APPENDIX C

TRACK 4 SSSCOs

APPENDIX C
Track 4 Site Specific Soil Cleanup Objectives
Gateway Center at Bronx Terminal Market, NY
Langan Project No. 5742506
BCP Index No. W2-1032-04-11, Site No. C203015

Analyte	Track 4 SSSCO[(1)]
Lead	1500 (mg/Kg)
Mercury	3 (mg/Kg)
Arsenic	21 (mg/Kg)
Volatile Organic Compounds (VOC)	TAGM 4046 RSCOs[(2)]
VOC (total)	10 (mg/Kg)
Semi-Volatile Organic Compounds (SVOC)(total)	500 (mg/Kg)
Total Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAH) compound index[(3)]	25 (mg/Kg)

Notes:

1) Track 4 Site Specific Soil Cleanup Objectives
2) NYSDEC Technical Administrative Guidance Manual #4046 Recommended Soil Cleanup Objectives
3) A compound index that includes seven cPAHS; benzo(a)pyrene, benzo(a)anthracene, benze(b)flouranthene, benzo(k)flouranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3 cd)pyrene

mg/Kg = milligrams per kilogram

APPENDIX E

RETAIL C SSD SYSTEM AS-BUILT DRAWINGS (CD-R)

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

AA A A.5 A.6 B C D D.2 E F G G.2 H H.4 J J.1

1 1.2 1.3 1.6 2 2.1 2.2 2.8 3 3.4 3.9 4 4.2 4.8 5 5.1 5.6 6 6.2 6.8 6.9 7 7.4 7.7 7.8 7.9 8

A.2 A.8

6" PERFORATED PIPE WITH GEOTECH SLEEVE

Show pump discharge FROM ELEVATOR sump pump AS PER ENGINEERS

COORDINATE with bulletin # 49

Refer to Bulletin #49 Provide all 4" stub-up Typical for all sanitary piping as shown on plans

deviation with original are acceptable only if coordinated and approved with structural engineer

Refer to Bulletin #49

Verify with latest Bulletin # 49

T.O.S. EL 10'-10" THIS AREA. ELEVATIONS THIS AREA BELOW EL. 10'-10".

T.O.S EL IN GARAGE +9'-0" ELEVATIONS THIS AREA BELOW EL 9'-6"

Missing or not readable

SEE NOTES, DETAILS

NOTCH SLAB PROVIDE INVERT

SUMP PUMP IN ELEVATOR PIT

SUMP PUMP IN BLDY. PIT

GARAGE UNDERGROUND
SCALE: 1/16"=1'-0"

SSDS ASBUILT

Plans Construction Corp
Lucas Terminal Market
Submittal No:
15420-044-1

DATE: APR 7 2021

REVIEWED. This review does not alleviate the subcontractor/supplier from conforming to the contract documents.

15420-044-1

☐ NO EXCEPTIONS TAKEN
☐ NOTE MARKINGS
☒ REVISE AND RESUBMIT
☐ REJECTED

REVIEW IS FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT AND CONTRACT DOCUMENTS. MARKINGS OR COMMENTS SHALL NOT BE CONSTRUED AS RELIEVING THE CONTRACTOR FROM COMPLIANCE WITH THE PROJECT PLANS AND SPECIFICATIONS, NOR RELIEVING THE CONTRACTOR FROM THE RESPONSIBILITY FOR DETAILS AND ACCURACY FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, FOR COORDINATION WITH OTHER WORK, WHETHER NEW OR EXISTING, AND FOR PERFORMING WORK IN A SAFE AND PROPER, AND WORKMANLIKE MANNER.

Glickman Engineering, PLLC
540 Sixth Avenue
New York, NY 10018
By: N.F Date: 04/11

PROVIDE INVERTS ELEVATIONS FOR all catch basins, house traps and recess openings.

ARCH./ENGS NOTE: RELOCATED SSDS MANIFOLD FROM STAIR WAY TO NICHE OUTSIDE OF STAIRS. PLEASE ADVISE.

RECEIVED
APR 24 2008
PLAZA CONSTRUCTION

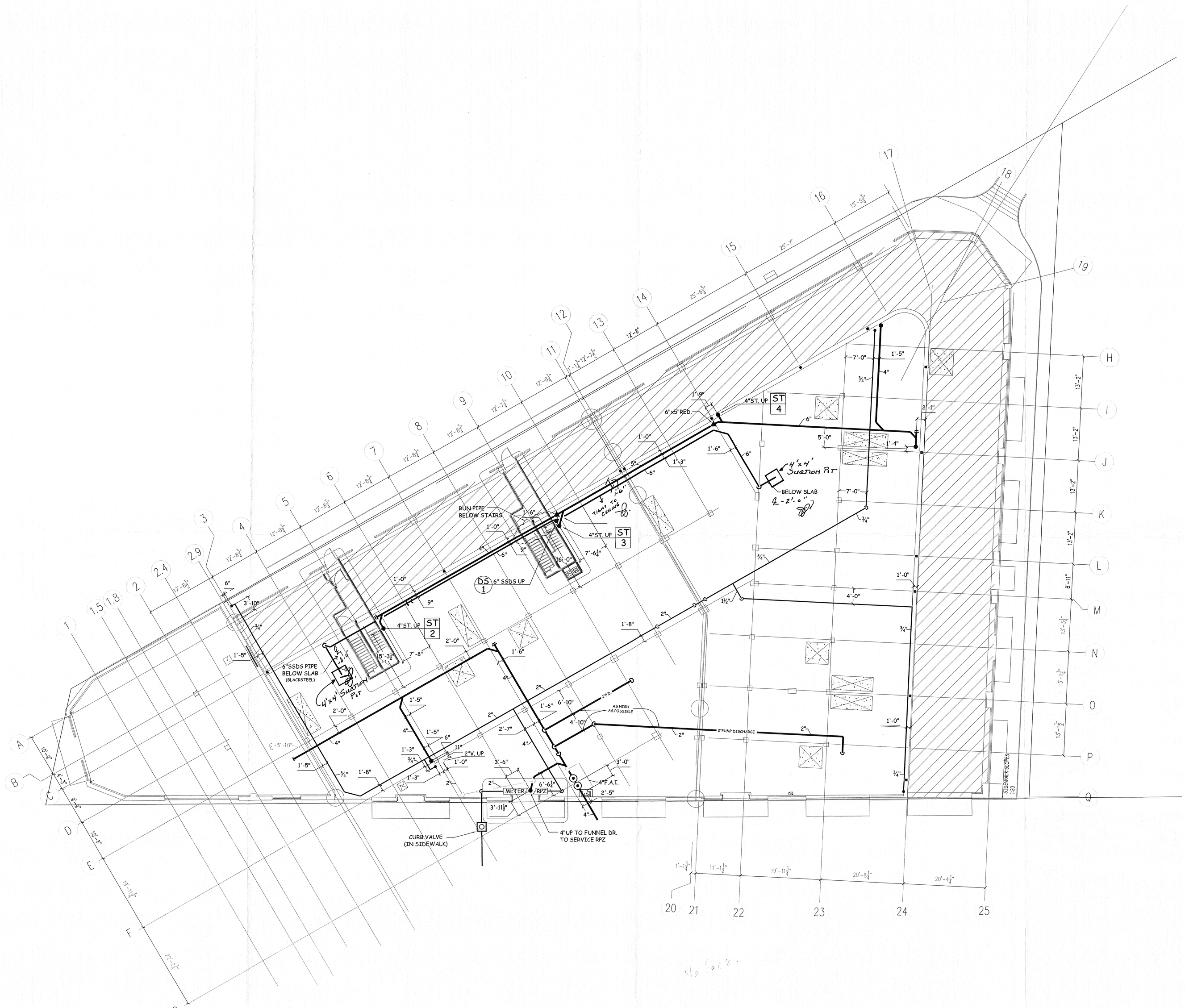
10-03-07	SUBMITTED FOR APPROVAL	0
DATE	DESCRIPTION	REV. #

Aspro Mechanical Contracting, Inc.
127-10 Merrick Blvd, Springfield Gardens, NY 11434
Tel. (718) 977-3653 Fax (718) 977-3658
Lic. Plumber #855 Lic. Plumber #1582

PROJECT: BRONX TERMINAL MARKET
DWG. TITLE: GARAGE-UNDERGROUND
ARCHITECT: HANDEL ARCH. LLP.
ENGINEER: I.M. ROBBINS
SCALE: 1/4"=1'-0" DRAWN BY: K.W.
DWG. NO: P-UG-1

APPENDIX F

RETAIL E1 SSD SYSTEM AS-BUILT DRAWINGS (CD-R)



CELLAR PIPING – PROWE BUILDING

SCALE: 1/8"=1'-0"

SSDS ASBUILT

DATE	DESCRIPTION	REV. #
0-0-08	SUBMITTED FOR APPROVAL	0

Tel. (718) 977-3653 Fax (718) 977-3658

Aspro Mechanical Contracting, Inc.

Lic. Plumber #855 — 127-08 Merrick Blvd. Springfield Gardens, NY 11434 — Lic. Plumber #1582

PROJECT: PROWE BUILDING

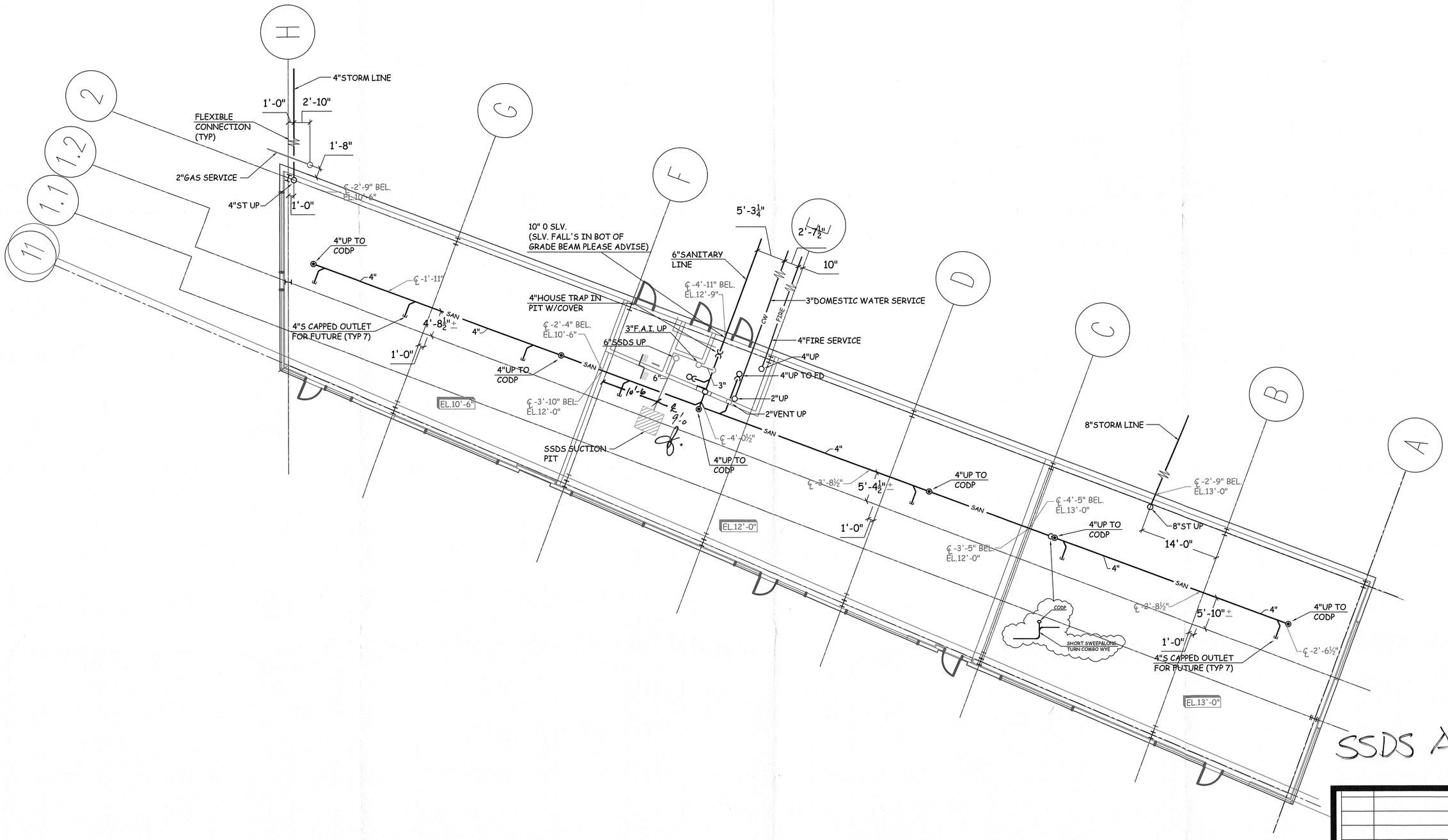
DWG. TITLE: CELLAR FLOOR

ARCHITECT:	HANDEL ARCH. LLP.	DWG. NO:
ENGINEER:	I.M. ROBBINS	
SCALE:	1/8"=1'-0"	DRAWN BY: K.W.
DATE:	8-29-08	CHECKED BY: ASPRO

APPENDIX G

RETAIL E2 SSD SYSTEM AS-BUILT DRAWINGS (CD-R)

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT



SSDS ASBUILT

RETAIL E2 – UNDERGROUND
SCALE: ⅛"=1'-0"

DATE	DESCRIPTION	REV. #
8-18-08	SUBMITTED FOR APPROVAL	0

Tel. (718) 977-3653 Fax (718) 977-3658
Aspro Mechanical Contracting, Inc.
Lic. Plumber #855 127-06 Merrick Blvd. Springfield Gardens, NY 11434 Lic. Plumber #1582

PROJECT: B.T.M. RETAIL E2

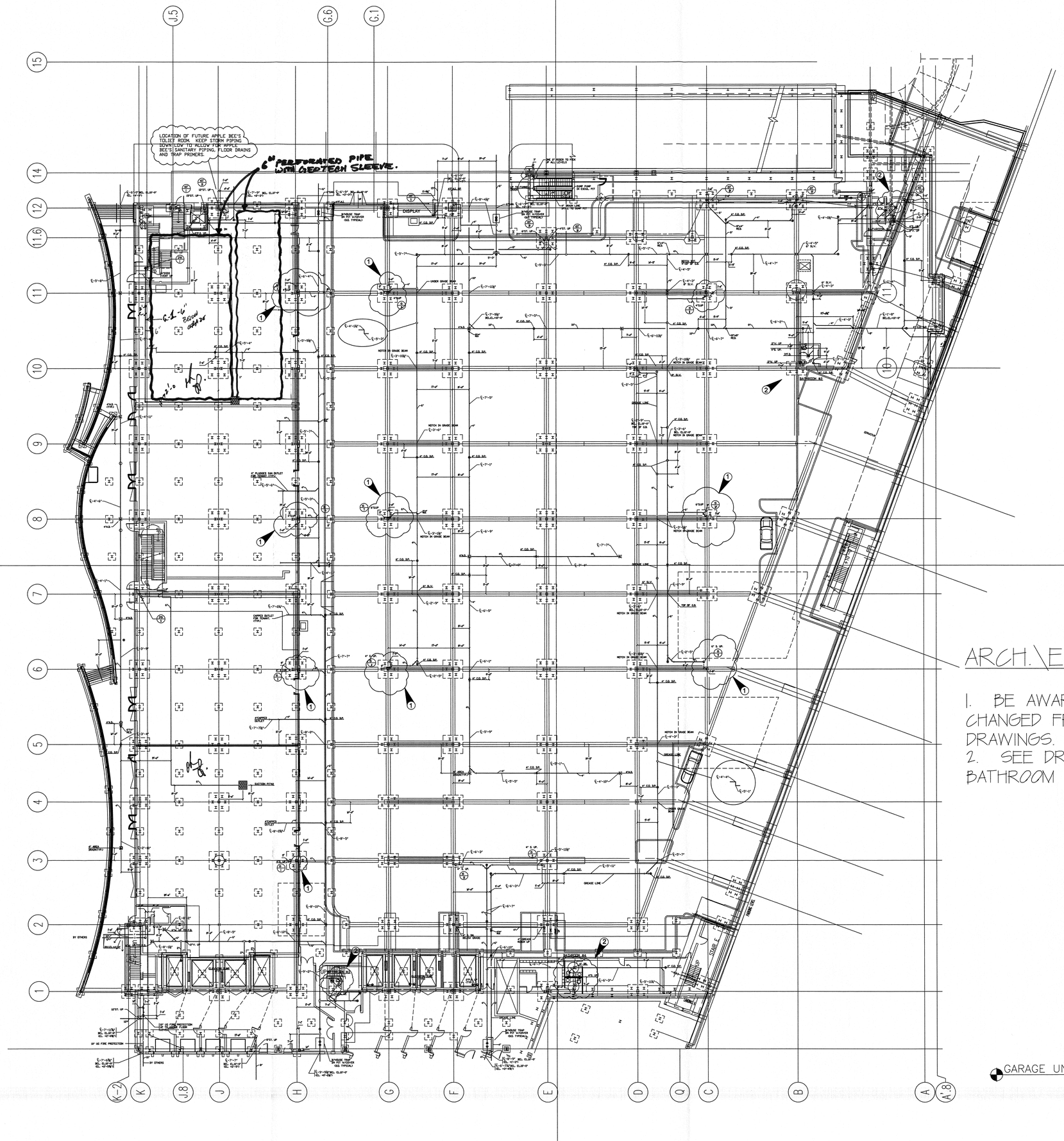
DWG. TITLE: UNDERGROUND PIPING

ARCHITECT:	HANDEL ARCH. LLP.		DWG. NO: PUG-1
ENGINEER:	I.M. ROBBINS		
SCALE:	⅛"=1'-0"	DRAWN BY: K.W.	
DATE:	8-13-08	CHECKED BY: ASPRO	

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT
PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT
PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

APPENDIX H

RETAIL F SSD SYSTEM AS-BUILT DRAWINGS (CD-R)



GARAGE UNDERGROUND
SCALE: 1/16"=1'-0"

ARCH.\ENG'S. NOTES!!!

1. BE AWARE DIMENSIONS HAVE CHANGED FROM SUBMITTED DRAWINGS.
2. SEE DRAWING P-UG(1) FOR BATHROOM DETAILS.

SSDS ASBUILT

DATE	DESCRIPTION	REV. #
8-22-07	SUBMITTED FOR APPROVAL	0

Aspro Mechanical Contracting, Inc.
127-08 Merrick Blvd
Springfield Gardens, NY 11434
Tel. (718) 977-3653 Fax (718) 977-3658
Lic. Plumber #855 Lic. Plumber #1582

PROJECT: B.T.M. RETAIL B

DWG. TITLE: RETAIL B-UNDERGROUND

ARCHITECT: HANDEL ARCH. LLP.
ENGINEER: I.M. ROBBINS
SCALE: 1/16"=1'-0" DRAWN BY: K.W.
DATE: 8-9-06 CHECKED BY: ASPRO

DWG. NO: P-UG

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT
PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

APPENDIX J

RETAIL A HVAC AS-BUILT DRAWINGS (CD-R)

1. Retail A HVAC As-Built (M Series Drawings prepared by BBG-BBGM)

HVAC DRAWINGS LIST

M-011	RETAIL A--HVAC GENERAL NOTES, VENTILTION NOTES, VENTILATION INDEX AND SCHEDULES
M-111C	RETAIL A--LEVEL 1 HVAC PLAN--CONDENSER WATER PIPING
M-111H	RETAIL A--LEVEL 1 HVAC PLAN--HOT WATER PIPING
M-112C	RETAIL A--LEVEL 2 HVAC PLAN--CONDENSER WATER PIPING
M-112H	RETAIL A--LEVEL 2 HVAC PLAN--HOT WATER PIPING
M-113	RETAIL A--LEVEL 3 HVAC PLAN
M-114	RETAIL A--ROOF HVAC PLAN
M-211	RETAIL A HVAC SCHEDULES
M-311	RETAIL A HVAC DETAILS
M-312	RETAIL A HVAC DETAILS
M-313	RETAIL A HVAC DETAILS
M-314	RETAIL A HVAC DETAILS
M-315	RETAIL A HVAC DETAILS
M-316	RETAIL A HVAC SCHEDULES & DETAILS

DUCT CONSTRUCTION SCHEDULE

DIMENSION OF LONGEST SIDE OF DUCT (IN.)	SHEET METAL GAUGES		RECOMMENDED JOINT CONSTRUCTION	MAX. JOINT SPACING
	STEEL	ALUMINUM		
UP TO 24"	24	22 (.025)	POCKET SLIP BAR -- S SLIP	8'--0"
24 THRU 30	24	22 (.025)	POCKET SLIP BAR -- S SLIP	4'--0"
31 THRU 60	22	20 (.032)	POCKET SLIP BAR -- S SLIP	4'--0"
61 THRU 72	20	18 (.040)	REINFORCED POCKET SLIP REINFORCED BAR -- S	4'--0"
73 THRU 90	20	18 (.040)	REINFORCED POCKET SLIP REINFORCED BAR -- S	4'--0"
91 AND UP	18	16 (.051)	REINFORCED POCKET SLIP REINFORCED BAR -- S	4'--0"

NEW YORK CITY VENTILATION INDEX

MINIMUM VENTILATION REQUIREMENTS ARE BASED ON THE GUIDELINES SET FORTH IN CHAPTER C26--1206.3 OF THE NEW YORK CITY BUILDING CODE.

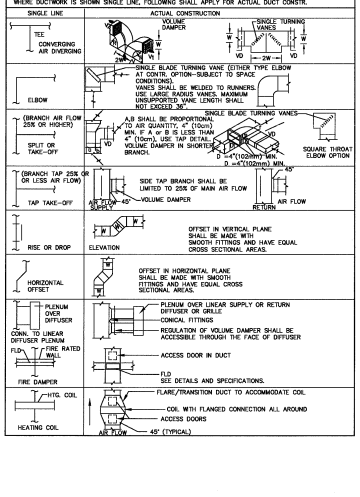
			NYC VENTILATION INDEX									
BLDG	FLOOR	SPACE	AREA	H, FT	VOLUME	No. OF PEOPLE	VENT. INDEX	REQ'D SUPPLY, CFM	ACT. SUPPLY, CFM	REQ'D OA, CFM	ACTUAL OA, CFM
BLDG A	1ST	HR (Home Improvement Store)	121,191.00	26.00	3,150,966.00	3,639.00		1,200.34	72,714.60	73,296.00	24,238.20	24,710.92
		STAPLER	15,116.00	26.00	392,890.00	454.00		1,190.98	8,996.70	15,490.00	3,023.00	4,648.00
	2ND	Public corridor	14,323	10	229,328	573		555	12,900	20,000	4,300	5,920
		TARGET	39,764	24	715,686	358		20,550	11,400	25,080	3,381	6,510
	3RD	Target (Junior Department Store)	147,696.00	24.00	3,542,544.00	2,214.00		2,266.07	50,542.40	91,135.00	19,860.60	29,530.00

VENTILATION NOTES

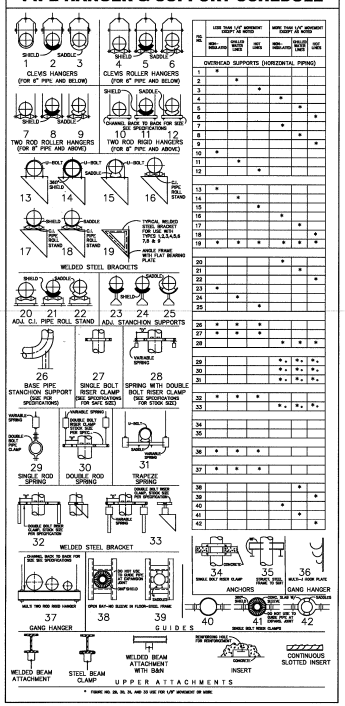
1. AS PER 27--779 (c), A STATEMENT WILL BE FILED BY OWNER STATING THAT VENTILATING SYSTEMS WILL BE KEPT IN OPERATION DURING BUILDING OPERATION AND THAT WILL KEEP SYSTEM IN GOOD REPAIR.
2. AS PER 27--779 (a), A CONTROLLED INSPECTION AS REQUIRED BY C--107.0 SHALL BE CONDUCTED BY AN ARCHITECT, ENGINEER OR PERSON HAVING 5 YEARS OF EXPERIENCE INSTALLING VENTILATION SYSTEM.
3. AS PER 27--754 (d) (2) MAKE--UP AIR IS ACCOMPLISHED BY INFILTRATION OF AIR THROUGH FIXED OPENINGS.
4. DUCT VELOCITIES SHALL CONFORM TO TABLE 12--6.
5. FIRE DAMPERS ARE TO BE INSTALLED IN ACCORDANCE WITH RS 13--1 SUB ARTICLE 3--3.7 AND 27--343.
6. THERE ARE NO WINDOWS OF A J--1, J--2 OR J--3 RESIDENCE WITHIN A 100 FT. SPHERICAL RADIUS OF ANY PART OF THE EXTERNAL MECHANICAL EQUIPMENT.
7. DUCTS SHALL CONFORM TO 2--1 OF RS 13--1.
8. ALL WORK SHALL BE IN ACCORDANCE WITH THE N.Y.C. BUILDING CODE AND REFERENCE STANDARD RS--13 AND RS--13--1.
9. AS PER C26--1206.3.b.2, ACTUAL OUTDOOR AIR SHALL BE AT LEAST 33--1/3% OF REQUIRED TOTAL AIR.
10. HEATING SYSTEM SHALL BE CAPABLE OF MAINTAINING MINIMUM SPACE TEMPERATURE AS PER TABLE AIR.
11. AIR FILTER SHALL CONFORM TO SECTION 5, FANS TO SECTION 6, ELECTRICAL WIRING AND EQUIPMENT TO SECTION 7 AND AIR COOLING AND HEATING EQUIPMENT TO SECTION 8 OR RS 13--1.
12. VENTILATION OF TOILET ROOMS SHALL CONFORM TO C26--1207.1 THRU 5.

INTERPRETATION OF SINGLE LINE DUCTWORK

WHERE DUCTWORK IS SHOWN SINGLE LINE, FOLLOWING SHALL APPLY FOR ACTUAL DUCT CONSTR.



PIPE HANGER & SUPPORT SCHEDULE



NO.	USE THIS "LH" ARRANGEMENT FOR ALL SIZES			ARRR. USE THIS "LH" ARRANGEMENT FOR ALL SIZES		
	WELDED LUGS	ROLLER LUGS	U BOLT	WELDED LUGS	ROLLER LUGS	U BOLT
	OVERHEAD SUPPORTS (HORIZONTAL PIPING)					
1	*					
2		*				
3			*			
4				*		
5					*	
6						*
7				*		
8					*	
9						*
10	*					
11		*				
12			*			
13	*					
14		*				
15			*			
16				*		
17					*	
18						*
19	*	*	*	*	*	*
20				*		
21					*	
22						*
23	*					
24		*				
25			*			
26	*	*	*			
27	*	*	*			
28				*	*	*
29				*	*	*
30				*	*	*
31				*	*	*
32	*	*	*			
33				*	*	*
34						
35						
36	*	*	*			
37	*	*	*			
38				*		
39					*	
40						*
41	*					
42						*

* FIGURE NO. 26, 30, 34, AND 35 USE FOR 1/2" ARRANGEMENT OR MORE.

GENERAL NOTES

(1) ALL MATERIALS FURNISHED AND ALL WORK INSTALLED SHALL BE IN STRICT ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS AND ALL APPLICABLE CODES AND REGULATIONS, INCLUDING BUT NOT LIMITED TO THE LATEST APPLICABLE EDITIONS OF NFPA, EEC, OSHA, SMACNA, BOCA MECHANICAL CODE, BUILDING CODE OF THE NEW YORK, NEW YORK STATE ENERGY CONSERVATION CODE.

(2) THE HVAC CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL PERMITS AND PAY ALL TAXES, FEES AND OTHER COSTS IN CONNECTION WITH HIS WORK. THE CONTRACTOR SHALL FILE AND OBTAIN ALL NECESSARY APPROVALS AND REQUIRED CERTIFICATES OF INSPECTION FOR HIS WORK JURISDICTIONAL AND DELIVER SAME TO THE ARCHITECT BEFORE REQUEST FOR ACCEPTANCE AND FINAL PAYMENT FOR THE WORK. THE CONTRACTOR SHALL INCLUDE IN HIS SCOPE OF WORK, WITHOUT EXTRA COST TO THE OWNER, ALL LABOR, MATERIALS, SERVICES, APPARATUS, PROFESSIONAL ENGINEERS SIGNED AND SEALED DRAWINGS (IN ADDITION TO CONTRACT AND DOCUMENTS), IN ORDER TO COMPLY WITH ALL APPLICABLE CODES, LAWS, ORDINANCES, RULES AND REGULATIONS.

(3) THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, EQUIPMENT, RIGGING, APPLIANCES, TOOLS AND ACCESSORIES REQUIRED TO PROVIDE, INSTALL, CONNECT, AND TEST THE COMPLETE HEATING, VENTILATING AND AIR CONDITIONING SYSTEM AND ASSOCIATED EQUIPMENT IN ACCORDANCE WITH THESE SPECIFICATIONS AND THE APPLICABLE DRAWINGS.

(4) DO NOT SCALE FROM THESE DRAWINGS.

(5) THE EXACT MOUNTING HEIGHTS AND LOCATIONS OF ALL HVAC EQUIPMENT SHALL BE FIELD VERIFIED AND COORDINATED WITH ALL OTHER MECHANICAL, ELECTRICAL, ARCHITECTURAL AND STRUCTURAL SYSTEMS. DIMENSIONS ARE GIVEN FOR REFERENCE ONLY AND MUST BE PRECISELY DETERMINED DURING COORDINATION DRAWING DEVELOPMENT.

(6) THE FINISH AND COLOR OF NEW EXPOSED DUCTWORK, EQUIPMENT AND AIR DEVICES TO BE COORDINATED WITH THE ARCHITECT.

(7) VERIFY ALL EQUIPMENT VOLTAGES WITH THE ELECTRICAL CONTRACTOR PRIOR TO ORDERING EQUIPMENT.

(8) PROVIDE DISCONNECT SWITCHES FOR ALL HVAC EQUIPMENT INCLUDING THOSE NOT SPECIFICALLY REQUIRED.

(9) PROVIDE PHASE LOSS PROTECTION FOR ALL POLY--PHASE MOTOR DEVICES.

(10) THE FINAL LOCATION OF AIR DEVICES MUST BE COORDINATED WITH THE REFLECTED CEILING PLAN AND ALL OTHER MECHANICAL, ELECTRICAL, SPRINKLER, ARCHITECTURAL, AND STRUCTURAL SYSTEMS.

(11) IT IS THE RESPONSIBILITY OF THIS CONTRACTOR TO PROVIDE FULLY DIMENSIONED COORDINATION DRAWINGS FOR ALL OF THESE RESPECTIVE WORK. THESE DRAWINGS SHALL BE PREPARED UTILIZING THE SPECIFIC PIECES OF EQUIPMENT ENTERING THE JOB. THESE DRAWINGS MUST BE FULLY COORDINATED WITH ALL EXISTING CONDITIONS, ALL HVAC, PLUMBING, FIRE PROTECTION, ELECTRICAL, LIGHTING, STRUCTURAL AND ARCHITECTURAL SYSTEMS PRIOR TO PREPARING COMPOSITE MULTI DISCIPLINE COORDINATION DRAWINGS.

(12) DUCTWORK SHALL BE CONSTRUCTED OF GALVANIZED SHEET STEEL IN STRICT COMPLIANCE WITH THE LATEST EDITION OF THE ASHRAE, NFPA, AND SMACNA GUIDE RECOMMENDATIONS. ALL DUCTS TO HAVE PITTSBURGH TYPE LOCK FOR LONGITUDINAL SEAMS AND DRIVE SLIP/"S" SLIP FOR TRANSVERSE JOINTS. "DUCT--MATE" JOINT SYSTEM IS ACCEPTABLE IN LIEU OF PRIOR SEAM SYSTEMS. SIZES AS SHOWN INDICATE INSIDE, CLEAR DIMENSIONS OF THE AIR PASSAGE. DUCTWORK SHALL BE FULLY RATED AS PER APPLICABLE CODES.

(13) DUCT SIZES MUST BE VERIFIED FOR CLEARANCES AT THE JOB SITE PRIOR TO FABRICATION. DIMENSIONS MAY BE CHANGED TO ACCOMMODATE CONSTRUCTION AS LONG AS EFFECTIVE CROSS--SECTIONAL AREA IS MAINTAINED. DUCT TRANSITIONS SHALL BE CONSTRUCTED WITH A SLOPE OF 1" TO 4". ALL DEVIATIONS FROM ORIGINAL CONTRACT DRAWINGS SHALL BE REVIEWED BY ENGINEER DURING THE SHOP DRAWING PROCESS.

(14) PROVIDE ELBOWS OR TEES WITH TURNING VANES FOR ALL CHANGES OF DUCT DIRECTION. PROVIDE SPLITTER DAMPERS WHERE SHOWN ON DRAWINGS IN ALL TEES.

(15) PROVIDE MANUAL BALANCING DAMPERS FOR NEW SUPPLY, RETURN AND EXHAUST SYSTEMS AS REQUIRED TO PROPERLY BALANCE EACH INDIVIDUAL AIR DISTRIBUTION SYSTEM. IF THE LOCATION OF THE BALANCING DAMPER IS NOT DEFINED ON THE DRAWINGS, THE FOLLOWING MINIMUM STANDARDS SHALL APPLY. ALL SUPPLY, RETURN, AND EXHAUST MAIN BRANCHES FROM TRUNKS, EACH SPLIT AND ALL SUB--BRANCHES FROM MAINS SHALL INCORPORATE BALANCING DAMPERS. BALANCING DAMPERS SHALL BE LOCATED ABOVE SHEETROCK CEILING WILL BE A REMOTE TYPE INSTEAD OF PROVIDE AN ACCESS DOOR.

(16) PROVIDE FLEXIBLE CONNECTORS AT ALL DUCT CONNECTIONS TO VIBRATING EQUIPMENT. THESE CONNECTIONS SHALL BE INSTALLED IN CLOSE PROXIMITY TO SUCH EQUIPMENT.

(17) FLEXIBLE DUCT DIAMETER SHALL MATCH THE NECK SIZE OF THE DIFFUSER TO WHICH CONNECTED, UNLESS NOTED OTHERWISE ON THE PLANS. LENGTH OF FLEXIBLE DUCT RUN SHALL NOT EXCEED 5'--0" (UNLESS NOTED OTHERWISE). MATERIAL SHEET METAL DUCT WITHIN 5'--0" OF THE AIR DEVICE FOR COMPLIANCE. FLEXIBLE DUCTWORK IS NOT PERMITTED FOR USE IN ANY PARTS OF THE RETURN OR EXHAUST AIR SYSTEMS. FLEXIBLE DUCTWORK SHALL NOT PASS THROUGH FIRE RATED CONSTRUCTION.

(18) FLEXIBLE DUCTWORK MUST BE INSTALLED WITH SUPERIOR WORKMANSHIP MAINTAINING FULL CROSS SECTIONAL AREA THROUGHOUT. SUPPORT FROM STRUCTURE AT 24" INTERVALS TO ENSURE FULL CROSS SECTIONAL AREA FOR MAXIMUM AIR FLOW.

(19) PROVIDE FIRE DAMPERS WITH RATED ACCESS DOORS AT ALL DUCT PENETRATIONS THROUGH FIRE RATED WALLS, SMOKE AND FIRE STOPPING, SHAFTS, FLOORS, RATED CEILINGS AND PARTITIONS AS REQUIRED TO MAINTAIN FIRE RATINGS. REFER TO THE ARCHITECTURAL PLANS AND SPECIFICATIONS FOR LOCATIONS AND FIRE RATING REQUIREMENTS.

(20) SYSTEM BALANCING SHALL BE PERFORMED IN STRICT COMPLIANCE WITH ALL APPLICABLE CODES, REGULATIONS, PLANS AND WRITTEN SPECIFICATIONS. BALANCE THE HEATING AND COOLING SYSTEMS TO PROVIDE UNIFORM TEMPERATURES IN ALL HEATED OR COOLED AREAS AND ROOMS. BALANCE ALL AIR SYSTEMS TO QUANTITIES INDICATED AND FURNISH TO OWNER A REPORT INDICATING FAN PERFORMANCE, DIFFUSER, REGISTER AND GRILLE SIZES, LOCATIONS, CFM VALUES, COIL SYSTEMS, AND OUTSIDE AIR QUANTITIES, ETC. SYSTEMS TO BE BALANCED ONLY AFTER POST CONSTRUCTION FILTER CHANGE.

(21) GUARANTEE ALL HVAC WORK AND EQUIPMENT FOR A PERIOD OF ONE YEAR FROM DATE OF STORE OPENING DURING THE ONE YEAR PERIOD, SERVICE SHALL BE PROVIDED TWENTY--FOUR HOURS PER DAY SEVEN DAYS PER WEEK AND SHALL INCLUDE ALL SERVICE CALLS, PARTS, LABOR AND MAINTENANCE AT NO ADDITIONAL COST TO THE OWNER OR TENANT. ALL FILTERS SHALL BE CHANGED ONCE PER MONTH. IN ADDITION, ALL COMPRESSORS SHALL CARRY A FIVE YEAR WARRANTY FROM THE MANUFACTURER. GREASE DUCTS TO BE CLEANED FOUR TIMES A YEAR THE FIRST YEAR BY THIS CONTRACTOR.

(22) PROVIDE ALL HVAC UNITS WITH 120V SMOKE DETECTORS WITH AUXILIARY CONTACTS AS PER NFPA, STATE, COUNTY AND LOCAL CODE. UPON ACTUATION OF SMOKE DETECTOR, THEY SHALL BE INTERFACED WITH ALARM SYSTEMS AND ACTIVATE AUDIBLE AND AUDIBLE DOWNSTAIRS ALARMS AT A CONSTANTLY ATTENDED LOCATION VIA SPRINKLER/ FIRE ALARM. DETECTORS MUST BE COMPATIBLE WITH THE APPROVED FIRE ALARM SYSTEM. THIS CONTRACTOR SHALL COORDINATE WITH THE GENERAL CONTRACTOR AND STRUCTURAL ENGINEER.

(23) ALL CUTTING, PATCHING AND FINISHING SHALL BE THE RESPONSIBILITY OF SO DIRECTED BY THE GENERAL CONTRACTOR THIS CONTRACTOR SHALL DO AND REMOVE FROM THE PREMISES ALL RUBBISH RESULTING FROM HIS WORK.

(24) THIS CONTRACTOR SHALL KEEP THE WORK AREA AND ITS SURROUNDINGS IN AN ORDERLY AND CLEAN CONDITION AND SHALL PERIODICALLY OR WHEN DIRECTED BY THE ARCHITECT.

(25) HVAC CONTRACTOR SHALL PROVIDE ALL THERMOSTAT AND CONTROLS FOR PROPER OPERATING OF THE HVAC SYSTEMS. PROVIDE ONE (1) DAY PROGRAMMABLE W/ AUTO HEAT/COOL CHANGEOVER. PROVIDE THERMOSTAT WITH LOCK COVERS.

(26) THIS CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE AND INSTALL ALL SUPPLEMENTARY SUPPORT STEEL AS REQUIRED TO HANG ALL HVAC EQUIPMENT FROM THE NEW STRUCTURAL SUPPORT GRID AS INDICATED ON ARCHITECTURAL DRAWINGS. VIBRATION ISOLATION SHALL BE FURNISHED AND INSTALLED AT ALL HUNG AND PLATFORM MOUNTED EQUIPMENT AND SYSTEMS WHICH VIBRATE.

(27) THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE TO ARRANGE AND PAY FOR ALL CONTROLLED INSPECTIONS. THE TRANSFER OF RESPONSIBILITY FROM THE ORIGINAL FILING ENGINEER TO THE NEW INSPECTIONS. THE TRANSFER OF RESPONSIBILITY FROM THE ORIGINAL FILING ENGINEER TO THE NEW CONTROLLED INSPECTION ENGINEER MUST BE COORDINATED WITH AND APPROVED BY THE ORIGINAL FILING ENGINEER. CONTROLLED INSPECTION MUST BE APPROVED BY ORIGINAL FILING ENGINEER.

(28) SEE SPECIFICATION FOR SERVICE AND WARRANTY REQUIREMENTS.

MECHANICAL VENTILATION NOTES & GENERAL NOTES:

1. UPON COMPLETION OF THE VENTILATING SYSTEM, A TEST SHALL BE CONDUCTED IN THE PRESENCE AND UNDER THE DIRECTION OF A PROFESSIONAL LICENSED ENGINEER OR A REGISTERED ARCHITECT QUALIFIED TO CONDUCT SUCH TESTS OR OTHER PERSON NOT HAVING LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF VENTILATING SYSTEMS AND QUALIFIED TO CONDUCT SUCH TESTS. THE TESTS SHALL SHOW COMPLIANCE WITH THE CODE REQUIREMENTS FOR VENTILATION AND THE PROPER FUNCTIONING OF ALL OPERATING DEVICES BEFORE THE SYSTEM IS APPROVED, AS PER C26--1301.2(A).
2. THE LICENSED PROFESSIONAL ENGINEER OR REGISTERED ARCHITECT OR OTHER QUALIFIED PERSON WHO CONDUCTS THE TEST SHALL FILE A CERTIFICATE AND REPORT OF TEST AS TO WHETHER THE TEST SHOWS THAT THE RATE OF AIR SUPPLY AND EXHAUST COMPLIES WITH THE REQUIREMENTS OF THE CODES PERTAINING TO VENTILATION, PER C26--1017.1 AND C26--1301.2(A).
3. FOR REQUIRED VENTILATION SYSTEMS, A STATEMENT SHALL BE FILED BY THE OWNER THAT THE SYSTEM OF VENTILATION SHALL BE KEPT IN CONTINUOUS OPERATION AT ALL TIMES DURING NORMAL OCCUPANCY OF THE STRUCTURE AS PROVIDED IN THE APPLICABLE SECTIONS OF THE CODE, AS PER C26--1301.2(C).
4. ALL FIRE DAMPERS TO COMPLY WITH REQUIREMENTS OF BOARD OF FIRE UNDERWRITERS. SEE NFPA NO. 90A.
5. SYSTEMS WILL COMPLY WITH 1968 BUILDING CODE L.L. 76/1968 RELATING TO THE INSTALLATION OF VENTILATING SYSTEMS.
6. HVAC UNITS SHALL BE APPROVED BY BOARD OF STANDARDS AND APPEALS, AND CONTRACTOR SHALL PROVIDE MEA NUMBER OF UNITS PURCHASED AND APPROVED FOR INSTALLATION.
7. THE ENTIRE VENTILATION SYSTEM SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE NYC BUILDING CODE (RS 13) AND THE RULES AND REGULATIONS OF ALL AUTHORITIES HAVING JURISDICTION.
8. ALL DUCTWORK SHALL BE CONSTRUCTED AS PER RS 13--1, DUCT HANGERS SHALL BE AS PER RS 13--1.
9. FIRE DAMPERS SHALL BE PROVIDED IN ALL DUCTWORK AS PER 13--1; FIRE DAMPERS SHALL BE PROVIDED IN ALL OUTDOOR AIR INTAKE OPENINGS AS PER RS 13--1. ALL FIRE DAMPERS SHALL BE OF MANUFACTURE AND TYPE APPROVED BY THE NY MEA AND THE FIRE UNDERWRITERS.
10. CONTRACTORS SHALL APPLY FOR AND OBTAIN EQUIPMENT USE PERMIT(S) AS REQUIRED.

A. AIR CONDITIONING AND VENTILATING SYSTEMS.
B. EQUIPMENT USE PERMITS SHALL BE OBTAINED IN ACCORDANCE WITH BUILDING CODE, MEA AND BSA NUMBERS FOR EQUIPMENT SHALL BE SUBMITTED AS REQUIRED.
11. MATERIALS AND EQUIPMENT SUBJECT CONTROLLED INSPECTION.
   A. CONTROLLED INSPECTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE APPLICABLE BUILDING CODE SECTIONS AND INCLUDE THE FOLLOWING:

ITEM	CODE REFERENCE
AIR--CONDITIONING & VENTILATING SYSTEMS	27--779, 27--780
HEATING SYSTEMS	27--767
FIRE STOPS	27--345

   B. FORM TR--1 SHALL BE FILED PRIOR TO INSTALLATION. FORM PW--4 SHALL BE FILED UPON COMPLETION OF INSTALLATION.

12. THE FOLLOWING WORK ITEMS COMPONENTS, MATERIALS, CAPACITIES, ETC. TO COMPLY WITH THE FOLLOWING CODE REQUIREMENTS:

WORK ITEM OR MATERIAL(S)	ARCOR REF. STANDARDS	PARAGRAPHS OR SUBPARAGRAPHS
A. DUCT CONSTRUCTION	RS 13--1	2--3 THRU 2--3.10 INCLUSIVE
B. AIR INLETS/OUTLETS	RS 13--1	2--3.12 THRU 2--3.13 INCLUSIVE
C. FILTERS	RS 13--1	2--2.2 THRU 2--2.2.6 INCLUSIVE
D. FANS	RS 13--1	2--2.3 THRU THRU 2--2.3.3 INCLUSIVE
E. ELEC. WIRING & EQUIP.	RS 13--1	4--2 THRU
F. FIRE CONTROL	RS 13--1	2--2.1 THRU 3--4.6.4 INCLUSIVE
G. CONTROLS	RS 13--1	4--1 THRU 4--4.3.4 INCLUSIVE
H. PIPING INSULATION	ANSI 14	C--251406 THRU 1406.3 INCLUSIVE
I. MVAC, DOWNSTS, RELIEFS ART 13		C26--1305.6 (d)

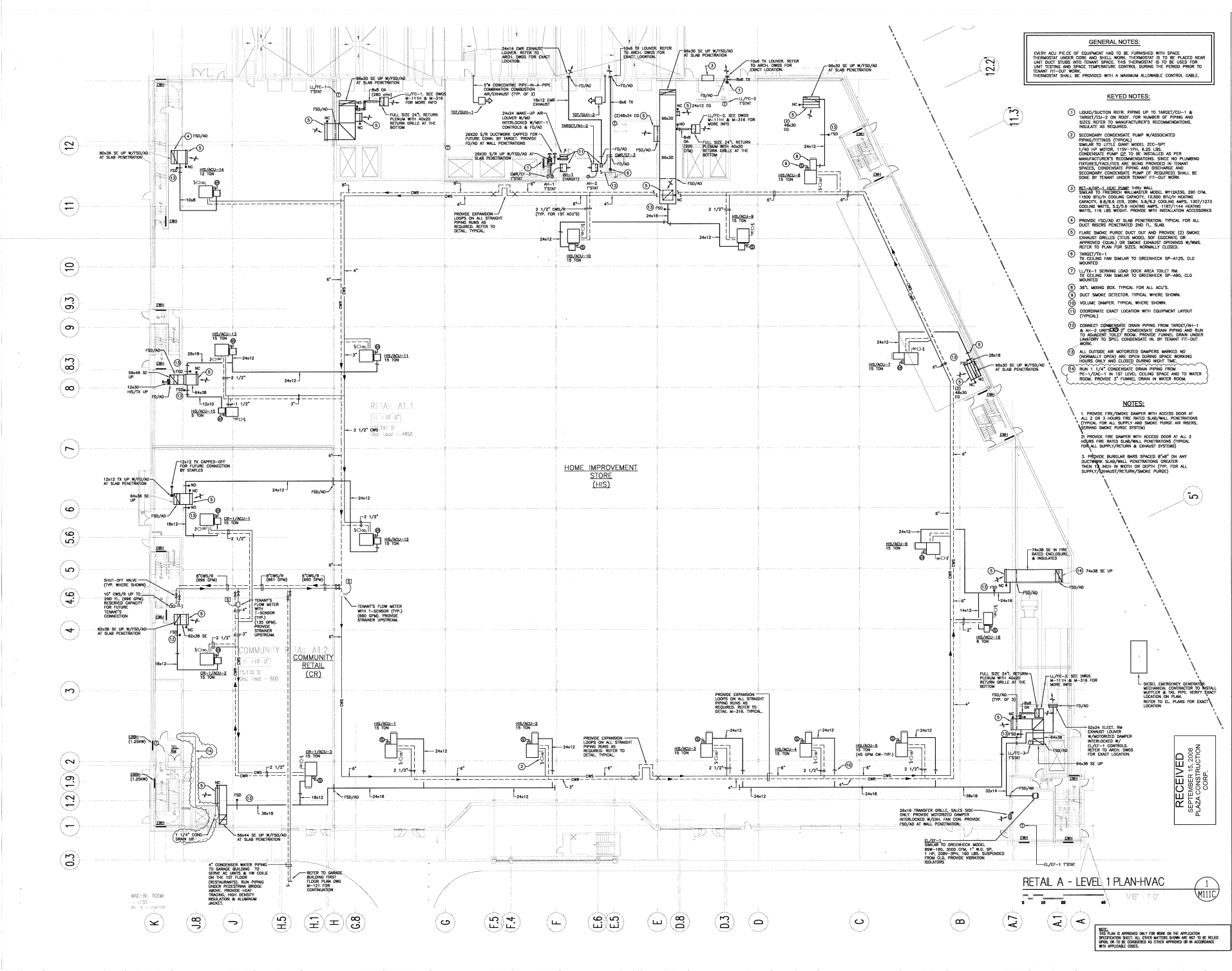
13. RATED FIRE SEPARATIONS COMPOSITIONS SHALL BE AS SHOWN ON ARCHITECTURAL DRAWINGS.
14. A STATEMENT WILL BE FILED (BY THE OWNER) THAT THE VENTILATION SYSTEM WILL BE KEPT IN CONTINUOUS OPERATION DURING NORMAL OCCUPANCY OF THE PREMISES.
15. THE VENTILATION INDEX FOR ALL AREAS COMPLIES WITH THE MINIMUM CODE REQUIREMENTS 27--754.
16. SEE ARCHITECTURAL DRAWINGS FOR DETAILS OF TWO--HOUR DUCT SHAFT ENCLOSURES.
17. WHERE DUCTS PASS THROUGH WALL, FLOORS OR PARTITIONS, AND AROUND THE DUCTS SHALL BE SEALED WITH MINERAL WOOL OR OTHER NON MATERIAL TO PREVENT THE PASSAGE OF FLAME OR SMOKE AS PER RS 13--1.3.12.2.
18. FIRE STOPPING SHALL COMPLY WITH BUILDING CALENDER NO. 105--85.
19. DUCTS SHALL BE SUBSTANTIALLY SUPPORTED ACCORDING TO RS 13--1, 2--1.1.2.3, NEW YORK CITY BUILDING CODE.
20. WHERE PIPING PENETRATES FIRE RATED WALL, OPENING SHALL BE PROTECTED BY CLOSE FITTING SLEEVE AND METAL ESCUTCHEONS AND SPACE BETWEEN PIPING AND WALL SHALL BE PACKED WITH NON--COMBUSTIBLE MATERIAL.
21. COMBUSTION AIR REQUIREMENTS SHALL COMPLY WITH ARTICLE 8 OF SUBCHAPTER B.
22. PIPING CONTAINING, HOT WATER OR OTHER FLUIDS SHALL COMPLY WITH ARTICLE 10 OF SUBCHAPTER 14.
23. FOR PIPE SIZES NOT INDICATED ON PLANS, SEE EQUIPMENT CONNECTION DETAILS AND RISER DIAGRAMS. PROVIDE COMPLETE PIPING INSTALLATIONS, VALVES, DAMPERS, ETC. AND INSTRUMENTATION FOR EACH PIECE OF EQUIPMENT AS PER DETAIL DRAWINGS SPECIFICATIONS, FLOW DIAGRAMS AND FLOOR PLANS.
24. WHERE INTERNAL DUCT INSULATION OR ACOUSTICAL LINING IS SPECIFIED ON THE DRAWINGS OR IN THE SPECIFICATIONS, THE DUCT SIZES SHALL BE INCREASED TO ACCOMMODATE THE THICKNESS OF INTERNAL INSULATION AND PROTECTION SHEET AS SPECIFIED. DUCT DIMENSIONS ON DRAWINGS ARE INSIDE CLEAR DIMENSIONS.
25. CONTRACTOR TO COORDINATE INSTALLATION OF VALVES, INSTRUMENTATION POINTS, SMOKE DETECTORS, ETC. INSTALLED BY OTHER TRADES.
26. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY THAT MASONRY OPENINGS IN WALLS AND PARTITIONS.
27. CONTRACTOR SHALL COORDINATE ALL DUCTWORK RUNS WITH ALL OTHER TRADES CONCERNED. ALL DUCTWORK TO BE KEPT AS HIGH AS POSSIBLE TO MAINTAIN MAXIMUM CEILING HEIGHTS AS SHOWN ON ARCHITECTURAL DRAWINGS.
28. ALL DUCTWORK SHALL BE CONSTRUCTED TO SMACNA SEAL CLASS B.
29. INTERLOCK MOTORIZED DAMPERS WITH THEIR RESPECTIVE EQUIPMENT UNITS, AIR HANDLING UNITS AND FANS.
30. SEAL PIPING PASSING THROUGH FIRE--RATED WALLS WITH SEALANTS SIMILAR TO 3M NO. 800 APPLIED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
31. ALL DIFFUSERS, REGISTERS, GRILLES SHALL BE LOCATED AS SHOWN ON THE ARCHITECTURAL DRAWINGS.
32. CONTRACTOR SHALL SUPPLY AND INSTALL MISCELLANEOUS STEEL FOR EQUIPMENT AND PIPING SUPPORT.
33. REFER TO STRUCTURAL DRAWINGS FOR FINNED OPENING LOCATIONS.
34. COORDINATION FOR THE MASONRY OPENINGS FOR DUCTWORK IS CONTRACTOR'S RESPONSIBILITY.
35. ALL DUCTWORK PASSING THROUGH FIRE RATED PARTITION SHALL BE PROVIDED WITH FIRE DAMPER WITH ACCESS DOOR.
36. IF A FILTER OR IS IN OPERATION, ANY COILS OR OTHER APPARATUS ARE STRETCHED OR AIR BOUND BY A RESTRICTION IN PRESSURE, THAT SHALL BE REPAIRED WITH NEW APPROVED AND NECESSARY FITTINGS, AIR VENTS, OR VACUUM BREAKERS AT NO EXTRA COST. IF CONNECTIONS ARE CONCEALED IN FURRING, FLOORS, OR CEILINGS, THIS TRADE SHALL BEAR ALL EXPENSES OF TAKING UP AND RE/HASHING CONSTRUCTION AND FINISH, LEAVING SAME IN AS GOOD CONDITION AS BEFORE IT WAS DISTURBED.

NOTE TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THESE PLANS ARE IN COMPLIANCE WITH THE NEW YORK STATE ENERGY CONSERVATION CODE.

KEY OF SYMBOLS

NOTE: THE KEY OF SYMBOLS INDICATED IS FOR CONVENIENCE ONLY AND ITEMS INDICATED ARE NOT NECESSARILY WITHIN THE SCOPE OF THE WORK.

	GATE VALVE	CW,H,S	CHILLED WATER SUPPLY
		CW,R,S	CHILLED WATER RETURN
	GLOBE VALVE	S,W,S	SECONDARY WATER SUPPLY
		S,W,R	SECONDARY WATER RETURN
		CWS	CONDENSER WATER SUPPLY
		CWR	CONDENSER WATER RETURN
		HWS	HOT WATER SUPPLY
		HWR	HOT WATER RETURN
	LUBRICATED PLUG VALVE		VENT OR RELIEF LINE
			PUMP DISCHARGE
	CHECK VALVE		LOW PRESSURE STEAM
			LOW PRESSURE RETURN
			LOW PRESSURE DRIP
	RELIEF OR SAFETY VALVE		MEDIUM PRESSURE STEAM
			H



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No.	Date	Description
1.	16 Dec 05	50% DD Set
2.	24 Feb 06	100% DD Set
3.	20 Mar 06	100% DD Set--addendum #3
4.	19 May 06	50% CD Set
5.	28 Jul 06	100% CD Set
6.	25 Oct 06	Per Set
7.	2 Nov. 06	Bulletin 1 (MEP)
8.	21 Dec. 06	Bulletin 8
9.	13 June 07	Bulletin 30
10.	15 Sept. 07	Bulletin 41
11.	12 Dec. 07	Bulletin 43R
12.	14 Mar. 08	Bulletin 49
13.	15 Aug 08	Bulletin 54

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AS BUILT 09/2008 Ryan R. Bell

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RETAIL A-
LEVEL 1 HVAC PLAN-
CONDENSER WATER PIPING

M-111C

NOTE:
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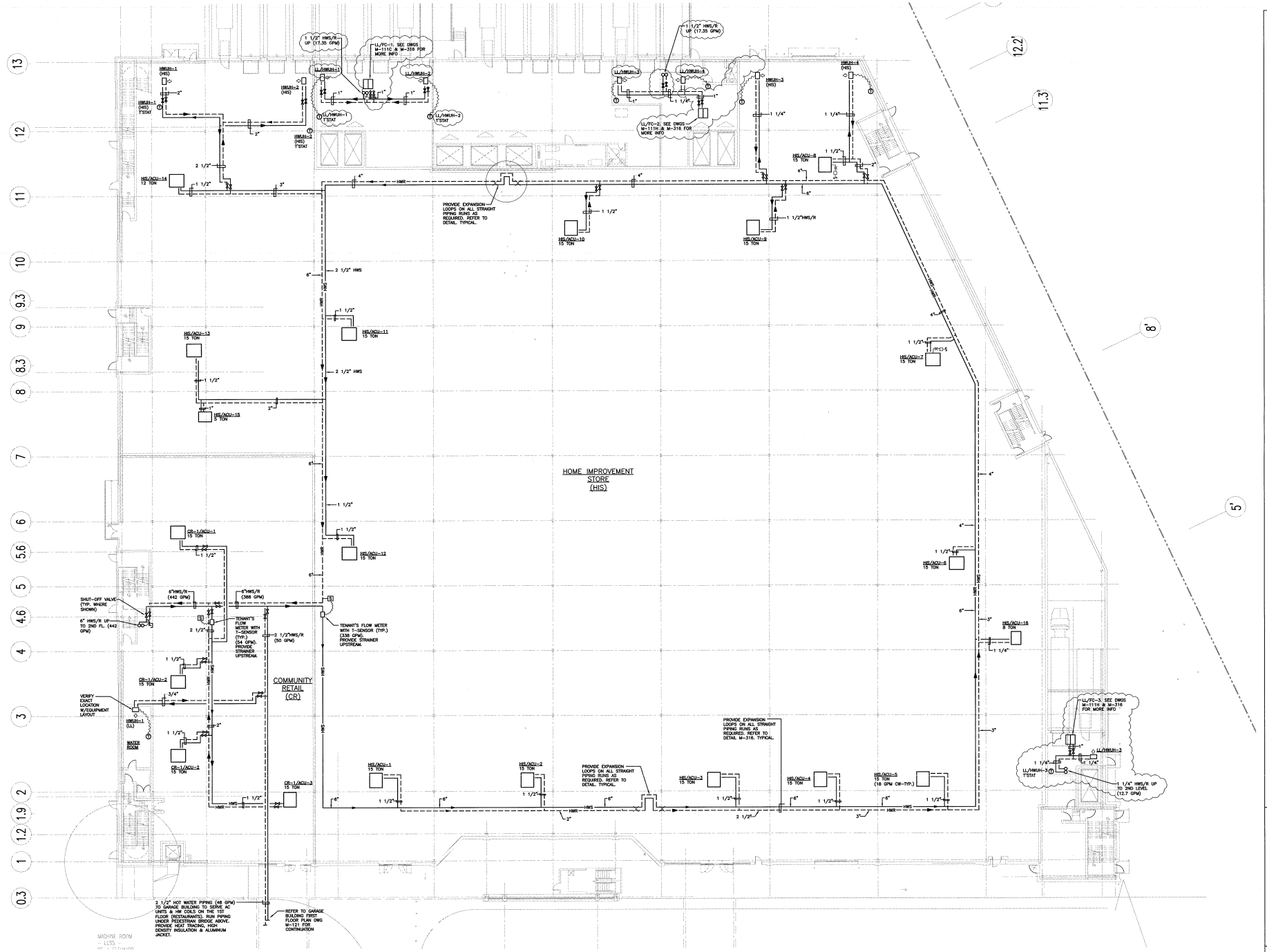

RETAIL A – LEVEL 1 PLAN (M111H)

1/16" = 1'-0"

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1.	16 Dec. 05	SCHE DD Set
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3.	10 Apr. 06	SCHE DD Set-addendum #3
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6.	5 Sept. 06	Bid Set
7.	2 Nov. 06	Bulletin 1 (MEP)
8.	21 Dec. 06	Bulletin 8
9.	10 Sept. 07	Bulletin 41
10.	12 Dec. 07	Bulletin 53R
11.	14 Mar. 08	Bulletin 49

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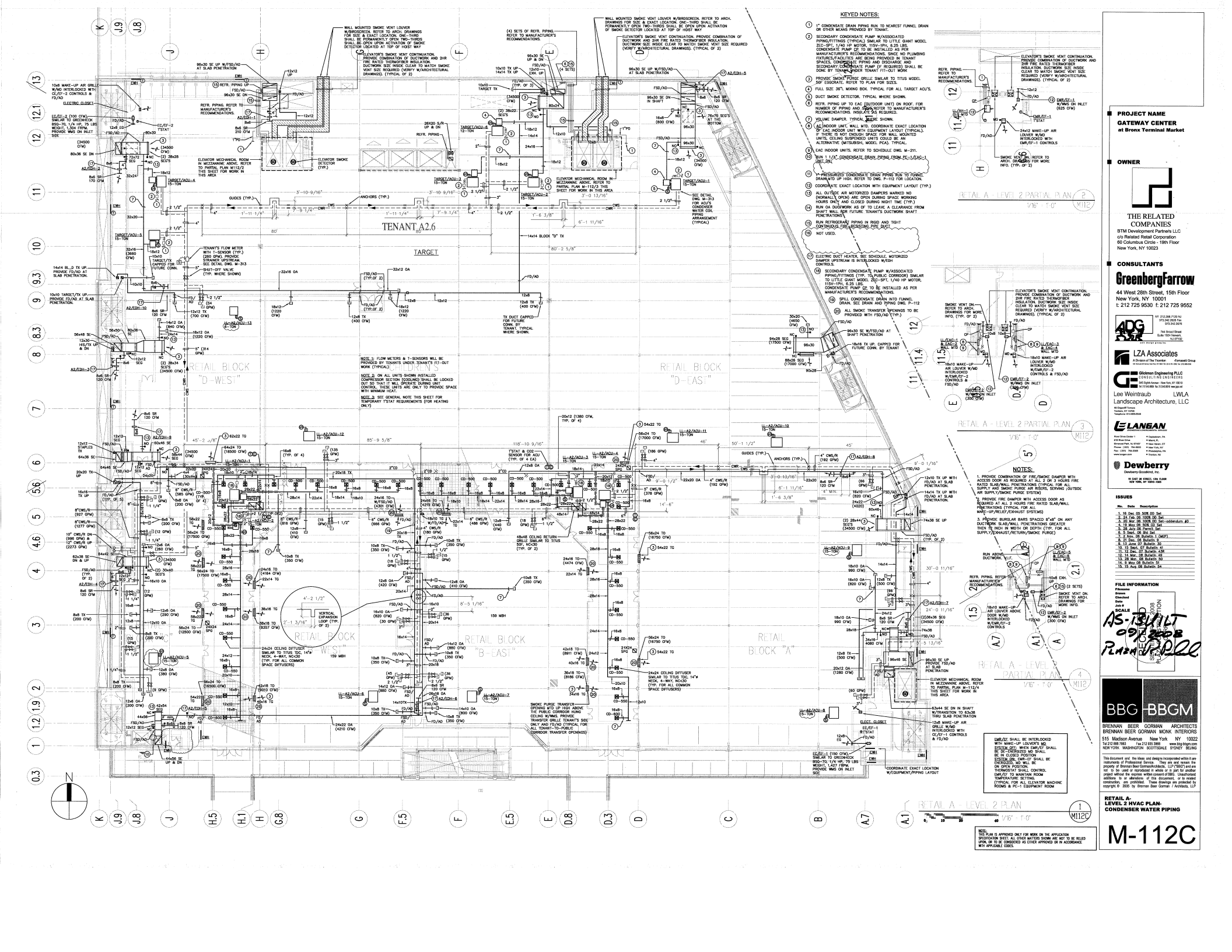
RETAIL A-
LEVEL 1 HVAC PLAN-
HOT WATER PIPING

M-111H



PROJECT NAME
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8.	21 Dec. 06	Bulletin 2
9.	13 June 07	Bulletin 33
10.	13 Sept. 07	Bulletin 41
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12.	12 Dec. 07	Bulletin 49
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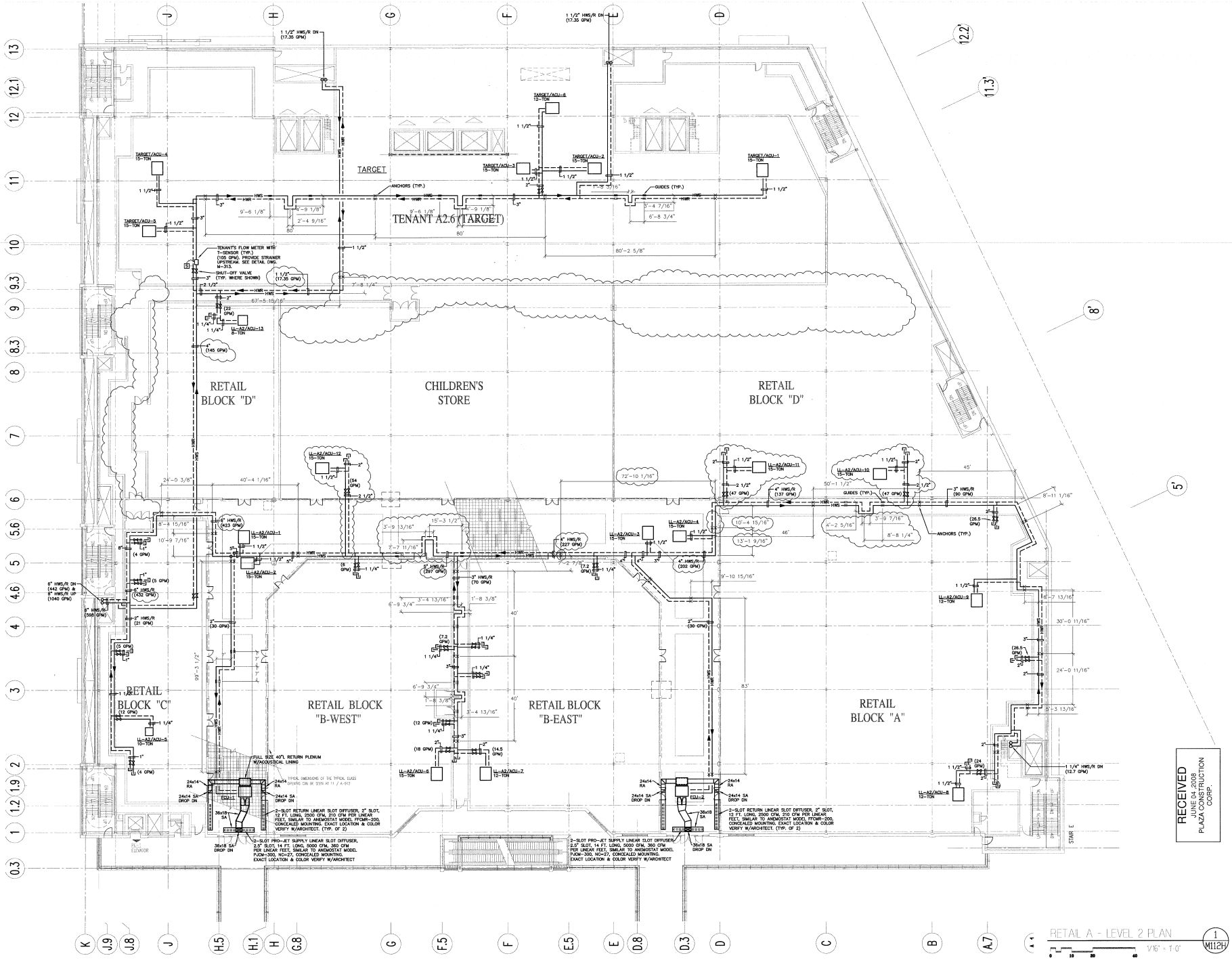
RETAIL A-
LEVEL 2 HVAC PLAN-
CONDENSER WATER PIPING

M-112C



RETAIL A - LEVEL 2 PLAN 1/16" = 1'-0" (1 M112H)

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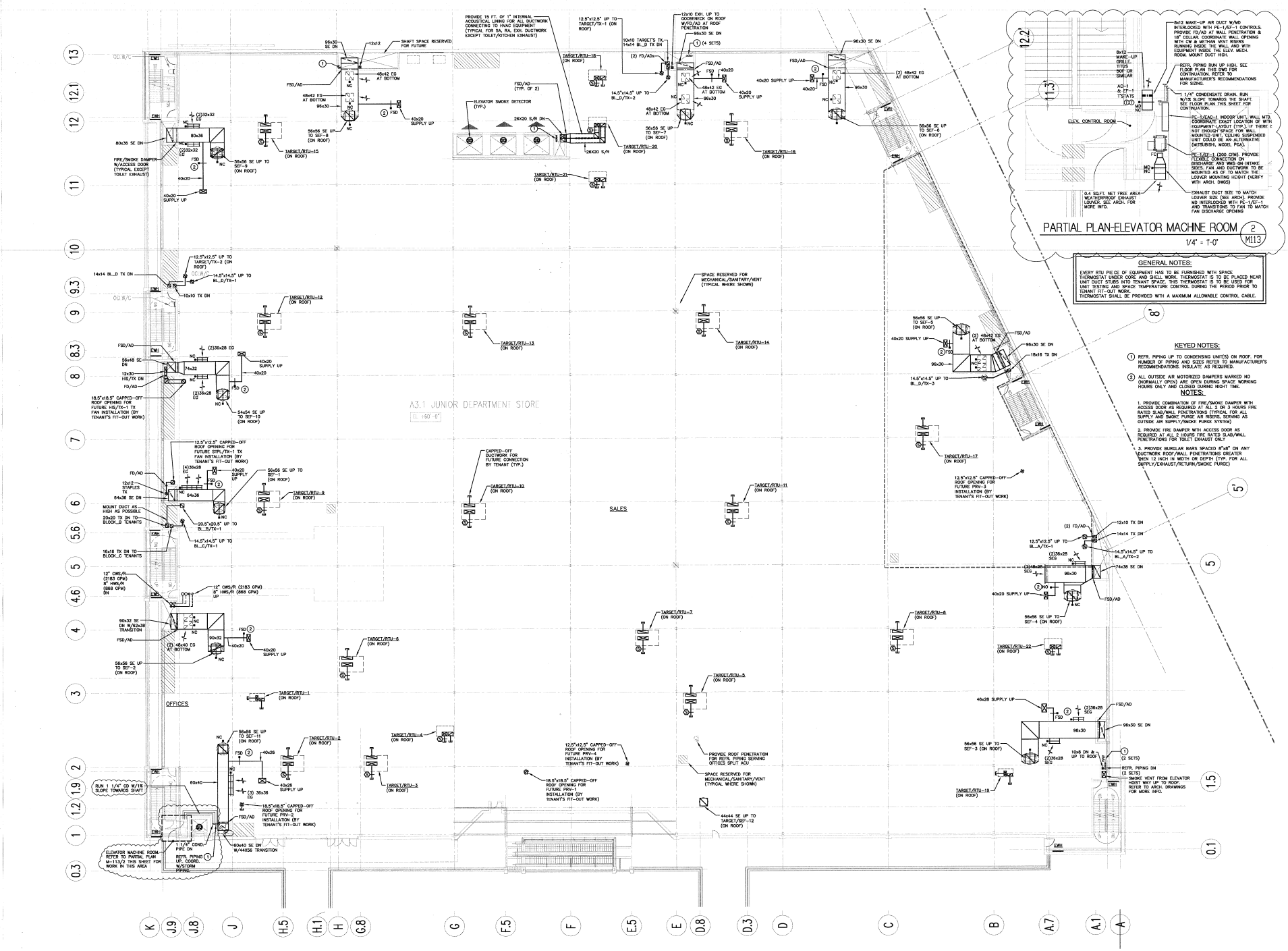
RETAIL A-
LEVEL 2 HVAC PLAN-
HOT WATER PIPING

M-112H



PARTIAL PLAN-ELEVATOR MACHINE ROOM

2 / M113

1/4" = 1'-0"

8x12 MAKE-UP AIR DUCT W/MD INTERLOCKED WITH PC-1/EF-1 CONTROLS. PROVIDE FD/AD AT WALL PENETRATION & 18" COLLAR. COORDINATE WALL OPENING WITH CW & METHAN VENT RISERS RUNNING INSIDE THE WALL AND WITH EQUIPMENT INSIDE THE ELEV. MECH. ROOM. MOUNT DUCT HIGH.

8x12 MAKE-UP GRILLE W/ 1/2" SCR OR SIMILAR

AC-1 & EF-1 T'STATS

REFR. PIPING RUN UP HIGH. SEE FLOOR PLAN THIS DWG FOR CONTINUATION. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SIZING.

1 1/4" CONDENSATE DRAIN. RUN W/1% SLOPE TOWARDS THE SHAFT. SEE FLOOR PLAN THIS SHEET FOR CONTINUATION.

PC-1/EAC-1 INDOOR UNIT, WALL MTD. COORDINATE EXACT LOCATION OF WITH EQUIPMENT LAYOUT (TYP.). IF THERE IS NOT ENOUGH SPACE FOR WALL MOUNTED-UNIT, CEILING SUSPENDED UNIT COULD BE AN ALTERNATIVE (MITSUBISHI, MODEL PCA).

PC-1/EF-1 (200 CFM). PROVIDE FLEXIBLE CONNECTION ON DISCHARGE AND MMS ON INTAKE SIDES. FAN AND DUCTWORK TO BE MOUNTED AS OF TO MATCH THE LOUVER MOUNTING HEIGHT (VERIFY WITH ARCH. DWGS)

EXHAUST DUCT SIZE TO MATCH LOUVER SIZE (SEE ARCH). PROVIDE MD INTERLOCKED WITH PC-1/EF-1 AND TRANSITIONS TO FAN TO MATCH FAN DISCHARGE OPENING

0.4 SQ.FT. NET FREE AREA WEATHERPROOF EXHAUST LOUVER. SEE ARCH. FOR MORE INFO.

ELEV. CONTROL ROOM

GENERAL NOTES:

EVERY RTU PIECE OF EQUIPMENT HAS TO BE FURNISHED WITH SPACE THERMOSTAT UNDER CORE AND SHELL WORK. THERMOSTAT IS TO BE PLACED NEAR UNIT DUCT STUBS INTO TENANT SPACE. THIS THERMOSTAT IS TO BE USED FOR UNIT TESTING AND SPACE TEMPERATURE CONTROL DURING THE PERIOD PRIOR TO TENANT FIT-OUT WORK.
THERMOSTAT SHALL BE PROVIDED WITH A MAXIMUM ALLOWABLE CONTROL CABLE.

KEYED NOTES:

1. REFR. PIPING UP TO CONDENSING UNIT(S) ON ROOF. FOR NUMBER OF PIPING AND SIZES REFER TO MANUFACTURER'S RECOMMENDATIONS. INSULATE AS REQUIRED.
2. ALL OUTSIDE AIR MOTORIZED DAMPERS MARKED NO (NORMALLY OPEN) ARE OPEN DURING SPACE WORKING HOURS ONLY AND CLOSED DURING NIGHT TIME.

NOTES:

1. PROVIDE COMBINATION OF FIRE/SMOKE DAMPER WITH ACCESS DOOR AS REQUIRED AT ALL 2 OR 3 HOURS FIRE RATED SLAB/WALL PENETRATIONS (TYPICAL FOR ALL SUPPLY AND SMOKE PURGE AIR RISERS, SERVING AS OUTSIDE AIR SUPPLY/SMOKE PURGE SYSTEM)
2. PROVIDE FIRE DAMPER WITH ACCESS DOOR AS REQUIRED AT ALL 2 HOURS FIRE RATED SLAB/WALL PENETRATIONS FOR TOILET EXHAUST ONLY
3. PROVIDE BURGLAR BARS SPACED 6"x8" ON ANY DUCTWORK ROOF/WALL PENETRATIONS GREATER THEN 12 INCH IN WIDTH OR DEPTH (TYP. FOR ALL SUPPLY/EXHAUST/RETURN/SMOKE PURGE)

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RETAIL A - LEVEL 3 PLAN

1 / M113

1/16" = 1'-0"

0 10 20 40

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10 EAST 23 STREET, 12th FLOOR
NEW YORK, NY 10010-1505

ISSUES

No.	Date	Description
1.	16 Dec 05	50% DD Set
2.	24 Feb 06	100% DD Set
3.	20 Mar 06	100% DD Set-addendum #3
4.	19 May 06	50% CD Set
5.	28 July 06	Permit Set
6.	5 Sept. 06	Bid Set
7.	2 Nov. 06	Bulletin 1 (WEP)
8.	21 Dec. 06	Bulletin 9
9.	13 June 07	Bulletin 30
10.	15 Sept. 07	Bulletin 41
11.	12 Dec. 07	Bulletin 43R
12.	14 Mar. 08	Bulletin 49
13.	9 May 08	Bulletin 51
14.	15 Aug 08	Bulletin 54

FILE INFORMATION
Filename
Drawn
Checked
Date
Job #
SCALE

As-Built 09/2008 PLAZA LEVEL

SEPTEMBER 2008 PLAZA LEVEL

BBG BBGM
BRENNAN BEER GORMAN ARCHITECTS
BRENNAN BEER GORMAN MONK INTERIORS
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NEW YORK WASHINGTON SCOTTSDALE SYDNEY BEIJING

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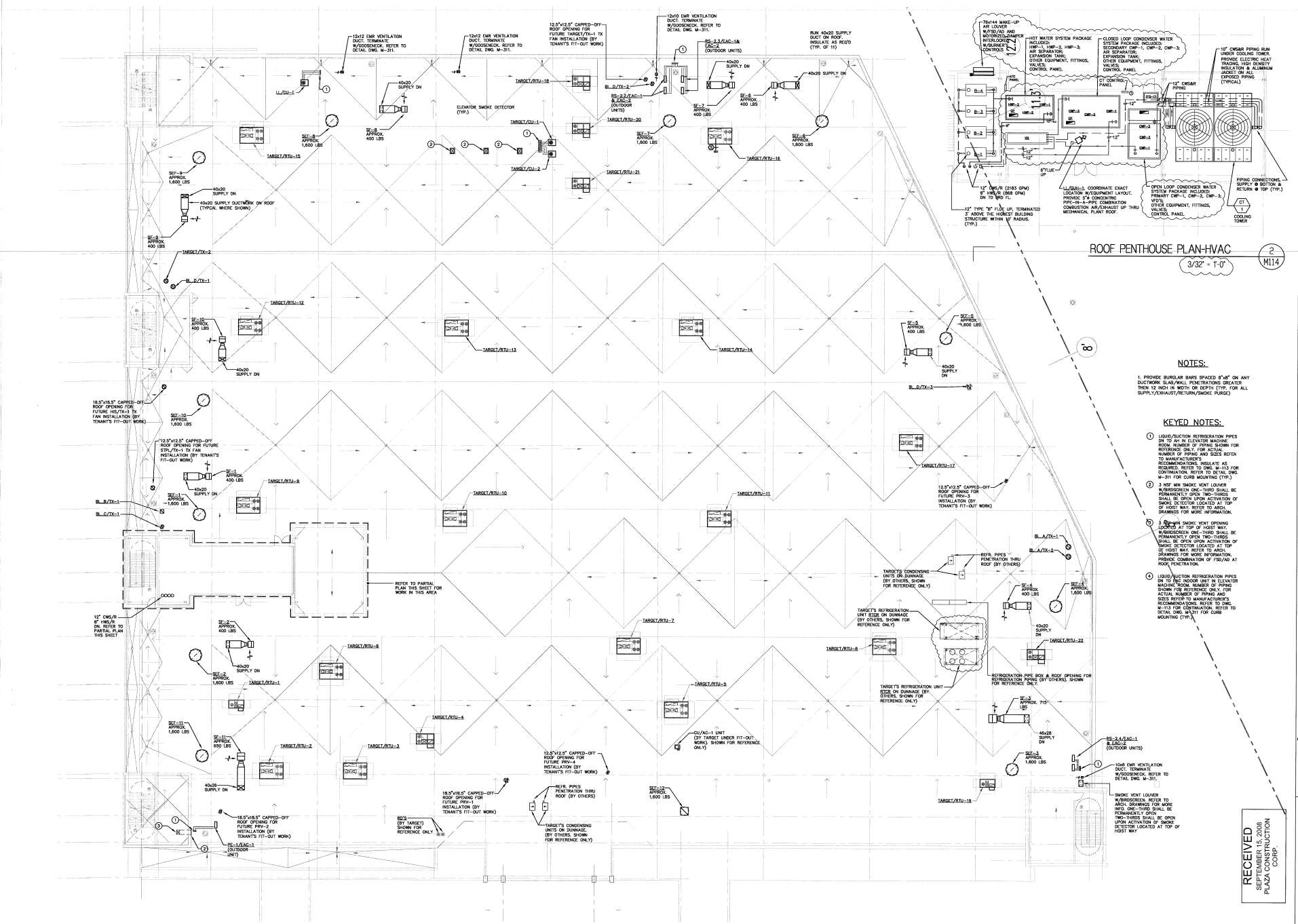
RETAIL A-
LEVEL 3 HVAC PLAN

M-113



ROOF PENTHOUSE PLAN-HVAC

2 M114

3/32" = 1'-0"

NOTES:

1. PROVIDE BURGLAR BARS SPACED 8"x8" ON ANY DUCTWORK SLAB/WALL PENETRATIONS GREATER THEN 12 INCH IN WIDTH OR DEPTH (TYP. FOR ALL SUPPLY/EXHAUST/RETURN/SMOKE PURGE)

KEYED NOTES:

1. LIQUID/SUCTION REFRIGERATION PIPES DN TO AH IN ELEVATOR MACHINE ROOM. NUMBER OF PIPING SHOWN FOR REFERENCE ONLY. FOR ACTUAL NUMBER OF PIPING AND SIZES REFER TO MANUFACTURER'S RECOMMENDATIONS. INSULATE AS REQUIRED. REFER TO DWG. M-113 FOR CONTINUATION. REFER TO DETAIL DWG. M-311 FOR CURB MOUNTING (TYP.)
2. 3 MSF MIN SMOKE VENT LOUVER W/BIRDSCREEN ONE-THIRD SHALL BE PERMANENTLY OPEN TWO-THIRDS SHALL BE OPEN UPON ACTION OF SMOKE DETECTOR LOCATED AT TOP OF HOIST WAY. REFER TO ARCH. DRAWINGS FOR MORE INFORMATION.
3. 3 MSF MIN SMOKE VENT OPENING LOCATED AT TOP OF HOIST WAY. W/BIRDSCREEN ONE-THIRD SHALL BE PERMANENTLY OPEN TWO-THIRDS SHALL BE OPEN UPON ACTION OF SMOKE DETECTOR LOCATED AT TOP OF HOIST WAY. REFER TO ARCH. DRAWINGS FOR MORE INFORMATION. PROVIDE COMBINATION OF F3D/AD AT ROOF PENETRATION.
4. LIQUID/SUCTION REFRIGERATION PIPES DN TO EAC INDOOR UNIT IN ELEVATOR MACHINE ROOM. NUMBER OF PIPING SHOWN FOR REFERENCE ONLY. FOR ACTUAL NUMBER OF PIPING AND SIZES REFER TO MANUFACTURER'S RECOMMENDATIONS. REFER TO DWG. M-113 FOR CONTINUATION. REFER TO DETAIL DWG. M-311 FOR CURB MOUNTING (TYP.)

RETAIL A - ROOF HVAC PLAN

1 M114

1/16" = 1'-0"

0 10 20 40

NOTE:
THIS PLAN IS APPROVED ONLY FOR WORK ON THE APPLICATION SPECIFICATION SHEET. ALL OTHER MATTERS SHOWN ARE NOT TO BE RELIED UPON, OR TO BE CONSIDERED AS EITHER APPROVED OR IN ACCORDANCE WITH APPLICABLE CODES.

RECEIVED
SEPTEMBER 15, 2008
PLAZA CONSTRUCTION CORP.

PROJECT NAME
GATEWAY CENTER
at Bronx Terminal Market

OWNER

THE RELATED COMPANIES
BTM Development Partners LLC
c/o Related Retail Corporation
60 Columbus Circle - 19th Floor
New York, NY 10023

CONSULTANTS

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545 Eighth Avenue - New York, NY 10018

Lee Weintraub LWLA
Landscape Architecture, LLC

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Dewberry-Goodkind, Inc.

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14.	15 Aug 08	Bulletin 54

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SCALE

As-Built 09/2008 PLAZA CONSTRUCTION CORP.

BBG - BBGM
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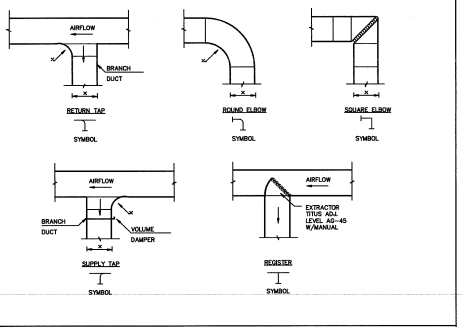
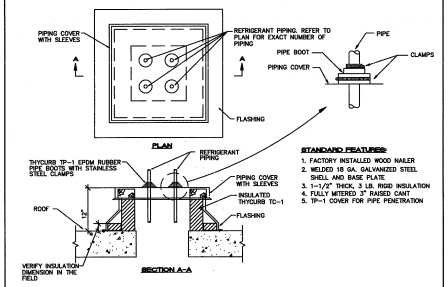
RETAIL A-
ROOF HVAC PLAN

M-114



BRANCH DUCT DETAILS

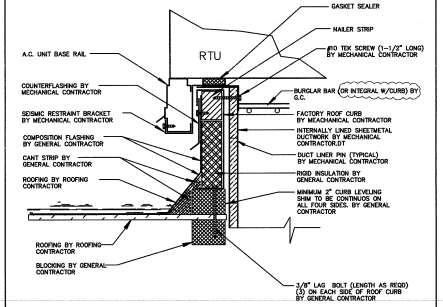
SCALE: NONE



NOTE: 3-1/2" DIAMETER COLLARS ACCOMMODATE PIPES 1/2" TO 3-1/2" NOM.
6-1/2" DIAMETER COLLARS ACCOMMODATE PIPES 3" TO 5" NOM.

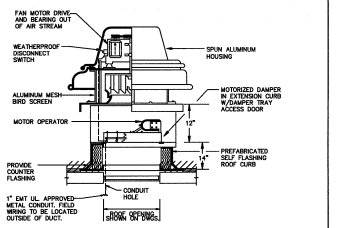
DETAIL OF PIPE FLASHING CURB

SCALE : NONE



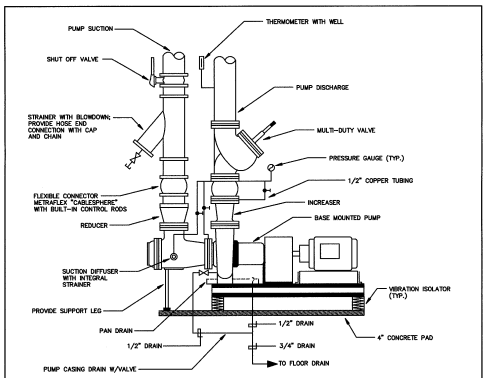
TYPICAL RTU ROOF CURB DETAIL

SCALE: NONE



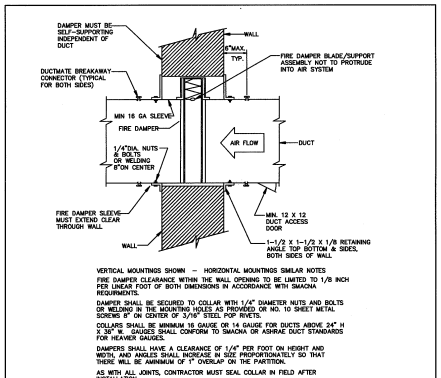
ROOF EXHAUST FAN DETAIL

SCHEMATIC ONLY



HOT WATER PUMP DETAIL

SCALE: NONE



VERTICAL MOUNTINGS SHOWN – HORIZONTAL MOUNTINGS SIMILAR NOTES

FIRE DAMPER CLEARANCE WITHIN THE WALL OPENING TO BE LIMITED TO 1/8 INCH PER LINEAR FOOT OF BOTH DIMENSIONS IN ACCORDANCE WITH SMACNA REQUIREMENTS.

DAMPER SHALL BE SECURED TO COLLAR WITH 1/4" DIAMETER NUTS AND BOLTS OR WELDING IN THE MOUNTING HOLES AS PROVIDED OR NO. 10 SHEET METAL SCREWS 8" ON CENTER OF 3/16" STEEL POP RIVETS.

COLLARS SHALL BE MINIMUM 16 GAUGE OR 14 GAUGE FOR DUCTS ABOVE 24" H OR 24" W. GAUGES SHALL CONFORM TO SMACNA OR ASHRAE DUCT STANDARDS FOR HEAVIER GAUGES.

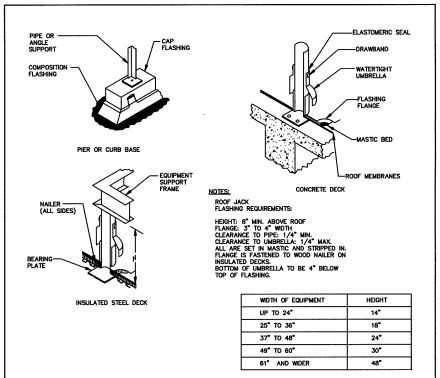
DAMPERS SHALL HAVE A CLEARANCE OF 1/4" PER FOOT ON HEIGHT AND WIDTH, AND ANGLES SHALL INCREASE IN SIZE PROPORTIONATELY SO THAT THERE WILL BE AMINIMUM OF 1" OVERLAP ON THE PARTITION.

AS WITH ALL JOINTS, CONTRACTOR MUST SEAL COLLAR IN FIELD AFTER INSTALLATION.

FIRE DAMPER ASSEMBLY MUST COMPLY WITH UL LISTING/LABELING AND UL 555 NYC BSA # 292-71-SM

TYPICAL FIRE DAMPER DETAIL

SCALE: NONE

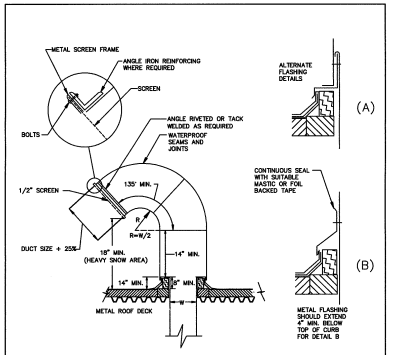


NOTES:
ROOF JACK FLASHING REQUIREMENTS:
HEIGHT: 8" MIN. ABOVE ROOF
FLANGE: 3" TO 4" WIDTH
CLEARANCE TO PIPE: 1/4" MIN.
CLEARANCE TO PIPE: 1/4" MAX.
FLANGE SET IN MASTIC AND STRIPPED IN, FLANGE IS FASTENED TO WOOD NAILER ON INSULATED DECKS.
BOTTOM OF UMBRELLA TO BE 4" BELOW TOP OF FLASHING.

WIDTH OF EQUIPMENT	HEIGHT
UP TO 24"	14"
25" TO 36"	18"
37" TO 48"	24"
49" TO 60"	30"
61" AND WIDER	48"

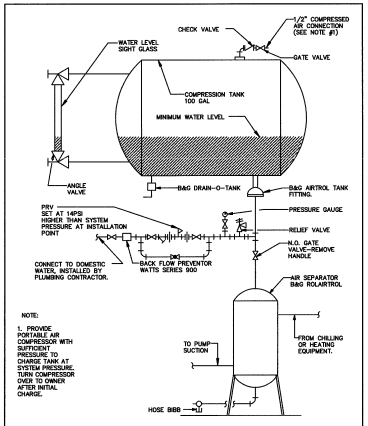
EQUIPMENT AND DUCT SUPPORT FLASHING

SCALE: NONE



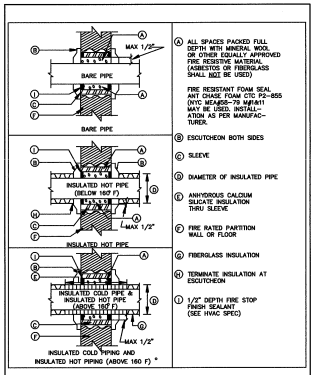
RECTANGULAR GOOSENECK

SCALE: NONE



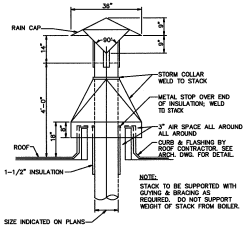
CLOSED COMPRESSION TANK

SCALE: NONE



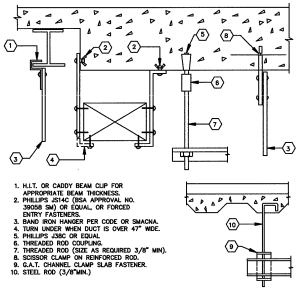
DETAIL OF PIPING PIERCING FIRE RATED PARTITIONS, WALLS AND FLOORS

SCALE: NONE



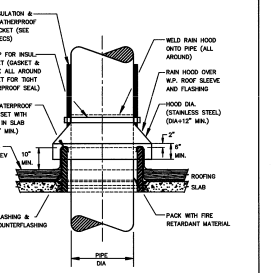
BOILER STACK DETAIL

SCALE: NONE



METHOD OF HANGING DUCTWORK

SCALE: NONE



PIPE PENETRATION THRU ROOF SLAB

SCALE: NONE

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PROJECT NAME
GATEWAY CENTER
at Bronx Terminal Market

OWNER

THE RELATED COMPANIES
BTM Development Partners LLC
c/o Related Retail Corporation
60 Columbus Circle – 19th Floor
New York, NY 10023

CONSULTANTS

GreenbergFarrow
44 West 28th Street, 15th Floor
New York, NY 10001
t: 212 725 9530 f: 212 725 9552

ADG — NY 212.398.7130 NJ 973.242.2626 Fax 973.242.2676 744 Broad Street Suite 1624 Newark, NJ 07102

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Lee Weintraub LWLA
Landscape Architecture, LLC

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7	2 Nov. 06	Bulletin 1 (MEP)
8	13 June 07	Bulletin 30

FILE INFORMATION
Filename
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Date
Job #

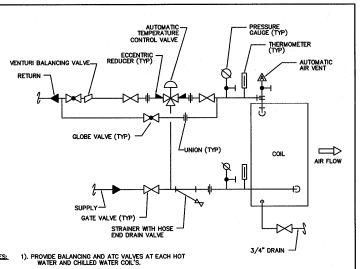
SCALE
As-Noted

RECEIVED 02/2008 DEPARTMENT OF BUILDINGS

PLAZA R.B.Q.

RETAIL A - HVAC DETAILS

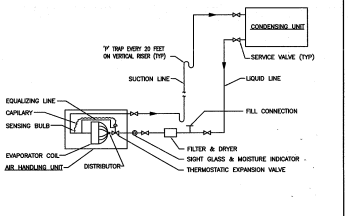
M-311



NOTES:
1). PROVIDE BALANCING AND ATC VALVES AT EACH HOT WATER AND CHILLED WATER COIL'S.
2). PROVIDE SEPERATE ASME RELIEF VALVE FOR EACH MODULE.
3). PROVIDE SUPPLY AND RETURN HEADERS, SIZED AS PER MANUFACTURER'S RECOMMENDATIONS.

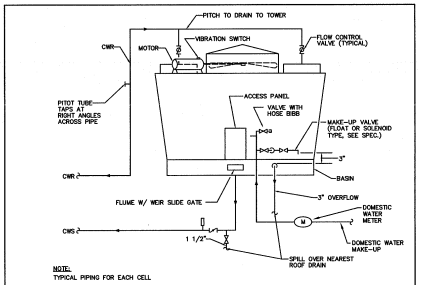
HOT WATER COIL'S PIPING

SCALE: NONE



REFRIGERANT PIPING SCHEMATIC - SPLIT SYSTEM

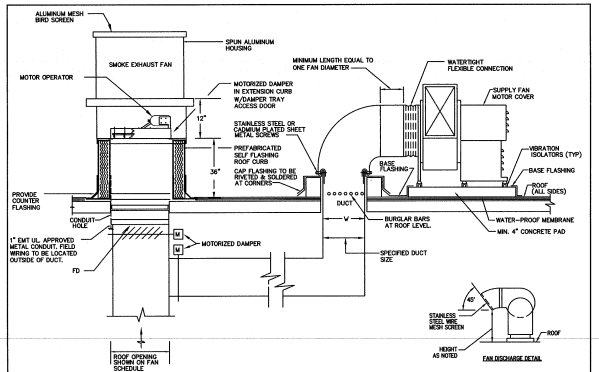
SCALE: NONE



NOTE:
TYPICAL PIPING FOR EACH CELL

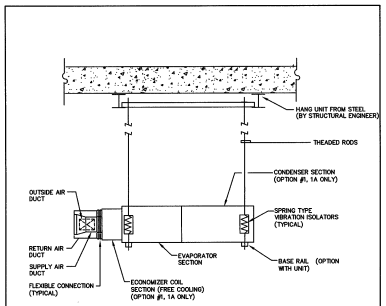
COOLING TOWER PIPING DETAIL

SCALE: NONE



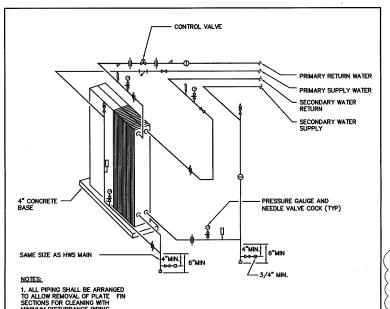
SMOKE EXHAUST FAN DETAIL WITH OUTSIDE AIR UTILITY FAN INSTALLATION DETAIL

SCALE: NONE



ACU HANGING DETAIL

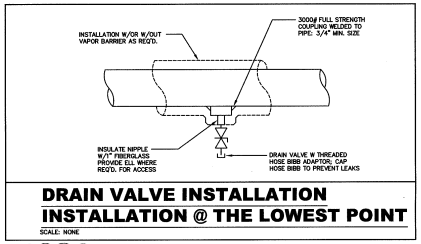
SCALE: NONE



NOTES:
1. ALL PIPING SHALL BE ARRANGED TO ALLOW REMOVAL OF PLATE FIN SECTIONS FOR CLEANING WITH MINIMUM DISTURBANCE PIPING

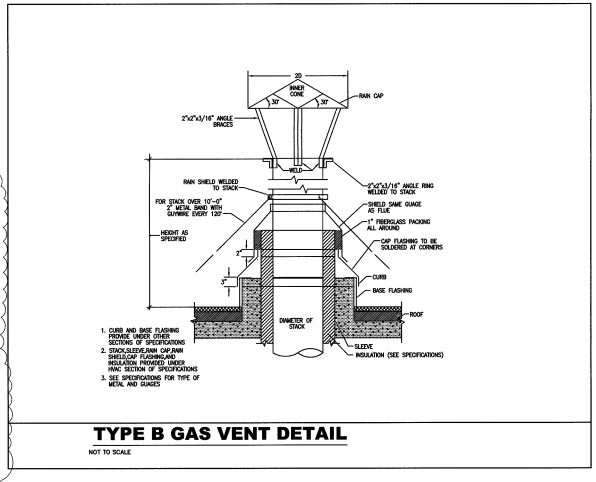
WATER-TO-WATER PLATE TYPE HEAT EXCHANGER PIPING

NOT TO SCALE



DRAIN VALVE INSTALLATION INSTALLATION @ THE LOWEST POINT

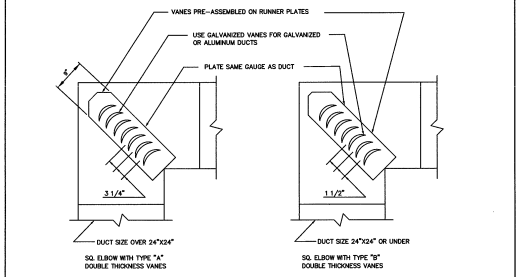
SCALE: NONE



1. CURB AND BASE FLASHING PROVIDE UNDER OTHER SECTIONS OF SPECIFICATIONS
2. STACK,SLEEVE,RAIN CAP,RAIN SHIELD,CAP FLASHING AND INSULATION PROVIDED UNDER HVAC SECTION OF SPECIFICATIONS
3. SEE SPECIFICATIONS FOR TYPE OF METAL AND GUAGES

TYPE B GAS VENT DETAIL

NOT TO SCALE



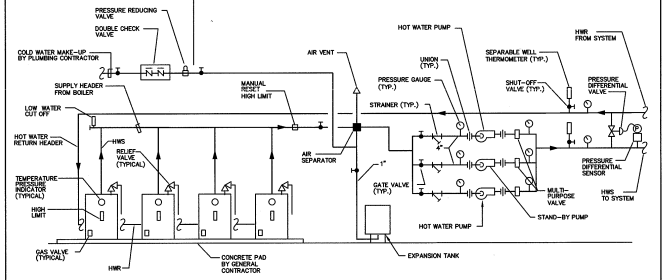
TURNING VANE DETAIL

SCALE: NONE

* MUST BE USED ON ALL 90° ELBOWS

TURNING VANE DETAIL

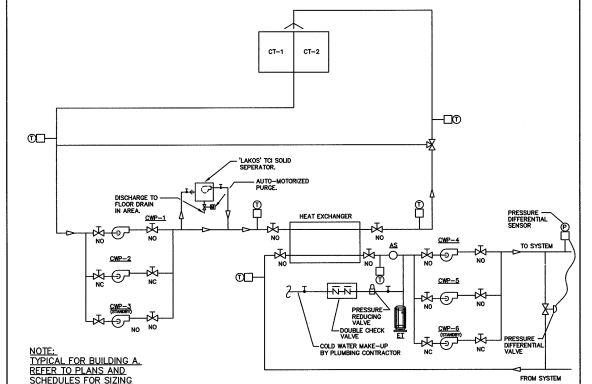
NOT TO SCALE



NOTES:
1). PROVIDE GATE VALVE AT EACH MODULE'S HOT WATER SUPPLY AND RETURN CONNECTION.
2). PROVIDE SEPERATE ASME RELIEF VALVE FOR EACH MODULE.
3). PROVIDE SUPPLY AND RETURN HEADERS, SIZED AS PER MANUFACTURER'S RECOMMENDATIONS.

BOILER PIPING DETAIL

SCALE: NONE



NOTE:
TYPICAL FOR BUILDING A.
REFER TO PLANS AND SCHEDULES FOR SIZING

SCHEMATIC CONDENSER WATER PIPING DIAGRAM

NOT TO SCALE

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GATEWAY CENTER
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NEW YORK, NY 10016-7000

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7.	2 Nov. 06	Bulletin 1 (MEP)

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SCALE
As-Built 09/2008
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PLAN CORR.

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BRENNAN BEER GORMAN MONK INTERIORS
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NEW YORK WASHINGTON SCOTTSDALE SYDNEY BEIJING

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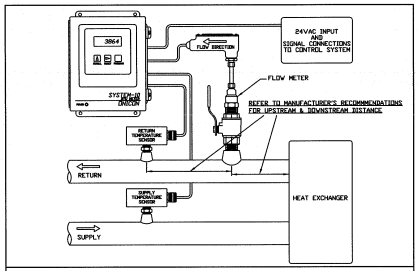
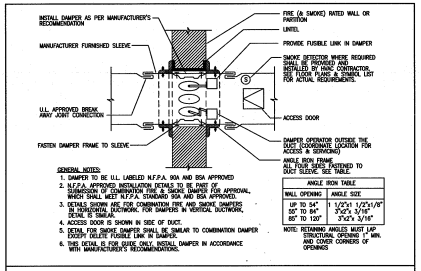
RETAIL A - HVAC DETAILS

M-312



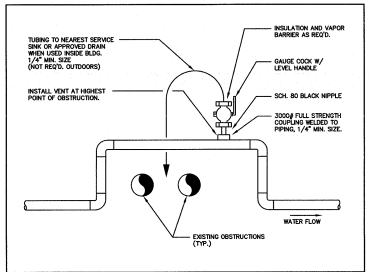
TYPICAL TENANT BTU MEASUREMENT INSTALLATION DETAIL

SCALE: NONE



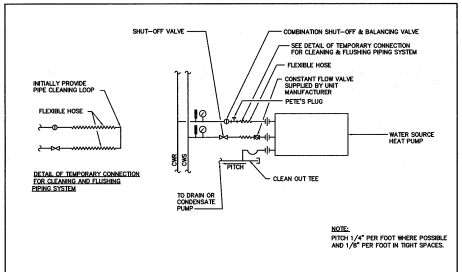
COMBINATION FIRE AND SMOKE DAMPER WITH FUSIBLE LINK

SCALE: NONE



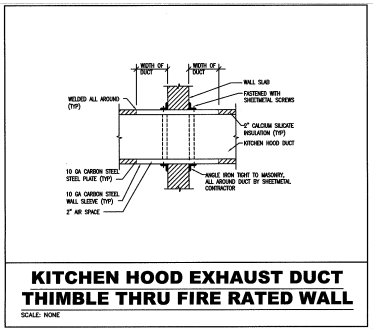
HIGH POINT MANUAL AIR VENT

NO SCALE



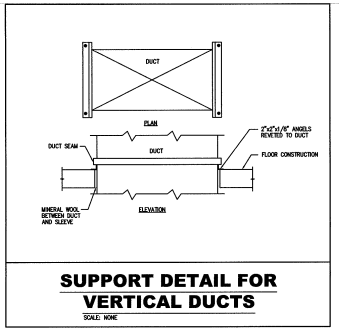
CONDENSER WATER SOURCE PIPING DETAIL

NOT TO SCALE



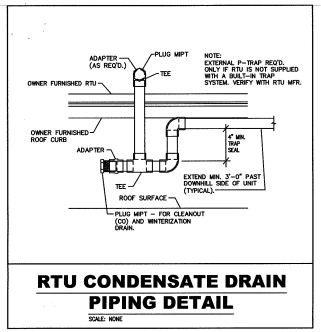
KITCHEN HOOD EXHAUST DUCT THIMBLE THRU FIRE RATED WALL

SCALE: NONE



SUPPORT DETAIL FOR VERTICAL DUCTS

SCALE: NONE



RTU CONDENSATE DRAIN PIPING DETAIL

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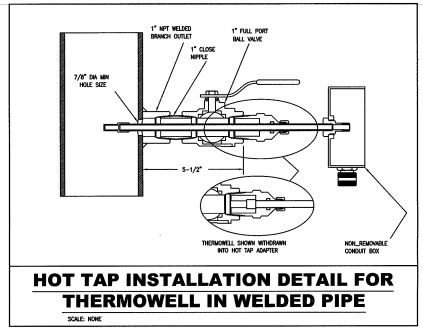

HOT TAP INSTALLATION DETAIL FOR THERMOWELL IN WELDED PIPE

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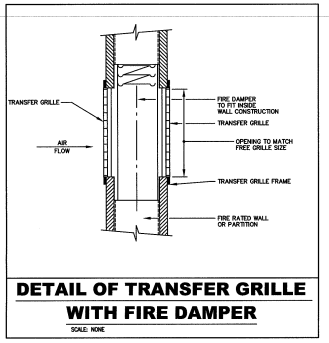
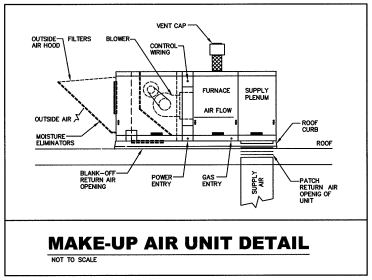


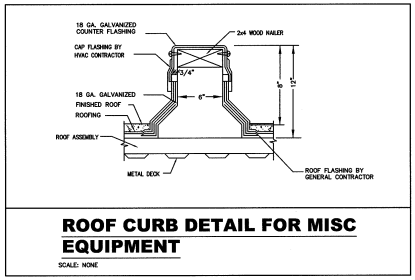
DETAIL OF TRANSFER GRILLE WITH FIRE DAMPER

SCALE: NONE



MAKE-UP AIR UNIT DETAIL

NOT TO SCALE



ROOF CURB DETAIL FOR MISC EQUIPMENT

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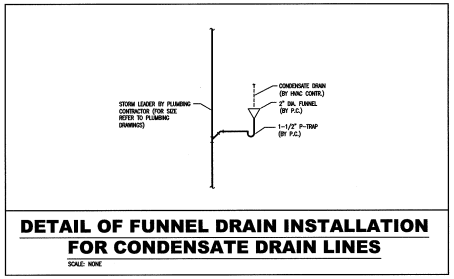

DETAIL OF FUNNEL DRAIN INSTALLATION FOR CONDENSATE DRAIN LINES

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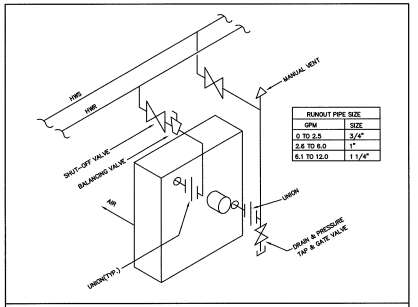
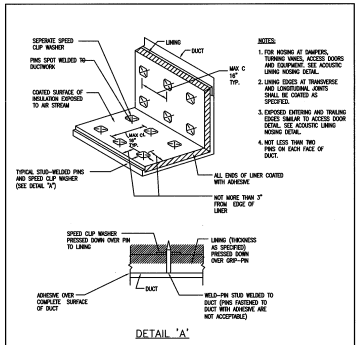


TYPICAL HOT WATER UNIT HEATER PIPING DIAGRAM

SCALE: NONE



SOUND LINING INSTALLATION DETAIL

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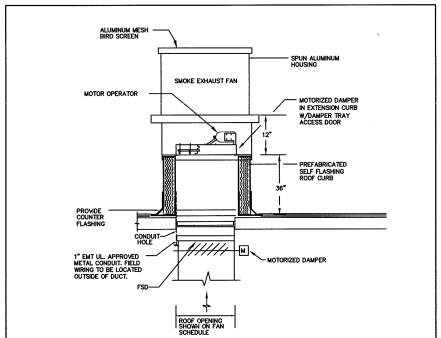
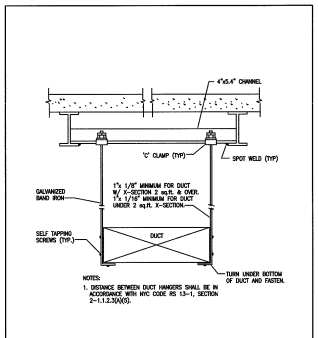


TYPICAL SMOKE EXHAUST FAN DETAIL

SCALE: NONE



DUCT HANGING DETAIL

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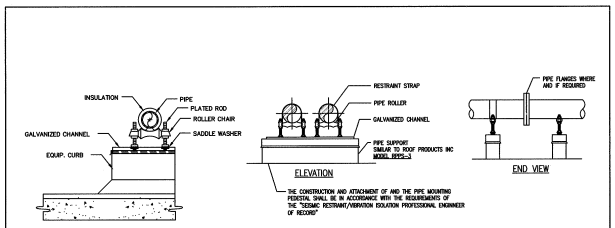

PIPE SUPPORT ON ROOF

SCALE: NONE

PROJECT NAME
GATEWAY CENTER
at Bronx Terminal Market

OWNER

THE RELATED COMPANIES
BTM Development Partners LLC
c/o Related Retail Corporation
60 Columbus Circle – 19th Floor
New York, NY 10023

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• New Haven, CT
• New York, NY
• Philadelphia, PA
• Trenton, NJ

Dewberry
Dewberry-Goodkind, Inc.
15 EAST 26 STREET, 13th FLOOR
NEW YORK, NY 10005-1006

ISSUES

No.	Date	Description
1.	16 Dec 05	SOE DD Set
2.	24 Feb 06	100K DD Set
3.	20 Mar 06	500K DD Set-addendum #3
4.	18 May 06	SOE CD Set
5.	28 July 06	100K CD Set
6.	5 Sept 06	For Bid
7.	2 Nov. 06	Bulletin 1 (MEP)

FILE INFORMATION
Filename
Drawn
Checked
Date
Job #

SCALE

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DEPARTMENT OF BUILDINGS
CONSTRUCTION CORP.:

BBG BBGM
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515 Madison Avenue New York NY 10022
Tel 212 888 7663 Fax 212 935 3868 www.bbgm.com
NEW YORK WASHINGTON SCOTTSDALE SYDNEY BEIJING

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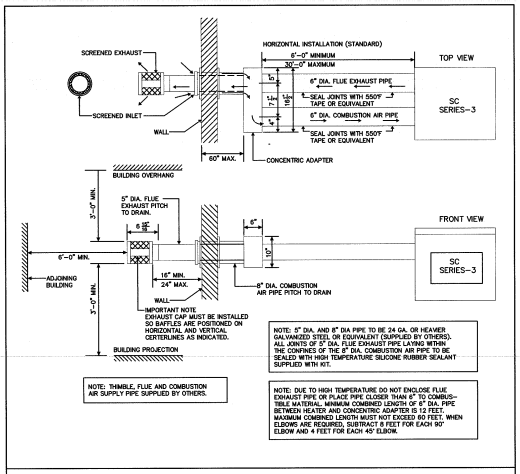
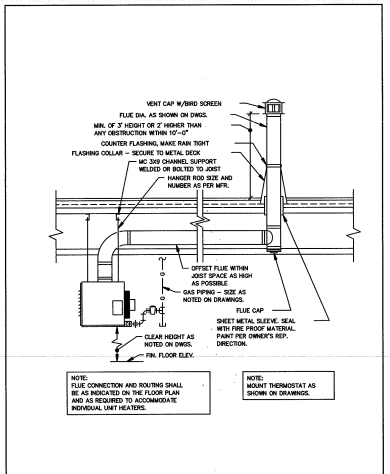
RETAIL A - HVAC DETAILS

M-313



HORIZONTAL SEPARATED COMBUSTION VENTING DETAIL

SCALE: NONE



GAS UNIT HEATER DETAIL

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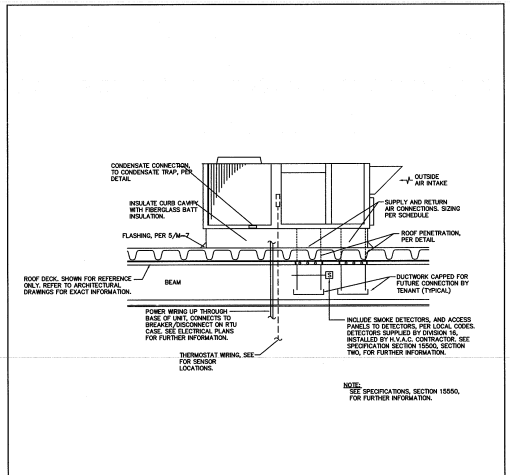

TYPICAL RTU INSTALLATION DETAIL

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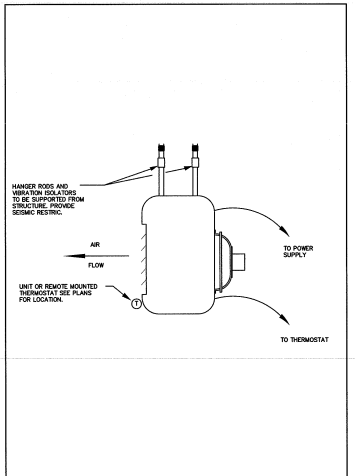

ELECTRIC HEATER DETAIL

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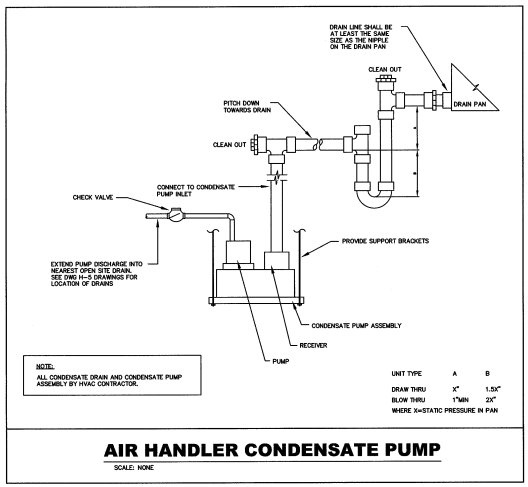
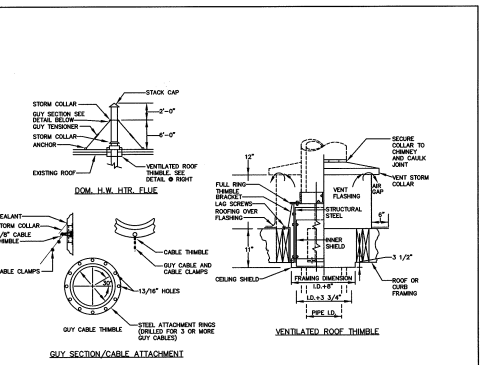


AIR HANDLER CONDENSATE PUMP

SCALE: NONE



FLUE VENT DETAILS

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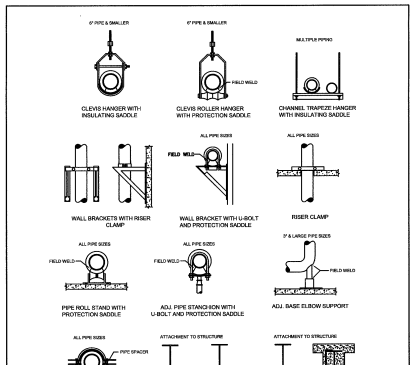

PIPE HANGERS and ATTACHMENTS

SCALE : NONE

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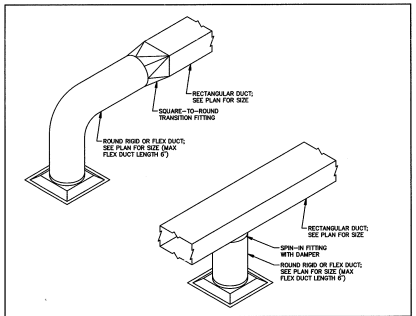
NOVEMBER 22, 2006
PLAZA CONSTRUCTION CORP.



DIFFUSER CONNECTION DETAIL

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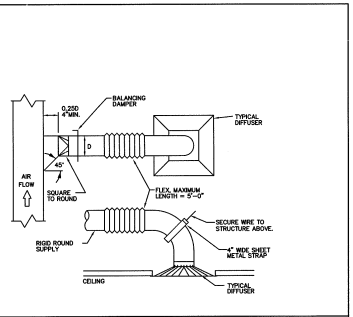

DIFFUSER CONNECTION DETAIL

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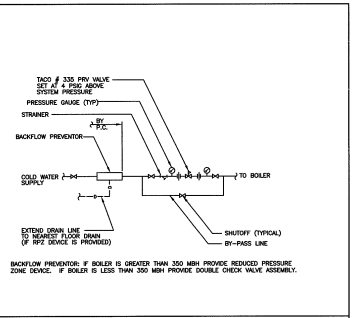

COLD WATER MAKE-UP DETAIL

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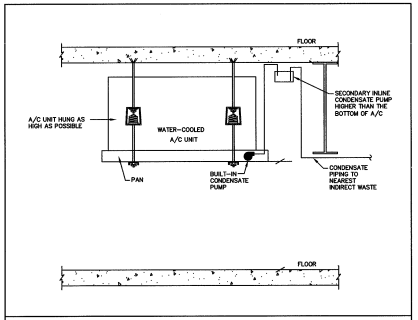

CONDENSATE PUMP DETAIL

SCALE: NONE

PROJECT NAME
GATEWAY CENTER
at Bronx Terminal Market

OWNER

THE RELATED COMPANIES
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c/o Related Retail Corporation
60 Columbus Circle – 19th Floor
New York, NY 10023

CONSULTANTS

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Dewberry
Dewberry-Goodkind, Inc.
15 EAST 26 STREET, 12th FLOOR
NEW YORK, NY 10010-1505

ISSUES

No.	Date	Description
1.	16 Dec 05	50% DD Set
2.	24 Feb 06	100% DD Set
3.	20 Mar 06	100% DD Set-addendum #3
4.	10 May 06	50% CD Set
5.	28 Jun 06	Permit Set
6.	3 Sept. 06	Bid Set
7.	2 Nov. 06	Bulletin 1 (MEP)

FILE INFORMATION

Filename
Drawn
Checked
Date
Job #

SCALE

As-Built 00/2008 PLAZA R.Bell

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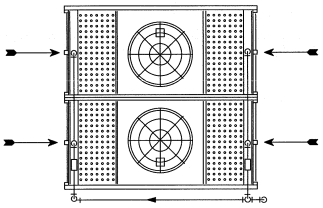
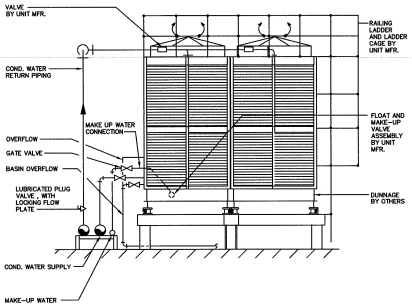
RETAIL A - HVAC DETAILS

M-314



PLAN VIEW



RIGHT ELEVATION VIEW

NOTES:

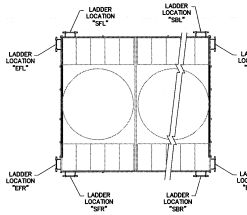
1) PROVIDE VIBRATION ISOLATION UNITS AS REQUIRED BY COOLING TOWER MANUFACTURER.
2) FOR MULTI-CELL TOWER PROVIDE FULL SIZE EQUALIZING LINE WITH ISOLATION VALVE FOR EA. CELL.
3) PROVIDE BASIN FREEZE PROTECTION AS SPECIFIED.
4) PROVIDE STAINLESS STEEL SUMP SCREEN OR VORTEX PLATE (WITH TOWER)
5) SEE SPEC'S FOR TWO SPEED FAN WIRING, VIBRATION, LIMIT SWITCH ETC.
6) PIPING ABOVE ROOF CAN BE DONE WITH "VICTAULIC" COUPLING (USE SPEC. PIPE SCH.)
7) FOR ROOF PIPING WINTERIZING SEE SPECIFICATION.
8) RAILING AND LADDER AS PER OSHA
9) MAKE-UP WATER RUNOUT TO HAVE A BACKFLOW PREVENTOR "WATTS" #900 (OR EQ.) PLUS VALVE, STRAINER ETC. (AS REQUIRED)
10) IF TOWER VENDOR DOES NOT FURNISH BAL. VA'S, INSTALL BUTTERFLY VA'S (BALANCING)
11) DRAIN VA'S @ LOW POINT TO BE PIPED WITH SHORT NIPPLE, AS TO BE INCORPORATED INTO WEATHERPROOF INSULATION (IF APPLIED, SEE SPEC.)
12) KEEP ACCESS TO MOTOR CLEAR OF PIPING FOR MOTOR REMOVAL.
13) TOWER DUNNAGE TO SUIT TOWER DATA (FOR LOAD AND LOCATION SEE COOLING TOWER MANUFACTURER DATA.
14) ALL ROOF PASSAGE OF PIPING, TO BE PROVIDED WITH W.P. SLEEVE (TO BE WATERHOOD, SLEEVE TO EXTEND 12" ABOVE ROOFING.
15) BLEED-OFF RIG. SOLENOID, VALVES, STRAINER AND UNIONS, PLUS WIRING ALL IN HVAC DIV. (SEE WATER TREATMENT ITEM IN SPEC.)
16) PROVIDE TAPPING IN PIPING (COUPLING'S) AT LOCATION AND SIZE REQUIRED BY TEMP. CONTROL CONTRACTOR.

BAC-BGCB000M00

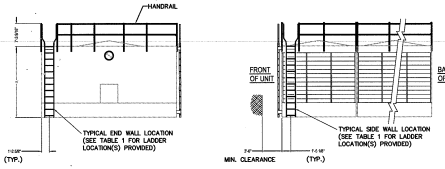
Model Number	A	Add Weight Per Ladder (LBS) See Note 1	Handrail Add Weight Per Cell (LBS) See Note 1
3501A	9'-11 3/4"	30	190

Unit Supplied With Ladders at Locations
EFL - End Front Left
EFR - End Front Right
EBL - End Back Left
EBR - End Back Right
SFL - Side Front Left
SFR - Side Front Right
SBL - Side Back Left
SBR - Side Back Right

TABLE 1



PLAN VIEW
LADDER LOCATION OPTIONS



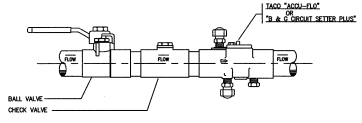
NOTES:
1. Weights for unit access accessories should be added to the standard unit weights.
2. External unit access accessories ship loose for field assembly.
3. Field piping must be kept clear and supported independently of all unit access accessories.
4. Optional, self closing, OSHA-compliant, safety gates are available for all handrail and platform packages. Refer to OSHA and local occupational safety regulations to determine if safety gates are required.
5. Optional ladder extensions and safety cages are available for all ladder packages.

LADDER & HANDRAIL LOCATION

SCALE: NONE

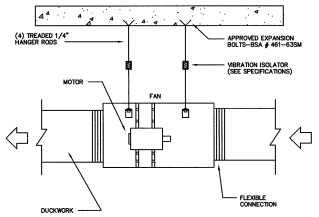
TYPICAL COOLING TOWER INSTALLATIONS AND ACCESSORIES

SCALE: NONE



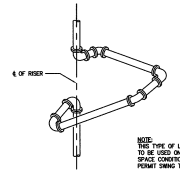
TYPICAL BALANCING VALVE RIG

SCALE: NONE



INLINE FAN HANGING SUPPORT DETAIL

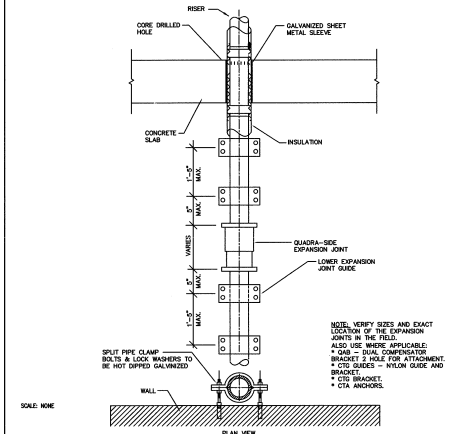
SCALE: NONE



NOTE:
THIS TYPE OF LOOP TO BE USED ONLY WHERE SPACE CONDITIONS DO NOT PERMIT SWING TYPE LOOP

SIX ELBOW SWING EXPANSION LOOP

SCALE: NONE

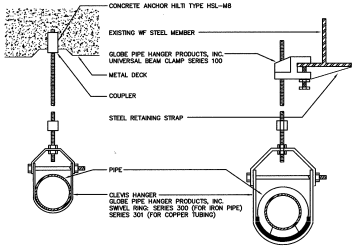


NOTE: VERIFY SIZES AND EXACT LOCATION OF THE EXPANSION JOINTS IN THE FIELD.
ALSO USE WHERE APPLICABLE:
* GNB — DUAL COMPENSATOR BRACKET 2 HOLE FOR ATTACHMENT.
* CTG GUIDES — NYLON GUIDE AND BRACKET.
* CTG BRACKET.
* CTA ANCHORS.

SCALE: NONE

PLAN VIEW

RISER EXPANSION JOINT INSTALLATION DETAIL

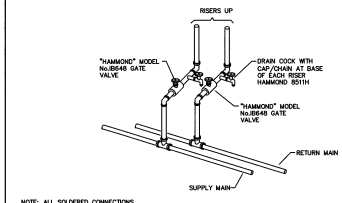


HANGER ROD SPACING AND SIZE SCHEDULE

NOM. PIPE SIZE (INCHES)	COPPER TUBE MAX. SPAN (FEET)	CAST-IRON SOIL PIPE MAX. SPAN (FEET)	MINIMUM ROD DIAMETER (INCHES)
UP TO 3/4	6	N/A	3/8
1	6	N/A	3/8
1-1/4	8	N/A	3/8
1-1/2	8	5	3/8
2	8	5	3/8
2-1/2	9	5	1/2
3	10	5	1/2
3-1/2	10	5	1/2
4	10	5	1/2, 5/8 FOR SOIL PIPE
5	10	5	1/2, 5/8 FOR SOIL PIPE
6	10	5	5/8, 3/4 FOR SOIL PIPE
8	10	5	3/4, 7/8 FOR SOIL PIPE
10	10	5	3/4, 7/8 FOR SOIL PIPE
12	10	5	3/4, 1 FOR SOIL PIPE

PIPING CLEVIS HANGER DETAIL

SCALE : NONE



NOTE: ALL SOLDERED CONNECTIONS.

RISER'S CONNECTION TO MAIN

SCALE: NONE

RECEIVED
NOVEMBER 22, 2006
PLAZA CONSTRUCTION CORP.

PROJECT NAME
GATEWAY CENTER
at Bronx Terminal Market

OWNER

THE RELATED COMPANIES
BTM Development Partners LLC
c/o Related Retail Corporation
60 Columbus Circle – 19th Floor
New York, NY 10023

CONSULTANTS

GreenbergFarrow
44 West 28th Street, 15th Floor
New York, NY 10001
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ADG
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Fax 973.242.2876
744 Broad Street
Suite 1824
Newark, NJ 07102
acoustics • vibration • architecture

LZA Associates
A Division of The Thornton-Tomasetti Group

Glickman Engineering PLLC
CONSULTING ENGINEERS
545 Eighth Avenue - New York, NY 10018
t: 212.564.0800 fx: 212.564.0815 www.gepllc.net

Lee Weintraub LWLA
Landscape Architecture, LLC
66 Edgecliff Terrace
Yonkers, NY 10705
Telephone: 914-965-6540

LANGAN
Environmental • Geotechnical
Clinton Plaza Center 1 • Englewood, NJ
400 Clinton Street • Elmwood Park, NJ 07407 • New Haven, CT
Phone: (201) 794-6900 • New York, NY
Fax: (201) 794-0366 • Philadelphia, PA
www.langan.com • Trenton, NJ

Dewberry
Dewberry-Goodkind, Inc.
19 EAST 26 STREET, 12th FLOOR
NEW YORK, NY 10010-1068

ISSUES

No.	Date	Description
1.	16 Dec 05	50% DD Set
2.	24 Feb 06	100% DD Set
3.	10 Mar 06	100% DD Set–addendum #3
4.	19 May 06	Permit Set
5.	9 Aug 06	Bid Set
6.	2 Nov. 06	Bulletin 1 (MEP)

FILE INFORMATION
Filename
Drawn
Checked
Date
Job #

SCALE

As-Built 09/2008 PLAZA R.R.D.

BBG BBGM
BRENNAN BEER GORMAN ARCHITECTS
BRENNAN BEER GORMAN MONK INTERIORS
515 Madison Avenue New York NY 10022
Tel 212 888 7063 Fax 212 935 3688 www.bbg-bbgm.com
NEW YORK WASHINGTON SCOTTSDALE SYDNEY BEIJING

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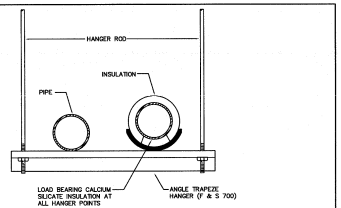
RETAIL A - HVAC DETAILS

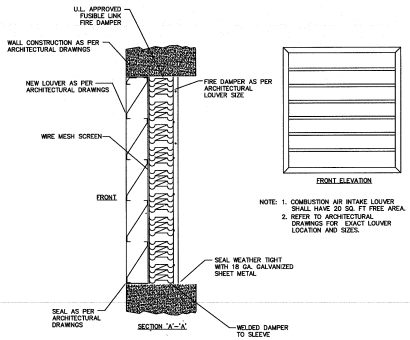
M-315



HANGER ROD SPACING AND SIZE SCHEDULE			
NOM. PIPE SIZE (INCHES)	STEEL PIPE MAX. SPAN (FEET)	COPPER TUBE MAX. SPAN (FEET)	MINIMUM ROD DIAMETER (INCHES)
UP TO 3/4	7	5	3/8
1	7	6	3/8
1-1/4	7	6	3/8
1-1/2	9	8	3/8
2	10	8	3/8
2-1/2	11	9	1/2
3	12	10	1/2
3-1/2	12	10	1/2
4	12	10	5/8, 1/2 FOR COPPER
5	12	10	5/8, 1/2 FOR COPPER
6	12	10	3/4, 5/8 FOR COPPER
8	12	10	7/8, 3/4 FOR COPPER

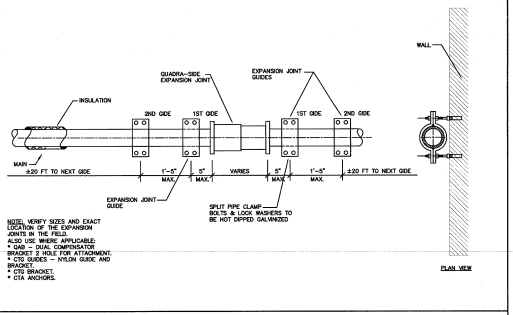
TRAPEZE PIPING HANGING DETAIL

SCALE: NONE



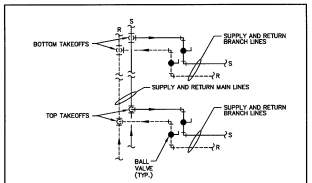
COMBUSTION AIR INTAKE LOUVER DETAIL

SCALE: NONE



ON MAIN EXPANSION JOINT INSTALLATION DETAIL

SCALE: NONE



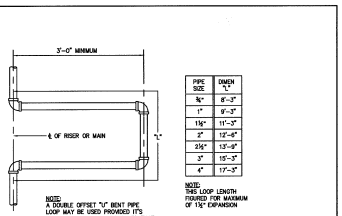
NOTES:
1. FOR ALL BRANCH LINES.
2. ALL HOT WATER BRANCH TAKEOFFS ARE TO CONSIST OF A THREE (3) ELBOW SWING JOINT (MIN.), AS SHOWN.
3. THREE (3) ELBOW SWING JOINTS ARE NOT REQUIRED FOR CHILLED AND/OR CONDENSER WATER BRANCH LINES.

TYPICAL HYDRONIC BRANCH TAKE-OFF DETAIL

SCALE: NONE

EMERGENCY GENERATOR NOTES:

1. EXHAUST PIPE THICKNESS SHALL BE AT LEAST 3/16" AND SHALL COMPLY WITH SEC. 1501.14 (a) (2) AND TABLE 15-A.
2. EXHAUST PIPE SHALL BE INSULATED SO SURFACE TEMP. SHALL NOT EXCEED 200F., AS PER SEC. 1501.14 (a)
3. EXHAUST PIPE JOINTS SHALL BE GAS TIGHT UNDER OPEN CONDITIONS, AS PER SEC. 1501.14 (a) (5).
4. EXHAUST PIPE TERMINATION SHALL NOT INTERFERE WITH OPENINGS IN THE SAME BUILDING OR ANY AD-JOINING BUILDINGS, AS PER SEC. 1300.8 (d).
5. EXHAUST PIPE CLEARANCE TO BE DETERMINED FROM THE COMBUSTIBLE CONSTRUCTION TABLE 15-2, AS PER SEC. 1501.14 (d).
6. EXHAUST PIPE SHALL HAVE A TEST RUN AS PER SEC. 1501.1 (e).
7. EXHAUST PIPE SHALL BE "SMOKE TESTED", AS PER SEC. 1501.1 (e).
8. EXHAUST PIPE SHALL HAVE A CLAEN OUT BASE, AS PER SEC. 1501.3
9. EXHAUST PIPE SHALL EXTEND AT LEAST 10' ABOVE HIGHEST CONSTRUCTION WITHIN 20', 1501.4 (b)
10. THE EXHAUST PIPE SHALL BE CONSTRUCTED OF AT LEAST THREE SIXTEENTHS INCH STEEL, OR OF OTHER EQUIVALENT METAL OF SIMILAR STRENGTH AND RESISTANCE TO THE TEMPERATURE AND CORROSIVE ACTION OF THE EXHAUST GASES. SECTION 27-869 (26R1501.14 (a) (2).
11. ALL JOINTS SHALL BE CONSTRUCTED SO AS TO BE GAS TIGHT UNDER ALL OPERATING CONDITIONS. NO THREADED JOINTS SHALL BE PERMITTED IN PIPE SIZES OVER FOUR INCHES OR IN PIPE OF A THICKNESS LESS THAN THAT OF SCHEDULE 40 STEEL PIPE SECTION 27-869 (C26-1501.14 (a) (5).
12. THE LOCATION OF THE DISCHARGE OPENING OF THE EXHAUST PIPE SHALL COMPLY WITH THE REQUIREMENTS OF SECTION C26-1300.8 (d), AND IN ADDITION, THE OPENING SHALL BE LOCATED SO THAT IT CANNOT CAUSE CONDENSATE LEAVING THE OUTLET TO COME IN CONTACT WITH PEOPLE. THE EXHAUST PIPE MAY BE CONNECTED TO A CHIMNEY USED FOR OTHER EQUIPMENT, PROVIDED THAT THE OPERATION OF THE ENGINE DOES NOT ADVERSELY AFFECT THE OPERATION OF THE OTHER EQUIPMENT SO AS TO CAUSE A FIRE OR HEALTH HAZARD OR TO CAUSE THE SMOKING FROM THE CHIMNEY TO BE IN VIOLATION OF THE AIR POLLUTION CONTROL CODE. SECTION 27-869 (C26-1501.14 (b).
13. THE LOCATION OF THE DISCHARGE OPENING OF THE EXHAUST PIPE TERMINATION DOES NOT INTERFERE WITH OPENINGS OF THE SAME BUILDING OR ADJOINING BUILDINGS. SECTION C26-1300.8 (d).
14. THE EXHAUST PIPE SHALL EXTEND AT LEAST THREE FEET ABOVE HIGHEST CONSTRUCTION WITHIN TEN FEET. SECTION 27-869 (C26-1501.4 (a).
15. PROVIDE SOUND SHIELD OUTDOOR ENCLOSURE FOR THE EMERGENCY GENERATOR.



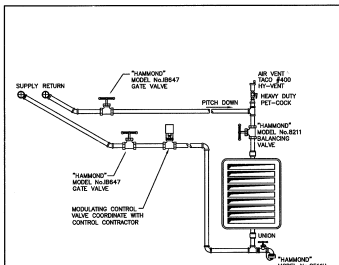
PIPE SIZE	DIMEN "L"
¾"	8'-3"
1"	9'-3"
1¼"	11'-3"
1½"	12'-6"
2"	13'-9"
2½"	15'-3"
3"	17'-3"
4"	17'-3"

NOTE: A DOUBLE OFFSET "L" BENT PIPE LOOP MAY BE USED PROVIDED IT'S DEVELOPED LENGTH IS EQUAL TO THAT GIVEN FOR "L"

NOTE: THIS LOOP LENGTH FIGURED FOR MAXIMUM OF 1½" EXPANSION

FOUR ELBOW SWING EXPANSION LOOP

SCALE: NONE



NOTE: ALL SOLDERED CONNECTIONS.

PIPING DETAIL AT UNIT HEATER

SCALE: NONE

2nd FLOOR	TOILET EXHAUST FAN SCHEDULE											
MARK	MANUFACTURER/ MODEL	TYPE	DRIVE	SERVICE AREA	VOLTS/ PHASE	FAN H.P.	CFM	STATIC PRESSURE (IN. W.G.)	ROOF OPENING IN x IN	APPROX. WEIGHT LBS	TOTAL UNITS	NOTES
BL C/TX-1	GREENHECK GB-121	CENTRIFUGAL	BELT	BL. C TOILETS	460/3	1/2	1000	1.3	16.0 x 16.0	148	1	(1)
BL B/TX-1	GREENHECK GB-180HP	CENTRIFUGAL	BELT	BL. B TOILETS	460/3	1 1/2	2800	1.5	20.0 x 20.0	200	1	(1)
BL D/TX-1	GREENHECK GB-150HP	CENTRIFUGAL	BELT	BL. D TOILETS	460/3	1/2	700	1.3	14.0 x 14.0	140	1	(1)
BL D/TX-2	GREENHECK GB-101HP	CENTRIFUGAL	BELT	BL. D TOILETS	460/3	1/2	800	1.5	14.0 x 14.0	140	1	(1)
BL D/TX-3	GREENHECK GB-121	CENTRIFUGAL	BELT	BL. D TOILETS	460/3	1/2	1000	1.3	14.0 x 14.0	148	1	(1)
BL A/TX-1	PENN D013N	CENTRIFUGAL	DIRECT	BL. A TOILETS	115/1	1/4	510	0.875	11.0 x 11.0	100	1	(1)
BL A/TX-2	GREENHECK GB-121	CENTRIFUGAL	BELT	BL. A TOILETS	460/3	1/2	1000	1.3	14.0 x 14.0	148	1	(1)

NOTES:
(1) FURNISH WITH STRUCTURAL CURB, BACK DRAFT DAMPER, BIRD SCREEN, AND DISCONNECT.
CONTRACTOR SHALL COORDINATE PENETRATION OF EXHAUST DUCT THRU ROOF AND OFFSET AS REQUIRED TO ALLOW ADEQUATE FAN SHROUD CLEARANCE

HOT WATER FAN-COIL SCHEDULE

MANUFACTURER: McQUAY

TAG	MODEL	UNIT ARRANGEMENT	SERIES	AIR VOLUME IN CFM	ESP. IN WC.	CAPACITY, BTU/H	EAT, °F	LAT, °F	EWT, °F	LWT, °F	WATER FLOW, GPM	WPD, FT	MOTOR HP	FLA	ELECTRICAL VOLTS	ELECTRICAL PHASE	MCA/MFS	DIMENSIONS (IN.) LxWxH	SHIPPING WEIGHT, LBS
LL/FC-1 LL/FC-2 LL/FC-3	FTSC*S08	HORIZONTAL THINLINE	2	574	0.25	43,077	35	104.9	200	180	4.43	6.86	0.12	2.3	115	1	2.88/15	52x26x12	130

FACTORY INSTALLED: UNITS COME WITH HEAVE DUTY CABINETS FOR EXPOSED INSTALLATION AND HANGING SUPPORTS. PROVIDE BACK CONNECTION TO RETURN PLENUM, PROVIDE DISCHANGE AIR GRILLE

FIELD INSTALLED: ROOM T'STAT, STARTER, SUPPORTS, DISCONNECT SWITCH, FREEZESTAT, EXTERNAL VIBRATION ISOLATION, TIMER CONTROLS, RETURN/OUTSIDE AIR SENSORS, RETURN PLENUM

RECEIVED
JUNE 04, 2008
PLAZA CONSTRUCTION CORP.

NOTE:
THIS PLAN IS APPROVED ONLY FOR WORK ON THE APPLICATION SPECIFICATION SHEET. ALL OTHER MATTERS SHOWN ARE NOT TO BE RELIED UPON, OR TO BE CONSIDERED AS EITHER APPROVED OR IN ACCORDANCE WITH APPLICABLE CODES.

PROJECT NAME
GATEWAY CENTER
at Bronx Terminal Market

OWNER

THE RELATED COMPANIES
BTM Development Partners LLC
c/o Related Retail Corporation
60 Columbus Circle – 19th Floor
New York, NY 10023

CONSULTANTS

GreenbergFarrow
44 West 28th Street, 15th Floor
New York, NY 10001
t: 212 725 9530 f: 212 725 9552

4DG 212.268.7120 NY 973.242.3939 Fax 973.242.2676 744 Broad Street Suite 1924 Newark, NJ

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Glickman Engineering PLLC
CONSULTING ENGINEERS
345 Eighth Avenue - New York, NY 10018
Ph 212.629.2355 Fax 212.629.2355 www.gepc.net

Lee Weintraub LWLA
Landscape Architecture, LLC

LANGAN
River Drive Center 1 • Elmwood Park, NJ 07407 River Terrace, 01 • Phone: (201) 794-6900 • New York, NY • Fax: (201) 794-0366 • Philadelphia, PA • Trenton, NJ
www.langan.com

Dewberry
Dewberry-Goodkind, Inc.
55 EAST 59 STREET, 13th FLOOR NEW YORK, NY 10022-1105

ISSUES

No.	Date	Description
1.	16 Dec. 05	SCHE DD Set
2.	24 Feb. 06	SCHE DD Set
3.	10 Apr. 06	SCHE DD Set--addendum #3
4.	19 May 06	SCHE DD Set
5.	28 July 06	Permit Set
6.	8 Sept. 06	Bid Set
7.	2 Nov. 06	Bulletin 1 (MEP)
8.	15 Sept. 07	Bulletin #1
9.	13 Dec. 07	Bulletin #3R
10.	14 Mar. 08	Bulletin #9
11.	9 May 08	Bulletin 31

FILE INFORMATION
Filename
Drawn
Checked
Date
Job #

SCALE
As-Built 05/2008
Plan No. 2

BBG BBGM
BRENNAN BEER GORMAN ARCHITECTS
BRENNAN BEER GORMAN MONK INTERIORS
515 Madison Avenue New York NY 10022
Tel 212 888 7993 Fax 212 935 3868 www.bbgm.com
NEW YORK WASHINGTON SCOTTSDALE SYDNEY BEIJING

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RETAIL A -
HVAC SCHEDULES & DETAILS

M-316

APPENDIX K

RETAIL A HVAC SYSTEM COMPONENT MANUAL (CD-R)

1. Above Air Technologies Equipment
2. Greenheck Products
3. Lenox Industries Units
4. Magic Aire Units

COPY + PENDING SUBM. DIAMOND

Date: 06-13-07

AboveAir Technologies

EQUIPMENT SUBMITTAL

☐ NO EXCEPTIONS TAKEN
☐ NOTE MARKINGS
☐ REVISE AND RESUBMIT
☐ REJECTED

ENGINEERS REVIEW IS FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT AND CONTRACT DOCUMENTS. MARKINGS OR COMMENTS SHALL NOT BE CONSTRUED AS RELIEVING THE CONTRACTOR FROM COMPLIANCE WITH THE PROJECT PLANS AND SPECIFICATIONS, NOR DEPARTING THEREFROM. THE CONTRACTOR REMAINS RESPONSIBLE FOR DETAILS AND ACCURACY, FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, FOR COORDINATION WITH OTHER WORK, WHETHER NEW OR EXISTING AND OTHER TRADES, FOR SELECTING FABRICATION PROCESS, FOR TECHNIQUES OF ASSEMBLY AND FOR PERFORMING HIS WORK IN A SAFE MANNER.

Glickman Engineering, PLLC
345 Eighth Avenue
New York, NY 10018
By

Project Name: Gateway Center at Bronx Terminal Retail - A

Engineer: Glickman Engineering, PLLC

Contractor: Plaza Construction Corporation

Owner: The Related Companies / BMT Development Partners, LLC

AboveAir Rep: Gabinelli & Gebhard, Inc.

Manufacturer: AboveAir Technologies, LLC (Frederick, MD 21703, USA)

AboveAir Technologies Equipment:

Models:
15-Ton, AWC-180-4-HW0-FE-R7, Qty. 30(thirty)
15-Ton, AWC-180-4-000-FE-R7, Qty. 13(thirteen)
12-Ton, AWC-144-4-HW0-FE-R7, Qty. 1(one)
10-Ton, AWC-120-4-HW0-FE-R7, Qty. 4(four)
8-Ton, AWC-096-4-HW0-FE-R7, Qty. 1(one)
5-Ton, AWC-060-4-HW0-FE-R7, Qty. 1(one)

Plaza Construction Corp.
Bronx Terminal Market
Submittal No:

15736-002-1

REVIEWED. This review does not alleviate the subcontractor/supplier from conforming to the contract documents.

Select Features Included:

- HK-Horizontal Series DX Water Cooled, Self-Contained Ceiling Mounted Air Conditioners
- R407C Refrigerant
- Water Side Economizer Coils (FE) as specified w/ 3-Way Control Valve - factory installed
- Hot Water (HW) Heating Coils w/ 2-Way Control Valve where specified - factory installed
- 3-Way, 150 Psig Head Pressure Control Water Regulating Valves (per circuit) - factory installed
- Hot Gas Bypass (per circuit) - factory installed
- Powder Coat Painted Per Architect Color Galvanized Steel Construction
- Oversized Blower Motors & Pillow Block Bearings as Required
- BacNet Compatible Thermostat - factory unit mounted
- Condensate Pump - factory unit mounted
- Main Power, Non-Fused Disconnect - factory unit mounted
- Precoated Fin Corrosion Protected Coils (all coils)

JUN 19 2007

MEA230-06-E NYC Approved & Labeled

Note:
Hanging Spring Vibration Isolators, Firestat, Smoke Detector, Secondary Drain Pan, Rigging, Installation & Labor, Labor Warranty to be supplied by others if applicable.

Submitted For Approval by: **Matt Miller** **Date:** **June 13, 2007**

AboveAir Technologies
4844 Winchester Blvd., Frederick, MD 21703
Tel: (301) 874-1130 * Fax: (301) 874-1131

☐ NO EXCEPTIONS TAKEN
☑ NOTE MARKINGS
☐ REVISE AND RESUBMIT
☐ REJECTED

ENGINEERS REVIEW IS FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT AND CONTRACT DOCUMENTS. MARKINGS OR COMMENTS SHALL NOT BE CONSTRUED AS RELIEVING THE CONTRACTOR FROM COMPLIANCE WITH THE PROJECT PLANS AND SPECIFICATIONS, NOR DEPARTING THEREFROM. THE CONTRACTOR REMAINS RESPONSIBLE FOR DETAILS AND ACCURACY, FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, FOR COORDINATION WITH OTHER WORK, WHETHER NEW OR EXISTING AND OTHER TRADES, FOR SELECTING FABRICATION PROCESS, FOR TECHNOLOGIES OF ASSEMBLY, AND FOR PERFORMING HIS WORK IN A SAFE MANNER.

Glickman Engineering, PLLC
545 Eighth Avenue
New York, NY 10018
By LL Date 9-24-07

PLEASE SUBMIT
6-TON ACU,
SEE NEW ACU SCHEDULE,
BULLETIN #41

SEE ATTACHED SCHEDULE

ABOVEAIR TECHNOLOGIES

Submittal Data Sheet
HK™ - Horizontal A/C's

Date: June 13, 2007

BULLETIN #4

Unit No:	RS-2.1/ACU-~~3,5,6,7,10,12~~ 1,2,3 & RS-2.2/ACU-~~1,4~~ & RS-2.3/ACU-1,2,5,7 & RS-2.4/ACU-1,2; CR-1/ACU-1 thru 3; HIS/ACU-1 thru 13	**Project:**	Gateway Center at Bronx Terminal Retail - A
RS-2.2/1 THRU 5		**Contractor:**	Plaza Construction Corporation
Evap Model:	~~AWC-180-4-HW0-FE-R7~~	**Owner:**	The Related Companies / BMT Development Partners, LLC
Qty.:	30(thirty)	**Engineer:**	Glickman Engineering, PLLC
Description:	15 Ton Nominal, Self-Contained Water Cooled Horizontal Ceiling Mtd with Free-Cooling Economizer & Hot Water Heating Coil	**AboveAir Rep:**	Gabinelli & Gebhard, Inc.

Main Power Supply:
Main Power: 460V / 3 Ph / 60 Hz

DX Cooling Capacity:
Total Cooling: 202.8 TMBH / 159.2 SMBH
Entering Air Temp: 80°F DB / 67°F WB, 50% RH
Outside Air CFM: 1,250 CFM ; 1800CFM / SEE SCHEDULE

FE, Free-Cooling Capacity:
Total Cooling: 163.4 TMBH / 135.4 SMBH
Entering Air Temp: 75°F DB / 62.5°F WB, 50% RH
Entering Water Temp: 45°F
Flow Rate / Coil PD: 45.0 GPM / 15.9 FT H2O

Evaporator Blower Data:
Blower Type / (Qty): Belt-Drive Centrifugal / (one)
Motor HP / FLA: 7-1/2 HP / FLA: 8.7
Total CFM: 5,000 CFM @ 1.0 IN WG ESP

DX Evaporator Coil Data:
Face Area: 8.6 Ft²
Rows: 4

Free-Cooling Economizer Coil Data:
Face Area: 8.6 Ft²
Rows: 4

Compressor Data:
Type / (Qty.): Scroll / (three)
~~HP / RLA / LRA:~~ ~~5.0 ea / 10.0 ea / 63.0 ea~~
Refrigerant Type: R-407C

Water Cooled Condenser Data:
Condenser Type: Coaxial / Qty 3(three)
EWT / LWT: 85°F / 95°F
Total Flow Rate / PD: 45.0 GPM @ 35.0 FT WG
Total Heat of Rej.: 225.0 MBH

Hot Water Heat Data (Built-In):
Type: Hot Water
Coil Row / Face Area: 1 Row / 8.4 Ft²
Heat Capacity: 222.2 MBH
EAT / LAT: 70.0°F DB / 103.2°F WB
EWT / LWT: 200.0°F / 180°F LWT
Flow Rate / Coil PD: 18.0 / 4.6 FT H2O
Control Type: 2-Way, Factory Installed

Air Filtration Data: *(Integral External Filter Rack)*
Size / Qty.: 16x25x2 / (three)
Efficiency: 30% Dust Spot

Connection Data:
Condenser Water: 1-3/8 OD IN/OUT
Hot Water Coil: 1-1/8" OD IN/OUT
Condensate Drain: 3/4" FPT

Physical Data:
H x W x L: 29" H x 82" W x 66" L
Weight (lbs): 1,325 lbs

Electrical Data:
@ 460/3/60: 38.7 FLA / 43.7 MCA / 60 MOP
EER: 12.8 EER

COORD FINAL REQ'S W/ ELECT CONTRACTOR

Factory Installed Features Included:
- ☑ 3-Way, 150 psig DX Water Reg Valves (per circuit)
- ☑ 3-Way, 300 psig Free-Cooling Control Valve
- ☑ Free-Cooling Aquastat
- ☑ 2-Way, Hot Water Heat Control Valve
- ☑ Hot Gas Bypass (per circuit)
- ☑ Pillow Block Bearing & Dual Pulleys/Belts
- ☑ TEC2603-2 JCI BacNet Compatible Thermostat
- ☑ Condensate Pump
- ☑ Main Power, Non-Fused Disconnect
- ☑ Precoated Fin Corrosion Protected Coils (all coils)

Factory Warranties Included:
- ☑ 1 Year Limted Parts & Labor Warranty
- ☑ 4 Year Extended (5 yr Total) Compressor Warranty

Select Standard Design Features:
- Powder-Coat Painted (color per Architect) Heavy Gauged Galvanized Steel Construction
- High Density Insulated Cabinet & Access Panels
- Adjustable High Static Belt-Drive Centrifugal Blower
- High efficiency, Al, Finned / Cu Tube Coils
- Stainless Steel 2" Deep Condensate Drain Pan
- High & Low Refrigerant Pressure Switches
- Condensate Pan Overflow Safety Switch
- Each unit Factory Tested per UL 1995 Requirements

ETL LISTED CONFORMS TO UL STD 1995 CERTIFIED TO CAN/CSA STD C22.2 No. 236 3091370

MEA230-06-E Approved

AboveAir Technologies
4844 Winchester Boulevard
Frederick, Maryland 21703, U.S.A.

NO MORE, SEE SCHEDULE

ABOVEAIR TECHNOLOGIES

Submittal Data Sheet

HK™ - Horizontal A/C's

BUL. #41

Date: June 13, 2007

Unit No:	RS-2.1/ACU-2,4,8,9,11,14,15 & RS-2.2/ACU-2,3 & RS-2.3 / ACU-3,4,6,8	**Project:**	Gateway Center at Bronx Terminal Retail - A
		Contractor:	Plaza Construction Corporation
Evap Model:	AWC-180-4-000-FE-R7	**Owner:**	The Related Companies / BMT Development Partners, LLC
Qty.:	13(thirteen)		
Description:	15 Ton Nominal, Self-Contained Water Cooled Horizontal Ceiling Mtd with Free-Cooling Economizer, *(Cooling Only (No Hot Water Heat))*	**Engineer:**	Glickman Engineering, PLLC
		AboveAir Rep:	Gabinelli & Gebhard, Inc.

Main Power Supply:

Main Power:	460V / 3 Ph / 60 Hz

DX Cooling Capacity:

Total Cooling:	202.8 TMBH / 159.2 SMBH
Entering Air Temp:	80°F DB / 67°F WB, 50% RH
Outside Air CFM:	1,250 CFM

FE, Free-Cooling Capacity:

Total Cooling:	163.4 TMBH / 135.4 SMBH
Entering Air Temp:	75°F DB / 62.5°F WB, 50% RH
Entering Water Temp:	45°F
Flow Rate / Coil PD:	45.0 GPM / 15.9 FT H2O

Evaporator Blower Data:

Blower Type / (Qty):	Belt-Drive Centrifugal / (one)
Motor HP / FLA:	7-1/2 HP / FLA: 8.7
Total CFM:	5,000 CFM @ 1.0 IN WG ESP

DX Evaporator Coil Data:

Face Area:	8.6 Ft^2
Rows:	4

Free-Cooling Economizer Coil Data:

Face Area:	8.6 Ft^2
Rows:	4

Compressor Data:

Type / (Qty.):	Scroll / (three)
HP / RLA / LRA:	5.0 ea / 10.0 ea / 63.0 ea
Refrigerant Type:	R-407C

Water Cooled Condenser Data:

Condenser Type:	Coaxial / Qty 3(three)
EWT / LWT:	85°F / 95°F
Total Flow Rate / PD:	45.0 GPM @ 35.0 FT WG
Total Heat of Rej.:	225.0 MBH

Hot Water Heat Data (Built-In):

Type	N/A
Coil Row / Face Area:	N/A
Heat Capacity:	N/A
EAT / LAT:	N/A
EWT / LWT:	N/A
Flow Rate / Coil PD:	N/A
Control Type:	N/A

Air Filtration Data: *(Integral External Filter Rack)*

Size / Qty.:	16x25x2 / (three)
Efficiency:	30% Dust Spot

Connection Data:

Condenser Water:	1-3/8 OD IN/OUT
Hot Water Coil:	N/A
Condensate Drain:	3/4" FPT

Physical Data:

H x W x L	29" H x 82" W x 66" L
Weight (lbs)	1,285 lbs

Electrical Data:

@ 460/3/60:	38.7 FLA / 43.7 MCA / 60 MOP
EER:	14.0 EER

Factory Installed Features Included:

- ☑ 3-Way, 150 psig DX Water Reg Valves (per circuit)
- ☑ 3-Way, 300 psig Free-Cooling Control Valve
- ☑ Free-Cooling Aquastat
- ☑ Hot Gas Bypass (per circuit)
- ☑ Pillow Block Bearing & Dual Pulleys/Belts
- ☑ TEC2603-2 JCI BacNet Compatible Thermostat
- ☑ Condensate Pump
- ☑ Main Power, Non-Fused Disconnect
- ☑ Precoated Fin Corrosion Protected Coils (all coils)

Factory Warranties Included:

- ☑ 1 Year Limted Parts & Labor Warranty
- ☑ 4 Year Extended (5 yr Total) Compressor Warranty

Select Standard Design Features:

- Powder-Coat Painted (color per Architect) Heavy Gauged Galvanized Steel Construction
- High Density Insulated Cabinet & Access Panels
- Adjustable High Static Belt-Drive Centrifugal Blower
- High efficiency, Al_2 Finned / Cu Tube Coils
- Stainless Steel 2" Deep Condensate Drain Pan
- High & Low Refrigerant Pressure Switches
- Condensate Pan Overflow Safety Switch
- Each unit Factory Tested per UL 1995 Requirements

ETL LISTED CONFORMS TO UL STD 1995 CERTIFIED TO CAN/CSA STD C22.2 No. 236

MEA230-06-E Approved

AboveAir Technologies
4844 Winchester Boulevard
Frederick, Maryland 21703, U.S.A.

ABOVEAIR TECHNOLOGIES

Submittal Data Sheet

HK™ - Horizontal A/C's

SEE SCHEDULE BULLETIN #41

Date: June 13, 2007

Unit No:	HIS/ACU-14 TARGET/ACU-6	**Project:**	Gateway Center at Bronx Terminal Retail - A
Evap Model:	AWC-144-4-HW0-FE-R7	**Contractor:**	Plaza Construction Corporation
Qty.:	1(one)	**Owner:**	The Related Companies / BMT Development Partners, LLC
Description:	12 Ton Nominal, Self-Contained Water Cooled Horizontal Ceiling Mtd with Free-Cooling Economizer & Hot Water Heating Coil	**Engineer:**	Glickman Engineering, PLLC
		AboveAir Rep:	Gabinelli & Gebhard, Inc.

Main Power Supply:

Main Power:	460V / 3 Ph / 60 Hz

DX Cooling Capacity:

Total Cooling:	164.0 TMBH / 126.5 SMBH
Entering Air Temp:	80°F DB / 67°F WB, 50% RH
Outside Air CFM:	1,010 CFM

FE, Free-Cooling Capacity:

Total Cooling:	139.6 TMBH / 112.8 SMBH
Entering Air Temp:	75°F DB / 62.5°F WB, 50% RH
Entering Water Temp:	45°F
Flow Rate / Coil PD:	36.0 GPM / 10.8 FT H2O

Evaporator Blower Data:

Blower Type / (Qty):	Belt-Drive Centrifugal / (one)
Motor HP / FLA:	7-1/2 HP / FLA: 8.7
Total CFM:	3,980 CFM @ 1.0 IN WG ESP

DX Evaporator Coil Data:

Face Area:	8.6 Ft²
Rows:	4

Free-Cooling Economizer Coil Data:

Face Area:	8.6 Ft²
Rows:	4

Compressor Data:

Type / (Qty.):	Scroll / (three)
HP / RLA / LRA:	4.0 ea / 7.9 ea / 50.0 ea
Refrigerant Type:	R-407C

Water Cooled Condenser Data:

Condenser Type:	Coaxial / Qty 3(three)
EWT / LWT:	85°F / 95°F
Total Flow Rate / PD:	36.0 GPM @ 35.0 FT WG
Total Heat of Rej.:	180.0 MBH

Hot Water Heat Data (Built-In):

Type	Hot Water
Coil Row / Face Area:	1 Row / 8.4 Ft²
Heat Capacity:	193.2 MBH
EAT / LAT:	70.0°F DB / 106.2°F WB
EWT / LWT:	200.0°F / 180°F LWT
Flow Rate / Coil PD:	14.5 / 3.2 FT H2O
Control Type:	2-Way, Factory Installed

Air Filtration Data:

(Integral External Filter Rack)

Size / Qty.:	16x25x2 / (three)
Efficiency:	30% Dust Spot

Connection Data:

Condenser Water:	1-3/8 OD IN/OUT
Hot Water Coil:	1-1/8" OD IN/OUT
Condensate Drain:	3/4" FPT

Physical Data:

H x W x L	29" H x 82" W x 66" L
Weight (lbs)	1,315 lbs

Electrical Data:

@ 460/3/60:	30.1 FLA / 34.0 MCA / 45 MOP
EER:	12.4 EER

COORD FINAL REQ'S W/ELECT CONTR.

Factory Installed Features Included:

- ☑ 3-Way, 150 psig DX Water Reg Valves (per circuit)
- ☑ 3-Way, 300 psig Free-Cooling Control Valve
- ☑ Free-Cooling Aquastat
- ☑ 2-Way, Hot Water Heat Control Valve
- ☑ Hot Gas Bypass (per circuit)
- ☑ Pillow Block Bearing & Dual Pulleys/Belts
- ☑ TEC2603-2 JCI BacNet Compatible Thermostat
- ☑ Condensate Pump
- ☑ Main Power, Non-Fused Disconnect
- ☑ Precoated Fin Corrosion Protected Coils (all coils)

Factory Warranties Included:

- ☑ 1 Year Limted Parts & Labor Warranty
- ☑ 4 Year Extended (5 yr Total) Compressor Warranty

Select Standard Design Features:

- Powder-Coat Painted (color per Architect) Heavy Gauged Galvanized Steel Construction
- High Density Insulated Cabinet & Access Panels
- Adjustable High Static Belt-Drive Centrifugal Blower
- High efficiency, Al_2 Finned / Cu Tube Coils
- Stainless Steel 2" Deep Condensate Drain Pan
- High & Low Refrigerant Pressure Switches
- Condensate Pan Overflow Safety Switch
- Each unit Factory Tested per UL 1995 Requirements

ETL LISTED CONFORMS TO UL STD 1995 3091370 CERTIFIED TO CAN/CSA STD C22.2 No. 236

MEA230-06-E Approved

AboveAir Technologies
4844 Winchester Boulevard
Frederick, Maryland 21703, U.S.A.

NO MORE. SEE SCHEDULE BULLETIN #41

ABOVEAIR TECHNOLOGIES

Submittal Data Sheet
HK™ - Horizontal A/C's

Date: June 13, 2007

Unit No:	RS-2.1/ACU-1,13,16 & RS-2.4 / ACU-3	**Project:**	Gateway Center at Bronx Terminal Retail - A
Evap Model:	AWC-120-4-HW0-FE-R7	**Contractor:**	Plaza Construction Corporation
Qty.:	4(four)	**Owner:**	The Related Companies / BMT Development Partners, LLC
Description:	10 Ton Nominal, Self-Contained Water Cooled Horizontal Ceiling Mtd with Free-Cooling Economizer & Hot Water Heating Coil	**Engineer:**	Glickman Engineering, PLLC
		AboveAir Rep:	Gabinelli & Gebhard, Inc.

Main Power Supply:
Main Power: 460V / 3 Ph / 60 Hz

DX Cooling Capacity:
Total Cooling: 142.7 TMBH / 104.5 SMBH
Entering Air Temp: 80°F DB / 67°F WB, 50% RH
Outside Air CFM: 840 CFM

FE, Free-Cooling Capacity:
Total Cooling: 121.1 TMBH / 96.6 SMBH
Entering Air Temp: 75°F DB / 62.5°F WB, 50% RH
Entering Water Temp: 45°F
Flow Rate / Coil PD: 30.0 GPM / 7.8 FT H2O

Evaporator Blower Data:
Blower Type / (Qty): Belt-Drive Centrifugal / (one)
Motor HP / FLA: 3 HP / FLA: 4.0
Total CFM: 3,320 CFM @ 1.0 IN WG ESP

DX Evaporator Coil Data:
Face Area: 8.6 Ft²
Rows: 4

Free-Cooling Economizer Coil Data:
Face Area: 8.6 Ft²
Rows: 4

Compressor Data:
Type / (Qty.): Scroll / (two)
HP / RLA / LRA: 5.0 ea / 10.0 ea / 63.0 ea
Refrigerant Type: R-407C

Water Cooled Condenser Data:
Condenser Type: Coaxial / Qty 2(two)
EWT / LWT: 85°F / 95°F
Total Flow Rate / PD: 30.0 GPM @ 35.0 FT WG
Total Heat of Rej.: 150.0 MBH

Hot Water Heat Data (Built-In):
Type: Hot Water
Coil Row / Face Area: 1 Row / 8.4 Ft²
Heat Capacity: 171.2 MBH
EAT / LAT: 70.0°F DB / 108.5°F WB
EWT / LWT: 200.0°F / 180°F LWT
Flow Rate / Coil PD: 12.0 / 2.3 FT H2O
Control Type: 2-Way, Factory Installed

Air Filtration Data: *(Integral External Filter Rack)*
Size / Qty.: 16x25x2 / (three)
Efficiency: 30% Dust Spot

Connection Data:
Condenser Water: 1-1/8 OD IN/OUT
Hot Water Coil: 1-1/8" OD IN/OUT
Condensate Drain: 3/4" FPT

Physical Data:
H x W x L: 29" H x 82" W x 66" L
Weight (lbs): 1,250 lbs

Electrical Data:
@ 460/3/60: 24.0 FLA / 26.5 MCA / 35 MOP
EER: 13.5 EER

Factory Installed Features Included:
- ☑ 3-Way, 150 psig DX Water Reg Valves (per circuit)
- ☑ 3-Way, 300 psig Free-Cooling Control Valve
- ☑ Free-Cooling Aquastat
- ☑ 2-Way, Hot Water Heat Control Valve
- ☑ Hot Gas Bypass (per circuit)
- ☑ TEC2603-2 JCI BacNet Compatible Thermostat
- ☑ Condensate Pump
- ☑ Main Power, Non-Fused Disconnect
- ☑ Precoated Fin Corrosion Protected Coils (all coils)

Factory Warranties Included:
- ☑ 1 Year Limted Parts & Labor Warranty
- ☑ 4 Year Extended (5 yr Total) Compressor Warranty

Select Standard Design Features:
- Powder-Coat Painted (color per Architect) Heavy Gauged Galvanized Steel Construction
- High Density Insulated Cabinet & Access Panels
- Adjustable High Static Belt-Drive Centrifugal Blower
- High efficiency, Al_2 Finned / Cu Tube Coils
- Stainless Steel 2" Deep Condensate Drain Pan
- High & Low Refrigerant Pressure Switches
- Condensate Pan Overflow Safety Switch
- Each unit Factory Tested per UL 1995 Requirements

ETL LISTED CONFORMS TO UL STD 1995 CERTIFIED TO CAN/CSA STD C22.2 No. 236 — 5091370

MEA230-06-E Approved

AboveAir Technologies
4844 Winchester Boulevard
Frederick, Maryland 21703, U.S.A.

SEE ATTACHED SCHEDULE
BULLETIN #41

AboveAir Technologies

Submittal Data Sheet
HK™ - Horizontal A/C's

Date: June 13, 2007

Unit No: HIS/ACU-16 (RS...)
Evap Model: AWC-096-4-HW0-FE-R7
Qty.: 1(one)
Description: 8 Ton Nominal, Self-Contained Water Cooled Horizontal Ceiling Mtd with Free-Cooling Economizer & Hot Water Heating Coil

Project: Gateway Center at Bronx Terminal Retail - A
Contractor: Plaza Construction Corporation
Owner: The Related Companies / BMT Development Partners, LLC
Engineer: Glickman Engineering, PLLC
AboveAir Rep: Gabinelli & Gebhard, Inc.

Main Power Supply:
Main Power: 460V / 3 Ph / 60 Hz

DX Cooling Capacity:
Total Cooling: 111.2 TMBH / 84.5 SMBH
Entering Air Temp: 80°F DB / 67°F WB, 50% RH
Outside Air CFM: 900 CFM

FE, Free-Cooling Capacity:
Total Cooling: 81.3 TMBH / 71.0 SMBH
Entering Air Temp: 75°F DB / 62.5°F WB, 50% RH
Entering Water Temp: 45°F
Flow Rate / Coil PD: 24.0 GPM / 4.8 FT H2O

Evaporator Blower Data:
Blower Type / (Qty): Belt-Drive Centrifugal / (one)
Motor HP / FLA: 3 HP / FLA: 4.0
Total CFM: 2,650 CFM @ 1.0 IN WG ESP

DX Evaporator Coil Data:
Face Area: 5.1 Ft²
Rows: 5

Free-Cooling Economizer Coil Data:
Face Area: 5.1 Ft²
Rows: 4

Compressor Data:
Type / (Qty.): Scroll / (two)
HP / RLA / LRA: 4.0 ea / 7.9 ea / 50.0 ea
Refrigerant Type: R-407C

Water Cooled Condenser Data:
Condenser Type: Coaxial / Qty 2(two)
EWT / LWT: 85°F / 95°F
Total Flow Rate / PD: 24.0 GPM @ 35.0 FT WG
Total Heat of Rej.: 120.0 MBH

Hot Water Heat Data (Built-In):
Type: Hot Water
Coil Row / Face Area: 1 Row / 5.0 Ft²
Heat Capacity: 120.0 MBH
EAT / LAT: 70.0°F DB / 103.5°F WB
EWT / LWT: 200.0°F / 180°F LWT
Flow Rate / Coil PD: 9.6 / 2.0 FT H2O
Control Type: 2-Way, Factory Installed

Air Filtration Data: *(Integral External Filter Rack)*
Size / Qty.: 16x24x2 / (two)
Efficiency: 30% Dust Spot

Connection Data:
Condenser Water: 1-1/8 OD IN/OUT
Hot Water Coil: 7/8" OD IN/OUT
Condensate Drain: 3/4" FPT

Physical Data:
H x W x L: 27" H x 57" W x 60" L
Weight (lbs): 925 lbs

Electrical Data:
@ 460/3/60: 19.8 FLA / 21.8 MCA / 25 MOP
EER: 14.0 EER

COORD FINAL PANEL'S W/ELEC CONTR.

Factory Installed Features Included:
- ☑ 3-Way, 150 psig DX Water Reg Valves (per circuit)
- ☑ 3-Way, 300 psig Free-Cooling Control Valve
- ☑ Free-Cooling Aquastat
- ☑ 2-Way, Hot Water Heat Control Valve
- ☑ Hot Gas Bypass (per circuit)
- ☑ TEC2603-2 JCI BacNet Compatible Thermostat
- ☑ Condensate Pump
- ☑ Main Power, Non-Fused Disconnect
- ☑ Precoated Fin Corrosion Protected Coils (all coils)

Factory Warranties Included:
- ☑ 1 Year Limted Parts & Labor Warranty
- ☑ 4 Year Extended (5 yr Total) Compressor Warranty

Select Standard Design Features:
- Powder-Coat Painted (color per Architect) Heavy Gauged Galvanized Steel Construction
- High Density Insulated Cabinet & Access Panels
- Adjustable High Static Belt-Drive Centrifugal Blower
- High efficiency, Al_2 Finned / Cu Tube Coils
- Stainless Steel 2" Deep Condensate Drain Pan
- High & Low Refrigerant Pressure Switches
- Condensate Pan Overflow Safety Switch
- Each unit Factory Tested per UL 1995 Requirements

ETL LISTED CONFORMS TO UL STD 1995
3091270 CERTIFIED TO CAN/CSA STD C22.2 No. 236

MEA230-06-E Approved

AboveAir Technologies
4844 Winchester Boulevard
Frederick, Maryland 21703, U.S.A.

SEE ATTACHED SCHEDULE, BULLETIN #41

ABOVEAIR TECHNOLOGIES

Submittal Data Sheet

HK™ - Horizontal A/C's

Date: June 13, 2007

Unit No:	HIS/ACU-15, RS-2 / ACU-4	**Project:**	Gateway Center at Bronx Terminal Retail - A
Evap Model:	AWC-060-4-HW0-FE-R7		
Qty.:	1(one)	**Contractor:**	Plaza Construction Corporation
Description:	5 Ton Nominal, Self-Contained Water Cooled Horizontal Ceiling Mtd with Free-Cooling Economizer & Hot Water Heating Coil	**Owner:**	The Related Companies / BMT Development Partners, LLC
		Engineer:	Glickman Engineering, PLLC
		AboveAir Rep:	Gabinelli & Gebhard, Inc.

Main Power Supply:

Main Power: 460V / 3 Ph / 60 Hz

DX Cooling Capacity:

Total Cooling:	72.4 TMBH / 53.5 SMBH
Entering Air Temp:	80°F DB / 67°F WB, 50% RH
Outside Air CFM:	560 CFM, 420CFM

FE, Free-Cooling Capacity:

Total Cooling:	56.8 TMBH / 47.3 SMBH
Entering Air Temp:	75°F DB / 62.5°F WB, 50% RH
Entering Water Temp:	45°F
Flow Rate / Coil PD:	15.0 GPM / 2.1 FT H2O

Evaporator Blower Data:

Blower Type / (Qty):	Belt-Drive Centrifugal / (one)
Motor HP / FLA:	1 HP / FLA: 1.9
Total CFM:	1,660 CFM @ 1.0 IN WG ESP

DX Evaporator Coil Data:

Face Area:	5.1 Ft²
Rows:	5

Free-Cooling Economizer Coil Data:

Face Area:	5.1 Ft²
Rows:	4

Compressor Data:

Type / (Qty.):	Scroll / (two)
HP / RLA / LRA:	2.5 ea / 5.0 ea / 31.0 ea
Refrigerant Type:	R-407C

Water Cooled Condenser Data:

Condenser Type:	Coaxial / Qty 2(two)
EWT / LWT:	85°F / 95°F
Total Flow Rate / PD:	15.0 GPM @ 35.0 FT WG
Total Heat of Rej.:	75.0 MBH

Hot Water Heat Data (Built-In):

Type	Hot Water
Coil Row / Face Area:	1 Row / 5.0 Ft²
Heat Capacity:	87.8 MBH
EAT / LAT:	70.0°F DB / 109.5°F WB
EWT / LWT:	200.0°F / 180°F LWT
Flow Rate / Coil PD:	6.0 / 0.9 FT H2O
Control Type:	2-Way, Factory Installed

Air Filtration Data: *(Integral External Filter Rack)*

Size / Qty.:	16x24x2 / (two)
Efficiency:	30% Dust Spot

Connection Data:

Condenser Water:	7/8 OD IN/OUT
Hot Water Coil:	7/8" OD IN/OUT
Condensate Drain:	3/4" FPT

Physical Data:

H x W x L	27" H x 57" W x 60" L
Weight (lbs)	845 lbs

Electrical Data:

@ 460/3/60:	11.9 FLA / 13.2 MCA / 15 MOP
EER:	15.6 EER

COORD. FINAL REQ'S W/ELEC CONTR.

Factory Installed Features Included:

- ☑ 3-Way, 150 psig DX Water Reg Valves (per circuit)
- ☑ 3-Way, 300 psig Free-Cooling Control Valve
- ☑ Free-Cooling Aquastat
- ☑ 2-Way, Hot Water Heat Control Valve
- ☑ Hot Gas Bypass (per circuit)
- ☑ TEC2603-2 JCI BacNet Compatible Thermostat
- ☑ Condensate Pump
- ☑ Main Power, Non-Fused Disconnect
- ☑ Precoated Fin Corrosion Protected Coils (all coils)

Factory Warranties Included:

- ☑ 1 Year Limted Parts & Labor Warranty
- ☑ 4 Year Extended (5 yr Total) Compressor Warranty

Select Standard Design Features:

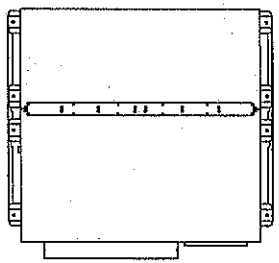
- Powder-Coat Painted (color per Architect) Heavy Gauged Galvanized Steel Construction
- High Density Insulated Cabinet & Access Panels
- Adjustable High Static Belt-Drive Centrifugal Blower
- High efficiency, Al_2 Finned / Cu Tube Coils
- Stainless Steel 2" Deep Condensate Drain Pan
- High & Low Refrigerant Pressure Switches
- Condensate Pan Overflow Safety Switch
- Each unit Factory Tested per UL 1995 Requirements

ETL LISTED CONFORMS TO UL STD 1995 3091270 CERTIFIED TO CAN/CSA STD C22.2 No. 236

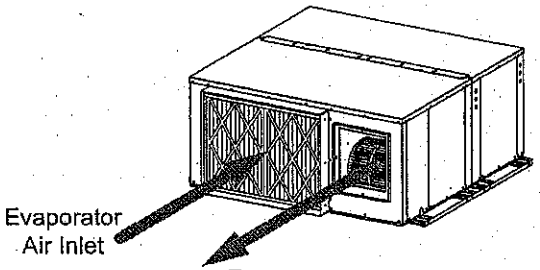
MEA230-06-E Approved

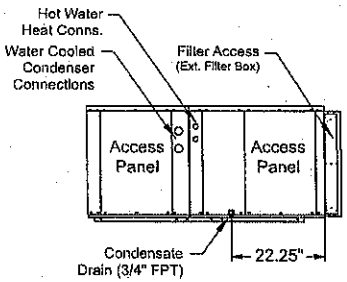
AboveAir Technologies
4844 Winchester Boulevard
Frederick, Maryland 21703, U.S.A.

Gateway A & B, 4-8 Tons, AWC-048, 060, 072 & 096-_-HW0-FE

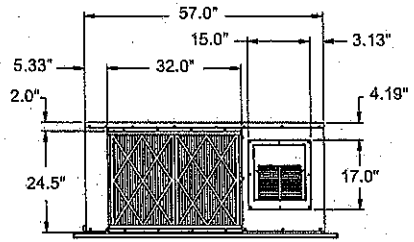


Top View

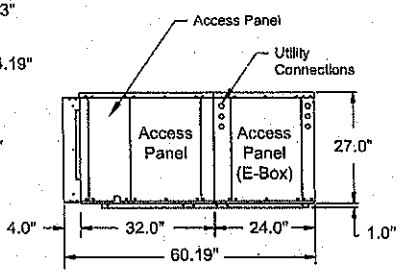




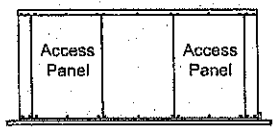
Left-Side View



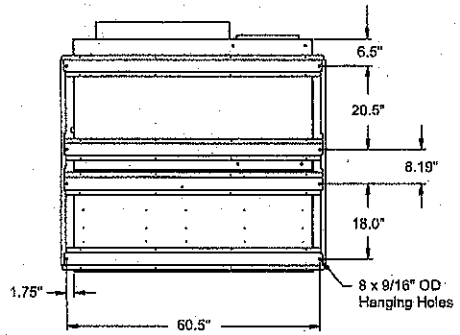
Front View



Right-Side View



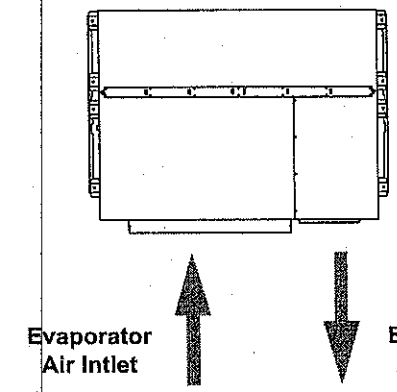
Rear View



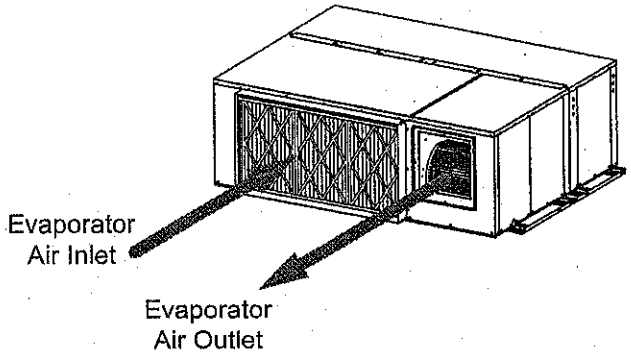
Bottom View

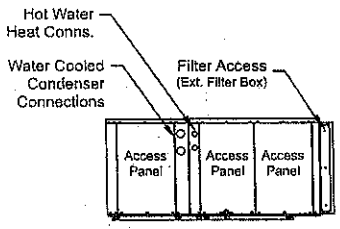
Revision Data: 04-17-07

Gateway A & B, 10-15 Tons, AWC-120, 144 & 180-_-HW0-FE

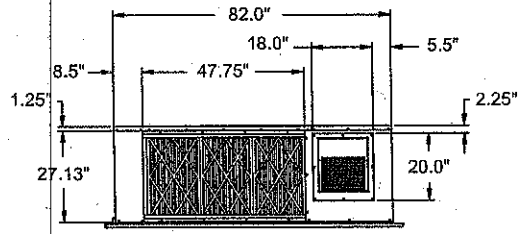


Top View

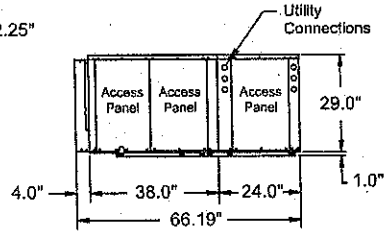




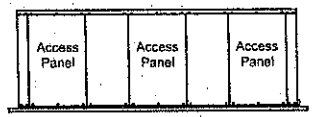
Left-Side View



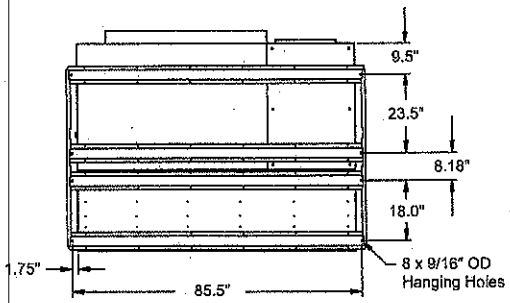
Front View



Right-Side View



Rear View



Bottom View

Revision Data: 04-17-07

TEC260x-2 Series BACnet® MS/TP Networked Thermostats

Description

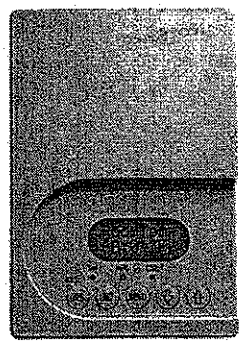
The TEC260x-2 Series Thermostats are BACnet® Master-Slave/Token-Passing (MS/TP) networked devices that provide control of rooftop units (with or without economizers), heat pumps, and single- and multi-stage heating/cooling equipment. The technologically advanced TEC260x-2 Series Thermostats feature a Building Automation System (BAS) BACnet MS/TP communication capability that enables remote monitoring and programmability for efficient space temperature control.

The TEC260x-2 Series Thermostats feature an intuitive user interface with backlit display that makes setup and operation quick and easy. The thermostats also employ a unique, Proportional-Integral (PI) time-proportioning algorithm that virtually eliminates temperature offset associated with traditional, differential-based thermostats.

Refer to the *TEC260x-2 Series BACnet® MS/TP Networked Thermostats Product Bulletin (LIT-12011116)* for important product application information.

Features

- BACnet MS/TP communication — provides compatibility with a proven communication network; BACnet MS/TP is widely accepted by Heating, Ventilating, and Air Conditioning (HVAC) control suppliers
- backlit Liquid Crystal Display (LCD) — offers real-time control status of the environment in easy-to-read, English text messages with constant backlight that brightens during user interaction
- simplified setpoint adjustment — enables the user to change the setpoint by simply pressing the **UP/DOWN** arrow keys
- five easy-to-use interface keys — allow for easy commissioning of the thermostat, and eliminate the need for DIP switches
- two configurable digital inputs — provide additional inputs for advanced functions such as remote night setback, occupancy override, and service or filter alarms
- over 20 configurable parameters — enable the thermostat to adapt to any application, allowing installer parameter access without opening the thermostat cover
- discharge air sensor — monitors unit efficiency
- economizer output (TEC2604-2 model) — provides control of economizer operation for single- and multi-stage unitary rooftop equipment



TEC260x-2 Series BACnet MS/TP Networked Thermostat

Repair Information

If the TEC260x-2 Series Thermostat fails to operate within its specifications, replace the unit. For a replacement thermostat, contact the nearest Johnson Controls® representative.

Selection Chart

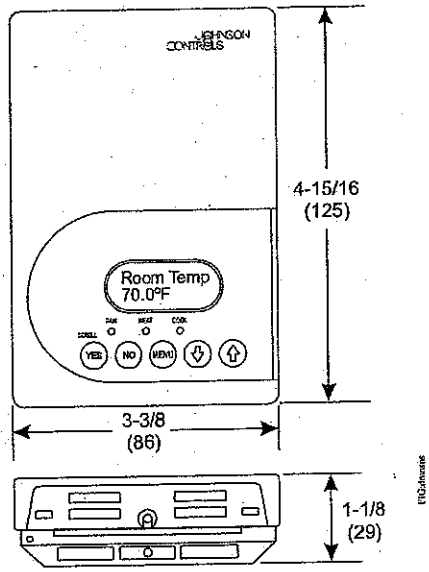
Code Number	Description	Applications
TEC2601-2	BACnet MS/TP Networked Single-Stage Thermostat	Fan Coil Units, Unit Heaters, and Single-Stage Packaged Heating/Cooling Equipment
TEC2602-2	BACnet MS/TP Networked Heat Pump Thermostat	Heat Pumps with Up to Three Heating and Two Cooling Stages
TEC2603-2	BACnet MS/TP Networked Multi-Stage Thermostat	Multi-Stage Packaged Heating/Cooling Equipment
TEC2604-2	BACnet MS/TP Networked Multi-Stage Economizer Thermostat	Economizer Operation for Single- and Multi-Stage Unitary Rooftop Equipment

Accessories

Code Number	Description
SEN-600-1	Remote Indoor Air Temperature Sensor
SEN-600-2	Outdoor Air Temperature Sensor
SEN-600-3	Duct Mount Air Temperature Sensor
SEN-600-4	Remote Indoor Air Temperature Sensor with Occupancy Override and Light-Emitting Diode (LED)

The performance specifications are nominal and conform to acceptable industry standards. For applications at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products. © 2006 Johnson Controls, Inc.

TEC260x-2 Series BACnet® MS/TP Networked Thermostats (Continued)



Thermostat Dimensions, in. (mm)

Technical Specifications

TEC260X-2 Series BACnet MS/TP Networked Thermostats		
Power Requirements		19 to 30 VAC, 50/60 Hz, 2 VA (Terminals RC and C) at 24 VAC Nominal, Class 2 or Safety Extra-Low Voltage (SELV)
Economizer Output Rating (TEC2604-2 Model)		0 to 10 VDC into 2k ohm Resistance (Minimum)
Relay/Triac Contact Rating		30 VAC, 1.0 A Maximum, 3.0 A In-Rush, Class 2 or SELV
Digital Inputs		Voltage-Free Contacts across Terminal C to Terminals DI1 and DI2
Wire Size		18 AWG (1.0 mm Diameter) Maximum, 22 AWG (0.6 mm Diameter) Recommended
MS/TP Network Guidelines		32 Devices Maximum; 4,000 ft (1,219 m) Maximum Cable Length
Thermostat Measurement Range		-40.0°F/-40.0°C to 122.0°F/50.0°C
Sensor Type		Local 10k ohm Negative Temperature Coefficient (NTC) Thermistor
Resolution		±0.2F°/±0.1C°
Control Accuracy		±0.9F°/±0.5C° at 70.0°F/21.0°C Typical Calibrated
Auxiliary/Outdoor Air Temperature Indication Range		-40.0°F/-40.0°C to 122.0°F/50.0°C
Control Range	Heating	40.0°F/4.5°C to 90.0°F/32.0°C in 0.5° Increments
	Cooling	54.0°F/12.0°C to 100.0°F/38.0°C in 0.5° Increments
Minimum Deadband		2F°/1C° between Heating and Cooling
Ambient Conditions	Operating	32 to 122°F (0 to 50°C); 95% RH Maximum, Noncondensing
	Storage	-22 to 122°F (-30 to 50°C); 95% RH Maximum, Noncondensing
Compliance	United States	UL Listed, File E27734, CCN XAPX, Under UL 873, Temperature Indicating and Regulating Equipment
		FCC Compliant to CFR 47, Part 15, Subpart B, Class A
	Canada	UL Listed, File E27734, CCN XAPX7, Under CAN/CSA C22.2 No. 24, Temperature Indicating and Regulating Equipment
		Industry Canada, ICES-003
	Europe	CE Mark, EMC Directive 89/336/EEC
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant
Shipping Weight		0.75 lb (0.34 kg)

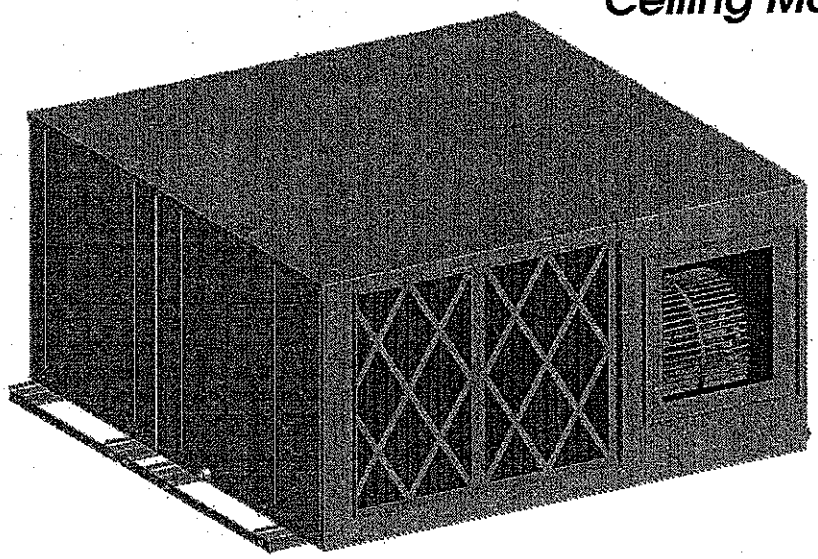
The performance specifications are nominal and conform to acceptable industry standards. For applications at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products. © 2006 Johnson Controls, Inc.

Engineering Manual

HK™ Horizontal

High Static Packaged & Split

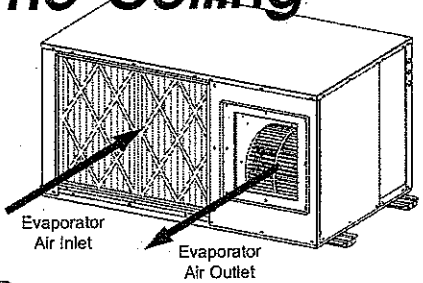
Ceiling Mounted Air Conditioners (DX & CW Systems)



1 to 15 Tons

Ducted Same-Face Series

"Above-The-Ceiling"



Features & Benefits

- 1 to 15 Ton Capacities
- *ComfortCool™*
  - General Office Spaces
  - Conference Rooms
  - Restaurants / Retail Stores
- *PrecisionCool™*
  - Computer / Server Rooms
  - Telecom Rooms
  - Labs / Hospitals
- Ducted, Same-Face Air Pattern with High Static BD Blowers
- DX Air, Water & Glycol Cooled, Chilled Water & Free-Cooling
- Total Temp & Humidity Control
  - Optional Steam Humidifier
  - Optional Heat/Reheat via Electric, Hot Gas, Hot Water, Steam or Heat Pump
- Microprocessor Controls & More!

ABOVEAIR TECHNOLOGIES

ETL LISTED
CONFORMS TO UL STD 1995
3091370 CERTIFIED TO CAN/CSA STD C22.2 No. 236

MEA230-06-E

HK™-Horizontal, above-the-ceiling air conditioners (AHK-L12)

INTRODUCTION

AboveAir™ ceiling mounted air conditioners are the space saving environmental control solution to your comfort and precision cooling needs. Available in a wide variety of cooling methods and cabinet configurations including a full range of options, ***AboveAir***™ ceiling A/C's are a step above!

- ☑ **Hidden above-the-ceiling installation**
- ☑ **Space saving "same-face" air pattern**
- ☑ **Variety of cooling methods**
- ☑ **Self-contained & split systems**
- ☑ **Flexible options and accessories**
- ☑ **Energy efficient operation**
- ☑ **Low sound operation**

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- DX Glycol Cooled, 1-5 Tons 10
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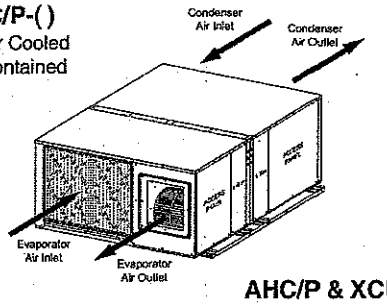
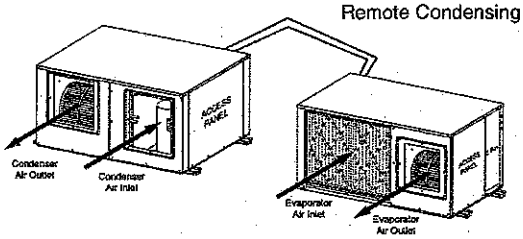
Air Cooled

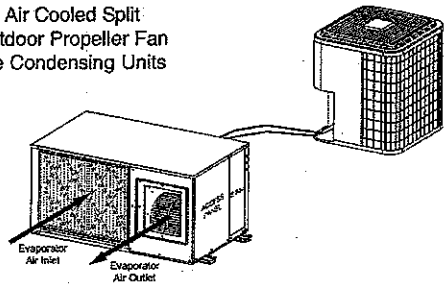
AAC/P-( )
DX - Air Cooled
Self-Contained



AHC/P & XCU-( )
DX - Air Cooled Split
with Indoor/Outdoor Centrifugal Blower
Remote Condensing Units

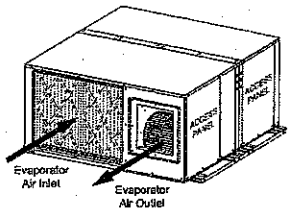


AHC/P & XPU-( )
DX - Air Cooled Split
with Outdoor Propeller Fan
Remote Condensing Units



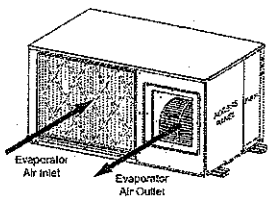
Water/Glycol Cooled
(plus Free-Cooling)

AWC/P & AGC/P-( )
DX - Water/Glycol
Cooled Self-Contained
(split available)



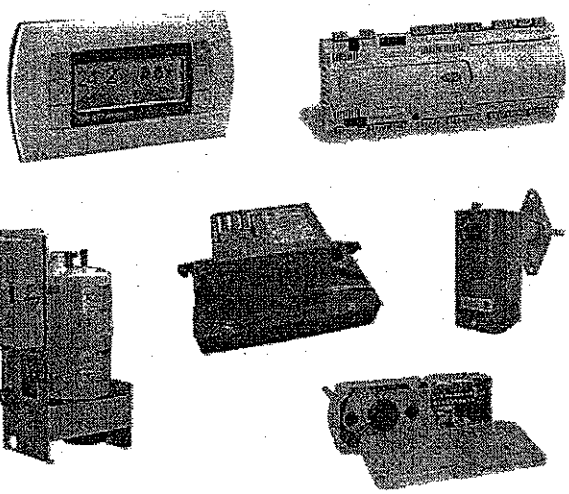
Chilled Water Systems

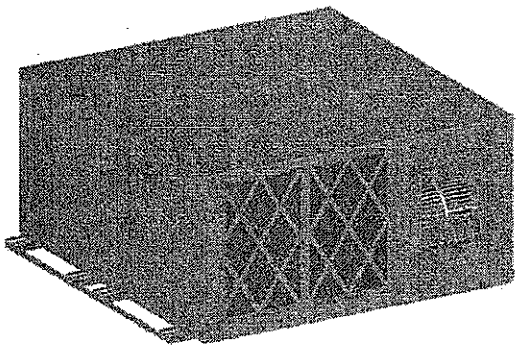
ACC/P-( )
Chilled Water
Air Handling Units



FEATURES & BENEFITS

AboveAir™ ducted high static belt-driven ceiling mounted air conditioners can be configured for various applications:





Packaged & Split Systems

- **Comfort**Cool™ - designed for comfort cooling applications, such as general office spaces, class rooms, conference rooms, restaurants and retail stores. These systems are designed to provide the additional latent cooling capacity required for these types of applications. **Comfort**Cool™ systems are available with optional electric, hot water, steam or heat pump heating, as well as, steam canister humidification.

- **Precision**Cool™ - designed for precision cooling applications, such as computer rooms, telecommunications rooms, laboratories and hospitals. These systems are designed to provide the high sensible cooling capacity and precision temperature and humidity control required by these critical cooling applications. **Precision**Cool™ systems are available for total temperature and humidity control with optional dehumidification with reheating and/or steam canister humidification.

This engineering manual provides complete specification details for both the **Comfort**Cool™ and **Precision**Cool™ configurations respectively.

Select Options:

- Digital Heat/Cool Thermostats
- Temp & Humid Microprocessor Controls with Alarms and Optional BMS Communications
- Steam Canister Humidifier
- Heating Mode with Electric, Hot Water, Steam or Heat Pump Heating
- Dehumidification Mode with Reheat
- High Efficiency Air Filtration
- Low Ambient Head Pressure Control
- 2 & 3-way 150 psig or 350 psig Water/Glycol Cooled Regulating Valves
- High Static Belt-Drive Blowers (up to 2" ESP)
- Hot Gas Bypass
- Free-Cooling: Air Side & Water/Glycol Side Economizer Systems

Select Accessories:

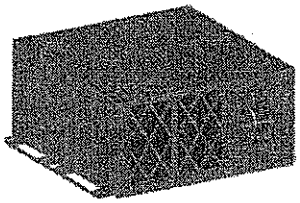
- Condensate Pumps
- Main Power Electrical Disconnects
- Firestats
- Smoke Detectors
- Remote Water-Leak Detectors
- Compressor Sound Jackets
- Hanging Vibration Isolators
- Glycol Pump Packages & Drycoolers
- ... and more!

ETL LISTED
CONFORMS TO
UL STD 1995
3091370
CERTIFIED TO
CAN/CSA STD C22.2 No. 236

MEA230-06-E

1.0 General

☑ 1.1 Summary



These specifications describe the requirements for a horizontal ceiling mounted air conditioner. The system shall be designed to control space temperature and humidity.

The air conditioning manufacturer shall design and furnish all equipment in the quantities and configurations shown on the project plans and specifications.

The system shall be provided by AboveAir Technologies in Frederick, Maryland, USA. The system shall be listed by Intertek (ETL Semko), Inc. to conform with UL Std 1995 and be certified to CAN/CSA Std C22.2 No. 236 (Control No. 3091370). The system shall be NYC MEA230-06-E and Chicago Code Approved. The system model number shall be _____.

☑ 1.2 Design Requirements

The system shall be an AboveAir HK-Horizontal™ brand factory assembled and tested. Evaporator sections shall be designed for above the drop-ceiling installation. Remote condensing unit sections shall be designed for either outdoor or indoor above the drop-ceiling installation.

Evaporators and indoor remote condensing unit sections shall be designed for ducted same-face air distribution.

The system shall have a total cooling capacity of _____ BTU/H, and a sensible cooling capacity of _____ BTU/H, based on an entering air condition of _____ °F DB, and _____ °F WB, _____ % RH.

The evaporator section shall be designed for _____ Volt, _____ Phase, _____ Hertz main power supply. The remote condensing unit section (if applicable) shall be designed for _____ Volt, _____ Phase, _____ Hertz main power supply.

☑ 1.3 Submittals

Submittals shall be provided after manufacturer's receipt of a written purchase order and shall include: Detailed Performance and Electrical Data; Guide Specifications; and Dimensional Drawings.

☑ 1.4 Quality Assurance

The system shall be factory tested prior to shipment. Testing shall include, but shall not be limited to: system and component operational and functional testing; electrical "HiPot" insulation test; refrigerant and water piping circuit pressuring testing per UL 1995 Safety Standard for Heating and Cooling Equipment. The system shall be designed and manufactured according to world class quality standards.

2.0 Products

☑ 2.1 Standard Features / All Systems

☑ 2.1.1 Cabinet

The cabinet chassis and access panels shall be constructed of heavy gauge galvanized steel. Cabinet access panels shall rest in recessed pockets designed for minimum air leakage. The cabinet and access panels shall be lined with 2 lb/ft² high density sound and thermal insulation conforming to NFPA 90A and 90B.

☑ 2.1.2 Component Access

The unit shall be serviceable within the ceiling through large side access panels.

☑ 2.1.3 Electrical System

General:
The electrical system shall conform to National Electric Code (NEC) requirements according to UL 1995. The control circuit shall be a 24 VAC low voltage circuit.

The electrical system shall include, but not be limited to the following factory installed items: 24 VAC control transformer; terminal connections; grounding lug; overload protection; and starter/contactors for blower motor, compressor, humidifier and electric heater stage (if applicable).

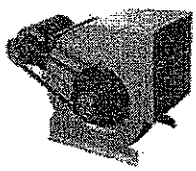
Packaged Systems: (single point power) Self-Contained systems shall be designed for single point main power connection.

Overflow Safety Float:
The system shall be provided with a factory installed float type condensate pan overflow safety switch. The circuit shall be designed to shut down all system water producing operations in the event of a overflow condition.

☑ 2.1.4 Air Distribution

The system air distribution shall be configured for a draw-through air pattern to provide even air distribution and maximum coil performance.

☑ 2.1.4.1 Evaporator Blower/Motor

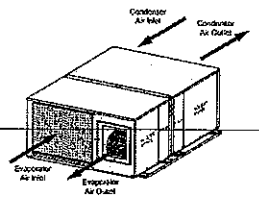


The evaporator blower assembly shall be designed for ____ CFM @ ____ inches external static pressure (e.s.p.)

The blower shall be the belt-driven centrifugal type, double width double inlet (DWDI), and statically and dynamically balanced to a minimum vibration level. The shaft shall be heavy duty steel with self-aligning ball bearings sized for an average 100,000 hours of service life.

The blower motor shall be ____ Hp at 1725 RPM (or 3450 RPM) and mounted on an adjustable base. Belts shall be sized for 200% of the motor horsepower rating. Motors shall have overload protection and a minimum NEMA service factor of 1.15.

☑ 2.1.4.2 Air Patterns (Same-Face)



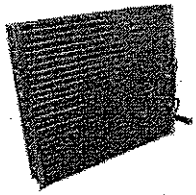
Evaporators and indoor air cooled remote condensing unit sections shall be designed for ducted same-face air distribution. Air inlet and outlet connections shall include factory provided turned-out duct flanges for each of field duct connection.

☑ 2.1.4.3 Air Filtration

The filter(s) shall be 2 inch thick pleated and rated for 30% dust spot efficiency (based on ASHRAE 52.1). The filter(s) shall be serviceable through a side access panel without shutting down the system.

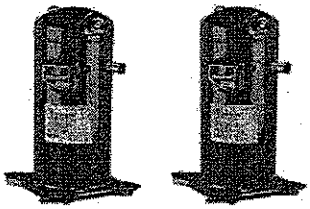
☑ 2.2 **Direct Expansion Systems**

☑ 2.2.1 **DX - Evaporator Coils**



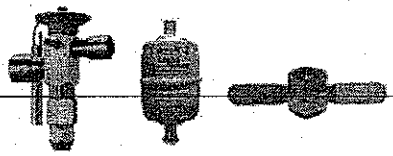
The DX evaporator coil shall be constructed of copper tubes and aluminum fins. The system shall be designed for a draw-through air pattern for maximum heat transfer. Coil end-plates shall be hot dipped galvanized. The evaporator coil shall be mounted in an insulated stainless steel condensate drain pan.

☑ 2.2.2 **Compressors**



Each compressor shall be the high efficiency, low sound power scroll type. Each compressor shall be mounted on vibration isolators. Each compressor shall be complete with reversible positive oil pump, charging and service ports, internal spring isolation, and discharge gas vibration eliminator.

☑ 2.2.3 **DX - Refrigeration Circuits**

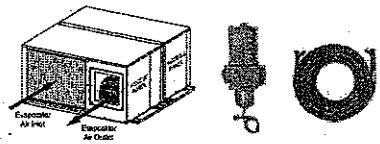


Each refrigeration circuit shall be pre-piped with refrigerant copper tubing. The refrigeration system shall include, but not be limited to: expansion valve with external equalizer; sight glass; refrigerant filter-drier; shraeder service valves and high & low refrigerant pressure safety switches.

☑ 2.3 **Standard Features / Individual Systems**

☑ 2.3.3 **DX - Water Cooled Systems**

☑ 2.3.3.1 **DX - Water Cooled**
(Self-Contained Systems)
AWC / AWP-( )

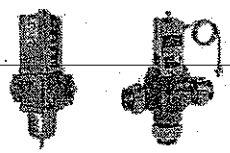


The system shall be a self-contained, ceiling mounted air conditioner with integral dx water cooled condensing unit. Each refrigerant circuit shall include a water cooled coaxial (or SS brazed-plate) condenser and factory installed head pressure controlling 3-way water regulating valve rated for 150 psi w.w.p. The water cooled condenser shall be designed to provide the total required system heat of rejection at 85°F entering water temperature and 95°F leaving water temperature. Source water shall be provided by a remote water source *(by others).*

All models sizes shall ship from the factory as a one-piece unit as standard. The system shall require only single point main power supply and ship from the factory with a full operating refrigerant charge.

2.4 Options

☑ 2.4.2 **DX - Water/Glycol Cooled Reg. Valves**



☐ 2.4.2.1 **2-Way, 150 psig Reg. Valve**

☑ 2.4.2.2 **3-Way, 150 psig Reg. Valve**

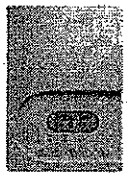
☐ 2.4.2.3 **2-Way, 350 psig Reg. Valve**

☐ 2.4.2.4 **3-Way, 350 psig Reg. Valve**

System head pressure shall be controlled by a factory provided 3-way water / glycol regulating valve rated for ____ psig w.w.p.

2.4.2 **CONTROL OPTIONS**

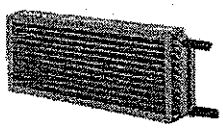
☑ 2.4.2.1 **TEC2603-2 BACnet Multi-Staged Thermostat**
(Non-Programmable)



A BACnet compatible multistage non-programmable thermostat shall be factory unit mounted & wired to the air condiitioning unit. The thermostat shall include a backlit Liquid Crystal Display (LCD) offering real-time control status of the environment in easy-to-read, English plain text messages with constant backlight that brightens during user interaction.

2.4.3 **HEAT / REHEAT OPTIONS**

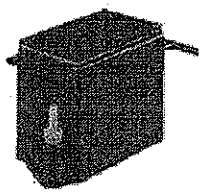
☑ 2.4.3.4 **Hot Water Heat**



A Hot Water Heating system shall be factory provided. The hot water heating system shall be complete a factory installed aluminum fin, copper tube hot water coil and factory provided & installed 2-way motorized hot water control valve. Hot water shall be provided by a remote source at the specified flow rate and temperature. The hot water heating system shall have a rated capacity of _____ BTUH @ _____ GPM, _____°F EWT.

2.5 Accessories

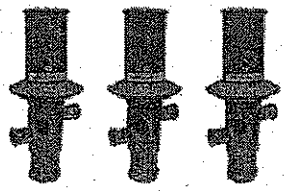
☑ 2.5.1 **Condensate Pump**



An in-pan condensate pump shall be factory installed and wired within the A/C unit condensate drain pan.

☑ **2.5.2 Hot Gas Bypass Systems**

☑ **2.5.2.1 Hot Gas Bypass To Evaporator Inlet**



Each refrigerant circuit shall be provided with a factory installed hot gas (discharge) bypass valve. The hot gas bypass valve shall be designed to supply hot gas to evaporator inlet as required to provide coil freeze-protection and capacity modulation under low load conditions.

☑ **2.5.4 Main Power, Non-Fused Disconnect**

A main power non-fused disconnect shall be factory provided & installe to the A/C unit. The disconnect shall be NEMA-1 rated for indoor installation.

☑ **2.5.8 DX Water/Glycol Cooled with Free Cooling Cycle**
AWP / AGP-( )-FE

The system shall include a factory installed water/glycol free cooling cycle complete with economizer cooling coil, aquastat, automatic control logic and factory-installed 3-way control valve. The FE coil shall be capable of providing rated sensible capacity without compressor operation when entering water/glycol fluid temperatures are 45°F or below.

Model Nomenclature

Packaged Systems & Split Evaporators

A	G	C	-	120	-	4	-	E1	H	-	FE	-	00
a	b	c	-	d	-	e	-	f	g	-	h	-	i

a: **A** - **Above**Air™ Horizonal HK Series

b:
- **A** - DX, Air Cooled
- **C** - Chilled Water
- **E** - DX, Evaporator with Compressor
- **G** - DX, Glycol Cooled
- **H** - DX, Air Handling Unit
- **W** - DX, Water Cooled

c:
- **C** - **Comfort**COOL™ Series (Standard CFM)
- **P** - **Precision**COOL™ Series (Optional CFM)

d: **012** = 1 Ton; **018** = 1.5 Tons; **024** = 2.0 Tons; **036** = 3.0 Tons; **048** = 4.0 Tons; **060** = 5.0 Tons; **072** = 6.0 Tons; **096** = 8.0 Tons; **120** = 10.0 Tons; **144** = 12.0 Tons; **180** = 15.0 Tons

e:
- **1** - 208-230V / 1 Ph / 60 Hz
- **3** - 208-230V / 3 Ph / 60 Hz
- **4** - 460-480V / 3 Ph / 60 Hz
- **5** - 575V / 3 Ph / 60 Hz
- **7** - 277V / 1 Ph / 60 Hz

e:
- **00** - No Heat
- **E1** - Electric Heat 1-Stage
- **E2** - Electric Heat 2-Stages
- **ES** - SCR Fired Electric Heat
- **HE** - Heat Pump with Auxiliary Electric Heat
- **HG** - Hot Gas Reheat
- **HP** - Heat Pump w/o Auxiliary Electric Heat
- **HW** - Hot Water Heat
- **ES** - SCR Fired Electric Heat
- **ST** - Steam Heat

g:
- **0** - No Humidifier
- **H** - Electrode Canister Humidifier

h:
- **00** - No Economizer
- **AE** - Air Side Economizer
- **DC** - Dual Cool / Alternate Water Source
- **FE** - Water/Glycol Side Free Cooling Economizer

i:
- **00** - None
- **OA** - 100% Outside-Air System

Remote Condensing Units

X	C	U	-	120	-	4	-	00	-	00
a	b	c	-	d	-	e	-	f	-	g

a: **X** - Exchange™ Series Remote Heat Exchanger

b:
- **C** - DX, Air Cooled, Centrifugal Blower Type
- **G** - DX, Glycol Cooled
- **P** - DX, Air Cooled, Propeller Fan Type
- **W** - DX, Water Cooled

c:
- **U** - DX Condensing Unit
- **X** - DX Condenser

d: **012** = 1 Ton; **018** = 1.5 Tons; **024** = 2.0 Tons; **036** = 3.0 Tons; **048** = 4.0 Tons; **060** = 5.0 Tons; **072** = 6.0 Tons; **096** = 8.0 Tons; **120** = 10.0 Tons; **144** = 12.0 Tons; **180** = 15.0 Tons

e:
- **1** - 208-230V / 1 Ph / 60 Hz
- **3** - 208-230V / 3 Ph / 60 Hz
- **4** - 460-480V / 3 Ph / 60 Hz
- **5** - 575V / 3 Ph / 60 Hz
- **7** - 277V / 1 Ph / 60 Hz

f:
- **00** - None
- **HP** - Heat Pump Option

g:
- **00** - None
- **OA** - 100% Outside-Air System

h:
- **A** - Indoor Mounted
- **B** - Outdoor Mounted

Approximate Shipping Weights (lbs.)

UNIT SIZE	MODEL TYPE											
	AAC/P			AHC/P	XCU	XPU	AWC/P & AGC/P			AWC/P & AGC/P-FE	XWU & XGU	ACC & ACP
	Evap	Cond	Packaged System				Evap	Cond	Packaged System			
012	235	325	570	235	325	130	235	195	440	455	195	240
018	235	345	590	235	345	135	235	215	460	475	215	240
024	250	355	610	250	355	135	250	215	470	495	215	245
036	250	360	620	250	360	140	250	225	480	505	225	245
048	340	475	820	340	475	200	340	290	640	680	290	340
060	340	515	865	340	515	210	340	325	675	715	325	340
072	370	585	960	370	585	140 x 2	370	375	745	795	375	360
096	385	590	985	385	590	200 x 2	385	400	795	845	400	370
120	550	895	1,475	550	895	210 x 2	550	535	1,105	1,175	535	550
144	560	940	1,515	560	940	425 x 2	560	570	1,145	1,215	570	550
180	560	940	1,515	560	940	450 x 2	560	580	1,155	1,225	580	550

Notes:

1) AAC/P, AWC/P & AGC/P-012/096 systems ship from the factory as a 1-piece, packaged unit as a standard. AAC/P, AWC/P & AGC/P-120/180 systems ship from the factory split for field rigging purposes.

Innovative HVAC Solutions

AboveAir Technologies

Ceiling Air Conditioners

SpotCool™ - 2x4 T-Bar "Spot Cooler" Comfort & Precision Ceiling Mounted A/C's

HK™ Horizontal - Hi-Static Ducted "Same-Face" Comfort & Precision Ceiling Mounted A/C's

HK-OA™ - Horizontal 100% Outside Air Ceiling Mounted A/C's

Floor Air Conditioners

VK™ Vertical - SCAV Vertical Floor Mounted Self-Contained & Split Comfort A/C's & Heat Pumps

VK-OA™ - VertiKUL™ 100% Outside Air Vertical Floor Mounted A/C's

MissionCritical™ - Precision Vertical Floor Mounted Computer Room A/C's

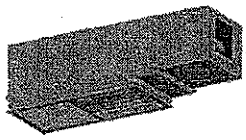
Air Purification Systems

PureAir™ - Ceiling Mounted 2x4 T-Bar Grille and Ducted Air Cleaners (Hepa, UV & Ionization ...)

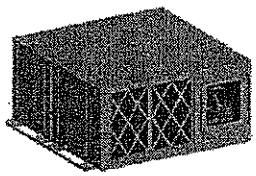
Remote Heat Rejection

FluidCool™ - Indoor & Outdoor Remote Glycol Drycoolers

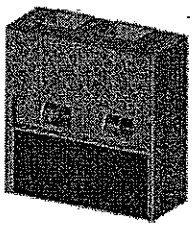
PumpAll™ - Single & Dual Standard plus All-In-One Integrated Glycol Pump Packages



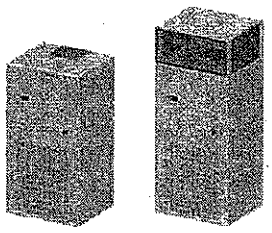
2x4 "Spot-Cooler" Ceiling Mounted A/C's
(1 to 3 Tons)



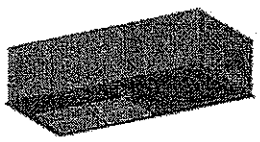
Ducted "Same-Face" Ceiling Mounted A/C's
(1 to 15 Tons)

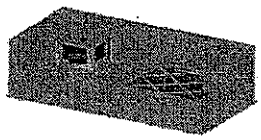


Comfort - Packaged & Split Vertical Floor Mounted Air Conditioners
(3 to 30 Tons)



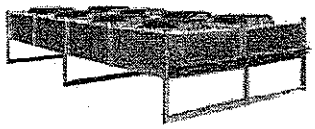
Precision - Vertical Floor Mounted Computer Room Air Conditioners
(3 to 20 Tons)



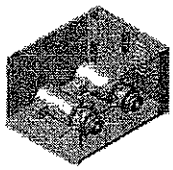


***PureAir™* - 400 to 3,000 CFM 2x4 T-Bar & Ducted Air Cleaning Purification Systems**
(Hepa, Carbon Filtration plus Ultra-Violet and Ionization Tube Technologies ...)

Remote Air Cooled Condensers, Condensing Units & Glycol Drycoolers
(1 to 180 Tons of THR)



Single & Dual Glycol Pump Packages
(1/2 to 50 HP)



www.aboveair.com

AboveAir Technologies
4844 Winchester Boulevard
Frederick, Maryland 21703, U.S.A.
Phone: 301-874-1130, Facsimile: 301-874-1131
Email: sales@aboveair.com

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Form: AHK-L12
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ABOVEAIR TECHNOLOGIES

06-13-07

AWC-180-4-HW0-FE-R7, 5000 CFM @ 1.0" ESP

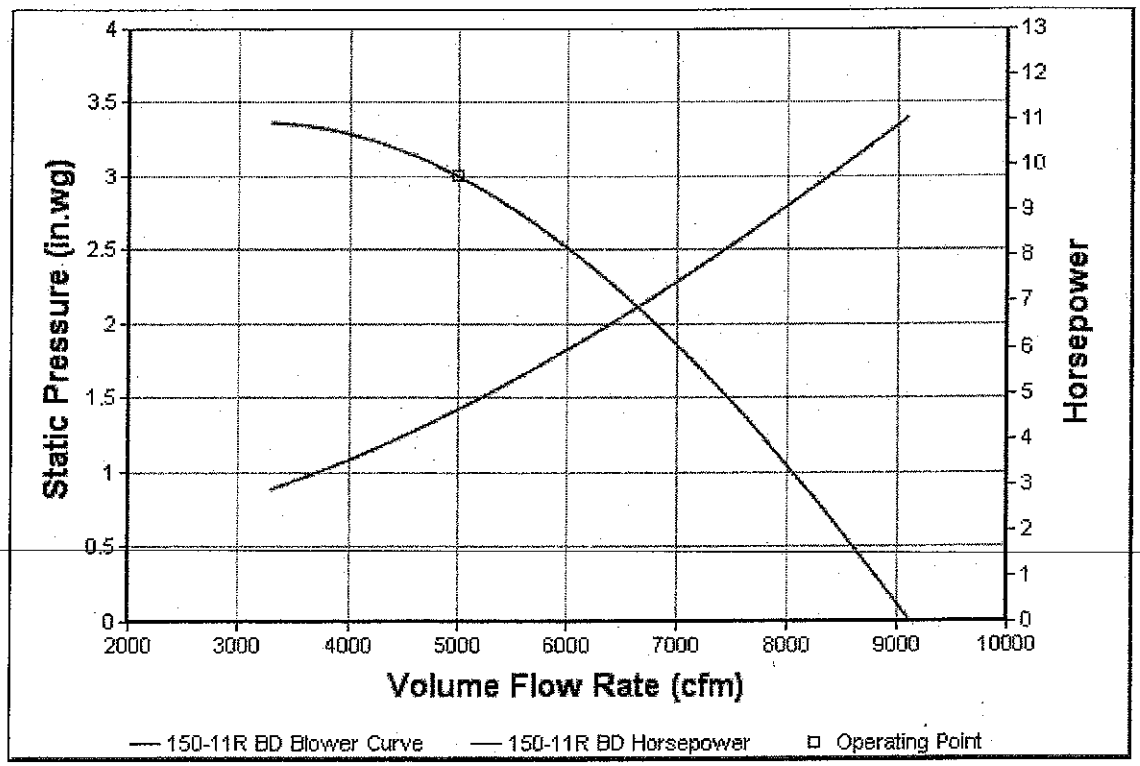
(Gateway Retail A: GRS-2.1/ACU-3,5,6,7,10,12 & RS-2.2/ACU-1,4 & RS-2.3/ACU-1,2,5,7 & RS-2.4/ACU-1,2; CR-1/ACU-1 thru 3; HIS/ACU-1 thru 13; Gateway Retail B: BJ'S/ACU-1 THRU 7, 10, 11, 12; B2.1/ACU-1,2,4,6; B2.2/ACU-1; B2.3/ACU-1; B2.4/ACU-1,3,4;RET B-LL/ACCU-1, RET-B-LL/ACCU-2)

Performance Parameters

(Volume Flow Rate: 5000 cfm, SP: 3.00 in. wg)

Model	Wheel Dia.	Wheel Width	RPM	HP	Torque (oz-ft)	Mech. Eff.
150-11R BD	15	11	1273	4.63	306	0.61

Performance Curves



◉ Horsepower ○ Torque ○ Motor Watts

Curve Matrix

Sound Power Levels

Model	Freq(Hz)	63	125	250	500	1K	2K	4K	8K	Overall
150-11R BD	Lw (dB)	97	97	87	80	82	75	70	65	100
	Lw (dB)(A)	71	81	78	77	82	76	71	64	86

Note: All noise levels are calculated based on fan type and performance. Values are good for fan only - not assembled equipment.

ABOVEAIR TECHNOLOGIES

06-13-07

AWC-180-4-000-FE-R7, 5000 CFM @ 1.0" ESP

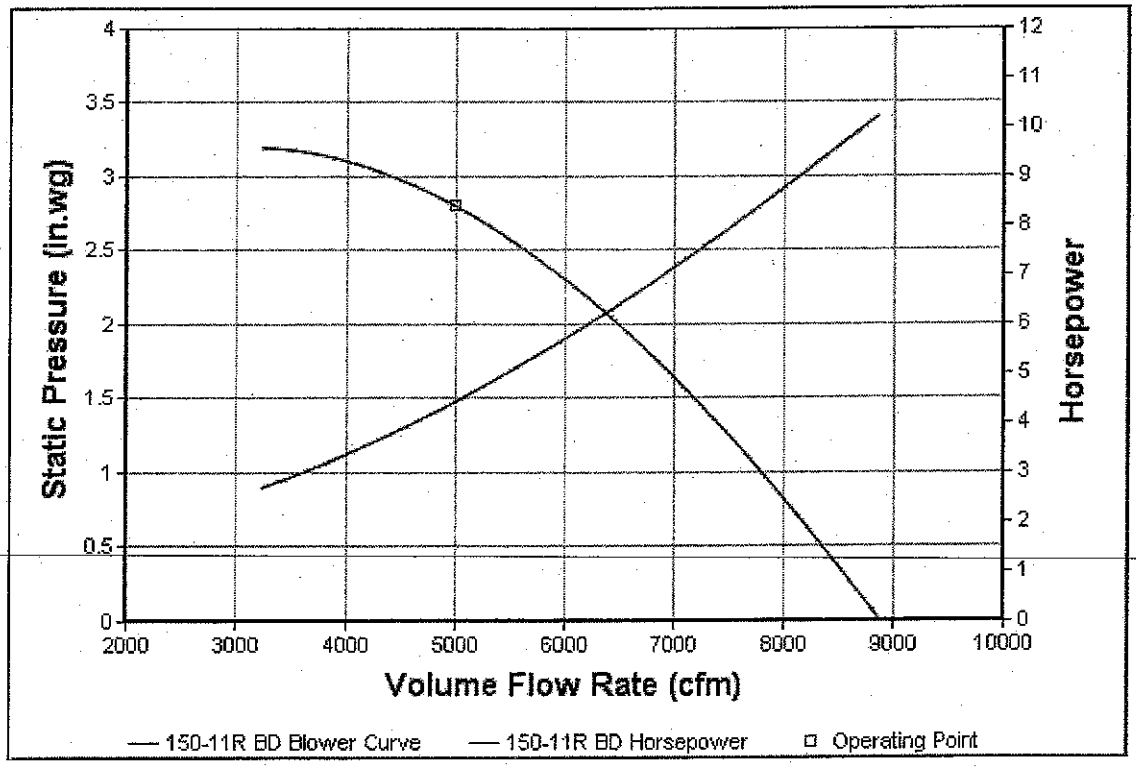
(Gateway Retail A: RS-2.1/ACU-2,4,8,9,11,14,15 & RS-2.2/ACU-2,3 & RS-2.3 / ACU-3,4,6,8; Gateway Retail B: B2.1/ACU-3,5,7; B2.3/ACU-2,3; B2.4/ACU-2

Performance Parameters

(Volume Flow Rate: 5000 cfm, SP: 2.80 in. wg)

Model	Wheel Dia.	Wheel Width	RPM	HP	Torque (oz-ft)	Mech. Eff.
150-11R BD	15	11	1241	4.44	300	0.60

Performance Curves



◉ Horsepower ○ Torque ○ Motor Watts

Curve Matrix

Sound Power Levels

Model	Freq(Hz)	63	125	250	500	1K	2K	4K	8K	Overall
150-11R BD	Lw (dB)	96	96	86	79	81	74	69	64	99
	Lw (dB)(A)	70	80	77	76	81	75	70	63	86

Note: All noise levels are calculated based on fan type and performance. Values are good for fan only - not assembled equipment.

ABOVEAIR TECHNOLOGIES

06-13-07

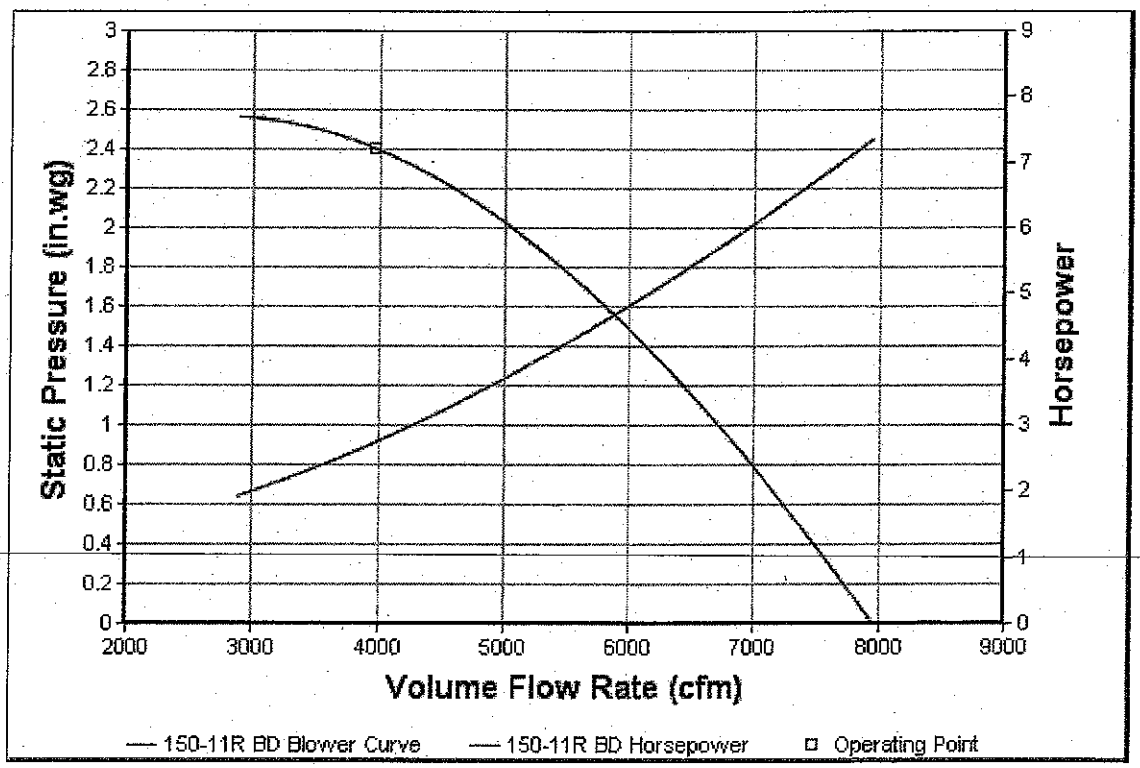
AWC-144-4-HW0-FE-R7, 3980 CFM @ 1.0" ESP
(Gateway Retail A: HIS/ACU-14
Gateway Retail B: BJ'S/ACU-9; B2.3/ACU-4)

Performance Parameters

(Volume Flow Rate: 3980 cfm, SP: 2.40 in. wg)

Model	Wheel Dia.	Wheel Width	RPM	HP	Torque (oz-ft)	Mech. Eff.
150-11R BD	15	11	1111	2.74	207	0.63

Performance Curves



◉ Horsepower ○ Torque ○ Motor Watts

Curve Matrix

Sound Power Levels

Model	Freq(Hz)	63	125	250	500	1K	2K	4K	8K	Overall
150-11R BD	Lw (dB)	94	94	84	77	79	72	67	62	97
	Lw (dB)(A)	68	78	75	74	79	73	68	61	83

Note: All noise levels are calculated based on fan type and performance.
Values are good for fan only - not assembled equipment.

ABOVEAIR TECHNOLOGIES

06-13-07

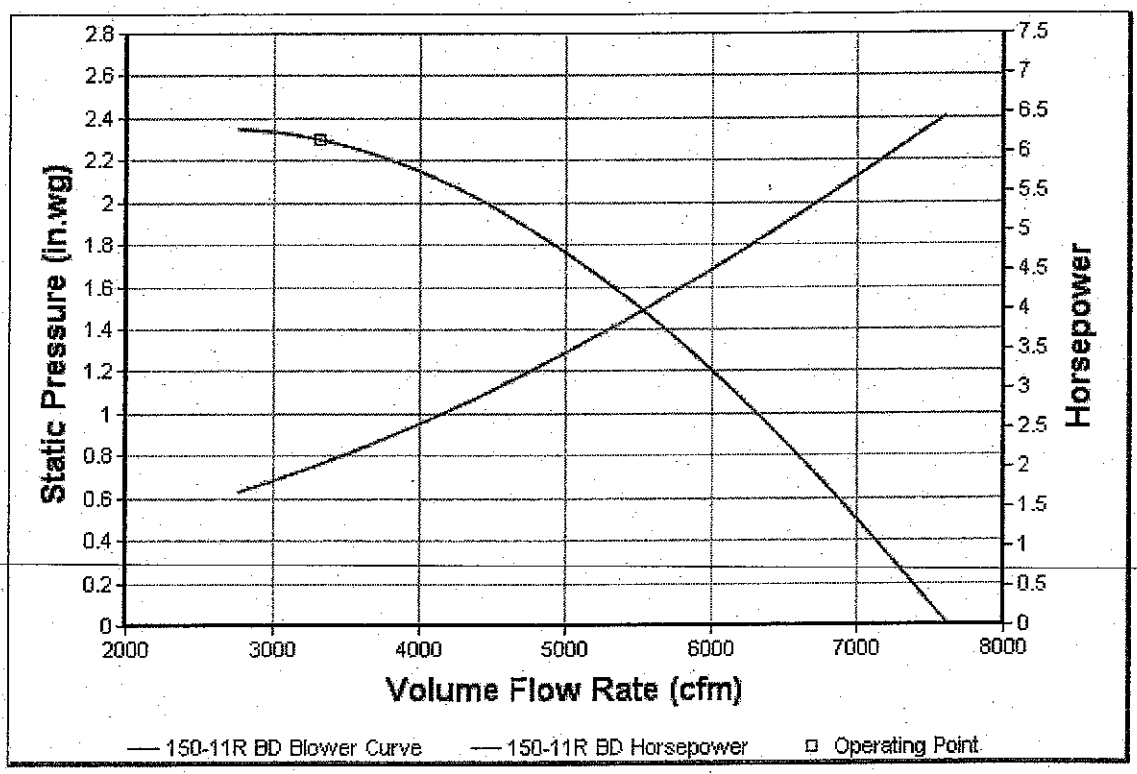
AWC-120-4-HW0-FE-R7, 3320 CFM @ 1.0" ESP
(Gateway Retail A: RS-2.1/ACU-1, 13, 16 & RS-2.4/ACU-3; Gateway Retail B: B2.5/ACU-1; B2.7/ACU-1; B2.9/ACU-1; RET B-LL/ACU-6)

Performance Parameters

(Volume Flow Rate: 3320 cfm, SP: 2.30 in. wg)

Model	Wheel Dia.	Wheel Width	RPM	HP	Torque (oz-ft)	Mech. Eff.
150-11R BD	15	11	1064	2.04	161	0.65

Performance Curves



◉ Horsepower ○ Torque ○ Motor Watts

Curve Matrix

Sound Power Levels

Model	Freq(Hz)	63	125	250	500	1K	2K	4K	8K	Overall
150-11R BD	Lw (dB)	92	92	82	75	77	70	65	60	96
	Lw (dB)(A)	66	76	73	72	77	71	66	59	82

Note: All noise levels are calculated based on fan type and performance. Values are good for fan only - not assembled equipment.

ABOVEAIR TECHNOLOGIES

06-13-07

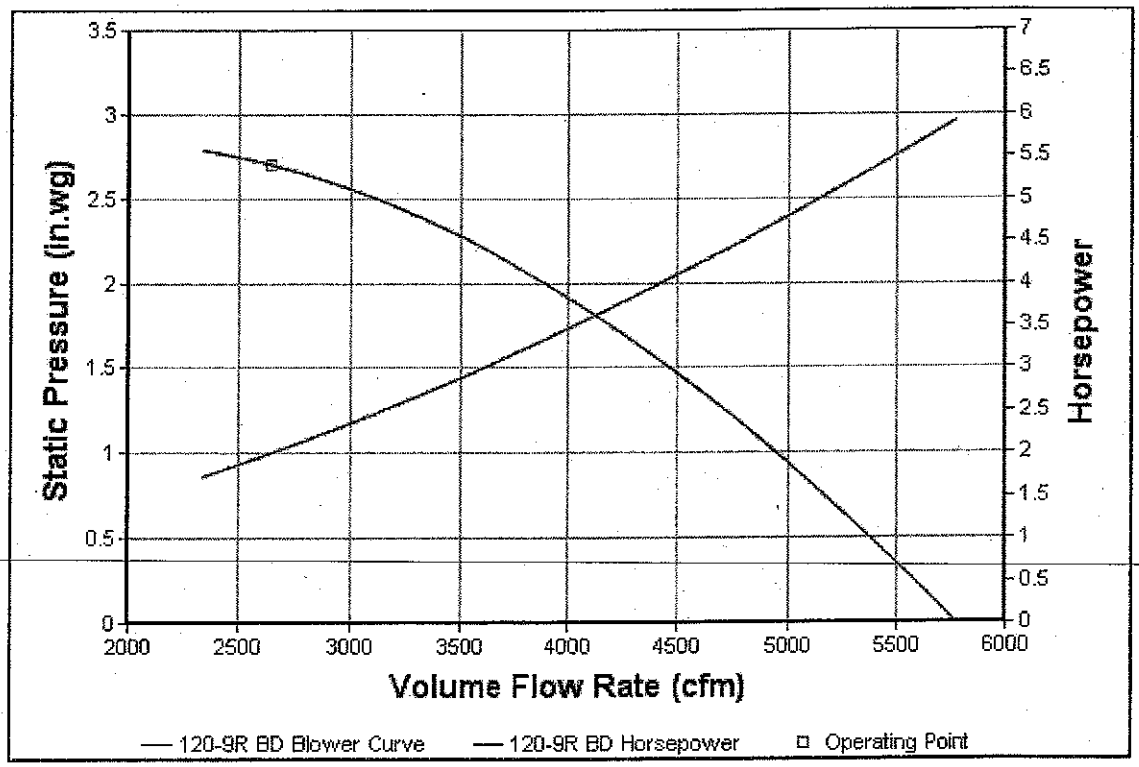
AWC-096-4-HW0-FE-R7, 2650 CFM @ 1.0" ESP
(Gateway Retail A: HIS/ACU-16; Gateway Retail B: F1.1/ACU-3 & 4; BJ'S/ACU-8; B2.4/ACU-5; B2.6/ACU-1)

Performance Parameters

(Volume Flow Rate: 2650 cfm, SP: 2.70 in. wg)

Model	Wheel Dia.	Wheel Width	RPM	HP	Torque (oz-ft)	Mech. Eff.
120-9R BD	12	9	1387	2.01	122	0.63

Performance Curves



◉ Horsepower ○ Torque ○ Motor Watts

Curve Matrix

Sound Power Levels

Model	Freq(Hz)	63	125	250	500	1K	2K	4K	8K	Overall
120-9R BD	Lw (dB)	93	93	83	76	78	71	66	61	96
	Lw (dB)(A)	67	77	74	73	78	72	67	60	83

Note: All noise levels are calculated based on fan type and performance. Values are good for fan only - not assembled equipment.

ABOVEAIR TECHNOLOGIES

06-13-07

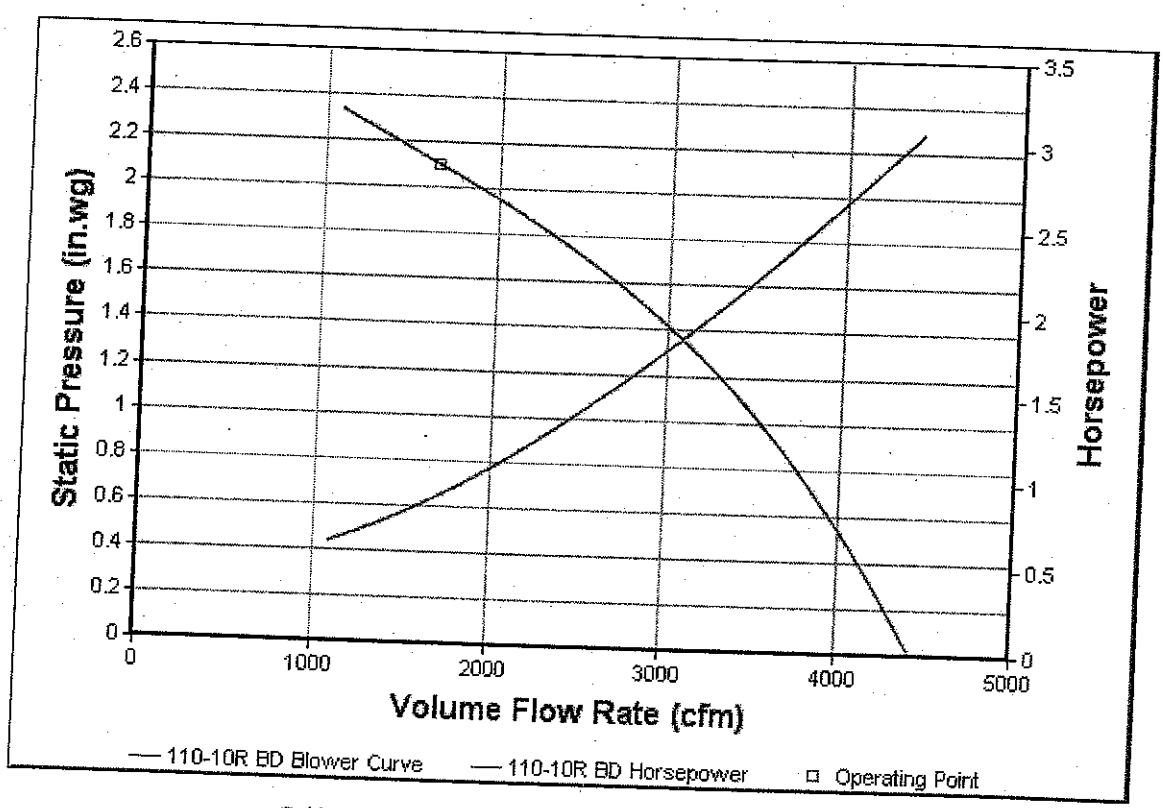
AWC-060-4-HW0-FE-R7, 1660 CFM @ 1.0" ESP
(Gateway Retail A; HIS/ACU-15)

Performance Parameters

(Volume Flow Rate: 1660 cfm, SP: 2.10 in. wg)

Model	Wheel Dia.	Wheel Width	RPM	HP	Torque (oz-ft)	Mech. Eff.
110-10R BD	11	10	1281	0.84	55	0.69

Performance Curves



Sound Power Levels

Model	Freq(Hz)	63	125	250	500	1K	2K	4K	8K	Overall
110-10R BD	Lw (dB)	89	89	79	72	74	67	62	57	92
	Lw (dB)(A)	63	73	70	69	74	68	63	56	78

Note: All noise levels are calculated based on fan type and performance. Values are good for fan only - not assembled equipment.

BULLETIN #41

MANUFACTURER:
ABOVEAIR TECHNOLOGIES

MARK	MODEL	ELECTRICAL V/PH/HZ	WEIGHT, LBS	EER	REMARKS
* HIS/ACU-1 THRU 13	AWC-180-4-HWO-FE-R7	460/3/60	1325	12.8	(1) THRU (11)
* HIS/ACU-14		460/3/60	1315	12.4	(1) THRU (11)
HIS/ACU-15	AWC-060-3-HWO-FE-R7	460/3/60	845	15.6	(1) THRU (11)
HIS/ACU-16	AWC-096-4-HWO-FE-R7	460/3/60	825	14.0	(1) THRU (11)
* RS-2.1/ACU-1, 2, 3 RS-2.2/ACU-1, 2, 3, 4, 5 RS-2.3/ACU-1, 2, 3, 4 RS-2.4/ACU-1, 2, 3, 4 RS-2.5/ACU-1, 2 TARGET/ACU-1, 2, 3, 4, 5	AWC-180-4-HWO-FE-R7	460/3/60	1325	12.8	(1) THRU (11)
TARGET/ACU-6	AWC-144-4-HWO-FE-R7	460/3/60	1325	12.4	(1) THRU (11)
RS-2.2/ACU-6 RS-2.3/ACU-5 RS-2.5/ACU-3	AWC-096-4-HWO-FE-R7	460/3/60	825	14.0	(1) THRU (11)
RS-2.4/ACU-5	AWC-072-4-HWO-FE-R7	460/3/60	825	14.0	(1) THRU (11)
RS-2.1/ACU-4	AWC-060-3-HWO-FE-R7	460/3/60	845	15.6	(1) THRU (11)

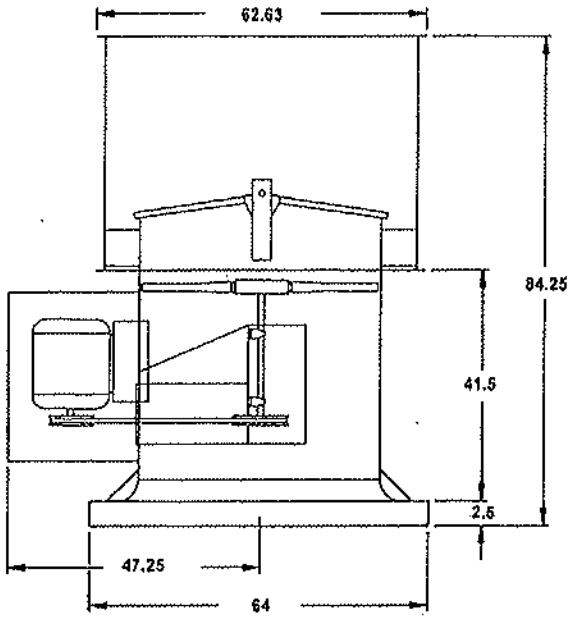
NOTES:

(1) 3-WAY, 150 PSIG DX WATER REG VALVES (PER ⊥ COILS)
(2) 3-WAY, 300 PSIG FREE-COOLING CONTROL VAL
(3) FREE-COOLING AQUASTAT
(4) 2-WAY, HOT WATER HEAT CONTROL VALVE

MEA NO. 230-06-E

GREENHECK
Building Value in Air.

Printed Date: 3/29/2007
Job: RETAIL A
Product Type: Fan
Mark: SEF-1 THRU SEF-11



NOTES: All dimensions shown are in units of inches
Fan weight is without accessories

TAUB

Tube Axial Upblast Belt Drive

TAGS

SEF-1	SEF-5	SEF-9
SEF-2	SEF-6	SEF-10
SEF-3	SEF-7	SEF-11
SEF-4	SEF-8	

STANDARD CONSTRUCTION FEATURES

HOUSING: Curb cap, windband, motor cover and fan tube are heavy gauge coated steel • Butterfly dampers • Adjustable motor plate • Ball bearing motor • Corrosion resistant fasteners
BEARINGS, SHAFT, AND PROPELLER: Heavy duty, self-aligning pillow block bearings • Extended lube lines • Polished, solid steel shaft • Welded and painted steel propeller
DRIVES: Variable pitch motor pulley on sizes 24-42, fixed pitch motor pulley on sizes 48-60, fixed pitch fan shaft pulley and static free belts

SELECTED OPTIONS & ACCESSORIES

Switch - Nema-1, Toggle, Ship Separate, Field Mounted
Curb GPI-64-G24
Curb Ext. GPE-64-G12
Steel Butterfly Dampers
Outlet Guard
Tie Down Points - Set of 4
HT-Option I (500° F / 260° C Continuous) w/ High Temp. Paint
Energy Efficient Motor meets EPACT and NEMA 1210
PROVIDE W/ MOTORIZED BACKDRAFT DAMPER

DIMENSIONS

Approx. Fan Weight (lb)	Recommended Roof/Wall Opening: (in)
1,250	56.5 x 56.5

PERFORMANCE (Elevation ft = 0, Airstream Temperature F = 70)

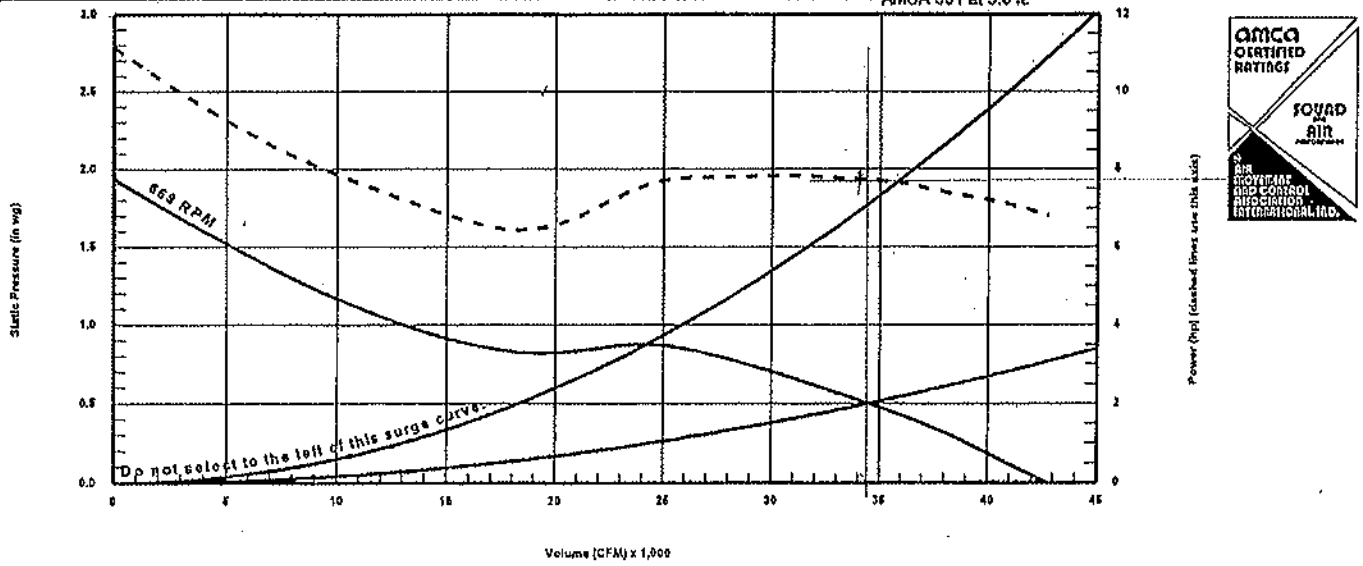
Qty	Model	Volume (CFM)	SP (in wg)	FRPM	Operating Power (hp)	Motor Information					
						Size (hp)	V/C/P	Encl:	Motor RPM:	Windings	FLA (A)
11	TAUB-54H-150	34,500	0.51.0	669	7.71	15	460/60/3	ODP	1725	1	21.0

SOUND

Inlet Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
104	101	98	94	89	85	81	76	96	85	47

FLA - Based on tables 150 or 148 of National Electrical Code 2002.

LwA - A weighted sound power level, based on ANSI S1.4.
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5.0 ft. Sones calculated using AMCA 301 at 5.0 ft.



GPI Roof Curb

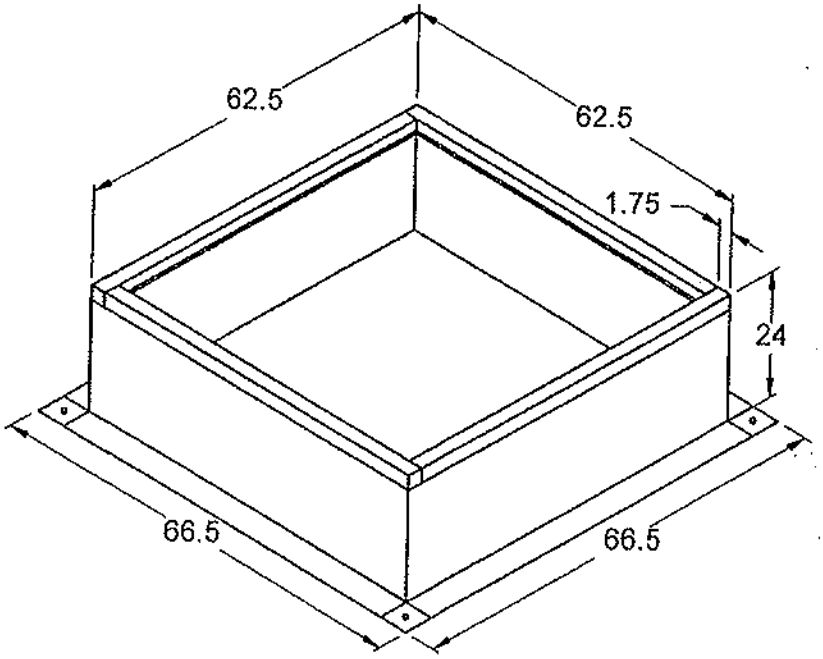
STANDARD CONSTRUCTION FEATURES

• Welded Aluminum (0.064 in) or galvanized (18 ga) construction • Stralght sided • 2 in roof mounting flange • 1 in 3# density insulation • Wood nailer.

Roof Opening - The Maximum roof opening dimension should not be greater than the "Actual" top outside dimension minus 2 in. With dampers, the Minimum roof opening dimension should be at least 2.5 in more than the damper dimension.

NOTES:

* The Roof Opening Dimension may NOT be the Structural Opening Dimension.
* Maximum single piece shipping length is 76".
* Security Bars are optional and must be specified. They are 0.5 in steel, and will be placed 6 in on center. These bars are welded to the frame, and the frame is welded to the curb. To prevent corrosion, they are coated with Greenheck's high performance Permatector coating. Security Bars are in lieu of damper and damper tray.

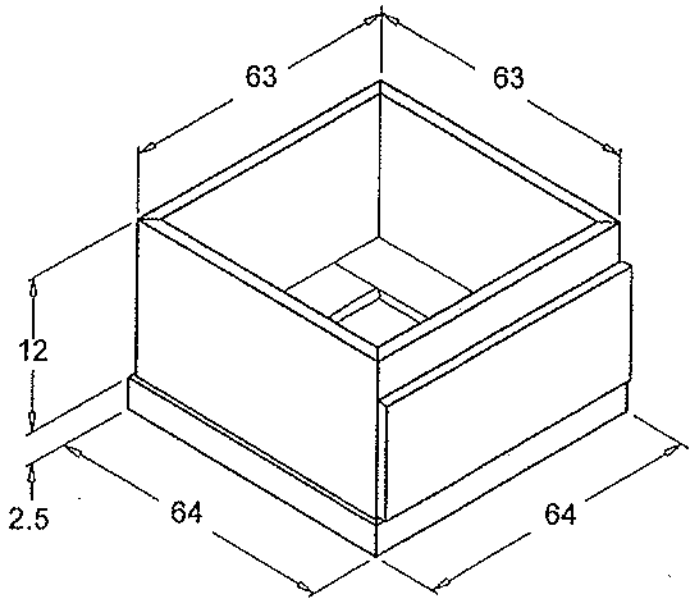


NOTES: All dimensions shown are in units of inches

GPE Curb Extension with Access Door

STANDARD CONSTRUCTION FEATURES

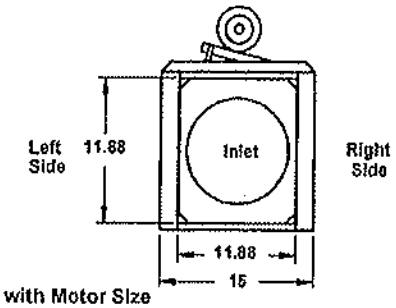
• Welded Aluminum (0.064 in) or galvanized (18 ga) construction • Bolted access door provides easy access to damper and damper actuator • Fulfills additional height requirements.
NOTES:
* Height - Available from 12 in to 24 in as specifed in 0.5 in increments.
* Tray - Damper Tray is standard. Tray size is same as damper size.



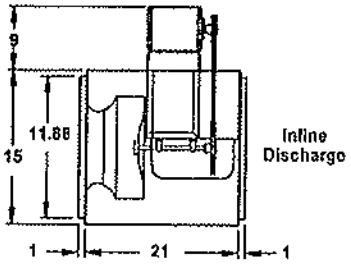
NOTES: All dimensions shown are in units of inches

BSQ

Belt Drive Centrifugal Inline Fan



* Varies with Motor Size



NOTES: All dimensions shown are in units of inches
Fan weight is without accessories

Tag: EMR/EF-2

STANDARD CONSTRUCTION FEATURES

• Galvanized steel housing • Backward inclined aluminum wheel • Two bolted access panels • Integral duct connection flanges • Ball bearing motors • Adjustable motor pulley • Adjustable motor plate • Fan shaft mounted in ball bearing pillow blocks • Static free belts • Corrosion resistant fasteners

SELECTED OPTIONS & ACCESSORIES

Switch - Nema-1, Toggle, Mounted & Wired
(Inline)Damper WD-330-PB-12x12, 120 VAC, Int Mnt.
Spring Hanging Isolators and Brackets
Galvanized Inlet Guard
Motor Cover - Galvanized Steel

DIMENSIONS

Approx. Fan Weight (lb)	Optional Damper (in)
79	12 x 12

PERFORMANCE (Elevation ft = 0, Airstream Temperature F = 70)

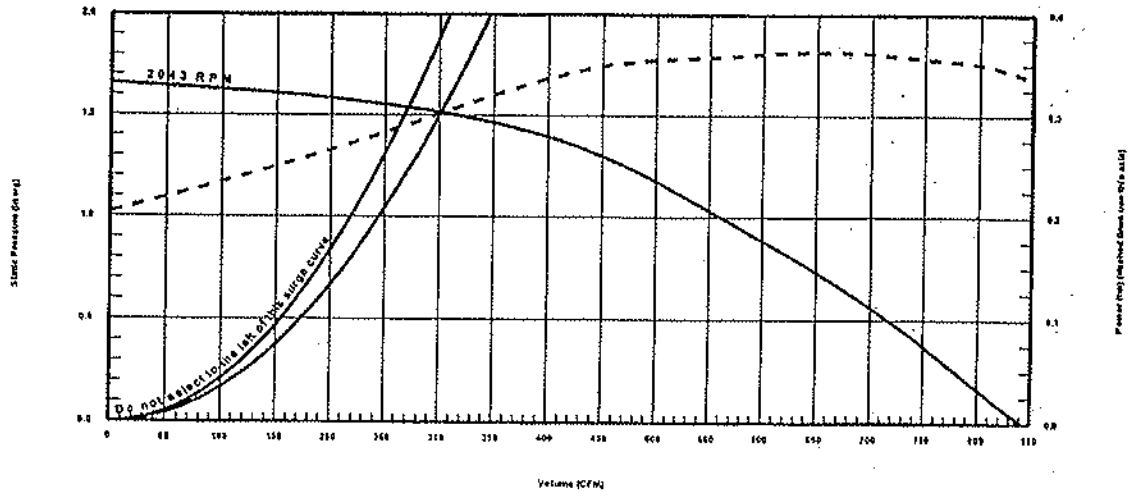
Qty	Model	Volume (CFM)	SP (In wg)	FRPM	Operating Power (hp)	Motor Information					
						Size (hp)	V/C/P	Encl:	Motor RPM:	Windings	FLA (A)
3	BSQ-80-5	300	1.5	2,043	0.3	1/2	115/60/1	ODP	1725	1	9.8

SOUND

Inlet / Radiated Sound Power by Octave Band								LwA	dBA	Sones
63	125	250	500	1000	2000	4000	8000			
80 / 81	83 / 85	78 / 72	75 / 69	68 / 63	64 / 58	61 / 55	58 / 54	76 / 72	65 / 61	13.9 / 12.6

FLA - Based on tables 150 or 148 of National Electrical Code 2002.

LwA - A weighted sound power level, based on ANSI S1.4.
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5.0 ft. Sones calculated using AMCA 301 at 5.0 ft.



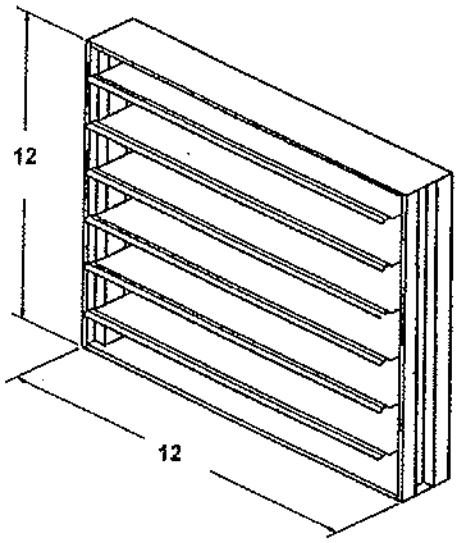
WD-330 Vertical Mount Exhaust Damper

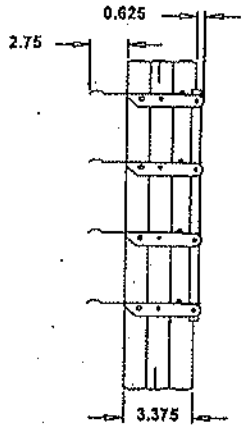
STANDARD CONSTRUCTION FEATURES

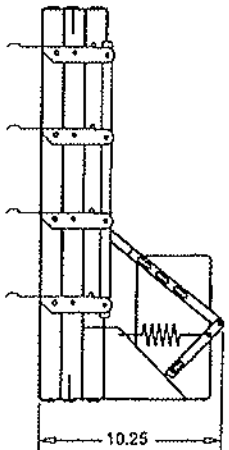
Vertical mount exhaust damper is constructed of 18 ga. galvanized steel with pre-punched mounting holes and a flangeless frame.
• Damper blades are 0.025 in roll formed aluminum with vinyl seals on the closing edge • Steel axles are 0.188 in diameter zinc plated mounted in acetal bushing • Synthetic axle bearings

Accessory Configuration

Blade Action	Parallel
Actuator Type	120 VAC



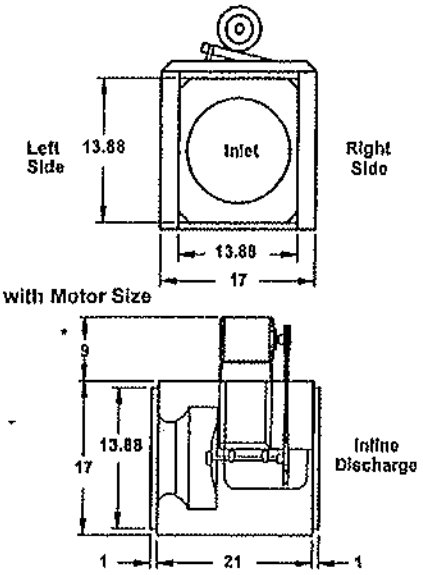




NOTES: All dimensions shown are in units of inches
Width and height furnished approximately 0.125 in undersize.

BSQ

Belt Drive Centrifugal Inline Fan



NOTES: All dimensions shown are in units of inches
Fan weight is without accessories

Tag: EMR/EF-3

STANDARD CONSTRUCTION FEATURES

• Galvanized steel housing • Backward inclined aluminum wheel • Two bolted access panels • Integral duct connection flanges • Ball bearing motors • Adjustable motor pulley • Adjustable motor plate • Fan shaft mounted in ball bearing pillow blocks • Static free belts • Corrosion resistant fasteners

SELECTED OPTIONS & ACCESSORIES

Switch - Nema-1, Toggle, Mounted & Wired
(Inline)Damper WD-330-PB-14x14, 208 VAC, Int Mnt.
Spring Hanging Isolators and Brackets
Galvanized Inlet Guard
Motor Cover - Galvanized Steel

DIMENSIONS

Approx. Fan Weight (lb)	Optional Damper (in)
83	14 x 14

PERFORMANCE (Elevation ft = 0, Airstream Temperature F = 70)

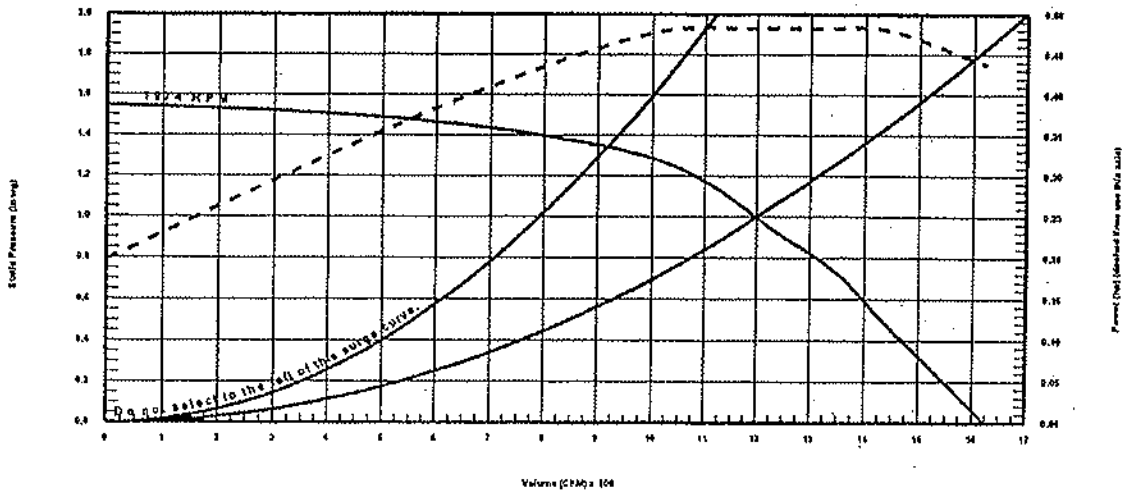
Qty	Model	Volume (CFM)	SP (in wg)	FRPM	Operating Power (hp)	Motor Information					
						Size (hp)	V/C/P	Encl:	Motor RPM:	Windings	FLA (A)
1	BSQ-100-5	1,200	1	1,974	0.48	1/2	208/60/3	ODP	1725	1	2.4

SOUND

Inlet / Radiated Sound Power by Octave Band								LwA	dBA	Sones
63	125	250	500	1000	2000	4000	8000			
79 / 80	86 / 88	78 / 72	83 / 77	71 / 66	65 / 59	64 / 58	62 / 58	81 / 77	70 / 66	17.7 / 15.2

FLA - Based on tables 150 or 148 of National Electrical Code 2002.

LwA - A weighted sound power level, based on ANSI S1.4. dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5.0 ft. Sones calculated using AMCA 301 at 5.0 ft.



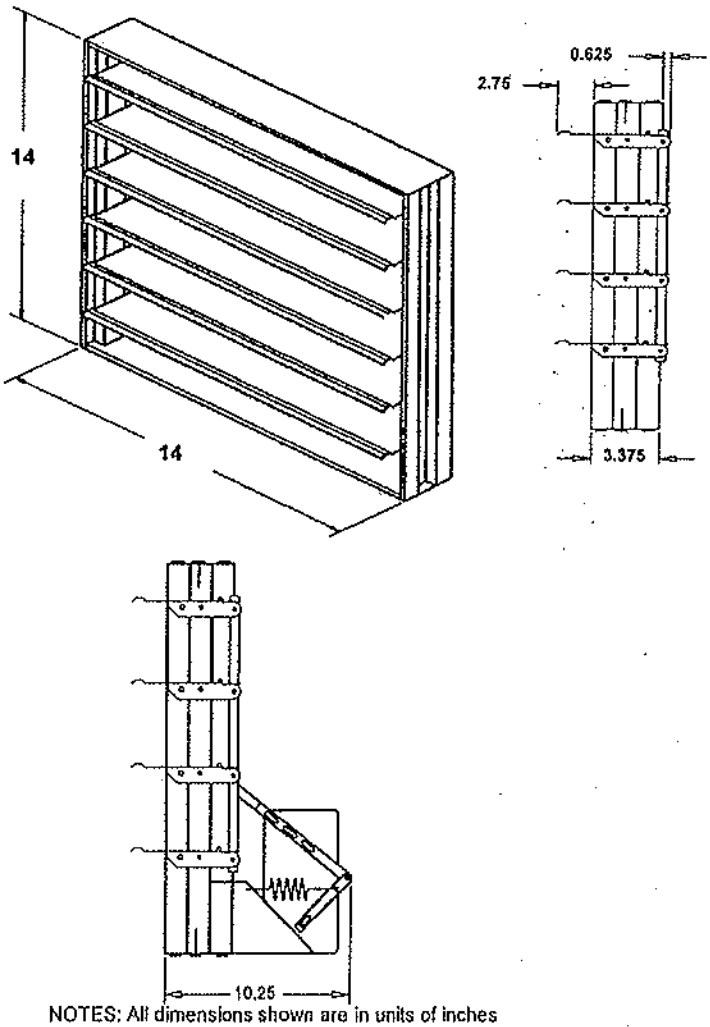
WD-330 Vertical Mount Exhaust Damper

STANDARD CONSTRUCTION FEATURES

Vertical mount exhaust damper is constructed of 18 ga. galvanized steel with pre-punched mounting holes and a flangeless frame.
• Damper blades are 0.025 in roll formed aluminum with vinyl seals on the closing edge • Steel axles are 0.188 in diameter zinc plated mounted in acetal bushing • Synthetic axle bearings

Accessory Configuration

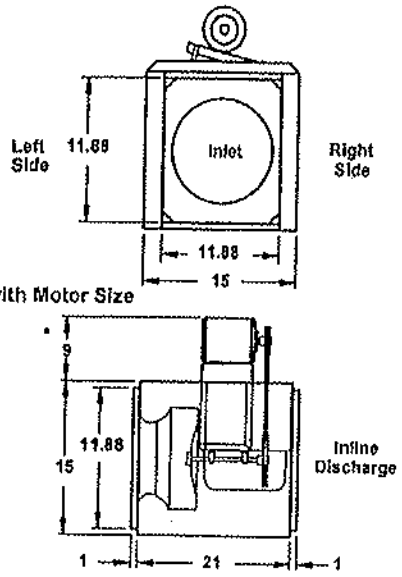
Blade Action	Parallel
Actuator Type	208 VAC



NOTES: All dimensions shown are in units of inches
Width and height furnished approximately 0.125 in undersize.

BSQ

Belt Drive Centrifugal Inline Fan



Tag: PE-1/EF-1

STANDARD CONSTRUCTION FEATURES

• Galvanized steel housing • Backward inclined aluminum wheel • Two bolted access panels • Integral duct connection flanges • Ball bearing motors • Adjustable motor pulley • Adjustable motor plate • Fan shaft mounted in ball bearing pillow blocks • Static free belts • Corrosion resistant fasteners

SELECTED OPTIONS & ACCESSORIES

Switch - Nema-1, Toggle, Mounted & Wired
(Inline)Damper WD-330-PB-12x12, 120 VAC, Int Mnt.
Spring Hanging Isolators and Brackets
Galvanized Inlet Guard
Motor Cover - Galvanized Steel

NOTES: All dimensions shown are in units of inches
Fan weight is without accessories

DIMENSIONS

Approx. Fan Weight (lb)	Optional Damper (in)
76	12 x 12

PERFORMANCE (Elevation ft = 0, Airstream Temperature F = 70)

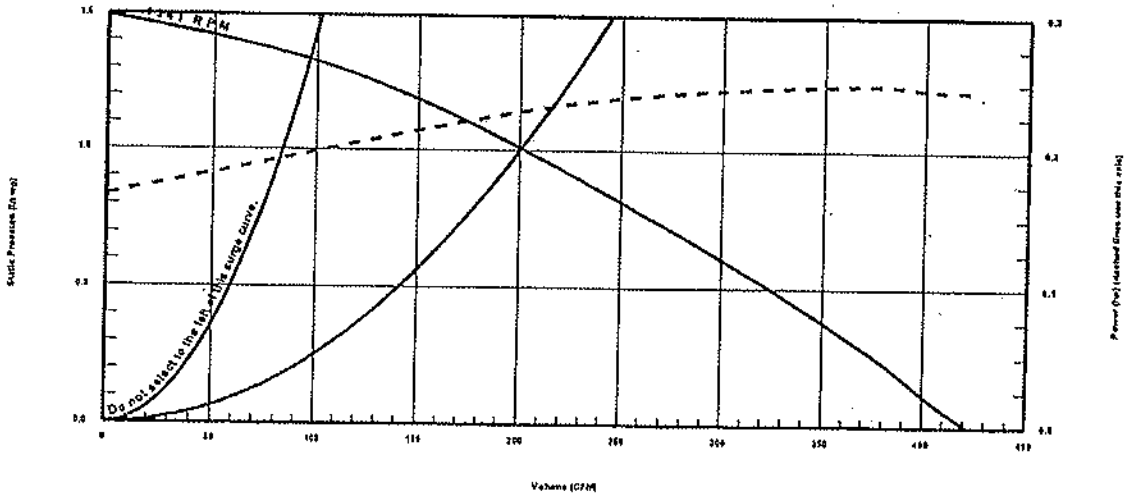
Qty	Model	Volume (CFM)	SP (in wg)	FRPM	Operating Power (hp)	Motor Information					
						Size (hp)	V/C/P	Encl:	Motor RPM:	Windings	FLA (A)
1	BSQ-70-4	200	1	1,941	0.23	1/4	115/60/1	ODP	1725	1	5.8

SOUND

Inlet / Radiated Sound Power by Octave Band								LwA	dBA	Sones
63	125	250	500	1000	2000	4000	8000			
78 / 79	86 / 88	77 / 71	82 / 76	70 / 65	65 / 59	64 / 58	62 / 58	80 / 76	69 / 65	17.1 / 14.8

FLA - Based on tables 150 or 148 of National Electrical Code 2002.

LwA - A weighted sound power level, based on ANSI S1.4.
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5.0 ft. Sones calculated using AMCA 301 at 5.0 ft.



amca CERTIFIED RATINGS
SOUND AIR PERFORMANCE
AIR MOVING AND CONTROL ASSOCIATION INTERNATIONAL, INC.

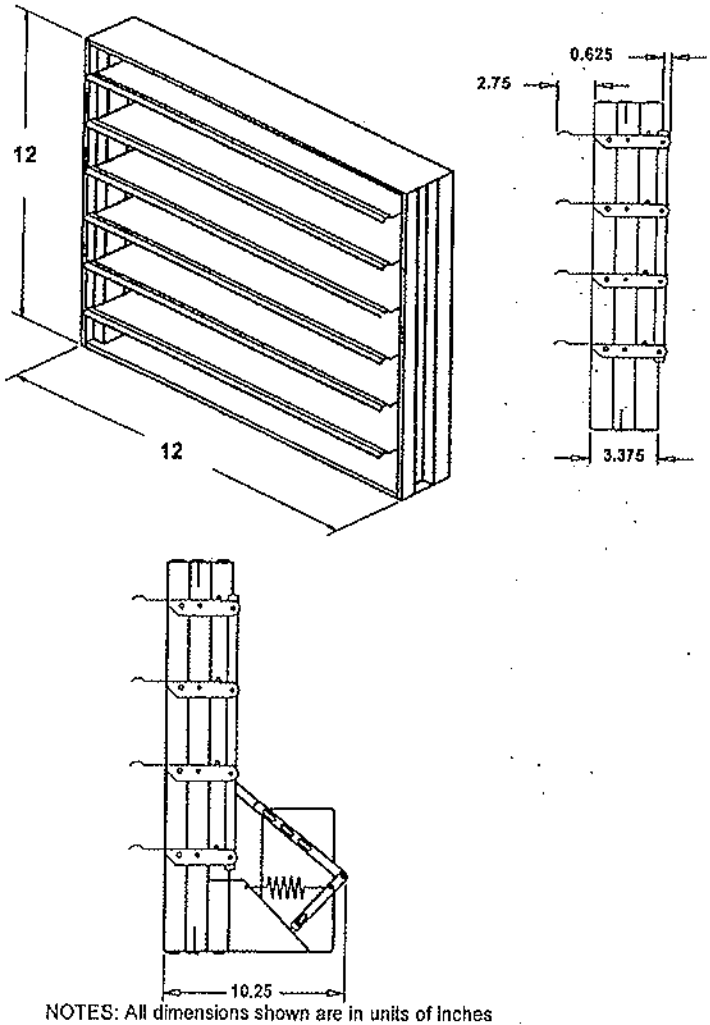
WD-330 Vertical Mount Exhaust Damper

STANDARD CONSTRUCTION FEATURES

Vertical mount exhaust damper is constructed of 18 ga. galvanized steel with pre-punched mounting holes and a flangeless frame.
• Damper blades are 0.025 in roll formed aluminum with vinyl seals on the closing edge • Steel axles are 0.188 in diameter zinc plated mounted in acetal bushing • Synthetic axle bearings

Accessory Configuration

Blade Action	Parallel
Actuator Type	120 VAC



NOTES: All dimensions shown are in units of inches
Width and height furnished approximately 0.125 in undersize.

GREENHECK
Building Value in Air.

Printed Date: 3/29/2007
Job: RETAIL A
Product Type: Fan
Mark: SF-1 THRU SF-11

SWB Backward Inclined Centrifugal Utility Fan

ENGINEERING DATA

Approx. Fan Weight (lb)	Max. T Motor Frame Size
324	213

**Fan weight is without accessories.

Drive Type
Variable

CONFIGURATION

Arrangement	Rotation	Discharge Position
10	CW	TH

INSTALLATION

Air Stream Temp. (F)
70

MOTOR SPECS

Size (hp)	RPM	V/C/P	Enclosure	Motor Frame Size	FLA (A)
5	1725	460/60/3	ODP	184	7.6

FLA - Based on tables 150 or 148 of National Electrical Code 2002.

TAGS

SF-1, SF-2, SF-3, SF-4, SF-5, SF-6, SF-7, SF-8, SF-9, SF-10, SF-11

STANDARD CONSTRUCTION FEATURES

HOUSING: Heavy gauge steel housing with Lock-seam construction • Unit support angles with prepunched mounting holes • Adjustable motor plate • Corrosion resistant fasteners • Entire unit is phosphatized and coated.
BEARINGS, SHAFT, AND WHEEL: Heavy duty lubricatable, self-aligning ball bearing pillow blocks • Polished, solid steel shafts • Backward inclined fan wheel
(Fans with EXP. motors include: aluminum wheel, aluminum rub ring, and shaft seal)

SELECTED OPTIONS & ACCESSORIES

Switch - Nema-1, Toggle, Ship With Unit, Field Mounted
Restrained, Spring Mount Isolators for Indoor/Outdoor use
Steel Wheel Construction
Permatector - Standard Coating on Entire Fan
Weatherhood
Energy Efficient Motor meets EPACT and NEMA 1210
OUTLET GUARD
GRAVITY OPERATED DAMPER

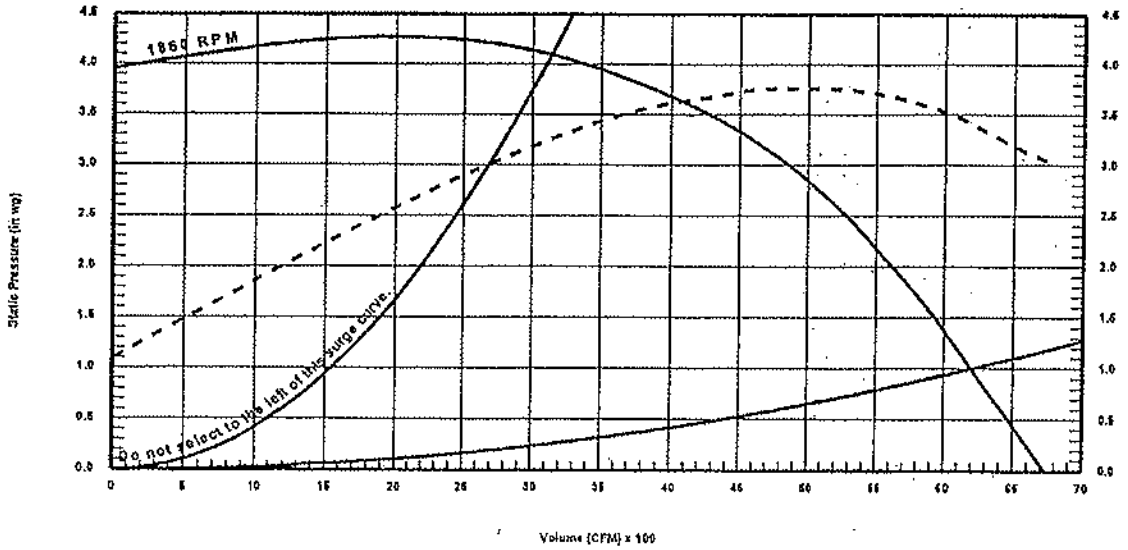
PERFORMANCE Elevation ft = 0

Qty.	Model	Volume (CFM)	SP (in wg)	TS (ft/min)	OV (ft/min)	FRPM	Operating Power (hp)	SE %
11	SWB-218-50	6,200	1	8,887.0	3,364.0	1,860	3.41	29

SOUND

Inlet Sound Power by Octave Band								LwA	dBA	Noise Criteria	Sones
62.5	125	250	500	1000	2000	4000	8000				
92	86	90	88	83	80	76	71	89	78	75	29

LwA - A weighted sound power level, based on ANSI S1.4. dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5.0 ft. Noise Criteria (NC) based on an average attenuation of 11.5 dB per octave band at 5.0 ft.



amca CERTIFIED RATINGS AIR AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

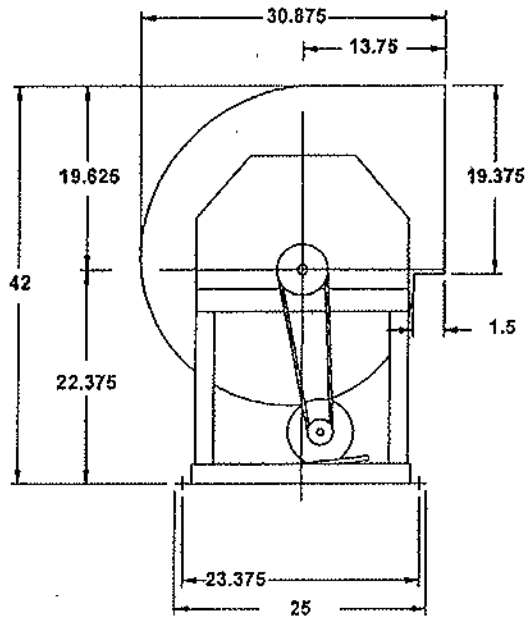
GREENHECK
Building Value in Air.

Printed Date: 3/29/2007
Job: RETAIL A
Product Type: Fan
Mark: SF-1 THRU SF-11

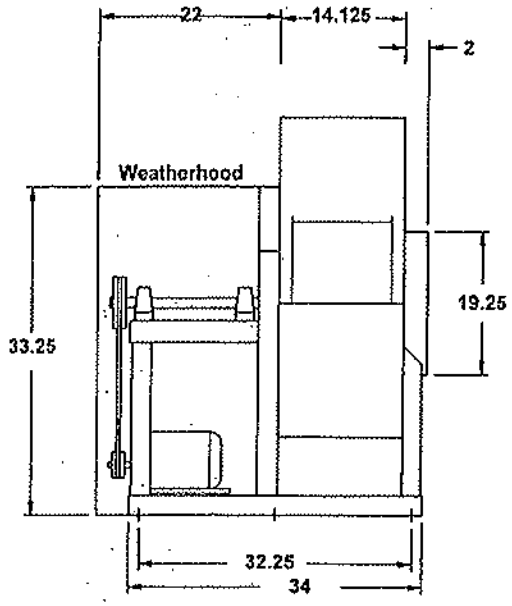
Size: 18
Arrangement: 10

SWB Backward Inclined Centrifugal Utility Fan

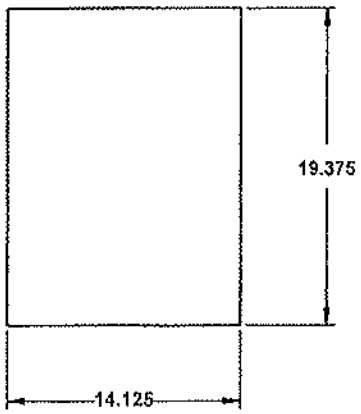
NOTES: All dimensions shown are in units of inches.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.



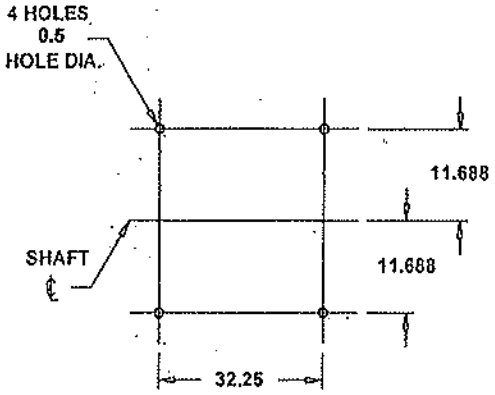
SIDE VIEW



END VIEW



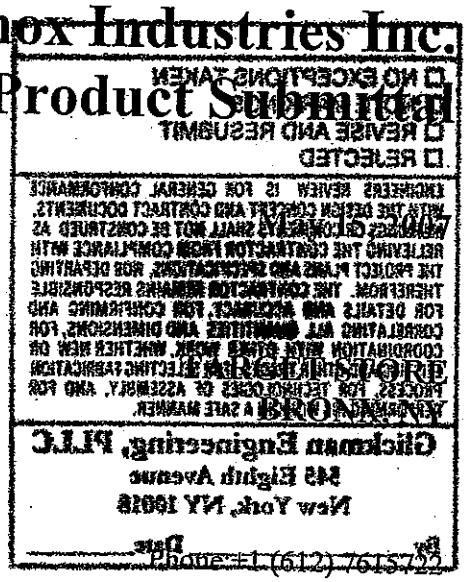
OUTLET



FOOTPRINT

9.14.730 2015

Lennox Industries Inc.
Product Submittal

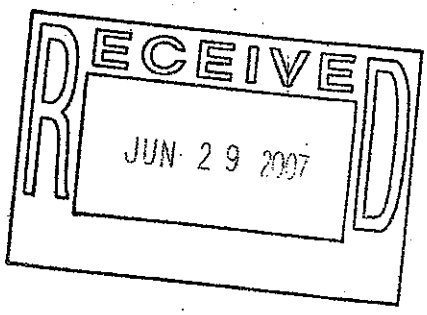


Lennox Industries
2100 Lake Park Blvd.
Dallas, Texas 75080
Phone: 972-497-6295

Plaza Construction Corp.
Bronx Terminal Market
Submittal No:

15732-109-1

REVIEWED. This review does not alleviate the subcontractor/supplier from conforming to the contract documents.



Project Information:U603Q1302P-02
TARGET STORE
BRONX, NY

Prepared By: Mark Moore

We are pleased to provide the attached project submittal. If you have any questions or need additional information, please feel free to call our office.

ORIGINAL

☐ NO EXCEPTIONS TAKEN
☑ NOTE MARKINGS
☐ REVISE AND RESUBMIT
☐ REJECTED

ENGINEERS REVIEW IS FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT AND CONTRACT DOCUMENTS. MARKINGS OR COMMENTS SHALL NOT BE CONSTRUED AS RELIEVING THE CONTRACTOR FROM COMPLIANCE WITH THE PROJECT PLANS AND SPECIFICATIONS, NOR DEPARTING THEREFROM. THE CONTRACTOR REMAINS RESPONSIBLE FOR DETAILS AND ACCURACY, FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, FOR COORDINATION WITH OTHER WORK, WHETHER NEW OR EXISTING AND OTHER TRADES, FOR SELECTING FABRICATION PROCESS, FOR TECHNOLOGIES OF ASSEMBLY, AND FOR PERFORMING HIS WORK IN A SAFE MANNER.

Glickman Engineering, PLLC
545 Eighth Avenue
New York, NY 10018
By _____ Date 8/27/17

* NOTE MARKINGS ON THE ENGINE UNITS

w/ BURG'S ELECT. CONTRACTOR.

Lennox Industries Inc. - Product Submittal
TARGET STORE #XXXXX

May 15, 2007
BRONX, NY

ALL UNITS R-410A GAS REFRIG. O.K.

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072 O.K.

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← 6TON

Submittal Nbr: U603Q1302P-02

Unit Controller As-installed: FAC IMC BACnet Module.

* ALL UNITS - DDC STAND ALONE CONTROL MODULE w/ BACNET

* 1-20T + 1-15T REQ'S HOT GAS REHEAT COIL (UNITS TO BE DESIGNATED BY TARGET.. RTU-8 & RTU-2

Unit ID: RTU - 01

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number	LGA060H2... PkgGE/5Ton/Configurable
Sound rating number (db)	82.0

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	0.5 (in.)
Mechanical: Heating capacity input (high stage)	78,000 (Btuh)
Mechanical: Heating capacity output (high stage)	62,400 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	30.0 (deg F)

COOLING PERFORMANCE

ARI gross cooling	63,000 (Btuh)
ARI net cooling	61,000 (Btuh)
ARI total unit watts	5,500
ARI EER (Btuh/Watts)	11.0
ARI SEER	13.0
Number of Compressors	1
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	60,710 (Btuh)
Direct Expansion: Net Total Cooling	56,988 (Btuh)
Direct Expansion: Gross sensible cooling	35,642 (Btuh)
Direct Expansion: Net Sensible Cooling	31,920 (Btuh)
Direct Expansion: Moisture Removal	23.5 (lb / hr)
Coil Discharge dry bulb temperature	49.0 (deg F)
Coil Discharge wet bulb temperature	47.9 (deg F)
Unit Discharge dry bulb temperature	50.0 (deg F)
Condensate drain size	0.75 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	1,920 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.13 (in. W.C.)
Economizer Static Pressure	0.05 (in. W.C.)
Total Static Pressure	1.18 (in. W.C.)
Supply Fan power	1.18 (bhp)
Supply fan motor nominal power	1.5 (hp)
Required RPM	1,128
RPM range	800 - 1105
Air filter quantity	2
Air filter length x width	16 x 25 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	2.8
Compressor RLA (total)	9.0
Condenser fan motor watts	360
Condenser fan full load amps (total)	1.3
System full load amps	14.8
System MOCP (amps)	25
System minimum circuit ampacity	18.0

15/20

DIMENSIONS

Dimensions	36.5(h) x 46.5(w) x 87.5(d) (in.)
Down-flo supply air opening	14.0(l) x 28.0(w) (in.)
Down-flo return air opening	14.0(l) x 28.0(w) (in.)
Horizontal supply air opening	14.0(h) x 28.0(w) (in.)
Horizontal return air opening	14.0(h) x 28.0(w) (in.)
Total installed unit weight	833 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

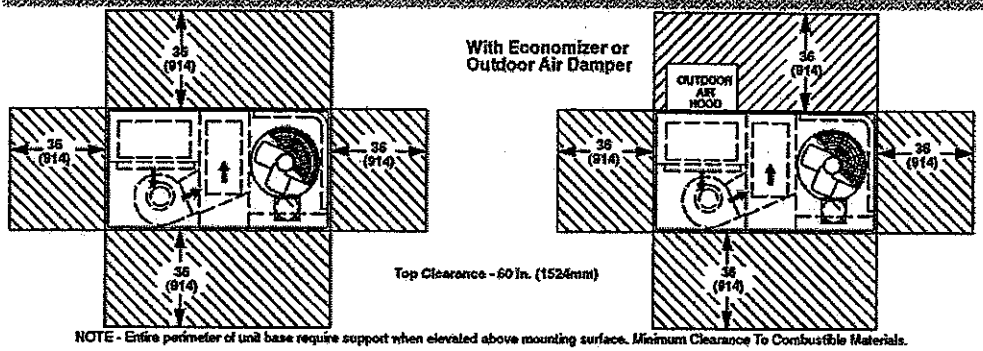
Constant Volume Belt Drive Blower
Air Filter Type - 2" Pleat MERV 8 -Target Filter

Blower Motor - 1.5 Hp Std
Blower Drive Kit -2 (800-1105 RPM)
Gas Heating - 78K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 25 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

FIELD INSTALLED OPTIONS	**MATERIAL**
LAPEF03/06 StdStat PEF/460-3	62K64
HAIL GUARD - 036/072	28L53

THERMOSTATS & CONTROLS	**Material**
FAC IMC BACNet Module	Factory Installed

INSTALLATION CLEARANCES - INCHES (MM)



NOTE - Entire perimeter of unit base require support when elevated above mounting surface. Minimum Clearance To Combustible Materials.

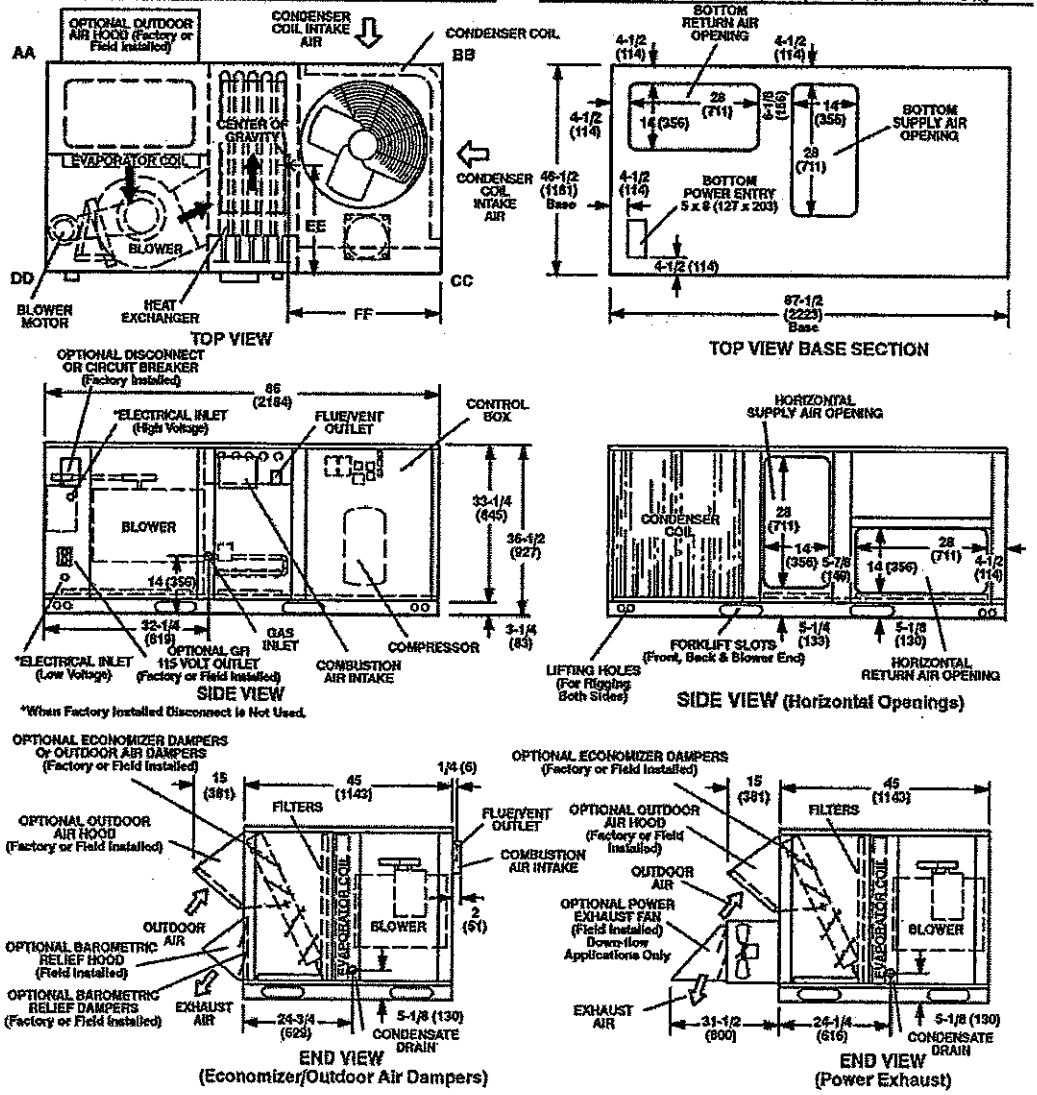
WEIGHTS AND DIMENSIONS - INCHES (MM)

Shown With Economizer Dampers, Power Exhaust Fan, Convenience Outlet, Disconnect, Belt Drive Blower

Model No.	WEIGHTS				CORNER WEIGHTS - Base Unit								CENTER OF GRAVITY			
	Net		Shipping		AA		BB		CC		DD		EE		FF	
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	in.	mm	in.	mm
060	730	331	860	390	146	66	160	73	233	106	211	96	18-7/8	479	41-5/8	1057

A-O-SKY SHIPPING WEIGHTS (add to base unit weight)

Dual/High Fire Heat Exchanger	18 lbs	8 kg		LTL Packaging (less than truck load)	8 lbs.	4 kg
Economizer	56 lbs.	25 kg		Barometric Relief Damper	15 lbs.	7 kg
Outdoor Air Damper	46 lbs.	21 kg		Hood for Barometric Relief Damper	13 lbs.	6 kg



Unit ID: RTU - 02

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC180H2... PkgGE/15Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	169,000 (Btuh)
Mechanical: Heating capacity input (high stage)	260,000 (Btuh)
Mechanical: Heating capacity output (high stage)	208,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	36.6 (deg F)

COOLING PERFORMANCE

ARI gross cooling	188,000 (Btuh)
ARI net cooling	182,000 (Btuh)
ARI total unit watts	15,400
ARI EER (Btuh/Watts)	11.8
ARI integrated part load value	13.3
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	174,757 (Btuh)
Direct Expansion: Net Total Cooling	167,030 (Btuh)
Direct Expansion: Gross sensible cooling	100,005 (Btuh)
Direct Expansion: Net Sensible Cooling	92,277 (Btuh)
Direct Expansion: Moisture Removal	70.2 (lb / hr)
Coil Discharge dry bulb temperature	48.5 (deg F)
Coil Discharge wet bulb temperature	47.2 (deg F)
Unit Discharge dry bulb temperature	49.5 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	5,250 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.02 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.06 (in. W.C.)
Total Static Pressure	1.08 (in. W.C.)
Supply Fan power	2.65 (bhp)
Supply fan motor nominal power	5.0 (hp)
Required RPM	850
RPM range	685 - 865
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	7.6
Compressor RLA (total)	27.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	42.4
System MOCP (amps)	50
System minimum circuit ampacity	45.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,490 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower

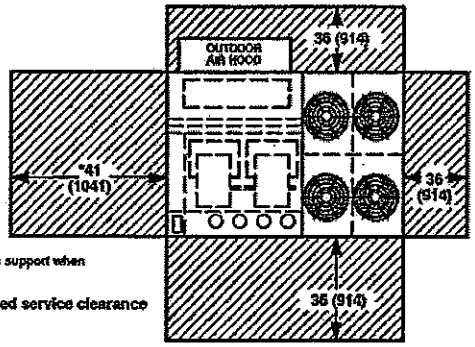
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 5 Hp Std
Blower Drive Kit -2 (685-865 RPM)
Gas Heating - 260K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 50 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

FIELD INSTALLED OPTIONS	**MATERIAL**
HAIL GUARD - LGA/LCA156-300S	88K25

THERMOSTATS & CONTROLS	**Material**
FAC IMC BACNet Module	Factory Installed

INSTALLATION CLEARANCES - INCHES (MM)

156H thru 300S



*66 in. (1676 mm) Recommended service clearance for blower deck removal

NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

UNIT WEIGHTS AND DIMENSIONS - INCHES (MM)

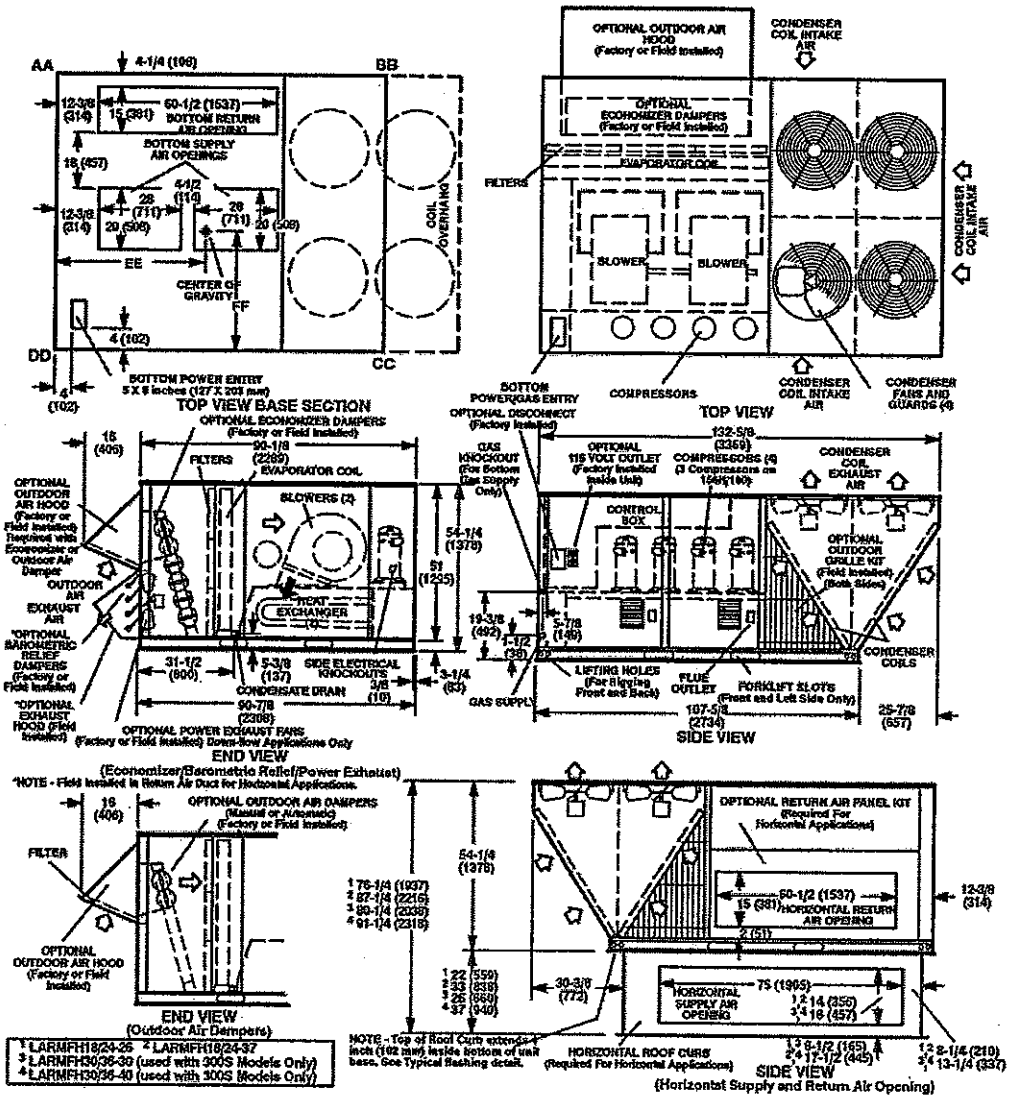
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS NET lbs.	WEIGHTS NET kg	SHIPPING lbs.	SHIPPING kg	CORNER WEIGHTS AA lbs.	AA kg	BB lbs.	BB kg	CC lbs.	CC kg	DD lbs.	DD kg	CENTER OF GRAVITY EE inch	EE mm	FF inch	FF mm
180 Base Unit	2355	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	38-1/2	978
180 Max. Unit	2560	1161	2760	1252	580	263	590	268	700	318	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg
Economizer	73 lbs.	33 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg
Power Exhaust	62 lbs.	19 kg
LTL Packaging (less than truck load)	280 lbs.	127 kg

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



Unit ID: RTU - 03

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC180H2... PkgGE/15Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	169,000 (Btuh)
Mechanical: Heating capacity input (high stage)	260,000 (Btuh)
Mechanical: Heating capacity output (high stage)	208,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	34.0 (deg F)

COOLING PERFORMANCE

ARI gross cooling	188,000 (Btuh)
ARI net cooling	182,000 (Btuh)
ARI total unit watts	15,400
ARI EER (Btuh/Watts)	11.8
ARI integrated part load value	13.3
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	177,220 (Btuh)
Direct Expansion: Net Total Cooling	168,673 (Btuh)
Direct Expansion: Gross sensible cooling	96,334 (Btuh)
Direct Expansion: Net Sensible Cooling	87,787 (Btuh)
Direct Expansion: Moisture Removal	75.9 (lb / hr)
Coil Discharge dry bulb temperature	50.5 (deg F)
Coil Discharge wet bulb temperature	48.1 (deg F)
Unit Discharge dry bulb temperature	51.5 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	5,650 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.02 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.06 (in. W.C.)
Total Static Pressure	1.08 (in. W.C.)
Supply Fan power	2.94 (bhp)
Supply fan motor nominal power	5.0 (hp)
Required RPM	865
RPM range	850 - 1045
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	7.6
Compressor RLA (total)	27.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	42.4
System MOCP (amps)	50
System minimum circuit ampacity	45.0

37/40

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,490 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower

Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 5 Hp Std
Blower Drive Kit -3 (850-1045 RPM)
Gas Heating - 260K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 50 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

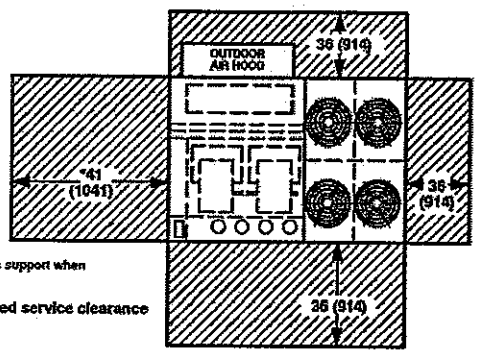
FIELD INSTALLED OPTIONS	**MATERIAL**
HAIL GUARD - LGA/LCA156-300S	88K25

THERMOSTATS & CONTROLS	**Material**
FAC IMC BACNet Module	Factory Installed

MISSING CO2 SENSOR

INSTALLATION CLEARANCES / INCHES (MM)

156H thru 300S



*66 in. (1676 mm) Recommended service clearance for blower deck removal

NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

180 WEIGHTS AND DIMENSIONS - INCHES (MM)

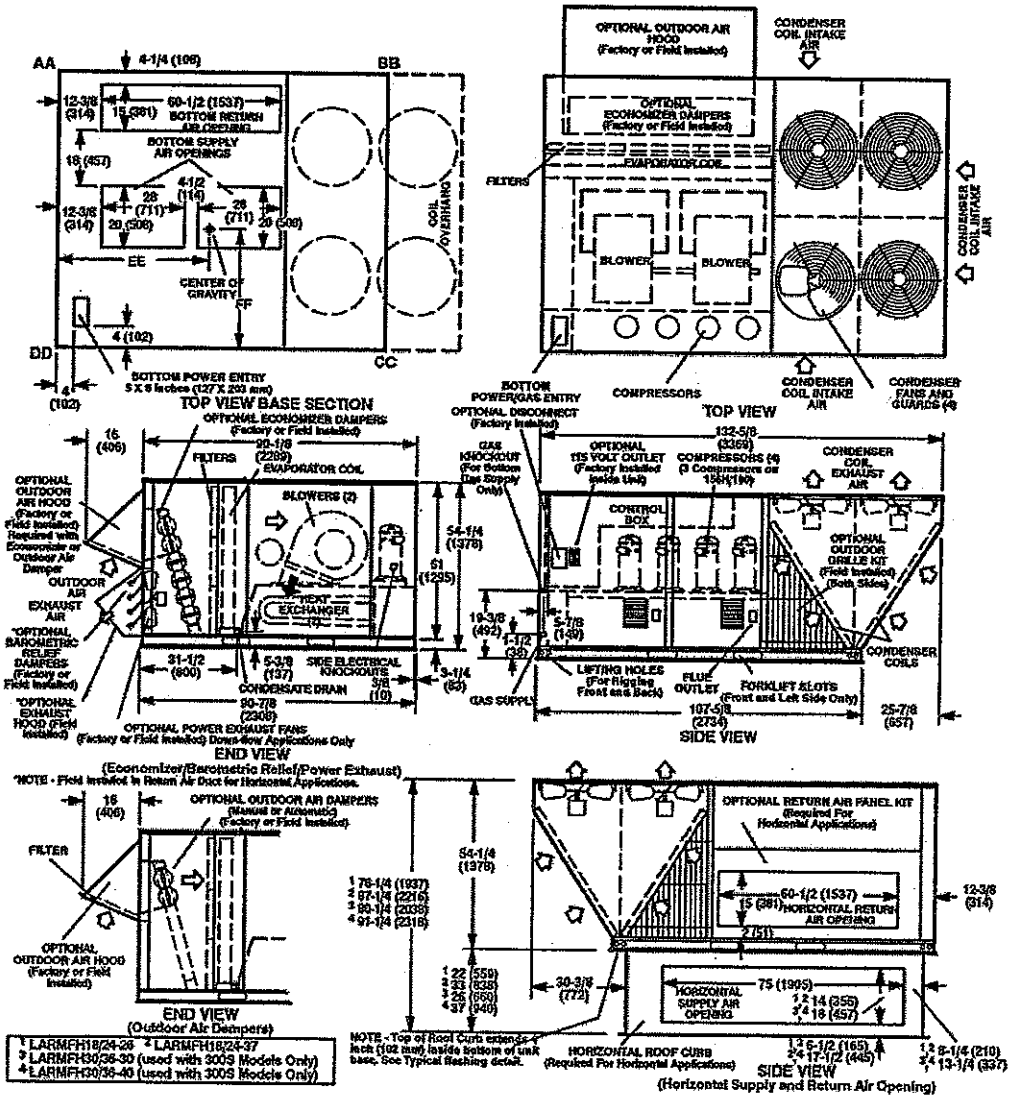
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS NET lbs.	kg	SHIPPING lbs.	kg	CORNER WEIGHTS AA lbs.	kg	BB lbs.	kg	CC lbs.	kg	DD lbs.	kg	CENTER OF GRAVITY EE inch	mm	FF inch	mm
180 Base Unit	2355	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	38-1/2	978
180 Max. Unit	2560	1161	2760	1252	580	263	590	268	700	316	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg
Economizer	73 lbs.	33 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg
Power Exhaust	62 lbs.	19 kg
LTL Packaging (less than truck load)	280 lbs.	127 kg

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



Unit ID: RTU - 04

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGA102H2... PkgGE/8.5Ton/Configurable
Sound rating number (db) 88.0

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	0.75 (in.)
Mechanical: Heating capacity input (low stage)	84,500 (Btuh)
Mechanical: Heating capacity output (low stage)	67,500 (Btuh)
Mechanical: Heating capacity input (high stage)	130,000 (Btuh)
Mechanical: Heating capacity output (high stage)	104,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	35.4 (deg F)

COOLING PERFORMANCE

ARI gross cooling	105,000 (Btuh)
ARI net cooling	101,000 (Btuh)
ARI total unit watts	9,000
ARI EER (Btuh/Watts)	11.2
ARI integrated part load value	11.7
Number of Compressors	2
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	96,937 (Btuh)
Direct Expansion: Net Total Cooling	92,531 (Btuh)
Direct Expansion: Gross sensible cooling	52,103 (Btuh)
Direct Expansion: Net Sensible Cooling	47,698 (Btuh)
Direct Expansion: Moisture Removal	42.0 (lb / hr)
Coil Discharge dry bulb temperature	48.4 (deg F)
Coil Discharge wet bulb temperature	46.2 (deg F)
Unit Discharge dry bulb temperature	49.4 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	2,720 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.08 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.05 (in. W.C.)
Economizer Static Pressure	0.04 (in. W.C.)
Total Static Pressure	1.19 (in. W.C.)
Supply Fan power	1.37 (bhp)
Supply fan motor nominal power	2.0 (hp)
Required RPM	866
RPM range	680 - 925
Air filter quantity	4
Air filter length x width	18 x 24 (in.)

Air filter thickness ..... 2 (in.)

ELECTRICAL

Power supply ..... 460 V 3 Phase
Unit operating range ..... + or - 10%
Blower motor full load amps 3.4
Compressor RLA (total) 14.2
Condenser fan motor watts 700
Condenser fan full load amps (total) 2.6
System full load amps 21.5
System MOCP (amps) 30
System minimum circuit ampacity 24.0

DIMENSIONS

Dimensions ..... 50.0(h) x 58.0(w) x 99.25(d) (in.)
Down-flo supply air opening ..... 20.0(l) x 28.0(w) (in.)
Down-flo return air opening ..... 20.0(l) x 28.0(w) (in.)
Horizontal supply air opening ..... 15.0(h) x 28.0(w) (in.)
Horizontal return air opening ..... 20.0(h) x 28.0(w) (in.)
Total installed unit weight ..... 1,375 (lbs.)

EQUIPMENT FEATURES

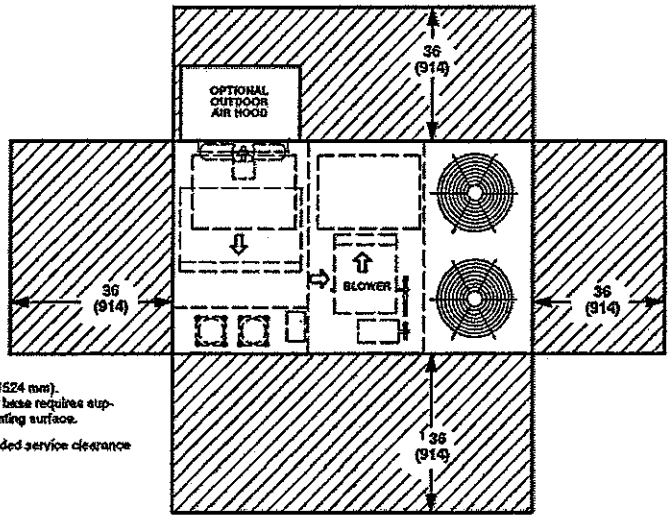
Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS
Constant Volume Belt Drive Blower
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 2 Hp Std
Blower Drive Kit -1 (680-925 RPM)
Gas Heating - 130K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 30 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

FIELD INSTALLED OPTIONS	**MATERIAL**
HAIL GUARD - LGA/LCA090-150	88K24

THERMOSTATS & CONTROLS	**Material**
FAC IMC BACNet Module	Factory Installed

INSTALLATION CLEARANCES - INCHES (MM)



NOTE - Top Clearance 60 in. (1524 mm).
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

1 60 in. (1524 mm) recommended service clearance for blower deck removal

WEIGHTS AND DIMENSIONS - INCHES (MM)

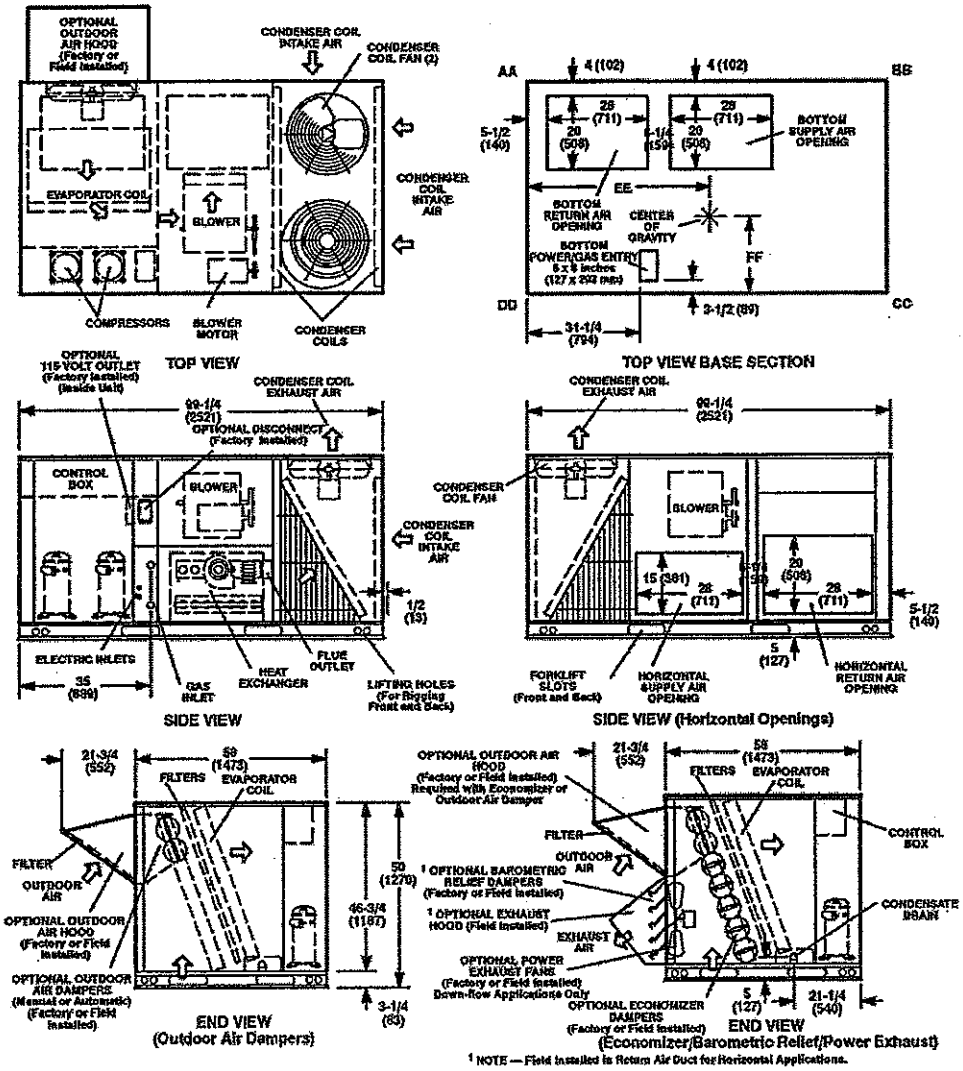
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS Net lbs.	Net kg	Shipping lbs.	Shipping kg	CORNER WEIGHTS AA lbs.	AA kg	BB lbs.	BB kg	CC lbs.	CC kg	DD lbs.	DD kg	CENTER OF GRAVITY EE inch	EE mm	FF inch	FF mm
102 Base Unit	1300	590	1385	628	314	142	289	131	329	149	368	167	47	1194	21-1/2	548
102 Max. Unit	1525	692	1610	730	381	173	339	154	374	170	431	195	46	1168	23-1/2	597

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

High Fire Heat Exchanger	40 lbs.	18 kg	Power Exhaust	28 lbs.	13 kg
Economizer	66 lbs.	30 kg	LTL Packaging (less than truck load)	105 lbs.	48 kg
Outdoor Air Damper	40 lbs.	18 kg			

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (Economizer, Power Exhaust Fans, High Input Heating and Controls)



Unit ID: RTU - 05

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGA240H2... PkgGE/20Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	234,000 (Btuh)
Mechanical: Heating capacity input (high stage)	360,000 (Btuh)
Mechanical: Heating capacity output (high stage)	288,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	44.4 (deg F)

COOLING PERFORMANCE

ARI gross cooling	252,000 (Btuh)
ARI net cooling	242,000 (Btuh)
ARI total unit watts	22,000
ARI EER (Btuh/Watts)	11.0
ARI integrated part load value	11.8
Number of Compressors	4
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	228,165 (Btuh)
Direct Expansion: Net Total Cooling	218,256 (Btuh)
Direct Expansion: Gross sensible cooling	118,574 (Btuh)
Direct Expansion: Net Sensible Cooling	108,665 (Btuh)
Direct Expansion: Moisture Removal	102.8 (lb / hr)
Coil Discharge dry bulb temperature	47.8 (deg F)
Coil Discharge wet bulb temperature	45.1 (deg F)
Unit Discharge dry bulb temperature	48.8 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	6,000 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.08 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.12 (in. W.C.)
Total Static Pressure	1.20 (in. W.C.)
Supply Fan power	3.44 (bhp)
Supply fan motor nominal power	7.5 (hp)
Required RPM	909
RPM range	850 - 1045
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	11.0
Compressor RLA (total)	36.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	54.8
System MOCP (amps)	60
System minimum circuit ampacity	58.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,750 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower

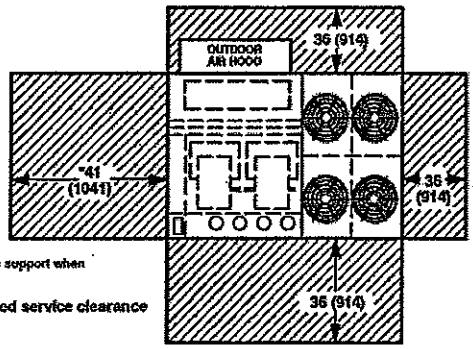
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 7.5 Hp Std
Blower Drive Kit -7 (850-1045 RPM)
Gas Heating - 360K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 60 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

FIELD INSTALLED OPTIONS ..... **MATERIAL**
HAIL GUARD - LGA/LCA156-300S 88K25

THERMOSTATS & CONTROLS ..... **Material**
FAC IMC BACNet Module ..... Factory Installed

INSTALLATION CLEARANCES: INCHES (MM)

156H thru 300S



*56 in. (1676 mm) Recommended service clearance for blower deck removal

NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

240 WEIGHTS AND DIMENSIONS - INCHES (MM)

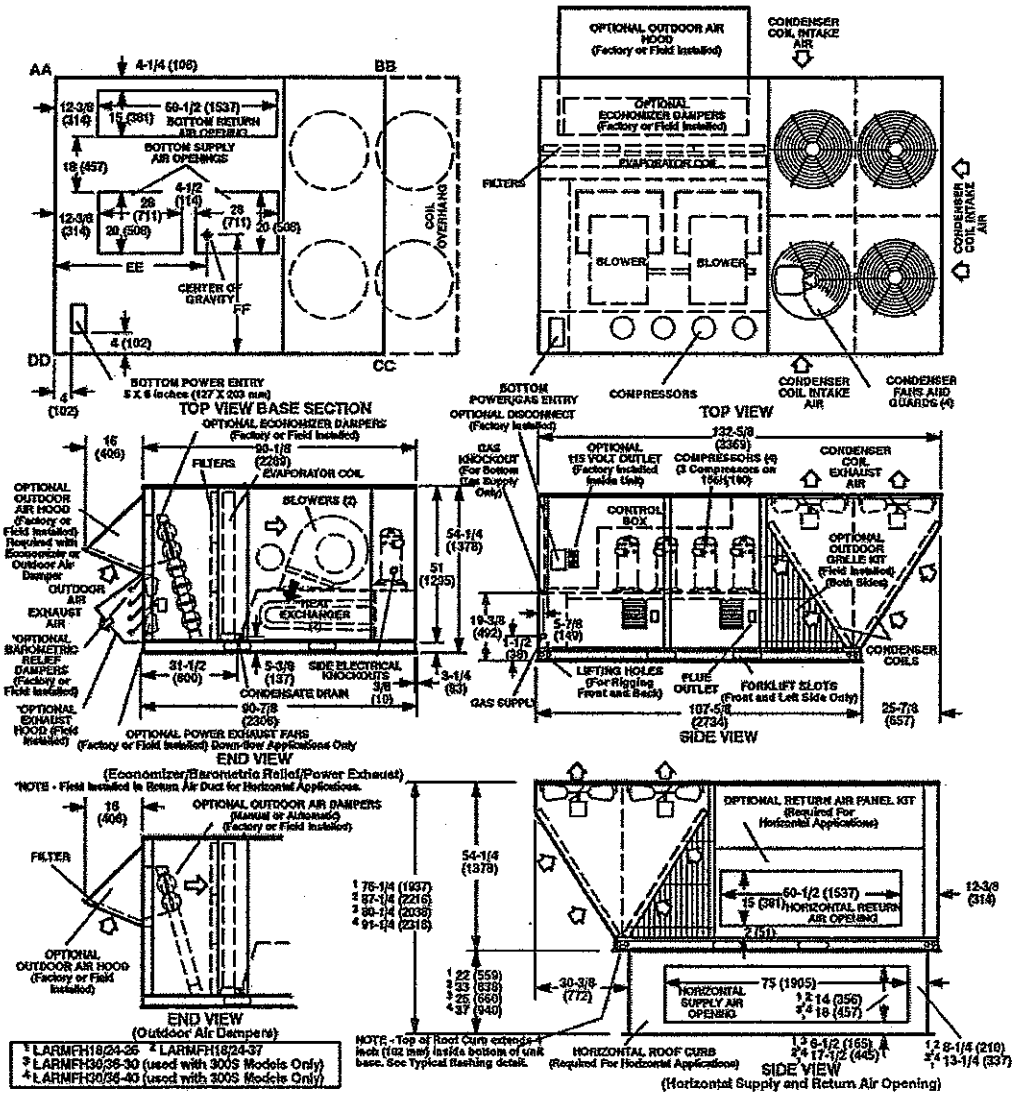
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS NET lbs.	kg	SHIPPING lbs.	kg	CORNER WEIGHTS AA lbs.	kg	BB lbs.	kg	CC lbs.	kg	DD lbs.	kg	CENTER OF GRAVITY EE inch	mm	FF inch	mm
240 Base Unit	2535	1150	2735	1241	490	222	520	236	740	336	710	322	54-1/2	1384	37-1/2	953
240 Max. Unit	2740	1243	2940	1334	610	277	610	277	750	304	770	349	53	1346	40-1/2	1029

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg	Power Exhaust	62 lbs.	19 kg
Economizer	73 lbs.	33 kg	LTL Packaging (less than truck load)	280 lbs.	127 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg			

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



Unit ID: RTU - 06

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC180H2... PkgGE/15Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	234,000 (Btuh)
Mechanical: Heating capacity input (high stage)	360,000 (Btuh)
Mechanical: Heating capacity output (high stage)	288,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	53.3 (deg F)

COOLING PERFORMANCE

ARI gross cooling	188,000 (Btuh)
ARI net cooling	182,000 (Btuh)
ARI total unit watts	15,400
ARI EER (Btuh/Watts)	11.8
ARI integrated part load value	13.3
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	173,218 (Btuh)
Direct Expansion: Net Total Cooling	165,897 (Btuh)
Direct Expansion: Gross sensible cooling	102,227 (Btuh)
Direct Expansion: Net Sensible Cooling	94,907 (Btuh)
Direct Expansion: Moisture Removal	66.5 (lb / hr)
Coil Discharge dry bulb temperature	47.2 (deg F)
Coil Discharge wet bulb temperature	46.6 (deg F)
Unit Discharge dry bulb temperature	48.2 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	5,000 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.02 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.09 (in. W.C.)
Total Static Pressure	1.11 (in. W.C.)
Supply Fan power	2.51 (bhp)
Supply fan motor nominal power	5.0 (hp)
Required RPM	850
RPM range	685 - 865
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	7.6
Compressor RLA (total)	27.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	42.4
System MOCP (amps)	50
System minimum circuit ampacity	45.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,570 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower

Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 5 Hp Std
Blower Drive Kit -2 (685-865 RPM)
Gas Heating - 360K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 50 amps - Factory Installed
GFCI - Factory Installed/Field Wired
R.A. Smoke Detector-Single Pnt - R.A. Smoke Detector-Single Pnt

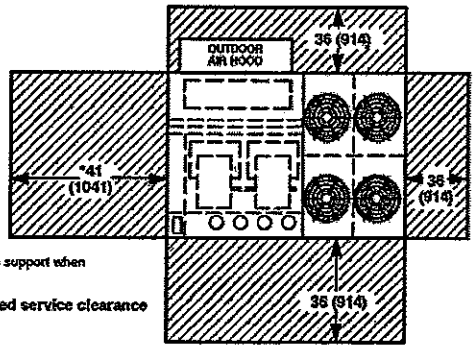
FIELD INSTALLED OPTIONS	**MATERIAL**
HAIL GUARD - LGA/LCA156-300S	88K25

THERMOSTATS & CONTROLS	**Material**
FAC IMC BACNet Module	Factory Installed

CO_2 SENSOR MISSING

INSTALLATION CLEARANCES - INCHES (MM)

156H thru 300S



NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

180 WEIGHTS AND DIMENSIONS - INCHES (MM)

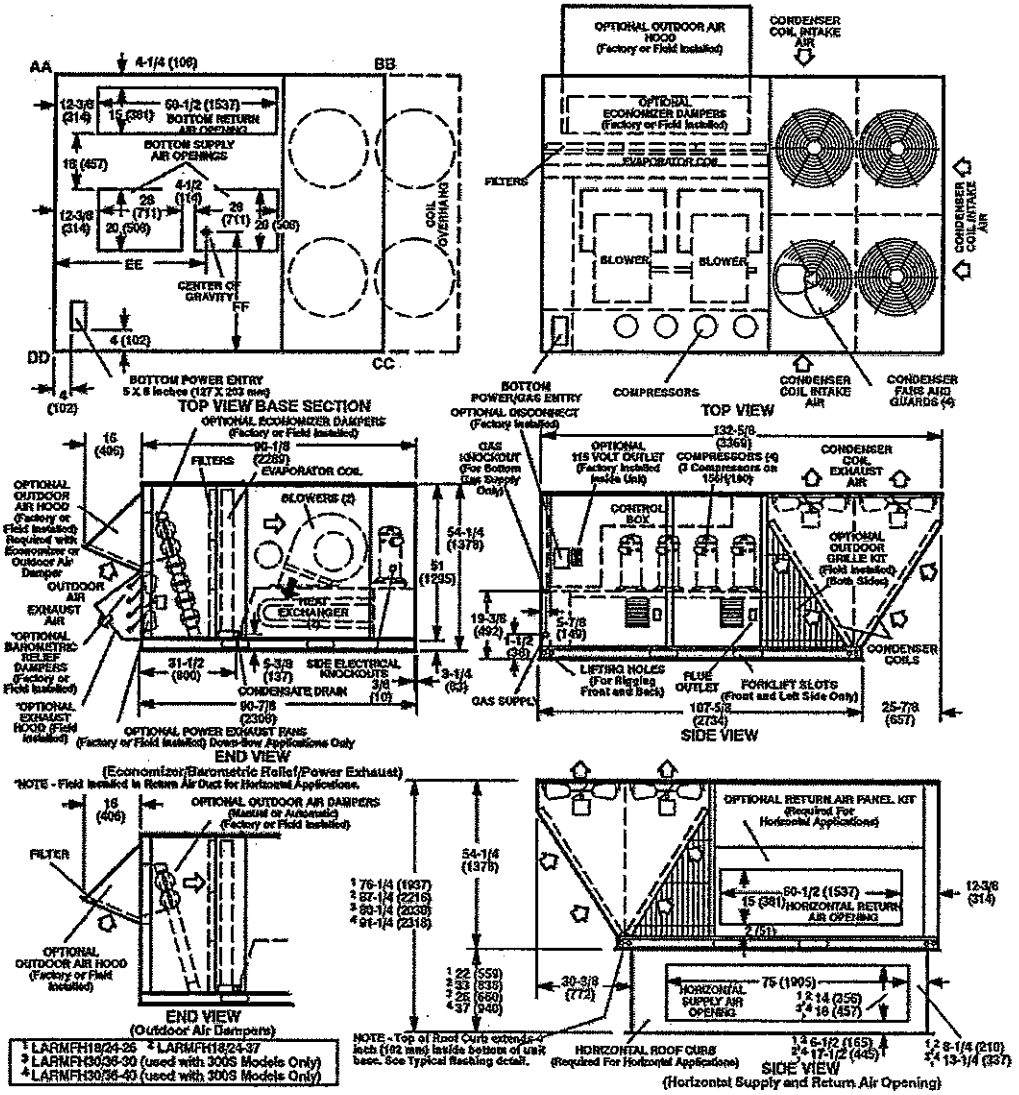
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS NET lbs.	kg	SHIPPING lbs.	kg	CORNER WEIGHTS AA lbs.	kg	BB lbs.	kg	CC lbs.	kg	DD lbs.	kg	CENTER OF GRAVITY EE inch	mm	FF inch	mm
180 Base Unit	2555	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	38-1/2	978
180 Max. Unit	2560	1161	2760	1252	580	263	590	268	700	316	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg
Economizer	73 lbs.	33 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg
Power Exhaust	62 lbs.	19 kg
LTL Packaging (less than truck load)	280 lbs.	127 kg

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



Unit ID: RTU - 07

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC180H2... PkgGE/15Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	234,000 (Btuh)
Mechanical: Heating capacity input (high stage)	360,000 (Btuh)
Mechanical: Heating capacity output (high stage)	288,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	44.4 (deg F)

COOLING PERFORMANCE

ARI gross cooling	188,000 (Btuh)
ARI net cooling	182,000 (Btuh)
ARI total unit watts	15,400
ARI EER (Btuh/Watts)	11.8
ARI integrated part load value	13.3
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	179,375 (Btuh)
Direct Expansion: Net Total Cooling	169,643 (Btuh)
Direct Expansion: Gross sensible cooling	93,005 (Btuh)
Direct Expansion: Net Sensible Cooling	83,273 (Btuh)
Direct Expansion: Moisture Removal	81.0 (lb / hr)
Coil Discharge dry bulb temperature	52.0 (deg F)
Coil Discharge wet bulb temperature	48.7 (deg F)
Unit Discharge dry bulb temperature	53.0 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	6,000 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.03 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.12 (in. W.C.)
Total Static Pressure	1.15 (in. W.C.)
Supply Fan power	3.34 (bhp)
Supply fan motor nominal power	5.0 (hp)
Required RPM	894
RPM range	850 - 1045
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	7.6
Compressor RLA (total)	27.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	42.4
System MOCP (amps)	50
System minimum circuit ampacity	45.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,570 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower

Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 5 Hp Std
Blower Drive Kit -3 (850-1045 RPM)
Gas Heating - 360K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 50 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

FIELD INSTALLED OPTIONS	**MATERIAL**
HAIL GUARD - LGA/LCA156-300S	88K25

THERMOSTATS & CONTROLS	**Material**
FAC IMC BACNet Module	Factory Installed

180 WEIGHTS AND DIMENSIONS - INCHES (MM)

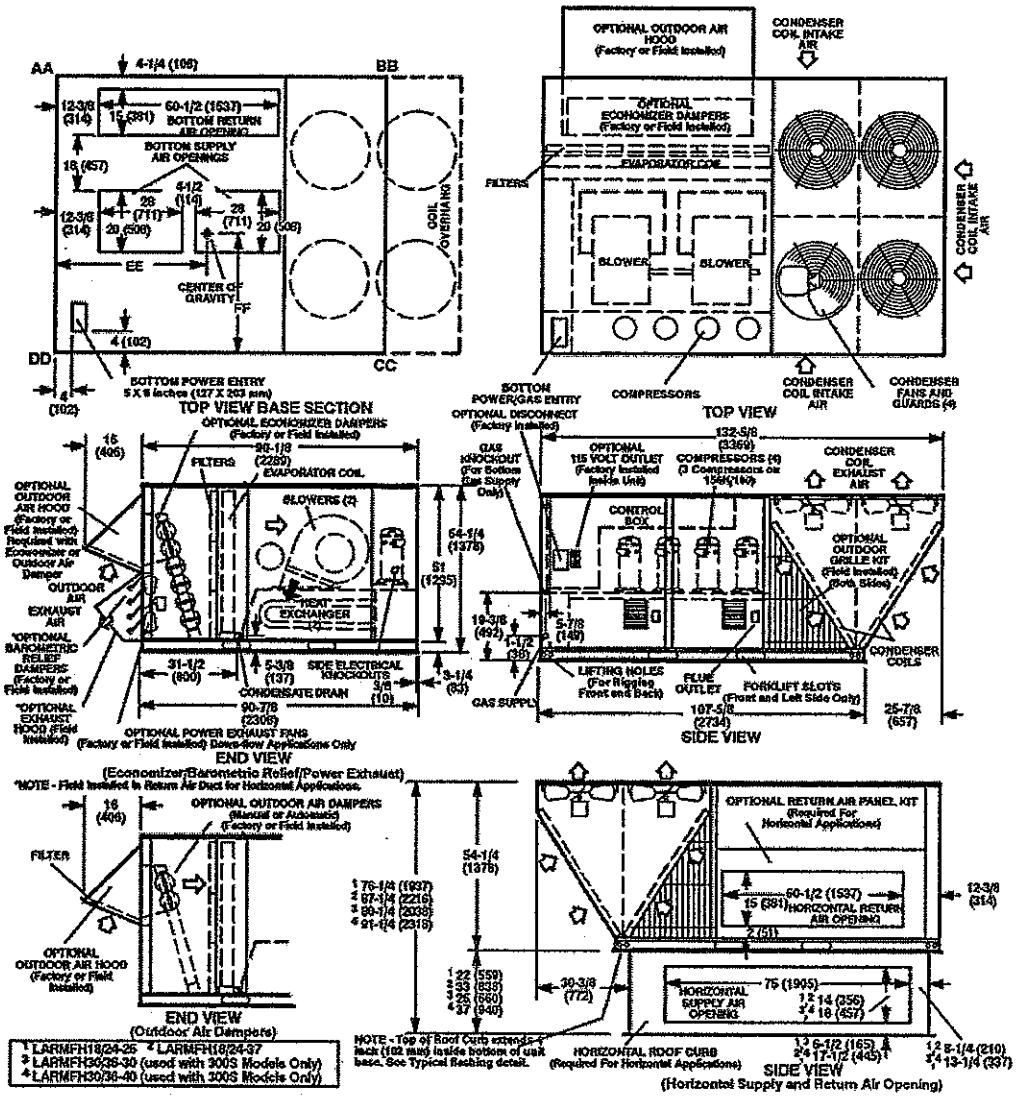
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS NET lbs.	kg	SHIPPING lbs.	kg	CORNER WEIGHTS AA lbs.	kg	BB lbs.	kg	CC lbs.	kg	DD lbs.	kg	CENTER OF GRAVITY EE inch	mm	FF inch	mm
180 Base Unit	2355	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	38-1/2	978
180 Max. Unit	2560	1161	2760	1252	580	263	590	268	700	318	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (Add to base unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg
Economizer	73 lbs.	33 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg
Power Exhaust	62 lbs.	19 kg
LTL Packaging (less than truck load)	280 lbs.	127 kg

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS Installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



Unit ID: RTU - 08

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC180H2... PkgGE/15Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	234,000 (Btuh)
Mechanical: Heating capacity input (high stage)	360,000 (Btuh)
Mechanical: Heating capacity output (high stage)	288,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	53.3 (deg F)

COOLING PERFORMANCE

ARI gross cooling	188,000 (Btuh)
ARI net cooling	182,000 (Btuh)
ARI total unit watts	15,400
ARI EER (Btuh/Watts)	11.8
ARI integrated part load value	13.3
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	173,218 (Btuh)
Direct Expansion: Net Total Cooling	165,481 (Btuh)
Direct Expansion: Gross sensible cooling	102,227 (Btuh)
Direct Expansion: Net Sensible Cooling	94,490 (Btuh)
Direct Expansion: Moisture Removal	66.5 (lb / hr)
Coil Discharge dry bulb temperature	47.2 (deg F)
Coil Discharge wet bulb temperature	46.6 (deg F)
Unit Discharge dry bulb temperature	48.2 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	5,000 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.02 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.09 (in. W.C.)
Humiditrol Static Pressure	0.02 (in. W.C.)
Total Static Pressure	1.13 (in. W.C.)
Supply Fan power	2.55 (bhp)
Supply fan motor nominal power	3.0 (hp)
Required RPM	857
RPM range	710 - 965
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	4.8
Compressor RLA (total)	27.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	39.6
System MOCP (amps)	50
System minimum circuit ampacity	42.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,570 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

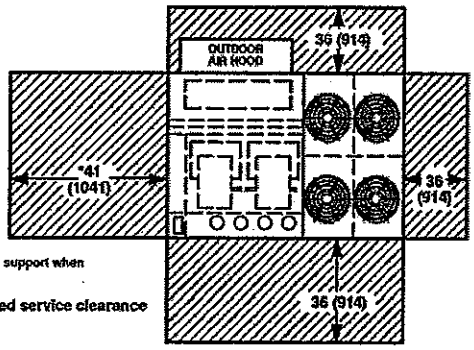
Constant Volume Belt Drive Blower
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 3 Hp Std
Blower Drive Kit -1 (710-965 RPM)
Gas Heating - 360K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 50 amps - Factory Installed
GFCI - Factory Installed/Field Wired
Humiditrol - Factory Installed
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

FIELD INSTALLED OPTIONS	**MATERIAL**
HAIL GUARD - LGA/LCA156-300S	88K25

THERMOSTATS & CONTROLS	**Material**
FAC IMC BACNet Module	Factory Installed

INSTALLATION CLEARANCES - INCHES (MM)

156H thru 300S

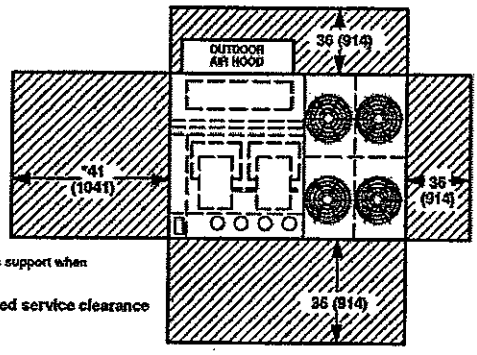


NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

INSTALLATION CLEARANCES - INCHES (MM)

156H thru 300S



NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

180 WEIGHTS AND DIMENSIONS - INCHES (MM)

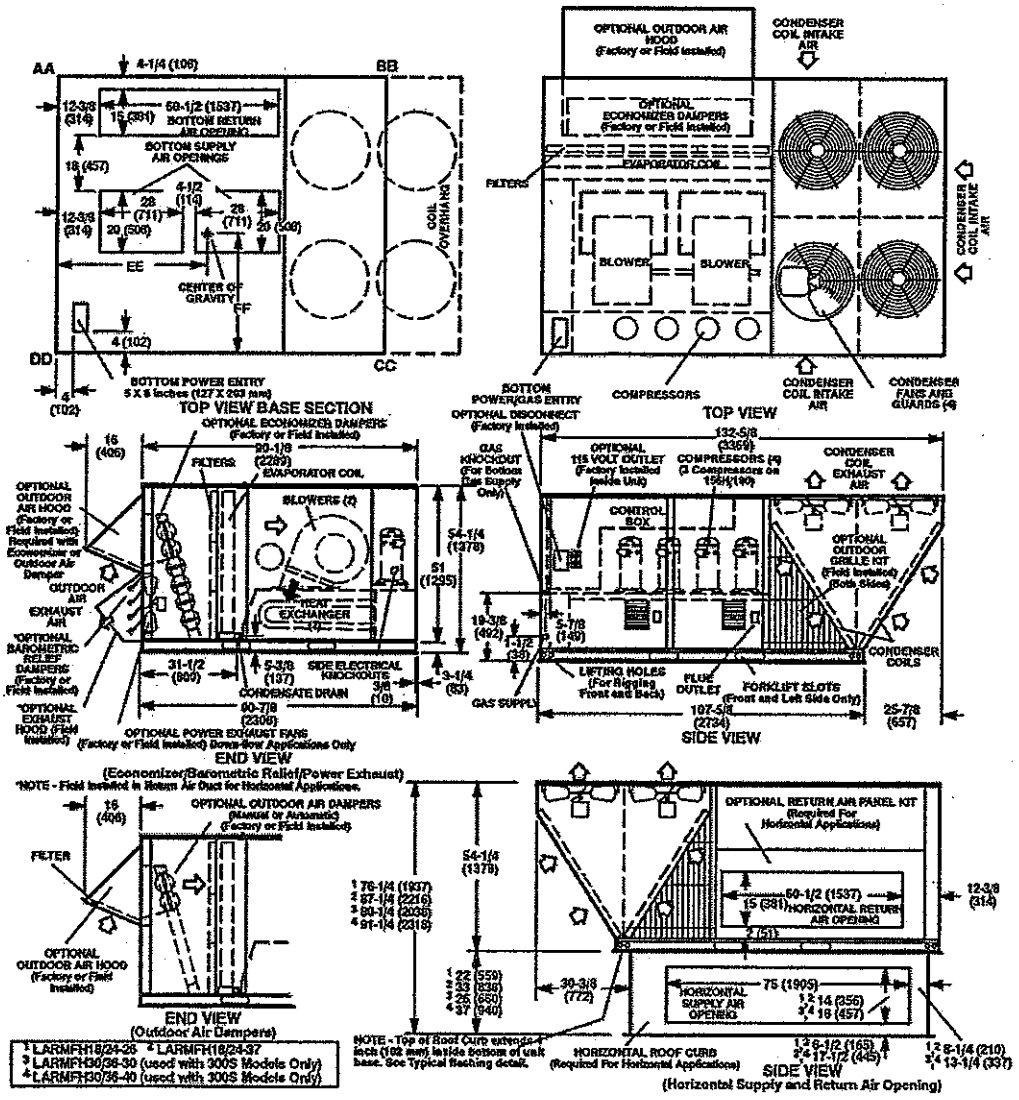
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS NET lbs.	kg	SHIPPING lbs.	kg	CORNER WEIGHTS AA lbs.	kg	BB lbs.	kg	CC lbs.	kg	DD lbs.	kg	CENTER OF GRAVITY EE inch	mm	FF inch	mm
180 Base Unit	2355	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	33-1/2	978
180 Max. Unit	2560	1161	2760	1252	580	263	590	268	700	318	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg	Power Exhaust	62 lbs.	19 kg
Economizer	73 lbs.	33 kg	LTL Packaging (less than truck load)	280 lbs.	127 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg			

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



Humiditrol HOT GAS Reheat Option - 156H-180H, 210H-240H & 300S (R-22)

Factory installed option designed to control humidity.
Provides dehumidification on demand using ASHRAE 90.1 recommended method for reheat with comfort conditioning humidity control.
In addition to a thermostat/room sensor used for conventional operation, a humidity sensor is required and must be located in the occupied space.
Humidity sensor provides input to the Integrated Modular Control (IMC) which is used to control activation of the dehumidification operation.
Reheat controls are located in the compressor control section of the unit for easy access.

Benefits

Improves indoor air quality.
Helps prevents damage due to high humidity levels.
Improves comfort levels by reducing space humidity levels.

Operation

No Dehumidification Demand

The unit will operate conventionally whenever there is a demand for cooling or heating and no dehumidification demand.
Free cooling is only permitted when there is no demand for dehumidification.

Dehumidification Demand Only

The IMC is factory set at 60% relative humidity setpoint and can be adjusted at the IMC or with optional Unit Controller Software.
For Network Control Panel (NCP) applications, the humidity setpoint can be adjusted at the NCP. The unit will operate in the dehumidification mode until the relative humidity of the conditioned space is 3% below the setpoint.
Reheat operation will initiate on a dehumidification demand and does not require a cooling demand.
The reheat coil is sized to offset most of the first stage sensible cooling effect during reheat only operation. This reduction in sensible cooling capacity extends compressor run time to control humidity when cooling loads are light.
Solenoid valves divert hot gas from compressor 1 and compressor 2 to the reheat coil.
The cooled and dehumidified air from the evaporator is then reheated as it passes through the reheat coil.
The de-superheated and partially condensed refrigerant continues to the outdoor condenser coil where condensing is completed.
The unit will continue to operate in this mode until the dehumidification demand is satisfied.
A heating demand will terminate reheat operation.

Dehumidification and Cooling Demand for 156H/180H three compressor models (Thermostat Application)

If both a dehumidification and a first stage cooling demand occur, the system will operate compressor 1 and compressor 2 in reheat and compressor 3 will operate in cooling.
A demand for second stage cooling will terminate reheat operation until second stage cooling demand is satisfied.

Dehumidification and Cooling Demand for 210H/240H/300S four compressor models (Thermostat Application)

If both a dehumidification and a first stage cooling demand occur, the system will operate compressor 1 and compressor 2 in reheat and compressor 3 and compressor 4 will operate in cooling.
A demand for second stage cooling will terminate reheat operation until second stage cooling demand is satisfied.

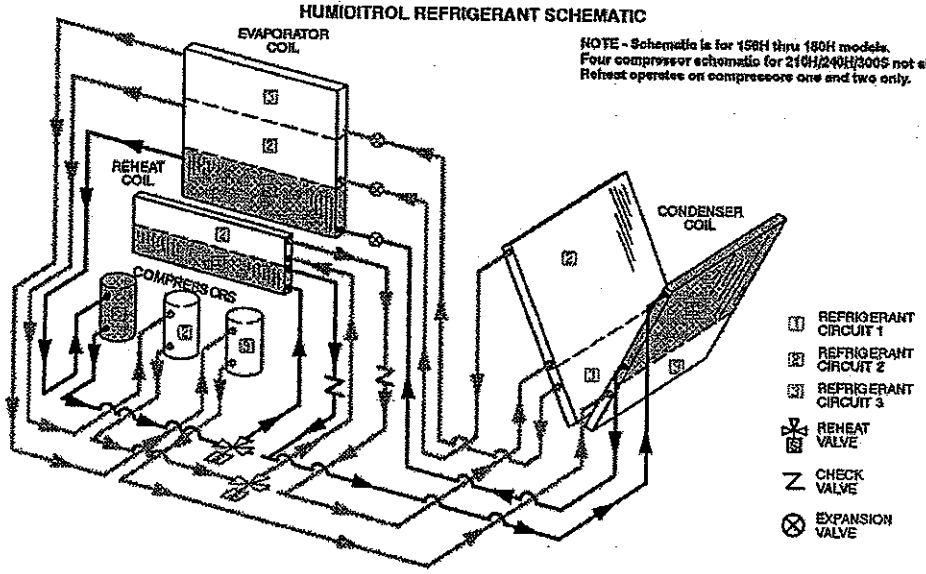
Dehumidification and Cooling Demand for 156H/180H three compressor models (Room Sensor Application)

If both a dehumidification and a first stage cooling demand occur, the system will operate compressor 1 and compressor 2 in reheat and compressor 3 will operate in cooling.
A demand for second stage cooling will terminate reheat and compressor 3 operation and operate compressor 1 and compressor 2 in cooling until second stage cooling demand is satisfied.
A demand for third stage cooling will operate compressor 1, compressor 2 and compressor 3 in cooling.

Dehumidification and Cooling Demand for 210H/240H/300S four compressor models (Room Sensor Application)

If both a dehumidification demand and a first stage cooling demand occur, the system will operate compressor 1 and compressor 2 in reheat and compressor 3 will operate in cooling.
If a demand for second stage cooling is initiated, compressor 1 and compressor 2 will operate in reheat and compressor 3 and compressor 4 will operate in cooling.
A demand for third stage cooling will terminate reheat and compressor 4 operation and operate compressor 1, compressor 2 and compressor 3 in cooling until third stage cooling demand is satisfied. A demand for fourth stage cooling will operate compressor 1, compressor 2, compressor 3 and compressor 4 in cooling.

HUMIDITROL REFRIGERANT SCHEMATIC



Unit ID: RTU - 09

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC180H2... PkgGE/15Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	234,000 (Btuh)
Mechanical: Heating capacity input (high stage)	360,000 (Btuh)
Mechanical: Heating capacity output (high stage)	288,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	44.4 (deg F)

COOLING PERFORMANCE

ARI gross cooling	188,000 (Btuh)
ARI net cooling	182,000 (Btuh)
ARI total unit watts	15,400
ARI EER (Btuh/Watts)	11.8
ARI integrated part load value	13.3
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	179,375 (Btuh)
Direct Expansion: Net Total Cooling	169,249 (Btuh)
Direct Expansion: Gross sensible cooling	93,005 (Btuh)
Direct Expansion: Net Sensible Cooling	82,880 (Btuh)
Direct Expansion: Moisture Removal	81.0 (lb / hr)
Coil Discharge dry bulb temperature	52.0 (deg F)
Coil Discharge wet bulb temperature	48.7 (deg F)
Unit Discharge dry bulb temperature	53.0 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	6,000 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.03 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.12 (in. W.C.)
Total Static Pressure	1.15 (in. W.C.)
Supply Fan power	3.34 (bhp)
Supply fan motor nominal power	3.0 (hp)
Required RPM	894
RPM range	710 - 965
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	4.8
Compressor RLA (total)	27.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	39.6
System MOCP (amps)	50
System minimum circuit ampacity	42.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,570 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower

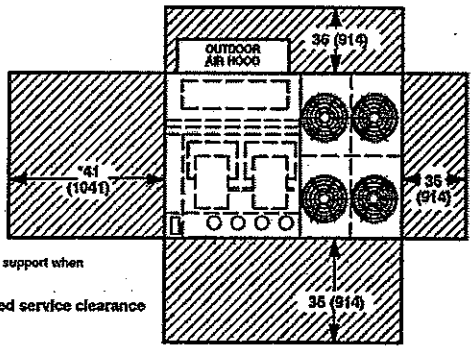
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 3 Hp Std
Blower Drive Kit -1 (710-965 RPM)
Gas Heating - 360K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 50 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

THERMOSTATS & CONTROLS.....**Material**
FAC IMC BACNet Module .....Factory Installed

CO2 SENSOR MISSING

INSTALLATION CLEARANCES - INCHES (MM)

156H thru 300S



NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

180 WEIGHTS AND DIMENSIONS - INCHES (MM)

Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

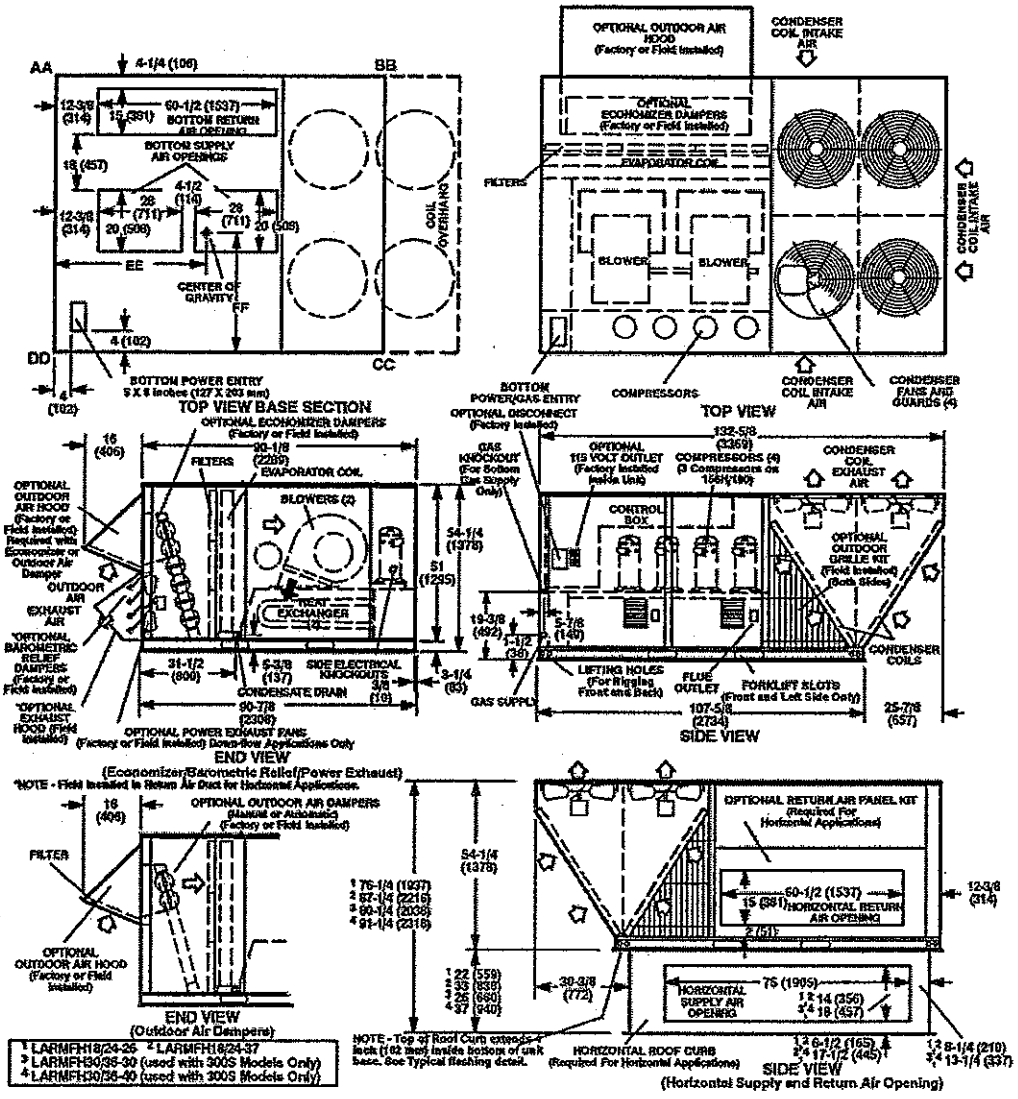
Model Number	WEIGHTS NET lbs.	kg	SHIPPING lbs.	kg	CORNER WEIGHTS AA lbs.	kg	BB lbs.	kg	CC lbs.	kg	DD lbs.	kg	CENTER OF GRAVITY EE inch	mm	FF inch	mm
180 Base Unit	2355	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	38-1/2	978
180 Max. Unit	2560	1161	2760	1252	580	263	590	268	700	318	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (add to Base unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg
Economizer	73 lbs.	33 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg

Power Exhaust	62 lbs.	19 kg
LTL Packaging (less than truck load)	280 lbs.	127 kg

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



Unit ID: RTU - 10

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC180H2... PkgGE/15Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	234,000 (Btuh)
Mechanical: Heating capacity input (high stage)	360,000 (Btuh)
Mechanical: Heating capacity output (high stage)	288,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	49.3 (deg F)

COOLING PERFORMANCE

ARI gross cooling	188,000 (Btuh)
ARI net cooling	182,000 (Btuh)
ARI total unit watts	15,400
ARI EER (Btuh/Watts)	11.8
ARI integrated part load value	13.3
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	175,681 (Btuh)
Direct Expansion: Net Total Cooling	167,459 (Btuh)
Direct Expansion: Gross sensible cooling	98,645 (Btuh)
Direct Expansion: Net Sensible Cooling	90,423 (Btuh)
Direct Expansion: Moisture Removal	72.2 (lb / hr)
Coil Discharge dry bulb temperature	49.3 (deg F)
Coil Discharge wet bulb temperature	47.6 (deg F)
Unit Discharge dry bulb temperature	50.3 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	5,400 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.02 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.10 (in. W.C.)
Total Static Pressure	1.12 (in. W.C.)
Supply Fan power	2.82 (bhp)
Supply fan motor nominal power	5.0 (hp)
Required RPM	868
RPM range	850 - 1045
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	7.6
Compressor RLA (total)	27.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	42.4
System MOCP (amps)	50
System minimum circuit ampacity	45.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,570 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower

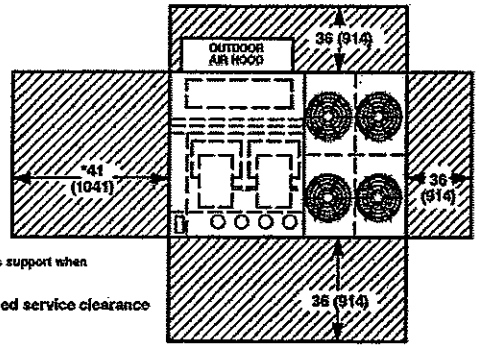
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 5 Hp Std
Blower Drive Kit -3 (850-1045 RPM)
Gas Heating - 360K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 50 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

THERMOSTATS & CONTROLS.....**Material**
FAC IMC BACNet Module .....Factory Installed

Co2 Sensor Missing

INSTALLATION CLEARANCES - INCHES (MM)

156H thru 300S



*66 in. (1676 mm) Recommended service clearance for blower deck removal

NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

180 WEIGHTS AND DIMENSIONS - INCHES (MM)

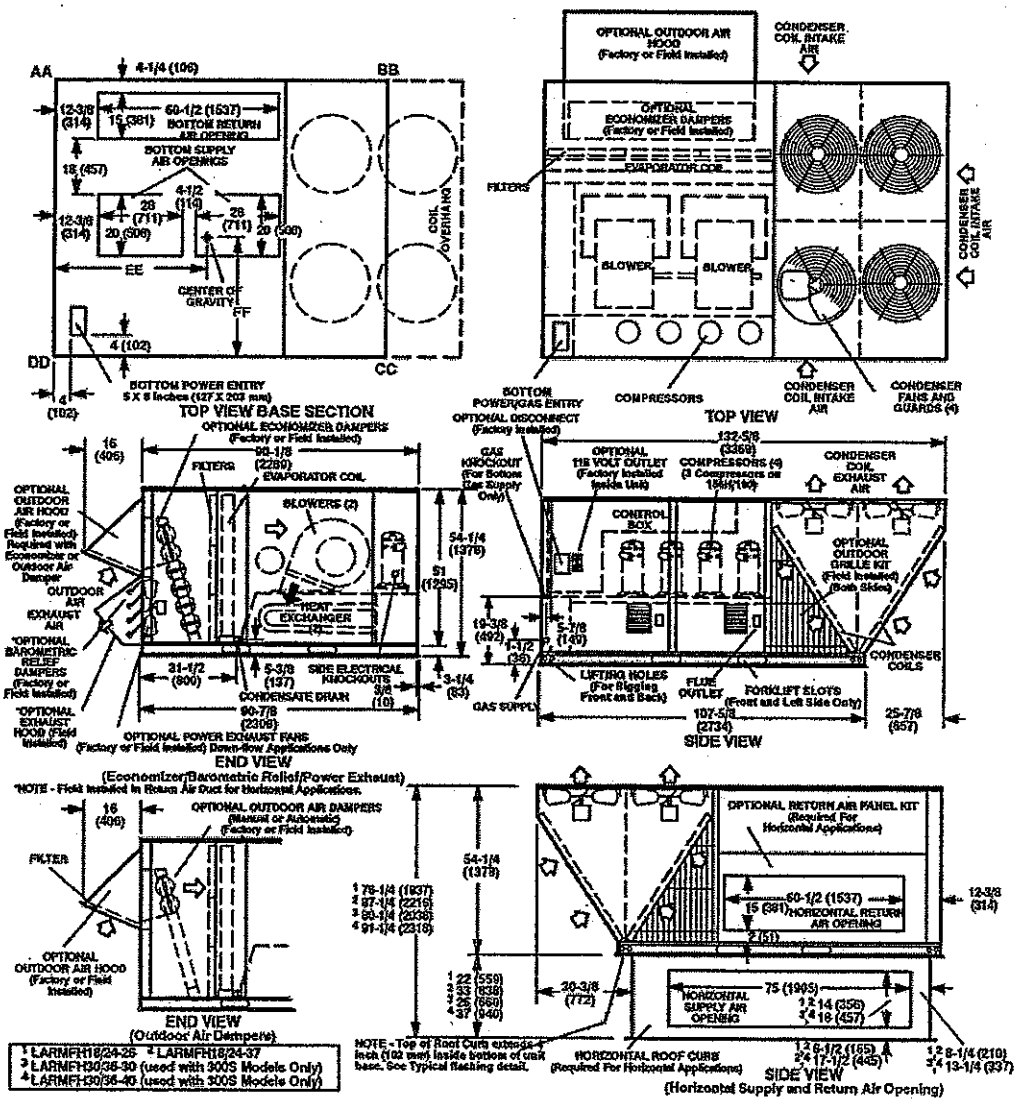
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS NET lbs.	kg	SHIPPING lbs.	kg	CORNER WEIGHTS AA lbs.	kg	BB lbs.	kg	CC lbs.	kg	DD lbs.	kg	CENTER OF GRAVITY EE inch	mm	FF inch	mm
180 Base Unit	2355	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	38-1/2	978
180 Max. Unit	2560	1161	2760	1252	590	263	590	268	700	318	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg
Economizer	73 lbs.	33 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg
Power Exhaust	62 lbs.	19 kg
LTL Packaging (less than truck load)	280 lbs.	127 kg

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



1 LARMFH18/24-25 2 LARMFH18/24-37
3 LARMFH30/36-30 (used with 300S Models Only)
4 LARMFH30/36-40 (used with 300S Models Only)

Unit ID: RTU - 11

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC180H2... PkgGE/15Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	234,000 (Btuh)
Mechanical: Heating capacity input (high stage)	360,000 (Btuh)
Mechanical: Heating capacity output (high stage)	288,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	49.3 (deg F)

COOLING PERFORMANCE

ARI gross cooling	188,000 (Btuh)
ARI net cooling	182,000 (Btuh)
ARI total unit watts	15,400
ARI EER (Btuh/Watts)	11.8
ARI integrated part load value	13.3
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	175,681 (Btuh)
Direct Expansion: Net Total Cooling	167,459 (Btuh)
Direct Expansion: Gross sensible cooling	98,645 (Btuh)
Direct Expansion: Net Sensible Cooling	90,423 (Btuh)
Direct Expansion: Moisture Removal	72.2 (lb / hr)
Coil Discharge dry bulb temperature	49.3 (deg F)
Coil Discharge wet bulb temperature	47.6 (deg F)
Unit Discharge dry bulb temperature	50.3 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	5,400 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.02 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.10 (in. W.C.)
Total Static Pressure	1.12 (in. W.C.)
Supply Fan power	2.82 (bhp)
Supply fan motor nominal power	5.0 (hp)
Required RPM	868
RPM range	850 - 1045
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	7.6
Compressor RLA (total)	27.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	42.4
System MOCP (amps)	50
System minimum circuit ampacity	45.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,570 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower

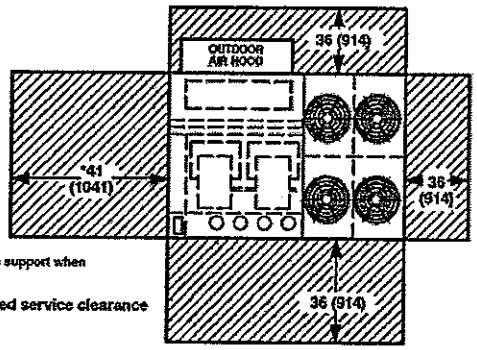
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 5 Hp Std
Blower Drive Kit -3 (850-1045 RPM)
Gas Heating - 360K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 50 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

THERMOSTATS & CONTROLS.....Material
FAC IMC BACNet Module .....Factory Installed

CO_2 SENSOR MISC

INSTALLATION CLEARANCES - INCHES (MM)

156H thru 300S



*66 in. (1676 mm) Recommended service clearance for blower deck removal

NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

180 WEIGHTS AND DIMENSIONS - INCHES (MM)

Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

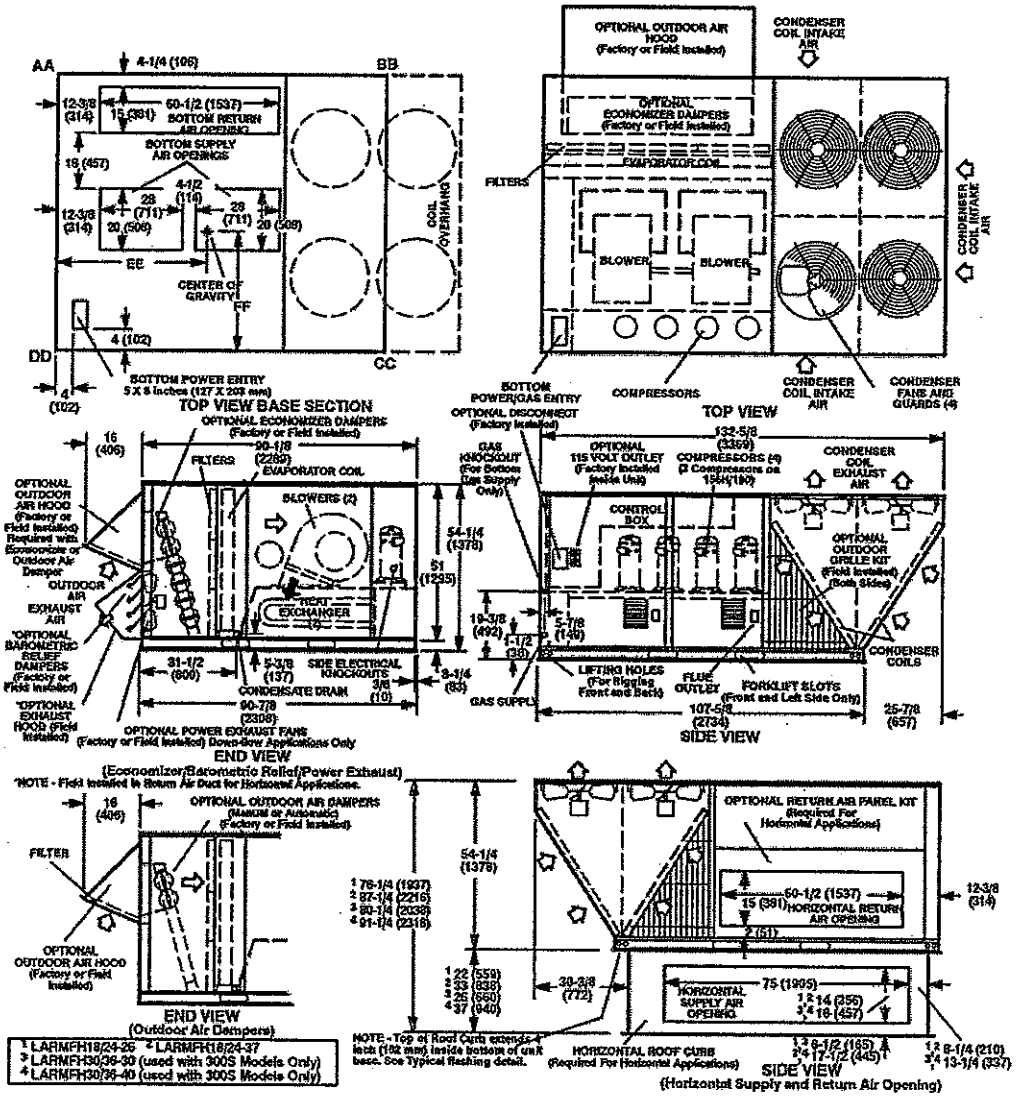
Model Number	WEIGHTS NET lbs.	NET kg	SHIPPING lbs.	SHIPPING kg	CORNER WEIGHTS AA lbs.	AA kg	BB lbs.	BB kg	CC lbs.	CC kg	DD lbs.	DD kg	CENTER OF GRAVITY EE inch	EE mm	FF inch	FF mm
180 Base Unit	2355	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	38-1/2	978
180 Max. Unit	2560	1161	2760	1252	580	263	590	268	700	316	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg
Economizer	73 lbs.	33 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg

Power Exhaust	62 lbs.	19 kg
LTL Packaging (less than truck load)	280 lbs.	127 kg

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



Unit ID: RTU - 12

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC180H2... PkgGE/15Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	234,000 (Btuh)
Mechanical: Heating capacity input (high stage)	360,000 (Btuh)
Mechanical: Heating capacity output (high stage)	288,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	49.3 (deg F)

COOLING PERFORMANCE

ARI gross cooling	188,000 (Btuh)
ARI net cooling	182,000 (Btuh)
ARI total unit watts	15,400
ARI EER (Btuh/Watts)	11.8
ARI integrated part load value	13.3
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	175,681 (Btuh)
Direct Expansion: Net Total Cooling	167,459 (Btuh)
Direct Expansion: Gross sensible cooling	98,645 (Btuh)
Direct Expansion: Net Sensible Cooling	90,423 (Btuh)
Direct Expansion: Moisture Removal	72.2 (lb / hr)
Coil Discharge dry bulb temperature	49.3 (deg F)
Coil Discharge wet bulb temperature	47.6 (deg F)
Unit Discharge dry bulb temperature	50.3 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	5,400 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.02 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.10 (in. W.C.)
Total Static Pressure	1.12 (in. W.C.)
Supply Fan power	2.82 (bhp)
Supply fan motor nominal power	5.0 (hp)
Required RPM	868
RPM range	850 - 1045
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	7.6
Compressor RLA (total)	27.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	42.4
System MOCP (amps)	50
System minimum circuit ampacity	45.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,570 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower

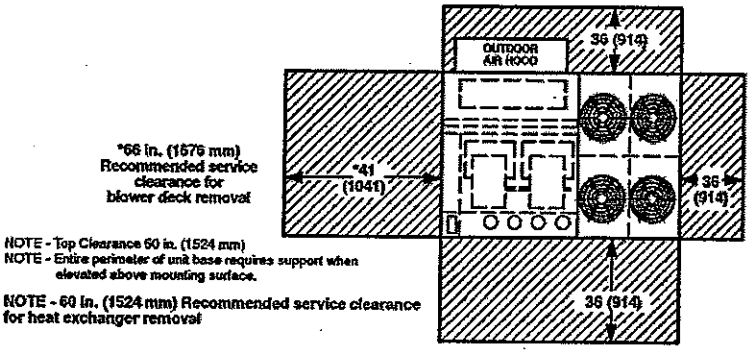
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 5 Hp Std
Blower Drive Kit -3 (850-1045 RPM)
Gas Heating - 360K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 50 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

THERMOSTATS & CONTROLS.....**Material**
FAC IMC BACNet Module .....Factory Installed

CO2 SENSOR MISSING

INSTALLATION CLEARANCES - INCHES (MM)

156H thru 300S



NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

180 WEIGHTS AND DIMENSIONS - INCHES (MM)

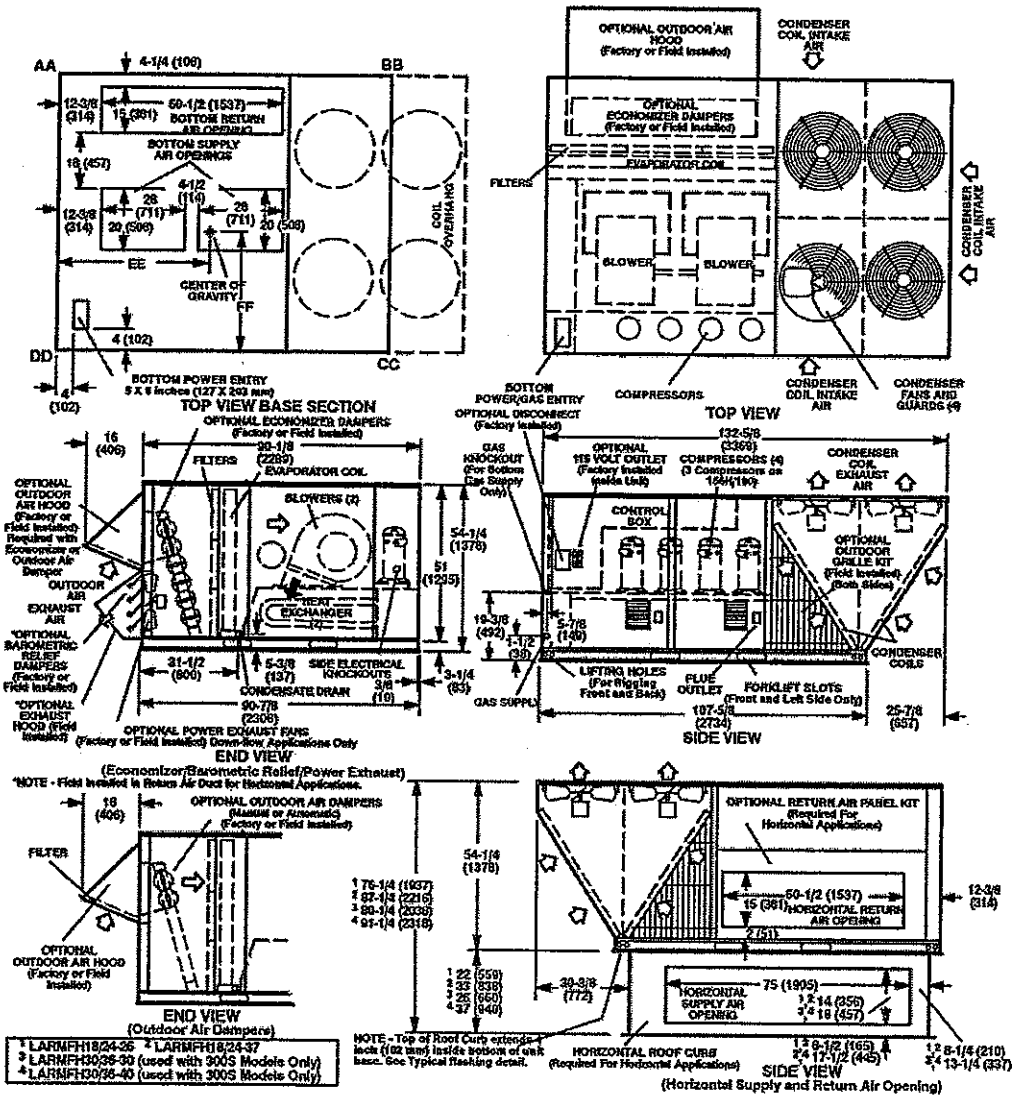
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS NET lbs.	kg	SHIPPING lbs.	kg	CORNER WEIGHTS AA lbs.	kg	BB lbs.	kg	CC lbs.	kg	DD lbs.	kg	CENTER OF GRAVITY EE inch	mm	FF inch	mm
180 Base Unit	2555	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	38-1/2	978
180 Max. Unit	2560	1161	2760	1252	580	263	590	268	700	318	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (Add to base unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg
Economizer	73 lbs.	33 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg
Power Exhaust	62 lbs.	19 kg
LTL Packaging (less than truck load)	280 lbs.	127 kg

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS Installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



Unit ID: RTU - 13

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC180H2... PkgGE/15Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	234,000 (Btuh)
Mechanical: Heating capacity input (high stage)	360,000 (Btuh)
Mechanical: Heating capacity output (high stage)	288,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	49.3 (deg F)

COOLING PERFORMANCE

ARI gross cooling	188,000 (Btuh)
ARI net cooling	182,000 (Btuh)
ARI total unit watts	15,400
ARI EER (Btuh/Watts)	11.8
ARI integrated part load value	13.3
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	175,681 (Btuh)
Direct Expansion: Net Total Cooling	167,459 (Btuh)
Direct Expansion: Gross sensible cooling	98,645 (Btuh)
Direct Expansion: Net Sensible Cooling	90,423 (Btuh)
Direct Expansion: Moisture Removal	72.2 (lb / hr)
Coil Discharge dry bulb temperature	49.3 (deg F)
Coil Discharge wet bulb temperature	47.6 (deg F)
Unit Discharge dry bulb temperature	50.3 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	5,400 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.02 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.10 (in. W.C.)
Total Static Pressure	1.12 (in. W.C.)
Supply Fan power	2.82 (bhp)
Supply fan motor nominal power	5.0 (hp)
Required RPM	868
RPM range	850 - 1045
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	7.6
Compressor RLA (total)	27.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	42.4
System MOCP (amps)	50
System minimum circuit ampacity	45.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,570 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower

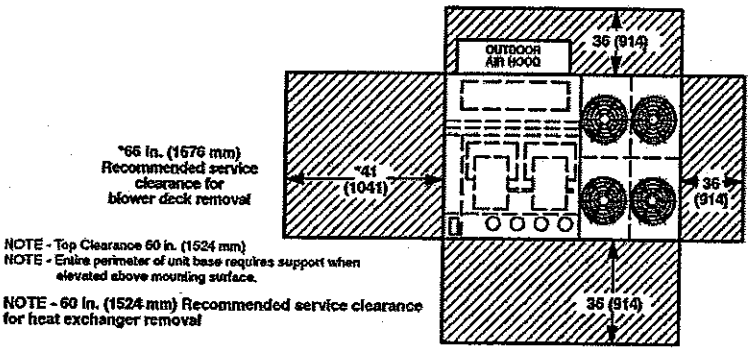
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 5 Hp Std
Blower Drive Kit -3 (850-1045 RPM)
Gas Heating - 360K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 50 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

THERMOSTATS & CONTROLS.....**Material**
FAC IMC BACNet Module .....Factory Installed

CO2 Sensor Missing

INSTALLATION CLEARANCES - INCHES (MM)

156H thru 300S



NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

180 WEIGHTS AND DIMENSIONS - INCHES (MM)

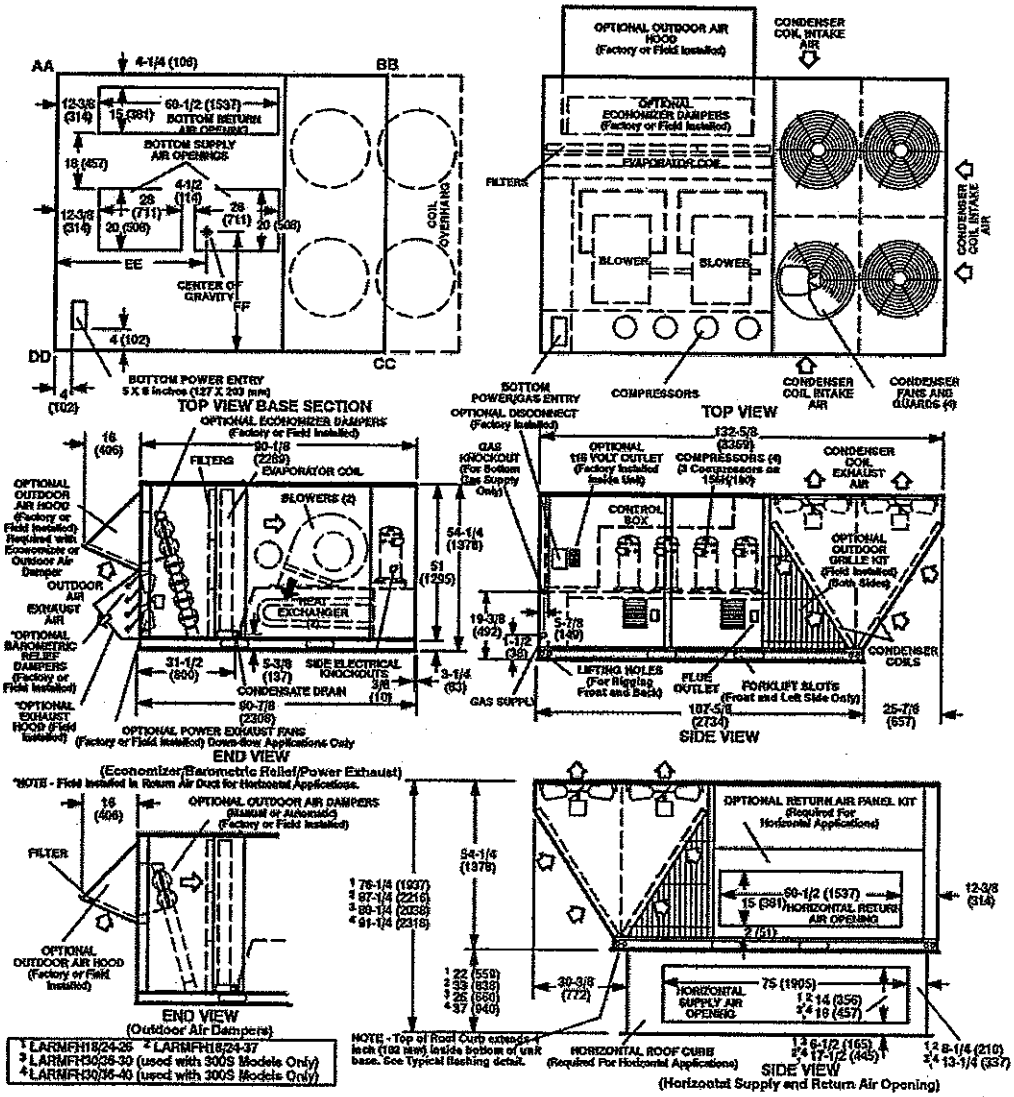
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS NET lbs.	kg	SHIPPING lbs.	kg	CORNER WEIGHTS AA lbs.	kg	BB lbs.	kg	CC lbs.	kg	DD lbs.	kg	CENTER OF GRAVITY EE inch	mm	FF inch	mm
180 Base Unit	2355	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	33-1/2	978
180 Max. Unit	2560	1161	2760	1252	580	263	590	268	700	318	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (Add to Base Unit Weight)

High Fire Heat Exchanger	80 lbs.	36 kg	Power Exhaust	62 lbs.	19 kg
Economizer	73 lbs.	33 kg	LTL Packaging (less than truck load)	280 lbs.	127 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg			

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



1 LARMFH18/24-25 2 LARMFH18/24-37
3 LARMFH30/36-30 (used with 300S Models Only)
4 LARMFH30/36-40 (used with 300S Models Only)

Unit ID: RTU - 14

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC180H2... PkgGE/15Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	234,000 (Btuh)
Mechanical: Heating capacity input (high stage)	360,000 (Btuh)
Mechanical: Heating capacity output (high stage)	288,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	49.3 (deg F)

COOLING PERFORMANCE

ARI gross cooling	188,000 (Btuh)
ARI net cooling	182,000 (Btuh)
ARI total unit watts	15,400
ARI EER (Btuh/Watts)	11.8
ARI integrated part load value	13.3
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	175,681 (Btuh)
Direct Expansion: Net Total Cooling	167,459 (Btuh)
Direct Expansion: Gross sensible cooling	98,645 (Btuh)
Direct Expansion: Net Sensible Cooling	90,423 (Btuh)
Direct Expansion: Moisture Removal	72.2 (lb / hr)
Coil Discharge dry bulb temperature	49.3 (deg F)
Coil Discharge wet bulb temperature	47.6 (deg F)
Unit Discharge dry bulb temperature	50.3 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	5,400 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.02 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.10 (in. W.C.)
Total Static Pressure	1.12 (in. W.C.)
Supply Fan power	2.82 (bhp)
Supply fan motor nominal power	5.0 (hp)
Required RPM	868
RPM range	850 - 1045
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	7.6
Compressor RLA (total)	27.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	42.4
System MOCP (amps)	50
System minimum circuit ampacity	45.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,570 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower

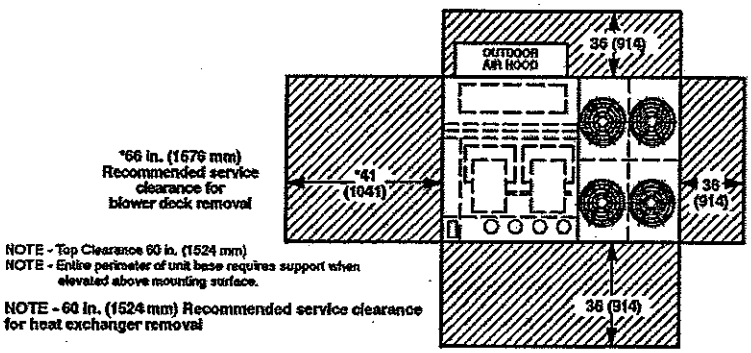
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 5 Hp Std
Blower Drive Kit -3 (850-1045 RPM)
Gas Heating - 360K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 50 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

THERMOSTATS & CONTROLS.....**Material**
FAC IMC BACNet Module.....Factory Installed

Co Sensor Missing

INSTALLATION CLEARANCES - INCHES (MM)

156H thru 300S



NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

TON WEIGHTS AND DIMENSIONS - INCHES (MM)

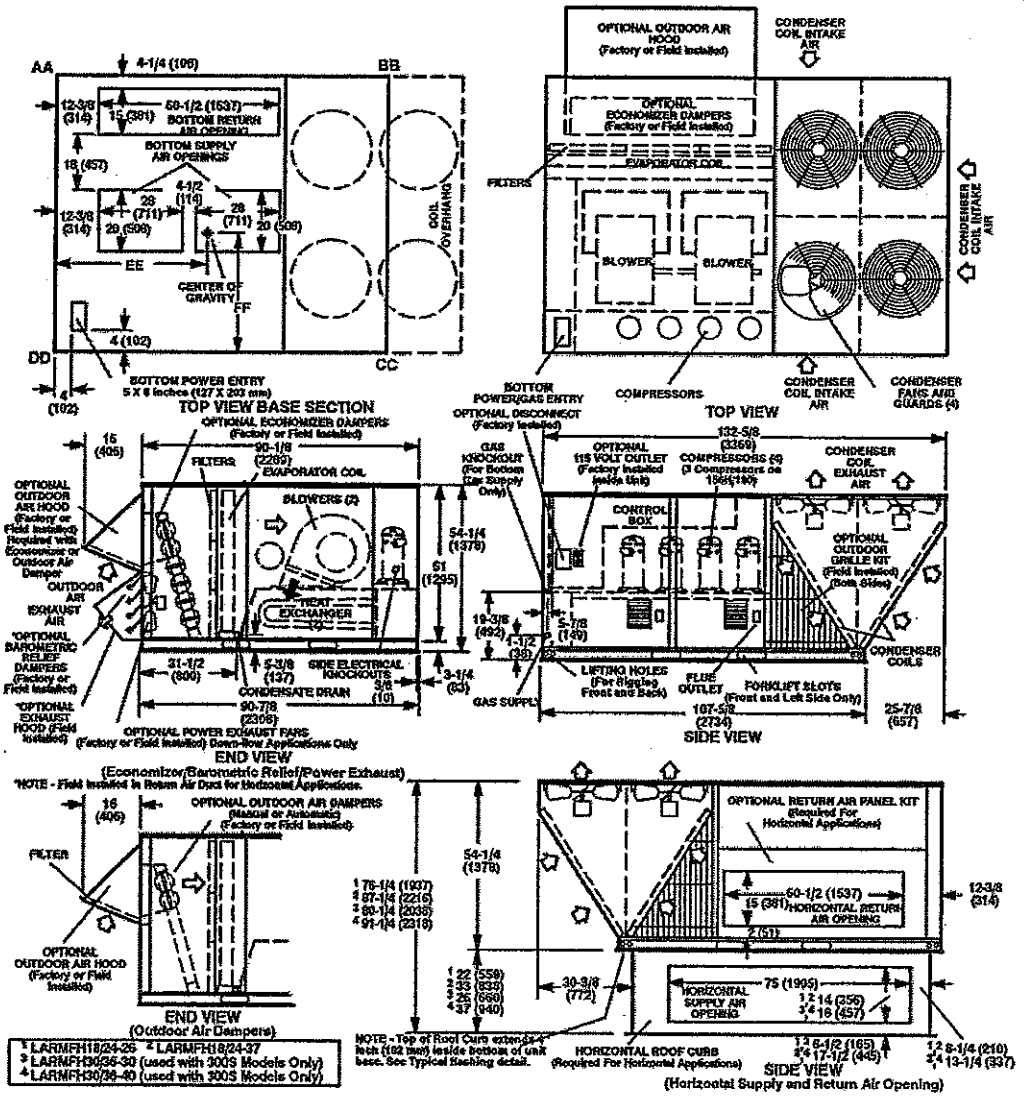
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS NET lbs.	kg	SHIPPING lbs.	kg	CORNER WEIGHTS AA lbs.	kg	BB lbs.	kg	CC lbs.	kg	DD lbs.	kg	CENTER OF GRAVITY EE inch	mm	FF inch	mm
180 Base Unit	2355	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	38-1/2	978
180 Max. Unit	2560	1161	2760	1252	580	263	690	268	700	318	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg
Economizer	73 lbs.	33 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg
Power Exhaust	62 lbs.	19 kg
LTL Packaging (less than truck load)	280 lbs.	127 kg

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



1 LARMFH18/24-26 2 LARMFH18/24-37
3 LARMFH30/36-30 (used with 300S Models Only)
4 LARMFH30/36-40 (used with 300S Models Only)

Unit ID: RTU - 15

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC180H2... PkgGE/15Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	234,000 (Btuh)
Mechanical: Heating capacity input (high stage)	360,000 (Btuh)
Mechanical: Heating capacity output (high stage)	288,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	49.3 (deg F)

COOLING PERFORMANCE

ARI gross cooling	188,000 (Btuh)
ARI net cooling	182,000 (Btuh)
ARI total unit watts	15,400
ARI EER (Btuh/Watts)	11.8
ARI integrated part load value	13.3
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	175,681 (Btuh)
Direct Expansion: Net Total Cooling	167,459 (Btuh)
Direct Expansion: Gross sensible cooling	98,645 (Btuh)
Direct Expansion: Net Sensible Cooling	90,423 (Btuh)
Direct Expansion: Moisture Removal	72.2 (lb / hr)
Coil Discharge dry bulb temperature	49.3 (deg F)
Coil Discharge wet bulb temperature	47.6 (deg F)
Unit Discharge dry bulb temperature	50.3 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	5,400 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.02 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.10 (in. W.C.)
Total Static Pressure	1.12 (in. W.C.)
Supply Fan power	2.82 (bhp)
Supply fan motor nominal power	5.0 (hp)
Required RPM	868
RPM range	850 - 1045
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	7.6
Compressor RLA (total)	27.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	42.4
System MOCP (amps)	50
System minimum circuit ampacity	45.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,570 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower

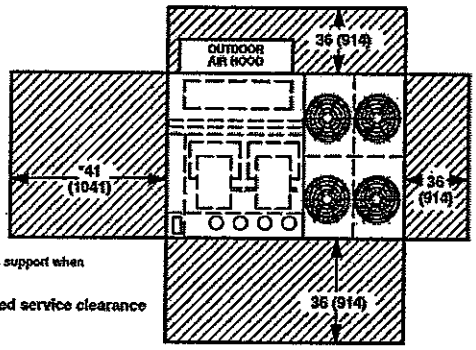
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 5 Hp Std
Blower Drive Kit -3 (850-1045 RPM)
Gas Heating - 360K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 50 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

THERMOSTATS & CONTROLS.....**Material**
FAC IMC BACNet Module .....Factory Installed

CO_2 Sensor

INSTALLATION CLEARANCES - INCHES (MM)

156H thru 300S



NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

180 WEIGHTS AND DIMENSIONS - INCHES (MM)

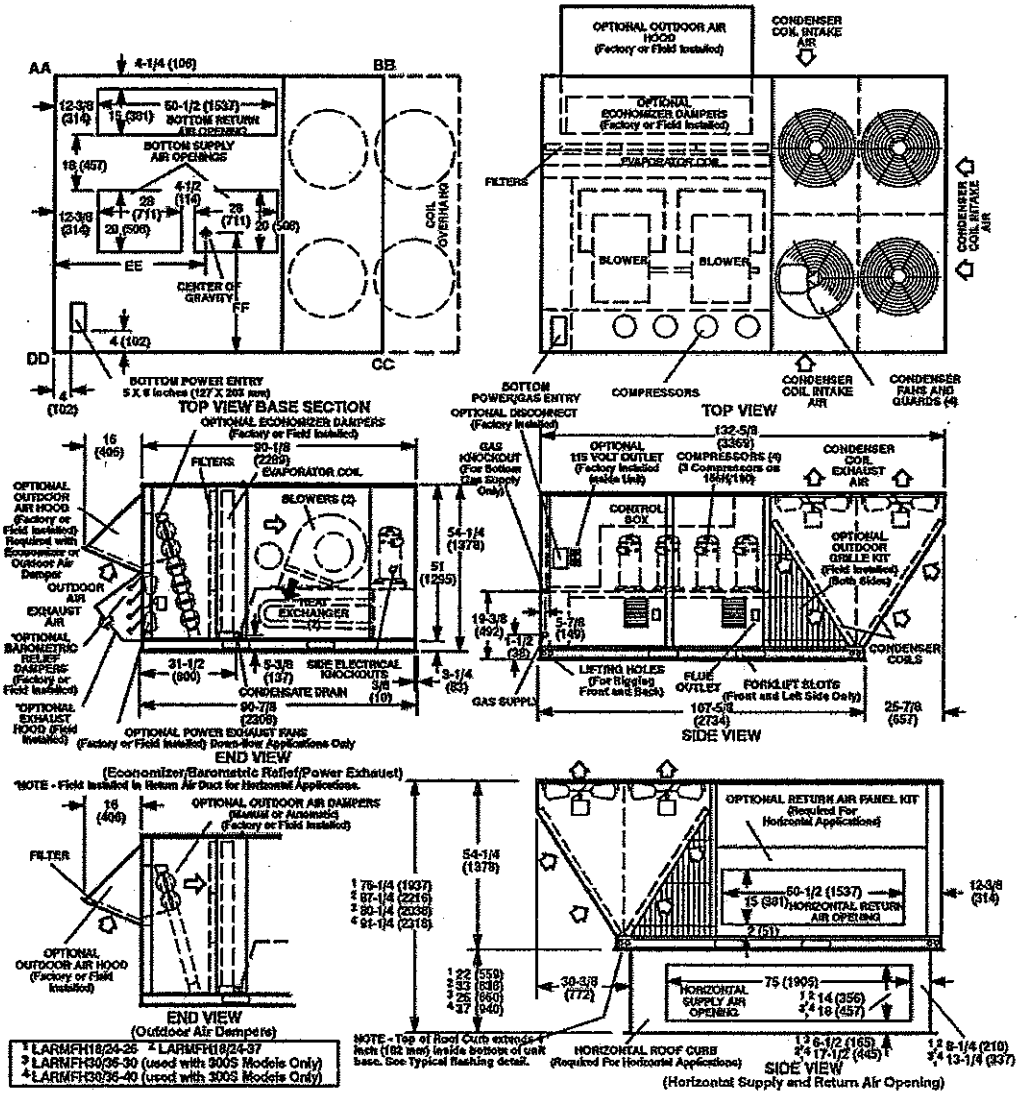
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS NET lbs.	kg	SHIPPING lbs.	kg	CORNER WEIGHTS AA lbs.	kg	BB lbs.	kg	CC lbs.	kg	DD lbs.	kg	CENTER OF GRAVITY EE inch	mm	FF inch	mm
180 Base Unit	2355	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	38-1/2	978
180 Max. Unit	2560	1161	2760	1252	580	263	590	268	700	318	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (add to Base Unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg
Economizer	73 lbs.	33 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg
Power Exhaust	62 lbs.	19 kg
LTL Packaging (less than truck load)	280 lbs.	127 kg

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (High input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



Unit ID: RTU - 16

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC180H2... PkgGE/15Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	234,000 (Btuh)
Mechanical: Heating capacity input (high stage)	360,000 (Btuh)
Mechanical: Heating capacity output (high stage)	288,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	49.3 (deg F)

COOLING PERFORMANCE

ARI gross cooling	188,000 (Btuh)
ARI net cooling	182,000 (Btuh)
ARI total unit watts	15,400
ARI EER (Btuh/Watts)	11.8
ARI integrated part load value	13.3
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	175,681 (Btuh)
Direct Expansion: Net Total Cooling	167,459 (Btuh)
Direct Expansion: Gross sensible cooling	98,645 (Btuh)
Direct Expansion: Net Sensible Cooling	90,423 (Btuh)
Direct Expansion: Moisture Removal	72.2 (lb / hr)
Coil Discharge dry bulb temperature	49.3 (deg F)
Coil Discharge wet bulb temperature	47.6 (deg F)
Unit Discharge dry bulb temperature	50.3 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	5,400 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.02 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.10 (in. W.C.)
Total Static Pressure	1.12 (in. W.C.)
Supply Fan power	2.82 (bhp)
Supply fan motor nominal power	5.0 (hp)
Required RPM	868
RPM range	850 - 1045
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	7.6
Compressor RLA (total)	27.0
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	42.4
System MOCP (amps)	50
System minimum circuit ampacity	45.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,570 (lbs.)

EQUIPMENT FEATURES

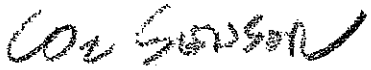
Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower

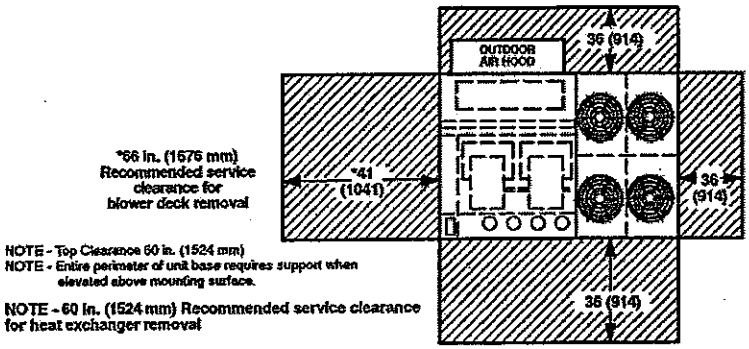
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 5 Hp Std
Blower Drive Kit -3 (850-1045 RPM)
Gas Heating - 360K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 50 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

THERMOSTATS & CONTROLS.....**Material**
FAC IMC BACNet Module .....Factory Installed



INSTALLATION CLEARANCES - INCHES (MM)

156H thru 300S



NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

180 WEIGHTS AND DIMENSIONS - INCHES (MM)

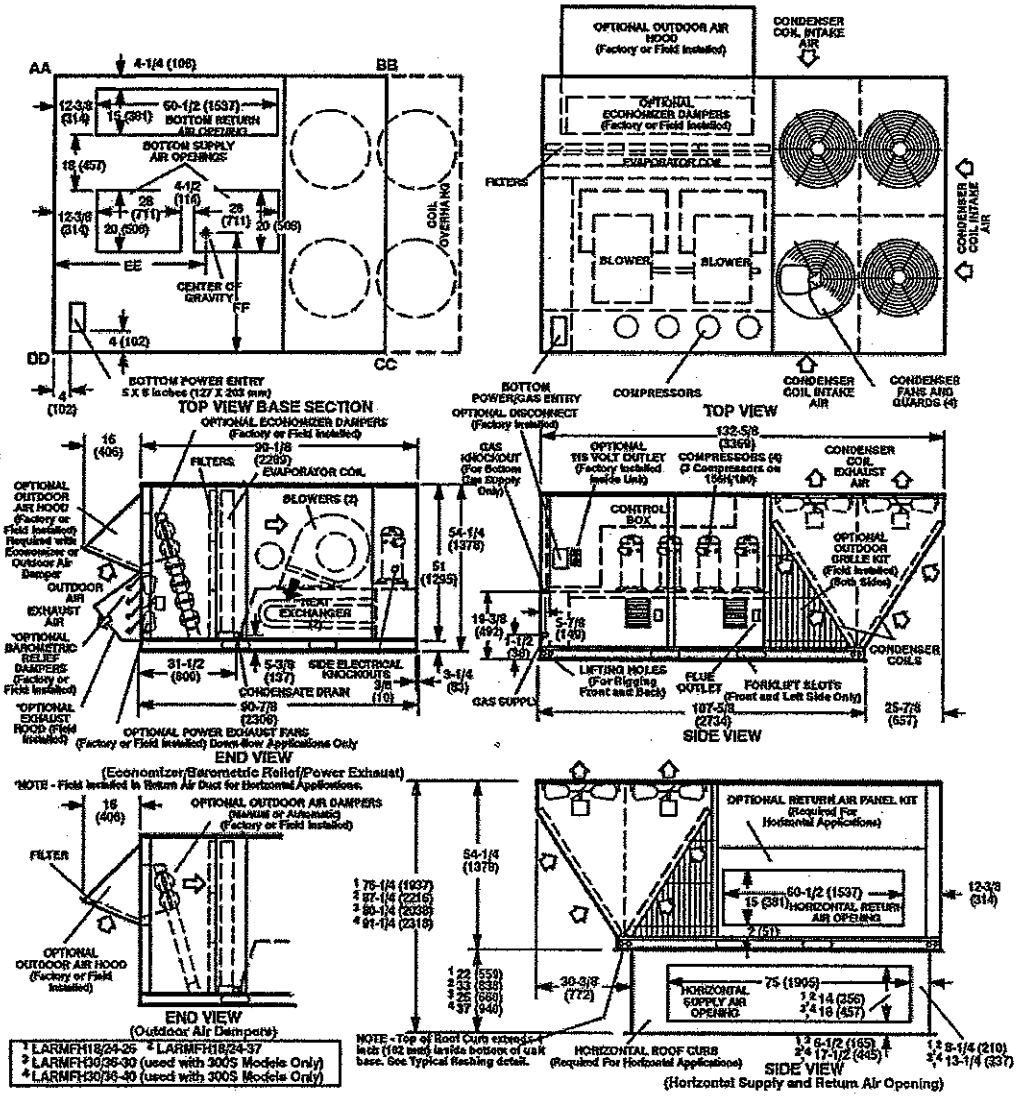
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS NET lbs.	kg	SHIPPING lbs.	kg	CORNER WEIGHTS AA lbs.	kg	BB lbs.	kg	CC lbs.	kg	DD lbs.	kg	CENTER OF GRAVITY EE inch	mm	FF inch	mm
180 Base Unit	2355	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	38-1/2	978
180 Max. Unit	2560	1161	2760	1252	580	263	590	268	700	318	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg	Power Exhaust	62 lbs.	19 kg
Economizer	73 lbs.	33 kg	LTL Packaging (less than truck load)	260 lbs.	127 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg			

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



Unit ID: RTU - 17

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGC156H2... PkgGE/13Ton/Configurable

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	1.0 (in.)
Mechanical: Heating capacity input (low stage)	169,000 (Btuh)
Mechanical: Heating capacity input (high stage)	260,000 (Btuh)
Mechanical: Heating capacity output (high stage)	208,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	37.0 (deg F)

COOLING PERFORMANCE

ARI gross cooling	160,000 (Btuh)
ARI net cooling	156,000 (Btuh)
ARI total unit watts	12,800
ARI EER (Btuh/Watts)	12.2
ARI integrated part load value	13.6
Number of Compressors	3
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	152,325 (Btuh)
Direct Expansion: Net Total Cooling	144,725 (Btuh)
Direct Expansion: Gross sensible cooling	85,302 (Btuh)
Direct Expansion: Net Sensible Cooling	77,702 (Btuh)
Direct Expansion: Moisture Removal	62.7 (lb / hr)
Coil Discharge dry bulb temperature	51.1 (deg F)
Coil Discharge wet bulb temperature	49.0 (deg F)
Unit Discharge dry bulb temperature	52.1 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	5,200 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.02 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.05 (in. W.C.)
Total Static Pressure	1.07 (in. W.C.)
Supply Fan power	2.61 (bhp)
Supply fan motor nominal power	5.0 (hp)
Required RPM	848
RPM range	685 - 865
Air filter quantity	6
Air filter length x width	24 x 24 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	7.6
Compressor RLA (total)	21.3
Condenser fan motor watts	1,395
Condenser fan full load amps (total)	5.2
System full load amps	36.7
System MOCP (amps)	45
System minimum circuit ampacity	39.0

DIMENSIONS

Dimensions	54.25(h) x 91.125(w) x 133.0(d) (in.)
Down-flo supply air opening	(2) 20.0(l) x 28.0(w) (in.)
Down-flo return air opening	15.0(l) x 60.5(w) (in.)
Horizontal supply air opening	14.0(h) x 75.0(w) (in.)
Horizontal return air opening	15.0(h) x 60.5(w) (in.)
Total installed unit weight	2,490 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

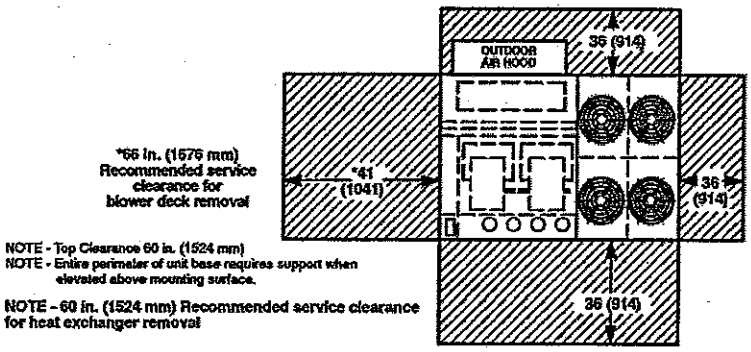
Constant Volume Belt Drive Blower

Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 5 Hp Std
Blower Drive Kit -2 (685-865 RPM)
Gas Heating - 260K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 45 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

THERMOSTATS & CONTROLS.....**Material**
FAC IMC BACNet Module .....Factory Installed

INSTALLATION CLEARANCES - INCHES (MM)

156H thru 300S



NOTE - Top Clearance 60 in. (1524 mm)
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

NOTE - 60 in. (1524 mm) Recommended service clearance for heat exchanger removal

156H WEIGHTS AND DIMENSIONS - INCHES (MM)

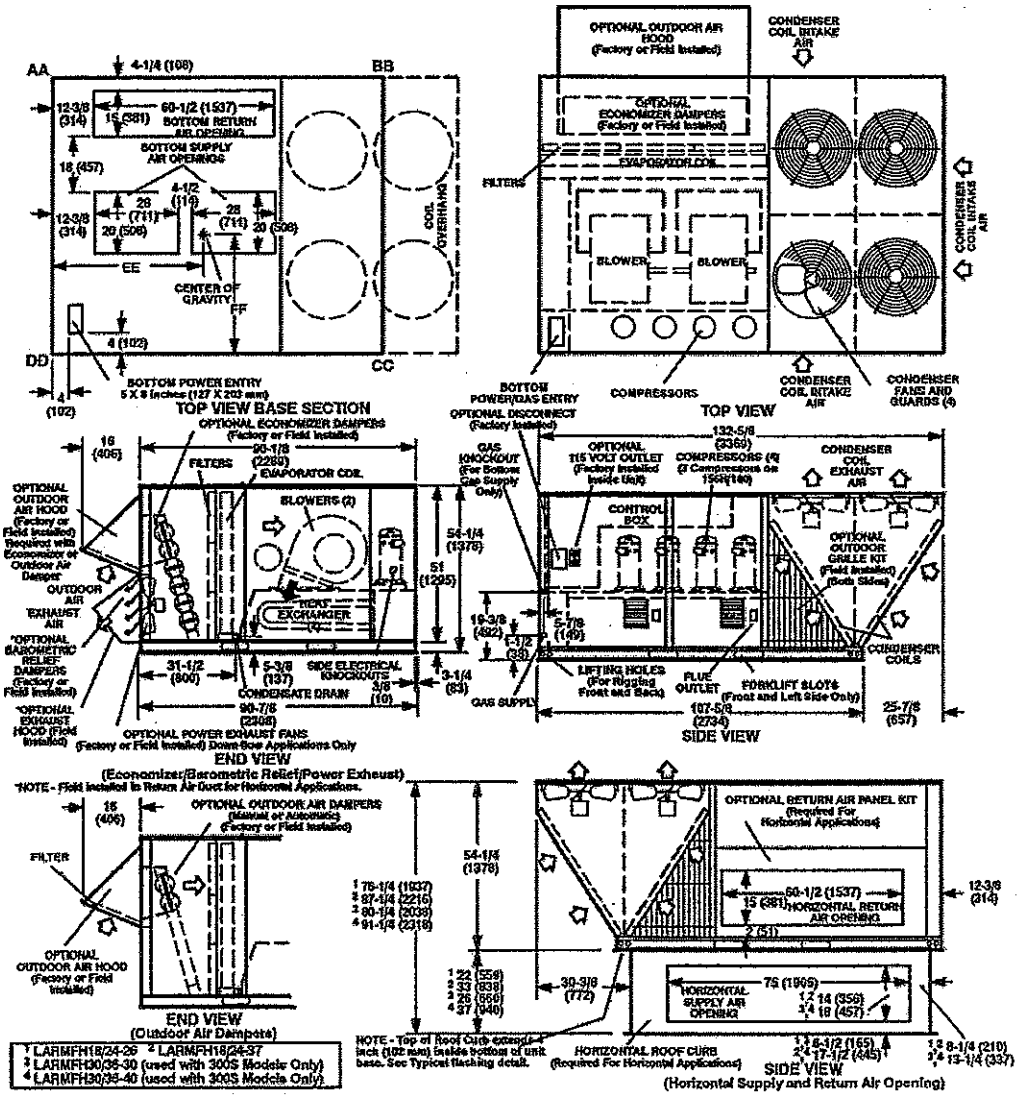
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS NET lbs.	NET kg	SHIPPING lbs.	SHIPPING kg	CORNER WEIGHTS AA lbs.	AA kg	BB lbs.	BB kg	CC lbs.	CC kg	DD lbs.	DD kg	CENTER OF GRAVITY EE inch	EE mm	FF inch	FF mm
156H Base Unit	2355	1070	2555	1159	470	213	470	213	650	295	650	295	50	1270	38-1/2	978
156H Max. Unit	2560	1161	2760	1252	580	263	590	268	700	318	690	313	54	1372	41-1/2	1054

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

High Fire Heat Exchanger	80 lbs.	36 kg	Power Exhaust	62 lbs.	19 kg
Economizer	73 lbs.	33 kg	LTL Packaging (less than truck load)	280 lbs.	127 kg
Outdoor Air Damper/Hood	233 lbs.	106 kg			

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)



Unit ID: RTU - 18

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGA036H2... PkgGE/3Ton/Configurable
Sound rating number (db) 82.0

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	0.5 (in.)
Mechanical: Heating capacity input (high stage)	78,000 (Btuh)
Mechanical: Heating capacity output (high stage)	62,400 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	48.1 (deg F)

COOLING PERFORMANCE

ARI gross cooling	37,600 (Btuh)
ARI net cooling	36,400 (Btuh)
ARI total unit watts	3,300
ARI EER (Btuh/Watts)	11.2
ARI SEER	13.0
Number of Compressors	1
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	35,687 (Btuh)
Direct Expansion: Net Total Cooling	33,482 (Btuh)
Direct Expansion: Gross sensible cooling	19,503 (Btuh)
Direct Expansion: Net Sensible Cooling	17,298 (Btuh)
Direct Expansion: Moisture Removal	15.1 (lb / hr)
Coil Discharge dry bulb temperature	51.2 (deg F)
Coil Discharge wet bulb temperature	48.8 (deg F)
Unit Discharge dry bulb temperature	52.2 (deg F)
Condensate drain size	0.75 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	1,200 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.03 (in. W.C.)
Economizer Static Pressure	0.04 (in. W.C.)
Total Static Pressure	1.07 (in. W.C.)
Supply Fan power	0.70 (bhp)
Supply fan motor nominal power	1.5 (hp)
Required RPM	999
RPM range	800 - 1105
Air filter quantity	2
Air filter length x width	16 x 25 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	2.8
Compressor RLA (total)	5.8
Condenser fan motor watts	360
Condenser fan full load amps (total)	1.3
System full load amps	11.6
System MOCP (amps)	15
System minimum circuit ampacity	14.0

DIMENSIONS

Dimensions	36.5(h) x 46.5(w) x 87.5(d) (in.)
Down-flo supply air opening	14.0(l) x 28.0(w) (in.)
Down-flo return air opening	14.0(l) x 28.0(w) (in.)
Horizontal supply air opening	14.0(h) x 28.0(w) (in.)
Horizontal return air opening	14.0(h) x 28.0(w) (in.)
Total installed unit weight	759 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

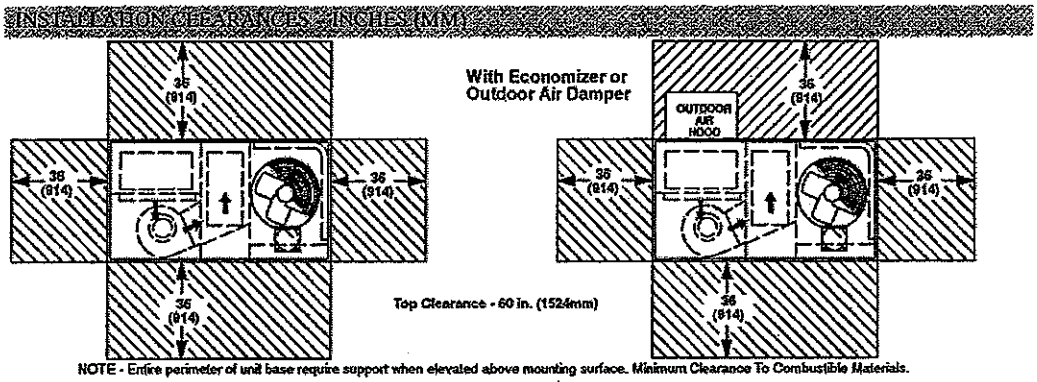
FACTORY INSTALLED OPTIONS

Constant Volume Belt Drive Blower
Air Filter Type - 2" Pleat MERV 8 -Target Filter

Blower Motor - 1.5 Hp Std
Blower Drive Kit -2 (800-1105 RPM)
Gas Heating - 78K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 15 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

FIELD INSTALLED OPTIONS	**MATERIAL**
HAIL GUARD - 036/072	28L53
LAPEF03/06 StdStat PEF/460-3	62K64

THERMOSTATS & CONTROLS	**Material**
FAC IMC BACNet Module	Factory Installed



NOTE - Entire perimeter of unit base require support when elevated above mounting surface. Minimum Clearance To Combustible Materials.

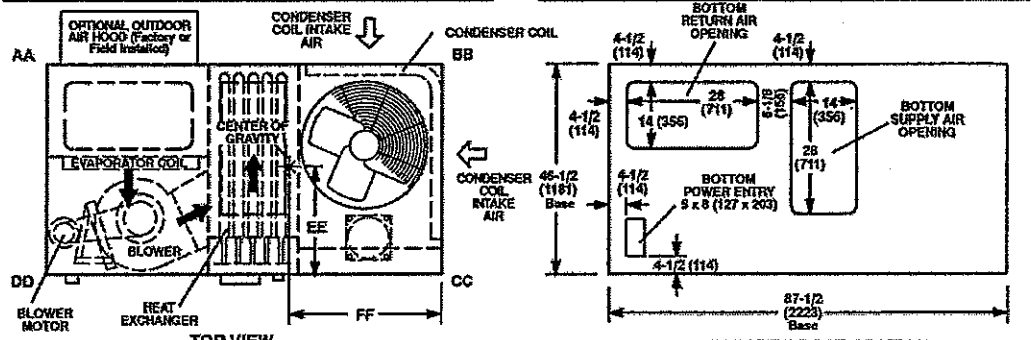
WEIGHTS AND DIMENSIONS - INCHES (MM)

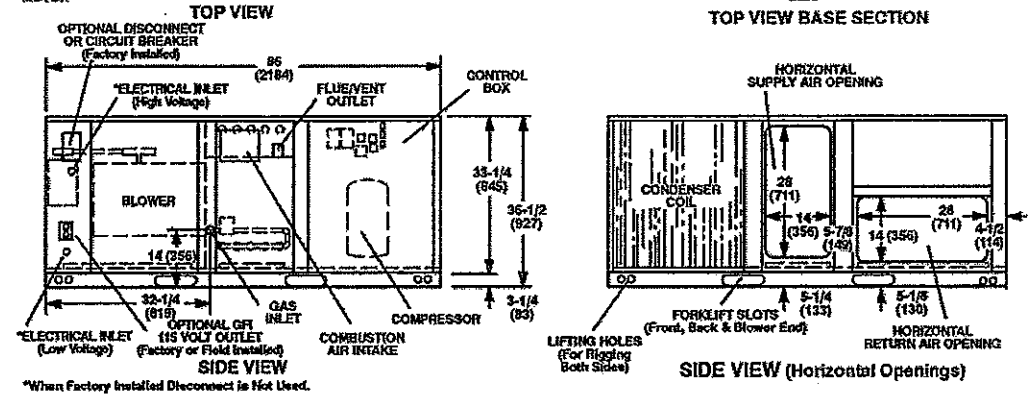
Shown With Economizer Dampers, Power Exhaust Fan, Convenience Outlet, Disconnect, Belt Drive Blower

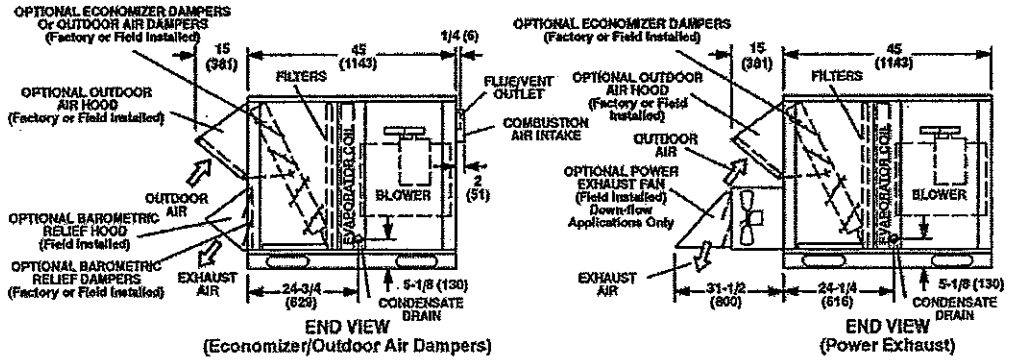
Model No.	WEIGHTS				CORNER WEIGHTS - Base Unit								CENTER OF GRAVITY			
	Net		Shipping		AA		BB		CC		DD		EE		FF	
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	in.	mm	in.	mm
036	656	298	786	357	120	54	146	66	215	98	176	80	18-3/4	476	39-3/8	1000

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

Dual/High Fire Heat Exchanger	18 lbs	8 kg		LTL Packaging (less than truck load)	8 lbs.	4 kg
Economizer	56 lbs.	25 kg		Barometric Relief Damper	15 lbs.	7 kg
Outdoor Air Damper	46 lbs.	21 kg		Hood for Barometric Relief Damper	13 lbs.	6 kg







Unit ID: RTU - 19

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGA072H2... PkgGE/6Ton/Configurable
Sound rating number (db) 82.0

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	0.5 (in.)
Mechanical: Heating capacity input (high stage)	78,000 (Btuh)
Mechanical: Heating capacity output (high stage)	62,400 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	19.2 (deg F)

COOLING PERFORMANCE

ARI gross cooling	74,000 (Btuh)
ARI net cooling	71,000 (Btuh)
ARI total unit watts	6,800
ARI EER (Btuh/Watts)	10.5
Number of Compressors	1
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	76,187 (Btuh)
Direct Expansion: Net Total Cooling	67,177 (Btuh)
Direct Expansion: Gross sensible cooling	55,945 (Btuh)
Direct Expansion: Net Sensible Cooling	46,935 (Btuh)
Direct Expansion: Moisture Removal	29.7 (lb / hr)
Coil Discharge dry bulb temperature	48.9 (deg F)
Coil Discharge wet bulb temperature	48.9 (deg F)
Unit Discharge dry bulb temperature	50.9 (deg F)
Condensate drain size	0.75 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	3,000 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.30 (in. W.C.)
Economizer Static Pressure	0.06 (in. W.C.)
Total Static Pressure	1.36 (in. W.C.)
Supply Fan power	2.98 (bhp)
Supply fan motor nominal power	3.0 (hp)
Required RPM	1,439
RPM range	1070 - 1325
Air filter quantity	2
Air filter length x width	16 x 25 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase

Unit operating range	+ or - 10%
Blower motor full load amps	4.8
Compressor RLA (total)	9.0
Condenser fan motor watts	360
Condenser fan full load amps (total)	1.3
System full load amps	16.8
System MOCP (amps)	25
System minimum circuit ampacity	20.0

DIMENSIONS

Dimensions	36.5(h) x 46.5(w) x 87.5(d) (in.)
Down-flo supply air opening	14.0(l) x 28.0(w) (in.)
Down-flo return air opening	14.0(l) x 28.0(w) (in.)
Horizontal supply air opening	14.0(h) x 28.0(w) (in.)
Horizontal return air opening	14.0(h) x 28.0(w) (in.)
Total installed unit weight	858 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

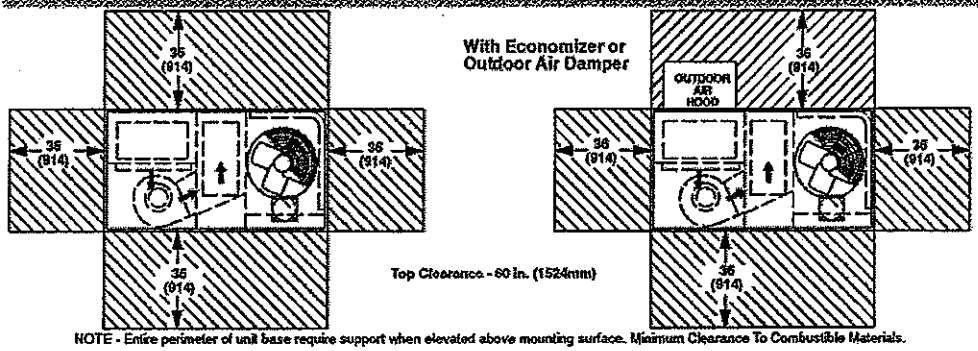
Constant Volume Belt Drive Blower
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 3 Hp Std

Blower Drive Kit -4 (1070-1325 RPM)
Gas Heating - 78K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 25 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

FIELD INSTALLED OPTIONS	**MATERIAL**
LAPEF03/06 StdStat PEF/460-3	62K64

THERMOSTATS & CONTROLS	**Material**
FAC IMC BACNet Module	Factory Installed

INSTALLATION CLEARANCES - INCHES (MM)



NOTE - Entire perimeter of unit base require support when elevated above mounting surface. Minimum Clearance To Combustible Materials.

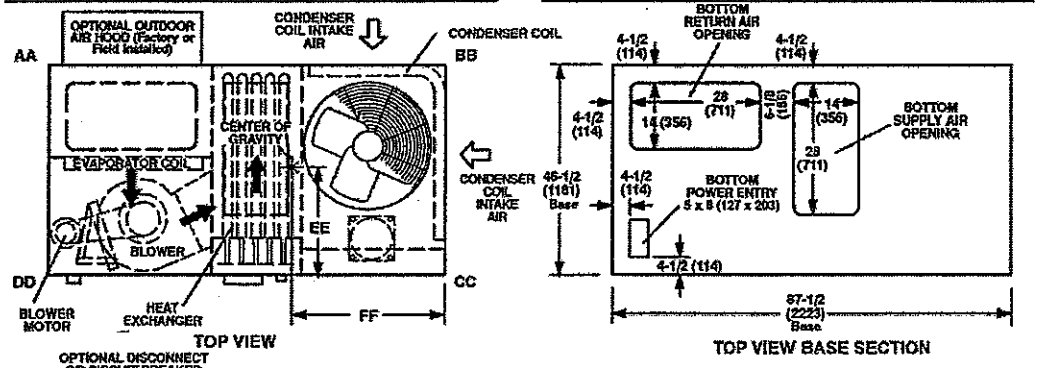
WEIGHTS AND DIMENSIONS - INCHES (MM)

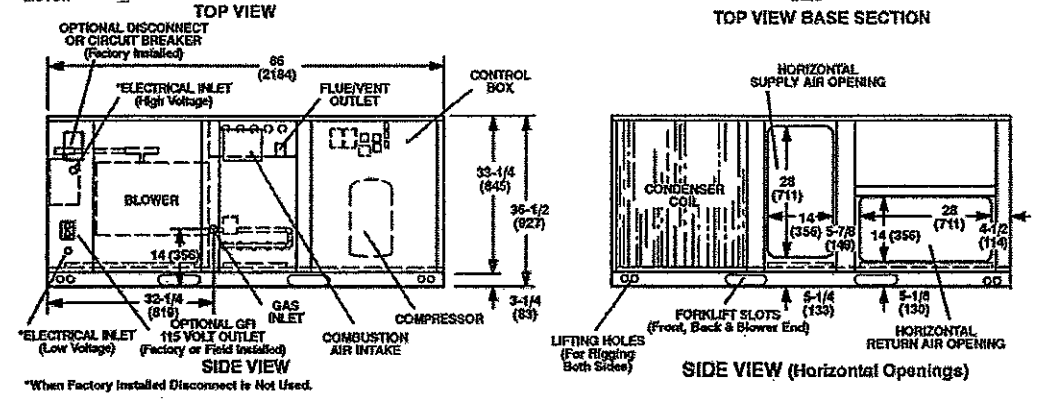
Shown With Economizer Dampers, Power Exhaust Fan, Convenience Outlet, Disconnect, Belt Drive Blower

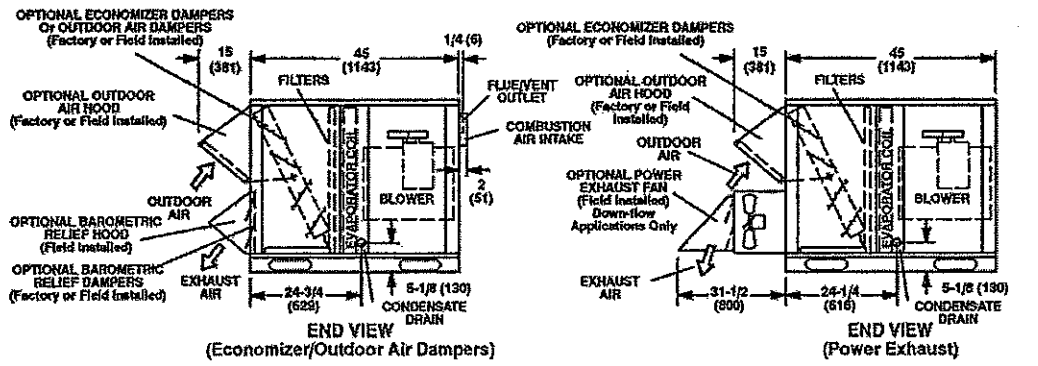
Model No.	WEIGHTS				CORNER WEIGHTS - Base Unit								CENTER OF GRAVITY			
	Net		Shipping		AA		BB		CC		DD		EE		FF	
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	in.	mm	in.	mm
072H	755	342	885	401	161	73	174	79	228	104	212	96	20-1/8	511	42-1/8	1070

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

Dual/High Fire Heat Exchanger	18 lbs	8 kg	LTL Packaging (less than truck load)	8 lbs.	4 kg
Economizer	56 lbs.	25 kg	Barometric Relief Damper	15 lbs.	7 kg
Outdoor Air Damper	46 lbs.	21 kg	Hood for Barometric Relief Damper	13 lbs.	6 kg







Unit ID: RTU - 20

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGA102H2... PkgGE/8.5Ton/Configurable
Sound rating number (db) 88.0

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	0.75 (in.)
Mechanical: Heating capacity input (low stage)	84,500 (Btuh)
Mechanical: Heating capacity output (low stage)	67,500 (Btuh)
Mechanical: Heating capacity input (high stage)	130,000 (Btuh)
Mechanical: Heating capacity output (high stage)	104,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	35.0 (deg F)

COOLING PERFORMANCE

ARI gross cooling	105,000 (Btuh)
ARI net cooling	101,000 (Btuh)
ARI total unit watts	9,000
ARI EER (Btuh/Watts)	11.2
ARI integrated part load value	11.7
Number of Compressors	2
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	97,127 (Btuh)
Direct Expansion: Net Total Cooling	92,657 (Btuh)
Direct Expansion: Gross sensible cooling	52,130 (Btuh)
Direct Expansion: Net Sensible Cooling	47,659 (Btuh)
Direct Expansion: Moisture Removal	42.1 (lb / hr)
Coil Discharge dry bulb temperature	48.6 (deg F)
Coil Discharge wet bulb temperature	46.4 (deg F)
Unit Discharge dry bulb temperature	49.6 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	2,750 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.09 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.06 (in. W.C.)
Economizer Static Pressure	0.04 (in. W.C.)
Total Static Pressure	1.19 (in. W.C.)
Supply Fan power	1.40 (bhp)
Supply fan motor nominal power	2.0 (hp)
Required RPM	868
RPM range	680 - 925
Air filter quantity	4
Air filter length x width	18 x 24 (in.)

Air filter thickness ..... 2 (in.)

ELECTRICAL

Power supply ..... 460 V 3 Phase
Unit operating range ..... + or - 10%
Blower motor full load amps 3.4
Compressor RLA (total) 14.2
Condenser fan motor watts 700
Condenser fan full load amps (total) 2.6
System full load amps 21.5
System MOCP (amps) 30
System minimum circuit ampacity 24.0

DIMENSIONS

Dimensions ..... 50.0(h) x 58.0(w) x 99.25(d) (in.)
Down-flo supply air opening ..... 20.0(l) x 28.0(w) (in.)
Down-flo return air opening ..... 20.0(l) x 28.0(w) (in.)
Horizontal supply air opening ..... 15.0(h) x 28.0(w) (in.)
Horizontal return air opening ..... 20.0(h) x 28.0(w) (in.)
Total installed unit weight ..... 1,375 (lbs.)

EQUIPMENT FEATURES

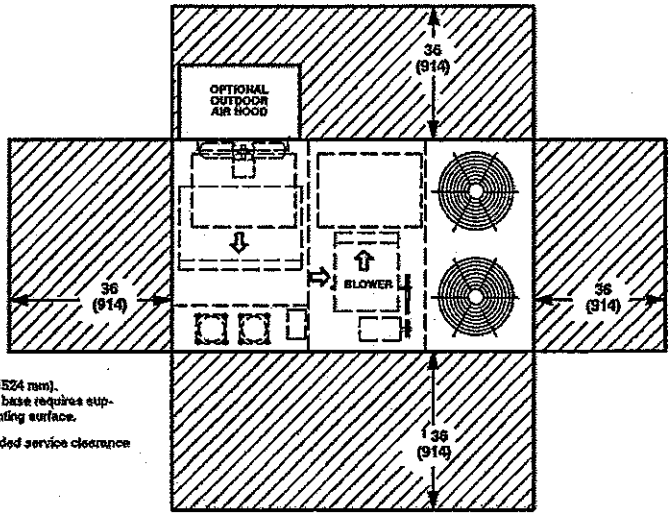
Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS
Constant Volume Belt Drive Blower
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 2 Hp Std
Blower Drive Kit -1 (680-925 RPM)
Gas Heating - 130K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 30 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

THERMOSTATS & CONTROLS.....**Material**
FAC IMC BACNet Module .....Factory Installed

Power Exhaust

INSTALLATION CLEARANCES - INCHES (MM)



NOTE - Top Clearance 60 in. (1524 mm).
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

1 60 in. (1524 mm) recommended service clearance for blower deck removal

WEIGHTS AND DIMENSIONS - INCHES (MM)

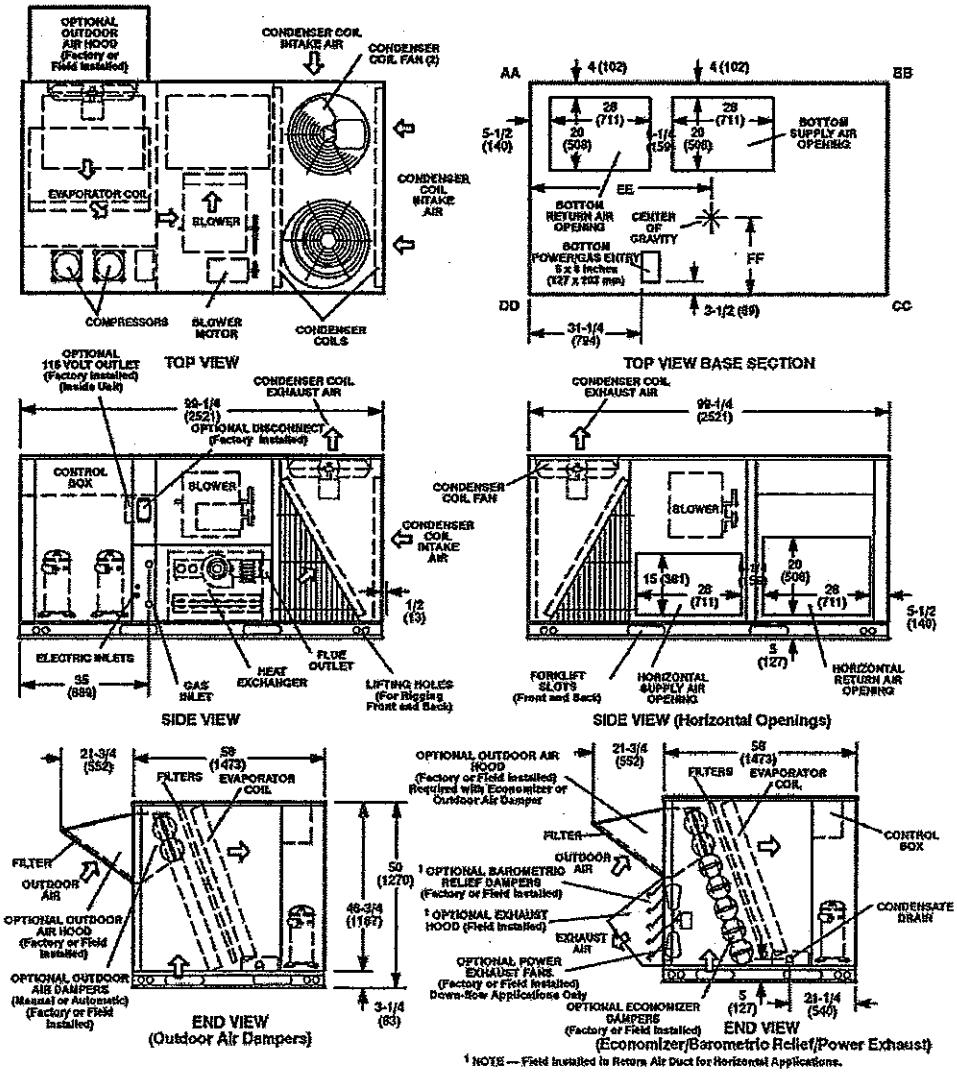
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS Net lbs.	Net kg	Shipping lbs.	Shipping kg	CORNER WEIGHTS AA lbs.	AA kg	BB lbs.	BB kg	CC lbs.	CC kg	DD lbs.	DD kg	CENTER OF GRAVITY EE inch	EE mm	FF inch	FF mm
102 Base Unit	1300	590	1385	628	314	142	289	131	329	149	368	167	47	1194	21-1/2	546
102 Max. Unit	1525	692	1610	730	381	173	339	154	374	170	431	196	46	1168	23-1/2	597

OPTIONS SHIPPING WEIGHTS (add to base unit weight)

High Fire Heat Exchanger	40 lbs.	18 kg	Power Exhaust	28 lbs.	13 kg
Economizer	68 lbs.	30 kg	LTL Packaging (less than truck load)	105 lbs.	48 kg
Outdoor Air Damper	40 lbs.	18 kg			

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (Economizer, Power Exhaust Fans, High Input Heating and Controls)



[1] NOTE — Field Installed in Return Air Duct for Horizontal Applications.

Unit ID: RTU - 21

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGA102H2... PkgGE/8.5Ton/Configurable
Sound rating number (db) 88.0

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	0.75 (in.)
Mechanical: Heating capacity input (low stage)	84,500 (Btuh)
Mechanical: Heating capacity output (low stage)	67,500 (Btuh)
Mechanical: Heating capacity input (high stage)	130,000 (Btuh)
Mechanical: Heating capacity output (high stage)	104,000 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	28.3 (deg F)

COOLING PERFORMANCE

ARI gross cooling	105,000 (Btuh)
ARI net cooling	101,000 (Btuh)
ARI total unit watts	9,000
ARI EER (Btuh/Watts)	11.2
ARI integrated part load value	11.7
Number of Compressors	2
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	101,250 (Btuh)
Direct Expansion: Net Total Cooling	95,086 (Btuh)
Direct Expansion: Gross sensible cooling	52,624 (Btuh)
Direct Expansion: Net Sensible Cooling	46,461 (Btuh)
Direct Expansion: Moisture Removal	45.7 (lb / hr)
Coil Discharge dry bulb temperature	52.0 (deg F)
Coil Discharge wet bulb temperature	48.7 (deg F)
Unit Discharge dry bulb temperature	53.0 (deg F)
Condensate drain size	1.00 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	3,400 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.12 (in. W.C.)
Gas Heat Exchanger Static Pressure	0.08 (in. W.C.)
Economizer Static Pressure	0.06 (in. W.C.)
Total Static Pressure	1.27 (in. W.C.)
Supply Fan power	1.92 (bhp)
Supply fan motor nominal power	2.0 (hp)
Required RPM	926
RPM range	895 - 1120
Air filter quantity	4
Air filter length x width	18 x 24 (in.)

Air filter thickness ..... 2 (in.)

ELECTRICAL

Power supply ..... 460 V 3 Phase
Unit operating range ..... + or - 10%
Blower motor full load amps 3.4
Compressor RLA (total) 14.2
Condenser fan motor watts 700
Condenser fan full load amps (total) 2.6
System full load amps 21.5
System MOCP (amps) 30
System minimum circuit ampacity 24.0

DIMENSIONS

Dimensions ..... 50.0(h) x 58.0(w) x 99.25(d) (in.)
Down-flo supply air opening ..... 20.0(l) x 28.0(w) (in.)
Down-flo return air opening ..... 20.0(l) x 28.0(w) (in.)
Horizontal supply air opening ..... 15.0(h) x 28.0(w) (in.)
Horizontal return air opening ..... 20.0(h) x 28.0(w) (in.)
Total installed unit weight ..... 1,375 (lbs.)

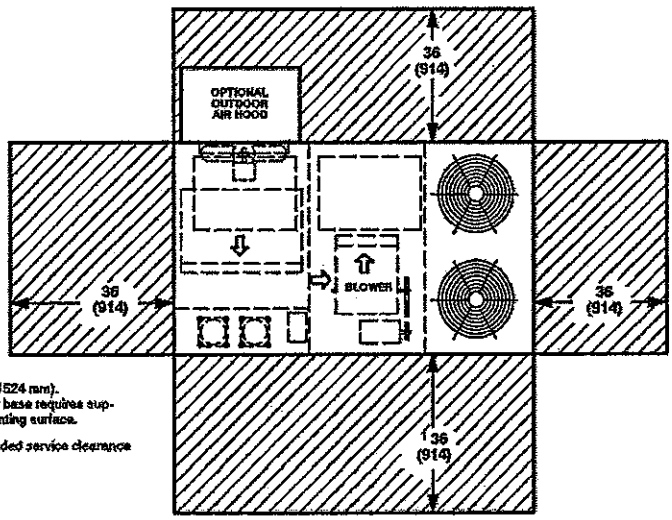
EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Two Stage Gas Heating
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS
Constant Volume Belt Drive Blower
Air Filter Type - 2" Pleat MERV 8 -Target Filter
Blower Motor - 2 Hp Std
Blower Drive Kit -3 (895-1120 RPM)
Gas Heating - 130K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Std Static PEF
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 30 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

THERMOSTATS & CONTROLS.....**Material**
FAC IMC BACNet Module .....Factory Installed

INSTALLATION CLEARANCES - INCHES (MM)



NOTE - Top Clearance 60 in. (1524 mm).
NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

[1] 60 in. (1524 mm) recommended service clearance for blower deck removal

WEIGHTS AND DIMENSIONS - INCHES (MM)

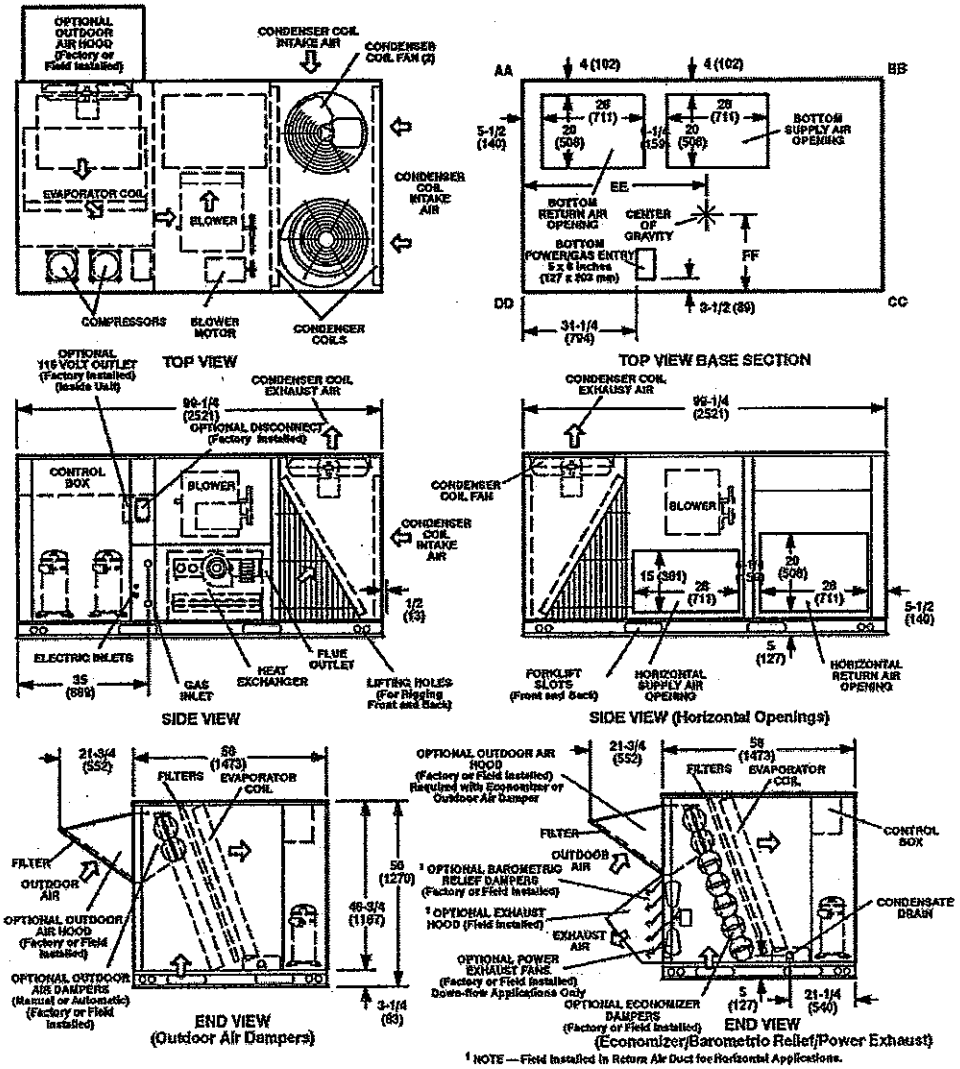
Shown With Optional Economizer Dampers, Power Exhaust Fans, Convenience Outlet, Unit Disconnect

Model Number	WEIGHTS Net lbs.	Net kg	Shipping lbs.	Shipping kg	CORNER WEIGHTS AA lbs.	AA kg	BB lbs.	BB kg	CC lbs.	CC kg	DD lbs.	DD kg	CENTER OF GRAVITY EE inch	EE mm	FF inch	FF mm
102 Base Unit	1300	590	1385	628	314	142	289	131	329	149	368	167	47	1194	21-1/2	546
102 Max. Unit	1525	692	1610	730	381	173	339	154	374	170	431	195	46	1168	23-1/2	597

ACCESSORY SHIPPING WEIGHTS (add to Base Unit weight)

High Fire Heat Exchanger	40 lbs.	18 kg
Economizer	66 lbs.	30 kg
Outdoor Air Damper	40 lbs.	18 kg
Power Exhaust	28 lbs.	13 kg
LTL Packaging (less than truck load)	105 lbs.	48 kg

Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS installed. (Economizer, Power Exhaust Fans, High Input Heating and Controls)



[1] NOTE — Field Installed in Return Air Duct for Horizontal Applications.

Unit ID: RTU - 22

SPECIFICATIONS AND RATINGS
Packaged Cooling & Gas Heating

Model number LGA036H2... PkgGE/3Ton/Configurable
Sound rating number (db) 82.0

HEATING PERFORMANCE

Heat source	Natural Gas
Gas supply connection	0.5 (in.)
Mechanical: Heating capacity input (high stage)	78,000 (Btuh)
Mechanical: Heating capacity output (high stage)	62,400 (Btuh)
Mechanical: AGA-CGA thermal efficiency	80.0%
Mechanical: Temperature Rise	48.1 (deg F)

COOLING PERFORMANCE

ARI gross cooling	37,600 (Btuh)
ARI net cooling	36,400 (Btuh)
ARI total unit watts	3,300
ARI EER (Btuh/Watts)	11.2
ARI SEER	13.0
Number of Compressors	1
Outdoor air dry bulb temperature	80.0 (deg F)
Mixed air dry bulb temperature	67.0 (deg F)
Mixed air wet bulb temperature	60.0 (deg F)
Direct Expansion: Gross total cooling	35,687 (Btuh)
Direct Expansion: Net Total Cooling	33,577 (Btuh)
Direct Expansion: Gross sensible cooling	19,503 (Btuh)
Direct Expansion: Net Sensible Cooling	17,392 (Btuh)
Direct Expansion: Moisture Removal	15.1 (lb / hr)
Coil Discharge dry bulb temperature	51.2 (deg F)
Coil Discharge wet bulb temperature	48.8 (deg F)
Unit Discharge dry bulb temperature	52.2 (deg F)
Condensate drain size	0.75 fpt (in.)
Refrigerant type	R-22

SUPPLY FAN PERFORMANCE

Supply fan total air flow	1,200 (CFM)
External static pressure - supply side	1.00 (in. W.C.)
Wet coil static pressure	0.03 (in. W.C.)
Economizer Static Pressure	0.04 (in. W.C.)
Total Static Pressure	1.07 (in. W.C.)
Supply Fan power	0.67 (bhp)
Supply fan motor nominal power	1.5 (hp)
Required RPM	982
RPM range	800 - 1105
Air filter quantity	2
Air filter length x width	16 x 25 (in.)
Air filter thickness	2 (in.)

ELECTRICAL

Power supply	460 V 3 Phase
Unit operating range	+ or - 10%
Blower motor full load amps	2.8
Compressor RLA (total)	5.8
Condenser fan motor watts	360
Condenser fan full load amps (total)	1.3
System full load amps	11.6
System MOCP (amps)	15
System minimum circuit ampacity	14.0

DIMENSIONS

Dimensions	36.5(h) x 46.5(w) x 87.5(d) (in.)
Down-flo supply air opening	14.0(l) x 28.0(w) (in.)
Down-flo return air opening	14.0(l) x 28.0(w) (in.)
Horizontal supply air opening	14.0(h) x 28.0(w) (in.)
Horizontal return air opening	14.0(h) x 28.0(w) (in.)
Total installed unit weight	759 (lbs.)

EQUIPMENT FEATURES

Durable Outdoor Enamel Paint Finish
Copeland Scroll Compressor
Pre-charged Refrigeration System
Expansion Valves
High Capacity Driers
Loss of Charge Switch
High Pressure Switch (Manual Reset)
Totally Enclosed Fan Motor
PVC Coated Fan Guard
Fan and Limit Controls
Factory Test Operated
Bonded for Grounding
Internal Pressure Relief Valve
Overload Protection
Crankcase Heater
Timed Off Control
Units will operate cooling down to 0 degrees F. (-17.7 degrees C.)
Copeland Scroll Compressor
* Two stage operation with a 1 stage thermostat & timed-on second stage.
Two Slab Coils
AGA-CGA Certified
Separate Compressor and Controls Compartment
Redundant Comb. Gas Control Valve
Electronic Flame Sensor
Direct Spark Ignition
Aluminized Steel Inshot Burners
Limited warranty on aluminized heat exchanger of 10 years
Limited compressor warranty of 5 years
Limited warranty on stainless steel heat exchanger of 15 years
Limited warranty on all other components of 1 year
See Limited Warranty Certificate included with unit for details

FACTORY INSTALLED OPTIONS

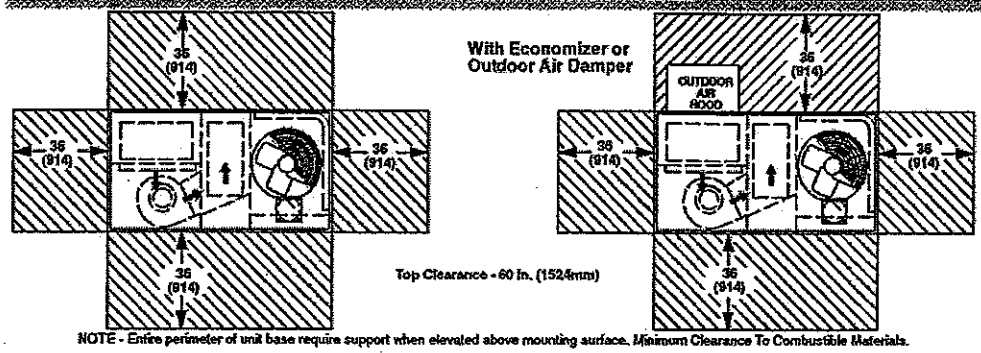
Constant Volume Belt Drive Blower
Air Filter Type - 2" Pleat MERV 8 -Target Filter

Blower Motor - 1.5 Hp Std
Blower Drive Kit -2 (800-1105 RPM)
Gas Heating - 78K Btuh Aluminized Steel Tubular Heat Exchanger
Global Economizer
Corrosion Protection - Outdoor
Drain Trap - PVC - Field Installed - Factory Enclosed
Circuit Breaker 15 amps - Factory Installed
GFCI - Factory Installed/Field Wired
S.A. Smoke Detector-Single Pnt - S.A. Smoke Detector-Single Pnt

FIELD INSTALLED OPTIONS	**MATERIAL**
HAIL GUARD - 036/072	28L53
LAPEF03/06 StdStat PEF/460-3	62K64

THERMOSTATS & CONTROLS	**Material**
FAC IMC BACNet Module	Factory Installed

INSTALLATION CLEARANCES - INCHES (MM)



NOTE - Entire perimeter of unit base require support when elevated above mounting surface. Minimum Clearance To Combustible Materials.

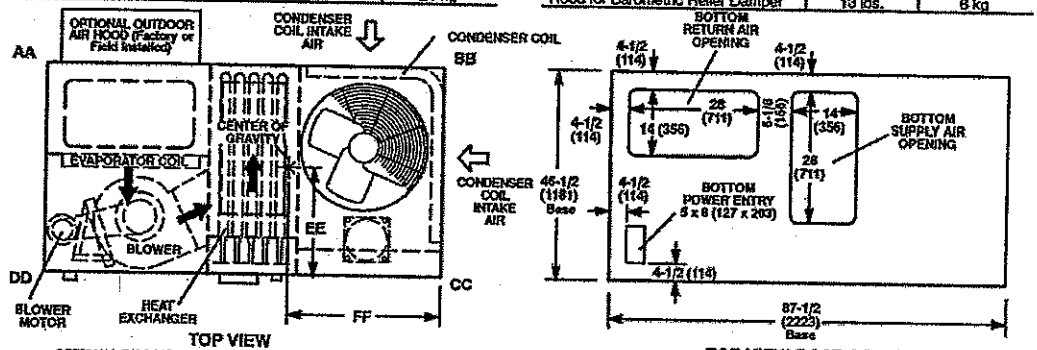
WEIGHTS AND DIMENSIONS - INCHES (MM)

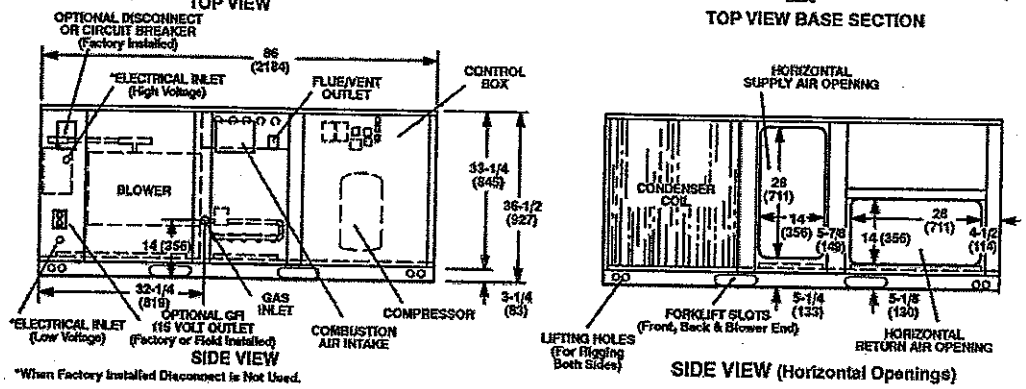
Shown With Economizer Dampers, Power Exhaust Fan, Convenience Outlet, Disconnect, Belt Drive Blower

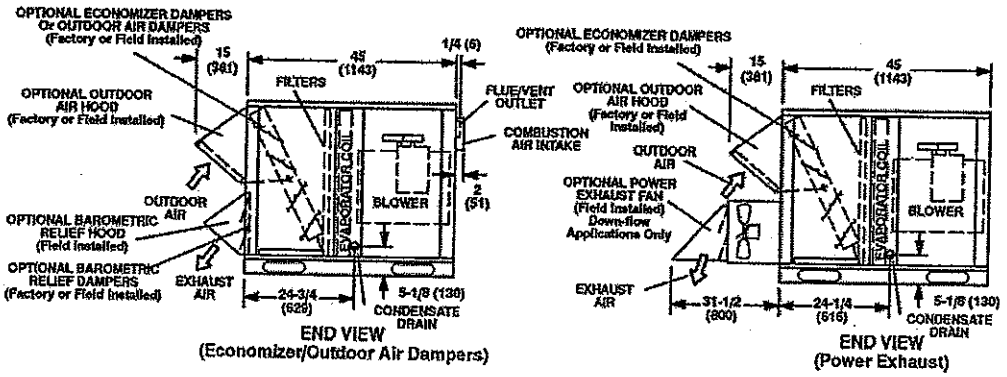
Model No.	WEIGHTS				CORNER WEIGHTS - Base Unit								CENTER OF GRAVITY			
	Net		Shipping		AA		BB		CC		DD		EE		FF	
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	in.	mm	in.	mm
036	655	298	786	357	120	54	146	66	215	98	176	80	18-3/4	476	39-3/8	1000

ACCESSORY SHIPPING WEIGHTS (add to base unit weight)

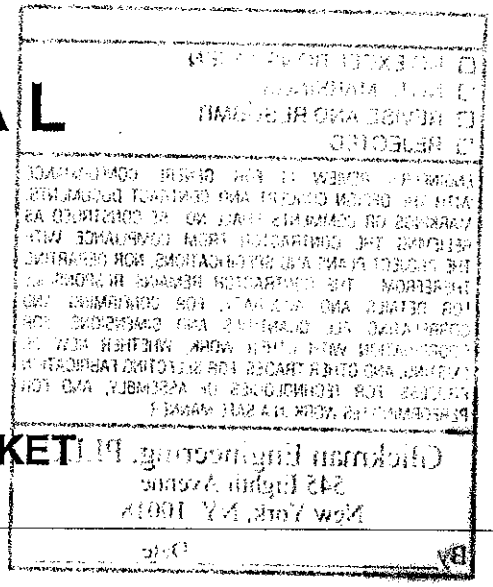
Dual/High Fire Heat Exchanger	18 lbs	8 kg	LTL Packaging (less than truck load)	8 lbs.	4 kg
Economizer	56 lbs.	25 kg	Barometric Relief Damper	15 lbs.	7 kg
Outdoor Air Damper	46 lbs.	21 kg	Hood for Barometric Relief Damper	18 lbs.	8 kg







SUBMITTAL



GATEWAY CENTER

BRONX TERMINAL MARKET

DIAM-N-BLU MECHANICAL CORP.
06/25/2008

FAN COILS ET 4

MAGIC AIRE UNITS

Plaza Construction Corp.
Bronx Terminal Market
Submittal No:

15768-167-1

REVIEWED. This review does not alleviate the subcontractor/supplier from conforming to the contract documents.

ABCO REFRIGERATION

☐ NO EXCEPTIONS TAKEN
☑ NOTE MARKINGS
☐ REVISE AND RESUBMIT
☐ REJECTED

ENGINEERS REVIEW IS FOR GENERL CONFORMANCE WITH THE DESIGN CONCEPT AND CONTRACT DOCUMENTS. MARKINGS OR COMMENTS SHALL NOT BE CONSTRUED AS RELIEVING THE CONTRACTOR FROM COMPLIANCE WITH THE PROJECT PLANS AND SPECIFICATIONS, NOR DEPARTING THEREFROM. THE CONTRACTOR REMAINS RESPONSIBLE FOR DETAILS AND ACCURACY, FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, FOR COORDINATION WITH OTHER WORK, WHETHER NEW OR EXISTING, AND OTHER TRADES, FOR SELECTING FABRICATION PROCESS, FOR TECHNOLOGIES OF ASSEMBLY, AND FOR PERFORMING HIS WORK IN A SAFE MANNER.

Glickman Engineering, PLLC
545 Eighth Avenue
New York, NY 10018

By LL Date 7-18-08

RECEIVED
22 2008
CONSTRUCTION

MagicAire®

RECEIVED
JUL 22 2008
PLAZA CONSTRUCTION

MODEL HB
UNIT DIMENSIONS
SUBMITTAL DATA

This unit is for heating only. (entrance)
no cooling

100% Return air
T'stat is enough (with temperature sensor)

Factory mixing box - no need - Return plenum is good enough.

GUIDE SPECIFICATION

Fan Coil Unit
Horizontal Cabinet Model, Ducted
HVAC Guide Specifications
Size Range: 400 to 8000 Nominal CFM
MagicAire Model Number: HB

Part 1 — General
1.01 SYSTEM DESCRIPTION
Horizontal, 2-pipe or 4-pipe, belt-driven fan coil unit. External parts are to be made with polyurethane based powder coated galvanealed, while internal parts are to be built from heavy gauge galvanized steel casing model fan coil unit for ducted installation above the ceiling, with full access to internal components.
1.02 QUALITY ASSURANCE
Each coil shall be factory tested for leakage at minimum of 400 psig air pressure with coil submerged in water. Insulation and adhesive shall meet NFPA-90A requirements for flame spread and smoke generation.
1.03 DELIVERY, STORAGE AND HANDLING
Unit shall be handled and stored in accordance with the manufacturer's instructions.

Part 2 — Products
2.01 EQUIPMENT
A. General:
Factory-assembled, horizontal, draw-thru type fan coil unit suitable for ducted installation above the ceiling or exposed. Unit shall be complete with water, DX or steam coil(s); fan(s); motor; belt drive; drain pan; and filters.
B. Casing:
Construction shall be heavy gauge galvanealed steel, painted with baked on polyurethane based powder coating, colored beige, lined with one-in. thick fiberglass Exact-O-Kote thermal/acoustical insulation. Knockouts acceptable for 3/8-in threaded rod shall be provided at the top and bottom of all unit corners for hanging the unit. Supply and return duct connections shall be approx. one inch long (04 - 40 only). Removable side panels shall be provided for access to the fan/motor assembly. A molded plastic double-sloped IAQ drain pan shall extend under the full length and width of the coil(s) with a 3/4-in FPT connection. HBB 04 & 06, and HBA 60 & 80 standard drain pans are Type 304 stainless steel coated with Aquaban.
(Optional) Stainless steel drain pan for sizes HBB 08-40.
C. Fans:
Belt-driven, double-width fan wheels shall have forward-curved blades and be statically and dynamically balanced. Fan drive shall consist of variable-pitch motor pulley, fixed-pitch fan pulley and V-belt. Fans and scrolls shall be of galvanized steel.
D. Coils:
Unit shall be equipped with a standard capacity (4)-row CW/HW or DX coil for installation in a 2-pipe system. Additional coils shall be provided for installation in a 4-pipe system. Coils shall have 3/8-in. (sizes 04-20) and 1/2-in. (sizes 30-80) copper tubes with aluminum fins bonded to the tubes by mechanical expansion. Coil(s) shall have a working pressure of 400 psig at 200 F. Each coil shall have sweat connections for copper tubes. Water coil(s) shall have manual air vent(s).
E. Operating Characteristics:
A single-circuit coil unit installed in a 2-pipe CW/HW system shall be capable of providing heating or cooling. DX coils are suitable for R-22, R410A cooling only, or R-22 heat pump operation. A two coil unit installed in a 4-pipe system shall be capable of providing sequenced heating and cooling as determined by the controls provided by others.
F. Motor(s):
Fan motors shall be open, drip-proof, single-speed, 60 Hz, 1750 rpm single or 3-phase, suitable for continuous duty at 104-deg F (40 C) in 115, 208, 230, or 277 volts (60 Hz). Three-phase motors are available in 208, 230, or 460 volts (60 Hz). Single-phase motors shall be provided with resilient mount. Three-phase 575 volt motors are by others.
G. Electric Heat:
The electric discharge heater shall be constructed of high-grade resistance wire supported by ceramic insulators on plated steel brackets. These heat elements are suspended in front of the outlet, after the blower and coil. High limit thermal cutouts and non adjustable air proving switch shall protect the heat elements in the event of an air failure. Electric heaters are factory mounted and wired for single point power connection with heater access door interlock switch.
H. Filters:
a. 2" throwaway filter(s) shall be installed in the unit.
b. (Optional) 2" pleated filter(s), MERV-7, shall be installed as indicated on the equipment schedule.
I. Insulation:
a. Units shall be equipped with 1-in. thick, 1.5-lbs/ft^3, Exact-O-Kote™ insulation.
b. (Optional) 7/8" closed cell insulation
c. (Optional) 1" double wall construction shall consist of 1" Exact-O- Kote™ insulation with a minimum 22-gauge galvanized steel liner with no fiberglass insulation exposed to the air stream.
J. Coil Options:
a. Unit shall be equipped with a high-capacity coil for installation in a 2-pipe system.
b. For installation in a 4-pipe CW/HW system, unit shall be equipped with either a 4-row cooling/1-row hot water heating coils, or a 4/2, 4/4, 6/1, 6/2, or 6/4 coils as required.
c. Unit shall be equipped with either a standard capacity DX (direct expansion) cooling coil or a high capacity (single or split face) DX cooling coil as required.
d. For installation in a 4-pipe system the unit shall be equipped with either a 3 or 4-row DX cooling/1-row heating coil or a 3 or 4/2, 3 or 4/4, 6/1, 6/2, or 6/4 coils as required. (Note: Hot water coil re-heat installation is requires using a heating coil low limit on units with DX cooling).
e. Provide (High) (Low) capacity steam distributing coil
Optional Accessories:
a. Unit shall be equipped with Face & Bypass Dampers, actuator by others.
b. Mixing Boxes shall include low leak damper assemblies constructed of steel channel frames with 18 gauge galvanized steel blades, die formed stiffeners with stops. Vinyl blade seals to reduce leakage shall be standard. All hardware shall be zinc plated with brass pivot points and bronze oilite bearings. Shafts shall be corrosion resistant steel. Mixing box shall be fully insulated with 1-in. thick Exact-O-Kote™ insulation. Optional - Provide actuators suitable for field mounting for (1) 3-position or (2) fully modulating control packages.
c. Units to be provided with ETL listed motor start stop station with 24v transformer, terminal strip and interlocking on-off switch with lockout/tagout capability.
Motors without thermal overload will have motor starters with overload protection.
d. Provide 4-way double deflection grille, painted with baked on polyurethane based powder coating, colored beige, lined with one-in. thick fiberglass Exact-O- Kote™ thermal/acoustical insulation.
e. Provide spring isolator hanging kit.
f. Provide return air grille with baked on polyurethane based powder coating, colored beige.

No cooling
4-row
Heat coil
only

HB Series Code Strings

POSITION	1	2	3	4	5	6	7	8	9	10	11
EXAMPLE	H	B	B	20		A	B	A	A	H4	

Horizontal Belt Drive

Generation

Unit Size	CFM
04	400 CFM
06	600 CFM
08	800 CFM
12	1200 CFM
16	1600 CFM
20	2000 CFM
30	3000 CFM
40	4000 CFM
50	5000 CFM
60	6000 CFM

5000 CFM

Future Use

Primary Coil Selection

Selection	Type	Rows	Face Split
A	None		
B	Chilled Water	4 Row	None
C		6 Row	None
H	DX/R22	Std Cap*	None
J			Dual
K		High Cap (6 row)	None
L			Dual
S	DX/R410A	Std Cap*	None
T			Dual
U		High Cap (6 row)	None
V			Dual

Future Use

Secondary Coil

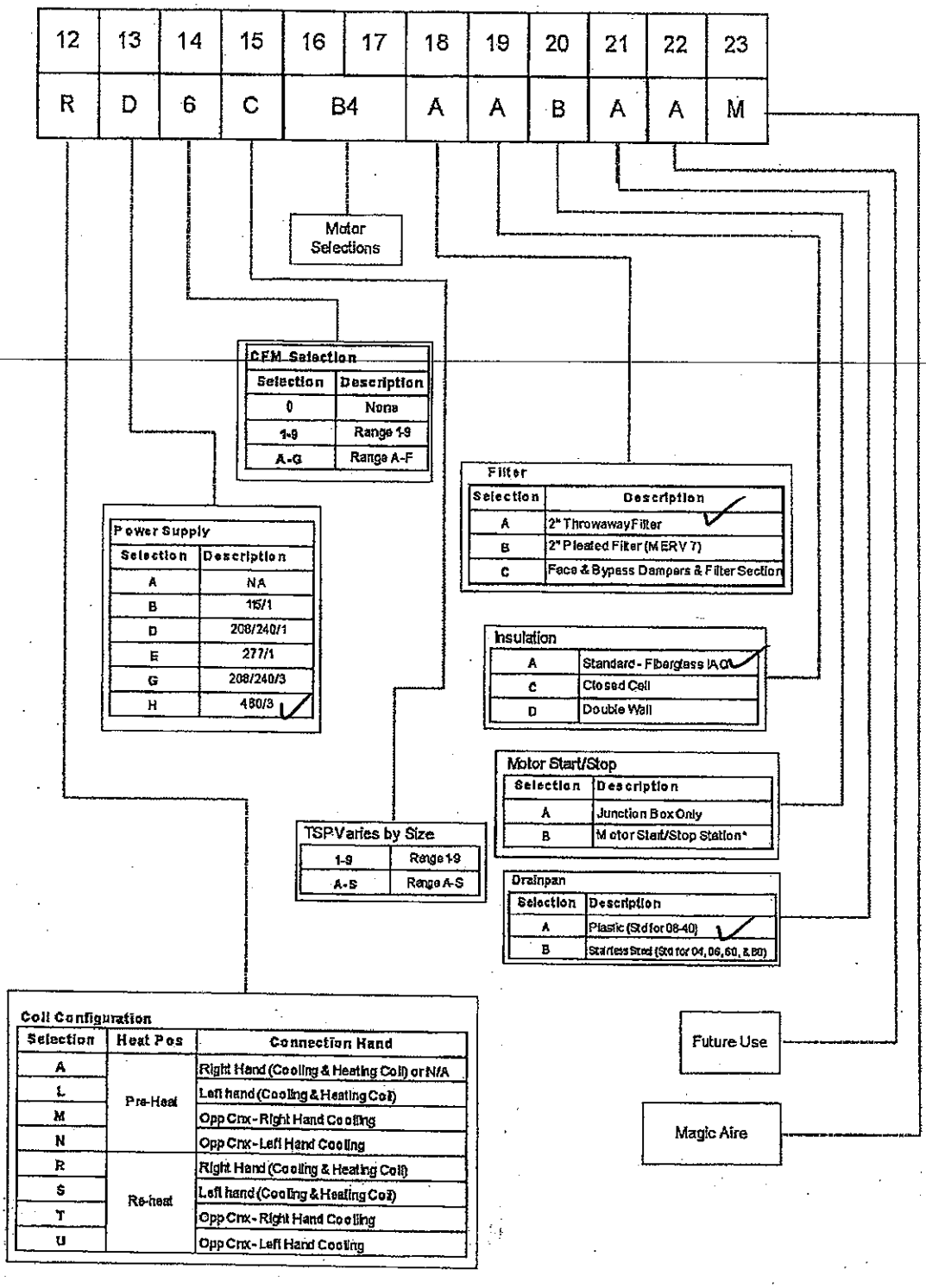
Selection	Type	Rows
AA	NONE- USE FOR 2 PIPE UNIT OR NO COIL	
H1	Hot Water	1 Row
H2		2 Row
H4		4 Row
H6		6 Row
SS	STEAM	Std Cap (2 rows)
SH		High Cap (2 rows)
	Electric Heat*	
	NOM KW	KW @ 208 V**
*01	1 KW	0.8 KW
02	2 KW	1.5 KW
03	3 KW	2.3 KW
04	4 KW	3.0 KW
05	5 KW	3.8 KW
06	6 KW	4.5 KW
07	7 KW	5.3 KW
08	8 KW	6.0 KW
09	9 KW	6.8 KW
10	10 KW	7.5 KW
11	11 KW	8.3 KW
12	12 KW	9.0 KW
13	13 KW	9.8 KW
14	14 KW	10.5 KW
15	15 KW	11.3 KW
16	16 KW	12.0 KW
17	17 KW	12.8 KW
18	18 KW	13.5 KW
19	19 KW	14.3 KW
20	20 KW	15.0 KW

TXV Selection Hi-Cap/Split Coil ONLY

Selection	TXV Nom Tons	Refrig	Nozzle No
A	Std or None*	R-22	(Std) -->
		R-410A	(Std) -->
C	2	R-22	1.5
		R-410A	1.5
E	3	R-22	2.5
		R-410A	2
F	4	R-22	3
		R-410A	2.5
G	5	R-22	4
		R-410A	4
H	7.5	R-22	6
		R-410A	5
L	15	R-22	15
		R-410A	12
N	20	R-22	10 (2)
		R-410A	8 (2)

* Refer to price pages for available combinations.

HB Series Code Strings (continued)



** Refer to price pages for available combinations.*

HB Series Code Strings (continued)

CFM

Ordering Number		Description	CFM							
Code	Selection		08	12	16	20	30	40	50	60
14	0	None - No Motor Supplied*	STD							
	1	CFM Range	600	900	1200	1500	2250	3000	5000	7000
	2		650	950	1280	1600	2400	3150	5200	7200
	3		700	960	1360	1700	2550	3200	5400	7400
	4		750	1000	1440	1800	2700	3300	5600	7600
	5		800	1020	1520	1900	2850	3400	5800	7800
	6		850	1080	1600	2000	3000	3450	6000	8000
	7		900	1140	1680	2100	3150	3600	6200	8200
	8		950	1200	1760	2200	3200	3750	6400	8400
	9		960	1260	1840	2300	3300	3800	6600	8600
	A		1000	1320	1920	2400	3400	4000	6600	8800
	B			1380	2000	2500	3450	4200	7000	9000
	C			1440			3600	4400		
	D			1500			3750	4600		
	E							4800		
	F							5000		

Notes:

*1. Drive kit (blower sheave, motor sheave and belts) to be supplied and installed by field.

TSP

Ordering Number		Description		TSP Schedule							
Code	Selection			08	12	16	20	30	40	50	60
15	0	None - No Motor Supplied									
	1	TSP Range	0.20 - 0.30	X	X	X	X	X	X	X	X
	2		0.31 - 0.40	X	X	X	X	X	X	X	X
	3		0.41 - 0.50	X	X	X	X	X	X	X	X
	4		0.51 - 0.60	X	X	X	X	X	X	X	X
	5		0.61 - 0.70	X	X	X	X	X	X	X	X
	6		0.71 - 0.80	X	X	X	X	X	X	X	X
	7		0.81 - 0.90	X	X	X	X	X	X	X	X
	8		0.91 - 1.00	X	X	X	X	X	X	X	X
	9		1.01 - 1.10	X	X	X	X	X	X	X	X
	A		1.11 - 1.20	X	X	X	X	X	X	X	X
	B		1.21 - 1.30	X	X	X	X	X	X	X	X
	C		1.31 - 1.40	X	X	X	X	X	X	X	X
	D		1.41 - 1.50	X	X	X	X	X	X	X	X
	E		1.51 - 1.60	X	X	X	X	X	X	X	X
	F		1.61 - 1.70	X	X	X	X	X	X	X	X
	G		1.71 - 1.80	X	X	X	X	X	X	X	X
	H		1.81 - 1.90	X	X	X	X	X	X	X	X
	J		1.91 - 2.00	X	X	X	X	X	X	X	X
	K		2.01 - 2.10	X	X	X	X	X	X	X	X
	L		2.11 - 2.20	X	X	X	X	X	X	X	X
	M		2.21 - 2.30			X	X	X	X	X	X
	N		2.31 - 2.40			X	X	X	X	X	X
	P		2.41 - 2.50			X	X	X	X	X	X

Code 16, 17	Description		
Selection	Voltage	Type, Encl	HP
AA	No Motor*		
B1	115/208-240/1	ODP	0.25
B2			0.33
B3			0.50
B4			0.75
B5			1.00
B6			1.50
B7			2.00
C1	115/230/1 ONLY	ODP, HE	0.50
C2			0.75
C3			1.00
E1	115/1	ODP, 2SP	0.50
E2			0.75
E3			1.00
F1	240/1	ODP, 2SP	0.50
F2			0.75
F3			1.00
G1	277/1	ODP	0.25
G2			0.33
G3			0.50
G4			0.75
G5			1.00
G6			1.50
G7			2.00
H1	208-240/460/3	ODP	0.50
H2			0.75
H3			1.00
H4			1.50
H5			2.00
H6			3.00
J1	208-240/460/3	ODP, HE	0.50
J2			0.75
J3			1.00
J4			1.50
J5			2.00
J6			3.00
J7			5.00
J8			7.50
J9			10.00
K1	208-240/460/3	ODP, 2SP	0.50
K2			0.75
K3			1.00
K4			1.50
K5	230/3 ONLY	ODP, 2SP	2.00
K6			3.00
K7			5.00

Notes:

*1. Drive kit (blower sheave, motor sheave and belts) to be supplied and installed by field.

2. All motors are 1750 rpm, 60 Hz.

3. Motor pulley hand shall be on same side as primary coil connection (Code 07).

4.. Motor voltage must match power supply (Code 12)

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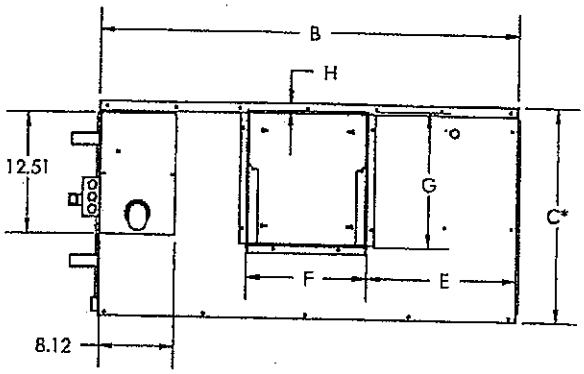
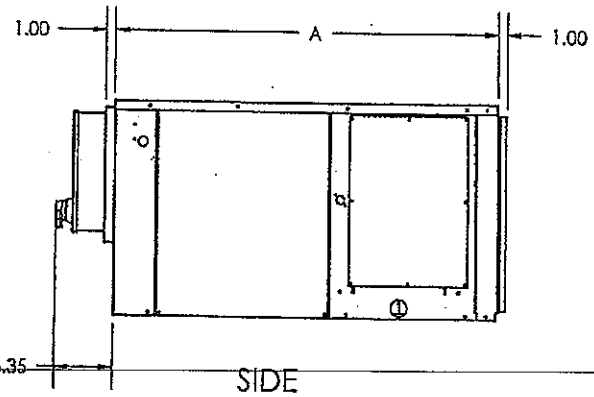
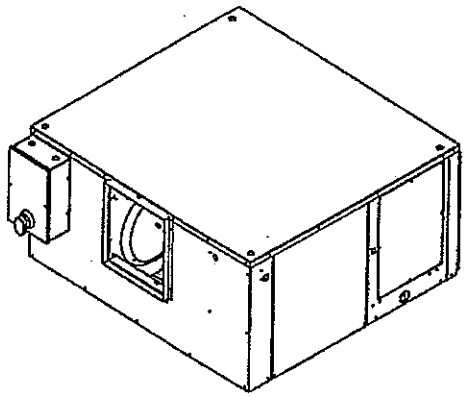
OPTIONAL MSS SHOWN

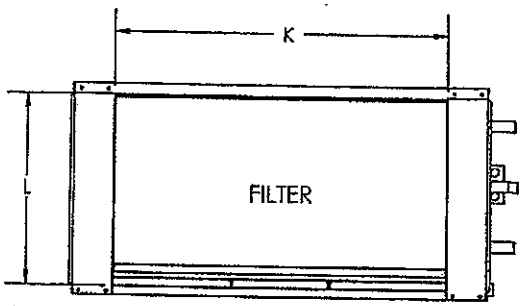


FRONT



SIDE





REAR

UNIT CABINET DIMENSIONS

MODEL	UNIT						BLOWER OPENING OUTLET		RETURN DUCT CONNECTION	
	A	B	C	C*	E	H	F	G	K	L
HBB04/06	38.00	28.00	14.13	15.13	9.63	1.00	8.50	10.75	22.00	12.25
HBB08/12	37.00	36.50	18.00	19.00	12.09	1.00	8.50	10.75	27.50	16.00
HBB16	42.00	45.00	22.00	23.00	16.00	1.00	9.50	14.00	36.00	20.00
HBB20	42.00	45.00	22.00	23.00	14.25	1.00	12.50	14.00	36.00	20.00
HBB30/40	52.50	57.00	35.00	35.00	21.88	8.50	13.25	16.25	48.00	32.00
HBB60	57.50	67.13	43.00	43.00	NOTE 1	7.00	(2) 16.07	(2) 15.88	57.75	40.25
HBB80	57.50	72.00	48.00	48.00	NOTE 2	11.88	(2) 16.07	(2) 15.88	66.00	45.00

C* Double Wall Height Dimension. NOTE: Models 30-80 Top is always double wall.

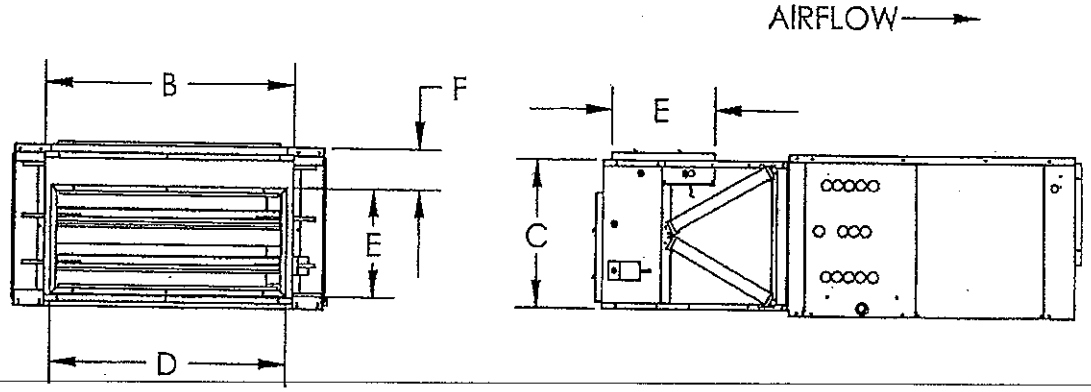
Note 1: Blower Opening 7" down from top of unit. Looking at discharge 14.375" left side, 11.375" center and 8.375 right side.

Note 2: Blower Opening 11.875"down from top unit. Looking at discharge 14.1875 left side, 11.375 center and 13.3125 right side.

PRODUCT INFORMATION IS SUBJECT TO CHANGE WITHOUT NOTICE

JOB NAME	JOB #	LOCATION	BUYER	BUYER #	DRAWING NO. HBBDIM-1	REV

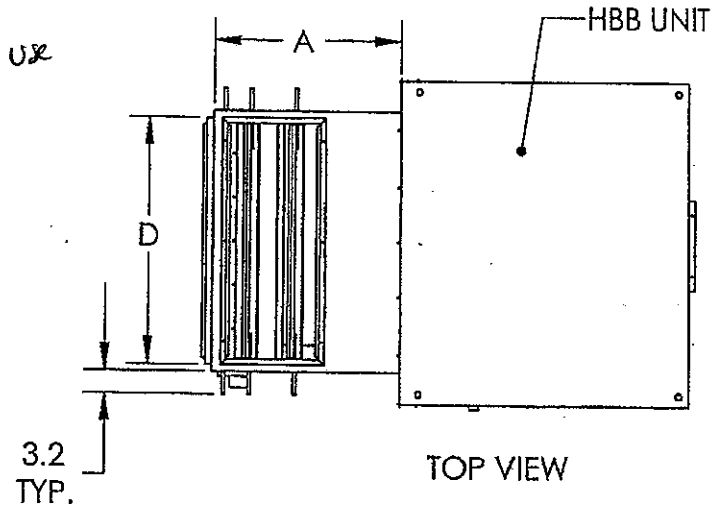
CODE NO. / CATALOG NO.	Magic Aire®	THIS DOCUMENT IS THE PROPERTY OF UNITED ELECTRIC CO. LP AND IS DELIVERED UPON THE EXPRESS CONDITION THAT THE CONTENTS WILL NOT BE DISCLOSED OR USED WITHOUT UNITED ELECTRIC CO. LP'S WRITTEN CONSENT.	SUBMISSION OF THESE DRAWINGS OR DOCUMENTS DOES NOT CONSTITUTE PART PERFORMANCE OR ACCEPTANCE OF CONTRACT.	HBB MIXING BOX REAR OUTDOOR AIR /TOP RETURN AIR RIGHT HAND CONNECTION	HBB



REAR VIEW

RIGHT VIEW

1) Rearrange ductwork to fit this mixing box, otherwise use field MTD mixing box



TOP VIEW

Size	Length	Width (centered)	Heigth (centered)	Duct Width	Duct Heigth	Top Clearence	Approx. Shipping Weight	Filters	
	A	B	C	D	E	F	(lbs)	Size	Qty
04/06	22.1	22.1	12.3	20.4	7.6	4.8	40	14 x 20 x 2	2
08/12	27.0	27.7	16.4	25.9	11.6	4.9	90	16 x 25 x 2	2
16/20	27.0	36.2	20.4	34.3	15.0	5.5	140	16 x 32 x 2	2
→ 30/40	32.0	48.2	32.4	46.3	15.0	9.7	200	20 x 24 x 2	4
60	36.0	58.0	40.3	56.0	16.0	13.2	260	20 x 25 x 2	4
								16 x 25 x 2	2
80	40.0	66.2	45.0	64.3	16.0	15.5	320	30 x 20 x 2	6

*NOTES
1. HBB unit shown for reference
2. Not all components shown for clarity
3. Optional actuator shown for reference
4. Dimensions are in inches

PRODUCT INFORMATION IS SUBJECT TO CHANGE WITHOUT NOTICE

JOB NAME	JOB #	LOCATION	BUYER	BUYER #	DRAWING NO. HBB-MB-2	REV

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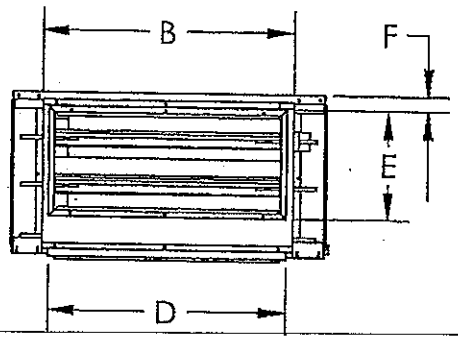
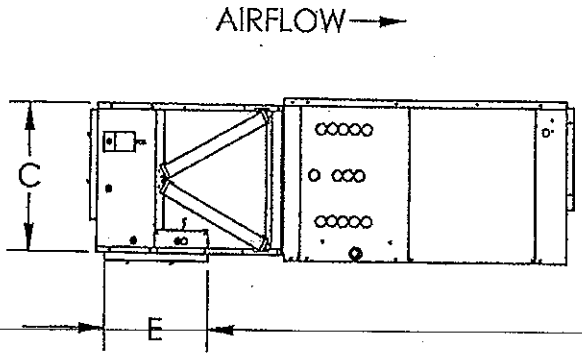
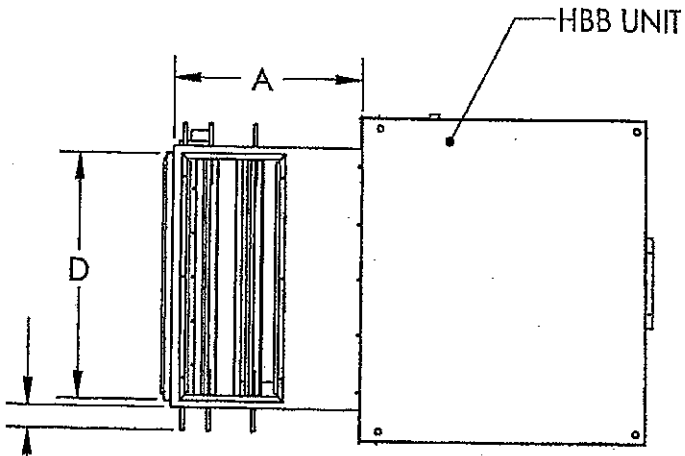


REAR VIEW



RIGHT VIEW

1) Rearrange ductwork to fit this mixing box, otherwise use field MTD mixing box



BOTTOM VIEW

Size	Length	Width (centered)	Heigth (centered)	Duct Width	Duct Heigth	Top Clearence	Approx. Shipping Weight	Filters	
	A	B	C	D	E	F	(lbs)	Size	Qty
04/06	22.1	22.1	12.3	20.4	7.6	2.0	40	14 x 20 x 2	2
08/12	27.0	27.7	16.4	25.9	11.6	2.0	90	16 x 25 x 2	2
16/20	27.0	36.2	20.4	34.3	15.0	2.0	140	16 x 32 x 2	2
30/40	32.0	48.2	32.4	46.3	15.0	9.7	200	20 x 24 x 2	4
60	36.0	58.0	40.3	56.0	16.0	13.2	260	20 x 25 x 2	4
								16 x 25 x 2	2
80	40.0	66.2	45.0	64.3	16.0	15.5	320	30 x 20 x 2	6

*NOTES
1. HBB unit shown for reference
2. Not all components shown for clarity
3. Optional actuator shown for reference
4. Dimensions are in inches

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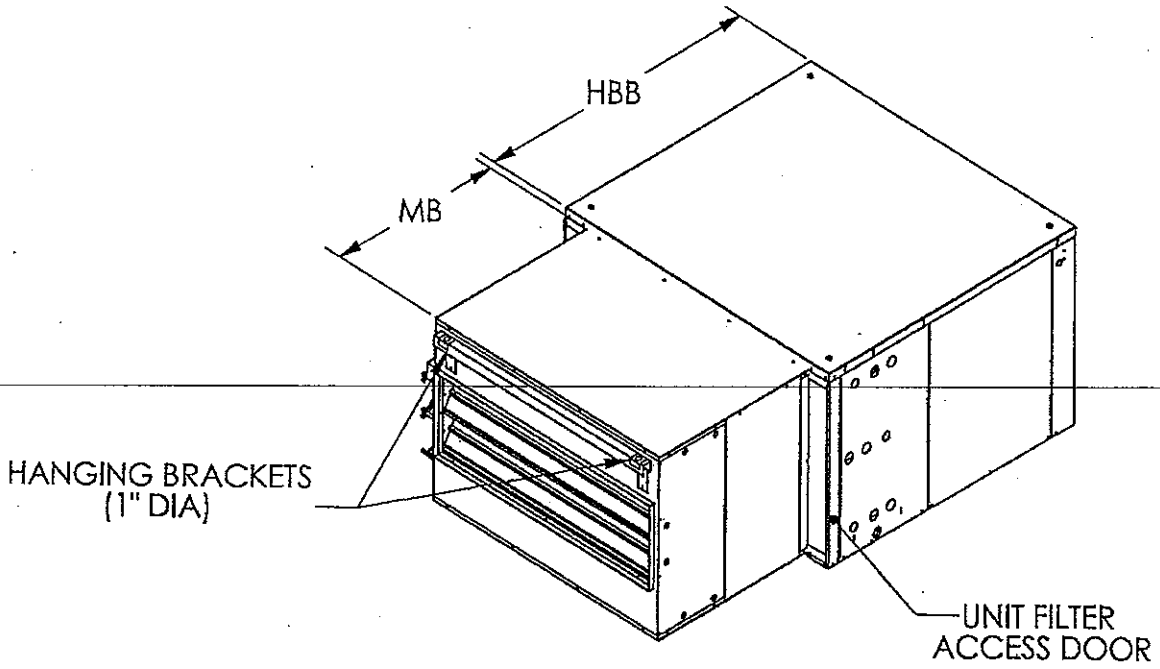

Hanging Instructions:

1. Insert rear return duct flanges of HBB unit into opening of Mixing Box(MB).
2. Ensure all unit flanges are inside the opening of the MB and screw a minimum of three screws intothe unit using self drilling screws. All four flanges require screws.
3. MB should now hang freely from unit.
4. **HBB30 and above**: Hanging brackets(shipped loose), as shown above, are recommended. To install brackets simply place in approximate location and use self drilling screws to attach to MB. Brackets are sized to allow hanging from Unistrut. Unistrut should be cut to the length one to two inches shorter than the width of the MB to avoid any interference with the damper linkages.
5. Remove unit filters before from HBB unit before startup.

HBB40

Rearrange ductwork layout to fit into this mixing box otherwise use field MTH MB

See DWG M-112H

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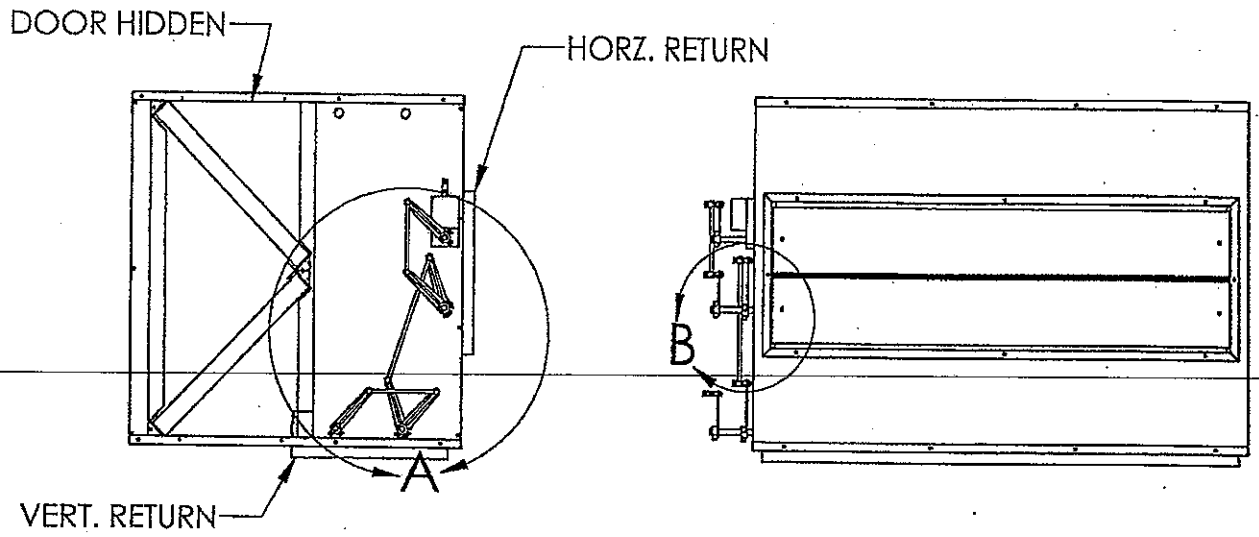
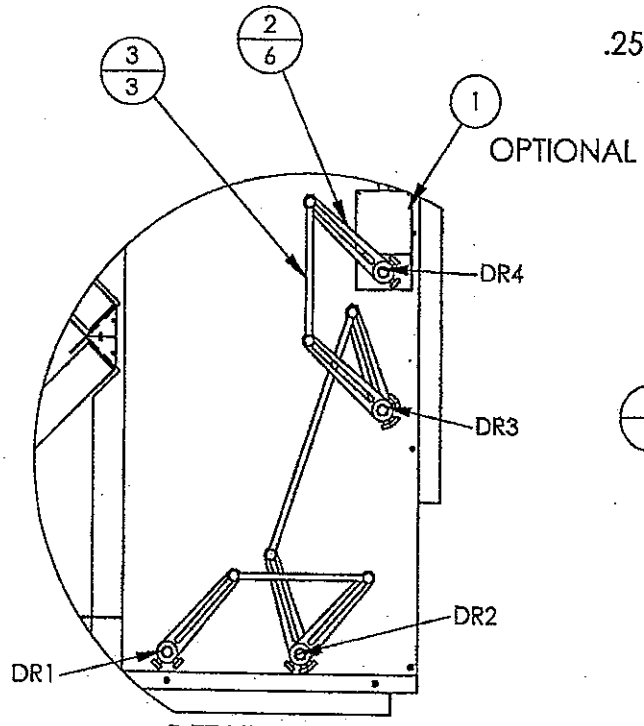
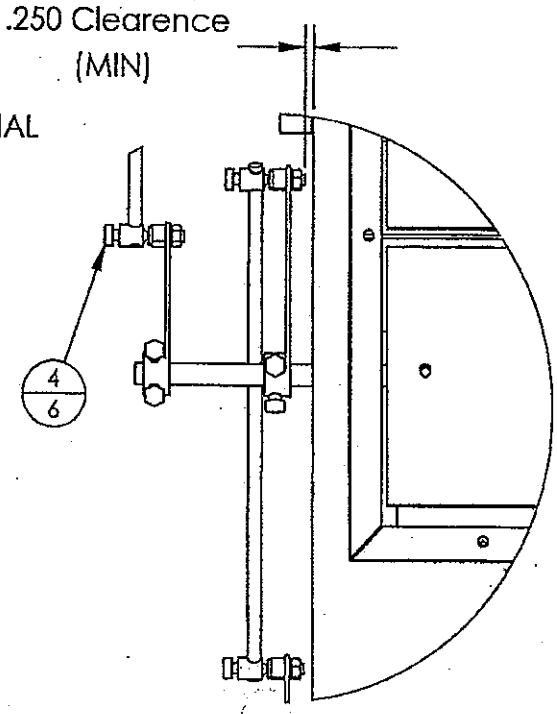




DETAIL A
SCALE 1 : 8



DETAIL B
SCALE 1 : 4

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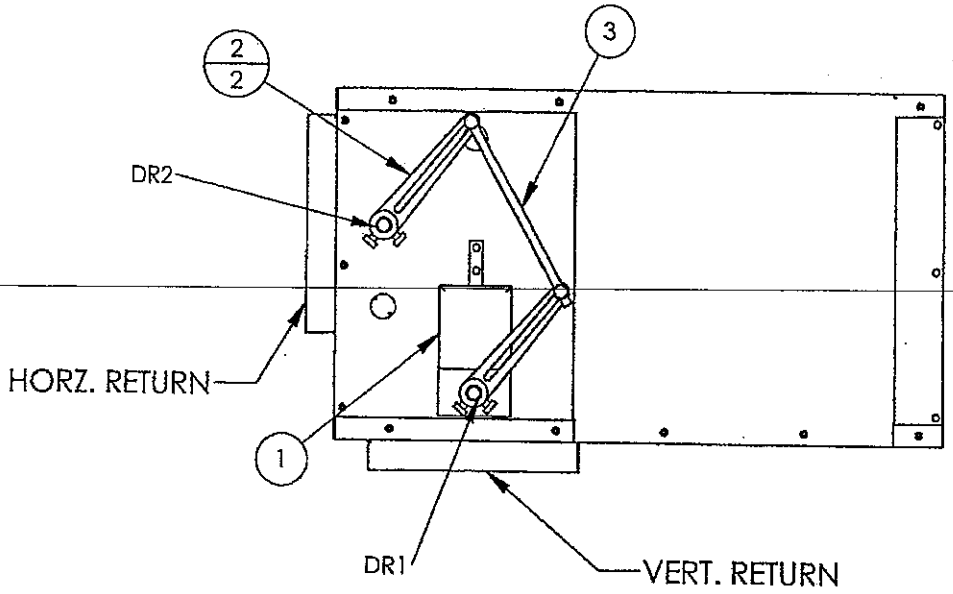

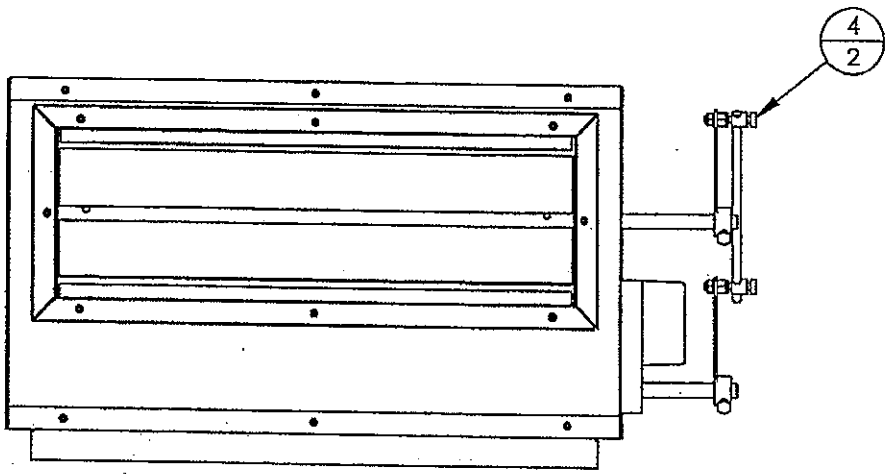

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					HBB-MB - 004	-

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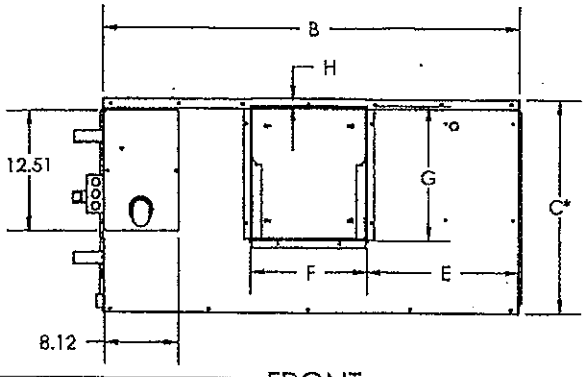
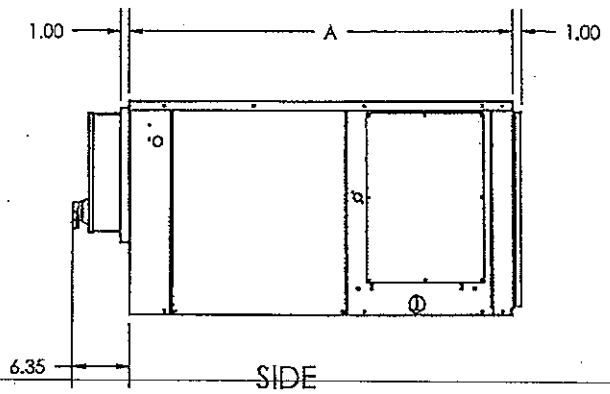
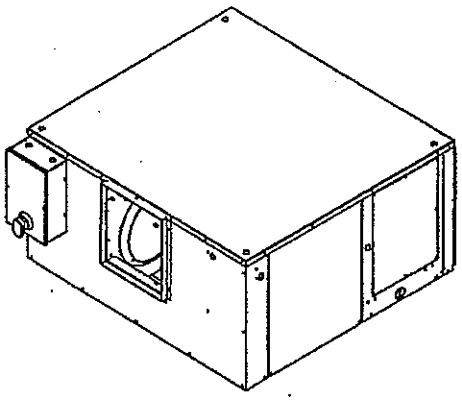
OPTIONAL MSS SHOWN

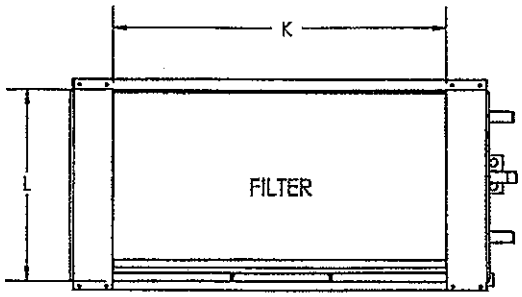


FRONT



SIDE





REAR

UNIT CABINET DIMENSIONS

MODEL	UNIT						BLOWER OPENING OUTLET		RETURN DUCT CONNECTION	
	A	B	C	C*	E	H	F	G	K	L
HBB04/06	38.00	28.00	14.13	15.13	9.63	1.00	8.50	10.75	22.00	12.25
HBB08/12	37.00	36.50	18.00	19.00	12.09	1.00	8.50	10.75	27.50	16.00
HBB16	42.00	45.00	22.00	23.00	16.00	1.00	9.50	14.00	36.00	20.00
HBB20	42.00	45.00	22.00	23.00	14.25	1.00	12.50	14.00	36.00	20.00
HBB30/40	52.50	57.00	35.00	35.00	21.88	8.50	13.25	16.25	48.00	32.00
HBB60	57.50	67.13	43.00	43.00	NOTE 1	7.00	(2) 16.07	(2) 15.88	57.75	40.25
HBB80	57.50	72.00	48.00	48.00	NOTE 2	11.88	(2) 16.07	(2) 15.88	66.00	45.00

C* Double Wall Height Dimension. NOTE: Models 30-80 Top is always double wall.

Note 1: Blower Opening 7" down from top of unit. Looking at discharge 14.375" left side, 11.375" center and 8.375 right side.

Note 2: Blower Opening 11.875"down from top unit. Looking at discharge 14.1875 left side, 11.375 center and 13.3125 right side.

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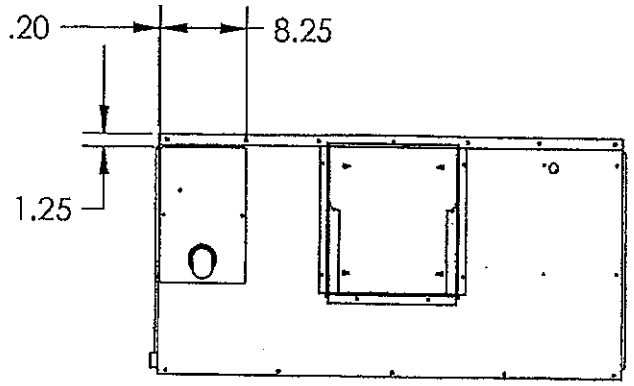

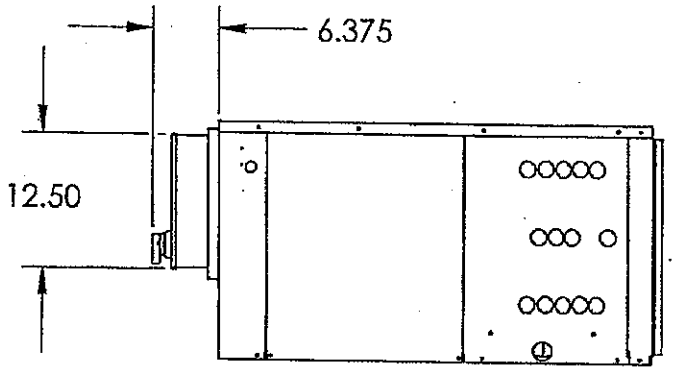

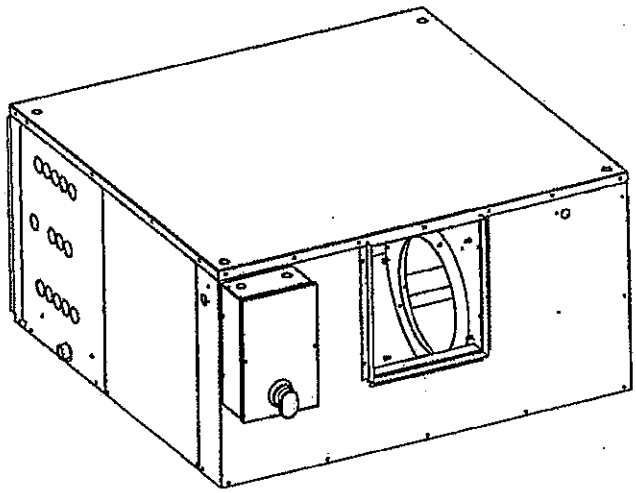

NOTES: SHOWN IN RIGHT HAND CONFIGURATION FOR REFERENCE ONLY
JUNCTION BOX WILL BE PROVIDED FOR UNITS WITH NO MSS

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JOB NAME	JOB #	LOCATION	BUYER	BUYER #	DRAWING NO. HBB MSS-001	REV -

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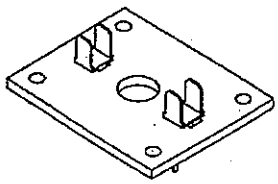
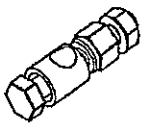
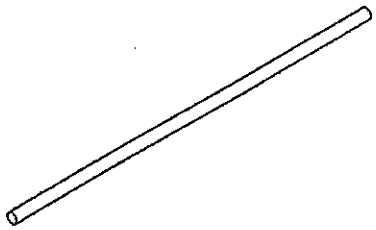


C7150B
Air Temperature
Sensor

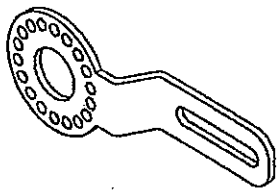


Swivel Nut

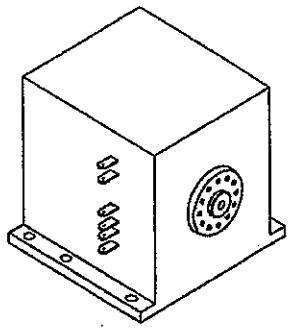
Linkage Arm



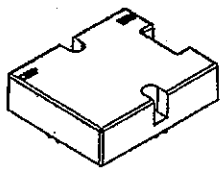
Linkage Rod



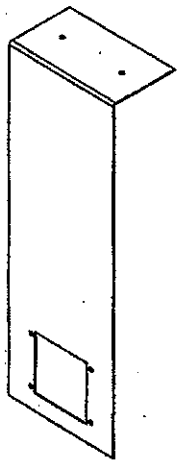
Actuator Arm



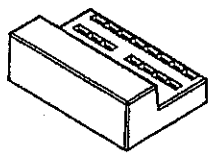
M7415, M7405,
or M8405
Actuator



C7400
Enthalpy Sensor
No need



Mixed Air Sensor
Mounting Bracket
No need
No mixed air



W7459
Logic Module

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JOB NAME	JOB #	LOCATION	BUYER	BUYER #	DRAWING NO. ECON-MB - 001	REV
						-

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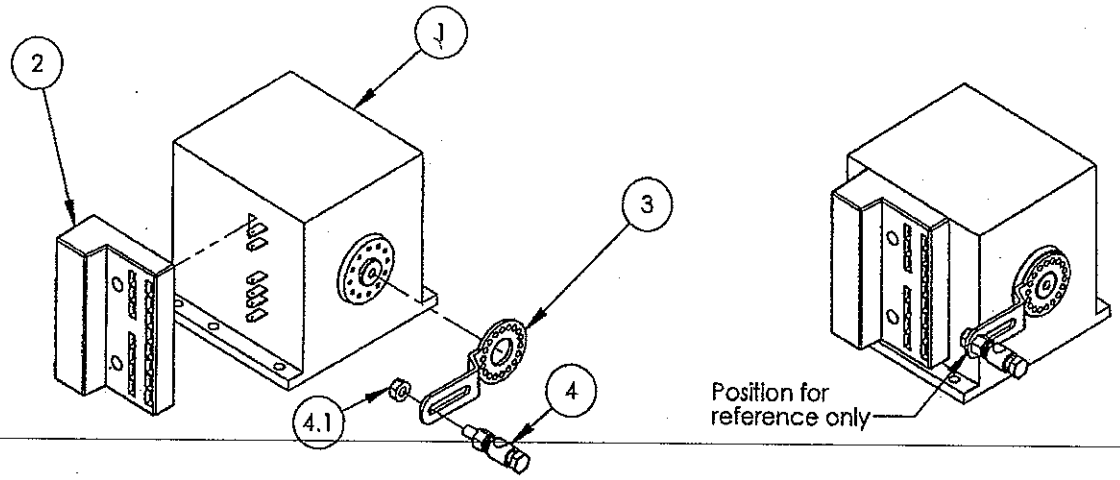
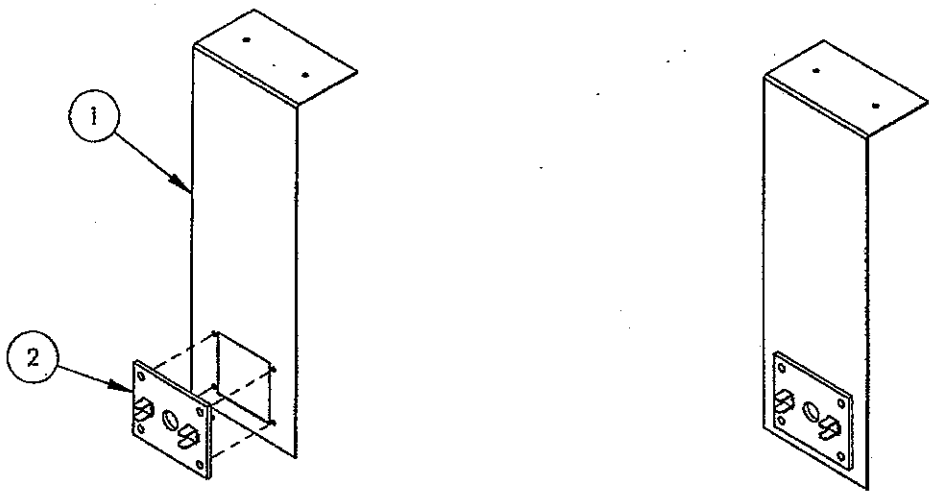


1. Press Logic Module (Item #2) onto Actuator (Item #1).
2. Remove lock nut (Item #4.1) from Swivel Nut Assembly (Item #4). Place Swivel nut assembly into slot on Actuator Arm (Item #3). Hand tighten lock nut onto Swivel nut Assembly. Swivel Nut Assembly will need to be adjusted once installed for proper actuator motion.
3. Attach Actuator Arm Assembly to Actuator with four 1/4" screws. Arm may need to be repositioned once installed to ensure proper actuator motion.



1. Attach Mixed Air Sensor (Item 2) into Mixed Air Sensor Bracket (Item #1).

There is no mixed air. There is only 100% return air.

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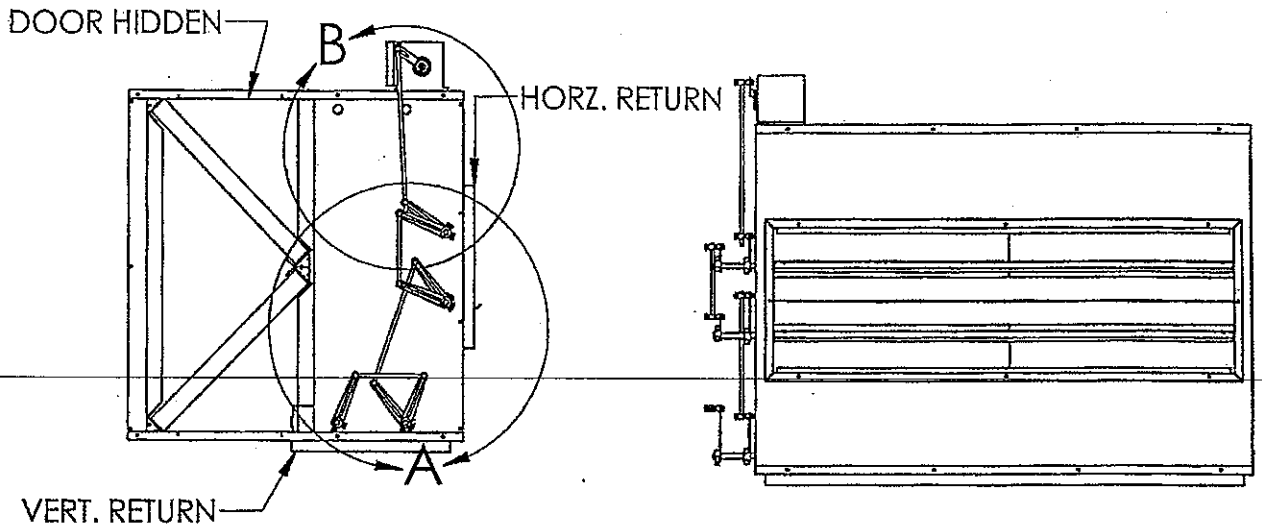
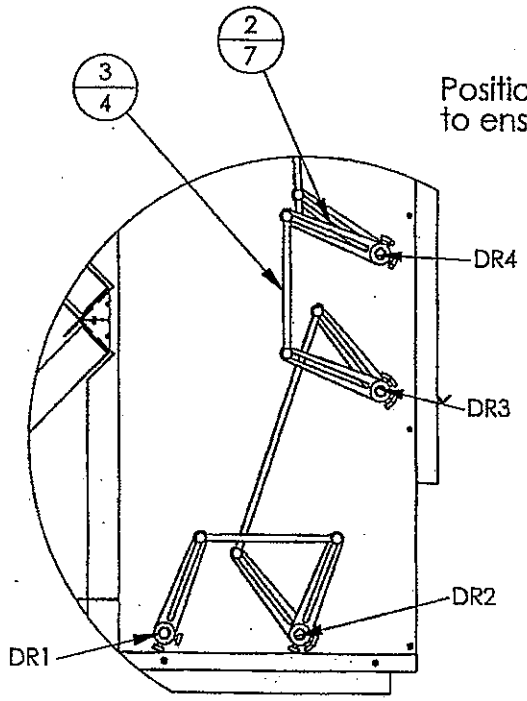
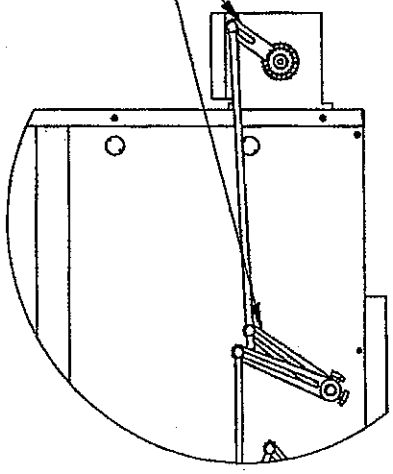




DETAIL A
SCALE 1 : 8

Position may need adjustment to ensure proper motion



DETAIL B
SCALE 1 : 8

PRODUCT INFORMATION IS SUBJECT TO CHANGE WITHOUT NOTICE

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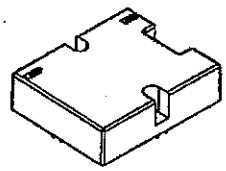
INSTALLATION INSTRUCTIONS:

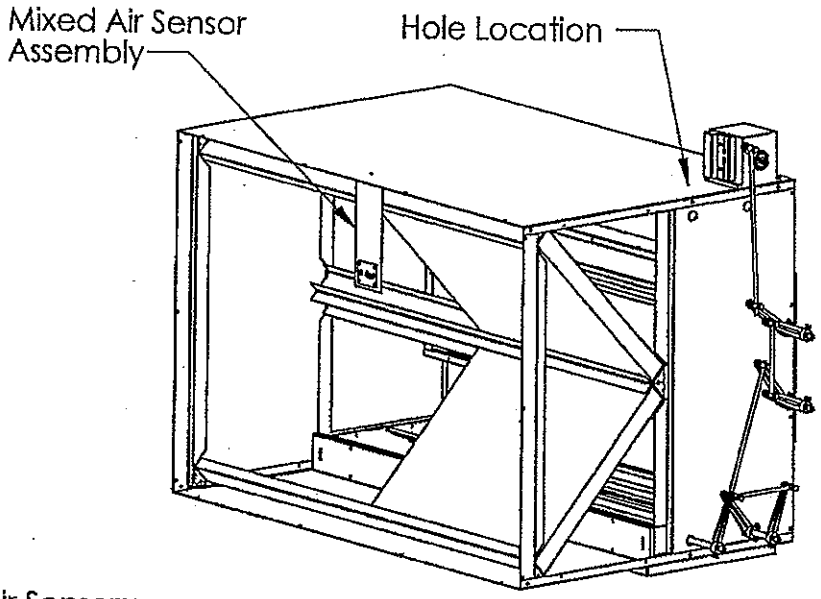
Looks like this mixing box is too complicated for the 100% Return air for heating only. Do we need it?

Actuator:

1. Align Actuator so that the Actuator Linkage Arm will have enough clearance for full range of motion. Align center line of the Actuator as close to the centerline of DR4 as possible. Use at least four self drilling screws to mount directly to top of unit.
2. Place Linkage Arm Assembly(Linkage Arm and Swivel Nut Asm) onto DR4 as shown on previous page. Do not tighten to DR4 as adjustments need to be made.
3. Place Linkage Rod between Actuator Arm and Linkage Arm on DR4. Linkage rod may need to be cut to length. Ensure Actuator Arm and Linkage Arm are parallel.
4. Ensure Linkage Assemblies are properly secured as shown in the Linkage Assembly Instructions sent with unit.
5. Open one set of dampers to 100% open and the other to 100% closed. Ensure actuator motion will operate as needed and tighten all linkages, swivel assemblies, and linkage rods into place.
6. Ensure Actuator motion opens and closes damper assemblies fully. If not, adjust settings of Linkage Arm, Actuator Arm, Swivel Nut Assemblies, and Linkage Rods one at a time until full operation is achieved.



Entahlpy Sensor



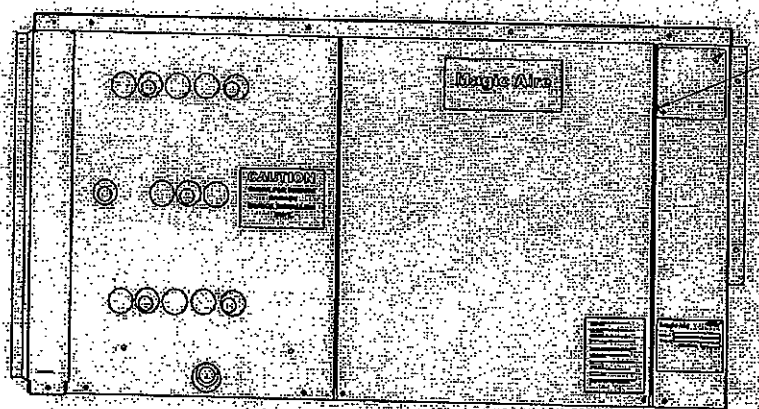
Mixed and Outside Air Sensors:

1. Remove Access Panel and filters as needed.
2. Place Mixed Air Sensor Assembly in air stream as shown above.
3. Attach to top of unit with self drilling screws.
4. Drill or knockout 1/2" hole into top of mixing box close to actuator.
5. Insert snap bushing in hole. Run wires inside unit, along top of mixing box, between the filter rail and insulation, and attach to Mixed Air Sensor.
6. Place Enthalpy Sensor in location suitable to meet manufacturer's requirements.
7. Connect all sensors to Logic Module per Manufacturer's instructions.
8. Test to ensure proper function.
9. Replace all parts and tape or fill any holes/gaps made.

STATION 4

PARTS NEEDED:

- TEST PROCEDURE
- LABELS
- INSPECTION PROCEDURE
- FIELD INSTRUCTIONS



AFFIX FIELD INSTRUCTIONS TO J-BOX

MAGIC AIRE

60-HRB BASE UNIT

673-100389 STATIONS

SUBMITTAL

GATEWAY CENTER

BRONX TERMINAL MARKET

DIAM-N-BLU MECHANICAL CORP.
06/25/2008

PROJET & FREEFLO LINEAR

ALBERT WEISS
270 Madison Avenue
New York, NY 10016
phone 212-679-8550
fax 212-213-5067

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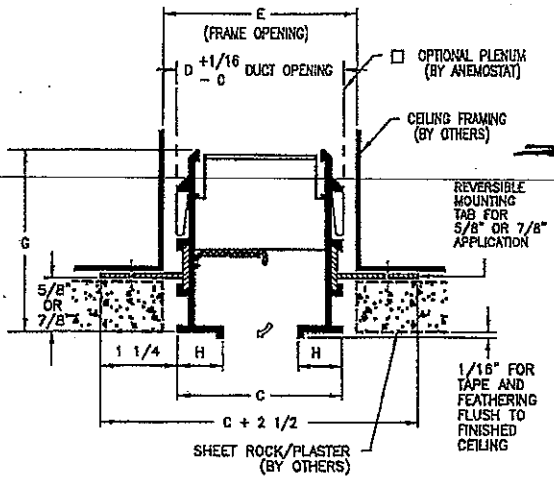
CARSON CA 310-835-7500

MODEL

FFCM-200

FREE FLO™
ARCHITECTURAL
LINEAR DIFFUSER
CONCEALED MOUNTING

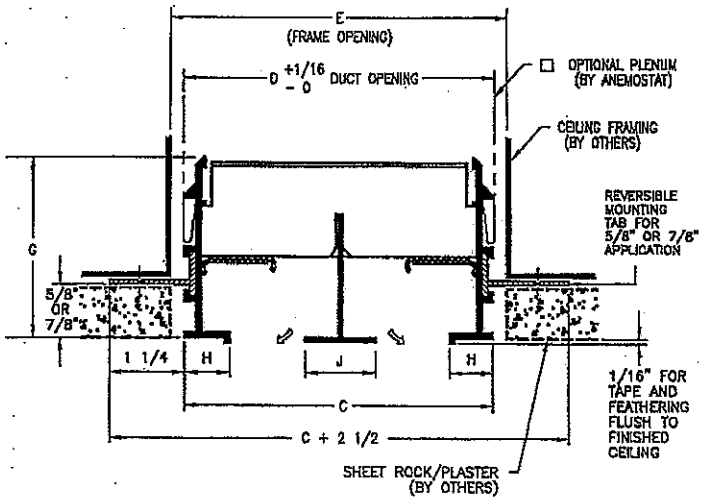
SINGLE SLOT

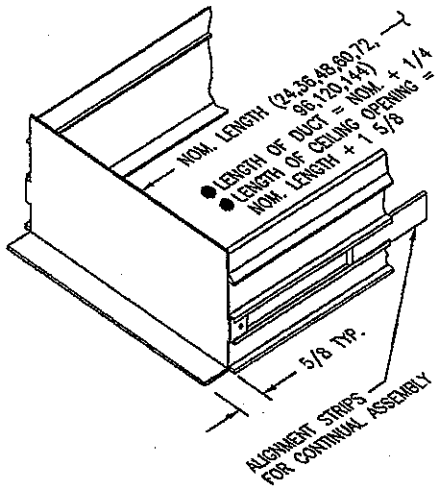


OK

FFCM-200 (2" SLOT WIDTH)						
# OF SLOTS	C	D	E	G	H	J
1	4 5/16	4 5/16	4 5/8	2 11/16	1 5/32	–
2	8 5/16	8 5/16	8 5/8			2
3	12 5/16	12 5/16	12 5/8			
4	16 5/16	16 5/16	16 5/8			

MULTIPLE SLOT





END PLATE DETAIL

MATERIAL: .062 ALUMINUM EXTRUSION
GALVANIZED HARDWARE

FINISH: OUTER FRAME – BLACK
CENTER TEE – WHITE
INTERIOR COMPONENTS – BLACK

ASSEMBLY: ALIGNMENT STRIPS AND MOUNTING BRACKETS FURNISHED FOR FIELD ASSEMBLY AND INSTALLATION

MFG. TOLERANCE ± 1/32

All Dimensions are in Inches

JOB NAME:	SUBMITTED BY:
LOCATION:	
ARCHITECT:	
ENGINEER:	DWG # LIN-0282
CONTRACTOR:	DATE 9-4-03 REV A

810A0006A1

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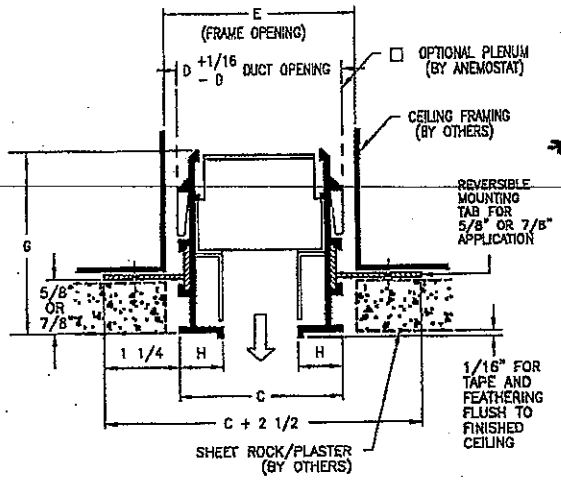
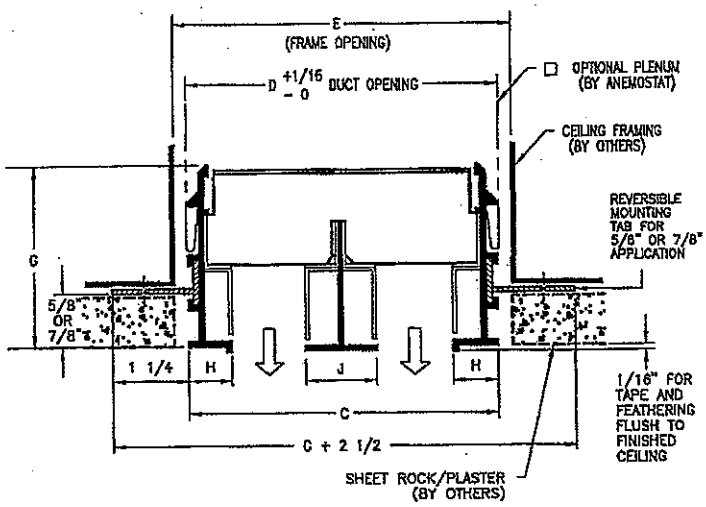
SINGLE SLOT

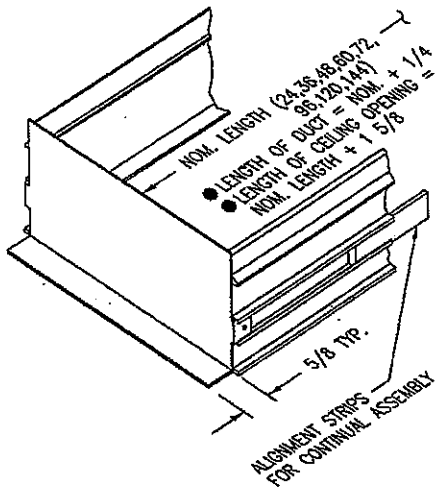


OK

PJCM-300 (3" SLOT WIDTH)						
# OF SLOTS	C	D	E	G	H	J
1	6 5/16	6 5/16	6 5/8	3 1/4	1 21/32	–
2	12 5/16	12 5/16	12 5/8			3
3	18 5/16	18 5/16	18 5/8			
4	24 5/16	24 5/16	24 5/8			

MULTIPLE SLOT





END PLATE DETAIL

MATERIAL: .062 ALUMINUM EXTRUSION
GALVANIZED HARDWARE

FINISH: OUTER FRAME – BLACK
CENTER TEE – WHITE
INTERIOR COMPONENTS – BLACK

ASSEMBLY: ALIGNMENT STRIPS AND MOUNTING BRACKETS FURNISHED FOR FIELD ASSEMBLY AND INSTALLATION

MFG. TOLERANCE ± 1/32

All Dimensions are in Inches

JOB NAME:	SUBMITTED BY:
LOCATION:	
ARCHITECT:	
ENGINEER:	DWG # LIN-0336
CONTRACTOR:	DATE 9-9-03 REV B

810A0004A1

Diam-N-Blu Mechanical Corp.
1165 Station Road
Medford, NY 11763
Ph : 631-286-5190

Letter of Transmittal

To: Antonio Vindigni
Plaza Construction Corporation
260 Madison Avenue
New York, NY 10016
Ph: (718)585-1975 x115 Fax: (866)668-2289

Transmittal #: 3
Date: 06/26/2008
Job: D1503 Gateway Center Bronx Terminal

Subject: D1503 BTM Magic Aire, ProJet & FreeFlo Submittals

WE ARE SENDING YOU

- [x] Attached
- [x] Under separate cover via E-Mail & UPS the following items:
- [x] Shop drawings
- [x] Prints
- [x] Plans
- [x] Samples
- [x] Copy of letter
- [x] Change order
- [x] Specifications
- [x] Submittal

Document Type	Copies	Date	No.	Description
Submittal	6		1 Rev 0	Magic Aire Units
Attachment	1			Re: Submittal 1 Rev 0 - D1503 Magic Aire Units Submittal.pdf
Submittal	6		2 Rev 0	ProJet & FreeFlo Linears
Attachment	1			Re: Submittal 2 Rev 0 - D1503 ProJet & FreeFlow Linear Submittal.pdf

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- [x] For your use
- [x] As requested
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- [x] Approved as submitted
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From: Anthony Bikowski (Diam-N-Blu Mechanical Corp.) **Signature:** _____

If enclosures are not as noted, kindly notify us at once.

APPENDIX L

HEALTH AND SAFETY PLAN AND COMMUNITY AIR MONITORING PLAN

HEALTH AND SAFETY PLAN

FOR

GATEWAY CENTER AT BRONX TERMINAL MARKET

NEW YORK, NEW YORK

BCP INDEX NO. W2-1032-04-11; SITE NO. C203015

Prepared For:

BTM Development Partners, LLC
60 Columbus Circle
New York, NY 10023

Prepared By:

Langan Engineering and Environmental Services, P.C.
360 West 31st Street, 8th Floor
New York, New York 10001

December 2008

5742506

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1.0 EMERGENCY CONTACT INFORMATION

1.1 Lincoln Hospital, Bronx: Call 911

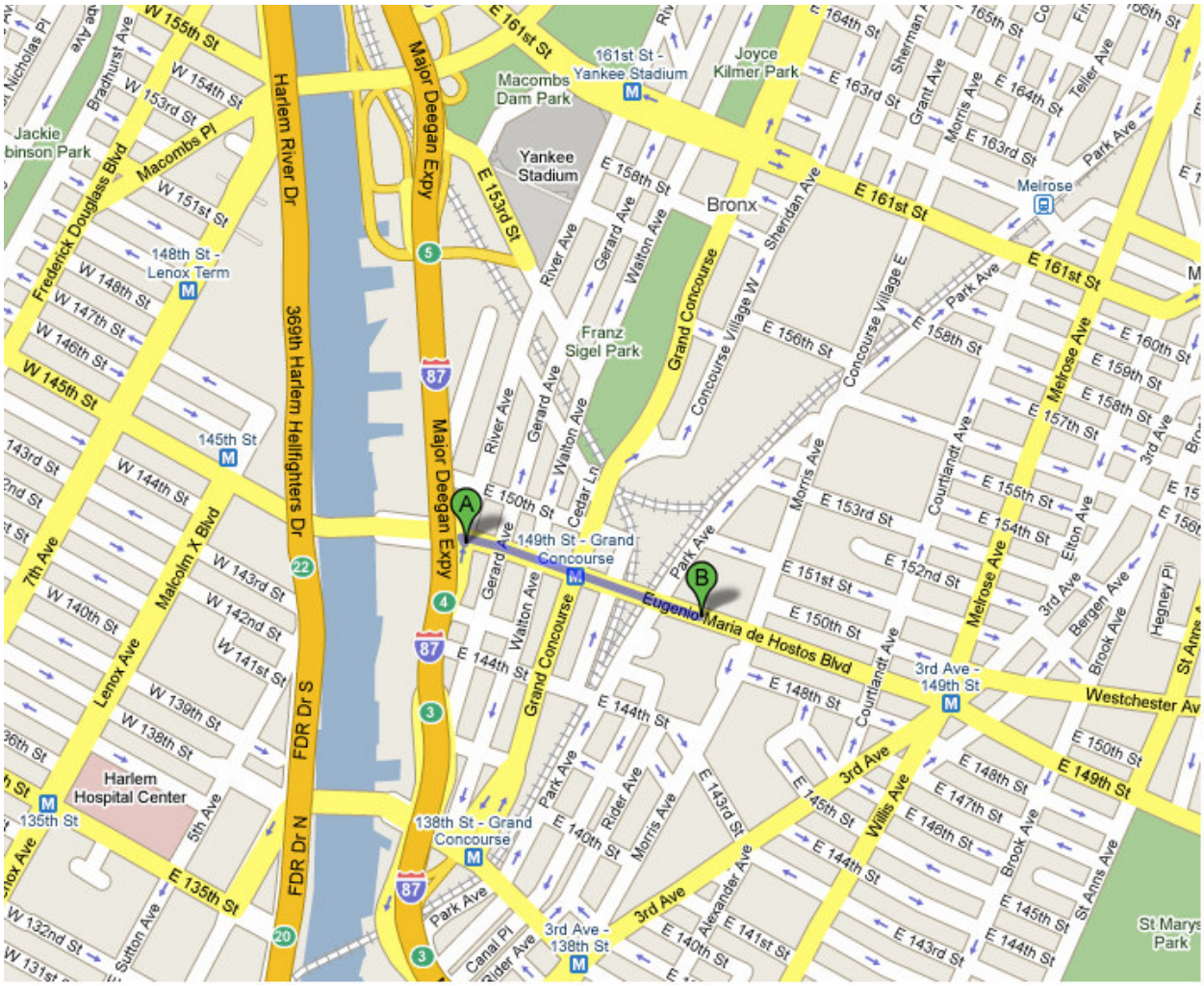
Site Location: 49 Bronx Terminal Market, Bronx, New York

Hospital Name: Lincoln Hospital

Hospital Location: 234 East 149th Street, Bronx, New York 10451

Hospital Telephone: (718) 993-3860

Figure 1 - Map showing route from the Gateway Center Site to the hospital.



Directions to the Hospital

Directions from the Site, located at 49 Bronx Terminal Market, Bronx, New York, to Lincoln Hospital, located at 234 East 149th Street, Bronx, New York:

1. Head east on East 149th Street towards Gerard Avenue approximately 0.30 miles
2. Hospital is on the south side of East 149th Street.

Total Distance: 0.30 miles

Total Estimated Time: approximately 1 minute

1.2 Emergency Contacts

In the event of any situation or unplanned occurrence requiring assistance, the appropriate contact(s) should be made from the list below. For emergency situations, contact should be made with the Field Team Leader (FTL) or designee, and the Field Health & Safety Officer (HSO) as soon as possible, after notifying the appropriate emergency personnel who will then contact the appropriate response teams. This emergency contacts list must be in an easily accessible location at the site.

- Medical, Fire, and Police: 911
- One Call Center: (800) 272-4480 (3 day notice required for utility markouts)
- Poison Control Center: (800) 222-1222
- Pollution Toxic Chemical Oil Spills: (800) 424-8802
- Lincoln Hospital: (718)-993-3860

1.3 Langan Contacts

Program Manager:	Joel Landes, P.E.	(212) 479-5404
Project Manager:	Jason Hayes	(212) 479-5423 (917) 859-4908
Corporate Health & Safety Officer (CHSO):	Robert Koto, P.G.	(201) 398-4566
Field Health & Safety Officer (HSO):	Doane Cafferty	(917) 882-7164
Health & Safety Coordinator (HSC):	Tarek Khouri	(201) 913-4325

2.0 INTRODUCTION

2.1 General

This Health and Safety Plan (HASP) has been developed by Langan Engineering and Environmental Services, Inc. (Langan) to comply with Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.120(b)(4), *Hazardous Waste Operations and Emergency Response*. The HASP addresses the potential for intrusive development activities beneath the Site-wide cap in accordance with the Site Management Plan (SMP) at the Gateway Center at Bronx Terminal Market (Gateway Center), New York, New York. Contractors and all subcontractors for the Gateway Center project are required to implement their own site-specific HASP that at a minimum meets the requirements of this HASP.

2.1.1 Site Location and Background

The Gateway Center (the Site) is located in the West Haven neighborhood in Bronx, New York. The 16.5 acre Site and adjacent properties have a long history of commercial and industrial use. The Site is owned by the City of New York and leased to BTM Development Partners, LLC (BTMDP). Construction of the existing Bronx Terminal Market buildings began in the 1920s and was completed in the mid 1970s. The former BTM buildings were demolished as part of the development of the Gateway Center.

As part of the development, BTMDP (the Developer) entered into a Brownfield Cleanup Agreement (BCA) Index No. W2-1034-04-11, Site No. C203015 with the New York State Department of Environmental Conservation (NYSDEC) in December 2004, to investigate and, where necessary, remediate a 16.5-acre parcel that is part of a larger, 85-year old, 34-acre industrial and commercial use area known as the Bronx Terminal Market (BTM).

The development is a retail use project that includes approximately 957,000 gross square feet of retail establishments and 2,600 parking spaces in a multi-level parking garage and at-grade parking.

2.1.2 Description of Tasks

This HASP pertains to all future intrusive activities at the Site in accordance with the SMP that are either construction-related or related to any activity that will breach the

Site-wide cap. This includes the removal of any undocumented underground storage tanks (UST), if discovered, during the course of said future intrusive activities.

3.0 IDENTIFICATION OF KEY PERSONNEL

3.1 Health and Safety Personnel

The following briefly describes the health and safety (HS) designations and general responsibilities which may be employed for future intrusive activities. The titles have been established to accommodate the Site needs and requirements in order to insure the safe conduct of on-site work. The number and type of HS personnel for a given work location is to be based upon the particular HS requirements relative to the proposed site activities or operations.

3.1.1 Langan Program Manager

The Langan Program Manager is Joel Landes. Mr. Landes is the NYSDEC-designated Remediation Engineer, and as such, was responsible for the remedial program as described in the FER, including the implementation of this HASP. The Program Manager is also responsible for the preparation of the SMP and this HASP.

3.1.2 Langan Project Manager

The Langan Project Manager (PM) is Jason Hayes. The PM's HS responsibilities include:

1. Ensuring that this HASP is developed and approved prior to on-site activities;
2. Monitoring future intrusive tasks completed by Langan for performance in a manner consistent with Langan's corporate comprehensive *Health and Safety Program for Hazardous Waste Operations* and this HASP, and resolving any discrepancies that arise.

3.1.3 Langan Corporate Health and Safety Manager

The Langan Corporate Health and Safety Manager (HSM) is Robert Koto, P.G. The HSM's responsibilities include:

1. Serving as a resource in the development and implementation of HASPs;
2. Reviewing and approving HASPs;
3. Reviewing results of Jobsite Safety Inspections;

4. Approving updated changes to HS Program for Hazardous Waste Operations;
5. Providing guidance and serving as a resource to the Langan Health and Safety Coordinator (HSC).

3.1.4 Langan Health and Safety Officer (HSO)

The Langan Health and Safety Officer (HSO) is Doane Cafferty. The HSO's responsibilities for Langan operations include:

1. Updating this HASP as dictated by the availability of more recent and detailed plans, changing job conditions, jobsite inspection results, and for other relevant reasons that come up during the course of the project.
2. Operating and maintaining the air monitors required for the Community Air Monitoring Program implemented by Langan.
3. Conducting Jobsite Safety Inspections (provided as Appendix A) and correcting any shortcomings in a timely manner.
4. Helping to select proper PPE (Personal Protective Equipment) and periodically inspecting the PPE.
5. Ensuring that PPE is properly stored and maintained.
6. Controlling ingress to and egress from any intrusive work areas of the Site.
7. Checking each team member's suitability for work based on a current physician's recommendation
8. Monitoring the work parties for signs of stress, such as heat stress, fatigue, and cold exposure
9. Monitoring Site hazards and conditions
10. Informing all site personnel of emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department
11. Resolving conflicting in consultation with the HSM situations that may arise concerning safety requirements and working conditions

3.1.5 Health and Safety Coordinator (HSC)

The Langan Health and Safety Coordinator (HSC) is Tarek Khouri, P.E. The HSC's responsibilities for Langan operations include:

1. Assisting HSO with updating the HASP;
2. Assisting HSO conduct Jobsite Safety Inspections and assisting with the corrections of shortcomings found;
3. Coordinating the activities of the general contractor and subcontractors in their HASP responsibilities;
4. Insuring training requirements are satisfied in a timely manner;
5. Insuring medical evaluations of Langan personnel are current;
6. Maintaining all records on personnel (medical evaluations results, training and certifications, accident investigation results).

3.2 Contractor Responsibilities

The Contractor and all subcontractors involved with any intrusive activities must adhere to applicable OSHA regulations, and shall develop and comply with their own HASP which shall be at least as stringent as this HASP. The Contractor's HSO shall inform subcontractors of the Site emergency response procedures and any potential fire, explosion, health, safety, or other hazards that have been identified. The Contractor HSO shall inform subcontractors of observed activities that do not meet the elements of this HASP or the HASP that the Contractor developed.

4.0 TASK AND OPERATION SAFETY AND HEALTH RISK ANALYSES

This section provides an assessment of the general hazards that may be encountered during field work activities through a task-by-task risk analysis. Potential hazards generally categorized as chemical exposure and physical hazards are addressed below.

4.1 Chemical Exposure Hazards

The Bronx Terminal Market is contaminated generally by historic fill and, in localized locations, by petroleum-contaminated soil. The Site's soil, groundwater, and soil vapor are contaminated by volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals. The primary contaminants of concern (COCs) targeted as part of the remedial action are listed in Table 1. This table also includes summarized information on the exposure limits, routes of exposure, effects and first aid. The Material Safety Data Sheets (MSDSs) include additional detail. The MSDSs for these compounds are attached in Appendix B

4.2 Physical Hazards

Physical hazards which may be encountered during Site operations for this project may include:

1. Biological (poisonous plants, insects, animals, infectious wastes, etc.);
2. Safety (slip, trip, and fall hazards, hand and power tools, heavy machinery, etc.);
3. Electrical (overhead powerlines, downed electrical wires, buried cables, electrical equipment, etc.);
4. Fire and explosion (from moving drums, mixing incompatible chemicals, introducing an ignition source;
5. Heat stress (major hazard from wearing protective equipment);
6. Cold exposure (low temperatures and wind chill and impaired ability to work are the dangers);
7. Noise (heavy equipment being the main source).

4.3 Task-By-Task Risk Analysis

Hazards that are potentially present have been determined for each specific task described in Section 1.3. Table 1 provides a summary of chemical exposure and

physical hazards that could potentially be encountered by personnel during each task effort.

4.3.1 Soil and Fill Removal and Sampling

The following hazards are associated with the removal of the targeted soil and fill:

1. Heavy excavation equipment (impact hazard to on-foot workers)
2. Open excavations (fall and cave-in hazard)
3. Uneven land surface (slip and trip hazard)
4. Contaminated media (chemical exposure hazard)
5. Exposure to potential simple asphyxiant (if working in a confined-space like conditions)
6. Potential explosive hazard

4.3.2 Groundwater Removal and Sampling

The following hazards are associated with the removal and sampling of contaminated groundwater:

1. Splash hazards (eye hazard)
2. Contaminated groundwater (chemical exposure hazard)
3. Potential exposure to pump components (electrical and mechanical hazard)

4.3.3 UST Closure

The following hazards are associated with the closures of undocumented USTs (if encountered):

1. Potential exposure to confining spaces (confined space hazard)
2. Potential for explosive of flammable conditions (explosive hazard)
3. Other hazards associated with the removal of the targeted fill and soil

4.3.4 Soil Backfill

The backfilling of the excavated areas have similar hazards as those associated with the removal of the targeted fill and soil.

5.0 SAFETY AND HEALTH RISK PREVENTIVE MEASURES

This section provides preventive measures to protect against the hazards that were identified in the previous section.

5.1 Chemical Hazards

Potential contaminants in the soil, groundwater, and soil vapor that exceed regulatory limits that may be encountered while conducting Site activities include SVOCs, VOCs, and metals.

Of the listed VOC COCs, benzene has the lowest Permissible Exposure Limit (PEL) as set by OSHA and hence sets the action limit for monitoring with a PID. In the absence of benzene a second PEL is used as described in Section 8.3. Other COCs will be indirectly monitored with dust meters, should dust be visibly generated, and the actions levels will be individually set for each excavation below the site cap. The action levels for all the monitored COCs are described in Section 8.3. Engineering controls such as localized ventilation, wetting, and altering the work method and pace will be used to maintain the working conditions below the set action levels.

The site's COCs could pose significant health threats if ingested. Therefore, personnel will not be allowed to eat in the work area and must wash their hands after they come into contact with contaminated soil and before leaving the site. Onsite personnel will make efforts to work upwind of the excavations and potential contaminated materials brought to the surface.

In addition to the COCs detected onsite, some of the solvents used in decontamination of equipment are potentially hazardous to human health if they are not used properly. Material Safety Data Sheets for substances that will be used on site and a select number of site contaminants are included in Attachment B of this HASP. Any substances brought on-site that are not included in this attachment will be added. All site personnel will be briefed on the added MSDS.

It is anticipated that dust, odors, and VOCs during future intrusive activities will not be a problem. Engineering controls such as localized ventilation, wetting, and altering the work method and pace will be used to maintain the working conditions safely within Level D conditions.

5.2 Physical Hazards

5.2.1 Biological Hazards

During Site operations, animals such as dogs, pigeons, sea gulls, mice, and rats may be encountered. Workers will use discretion and avoid all contact with animals. Bites and scratches from dogs can be painful and if the animal is rabid, the potential for contracting rabies exists. Contact with rat and mice droppings may lead to contracting hantavirus. Inhalation of dried pigeon droppings may lead to psittacosis; crytococcosis and histoplasmosis are also diseases associated with exposure to dried bird droppings but these are less likely to occur in this occupational setting.

Insects may be present at this Site. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition. In addition, mosquito bites may lead to St. Louis encephalitis or West Nile encephalitis. Personnel that have been bitten or stung by an insect at the Site should notify the HSO or HSC of such immediately. The following is a list of preventive measures:

1. Apply insect repellent prior to fieldwork and as often as needed throughout the shift;
2. Wear proper protective clothing (work boots, socks and light colored pants);
3. Field personnel who may have insect allergies (e.g., bee sting) should provide this information to the HSO or FSO prior to commencing work.

The HSO or HSC will instruct the project personnel in the recognition and procedures for encountering potentially hazardous insects at the Site.

5.2.2 General Safety

Slips, Trips and Fall Hazards. Care should be exercised when walking across the Site, especially when carrying equipment. The presence of surface debris, uneven surfaces, facility equipment, and soil piles may contribute to tripping hazards.

Hand and Power Tools. To complete the various tasks for the project, personnel may utilize hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Ground Fault Circuit Interrupters (GFCIs) are required for all portable electric tools.

Working near Heavy Machinery. Care should be exercised when working near heavy machinery such as the excavators. Workers should always stay in view of the equipment operator; give equipment wide berth. Clear communications signals, including hand signals, should be established prior to commencement of work and the equipment should have a back-up alarm.

Lifting. Improper lifting and carrying of equipment and materials and shoveling soil may cause strains. Safe lifting and general material handling techniques should be exercised.

Falling Hazards. Soil material, crushed stone, tools, etc. may fall from power shovels, front-end loaders, etc. Hard hats are to be worn at all times while in work zones.

Vehicle Hazards. Vehicle access to the Site will be via two entrances and one exit from Exterior Street, an important access road for the Major Deegan Expressway. Care should be taken when working on-Site and be aware of surroundings at all times. When working near vehicular traffic or work zones, attempt to keep eye contact with the machine operators.

Electrocution and Fire Hazards. Prior to the start of any intrusive field work, the location of underground utilities will be clearly marked out by the subcontractor responsible for the excavation. Before excavation, appropriate calls will be placed to One Call (phone number is listed in Section 1.2) and appropriate geophysical surveys completed to identify buried utilities. Potential adverse effects of electrical hazards include burns and electrocution, which could result in death.

Hearing Loss Prevention. Work activities during the intrusive and construction activities may be conducted at locations with high noise levels from the operation of equipment. Hearing protection will be used as necessary.

5.2.3 Heat Stress Prevention

The use of Level C protective equipment, or greater, may create heat stress. Monitoring of personnel wearing personal protective clothing should commence when the ambient temperature is 72°F or above. Table 2 presents the suggested frequency for such monitoring. Monitoring frequency should increase as ambient temperature increases or as slow recovery rates are observed.

Refer to the Table 3 to assist in assessing when the risk for heat related illness is likely. To use this table, the ambient temperature and relative humidity must be obtained (a regional weather report should suffice). Heat stress monitoring should be performed by

the HSO, who shall be able to recognize symptoms related to heat stress. However, Site workers should be trained to be able to prevent and identify symptoms of heat stress. Should heat become a severe problem, work should be stopped unless engineering controls are established. This will be determined by the HSO. The following are some heat-related disorders and their symptoms:

1. Prickly Heat (Heat rash);
2. Painful, itchy red rash. Occurs during sweating, on skin covered by clothing;
3. Heat Cramps;
4. Painful spasm of arm, leg or abdominal muscles, during or after work;
5. Heat Exhaustion;
6. Headache, nausea, dizziness. Cool, clammy, moist skin. Heavy sweating. Weak, fast pulse. Shallow respiration, normal temperature;
7. Heat Fatigue;
8. Weariness, irritability, loss of skill for fine or precision work. Decreased ability to concentrate. No loss of temperature control;
9. Heat Syncope (Heat Collapse);
10. Fainting while standing in a hot environment;
11. Heat Stroke;
12. Headache, nausea, weakness, hot dry skin, fever, rapid strong pulse, rapid deep respirations, loss of consciousness, convulsions, coma. This is a life threatening condition.

Do not permit a worker to wear a semi-permeable or impermeable garment when they are showing signs or symptoms of heat-related illness. The following technique may be used as a screening mechanism to monitor the worker wearing impervious clothing:

Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.

1. If the heart rate exceeds 100 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.
2. If the heart rate still exceeds 100 beats per minute at the next rest period, shorten the following work cycle by one-third. A worker cannot return to work after a rest period until their heart rate is below 100 beats per minute.

Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking):

1. If oral temperature exceeds 99.6oF (37.6oC), shorten the next work cycle by one-third without changing the rest period. A worker cannot return to work after a rest period until their oral temperature is below 99.6oF.
2. If oral temperature still exceeds 99.6oF (37.6oC) at the beginning of the next rest period, shorten the following cycle by one-third.
3. Do not permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6oF (38.1oC).

Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

1. Adjust work schedules;
2. Mandate work slowdowns as needed;
3. Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided;
4. Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.

Another important preventive measure is to maintain body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:

1. Maintain water temperature 50o to 60oF (10o to 16.6oC).
2. Provide small disposal cups that hold about four ounces (0.1 liter).
3. Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
4. Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break.

5.2.4 Cold-Related Illness Prevention

If the intrusive construction work continues in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally called frostbite.

Hypothermia is defined as a decrease in the patient core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interference with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include: shivering, apathy, listlessness, sleepiness, and unconsciousness.

Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20°F. Symptoms of frostbite are: a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid. To prevent cold-related illness the following procedures should be adhered to:

1. Educate workers to recognize the symptoms of frostbite and hypothermia;

2. Identify and limit known risk factors;

3. Assure the availability of enclosed, heated environment on or adjacent to the Site;

4. Assure the availability of dry changes of clothing;

5. Assure the availability of warm drinks;

6. Start (oral) temperature recording at the job Site;

7. At the HSO's discretion when suspicion is based on changes in a worker's performance or mental status;

8. At a worker's request;

9. As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20°F, or wind-chill less than 30°F with precipitation);

10. As a screening measure whenever any one worker on the Site develops hypothermia;

11. Any person developing moderate hypothermia (a core temperature of 92°F) cannot return to work for 48 hours.

5.3 Task Hazard-Specific Precautions

5.3.1 Soil and Fill Removal and Sampling

Operating mechanical equipment pose the greatest danger to the Site workers. Site workers in the vicinity of operational machinery should always be aware of their surroundings and should attempt to be within the operator's line of sight as much as possible.

The excavations will likely create holes, uneven land surfaces and other tripping hazards across the Site. Site workers need to be aware at all times where they are standing or walking over to prevent falling into pitfalls or tripping. In addition, to the extent possible pathways should remain clear of debris and equipment. Site workers need to be aware of the stability of the slopped areas to avoid becoming trapped by failing slopes. Site workers will be required at a minimum to wear Level D PPE, as described in Section 9, to protect Site workers from the physical hazards found on-Site.

Site workers can be exposed to the contaminated soil via dermal absorption, inhalation, and ingestion. Level D PPE should be sufficient for most of the Site to prevent dermal absorption. Those Site workers whose activities involve direct contact with contaminated soil will be given Tyvek outerwear, gloves, and other appropriate PPE for those tasks.

The inhalation risk shall be controlled by adhering to the community air monitoring plan (CAMP) and taking immediate action after the air quality degrades past selected parameters. Ingestion will be controlled by not allowing workers to eat in the work zones and by providing hand wash stations at all break areas, entrances and exits.

5.3.2 Groundwater Treatment and Sampling

Groundwater will be appropriately treated if it needs to be pumped out of the excavations during construction activities and exceeds NYSDEC ambient water quality standards and if groundwater. Site workers involved with groundwater treatment are required to use appropriate glove and eye protection PPE. Tyvek outerwear may also be issued if there is potential for extensive splashing.

The Site Management Plan anticipates groundwater samples will be taken from the two existing monitoring wells on Exterior Street, quarterly for a two year period. Sampling and treatment shall be performed, at a minimum, with nitrile gloves in addition to the required Level D PPE.

5.3.3 UST Closure

If an undocumented UST is encountered during the course of intrusive construction activities, all guidance regarding UST closure and removal shall be adhered to. It is not anticipated that the closure and removal of the USTs will require confined space entries by Langan employees. If a confined space entry is required, the project manager shall be informed. Only trained and properly equipped personnel shall make the entry and tanks under an approved plan that complies with applicable confined space regulation. Tanks should be cleaned and made safe using approved methods and tested with an oxygen or explosion meter in accordance with guidance documents before being moved.

Soil end-point sampling is integral to the UST closure process. Although not anticipated, groundwater sampling might also be required. Personnel are required to wear nitrile gloves (or equivalent) while collecting samples. Samples shall be collected by the excavator or a shovel in order to avoid entering the excavation, where possible.

5.3.4 Carbon Monoxide

If intrusive work is to be performed at an indoor location, adequate ventilation will be provided as necessary to reduce potential exposure via inhalation of vapors from the subsurface and exhaust from the mechanical equipment and support vehicles. Windows and entrances will be left open where possible. If necessary, fans will be used or the drill rig exhaust will be ducted to the outside, and whenever possible through building sides located interior to the property.

A carbon monoxide (CO) meter will be used to monitor the build up of exhaust gas in the vicinity of the work area inside the buildings. If the CO action level is triggered, work will cease and all employees within the potential affected area will be evacuated until adequate mechanical ventilation can be setup to control the hazard. Even if the building is well ventilated and the work area is ducted to the outside, a CO meter is still required.

5.3.5 Backfill Operations

It is anticipated that the source of all structural backfill will come from on-Site soil and recycled, crushed building material obtained from the demolished buildings. All precautions specified for fill and soil removal and sampling apply. In addition, all candidate fill will be sampled to confirm its reusability. Personnel are required to wear nitrile gloves (or equivalent) while collecting these samples.

5.4 Safe Work Practices

The standing orders (safe work practices that shall be followed while on Site) are listed in Table 4. Many are common sense in nature. The Site HSO has the responsibility for enforcing these practices which are posted prominently at the Site, or are made available to personnel. Actions not in accordance with the standing orders shall be corrected.

6.0 PERSONNEL TRAINING

6.1 Basic Training

Completion of an initial 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training program (or its equivalent) as detailed in OSHA's 29 CFR 1910.120 (e) is required for all employees who will perform work in areas where the potential for a toxic exposure exists. Annual 8-hour refresher training is also required to maintain competencies to ensure a safe work environment. In addition to these training requirements, supervisory personnel must also receive 8 additional hours of specialized management training. Training records are maintained by the HSC.

6.2 Site-Specific Training

Training will be provided that will specifically address the activities, procedures, monitoring, and equipment for the Site operations. It will include Site and facility layout, hazards, and emergency services at the Site, and will detail all the provisions contained within the HASP. Specific issues that will be addressed include the hazards described in Section 4.0.

6.3 Safety Briefings

Project personnel will be given briefings by the Site HSO on a daily or as-needed basis to further assist Site personnel in conducting their activities safely. Briefings will be provided when new activities are to be conducted, changes in work practices must be implemented due to new information made available, or if Site or environmental conditions change. Briefings will also be given to facilitate conformance with prescribed safe practices when performance deficiencies are identified during routine daily activities or as a result of jobsite safety inspections. A safety briefing form is included in Appendix C.

6.4 CPR and Basic First Aid Training

The HSO will endeavor to have at least one individual on-Site, trained and certified to administer cardiopulmonary resuscitation (CPR) and basic First Aid (see Section 11.5). This training will be consistent with the requirements of the National Safety Council. Copies of training certificates are maintained by the HSC.

6.5 Confined Space Entry Training

It is not anticipated that confined space entries by Langan employees will be required for future intrusive action. Confined space work that may be performed by other contractors shall be in accordance with a plan outlining controls and methods consistent with Federal, State and Local regulation. Training consistent with OSHA 29 CFR 1910.146(g-j), *Permit-required Confined Spaces*, is required of all personnel before engaging in permit-required confined space entry operations. Copies of training certifications are maintained by the HSC.

7.0 MEDICAL SURVEILLANCE

All personnel who will be performing field work involving potential exposure to toxic and hazardous substances will be required to have passed an initial baseline medical examination, with annual follow-up medical exams thereafter, consistent with OSHA regulations. Medical evaluations will be performed by, or under the direction of, a physician board-certified in occupational medicine. Results of medical evaluations are maintained by the HSC.

Those personnel who may be required to perform work while wearing a respirator must receive medical clearance to do so, consistent with 29 CFR 1910.134(e), *Respiratory Protection*. Again, medical evaluations will be performed by, or under the direction of, a physician board-certified in occupational medicine.

8.0 ODOR, VAPOR, AND DUST MONITORING AND RESPONSE

8.1 General

Intrusive construction activities will be monitored for visible dust and odors by field inspectors. Continuous monitoring for VOCs and dust and is required for all ground intrusive activities such as soil excavation and handling activities on the perimeter of the work zones. The work zone is defined as the general area in which machinery is operating in support of intrusive construction activities. Periodic monitoring for VOCs will be required during non-intrusive activities such as soil and groundwater sampling. Specific responses to protect site workers and the community are detailed in the following subsections.

The Contractor will provide the monitoring equipment for the Community Air Monitoring Plan (CAMP) and site worker monitoring. Contractor and sub-contractor site worker monitoring will be the responsibility of the respective contractor. The Contractor will be responsible for operating and maintaining the odor, vapor, and dust monitoring equipment, as required. Monitoring equipment for dust will be required if visible emissions are observed. The HSO shall obtain other types of monitoring equipment as necessitated by the field conditions. The HSO shall notify the Contractor if levels exceed the CAMP's limits for odor, VOC, or dust.

Table 5 summarizes the likely types of monitoring equipment that will required by the CAMP and Langan site worker monitoring program. Calibration logs are included in Appendix D and air monitoring records are included in Appendix E.

8.2 Community Air Monitoring Program

This CAMP was developed in accordance with the NYSDOH Generic Community Air Monitoring Plan.

8.2.1 VOC Monitoring, Response Levels, and Actions

VOCs must be monitored at the downwind perimeter of an active work zone on a continuous basis during intrusive construction activities until the ground is completely re-capped with clean soil or impervious barrier (site cap). Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to the known VOC contaminants on the Site. This equipment should be calibrated daily and should be capable of calculating 15-minute running averages. All 15-minute readings will be recorded and be available for State personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded. The measured 15-minute averages will be compared to the levels below:

1. If the ambient air concentration of total VOCs at the downwind perimeter of the work area exceeds 5 parts per million (ppm) above background for the 15 minute average, work activities must be halted until the levels readily decreases below 5 ppm (per instantaneous readings).
2. If the total VOCs at the downwind perimeter of the work area persist at levels in excess of 5 ppm over background but less than 25 ppm, work must be halted. The source of vapors must be identified and corrective actions must be taken to abate the emissions. Work activities can only resume provided that the concentration is less than 5 ppm over a 15 minute average period.
3. If the total VOC level is above 25 ppm at the perimeter of the work area, all activities must be shut down and work methods and controls will be re-evaluated.

8.2.2 Particulate Monitoring, Response Levels, and Actions

Dust or particulate concentrations should be monitored continuously at the upwind and downwind perimeters at the site perimeter and active work zones. The particulate monitoring should include observation for visible emissions. If visible emissions are observed, dust monitoring shall be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and

capable of integrating over a period of 15 minutes or less for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities. All readings will be recorded and be available for state personnel review. Corrective action is determined by the following levels, considering visible emissions have been observed:

1. If the downwind PM-10 at a site perimeter location is 100 micrograms per cubic meter (µg/m3) greater than background for the 15 minute period of if airborne dust is observed at the site perimeter from excavation activity, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that the downwind PM-10 particulate level does not exceed 150 µg/m3 above the upwind level and provided that no visible dust is migrating from the excavation work area.
2. If, after implementing dust suppression techniques, downwind PM-10 particulate levels are greater than 150 µg/m3 above the upwind level, work must be stopped and re-evaluation of work activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 µg/m3 of the upwind level and in preventing visible dust migration.

8.3 Site Worker Operating Conditions

All action levels that are shown below are based on 15-minute averages.

8.3.1 Level D

Engineering controls will be used to keep working conditions at this level.

- VOCs where benzene is not present <25 ppm
- Benzene <1 ppm
- Nuisance Dust <15 ppm from excavation areas; No visible fugitive dust
- Methane <0.5%

8.3.2 Level C

If Level C conditions are encountered, work will stop and engineering controls will be implemented and work methods will be altered to resume work under Level D conditions. If this is not feasible, appropriate PPE will be provided if short term work must occur at the specified levels.

- Benzene: 1 to <5 ppm
- VOCs where benzene is not present 25 to <500 ppm
- Nuisance Dust >15 mg/m^3 from excavation areas

8.3.3 Level B

Level B work is not anticipated for the Site. Appropriate PPE will be provided if short term work must occur at the specified levels.

- Benzene: >5 ppm
- VOCs where benzene is not present >500 ppm
- Nuisance Dust >15 mg/m^3 from excavation areas
- Methane >0.5%
- Oxygen <19.5%

9.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE must protect workers from the specific hazards they are likely to encounter on-site. Selection of the appropriate PPE must be taken into consideration: (1) identification of the hazards or suspected hazards; (2) potential exposure routes; and (3) the performance of the PPE construction (materials and seams) in providing a barrier to these hazards. Based on anticipated site conditions, engineering controls and the proposed work activities to be performed at the Site, Level D Protection should be used. The decision to modify standard PPE will be made by the Site HSO after conferring with the PM and the HSC. The levels of protection are described below.

9.1 Level D Protection

1. Safety glasses with side-shields or chemical splash goggles if a splash hazard is present
2. Safety boots/shoes (toe-protected)
3. Hard hat
4. Long sleeve work shirt and work pants
5. Nitrile gloves
6. Hearing protection (as needed)
7. Traffic vest (if working or adjacent to roadway)
8. Coveralls (Tyvek or equivalent) if extensive splashing or contaminated media is expected

9.2 Level C Protection

1. Full or half mask respirator, air-purifying, cartridge-equipped, NIOSH approved respirator suitable for the compound of concern
2. Inner (latex) and outer (nitrile) chemical resistant gloves;
3. Chemical-resistant safety boots/shoes (toe-protected);
4. Hard hat;
5. Long sleeve work shirt and work pants;
6. Coveralls (Tyvek or equivalent);
7. Hearing protection (as needed);
8. Traffic vest (if working on or adjacent to roadway);

9.3 Level B Protection

1. Pressure-demand, full-face piece, NIOSH-approved SCBA or pressure-demand supplied-air respirator with escape SCBA;
2. Inner (latex) and outer (nitrile) chemical resistant gloves;
3. Chemical-resistant safety boots/shoes (toe-protected);
4. Hard hat;
5. Long sleeve work shirt and work pants;
6. Coveralls (Tyvek or equivalent);
7. Hearing protection (as needed);
8. Traffic vest (if working out or adjacent to roadway).

9.4 Level A Protection

1. Pressure-demand, full-face piece, NIOSH approved SCBA or pressure-demand supplied air respirator with escape SCBA;
2. Fully encapsulating, chemical-resistant suit;
3. Inner (latex) and outer (nitrile) chemical-resistant gloves;
4. Chemical-resistant safety boots/shoes (toe-protected);
5. Hard hat;
6. Coveralls (Tyvek or equivalent);
7. Hearing protection (as needed);
8. Traffic vest (if working on or adjacent to roadway);

10.0 SITE CONTROL

10.1 Site Communication Plan

Verbal communication will be the primary method of communication used at the Site during the intrusive construction work. Cell phones shall be used to the extent practical by field teams for communication between downrange operations and the command post base station. The HSO's cell phone number shall be made available to all site workers. In the instances where verbal communication cannot be used hand signals will be used. It may also be necessary to use these signals when working around noisy heavy equipment. Hand signals will be covered during Site-specific training. Hand signals and their message:

Hand Signal	Meaning
Hand gripping throat	Out of air; cannot breathe
Grip partners wrists or place both hands around waist	Leave immediately without debate
Hands on top of head	Need assistance
Thumbs up	OK; I'm alright; I understand
Thumbs down	No; negative
Simulated "stick" break with fists	Take a break; stop work

10.2 Work Zones

The need to formally establish work zones during Site activities shall be determined by the HSO.

10.2.1 Hot Zone

Hot Zones will be established 25 feet from each planned excavation extent. All personnel within the hot zone must don the appropriate levels of personal protection as set forth by the FSO. It is not anticipated that Level C or higher will be required for this Site. All personnel within the hot zones will be required to use the specified level of protection. No food, drink, or smoking will be allowed in the warm or hot zones (described below).

10.2.2 Warm Zone

A Warm Zone will be established and utilized during the field activities. This zone will be established between the hot zone and the cold zone, and will include the personnel and equipment necessary for decontamination of equipment and personnel exiting the hot zone. Personnel and equipment in the hot zone must pass through this zone before entering the cold zone. This zone should always be located upwind of the hot zone.

10.2.3 Cold Zone

The Cold Zone will include the remaining areas of the job Site. Break areas and support facilities (include equipment storage and maintenance areas) will be located in this zone. No equipment or personnel will be permitted to enter the cold zone from the hot zone without passing through the decontamination station in the warm zone. Eating, smoking, and drinking will be allowed only in this area.

10.3 The Buddy System

When working in teams of two or more, workers will use the "buddy system" for all work activities, particularly for work performed in the hot zones, to ensure rapid assistance can be provided in the event of an emergency. This requires work groups to be organized such that workers can remain close together and maintain visual contact with each other. Workers using the "buddy system" have the following responsibilities:

1. Provide his or her partner with assistance when needed;
2. Observe his or her partner for signs of chemical or heat exposure;
3. Periodically check the integrity of his or her partner's PPE;
4. Notify the HSO or other Site personnel if emergency service is needed.

10.4 Site Security

The Contractor is responsible for designing and implementing a Site control program. Once the program is designed, this section will be updated with the pertinent information. The Site control program will:

1. Reduce the spread of contaminated material from the Site;
2. Identify and isolate contaminated source and stockpile areas;
3. Assist emergency evacuation and medical care ;
4. Prevent unauthorized entry to the Site; and,
5. Deter vandalism and theft.

11.0 DECONTAMINATION PLAN

11.1 General

All personnel, clothing, equipment, and samples leaving the contaminated area of the Site should be decontaminated. Contamination prevention and decontamination for this operation is achieved through physical removal and chemical detoxification, disinfection or sterilization including, but not limited to:

1. removal of disposable outer garments (e.g. Tyvek)
2. Work habits that minimize contact with wastes
3. Disposable equipment use, where appropriate
4. Immediately washing exposed areas

Standard decontamination procedures that will be used are described in Appendix F.

The Contractor is responsible for developing a decontamination disposal plan that includes the proper disposal of all disposable contaminated equipment, spent solutions, and decontamination water.

12.0 EMERGENCY RESPONSE

12.1 General

Because of the hazards that may be present at the Site, and the conditions under which operations are conducted, it is possible that an emergency situation might develop. Emergency situations can be characterized as injury or chemical exposure to personnel; fire or explosion; environmental release; or serious weather conditions.

12.2 Responsibilities

Site Emergency Coordinator - The HSO, HSC, or other appropriate person will serve as the Site Emergency Coordinator and shall implement emergency procedures whenever conditions warrant such action. The Site Emergency Coordinator will be responsible for assuring the evacuation, emergency treatment, emergency transport of Site personnel, and notification of emergency units and the appropriate management staff. Emergency response instructions will be provided by the HSO as part of every employee's training prior to the start of work.

Site Workers – All workers who are contracted to work on the Site must become familiar with emergency response procedures for the Site.

12.3 Evacuation

In the event of an emergency situation, an air horn or vehicle horn will be sounded three (3) times indicating the initiation of evacuation procedures. All personnel will evacuate and assemble outside the nearest of the three access gates along Exterior Street. No one, except the emergency responders, will be allowed to proceed into the area once the emergency signal has been given. The Site Emergency Coordinator will ensure that access for emergency equipment is provided and that all sources of combustion (e.g. operation machinery, etc.) have been shut down once the alarm has been sounded. Wind direction will be taken into consideration for emergency plans. Evacuation plans will be discussed at the initial Site-Specific training and as needed at the regular safety briefings.

In all situations, when an on-site emergency results in an evacuation, personnel shall not re-enter until:

1. The conditions resulting in the emergency have been corrected
2. The hazards have been re-evaluated
3. This HASP has been reviewed
4. Site personnel have been briefed on any changes to this HASP

12.4 Emergency Contacts/Notification System

The fire department and other emergency response group will be notified by telephone of the emergency as soon as possible. Emergency telephone numbers list is found at the beginning of this HASP. The list is also posted prominently at the Site, or made readily available to all personnel all of the time.

12.5 Personal Injury

The Contractor shall check that some site workers have current training in first aid and CPR. In case of personal injury at the site, the following procedures should be followed:

1. Another team member (buddy) should signal the Field Team Leader that an injury has occurred.
2. A field team member trained in first aid can administer treatment to an injured worker.
3. If necessary, the victim should then be transported to the nearest hospital or medical center. If necessary, an ambulance should be called to transport the victim.
4. For less severe cases, the individual can be treated with contents of the first-aid kit.

The Field Team Leader or HSO is responsible for verifying that an Accident Report Form is completed. Follow-up action should be taken to correct the situation that caused the accident. Any incident (near miss, property damage, first aid, medical treatment, etc.) must be reported and evaluated. A first-aid kit will be kept on-Site during the field activities.

Personnel Exposure – Emergency first aid procedures to be followed are:

1. Skin Contact: Use copious amounts of soap and water. Wash/rinse affected areas thoroughly, and then provide appropriate medical attention. Rinse eyes with water for at least 15 minutes.
2. Inhalation: Move to fresh air and/or, if necessary, decontaminate and transport to hospital.
3. Ingestion:Decontaminate and transport to emergency medical facility.
4. Puncture/Laceration: Decontaminate, if possible, and transport to emergency medical facility.

12.6 Fire or Explosion

Appropriate fire extinguishers will be made available at the Site for trained personnel to use on insipient stage fires without endangering the safety and health of those nearby. If the use of fire extinguishers will not extinguish the fire, immediately notify the fire department, sound the evacuation signal, and then evacuate the area, assembling outside the nearest of the three access gates to be accounted for and to receive further instructions.

12.7 Spills and Leaks

Control or stop the spread of minor chemical spills contamination utilizing the appropriate materials (absorbents, etc.) if possible. If the release is significant, or highly hazardous, immediately notify the appropriate response groups, sound the evacuation signal, evacuate the area, and assemble outside the nearest of the three access gates to be accounted for and to receive further instructions.

12.8 Adverse Weather Conditions

In the event of heavy precipitation (rain, snow, sleet, etc.), conditions will be assessed on Site to determine if the work can proceed safely. If it is determined that the weather poses a significant hazard, site operations will be stopped and rescheduled. Some of the items to be considered prior to determining if work should continue include:

1. Potential for heat stress and heat-related injuries
2. Potential for cold stress and cold-related injuries
3. Treacherous weather-related working conditions
4. Limited visibility

12.9 Documentation

For emergencies involving personnel injury and/or exposure, the Site Emergency Coordinator will complete and submit the Employee Exposure and Injury Incident Report within 48 hours of the incident. The form is attached in Appendix G.

TABLES

TABLE 1
Task Risk Analysis
Gateway Center at Bronx Terminal Market, NY
Langan Project No. 5591006
BCP Index No. w2-1032-04-11, Site No. C20315

A. CONTAMINANT HAZARDS OF CONCERN

Contaminant	Monitoring Device	AIR - PEL	Source of Concentration on Site	Route of Exposure	Toxicological Effects, Symptoms, and Hazards	First Aid
Acetone	PID	1000 ppm	Soil	Inh, Abs, Ing, Con	Irrit eyes, skin, muc, narcosis, kidney damage, nau, coma	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Benzene	PID	1 ppm	Groundwater	Inh, Abs, Ing, Con	Irrit eyes, skin, nose, resp tract., gidd, head, nau, staggered gait; lass, derm, bone marrow depress, [carc]	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Ethylbenzene	PID	100 ppm	Groundwater	Inh, Abs, Ing, Con	Irrit eyes, skin, nose, resp tract., gidd, head, nau, staggered gait; lass, derm, bone marrow depress	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Styrene	PID	100 ppm	Groundwater	Inh, Abs, Ing, Con	Irrit eyes, skin, nose, resp tract., gidd, head, nau, staggered gait; lass, derm, bone marrow depress	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Toluene	PID	200 ppm	Groundwater	Inh, Abs, Ing, Con	Irrit eyes, skin, nose, resp tract., gidd, head, nau, staggered gait; lass, derm, bone marrow depress	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Vinyl Chloride	PID	1 ppm	Groundwater	Inh, Abs, Ing, Con	Irrit eyes, skin, nose, resp tract., gidd, head, nau, staggered gait; lass, derm, bone marrow depress	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Xylene	PID	100 ppm	Groundwater	Inh, Abs, Ing, Con	Irrit eyes, skin, nose, resp tract., gidd, head, nau, staggered gait; lass, derm, bone marrow depress	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Benzo(a)anthracene	Dust Meter	Not available	Soil	Inh,Con	Irrit eyes, skin, headache ,naus, cancer	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Benzo(a)pyrene	Dust Meter	0.2 mg/m3	Soil	Inh, Ing	(Carc), mutagenic, neoplastic	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Benzo(b)fluoranthene	Dust Meter	Not available	Soil	Inh, Ing, Con	Irrit eyes, skin, nose, muc, upper resp tract	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Benzo(ghi)perylene	Dust Meter	Not Available	Soil	Inh, Ing	(Carc)	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately

EXPLANATION OF ABBREVIATIONS

PID = Photoionization Detector
ppm = parts per million
Derm = Dermatitis
Drow = Drowsiness
Inj = Injury
Ing = Ingestion
Abdom = Abdominal
Dizz = Dizziness
Tg = Fatigue
Lass = Lassitude
Con = Skin and/or eye contact
Gastro = Gastro-intestinal
Depres = Depressant
Gidd = Giddiness
Muc memb = mucous membrane
PEL = Permissible Exposure Limit (8-hour Time Weighted Average)
Resp = Respiratory
CNS = Central Nervouse System
Inco = Incoordination
Nau = Nausea
Inh = Inhalation
Card = Cardiac
(Carc) = Potential occupational Carcinogen
Abs = Skin absorption
Verti = Vertigo

TABLE 1
Task Risk Analysis
Gateway Center at Bronx Terminal Market, NY
Langan Project No. 5591006
BCP Index No. w2-1032-04-11, Site No. C20315

Contaminant	Monitoring Device	AIR - PEL	Source of Concentration on Site	Route of Exposure	Toxicological Effects, Symptoms, and Hazards	First Aid
Benzo(k)fluoranthene	Dust Meter	Not available	Soil	Inh, Ing, Con	Irrit eyes, skin, carcinogen, ung damage	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Chrysene	Dust Meter	0.2 mg/m3	Soil	Inh, Ing	Irrit,cancer, pulmonary edema, sensitizer, dermatitis, naus, kidney damage	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Dibenzo(a h)anthracene	Dust Meter	Not available	Soil	Inh, Ing	(Carc)	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Indeno(1 2 3-cd)pyrene	Dust Meter	Not available	Soil	Ing, Ing, Con	(Carc)	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Phenanthrene	Dust Meter	Not available	Soil	Ing, Ing, Con	Cancer and mutagen indications, skin photosensitizer	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Pyrene	Dust Meter	0.2 mg/m3	Soil	Inh,Ing, Con	Cancer, mutagenic, neoplastic	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Beryllium	Dust Meter	0.002 mg/m3	Soil	Inh, Ing, Con	Carcinogen, mutagen, lung fibriosis, dyspnea, weight loss	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Cadmium	Dust Meter	0.005 mg/m3	Groundwater Soil	Inh, Ing, Con	Irrit eyes, skin, chest pain, edema, headache, cough	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Calcium	Dust Monitor	5 mg/m3	Soil	Inh, Ing, Con	Redness of skin, eyes, naus, vomiting	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Chromium	Dust Monitor	1 mg/m3	Soil	Ing, Ing, Con	Irrit eyes, skin, corrosive on tissue ,ulcer	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Cobalt	Dust Monitor	0.1 mg/m3	Soil	Inh, Ing, Con	Irrit skin, eyes, muc, pulmonary edema, heart failure, deafness. rash, thyroid enlargement	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Copper	Dust Monitor	1 mg/m3	Soil		Irrit skin, eyes, resp tract, birth defects, kidney cancer,chills, sweating, fever, naus	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately

EXPLANATION OF ABBREVIATIONS

PID = Photoionization Detector
ppm = parts per million
Derm = Dermatitis
Drow = Drowsiness
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Gastro = Gastro-intestinal
Depres = Depressant
Gidd = Giddiness
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TABLE 1
Task Risk Analysis
Gateway Center at Bronx Terminal Market, NY
Langan Project No. 5591006
BCP Index No. w2-1032-04-11, Site No. C20315

Contaminant	Monitoring Device	AIR - PEL	Source of Concentration on Site	Route of Exposure	Toxicological Effects, Symptoms, and Hazards	First Aid
Lead	XRF monitor	0.05 mg/m3	Groundwater Soil	Inh, Ing, Con	Irrit skin, eyes, vomiting, stupor, coma, insomnia, paralysis	Eyes: Irrigate immediately Skin: Water wash promptly Breath: Resp. support Swallow: Induce vomiting,med att.
Magnesium	Dust Monitor	15 mg/m3 (as for MgO)	Soil	Inh, Con	Irrit skin, eyes, resp tract, gastro	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Mercury	Spectrometer	0.1 mg/m3	Soil	Inh, Ing, Con	Nervous irritability, lass, tremor, gingivitis, graying of eye	Eyes: Irrigate immediately Skin: Water wash promptly. Breath: Resp. support Swallow: Induce vomiting,med att.
Nickel	Dust Monitor	1 mg/m3	Soil	Inh, Ing, Con	Irrit skin, eyes	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Selenium	Dust Monitor	0.2 mg/m3	Soil	Con	Irrit skin, eyes, muc	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Zinc	Dust Monitor	1 mg/m3	Soil	Inh, Ing, Con	Toxic	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Heptachlor Epoxide	Dust Monitor	Not available	Soil	Inh	Fatal & toxic	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support Swallow: Med. attn. immediately
Nuisance Dust	Dust Monitor	15 mg/m3	Soil	Inh, Ing	Irrit eyes, skin, resp. tract	Eyes: Irrigate immediately Skin: Soap wash promptly Breath: Resp. support

Note: See section 8 of the HASP for a discussion of how the dust meter will be used to monitor the compounds of concern listed in this table.

EXPLANATION OF ABBREVIATIONS

PID = Photoionization Detector
ppm = parts per million
Derm = Dermatitis
Drow = Drowsiness
Inj = Injury
Ing = Ingestion
Abdom = Abdominal
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TABLE 1
Task Risk Analysis
Gateway Center at Bronx Terminal Market, NY
Langan Project No. 5591006
BCP Index No. w2-1032-04-11, Site No. C20315

B. PHYSICAL HAZARDS OF CONCERN

Hazard	Description	Control Measures	First Aid
Skin contact	Sample spills on skin; splashes in eyes.	Wear proper PPE; follow safe practices	See Table 1 – Part "A" above
Lacerations, abrasions, punctures	Cutting bailer twine, pump tubing, etc. with knife. Using tools in tight spaces, etc.	Wear proper PPE; follow safe practices	See pages 48-51, NSC "First Aid an CPR Standard" manual
Inhalation	Opening wells, purging and sampling exposes sampler	Follow air monitoring plan; have quick access to respirator	See Table 1 – Part "A" above
Explosive atmosphere		Follow air monitoring plan	
Lifting	Improper lifting/carrying of equipment and materials causing strains	Follow safe lifting techniques	Follow the RICE procedures (p.99 in NSC manual)
Slips, trips, and falls	Any number of injuries could occur from slips, trips, and falls in carrying out tasks	Good housekeeping at site, constant awareness and focus on the task	
Noise	Drill rig engine and soil boring.	Wear hearing protection	
Falling objects	Soil material, tools, etc. dropping from drill rigs, front-end loaders, etc.	Hard hats to be worn at all times while in work zones	
Underground/overhead utilities	Excavators and demolition equipment making contact with utilities	"One Call" before dig; follow safe practices	

TABLE 1
Task Risk Analysis
Gateway Center at Bronx Terminal Market, NY
Langan Project No. 5591006
BCP Index No. w2-1032-04-11, Site No. C20315

C. Task-by-Task Risk Analysis

Task	Hazard	Description	Control Measures	First Aid
Removal of Targeted Soil and Fill	Heavy machinery	Demolition and excavation with hydraulic equipment	Wear proper PPE; follow safe practices	See Table 1 - Part "A" above
	Building Demolition	Demolition with hydraulic equipment, falling building material	Wear proper PPE; follow safe practices	See pages 48-51, NSC "First Aid an CPR Standard" manual
	Working and Sampling within the Excavations	Surveying size of excavation, Screening and sampling end-point samples	Wear proper PPE; follow air monitoring plan; have quick access to respirator	See Table 1 - Part "A" above
	Exposure to contaminated media	Working within the hot zones	Wear proper PPE; follow air monitoring plan	See decon procedures in HASP
Groundwater Treatment and Sampling	Splash Hazards	Sample spills on skin; splashes in eyes.	Wear proper PPE; follow safe lifting techniques	Follow the RICE procedures (p.99 in NSC manual)
	Exposure to contaminated groundwater	Inhalation and dermal absorption risk	Wear proper PPE; good housekeeping at site, constant awareness and focus on the task	
	Exposure to moving pump components		Keep loose clothing from equipment. Keep safety gloves on.	
Methane Source Removal	Exposure to potential simple asphyxiant	Drill rig engine and soil boring.	Wear proper PPE with hearing protection; use methane and explosive meters	
	Potential Explosive Hazard	Soil material, tools, etc. dropping from drill rigs, front-end loaders, etc.	Wear proper PPE; hard hats to be worn at all times while in work zones	
UST Closure	Potential Exposure to Confining Spaces	Drill rig auger makes contact with underground object; boom touches	Wear proper PPE; "One Call" before dig; follow safe practices	
	Potential for explosive or flammable conditions	Static charge may ignite residual explosive and flammable vapors	Follow proper UST closure proceedings for tank venting	
	Removal of UST and soil	See "Removal of Targeted Soil and Fill"		
Soil Backfill	See "Removal of Targeted Soil and Fill"			
Engineering Control Construction				

TABLE 2

Heat Stress Monitoring Frequency

Gateway Center at Bronx Terminal Market, NY

Langan Project No. 5591006

Heat Index Temperature [2]	Normal Work Clothing [3]	Impermeable Clothing
90°F or above (32.2°C) or above	After each 45 min. of work	After each 15 min. of work
87.5°F (30.8°-32.2°C)	After each 60 min. of work	After each 30 min. of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 min. of work	After each 60 min. of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 min. of work	After each 90 min. of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 min. of work	After each 120 min. of work

TABLE 3
Heat Index
Gateway Center at Bronx Terminal Market, NY
Langan Project NO.5591006
BCP Index No. w2-1032-04-11. Site No. C20315

ENVIRONMENTAL TEMPERATURE (Fahrenheit)

RELATIVE HUMIDITY	70	75	80	85	90	95	100	105	110	115	120
	APPARENT TEMPERATURE*										
0%	64	69	73	78	83	87	91	95	99	103	107
10%	65	70	75	80	85	90	95	100	105	111	116
20%	66	72	77	82	87	93	99	105	112	120	130
30%	67	73	78	84	90	96	104	113	123	135	148
40%	68	74	79	86	93	101	110	123	137	151	
50%	69	75	81	88	96	107	120	135	150		
60%	70	76	82	90	100	114	132	149			
70%	70	77	85	93	106	124	144				
80%	71	78	86	97	113	136					
90%	71	79	88	102	122						
100%	72	80	91	108							

*Combined Index of Heat and Humidity...what it "feels like" to the body
Source: National Oceanic and Atmospheric Administration

How to use Heat Index:
1. Across top locate Environmental Temperature
2. Down left side locate Relative Humidity
3. Follow across and down to find Apparent Temperature
4. Determine Heat Stress Risk on chart at right

Note: Exposure to full sunshine can increase Heat Index values by up to 15 degrees F.

Apparent Temperature	Heat Stress Risk with Physical Activity and/or Prolonged Exposure
90-105	Heat Cramps or Heat Exhaustion Possible
105-130	Heat Cramps or Heat Exhaustion Likely, Heat Stroke Possible
>130	Heatstroke Highly Likely

Table 4
Standing Orders
(Must be Posted)
Gateway Center at Bronx Terminal Market, NY
Langan Project No. 5591006
BCP Index No. w2-1032-04-11, Site No.C20315

GENERAL

- No smoking, eating, or drinking in this work zone.
- Upon leaving the work zone, personnel will thoroughly wash their hands and face.
- Minimize contact with contaminated materials through proper planning of work areas and decontamination areas, and by following proper procedures.
- Do not place equipment on the ground. Do not sit on contaminated materials.
- No open flames in the work zone.
- Only properly trained and equipped personnel are permitted to work in potentially contaminated areas.
- Always use the appropriate level of personal protective equipment (PPE).
- Maintain close contact with your buddy in the work zone
- Contaminated material will be contained in the Exclusion Zone (EZ).
- Report any unusual conditions.
- Work areas will be kept clear and uncluttered. Debris and other slip, trip, and fall hazards will be removed as frequently as possible.
- The number of personnel and equipment in the work zone will be kept to an essential minimum.
- Be alert to the symptoms of fatigue and heat/cold stress, and their effects on the normal caution and judgment of personnel.
- Conflicting situations which may arise concerning safety requirements and working conditions must be addressed and resolved quickly by the site HSO.

TOOLS AND HEAVY EQUIPMENT

- Do not, under any circumstances, enter or ride in or on any backhoe bucket, materials hoist, or any other device not specifically designed to carrying passengers.
- Loose-fitting clothing or loose long hair is prohibited around moving machinery.
- Ensure that heavy equipment operators and all other personnel in the work zone are using the same hand signals to communicate.
- Drilling/excavating within 20 feet in any direction of overhead power lines is prohibited.
- The locations of all underground utilities must be identified and marked out prior to initiating any subsurface activities.
- Check to insure that the equipment operator has lowered all blades and buckets to the ground before shutting off the vehicle.
- If the equipment has an emergency stop device, have the operator show all personnel its location and how to activate it.
- Help the operator ensure adequate clearances when the equipment must negotiate in tight quarters; serve as a signalman to direct backing as necessary.
- Ensure that all heavy equipment that is used in the Exclusion Zone is kept in that zone until the job is done, and that such equipment is completely decontaminated before moving it into the clean area of the work zone.
- Samplers must not reach into or get near rotating equipment such as the drill rig. If personnel must work near any tools that could rotate, the equipment operator must completely shut down the rig prior to initiating such work. It may be necessary to use a remote sampling device.

TABLE 5
Summary of Monitoring Equipment
Gateway Center at Bronx Terminal Market, NY
Langan Project NO.5591006
BCP Index No. w2-1032-04-11. Site No. C20315

Instrument	Operation Parameters
Combustible Gas Indicator (CGI)	**Hazard Monitored:** Combustible gases and vapors. **Application:** Measures the concentration of combustible gas or vapor. **Detection Method:** A filament, usually made of platinum, is heated by burning the combustible gas or vapor. The increase in heat is measured. Gases and vapors are ionized in a flame. A current is produced in proportion to the number of carbon atoms present. **General Care/Maintenance:** Recharge or replace battery. Calibrate immediately before use. **Typical Operating Time:** Can be used for as long as the battery lasts, or for the recommended interval between calibrations, whichever is less.
Flame Ionization Detector (FID) with Gas Chromatography Option *(i.e., Foxboro Organic Vapor Analyzer (OVA))*	**Hazard Monitored:** Many organic gases and vapors (approved areas only). **Application:** In survey mode, detects the concentration of many organic gases and vapors. In gas chromatography (GC) mode, identifies and measures specific compounds. In survey mode, all the organic compounds are ionized and detected at the same time. In GC mode, volatile species are separated. **General Care/Maintenance:** Recharge or replace battery. Monitor fuel and/or combustion air supply gauges. Perform routine maintenance as described in the manual. Check for leaks. **Typical Operating Time:** 8 hours; 3 hours with strip chart recorder.
Potable Infrared (IR) Spectrophotometer	**Hazard Monitored:** Many gases and vapors. **Application:** Measures concentration of many gases and vapors in air. Designed to quantify one or two component mixtures. **Detection Method:** Passes different frequencies of IR through the sample. The frequencies absorbed are specific for each compound. **General Care/Maintenance:** As specified by the manufacturer.
Photoionization Detector (PID)	**Hazard Monitored:** Many organic and some inorganic gases and vapors. **Application:** Detects total concentration of many organic and some inorganic gases and vapors. Some identification of compounds are possible if more than one probe is measured. **Detection Method:** Ionizes molecules using UV radiation; produces a current that is proportional to the number of ions. **General Care/Maintenance:** Recharge or replace battery. Regularly clean lamp window. Regularly clean and maintain the instrument and accessories. **Typical Operating Time:** 10 hours. 5 hours with strip chart recorder.

TABLE 5
Summary of Monitoring Equipment
Gateway Center at Bronx Terminal Market, NY
Langan Project NO.5591006
BCP Index No. w2-1032-04-11. Site No. C20315

Instrument	Operation Parameters
Direct Reading Colorimetric Indicator Tube	**Hazard Monitored:** Specific gas and vapors. **Application:** Measures concentration of specific gases and vapors. **Detection Method:** The compound reacts with the indicator chemical in the tube, producing a stain whose length or color change is proportional to the compound's concentration. **General Care/Maintenance:** Do not use a previously opened tube even if the indicator chemical is not stained. Check pump for leaks before and after use. Refrigerate before use to maintain a shelf life of about 2 years. Check expiration dates of tubes. Calibrate pump volume at least quarterly. Avoid rough handling which may cause channeling.
Aerosol Monitor	**Hazard Monitored:** Airborne particulate (dust, mist, fume) concentrations **Application:** Measures total concentration of semi-volatile organic compounds, PCBs, and metals. **Detection Method:** Based on light-scattering properties of particulate matter. Using an internal pump, air sample is drawn into the sensing volume where near infrared light scattering is used to detect particles. **General Care/Maintenance:** As specified by the manufacturer. Also, the instrument must be calibrated with particulates of a size and refractive index similar to those to be measured in the ambient air.
Oxygen Meter	**Hazard Monitored:** Oxygen (O_2). **Application:** Measures the percentage of O_2 in the air. **Detection Method:** Uses an electrochemical sensor to measure the partial pressure of O_2 in the air, and converts the reading to O_2 concentration. **General Care/Maintenance:** Replace detector cell according to manufacturer's recommendations. Recharge or replace batteries prior to explanation of the specified interval. If the ambient air is less than 0.5% C O_2, replace the detector cell frequently. **Typical Operating Time:** 8 – 12 hours.
Monitox	**Hazard Monitored:** Gases and vapors. **Application:** Measures specific gases and vapors. **Detection Method:** Electrochemical sensor relatively specific for the chemical species in question. **General Care/Maintenance:** Moisten sponge before use; check the function switch; change the battery when needed.

TABLE 5
Summary of Monitoring Equipment
Gateway Center at Bronx Terminal Market, NY
Langan Project NO.5591006
BCP Index No. w2-1032-04-11. Site No. C20315

Instrument	Operation Parameters
X-Ray Fluorescence	**Hazard Monitored:** Lead. **Application:** Measure lead in dust wipes. **Detection Method:** Characteristic X-rays from sample, analysed and quantified by a spectrometer. **General Care/ Maintenance:** As specified by the manufacturer.
Continuous Emission Monitor	**Hazard Monitored:** Mercury. **Application:** Measures elemental and total mercury emissions. **Detection Method:** Cold vapor atomic absorption spectroscopy with Zeeman high frequency polarization background correction. **General Care/Maintenance:** As specified by the manufacturer for ice bath condensers in sampling inlets.

U:\Data0\5591006\Office Data\Reports\RAWP\Appendix\Appendix E HASP\BTM HASP06 Table5 SummaryMonitoringEquipt.doc

APPENDIX A

TYPICAL SAFETY INSPECTION CHECKLIST

Langan
Engineering and Environmental Services, Inc.

JOBSITE SAFETY INSPECTION CHECKLIST

Client: _____ Inspection Date: _____

Site: _____ Inspector: _____

Project Number: _____

Check one of the following: **A:** Acceptable **NA**: Not Applicable **D**: Deficiency

	A	NA	D	Remarks
1. HASP available on site for inspection?				
2. Health & Safety Compliance agreement (in HASP) appropriately signed by Langan employees and subcontractors?				
3. Hospital route map with directions posted on site?				
4. Emergency Notification List posted on site?				
5. First Aid kit available and properly stocked?				
6. Personnel trained in CPR/First Aid on site?				
7. MSDSs readily available, and all workers knowledgeable about the specific chemicals and compounds to which they may be exposed?				
8 Appropriate PPE being worn by Langan employees and subcontractors?				
9. Project site safe practices ("Standing Orders") posted?				
10. Project staff have 40-hr./8-hr./Supervisor HAZWOPER training?				
11. Project staff medically cleared to work in hazardous waste sites and fit-tested to wear respirators, if needed?				
12. Respiratory protection readily available?				
13. Health & Safety Incident Report forms available?				
14. Air monitoring instruments calibrated daily and results recorded on the Daily Instrument Calibration check sheet?				
15. Air monitoring readings recorded on the air monitoring data sheet/field log book?				
16. Subcontract workers have received 40-hr./8-hr./Spvsr. HAZWOPER training, as appropriate?				
17. Subcontract workers medically cleared to work on site, and fit-tested for respirator wear?				
18. Subcontract workers have respirators readily available?				
19. Markouts of underground utilities done prior to initiating any subsurface activities?				
20. Decontamination procedures being followed as outlined in HASP?				
21. Are tools in good condition and properly used?				
22. Drilling performed in areas free from underground objects including utilities?				
23. Adequate size/type fire extinguisher supplied?				
24. Equipment at least 20 feet from overhead powerlines?				
25. Evidence that drilling operator is responsible for the safety of his rig.				
26. Trench sides shored, layed back, or boxed?				
27. Underground utilities located and authorities contacted before digging?				
28. Ladders in trench (25-foot spacing)?				

29. Excavated material placed more than 2 feet away from excavation edge?					
30. Public protected from exposure to open excavation?					
31. People entering the excavation regarding it as a permit-required confined space and following appropriate procedures?					
32. Confined space entry permit is completed and posted?					
33. All persons knowledgable about the conditions and characteristics of the confined space?					
34. All persons engaged in confined space operations have been trained in safe entry and rescue (non-entry)?					
35. Full body harnesses, lifelines, and hoisting apparatus available for rescue needs?					
36. Attendant and/or supervisor certified in basic first aid and CPR?					
37. Confined space atmosphere checked before entry and continuously while the work is going on?					
38. Results of confined space atmosphere testing recorded?					
39. Evidence of coordination with off-site rescue services to perform entry rescue, if needed?					
40. Are extension cords rated for this work being used and are they properly maintained?					
41. Are GFCIs provided and being used?					

Unsafe acts observed? _____

_____

_____

_____

Additional remarks _____

_____

_____

_____

Distribution: Project Manager (for information and follow-up) Name: _____

Health & Safety Officer (for corrective action) Name: _____

Health & Safety Coordinator (resource for corrective action and follow-up) Rodger Bushnell

APPENDIX B

MATERIAL SAFETY DATA SHEETS

Appendix B
MSDSs
Gateway Center at Bronx Terminal Market, NY
Langan Project No. 5591006
BCP Index No. w2-1032-04-11, Site No. C20315

MATERIAL SAFETY DATA SHEETS

- Diesel Fuel
- Unleaded Gasoline
- Motor Oil, 10W-40
- Methane in Air
- Compressed Oxygen in Air
- Isobutylene Gas in Air, 100 ppm
- Hydrochloric Acid, 0.01N to 0.2N Solution (aqueous sample preservative)
- Alconox
- Acetone
- Benzene
- Ethylbenzene
- Styrene
- Toluene
- Vinyl Chloride
- Xylene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Chrysene
- Dibenzo(ah)anthracene
- Indeno(1,2,3-cd)pyrene
- Phenanthrene
- Pyrene
- Beryllium
- Cadmium
- Calcium
- Chromium
- Cobalt
- Copper
- Lead
- Magnesium
- Mercury
- Nickel
- Selenium
- Zinc
- Heptachlor Epoxide

PHIBRO ENERGY USA, INC. -- DIESEL FUEL -- 9140-00-000-0184

========== Product Identification ==========

Product ID:DIESEL FUEL
MSDS Date:01/31/1994
FSC:9140
NIIN:00-000-0184
MSDS Number: BVGFN
=== Responsible Party ===
Company Name:PHIBRO ENERGY USA, INC.
Address:500 DALLAS AVE, SUITE 3200
City:HOUSTON
State:TX
ZIP:77002
Country:US
Info Phone Num:713-646-5135
Emergency Phone Num:713-923-6641, CHEMTREC 800-424-9300
Preparer's Name:SUE BOTTOM
CAGE:0V310
=== Contractor Identification ===
Company Name:PHIBRO ENERGY USA INC
Address:500 DALLAS AVE SUITE 3200
Box:City:HOUSTON
State:TX
ZIP:77002
Country:US
Phone:713-923-6641, CHEMTREC800-424-9300
CAGE:0V310

========== Composition/Information on Ingredients ==========

Ingred Name:PETROLEUM DISTILLATE, ALIPHATIC AND AROMATIC HYDROCARBONS
(VARYING FROM C9 TO C20), CONTAING ALSO INGREDIENT #2 TO 7.
Fraction by Wt: BALANCE
Other REC Limits:NONE SPECIFIED
OSHA PEL:400 PPM NAPHTHA TWA

Ingred Name:N-OCTANE
CAS:111-65-9
RTECS #:RG8400000
Fraction by Wt: <1-2%
Other REC Limits:NONE SPECIFIED
OSHA PEL:300 PPM TWA 1989
ACGIH TLV:300 PPM/375STEL;9394

Ingred Name:N-NONANE
CAS:111-84-2
RTECS #:RA6115000
Fraction by Wt: <1-3%
Other REC Limits:NONE SPECIFIED
OSHA PEL:200 PPM
ACGIH TLV:200 PPM; 9192

Ingred Name:NAPHTHALENE (SARA III)
CAS:91-20-3
RTECS #:QJ0525000
Fraction by Wt: <1-3%
Other REC Limits:NONE RECOMMENDED

OSHA PEL:10 PPM
ACGIH TLV:10 PPM/15 STEL; 9394
EPA Rpt Qty:100 LBS
DOT Rpt Qty:100 LBS

Ingred Name:HEXANE ISOMERS (OTHER THAN N-HEXANE)
Fraction by Wt: <1-3%
Other REC Limits:NONE RECOMMENDED
OSHA PEL:500 PPM
ACGIH TLV:500 PPM

Ingred Name:N-HEXANE
CAS:110-54-3
RTECS #:MN9275000
Fraction by Wt: <1-2%
Other REC Limits:NONE RECOMMENDED
OSHA PEL:50 PPM 1989
ACGIH TLV:50 PPM; 9394
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

Ingred Name:N-HEPTANE
CAS:142-82-5
RTECS #:MI7700000
Fraction by Wt: <1-2%
Other REC Limits:NONE RECOMMENDED
OSHA PEL:400 PPM TWA 1989
ACGIH TLV:400 PPM/500STEL;9394

Ingred Name:HYDROGEN SULFIDE (SARA III)
CAS:7783-06-4
RTECS #:MX1225000
Other REC Limits:NONE RECOMMENDED
OSHA PEL:C, 20 PPM
ACGIH TLV:10 PPM/15 STEL; 9394
EPA Rpt Qty:100 LBS
DOT Rpt Qty:100 LBS

========== Hazards Identification ==========

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:ACUTE-INHALATION:CNS EFFECTS,
RESPIRATORY IRRITATION. EYES:SEVERE IRRITATION. INGESTION:HARMFUL
OR FATAL, IRRITATION OF GI TRACT. ASPIRATION INTO THE LUNGS CAN
CAUSE SEVERE CHEMICAL PNEUMONITIS, WHICH CAN BE FATAL.
SKIN:REPEATED EXPOSURE MAY CAUSE IRRITATION. CHRONIC:DERMATITIS.
TARGET ORGANS:SKIN, LUNG, CNS.
Explanation of Carcinogenicity:PER NIOSH BULLETIN 50 A POTENTIAL
OCCUPATIONAL CARCINOGENIC HAZARD EXISTS DUE TO HUMAN EXPOSURE TO
DIESEL EXHAUST.
Effects of Overexposure:EYE:IRRITATION, REDNESS, TEARING, BLURRED
VISION, CONJUCTIVITIS. SKIN:IRRITATION, DRYNESS, REDNESS, ITCHING.
INHAL:HEADACHE, DIZZINESS, DROWZINESS, NAUSEA, VOMITNING, TREMORS,
CONVULSIONS, IRREGULAR H EART BEAT. INGESTION: G/I IRRITATION AND
SYMPTOMS SIMILAR TO INHALATION.
Medical Cond Aggravated by Exposure:EYE, SKIN, HEART, CNS, AND
RESPIRATORY DISORDERS MAY BE AGGARAVATED BY OVEREXPOSURE.

========== First Aid Measures ==========

First Aid:SKIN:REMOVE CONTAMINATED CLOTHING. WASH WITH SOAP AND WATER. GET MEDICAL ATTENTION IF IRRITATION PERSISTS. INHALATION:REMOVE TO FRESH AIR & RESTORE BREATHING IF NECESSARY. GET MEDICAL ATTENTION. EYE:I MMEDIATELY FLUSH WITH WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION. INGESTION:GET IMMEDIATE MEDICAL ATTENTION. DO NOT INDUCE VOMITING. NOTHING BY MOUTH IF UNCONSCIOUS.

========== Fire Fighting Measures ==========

Flash Point:125F,52C
Lower Limits:0.4%
Upper Limits:8.0%
Extinguishing Media:CARBON DIOXIDE, FOAM, OR DRY CHEMICAL.
Fire Fighting Procedures:EVACUATE AREA. USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT TO FIGHT FIRE. USE WATER SPRAY TO COOL EXPOSED CONTAINERS. DIRECT WATER SPRAY MAY SPREAD FIRE
Unusual Fire/Explosion Hazard:VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL ALONG GROUND OR FLOOR, THEN 'FLASH BACK' FROM A DISTANT IGNITION SOURCE. TOXIC FUMES & GASES ARE PRODUCED BY FIRE.

========== Accidental Release Measures ==========

Spill Release Procedures:EVACUATE AREA. WEAR PROTECTIVE EQUIPMENT. SHUT OFF SOURCE IF POSSIBLE & CONTAIN SPILL. REMOVE IGNITION SOURCES. KEEP OUT OF WATER RESOURCES AND SEWERS. ABSORB IN INERT MATERIAL OR RECOVER BY PUMPING. TRANSFER TO DISPOSAL DRUMS.
Neutralizing Agent:NONE

========== Handling and Storage ==========

Handling and Storage Precautions:KEEP AWAY FROM HEAT, SPARKS, FLAME. STORE IN WELL VENTILATED AREA. GROUND CONTAINERS DURING TRANSFER. STORE IN CLOSED CONTAINER.
Other Precautions:EMPTY CONTAINERS RETAIN RESIDUE. DO NOT PRESSURIZE, CUT, WELD OR EXPOSE TO HEAT, FLAME, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:FOR CONCENTRATIONS EXCEEDING RECOMMENDED LEVEL, USE NIOSH/MSHA APPROVED AIR PURIFYING RESPIRATOR. FOR SPILL OR IF CONCENTRATION IS UNKNOWN, USE NIOSH/MSHA SUPPLIED AIR RESPIRATOR OR SCBA.
Ventilation:GENERAL OR MECHANICAL
Protective Gloves:NEOPRENE OR NITRILE
Eye Protection:SAFETY GLASSES OR CHEMICAL SPLASH GOGGLE
Other Protective Equipment:PROTECTIVE GARMENTS TO PREVENT SKIN CONTACT.
Work Hygienic Practices:DO NOT EAT, DRINK OR SMOKE WHILE WORKING WITH THIS PRODUCT.
Supplemental Safety and Health
DANGER! UNTREATED PRODUCT MAY CONTAIN OR RELEASE HYDROGEN SULFIDE. H2S IS A HIGHLY TOXIC AND FLAMMABLE GAS WHICH CAN BE FATAL IF INHALED AT CERTAIN CONCENTRATION.

========== Physical/Chemical Properties ==========

HCC:F4
NRC/State Lic Num:NONE

Boiling Pt:B.P. Text:325F,163C
Vapor Pres:<0.1 PSI
Vapor Density:3-7
Spec Gravity:0.84 - 0.93
Viscosity:8 CST @ -4F
Solubility in Water:NEGLIGIBLE
Appearance and Odor:CLEAR TO STRAW COLORED LIQUID, KEROSENE ODOR.
Percent Volatiles by Volume:NEGLIG

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
STRONG OXIDIZING AGENTS, STRONG ACIDS, CAUSTICS AND HALOGENS.
Stability Condition to Avoid:OPEN FLAMES, SOURCES OF IGNITION, STATIC ELECTRICITY.
Hazardous Decomposition Products:CARBON MONOXIDE, CARBON DIOXIDE AND REACTIVE HYDROCARBONS (LDEHYDES, AROMATICS, ETC) COMPOUNDS.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

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AMERADA HESS CORP -- PREMIUM UNLEADED GASOLINE -- 9130-00N038435

========== Product Identification ==========

Product ID:PREMIUM UNLEADED GASOLINE
MSDS Date:01/13/1989
FSC:9130
NIIN:00N038435
MSDS Number: BQXMS
=== Responsible Party ===
Company Name:AMERADA HESS CORP
Address:1 HESS PLAZA
City:WOODBRIDGE
State:NJ
ZIP:07095
Country:US
Info Phone Num:201-750-6000
Emergency Phone Num:800-424-9300(CHEMTREC)
CAGE:4N717
=== Contractor Identification ===
Company Name:AMERADA HESS CORP
Address:1 HESS PLAZA
Box:City:WOODBRIDGE
State:NJ
ZIP:07095-1229
Country:US
Phone:908-750-6000, CHEMTREC 800-424-9300
CAGE:4N717

========== Composition/Information on Ingredients ==========

Ingred Name:ING 17:OPEN SPILLS MAY EMIT FLAMM VAPS. APPROACH FROM
UPWIND IF POSS. AVOID BRTHG EMITTED VAPS. WEAR NIOSH/MSHA (ING 19)
RTECS #:9999999ZZ

Ingred Name:ING 18:APPRVD SELF CNTND POSITIVE PRESS BRTHG APPARATUS, IF
REQD, TO PVNT INHAL OF VAPS.
RTECS #:9999999ZZ

Ingred Name:WASTE DISP METH:OF VOLATILE, FLAMMABLE, VAPORS.
RTECS #:9999999ZZ

Ingred Name:OTHER PREC: IGNIT. USE ONLY AS A MOTOR FUEL. HNDLE,
TRANSPORT & STORE I/A/W APPLIC LAWS & REGS. ELEC EQUIP (ING 22)
RTECS #:9999999ZZ

Ingred Name:ING 21:SHOULD BE APPRVD FOR CLASSIFIED AREA. REMOVE SOILED
CLTHG & LAUNDER BEFORE-REUSE. DISCARD OIL SOAKED (ING 23)
RTECS #:9999999ZZ

Ingred Name:ING 22:SHOES. WEAR FULL LNGTH CLTHG, & LAUNDER ON A REGULAR
& FREQ BASIS. VENT MUST BE SUFFICIENT TO PVNT (ING 24)
RTECS #:9999999ZZ

Ingred Name:ING 23:ACCUMULATION OF TOX/FLAMM CONC OF VAPOR IN AIR.
RTECS #:9999999ZZ

Ingred Name:HYGIENE PRACT: UPWIND OF VAPOR OR MIST RELEASE, SPILL OR
LEAK.

RTECS #:9999999ZZ

Ingred Name:ETHER, TERT-BUTYL METHYL; (METHYL TERT-BUTYL ETHER &/OR
TERT-AMYL METHYL ETHER, CAS # 994-05-8)
CAS:1634-04-4
RTECS #:KN5250000
Fraction by Wt: <15%
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

Ingred Name:TOLUENE
CAS:108-88-3
RTECS #:XS5250000
Fraction by Wt: 15-<30%
OSHA PEL:200 PPM/150 STEL
ACGIH TLV:50 PPM; 9293
EPA Rpt Qty:1000 LBS
DOT Rpt Qty:1000 LBS

Ingred Name:XYLENE (MIXED ISOMERS)
CAS:1330-20-7
RTECS #:ZE2100000
Fraction by Wt: 10-<15%
OSHA PEL:100 PPM;150 PPM STEL
ACGIH TLV:100 PPM;150 PPM STEL
EPA Rpt Qty:1000 LBS
DOT Rpt Qty:1000 LBS

Ingred Name:BENZENE
CAS:71-43-2
RTECS #:CY1400000
Fraction by Wt: 0.1-<5%
OSHA PEL:10 PPM
ACGIH TLV:10 PPM
EPA Rpt Qty:10 LBS
DOT Rpt Qty:10 LBS

Ingred Name:BENZENE, ETHYL-; (ETHYL BENZENE)
CAS:100-41-4
RTECS #:DA0700000
Fraction by Wt: <3%
OSHA PEL:100 PPM;125 STEL
ACGIH TLV:100 PPM;125 STEL
EPA Rpt Qty:1000 LBS
DOT Rpt Qty:1000 LBS

Ingred Name:BENZENE, 1,2,4-TRIMETHYL-; (1,2,4-TRIMETHYLBENZENE)
CAS:95-63-6
RTECS #:DC3325000
Fraction by Wt: <6%

Ingred Name:SUPP DATA: IGNIT. VAPS CAN READILY FORM EXPLOS MIXT IN AIR.
HVR/AIR VAPS CAN FLOW ALONG SURF TO DIST SOURCES (ING 9)
RTECS #:9999999ZZ

Ingred Name:ING 8:IGNIT & FLASH BACK. FLOWING GASOLINE CAN BE IGNITED
BY SELF-GENERATED STATIC ELEC. RUNOFF TO SEWERS (ING 10)
RTECS #:9999999ZZ

Ingred Name:ING 9: MAY CREATE FIRE &/OR EXPLOSION HAZARD.

RTECS #:9999999ZZ

Ingred Name:EFTS OF OVEREXP:DISEASE, INCL LEUKEMIA, AFTER RPTD & PRLNGD EXPOS @ HIGH CONC.INHAL TO 100 PPM MAY CAUSE SLIGHT (ING 12)
RTECS #:9999999ZZ

Ingred Name:ING 11:DROW & HDCH. 100-200 PPM MAY CAUSE FATG, NAUS, ITCH & WILL FATG OLFACTORY SENSES.IMMED DANGER TO HLTH/ (ING 13)
RTECS #:9999999ZZ

Ingred Name:ING 12:LIFE IS REPRESENTED BY 2,000 PPM. INGEST & INHAL OF LIQ &/OR EXCESS VAPS CAN HAVE AN ANESTH EFT, CAUSE (ING 14)
RTECS #:9999999ZZ

Ingred Name:ING 13:VERTIGO, BLURRED VISION, VOMIT & CYANOSIS. OVEREXP MAY CAUSE CNS DEPRESS. NOTE: TOLUENE CAS# 108-88-3 (ING 15)
RTECS #:9999999ZZ

Ingred Name:ING 14:APPEARS ON NAVY LIST OF OCCUP REPROD HAZ. SEEK CONSULTATION FROM APPROP HLTH PROFESSIONALS CONCERNING (ING 16)
RTECS #:9999999ZZ

Ingred Name:ING 15:LATEST HAZ LIST INFO & SAFE HANDLING AND EXPOSURE RECOMMENDATION .
RTECS #:9999999ZZ

Ingred Name:SPILL PROC: ANIMAL/AQUATIC LIFE. CAUTION-EVAC ALL NON-ESSENTIAL PERS. SPILLED MATL MAY CAUSE SLIPPERY CNDTNS. (ING 18)
RTECS #:9999999ZZ

Ingred Name:GASOLINE CONTAINING INGS 2-7
CAS:8006-61-9
RTECS #:LX3300000
Fraction by Wt: 100%
OSHA PEL:300 PPM;500 STEL
ACGIH TLV:300 PPM;500 STEL

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:YES
Health Hazards Acute and Chronic:ACUTE/CHRONIC: HARMFUL/FATAL IF SWALLOWED/ASPIRATED. LONG TERM EXPOS TO VAPS HAS CAUSED CANCER IN SOME LAB ANIMALS. INGEST MAY CAUSE GI DISTURB. ASPIR INTO LUNGS MAY CAUSE PNEUM. PRLNGD CONT W/SKIN MA Y RSLT IN DEFAT/RED, ITCH, INFLAMM, CRACK & POSS SECONDARY INFECTION. HAS A LOW ORDER OF ACUTE ORAL TOX(EFTS OF OVEREXP)
Explanation of Carcinogenicity:BENZENE: OSHA REG 29 CFR 1910.1028, REV JUL 92; KNOWN CARCINOGEN (NTP) NTP 6TH ANN RPT, 1991; IARC 2B,VOL45,P159,1989.
Effects of Overexposure:HLTH HAZ:IF INGESTED, BUT MIN AMTS ASPIRATED DURING SUCH INGEST MAY CAUSE DEATH. HIGH PRESS SKIN INJECTIONS ARE SERIOUS MED EMER! RPTD/PRLNGD EXPOS TO VAPS CNTNG HIGH CONC OF BENZENE MAY CAUSE ANEMIA & OTHER BLOOD DISEASES, INCL LEUKEMIA. BENZENE IS RECOGNIZED AS HAVING POTNTL TO INDUCE ANEMIA & OTHER BLOOD (ING 11)
Medical Cond Aggravated by Exposure:OPEN WOUNDS, SKIN DISORDERS, CHRONIC RESPIRATORY DISEASE OR PRE-EXISTING CENTRAL NERVOUS SYSTEM

DISEASE.

========== First Aid Measures ==========

First Aid:INHAL: REMOVE TO FRESH AIR, PROVIDE OXYGEN THERAPY &/OR RESUSCITATION AS INDICATED. SKIN: REMOVE CONTAMINATED CLOTHING & FLUSH WITH SOAP AND WATER. EYE: FLUSH WITH WATER FOR AT LEAST 15 MINUTES. INGES T: RINSE MOUTH W/WATER. KEEP CALM AND WARM. DO NOT INDUCE VOMIT! ASPIRATION OF MATERIAL INTO LUNGS MAY CAUSE CHEMICAL PNEUMONIA. CALL PHYSICIAN IMMEDIATELY.

========== Fire Fighting Measures ==========

Flash Point Method:TCC
Flash Point:-40F,-40C
Lower Limits:1.4%
Upper Limits:7.4%
Extinguishing Media:ANY APPRVD EXTING AGENT FOR CLASS B FIRES, DRY CHEM, FOAM, CARBON DIOXIDE/HALON. WATER IS NOT ORD EFTIVE. (SUPP DATA)
Fire Fighting Procedures:NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP. AVOID INHAL OF VAPS. WATER SHOULD BE USED TO KEEP EXPOS CONTRS COOL. APPROACH FROM UPWIND IF POSSIBLE.
Unusual Fire/Explosion Hazard:CLASS 1A FLAMM LIQ. KEEP AWAY FROM HEAT, SOURCES OF IGNIT & OXIDIZERS. BURNING MAY CAUSE EMISSION OF TOX PROD OF COMBUST. EMPTY PROD CNTRS/VESSELS (SUPP DATA)

========== Accidental Release Measures ==========

Spill Release Procedures:CNTN ALL SPILLS. ABSORB ALL FREE LIQ. REMOVE ALL IGNIT SOURCES & SAFELY STOP FLOW OF SPILL. PVNT FROM ENTERING ALL BODIES OF WATER. COMPLY W/ALL APPLIC LAWS & REGS. ABSORB MATL, PADS, SAND/EARTH MAY B E USED. CONTAM WATER/SOIL MAY BE HAZ TO(ING 17)
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:KEEP AWAY FROM HEAT, SPARKS & OPEN FLAME. AVOID BRTHG VAP/MIST. AVOID SKIN/EYE CONTACT. KEEP CONTAINERS CLOSED & PLAINLY LABELED.
Other Precautions:TRANSFER LINES MUST BE BONDED & GROUNDED TO PVNT POTNTL ACCUMULATION OF STATIC ELEC. NO SMOKING IN AREAS OF HNDLG/STOR. STOR SHOULD BE IN TIGHTLY CLSD CONTRS IN COOL, DRY, ISOLATED & WELL VENTD AREA A WAY FROM POTNTL SOURCE OF (ING 21)

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NIOSH/MSHA APPRVD SELF CNTND, POSITIVE PRESSURE, BREATHING APPARATUS IN CONFINED SPACES/WHEN EXPOSED TO HEAVY MIST.
Ventilation:LOCAL EXHAUST: GENERALLY NOT REQD. MECH(GEN): EXPLOSION PROOF (APPROVED FOR CLASSIFIED AREA). SPECIAL: NONE REQUIRED.
Protective Gloves:IMPERVIOUS.
Eye Protection:CHEM WORK GOG OR FULL LNGTH FSHLD.
Other Protective Equipment:IMPERVIOUS CLOTHING AS REQUIRED TO PREVENT SKIN CONTACT. EYE WASH/BATH READILY AVAILABLE WHERE EYE CONTACT IS POSSIBLE.
Work Hygienic Practices:WASH SKIN THORO W/SOAP & WATER BEFORE EATING, DRINK/SMOKING. VENT MAY BE USED TO CTL/REDUCE AIRBORNE CONC. STAND(ING 25)

Supplemental Safety and Health
VP: 275-475@68F (VARIES SEASONALLY). APPEAR/ODOR: (CLEAR RED, BRONZE & YELLOW ARE TYPICAL). EXTING MEDIA: HOWEVER, WATER FOG MAY BE USED BY EXPER FIRE FIGHTERS FOR INTENSITY CTL, & TO COOL EXPOSED ARE AS. EXPLO HAZ: MAY CNTN EXPLOS VAPS. DONOT PRESSURIZE, CUT, HEAT, WELD/EXPOSE SUCH CONTRS/VESSELS TO SOURCE OF (ING 8)

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:>85F,>29.4C
Vapor Pres:SUPP DATA
Vapor Density:3-4
Spec Gravity:0.76(H*2O=1)
Evaporation Rate & Reference:10-11(BUTYL ACETATE=1)
Solubility in Water:SLIGHT
Appearance and Odor:CLEAR LIQ W/CHARACT AROMATIC ODOR.MAY BE DYED FOR IDENTIFICATION (SUPP DATA)
Percent Volatiles by Volume:100

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
OXIDIZING AGENTS. COMBINATION OF NITRIC AND SULFURIC ACIDS.
Stability Condition to Avoid:AVOID HANDLING OR STORING NEAR HEAT, SPARKS/OPEN FLAME.
Hazardous Decomposition Products:CONTACT WITH NITRIC AND SULFURIC ACIDS WILL FORM NITROCRESOLS THAT CAN DECOMPOSE VIOLENTLY.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSE OF PROD & CONTAMD MATL AS EPA "IGNITABLE HAZ WASTE". USE ONLY APPRVD TRTMT TRANSPORTERS & DISP SITE IN COMPLIANCE W/ALL APPLIC FED, ST & LOC REGS . MAINTAIN SURVEILLANCE OF ABSORBED MATL UNTIL FINAL DISP TO OBSERVE FOR EMISSION (ING 20)

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CONOCO,INC. -- CONOCO TRACON MOTOR OIL 10W-40 -- 9150-00B030018

========== Product Identification ==========

Product ID:CONOCO TRACON MOTOR OIL 10W-40
MSDS Date:10/21/1985
FSC:9150
NIIN:00B030018
MSDS Number: BBBHW
=== Responsible Party ===
Company Name:CONOCO,INC.
Box:1267
City:PONCA CITY
State:OK
ZIP:74603
Country:US
Info Phone Num:405 767-6000
Emergency Phone Num:800 424-9300
CAGE:DO836
=== Contractor Identification ===
Company Name:CONOCO,INC.
Box:1267
City:PONCA CITY
State:OK
ZIP:74603
Country:US
Phone:405 767-6000
CAGE:DO836

========== Composition/Information on Ingredients ==========

Ingred Name:NO HAZARDOUS MATERIALS

========== Hazards Identification ==========

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Effects of Overexposure:THIS PRODUCT MAY CAUSE IRRITATION TO
EYES,LUNGS,OR SKIN AFTER PROLONGED EXPOSURE.

========== First Aid Measures ==========

First Aid:EYES:QUICKLY WASH WITH FRESH WATER FOR 15 MIN AND GET MEDICAL
ATTENTION.SKIN:WASH WITH SOAP AND WATER AND REMOVE CONTAMINATED
CLOTHING.INHALATION: IF OVEREXPOSED,REMOVE INDIVIDUAL TO FRESH AIR.
IF BRE ATHING STOPS,ADMINISTER ARTIFICIAL RESPIRATION.INGESTION:IF
SWALLOWED,DONOT INDUCE VOMITING.IF VOMITING BEGINS,LOW VICTIMS HEAD
IN AN EFFECT TO PREVENT VOMITUS FROM ENTERING LUNGS.CALL PHYSICIAN.

========== Fire Fighting Measures ==========

Flash Point Method:PMCC
Flash Point:340
Extinguishing Media:USE WATER SPRAY,DRY CHEMICAL,FOAM,OR CARBON DIOXIDE
Fire Fighting Procedures:WATER OR FOAM MAY CAUSE FROTHING. USE WATER TO
KEEP FIRE EXPOSED CONTAINERS COOL. WATER SPRAY MAY BE USED TO FLUSH
SPILLS AWAY FROM EXPOSURES.
Unusual Fire/Explosion Hazard:PRODUCTS OF COMBUSTION MAY CONTAIN CARBON
MONOXIDE,CARBON DIOXIDE,AND OTHER TOXIC MATERIALS. DONOT ENTER

ENCLOSED SPACE WITHOUT PROTECTIVE EQUIPMENT.

========== Accidental Release Measures ==========

Spill Release Procedures:CONTAIN SPILL IMMEDIATELY IN SMALLEST AREA POSSIBLE.RECOVER AS MUCH OF THE PRODUCT ITSELF AS POSSIBLE BY VACUUMING,FOLLOWED BY SOAKING UP RESIDUAL FLUIDS BY USE OF ABSORBENT MATERIALS.

========== Handling and Storage ==========

Handling and Storage Precautions:PRODUCT IS CLASS IIIB COMBUSTIBLE LIQUID STORE AND HANDLE ACCORDINGLY.
Other Precautions:PROLONGED OR REPEATED SKIN CONTACT WITH USED MOTOR OIL MAY BE HARMFUL. WASH THOROUGHLY WITH SOAP AND WATER AFTER CONTACT.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NONE REQUIRED EXCEPT UNDER UNUSUAL CIRCUMSTANCES.
Ventilation:NORMAL SHOP VENTILATION.
Protective Gloves:NONE REQUIRED
Eye Protection:NONE REQUIRED
Other Protective Equipment:NONE REQUIRED
Supplemental Safety and Health

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:650-1200 F
Spec Gravity:0.88
Solubility in Water:INSOLUBLE
Appearance and Odor:BROWN LIQUID;MILD PETROLEUM HYDROCARBON ODOR

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
Stability Condition to Avoid:STRONG OXIDIZING MATERIALS,HEAT,FLAME
Hazardous Decomposition Products:NORMAL COMBUSTION FORMS,CARBON DIOXIDE.INCOMPLETE COMBUSTION MAY PRODUCE CARBON MONOXIDE.

========== Disposal Considerations ==========

Waste Disposal Methods:RECYCLE AS MUCH OF THE RECOVERABLE PRODUCT AS POSSIBLE.DISPOSE OF NONRECYCLABLE MATERIAL BY SUCH METHODS AS CONTROLLED INCINERATION,COMPLYING WITH FEDERAL,STATE AND LOCAL REGULATIONS.

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SCOTT SPECIALTY GASES -- METHANE IN AIR -- 6830-01-360-1866

========== Product Identification ==========

Product ID:METHANE IN AIR
MSDS Date:10/13/2000
FSC:6830
NIIN:01-360-1866
Status Code:A
MSDS Number: CLBFD
=== Responsible Party ===
Company Name:SCOTT SPECIALTY GASES
Address:6141 EASTON RD
Box:310
City:PLUMSTEADVILLE
State:PA
ZIP:18949-0310
Country:US
Info Phone Num:215-766-8861
Emergency Phone Num:215-766-8861
Resp. Party Other MSDS Num.:M-22711/E-2
CAGE:51847
=== Contractor Identification ===
Company Name:GASQUIP INC
Address:9399 HAMILTON DR
Box:City:MENTOR
State:OH
ZIP:44060
Country:US
Phone:440-357-6465
Contract Num:SP0450-01-M-D843
CAGE:1SAT6
Company Name:SCOTT SPECIALTY GASES
Address:6141 EASTON RD (6141 ROUTE 611)
Box:310
City:PLUMSTEADVILLE
State:PA
ZIP:18934
Country:US
Phone:215-766-8861/ FAX: 215-766-0416
CAGE:51847

========== Composition/Information on Ingredients ==========

Ingred Name:METHANE
CAS:74-82-8
RTECS #:PA1490000
Fraction by Wt: 0.0001-4% %

Ingred Name:AIR
CAS:132259-10-0
Fraction by Wt: BALANCE

========== Hazards Identification ==========

LD50 LC50 Mixture:NO DATA PROVIDED BY MANUFACTURER
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:ACUTE EFFECTS: NONE. CHRONIC EFFECTS:
NONE KNOWN.

Explanation of Carcinogenicity:NO DATA PROVIDED BY MANUFACTURER
Effects of Overexposure:NONE
Medical Cond Aggravated by Exposure:NONE KNOWN

========== First Aid Measures ==========

First Aid:INHALATION: NONE. INGESTION: NONE. EYE CONTACT: NONE. SKIN CONTACT: NONE. IN THE EVENT OF EXPOSURE, CONSULT A PHYSICIAN. NOTE TO PHYSICIAN: NONE.

========== Fire Fighting Measures ==========

Flash Point:NON-FLAMMABLE
Autoignition Temp:Autoignition Temp Text:N/AP
Extinguishing Media:USE WHAT IS APPROPRIATE FOR SURROUNDING FIRE.
Fire Fighting Procedures:WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. KEEP FIRE EXPOSED CYLINDERS COOL WITH WATER SPRAY. IF POSSIBLE, STOP THE PRODUCT FLOW.
Unusual Fire/Explosion Hazard:CYLINDER RUPTURE MAY OCCUR UNDER FIRE CONDITIONS. COMPRESSED AIR AT HIGH PRESSURE WILL ACCELERATE THE COMBUSTION OF FLAMMABLE MATERIALS.

========== Accidental Release Measures ==========

Spill Release Procedures:EVACUATE AND VENTILATE AREA. REMOVE LEAKING CYLINDER TO EXHAUST HOOD OR SAFE OUTDOOR AREA. SHUT OFF SOURCE IF POSSIBLE AND REMOVE SOURCE OF HEAT.
Neutralizing Agent:NO DATA PROVIDED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:SECURE CYLINDER WHEN USING TO PROTECT FROM FALLING. USE SUITABLE HAND TRUCK TO MOVE CYLINDERS. STORE IN WELL VENTILATED AREAS. KEEP VALVE PROTECTION CAP ON CYLINDERS WHEN NOT IN USE.
Other Precautions:PROTECT CONTAINERS FROM PHYSICAL DAMAGE. DO NOT DEFACE CYLINDERS OR LABELS. CYLINDERS SHOULD BE REFILLED BY QUALIFIED PRODUCERS OF COMPRESSED GAS. SHIPMENT OF A COMPRESSED GAS CYLINDER WHICH HAS NOT B EEN FILLED BY THE OWNER OR WITH HIS WRITTEN CONSENT IS A VIOLATION OF FEDERAL LAW (49 CFR)

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:IN CASE OF LEAKAGE, USE SELF-CONTAINED BREATHING APPARATUS.
Ventilation:NONE
Protective Gloves:NONE
Eye Protection:SAFETY GLASSES.
Other Protective Equipment:SAFETY SHOES WHEN HANDLING CYLINDERS.
Work Hygienic Practices:NO DATA PROVIDED BY MANUFACTURER.
Supplemental Safety and Health
NO DATA PROVIDED BY MANUFACTURER.

========== Physical/Chemical Properties ==========

HCC:G3
Boiling Pt:B.P. Text:GAS
Vapor Pres:N/AP
Vapor Density:0.982-1.0
Spec Gravity:GAS

Evaporation Rate & Reference:GAS
Solubility in Water:18.68 @ 20 C
Appearance and Odor:COLORLESS, ODORLESS GAS

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
STRONG ACIDS, OXIDIZERS, AND ACTIVE METALS. VRF5, C12, CL02, NF3, LIQUID 02, AND OF2.
Stability Condition to Avoid:STORAGE IN POORLY VENTILATED AREAS. STORAGE NERAR A HEAT SOURCE.
Hazardous Decomposition Products:TOXIC CARBON MONOXIDE MAY BE GIVEN OFF DURING COMBUSTION.

========== Toxicological Information ==========

Toxicological Information:LETHAL CONCENTRATION (LC50): NOT ESTABLISHED. LETHAL DOSE (LD50): NOT APPLICABLE. TERATOGENICITY: NOT APPLICABLE. MUTAGENICITY: NOT APPLICABLE. REPRODUCTIVE EFFECTS: NOT APPLICABLE.

========== Ecological Information ==========

Ecological:NO ADVERSE ECOLOGICAL EFFECTS ARE EXPECTED.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSE OF NON-REFILLABLE CYLINDERS IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS. ALLOW GAS TO VENT SLOWLY TO ATMOSPHERE IN AN UNCONFINED AREA OR EXHAUST HOOD. IF THE CYLINDERS ARE THE REF ILLABLE TYPE, RETURN CYLINDERS TO SUPPLIER WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PRO TECTION CAPS IN PLACE.

========== MSDS Transport Information ==========

Transport Information:CONCENTRATION: 0.0005-3%. DOT DESCRIPTION 9US ONLY): PROPER SHIPPING NAME: COMPRESSED GASES, N.O.S. HAZARD CLASS: 2.2 (NON-FLAMMABLE). IDENTIFICATION NUMBER: UN1956. REPORTABLE QUANTITIES: NONE. LABEL ING: NONFLAMMABLE GAS. ADR/RID (EU ONLY): CLASS 2, 1A. SPECIAL PRECAUTIONS: CYLINDERS SHOULD BE TRANSPORTED IN A SECURE UPRIGHT POSITION IN A WELL-VENTILATED TRUCK.

========== Regulatory Information ==========

SARA Title III Information:SARA: THE THRESHOLD PLANNING QUANTITY FOR THIS MIXTURE IS 10,000 LBS.
Federal Regulatory Information:OSHA PROCESS AFETY MANAGEMENT: MATERIALS ARE NOT LISTED IN APPENDIX A OF 29 CFR 1910.119 AS HIGHLY HAZARDOUS CHEMICALS. TSCA: MATERIALS ARE LISTED IN TSCA INVENTORY.
State Regulatory Information:NO DATA PROVIDED BY MANUFACTURER.

========== Other Information ==========

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particular situation.

INDUSTRIAL GAS DIVISION AIR PRODUCTS AND CHEMICALS, INC. -- OXYGEN, COMPRESSED -- 6830-01-169-3977

========== Product Identification ==========

Product ID:OXYGEN, COMPRESSED
MSDS Date:01/01/1995
FSC:6830
NIIN:01-169-3977
Status Code:A
MSDS Number: CKTPJ
=== Responsible Party ===
Company Name:INDUSTRIAL GAS DIVISION AIR PRODUCTS AND CHEMICALS, INC.
Address:7201 HAMILTON BLVD
City:ALLENTOWN
State:PA
ZIP:18195-1501
Country:US
Info Phone Num:215-481-4911
Emergency Phone Num:800-523-9374/610-481-7711
Resp. Party Other MSDS Num.:1012
CAGE:00742
=== Contractor Identification ===
Company Name:AIR PRODUCTS AND CHEMICALS INC
Address:7201 HAMILTON BLVD
Box:City:ALLENTOWN
State:PA
ZIP:18195-1501
Country:US
Phone:800-345-3148/ 800-752-1597
Contract Num:SP0450-00-M-SJ79
CAGE:00742

========== Composition/Information on Ingredients ==========

Ingred Name:OXYGEN
CAS:7782-44-7
RTECS #:RS2060000
> Wt:99.

========== Hazards Identification ==========

Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:TARGET ORGANS: EYES, CENTRAL NERVOUS SYSTEM. INHALATION: BREATHING 80% OR MORE OXYGEN AT ATMOSPHERIC PRESSURE FOR MORE THAN A FEW HOURS MAY CAUSE NASAL STUFFINESS, COUGH, SORE THROAT, CHEST PAIN & BRE ATHING DIFFICULTY. BREATHING OXYGEN AT HIGHER PRESSURE INCREASES THE LIKELIHOOD OF ADVERSE EFFECTS WITHIN A SHORTER TIME PERIOD. BREATHING PURE OXYGEN UNDER PRESSURE MAY CAUSE LUNG DAMAGE & ALSO CNS E FFECTS, AND MAY CAUSE PROLONGATION OF ADAPTATION TO DARKNESS AND REDUCED PERIPHERAL VISION.
Explanation of Carcinogenicity:OXYGEN IS NOT LISTED AS A CARCINOGEN OR POTENTIAL CARCINOGEN BY NTP, IARC, OR OSHA SUBPART Z.
Effects of Overexposure:BREATHING 80% OR MORE OXYGEN AT ATMOSPHERIC PRESSURE: NASAL STUFFINESS, COUGH, SORE THROAT, CHEST PAIN & BREATHING DIFFICULTY. BREATHING PURE OXYGEN UNDER PRESSURE MAY CAUSE LUNG DAMAGE & ALSO CNS EFF ECTS RESULTING IN DIZZINESS, POOR

COORDINATION, TINGLING SENSATION, VISUAL & HEARING DISTURBANCES, MUSCULAR TWITCHING, UNCONSCIOUSNESS & CONVULSIONS, MAY CAUSE PROLONGATION OF ADAPTATION TO DARKNESS & REDUCED PERIPHERAL VISION.

Medical Cond Aggravated by Exposure:PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE.

========== First Aid Measures ==========

First Aid:INHALATION: MOVE VICTIM TO FRESH AIR OR IF IN ELEVATED PRESSURES REDUCE OXYGEN PRESSURES TO ONE ATMOSPHERE. CALL A PHYSICIAN. THE PHYSICIAN SHOULD BE ADVISED THAT THE VICTIM HAS BEEN EXPOSED TO A HIGH CONCENTRATION OF OXYGEN. NO TREATMENT IS REQUIRED IN THE ABSENCE OF SYMPTOMS OF HIGH PRESSURE EXPOSURE. EYE/SKIN: NOT APPLICABLE. NOTES TO PHYSICIAN: ANIMAL STUDIES SUGGEST THAT THE ADMINISTRATION OF CERTAIN DRUGS, INCLUDING PHENOTHIAZINE DRUGS AND CHLOROQUINE, INCREASE THE SUSCEPTIBILITY TO TOXICITY FROM OXYGEN AT HIGH PRESSURES. ANIMAL STUDIES ALSO INDICATE THAT VITAMIN "E" DEFICIENCY (CONTINUE D TO TOXICOLOGICAL SECTION)

========== Fire Fighting Measures ==========

Flash Point:NONFLAMMABLE

Extinguishing Media:OXYGEN IS NONFLAMMABLE BUT WILL SUPPORT COMBUSTION. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

Fire Fighting Procedures:EVACUATE ALL PERSONNEL FROM THE DANGER AREA. IF POSSIBLE, SHUT OFF FLOW OF OXYGEN WHICH IS SUPPORTING THE FIRE. IMMEDIATELY COOL CONTAINERS WITH WATER SPRAY FROM MAXIMUM DISTANCE. WHEN COOL MOVE CYLIN DERS FROM FIRE AREA, IF POSSIBLE WITHOUT RISK. SELF CONTAINEED BREATHING APPARATUS MAY BE REQUIRED FOR RESCUE WORKERS.

Unusual Fire/Explosion Hazard:OXYGEN VIGOROUSLY ACCELERATES COMBUSTION. SOME MATERIALS WHICH ARE NONCOMBUSTIBLE IN AIR WILL BURN IN THE PRESENCE OF AN OXYGEN ENRICHED ATMOSPHERE (GREATER THEN 23%). FIRE RESISTANT CLOTHING MAY BURN AND OFFER NO PROTECTION IN OXYGEN RICH ATMOSPHERES. OXYGEN MAY FORM EXPLOSIVE COMPOUNDS WHEN EXPOSED TO COMBUSTIBLES.

========== Accidental Release Measures ==========

Spill Release Procedures:EVACUATE ALL PERSONNEL FROM AFFECTED AREA. SHUT OFF SOURCE OF OXYGEN IF POSSIBLE. INCREASE VENTILATION TO RELEASE AREA. PERSONNEL WHO HAVE BEEN EXPOSED TO HIGH CONCENTRATIONS OF OXYGEN SHOULD STAY IN A WELL-VENTILATED OR OPEN AREA FOR 30 MINUTES BEFORE GOING INTO A CONFINED SPACE OR NEAR AN IGNITION SOURCE. IF LEAK IS FROM CONTAINER OR ITS VALVE, CALL THE AIR PRODUCTS EMERGENCY TELEPHONE NUMBER.

========== Handling and Storage ==========

Handling and Storage Precautions:CYLINDERS SHOULD BE STORED UPRIGHT IN A WELL-VENTILATED, SECURE AREA, PROTECTED FROM THE WEATHER. STORAGE AREA TEMPERATURES SHOULD NOT EXCEED 125F (52C) AND AREA SHOULD BE FREE OF COMBUSTIBLE MATERIAL S. STORAGE SHOULD BE AWAY FROM HEAVILY TRAVELED AREAS AND EMERGENCY EXITS.

Other Precautions:SPECIAL REQUIREMENTS: ALWAYS STORE AND HANDLE COMPRESSED GASES IN ACCORDANCE WITH COMPRESSED GAS ASSOCIATION, INC. (PH. 703-412-0900) PAMPLET CGA P-1, SAFE HANDLING OF COMPRESSED GASES IN CONTAINERS. LOCAL REGULATIONS MAY REQUIRE

SPECIFIC EQUIPMENT FOR STORAGE OR USE.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:GENERAL USE: NONE REQUIRED. EMERGENCY: USE SCBA DUE TO POSSIBILITY OF FIRE WHEN CONCENTRATIONS EXCEED 23%.
Ventilation:PROVIDE VENTILATION AND/OR LOCAL EXHAUST TO PREVENT ACCUMULATION OF HIGH CONCENTRATIONS OF GAS (GREATER THAN 23%).
Protective Gloves:WORK GLOVES RECOMMENDED WHEN HANDLING CYLINDERS.
Other Protective Equipment:SAFETY SHOES RECOMMENDED WHEN HANDLING CYLINDERS.
Work Hygienic Practices:CLOTHING EXPOSED TO HIGH CONCENTRATIONS MAY RETAIN OXYGEN 30 MINUTES OR LONGER AND BECOME A POTENTIAL FIRE HAZARD. STAY AWAY FROM IGNITION SOURCES.
Supplemental Safety and Health
CAUTION:COMPRESSED GAS CYLINDERS SHALL NOT BE REFILLED EXCEPT BY QUALIFIED PRODUCERS OF COMPRESSED GASES. SHIPMENT OF A COMPRESSED GAS CYLINDER WHICH HAS NOT BEEN FILLED BY THE OWNER OR WITH THE OWNER 'S WRITTEN CONSENT IS A VIOLATION OF FEDERAL LAW. NSN FOR GAS ONLY: 6810-01-169-4836.

========== Physical/Chemical Properties ==========

HCC:G4
Boiling Pt:=-182.9C, -297.3F
Melt/Freeze Pt:=-218.8C, -361.9F
Vapor Pres:NOT APPLICABLE AT 70F
Spec Gravity:1.10
Solubility in Water:0.049
Appearance and Odor:COLORLESS GAS; ODORLESS.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
OILS, GREASE, HYDROCARBONS AND FLAMMABLE MATERIALS.
Stability Condition to Avoid:NONE.
Hazardous Decomposition Products:NONE
Conditions to Avoid Polymerization:WILL NOT OCCUR.

========== Toxicological Information ==========

Toxicological Information:FROM FIRST AID: VITAMIN E DEFICIAENCY MAY INCREASE SUSCEPTIBILITY TO OXYGEN TOXICITY. AIRWAY OBSTRUCTION DURING HIGH OXYGEN TENSION MAY CAUSE ALVEOLAR COLLAPSE FOLLOWING ABSORPTION OF THE OXYGEN. SIMI LARLY, OCCLUSION OF THE EUSTACHIAN TUBS MAY CAUSE RETRACTION OF THE EARDRUM AND OBSTRUCTION OF THE PARANASAL SINUS MAY PRODUCE "VACUUM-TYPE" HEADACHE. ALL INDIVIDUALS EXPOSED FOR LONG PERIODS TO OXYGE N AT HIGH PRESSURE AND WHO EXHIBIT OVERT OXYGEN TOXICITY SHOULD HAVE OPHTHALMOLOGIC EXAMINATIONS.

========== Ecological Information ==========

Ecological:ATMOSPHERE CONTAINS 21% OXYGEN. NO ADVERSE ECOLOGICAL EFFECTS ARE EXPECTED. OXYGEN DOES NOT CONTAIN ANY CLASS I CLASS II OZONE DEPLETING CHEMICALS. OXYGEN IS LISTED AS A MARINE POLLUTANT BY DOT (29 CF R 171).

========== Disposal Considerations ==========

Waste Disposal Methods:FOR EMERGENCY DISOSAL, SECURE CYLINDER AND SLOWLY DISCHARGE GAS TO THE ATMOSPHERE IN A WELL-VENTILATED AREA OR OUTDOORS. UNUSED PRODUCT/EMPTY CONTAINER:RETURN CONTAINER AND UNUSED PRODUCT TO SUPPLIER. DO NOT ATTEMPT TO DISPOSE OF RESIDUAL OR UNUSED QUANTITIES.

========== MSDS Transport Information ==========

Transport Information:PSN: OXYGEN, COMPRESSED, 2.2, UN1072. LABEL: NON-FLAMMABLE GAS, OXIDIZER.

========== Other Information ==========

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SCOTT SPECIALTY GASES -- ISOBUTYLENE IN AIR -- 6665-01-214-8247

========== Product Identification ==========

Product ID:ISOBUTYLENE IN AIR
MSDS Date:04/23/1992
FSC:6665
NIIN:01-214-8247
MSDS Number: BVRGC
=== Responsible Party ===
Company Name:SCOTT SPECIALTY GASES
Address:ROUTE 611 NORTH
City:PLUMSTEADVILLE
State:PA
ZIP:18949
Country:US
Info Phone Num:215-766-8861
Emergency Phone Num:215-766-8861; 908-754-7700
CAGE:51847
=== Contractor Identification ===
Company Name:SCOTT SPECIALTY GASES
Address:6141 EASTON RD (6141 ROUTE 611)
Box:310
City:PLUMSTEADVILLE
State:PA
ZIP:18934
Country:US
Phone:215-766-8861/ FAX: 215-766-0416
CAGE:51847

========== Composition/Information on Ingredients ==========

Ingred Name:PROPENE, 2-METHYL-; (ISOBUTYLENE)
CAS:115-11-7
RTECS #:UD0890000
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:AIR, REFRIGERATED LIQUID; AIR COMPRESSED (UN1002, DOT); AIR
REFRIGERATED LIQUID (CRYOGENIC LIQUID) (UN1003) (DOT)
RTECS #:AX5271000
OSHA PEL:N/K
ACGIH TLV:N/K

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:ACUTE:CONCENTRATION OF ISOBUTYLENE IS
THIS MIXTURE SHOULD NOT PRESENT ANY SYMPTOMS OF TOXICITY.
CHRONIC:NONE.
Explanation of Carcinogenicity:NOT RELEVANT
Effects of Overexposure:NONE SPECIFIED BY MANUFACTURER.
Medical Cond Aggravated by Exposure:NONE.

========== First Aid Measures ==========

First Aid:INGEST:CALL MD IMMEDIATELY . EYES:IMMEDIATELY FLUSH W/POTABLE

WATER FOR A MINIMUM OF 15 MINUTES, SEEK ASSISTANCE FROM MD . SKIN:FLUSH W/COPIOUS AMOUNTS OF WATER. CALL MD . INHAL:IMME DIATELY REMOVE VICTIM TO FRESH AIR. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

========== Fire Fighting Measures ==========

Flash Point:NONFLAMMABLE
Extinguishing Media:USE WHAT IS APPROPRIATE FOR SURROUNDING FIRE.
Fire Fighting Procedures:USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT . USE WATER SPRAY TO KEEP FIRE EXPOSED CYLINDERS COOL.
Unusual Fire/Explosion Hazard:COMPRESSED AIR AT HIGH PRESSURES WILL ACCELERATE THE BURNING OF FLAMMABLE MATERIALS.

========== Accidental Release Measures ==========

Spill Release Procedures:EVACUATE & VENTILATE AREA. REMOVE LEAKING CYLINDER TO EXHAUST HOOD OR SAFE OUTDOORS AREA IF THIS CAN BE DONE SAFELY.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE IN WELL VENTILATED AREAS ONLY. KEEP VALVE PROT CAP ON CYLS WHEN NOT IN USE & SECURE CYL WHEN USING TO PROT FROM FALLING.
Other Precautions:USE SUITABLE HAND TRUCK TO MOVE CYLS. PROT CYLS FROM PHYSICAL DMG. DO NOT DEFACE CYLS/LBLS. MOVE CYL W/ADEQ HAND TRUCK. CYL SHOULD BE REFILLED BY QUALIFIED PRODUCERS OF COMPRESSED GAS. SHIPMENT OF COM PRESSED GAS CYL WHICH HAS NOT (SUPDAT)

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:USE NIOSH/MSHA APPROVED SCBA IN CASE OF EMERGENCY OR NON-ROUTINE USE.
Ventilation:PROVIDE ADEQUATE GENERAL & LOCAL EXHAUST VENTILATION.
Protective Gloves:RUBBER GLOVES.
Eye Protection:ANSI APPROVED CHEM WORKERS GOGGS .
Other Protective Equipment:WEAR SAFETY SHOES. A SAFETY SHOWER & EYEWASH STATION SHOULD BE READILY AVAILABLE.
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health
OTHER PREC:BEEN FILLED BY OWNER OR WITH HIS WRITTEN CONSENT IS A VIOLATION OF FEDERAL LAW (49 CFR).

========== Physical/Chemical Properties ==========

HCC:G3
Boiling Pt:B.P. Text:-318F,-194C
Vapor Density:1.2
Spec Gravity:0.88 (H*2O=1)
Solubility in Water:INSOLUBLE
Appearance and Odor:COLORLESS GAS W/POSSIBLE SLIGHT OLEFINIC ODOR.
Percent Volatiles by Volume:100

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
NONE.
Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.

Hazardous Decomposition Products:NONE.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSAL MUST BE I/A/W FEDERAL, STATE & LOCAL REGULATIONS . RETURN CYLS TO SUPPLIER FOR PROPER DISP W/ANY VALVE OUTLET PLUGS/CAPS SECURED & VALVE PROT CAP IN PLACE. ALLOW GAS TO DISCHARGE AT SLO W RATE TO ATM IN UNCONFINED AREA/EXHST HOOD.

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FISHER SCIENTIFIC -- HYDROCHLORIC ACID 0.01 TO 2.0N, S70041-3, S71

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MSDS Safety Information

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FSC: 6810
NIIN: 01-467-0897
MSDS Date: 12/01/1999
MSDS Num: CLGVP
Product ID: HYDROCHLORIC ACID 0.01 TO 2.0N, S70041-3, S718255, S74856MF
MFN: 01
Responsible Party
Cage: IB464
Name: FISHER SCIENTIFIC
Address: 1 REAGENT LANE
City: FAIRLAWN NJ 07410
Info Phone Number: 201-796-7100
Emergency Phone Number: 201-796-7100
Resp. Party Other MSDS No.: ACC40067 SA481
Chemtrec IND/Phone: (800)424-9300
Review Ind: Y
Published: Y

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Contractor Summary

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Cage: IB464
Name: FISHER SCIENTIFIC CO
Address: 1 REAGENT LANE
City: FAIRLAWN NJ 07410
Phone: 201-796-7100

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Item Description Information

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Ingredients

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Cas: 7647-01-0
RTECS #: MW4025000
Name: HYDROCHLORIC ACID. (EINECS# 231-595-7)
% low Wt: .03
% high Wt: 6.1
Other REC Limits: 50 PPM NIOSH IDLH
OSHA PEL: C 7 MG/M3; C 5 PPM
ACGIH TLV: C 7.5 MG/M3; C 5 PPM
EPA Rpt Qty: 5000 LBS
DOT Rpt Qty: 5000 LBS

Cas: 7732-18-5
RTECS #: ZC0110000
Name: WATER. (EINECS# 231-791-2)
% low Wt: 92.3
% high Wt: 99.
Other REC Limits: NONE LISTED
OSHA PEL: NONE LISTED
OSHA STEL: NONE LISTED
ACGIH TLV: NONE LISTED
ACGIH STEL: NONE LISTED

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Health Hazards Data

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Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: YES
Carcinogenicity Inds - NTP: YES

IARC: YES
OSHA: YES
Effects of Exposure: DANGER! CORROSIVE. MAY BE HARMFUL IF SWALLOWED. MAY CAUSE SEVERE EYE IRRITATION AND POSSIBLE INJURY. CAUSES EYE AND SKIN IRRITATION AND POSSIBLE BURNS. CAUSES DIGESTIVE AND RESPIRATORY TRACT IRRITATIO N WITH POSSIBLE BURNS. TARGET ORGANS:NONE. EYE: MAY RESULT IN CORNEAL INJURY. MAY CAUSE PAINFUL SENSITIZATION TO LIGHT. MAY CAUSE CONJUNCTIVITIS. CAUSES EYE IRRIRTATION AND POSSIBLE BURNS. SKIN: MAY CAUSE PHOTOSENSITIZATION IN CERTAIN INDIVIDUALS. CAUSES SEVERE SKIN IRRITATION AND POSSIBLE BURNS. INGESTION: MAY CAUSE SEVERE GASTROINTESTINAL TRACT IRRITATION WITH NAUSEA, VOMITING AND POSSIBLE BURN S. (SIGNS AND SYMPTOMS OF OVEREXPOSURE)
Signs And Symptions Of Overexposure: HEALTH HAZARDS ACUTE AND CHRONIC (CONT): MAY BE HARMFUL IS SWALLOWED. INHALATION: MAY CAUSE BURNS TO THE RESPIRATORY TRACT. MAY CAUSE IRRITATION AND BURNING OF THE EYES, LACHRYMATION, COUGHING AND IR RITATION OF NOSE AND THROAT. CHRONIC: PROLONGED OR REPEATED SKIN CONTACT MAY CAUSE DERMATITIS. REPEATED EXPOSURE MAY CAUSE EROSION OF TEETH. MAY CAUSE CONJUNCTIVITIS AND PHOTOSENSITIZATION.
First Aid: EYES: GET MEDICAL AID IMMEDIATELY. DO NOT ALLOW VICTIM TO RUB OR KEEP EYES CLOSED. EXTENSIVE IRRIGATION IS REQUIRED (AT LEAST 30 MINS). SKIN: GET MEDICAL AID IMMEDIATELY. IMMEDIATELY FLUSH SKIN WITH P LENTY OF SOAP & WATER FOR AT LEAST 15 MINS WHILE REMOVING CONTAMINATED CLOTHING & SHOES. WASH CLOTHING BE REUSE. INGESTION: NEVER GIVE ANYTHING BY MOUTHT AN UNCONSCIOUS PERSON. GET MEDICAL AID IMMEDIA TELY. DO NOT INDUCE VOMITING. IF CONSCIOUS AND ALERT, RINSE MOUTH AND DRINK 2-4 CUPFULS OF MILK OR WATER. INHALATION: REMOVE FROM EXPOSURE TO FRESH AIR IMMEDIATELY. IF NOT BREATHING, GIVE ARTIFICIAL R ESPIRATION. (SPILL RELEASE PROCEDURES)

Handling and Disposal

Spill Release Procedures: USE PROPER PERSONAL PROTECTIVE EQUIPMENT AS INDICATED IN CONTROL MEASURES. LARGE SPILLS MAY BE NEUTRALIZED WITH DILUTE ALKALINE SOLUTIONS OF SODA ASH OR LIME. SWEEP UP OR ABSORB MATERIAL, THEN PLACE I NTO A SUITABLE CLEAN, DRY, CLOSED CONTAINER FOR DISPOSAL. PROVIDE VENTALATION. FIRSTAID (CONT): IF BREATHING IS DIFFICULT, GIVE OXYGEN. GET MEDICAL AID. NOTES TO PHYSICIAN: TREAT SYMPTOMATICALLY.
Waste Disposal Methods: DISPOSE OF IN A MANNER CONSISTENT WITH FEDERAL, STATE AND LOCAL REGULATIONS. RCRA P-SERIES: NONE LISTED. RCRA U-SERIES: NONE LISTED.
Handling And Storage Precautions: HANDLING: WASH THOROUGHLY AFTER HANDLING. REMOVE CONTAMINATED CLOTHING AND WASH BEFORE REUSE. USE ONLY IN A WELL VENTILATED AREA. DO NOT GET IN EYES, ON SKIN OR ON CLOTHING. DO NOT INGEST OR INHALE. D O NOT ALLOW CONTACT WITH WATER. STORAGE: DO NOT STORE IN DIRECT SUNLIGHT. (OTHER PRECAUTIONS).
Other Precautions: HANDLING AND STORAGE PRECAUTIONS: (CONT): KEEP CONTAINERS CLOSED WHEN NOT IN USE. STORE IN A COOL, DRY, WELL VENTILATED AREA AWAY FROM INCOMPATIBLE SUBTANCES. CORROSIVES AREA.

Fire and Explosion Hazard Information

Extinguishing Media: SUBSTANCE IS NONFLAMMABLE; USE AGENT MOST APPROPRIATE TO EXTINGUISH SURROUNDING FIRE. IN CASE OF FIRE USE WATER SPRAY, DRY CHEMICAL, CARBON DIOXIDE, (UNUSUAL FIRE & EXPLOSION HAZARD)
Fire Fighting Procedures: AS IN ANY FIRE, WAER A SELF-CONTAINED BREATHING APPARATUS IN PRESSURE-DEMAND, NIOSH (APPROVED OR EQUIVALENT), AND FULL PROTECTIVE GEAR. NOT FLAMMABLE, BUT REACTS WITH MOST METALS TO FORM FLAMMABLE HYD ROGEN GAS. USE WATER SPRAY TO KEEP FIRE-EXPOSED CONTAINERS COOL.
Unusual Fire/Explosion Hazard: N/P. EXTINGUISHING MEDIA (CONT): OR ALCOHOL-RESISTANT FOAM. DO NOT GET WATER INSIDE CONTAINERS.

Control Measures

Respiratory Protection: FOLLOW THE OSHA RESPIRATOR REGULATIONS FOUND IN 29CFR1910.134 OR EUROPEAN STANDARD EN 149. ALWAYS USE A NIOSH OR EUROPEAN

STANDARD EN 149 APPROVED RESPIRATOR WHEN NECESSARY. EXPOSURE LIMITS: (SEE INGREDIENTS SECTION - FP N). OSHA VACATED PELS: HYDROCHLORIC ACID: NO OSH VACATED PELS FOR THIS CHEMICAL. WATER: NO OSHA VACATED PELS FOR THIS CHEMICAL.
Ventilation: USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP AIRBORNE CONCENTRATIONS BELOW THE PERMISSABLE EXPOSURE LIMITS.
Protective Gloves: WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT SKIN EXPOSURE.
Eye Protection: WEAR APPROPRIATE CHEMICAL SAFETY GOGGLES AS (SUPPLEMENTAL SAFETY & HEALTH)
Other Protective Equipment: WEAR APPROPRIATE PROTECTIVE CLOTHING TO PREVENT SKIN EXPOSURE.
Supplemental Safety and Health: CONTROL MEASURES (CONT): DESCRIBED BY OSHA'S EYE & FACE PROTECTION REGULATIONS IN 29 CFR 1910.133 OR EUROPEAN STANDARD EN166. PHYSICAL / CHEMICAL PROPERTIES (CONT): DECOMPOSITION TEMPERATURE: N OT AVAILABLE. MOLECULAR FORMULA: HCL. MOLECULAR WEIGHT: 36.46.

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Physical/Chemical Properties

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HCC: C1
Boiling Point: =100.C, 212.F
Melt/Freeze Pt: =0.C, 32.F
Vapor Pres: NOT AVAILABLE
Spec Gravity: 1.0 -1.2
PH: 1.1 (0.1N SOL)
Viscosity: NOT AVAILABLE
Evaporation Rate & Reference: >1
Solubility in Water: SOLUBLE IN WATER.
Appearance and Odor: CLEAR, COLORLESS LIQUID. PUNGENT ODOR.

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Reactivity Data

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Stability Indicator: YES INE, (ECOLOGICAL INFO)
Stability Condition To Avoid: INCOMPATIBLE MATERIALS, LIGHT.
Materials To Avoid: ACETATE, ACETIC ANHYDRIDE,ALCOHOLS + HYDROGEN CYANIDE, 2-AMINOETHANOL, AMMONIUM HYDROXIDE, CALCIUM CARBIDE, CALCIUM PHOSHIDE, CESIUM ACETYLENE CARBIDE, CESIUM CARBIDE, CHLOROSULFONIC ACID, 1,1-DIFLUOROETHYLENE, ETHYLENE DIA
Hazardous Decomposition Products: HYDROGEN CHLORIDE, HYDROGEN GAS.
Hazardous Polymerization Indicator: NO

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Toxicological Information

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Toxicological Information: LD50 / LC50: CAS# 7647-01-0: INHAL, MOUSE: LC50=1108 PPM/1H; INHAL, RAT: LC50 = 3124 PPM/1H; ORAL, RABBIT: LD50=900 MG/KG. CAS# 7732-18-5: ORAL, RAT: LD50 = >90 ML/KG. CARCINOGENICITY: HYDROCHLORI C ACID - IARC: GROUP 3 CARCINOGEN. WATER - NOT LISTED BY ACGIH, IARC, NIOSH, NTP OR OSHA. EPIDEMIOLOGY: NO INFORMATION AVAILABLE. TERATOGENICITY: EMBRYO OR FETUS: STUNTED FETUS, INHALATION, RAT TC LO = 450 MG/M3/1H SPECIFIC DEVELOPMENTAL ABNORMALITIES: HOMEOSTASIS, INHALATION, RAT TCLO = 450 MG/M3/1H. REPRODUCTIVE EFFECTS: NO INFORMATION AVAILABL. NEUROTOXICITY: NO INFO AVAIL. MUTAGENICITY: N O INFO AVAILABLE. OTHER STUDIES: NONE.

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Ecological Information

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Ecological: ECOTOXICITY: TROUT LC100=10 MG/L/24H SHRIMP LC50=100-330 PPM STARFISH LC50=100-330MG/L/48H SHORE CRAB LC50=240 MG/L/48H CHRONIC PLANT TOXICITY=100 PPM. ENVIROMENTAL FATE: SUBSTANCE WILL NEUTRALIZE S OIL CARBONATE-BASED COMPONENTS. PHYSICAL/CHEMICAL: NO INFORMATION AVAILABLE. OTHER: NONE. MATERIALS TO AVOID (CONT): ETHYLENEIMINE, FLUORINE, LITHIUM SILICIDE, MAGNESIUM BORIDE, MERCURIC SULFA TE, OLEUM, PERCHLORIC ACID, POTASSIUM PERMANGANATE,B-PROPIOLACTONE, PROPYLENE OXIDE, RUBIDUM ACETYLENE CARBIDE, RUBIDUM CARBIDE, SILVER PERCHLORATE + CARBON

TETRACHLORIDE, SODIUM, SODIUM HYDROXIDE, S ULFURIC ACID, URANIUM (TRANSPORT INFO)

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MSDS Transport Information

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Transport Information: US DOT: SHIPPING NAME: HYDROCHLORIC ACID. HAZARD CLASS: 8. UN NUMBER: UN1789. PACKING GROUP: II. IMO: NOT REGULATED AS A HAZARDOUS MATERIAL. IATA: NOT REGULATED AS A HAZARDOUS MATERIAL. RID/ADR: NOT REGULATED AS A HAZARDOUS MATERIAL. CANADIAN TDG: SHIPPING NAME: HYDROCHLORIC ACID SOLUTION. HAZARD CLASS: 8(9.2). UN NUMBER: UN1789. ECOLOGICAL INFO (CONT): PHOSPHIDE, VINYL ACETATE. SUB STANCE POLYMERIZES ON CONTACT WITH ALDEHYDES OR EPOXIDES.

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Regulatory Information

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Sara Title III Information: SECTION 302 (RQ): CAS # 7647-01-0: FINAL RQ = 5000 POUNDS (2270 KG). SECTION 302 (TPQ) CAS# 7647-01-0: TPQ =500 POUNDS; RQ = 5000 POUNDS (DOES NOT MEET TOXICITY CRITERIA BUT BECAUSE OF HIGH PRODUCTIO N VOLUME AND RECOGNIZED TOXICITY IS CONSIDERED A CHEMICAL CONCERN). SARA CODES: CAS# 7647-01-0: ACUTE. SECTION 313: THIS CHEMICAL IS NOT A HIGH ENOUGH CONCENTRATION TO BE REPORTABLE UNDER SECTION 313 . NO CHEMICALS ARE REPORTABLE UNDER SECTION 313.

Federal Regulatory Information: TSCA: CAS# 7647-01-0 IS LISTED ON THE TSCA INVENTORY. CAS# 7732-18-5 IS LISTED ON THE TSCA INVENTORY. HEALTH AND SAFETY REPORTING LIST: NONE OF THE CHEMICALS ARE ON THE HEALTH AND SAFETY REPORTING LI ST. CHEMICAL TEST RULES:NONE OF HE CHEMICALS IN THIS PRODUCT ARE UNDER A CHEMICAL TEST RULE. SECTION 12B: NONE OF THE CHEMICALS ARE LISTED UNDER TSCA SECTION 12B. TSCA SIGNIFICANT NEW USE RULE: NONE OF THE CHEMICALS IN THIS MATERIAL HAVE A SNUR UNDER TSCA. CLEAN AIR ACT: CAS# 7647-01-0 IS LISTED AS A HAZARDOUS AIR POLLUTANT (HAP). THIS MATERIAL DOES NOT CONTAIN ANY CLASS 1 OZONE DEPLETORS. THIS MATERIAL DOES NOT (OTHER INFORMATION)

State Regulatory Information: HYDROCHLORIC ACID CAN BE FOUND ON THE FOLLOWING STATE RIGHT TO KNOW LISTS: CALIFORNIA, NEW JERSEY, FLORIDA, PENNSYLVANIA, MINNESOTA, MASSACHUSETTS. WATER IS NOT PRESENT ON STATE LISTS FROM CA, PA, MN , FL OR NJ. CALIFORNIA NO SIGNIFICANT RISK LEVEL: NONE OF THE CHEMICALS IN THIS PRODUCT ARE LISTED. EUROPEAN / INTERNATIONAL REGULATIONS: EUROPEAN LABELING IN ACCORDANCE WITH EC DIRECTIVES. HAZARD SYMBOLS: NOT AVAILABLE. RISK PHASES: N/P. SAFETY PHASES: N/P. WGK (WATER DANGER / PROTECTION): CAS # 7647-01-0: 1, CAS# 7732-18-5: NO INFORMATION AVAILABLE. CANADA: CAS# 7647-01-0 IS LISTED ON CANADA'S DSL/NDSL LIST. (OTHER INFORMATION)

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Other Information

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Other Information: SYNONYMS: CHLOROHYDIC ACID, HYDROGEN CHLORIDE, MURIATIC ACID, SPIRITS OF SALT. FEDERAL REGS (CONT): CONTAIN ANY CLASS 2 OZONE DEPLETORS. CLEAN WATER ACT: CAS# 7647-01-0 IS LISTED AS A HAZARDOUS S UBSTANCE UNDER THE CWA. NONE OF THE CHEMS IN THIS PRODUCT ARE LISTED AS PRIORITY POLLUTANTS UNDER THE CWA. NONE OF THE CHEMS IN THIS PRODUCT ARE LISTED AS TOXIC POLLUTANTS UNDER THE CWA. STATE REG S (CONT): CSA# 7732-18-5 IS LISTED ON CANADA'S DSL/NDSL LIST. THIS PRODUCT HAS A W CLASS OF E. CAS# 7647-01-0 IS NOT LISTED ON CANADA'S INGREDIENT DISCLOSURE LIST. CAS# 7732-18-5 IS NOT LISTED ON CANADA'S INGREDIENT DISCLOSURE LIST.

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HAZCOM Label

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Product ID: HYDROCHLORIC ACID 0.01 TO 2.0N, S70041-3, S718255, S74856MF
Cage: IB464
Company Name: FISHER SCIENTIFIC CO
Street: 1 REAGENT LANE
City: FAIRLAWN NJ
Zipcode: 07410
Health Emergency Phone: 201-796-7100
Label Required IND: Y

Date Of Label Review: 07/12/2001
Status Code: A
Origination Code: G
Hazard And Precautions: DANGER! CORROSIVE. MAY BE HARMFUL IF SWALLOWED. MAY CAUSE SEVERE EYE IRRITATION AND POSSIBLE INJURY. CAUSES EYE AND SKIN IRRITATION AND POSSIBLE BURNS. CAUSES DIGESTIVE AND RESPIRATORY TRACT IRRITATIO N WITH POSSIBLE BURNS. TARGET ORGANS:NONE. EYE: MAY RESULT IN CORNEAL INJURY. MAY CAUSE PAINFUL SENSITIZATION TO LIGHT. MAY CAUSE CONJUNCTIVITIS. CAUSES EYE IRRIRTATION AND POSSIBLE BURNS. SKIN: MAY CAUSE PHOTOSENSITIZATION IN CERTAIN INDIVIDUALS. CAUSES SEVERE SKIN IRRITATION AND POSSIBLE BURNS. INGESTION: MAY CAUSE SEVERE GASTROINTESTINAL TRACT IRRITATION WITH NAUSEA, VOMITING AND POSSIBLE BURN S. (SIGNS AND SYMPTOMS OF OVEREXPOSURE)
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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

ALCONOX

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

Section 1 - Product and Company Identification
ALCONOX

Product Identification: ALCONOX
Date of MSDS: 08/14/1992 **Technical Review Date:** 09/28/1992
FSC: 6505 **NIIN:** 00-839-8894
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ALCONOX INC
Manufacturer's Address1: 215 PARK AVE S
Manufacturer's Address2: NEW YORK, NY 10003
Manufacturer's Country: US
General Information Telephone: 212-473-1300
Emergency Telephone: 212-473-1300
Emergency Telephone: 212-473-1300
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 17534
Special Project Code: N

Item Description

Item Name: DETERGENT,SURGICAL INSTRUMENT
Item Manager: NK
Specification Number: NK
Type/Grade/Class: NK
Unit of Issue: NK **Quantitative Expression:** NK
Unit of Issue Quantity: NK
Type of Container:

Contractor Information

Contractor's Name: ALCONOX INC
Contractor's Address1: 9 EAST 40TH STREET, SUITE 200
Contractor's Address2: NEW YORK, NY 10016
Contractor's Telephone: 212-532-4040
Contractor's CAGE: 17534

Section 2 - Compositon/Information on Ingredients
ALCONOX

Ingredient Name: ALCONOX
Ingredient CAS Number: Ingredient CAS Code: X
RTECS Number: RTECS Code: X
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: N/K
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: NOT APPLICABLE **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:

ACGIH TLV: NOT APPLICABLE **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Section 3 - Hazards Identification, Including Emergency Overview
ALCONOX

Health Hazards Acute & Chronic: PROLONGED EXPOSURE TO DUST MAY IRRITATE MUCOUS MEMBRANES.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:
Inhalation: YES
Skin: NO
Ingestion: NO

Carcenogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures
ALCONOX

First Aid:
EYES: FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MIN. SKIN: FLUSH WITH PLENTY OF WATER. INGEST: DRINK LARGE QTY OF WATER TO DILUTE MATERIAL. GET MED ATTN FOR DISCOMFORT. INHAL: REMOVE TO FRESH AIR. SU PPORT BRTHG (GIVE O*2/ARTF RESP) (FP N).

Section 5 - Fire Fighting Measures
ALCONOX

Fire Fighting Procedures:
WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire or Explosion Hazard:
NONE.
Extinguishing Media:
WATER, CARBON DIOXIDE, DRY CHEMICAL, FOAM SAND/EARTH.
Flash Point: Flash Point Text: NONE

Autoignition Temperature:

Autoignition Temperature Text: N/A
Lower Limit(s): N/A
Upper Limit(s): N/A

Section 6 - Accidental Release Measures
ALCONOX

Spill Release Procedures:
MATERIAL FOAMS PROFUSELY, SHOVEL & RECOVER AS MUCH AS POSSIBLE. RINSE REMAINDER TO SEWER. MATERIAL IS COMPLETELY BIODEGRADABLE.

Section 7 - Handling and Storage
ALCONOX

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
ALCONOX

Repiratory Protection:
NIOSH/MSHA APPROVED DUST MASK.
Ventilation:
LOCAL EXHAUST: NORMAL.
Protective Gloves:
IMPERVIOUS GLOVES (FP N).
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: NOT REQUIRED.
Work Hygenic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Health & Safety Information: NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties
ALCONOX

HCC:
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: N/A
Melting/Freezing Point: Melting/Freezing Text: N/K
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/A **Vapor Density:** N/A
Percent Volatile Organic Content:
Specific Gravity: N/A
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: NOT APPLICABLE
Solubility in Water: APPRECIABLE
Appearance and Odor: WHITE POWDER INTERSPERSED W/CREAM COLORED FLAKES-ODORLESS

Percent Volatiles by Volume: N/A
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
ALCONOX

Stability Indicator: YES
Materials to Avoid:
AVOID STRONG ACIDS.
Stability Condition to Avoid:
NONE.
Hazardous Decomposition Products:
MAY RELEASE CARBON DIOXIDE GAS ON BURNING.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT

Section 11 - Toxicological Information
ALCONOX

Toxicological Information:
N/P

Section 12 - Ecological Information
ALCONOX

Ecological Information:
N/P

Section 13 - Disposal Considerations
ALCONOX

Waste Disposal Methods:
SMALL QTY MAY BE DISPOSED OF IN SEWER. LARGE QTY SHOULD BE DISPOSED OF ACCORDING TO LOCAL, FEDERAL & STATE REQUIREMENTS FOR NON-HAZARDOUS DETERGENT.

Section 14 - MSDS Transport Information
ALCONOX

Transport Information:
N/P

Section 15 - Regulatory Information
ALCONOX

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
ALCONOX

Other Information:
N/P

HMIS Transportation Information

Product Identification: ALCONOX
Transporation ID Number: 88154
Responsible Party CAGE: 17534
Date MSDS Prepared: 08/14/1992
Date MSDS Reviewed: 02/22/1993
MFN: 02/22/1993
Submitter: N TN
Status Code: C

Container Information

Unit of Issue: NK
Container Quantity: NK
Type of Container:
Net Unit Weight:

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:
NOT REGULATED FOR TRANSPORTATION

Department of Transportation Information

DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
DOT PSN Code: ZZZ
Symbols: N/R
DOT PSN Modifier:
Hazard Class: N/R
UN ID Number: N/R
DOT Packaging Group: N/R
Label: N/R
Special Provision(s): N/R
Packaging Exception: N/R
Non Bulk Packaging: N/R
Bulk Packaging: N/R
Maximimum Quanity in Passenger Area: N/R
Maximimum Quanity in Cargo Area: N/R
Stow in Vessel Requirements: N/R
Requirements Water/Sp/Other: N/R

IMO Detail Information

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO PSN Modifier:
IMDG Page Number: N/R
UN Number: N/R
UN Hazard Class: N/R
IMO Packaging Group: N/R
Subsidiary Risk Label: N/R
EMS Number: N/R
Medical First Aid Guide Number: N/R

IATA Detail Information

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA PSN Modifier:
IATA UN Id Number: N/R
IATA UN Class: N/R
Subsidiary Risk Class: N/R
UN Packaging Group: N/R
IATA Label: N/R
Packaging Note for Passengers: N/R
Maximum Quantity for Passengers: N/R
Packaging Note for Cargo: N/R
Maximum Quantity for Cargo: N/R
Exceptions: N/R

AFI Detail Information

AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Symbols:
AFI PSN Code: ZZZ
AFI PSN Modifier:
AFI UN Id Number: N/R
AFI Hazard Class: N/R
AFI Packing Group: N/R
AFI Label: N/R
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: ALCONOX
CAGE: 17534
Assigned Individual: N
Company Name: ALCONOX INC
Company PO Box:
Company Street Address1: 9 EAST 40TH STREET, SUITE 200
Company Street Address2: NEW YORK, NY 10016 US
Health Emergency Telephone: 212-473-1300
Label Required Indicator: Y
Date Label Reviewed: 09/18/1992
Status Code: C
Manufacturer's Label Number:
Date of Label: 09/18/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES

Respiratory Protection Indicator: YES
Signal Word: CAUTION
Health Hazard: Slight
Contact Hazard: Slight
Fire Hazard: None
Reactivity Hazard: None

8/8/2002 12:40:10 AM

Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

ACETONE

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
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Section 1 - Product and Company Identification
ACETONE

Product Identification: ACETONE
Date of MSDS: 01/01/1985 **Technical Review Date:** 07/03/1999
FSC: 6810 **NIIN:** 01-015-8437
Submitter: D DG
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ALLIED CHEMICAL CORP
Post Office Box: 1087R
Manufacturer's Address1: COLUMBIA RD & PARK AVE
Manufacturer's Address2: MORRISTOWN, NJ 07960
Manufacturer's Country: US
General Information Telephone:
Emergency Telephone: NONE
Emergency Telephone: NONE
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 1L168
Special Project Code: N

Item Description

Item Name: ACETONE,ACS
Item Manager: S9G
Specification Number: O-C-265
Type/Grade/Class: NONE
Unit of Issue: CN **Quantitative Expression:** 00000000005GL
Unit of Issue Quantity: 0
Type of Container: 1A1 METAL

Contractor Information

Contractor's Name: ALLIED CHEMICAL COMPANY
Post Office Box: 1087R
Contractor's Address1: UNKNOWN
Contractor's Address2: UNKNOWN, NK 00000
Contractor's Telephone: UNKNOWN
Contractor's CAGE: 1L168

Contractor Information

Contractor's Name: ALLIED-SIGNAL INC
Post Office Box: 2332R
Contractor's Address1:
Contractor's Address2: MORRISTOWN, NJ 07962-2332
Contractor's Telephone: 201-455-4414
Contractor's CAGE: 1L164

Section 2 - Compositon/Information on Ingredients
ACETONE

Ingredient Name: ACETONE (SARA III)
Ingredient CAS Number: 67-64-1 **Ingredient CAS Code:** M
RTECS Number: AL3150000 **RTECS Code:** M

=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 100
% Enviromental Weight:
Other REC Limits: N/P
OSHA PEL: 1000PPM **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 750PPM/1000STEL;9293 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 5000 LBS
DOT Reporting Quantity: 5000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
ACETONE

Health Hazards Acute & Chronic: N/P

Signs & Symptoms of Overexposure:
IRRTNT TO EYES,SKIN,MUCOUSA.INGEST:GI IRRTNT,NARCOSIS,KID/LIV DAMAGE.INHAL:HEADACH,NAUS,DROWSNS,COMA

Medical Conditions Aggravated by Exposure:
N/P

LD50 LC50 Mixture: N/P

Route of Entry Indicators:
- **Inhalation:** N/P
- **Skin:** N/P
- **Ingestion:** N/P

Carcenogenicity Indicators
- **NTP:** N/P
- **IARC:** N/P
- **OSHA:** N/P

Carcinogenicity Explanation: N/P

Section 4 - First Aid Measures
ACETONE

First Aid:
EYES:FLUSH COPIOUSLY W H*2O.SKIN:WASH W SOAP & WATER.REMOVE CONTAMINATED CLOTHES,INHALED:REMOVE TO FRESH AIR.GIV CPR/O*2 IF NEED.INGEST:GIV 2 TBLSPNS SYRUP IPECAC FOLLOWED BY 3/4 GLASS H*2O.REPEAT IF NO VOMIT IN 20 MIN.CALL DR. AT ONCE.

Section 5 - Fire Fighting Measures
ACETONE

Fire Fighting Procedures:
USE H*2O SPRAY TO COOL EXPOSED CONT.WEAR SELF-CNTND BRTHG AP
Unusual Fire or Explosion Hazard:
EXTREMELY FLAMMABLE.VAPORS FORM EXPLOSV MIX IN AIR.DANGER WHEN EXPOSD TO HEAT,SPARKS,FLAME,OXIDANTS.
Extinguishing Media:
SM FIRE:CO*2,DRY CHEM;LG FIRE:ALC FOAM,H*2O SPRAY REDUC FLAM
Flash Point: Flash Point Text: 1.4F/-17C CC

Autoignition Temperature:
Autoignition Temperature Text: 869F
Lower Limit(s): 2.15
Upper Limit(s): 13

Section 6 - Accidental Release Measures
ACETONE

Spill Release Procedures:
STOP LEAK IF POSSIBLE.ELIMINATE IGNIT.SOURCES.ISOLATE SPILL AREA.COLLECT IN WASTE CONT.FLUSH AREA W H*2O.WASH CONTAMINATED EQUIP W H*2O.DIKE LG SPILL TO PREVENT ENTRY TO WATER WAY.REPORT SPILLS TO LOC AL,STATE,FED AUTHORITIES.ADEQUATELY VENTILATE AREA

Section 7 - Handling and Storage
ACETONE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
ACETONE

Repiratory Protection:
<5000 PPM:GAS MSK W ORG.CONSTR;<10,000 PPM-ESCAP:SELF-CNTND BTHG APP
Ventilation:
LOCAL/MECHAN TO MAINTN EXPOS **Protective Gloves:**
RUBBER/NEOPRENE
Eye Protection: SAFETY GLASSES/GOGGLES
Other Protective Equipment: SAFETY SHOES,HARD HAT,FACE SHIELD,SPECIAL PROTECTVE CLOTHES.

Work Hygenic Practices: N/P
Supplemental Health & Safety Information: N/P

Section 9 - Physical & Chemical Properties
ACETONE

HCC: F2
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 133F/56.2C
Melting/Freezing Point: Melting/Freezing Text: N/A
Decomposition Point: Decomposition Text: N/A
Vapor Pressure: 181 **Vapor Density:** 2.0
Percent Volatile Organic Content:
Specific Gravity: 0.79
Volatile Organic Content Pounds per Gallon:
pH: N/P
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: >7.0(BU ACETONE)
Solubility in Water: COMPLETE
Appearance and Odor: COLORLESS LIQUID;SWEET PUNGENT ODOR.
Percent Volatiles by Volume: 100
Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data
ACETONE

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDIZING AGENTS
Stability Condition to Avoid:
HEAT,SPARKS AND OPEN FLAME.
Hazardous Decomposition Products:
COMPLETE BURN:CO*2,H*2O;INCOMPLETE BURN:CAN PRODUCE CO.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NONE

Section 11 - Toxicological Information
ACETONE

Toxicological Information:
N/P

Section 12 - Ecological Information
ACETONE

Ecological Information:
N/P

Section 13 - Disposal Considerations

ACETONE

Waste Disposal Methods:
WASTE MATERIAL SHOULD BE TREATED/DISPOSED AT AUTHORIZED WASTE SITE.CONTACT APPROP LOCAL,STATE,FED REGS BEFORE DISPOSAL.

Section 14 - MSDS Transport Information
ACETONE

Transport Information:
N/P

Section 15 - Regulatory Information
ACETONE

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
ACETONE

Other Information:
N/P

HMIS Transportation Information

Product Identification: ACETONE
Transporation ID Number: 98735
Responsible Party CAGE: 1L168
Date MSDS Prepared: 01/01/1985
Date MSDS Reviewed: 09/02/1982
MFN: 09/02/1982
Submitter: D DG
Status Code: C

Container Information
- **Unit of Issue:** CN
- **Container Quantity:** 0
- **Type of Container:** 1A1 METAL
- **Net Unit Weight:**

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:

DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:
MFGR STATES(1 SEPT 82) IATA/IMCO PROPER SHIPPING NAME:ACETONE;CLASS-FLAMMABLE LIQUID.FLASHPOINT FROM MFGR: -17C CC.

Department of Transportation Information

DOT Proper Shipping Name: ACETONE
DOT PSN Code: ABF
Symbols:
DOT PSN Modifier:
Hazard Class: 3
UN ID Number: UN1090
DOT Packaging Group: II
Label: FLAMMABLE LIQUID
Special Provision(s): T8
Packaging Exception: 150
Non Bulk Packaging: 202
Bulk Packaging: 242
Maximimum Quanity in Passenger Area: 5 L
Maximimum Quanity in Cargo Area: 60 L
Stow in Vessel Requirements: B
Requirements Water/Sp/Other:

IMO Detail Information

IMO Proper Shipping Name: ACETONE
IMO PSN Code: ADF
IMO PSN Modifier:
IMDG Page Number: 3102
UN Number: 1090
UN Hazard Class: 3.1
IMO Packaging Group: II
Subsidiary Risk Label: -
EMS Number: 3-06
Medical First Aid Guide Number: 300

IATA Detail Information

IATA Proper Shipping Name: ACETONE
IATA PSN Code: ACM
IATA PSN Modifier:
IATA UN Id Number: 1090
IATA UN Class: 3
Subsidiary Risk Class:
UN Packaging Group: II
IATA Label: FLAMMABLE LIQUID
Packaging Note for Passengers: 305
Maximum Quantity for Passengers: 5L
Packaging Note for Cargo: 307
Maximum Quantity for Cargo: 60L

Exceptions:

AFI Detail Information

AFI Proper Shipping Name: ACETONE
AFI Symbols:
AFI PSN Code: ACM
AFI PSN Modifier:
AFI UN Id Number: UN1090
AFI Hazard Class: 3
AFI Packing Group: II
AFI Label: FLAMMABLE LIQUID
Special Provisions: P5
Back Pack Reference: A7.3

HAZCOM Label Information

Product Identification: ACETONE
CAGE: 1L168
Assigned Individual: N
Company Name: ALLIED CHEMICAL COMPANY
Company PO Box: 1087R
Company Street Address1: UNKNOWN
Company Street Address2: UNKNOWN, NK 00000 NK
Health Emergency Telephone:
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: F
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

BENZENE

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification
BENZENE

Product Identification: BENZENE
Date of MSDS: 01/01/1985 **Technical Review Date:** 02/29/1984
FSC: 6810 **NIIN:** 00-973-8588
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: BURDICK & JACKSON LAB (SEE SUP DATA)
Manufacturer's Address1: 1953 S HARVEY STREET
Manufacturer's Address2: MUSKEGON, MI 49442-6101
Manufacturer's Country: US
General Information Telephone: 616-726-3171
Emergency Telephone: 616-726-3171
Emergency Telephone: 616-726-3171
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: BURDI
Special Project Code: N

Item Description

Item Name: BENZENE,ACS
Item Manager:
Specification Number: NK
Type/Grade/Class: NK
Unit of Issue:
Unit of Issue Quantity:
Type of Container: BOTTLE,GLASS

Contractor Information

Contractor's Name: BURDICK & JACKSON, INC.
Contractor's Address1: 1953 S. HARVEY STREET
Contractor's Address2: MUSKEGON, MI 49442
Contractor's Telephone: 616-726-3171
Contractor's CAGE: BURDI

Contractor Information

Contractor's Name: BURDICK AND JACKSON DIV OF BAXTER HEALTHCARE CORP.
Contractor's Address1: 1953 S HARVEY STREET
Contractor's Address2: MUSKEGON, MI 49442-6101
Contractor's Telephone: 616-726-3171, CHEMTREC 800-424-9300
Contractor's CAGE: 2H215

Section 2 - Compositon/Information on Ingredients
BENZENE

Ingredient Name: BENZENE (SARA III)
Ingredient CAS Number: 71-43-2 **Ingredient CAS Code:** M
RTECS Number: CY1400000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:

>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: >90
% Enviromental Weight:
Other REC Limits: N/P
OSHA PEL: 1PPM/5STEL;1910.1028 **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 10 PPM; A2; 9192 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 10 LBS
DOT Reporting Quantity: 10 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
BENZENE

Health Hazards Acute & Chronic: N/P

Signs & Symptoms of Overexposure:
EYE: IRRIT. VAPOR: DIZZY,NAUSEA,INCOORDINATION,STUPOR,UNCONSCIOUSNESS & CHANGE IN BLOOD COMPOSITION.

Medical Conditions Aggravated by Exposure:
N/P

LD50 LC50 Mixture: N/P

Route of Entry Indicators:
- **Inhalation:** N/P
- **Skin:** N/P
- **Ingestion:** N/P

Carcenogenicity Indicators
- **NTP:** N/P
- **IARC:** N/P
- **OSHA:** N/P

Carcinogenicity Explanation: N/P

Section 4 - First Aid Measures
BENZENE

First Aid:
EYE: FLUSH WITH WATER 15 MIN,GET MED ATTN. INHALATION: REMOVE FROM EXPOSURE,GIVE ARTIFICIAL RESPIRATION IF NEEDED,GET MEDICAL ASSISTANCE.

Section 5 - Fire Fighting Measures
BENZENE

Fire Fighting Procedures:
SELF-CONT BREATH APP,WATER FOG TO COOL EXPOSED CONTAINERS.
Unusual Fire or Explosion Hazard:
BURNS VIGOROUSLY AND EMITS ACID FUMES.
Extinguishing Media:
FOAM,CO*2,DRY CHEMICAL
Flash Point: Flash Point Text: 12F/-11C

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): 1.3
Upper Limit(s): 7.9

Section 6 - Accidental Release Measures
BENZENE

Spill Release Procedures:
PROTECT FROM IGNITION. WEAR SELF CONTAINED BREATHING APPARATUS.

Section 7 - Handling and Storage
BENZENE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
BENZENE

Repiratory Protection:
NIOSH/MSHA APPROVED RESP DEVICE IN ACCORD WITH EXPOSURE OF CONCERN.
Ventilation:
LOCAL/HIGH RATE MECHANICAL
Protective Gloves:
CHEMICAL TYPE
Eye Protection: GOGGLES/FACE MASK
Other Protective Equipment: AS REQUIRED TO PREVENT SKIN CONTACT.
Work Hygenic Practices: N/P
Supplemental Health & Safety Information: MFR CONT: PHILLIPS PETROL CO MFR'S THE RAW MATERIAL,BURDICK & JACKSON LAB. REFINES IT TO DESIRED PCT,SPEC & GRADE. CONTAINER SIZE: 500 ML BOTTLE

Section 9 - Physical & Chemical Properties
BENZENE

HCC: F5

NRC/State License Number: N/A
Net Property Weight for Ammo: N/A
Boiling Point: Boiling Point Text: 176F/80C
Melting/Freezing Point: Melting/Freezing Text: N/A
Decomposition Point: Decomposition Text: N/A
Vapor Pressure: 100 **Vapor Density:** 2.77
Percent Volatile Organic Content:
Specific Gravity: 0.884
Volatile Organic Content Pounds per Gallon:
pH: N/P
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: <1 (ETHYL ETHER)
Solubility in Water: NEGLIGIBLE
Appearance and Odor: COLORLESS LIQUID. AROMATIC HYDROCARBON ODOR
Percent Volatiles by Volume: 100
Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data
BENZENE

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDANTS
Stability Condition to Avoid:
N/P
Hazardous Decomposition Products:
N/P
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
N/P

Section 11 - Toxicological Information
BENZENE

Toxicological Information:
N/P

Section 12 - Ecological Information
BENZENE

Ecological Information:
N/P

Section 13 - Disposal Considerations
BENZENE

Waste Disposal Methods:
BURN UNDER CONTROLLED CONDITIONS. COMPLY WITH LOCAL,STATE AND FEDERAL REGULATIONS.

Section 14 - MSDS Transport Information

BENZENE

Transport Information:
N/P

Section 15 - Regulatory Information
BENZENE

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
BENZENE

Other Information:
N/P

HMIS Transportation Information

Product Identification: BENZENE
Transporation ID Number: 95976
Responsible Party CAGE: BURDI
Date MSDS Prepared: 01/01/1985
Date MSDS Reviewed: 09/05/1986
MFN: 09/05/1986
Submitter: N TN
Status Code: C

Container Information
- **Unit of Issue:**
- **Container Quantity:**
- **Type of Container:** BOTTLE,GLASS
- **Net Unit Weight:**

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:

Department of Transportation Information

DOT Proper Shipping Name: BENZENE
DOT PSN Code: BRS
Symbols:
DOT PSN Modifier:
Hazard Class: 3
UN ID Number: UN1114
DOT Packaging Group: II
Label: FLAMMABLE LIQUID
Special Provision(s): B101,T8
Packaging Exception: 150
Non Bulk Packaging: 202
Bulk Packaging: 242
Maximimum Quanity in Passenger Area: 5 L
Maximimum Quanity in Cargo Area: 60 L
Stow in Vessel Requirements: B
Requirements Water/Sp/Other: 40

IMO Detail Information

IMO Proper Shipping Name: BENZENE
IMO PSN Code: BXB
IMO PSN Modifier:
IMDG Page Number: 3185
UN Number: 1114
UN Hazard Class: 3.2
IMO Packaging Group: II
Subsidiary Risk Label: -
EMS Number: 3-03
Medical First Aid Guide Number: 312

IATA Detail Information

IATA Proper Shipping Name: BENZENE
IATA PSN Code: DBA
IATA PSN Modifier:
IATA UN Id Number: 1114
IATA UN Class: 3
Subsidiary Risk Class:
UN Packaging Group: II
IATA Label: FLAMMABLE LIQUID
Packaging Note for Passengers: 305
Maximum Quantity for Passengers: 5L
Packaging Note for Cargo: 307
Maximum Quantity for Cargo: 60L
Exceptions:

AFI Detail Information

AFI Proper Shipping Name: BENZENE
AFI Symbols:
AFI PSN Code: DBA
AFI PSN Modifier:
AFI UN Id Number: UN1114
AFI Hazard Class: 3

AFI Packing Group: II
AFI Label:
Special Provisions: P5
Back Pack Reference: A7.3

HAZCOM Label Information

Product Identification: BENZENE
CAGE: BURDI
Assigned Individual: N
Company Name: BURDICK & JACKSON, INC.
Company PO Box:
Company Street Address1: 1953 S. HARVEY STREET
Company Street Address2: MUSKEGON, MI 49442 US
Health Emergency Telephone: 616-726-3171
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: F
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

ETHYLBENZENE, 251C-6

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification
ETHYLBENZENE, 251C-6

Product Identification: ETHYLBENZENE, 251C-6
Date of MSDS: 03/01/1992 **Technical Review Date:** 11/13/1995
FSC: 6810 **NIIN:** **LIIN:** 00N047370
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: POLYSCIENCE
Manufacturer's Address1: 7800 MERRIMAC AVE
Manufacturer's Address2: NILES, IL 60648
Manufacturer's Country: US
General Information Telephone: 312-956-0611
Emergency Telephone: 312-965-0611
Emergency Telephone: 312-965-0611
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: IO526
Special Project Code: N

Contractor Information

Contractor's Name: POLYSCIENCE
Contractor's Address1: 7800 MERRIMAC AVE
Contractor's Address2: NILES, IL 60714
Contractor's Telephone: 708-965-0611
Contractor's CAGE: IO526

Contractor Information

Contractor's Name: POLYSCIENCE CORP
Post Office Box: 48312
Contractor's Address1: 7800 N MERRIMAC AVE
Contractor's Address2: NILES, IL 60714-3426
Contractor's Telephone: 708-965-0611
Contractor's CAGE: 58378

Section 2 - Compositon/Information on Ingredients
ETHYLBENZENE, 251C-6

Ingredient Name: BENZENE, ETHYL-; (ETHYLBENZENE) (SARA III)
Ingredient CAS Number: 100-41-4 **Ingredient CAS Code:** M
RTECS Number: DA0700000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: N/K
% Enviromental Weight:

Other REC Limits: N/K
OSHA PEL: 100 PPM; 125 STEL **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 100 PPM; 125 STEL **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1000 LBS
DOT Reporting Quantity: 1000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
ETHYLBENZENE, 251C-6

Health Hazards Acute & Chronic: ACUTE: MAY BE HARMFUL BY INHALATION, INGESTION OR SKIN ABSORPTION. CAUSES SKIN IRRITATION. VAPOR OR MIST IS IRRITATING TO THE EYES, MUCOUS MEMBRANES & UPPER RESPIRATORY TRACT. CAN CAUSE CNS DEPRESSION . EXPOSURE CAN CAUSE NAUSEA, HEADACHE &VOMITING. TARGET ORGAN:CNS.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: LD50: (ORAL, RAT): 3500 MG/KG

Route of Entry Indicators:
Inhalation: YES
Skin: YES
Ingestion: YES

Carcenogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures
ETHYLBENZENE, 251C-6

First Aid:
EYES: IMMEDIATELY FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SKIN: IMMEDIATELY FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING & SHOE S. INHAL: REMOVE TO FRESH AIR. INGEST: WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. CALL MD. WASH CONTAMINATED CLOTHING BEFORE REUSE.

Section 5 - Fire Fighting Measures
ETHYLBENZENE, 251C-6

Fire Fighting Procedures:
USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N). USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS. WARNING:FLAMMABLE LIQUID.
Unusual Fire or Explosion Hazard:
VAPOR MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION & FLASH BACK. CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS.
Extinguishing Media:
CARBON DIOXIDE, DRY CHEMICAL POWDER/APPROP FOAM. WATER MAY BE EFTIVE FOR COOLING, BUT MAY NOT EFFECT EXTINGUISHMENT.
Flash Point: Flash Point Text: 72.0F,22.2C

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): 1%
Upper Limit(s): 6.7%

Section 6 - Accidental Release Measures
ETHYLBENZENE, 251C-6

Spill Release Procedures:
EVACUATE AREA. SHUT OFF ALL SOURCES OF IGNIT. WEAR NIOSH/MSHA APPRVD SCBA, RUB BOOTS & HEAVY RUB GLOVES. USE NONSPK TOOLS. COVER W/ACTIVATED CARBON ABSORB, TAKE UP & PLACE IN CLSD CNTNRS. TRANSPORT OU TDOORS. VENT AREA & WASH SPILL SITE AFTER (SUPDAT)

Section 7 - Handling and Storage
ETHYLBENZENE, 251C-6

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
ETHYLBENZENE, 251C-6

Repiratory Protection:
NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation:
MECHANICAL EXHAUST REQUIRED.
Protective Gloves:
RUBBER GLOVES.
Eye Protection: ANSI APPRVD CHEM WORKER GOGGLES (FP N).
Other Protective Equipment: WEAR SUITABLE PROTECTIVE CLOTHING. ANSI APPRV SAFETY SHOWER & EYE BATH.
Work Hygenic Practices: DO NOT GET IN EYES, ON SKIN, ON CLOTHING. DO NOT BREATHE VAPOR. WASH THOROUGHLY AFTER HANDLING.
Supplemental Health & Safety Information: VP:10 @ 20C, 19 @ 37.7C. SPILL PROC:MATERIAL PICKUP IS COMPLETE.

Section 9 - Physical & Chemical Properties
ETHYLBENZENE, 251C-6

HCC: F3
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 277F,136C
Melting/Freezing Point: Melting/Freezing Text: -139F,-95C
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: SUPDAT **Vapor Density:** 3.7
Percent Volatile Organic Content:
Specific Gravity: 0.867
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/K
Solubility in Water: N/K
Appearance and Odor: COLORLESS LIQUID.
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
ETHYLBENZENE, 251C-6

Stability Indicator: YES
Materials to Avoid:
OXIDIZING AGENTS.
Stability Condition to Avoid:
NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:
TOXIC FUMES OF: CARBON MONOXIDE, CARBON DIOXIDE.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT

Section 11 - Toxicological Information
ETHYLBENZENE, 251C-6

Toxicological Information:
N/P

Section 12 - Ecological Information
ETHYLBENZENE, 251C-6

Ecological Information:
N/P

Section 13 - Disposal Considerations
ETHYLBENZENE, 251C-6

Waste Disposal Methods:

BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER & SCRUBBER BUT EXERT EXTRA CARE IN IGNITING AS THIS MATERIAL IS HIGHLY FLAMMABLE. OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.

Section 14 - MSDS Transport Information
ETHYLBENZENE, 251C-6

Transport Information:
N/P

Section 15 - Regulatory Information
ETHYLBENZENE, 251C-6

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
ETHYLBENZENE, 251C-6

Other Information:
N/P

HAZCOM Label Information

Product Identification: ETHYLBENZENE, 251C-6
CAGE: IO526
Assigned Individual: Y
Company Name: POLYSCIENCE
Company PO Box:
Company Street Address1: 7800 MERRIMAC AVE
Company Street Address2: NILES, IL 60714 US
Health Emergency Telephone: 312-965-0611
Label Required Indicator: Y
Date Label Reviewed: 01/11/1994
Status Code: C
Manufacturer's Label Number:
Date of Label: 01/11/1994
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: DANGER
Health Hazard: Moderate
Contact Hazard: Slight
Fire Hazard: Severe
Reactivity Hazard: None

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

STYRENE

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification
STYRENE

Product Identification: STYRENE
Date of MSDS: 01/01/1985 **Technical Review Date:** 06/19/1999
FSC: 6810 **NIIN:** 00-987-4126
Submitter: D DG
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: CHEMICAL COMMODITIES(DIST),J.T.BAKER CHEMICAL (MFR
Manufacturer's Address1: 27447 PACIFIC STREET
Manufacturer's Address2: HIGHLAND, CA 92346-2640
Manufacturer's Country: US
General Information Telephone: 714-864-2310
Emergency Telephone: 714-864-2310
Emergency Telephone: 714-864-2310
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 60777
Special Project Code: N

Item Description

Item Name: STYRENE,ANALYZED REAGENT
Item Manager: S9G
Specification Number: UNKNOWN
Type/Grade/Class: NONE
Unit of Issue: EA
Unit of Issue Quantity: 1
Type of Container: CAN

Contractor Information

Contractor's Name: CHEMICAL COMMODITIES AGENCY, INC.
Contractor's Address1: 27447 PACIFIC STREET
Contractor's Address2: HIGHLAND, CA 92346-2640
Contractor's Telephone: 909-864-2310
Contractor's CAGE: 60777

Section 2 - Compositon/Information on Ingredients
STYRENE

Ingredient Name: STYRENE, MONOMER (SARA III)
Ingredient CAS Number: 100-42-5 **Ingredient CAS Code:** M
RTECS Number: WL3675000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 100

% Enviromental Weight:
Other REC Limits: N/P
OSHA PEL: 100 PPM **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: S,50PPM/100STEL;9293 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1000 LBS
DOT Reporting Quantity: 1000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
STYRENE

Health Hazards Acute & Chronic: N/P

Signs & Symptoms of Overexposure:
CONJUNCTIVITIS,IRRITATION OF RESPIRATORY TRACT;LACK OF APPETITE,NAUSEA,VOMITING,WEAKNESS,DEFATTING.

Medical Conditions Aggravated by Exposure:
N/P

LD50 LC50 Mixture: N/P

Route of Entry Indicators:
Inhalation: N/P
Skin: N/P
Ingestion: N/P

Carcenogenicity Indicators
NTP: N/P
IARC: N/P
OSHA: N/P

Carcinogenicity Explanation: N/P

Section 4 - First Aid Measures
STYRENE

First Aid:
IN CASE OF CONTACT,IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.CALL A PHYSICIAN.WASH CONTAMINATED AREAS OF BODY WITH SOAP & WATER.

Section 5 - Fire Fighting Measures
STYRENE

Fire Fighting Procedures:
IN MASSIVE FIRES,FIREFIGHTING SHOULD BE DONE FROM SAFE DIST.
Unusual Fire or Explosion Hazard:

MAY TRAVEL CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION & FLASH BACK
Extinguishing Media:
DRY CHEMICAL,ALCOHOL FOAM OR CO*2
Flash Point: Flash Point Text: 90F CC

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): 1.1
Upper Limit(s): 6.1

Section 6 - Accidental Release Measures
STYRENE

Spill Release Procedures:
ELIMINATE ALL SOURCES OF IGNITION.ABSORB ON PAPER.EVAPORATE ON AN IRON PAN IN A HOOD.BURN THE PAPER,PROVIDING LOCAL DISPOSAL REGULATION PERMIT.

Section 7 - Handling and Storage
STYRENE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
STYRENE

Repiratory Protection:
HAVE ALL-PURPOSE CANNISTER MASK AVAILABLE
Ventilation:
LOCAL & MECHANICAL EXHAUST AS REQUIRED TO CONTROL TLV IN AIR
Protective Gloves:
RUBBER GLOVES
Eye Protection: FACE SHIELD
Other Protective Equipment: APPROVED WORK CLOTHES
Work Hygenic Practices: N/P
Supplemental Health & Safety Information: STYRENE FREEZING POINT:-23F.(HI TEM) SHOULD BE AVOIDED TO PRECLUDE HAZARDOUS POLYMERIZATION. IN HANDLING & STORAGE:AVOID OXIDIZING AGENTS,WEAR GOGGLES,RUBBER GLOVES & CHEM.CARTRIDGE RESPIR.STO

Section 9 - Physical & Chemical Properties
STYRENE

HCC: F3
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 293F
Melting/Freezing Point: Melting/Freezing Text: N/A
Decomposition Point: Decomposition Text: N/A

Vapor Pressure: 6 **Vapor Density:** 3.6
Percent Volatile Organic Content:
Specific Gravity: 0.92
Volatile Organic Content Pounds per Gallon:
pH: N/P
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/P
Solubility in Water: NEGLIGIBLE
Appearance and Odor: COLORLESS TO YELLOWISH,PENETRATING ODOR
Percent Volatiles by Volume: 100
Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data
STYRENE

Stability Indicator: YES
Materials to Avoid:
PEROXIDES & STRONG ACIDS, OXIDIZING AGENTS
Stability Condition to Avoid:
HEAT,SPARKS & OPEN FLAME
Hazardous Decomposition Products:
N/P
Hazardous Polymerization Indicator: YES
Conditions to Avoid Polymerization:
CONTAMINATION WITH POLY.CATALYST,E.G.PEROXIDES,ACIDS,HI TEM

Section 11 - Toxicological Information
STYRENE

Toxicological Information:
N/P

Section 12 - Ecological Information
STYRENE

Ecological Information:
N/P

Section 13 - Disposal Considerations
STYRENE

Waste Disposal Methods:
ATOMIZE INTO AN APPROVED INCINERATOR UNDER CONTROLLED CONDITIONS,PROVIDING LOCAL DISPOSAL REGULATIONS PERMIT.INCINERATION WILL BECOME EASIER BY MIXING WITH A MORE FLAMMABLE SOLVENT

Section 14 - MSDS Transport Information
STYRENE

Transport Information:
N/P

Section 15 - Regulatory Information
STYRENE

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
STYRENE

Other Information:
N/P

HMIS Transportation Information

Product Identification: STYRENE
Transporation ID Number: 96858
Responsible Party CAGE: 60777
Date MSDS Prepared: 01/01/1985
Date MSDS Reviewed: 09/05/1986
MFN: 09/05/1986
Submitter: D DG
Status Code: C

Container Information
Unit of Issue: EA
Container Quantity: 1
Type of Container: CAN
Net Unit Weight:

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:
STYRENE IS INHIBITED WITH 10-15 PPM OF 4 TERT-BUTYL PROCATECHOL

Department of Transportation Information

DOT Proper Shipping Name: STYRENE MONOMER, INHIBITED

DOT PSN Code: NNJ
Symbols:
DOT PSN Modifier:
Hazard Class: 3
UN ID Number: UN2055
DOT Packaging Group: III
Label: FLAMMABLE LIQUID
Special Provision(s): B1,T1
Packaging Exception: 150
Non Bulk Packaging: 203
Bulk Packaging: 242
Maximimum Quanity in Passenger Area: 60 L
Maximimum Quanity in Cargo Area: 220 L
Stow in Vessel Requirements: A
Requirements Water/Sp/Other:

IMO Detail Information

IMO Proper Shipping Name: STYRENE MONOMER, INHIBITED
IMO PSN Code: OCX
IMO PSN Modifier: P
IMDG Page Number: 3381
UN Number: 2055
UN Hazard Class: 3.3
IMO Packaging Group: III
Subsidiary Risk Label: -
EMS Number: 3-07
Medical First Aid Guide Number: 310

IATA Detail Information

IATA Proper Shipping Name: STYRENE MONOMER, INHIBITED
IATA PSN Code: XDS
IATA PSN Modifier:
IATA UN Id Number: 2055
IATA UN Class: 3
Subsidiary Risk Class:
UN Packaging Group: III
IATA Label: FLAMMABLE LIQUID
Packaging Note for Passengers: 309
Maximum Quantity for Passengers: 60L
Packaging Note for Cargo: 310
Maximum Quantity for Cargo: 220L
Exceptions:

AFI Detail Information

AFI Proper Shipping Name: STYRENE MONOMER, INHIBITED
AFI Symbols:
AFI PSN Code: XDS
AFI PSN Modifier:
AFI UN Id Number: UN2055
AFI Hazard Class: 3
AFI Packing Group: III
AFI Label:
Special Provisions: P5
Back Pack Reference: A7.3

HAZCOM Label Information

Product Identification: STYRENE
CAGE: 60777
Assigned Individual: N
Company Name: CHEMICAL COMMODITIES AGENCY, INC.
Company PO Box:
Company Street Address1: 27447 PACIFIC STREET
Company Street Address2: HIGHLAND, CA 92346-2640 US
Health Emergency Telephone: 714-864-2310
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: F
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

TOLUENE

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification
TOLUENE

Product Identification: TOLUENE
Date of MSDS: 01/01/1985 **Technical Review Date:** 12/02/1998
FSC: 8030 **NIIN:** 00-432-1544
Submitter: F BT
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ESSEX CHEMICAL CORP PRO-SEAL DIV
Manufacturer's Address1: 19451 SUSANA RD
Manufacturer's Address2: COMPTON, CA 90221-5713
Manufacturer's Country: US
General Information Telephone: 310-537-7600
Emergency Telephone: 310-537-7600
Emergency Telephone: 310-537-7600
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 83527
Special Project Code: N

Item Description

Item Name: SEALING COMPOUND
Item Manager: GSA
Specification Number: MIL-S-8802
Type/Grade/Class: TYPE 2; CLASS C-80
Unit of Issue: KT
Unit of Issue Quantity: 0
Type of Container: METAL

Contractor Information

Contractor's Name: ESSEX CHEMICAL CORP PRO-SEAL DIV
Contractor's Address1: 19451 SUSANA RD
Contractor's Address2: COMPTON, CA 90221-5713
Contractor's Telephone: 310-537-7600
Contractor's CAGE: 83527

Section 2 - Compositon/Information on Ingredients
TOLUENE

Ingredient Name: TOLUENE (SARA III)
Ingredient CAS Number: 108-88-3 **Ingredient CAS Code:** M
RTECS Number: XS5250000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: N/P

% Enviromental Weight:
Other REC Limits: N/P
OSHA PEL: 200 PPM/150 STEL **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 50 PPM; 9293 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1000 LBS
DOT Reporting Quantity: 1000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
TOLUENE

Health Hazards Acute & Chronic: N/P

Signs & Symptoms of Overexposure:
N/P

Medical Conditions Aggravated by Exposure:
N/P

LD50 LC50 Mixture: N/P

Route of Entry Indicators:
- **Inhalation:** N/P
- **Skin:** N/P
- **Ingestion:** N/P

Carcenogenicity Indicators
- **NTP:** N/P
- **IARC:** N/P
- **OSHA:** N/P

Carcinogenicity Explanation: N/P

Section 4 - First Aid Measures
TOLUENE

First Aid:
N/P

Section 5 - Fire Fighting Measures
TOLUENE

Fire Fighting Procedures:
WATER NOT RECOMMENDED
Unusual Fire or Explosion Hazard:
VOLIATILE SOLVENT
Extinguishing Media:
CO2, FOAM, DRY CHEMICAL

Flash Point: Flash Point Text: 66 F CLOSED CUP

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): 1.3
Upper Limit(s): 7

Section 6 - Accidental Release Measures
TOLUENE

Spill Release Procedures:
N/P

Section 7 - Handling and Storage
TOLUENE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
TOLUENE

Repiratory Protection:
N/P
Ventilation:
N/P
Protective Gloves:
N/P
Eye Protection: N/P
Other Protective Equipment: N/P
Work Hygenic Practices: N/P
Supplemental Health & Safety Information: ESSEX CHEMICAL CORP., SPECIALTY CHEMICAL DIV. 19451 SUSANA ROAD, COMPTON, CA 90221

Section 9 - Physical & Chemical Properties
TOLUENE

HCC: F2
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 110.7 C
Melting/Freezing Point: Melting/Freezing Text: N/A
Decomposition Point: Decomposition Text: N/A
Vapor Pressure: 36. **Vapor Density:** 3.1
Percent Volatile Organic Content:
Specific Gravity: 0.86
Volatile Organic Content Pounds per Gallon:
pH: N/P
Volatile Organic Content Grams per Liter:

Viscosity: N/P
Evaporation Weight and Reference: 4.5
Solubility in Water: NIL
Appearance and Odor: WHITE PASTE, ORGANIC SULFIDE ODOR
Percent Volatiles by Volume: 14
Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data
TOLUENE

Stability Indicator: N/P
Materials to Avoid:
N/P
Stability Condition to Avoid:
N/P
Hazardous Decomposition Products:
N/P
Hazardous Polymerization Indicator: N/P
Conditions to Avoid Polymerization:
N/P

Section 11 - Toxicological Information
TOLUENE

Toxicological Information:
N/P

Section 12 - Ecological Information
TOLUENE

Ecological Information:
N/P

Section 13 - Disposal Considerations
TOLUENE

Waste Disposal Methods:
N/P

Section 14 - MSDS Transport Information
TOLUENE

Transport Information:
N/P

Section 15 - Regulatory Information
TOLUENE

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P

State Regulatory Information:
N/P

Section 16 - Other Information
TOLUENE

Other Information:
N/P

HAZCOM Label Information

Product Identification: TOLUENE
CAGE: 83527
Assigned Individual: N
Company Name: ESSEX CHEMICAL CORP PRO-SEAL DIV
Company PO Box:
Company Street Address1: 19451 SUSANA RD
Company Street Address2: COMPTON, CA 90221-5713 US
Health Emergency Telephone: 213-537-7600
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
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VINYL CHLORIDE

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
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Section 1 - Product and Company Identification
VINYL CHLORIDE

Product Identification: VINYL CHLORIDE
Date of MSDS: 10/01/1985 **Technical Review Date:** 10/09/1992
FSC: 6810 **NIIN: LIIN:** 00N034925
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: MATHESON GAS PRODUCTS
Manufacturer's Address1: 932 PATTERSON PLANK RD
Manufacturer's Address2: EAST RUTHERFORD, NJ 07073
Manufacturer's Country: US
General Information Telephone: 201-933-2400
Emergency Telephone: 201-933-2400
Emergency Telephone: 201-933-2400
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 0FB11
Special Project Code: N

Contractor Information

Contractor's Name: MATHESON GAS PRODUCTS
Contractor's Address1: 30 SEAFIEW DRIVE
Contractor's Address2: SEACAUCUS, NJ 07096
Contractor's Telephone: 201-867-4100, CHEMTREC 800-424-9300
Contractor's CAGE: 0FB11

Section 2 - Compositon/Information on Ingredients
VINYL CHLORIDE

Ingredient Name: ETHYLENEM, CHLORO-; (VINYL CHLORIDE) (SARA III)
Ingredient CAS Number: 75-01-4 **Ingredient CAS Code:** M
RTECS Number: KU9625000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: N/K
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: SEE 1910.1017 **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 5 PPM, A1; 9293 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1 LB
DOT Reporting Quantity: 1 LB
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
VINYL CHLORIDE

Health Hazards Acute & Chronic: ACUTE:INHAL MAY CAUSE DROWS, BLURRED VISION, STAG GAIT, & TINGLING & NUMBNESS IN THE FEET & HANDS. IN HIGH CONC VINYL CHLORIDE ACTS AS AN ANESTHETIC. CONTACT WITH LIQ VINYL CHLORIDE MAY CAUSE SEVERE I RRITATION & BURNS. CHRONIC: VINYL CHLORIDE IS A RECOGNIZED CARCINOGEN & HAS CAUSED CANCER IN MAN.(EFTS OF OVEREXP)

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:
Inhalation: YES
Skin: NO
Ingestion: YES

Carcenogenicity Indicators
NTP: YES
IARC: YES
OSHA: YES

Carcinogenicity Explanation: VINYL CHLORIDE: KNOWN CARCINOGEN (NTP), GROUP 1 (IARC); OSHA REGULATED

Section 4 - First Aid Measures
VINYL CHLORIDE

First Aid:
INHAL: MOVE VICTIM TO FRESH AIR. IF NOT BRTHG, GIVE ARTF RESP. IF BRTHG IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN. EYE/SKIN: IMMED FLUSH EYE/SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MIN. REMOVE CON TAMINATED CLOTHING AND SHOES. CALL A PHYSICIAN. INGEST: GET MD IMMEDIATELY (FP N). NOTE: SKIN BURNS CAN BE TREATED BY THE APPLICATION OF MAGNESIUM PASTE (MAGNESIUM OXIDE AND GLYCERINE).

Section 5 - Fire Fighting Measures
VINYL CHLORIDE

Fire Fighting Procedures:
FIRE FIGHTERS MUST WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N). FIREIGHTERS TURNOUT GEAR IS INADEQUATE.
Unusual Fire or Explosion Hazard:
CYLINDERS THAT ARE EXPOSED TO FIRE MAY RUPTURE WITH VIOLENT FORCE. EXTING SURROUNDING FIRE & KEEP CYLINDERS COOL USING A WATER SPRAY

APPLIED FROM THE(SUPP DATA)
Extinguishing Media:
TO EXTING A VINYL CHLORIDE FIRE STOP THE FLOW OF GAS. IF THE FLOW CANNOT BE STOPPED, LET THE FIRE BURN ITSELF(SUPP DATA)
Flash Point: Flash Point Text: N/K

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): 4%
Upper Limit(s): 22%

Section 6 - Accidental Release Measures
VINYL CHLORIDE

Spill Release Procedures:
EVACUATE AREA. PERSONNEL EQUIPPED W/SPECIAL PERSONAL PROTECTIVE SUITS FOR FIRE/CHEMICALS AND POSITIVE PRESSURE NIOSH/MSHA APPROVED SCBA CAN RE-ENTER THE AREA AND ATTEMPT TO STOP LEAK.

Section 7 - Handling and Storage
VINYL CHLORIDE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
VINYL CHLORIDE

Repiratory Protection:
NIOSH/MSHA APPROVED POSITIVE PRESSURE SCBA SHOULD BE WORN IF IT IS SUSPECTED THAT VINYL CHLORIDE IS IN THE AIR.
Ventilation:
NONE SPECIFIED BY MANUFACTURER.
Protective Gloves:
IMPERVIOUS GLOVES.
Eye Protection: CHEM WORK GOGG/FULL LENGTH FSHLD (FP N).
Other Protective Equipment: EYE WASH STATIONS & SAFETY SHOWERS READILY AVAILABE.
Work Hygenic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Health & Safety Information: EXTING MEDIA:OUT WHILE COOLING CYLINDER & SURROUNDINGS USING A H*2O SPRAY. EXPLO HAZ:MAX POSS DISTANCE. FLAMM & TOX GASES MAY SPREAD FROM A SPILL AFTER FIRE IS EXTING & BE SUBJECT TO REIGNIT. THERMAL DECOMP PRODS MAY INCL HCL & PHOSGENE (FP N). OTHER PREC: PLAN COVERING STEPS TO BE TAKEN IN CASE OF ACCIDENTAL RELEASE.

Section 9 - Physical & Chemical Properties
VINYL CHLORIDE

HCC: G2

NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 7.2F,-13.8C
Melting/Freezing Point: Melting/Freezing Text: -245F,-154C
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: 234KPA@21C **Vapor Density:** N/K
Percent Volatile Organic Content:
Specific Gravity: 2.21
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/K
Solubility in Water: 1.07 CM3/1 ML H*2O
Appearance and Odor: COLORLESS, HIGHLY FLAMM GAS WITH A PLEASANT, SWEET ODOR AT HIGH CONC.
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
VINYL CHLORIDE

Stability Indicator: YES
Materials to Avoid:
OXIDIZING MATLS, ACTIVE METALS, ALUMINUM ALLOYS AND ORGANOMETALLICS.
Stability Condition to Avoid:
AVOID EXPOSURE TO SUNLIGHT, HEAT, AIR, OXYGEN PEROXIDES AND OTHER STRONG OXIDIZING AGENTS.
Hazardous Decomposition Products:
HYDROGEN CHLORIDE, PHOSGENE, CARBON MONOXIDE.
Hazardous Polymerization Indicator: YES
Conditions to Avoid Polymerization:
OXYGEN (AIR), HEAT, SUNLIGHT, MOISTURE AND FREE RADICAL INITIATORS OR OTHER CATALYTIC MATERIALS.

Section 11 - Toxicological Information
VINYL CHLORIDE

Toxicological Information:
N/P

Section 12 - Ecological Information
VINYL CHLORIDE

Ecological Information:
N/P

Section 13 - Disposal Considerations
VINYL CHLORIDE

Waste Disposal Methods:
DISPOSAL MUST BE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL

REGULATIONS (FP N).

Section 14 - MSDS Transport Information
VINYL CHLORIDE

Transport Information:
N/P

Section 15 - Regulatory Information
VINYL CHLORIDE

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
VINYL CHLORIDE

Other Information:
N/P

HMIS Transportation Information

Product Identification: VINYL CHLORIDE
Transporation ID Number: 39375
Responsible Party CAGE: 0FB11
Date MSDS Prepared: 10/01/1985
Date MSDS Reviewed: 03/24/1993
MFN: 03/24/1993
Submitter: N TN
Status Code: C

Container Information
- **Unit of Issue:** NK
- **Container Quantity:** NK
- **Type of Container:**
- **Net Unit Weight:**

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N

Kit Part Indicator: N
Review Indicator: Y
Additional Data:

Department of Transportation Information

DOT Proper Shipping Name: VINYL CHLORIDE, INHIBITED OR VINYL CHLORIDE, STABILIZED
DOT PSN Code: PRS
Symbols:
DOT PSN Modifier:
Hazard Class: 2.1
UN ID Number: UN1086
DOT Packaging Group:
Label: FLAMMABLE GAS
Special Provision(s): 21,B44
Packaging Exception: 306
Non Bulk Packaging: 304
Bulk Packaging: 314,315
Maximimum Quanity in Passenger Area: FORBIDDEN
Maximimum Quanity in Cargo Area: 150 KG
Stow in Vessel Requirements: B
Requirements Water/Sp/Other: 40

IMO Detail Information

IMO Proper Shipping Name: VINYL CHLORIDE, INHIBITED
IMO PSN Code: PJJ
IMO PSN Modifier:
IMDG Page Number: 2186
UN Number: 1086
UN Hazard Class: 2(2.1)
IMO Packaging Group: -
Subsidiary Risk Label: -
EMS Number: 2-07
Medical First Aid Guide Number: 340

IATA Detail Information

IATA Proper Shipping Name: VINYL CHLORIDE, INHIBITED
IATA PSN Code: ZHW
IATA PSN Modifier:
IATA UN Id Number: 1086
IATA UN Class: 2.1
Subsidiary Risk Class:
UN Packaging Group:
IATA Label: FLAMMABLE GAS
Packaging Note for Passengers: FORB
Maximum Quantity for Passengers: FORB
Packaging Note for Cargo: 200
Maximum Quantity for Cargo: 150KG
Exceptions: A1

AFI Detail Information

AFI Proper Shipping Name: VINYL CHLORIDE, INHIBITED
AFI Symbols:

AFI PSN Code: ZHW
AFI PSN Modifier:
AFI UN Id Number: UN1086
AFI Hazard Class: 2.1
AFI Packing Group: N/A
AFI Label:
Special Provisions: P4
Back Pack Reference: A6.3, A6.5

HAZCOM Label Information

Product Identification: VINYL CHLORIDE
CAGE: 0FB11
Assigned Individual: N
Company Name: MATHESON GAS PRODUCTS
Company PO Box:
Company Street Address1: 30 SEAFIEW DRIVE
Company Street Address2: SEACAUCUS, NJ 07096 US
Health Emergency Telephone: 201-933-2400
Label Required Indicator: Y
Date Label Reviewed: 10/08/1992
Status Code: C
Manufacturer's Label Number:
Date of Label: 10/08/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: Y
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: DANGER
Health Hazard: Moderate
Contact Hazard: Moderate
Fire Hazard: Severe
Reactivity Hazard: Slight

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
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XYLENE

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification
XYLENE

Product Identification: XYLENE
Date of MSDS: 01/01/1987 **Technical Review Date:** 06/26/1999
FSC: 6810 **NIIN:** 00-584-4071
Submitter: D DG
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: PHIPPS PRODUCTS CORP
Manufacturer's Address1: 186 LINCOLN ST SUITE 502
Manufacturer's Address2: BOSTON, MA 02111-2403
Manufacturer's Country: US
General Information Telephone:
Emergency Telephone: NONE
Emergency Telephone: NONE
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 86511
Special Project Code: N

Item Description

Item Name: XYLENE,TECHNICAL
Item Manager: S9G
Specification Number: 81345-ASTM D 846
Type/Grade/Class: NONE
Unit of Issue: QT
Unit of Issue Quantity: G
Type of Container: GLASS

Contractor Information

Contractor's Name: PHIPPS PRODUCTS CORP
Contractor's Address1: 186 LINCOLN ST SUITE 502
Contractor's Address2: BOSTON, MA 02111-2403
Contractor's Telephone: OUT OF BUSINESS
Contractor's CAGE: 86511

Section 2 - Compositon/Information on Ingredients
XYLENE

Ingredient Name: XYLENES (O-,M-,P- ISOMERS) (SARA III)
Ingredient CAS Number: 1330-20-7 **Ingredient CAS Code:** M
RTECS Number: ZE2100000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 100

% Enviromental Weight:
Other REC Limits: N/P
OSHA PEL: 100 PPM/150 STEL **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 100 PPM/150STEL;9192 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1000 LBS
DOT Reporting Quantity: 1000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
XYLENE

Health Hazards Acute & Chronic: N/P

Signs & Symptoms of Overexposure:
IRRITATING RESPIRATORY TRACT.MAY CAUSE DIZZINESS,UNCONSCIOUSNESS,OR COMA.

Medical Conditions Aggravated by Exposure:
N/P

LD50 LC50 Mixture: N/P

Route of Entry Indicators:
- **Inhalation:** N/P
- **Skin:** N/P
- **Ingestion:** N/P

Carcenogenicity Indicators
- **NTP:** N/P
- **IARC:** N/P
- **OSHA:** N/P

Carcinogenicity Explanation: N/P

Section 4 - First Aid Measures
XYLENE

First Aid:
INHALE:REMOVE TO FRESH AIR, GIVE CPR/O*2 IF NEED;EYES/SKIN:FLUSH W LG AMTS H*2O FOR 15 MIN;INGEST:RINSE MOUTH; GET MEDICAL ATTENTION FOR EYES, BREATHING DIFFICULTY, OR OTHER SYMPTOMS OF OVEREXPOSURE.

Section 5 - Fire Fighting Measures
XYLENE

Fire Fighting Procedures:
USE NIOSH APPROVED SCBA TO FIGHT FIRES.COOL CNTNRS W.WATER
Unusual Fire or Explosion Hazard:

KEEP AWAY FROM HEAT AND OPEN FLAME.CLOSED CONTAINERS MAY EXPLODE IF EXPOSED TO EXTREME HEAT.
Extinguishing Media:
DRY CHEMICAL,CO*2,FOAM.
Flash Point: Flash Point Text: 28C/82F (T.C.C.)

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): 1.1
Upper Limit(s):

Section 6 - Accidental Release Measures
XYLENE

Spill Release Procedures:
ISOLATE FROM SOURCE OF IGNITION.USE PERSONAL PROTECTION EQUIPMENT.COLLECT LEAKING LIQUID IN A SEALABLE CONTAINER,ABSORB SPILLED LIQUID IN SAND OR INERT ABSORBENT AND RECOVER IT FOR FURHTER DISPOSAL.

Section 7 - Handling and Storage
XYLENE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
XYLENE

Repiratory Protection:
USE NIOSH APPROVED RESPIRATOR XYLENE,IF IN EXCESS OF TLV.
Ventilation:
PROVIDE MECHAN(GEN/LOCAL EXHAUST)VENT TO MAINTN **Protective Gloves:**
IMPERVIOUS
Eye Protection: SAFETY/CHEM GOGGLES
Other Protective Equipment: FULL PROTECTIVE CLOTHING,SAFETY SHOWER,EYE WASH STATION
Work Hygenic Practices: N/P
Supplemental Health & Safety Information: MSDS DATED 5/19/83

Section 9 - Physical & Chemical Properties
XYLENE

HCC: F3
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 139C/283F
Melting/Freezing Point: Melting/Freezing Text: N/A
Decomposition Point: Decomposition Text: N/A
Vapor Pressure: 9.5 **Vapor Density:** 9.5

Percent Volatile Organic Content:
Specific Gravity: 0.870
Volatile Organic Content Pounds per Gallon:
pH: N/P
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: 11.0 (ETHER=1)
Solubility in Water: NEGLIGIBLE
Appearance and Odor: CLEAR,WATER LIKE LIQUID
Percent Volatiles by Volume: 100
Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data
XYLENE

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDIZERS.
Stability Condition to Avoid:
EXTREME HEAT.
Hazardous Decomposition Products:
INCOMPLETE COMBUSTION MAY GIVE CO AND/OR CO*2.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NONE SPECIFIED BY THE MFR.

Section 11 - Toxicological Information
XYLENE

Toxicological Information:
N/P

Section 12 - Ecological Information
XYLENE

Ecological Information:
N/P

Section 13 - Disposal Considerations
XYLENE

Waste Disposal Methods:
CONSULT LOCAL AUTHORITIES.DISPOSAL MUST BE IAW LOCAL,STATE AND FEDERAL REGULATIONS.

Section 14 - MSDS Transport Information
XYLENE

Transport Information:
N/P

Section 15 - Regulatory Information

XYLENE

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
XYLENE

Other Information:
N/P

HMIS Transportation Information

Product Identification: XYLENE
Transporation ID Number: 78109
Responsible Party CAGE: 86511
Date MSDS Prepared: 01/01/1987
Date MSDS Reviewed: 07/19/1988
MFN: 07/19/1988
Submitter: D DG
Status Code: C

Container Information
Unit of Issue: QT
Container Quantity: G
Type of Container: GLASS
Net Unit Weight:

Article without MSDS: N
Technical Entry NOS Shipping Number: XYLOL
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:

Department of Transportation Information

DOT Proper Shipping Name: XYLENES
DOT PSN Code: PWS
Symbols:

DOT PSN Modifier:
Hazard Class: 3
UN ID Number: UN1307
DOT Packaging Group: III
Label: FLAMMABLE LIQUID
Special Provision(s): B1,T1
Packaging Exception: 150
Non Bulk Packaging: 203
Bulk Packaging: 242
Maximimum Quanity in Passenger Area: 60 L
Maximimum Quanity in Cargo Area: 220 L
Stow in Vessel Requirements: A
Requirements Water/Sp/Other:

IMO Detail Information

IMO Proper Shipping Name: XYLOLS
IMO PSN Code: PPN
IMO PSN Modifier:
IMDG Page Number: SEE 3292
UN Number: 1307
UN Hazard Class: 3.2
IMO Packaging Group: II
Subsidiary Risk Label: -
EMS Number: 3-07
Medical First Aid Guide Number: 310

IATA Detail Information

IATA Proper Shipping Name: XYLENES
IATA PSN Code: ZPL
IATA PSN Modifier:
IATA UN Id Number: 1307
IATA UN Class: 3
Subsidiary Risk Class:
UN Packaging Group: III
IATA Label: FLAMMABLE LIQUID
Packaging Note for Passengers: 309
Maximum Quantity for Passengers: 60L
Packaging Note for Cargo: 310
Maximum Quantity for Cargo: 220L
Exceptions:

AFI Detail Information

AFI Proper Shipping Name: XYLENES
AFI Symbols:
AFI PSN Code: ZPL
AFI PSN Modifier:
AFI UN Id Number: UN1307
AFI Hazard Class: 3
AFI Packing Group: III
AFI Label:
Special Provisions: P5
Back Pack Reference: A7.3

HAZCOM Label Information

Product Identification: XYLENE

CAGE: 86511
Assigned Individual: N
Company Name: PHIPPS PRODUCTS CORP
Company PO Box:
Company Street Address1: 186 LINCOLN ST SUITE 502
Company Street Address2: BOSTON, MA 02111-2403 US
Health Emergency Telephone:
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: F
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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SUPELCO,INC. -- BENZO(A)ANTHRACENE 0.1G,48563 -- 6810-00N010656

========== Product Identification ==========

Product ID:BENZO(A)ANTHRACENE 0.1G,48563
MSDS Date:05/16/1985
FSC:6810
NIIN:00N010656
MSDS Number: BHYRL
=== Responsible Party ===
Company Name:SUPELCO,INC.
Address:SUPELCO PARK
City:BELLEFONTE
State:PA
ZIP:16823-0048
Info Phone Num:814-359-3441
Emergency Phone Num:814-359-3441
CAGE:HO582
=== Contractor Identification ===
Company Name:SIGMA-ALDRICH INC.
Address:3050 SPRUCE STREET
Box:14508
City:ST. LOUIS
State:MO
ZIP:63103
Country:US
Phone:314-771-5765/414-273-3850X5996
CAGE:54968
Company Name:SUPELCO,INC.
Address:SUPELCO PARK
Box:City:BELLEFONTE
State:PA
ZIP:16823-0048
Phone:814-359-3441
CAGE:HO582

========== Composition/Information on Ingredients ==========

Ingred Name:BENZ A ANTHRACENE (SARA III)
CAS:56-55-3
RTECS #:CV9275000
Other REC Limits:N/K
ACGIH TLV:A2 ; 9394
EPA Rpt Qty:10 LBS
DOT Rpt Qty:10 LBS

========== Hazards Identification ==========

Routes of Entry: Inhalation:NO Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:NO
Health Hazards Acute and Chronic:SEE SIGNS AND SYMPTOMS OF
OVEREXPOSURE.
Explanation of Carcinogenicity:SUSPECTED HUM CARCIN/KNOWN ANIM CARCIN
(NTP 1985).INADEQ EVID FOR CARC IN HUM,SUFF EVID FOR CARC IN
ANIMALS (IARC 1987).
Effects of Overexposure:EYES/SKIN/INGESTION/INHALATION:N/K .
Medical Cond Aggravated by Exposure:N/K

========== First Aid Measures ==========

First Aid:EYES:FLUSH WITH WATER FOR AT LEAST 15 MINUTES.SKIN:FLUSH WITH LARGE VOLUMES OF WATER.REMOVE CONTAMINATED CLOTHING.INGESTION:CONTACT PHYSICIAN.INHALATION:IMMEDIAATELY MOVE TO FRESH AIR.GIVE OXYGEN IF B REATHING IS LABORED.IF BREATHING STOPS,GIVE ARTIFICIAL RESPIRATION.CONTACT PHYSICIAN.

========== Fire Fighting Measures ==========

Flash Point:N/K
Lower Limits:N/K
Upper Limits:N/K
Extinguishing Media:CO*2,FOAM,DRY CHEMICAL.
Fire Fighting Procedures:USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT .

========== Accidental Release Measures ==========

Spill Release Procedures:SWEEP UP MATERIAL.VENTILATE AREA.AVOID GENERATING DUST.
Neutralizing Agent:N/K

========== Handling and Storage ==========

Handling and Storage Precautions:STORE IN SEALED CONTAINER IN COOL,DRY LOCATION.KEEP AWAY FROM OXIDIZERS.AVOID GENERATING DUST.
Other Precautions:REPORTED CANCER HAZARD.AVOID EYE OR SKIN CONTACT.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN .
Ventilation:LOCAL AND GENERAL VENTILATION NECESSARY TO KEEP AIR CONCENTRATION BELOW LEVEL OF CONCERN .
Protective Gloves:RUBBER
Eye Protection:CHEMICAL WORKERS GOGGLES .
Work Hygienic Practices:N/K
Supplemental Safety and Health
ROUTES OF ENTRY:INHALATION/SKIN/INGESTION .

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:438C,820F
Melt/Freeze Pt:M.P/F.P Text:157C,315F
Decomp Temp:Decomp Text:N/K
Appearance and Odor:PALE YELLOW CRYSTAL.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
OXIDIZING AGENTS.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSAL MUST BE IN ACCORDANCE WITH FEDERAL,STATE AND LOCAL REGULATIONS .

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

BENZO (A) PYRENE, MD-1956

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
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Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
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Section 1 - Product and Company Identification
BENZO (A) PYRENE, MD-1956

Product Identification: BENZO (A) PYRENE, MD-1956
Date of MSDS: 03/25/1986 **Technical Review Date:** 09/30/1992
FSC: 6810 **NIIN: LIIN:** 00N034844
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: MERCK FROSST CANADA INC
Post Office Box: 899
Manufacturer's Address1:
Manufacturer's Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, NK 00000
Manufacturer's Country: NK
General Information Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 09578
Special Project Code: N

Contractor Information

Contractor's Name: MERCK FROSST CANADA INC
Contractor's Address1: UNKNOWN
Contractor's Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000
Contractor's Telephone: 800-325-9034; 514-697-2823
Contractor's CAGE: 09578

Section 2 - Compositon/Information on Ingredients
BENZO (A) PYRENE, MD-1956

Ingredient Name: BENZO (A) PYRENE
Ingredient CAS Number: 50-32-8 **Ingredient CAS Code:** M
RTECS Number: DJ3675000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: >99
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 0.2 MG/M3 **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: A2, MG/M3;9394 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1 LB
DOT Reporting Quantity: 1 LB
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
BENZO (A) PYRENE, MD-1956

Health Hazards Acute & Chronic: CANCER SUSPECT (GASTRIC), MUTAGENIC, NEOPLASTIC.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:
Inhalation: YES
Skin: NO
Ingestion: YES

Carcenogenicity Indicators
NTP: YES
IARC: YES
OSHA: NO

Carcinogenicity Explanation: BENZO (A) PYRENE: GROUP 2A (IARC), ANTICIPATED TO BE A CARCINOGEN (NTP).

Section 4 - First Aid Measures
BENZO (A) PYRENE, MD-1956

First Aid:
SUMMON A PHYSICIAN. SKIN: WASH WITH WATER. INHALATION: REMOVE TO FRESH AIR, ARTIFICIAL RESPIRATION OR OXYGEN IF NECESSARY. INGESTION: GIVE WATER AND INDUCE VOMITING. MEDICAL ASSISTANCE FOR GASTRIC LAV AGE. EYE: FLUSH WITH WATER FOR AT LEAST15 MINUTES (FP N).

Section 5 - Fire Fighting Measures
BENZO (A) PYRENE, MD-1956

Fire Fighting Procedures:
WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire or Explosion Hazard:
NONE SPECIFIED BY MANUFACTURER.
Extinguishing Media:
CO*2, DRY CHEMICAL, ALCOHOL FOAM.
Flash Point: Flash Point Text: N/K

Autoignition Temperature:
Autoignition Temperature Text: N/A

Lower Limit(s): N/K
Upper Limit(s): N/K

Section 6 - Accidental Release Measures
BENZO (A) PYRENE, MD-1956

Spill Release Procedures:
PROVIDE GOOD VENTILATION. CAREFULLY SCOOP UP AND TRANSFER TO A CLOSED CONTAINER.

Section 7 - Handling and Storage
BENZO (A) PYRENE, MD-1956

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
BENZO (A) PYRENE, MD-1956

Repiratory Protection:
WEAR NIOSH/MSHA APPROVED SELF-CONTAINED BREATHING APPARATUS.
Ventilation:
LOCAL EXHAUST: STRONG FUMEHOOD.
Protective Gloves:
RUBBER GLOVES.
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: PROTECTIVE CLOTHING. PROVIDE SAFETY SHOWER AND EYEWASH STATION NEAR WORKPLACE.
Work Hygenic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Health & Safety Information: NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties
BENZO (A) PYRENE, MD-1956

HCC: N1
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 594F,312C
Melting/Freezing Point: Melting/Freezing Text: 354F,179C
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/K **Vapor Density:** N/K
Percent Volatile Organic Content:
Specific Gravity: N/K
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/K
Solubility in Water: <0.1

Appearance and Odor: YELLOW SOLID.
Percent Volatiles by Volume: LOW
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
BENZO (A) PYRENE, MD-1956

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDIZING AGENTS.
Stability Condition to Avoid:
NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:
CARBON MONOXIDE, CARBON DIOXIDE ON COMBUSTION.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT.

Section 11 - Toxicological Information
BENZO (A) PYRENE, MD-1956

Toxicological Information:
N/P

Section 12 - Ecological Information
BENZO (A) PYRENE, MD-1956

Ecological Information:
N/P

Section 13 - Disposal Considerations
BENZO (A) PYRENE, MD-1956

Waste Disposal Methods:
VIA LICENSED DISPOSAL COMPANY. DISPOSE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (FP N).

Section 14 - MSDS Transport Information
BENZO (A) PYRENE, MD-1956

Transport Information:
N/P

Section 15 - Regulatory Information
BENZO (A) PYRENE, MD-1956

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
BENZO (A) PYRENE, MD-1956

Other Information:
N/P

HMIS Transportation Information

Product Identification: BENZO (A) PYRENE, MD-1956
Transporation ID Number: 39315
Responsible Party CAGE: 09578
Date MSDS Prepared: 03/25/1986
Date MSDS Reviewed: 02/17/1993
MFN: 02/17/1993
Submitter: N TN
Status Code: C

Container Information
- **Unit of Issue:** NK
- **Container Quantity:** NK
- **Type of Container:**
- **Net Unit Weight:**

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:
NOT REGULATED FOR TRANSPORTATION

Department of Transportation Information

DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
DOT PSN Code: ZZZ
Symbols: N/R
DOT PSN Modifier:
Hazard Class: N/R
UN ID Number: N/R
DOT Packaging Group: N/R
Label: N/R
Special Provision(s): N/R
Packaging Exception: N/R
Non Bulk Packaging: N/R

Bulk Packaging: N/R
Maximimum Quanity in Passenger Area: N/R
Maximimum Quanity in Cargo Area: N/R
Stow in Vessel Requirements: N/R
Requirements Water/Sp/Other: N/R

IMO Detail Information

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO PSN Modifier:
IMDG Page Number: N/R
UN Number: N/R
UN Hazard Class: N/R
IMO Packaging Group: N/R
Subsidiary Risk Label: N/R
EMS Number: N/R
Medical First Aid Guide Number: N/R

IATA Detail Information

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA PSN Modifier:
IATA UN Id Number: N/R
IATA UN Class: N/R
Subsidiary Risk Class: N/R
UN Packaging Group: N/R
IATA Label: N/R
Packaging Note for Passengers: N/R
Maximum Quantity for Passengers: N/R
Packaging Note for Cargo: N/R
Maximum Quantity for Cargo: N/R
Exceptions: N/R

AFI Detail Information

AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Symbols:
AFI PSN Code: ZZZ
AFI PSN Modifier:
AFI UN Id Number: N/R
AFI Hazard Class: N/R
AFI Packing Group: N/R
AFI Label: N/R
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: BENZO (A) PYRENE, MD-1956
CAGE: 09578
Assigned Individual: N
Company Name: MERCK FROSST CANADA INC
Company PO Box:
Company Street Address1: UNKNOWN
Company Street Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000 US
Health Emergency Telephone: 800-325-9034;514-697-2823
Label Required Indicator: Y

Date Label Reviewed: 09/30/1992
Status Code: C
Manufacturer's Label Number:
Date of Label: 09/30/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: Y
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: WARNING
Health Hazard: Slight
Contact Hazard: Moderate
Fire Hazard: None
Reactivity Hazard: None

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
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F74 BENZO/B/FLUORANTHENE

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

Section 1 - Product and Company Identification
F74 BENZO/B/FLUORANTHENE

Product Identification: F74 BENZO/B/FLUORANTHENE
Date of MSDS: 09/11/1990 **Technical Review Date:** 12/14/1994
FSC: 6550 **NIIN:** **LIIN:** 00F037517
Submitter: F BT
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: CHEM SERVICE INC
Post Office Box: 3108
Manufacturer's Address1: 660 TOWER LN
Manufacturer's Address2: WEST CHESTER, PA 19381-3108
Manufacturer's Country: US
General Information Telephone: 215-692-3026/800-452-9994
Emergency Telephone: 215-692-3026/800-452-9994
Emergency Telephone: 215-692-3026/800-452-9994
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 84898
Special Project Code: N

Preparer Information

Preparer's Name: CHEM SERVICE INC
Post Office Box: 3108
Preparer's Address1: N/K
Preparer's Address2: WEST CHESTER, PA 19381
Preparer's CAGE: 84898
Assigned Individual: N

Contractor Information

Contractor's Name: CHEM SERVICE INC
Post Office Box: 3108
Contractor's Address1: N/K
Contractor's Address2: WEST CHESTER, PA 19381
Contractor's Telephone: 215-692-3026
Contractor's CAGE: 84898

Contractor Information

Contractor's Name: CHEM SERVICE, INC
Post Office Box: 599
Contractor's Address1: 660 TOWER LN
Contractor's Address2: WEST CHESTER, PA 19301-9650
Contractor's Telephone: 610-692-3026
Contractor's CAGE: 8Y898

Section 2 - Compositon/Information on Ingredients
F74 BENZO/B/FLUORANTHENE

Ingredient Name: BENZO (B) FLUORANTHENE (SUSPECTED CARCINOGEN BY NTP, IARC GROUP 2B) *94-4*
Ingredient CAS Number: 205-99-2 **Ingredient CAS Code:** M
RTECS Number: DF6350000 **RTECS Code:** M

=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: N/K
% Enviromental Weight:
Other REC Limits: A2 CARCINOGEN
OSHA PEL: N/K **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: N/K **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1 LB
DOT Reporting Quantity: 1 LB
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
F74 BENZO/B/FLUORANTHENE

Health Hazards Acute & Chronic: N/K

Signs & Symptoms of Overexposure:
N/K

Medical Conditions Aggravated by Exposure:
N/K

LD50 LC50 Mixture: ORAL LD50 (RAT/MOUSE): 72 MG/KG

Route of Entry Indicators:
- **Inhalation:** NO
- **Skin:** NO
- **Ingestion:** NO

Carcenogenicity Indicators
- **NTP:** YES
- **IARC:** YES
- **OSHA:** NO

Carcinogenicity Explanation: SEE INGREDIENTS

Section 4 - First Aid Measures
F74 BENZO/B/FLUORANTHENE

First Aid:

EYES: FLUSH W/WATER FOR 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NOT BURNED, WASH W/SOAP & WATER TO CLEANSE. INHALATION: REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NEEDED. KEEP WARM & QUIET. IN GESTION: DON'T GIVE LIQUIDS/INDUCE VOMITING IF UNCONSCIOUS/CONVULSING. IF VOMITING OCCURS, WATCH CLOSELY TO AVOID AIRWAY OBSTRUCTION. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Section 5 - Fire Fighting Measures
F74 BENZO/B/FLUORANTHENE

Fire Fighting Procedures:
N/K
Unusual Fire or Explosion Hazard:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER/SPRAY.
Flash Point: Flash Point Text: N/K

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): N/K
Upper Limit(s): N/K

Section 6 - Accidental Release Measures
F74 BENZO/B/FLUORANTHENE

Spill Release Procedures:
EVACUATE AREA. WEAR APPRORPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE/SIMILAR MATERIAL. SWEEP UP & PLACE IN APPROPRIATE CONTAINER/HOLD FOR DISPOSAL. WASH CONTAMINATED SURFAC ES TO REMOVE ANY RESIDUES.

Section 7 - Handling and Storage
F74 BENZO/B/FLUORANTHENE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
F74 BENZO/B/FLUORANTHENE

Repiratory Protection:
WEAR APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.
Ventilation:
CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.
Protective Gloves:
N/K
Eye Protection: EYE SHIELDS
Other Protective Equipment: N/K

Work Hygenic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.
Supplemental Health & Safety Information: N/K

Section 9 - Physical & Chemical Properties
F74 BENZO/B/FLUORANTHENE

HCC:
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: N/K
Melting/Freezing Point: Melting/Freezing Text: 334.4F
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/K **Vapor Density:** N/K
Percent Volatile Organic Content:
Specific Gravity: N/K
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/K
Solubility in Water: N/K
Appearance and Odor: CRYSTALLINE SOLID
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
F74 BENZO/B/FLUORANTHENE

Stability Indicator: YES
Materials to Avoid:
N/K
Stability Condition to Avoid:
N/K
Hazardous Decomposition Products:
N/K
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
N/K

Section 11 - Toxicological Information
F74 BENZO/B/FLUORANTHENE

Toxicological Information:
N/P

Section 12 - Ecological Information
F74 BENZO/B/FLUORANTHENE

Ecological Information:
N/P

Section 13 - Disposal Considerations

F74 BENZO/B/FLUORANTHENE

Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER IAW/FEDERAL, STATE & LOCAL REGULATIONS.

Section 14 - MSDS Transport Information
F74 BENZO/B/FLUORANTHENE

Transport Information:
N/P

Section 15 - Regulatory Information
F74 BENZO/B/FLUORANTHENE

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
F74 BENZO/B/FLUORANTHENE

Other Information:
N/P

HAZCOM Label Information

Product Identification: F74 BENZO/B/FLUORANTHENE
CAGE: 84898
Assigned Individual: N
Company Name: CHEM SERVICE INC
Company PO Box: 3108
Company Street Address1: N/K
Company Street Address2: WEST CHESTER, PA 19381 US
Health Emergency Telephone: 215-692-3026/800-452-9994
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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Material Safety Data Sheet

Benzo[k]fluoranthene, 99+% (tlc)

ACC# 54641

Section 1 - Chemical Product and Company Identification

MSDS Name: Benzo[k]fluoranthene, 99+% (tlc)
Catalog Numbers: AC279730000, AC279732500
Synonyms: 8,9-Benzofluoranthane.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
207-08-9	Benzo[k]fluoranthene, 99+% (TLC)	99%	205-916-6

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow solid.
Danger! Toxic. May be fatal if swallowed. Cancer hazard. May be fatal if absorbed through the skin. May be fatal if inhaled. Carcinogen. Causes eye and skin irritation. Causes digestive and respiratory tract irritation. May cause lung damage.
Target Organs: Lungs, respiratory system.

Potential Health Effects

Eye: Causes eye irritation.
Skin: Causes skin irritation. May be fatal if absorbed through the skin.
Ingestion: May be fatal if swallowed. Causes gastrointestinal irritation with nausea, vomiting and diarrhea.
Inhalation: May be fatal if inhaled. Causes respiratory tract irritation.
Chronic: May cause cancer according to animal studies.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion: Call a poison control center. If swallowed, do not induce vomiting unless directed to do

so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: Not available.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: Not published.

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash hands before eating. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not breathe dust, vapor, mist, or gas. Do not get on skin or in eyes. Do not ingest or inhale.
Storage: Store in a cool, dry place. Store in a tightly closed container.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Benzo[k]fluoranthene, 99+% (TLC)	none listed	none listed	none listed

OSHA Vacated PELs: Benzo[k]fluoranthene, 99+% (TLC): No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: yellow
Odor: Not available.
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 480 deg C @ 760.00mm Hg
Freezing/Melting Point:216 - 218 deg C
Decomposition Temperature: Not available.
Solubility: Not available.
Specific Gravity/Density: Not available.
Molecular Formula:C20H12
Molecular Weight:252.32

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, dust generation.
Incompatibilities with Other Materials: Strong oxidants.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 207-08-9: DF6350000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 207-08-9:

- **ACGIH:** Not listed.
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: Samonella typhimurium : 10æg/plate
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. From calc logKow of 6.84, the est bioconc factor for fish is 144. However no accum is likely due to the pres of microsomal mixed funct oxidases which enables it to be metabolised (Lyman,W.J. Handb of chem.prop est meth. Env behaviour of org chem 1982; Santodonato, J. Health and ecol assessment of polynucl arom hydrocarb. 1981) Short-necked clam cultured in artif seawater at 21-25øC for 10 days revealed a decr in benzo[k].. of ca 20% on day 8. When clams were placed in a basket and kept in harbour water, only a small incr in polycycl arom hydrocarb were found.
Environmental: When soil treated with 7 applications of oil sludge containing polynucleated arom. hydrocarb. over a two yr period, was monitored for an additional 18 months, the benzo[k] fluoranthene residue in the soil decreased by 57%. In a static biodegrad. test employing a domestic wastewater inoculum, 50-70% of benzo[k]fluoranthene residue in the soil decreased by 57%. In a static biodegrad. test employing a dometic wastewater inoculum, 50-70% of benzo[k] fluoranthene was degradated in four successive weekkly subcultures (Tabak H.H. 94th An.Mtg.Assoc.Off.Anal.Chem.1981)
Physical: No information available.
Other: Abiotic removal : Demonstrates considerable atmospheric stability. Pollution resulting from emissions can be found far from source. (Bjorseth A. Handbook of polycyclic aromatic hydrocarbons 1983, MArcel Dekker Inc., New York)

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 207-08-9 is not listed on the TSCA inventory. It is for research and development use only.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 207-08-9: 1 lb final RQ; 0.454 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

Section 313

This material contains Benzo[k]fluoranthene, 99+% (TL (CAS# 207-08-9, 99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 207-08-9 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 207-08-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Benzo[k]fluoranthene, 99+% (TL, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T

Risk Phrases:

R 45 May cause cancer.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.

WGK (Water Danger/Protection)

CAS# 207-08-9: No information available.

Canada - DSL/NDSL

None of the chemicals in this product are listed on the DSL or NDSL list.

Canada - WHMIS

WHMIS: Not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 207-08-9 is not listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #4 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

CHRYSENE, MD-402

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
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Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

Section 1 - Product and Company Identification
CHRYSENE, MD-402

Product Identification: CHRYSENE, MD-402
Date of MSDS: 03/25/1986 **Technical Review Date:** 10/05/1992
FSC: 6810 **NIIN: LIIN:** 00N034847
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: MERCK FROSST CANADA INC
Post Office Box: 899
Manufacturer's Address1:
Manufacturer's Address2: POINT CLAIRE-DORVAL, QUEBEC, CANADA, NK 00000
Manufacturer's Country: NK
General Information Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 09578
Special Project Code: N

Contractor Information

Contractor's Name: MERCK FROSST CANADA INC
Contractor's Address1: UNKNOWN
Contractor's Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000
Contractor's Telephone: 800-325-9034; 514-697-2823
Contractor's CAGE: 09578

Section 2 - Compositon/Information on Ingredients
CHRYSENE, MD-402

Ingredient Name: CHRYSENE (PEL LIMIT FROM COAL TAR PITCH VOLITILES) (SARA III)
Ingredient CAS Number: 218-01-9 **Ingredient CAS Code:** M
RTECS Number: GC0700000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: >99
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 0.2 PPM **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: A2 9394 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 100 LBS
DOT Reporting Quantity: 100 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
CHRYSENE, MD-402

Health Hazards Acute & Chronic: CANCER SUSPECT AGENT; IRRITATION, PULMONARY EDEMA, SENSITIZER, DERMATITIS, DIZZINESS, NAUSEA, CONVULSIONS, KIDNEY AND LIVER DAMAGE.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:
Inhalation: YES
Skin: NO
Ingestion: YES

Carcenogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures
CHRYSENE, MD-402

First Aid:
SKIN: WASH WITH WATER. INHAL: REMOVE TO FRESH AIR, ARTIFICIAL RESPIRATION OR OXYGEN IF NECESSARY. INGEST: GIVE WATER AND INDUCE VOMITING. MEDICAL ASSISTANCE FOR GASTRIC LAVAGE. EYES: IMMED FLUSH WITH POTABLE WATER FOR A MINIMUM OF 15 MIN. SEEK ASSISTANCE FROM MD (FP N).

Section 5 - Fire Fighting Measures
CHRYSENE, MD-402

Fire Fighting Procedures:
WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire or Explosion Hazard:
CANCER SUSPECT.
Extinguishing Media:
CO*2, DRY CHEMICAL, ALCOHOL FOAM.
Flash Point: Flash Point Text: N/K

Autoignition Temperature:
Autoignition Temperature Text: N/A

Lower Limit(s): N/K
Upper Limit(s): N/K

Section 6 - Accidental Release Measures
CHRYSENE, MD-402

Spill Release Procedures:
PROVIDE ADEQUATE VENTILATION. CAREFULLY SCOOP UP AND TRANSFER TO A CLOSED CONTAINER.

Section 7 - Handling and Storage
CHRYSENE, MD-402

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
CHRYSENE, MD-402

Repiratory Protection:
NIOSH/MSHA APPROVED SCBA.
Ventilation:
LOCAL EXHAUST: STRONG FUMEHOOD. SPECIAL: CANCER SUSPECT; AVOID ALL CONTACT.
Protective Gloves:
RUBBER GLOVES.
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: PROTECTIVE CLOTHING. PROVIDE SAFETY SHOWERS AND EYEWASH STATION NEAR WORKPLACE.
Work Hygenic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Health & Safety Information: % VOLATILE: SUBLIMES.

Section 9 - Physical & Chemical Properties
CHRYSENE, MD-402

HCC: N1
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 838F,448C
Melting/Freezing Point: Melting/Freezing Text: 489F,254C
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/K **Vapor Density:** N/K
Percent Volatile Organic Content:
Specific Gravity: 1.27
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/K

Solubility in Water: <0.1 %
Appearance and Odor: WHITE-PALE YELLOW SOLID
Percent Volatiles by Volume: SUPDAT
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
CHRYSENE, MD-402

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDIZING AGENTS.
Stability Condition to Avoid:
NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:
CO/CO*2 ON COMBUSTION
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT

Section 11 - Toxicological Information
CHRYSENE, MD-402

Toxicological Information:
N/P

Section 12 - Ecological Information
CHRYSENE, MD-402

Ecological Information:
N/P

Section 13 - Disposal Considerations
CHRYSENE, MD-402

Waste Disposal Methods:
VIA LICENSED DISPOSAL COMPANY. DISPOSE OF ACCORDING TO FEDERAL, STATE AND LOCAL REGULATIONS.

Section 14 - MSDS Transport Information
CHRYSENE, MD-402

Transport Information:
N/P

Section 15 - Regulatory Information
CHRYSENE, MD-402

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:

N/P

Section 16 - Other Information
CHRYSENE, MD-402

Other Information:
N/P

HMIS Transportation Information

Product Identification: CHRYSENE, MD-402
Transporation ID Number: 39318
Responsible Party CAGE: 09578
Date MSDS Prepared: 03/25/1986
Date MSDS Reviewed: 04/15/1993
MFN: 04/15/1993
Submitter: N TN
Status Code: C

Container Information
Unit of Issue: NK
Container Quantity: NK
Type of Container:
Net Unit Weight:

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:
NOT REGULATED FOR TRANSPORTATION

Department of Transportation Information

DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
DOT PSN Code: ZZZ
Symbols: N/R
DOT PSN Modifier:
Hazard Class: N/R
UN ID Number: N/R
DOT Packaging Group: N/R
Label: N/R
Special Provision(s): N/R
Packaging Exception: N/R

Non Bulk Packaging: N/R
Bulk Packaging: N/R
Maximimum Quanity in Passenger Area: N/R
Maximimum Quanity in Cargo Area: N/R
Stow in Vessel Requirements: N/R
Requirements Water/Sp/Other: N/R

IMO Detail Information

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO PSN Modifier:
IMDG Page Number: N/R
UN Number: N/R
UN Hazard Class: N/R
IMO Packaging Group: N/R
Subsidiary Risk Label: N/R
EMS Number: N/R
Medical First Aid Guide Number: N/R

IATA Detail Information

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA PSN Modifier:
IATA UN Id Number: N/R
IATA UN Class: N/R
Subsidiary Risk Class: N/R
UN Packaging Group: N/R
IATA Label: N/R
Packaging Note for Passengers: N/R
Maximum Quantity for Passengers: N/R
Packaging Note for Cargo: N/R
Maximum Quantity for Cargo: N/R
Exceptions: N/R

AFI Detail Information

AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Symbols:
AFI PSN Code: ZZZ
AFI PSN Modifier:
AFI UN Id Number: N/R
AFI Hazard Class: N/R
AFI Packing Group: N/R
AFI Label: N/R
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: CHRYSENE, MD-402
CAGE: 09578
Assigned Individual: N
Company Name: MERCK FROSST CANADA INC
Company PO Box:
Company Street Address1: UNKNOWN
Company Street Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000 US
Health Emergency Telephone: 800-325-9034;514-697-2823

Label Required Indicator: Y
Date Label Reviewed: 10/05/1992
Status Code: C
Manufacturer's Label Number:
Date of Label: 10/05/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: Y
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: WARNING
Health Hazard: Moderate
Contact Hazard: Moderate
Fire Hazard: None
Reactivity Hazard: None

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SUPELCO INC -- 48574, DIBENZO (A,H) ANTHRACENE 0.1G -- 6810-00N032523

========== Product Identification ==========

Product ID:48574, DIBENZO (A,H) ANTHRACENE 0.1G
MSDS Date:12/19/1985
FSC:6810
NIIN:00N032523
MSDS Number: BNSSL
=== Responsible Party ===
Company Name:SUPELCO INC
Address:SUPELCO PARK
City:BELLEFONTE
State:PA
ZIP:16823-0048
Country:US
Info Phone Num:814-359-3441
Emergency Phone Num:814-359-3441
CAGE:54968
=== Contractor Identification ===
Company Name:SIGMA-ALDRICH INC.
Address:3050 SPRUCE STREET
Box:14508
City:ST. LOUIS
State:MO
ZIP:63103
Country:US
Phone:314-771-5765/414-273-3850X5996
CAGE:54968

========== Composition/Information on Ingredients ==========

Ingred Name:DIBENZ A,H ANTHRACENE
CAS:53-70-3
RTECS #:HN2625000
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:YES Skin:NO Ingestion:YES
Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:NO
Health Hazards Acute and Chronic:REPORTED ANIMAL CARCINOGEN.
Explanation of Carcinogenicity:DIBENZ(A,H) ANTHRACENE: GROUP 2A(IARC),
ANTICIPATED TO BE CARCINOGEN (NTP).
Effects of Overexposure:NONE SPECIFIED BY MANUFACTURER.
Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

========== First Aid Measures ==========

First Aid:EYES: FLUSH WITH WATER FOR AT LEAST 15 MIN. CONTACT A
PHYSICIAN. SKIN: FLUSH WITH LARGE VOLUMES OF WATER. CONTACT A
PHYSICIAN. INHAL: IMMED MOVE TO FRESH AIR. INGEST: CONTACT A
PHYSICIAN.

========== Fire Fighting Measures ==========

Lower Limits:1%

Extinguishing Media:WATER, CO2, DRY CHEMICAL.
Fire Fighting Procedures:WEAR NIOSH/MSHA APPROVED SCBA AND FULL
PROTECTIVE EQUIPMENT .

========== Accidental Release Measures ==========

Spill Release Procedures:SWEEP UP MATERIAL. AVOID GENERATING DUST.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE IN SEALED CONTAINER IN COOL, DRY
LOCATION. AVOID GENERATING DUST.
Other Precautions:REPORTED CANCER HAZARD. AVOID EYE OR SKIN CONTACT.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:WEAR NIOSH/MSHA APPROVED SCBA.
Ventilation:USE ONLY IN WELL VENTILATED AREA.
Protective Gloves:IMPERVIOUS GLOVES .
Eye Protection:CHEMICAL WORKERS GOGGLES .
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health
NONE SPECIFIED BY MANUFACTURER.

========== Physical/Chemical Properties ==========

HCC:T6
Boiling Pt:B.P. Text:509F,265C
Vapor Density:9.60
Spec Gravity:>1(H2O=1)
Appearance and Odor:OFF-WHITE TO YELLOW-GREEN CRYSTALLINE

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
OXIDIZING AGENTS.

========== Disposal Considerations ==========

Waste Disposal Methods:COMPLY WITH ALL APPLICABLE FEDERAL, STATE, OR
LOCAL REGULATIONS.

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SUPELCO INC -- 48499, INDENO (1,2,3-CD) PYRENE 10MG -- 6810-00N032522

========== Product Identification ==========

Product ID:48499, INDENO (1,2,3-CD) PYRENE 10MG
MSDS Date:06/06/1985
FSC:6810
NIIN:00N032522
MSDS Number: BNSSK
=== Responsible Party ===
Company Name:SUPELCO INC
Address:SUPELCO PARK
City:BELLEFONTE
State:PA
ZIP:16823-0048
Country:US
Info Phone Num:814-359-3441
Emergency Phone Num:814-359-3441
CAGE:54968
=== Contractor Identification ===
Company Name:SIGMA-ALDRICH INC.
Address:3050 SPRUCE STREET
Box:14508
City:ST. LOUIS
State:MO
ZIP:63103
Country:US
Phone:314-771-5765/414-273-3850X5996
CAGE:54968

========== Composition/Information on Ingredients ==========

Ingred Name:INDENO 1,2,3-CD PYRENE
CAS:193-39-5
RTECS #:NK9300000
EPA Rpt Qty:100 LBS
DOT Rpt Qty:100 LBS

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:NO
Health Hazards Acute and Chronic:REPORTED ANIMAL CARCINOGEN.
Explanation of Carcinogenicity:INDENO(1,2,3-CD) PYRENE: GROUP 2B(IARC),
ANTICIPATED TO BE CARCINOGEN (NTP).
Effects of Overexposure:NONE SPECIFIED BY MANUFACTURER.
Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

========== First Aid Measures ==========

First Aid:EYES: FLUSH WITH WATER FOR AT LEAST 15 MIN. SKIN: FLUSH WITH
LARGE VOLUMES OF WATER. REMOVE CONTAMINATED CLOTHING. INHAL: MOVE
TO FRESH AIR. IF BREATHING STOPS, GIVE ARTF RESP. INGEST: IMMED
CONTACT A PHYSICIAN.

========== Fire Fighting Measures ==========

Flash Point:400F,204C

Extinguishing Media:CO2, DRY CHEMICAL.
Fire Fighting Procedures:WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT .

========== Accidental Release Measures ==========

Spill Release Procedures:SWEEP UP MATERIAL. AVOID GENERATING DUST.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE IN SEALED CONTR IN COOL, DRY LOCATION. KEEP AWAY FROM OXIDIZERS. STORE IN DRY, WELL VENTILATED AREA.
Other Precautions:REPORTED CANCER HAZARD. AVOID EYE OR SKIN CONTACT.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT .
Ventilation:USE ONLY IN EXHAUST HOOD.
Protective Gloves:NEOPRENE GLOVES.
Eye Protection:CHEMICAL WORKERS GOGGLES .
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health
NONE SPECIFIED BY MANUFACTURER.

========== Physical/Chemical Properties ==========

HCC:T6
Melt/Freeze Pt:M.P/F.P Text:324F,162C
Vapor Pres:0.10
Appearance and Odor:YELLOW CRYSTALS

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
OXIDIZING AGENTS. METALLIC SODIUM & POTASSIUM.

========== Disposal Considerations ==========

Waste Disposal Methods:COMPLY WITH ALL APPLICABLE FEDERAL, STATE, OR LOCAL REGULATIONS.

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

PHENANTHRENE, MS-2283

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification
PHENANTHRENE, MS-2283

Product Identification: PHENANTHRENE, MS-2283
Date of MSDS: 11/22/1985 **Technical Review Date:** 09/22/1992
FSC: 6810 **NIIN: LIIN:** 00N034845
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: MERCK FROSST CANADA INC
Post Office Box: 899
Manufacturer's Address1:
Manufacturer's Address2: POINT CLAIRE-DORVAL, QUEBEC, CANADA, NK 00000
Manufacturer's Country: NK
General Information Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 09578
Special Project Code: N

Contractor Information

Contractor's Name: MERCK FROSST CANADA INC
Contractor's Address1: UNKNOWN
Contractor's Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000
Contractor's Telephone: 800-325-9034; 514-697-2823
Contractor's CAGE: 09578

Section 2 - Compositon/Information on Ingredients
PHENANTHRENE, MS-2283

Ingredient Name: PHENANTHRENE
Ingredient CAS Number: 85-01-8 **Ingredient CAS Code:** M
RTECS Number: SF7175000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: >99
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: NOT APPLICABLE **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: NOT APPLICABLE **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 5000 LBS
DOT Reporting Quantity: 5000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
PHENANTHRENE, MS-2283

Health Hazards Acute & Chronic: CANCER & MUTAGEN INDICATIONS; SKIN PHOTOSENSITIZER.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: LD50:(ORAL,RAT)700 MG/KG

Route of Entry Indicators:
Inhalation: NO
Skin: NO
Ingestion: NO

Carcenogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures
PHENANTHRENE, MS-2283

First Aid:
SKIN: WASH WITH WATER. GET MED ATTN (FP N). EYE: IMMED FLUSH WITH POTABLE WATER FOR A MINIMUM OF 15 MIN, SEEK ASSISTANCE FROM MD (FP N). INHAL: REMOVE TO FRESH AIR, ARTFICIAL RESPIRATION OR OXYGEN IF NECESSARY. GET MED ATTN (FP N).INGEST: GIVE WATER AND INDUCE VOMITING. SUMMON A PHYSICIAN.

Section 5 - Fire Fighting Measures
PHENANTHRENE, MS-2283

Fire Fighting Procedures:
WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire or Explosion Hazard:
CANCER INDICATIONS.
Extinguishing Media:
CARBON DIOXIDE, DRY CHEMICAL, ALCOHOL FOAM.
Flash Point: Flash Point Text: N/K

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): N/K

Upper Limit(s): N/K

Section 6 - Accidental Release Measures
PHENANTHRENE, MS-2283

Spill Release Procedures:
PROVIDE ADEQUATE VENTILATION. CAREFULLY SCOOP UP & TRANSFER TO A CLOSED CONTAINER.

Section 7 - Handling and Storage
PHENANTHRENE, MS-2283

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
PHENANTHRENE, MS-2283

Repiratory Protection:
NIOSH/MSHA APPROVED SCBA OR CHEMICAL CARTRIDGE.
Ventilation:
LOCAL EXHAUST: GOOD FUMEHOOD. SPECIAL: CANCER INDICATIONS.
Protective Gloves:
RUBBER GLOVES.
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: PROTECTIVE CLOTHING. PROVIDE SAFETY SHOWERS & EYEWASH STATION NEAR WORKPLACE.
Work Hygenic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Health & Safety Information: NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties
PHENANTHRENE, MS-2283

HCC: N1
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 642F,339C
Melting/Freezing Point: Melting/Freezing Text: 212F,100C
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: 1 **Vapor Density:** 6.14
Percent Volatile Organic Content:
Specific Gravity: 1.18(H*2O=1)
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/K
Solubility in Water: <0.1%
Appearance and Odor: WHITE-PALE YELLOW SOLID.

Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
PHENANTHRENE, MS-2283

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDIZING AGENTS.
Stability Condition to Avoid:
NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:
CARBON MONOXIDE/CARBON DIOXIDE ON COMBUSTION.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT

Section 11 - Toxicological Information
PHENANTHRENE, MS-2283

Toxicological Information:
N/P

Section 12 - Ecological Information
PHENANTHRENE, MS-2283

Ecological Information:
N/P

Section 13 - Disposal Considerations
PHENANTHRENE, MS-2283

Waste Disposal Methods:
VIA LICENSED DISPOSAL COMPANY. DISPOSE OF ACCORDING TO FEDERAL, STATE & LOCAL REGULATIONS.

Section 14 - MSDS Transport Information
PHENANTHRENE, MS-2283

Transport Information:
N/P

Section 15 - Regulatory Information
PHENANTHRENE, MS-2283

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
PHENANTHRENE, MS-2283

Other Information:
N/P

HMIS Transportation Information

Product Identification: PHENANTHRENE, MS-2283
Transporation ID Number: 39316
Responsible Party CAGE: 09578
Date MSDS Prepared: 11/22/1985
Date MSDS Reviewed: 02/17/1993
MFN: 02/17/1993
Submitter: N TN
Status Code: C

Container Information
- **Unit of Issue:** NK
- **Container Quantity:** NK
- **Type of Container:**
- **Net Unit Weight:**

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:
NOT REGULATED FOR TRANSPORTATION

Department of Transportation Information

DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
DOT PSN Code: ZZZ
Symbols: N/R
DOT PSN Modifier:
Hazard Class: N/R
UN ID Number: N/R
DOT Packaging Group: N/R
Label: N/R
Special Provision(s): N/R
Packaging Exception: N/R
Non Bulk Packaging: N/R
Bulk Packaging: N/R

Maximimum Quanity in Passenger Area: N/R
Maximimum Quanity in Cargo Area: N/R
Stow in Vessel Requirements: N/R
Requirements Water/Sp/Other: N/R

IMO Detail Information

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO PSN Modifier:
IMDG Page Number: N/R
UN Number: N/R
UN Hazard Class: N/R
IMO Packaging Group: N/R
Subsidiary Risk Label: N/R
EMS Number: N/R
Medical First Aid Guide Number: N/R

IATA Detail Information

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA PSN Modifier:
IATA UN Id Number: N/R
IATA UN Class: N/R
Subsidiary Risk Class: N/R
UN Packaging Group: N/R
IATA Label: N/R
Packaging Note for Passengers: N/R
Maximum Quantity for Passengers: N/R
Packaging Note for Cargo: N/R
Maximum Quantity for Cargo: N/R
Exceptions: N/R

AFI Detail Information

AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Symbols:
AFI PSN Code: ZZZ
AFI PSN Modifier:
AFI UN Id Number: N/R
AFI Hazard Class: N/R
AFI Packing Group: N/R
AFI Label: N/R
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: PHENANTHRENE, MS-2283
CAGE: 09578
Assigned Individual: N
Company Name: MERCK FROSST CANADA INC
Company PO Box:
Company Street Address1: UNKNOWN
Company Street Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000 US
Health Emergency Telephone: 800-325-9034;514-697-2823
Label Required Indicator: Y
Date Label Reviewed: 09/22/1992

Status Code: C
Manufacturer's Label Number:
Date of Label: 09/22/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: CAUTION
Health Hazard: Slight
Contact Hazard: Slight
Fire Hazard: None
Reactivity Hazard: None

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

BENZO (A) PYRENE, MD-1956

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

Section 1 - Product and Company Identification
BENZO (A) PYRENE, MD-1956

Product Identification: BENZO (A) PYRENE, MD-1956
Date of MSDS: 03/25/1986 **Technical Review Date:** 09/30/1992
FSC: 6810 **NIIN: LIIN:** 00N034844
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: MERCK FROSST CANADA INC
Post Office Box: 899
Manufacturer's Address1:
Manufacturer's Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, NK 00000
Manufacturer's Country: NK
General Information Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 09578
Special Project Code: N

Contractor Information

Contractor's Name: MERCK FROSST CANADA INC
Contractor's Address1: UNKNOWN
Contractor's Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000
Contractor's Telephone: 800-325-9034; 514-697-2823
Contractor's CAGE: 09578

Section 2 - Compositon/Information on Ingredients
BENZO (A) PYRENE, MD-1956

Ingredient Name: BENZO (A) PYRENE
Ingredient CAS Number: 50-32-8 **Ingredient CAS Code:** M
RTECS Number: DJ3675000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: >99
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 0.2 MG/M3 **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: A2, MG/M3;9394 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1 LB
DOT Reporting Quantity: 1 LB
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
BENZO (A) PYRENE, MD-1956

Health Hazards Acute & Chronic: CANCER SUSPECT (GASTRIC), MUTAGENIC, NEOPLASTIC.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:
Inhalation: YES
Skin: NO
Ingestion: YES

Carcenogenicity Indicators
NTP: YES
IARC: YES
OSHA: NO

Carcinogenicity Explanation: BENZO (A) PYRENE: GROUP 2A (IARC), ANTICIPATED TO BE A CARCINOGEN (NTP).

Section 4 - First Aid Measures
BENZO (A) PYRENE, MD-1956

First Aid:
SUMMON A PHYSICIAN. SKIN: WASH WITH WATER. INHALATION: REMOVE TO FRESH AIR, ARTIFICIAL RESPIRATION OR OXYGEN IF NECESSARY. INGESTION: GIVE WATER AND INDUCE VOMITING. MEDICAL ASSISTANCE FOR GASTRIC LAV AGE. EYE: FLUSH WITH WATER FOR AT LEAST15 MINUTES (FP N).

Section 5 - Fire Fighting Measures
BENZO (A) PYRENE, MD-1956

Fire Fighting Procedures:
WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire or Explosion Hazard:
NONE SPECIFIED BY MANUFACTURER.
Extinguishing Media:
CO*2, DRY CHEMICAL, ALCOHOL FOAM.
Flash Point: Flash Point Text: N/K

Autoignition Temperature:
Autoignition Temperature Text: N/A

Lower Limit(s): N/K
Upper Limit(s): N/K

Section 6 - Accidental Release Measures
BENZO (A) PYRENE, MD-1956

Spill Release Procedures:
PROVIDE GOOD VENTILATION. CAREFULLY SCOOP UP AND TRANSFER TO A CLOSED CONTAINER.

Section 7 - Handling and Storage
BENZO (A) PYRENE, MD-1956

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
BENZO (A) PYRENE, MD-1956

Repiratory Protection:
WEAR NIOSH/MSHA APPROVED SELF-CONTAINED BREATHING APPARATUS.
Ventilation:
LOCAL EXHAUST: STRONG FUMEHOOD.
Protective Gloves:
RUBBER GLOVES.
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: PROTECTIVE CLOTHING. PROVIDE SAFETY SHOWER AND EYEWASH STATION NEAR WORKPLACE.
Work Hygenic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Health & Safety Information: NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties
BENZO (A) PYRENE, MD-1956

HCC: N1
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 594F,312C
Melting/Freezing Point: Melting/Freezing Text: 354F,179C
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/K **Vapor Density:** N/K
Percent Volatile Organic Content:
Specific Gravity: N/K
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/K
Solubility in Water: <0.1

Appearance and Odor: YELLOW SOLID.
Percent Volatiles by Volume: LOW
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
BENZO (A) PYRENE, MD-1956

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDIZING AGENTS.
Stability Condition to Avoid:
NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:
CARBON MONOXIDE, CARBON DIOXIDE ON COMBUSTION.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT.

Section 11 - Toxicological Information
BENZO (A) PYRENE, MD-1956

Toxicological Information:
N/P

Section 12 - Ecological Information
BENZO (A) PYRENE, MD-1956

Ecological Information:
N/P

Section 13 - Disposal Considerations
BENZO (A) PYRENE, MD-1956

Waste Disposal Methods:
VIA LICENSED DISPOSAL COMPANY. DISPOSE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (FP N).

Section 14 - MSDS Transport Information
BENZO (A) PYRENE, MD-1956

Transport Information:
N/P

Section 15 - Regulatory Information
BENZO (A) PYRENE, MD-1956

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
BENZO (A) PYRENE, MD-1956

Other Information:
N/P

HMIS Transportation Information

Product Identification: BENZO (A) PYRENE, MD-1956
Transporation ID Number: 39315
Responsible Party CAGE: 09578
Date MSDS Prepared: 03/25/1986
Date MSDS Reviewed: 02/17/1993
MFN: 02/17/1993
Submitter: N TN
Status Code: C

Container Information
- **Unit of Issue:** NK
- **Container Quantity:** NK
- **Type of Container:**
- **Net Unit Weight:**

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:
NOT REGULATED FOR TRANSPORTATION

Department of Transportation Information

DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
DOT PSN Code: ZZZ
Symbols: N/R
DOT PSN Modifier:
Hazard Class: N/R
UN ID Number: N/R
DOT Packaging Group: N/R
Label: N/R
Special Provision(s): N/R
Packaging Exception: N/R
Non Bulk Packaging: N/R

Bulk Packaging: N/R
Maximimum Quanity in Passenger Area: N/R
Maximimum Quanity in Cargo Area: N/R
Stow in Vessel Requirements: N/R
Requirements Water/Sp/Other: N/R

IMO Detail Information

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO PSN Modifier:
IMDG Page Number: N/R
UN Number: N/R
UN Hazard Class: N/R
IMO Packaging Group: N/R
Subsidiary Risk Label: N/R
EMS Number: N/R
Medical First Aid Guide Number: N/R

IATA Detail Information

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA PSN Modifier:
IATA UN Id Number: N/R
IATA UN Class: N/R
Subsidiary Risk Class: N/R
UN Packaging Group: N/R
IATA Label: N/R
Packaging Note for Passengers: N/R
Maximum Quantity for Passengers: N/R
Packaging Note for Cargo: N/R
Maximum Quantity for Cargo: N/R
Exceptions: N/R

AFI Detail Information

AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Symbols:
AFI PSN Code: ZZZ
AFI PSN Modifier:
AFI UN Id Number: N/R
AFI Hazard Class: N/R
AFI Packing Group: N/R
AFI Label: N/R
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: BENZO (A) PYRENE, MD-1956
CAGE: 09578
Assigned Individual: N
Company Name: MERCK FROSST CANADA INC
Company PO Box:
Company Street Address1: UNKNOWN
Company Street Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000 US
Health Emergency Telephone: 800-325-9034;514-697-2823
Label Required Indicator: Y

Date Label Reviewed: 09/30/1992
Status Code: C
Manufacturer's Label Number:
Date of Label: 09/30/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: Y
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: WARNING
Health Hazard: Slight
Contact Hazard: Moderate
Fire Hazard: None
Reactivity Hazard: None

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

BERYLLIUM, 213713

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification
BERYLLIUM, 213713

Product Identification: BERYLLIUM, 213713
Date of MSDS: 02/12/1994 **Technical Review Date:** 11/27/1995
FSC: 6810 **NIIN: LIIN:** 00N055260
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ICN BIOMEDICALS
Manufacturer's Address1: 1263 S CHILLICOTHE RD
Manufacturer's Address2: AURORA, OH 44202
Manufacturer's Country: US
General Information Telephone: 216-562-1500
Emergency Telephone: 800-424-9300 (CHEMTREC)
Emergency Telephone: 800-424-9300 (CHEMTREC)
MSDS Preparer's Name: RL
Proprietary: N
Reviewed: N
Published: Y
CAGE: IO030
Special Project Code: N

Contractor Information

Contractor's Name: ICN BIOCHEMICALS
Post Office Box: N/K
Contractor's Address1: 4911 COMMERCE PARKWAY
Contractor's Address2: CLEVELAND, OH 44128
Contractor's Telephone: 216-831-3000/800-424-9300(CHEMTREC)
Contractor's CAGE: 30060

Contractor Information

Contractor's Name: ICN BIOMEDICALS INC
Post Office Box: 28050
Contractor's Address1: UNKNOWN
Contractor's Address2: CLEVELAND, OH 44128-0250
Contractor's Telephone: 216-831-3000
Contractor's CAGE: IO030

Section 2 - Compositon/Information on Ingredients
BERYLLIUM, 213713

Ingredient Name: BERYLLIUM (SARA III)
Ingredient CAS Number: 7440-41-7 **Ingredient CAS Code:** M
RTECS Number: DS1750000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: N/K

% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 0.002 MG/M3 **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 0.002MG/M3 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Section 3 - Hazards Identification, Including Emergency Overview
BERYLLIUM, 213713

Health Hazards Acute & Chronic: DEADLY POISON BY INTRANEOUS ROUTE. SUSPECTED CARCINOGEN, EXPERIMENTAL MUTAGEN. SYSTEMIC EFFECTS BY INHALATION: LUNG FIBROSIS, DYSPNEA AND WEIGHT LOSS.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:
Inhalation: YES
Skin: YES
Ingestion: YES

Carcenogenicity Indicators
NTP: YES
IARC: YES
OSHA: NO

Carcinogenicity Explanation: BERYLLIUM: IARC MONOGRAPHS, SUPP, VOL 7, PG 127, 1987: GROUP 2A. NTP 7TH ANNUAL REPORT ON CARCINOGENS, 1994: (SUPP DATA)

Section 4 - First Aid Measures
BERYLLIUM, 213713

First Aid:
SKIN: REMOVE CONTAMD CLTHG, RINSE LIBERALLY W/SOAP & WATER FOR A CONSIDERABLE PERIOD. CALL MD. INGEST: DRINK 1 OR 2 GLASSES OF WATER. CALL MD OR TAKE PATIENT TO A HOSPITAL. EYES: RINSE LIBERALLY WITH WATER FOR AT LEAST 15 MINS. CALL MD/TAKE PATIENT TO A HOSPITAL. INHAL: TAKE THE PATIENT INTO THE FRESH AIR AND ALLOW TO REST. CALL MD/TAKE PATIENT TO A HOSPITAL.

Section 5 - Fire Fighting Measures
BERYLLIUM, 213713

Fire Fighting Procedures:
WEAR NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT(FP N).
Unusual Fire or Explosion Hazard:
RISK OF EXPLOSIVE MIXTURE IN AIR. POWDER MAY CAUSE FINE HAZARD WHEN EXPOSED TO HEAT OR FLAME.
Extinguishing Media:
CO*2, DRY CHEMICAL, FOAM.
Flash Point: Flash Point Text: N/K

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): N/K
Upper Limit(s): N/K

Section 6 - Accidental Release Measures
BERYLLIUM, 213713

Spill Release Procedures:
SWEEP INTO SUITABLE CONTAINER FOR DISPOSAL.

Section 7 - Handling and Storage
BERYLLIUM, 213713

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
BERYLLIUM, 213713

Repiratory Protection:
USE NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation:
LOCAL EXHAUST REQUIRED.
Protective Gloves:
IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS (SUPP DATA)
Other Protective Equipment: NONE SPECIFIED BY MANUFACTURER.
Work Hygenic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Health & Safety Information: EXPLAN OF CARCIN: ANTICIPATED TO BE CARCINOGEN, HUMAN: LUNG FIBROSIS. EYE PROTECTION: GOGGLES AND FULL LENGTH FACESHIELD (FP N).

Section 9 - Physical & Chemical Properties
BERYLLIUM, 213713

HCC:
NRC/State License Number:

Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 5378F,2970C
Melting/Freezing Point: Melting/Freezing Text: 2332F,1278C
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/A **Vapor Density:** N/K
Percent Volatile Organic Content:
Specific Gravity: 1.85
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/K
Solubility in Water: INSOLUBLE.
Appearance and Odor: DARK GRAY FINE POWDER.
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
BERYLLIUM, 213713

Stability Indicator: YES
Materials to Avoid:
MINERAL ACIDS, HALOGENS, SULFUR, PHOSPHOROUS AND OXIDIZING AGENTS.
Stability Condition to Avoid:
NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:
DECOMPOSITION/HEATED OR BURNED: BEO*X
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT.

Section 11 - Toxicological Information
BERYLLIUM, 213713

Toxicological Information:
N/P

Section 12 - Ecological Information
BERYLLIUM, 213713

Ecological Information:
N/P

Section 13 - Disposal Considerations
BERYLLIUM, 213713

Waste Disposal Methods:
INCINERATE OR LANDFILL AS COMPLIES WITH LOCAL, STATE & FEDERAL LAWS.

Section 14 - MSDS Transport Information
BERYLLIUM, 213713

Transport Information:
N/P

Section 15 - Regulatory Information
BERYLLIUM, 213713

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
BERYLLIUM, 213713

Other Information:
N/P

HAZCOM Label Information

Product Identification: BERYLLIUM, 213713
CAGE: IO030
Assigned Individual: Y
Company Name: ICN BIOMEDICALS INC
Company PO Box: 28050
Company Street Address1: UNKNOWN
Company Street Address2: CLEVELAND, OH 44128-0250 US
Health Emergency Telephone: 800-424-9300 (CHEMTREC)
Label Required Indicator: Y
Date Label Reviewed: 11/14/1994
Status Code: C
Manufacturer's Label Number:
Date of Label: 11/14/1994
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: DANGER
Health Hazard: Severe
Contact Hazard: Severe
Fire Hazard: Moderate
Reactivity Hazard: None

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ACP CHEMICALS INC -- CADMIUM, METAL (SEE SUPPL) -- -

========== Product Identification ==========

Product ID:CADMIUM, METAL (SEE SUPPL)
MSDS Date:05/01/2001
FSC:NIIN:Submitter:D DG
Status Code:A
Kit Part:Y
MSDS Number: CLJJK
=== Responsible Party ===
Company Name:ACP CHEMICALS INC
Address:4601 DES GRANDES PROFRIES
City:ST LEONARD, QC HIR 1A5
Info Phone Num:514-327-0323
Emergency Phone Num:416-226-6177 (DAY)
Resp. Party Other MSDS Num.:REVISION 1
Preparer's Name:AJ
Chemtrec Ind/Phone:(800)424-9300
CAGE:UO627
=== Contractor Identification ===
Company Name:ACP CHEMICALS INC
Address:4601 DES GRANDES PROFRIES
Box:City:ST LEONARD, QC HIR 1A5
Phone:514-327-0323
CAGE:UO627
Company Name:WARDS NATURAL SCIENCE ESTABLISHMENT INC
Address:5100 W HENRIETTA RD
Box:92912
City:ROCHESTER
State:NY
ZIP:14692-9012
Country:US
Phone:(716) 359-2502
Contract Num:MDA414-01-P-2041
CAGE:63759

========== Composition/Information on Ingredients ==========

Ingred Name:CADMIUM
CAS:7440-43-9
RTECS #:EU9800000
= Wt:99.8
Other REC Limits:NOT PROVIDED
OSHA PEL:SEE 1910.1027
ACGIH TLV:0.05 MG/M3 (TDUST)
ACGIH STEL:0.2 MG/M3
EPA Rpt Qty:10 LBS
DOT Rpt Qty:10 LBS

========== Hazards Identification ==========

LD50 LC50 Mixture:NOT PROVIDED
Reports of Carcinogenicity:NTP:YES IARC:NO OSHA:YES
Health Hazards Acute and Chronic:EFFECTS OF OVEREXPOSURE: A SINGLE EXPOSURE TO EXCESSIVE LEVELS OF CADMIUM FUMES OR DUSTS CAN CAUSE SEVERE LUNG IRRITATION, CHEST PAIN AND EDEMA WHICH MAY BE FATAL. DRYNESS OF THROAT, COUGH, HEADACHE, SHORTNESS OF BREATH, AND VOMITING CAN ALSO OCCUR AT LOW LEVELS AS WELL. SKIN: POSSIBLE SKIN

IRRITATION AND COLORATION. EYES: MECHANICAL IRRITATION.
Explanation of Carcinogenicity:NOT PROVIDED
Effects of Overexposure:A SINGLE EXPOSURE TO EXCESSIVE LEVELS OF CADMIUM FUMES OR DUSTS CAN CAUSE SEVERE LUNG IRRITATION, CHEST PAIN AND EDEMA. DRYNESS OF THROAT, COUGH, HEADACHE, SHORTNESS OF BREATH, AND VOMITING CAN ALSO OCCUR AT LOW LEVELS AS WELL. SKIN: POSSIBLE SKIN IRRITATION AND COLORATION. EYES: MECHANICAL IRRITATION.
Medical Cond Aggravated by Exposure:NOT PROVIDED

========== First Aid Measures ==========

First Aid:INHALATION: AT HIGH LEVELS REMOVE TO FRESH AIR, GIVE OXYGEN AND CONTACT PHYSICIAN. EYE: FLUSH THOROUGHLY WITH WATER, CONTACT PHYSICIAN. SKIN: FLUSH THOROUGHLY WITH WATER, THEN WITH SOAP AND WATER. ING ESTION: IF SWALLOWED, IF CONSCIOUS, GIVE ONE OR TWO GLASSES OF WATER, INDUCE VOMITING AND CALL PHYSICIAN. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

========== Fire Fighting Measures ==========

Flash Point:>787.C, 1448.6F
Lower Limits:N/AV
Upper Limits:N/AV
Extinguishing Media:CARBON DIOXIDE (CO2) OR DRY CHEMICAL. TYPE (ABC), SAND CAN BE USED.
Fire Fighting Procedures:CADMIUM DUST WILL BURN WITH EVOLUTION OF CADMIUM OXIDE FUMES. MUST WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
Unusual Fire/Explosion Hazard:AT TEMP. ABOVE 610C CADMIUM OR CADMIUM OXIDE FUMES MAY BE EVOLVED. DANGEROUS. IT CAN REACT VIGOROUSLY WITH OXIDIZING MATERIALS.

========== Accidental Release Measures ==========

Spill Release Procedures:NORMAL CLEANUP PROCEDURE IS APPLICABLE. IF DUST PREVAILS, USE APPROVED RESPIRATORY EQUIPMENT.
Neutralizing Agent:NOT RELEVANT

========== Handling and Storage ==========

Handling and Storage Precautions:STORE IN A COOL, DRY PLACE AWAY FROM CORROSIVE MATERIALS. WASH THOROUGHLY AFTER HANDLING. KEEP CONTAINER TIGHTLY CLOSED WHEN NOT IN USE.
Other Precautions:PERSONAL RESPIRATORY EQUIPMENT MAY BE USED. REMOVE AND WASH CONTAMINATED SLOTHING. ABRASIVE TO SKIN. READ LABEL ON CONTAINER BEFORE USING. DO NOT WEAR CONTACT LENSES WHEN WORKING WITH CHEMICALS. FOR L ABORATORY USE ONLY. NOT FOR DRUG, FOOD, OR HOUSEHOLD USE. KEEP OUT OF REACH OF CHILDREN.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NONE NEEDED IN NORMAL LAB HANDLING. IF DUST PREVAILS, WEAR NIOSH/MSHA DUST MASK OR WORK IN ADEQUATE VENTILATION HOOD.
Ventilation:LOCAL/MECHANICAL: RECOMMENDED. SPECIAL: AS REQUIRED. OTHER: NO
Protective Gloves:RUBBER, LEATHER
Eye Protection:CHEMICAL SAFETY GLASSES
Other Protective Equipment:GOGGLES, LAB COAT, VENTILATION, PROPER

GLOVES, EYE WASH STATION.
Work Hygienic Practices:NOT PROVIDED
Supplemental Safety and Health
PART OF KIT FOR QUALITATIVE WATER ANALYSIS. WARDS PART NUMBER: #361225.
OTHER MSDS SERIAL NUMBERS:
CLHWG,CLHWH,CLHWL,CLHWP,CLHWR,CLJCR,CLJDG,CLJFN,CLJFZ,CLJGX,CLJHN,CLJHX,CLJJC,CLJJD,CLJJF

========== Physical/Chemical Properties ==========

HCC:F5
NRC/State Lic Num:NOT RELEVANT
Boiling Pt:=765.C, 1409.F
Melt/Freeze Pt:=321.C, 609.8F
Decomp Temp:Decomp Text:NOT PROVIDED
Vapor Pres:1MMHG@394C
Vapor Density:N/AV
Spec Gravity:NOT AVAILABLE
Evaporation Rate & Reference:NON-VOLATILE (BUAC=1)
Solubility in Water:INSOLUBLE
Appearance and Odor:SILVER-WHITE LUSTROUS METAL; NO ODOR

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:NO
OXIDIZING AGENTS. TARNISHES IN MOIST AIR. DO NOT STORE NEAR ACIDS OR ALKALINE HYDROXIDES MAY EXPLODE.
Stability Condition to Avoid:TEMPERATURES ABOVE 610C MAY PRODUCE FUMES.
Hazardous Decomposition Products:HEAT TREATMENT WILL PRODUCE TOXIC CADMIUM OXIDE FUMES.

========== Toxicological Information ==========

Toxicological Information:NOT PROVIDED

========== Ecological Information ==========

Ecological:NOT PROVIDED

========== Disposal Considerations ==========

Waste Disposal Methods:DISCHARGE, TREATMENT OR DISPOSAL MAY BE SUBJECT TO FEDERAL, STATE OR LOCAL LAWS. THESE DISPOSAL GUIDELINES ARE INTENDED FOR CATALOG-SIZE QUANTITIES ONLY. DISPOSE OF IN AN APPROVED INCINERATOR OR CONTA CT LICENSED CHEMICAL WASTE DISPOSAL AGENCY.

========== MSDS Transport Information ==========

Transport Information:D.O.T.: POISONOUS SOLIDS N.O.S. (CADMIUM), CLASS 6.1

========== Regulatory Information ==========

SARA Title III Information:NOT PROVIDED
Federal Regulatory Information:NOT PROVIDED
State Regulatory Information:NOT PROVIDED

========== Other Information ==========

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MSDS Number: **C0253** * * * * * *Effective Date:* ***08/10/04*** * * * * * *Supercedes:* ***11/02/01***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker ®

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

CALCIUM METAL

1. Product Identification

Synonyms: Calcium metal crystalline
CAS No.: 7440-70-2
Molecular Weight: 40.08
Chemical Formula: Ca
Product Codes: 1262

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Calcium	7440-70-2	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! FLAMMABLE SOLID. WATER REACTIVE. CORROSIVE. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED

THROUGH SKIN. CONTACT MAY CAUSE BURNS TO ALL BODY TISSUE.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 2 - Moderate
Reactivity Rating: 2 - Moderate
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; CLASS D EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation produces damaging effects on the mucous membranes and upper respiratory tract. Symptoms may include irritation of the nose and throat, and labored breathing. May cause lung edema, a medical emergency.
Ingestion:
Irritant due to formation of caustic lime by reaction with moisture. Large amounts may have a corrosive effect. Abdominal pain or stricture, possible nausea, vomiting, diarrhea are symptoms.
Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur.
Eye Contact:
Corrosive. Causes redness, pain; possible burns and damage to eye tissues.
Chronic Exposure:
Prolonged inhalation of dust or fume may cause severe mucous membrane irritation, chemical pneumonitis.
Aggravation of Pre-existing Conditions:
No information found.

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4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Keep patient quiet in half upright position. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Wipe off excess material from skin then immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper

eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Flammable solid, water reactive. Can react vigorously with water, steam, acids to release flammable/explosive hydrogen. Dangerous in presence of oxidants. Liquid calcium can react violently.
Explosion:
Possible explosion hazard from generated hydrogen or intimate contact with strong oxidizers. Contact with alkali hydroxides or carbonates may cause detonation.
Fire Extinguishing Media:
Use dry soda ash, dry salt, sand, graphite powder or metal-fire-extinguishing dry powder such as Met-L-X®. Do not use water, foam, carbon dioxide, dry chemical, or chlorinated fire extinguishers.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to keep fire exposed containers cool. Do not allow contact of calcium with water. Finely divided calcium exposed to moist air may ignite spontaneously.

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6. Accidental Release Measures

Collect spilled material quickly and transfer to a container of kerosene, light oil or similar hydrocarbon fluid for recovery. Minimize exposure to air. Do not use water on metal.
If the spilled calcium has come into contact with water, proceed cautiously. The reaction can rapidly proceed to self-ignition of hydrogen and spattering of molten calcium. Evacuate the area, put on protective equipment and proceed as with a metal fire.
Waste calcium should be packaged under a hydrocarbon fluid and sent to an approved disposal facility.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Keep away from water or locations where water may be needed for fire. Avoid high temperatures. Store under nitrogen or kerosene. Never store under halogenated hydrocarbons. A detached fire-resistive building is recommended for quantity storage. Isolate from air, acids, and oxidizing materials. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the dust or mist is apparent, a full-face respirator with particulate cartridges (NIOSH type N95 or better) should be worn. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Silver-gray granules or lumps.
Odor:
Odorless.
Solubility:
Reacts with water with evolution of hydrogen.
Density:
1.54
pH:
Water solution alkaline (pH > 7).
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
1440C (2624F)
Melting Point:
850C (1562F)
Vapor Density (Air=1):
1.4
Vapor Pressure (mm Hg):
10 @ 983C (1801F)
Evaporation Rate (BuAc=1):

Not applicable.

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Water reactive.
Hazardous Decomposition Products:
Hydrogen, caustic calcium oxide and calcium hydroxide.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Air, asbestos cement, halogens, lead dichloride phosphorus pentoxide, silicon, sodium, mixed oxides, sulfur, water, acids, alcohols. Contact with alkali hydroxides or carbonates may cause detonation.
Conditions to Avoid:
Air, heat, flames, ignition sources and incompatibles.

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11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure.

--------\Cancer Lists\--

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Calcium (7440-70-2)	No	No	None

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12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

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13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in

accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CALCIUM
Hazard Class: 4.3
UN/NA: UN1401
Packing Group: II
Information reported for product/size: 500G

International (Water, I.M.O.)

Proper Shipping Name: CALCIUM, METAL
Hazard Class: 4.3
UN/NA: UN1401
Packing Group: II
Information reported for product/size: 500G

International (Air, I.C.A.O.)

Proper Shipping Name: CALCIUM, METAL
Hazard Class: 4.3
UN/NA: UN1401
Packing Group: II
Information reported for product/size: 500G

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15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Calcium (7440-70-2)	Yes	Yes	No	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
Calcium (7440-70-2)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

	-SARA 302-		------SARA 313------	
Ingredient	RQ	TPQ	List	Chemical Catg.
Calcium (7440-70-2)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

	-RCRA-	-TSCA-

Ingredient	CERCLA	261.33	8(d)
Calcium (7440-70-2)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: Yes (Pure / Solid)

Australian Hazchem Code: 4W
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **1** Reactivity: **2** Other: **Water reactive**
Label Hazard Warning:
DANGER! FLAMMABLE SOLID. WATER REACTIVE. CORROSIVE. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CONTACT MAY CAUSE BURNS TO ALL BODY TISSUE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe dust.
Use only with adequate ventilation.
Store in a tightly closed container.
Wash thoroughly after handling.
Remove and wash contaminated clothing promptly.
Do not allow contact with water, acids, or moisture.
Keep away from heat, sparks and flame.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, wipe off excess material from skin then immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

CERAC INC -- CHROMIUM METAL -- 6810-00N052881

========== Product Identification ==========

Product ID:CHROMIUM METAL
MSDS Date:06/08/1988
FSC:6810
NIIN:00N052881
MSDS Number: BVPDR
=== Responsible Party ===
Company Name:CERAC INC
Box:1178
City:MILWAUKEE
State:WI
ZIP:53201
Country:US
Info Phone Num:414-289-9800
Emergency Phone Num:800-562-8236;800-424-9300(CHEMTREC)
CAGE:FO994
=== Contractor Identification ===
Company Name:CERAC INC
Address:407 NO 13TH ST
Box:1178
City:MILWAUKEE
State:WI
ZIP:53201
Phone:(414) 289-9800
CAGE:FO994
Company Name:CERAC, INCORPORATED
Address:1316 W. ST. PAUL AVENUE
Box:1178
City:MILWAUKEE
State:WI
ZIP:53233
Country:US
Phone:414-289-9800
CAGE:67027

========== Composition/Information on Ingredients ==========

Ingred Name:CHROMIUM (SARA III)
CAS:7440-47-3
RTECS #:GB4200000
Fraction by Wt: 99.9%
OSHA PEL:1 MG/M3
ACGIH TLV:0.5 MG/M3
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

Ingred Name:EXPLAN OF CARCIN:HUMAN/ANIMAL:LUNG CANCER, SKIN ULCERS.
RTECS #:9999999ZZ

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:NO
Health Hazards Acute and Chronic:INHAL:CHROMIUM METAL IS RELATIVELY
NONTOX. INHAL HAZ OF PWDRS DEPENDENT UPON PARTICLE SIZE. CHROMIUM

METAL & INSOLUBLE SALTS SAID TO BE INVOLVED IN HISTOLOGICAL FIBROSIS OF LUNGS. WHEN METAL HEATED TO HIGH TEMP, FUMES PRDCED MAY BE DAMAGING TO LUNGS WHEN INHALED (POSS PNEUMOCONIOSIS). (SEE EFTS OF OVEREXP)

Explanation of Carcinogenicity:CHROMIUM:IARC MONOGRAPHS, VOL 49, PG 49, 1990:GRP 1. NTP 7TH ANNUAL RPT ON CARCINS, 1994:KNOWN TO BE CARCIN. (ING 2)

Effects of Overexposure:HLTH HAZ:EYE/SKIN:CAN CAUSE EYE & SKIN IRRIT. HEXAVALENT CHROMIUM CMPDS ARE CARCINOGENIC (OSHA) & CORROSIVE ON TISSUE, RESULTING IN ULCERS & DERM ON PRLNGD CNTCT. IARC HAS DETERMINED A "CAUSAL" ASSOC BETWEEN OCCUPATIONAL EXPOS TO CHROMIUM & CERTAIN CHROMIUM CMPDS & CANCER IN HUMANS. THIS DETERMINATION WAS (SUPP DATA)

Medical Cond Aggravated by Exposure:NONE.

========== First Aid Measures ==========

First Aid:INGEST:GIVE WATER TO DRINK; INDUCE VOMIT & SEEK PROMPT MED ATTN FOR FURTHER TREATMENT, SUPPORT & OBSERVATION. INHAL:REMOVE TO FRESH AIR. RESTORE AND/OR SUPPORT BRTHG AS REQUIRED. SKIN:BRUSH OFF CHROMI UM DUST. WASH WELL W/SOAP & WATER. EYE:FLUSH W/RUNNING WATER FOR 15 MINUTES, INCLUDING UNDER EYELIDS.

========== Fire Fighting Measures ==========

Extinguishing Media:POWDER FORM IS COMBUSTIBLE. USE WATER SPRAY OR FOG, DRY CHEMICAL, CO2, OR SAND. CLASS D.

Fire Fighting Procedures:FIRE MAY BE ISOLATED & ALLOWED TO BURN ITSELF OUT. WHEN POWDERED, FIREFIGHTERS SHOULD USE NIOSH/MSHA APPRVD SCBA & FULL PROTECTIVE EQUIPMENT .

Unusual Fire/Explosion Hazard:WHEN POWDERED CHROMIUM IS EXPSD TO HEAT/IGNIT SOURCES, IT IS A MODERATE FIRE & EXPLO HAZ. INDEX OF EXPLOSIBILITY (<0.1 WEAK, >10 SEVERE) = 0.1.

========== Accidental Release Measures ==========

Spill Release Procedures:NOTIFY SAFETY PERSONNEL OF LARGE SPILLS. REMOVE SOURCES OF HEAT/IGNIT. PROVIDE ADEQ VENT. KEEP AIRBORNE DUST TO MINIMUM BY USING VACUUM TO CLEAN UP DRY SPILLS/DUST. CLEAN UP PERSONNEL TO WEAR PROT CLT HG & NIOSH APPRVD RESP. REMOVE SPILL (SUPP DATA)

Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE MATL IN COOL, DRY, WELL-VENT AREA AWAY FROM HEAT/IGNIT SOURCES. STORE AWAY FROM OXIDIZING AGENTS.

Other Precautions:USE GOOD HOUSECLEANING TECHNIQUES THAT WILL KEEP AIRBORNE PARTICLES AT MINIMUM. USE NONSPARKING TOOLS & GROUND ELEC EQUIP & MACHINERY.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NIOSH/MSHA APPROVED FULL FACE RESPIRATOR REQUIRED FOR HIGH EXPOSURE AREAS.

Ventilation:LOCAL & MECHANICAL EXHAUST NECESSARY TO MEET TLV REQUIREMENTS.

Protective Gloves:RUBBER OR LIGHT PLASTIC REQUIRED.

Eye Protection:SAFETY GLASSES OR GOGGLES REQURIED.

Other Protective Equipment:WEAR PROTECTIVE CLOTHING APPROPRIATE FOR THE WORK SITUATION TO MINIMIZE SKIN CONTACT.
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health
HAZ DECOMP PROD:PWDR INCOMPAT W/STRONG OXIDIZING AGENTS, INCLDG HIGH O*2 CONC. EVAP OF HG FROM CR AMALGAM LEAVES PYROPHORIC CHROMIUM. EFTS OF OVEREXP:BASED ON EVID WHERE EXPOS WERE ESSENTIALLY TO HEXA VALENT CHROMIUM CMPDS. SPILL PROCS:QUICKLY & PLACE IN APPROPRIATE CONTAINERS FOR DISPOSAL OR REUSE.

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:4842F,2672C
Melt/Freeze Pt:M.P/F.P Text:3434F,1890C
Vapor Pres:1 @ 1616C
Vapor Density:7.1(GM CC)
Solubility in Water:INSOLUBLE.
Appearance and Odor:STEEL-GREY METALLIC PIECES, POWDER, AND FLAKES. ODORLESS.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
STRONG OXIDIZERS, MINERAL ACIDS, AMMONIUM NITRATE, HYDROGEN PEROXIDE, CHLORATES, SULFUR DIOXIDE.
Stability Condition to Avoid:NONE.
Hazardous Decomposition Products:RXN W/MINERAL ACIDS MAY LIBERATE HYDROGEN GAS. REACTS READILY W/DILUTE ACIDS(NOT NITRIC) TO FORM CHROMOUS SALTS.(SUPDAT)

========== Disposal Considerations ==========

Waste Disposal Methods:RECLAIM SALVAGEABLE METAL. PLACE WASTE IN AN APPROVED SECURE HAZARDOUS WASTE LANDFILL SITE. OR INCINERATE W/APPROVED AIR POLLUTION CONTROLS. FOLLOW FEDERAL, STATE, AND LOCAL REGULATIONS.

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

1000 PPM COBALT

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification
1000 PPM COBALT

Product Identification: 1000 PPM COBALT
Date of MSDS: 03/05/1992 **Technical Review Date:** 11/22/1994
FSC: 6550 **NIIN: LIIN:** 00F037421
Submitter: F BT
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Post Office Box: N/K
Manufacturer's Address1: 5540 MARSHALL ST
Manufacturer's Address2: ARVADA, CO 80002-3108
Manufacturer's Country: US
General Information Telephone: 303-431-8454
Emergency Telephone: 303-431-8454
Emergency Telephone: 303-431-8454
MSDS Preparer's Name: DANIEL A GOLDSTEIN
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 1R664
Special Project Code: N

Preparer Information

Preparer's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Preparer's Address1: 5540 MARSHALL STREET
Preparer's Address2: ARVADA, CO 80002
Preparer's CAGE: 1R664
Assigned Individual: N

Contractor Information

Contractor's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Contractor's Address1: 5540 MARSHALL STREET
Contractor's Address2: ARVADA, CO 80002
Contractor's Telephone: 303-431-8454
Contractor's CAGE: 1R664

Section 2 - Compositon/Information on Ingredients
1000 PPM COBALT

Ingredient Name: COBALT (ANIMAL CARCINOGEN BY IARC - GROUP 2B) *94-3*
Ingredient CAS Number: 7440-48-4 **Ingredient CAS Code:** M
RTECS Number: GF8750000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: <1
% Enviromental Weight:

Other REC Limits: 0.05 PPM
OSHA PEL: 0.05 MG/CUM **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 0.05 MG/CUM **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Ingredient Name: NITRIC ACID, HYDROGEN NITRATE
Ingredient CAS Number: 7697-37-2 **Ingredient CAS Code:** M
RTECS Number: QU5775000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: <5
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 2 PPM **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 5.2 MG/CUM **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1000 LBS
DOT Reporting Quantity: 1000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
1000 PPM COBALT

Health Hazards Acute & Chronic: POISON & CORROSIVE TO SKIN, EYES, MUCOUS MEMBRANES/LUNGS. MAY BURN ANY TISSUE & CAUSE BLINDNESS. MAY CAUSE GI TRACT PERFORATION, PULMONARY EDEMA. COBALT: HEART FAILURE, SEVERE GASTROENTERITIS.

Signs & Symptoms of Overexposure:
IRRITATION, BURNING, COUGH, METHEMOGLOBINEMIA, PAIN, ABDOMINAL PAIN, FLUSHING, DEAFNESS, RASH, GOITRE, REDNESS, SHORTNESS OF BREATH, VOMITING, CYANOSIS, THYROID ENLARGEMENT, ANKLE SWELLING.

Medical Conditions Aggravated by Exposure:
ASTHMA, THYROID/HEART DISEASE.

LD50 LC50 Mixture: N/P

Route of Entry Indicators:
Inhalation: YES
Skin: YES
Ingestion: YES

Carcenogenicity Indicators
NTP: NO
IARC: YES
OSHA: NO

Carcinogenicity Explanation: SEE INGREDIENTS

Section 4 - First Aid Measures
1000 PPM COBALT

First Aid:
EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: GIVE MOIST OXYGEN. INGESTION: GIVE WATER/MILK. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Section 5 - Fire Fighting Measures
1000 PPM COBALT

Fire Fighting Procedures:
NONE
Unusual Fire or Explosion Hazard:
NONE
Extinguishing Media:
NONE
Flash Point: Flash Point Text: N/K

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): N/K
Upper Limit(s): N/K

Section 6 - Accidental Release Measures
1000 PPM COBALT

Spill Release Procedures:
NEUTRALIZE & FLUSH W/WATER/NEUTRALIZE & ABOSRB. VENTILATE AREA.

Section 7 - Handling and Storage
1000 PPM COBALT

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
1000 PPM COBALT

Repiratory Protection:
WEAR ACID GAS TYPE DUST/MIST RESPIRATOR IF MIST PRODUCTION OCCURS.
Ventilation:
MECHANICAL/LOCAL EXHAUST: USE IN HOOD.
Protective Gloves:
ACID PROOF
Eye Protection: SPLASH GOGGLES
Other Protective Equipment: ACID PROOF APRON W/SLEEVES, LAB COAT, CLOSED SHOES, SAFETY SHOWER, EYE WASH.
Work Hygenic Practices: N/K
Supplemental Health & Safety Information: BOILING POINT (0-5% ACID): 212-212.72F.

Section 9 - Physical & Chemical Properties
1000 PPM COBALT

HCC:
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: (SEE SUPP)
Melting/Freezing Point: Melting/Freezing Text: N/K
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: 28 **Vapor Density:** >1
Percent Volatile Organic Content:
Specific Gravity: 1
Volatile Organic Content Pounds per Gallon:
pH: <1
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: (WATER =1): 1
Solubility in Water: COMPLETE
Appearance and Odor: RED LIQUID W/NO ODOR
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
1000 PPM COBALT

Stability Indicator: YES
Materials to Avoid:
METALS
Stability Condition to Avoid:
FREEZING
Hazardous Decomposition Products:
HYDROGEN
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NONE

Section 11 - Toxicological Information
1000 PPM COBALT

Toxicological Information:
N/P

Section 12 - Ecological Information
1000 PPM COBALT

Ecological Information:
N/P

Section 13 - Disposal Considerations
1000 PPM COBALT

Waste Disposal Methods:
DISPOSE OF AS NON-HAZARDOUS WASTE IAW/FEDERAL, STATE & LOCAL REGULATIONS.

Section 14 - MSDS Transport Information
1000 PPM COBALT

Transport Information:
N/P

Section 15 - Regulatory Information
1000 PPM COBALT

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
1000 PPM COBALT

Other Information:
N/P

HAZCOM Label Information

Product Identification: 1000 PPM COBALT
CAGE: 1R664
Assigned Individual: N
Company Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Company PO Box:
Company Street Address1: 5540 MARSHALL STREET
Company Street Address2: ARVADA, CO 80002 US
Health Emergency Telephone: 303-431-8454
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K

Organization Code: G
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

101/102/110 COPPER/COPPER ALLOYS

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

Section 1 - Product and Company Identification
101/102/110 COPPER/COPPER ALLOYS

Product Identification: 101/102/110 COPPER/COPPER ALLOYS
Date of MSDS: 09/01/1989 **Technical Review Date:** 08/18/1993
FSC: 3439 **NIIN: LIIN:** 00F029170
Submitter: F BT
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ANSONIA COPPER & BRASS INC
Post Office Box: 109
Manufacturer's Address1: 75 LIBERTY ST
Manufacturer's Address2: ANSONIA, CT 06401
Manufacturer's Country: US
General Information Telephone: 203-732-6600/800-521-17038
Emergency Telephone: 203-732-6600/800-521-1703
Emergency Telephone: 203-732-6600/800-521-1703
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 40518
Special Project Code: N

Preparer Information

Preparer's Name: ANSONIA COPPER & BRASS INC
Preparer's Address1: 75 LIBERTY ST
Preparer's Address2: ANSONIA, CT 06401
Preparer's CAGE: 40518
Assigned Individual: N

Contractor Information

Contractor's Name: ANSONIA COPPER & BRASS INC
Contractor's Address1: 75 LIBERTY ST
Contractor's Address2: ANSONIA, CT 06401
Contractor's Telephone: 203-732-6600/800-521-17038
Contractor's CAGE: 40518

Section 2 - Compositon/Information on Ingredients
101/102/110 COPPER/COPPER ALLOYS

Ingredient Name: COPPER (DUST & MIST), BRONZE POWDER
Ingredient CAS Number: 7440-50-8 **Ingredient CAS Code:** M
RTECS Number: GL5325000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 100
% Enviromental Weight:

Other REC Limits: 1 MG(CU)/M3 (DUST)
OSHA PEL: 0.1 MG(CU)/M3 (FUME) **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 0.2 MG/M3 (FUME) **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 5000 LBS
DOT Reporting Quantity: 5000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
101/102/110 COPPER/COPPER ALLOYS

Health Hazards Acute & Chronic: RESPIRATORY TRACT IRRITATION, METAL FUME FEVER, EYE IRRITATION. LEAD INTOXICATION INCLUDING KIDNEY DISEASE, ANEMIA, NERVOUS DISORDERS, REPRODUCTIVE EFFECTS, BIRTH DEFECTS & KIDNEY CANCER. COPPER FUMES CAUSES METAL FUME FEVER, SKIN/HAIR DISCOLORATION, KERATINIZATION OF HANDS/FEET SOLES, & RESPIRATORY TRACT IRRITATION.

Signs & Symptoms of Overexposure:
METAL FUME FEVER SYMPTOMS INCLUDE: SWEET OR METALLIC TASTE IN MOUTH, DRYNESS & IRRITATION OF THROAT, COUGH, SHORTNESS OF BREATH, CHEST PAIN, NAUSEA, VOMITING, WEAKNESS, FATIGUE, MUSCLE & JOINT PAIN, C HILLS, SWEATING & FEVER. COPPER: METALLIC TASTE IN MOUTH & NAUSEA. SEE SUPP.

Medical Conditions Aggravated by Exposure:
N/K

LD50 LC50 Mixture: N/K

Route of Entry Indicators:
Inhalation: YES
Skin: YES
Ingestion: YES

Carcenogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NONE

Section 4 - First Aid Measures
101/102/110 COPPER/COPPER ALLOYS

First Aid:
EYES: FLUSH W/WATER. SKIN: VACUUM OFF EXCESS DUST. WASH W/SOAP & WATER. INHALATION: REMOVE TO FRESH AIR. METAL FUME FEVER MAY BE TREATED SYMPTOMATICALLY. INGESTION: OBTAIN MEDICAL ATTENTION IF LARGE Q UANTITIES HAVE BEEN INGESTED. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Section 5 - Fire Fighting Measures
101/102/110 COPPER/COPPER ALLOYS

Fire Fighting Procedures:
SOLID MASSIVE FORM ISN'T COMBUSTIBLE. WEAR SELF-CONTAINED BREATHING APPARATUS & PROTECTIVE CLOTHING. WHEN IN DUST FORM USE DRY CHEMICAL/SAND.
Unusual Fire or Explosion Hazard:
FIRE & EXPLOSION HAZARDS ARE MODERATE WHEN MATERIAL IS IN THE FORM OF DUST & EXPOSED TO HEAT, FLAMES, CHEMICAL REACTION OR IN CONTACT W/POWDERFUL OXIDIZERS.
Extinguishing Media:
N/K
Flash Point: Flash Point Text: N/R

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): N/R
Upper Limit(s): N/R

Section 6 - Accidental Release Measures
101/102/110 COPPER/COPPER ALLOYS

Spill Release Procedures:
LARGE QUANTITIES OF DUST: VACUUM/WET SWEEP. LIQUIDS W/SOLID METAL: EVACUATE AREA. ABSORB W/VERMICULATE/DRY SAND/SIMILAR MATERIAL.

Section 7 - Handling and Storage
101/102/110 COPPER/COPPER ALLOYS

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
101/102/110 COPPER/COPPER ALLOYS

Repiratory Protection:
USE NIOSH/OSHA APPROVED RESPIRATORY PROTECTION IF EXPOSURE EXCEEDS THE PEL/TLV LIMITS.
Ventilation:
LOCAL EXHAUST/MECHANICAL (GENERAL): REQUIRED IF DUST/FUME CREATED IN HANDLING OR WORKING ON THIS MATERIAL
Protective Gloves:
REQUIRED FOR MELT/GRIND/CUT/WELD JOBS
Eye Protection: SAFETY GLASSES W/SIDE SHIELDS
Other Protective Equipment: GRINDING OPERATIONS MAY REQUIRED FACE SHIELDS. MELTING/WELDING REQUIRE FACE SHIELDS W/SPECIALTY TINTED GLASS.
Work Hygenic Practices: USE GOOD PERSONAL HYGIENE. WASH HANDS BEFORE

EATING/DRINKING/SMOKING/LEAVING WORK AFTER CONTACT W/METAL DUST OR FUME.
Supplemental Health & Safety Information: UNDER NORMAL CONDITIONS THE SOLID ALLOY PRESENTS NO SIGNIFICANT HEALTH HAZARDS. PROCESSSING OF THE ALLOY BY DUST/FUME PRODUCING OPERATION (GRINDING/BUFFING/HEATING/WELDING) MAY RESULT IN POTENTIAL FOR EXPOSURE TO AIRBORNE METAL PARTICULATES/FUME.

Section 9 - Physical & Chemical Properties
101/102/110 COPPER/COPPER ALLOYS

HCC:
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: N/R
Melting/Freezing Point: Melting/Freezing Text: 1500-2260F
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/R **Vapor Density:** N/R
Percent Volatile Organic Content:
Specific Gravity: 7.4-9
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/R
Solubility in Water: INSOLUBLE
Appearance and Odor: SILVER OR YELLOW TO RED SOLID
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
101/102/110 COPPER/COPPER ALLOYS

Stability Indicator: YES
Materials to Avoid:
STRONG ACIDS, BASES & OXIDERS. MAY REACT VIOLENTLY W/WATER. MERCURY, AMMONIA & ACETYLENE.
Stability Condition to Avoid:
HEAT, FLAMES
Hazardous Decomposition Products:
METAL FUME
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
N/K

Section 11 - Toxicological Information
101/102/110 COPPER/COPPER ALLOYS

Toxicological Information:
N/P

Section 12 - Ecological Information
101/102/110 COPPER/COPPER ALLOYS

Ecological Information:
N/P

Section 13 - Disposal Considerations
101/102/110 COPPER/COPPER ALLOYS

Waste Disposal Methods:
MAXIMIZE PRODUCT RECOVERY FOR REUSE OR RECYCLING. CONDITIONS MAY CAUSE THIS MATERIAL TO BECOME A SOLID HAZARDOUS WASTE. SOLID WASTE LEACHATE TESTING MAY INDICATE THE NEED FOR PROPERLY PERMITTED DISPOS AL IN ACCORDANCE W/FEDERAL, STATE, & LOCAL LAWS.

Section 14 - MSDS Transport Information
101/102/110 COPPER/COPPER ALLOYS

Transport Information:
N/P

Section 15 - Regulatory Information
101/102/110 COPPER/COPPER ALLOYS

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
101/102/110 COPPER/COPPER ALLOYS

Other Information:
N/P

HAZCOM Label Information

Product Identification: 101/102/110 COPPER/COPPER ALLOYS
CAGE: 40518
Assigned Individual: N
Company Name: ANSONIA COPPER & BRASS INC
Company PO Box:
Company Street Address1: 75 LIBERTY ST
Company Street Address2: ANSONIA, CT 06401 US
Health Emergency Telephone: 203-732-6600/800-521-1703
Label Required Indicator: N
Date Label Reviewed: 08/18/1993
Status Code: C
Manufacturer's Label Number: N/R
Date of Label: 08/18/1993
Year Procured: N/K
Organization Code: N
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P

Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Product Identification: PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD
Date of MSDS: 12/09/1985 **Technical Review Date:** 10/26/1988
FSC: 5910 **NIIN: LIIN:** 00F007527
Submitter: F BT
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: WESCO ELECTRICAL CO
Post Office Box: N/K
Manufacturer's Address1: 201 MUNSON ST
Manufacturer's Address2: GREENVILLE, MA 01301-9605
Manufacturer's Country: NK
General Information Telephone: (413) 774-4358
Emergency Telephone: (413) 774-4358
Emergency Telephone: (413) 774-4358
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 12673
Special Project Code: N

Preparer Information

Preparer's Name: WESCO ELECTRICAL
Preparer's Address1: 201 MUNSON ST
Preparer's Address2: GREENVILLE, MA 01301
Preparer's CAGE: 12673
Assigned Individual: N

Contractor Information

Contractor's Name: WESCO ELECTRICAL
Contractor's Address1: 201 MUNSON ST
Contractor's Address2: GREENVILLE, MA 01301
Contractor's Telephone: (413) 774-4358
Contractor's CAGE: 12673

Section 2 - Compositon/Information on Ingredients
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Ingredient Name: LEAD (SARA III)
Ingredient CAS Number: 7439-92-1 **Ingredient CAS Code:** M
RTECS Number: OF7525000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 99.9%
% Enviromental Weight:

Other REC Limits: N/K
OSHA PEL: 0.05 MG/M3;1910.1025 **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 0.15 MG/M3;DUST 9192 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1 LB
DOT Reporting Quantity: 1 LB
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Health Hazards Acute & Chronic: IRRITATING TO THE RESPIRATORY SYSTEM, SKIN, & EYES, WEAKNESS, VOMITING, LOSS OF APPETITE,UNCOORDINATION, CONVULSIONS, STUPOR, COMA.

Signs & Symptoms of Overexposure:
IF LEFT UNTREATED: WEAKNESS, INSOMINIA, HYERTENSION, IRRITATION TO SKIN & EYE, ANEMIA, METALIC TASTE, CONSTIPATION, HEADACHE, MUSCLE & JOINT PAIN, NEUROMUSCULAR DYSFUNCTION, PARALYSIS, ENCEPHALOPATHY. LEAD & ITS INORGANIC COMPOUNDS ARE NEUROTOXINS WHICH MAY PRODUCE PERIPHERAL NEUOPATHY.

Medical Conditions Aggravated by Exposure:
N/K

LD50 LC50 Mixture: N/K

Route of Entry Indicators:
Inhalation: YES
Skin: YES
Ingestion: YES

Carcenogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NONE

Section 4 - First Aid Measures
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

First Aid:
EYES: FLUSH WITH COPIOUS QUANTITIES OF WATER. GET MEDICAL ATTENTION. SKIN: WASH THOROUGHLY WITH SOAP & WATER. INHALATION: REMOVE FROM EXPOSURE. GET MEDICAL ATTENTION. INGESTION: GET MEDICAL ATTENTION.

Section 5 - Fire Fighting Measures
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Fire Fighting Procedures:
WEAR SELF-CONTAINED BREATHING APPARATUS (SCBA) AND FULL PROTECTIVE CLOTHING.
Unusual Fire or Explosion Hazard:
MOLTEN METALS PRODUCE FUME, VAPOR & DUST THAT MAY BE TOXIC & RESPIRATORY IRRITANTS.
Extinguishing Media:
DRY CHEMICAL, CO2. DON'T USE WATER ON FIRES WHERE MOLTEN METAL IS PRESENT.
Flash Point: Flash Point Text: N/R

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): N/R
Upper Limit(s): N/R

Section 6 - Accidental Release Measures
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Spill Release Procedures:
DUST MATERIAL SHOULD BE VACUUMED, OR WET SWEPT WHERE VACUUMING ISN'T FEASIBLE. PARTICULATE MATTER SHOULD BE STORED IN DRY CONTAINERS FOR LATER DISPOSAL. DON'T USE COMPRESSED AIR OR DRY SWEEPING AS A M EANS OF CLEANING.

Section 7 - Handling and Storage
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Repiratory Protection:
N/K
Ventilation:
PROVIDE LOCAL EXHAUST VENTILATION TO KEEP **Protective Gloves:**
SHOULD BE WORN
Eye Protection: FACE SHIELD, GOGGLES
Other Protective Equipment: COVERALLS, FULL BODY CLOTHING. HAT, SAFETY BOOTS, & SHOES SHOULD BE PROTECTED FROM CONTAMINATION WITH THIS PRODUCT.
Work Hygenic Practices: ALWAYS EXERCISE NORMAL, GOOD PERSONAL HYGIENE PRIOR TO SMOKING OR EATING.
Supplemental Health & Safety Information: N/P

Section 9 - Physical & Chemical Properties
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

HCC:
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 3164F
Melting/Freezing Point: Melting/Freezing Text: 621F
Decomposition Point: Decomposition Text: N/R
Vapor Pressure: N/R **Vapor Density:** N/R
Percent Volatile Organic Content:
Specific Gravity: 11.3
Volatile Organic Content Pounds per Gallon:
pH: N/R
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/R
Solubility in Water: NEGLIGIBLE
Appearance and Odor: SILVER-GRAY METAL, TARNISHES; NO APPARENT ODOR.
Percent Volatiles by Volume: N/R
Corrosion Rate: N/R

Section 10 - Stability & Reactivity Data
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Stability Indicator: YES
Materials to Avoid:
CAN REACT VIGOROUSLY WITH STRONG OXIDIZING AGENTS & THIS PRODUCT MAY LIBERATE HYDROGEN GAS.
Stability Condition to Avoid:
N/R
Hazardous Decomposition Products:
HIGH TEMPERATURESS MAY PRODUCE HEAVY METAL FUME, VAPOR & DUST.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
N/R

Section 11 - Toxicological Information
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Toxicological Information:
N/P

Section 12 - Ecological Information
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Ecological Information:
N/P

Section 13 - Disposal Considerations
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Waste Disposal Methods:
DISPOSE OF TOXIC SUBSTANCES & HAZARDOUS WASTES IN ACCORDANCE WITH LOCAL, STATE & FEDERAL REGULATIONS.

Section 14 - MSDS Transport Information
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Transport Information:
N/P

Section 15 - Regulatory Information
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Other Information:
N/P

HAZCOM Label Information

Product Identification: PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD
CAGE: 12673
Assigned Individual: N
Company Name: WESCO ELECTRICAL
Company PO Box:
Company Street Address1: 201 MUNSON ST
Company Street Address2: GREENVILLE, MA 01301 NK
Health Emergency Telephone: (413) 774-4358
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
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MAGNESIUM

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
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Section 1 - Product and Company Identification
MAGNESIUM

Product Identification: MAGNESIUM
Date of MSDS: 01/01/1985 **Technical Review Date:** 09/18/1978
FSC: 6810 **NIIN:** 00-174-6583
Submitter: D DG
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: BOUGHT BY ITEM DESCRIPTION
Manufacturer's Address1: 222 RED SCHOOL LANE
Manufacturer's Address2: PHILLIPSBURG, NJ 08865-2219
Manufacturer's Country: US
General Information Telephone: 201-859-2151
Emergency Telephone: 201-859-2151
Emergency Telephone: 201-859-2151
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: OO331
Special Project Code: N

Item Description

Item Name: MAGNESIUM,REAGENT
Item Manager:
Specification Number: NK
Type/Grade/Class: NK
Unit of Issue: LB
Unit of Issue Quantity: G
Type of Container:

Contractor Information

Contractor's Name: BOUGHT BY ITEM DESCRIPTION
Post Office Box: 23214
Contractor's Address1: UNKNOWN
Contractor's Address2: UNKNOWN, NK 00000
Contractor's Telephone: UNKNOWN
Contractor's CAGE: OO331

Contractor Information

Contractor's Name: MALLINCKRODT BAKER, INC. (FORMERLY J.T. BAKER INC)
Contractor's Address1: 222 RED SCHOOL LANE
Contractor's Address2: PHILLIPSBURG, NJ 08865-2219
Contractor's Telephone: 800-582-2537
Contractor's CAGE: 70829

Section 2 - Compositon/Information on Ingredients
MAGNESIUM

Ingredient Name: MAGNESIUM
Ingredient CAS Number: 7439-95-4 **Ingredient CAS Code:** M
RTECS Number: OM2100000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:

>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: N/P
% Enviromental Weight:
Other REC Limits: N/P
OSHA PEL: NOT ESTABLISHED **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: NOT ESTABLISHED **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
MAGNESIUM

Health Hazards Acute & Chronic: N/P

Signs & Symptoms of Overexposure:
N/P

Medical Conditions Aggravated by Exposure:
N/P

LD50 LC50 Mixture: N/P

Route of Entry Indicators:
- **Inhalation:** N/P
- **Skin:** N/P
- **Ingestion:** N/P

Carcenogenicity Indicators
- **NTP:** N/P
- **IARC:** N/P
- **OSHA:** N/P

Carcinogenicity Explanation: N/P

Section 4 - First Aid Measures
MAGNESIUM

First Aid:
N/P

Section 5 - Fire Fighting Measures
MAGNESIUM

Fire Fighting Procedures:
N/P
Unusual Fire or Explosion Hazard:
N/P
Extinguishing Media:
N/P
Flash Point: Flash Point Text: N/A

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s):
Upper Limit(s):

Section 6 - Accidental Release Measures
MAGNESIUM

Spill Release Procedures:
N/P

Section 7 - Handling and Storage
MAGNESIUM

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
MAGNESIUM

Repiratory Protection:
N/P
Ventilation:
N/P
Protective Gloves:
N/P
Eye Protection: N/P
Other Protective Equipment: N/P
Work Hygenic Practices: N/P
Supplemental Health & Safety Information: N/P

Section 9 - Physical & Chemical Properties
MAGNESIUM

HCC: F8
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: N/A

Melting/Freezing Point: Melting/Freezing Text: N/A
Decomposition Point: Decomposition Text: N/A
Vapor Pressure: N/P **Vapor Density:** N/P
Percent Volatile Organic Content:
Specific Gravity: N/P
Volatile Organic Content Pounds per Gallon:
pH: N/P
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/P
Solubility in Water: N/P
Appearance and Odor:
Percent Volatiles by Volume: N/P
Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data
MAGNESIUM

Stability Indicator: N/P
Materials to Avoid:
N/P
Stability Condition to Avoid:
N/P
Hazardous Decomposition Products:
N/P
Hazardous Polymerization Indicator: N/P
Conditions to Avoid Polymerization:
N/P

Section 11 - Toxicological Information
MAGNESIUM

Toxicological Information:
N/P

Section 12 - Ecological Information
MAGNESIUM

Ecological Information:
N/P

Section 13 - Disposal Considerations
MAGNESIUM

Waste Disposal Methods:
N/P

Section 14 - MSDS Transport Information
MAGNESIUM

Transport Information:
N/P

Section 15 - Regulatory Information
MAGNESIUM

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
MAGNESIUM

Other Information:
N/P

HMIS Transportation Information

Product Identification: MAGNESIUM
Transporation ID Number: 53562
Responsible Party CAGE: OO331
Date MSDS Prepared: 01/01/1985
Date MSDS Reviewed: 09/18/1978
MFN: 09/18/1978
Submitter: D DG
Status Code: C

Container Information
- **Unit of Issue:** LB
- **Container Quantity:** G
- **Type of Container:**
- **Net Unit Weight:**

Article without MSDS: N
Technical Entry NOS Shipping Number: POWERED,PELLETS,TURNINGS,RIBBONS
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:
FOR SHIPMENT BY MILITARY AIRCRAFT THE COMPLETE LABELING WILL BE FLAMMABLE SOLID AND DANGEROUS WHEN W ET.

Department of Transportation Information

DOT Proper Shipping Name: MAGNESIUM OR MAGNESIUM ALLOYS
DOT PSN Code: IOP
Symbols:
DOT PSN Modifier: WITH MORE THAN 50 PER CENT MAGNESIUM IN PELLETS, TURNINGS OR RIBBONS
Hazard Class: 4.1
UN ID Number: UN1869
DOT Packaging Group: III
Label: FLAMMABLE SOLID
Special Provision(s): A1
Packaging Exception: 151
Non Bulk Packaging: 213
Bulk Packaging: 240
Maximimum Quanity in Passenger Area: 25 KG
Maximimum Quanity in Cargo Area: 100 KG
Stow in Vessel Requirements: A
Requirements Water/Sp/Other: 39

IMO Detail Information

IMO Proper Shipping Name: MAGNESIUM
IMO PSN Code: JCT
IMO PSN Modifier: ,WITH MORE THAN 50% MAGNESIUM,IN PELLETS,TURNINGS OR RIBBONS
IMDG Page Number: 4153
UN Number: 1869
UN Hazard Class: 4.1
IMO Packaging Group: III
Subsidiary Risk Label: -
EMS Number: 4.1-02
Medical First Aid Guide Number: NON

IATA Detail Information

IATA Proper Shipping Name: SEE ADDITIONAL DATA FIELD IN HMIS FOR FURTHER INFORMATION
IATA PSN Code: XXX
IATA PSN Modifier:
IATA UN Id Number:
IATA UN Class:
Subsidiary Risk Class:
UN Packaging Group:
IATA Label:
Packaging Note for Passengers:
Maximum Quantity for Passengers:
Packaging Note for Cargo:
Maximum Quantity for Cargo:
Exceptions:

AFI Detail Information

AFI Proper Shipping Name: MAGNESIUM OR MAGNESIUM ALLOYS
AFI Symbols:
AFI PSN Code: PJK
AFI PSN Modifier: WITH MORE THAN 50% MAGNESIUM IN PELLETS,TURNINGS OR RIBBONS
AFI UN Id Number: UN1869

AFI Hazard Class: 4.1
AFI Packing Group: III
AFI Label:
Special Provisions: P5, A1
Back Pack Reference: A8.4

HAZCOM Label Information

Product Identification: MAGNESIUM
CAGE: OO331
Assigned Individual: Y
Company Name: BOUGHT BY ITEM DESCRIPTION
Company PO Box: 23214
Company Street Address1: UNKNOWN
Company Street Address2: UNKNOWN, NK 00000 NK
Health Emergency Telephone: 201-859-2151
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: F
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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BELMONT METALS INC -- MERCURY -- 9650-00-537-7929

========== Product Identification ==========

Product ID:MERCURY
MSDS Date:08/03/1989
FSC:9650
NIIN:00-537-7929
MSDS Number: BWXRF
=== Responsible Party ===
Company Name:BELMONT METALS INC
Address:330 BELMONT AVE
City:BROOKLYN
State:NY
ZIP:11207-4010
Country:US
Info Phone Num:718-342-4900
Emergency Phone Num:718-342-4900
Preparer's Name:BRUCE N REED
CAGE:70774
=== Contractor Identification ===
Company Name:BELMONT METALS INC
Address:330 BELMONT AVE
Box:City:BROOKLYN
State:NY
ZIP:11207
Phone:718-342-4900
CAGE:70774

========== Composition/Information on Ingredients ==========

Ingred Name:MERCURY, QUICKSILVER (IARC CANCER REVIEW GROUP 3) *94-4*
CAS:7439-97-6
RTECS #:OV4550000
Fraction by Wt: 99.99%
Other REC Limits:INORGANIC 0.1 MG/CUM
OSHA PEL:0.1 MG/CUM
ACGIH TLV:0.01 MG/CUM (SKIN)
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

========== Hazards Identification ==========

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:CHRONIC MERCURY POISONING RESULTS IN
NERVOUS IRRITABILITY, WEAKNESS, TREMOR, GINGIVITIS, ERETHISM,
GREYING OF LENS OF EYE.
Explanation of Carcinogenicity:NONE
Effects of Overexposure:CHRONIC MERCURY POISONING RESULTS IN NERVOUS
IRRITABILITY, WEAKNESS, TREMOR, GINGIVITIS, ERETHISM, GREYING OF
LENS OF EYE.

========== First Aid Measures ==========

First Aid:INHALATION: REMOVE TO FRESH AIR. INGESTION: INDUCE VOMITING.
EYES/SKIN: FLUSH W/WATER. OBTAIN MEDICAL ATTENTION IN ALL CASES.

========== Fire Fighting Measures ==========

Fire Fighting Procedures:WEAR DUST MASK W/CARTRIDGE FOR MERCURY VAPOR.
Unusual Fire/Explosion Hazard:HIGH TEMPS INCREASE VAPORIZATION OF MERCURY.

========== Accidental Release Measures ==========

Spill Release Procedures:SWEEP AREA TO REMOVE AS MUCH AS POSSIBLE. VACUUM AREA USING SPECIAL MERCURY VACUUM CLEANER.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE IN CLOSED CONTAINERS IN WELL VENTILATED COOL PLACES AWAY FROM AREAS OF HIGH TEMPS/ACUTE FIRE HAZARDS.
Other Precautions:AVOID INHALATION OF VAPORS/INGESTION. DON'T SMOKE/EAT IN IMMEDIATE AREA OF USE/STORAGE.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:WEAR A DUST MASK W/CARTRIDGE FOR MERCURY VAPOR.
Ventilation:LOCAL EXHAUST INCLUDING FLOOR LEVEL.
Protective Gloves:RUBBER/OTHER IMPERVIOUS
Eye Protection:SAFETY GLASSES
Other Protective Equipment:SHOWERS, PROTECTIVE CLOTHING
Work Hygienic Practices:REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE. WASH THOROUGHLY AFTER HANDLING.
Supplemental Safety and Health

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:676F
Melt/Freeze Pt:M.P/F.P Text:-39F
Vapor Pres:0.0012
Vapor Density:>1
Spec Gravity:13.55
Evaporation Rate & Reference:SLOWER THAN ETHER
Appearance and Odor:SILVERY LIQUID AT 70F.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
HALOGENS, NITRIC ACID
Stability Condition to Avoid:HIGH TEMPS

========== Disposal Considerations ==========

Waste Disposal Methods:RETURN TO SUPPLIER IAW/FEDERAL, STATE & LOCAL REGULATIONS.

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BELMONT METALS INC -- NICKEL -- 9650-00N093372

========== Product Identification ==========

Product ID:NICKEL
MSDS Date:02/01/1995
FSC:9650
NIIN:00N093372
Status Code:A
MSDS Number: CJXVZ
=== Responsible Party ===
Company Name:BELMONT METALS INC
Address:330 BELMONT AVE
City:BROOKLYN
State:NY
ZIP:11207
Info Phone Num:718-342-4900
Emergency Phone Num:718-342-4900
Resp. Party Other MSDS Num.:9002
CAGE:70774
=== Contractor Identification ===
Company Name:BELMONT METALS INC
Address:330 BELMONT AVE
Box:City:BROOKLYN
State:NY
ZIP:11207
Phone:718-342-4900
Contract Num:N00406-99-P-F82
CAGE:70774

========== Composition/Information on Ingredients ==========

Ingred Name:NICKEL
CAS:7440-02-0
RTECS #:QR5950000
> Wt:99.9
OSHA PEL:1 MG/M3
ACGIH TLV:1 MG/M3

========== Hazards Identification ==========

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:NO
Health Hazards Acute and Chronic:INHALATION: SEE BELOW. INGESTION: MAY CAUSE IRRITATION OF STOMACH LINING. EYE: MAY CAUSE IRRITTION OF THE EYES. SKIN CONTACT/ABSORPTION: MAY CAUSE SKIN IRRITATION. SIGNS AND SYMPTOMS ASSOCIATED WITH E XPOSURE OVER TLV: NO ACUTE RESPIRATORY REACTION OR CONCLUSIVE CHRONIC EFFECTS FROM EXPOSURE TO NICKEL METAL HAVE BEEN OBSERVED BY PROPER INDUSTRIAL HYGIENE MAINTENANCE WORKING ATMOSPHERE AT CONCENTRAT IONS BELOW THE RECOMMENDED TLV. OVER HEATING OF ALLOY CAN PRODUCE METAL FUMES AND OXIDES. MACHINING OPERATIONS SUCH AS GRINDING, SAWING, BUFFING CAN GENERATE AIRBORNE PARTICULATE IN THE WORK AREA. THE EXPOSURE LEVELS (EFTS OF OVEREXP)
Explanation of Carcinogenicity:NICKEL: IARC MONOGRAPHS ON THE EVALUATION OF CARCINOGENIC RISK OF CHEMICALS TO MAN. VOLUME 49, PAGE 257, YEAR 1990: GROUP 2B. NTP 8TH ANNUAL REPORT ON CARCINOGENS, 1998: REASONABLY ANTICIAPATED TO BE HUMAN CARCINOGEN.
Effects of Overexposure:HLTH HAZ: INDICATED IN SECTION II ARE RELEVANT

TO THESE & OTHER OPERATIONS. CEILING LIMITS(C): ELEMENTS W/CEILING LIMITS(C) ARE AS FLOLLOWS: NONE: FOLLOWING ARE SYMPTOMS OF OVER EXPOSURE TO VARIOUS I NGREDIENTS: NICKEL: MOST COMMON AILMENT ARISING FROM CONTACT W/NICKEL/ITS COMPOUNDS IS ALLERGIC DERMATITIS KNOWN AS "NICKEL ITCH" WHICH USUALLY OCCURS WHEN SKIN IS MOIST. GENERALLY NICKEL & MOST SALTS OF NICKEL DO NOT CAUSE SYSTEMIC POISONING. IARC HAS DETERMINED THAT THERE IS AT LEAST LIMITED EVIDENCE THAT NICKEL AND CERTAIN NICKEL COMPOUNDS MAY BE HUMAN CARCINOGENS. (SUPDAT)

Medical Cond Aggravated by Exposure:NOT APPLICABLE.

========== First Aid Measures ==========

First Aid:INHALATION: REMOVE TO FRESH AIR. CONSULT A PHYSICIAN. INGESTION: INDUCE VOMITING IF PATIENT IS CONSCIOUS. CONSULT A PHYSICIAN. EYE CONTACT: FLUSH WITH COPIOUS QUANTITIES OF WATER FOR AT LEAST 15 MINUT ES. SKIN CONTACT: WASH WELL WITH SOAP AND WATER. SKIN ABSORPTION: NOT APPLICABLE.

========== Fire Fighting Measures ==========

Lower Limits:N.A.
Upper Limits:N.A.
Extinguishing Media:CO*2, SAND, DRY CHEMICAK. DO NOT USE WATER.
Fire Fighting Procedures:USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT .
Unusual Fire/Explosion Hazard:DO NOT USE WATER MOLTEN METAL WILL EXPLODE ON CONTACT WITH WATER.

========== Accidental Release Measures ==========

Spill Release Procedures:ANY NORMAL CLEAN UP PROCEDURE IS APPLICABLE.

========== Handling and Storage ==========

Handling and Storage Precautions:THIS PRODUCT MUST BE HANDLED ACCORDING TO THE SIZE, SHAPE AND QUANTITY OF MATERIAL INVOLVED. SOLID METAL MAY REQUIRE USE OF HOISTS CRANES ETC. POWDERS SHOULD BE MOVED OR TRANSPORTED TO MINIMIZE SPILL OR RELEASE POTENTIAL. IN SOLID FORM THIS MATERIAL POSES NO SPECIAL STORAGE PROBLEMS.
Other Precautions:DO NOT STORE ADJACENT TO MINERAL ACIDS. FINE METAL POWDER SHOULD BE KEPT AWAY FROM FLAMES AND SOURCES OF IGNITION.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NIOSH APPROVED RESPIRATOR FOR DUSTS AND FUMES.
Ventilation:PROVIDE GENERAL AND/OR LOCAL VENTILATION IF NECESSARY TO MAINTAIN CONCENTRATIONS BELOW TLV'S.
Protective Gloves:IMPERVIOUS GLOVES .
Eye Protection:ANSI APPROVED CHEMICAL WORKERS GOGGLES .
Other Protective Equipment:ANSI APPROVED EYE WASH AND DELUGE SHOWER . PROTECTIVE CLOTHING ADVISABLE DURING MELTING AND PURING.
Supplemental Safety and Health
EFTS OF OVEREXP: SEVERAL NICKEL COMPOUNDS ARE CARCINOGENIC TO LABORATORY ANIMALS BY VARIOUS ROUTES OF ENTRY.

========== Physical/Chemical Properties ==========

Boiling Pt:=2732.2C, 4950.F
Decomp Temp:=1451.7C, 2645.F

Vapor Pres:N.A.
Vapor Density:N.A.
Spec Gravity:8.90
Evaporation Rate & Reference:N.A.
Solubility in Water:NEGLIGIBLE
Appearance and Odor:SILVERY GRAY METAL; NO ODOR.
Percent Volatiles by Volume:N.A.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
REACTS WITH MINERAL ACIDS TO LIBERATE HYDROGEN.
Stability Condition to Avoid:STORAGE NEAR MINERAL ACIDS.
Hazardous Decomposition Products:EVOLVED HYDROGEN MAY BECOME AN EXPLOSION HAZARD.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSE OF IN ACCORDANCE WITH STATE, FEDERAL AND LOCAL REGULATIONS.

========== MSDS Transport Information ==========

Transport Information:DOT REGULATED: NO. DOT PROPER SHIPPING NAME: NOT APPLICABLE. DOT HAZARD CLASS: NOT APLICABLE. DOT NUMBER: NOT APPLICABLE.

========== Regulatory Information ==========

SARA Title III Information:NICKEL IS SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENT AND REAUTHORIZATION ACT OF 1986 IN 40 CFR PART 372.
Federal Regulatory Information:RCRA REGULATED: NO. RCRA NUMBER: NOT APPLICABLE. CERCLA (SUPERFUND) REPORTABLE QUANTITY: NOT APPLICABLE.

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

SELENIUM, 93492

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification
SELENIUM, 93492

Product Identification: SELENIUM, 93492
Date of MSDS: 04/04/1997 **Technical Review Date:** 10/27/1998
FSC: 6810 **NIIN: LIIN:** 00N090598
Submitter: N EN
Status Code: A
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: QCD ANALYSTS
Post Office Box: 699
Manufacturer's Address1:
Manufacturer's Address2: SPRING LAKE, NJ 07762
Manufacturer's Country: US
General Information Telephone: 888-723-5478
Emergency Telephone: 732-919-1909
Emergency Telephone: 732-919-1909
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: JO626
Special Project Code: N

Contractor Information

Contractor's Name: QCD ANALYSTS
Post Office Box: 699
Contractor's Address1:
Contractor's Address2: SPRING LAKE, NJ 07762
Contractor's Telephone: 888-QCD-LIST
Contractor's CAGE: 09KS0

Contractor Information

Contractor's Name: QCD ANALYSTS
Post Office Box: 699
Contractor's Address1: UNKNOWN
Contractor's Address2: SPRING LAKE, NJ 07762
Contractor's Telephone: 800-723-5478
Contractor's CAGE: JO626

Section 2 - Compositon/Information on Ingredients SELENIUM, 93492

Ingredient Name: NITRIC ACID (SARA 302/313) (CERCLA)
Ingredient CAS Number: 7697-37-2 **Ingredient CAS Code:** M
RTECS Number: QU5775000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:

% Text: 2
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 2 PPM **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 2 PPM;4 STEL **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1000 LBS
DOT Reporting Quantity: 1000 LBS
Ozone Depleting Chemical: N

Ingredient Name: SELENIOUS ACID (SARA 302/313) (CERCLA)
Ingredient CAS Number: 7783-00-8 **Ingredient CAS Code:** M
RTECS Number: VS7175000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 0.01-1
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 0.2 MG/M3 (SE) **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 0.2 MG/M3 (SE) **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 10 LBS
DOT Reporting Quantity: 10 LBS
Ozone Depleting Chemical: N

Ingredient Name: WATER
Ingredient CAS Number: 7732-18-5 **Ingredient CAS Code:** M
RTECS Number: ZC0110000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 98
% Enviromental Weight:
Other REC Limits: N/K

OSHA PEL: N/K (FP N) **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: N/K (FP N) **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
SELENIUM, 93492

Health Hazards Acute & Chronic: SKIN/EYE IRRITATION OR INFLAMMATION, SKIN ABSORPTION, IRRITATION OF MUCOUS MEMBRANES.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:
Inhalation: NO
Skin: YES
Ingestion: NO

Carcenogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures
SELENIUM, 93492

First Aid:
SEEK MEDICAL ASSISTANCE FOR FURTHER ASSISTANCE. EYES:FLUSH W/WATER FOR AT LEAST 15 MINUTES. SKIN:FLUSH W/WATER FOR 15 MINUTES. WASH CONTAMINATED CLOTHING BEFORE RE-USE. INHAL:REMOVE TO FRESH AIR. INGE ST:DO NOT INDUCE VOMITING. GIVE WATER OR MILK.

Section 5 - Fire Fighting Measures
SELENIUM, 93492

Fire Fighting Procedures:
USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire or Explosion Hazard:
NONE.

Extinguishing Media:
WATER OR CO*2.
Flash Point: Flash Point Text: NOT APPLICABLE

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): N/A
Upper Limit(s): N/A

Section 6 - Accidental Release Measures
SELENIUM, 93492

Spill Release Procedures:
TAKE UP W/INERT, ABSORBENT MATERIAL. CONTAINERIZE FOR DISPOSAL. FLUSH SPILL AREA W/WATER.

Section 7 - Handling and Storage
SELENIUM, 93492

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
SELENIUM, 93492

Repiratory Protection:
NIOSH APPROVED RESPIRATORY PROTECTION, WHEN NEEDED.
Ventilation:
NONE REQUIRED. LOCAL EXHAUST, WHEN NEEDED.
Protective Gloves:
NEOPRENE GLOVES.
Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS(SUPDAT)
Other Protective Equipment: EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N). LAB COAT.
Work Hygenic Practices: USUAL.
Supplemental Health & Safety Information: EYE PROT:& FULL LENGTH FACESHIELD (FP N).

Section 9 - Physical & Chemical Properties
SELENIUM, 93492

HCC:
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 212F,100C
Melting/Freezing Point: Melting/Freezing Text: N/A
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/A **Vapor Density:** N/A
Percent Volatile Organic Content:
Specific Gravity: 1 (H*2O=1)

Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: H*2O=1
Solubility in Water: SOLUBLE
Appearance and Odor: CLEAR, COLORLESS SOLUTION; NO ODOR.
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
SELENIUM, 93492

Stability Indicator: YES
Materials to Avoid:
STRONG BASES OR STRONG REDUCING AGENTS.
Stability Condition to Avoid:
EXCESSIVE HEAT OR EXTREME COLD.
Hazardous Decomposition Products:
NO*X.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT

Section 11 - Toxicological Information
SELENIUM, 93492

Toxicological Information:
N/P

Section 12 - Ecological Information
SELENIUM, 93492

Ecological Information:
N/P

Section 13 - Disposal Considerations
SELENIUM, 93492

Waste Disposal Methods:
CORROSIVE WASTE I/A/W ALL FEDERAL, STATE & LOCAL ENVIRONMENTAL REGULATIONS.

Section 14 - MSDS Transport Information
SELENIUM, 93492

Transport Information:
N/P

Section 15 - Regulatory Information
SELENIUM, 93492

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
SELENIUM, 93492

Other Information:
N/P

HAZCOM Label Information

Product Identification: SELENIUM, 93492
CAGE: JO626
Assigned Individual: Y
Company Name: QCD ANALYSTS
Company PO Box: 699
Company Street Address1: UNKNOWN
Company Street Address2: SPRING LAKE, NJ 07762 US
Health Emergency Telephone: 732-919-1909
Label Required Indicator: Y
Date Label Reviewed: 11/05/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 11/05/1998
Year Procured: N/K
Organization Code: M
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: WARNING
Health Hazard: None
Contact Hazard: Moderate
Fire Hazard: None
Reactivity Hazard: None

8/9/2002 10:37:02 AM

E I DU PONT DE NEMOURS & CO INC -- ZINC METAL -- 9650-00N056501

========== Product Identification ==========

Product ID:ZINC METAL
MSDS Date:12/31/1985
FSC:9650
NIIN:00N056501
MSDS Number: BWGBT
=== Responsible Party ===
Company Name:E I DU PONT DE NEMOURS & CO INC
Address:1007 MARKET ST
City:WILMINGTON
State:DE
ZIP:19898
Country:US
Info Phone Num:800-962-9919
Emergency Phone Num:800-424-9300 (CHEMTREC)
CAGE:B0589
=== Contractor Identification ===
Company Name:E I DU PONT DE NEMOURS & CO
Address:RAKETSTRAAT, 100, RUE DE LA FUSEE
City:BRUSSEL
Country:BE
Phone:32-(0)15-401.505
CAGE:B0589
Company Name:E.I. DUPONT DE NEMOURS & CO
Address:1007 MARKET STREET
Box:City:WILMINGTON
State:DE
ZIP:19898
Country:US
Phone:800-441-7515;800-441-9442
CAGE:18873

========== Composition/Information on Ingredients ==========

Ingred Name:ZINC (SARA III)
CAS:7440-66-6
RTECS #:ZG8600000
OSHA PEL:10 MG/M3
ACGIH TLV:10 MG/M3
EPA Rpt Qty:1000 LBS
DOT Rpt Qty:1000 LBS

========== Hazards Identification ==========

LD50 LC50 Mixture:LD50 (MICE)=15 MG/KG (INTERPERITONEAL)
Routes of Entry: Inhalation:NO Skin:NO Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:TOXIC IF INGESTED.
Explanation of Carcinogenicity:NOT RELEVANT
Effects of Overexposure:SEE HEALTH HAZARDS.
Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

========== First Aid Measures ==========

First Aid:INGEST: CALL MD IMMEDIATELY . INHAL: REMOVE TO FRESH AIR.
SUPPORT BREATHING (GIVE OXYGEN/ARTIFICIAL RESPIRATION) . EYES:

IMMEDIATELY FLUSH W/POTABLE WATER FOR A MINIMUM OF 15 MINUTES, SEEK ASSISTANCE FROM MD . SKIN: FLUSHW/COPIOUS AMOUNTS OF WATER. CALL MD .

========== Fire Fighting Measures ==========

Extinguishing Media:DRY CHEMICAL.
Fire Fighting Procedures:USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT . NO SPECIAL PROCEDURES.
Unusual Fire/Explosion Hazard:EXPLOSIVE IF HIGH LEVELS OF DUST EXPOSED TO FIRE.

========== Accidental Release Measures ==========

Spill Release Procedures:NO SPECIAL PROCEDURES.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:NO SPECIAL PROCEDURES.
Other Precautions:NONE SPECIFIED BY MANUFACTURER.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NONE. USE NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN .
Ventilation:LOCAL EXHAUST.
Protective Gloves:IMPERVIOUS GLOVES .
Eye Protection:ANSI APPROVED SAFETY GLASSES .
Other Protective Equipment:NONE SPECIFIED BY MANUFACTURER.
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health
NONE SPECIFIED BY MANUFACTURER.

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:1665F,907C
Melt/Freeze Pt:M.P/F.P Text:788F,420C
Vapor Pres:1 @ 487C
Spec Gravity:7.13
Evaporation Rate & Reference:0
Solubility in Water:INSOLUBLE
Appearance and Odor:BLUISH-WHITE METAL.
Percent Volatiles by Volume:0

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
NONE.
Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:NONE.

========== Disposal Considerations ==========

Waste Disposal Methods:SEPARATE FROM ACIDIC SOLUTIONS. DISPOSE OF BY MEANS AS TO COMPLY WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS OR CONTACT AN APPROVED AND LICENSED DISPOSAL AGENCY.

Disclaimer (provided with this information by the compiling agencies):
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of Defense. The United States of America in no manner whatsoever, expressly or implied, warrants this information to be accurate and disclaims all liability for its use. Any person utilizing this document should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation.

POLYSCIENCE -- HEPTACHLOR EPOXIDE, 590C-12 -- 6810-00N047421

========== Product Identification ==========

Product ID:HEPTACHLOR EPOXIDE, 590C-12
MSDS Date:04/01/1992
FSC:6810
NIIN:00N047421
MSDS Number: BVBVP
=== Responsible Party ===
Company Name:POLYSCIENCE
Address:7800 MERRIMAC AVE
City:NILES
State:IL
ZIP:60648
Country:US
Info Phone Num:321-965-0611
Emergency Phone Num:321-965-0611
CAGE:IO526
=== Contractor Identification ===
Company Name:POLYSCIENCE
Address:7800 MERRIMAC AVE
Box:City:NILES
State:IL
ZIP:60714
Country:US
Phone:708-965-0611
CAGE:IO526
Company Name:POLYSCIENCE CORP
Address:7800 N MERRIMAC AVE
Box:48312
City:NILES
State:IL
ZIP:60714-3426
Country:US
Phone:708-965-0611
CAGE:58378

========== Composition/Information on Ingredients ==========

Ingred Name:4,7-METHANOINDAN, 1,4,5,6,7,8,8-HEPTACHLORO-2,
3-EPOXY-3A,4,7,7A-TETRAHYDRO-; (HEPTACHLOR EPOXIDE)
CAS:1024-57-3
RTECS #:PB9450000
OSHA PEL:N/K
ACGIH TLV:N/K
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

========== Hazards Identification ==========

LD50 LC50 Mixture:LD50:(ORAL,RAT)62 MG/KG
Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:YES OSHA:NO
Health Hazards Acute and Chronic:NONE SPECIFIED BY MANUFACTURER.
Explanation of Carcinogenicity:HEPTACHLOR EPOXIDE: IARC MONOGRAPHS ON
EVAL OF CARCIN RISK OF CHEMS TO MAN, VOL 53, PG 115, 1991: GRP 2B.
ANIMAL LIVER.
Effects of Overexposure:NONE SPECIFIED BY MANUFACTURER.

Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

========== First Aid Measures ==========

First Aid:INHAL: REMOVE TO FRESH AIR. SUPPORT BRTHG (GIVE O*2/ARTF RESP) . INGEST: CALL MD IMMED . EYE: IMMED FLUSH WITH POTABLE WATER FOR A MINIMUM OF 15 MIN, SEEK ASSISTANCE FROM MD . SKIN: FLUSH WITH COPIOUS AMOUNTS OF WATER. CALL MD .

========== Fire Fighting Measures ==========

Extinguishing Media:CO*2 OR DRY POWDER EXTINGUISHER.
Fire Fighting Procedures:WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT .
Unusual Fire/Explosion Hazard:NONE SPECIFIED BY MANUFACTURER.

========== Accidental Release Measures ==========

Spill Release Procedures:COVER W/SAND/VERMICULITE, SWEEP UP AND PLACE IN CLOSED CONTAINERS.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:KEEP IN COOL, DRY PLACE.
Other Precautions:NONE SPECIFIED BY MANUFACTURER.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:WEAR NIOSH/MSHA APPROVED SCBA.
Ventilation:MECHANICAL EXHAUST FAN.
Protective Gloves:RUBBER GLOVES.
Eye Protection:ANSI APPRVD CHEM WORKERS GOGGLES.
Other Protective Equipment:NONE SPECIFIED BY MANUFACTURER.
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health
NONE SPECIFIED BY MANUFACTURER.

========== Physical/Chemical Properties ==========

HCC:T4
Appearance and Odor:WHITE CRYSTAL

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
NONE SPECIFIED BY MANUFACTURER.
Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:NONE SPECIFIED BY MANUFACTURER.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSE ACCORDING TO FEDERAL, STATE AND LOCAL REGULATIONS.

Disclaimer (provided with this information by the compiling agencies):
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document should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation.

APPENDIX C

SAFETY BRIEFING FORM

Safety Briefing
Gateway Center at Bronx Terminal Market, NY
BCP Index No. w2-1032-04-11, Site No. C20315

Date: _____
Time: _____Leader: _____Location: _____

Work Task: _____

SAFETY TOPICS (*provide some detail of discussion points*)

Chemical Exposure Hazards and Control _____

Physical Hazards and Control _____

Air Monitoring _____

PPE _____

Communications _____

Safe Work Practices _____

Emergency Response _____

Hospital/Medical Center Location _____

Phone Nos. _____

Other _____

FOR FOLLOW-UP (issue, responsibility, due date)

_____

_____

_____

ATTENDEES

PRINT NAME	COMPANY	SIGNATURE

Briefing Conducted By: _____

Q:\Other\Health&Safety\GenericAppendixG-SafetyBriefingForm

APPENDIX D

CALIBRATION LOG

INSTRUMENT CALIBRATION LOG

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

PROJECT No.	5591006	CLIENT:	
PROJECT	Gateway Center at BTM	BTM Development Partners,	
LOCATION	Bronx, NY	LLC.	

DATE	TIME	UltraRAE SERIAL #	FRESH AIR (PPM)	ISOBUTYLENE (100 PPM) LOT #	CAL.VALUE	COMMENTS	INITIALS

APPENDIX E

AIR MONITORING RESULTS

PID AND DUST MONITORING LOG

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

PROJECT No.	5591006	CLIENT:	
PROJECT	Gateway Center at BTM	BTM Development Partners,	
LOCATION	Bronx, NY	LLC	

DATE	TIME	UltraRAE PID READING			TSI Dust TRAK READING			COMMENTS	INITIALS
		SERIAL #	LOCATION	PPM	SERIAL #	LOCATION	mg/m³		

APPENDIX F

DECONTAMINATION PROCEDURES

LEVEL A DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and fully-encapsulating suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Tank Change	4. If worker leaves Exclusion Zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	5. Boots, fully-encapsulating suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 6:	SCBA Removal	6. SCBA backpack and facepiece is removed (avoid touching face with fingers). SCBA deposited on plastic sheets.
Station 7:	Field Wash	7. Hands and face are thoroughly washed. Shower as soon as possible.

LEVEL B DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Tank Change	4. If worker leaves Exclusion Zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.

Station 5:	Boot, Gloves and Outer Garment Removal	5. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 6:	SCBA Removal	6. SCBA backpack and facepiece is removed (avoid touching face with fingers). SCBA deposited on plastic sheets.
Station 7:	Field Wash	7. Hands and face are thoroughly washed. Shower as soon as possible.

LEVEL C DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Canister or Mask Change	4. If worker leaves Exclusion Zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	5. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 6:	Facepiece Removal	6. Facepiece is removed (avoid touching face with fingers). Facepiece deposited on plastic sheets.
Station 7:	Field Wash	7. Hands and face are thoroughly washed. Shower as soon as possible.

LEVEL D DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Boot, Gloves and Outer Garment Removal	4. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 5:	Field Wash	5. Hands and face are thoroughly washed. Shower as soon as possible.

EQUIPMENT DECONTAMINATION

GENERAL:

Equipment to be decontaminated during the project may include tools, monitoring equipment, respirators, sampling containers, laboratory equipment and drilling equipment.

All decontamination will be done by personnel in protective gear, appropriate for the level of decontamination, as determined by the site HSO. The decontamination work tasks will be split or rotated among support and work crews.

Depending on site conditions, backhoe and pumps may be decontaminated over a portable decontamination pad to contain wash water; or, wash water may be allowed to run off into a storm sewer system. Equipment needed may include a steam generator with high-pressure water, empty drums, screens, screen support structures, and shovels. Drums will be used to hold contaminated wash water pumped from the lined pit. These drums will be labeled as such.

Miscellaneous tools and equipment will be dropped into a plastic pail, tub, or other container. They will be brushed off and rinsed with a detergent solution, and finally rinsed with clean water.

MONITORING EQUIPMENT:

Monitoring equipment will be protected as much as possible from contamination by draping, masking, or otherwise covering as much of the instruments as possible with plastic without hindering the operation of the unit. The HNu or OVA meter, for example, can be placed in a clear plastic bag, which allows reading of the scale and operation of knobs. The probes can be partially wrapped keeping the sensor tip and discharge port clear.

The contaminated equipment will be taken from the drop area and the protective coverings removed and disposed in the appropriate containers. Any dirt or obvious contamination will be brushed or wiped with a disposable paper wipe.

RESPIRATORS:

Respirators will be cleaned and disinfected after every use. Taken from the drop area, the masks (with the cartridges removed and disposed of with other used disposable gear) will be immersed in a cleaning solution and scrubbed gently with a soft brush, followed by a rinse in plain warm water, and then allowed to air dry. In the morning, new cartridges will be installed. Personnel will inspect their own masks for serviceability prior to donning them. And, once the mask is on, the wearer will check the respirator for leakage using the negative and positive pressure fit check techniques.

APPENDIX G

EMPLOYEE EXPOSURE AND INJURY INCIDENT REPORT

Appendix H
Incident Report
Gateway Center at Bronx Terminal Market, NY
Langan Project No. 5591006
BCP Index No. w2-1032-04-11, Site No. C20315

LANGAN EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT
(Submit a Separate Report for Each Employee and/or Incident)

Date: _____

Employee Name:_____ Employee No:_____

Sex: M _____ F _____ Age: _____

Region: _____ Location:_____

Project: _____ Project No: _____

Incident:_____

Type: Possible Exposure _____ Exposure _____ Physical Injury _____

Location: _____

Date of Incident: _____ Time of Incident: _____

Date of Report Incident: _____

Person(s) to Whom Incident was Reported:
_____

Weather Conditions During Incident: Temperature _____ Humidity _____

Wind Speed and Direction: _____ Cloud Cover:
_____

Clear: _____ Precipitation: _____

Materials Potentially Encountered: _____

Chemical (give name of description - liquid, solid, gas, vapor, fume, mist):
_____

_____

Radiological:_____
Other: _____

Appendix H
Incident Report
Gateway Center at Bronx Terminal Market, NY
Langan Project No. 5591006
BCP Index No. w2-1032-04-11, Site No. C20315

Nature of the Exposure/Injury: (State the nature of the exposure/injury in detail and list the parts of the body affected. Attach extra sheets if necessary).

_____

_____

_____

_____

_____

Did you receive medical care? Yes _____ No _____ If so, when _____

Where? On-Site _____ Off-Site _____

By Whom: Name of Paramedic: _____

Name of Physician: _____

Other: _____

If Off-Site, name facility (hospital, clinic, etc):_____

_____

Length of stay at the facility?_____

Was the Site Safety Officer contacted? Yes _____ No _____ When?_____

Was the Corporate Health and Safety Officer contacted? Yes _____ No _____

If so, who was the contact?_____

Did the exposure/injury result in permanent disability? Yes _____ No _____

If so, explain:_____

_____

_____

_____

Has the employee returned to work? Yes _____ No _____

List the names of other persons affected during this incident:

List the names of persons who witnessed the exposure/injury incident:

Possible cause of the exposure/injury incident:

What was the name and title of the field team leader or immediate supervisor at the site of the incident?

Was the operation being conducted under an established Health and Safety Plan?

Yes _____ No _____ If yes, attach a copy. If no, explain

Describe protective equipment and clothing used by the employee:

Did any limitations in safety equipment or protective clothing contribute to or affect exposure? If so, explain:

What was the employee doing when the exposure/injury occurred? (Describe briefly as Site Reconnaissance, Site Characterization, or Sampling, etc.):

Where exactly on site or off site did the exposure/injury occur?

Appendix H
Incident Report
Gateway Center at Bronx Terminal Market, NY
Langan Project No. 5591006
BCP Index No. w2-1032-04-11, Site No. C20315

How did the exposure/injury occur? (Describe fully what factors led up to and/or contributed to the incident):

_____

_____

_____

_____

_____

Name of person(s) initiating report, job title, phone number:

_____

_____

_____

_____

_____ _____

Employee Signature Date

_____ _____

Site Safety Officer Signature or Field Team Leader Signature Date

Q:\Other|HealthandSafety|GenericAppendixF-IncidentReport

APPENDIX N

SSD SYSTEM INSPECTION CHECKLIST

SSD SYSTEM INSPECTION CHECKLIST

Site Name: _____ Location: _____ Project Number: _____

Inspector Name: _____ Date: _____ Weather Conditions: _____

Reason for Inspection (i.e., routine, maintenance, severe condition, etc.): _____

SSD and/or Building Number: _____
(Sub-slab components of SSD system installed in Retail C, F, E1, and E2.)

Check one of the following: **Y:** Yes **N:** No **NA**: Not Applicable

		Y	N	NA	Normal Situation	Remarks
	Records					
1	Is the Operations & Maintenance Plan readily available on-site?				Y	
2	Based on site records, when was the last inspection, maintenance, or repair event?				Date not to exceed minimum schedule	
3	Based on site records, was the system inoperational for any amount of time since the last inspection, maintenance, or repair event? For how long? Provide details.				N	
	Alarm System					
4	Do the alarm lights indicate that the system is operational?				Y	
5	Did manual tripping of alarm system indicate that the alarm is functional?				Y	
	General System					
6	Is there any construction activity, or indication of any construction activity within the past certification year (including any tenant improvements), that included the breaching of the floor slab, on-site at the time of this inspection?				N	
7	If YES to number 5, is there documentation that the Site Management Plan, HASP, and CAMP for the site was/is being followed?				NA if N to 5/ Y if Y to 5	
8	If YES to number 5, is there documentation that all breaches in the floor slab have been sealed, with vapor barrier repaired?				NA if N to 5/ Y if Y to 5	
9	Does all visible SSD piping appear intact and undamaged?				Y	
10	Have any intake points been constructed at the roof near (less than 10 feet) the SSD blower discharge point?				N	

SSD SYSTEM INSPECTION CHECKLIST

Check one of the following: **Y:** Yes **N:** No **NA**: Not Applicable

		Y	N	NA	Normal Situation	Remarks
	SSD Blower Unit					
11	Is the SSD blower operational at the time of the inspection?				Y	
12	What is the VelociCalc Meter reading?					
13	Is the SSD blower expelling air at the discharge point?				Y	

If the answer to any of the above questions indicate the SSD system is non-operational or malfunctioning, or that this EC is in non-compliance,additional remarks must be provided and, where applicable, documentation attached to this checklist detailing additional inspection and repair activities.

Additional remarks _____

_____

_____

_____

_____

_____

_____

_____

Minimum Inspection Schedule: Inspection of blowers and other SSD equipment will be conducted on an annual basis to establish that the system is operational and performing within the design specifications. Unscheduled inspections and/or sampling may take place when a suspected failure of the SSD system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. The minimum schedule may be revised, as necessary, following the first certification year. All inspection events will utilize this checklist.

APPENDIX P

HVAC INSPECTION CHECKLIST

RETAIL A POSITIVE PRESSURE HVAC SYSTEM INSPECTION CHECKLIST

Site Name: _____ Location: _____ Project Number: _____

Inspector Name: _____ Date: _____ Weather Conditions: _____

Reason for Inspection (i.e., routine, maintenance, severe condition, etc.): _____

Check one of the following: **Y:** Yes **N:** No **NA**: Not Applicable

		Y	N	NA	Normal Situation	Remarks
	Records					
1	Is the Operations & Maintenance Plan readily available on-site?				Y	
2	Is a preventative maintenance schedule established and in operation for the HVAC system? Is the schedule in accordanc with the manufacturer's recommendations or accepted practice for the HVAC system?				Y	
3	Based on site records, when was the last inspection, maintenance, or repair event?				Date not to exceed minimum schedule	
4	Based on site records, was the system inoperational for any amount of time since the last inspection, maintenance, or repair event? For how long? Provide details.				N	
	Alarm System					
5	Do the alarm lights indicate that the system is operational?				Y	
6	Did manual tripping of alm system indicate that the alarm is functional?				Y	
	General System					
7	Is there any construction activity, or indication of any construction activity within the past certification year (including any tenant improvements), that included the breaching of the floor slab, on-site at the time of this inspection?				N	
8	If YES to number 6, is there documentation that the Site Management Plan, HASP, and CAMP for the site was/is being followed?				NA if N to 5/ Y if Y to 5	
9	If YES to number 6, is there documentation that all breaches in the floor slab have been sealed?				NA if N to 5/ Y if Y to 5	
10	Does the HVAC preventative maintenance schedule include the following?: 1) checking and/or changing air filters and belts; 2) lubricating equipment parts; 3) checking the fan and blower motors; and 4) confirming that all equipment is in operating order.				Y	
11	Are damaged or inoperable components of the HVAC system replaced or repaired as appropriate?				Y	

If the answer to any of the above questions indicate the HVAC system is non-operational or malfunctioning, or that this EC is in non-compliance,additional remarks must be provided and, where applicable, documentation attached to this checklist detailing additional inspection and repair activities.

RETAIL A POSITIVE PRESSURE HVAC SYSTEM INSPECTION CHECKLIST

Additional remarks _____
_____
_____
_____
_____
_____
_____
_____

Minimum Inspection Schedule: Inspection of HVAC equipment will be conducted on an annual basis to establish that the system is operational and performing within the design specifications. Unscheduled inspections and/or sampling may take place when a suspected failure of the HVAC system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. The minimum schedule may be revised, as necessary, following the first certification year. All inspection events will utilize this checklist.

APPENDIX Q

RETAIL A HVAC SYSTEM TEST RESULTS

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

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Alan R. Poeppel, P.E.

January 27, 2009

Ms. Dana Kaplan
Environmental Engineer
New York State Department of Environmental Conservation
47-40 21st Street
Long Island City, New York 11101

RE: Retail A Soil Vapor Mitigation System- Positive Pressure HVAC Pressure and Indoor Air Testing
Gateway Center at Bronx Terminal Market
Bronx, New York
BCP Index No. W2-1032-04-11; Site No. C203015
Langan Project No.: 5742506

Dear Ms. Kaplan:

Langan Engineering & Environmental Services, PC (Langan) is pleased to present this letter report summarizing the startup testing of the Positive Pressure modified HVAC soil vapor mitigation system for Retail A at the Gateway Center at Bronx Terminal Market (the "Site"). System testing included sub-slab testing point installation, differential pressure measurements, and indoor and ambient air quality sampling.

BACKGROUND

Soil vapor samples collected during the remedial investigation in late 2004 and early 2005 found soil vapor impacts of methane and volatile organic compounds (VOCs). To mitigate potential soil vapor intrusion into the Retail A building, a positive pressure HVAC modification system and a vapor barrier were installed in Retail A. The system design was submitted to NYSDEC and NYSDOH in a letter dated January 30, 2008. In an email dated March 14, 2008, NYSDEC and NYSDOH indicated that the use of a modified HVAC system to provide a positive pressure soil vapor mitigation system for the Retail A building would be acceptable, provided that a long-term monitoring plan, including indoor air sampling and/or pressure testing, is implemented to ensure that the building is operating under positive pressure. In a telephone conversation on September 4, 2008, NYSDOH further clarified that the long-term monitoring should be annual pressure monitoring, considering the use of the building would prevent the collection of reliable indoor air sampling data.

As part of the installation and start-up of the Retail A positive-pressure modified HVAC system, differential pressure testing and indoor air testing were completed as described herein.

DIFFERENTIAL PRESSURE TESTING

Six sub-slab testing points were installed in the Retail A building to monitor the pressure differential between the building indoor air and the sub-slab. These monitoring locations are shown on Figure 2.

Testing Point Installation

Testing points were installed on October 8, 9, and 10, 2008, by Laurel Environmental of Huntington, New York using a Hilti TE 56 impact hammer drill to create a ¾ inch hole to the sub-slab.

Testing points were constructed with ¼ inch diameter polyethylene tubing extending from two inches below the top of the hole to approximately 2-3 inches below the bottom of the slab. This tubing was sealed in place from the vapor barrier to the top of the slab with a polyurethane sealant. The top of the ¼-inch diameter tubing was connected to approximately 3 inches of flex tubing which connected to a Swagelok quick connect ball valve fitted with a ¼-inch hose barb. The quick connect is designed to be capped when not in use. This fitting and barb fit in a 2-inch diameter flush-mounted cast iron manhole cover.

Differential Pressure Monitoring and Results

On October 10, 2008, Langan personnel conducted differential pressure measurements on all six testing point locations. Differential pressure readings were measured using a TSI micromanometer, model number 8720-XX1.

The micromanometer was connected to the sampling barb and the value to the sub-slab was opened. The micromanometer was set up to measure the pressure differential between the sub-slab and the first floor. A positive reading indicated that first floor pressure was greater than the sub-slab pressure. The instrument was allowed to stabilize prior to recording differential pressures. The micromanometer is capable of detecting differential pressure in inches of water up to five decimal places; however due to the sensitivity of the instrument, differential pressures were recorded to the greatest number of stabilized digits. The test was duplicated for accuracy. Copies of the completed field measurement forms are included as Table 1 of this report.

The pressures differential readings were positive for all six points, indicating that the first floor pressure was greater than the sub-slab pressure. The pressure differential measurements are documented in Table 1.

INDOOR AND AMBIENT AIR SAMPLING

Prior to sample collection, a site walk was performed to document materials that could potentially interfere with air sampling results. This inspection included a photoionization detector (PID) screening for VOCs. The contractor provided a list of site activities for the week preceding air sampling as well as material safety data sheets (MSDSs) for all chemicals used in the vicinity of Retail A. Products associated with building construction including paints, floor adhesives, caulks, paint strippers, glues and binders commonly release VOCs, which could interfere with sample results. Site activities in the vicinity of Retail A for the week preceding the sampling event included: painting, asphalt paving around the building, operation of gas powered equipment in and around the building, floor patching with concrete binder, and installation of pressure monitoring points, which included the use of polyurethane sealant and thread lubricant.

Indoor air sampling was conducted on October 24, 2008. Six indoor air samples, one duplicate sample, and one ambient air sample were collected in total. The indoor air samples were located approximately 3 to 5 feet above the floor slab adjacent to each of the six pressure monitoring points in Retail A. The samples were collected in one-liter Summa canisters using a flow controller calibrated for an 8-hour sampling period. An ambient air sample was collected to represent ambient air conditions in the vicinity of the building.

After sample collection, the Summa canisters were labeled and shipped under chain-of-custody protocol to Centek Laboratories, LLC in Syracuse, New York for analysis of compounds of concern, which include compounds detected beneath and immediately adjacent to Retail A during the RI conducted at the Site. Centek is an NYSDOH ELAP-certified laboratory. The chain of custody documentation, laboratory analytical report, and NYSDOH laboratory certificate are provided as Attachments A and B.

Indoor Air Sampling Results

New York State currently does not have standards, criteria, or guidance values for concentrations of acetone, m& p-xylene or o-xylene in air samples. The NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York states that the 90th percentile values from the EPA BASE data for indoor air can be used as an initial benchmark in office and commercial buildings. Six of the seven indoor air samples (including a duplicate) detected m&p-xylene and o-xylene at concentrations above the EPA 2001 BASE Database's 90th percentile concentrations. O-xylene concentrations ranged from 9.27 ug/m^3 to 10.6 ug/m^3, which were slightly above the 90th Percentile concentration of 7.9 ug/m^3. M&p-xylene concentrations ranged from 57.8 ug/m^3 to 77.2 ug/m^3., which were slightly above the 90th percentile concentration of 22.2 ug/m^3. One sample (NW-10/24/08) had an acetone concentration slightly above the 90th percentile concentration (98.9 ug/m^3) at 170 ug/m^3. A summary of detections are provided in Table 2.

CONCLUSIONS AND RECCOMENDATIONS

Based on the investigation results, our conclusions are as follows:

- The pressure differential testing confirmed that the HVAC system creates positive air pressure inside the building that is greater than air pressure beneath the building slab, demonstrating that the direction of potential air flow through the slab would be from the indoor space to the space below the floor slab.
- Of the fourteen constituents sampled, only concentrations of acetone, o-xylene, and m&p-xylene were detected above the 90th percentile concentrations, and those exceedances were slight. All but one of the acetone concentrations were below both the 90th percentile concentrations and the ambient air sample concentrations. The concentrations detected in the commercial space are attributed to the products associated with building construction (listed above) and site activities preceding the sampling event. Xylenes are a common constituent in polyurethane products and many paint removers contain acetone. Both polyurethane sealant and paint strippers were used in the week proceeding air sampling. Additionally xylenes and acetone are common fuel additives and there was fuel-powered equipment operating in the building during the week prior to sampling.

Based on the test results and the presence of the sub-slab vapor barrier, the potential for vapor intrusion into the building from the subsurface has been eliminated. In our professional opinion, no additional indoor air sampling is required. Monitoring will continue under the Site Management Plan, including annual monitoring of the HVAC system to verify that the system continues to operate as designed and installed, and annual pressure monitoring to ensure the pressure inside the building is greater than the sub-slab.

Please call if you have any questions.

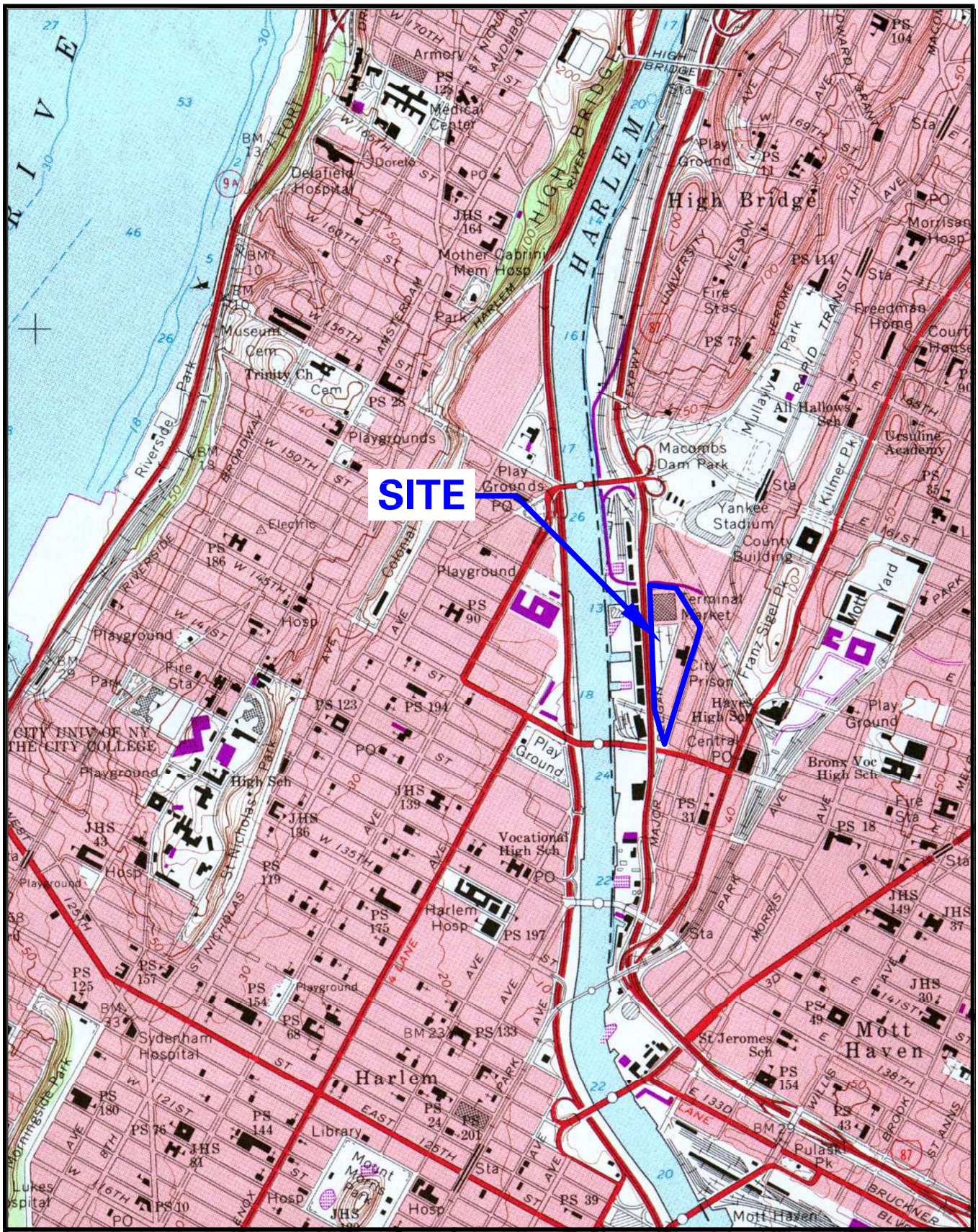
Sincerely,
Langan Engineering & Environmental Services, P.C.

Joel B. Landes, P.E.
Senior Associate

Enclosure(s):
Figure 1- Site Location Map
Figure 2- Pressure Monitoring Point Locations
Table 1- Pressure Differential Measurements
Table 2- Indoor Air sample Results
Attachment A- Laboratory Analytical Report
Attachment B- NYSDOH Laboratory Certification

cc:
J. Hayes – Langan

FIGURES



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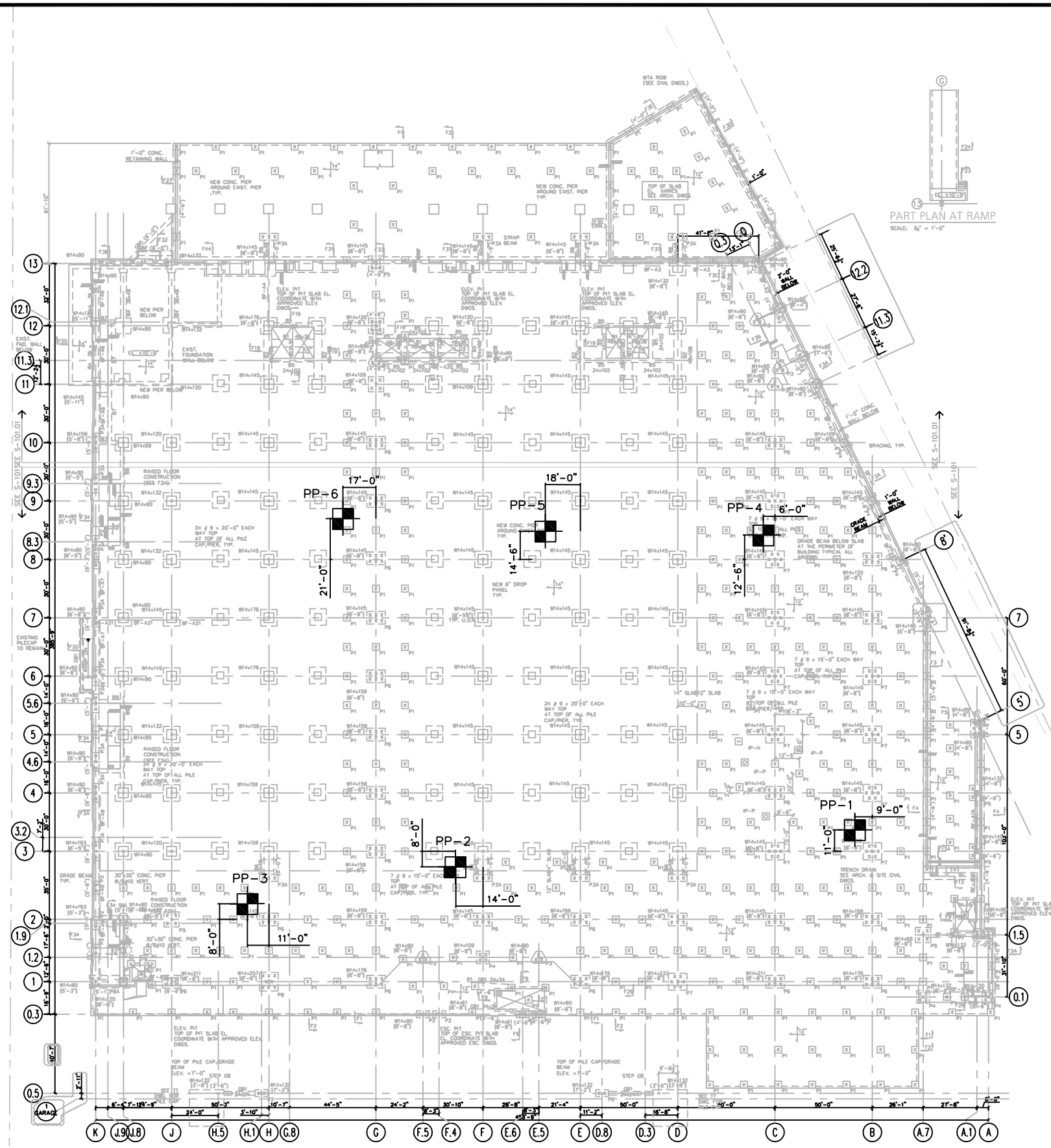
GATEWAY CENTER AT BRONX TERMINAL MARKET

SITE LOCATION MAP

BRONX NEW YORK

Project No.	Date	Scale	Fig. No.
5742506	10/12/05	NTS	1

Name: U:\Data5\5742506\Office Data\Reports\FER\Figures\Figure 1 Site Location Map\Figure 1 Site Location Map.dwg Date: 6/11/2008 Time: 9:07 User: emuller Style Table: Langan.stb Layout: Site Map



RETAIL A
LEVEL 1 FRAMING PLAN
(EL +10.00)

SCALE: 3/16" = 1'-0"

NOTES:

1. TOP OF SLAB SHALL BE AT EL. 10'-0", U.O.N. THIS ..... INDICATING DISTANCE ABOVE OR BELOW REFERENCED SLAB ELEVATION.
2. 14" — INDICATES 14" THICK NORMAL WEIGHT CONCRETE FORMED SLAB WITH fc' = 5000 PSI REINFORCED WITH #7 @ 12" O.C. TOP AND BOTTOM EACH WAY CONT. SEE PLAN FOR ADDITIONAL SLAB REINFORCEMENT. REMOVE EXISTING GROUND FLOOR SLAB AND FRAMING AS REQUIRED.
3. 12" — INDICATES 12" THICK NORMAL WEIGHT CONCRETE FORMED SLAB WITH FC' = 5000 PSI REINFORCED WITH #7 @ 12" O.C. TOP AND BOTTOM EACH WAY CONT. SEE PLAN FOR ADDITIONAL SLAB REINFORCEMENT.
4. P X — INDICATES X – NUMBER OF 100 TON HP 12 x 63 STEEL PILES. SEE GEOTECHNICAL SPECIFICATIONS FOR ADDITIONAL INFORMATION. SEE DWG. S-601 FOR PILE CAP SCHEUDLE.
5. IP-P INDICATES AS-BUILT INDEX PIPE-PILE 10.75"ø x 0.5" THICK, CLOSED-END, CONCRETE FILLED, 75 TON CAPACITY. (VERIFY IN FIELD EXACT LOCATION)
6. IP-H INDICATES AS-BUILT INDEX H-PILE HP12x63, 100 TON CAPACITY. (VERIFY IN FIELD EXACT LOCATION)
7. FOR BEAM SCHEDULE, SEE S-101.01
8. TOP OF PILE CAP/GRADE BEAM EL. SHALL BE 1'-6" BELOW TOP OF SLAB, U.O.N. THUS (...)
9. SEE THE FOLLOWING DRAWINGS FOR ITEMS NOTED:

ITEM	DRAWING NO.
GENERAL NOTES	S-001
TYPICAL CONCRETE DETAILS	S-601, S-602, S-603, S-604
TYPICAL STEEL DETAILS	S-611, S-612, S-613, S-614
LATERAL BRACING ELEV. (RETAIL A)	S-501
LATERAL BRACING ELEV. (RETAIL B)	S-511
PYLON STRUCTURE DETAILS	S-521
LATERAL BRACING DETAILS	S-531
FOUNDATION SECTION & DETAILS	S-621, S-622

SYMBOL LEGEND

- INDICATES COMPOSITE DECK SPAN DIRECTION
- INDICATES COLUMN ABOVE
- INDICATES COLUMN BELOW
- INDICATES HANGER BELOW
- INDICATES LATERAL BRACING
- INDICATES MOMEMT CONNECTION
- [...] INDICATES NUMBER OF STUDS
- < ... > INDICATES UPWARD CAMBER AT MID SPAN
- (...) INDICATES TOP OF PILE CAP/GRADE BEAM EL.
- W14x159 – INDICATES COL. SIZE
- {9'-5½"} – INDICATES BOTT. OF BASE PLATE EL.
- PP-1 — PRESSURE SAMPLING POINT
- W14x145 — COLLUMN LOCATION

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NEW JERSEY PENNSYLVANIA **NEW YORK** CONNECTICUT FLORIDA NEVADA
NJ Certificate of Authorization No: 24GA27996400

GATEWAY CENTER AT BRONX TERMINAL MARKET

PRESSURE SAMPLING POINT LOCATIONS

BRONX NEW YORK

Project No.	Date	Scale	Dwg. No.
5742506	10/27/2008	1"=64'	2

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Filename: U:\Data5\5742506\Cadd Data – 5742506\Dwg\Pressure Sampling Points updated.dwg Date: 1/27/2009 Time: 15:58 User: jgood Style Table: Langan.stb Layout: B Size Sheet (Bottom)

TABLES

Table 1
Retail A Pressure Differential Measurements
Gateway Center at Bronx Terminal Market
Langan Project No: 5742506

Time	Location	Pressure Differential Reading (Inches of H_2O)
3:00 PM	PP-1	0.015
	PP-2	0.002
	PP-3	0.0235
	PP-4	0.004
	PP-5	0.002
	PP-6	0.0003
3:45 PM	PP-1	0.018
	PP-2	0.0018
	PP-3	0.018
	PP-4	0.007
	PP-5	0.0015
	PP-6	0.0005

Notes:
Pressure differential readings collected on October 10, 2008.
Weather Conditions: Sunny, 65.0 F, Winds @ 4 mph

Table 2
Summary of BTM Retail A - Air Sampling Results (October 30, 2008)
Gateway Center at Bronx Terminal Market
Langan Project No: 5742506
BCP Index No. W2-1032-04-11; Site No. C203015

Langan Sample ID:	Air Guideline Value Table 3.1 - NYSDOH Guidance for Evaulating Soil Vapor Intrusion in NY State (Oct. 2006)	EPA 2001: Building Assessment and Survey Evaluation (BASE) Database: 90th Percentile	AMBIENT-10/24/08	NC-MS/MSD-10/24/08	NE-10/24/08	NE2-10/24/08	NW-10/24/08	SC-10/24/08	SE-10/24/08	SW-10/24/08
Location (Units)	-- (ug/m^3)	Indoor (ug/m^3)	Outdoor Sample (ug/m^3)	Indoor Sample (ug/m^3)	Indoor Sample (ug/m^3)	Indoor Sample (ug/m^3)	Indoor Sample (ug/m^3)	Indoor Sample (ug/m^3)	Indoor Sample (ug/m^3)	Indoor Sample (ug/m^3)
1,2,4-Trimethylbenzene	--	9.5	1.70	2.80	2.70	2.00	2.20	3.05	3.60	2.85
1,3,5-Trimethylbenzene	--	3.7	0.650 J	0.800	1.05	0.500 J	0.650 J	0.949	1.20	0.750
4-ethyltoluene	--	3.6	0.999	1.55	1.45	1.30	1.30	1.60	1.85	1.05
Acetone	--	98.9	25.4 D^{10}	22.9 D^{10}	20.3 D^{10}	17.6 D^{10}	**170 D^{40}**	18.3	18.6 D^{10}	15.7 D^{10}
Carbon disulfide	--	4.2	0.411 J	0.380 J	0.443 J	0.411 J	0.380 J	0.411 J	0.506	0.538
Cyclohexane	--	--	0.770	3.29	3.01	2.41	1.85	1.82	2.94	1.50
Freon 11	--	18.1	1.94	1.83	1.88	1.60	1.88	1.71 D^{10}	1.77	1.71
Freon 12	--	16.5	2.97	1.76	2.16	1.16	2.31	1.86	2.21	2.56
m&p-Xylene	--	22.2	5.12	**76.4 D^{10}**	**72.8 D^{10}**	**57.8 D^{10}**	**71.5 D^{10}**	**77.2**	**73.3 D^{10}**	8.61
Methyl Ethyl Ketone	--	12	2.73	8.39 J, D^{10}	8.99 D^{10}	9.59 D^{10}	11.1 D^{10}	8.99	8.99 D^{10}	5.07
Methyl Isobutyl Ketone	--	6	0	0	0	0	0	0 D^{10}	0	0
o-Xylene	--	7.9	1.77	**10.6 D^{10}**	**10.2 D^{10}**	**9.27 D^{10}**	**10.2 D^{10}**	**10.2**	**9.27 D^{10}**	2.30
Tetrachloroethylene	100	15.9	1.72	1.45	1.24	3.79	7.03	1.38	1.38	3.72
Toluene	--	43	8.31	28.7 D^{10}	25.7 D^{10}	23.7 D^{10}	28.7 D^{10}	25.7	25.3 D^{10}	7.66 D^{10}

Notes:
Target list of volatile chemicals based on previous environmental sampling conducted in the Retail A slab area during the Remedial Investigation.

Qualifiers:
J= Analyte detected at or below quantitation limits
S= Spike Recovery outside accepted recovery limits
*= m & p xylene values are the sum of m mean value and the p mean value
D^x= Dilution factor
-- = value not provided.

BOLD Detected concentration exceeds the EPA 2001: Building Assessment and Survey Evaluation (BASE) 90th Percentile Standard. Use of this database benchmark is recommended by the NYSDOH Guidance for evaluating indoor air in office and commercial buildings.

ATTACHMENT A
LABORATORY ANALYTICAL REPORT

Centek Laboratories, LLC

Date: *17-Nov-08*

CLIENT:	Langan Engineering	**Client Sample ID:**	SC-10/24/08
Lab Order:	C0810032	**Tag Number:**	108,149
Project:	Bronx Terminal	**Collection Date:**	10/24/2008
Lab ID:	C0810032-001A	**Matrix:**	AIR

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
1UG/M3 W/ 0.25UG/M3 CT-TCE-VC		**TO-15**				Analyst: **LL**
1,2,4-Trimethylbenzene	3.05	0.749		ug/m3	1	10/28/2008 12:57:00 AM
1,3,5-Trimethylbenzene	0.949	0.750		ug/m3	1	10/28/2008 12:57:00 AM
4-ethyltoluene	1.60	0.750		ug/m3	1	10/28/2008 12:57:00 AM
Acetone	18.3	7.24		ug/m3	10	10/28/2008 1:30:00 AM
Carbon disulfide	0.411	0.475	J	ug/m3	1	10/28/2008 12:57:00 AM
Cyclohexane	1.82	0.525		ug/m3	1	10/28/2008 12:57:00 AM
Freon 11	1.71	0.857		ug/m3	1	10/28/2008 12:57:00 AM
Freon 12	1.86	0.754		ug/m3	1	10/28/2008 12:57:00 AM
m&p-Xylene	77.2	13.2		ug/m3	10	10/28/2008 1:30:00 AM
Methyl Ethyl Ketone	8.99	8.99		ug/m3	10	10/28/2008 1:30:00 AM
Methyl Isobutyl Ketone	ND	1.25		ug/m3	1	10/28/2008 12:57:00 AM
o-Xylene	10.2	6.62		ug/m3	10	10/28/2008 1:30:00 AM
Tetrachloroethylene	1.38	1.03		ug/m3	1	10/28/2008 12:57:00 AM
Toluene	25.7	5.75		ug/m3	10	10/28/2008 1:30:00 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected at or below quantitation limits
JN	Non-routine analyte. Quantitation estimated.	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

Centek Laboratories, LLC

Date: *17-Nov-08*

CLIENT:	Langan Engineering	**Client Sample ID:**	SE-10/24/08
Lab Order:	C0810032	**Tag Number:**	193,445
Project:	Bronx Terminal	**Collection Date:**	10/24/2008
Lab ID:	C0810032-002A	**Matrix:**	AIR

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
1UG/M3 W/ 0.25UG/M3 CT-TCE-VC		**TO-15**				Analyst: **LL**
1,2,4-Trimethylbenzene	3.60	0.749		ug/m3	1	10/28/2008 2:06:00 AM
1,3,5-Trimethylbenzene	1.20	0.750		ug/m3	1	10/28/2008 2:06:00 AM
4-ethyltoluene	1.85	0.750		ug/m3	1	10/28/2008 2:06:00 AM
Acetone	18.6	7.24		ug/m3	10	10/28/2008 2:39:00 AM
Carbon disulfide	0.506	0.475		ug/m3	1	10/28/2008 2:06:00 AM
Cyclohexane	2.94	0.525		ug/m3	1	10/28/2008 2:06:00 AM
Freon 11	1.77	0.857		ug/m3	1	10/28/2008 2:06:00 AM
Freon 12	2.21	0.754		ug/m3	1	10/28/2008 2:06:00 AM
m&p-Xylene	73.3	13.2		ug/m3	10	10/28/2008 2:39:00 AM
Methyl Ethyl Ketone	8.99	8.99		ug/m3	10	10/28/2008 2:39:00 AM
Methyl Isobutyl Ketone	ND	1.25		ug/m3	1	10/28/2008 2:06:00 AM
o-Xylene	9.27	6.62		ug/m3	10	10/28/2008 2:39:00 AM
Tetrachloroethylene	1.38	1.03		ug/m3	1	10/28/2008 2:06:00 AM
Toluene	25.3	5.75		ug/m3	10	10/28/2008 2:39:00 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected at or below quantitation limits
JN	Non-routine analyte. Quantitation estimated.	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

Centek Laboratories, LLC

Date: *17-Nov-08*

CLIENT:	Langan Engineering	**Client Sample ID:**	NE-10/24/08
Lab Order:	C0810032	**Tag Number:**	85,115
Project:	Bronx Terminal	**Collection Date:**	10/24/2008
Lab ID:	C0810032-003A	**Matrix:**	AIR

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
1UG/M3 W/ 0.25UG/M3 CT-TCE-VC		**TO-15**				Analyst: **LL**
1,2,4-Trimethylbenzene	2.70	0.749		ug/m3	1	10/28/2008 3:15:00 AM
1,3,5-Trimethylbenzene	1.05	0.750		ug/m3	1	10/28/2008 3:15:00 AM
4-ethyltoluene	1.45	0.750		ug/m3	1	10/28/2008 3:15:00 AM
Acetone	20.3	7.24		ug/m3	10	10/28/2008 3:49:00 AM
Carbon disulfide	0.443	0.475	J	ug/m3	1	10/28/2008 3:15:00 AM
Cyclohexane	3.01	0.525		ug/m3	1	10/28/2008 3:15:00 AM
Freon 11	1.88	0.857		ug/m3	1	10/28/2008 3:15:00 AM
Freon 12	2.16	0.754		ug/m3	1	10/28/2008 3:15:00 AM
m&p-Xylene	72.8	13.2		ug/m3	10	10/28/2008 3:49:00 AM
Methyl Ethyl Ketone	8.99	8.99		ug/m3	10	10/28/2008 3:49:00 AM
Methyl Isobutyl Ketone	ND	1.25		ug/m3	1	10/28/2008 3:15:00 AM
o-Xylene	10.2	6.62		ug/m3	10	10/28/2008 3:49:00 AM
Tetrachloroethylene	1.24	1.03		ug/m3	1	10/28/2008 3:15:00 AM
Toluene	25.7	5.75		ug/m3	10	10/28/2008 3:49:00 AM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
J	Analyte detected at or below quantitation limits
JN	Non-routine analyte. Quantitation estimated.
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits

Centek Laboratories, LLC

Date: *17-Nov-08*

CLIENT:	Langan Engineering	**Client Sample ID:**	NC-MS/MSD-10/24/08
Lab Order:	C0810032	**Tag Number:**	210,292
Project:	Bronx Terminal	**Collection Date:**	10/24/2008
Lab ID:	C0810032-004A	**Matrix:**	

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
1UG/M3 W/ 0.25UG/M3 CT-TCE-VC		**TO-15**				Analyst: **LL**
1,2,4-Trimethylbenzene	2.80	0.749		ug/m3	1	10/28/2008 4:59:00 AM
1,3,5-Trimethylbenzene	0.800	0.750		ug/m3	1	10/28/2008 4:59:00 AM
4-ethyltoluene	1.55	0.750		ug/m3	1	10/28/2008 4:59:00 AM
Acetone	22.9	7.24		ug/m3	10	10/28/2008 6:53:00 AM
Carbon disulfide	0.380	0.475	J	ug/m3	1	10/28/2008 4:59:00 AM
Cyclohexane	3.29	0.525		ug/m3	1	10/28/2008 4:59:00 AM
Freon 11	1.83	0.857		ug/m3	1	10/28/2008 4:59:00 AM
Freon 12	1.76	0.754		ug/m3	1	10/28/2008 4:59:00 AM
m&p-Xylene	76.4	13.2		ug/m3	10	10/28/2008 6:53:00 AM
Methyl Ethyl Ketone	8.39	8.99	J	ug/m3	10	10/28/2008 6:53:00 AM
Methyl Isobutyl Ketone	ND	1.25		ug/m3	1	10/28/2008 4:59:00 AM
o-Xylene	10.6	6.62		ug/m3	10	10/28/2008 6:53:00 AM
Tetrachloroethylene	1.45	1.03		ug/m3	1	10/28/2008 4:59:00 AM
Toluene	28.7	5.75		ug/m3	10	10/28/2008 6:53:00 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected at or below quantitation limits
JN	Non-routine analyte. Quantitation estimated.	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

Centek Laboratories, LLC

Date: *17-Nov-08*

CLIENT:	Langan Engineering	**Client Sample ID:**	NW-10/24/08
Lab Order:	C0810032	**Tag Number:**	163,402
Project:	Bronx Terminal	**Collection Date:**	10/24/2008
Lab ID:	C0810032-005A	**Matrix:**	AIR

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
1UG/M3 W/ 0.25UG/M3 CT-TCE-VC		**TO-15**				Analyst: **LL**
1,2,4-Trimethylbenzene	2.20	0.749		ug/m3	1	10/28/2008 7:29:00 AM
1,3,5-Trimethylbenzene	0.650	0.750	J	ug/m3	1	10/28/2008 7:29:00 AM
4-ethyltoluene	1.30	0.750		ug/m3	1	10/28/2008 7:29:00 AM
Acetone	170	29.0		ug/m3	40	10/28/2008 8:37:00 PM
Carbon disulfide	0.380	0.475	J	ug/m3	1	10/28/2008 7:29:00 AM
Cyclohexane	1.85	0.525		ug/m3	1	10/28/2008 7:29:00 AM
Freon 11	1.88	0.857		ug/m3	1	10/28/2008 7:29:00 AM
Freon 12	2.31	0.754		ug/m3	1	10/28/2008 7:29:00 AM
m&p-Xylene	71.5	13.2		ug/m3	10	10/28/2008 8:05:00 AM
Methyl Ethyl Ketone	11.1	8.99		ug/m3	10	10/28/2008 8:05:00 AM
Methyl Isobutyl Ketone	ND	1.25		ug/m3	1	10/28/2008 7:29:00 AM
o-Xylene	10.2	6.62		ug/m3	10	10/28/2008 8:05:00 AM
Tetrachloroethylene	7.03	1.03		ug/m3	1	10/28/2008 7:29:00 AM
Toluene	28.7	5.75		ug/m3	10	10/28/2008 8:05:00 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected at or below quantitation limits
JN	Non-routine analyte. Quantitation estimated.	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

Centek Laboratories, LLC

Date: *17-Nov-08*

CLIENT:	Langan Engineering	**Client Sample ID:**	SW-10/24/08
Lab Order:	C0810032	**Tag Number:**	286,258
Project:	Bronx Terminal	**Collection Date:**	10/24/2008
Lab ID:	C0810032-006A	**Matrix:**	AIR

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
1UG/M3 W/ 0.25UG/M3 CT-TCE-VC		**TO-15**				Analyst: **LL**
1,2,4-Trimethylbenzene	2.85	0.749		ug/m3	1	10/28/2008 3:03:00 PM
1,3,5-Trimethylbenzene	0.750	0.750		ug/m3	1	10/28/2008 3:03:00 PM
4-ethyltoluene	1.05	0.750		ug/m3	1	10/28/2008 3:03:00 PM
Acetone	15.7	7.24		ug/m3	10	10/28/2008 3:37:00 PM
Carbon disulfide	0.538	0.475		ug/m3	1	10/28/2008 3:03:00 PM
Cyclohexane	1.50	0.525		ug/m3	1	10/28/2008 3:03:00 PM
Freon 11	1.71	0.857		ug/m3	1	10/28/2008 3:03:00 PM
Freon 12	2.56	0.754		ug/m3	1	10/28/2008 3:03:00 PM
m&p-Xylene	8.61	1.32		ug/m3	1	10/28/2008 3:03:00 PM
Methyl Ethyl Ketone	5.07	0.899		ug/m3	1	10/28/2008 3:03:00 PM
Methyl Isobutyl Ketone	ND	1.25		ug/m3	1	10/28/2008 3:03:00 PM
o-Xylene	2.30	0.662		ug/m3	1	10/28/2008 3:03:00 PM
Tetrachloroethylene	3.72	1.03		ug/m3	1	10/28/2008 3:03:00 PM
Toluene	7.66	5.75		ug/m3	10	10/28/2008 3:37:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected at or below quantitation limits
JN	Non-routine analyte. Quantitation estimated.	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

Centek Laboratories, LLC

Date: *17-Nov-08*

CLIENT:	Langan Engineering	**Client Sample ID:**	AMBIENT-10/24/08
Lab Order:	C0810032	**Tag Number:**	136,66
Project:	Bronx Terminal	**Collection Date:**	10/24/2008
Lab ID:	C0810032-007A	**Matrix:**	AIR

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
1UG/M3 W/ 0.25UG/M3 CT-TCE-VC		**TO-15**				Analyst: **LL**
1,2,4-Trimethylbenzene	1.70	0.749		ug/m3	1	10/27/2008 11:48:00 PM
1,3,5-Trimethylbenzene	0.650	0.750	J	ug/m3	1	10/27/2008 11:48:00 PM
4-ethyltoluene	0.999	0.750		ug/m3	1	10/27/2008 11:48:00 PM
Acetone	25.4	7.24		ug/m3	10	10/28/2008 12:21:00 AM
Carbon disulfide	0.411	0.475	J	ug/m3	1	10/27/2008 11:48:00 PM
Cyclohexane	0.770	0.525		ug/m3	1	10/27/2008 11:48:00 PM
Freon 11	1.94	0.857		ug/m3	1	10/27/2008 11:48:00 PM
Freon 12	2.97	0.754		ug/m3	1	10/27/2008 11:48:00 PM
m&p-Xylene	5.12	1.32		ug/m3	1	10/27/2008 11:48:00 PM
Methyl Ethyl Ketone	2.73	0.899		ug/m3	1	10/27/2008 11:48:00 PM
Methyl Isobutyl Ketone	ND	1.25		ug/m3	1	10/27/2008 11:48:00 PM
o-Xylene	1.77	0.662		ug/m3	1	10/27/2008 11:48:00 PM
Tetrachloroethylene	1.72	1.03		ug/m3	1	10/27/2008 11:48:00 PM
Toluene	8.31	0.575		ug/m3	1	10/27/2008 11:48:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected at or below quantitation limits
JN	Non-routine analyte. Quantitation estimated.	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

Centek Laboratories, LLC

Date: *17-Nov-08*

CLIENT:	Langan Engineering	**Client Sample ID:**	NE2-10/24/08
Lab Order:	C0810032	**Tag Number:**	473,440
Project:	Bronx Terminal	**Collection Date:**	10/24/2008
Lab ID:	C0810032-008A	**Matrix:**	AIR

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
1UG/M3 W/ 0.25UG/M3 CT-TCE-VC		**TO-15**				Analyst: **LL**
1,2,4-Trimethylbenzene	2.00	0.749		ug/m3	1	10/28/2008 4:10:00 PM
1,3,5-Trimethylbenzene	0.500	0.750	J	ug/m3	1	10/28/2008 4:10:00 PM
4-ethyltoluene	1.30	0.750		ug/m3	1	10/28/2008 4:10:00 PM
Acetone	17.6	7.24		ug/m3	10	10/28/2008 4:44:00 PM
Carbon disulfide	0.411	0.475	J	ug/m3	1	10/28/2008 4:10:00 PM
Cyclohexane	2.41	0.525		ug/m3	1	10/28/2008 4:10:00 PM
Freon 11	1.60	0.857		ug/m3	1	10/28/2008 4:10:00 PM
Freon 12	1.16	0.754		ug/m3	1	10/28/2008 4:10:00 PM
m&p-Xylene	57.8	13.2		ug/m3	10	10/28/2008 4:44:00 PM
Methyl Ethyl Ketone	9.59	8.99		ug/m3	10	10/28/2008 4:44:00 PM
Methyl Isobutyl Ketone	ND	1.25		ug/m3	1	10/28/2008 4:10:00 PM
o-Xylene	9.27	6.62		ug/m3	10	10/28/2008 4:44:00 PM
Tetrachloroethylene	3.79	1.03		ug/m3	1	10/28/2008 4:10:00 PM
Toluene	23.7	5.75		ug/m3	10	10/28/2008 4:44:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected at or below quantitation limits
JN	Non-routine analyte. Quantitation estimated.	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

CLIENT: Langan Engineering
Work Order: C0810032
Project: Bronx Terminal

ANALYTICAL QC SUMMARY REPORT

TestCode: 0.25CT-TCE-VC

Sample ID: **MB1UT-102708** SampType: **MBLK** TestCode: **0.25CT-TCE-** Units: **ppbV** Prep Date: RunNo: **2010**
Client ID: **ZZZZZ** Batch ID: **R2010** TestNo: **TO-15** Analysis Date: **10/27/2008** SeqNo: **27360**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trimethylbenzene	ND	0.150									
1,3,5-Trimethylbenzene	ND	0.150									
4-ethyltoluene	ND	0.150									
Acetone	ND	0.300									
Carbon disulfide	ND	0.150									
Cyclohexane	ND	0.150									
Freon 11	ND	0.150									
Freon 12	ND	0.150									
m&p-Xylene	ND	0.300									
Methyl Ethyl Ketone	ND	0.300									
Methyl Isobutyl Ketone	ND	0.300									
o-Xylene	ND	0.150									
Tetrachloroethylene	ND	0.150									
Toluene	ND	0.150									

Sample ID: **MB1UT-102808** SampType: **MBLK** TestCode: **0.25CT-TCE-** Units: **ppbV** Prep Date: RunNo: **2011**
Client ID: **ZZZZZ** Batch ID: **R2011** TestNo: **TO-15** Analysis Date: **10/28/2008** SeqNo: **27377**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trimethylbenzene	ND	0.150									
1,3,5-Trimethylbenzene	ND	0.150									
4-ethyltoluene	ND	0.150									
Acetone	ND	0.300									
Carbon disulfide	ND	0.150									
Cyclohexane	ND	0.150									
Freon 11	ND	0.150									
Freon 12	ND	0.150									
m&p-Xylene	ND	0.300									
Methyl Ethyl Ketone	ND	0.300									

Qualifiers:
E Value above quantitation range
H Holding times for preparation or analysis exceeded
J Analyte detected at or below quantitation limits
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

CLIENT: Langan Engineering
Work Order: C0810032
Project: Bronx Terminal

ANALYTICAL QC SUMMARY REPORT

TestCode: 0.25CT-TCE-VC

Sample ID: **MB1UT-102808** SampType: **MBLK** TestCode: **0.25CT-TCE-** Units: **ppbV** Prep Date: RunNo: **2011**
Client ID: **ZZZZZ** Batch ID: **R2011** TestNo: **TO-15** Analysis Date: **10/28/2008** SeqNo: **27377**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methyl Isobutyl Ketone	ND	0.300									
o-Xylene	ND	0.150									
Tetrachloroethylene	ND	0.150									
Toluene	ND	0.150									

Sample ID: **LCS1UT-102708** SampType: **LCS** TestCode: **0.25CT-TCE-** Units: **ppbV** Prep Date: RunNo: **2010**
Client ID: **ZZZZZ** Batch ID: **R2010** TestNo: **TO-15** Analysis Date: **10/27/2008** SeqNo: **27361**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trimethylbenzene	0.9600	0.150	1	0	96.0	70	130				
1,3,5-Trimethylbenzene	1.030	0.150	1	0	103	70	130				
4-ethyltoluene	1.060	0.150	1	0	106	70	130				
Acetone	1.290	0.300	1	0	129	70	130				
Carbon disulfide	1.270	0.150	1	0	127	70	130				
Cyclohexane	0.9900	0.150	1	0	99.0	70	130				
Freon 11	1.220	0.150	1	0	122	70	130				
Freon 12	1.110	0.150	1	0	111	70	130				
m&p-Xylene	2.030	0.300	2	0	102	70	130				
Methyl Ethyl Ketone	1.080	0.300	1	0	108	70	130				
Methyl Isobutyl Ketone	1.160	0.300	1	0	116	70	130				
o-Xylene	1.020	0.150	1	0	102	70	130				
Tetrachloroethylene	0.8600	0.150	1	0	86.0	70	130				
Toluene	0.9500	0.150	1	0	95.0	70	130				

Sample ID: **LCS1UT-102808** SampType: **LCS** TestCode: **0.25CT-TCE-** Units: **ppbV** Prep Date: RunNo: **2011**
Client ID: **ZZZZZ** Batch ID: **R2011** TestNo: **TO-15** Analysis Date: **10/28/2008** SeqNo: **27378**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trimethylbenzene	0.8900	0.150	1	0	89.0	70	130				
1,3,5-Trimethylbenzene	1.020	0.150	1	0	102	70	130				

Qualifiers:
E Value above quantitation range
H Holding times for preparation or analysis exceeded
J Analyte detected at or below quantitation limits
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

CLIENT: Langan Engineering
Work Order: C0810032
Project: Bronx Terminal

ANALYTICAL QC SUMMARY REPORT

TestCode: 0.25CT-TCE-VC

Sample ID: **LCS1UT-102808** SampType: **LCS** TestCode: **0.25CT-TCE-** Units: **ppbV** Prep Date: RunNo: **2011**
Client ID: **ZZZZZ** Batch ID: **R2011** TestNo: **TO-15** Analysis Date: **10/28/2008** SeqNo: **27378**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4-ethyltoluene	0.9700	0.150	1	0	97.0	70	130				
Acetone	1.290	0.300	1	0	129	70	130				
Carbon disulfide	1.290	0.150	1	0	129	70	130				
Cyclohexane	1.050	0.150	1	0	105	70	130				
Freon 11	1.460	0.150	1	0	146	70	130				S
Freon 12	1.290	0.150	1	0	129	70	130				
m&p-Xylene	2.190	0.300	2	0	110	70	130				
Methyl Ethyl Ketone	1.040	0.300	1	0	104	70	130				
Methyl Isobutyl Ketone	1.130	0.300	1	0	113	70	130				
o-Xylene	1.050	0.150	1	0	105	70	130				
Tetrachloroethylene	0.9700	0.150	1	0	97.0	70	130				
Toluene	0.9800	0.150	1	0	98.0	70	130				

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded	J	Analyte detected at or below quantitation limits
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike Recovery outside accepted recovery limits

ATTACHMENT B
NYSDOH LABORATORY CERTIFICATION

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER
RICHARD F. DAINES, M.D.

Expires 12:01 AM April 01, 2009
Issued April 01, 2008

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. RUSSELL J. PELLEGRINO
CENTEK LABORATORIES LLC
143 MIDLER PARK DRIVE
SYRACUSE, NY 13206

NY Lab Id No: 11830
EPA Lab Code:

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:

Acrylates	
Acetonitrile	EPA TO-15
Chlorinated Hydrocarbons	
1,2,4-Trichlorobenzene	EPA TO-15
Hexachlorobutadiene	EPA TO-15
Hexachloroethane	EPA TO-15
Miscellaneous Air	
Formaldehyde	EPA TO-15
Polynuclear Aromatics	
Naphthalene	EPA TO-15
Purgeable Aromatics	
1,2,4-Trimethylbenzene	EPA TO-15
1,2-Dichlorobenzene	EPA TO-15
1,3,5-Trimethylbenzene	EPA TO-15
1,4-Dichlorobenzene	EPA TO-15
Benzene	EPA TO-15
Chlorobenzene	EPA TO-15
Ethyl benzene	EPA TO-15
Isopropylbenzene	EPA TO-15
Styrene	EPA TO-15
Toluene	EPA TO-15
Total Xylenes	EPA TO-15
Purgeable Halocarbons	
1,1,1-Trichloroethane	EPA TO-15
1,1,2,2-Tetrachloroethane	EPA TO-15
1,1,2-Trichloroethane	EPA TO-15
1,1,2-Trifluoro-1,2,2-Trichloroethane	EPA TO-15

Purgeable Halocarbons	
1,1-Dichloroethane	EPA TO-15
1,1-Dichloroethene	EPA TO-15
1,2-Dibromo-3-chloropropane	EPA TO-15
1,2-Dibromoethane	EPA TO-15
1,2-Dichloro-1,1,2,2-tetrafluoroethane	EPA TO-15
1,2-Dichloroethane	EPA TO-15
1,2-Dichloropropane	EPA TO-15
Bromoform	EPA TO-15
Bromomethane	EPA TO-15
Carbon tetrachloride	EPA TO-15
Chloroethane	EPA TO-15
Chloroform	EPA TO-15
Chloromethane	EPA TO-15
cis-1,2-Dichloroethene	EPA TO-15
cis-1,3-Dichloropropene	EPA TO-15
Dibromochloromethane	EPA TO-15
Dichlorodifluoromethane	EPA TO-15
Methylene chloride	EPA TO-15
Tetrachloroethene	EPA TO-15
trans-1,2-Dichloroethene	EPA TO-15
trans-1,3-Dichloropropene	EPA TO-15
Trichloroethene	EPA TO-15
Trichlorofluoromethane	EPA TO-15
Vinyl bromide	EPA TO-15
Vinyl chloride	EPA TO-15
Volatile Chlorinated Organics	
Benzyl chloride	EPA TO-15

Serial No.: 36501

Property of the New York State Department of Health. Valid only at the address shown. Must be conspicuously posted. Valid certificates have a raised seal. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify laboratory's accreditation status.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER
RICHARD F. DAINES, M.D.

Expires 12:01 AM April 01, 2009
Issued April 01, 2008

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. RUSSELL J. PELLEGRINO
CENTEK LABORATORIES LLC
143 MIDLER PARK DRIVE
SYRACUSE, NY 13206

NY Lab Id No: 11830
EPA Lab Code:

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:

Volatile Organics

1,2-Dichlorotetrafluoroethane	EPA TO-15
1,3-Butadiene	EPA TO-15
1,4-Dioxane	EPA TO-15
2,2,4-Trimethylpentane	EPA TO-15
2-Butanone (Methylethyl ketone)	EPA TO-15
4-Methyl-2-Pentanone	EPA TO-15
Acetone	EPA TO-15
Carbon Disulfide	EPA TO-15
Cyclohexane	EPA TO-15
Hexane	EPA TO-15
Isopropanol	EPA TO-15
Methyl tert-butyl ether	EPA TO-15
n-Heptane	EPA TO-15
tert-Butyl alcohol	EPA TO-15
Vinyl acetate	EPA TO-15

Serial No.: 36501

Property of the New York State Department of Health. Valid only at the address shown. Must be conspicuously posted. Valid certificates have a raised seal. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify laboratory's accreditation status.

APPENDIX R

WELL CONSTRUCTION LOGS

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

Log of Boring **MW-13B** Sheet 1 of 1

Project: Bronx Terminal Market	Project No.: 5742506
Location: Bronx, New York	Elevation and Datum: Approx. 5
Drilling Agency: Earth Tech	Date Started: 1/30/08 — Date Finished: 1/30/08
Drilling Equipment: B-61 Mobile	Completion Depth: 10 ft — Rock Depth:
Size and Type of Bit: 4 1/4"	Number of Samples: Disturbed — Undisturbed — Core
Casing Diameter (in) — Casing Depth (ft)	Water Level (ft.): First ▽ 3.5 — Completion ▼ — 24 HR. ▼
Casing Hammer — Weight (lbs) — Drop (in)	Drilling Foreman: Joe
Sampler	Inspecting Engineer: Doane E. Cafferty
Sampler Hammer — Weight (lbs) — Drop (in)	

Material Symbol	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Contact Depth	Well Diagram
	+5.0			0							
		Fill material Dark gray-black SAND, subangular to subrounded gravel, f-c sand (dry) No odor	0.3	1							
			0.5	2							
				3							
	+1.0		0.7	4						4.0	Bentonite
		Fill material CLAY with some sand and silt (moist) Slight organic odor		5							
				6							Sand
				7							
		Dark gray CLAY (moist to wet) Strong organic odor		8							
			0.7	9							Screen
	-5.0			10						10.0	
		End of boring at 10'		11							
				12							
				13							
				14							
				15							
				16							
				17							
				18							
				19							
				20							

G:\DATA5\005742506\ENGINEERING DATA\GEOTECHNICAL\GINTLOGS\5742506.GPJ ... 2/28/2008 8:46:54 AM ... Report: Log - LANGAN ...Template TEMPLATE.GDT

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

Log of Boring **MW-13C** Sheet 1 of 1

Project: Bronx Terminal Market	Project No.: 5742506
Location: Bronx, New York	Elevation and Datum: Approx. 5
Drilling Agency: Earth Tech	Date Started: 1/30/08 / Date Finished: 1/30/08
Drilling Equipment: B-61 Mobile	Completion Depth: 10 ft / Rock Depth:
Size and Type of Bit: 4 1/4"	Number of Samples: Disturbed / Undisturbed / Core
Casing Diameter (in) / Casing Depth (ft)	Water Level (ft.): First ▽ 3.5 / Completion ▼ / 24 HR. ▼
Casing Hammer / Weight (lbs) / Drop (in)	Drilling Foreman: Joe
Sampler	Inspecting Engineer: Doane E. Cafferty
Sampler Hammer / Weight (lbs) / Drop (in)	

Material Symbol	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data: Number / Type / Recov. (in) / Penetr. resist BL/6in / N-Value (Blows/ft) 10 20 30 40	Contact Depth	Well Diagram
	+5.0			0			
		Fill material Dark gray-black SAND, subrounded gravel, f-c sand (dry) No odor	0	1			Bentonite
				2			
				3			Sand
			0.5	4			
	0.0			5		5.0	
		Fill material CLAY with some sand and silt (moist) No odor	0.5	6			Screen
		Dark gray CLAY (moist to wet) Very slight organic odor		7			
				8			
				9			
	-5.0			10		10.0	
		End of boring at 10'		11			
				12			
				13			
				14			
				15			
				16			
				17			
				18			
				19			
				20			

G:\DATA5\005742506\ENGINEERING DATA\GEOTECHNICAL\GINTLOGS\5742506.GPJ ... 2/28/2008 8:47:00 AM ... Report: Log - LANGAN ...Template TEMPLATE.GDT

WELL CONSTRUCTION SUMMARY

Well No. MW-13D

PROJECT Bronx Terminal Market	**PROJECT NO.** 5742506
LOCATION Manhattan, New York	**ELEVATION AND DATUM** Approx. 5
DRILLING AGENCY Moretrench	**DATE STARTED** 10/2/2008 **DATE FINISHED** 10/2/2008
DRILLING EQUIPMENT B-61	**DRILLER** Ed
SIZE AND TYPE OF BIT 4 2/3"	**INSPECTOR** J. Good

METHOD OF INSTALLATION
Hollow stem augers

METHOD OF WELL DEVELOPMENT
Peristaltic pump

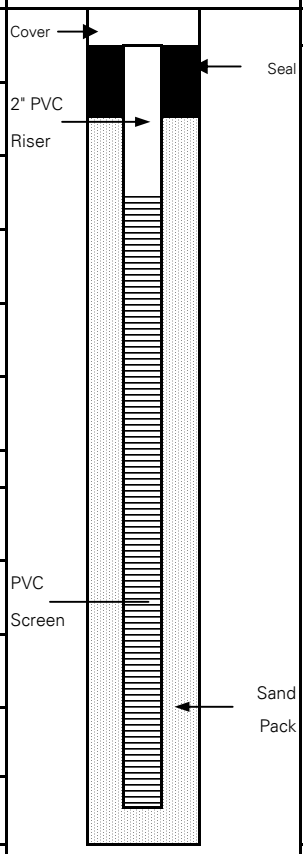
TYPE OF CASING PVC	**DIAMETER** 2 "	**TYPE OF BACKFILL MATERIAL** N/A
TYPE OF SCREEN 0.010 " slot	**DIAMETER** 2"	**TYPE OF SEAL MATERIAL** Bentonite
BOREHOLE DIAMETER 4 2/3"		**TYPE OF FILTER MATERIAL** 10/20 sand

TOP OF CASING	**ELEVATION**	**DEPTH (ft)** above ground 3
TOP OF SEAL	**ELEVATION**	**DEPTH (ft)** 0.5
TOP OF FILTER	**ELEVATION**	**DEPTH (ft)** 2
TOP OF SCREEN	**ELEVATION**	**DEPTH (ft)** 3
BOTTOM OF BORING	**ELEVATION**	**DEPTH (ft)** 12
SCREEN LENGTH		9
SLOT SIZE		

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
	10/2/2008	8 ft

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
Dark grey-black sand and gravel with some glass (Fill)	0-5
Dark grey -black sand with some clay and trace silt	5-7
Dark grey clay and trace silt (Native)	7-12

LANGAN Engineering and Environmental Services, Inc.
21 Penn Plaza, 360 West 31st Street, 8th Floor, New York, New York 10001-2727

WELL CONSTRUCTION SUMMARY

Well No. MW-13E

PROJECT Bronx Terminal Market	**PROJECT NO.** 5742506
LOCATION Manhattan, New York	**ELEVATION AND DATUM** Approx. 5
DRILLING AGENCY Moretrench	**DATE STARTED** 10/2/2008 **DATE FINISHED** 10/2/2008
DRILLING EQUIPMENT B-61	**DRILLER** Ed
SIZE AND TYPE OF BIT 4 2/3"	**INSPECTOR** J. Good

METHOD OF INSTALLATION
Hollow stem augers

METHOD OF WELL DEVELOPMENT
Peristaltic pump

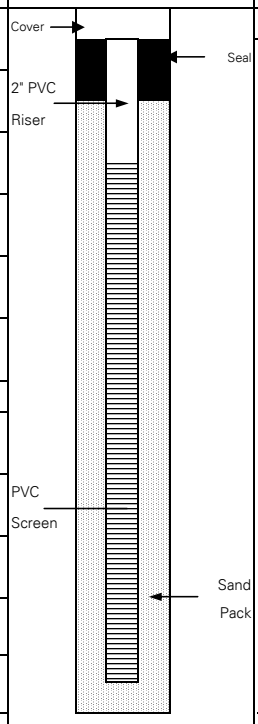
TYPE OF CASING PVC	**DIAMETER** 2 "	**TYPE OF BACKFILL MATERIAL** N/A
TYPE OF SCREEN 0.010 " slot	**DIAMETER** 2"	**TYPE OF SEAL MATERIAL** Bentonite
BOREHOLE DIAMETER 4 2/3"		**TYPE OF FILTER MATERIAL** 10/20 sand

TOP OF CASING **ELEVATION**	above ground	**DEPTH (ft)** 3.5
TOP OF SEAL **ELEVATION**		**DEPTH (ft)** 0
TOP OF FILTER **ELEVATION**		**DEPTH (ft)** 1.5
TOP OF SCREEN **ELEVATION**		**DEPTH (ft)** 3.5
BOTTOM OF BORING **ELEVATION**		**DEPTH (ft)** 9.5
SCREEN LENGTH		6
SLOT SIZE		

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
	10/2/2008	5 ft

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
Dark grey-black sand and gravel with some glass (Fill)	0-3
Dark grey -black sand with some clay and trace silt	3-5
Dark grey clay and trace silt (Native)	5-9.5

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21 Penn Plaza, 360 West 31st Street, 8th Floor, New York, New York 10001-2727

APPENDIX S

GROUNDWATER SAMPLING LOGS

GROUND WATER SAMPLE FIELD INFORMATION FORM

Site:	Well#/Location:	Job No.
Date:	Weather:	Sampling Personnel:

Well Information

Sample ID	
Well Depth (ft)	
Screened Interval (ft)	
Casing Elevation (msl)	
Casing Diameter (in)	
Depth to Water (ft)	
Water Elevation (msl)	
Casing Volume (gal)	
PID/FID Reading (ppm)	

Purging Information

Purging Method	
Purging Rate (l/m; gpm)	
Start Purge Time	
End Purge Time	
Volume Purged (gal)	

Sampling Information

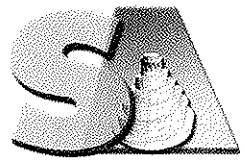
Sampling Method	
Start Sampling Time	
End Sampling Time	
Depth Before Sampling (ft)	
Number Bottles Collected	

	Parameters							
Sample Time	**pH**	**Conductivity (mS/cm)**	**Turbidity (NTU)**	**Dissolved Oxygen (mg/L)**	**Temp (◦C)**	**ORP (mV)**	**Depth to Water (ft)**	**Purged Volume (gallons)**

Notes/Remarks

APPENDIX T

SAMPLE CHAIN-OF-CUSTODY



SPECTRUM ANALYTICAL, INC.
Featuring
HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page _____ of _____

Special Handling:

☐ Standard TAT - 7 to 10 business days
☐ Rush TAT - Date Needed: _____
· All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
· Samples disposed of after 60 days unless otherwise instructed.

Report To: _____

Project Mgr.: _____

Invoice To: _____

P.O. No.: _____ RQN: _____

Project No.: _____

Site Name: _____

Location: _____ State: _____

Sampler(s): _____

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid
7=CH_3OH 8= $NaHSO_4$ 9=_____ 10=_____

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Preservative	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic		Analyses:								QA Reporting Notes: (check if needed)
																				☐ Provide MA DEP MCP CAM Report ☐ Provide CT DEP RCP Report **QA/QC Reporting Level** ☐ Standard ☐ No QC ☐ Other _____ State specific reporting standards:

☐ Fax results when available to (_____) _____

☐ E-mail to _____

EDD Format _____

Condition upon receipt: ☐ Iced ☐ Ambient ☐ °C _____

Relinquished by:	Received by:	Date:	Time:

11 Almgren Drive • Agawam, Massachusetts 01001 • 413-789-9018 • Fax 413-789-4076 • www.spectrum-analytical.com

APPENDIX U

SITE-WIDE INSPECTION FORM

SITE WIDE INSPECTION CHECKLIST

Site Name: _____ Location: _____ Project Number: _____

Inspector Name: _____ Date: _____ Weather Conditions: _____

Reason for Inspection (i.e., routine, severe condition, etc.): _____Annual Inspection_____

Check one of the following: **Y:** Yes **N:** No **NA**: Not Applicable

		Y	N	NA	Normal Situation	Remarks
	General					
1	What are the current site conditions?	--	--	--	--	
2	Are all applicable site records (e.g., documentation of construction activity, SSD or HVAC system maintenance and repair, most current easement, etc.) complete and up to date?				Y	
	Easement					
3	Has site use (restricted commercial) remained the same?				Y	
4	Does it appear that all environmental easement restrictions have been followed?				Y	
	Impermeable Cap					
5	Are there any indications of a breach in the capping system at the time of this inspection?				N	
6	Are there any cracks in the building slabs?				N	
7	Are there any cracks in the building walls?				N	
8	Is there any construction activity, or indication of any construction activity within the past certification year (including any tenant improvements), that included the breaching of the capping system, on-site at the time of this inspection?				N	
9	If YES to number 7, is there documentation that the Site Management Plan, HASP, and CAMP for the site was/is being followed?				NA if N to 6/ Y if Y to 6	
	SSD Systems					
10	Are all visible SSD system components intact and operational at the time of this inspection?				Y	

SITE WIDE INSPECTION CHECKLIST

Check one of the following: **Y:** Yes **N:** No **NA**: Not Applicable

		Y	N	NA	Normal Situation	Remarks
	HVAC Systems					
11	Are the Retail A Positive Pressure HVAC system components intact and operational at the time of this inspection?				Y	
	Groundwater Monitoring Well Network					
12	Are all wells within the groundwater monitoring network intact and secured at the time of this inspection?				Y	
13	Have the minimum number of groundwater monitoring events been counducted for the certification year (i.e., quarterly for first year)?				Y	

*** **If the answer to any of the above questions indicate non-compliance with any IC/ECs for the site, additional remarks must be provided and, where applicable, documentation attached to this checklist detailing additional inspection and repair activities.**

Additional remarks _____

_____

_____

_____

_____

_____

_____

_____

Minimum Inspection Schedule: Site-wide inspections will be conducted annually, per certification year, at a minimum. Additional inspections will also be conducted at times of severe condition events. All inspection events will utilize this checklist.

APPENDIX V

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN
FOR
GATEWAY CENTER AT BRONX TERMINAL MARKET
BRONX, NEW YORK

BCA Index No. W2-1032-04-11
Site No. C203015

Prepared For:

BTM Development Partners, LLC
60 Columbus Circle
New York, NY 10023

Prepared By:

Langan Engineering and Environmental Services, P.C.
360 West 31st Street, 8th Floor
New York, New York 10001

March 2009
5742506

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

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Attachment A Resumes for Project Manager, Quality Assurance Officer, Preparer of Data Usability Summary Reports ..... Follows Section 2

SECTION 1

PROJECT DESCRIPTION

1.1 INTRODUCTION

This Quality Assurance Project Plan (QAPP) was completed for the Gateway Center at Bronx Terminal Market in Bronx, New York (the "Site") on behalf of the BTM Development Partners, LLC (BTMDP) in support of the Site Management Plan (SMP) pursuant to the Brownfield Cleanup Program Agreement between BTMDP and the New York State Department of Environmental Conservation (NYSDEC) (BCP Number W2-1032-04-11, Site Number C203015). BTMDP selected Langan Engineering and Environmental Services, PC (Langan) as the Remediation Engineer to prepare the SMP and the associated QAPP.

The project with be consistent with "DRAFT DER-10 Technical Guidance for Site Investigation and Remediation December 2002" available at http://www.dec.ny.gov/docs/remediation_hudson_pdf/der10dr.pdf and the July 2005 NYSDEC Analytical Services Protocol (ASP). A copy of the ASP can be obtained from the NYSDEC Division of Water by contacting Jason Fagel at jrfagel@gw.dec.state.ny.us or at 518-402-8156.

1.2 PROJECT OBJECTIVES

The objectives of this QAPP are to specify the analytical methods to be used to ensure that data from future intrusive activities at the Site are precise, accurate, representative, comparable, and complete.

1.3 SCOPE OF WORK

The specific scope of work covered by this QAPP includes any future intrusive work at the Site that may be conducted beneath the Site-cap and any Site activities covered under the SMP. Any future samples will be collected from soil stockpiles or excavations, as necessary. These samples will be analyzed using the USEPA SW-846 "Test Methods for Evaluating Solid Waste," November 1986, 3rd edition (and subsequent updates).

1.4 DATA QUALITY OBJECTIVES AND PROCESSES

The quality assurance and quality control objectives for all measurement data include:

- ***Precision*** – an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Field sampling precision will be determined by analyzing coded duplicate samples and analytical precision will be determined by analyzing internal QC duplicates and matrix spike duplicates.

- ***Accuracy*** – a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern. Sampling accuracy will be determined

through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy will be assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks.

- ***Representativeness*** – expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness will be determined by assessing a number of investigation procedures, including chain of custody, decontamination, and analysis of field blanks and trip blanks.

- ***Completeness*** – the percentage of measurements made which are judged to be valid. Completeness will be assessed through data validation. The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested.

- ***Comparability*** – expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured using several procedures, including standard methods for both sampling and analysis, instrument calibrations, using standard reporting units and reporting formats, and data validation.

Each of the above objectives are discussed in detail in Section 3.

SECTION 2

PROJECT ORGANIZATION

Any future intrusive activities beneath the site cap will be overseen by Langan or another environmental consultant on behalf of the owner. The environmental consultant will provide on-site field representatives to perform the intrusive activity oversight and any required sampling. The environmental consultant will also arrange data analysis and reporting tasks. The analytical services will be performed by a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP)-approved laboratory for analysis. Quality assurance review will be performed by the Langan Quality Assurance Officer or another environmental consultant on behalf of the owner to determine whether future intrusive work is being implemented according to the SMP. Data validation services will be performed by approved data validation contractor(s). The data validation portion of the assessment will check the quality of the analytical data against the quality control programs used by the laboratory.

All on-site field representatives must be qualified environmental professionals. All intrusive work and the people who perform the work must be documented in the annual reports.

Key personnel and their responsibilities as they are applicable to this SMP are as follows:

Job Title or Company	Designated Person	Responsibilities
Langan Principal & Associate	Mr. Joel Landes, P.E.	Remediation Project Engineer
Langan Quality Assurance Officer (QAO)	Mr. Tarek Khouri	Oversee and conduct Quality Assurance and Quality Control (QAQC) and other audits
Alpha Geoscience	Mr. Don Anne	Analytical data validation

Copies of resumes for the Remediation Project Engineer, Quality Assurance Officer, and preparer of the Data Usability Summary Reports (DUSR) are attached following this Section.

ATTACHMENT A

Resumes for Project Manager, Quality Assurance Officer, and Preparer of Data Usability Summary Reports

JOEL B. LANDES, P.E.
Senior Associate

Environmental Remediation
Phase I ESA / Risk Management
Regulatory Compliance
Environmental Engineering

EDUCATION

The Cooper Union, New York: M.E. Environmental Planning and Management
Polytechnic Institute of Brooklyn: B.S. Chemical Engineering
Union College, New York: Graduate Studies in Business Management

PROFESSIONAL REGISTRATIONS

Professional Engineer: NY, NJ

YEARS OF EXPERIENCE: 35

SUMMARY OF EXPERIENCE

Mr. Landes has over 35-years of experience conducting Phase I Environmental Site Assessments including 30-years as a project engineer and environmental manager. In addition, his experience includes managing environmental compliance audits, Phase II environmental site assessments, due diligence for industrial site selection and permitting evaluation; remedial investigations, feasibility studies, remedial measure design and implementation for former manufactured gas plant sites, transportation-related, industrial and manufacturing facilities. Mr. Landes continues to provide consultation to private developers on Brownfield property development, federal and state environmental regulatory programs, permitting, and risk and hazard assessment.

REPRESENTATIVE EXPERIENCE

The Shops at Atlas Park, Glendale, NY – This 12-acre property consisted of a 90 year old industrial park, with a central boiler house, railroad unloading facilities and extensive underground fuel oil and gasoline storage facilities. Under Langan's guidance, Atlas Park became one of the first projects to enter into the BCP and granted an approved remedial action work plan (RAWP). An extensive subsurface investigation was performed to delineate contamination as required by the BCP. Over 60 test borings, 20 soil gas probes and 10 monitoring wells were installed.

The services included environmental due diligence, oversight of abatement and building demolition, preparation and implementation of combined geotechnical and remedial investigations, and remedial action plans, preparation of remediation construction documents in coordination with site/civil, geotechnical, structural and mechanical design efforts, design of subslab depressurization and vapor barrier systems for 6 new retail structures, and oversight of construction of the remedial elements for an outdoor shopping and entertainment center.

Atlas Park received as ACEC New York Gold Award for Engineering Excellence.
Phoenix Award for Excellence in Brownfield Development, Region 2
(US EPA)

New Yankee Stadium Redevelopment Project, Bronx, NY – Senior Program Manager for the remediation of petroleum spills on Piers 2, 3 and 4 on the Harlem River waterfront. This project comprised the development of a park for the NYCEDC and NYC Department of Parks and Recreation, in association with the construction of the new Yankee Stadium. The spills were identified and reported to NYSDEC during due diligence. Services included soil and groundwater investigation to determine the extent of the impacted area, remediation design (plans

and specifications), bid support, preparation of remediation reports and coordination with NYCDEP and NYSDEC to close out the spills. Remedial activities included the removal of petroleum free product, removal, registration and closure of 9 USTs, treatment of residual VOCs in the groundwater with chemical oxidant, and disposal of approximately 20,000 tons of contaminated soil.

Bronx Terminal Market, Bronx, NY – Project director responsible for conducting environmental due diligence on the 34-acre Bronx Terminal Market site, an industrialized urban area adjacent to the Harlem River in the Bronx, N.Y.. The former site included the former Bronx Men's House of Detention, a 6-story refrigerated warehouse, a powerhouse, and various market buildings. Langan's services included:

- Phase I ESA environmental site assessment and due diligence for redevelopment
- Phase II subsurface soil, soil gas and groundwater investigations
- remedial alternative analysis
- cost estimates
- Preparation of the client's NYS Brownfield Cleanup Program application.

Under Mr. Landes' direction, Langan then developed and implemented a Public Participation Plan and a Remedial Investigation Work Plan (RIWP) for the property. Langan also participated as part of the consulting team in preparation of the draft environmental impact statement for the project. Subsequent to submittal and approval of our Remedial Investigation Report, Langan prepared a Remedial Action Work Plan (RAWP) and specifications for remediation. The specifications were coordinated with those being prepared for site/civil and geotechnical work. Approval of the RAWP was negotiated with NYSDEC and approved for construction. Langan will serve as the engineer responsible for the conduct of the remedial work and preparation of the Final Engineering Report. Services include environmental due diligence, support of the EIS/ULURP process, oversight of abatement and building demolition, preparation and implementation of remedial investigation and remedial action plans, preparation of remediation construction documents in coordination with site/civil, geotechnical, structural and mechanical design efforts, design of subslab depressurization and vapor barrier systems for 5 new structures, and oversight of construction of the remedial elements.

River Place, New York, NY – Program Manager for the preparation of specifications and management of contaminated soil at the site of a proposed high-rise residential building in midtown New York City. Investigation of subsurface soil and groundwater indicated that the site was a former manufactured gas plant (MGP) site from the mid- 1800's to the early 1900's. The investigation and remediation of the site was the responsibility of Con Edison under a NYS Voluntary Cleanup Agreement. We assisted Con Edison in their development of a Remedial Action Work Plan (RAWP) for the site by preparing the soil and groundwater management plan and community air monitoring plan, which includes provisions for handling, characterization and disposal of soil and groundwater that would be disturbed during construction, and protect the health of construction workers and the general public from exposure to contaminants. When the site entered into the NYS Brownfield Cleanup Program (BCP), Silverstein Properties took on the responsibility of implementing the approved Remedial Action Work Plan with Langan as the Remediation Engineer of record. Langan prepared specifications, schedules and cost estimates to integrate the cleanup with the development of a proposed high-rise, multi-unit residential structure. Our responsibilities included all field oversight activities including the installation of interlocking, sealed joint sheet piles and excavation and disposal of 80,000 tons of MGP waste material, As the Remedial Engineer, we oversaw the implementation of the RAWP, prepared the

Final Engineering Report and obtained a Certificate of Completion for the Project, allowing the owner to obtain the BCP tax credits.

John Jay College Expansion, New York, NY – This 3 acre property was a former manufactured gas storage and distribution facility, a gasoline filling station and a warehouse, and includes an Amtrak track right-of-way. The services included environmental due diligence, design and oversight of abatement and building demolition, preparation and implementation of a remedial investigation plan and preparation of remediation construction documents in coordination with site/civil, geotechnical, structural and mechanical design efforts. We are currently overseeing the remedial elements for a multi-story structure, which will include classrooms and dormitory space, which will be connected to the existing John Jay College building.

Responsible for comprehensive investigation of below grade soil and groundwater quality and recommendations and consulting for all environmental remediation work required, and a lead and asbestos survey of the existing garage and preparation of plans and specifications for the demolition contractor. As part of the environmental investigation, Langan developed and managed an EQuIS chemistry database for the management of all soil, groundwater and soil gas data for the multi-story expansion with two below grade basement levels.

Waterside Generating Plan and Office Building, New York, NY – Langan participated in a team of other consultants, attorneys and insurance brokers to evaluate potential costs to remediate four Con Edison properties, one an office and service building that was a former manufactured gas plant (MGP) and one an operating steam and electric generating station covering 6 acres. Based on the limited data available, Langan recommended a geotechnical and environmental investigation program be implemented to evaluate the need for estimate the cost of remediation and redevelopment.

Con Edison hired a remediation contractor who entered into a Voluntary Cleanup Agreement (VCA) with NYSDEC. The investigation proposed by Langan was implemented by the remediation contractor with Langan oversight. Langan reviewed the investigation reports and interim remedial action plans, and assisted in the evaluation of the financial assurance package, which included a remediation cost cap insurance policy and a pollution liability policy. A Monte Carlo simulation was developed to assess all probabilities for potential remedial action scenarios. Findings indicated that the lump sum bid by the remedial contractor was inadequate to cover most probable scenarios but the additional coverage provided by an insurance carrier made up for the inadequacy.

Con Edison MGP Facilities, NY – Langan conducted preliminary environmental assessments of 10 former Con Edison manufactured gas plants (MGPs) pursuant to a Voluntary Cleanup Agreement (VCA) between Con Edison and the NYSDEC. These MGPs operated as early as 1830 in New York City. The assessments included:

- Evaluation of pre-Sanborn era historical maps and drawings found in the New York Public and Engineering Libraries,
- Review and evaluation of annual Public Service Commission reports available from New York state archives,
- Evaluation of the demography and zoning,
- Review of title search reports extending back to the early 1800's,
- Review of reference directories (e.g. Brown's Directories),

- Review of Con Edison property records,
- Review of NYC department records (Building, Fire, health, and
- Inspections of the facilities and the surrounding

The sites are currently privately owned properties including schools, nurseries and residential developments. These sites were prioritized based on the presence of such receptors and site characterization work plans have been prepared to assess subsurface soil and groundwater. Several of the high priority sites are now undergoing extensive indoor air and soil gas assessments.

Peter Cooper Village/Stuyvesant Town, New York, NY – Peter Cooper Village/ Stuyvesant Town (PCV/ST) is a 100 acre residential development constructed in the late 1940's. Prior to residential development, the site contained several manufactured gas plant (MGP) operations and is now one of the former Con Edison sites included in the Voluntary Cleanup Agreement (VCA) between Con Edison and NYSDEC. Langan was retained by MetLife, the owner of PCV/ST to assist them in evaluating the impact to their residents and operations in general due to the implementation by Con Edison of indoor air sampling and site characterization activities conducted pursuant to the VCA.

Langan has reviewed work plans for indoor air quality sampling, soil gas sampling and soil and groundwater sampling prepared by Con Edison. We have provided consultation regarding site impacts and remedial alternatives. We have inspected sample collection activities and reviewed data. Langan has also worked closely with representatives of the NYSDEC and NYSDOH and understand the relevant and appropriate guideline for cleanup.

Atlantic Avenue Service Center, Brooklyn, NY – This site is the location of a Con Edison service building that utilizes underground storage tanks for fueling vehicles. Leakage from the USTs has impacted soil and groundwater at the site. In addition, the site was a former Brooklyn Union Gas Company manufactured gas plant (MGP).

Pursuant to a Voluntary Cleanup Agreement (VCA) between Con Edison and NYSDEC, Langan conducted a preliminary review of site environmental data and prepared a work plan for evaluation of impacts from the Con Edison USTs and potential MGP wastes. Langan prepared a site specific health and safety plan, a site specific quality assurance project plan and a field sampling manual. The work plan and the associated documents were approved by Con Edison and currently await NYSDEC review.

Ink Manufacturing Facility, New York – Retained by the buyer of this facility who planned to demolish and redevelop into a multi-story residential building. Intrusive investigations were conducted to evaluate environmental conditions, develop conceptual remediation plans and to prepare remediation budgets for this property. Initial findings indicated a petroleum release from the facility's underground fuel oil storage tank, and the presence of free-phase petroleum product underlying the site. In addition, the building was constructed on contaminated fill. A remedial action plan was developed to quickly remove the source, prevent further migration and remove the free-phase product, and to remove and reverse the flow of contaminated soil gases and product that had migrated beyond the property line. In addition, plans and budgets were provided for long term demolition of the building, including asbestos abatement, and remediation of the residual petroleum contamination and fill under the building, so that the future building could be constructed in a clean environment with no requirement for engineered barriers. We are currently engaged in oversight of the implementation of the initial remedial action plan.

Silverstein Properties, New York – Provided environmental services to assist in the redevelopment of the 7 World Trade Center site destroyed in the 9/11 attacks.

1. Prepared Environmental Assessment Forms as required under the New York SEQRA for the development project.
2. Evaluated previous investigations and developed and implemented a soil and groundwater management plan, approved by NYSDEC, for the excavation of approximately 25,000 cubic yards of soil and demolition of subsurface building features to allow for the construction of a new building foundation.
3. Planned, provided oversight and prepared a closure report (received NYSDEC NFA letter) for the removal of two vaulted 11,500-gallon fuel oil USTs.
4. Provided oversight for the excavation and removal of two 6,500-gallon fuel oil USTs that were damaged and spilled during the 9/11 attacks.

Silverstein Properties, New York – Program Manager for the preparation of specification for management of clean and contaminated soil at the site of a proposed high-rise residential building in midtown New York City. Investigation of subsurface soil and groundwater indicated that the site was a former manufactured gas plant (MGP) site from the mid- 1800's to the early 1900's. The remediation of the site is now the responsibility of Con Edison under the NYS Voluntary Cleanup Program and we are charged with oversight for the property owner. Our responsibilities include assisting the client's decision to enter into an agreement with Con Edison to take over the cleanup responsibility through the new Brownfield Cleanup Program. To this end we have prepared schedules and cost estimates that integrate the cleanup with the development of the proposed high-rise. We have also assisted Con Edison in their development of a Remedial Action Work Plan for the site by preparing the soil and groundwater management plan, which includes provisions for handling, characterization and disposal of soil and groundwater that would be disturbed during construction, and to protect the health of construction workers and future occupants from potential exposure to contaminants during and after construction**.**

10 Chelsea, Manhattan, New York, NY – Senior Program Manager for environmental oversight for the construction of a 12-story residential building with ground floor retail space. The site was a former gasoline filling station, which is a NYSDEC Spill Site and a NYC E-Designated Site. Our primary responsibilities included assisting the developer in negotiating a remediation/development cost and work allocation agreement with the Responsible Party, coordinating the submittal of a Remedial Action Plan to NYSDEC and NYCDEP, required pursuant to the E designation, and obtaining a Notice to Proceed, and implementation of remedial investigation work required by the approved RAP (NYCDEP and NYSDEC). We are providing continuous consultation regarding the progress of the remediation as the project movers forward.

Clinton Green Towers, New York, NY – This 5 acre property included a former gasoline service station, warehouses and residential buildings, and an Amtrak track right-of-way. The services included environmental due diligence, support of the EIS/ULURP process, design and oversight of abatement and building demolition, preparation and implementation of remedial investigation and remedial action plans, preparation of remediation construction documents in coordination with site/civil, geotechnical, structural and mechanical design efforts, and oversight of construction of the remedial elements for two high-rise residential buildings and one four story commercial structure and theater.

Duane Street Condominium, New York, NY – Retained by counsel to develop a remediation strategy to remove mercury that was found in the floors and ceilings of condominium units in a 5-story residential building. Previous survey data and remediation reports were reviewed,

additional survey data was collected and a pilot remediation study was designed and implemented in two of the condominium units. Based on the results of the pilot studies, we determined the optimal remedial requirements for cleaning, encapsulation and ventilation, and are now in the process of final remedial design for the remainder of the building.

475 Ninth Avenue, New York, NY – Project Manager for the removal of 15 underground gasoline and fuel oil storage tanks uncovered during excavation for subsurface parking garage. Removal of the tanks and remediation of over 800 tons of contaminated soil and rock was conducted without impacting the building construction schedule.

P.S. 192, New York, NY – Conducted a remedial investigation to determine the extent of contamination that leaked from 2, 10,000-gallon fuel oil storage tanks. We prepared a conceptual design for remediation that included the use of innovative technology, high vacuum extraction to remove free product. The conceptual design was reviewed and accepted by the NYC School Construction Authority and the NYSDEC. We then prepared detailed design for construction, including complete plans and specifications to for UST removal, contaminated soil and groundwater handling and disposal, and installation of the remediation system.

High Line Park, New York, NY – Environmental project manager for the development of the neglected High Line overpass into the nation's first elevated park. The abandoned railroad structure is located on Manhattan's West Side and will run a mile and half through the city – from Greenwich Village to Midtown Manhattan, hovering 3-stories above New York City traffic. Provided remediation design and oversight for soil and groundwater beneath a section of the Highline Park between West 17th Street and West 18th Street.

Nippon Cargo, Jamaica, Queens, NY - Project Manager and Principal Investigator for Phase I and II environmental assessments for the construction of a 60,000 square foot hangar facility for Nippon Cargo at JFK International Airport. The Phase I and Phase II assessment included asbestos and lead paint surveys and identification and evaluation of the impacts of underground heating oil storage tanks and subsurface oil – water separators. The assessment was used by Nippon Cargo to negotiate closure and demolition of an older hangar facility. Demolition of the old hangar and remediation of areas of contamination due to the underground storage tanks was performed by the Port Authority under our oversight.

American Airlines – Project Manager and Principal Investigator for Phase I and II environmental assessments for an Eastern Airlines Hangar at JFK International Airport. The Phase II investigation of subsurface soil and groundwater addressed floor drains, underground waste oil and heating oil tanks, and an oil-water separator. Investigation and subsequent remediation of soil contamination was conducted in cooperation with the Port Authority of New York and New Jersey, and in compliance with the requirements of NYSDEC. Remediation of free product in groundwater was the responsibility of the Port Authority.

Schmid Labs, **Little Falls, NJ –** ISRA/ECRA cleanup of a medical product manufacturing facility. Prepared detailed plans and specifications and managed the investigation and remediation of 1.5 acres of petroleum naphtha NAPL, and groundwater contamination. Successfully expedited the cleanup to NJDEP approval in 9 months. The expedited remedial action included demolition of two former manufacturing buildings overlying the LNAPL, selective excavation and recycle of LNAPL-containing soils. NJDEP approved recommendation to allow groundwater to naturally attenuate, saving the client several million dollars.

TAREK KHOURI, CEM, PE
Project Manager

Environmental Risk Management
Environmental Engineering
Solid Waste Management
Phase I and Phase II Site Assessments

EDUCATION

University of Central Florida: M.S. Environmental Engineering
University of Central Florida: B.S. Chemistry

PROFESSIONAL CERTIFICATION

USACE Construction Quality Management
IATA/ DOT 24-Hour Air Transportation of Dangerous Goods
OSHA 40-Hour HAZWOPER
OSHA 8-Hour Supervisor Management & 10-Hour Construction Safety
NJDEP, Industrial Wastewater Treatment Systems Operator, N2 Level
New York State Certified Asbestos Management Planner
New York State Certified Asbestos Inspector

YEARS OF EXPERIENCE 11

SUMMARY OF QUALIFICATIONS

Mr. Khouri has more than 11 years experience in the construction and remediation industries. His experience includes hazardous waste remediation, waste treatment and waste management, groundwater treatment plants construction and O&M, PCB and TPH contaminated soil removals, underground and aboveground tank cleaning and removal, Lead and Asbestos abatement, and contaminated building cleanup and demolition. Mr. Khouri was also part of a team that was contracted by the Federal Government and the USPS to perform Anthrax sampling and investigation throughout the US. Mr. Khouri's areas of expertise include project management, construction management, project scheduling, project document control, project cost control, quality assurance, quality control, and health and safety.

RELEVANT EXPERIENCE

Javits Center Expansion ESA, New York, N.Y. – Project Environmental Engineer for the Phase I assessment for the planned expansion of the Javits Center.

New York Jets Stadium, New York, N.Y. – Project Environmental Engineer for the Brownfield's remediation on the site of the proposed, $1.2 billion Jets/Olympic Stadium on the west side of Manhattan. Requires close interaction with multiple entities including the Long Island RR, MTA, NYC Department of Sanitation, Amtrak, and adjacent property owners such as the Jacob Javits Center.

Javits Convention Center Expansion, Manhattan, N.Y. – $600 Millions Estimated Budget - As the project manager, I was responsible for environmental site assessment and site investigation for the planned expansion of the Javits Convention Center. The site investigation encompassed soil borings, soil gas and ground water monitoring wells installation and sampling. Duties included the preparation of the Phase I and Phase II investigative programs, management of site activities, coordination with clients, city and state agencies, and subcontractors for the timely execution of the work.

New York Jets Stadium, New York, N.Y. – $1.4 Billion Estimated Budget - Langan is serving as the geotechnical, site/civil and environmental consultant for the design and construction of the proposed Jets/Olympic Stadium on the west side of Manhattan. As the environmental project manager, I was responsible for the environmental program that included subsurface investigation for soil, groundwater, and soil gas for inclusion in the Final Environmental Impact Statement (FEIS). The work required close interaction with

multiple entities including the MTA, LIRR, NYCTA, NYCDOS, NYSDEC, Amtrak, and adjacent property owners such as the Jacob Javits Center.

MTA/LIRR East Side Access Project, New York, N.Y. – $6.1 Billions Estimated Budget - Served as the Lead Environmental Engineer for the East Side Access project in New York City. The job involves the construction of new tunnels system in densely developed areas of midtown Manhattan, new tunnels system construction beneath active Amtrak facilities, construction of new terminals, ventilation facilities, off street entrances, and yards development. Responsible for the environmental coordination and oversight for the entire project, providing technical support for the design engineering and construction teams, inspectors, and environmental sub consultants so that construction of the project proceeds in compliance with environmental commitments and regulatory requirements.

City University of New York, Tank Rehabilitation, Remediation and Closure Program, New York, N.Y. – Served as the project manager for the technical assessment of the Underground Storage Tank (UST) facilities at seven City University campuses. Tanks sizes ranged from 550-gallons to 50,000-gallons. Alternative types of tanks, materials, piping systems, pumping mechanisms and monitoring devices were evaluated, and reports detailing work required at each site including estimated cost of removal/installation and a detailed implementation schedule was delineated.

Phase I & Phase II Environmental Site Assessments - Completed numerous Phase I Environmental Site Assessments for various developers specializing in urban renewal. Many of these properties were located in New Jersey and New York and included warehouses, hotels, manufacturing facilities, stores, shops, residential buildings, gas stations and vacant land. Also managed Phase II subsurface soil, groundwater, and soil gas sampling and provided support for the client's NYS Brownfield Cleanup Program application. Efforts included client communications, state agencies coordination, project meeting, coordination and oversight of field investigation, and report completion.

LIRR/MTA East Side Access Project, New York, N.Y. – Served as the Lead Environmental Engineer for the ESA project in New York City, NY. The job involves the construction of new tunnels system in densely developed areas of midtown Manhattan, new tunnels system construction beneath active Amtrak facilities, construction of new terminals, ventilation facilities, off street entrances, and yards development. The job is to be completed in 2014. Also managed the Environmental Department with primary responsibility being the environmental coordination and oversight for the entire project, providing technical support for the design engineering and construction teams, inspectors, and environmental sub consultants so that construction of the project proceeds in compliance with environmental commitments and requirements.

LCP Chemicals Inc. Superfund Site, Linden, N.J. – Served as the Project Manager for the interim removal action program for mercury clean up and removal, petroleum contaminated soil excavation, storage tanks, steel structure demolition, asbestos cleanup, and laboratory packs. The job also included a drum landfill investigation, which was done in level B PPE. Awarded the 74th Annual Governor's Occupational Safety & Health Award, Citation of Merit, State of New Jersey, 2002.

Circuitron Corporation Superfund Site, Ground Water Treatment System, East Farmingdale, N.Y. – Served as the Project Engineer providing technical direction for on-site staff, and guidance in hazardous waste/material management and performing technical review of reports/contract deliverables. Coordinated with United States Army Corp. of Engineers (USACE) representatives for the day-to-day operations and quality control matters.

Rhodia Inc, New Brunswick, N.J. – Served as the Project Manager for the remedial action performed at the creek banks of Mile Run Brook. The job involved the excavation of soil contaminated with TPH, PCB and Coumarin at both slopes of the creek banks, followed by the installation of absorbent pads, geotextile fabric, and biologs along the excavation area.

Normandy Landfill Treatment Project, Beirut, Lebanon - Prepared Quality Assurance Project Plans for the remediation work. Supervised laboratory pre-qualification, equipment purchase, fieldwork, chemists training and laboratory analysis.

FAA Technical Center, Area D Jet fuel Farm Ground Water Treatment System, Atlantic City, N.J. – - Served as the Quality Control Manager. Supervised laboratory prequalification, fieldwork, and laboratory analysis. Evaluated and optimized the operation of the groundwater treatment system, CEM, and SVE bioremediation system, and prepared quarterly reports deliverables to the USEPA and the USACE. Also performed quality assurance audit and review for the pre-excavation sampling results performed by FAA subcontractors, using field test kits for PCB and TPH.

FAA Technical Center, PCB Soil Remediation at Area 20A, Atlantic City, N.J. – Served as a Laboratory Manager for the PCB Contaminated Soils Removal Project at FAA Technical Center. Responsibilities included the development of sampling and analysis plans, establishment of project data quality objectives, evaluation and selection of laboratories for testing programs, data quality assessment, and preparation of test reports.

Solidere, Beirut, Lebanon - Managed the analytical program of a 60 acres' landfill reclamation project, including the setting-up of a laboratory, supervising 4 chemists and 3 technicians, collection and analysis of soil and water samples, assessment of results, and assessment and development of remedial options. Additionally, corresponded with management, owners, developers, and government representatives in relation to the above.

ADDITIONAL CERTIFICATION AND PROFESSIONAL AWARDS

State of New Jersey, Governor's Occupational Safety & Health Award, Citation of Merit, 2002.
Project Management, 35-Hour, Project Management Institute, 2001
California State University, 45-Hour, Utility Management, Sacramento, 2001.
Rutgers University, Instrumentation & Controls and Variable Frequency Drive, College of Engineering, 2001.
Rutgers University, 45-Hour, Industrial Wastewater Treatment Operators, College of Engineering, 2001.
Fall Management, Trenching and Excavation Safety, St. Paul's Companies, 2000.
Dredging Regulations, Material Management & Benthic Evaluation, DOTS and USACE, 2000.
Registered Professional Engineer, Lebanon, License # 4097.
Registered Professional Chemist, Lebanon, License # 286.
Sworn Translator (English, French and Arabic), 1991 - 1996.
First Aid and CPR, 1999, 2000, 2001 and 2002.

PUBLICATIONS

The Effect of Organic Substrates on Enhanced Biological Phosphorus Removal in Continuous Culture and Batch Experiments, *Advances in Environmental Research*, 1998.

Comparison of Enhanced Biological Phosphorus Removal Populations under Ten Different Environmental Conditions, *IAWQ 19th Biennial Conference*, Vancouver, Canada, June 1998.

Observations From Steady State and Batch Experiments Concerning the Effect on Enhanced Biological Phosphorus Removal of Volatile Fatty Acids and Glucose, *International Conference on Microorganisms in Activated Sludge and Biofilm Processes*, Berkeley, California, July 1997.

Single Stage Anaerobic and Aerobic Sequencing Biotransformation and Mineralization of Tetrachloroethylene (PCE) for the Remediation of Contaminated Soils and Groundwater, *Emerging Technologies in Hazardous Waste Management VIII*, Birmingham, Alabama, September 1996.

DONALD C. ANNÉ
SENIOR CHEMIST

EDUCATION: M.S., Chemical Oceanography, Florida Institute of Technology, 1981
B.A., Earth Sciences, Millersville University of Pennsylvania, 1975

SPECIAL TRAINING:
Certified 40-Hour OSHA Health and Safety
Certified 8-Hour OSHA Supervisory Course
Ground Water Geochemistry (NWWA)
Ground Water Pollution and Hydrology (Princeton Associates)
Quality Assurance Programs for Environmental Monitoring Data (Stat-A-Matrix)

PROFESSIONAL AFFILIATIONS: American Chemical Society (AFS), 1979-Present

EXPERIENCE SUMMARY:

Mr. Anné has more than 27 years of environmental chemistry experience specializing in data validation, environmental sampling, analytical methodologies, petroleum fingerprinting, laboratory audits, field sampling audits, and preparing Quality Assurance Project Plans and Quality Assurance Manuals. Mr. Anné's experience includes analytical laboratory work with gas chromatography, atomic absorption, infrared spectrometry and wet chemistry methods.

PROJECT EXPERIENCE:

Quality Assurance/Quality Control of Chemical Data

Mr. Anné has more than 20 years experience as a data validator and quality assurance officer. Mr. Anné has validated data for most EPA Regions and under several independent state programs, including the NYSDEC. He has performed laboratory and field audits as well as written Quality Assurance Project Plans. Mr. Anné has written, reviewed, and initiated laboratory Quality Assurance Manuals for laboratories to maintain their regulatory compliance. Typical project experience includes:

- Senior Chemist responsible for data validation. Reviewed chemical data for several projects under the New Jersey ISRA regulations. The clients included industry and utilities.

- Supervising Environmental Scientist responsible for data validation. Reviewed chemical laboratory data for adherence to QA/QC protocols for several key projects, including National Priorities List sites and RCRA Corrective Actions located in EPA Regions I, II, III, IV, V, and IX. Validated analytical data, outlined problems and actions to be taken, and qualified all affected data. Consulted with project managers on data usability, and recommended corrective actions to support project goals. Responded to comments made by regulators regarding data quality.

- Supervising Environmental Scientist recognized by the New York State Department of Environmental Conservation (NYSDEC) to perform third party data validation. Attended NYSDEC workshop on data validation as part of the requirements set forth by NYSDEC. Performed data validation in support of NYSDEC STARS and ASP programs as well as data in support of the NYSDEC Part 360 Regulations for landfills. Validated data for an Albany area municipal landfill.

- Supervising Environmental Scientist responsible for developing and preparing Quality Assurance Project Plans (QAPPs) for several state and federal Superfund sites and federal RCRA corrective action sites. Negotiated with regulators for the acceptance of the QAPPs. The sites were located throughout the eastern United States.

- Environmental Chemist responsible for developing a laboratory QA/QC program which fulfilled requirements of the EPA and agencies from the States of Texas and Louisiana. Implemented and managed the program throughout DOE's SPR Environmental laboratories. Received verbal commendations from EPA and the Texas Water commission on the QA/QC Program.

Environmental Chemistry

Mr. Anné is experienced in sampling soil, water, air, and wastes in accordance with federal and state guidelines. He has performed field sampling audits and prepared sampling plans for numerous projects in accordance with applicable programmatic requirements. Mr. Anné is familiar with the geochemical aspects of fate and transport of contaminants. Mr. Anné's typical project experience includes:

- Data manager for the Pennwalt Corporation's RCRA Corrective Action RFI Phase I program. The project included quantifying and characterizing soil contamination and hydrogeologic flow systems of 12 SWMUs at a flourochemicals plant in Thorofare, New Jersey. Validated and prepared QA/QC reports for data generated during the project. Qualified all data in preparation of the final report. Work was performed under the direction of NJDEP.

- Project Chemist in charge of field sampling activities, including coordinating and scheduling all subcontracted laboratory work for more than 25 sites in Connecticut. Trained field teams in sampling techniques for soil, groundwater, and surface water; chain of custody requirements; sampling QA/QC protocols; and analytical requirements. Work was performed under the scrutiny of ConnDEP.

- Field Team Leader for a major hazardous waste drum excavation project. Supervised all field activities including site safety; excavation; removal, sampling, and over packing of drums; staging and sampling of contaminated soil; and preparation of samples. Coordinated excavation and laboratory subcontractors. Work was performed under the scrutiny of ConnDEP.

- Created an environmental monitoring program for the Bryan Mound site of DOE's Strategic Petroleum Reserve for testing ground water and surface water. Developed sampling protocols, frequency of sampling, and lists of target analytes. This program was designed to provide baseline data for pre-spill conditions in the event of a release. The site was under scrutiny by EPA Region V and the Texas Water commission.

- Project Chemist responsible for developing analytical QA/QC program that included sampling and chemical analyses of surface water, groundwater, soil, and sediment matrices as part of a Remedial Investigation/Feasibility Study (RI/FS). The RI/FS involved more than 25 sites throughout the State of Connecticut. Work was under the guidance of ConnDEP.

Analytical Chemistry

Mr. Anné has experience working in both fixed-base and mobile laboratories. His experience includes the use of gas chromatography, atomic absorption spectrometers, infrared spectrometers, and numerous wet chemistry and preparation equipment methods. He has served in the laboratory as an analyst, laboratory advisor, and QA officer. He has interfaced with regulators in the area of analytical chemistry and has experience in petroleum fingerprinting techniques and methods. Typical projects include:

- Performed bench scale experiments for St. Lawrence Zinc in order to obtain the optimum level of Phlotec necessary to treat discharged water to resolve an N.O.V. for the SPDES outfall. The optimum level of Phlotec would precipitate enough dissolved zinc for the water to meet the discharge requirement. Also performed routine analyses of samples after implementing the treatment, to insure that the proper concentration was being used.

- Environmental Chemist in charge of project to design updates for the DOE's laboratories at its SPR facilities. Evaluated IR and FT-IR instrumentation and personal computers to link with existing and future instrumentation. Wrote procedures for the acceptance of an alternative oil & grease method for NPDES permit

monitoring by EPA Region V. Coordinated all site activities necessary for implementing upgrades.

- Environmental Chemist in charge of replacing obsolete total organic carbon (TOC) analyzers for the SPR laboratories. Evaluated state-of-the-art TOC analyzers and recommended replacement TOC analyzer. Negotiated with supplier and wrote technical specification for the bid process required by DOE. Supervised installation and set-up of all new TOC analyzers.

- Analytical Chemist for Berkley Products Company responsible for product development. Analyzed competitor's products and formulated new coatings with equal or better quality. Responsible for solvent operations which included managing the waste solvent recovery operations, solvent formulation, and manufacturing QA/QC. Worked with sales and manufacturing staff to address and resolve client complaints. Received two cash bonuses for suggestions on the manufacture of products which saved the company money.

- Analytical Chemist for the mobile laboratory responsible for sample preparation in support of several projects for a range of clients located in three EPA regions and in conjunction with several state agencies. Extracted, concentrated, and prepared water and soil samples for analyses by GC/FIND, GC/ECD, GC/PID, and GC/MS. Samples were prepared for PCB, pesticide, polynuclear aromatic hydrocarbon, and petroleum hydrocarbon analyses.

EMPLOYMENT:

2005- present, Alpha Geoscience
1998-2005, Alpha Environmental Consultants, Inc.
1990-1998, McLaren/Hart
1986-1990, Fred C. Hart Associates
1985-1986, Boeing Petroleum Services
1982-1985, Petroleum Operations and Support Services
1981-1982, Dravo Utility Constructors
1979-1981, Florida Institute of Technology
1975-1979, Berkley Products Company

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SECTION 3

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OBJECTIVES FOR MEASUREMENT OF DATA

3.1 INTRODUCTION

The quality assurance and quality control objectives for all measurement data include precision, accuracy, representativeness, completeness, and comparability. These objectives are defined in following subsections. They are formulated to meet the requirements of the USEPA SW-846. The analytical methods and their Contract Required Quantitation Limits (CRQLs) are given in Section 7.

3.2 PRECISION

Precision is an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Specifically, it is a quantitative measurement of the variability of a group of measurements compared to their average value (USEPA, 1987). Precision is usually stated in terms of standard deviation, but other estimates such as the coefficient of variation (relative standard deviation), range (maximum value minus minimum value), relative range, and relative percent difference (RPD) are common.

For this project, field sampling precision will be determined by analyzing coded duplicate samples (labeled so that the laboratory does not recognize them as duplicates) for the same parameters, and then, during data validation (Section 8), calculating the RPD for duplicate sample results.

Analytical precision will be determined by the laboratory by calculating the RPD for the results of the analysis of internal QC duplicates and matrix spike duplicates. The formula for calculating RPD is as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where:

RPD	=	Relative Percent Difference.
V1, V2	=	The two values to be compared.
$\|V1 - V2\|$	=	The absolute value of the difference between the two values.
$(V1 + V2)/2$	=	The average of the two values.

The data quality objectives for analytical precision, calculated as the RPD between duplicate analyses, are presented in Tables 3.1 and 3.2.

TABLE 3.1
QUALITY CONTROL LIMITS FOR WATER SAMPLES

		Laboratory Accuracy and Precision					
Analytical Parameters	**Analytical Method (a)**	**Matrix Spike (MS) Compounds**	**MS/MSD (b) % Recovery**	**MS/MSD RPD l**	**LCS (d) % Recovery**	**Surrogate Compounds**	**Surrogate % Recovery**
VOCs (e)	8260	1,1-Dichloroethane	61-145	14	NA	Toluene-d8	88-110
		Trichloroethene	71-120	14	NA	Bromofluorobenzene	86-115
		Benzene	76-127	11	NA	1,2-Dichloroethane-d4	76-114
		Toluene	76-125	13	NA		
		Chlorobenzene	75-130	13	NA		
SVOCs (f)	8270	Phenol	12-110	42	NA	Nitrobenzene-d5	35-114
		2-Chlorophenol	27-123	40	NA	2-Fluorobiphenyl	43-116
		1,4-Dichlorobenzene	36-97	28	NA	Terphenyl-d14	33-141
		N-Nitroso-di-n-propylamine	41-116	38	NA	Phenol-d5	10-110
		1,2,4-Trichlorobenzene	39-98	28	NA	2-Fluorophenol	21-110
		4-Chloro-3-methylphenol	23-97	42	NA	2,4,6-Tribromophenol	10-123
		Acenaphthene	46-118	31	NA	2-Chlorophenol-d4	33-110 (g)
		4-Nitrophenol	10-80	50	NA	1,2-Dichlorobenzene-d4	16-110 (g)
		2,4-Dinitrotoluene	24-96	38	NA		
		Pentachlorophenol	9-103	50	NA		
		Pyrene	26-127	31	NA		
Inorganics (i)	6010,7470/7471, 7841,9010, OIA-1677	Inorganic Analyte	75-125 (j)	20 (k)	80-120	NA	NA

(a) Analytical Methods: USEPA SW-846, 3rd edition, Revision 1, November 1990; any subsequent revisions shall supersede this information
(b) Matrix Spike/Matrix Spike Duplicate
(c) Relative Percent Difference
(d) Laboratory Control Sample
(e) Target Compound List Volatile Organic Compounds plus library search
(f) Target Compound List Semivolatile Organic Compounds plus library search
(g) Limits are advisory only
(h) Polychlorinated Biphenyls
(i) Target Analyte List Inorganics (metals)
(j) Matrix spike only
(k) Laboratory duplicate RPD
NA - Not Applicable

TABLE 3.2
QUALITY CONTROL LIMITS FOR SOIL SAMPLES

		Laboratory Accuracy and Precision					
Analytical Parameter	**Analytical Method (a)**	**Matrix Spike (MS) Compounds**	**MS/MSD (b) % Recovery**	**MS/MSD RPD (c)**	**LCS (d) % Recovery**	**Surrogate Compounds**	**Surrogate % Recovery**
VOCs (e)	8260	1,1-Dichloroethane	59-172	22	NA	Toluene-d8	84-138
		Trichloroethene	62-137	24	NA	Bromofluorobenzene	59-113
		Benzene	66-142	21	NA	1,2-Dichloroethane-d4	70-121
		Toluene	59-139	21	NA		
		Chlorobenzene	60-133	21	NA		
SVOCs (f)	8270	Phenol	26-90	35	NA	Nitrobenzene-d5	23-120
		2-Chlorophenol	25-102	50	NA	2-Fluorobiphenyl	30-115
		1,4-Dichlorobenzene	28-104	27	NA	Terphenyl-d14	18-137
		N-Nitroso-di-n-propylamine	41-126	38	NA	Phenol-d5	24-113
		1,2,4-Trichlorobenzene	38-107	23	NA	2-Fluorophenol	25-121
		4-Chloro-3-methylphenol	26-103	33	NA	2,4,6-Tribromophenol	19-122
		Acenaphthene	31-137	19	NA	2-Chlorophenol-d4	20-130 (g)
		4-Nitrophenol	11-114	50	NA	1,2-Dichlorobenzene-d4	20-130 (g)
		2,4-Dinitrotoluene	28-89	47	NA		
		Pentachlorophenol	17-109	47	NA		
		Pyrene	35-142	36	NA		
Inorganics (i)	6010, 7470/7471, 7841, 9010	Inorganic Analyte	75-125 (j)	20 (k)	80-120	NA	NA

(a) Analytical Methods: USEPA SW-846, 3rd edition, Revision 1, November 1990, any subsequent revisions shall supersede this information
(b) Matrix Spike/Matrix Spike Duplicate
(c) Relative Percent Difference
(d) Laboratory Control Sample
(e) Target Compound List Volatile Organic Compounds
(f) Target Compound List Semivolatile Organic Compounds
(g) Limits are advisory only
(h) Polychlorinated Biphenyls
(i) Target Analyte List Inorganics (metals and cyanide)
(j) Matrix spike only
(k) Laboratory duplicate RPD
NA - Not Applicable

3.3 ACCURACY

Accuracy is a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern (Taylor, 1987), or the difference between a measured value and the true or accepted reference value. The accuracy of an analytical procedure is best determined by the analysis of a sample containing a known quantity of material, and is expressed as the percent of the known quantity which is recovered or measured. The recovery of a given analyte is dependent upon the sample matrix, method of analysis, and the specific compound or element being determined. The concentration of the analyte relative to the detection limit of the analytical method is also a major factor in determining the accuracy of the measurement. Concentrations of analytes which are close to the detection limits are less accurate because they are more affected by such factors as instrument "noise". Higher concentrations will not be as affected by instrument noise or other variables and thus will be more accurate.

Sampling accuracy may be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy is typically assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks. Additionally, initial and continuing calibrations must be performed and accomplished within the established method control limits to define the instrument accuracy before analytical accuracy can be determined for any sample set.

Accuracy is normally measured as the percent recovery (%R) of a known amount of analyte, called a spike, added to a sample (matrix spike) or to a blank (blank spike). The %R is calculated as follows:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where:

%R = Percent recovery.

SSR = Spike sample result: concentration of analyte obtained by analyzing the sample with the spike added.

SR = Sample result: the background value, i.e., the concentration of the analyte obtained by analyzing the sample.

SA = Spiked analyte: concentration of the analyte spike added to the sample.

The acceptance limits for accuracy for each parameter are presented in Tables 3.1 and 3.2.

3.4 REPRESENTATIVENESS

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter which is most concerned with the proper design of the sampling program (USEPA, 1987). Samples must be representative of the environmental media being sampled. Selection of sample locations and sampling procedures will incorporate consideration of obtaining the most representative sample possible.

Field and laboratory procedures will be performed in such a manner as to ensure, to the degree that is technically possible, that the data derived represents the in-place quality of the material sampled. Every effort will be made to ensure chemical compounds will not be introduced into the sample via sample containers, handling, and analysis. Decontamination of sampling devices and digging equipment will be performed between samples as outlined in the Soil Management Plan. Analysis of field blanks, trip blanks, and method blanks will also be performed to monitor for potential sample contamination from field and laboratory procedures.

The assessment of representativeness also must consider the degree of heterogeneity in the material from which the samples are collected. Sampling heterogeneity will be evaluated during data validation through the analysis of coded field duplicate samples. The analytical laboratory will also follow acceptable procedures to assure the samples are adequately homogenized prior to taking aliquots for analysis, so the reported results are representative of the sample received.

Chain-of-custody procedures will be followed to document that contamination of samples has not occurred during container preparation, shipment, and sampling. Details of blank, duplicate and Chain-of-custody procedures are presented in Sections 4 and 5.

3.5 COMPLETENESS

Completeness is defined as the percentage of measurements made which are judged to be valid (USEPA, 1987). The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested. Completeness is defined as follows for all sample measurements:

$$\%C = \frac{V}{T} \times 100$$

where:

%C = Percent completeness.

V = Number of measurements judged valid.

T = Total number of measurements.

3.6 COMPARABILITY

Comparability expresses the degree of confidence with which one data set can be compared to another (USEPA, 1987). The comparability of all data collected for this project will be ensured by:

- Using identified standard methods for both sampling and analysis phases of this project;
- Requiring traceability of all analytical standards and/or source materials to the U.S. Environmental Protection Agency (USEPA) or National Institute of Standards and Technology (NIST);
- Requiring that all calibrations be verified with an independently prepared standard from a source other than that used for calibration (if applicable);
- Using standard reporting units and reporting formats including the reporting of QC data;
- Performing a complete data validation on a representative fraction of the analytical results, including the use of data qualifiers in all cases where appropriate; and
- Requiring that all validation qualifiers be used any time an analytical result is used for any purpose.

These steps will ensure all future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and conclusions.

SECTION 4

SAMPLING PROGRAM

4.1 INTRODUCTION

The sampling program will provide data concerning the presence, nature and extent of contamination of soil, soil vapor and groundwater, if any. This section presents sample container preparation procedures, sample preservation procedures, sample holding times, and field QC sample requirements. Sample locations, and the number of environmental and QC samples to be taken will be collected in accordance with these procedures and the requirements of the SMP.

4.2 SAMPLE CONTAINER PREPARATION AND SAMPLE PRESERVATION

Samples should be segregated into Sample Delivery Groups as defined in the July 2005 NYSDEC Analytical Services Protocol (ASP). Sample containers and sample preservation should also be as defined in the ASP.

Sample containers will be properly washed and decontaminated prior to their use by either the analytical laboratory or the container vendor to the specifications required by the USEPA. Copies of the sample container QC analyses will be provided by the laboratory for each container lot used to obtain samples. The containers will be tagged, the appropriate preservatives will be added. The types of containers are shown in Tables 4.1 and 4.2.

Samples shall be preserved according to the preservation techniques given in Tables 4.1 and 4.2. Preservatives will be added to the sample bottles by the laboratory prior to their shipment in sufficient quantities to ensure that proper sample pH is met. Following sample collection, the sample bottles should be placed on ice in the shipping cooler, cooled to 4^{0}C with ice or "blue ice", and delivered to the laboratory within 48 hours of collection. Chain-of-custody procedures are described in Section 7.

4.3 SAMPLE HOLDING TIMES

The sample holding times for organic and inorganic parameters are given in Tables 4.1 and 4.2 and must be in accordance with the NYSDEC ASP requirements. The NYSDEC ASP holding times must be strictly adhered to by the laboratory. Any holding time exceedances must be reported to BTMDP.

4.4 FIELD QC SAMPLES

To assess field sampling and decontamination performance, two types of "blanks" will be collected and submitted to the laboratory for analyses. In addition, the precision of field sampling procedures will be assessed by collecting coded field duplicates and matrix spike/matrix spike duplicates (MS/MSDs). The blanks will include:

The duplicates will consist of:

a. Coded Field Duplicate - To determine the representativeness of the sampling methods, coded field duplicates will be collected at a frequency of one duplicate sample per 20 field samples. The samples are termed "coded" because they will be labeled in such a manner that the laboratory will not be able to determine that they are a duplicate sample. This will eliminate any possible bias that could arise.

b. Matrix Spike/Matrix Spike Duplicate (MS/MSD) - MS/MSD samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes. The percent recoveries and RPDs are given in Tables 3.1 and 3.2.

c. Trip Blank – The Trip Blank will be prepared before the sample containers are sent to the laboratory. The trip blank will consist of a 40 ml volatile organic analysis vial containing distilled, deionized water, which accompanies the other water sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of water samples for Target Compound List (TCL) volatiles analysis. The trip blank will be analyzed for TCL volatile organic compounds to assess any contamination from sampling and transport, and internal laboratory procedures.

4.5 SAMPLING EQUIPMENT DECONTAMINATION

The following equipment and procedures will be used to decontaminate sampling equipment:

Suggested Materials:

- Potable water;
- Phosphate-free detergent;
- Acetone;
- Dilute nitric acid (10% solution, except for carbon steel split-spoon samplers 1% solution);
- Distilled water;
- Aluminum foil;
- Plastic/polyethylene sheeting;
- Plastic buckets and brushes; and
- Personal protective equipment in accordance with the HASP

Procedures:

Prior to sampling, all non-dedicated sampling equipment (bowls, spoons, submersible pumps, interface probes, water quality meter, etc.) will be either steam cleaned or washed using the following procedures:

- Potable water and a phosphate-free detergent wash;
- Dilute nitric acid rinse (10% for non-metallic equipment, 1% for split-spoon samplers);
- Potable water rinse;
- Acetone rinse;

- Potable water rinse;
- Final de-ionized water rinse;
- Air dry;
- Decontamination may take place at the sampling location as long as all liquids are contained in pails, buckets, etc;
- Between rinses, equipment will be placed on polyethylene sheets or aluminum foil if necessary. At no time will washed equipment be placed directly on the ground; and
- Equipment will be wrapped in polyethylene plastic or aluminum foil for storage or transportation from the designated decontamination area to the sampling location.

4.6 ANALYTICAL METHODS/QUALITY ASSURANCE SUMMARY TABLE

For each further operation that occurs in accordance with the SMP, an Analytical Methods/Quality Assurance Summary Table will be prepared. The table will include the following:

- Matrix type;
- Number or frequency of samples to be collected per matrix;
- Number of field and trip blanks per matrix;
- Analytical parameters to be measured per matrix;
- Analytical methods to be used per matrix;
- The number and type of matrix spike and matrix spike duplicate samples to be collected;
- The number and type of duplicate samples to be collected;
- The number and type of split samples to be collected;
- The number and type of performance evaluation samples to be analyzed;
- Sample preservation to be used per analytical method and sample matrix; and
- Sample holding times to be used per analytical method and sample matrix.

4.7 SAMPLE STORAGE FIELD PROTOCOL

The following describes how soil and groundwater samples should be stored in the field:

Soil Samples:

- Samples for VOC analyses will be collected immediately, placed into appropriate containers, and compacted to minimize head space and pore space. The remaining sample volume will be homogenized, and placed in appropriate containers for the other analyses.

- The sample containers will be labeled, placed in a laboratory-supplied cooler and packed on ice (to maintain a temperature of 4°C). The coolers will be couriered or shipped overnight to the laboratory for analysis.
- Chain-of-custody procedures will be followed as outlined in this QAPP.

Groundwater Samples:

- Sample containers for VOCs and gas sensitive components should be sampled first. Sample containers for the other analytes will follow. If sampling using the low-flow method, sample containers for VOCs will be filled last.
- If turbidity is a problem in the samples, extra water can be collected for metals and placed in unpreserved bottles provided by the laboratory. The turbidity can then be allowed to settle, and the water decanted into a pre-preserved bottle provided by the laboratory for shipment to and analysis by the laboratory.
- The sample containers will be labeled, placed in a laboratory-supplied cooler and packed on ice (to maintain a temperature of 4o C). The cooler will be shipped overnight or delivered to the laboratory for analysis.
- Chain-of-custody procedures will be followed as outlined in this QAPP.

TABLE 4.1

WATER SAMPLE CONTAINERIZATION, PRESERVATION, AND HOLDING TIMES

Analysis	Bottle Type	Preservation [a]	Holding Time [b]
Volatile Organic Compounds (VOCs)	2-40 mL glass vial w/ Teflon septum	Cool to 4°C	10 days
Semivolatile Organics Compounds (SVOCs)	1000 mL glass w/ Teflon lined cap	Cool to 4°C	5 days*
Metals	1000 mL plastic bottle	Nitric Acid to pH < 2 Cool to 4°C	6 months, except mercury (26 days)

(a) All samples to be preserved in ice during collection and transport. The temperature of the samples when received by the laboratory should be 4° C ± 2 degrees.

(b) Days from validated time of sample receipt (VTSR).

* Continuous liquid-liquid extraction is the required extraction for water samples for SVOCs. Continuous liquid-liquid extraction and concentration of water samples for SVOCs analysis completed within 7 days of VTSR. Extracts of water samples must be analyzed within 40 days of extraction.

TABLE 4.2

SOIL SAMPLE CONTAINERIZATION AND HOLDING TIMES

Analysis	Bottle Type	Preservation [a]	Holding Time [b]
Volatile Organic Compounds (VOCs)	Wide-mouth glass w/ teflon lined cap	Cool to 4°C	10 days
Other Organic Compounds [c]	Wide-mouth glass w/ teflon lined cap	Cool to 4°C	10 days*
Metals	Wide-mouth plastic or glass	Cool to 4°C	6 months, except mercury (26 days)

(a) All samples to be preserved in ice during collection and transport.
(b) Days from date of sample collection.
(c) Semivolatile organic compounds or PCBs.
* Sohxlet or sonication procedures for extraction and concentration of soil/waste samples for SVOCs must be completed within 10 days of VTSR. Extracts of soil samples must be analyzed within 40 days of extraction.

SECTION 5

SAMPLE TRACKING AND CUSTODY

5.1 INTRODUCTION

This section presents sample custody procedures for both the field and laboratory. Implementation of proper custody procedures for samples generated in the field is the responsibility of field personnel. Both laboratory and field personnel involved in the Chain-of-custody (COC) and transfer of samples will be trained as to the purpose and procedures prior to implementation.

Evidence of sample traceability and integrity is provided by COC procedures. These procedures document the sample traceability from the selection and preparation of the sample containers by the laboratory, to sample collection, to sample shipment, to laboratory receipt and analysis. The sample custody flowchart is shown in Figure 5.1. A sample is considered to be in a person's custody if the sample is:

- In a person's possession;
- Maintained in view after possession is accepted and documented;
- Locked and tagged with Custody Seals so that no one can tamper with it after having been in physical custody; or
- In a secured area which is restricted to authorized personnel.

5.2 FIELD SAMPLE CUSTODY

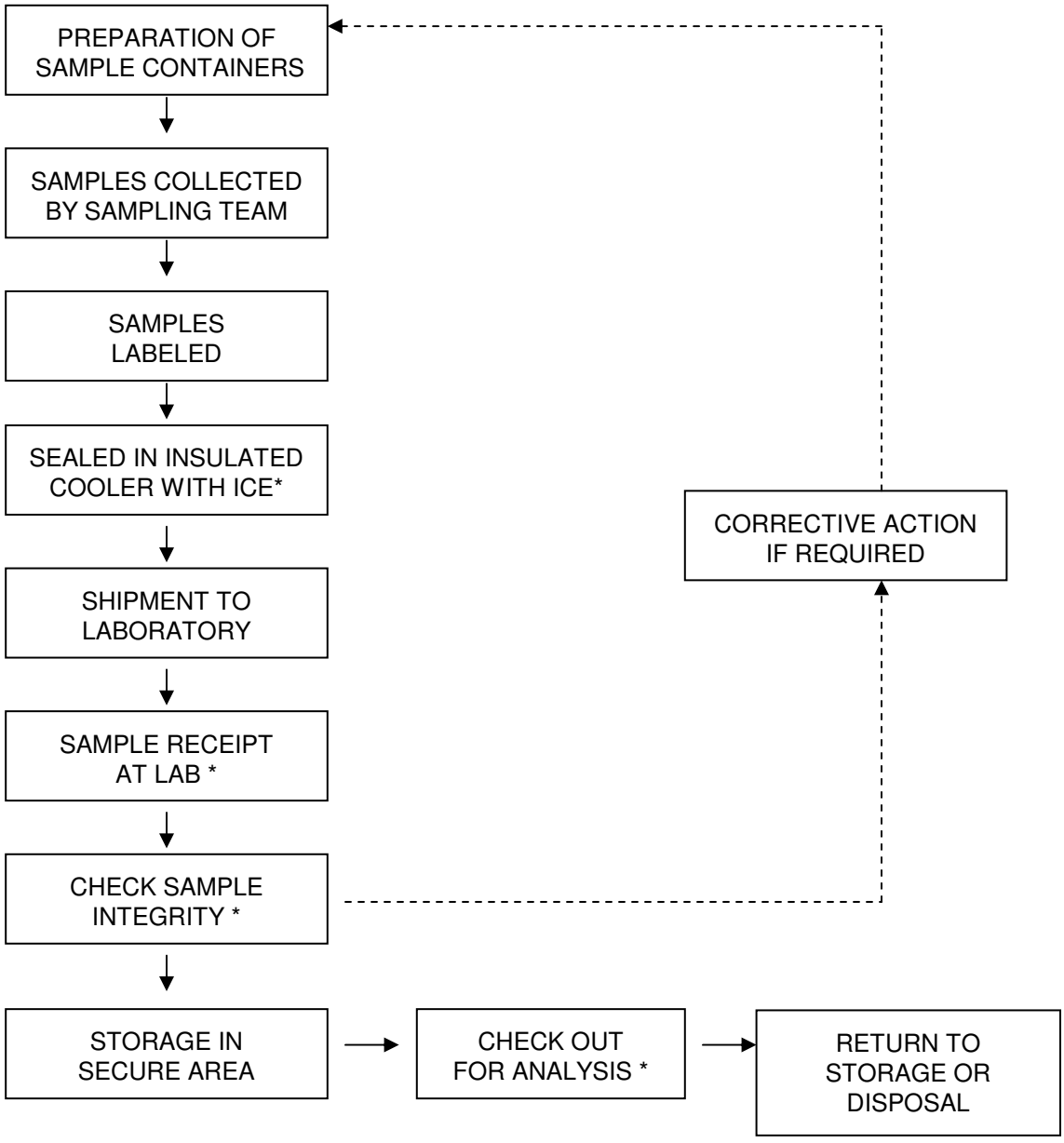
A COC record (Figure 5.2 or similar) accompanies the sample containers from selection and preparation at the laboratory, during shipment to the field for sample containment and preservation, and during return to the laboratory. Triplicate copies of the COC must be completed for each sample set collected.

The COC lists the field personnel responsible for taking samples, the project name and number, the name of the analytical laboratory to which the samples are sent, and the method of sample shipment. The COC also lists a unique description of every sample bottle in the set. If samples are split and sent to different laboratories, a copy of the COC record will be sent with each sample.

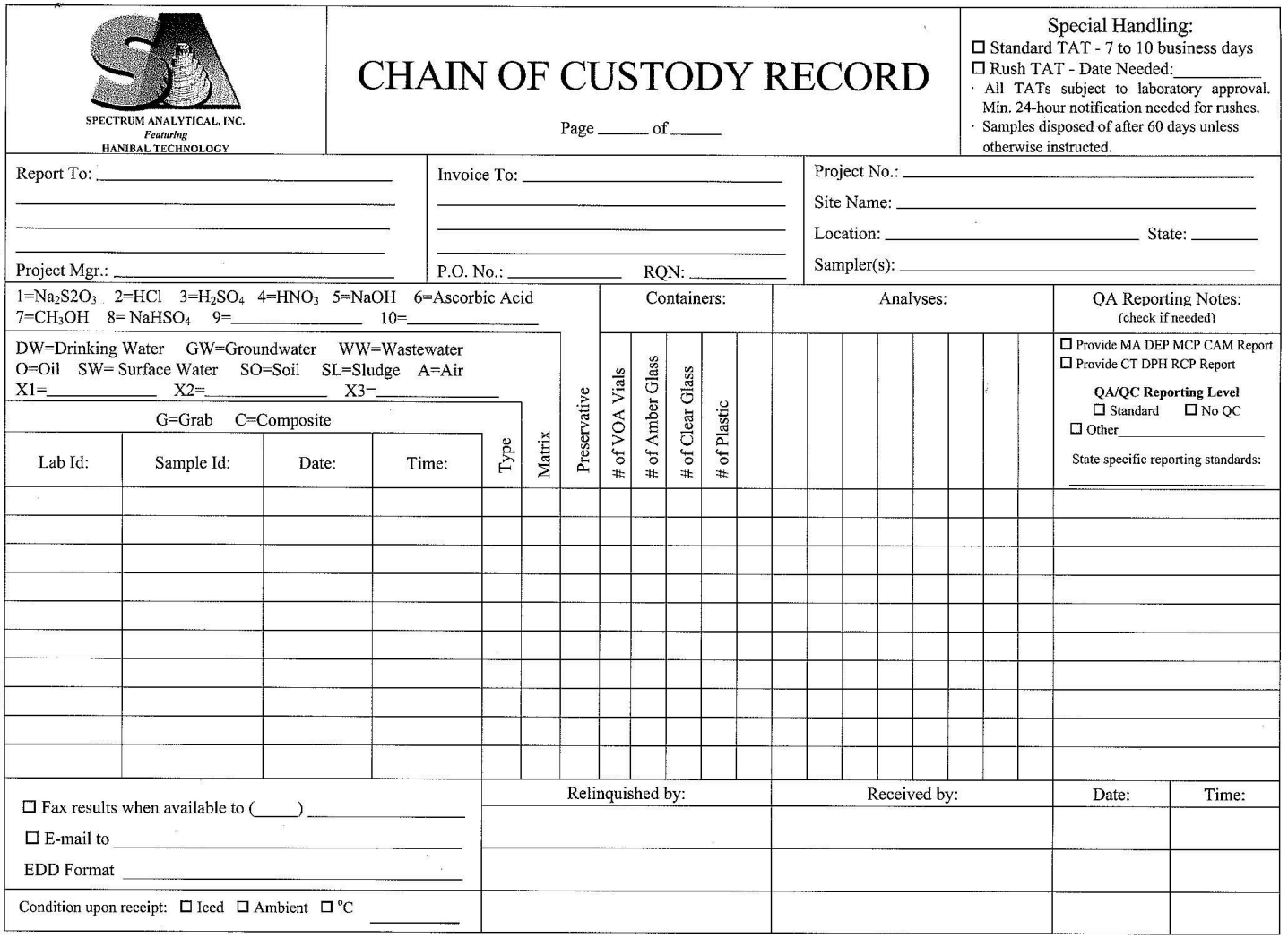
The REMARKS space on the COC is used to indicate if the sample is a matrix spike, matrix spike duplicate, or any other sample information for the laboratory. Since they are not specific to any one sample point, trip and field blanks are indicated on separate rows. Once all bottles are properly accounted for on the form, a sampler will write his or her signature and the date and time on the first RELINQUISHED BY space. The sampler will also write the method of shipment, the shipping cooler identification number, and the

FIGURE 5.1

SAMPLE CUSTODY



* REQUIRES SIGN-OFF ON CHAIN-OF-CUSTODY FORM



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CHAIN OF CUSTODY RECORD

Page _____ of _____

Special Handling:
- ☐ Standard TAT - 7 to 10 business days
- ☐ Rush TAT - Date Needed: _____
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

Report To: _____

Project Mgr.: _____

Invoice To: _____

P.O. No.: _____ RQN: _____

Project No.: _____

Site Name: _____

Location: _____ State: _____

Sampler(s): _____

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid
7=CH_3OH 8= $NaHSO_4$ 9=_____ 10=_____

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Preservative	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic		Analyses:								QA Reporting Notes: (check if needed)
																				☐ Provide MA DEP MCP CAM Report ☐ Provide CT DPH RCP Report **QA/QC Reporting Level** ☐ Standard ☐ No QC ☐ Other_____ State specific reporting standards:

☐ Fax results when available to (____) _____

☐ E-mail to _____

EDD Format _____

Condition upon receipt: ☐ Iced ☐ Ambient ☐ °C _____

Relinquished by:	Received by:	Date:	Time:

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Figure 5.2 Chain-of-Custody Record

shipper airbill number on the top of the COC. Mistakes will be crossed out with a single line in ink and initialed by the author.

One copy of the COC is retained by sampling personnel (notations identifying blind duplicate samples will be added to this copy of the COC but not the others that will go to the laboratory) and the other two copies are put into a sealable plastic bag and taped inside the lid of the shipping cooler. The cooler lid is closed, custody seals provided by the laboratory are affixed to the latch and across the back and front lids of the cooler, and the person relinquishing the samples signs their name across the seal. The seal is taped, and the cooler is wrapped tightly with clear packing tape. It is then relinquished by field personnel to personnel responsible for shipment, typically an overnight carrier. The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager, and the sample will not be analyzed.

5.3 LABORATORY SAMPLE CUSTODY

The Project Manager or Field Team Leader will notify the laboratory of upcoming field sampling activities, and the subsequent shipment of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The following laboratory sample custody procedures will be used:

- The laboratory will designate a sample custodian who will be responsible for maintaining custody of the samples, and for maintaining all associated records documenting that custody.
- Upon receipt of the samples, the custodian will check cooler temperature, and check the original COC documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian will sign the COC record and record the date and time received.
- Care will be exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the Project Manager or Field Team Leader as part of the corrective action process. A qualitative assessment of each sample container will be performed to note any anomalies, such as broken or leaking bottles. This assessment will be recorded as part of the incoming chain-of-custody procedure.
- The samples will be stored in a secured area at a temperature of approximately 4 degrees Celsius until analyses commence.
- A laboratory tracking record will accompany the sample or sample fraction through final analysis for control.
- A copy of the tracking record will accompany the laboratory report and will become a permanent part of the project records.

SECTION 6

CALIBRATION PROCEDURES

6.1 FIELD INSTRUMENTS

All field analytical equipment will be calibrated immediately prior to each day's use. The calibration procedures will conform to manufacturer's standard instructions and are described in the Site Management Plan. This calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. Records of all instrument calibration will be maintained by the Field Team Leader. Copies of all the instrument manuals will be maintained on-site by the Field Team Leader.

Calibration procedures for instruments used for monitoring health and safety hazards (e.g., photoionization detector and explosimeter) are provided in the Health and Safety Plan.

6.2 LABORATORY INSTRUMENTS

The laboratory will follow all calibration procedures and schedules as specified in the sections of the USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods given in Section 7.

SECTION 7

ANALYTICAL PROCEDURES

7.1 INTRODUCTION

Samples will be analyzed according to the USEPA SW-846 "Test Methods for Evaluating Solid Waste," November 1986, 3rd edition and subsequent updates. The methods to be used for the laboratory analysis of water and soil samples are presented in Table 7.1. These methods were selected because they attain the quantitation limits which are compiled on Table 7.1.

TABLE 7.1

PROJECT QUANTITATION LIMITS

		Quantitation Limits		State of New York Standards	
Analysis/Compound	**Method**	**Water (ug/L)**	**Soil (ug/kg)**	**Water (ug/L) [a]**	**Soil (ug/kg) [b]**
Volatile Organics					
1 1,1,1-Trichloroethane	SW8260B	1	5	5	800
2 1,1,2,2-Tetrachloroethane	SW8260B	1	5	5	600
3 1,1,2-Trichloroethane	SW8260B	1	5	1	
4 1,1-Dichloroethane	SW8260B	1	5	5	200
5 1,1-Dichloroethene	SW8260B	1	5	5	400
6 1,2-Dichloroethane	SW8260B	1	5	0.6	100
7 1,2-Dichloroethene(total)	SW8260B	1	5	5	300
8 1,2-Dichloropropane	SW8260B	1	5	1	
9 2-Butanone (MEK)	SW8260B	10	20		300
10 2-Hexanone	SW8260B	10	20		
11 4-Methyl-2-pentanone(MIBK)	SW8260B	5	20		1000
12 Acetone	SW8260B	10	20		200
13 Benzene	SW8260B	1	5	1	60
14 Bromodichloromethane	SW8260B	1	5		
15 Bromoform	SW8260B	1	5		
16 Bromomethane	SW8260B	2	10	5	
17 Carbon Disulfide	SW8260B	1	5		2700
18 Carbon Tetrachloride	SW8260B	1	5	5	600
19 Chlorobenzene	SW8260B	1	5	5	1700
20 Chloroethane	SW8260B	2	10	5	1900
21 Chloroform	SW8260B	1	5	7	300
22 Chloromethane	SW8260B	2	10	5	
23 cis-1,3-Dichloropropene	SW8260B	1	5	0.4	
24 Dibromochloromethane	SW8260B	1	5	5	
25 Ethyl Benzene	SW8260B	1	5	5	5500
26 Methylene Chloride	SW8260B	1	5	5	100
27 Styrene	SW8260B	1	5	5	
28 Tetrachloroethene	SW8260B	1	5	5	1400
29 Toluene	SW8260B	1	5	5	1500
30 trans-1,3-Dichloropropene	SW8260B	1	5	0.4	
31 Trichloroethene	SW8260B	1	5	5	700
32 Vinyl Chloride	SW8260B	2	10	2	200
33 Xylenes (total)	SW8260B	1	5	5	1200

TABLE 7.1 (Continued)

PROJECT QUANTITATION LIMITS

			Quantitation Limits		State of New York Standards	
	Analysis/Compound	Method	Water (ug/L)	Soil (ug/kg)	Water (ug/L)	Soil (ug/kg)
	Semivolatile Organics					
1	1,2,4-Trichlorobenzene	SW8270C	10	330	5	3400
2	1,2-Dichlorobenzene	SW8270C	10	330	3	7900
3	1,3-Dichlorobenzene	SW8270C	10	330	3	1600
4	1,4-Dichlorobenzene	SW8270C	10	330	3	8500
5	2,2'-oxybis(1-chloropropane)*	SW8270C	10	330	5	
6	2,4,5-Trichlorophenol	SW8270C	25	330	1	100
7	2,4,6-Trichlorophenol	SW8270C	10	330	1	
8	2,4-Dichlorophenol	SW8270C	10	330	1	400
9	2,4-Dimethylphenol	SW8270C	10	330	1	
10	2,4-Dinitrophenol	SW8270C	25	330	1	200
11	2,4-Dinitrotoluene	SW8270C	10	330	5	
12	2,6-Dinitrotoluene	SW8270C	10	330	5	1000
13	2-Chloronaphthalene	SW8270C	10	330		
14	2-Chlorophenol	SW8270C	10	330	1	800
15	2-methyl-4,6-Dinitrophenol	SW8270C	25	330		
16	2-Methylnaphthalene	SW8270C	10	330		36400
17	2-Methylphenol	SW8270C	10	330	1	100
18	2-Nitrolaniline	SW8270C	25	330	5	430
19	2-Nitrophenol	SW8270C	10	330	1	330
20	3,3'-Dichlorobenzidine	SW8270C	10	330	5	
21	3-Nitroaniline	SW8270C	25	330	5	500
22	4-Bromophenyl-phenyl ether	SW8270C	10	330		
23	4-Chloro-3-methylphenol	SW8270C	10	330		240
24	4-Chloroaniline	SW8270C	10	330	5	220
25	4-Chlorophenyl-phenyl ether	SW8270C	10	330		
26	4-Methylphenol	SW8270C	10	330	1	900
27	4-Nitroaniline	SW8270C	25	330	5	
28	4-Nitrophenol	SW8270C	25	330	1	100
29	Acenaphthene	SW8270C	10	330		50000
30	Acenaphthylene	SW8270C	10	330		41000
31	Anthracene	SW8270C	10	330		50000
32	Benzo(a)anthracene	SW8270C	10	330		224
33	Benzo(a)pyrene	SW8270C	10	330		61
34	Benzo(b)fluoranthene	SW8270C	10	330		1100

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Quantitation Limits		State of New York Standards	
			Water (ug/L)	Soil (ug/kg)	Water (ug/L)	Soil (ug/kg)
	Semivolatile Organics, cont.					
35	Benzo(g,h,i)perylene	SW8270C	10	330		50000
36	Benzo(k)fluoranthene	SW8270C	10	330		1100
37	bis(2-Chloroethoxy) methane	SW8270C	10	330	5	
38	bis(2-Chloroethyl) ether	SW8270C	10	330	1	
39	bis(2-ethylhexyl)phthalate	SW8270C	10	330	5	50000
40	Butylbenzylphthalate	SW8270C	10	330		50000
41	Carbazole	SW8270C	10	330		
42	Chrysene	SW8270C	10	330		400
43	Di-n-butylphthalate	SW8270C	10	330	50	8100
44	Di-n-octylphthalate	SW8270C	10	330		50000
45	Dibenz(a,h)anthracene	SW8270C	10	330		14
46	Dibenzofuran	SW8270C	10	330		6200
47	Diethylphthalate	SW8270C	10	330		7100
48	Dimethylphthalate	SW8270C	10	330		2000
49	Fluoranthene	SW8270C	10	330		50000
50	Fluorene	SW8270C	10	330		50000
51	Hexachlorobenzene	SW8270C	NA (8081A)	330		410
52	Hexachlorobutadiene	SW8270C	10	330	0.5	
53	Hexachlorocyclopentadiene	SW8270C	10	330	5	
54	Hexachloroethane	SW8270C	10	330	5	
55	Indeno(1,2,3-cd)pyrene	SW8270C	10	330		3200
56	Isophorone	SW8270C	10	330		4400
57	N-Nitroso-di-n-propylamine	SW8270C	10	330		
58	N-nitrosodiphenylamine	SW8270C	10	330		
59	Naphthalene	SW8270C	10	330		13000
60	Nitrobenzene	SW8270C	10	330	0.4	200
61	Pentachlorophenol	SW8270C	25	330	1	1000
62	Phenanthrene	SW8270C	10	330		50000
63	Phenol	SW8270C	10	330	1	30
64	Pyrene	SW8270C	10	330		50000

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Limits Water (ug/L)	Soil (ug/kg)	State of New York Standards Water (ug/L)	Soil (ug/kg)
	PCBs					
1	Aroclor-1016	SW8082	1.0	33	0.09	1000
2	Aroclor-1221	SW8082	2.0	33	0.09	1000
3	Aroclor-1232	SW8082	1.0	33	0.09	1000
4	Aroclor-1242	SW8082	1.0	33	0.09	1000
5	Aroclor-1248	SW8082	1.0	33	0.09	1000
6	Aroclor-1254	SW8082	1.0	33	0.09	1000
7	Aroclor-1260	SW8082	1.0	33	0.09	1000
	Metals		**(mg/L)**	**(mg/kg)**	**(mg/L)**	**(mg/kg)**
1	Antimony	SW6010B	0.006	5.0	0.003	
2	Arsenic	SW6010B	0.01	1	0.025	7.5
3	Barium	SW6010B	0.01	1	1	300
4	Beryllium	SW6010B	0.005	0.5	0.003	0.16
5	Cadmium	SW6010B	0.005	0.5	0.005	1
6	Chromium	SW6010B	0.01	1	0.05	10
7	Copper	SW6010B	0.03	2.5	0.2	25
8	Lead	SW6010B	0.01	0.5	0.025	400[(c)]
9	Mercury	SW7470A/7471A	0.0002	0.01	0.0007	0.1
10	Nickel	SW6010B	0.04	4	0.1	13
11	Selenium	SW6010B	0.01	1	0.01	2
12	Silver	SW6010B	0.01	1	0.05	
13	Thallium	SW7841	0.002	1	0.0005	
14	Zinc	SW6010B	0.02	2	2	20
15	Vanadium	SW6010B	0.05	1	0.0005	150
16	Cobalt	SW6010B	0.05	1		30
17	Aluminum	SW6010B	0.2	20		
18	Calcium	SW6010B	5	500		
19	Iron	SW6010B	0.1	10	0.3	2000

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

		Estimated Quantitation Limits		State of New York Standards	
Analysis/Compound	Method	Water (mg/L)	Soil (mg/kg)	Water (mg/L)	Soil (mg/kg)
Metals, cont.					
20 Magnesium	SW6010B	5	500	35	
21 Manganese	SW6010B	0.015	1.5	0.3	
22 Potassium	SW6010B	5	500		
23 Sodium	SW6010B	5	500	20	

Notes:
N/A Not Applicable
(a) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, NYSDEC, October 1993
(b) Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC, January 24, 1994
(c) EPA Guidance on Residential Lead-Based Paint, Lead Contaminated Dust, and Lead Contaminated Soil, July 14, 1994

SECTION 8

DATA REDUCTION, VALIDATION, AND REPORTING

8.1 INTRODUCTION

Data collected will be reduced and reviewed by the laboratory QA personnel, and a report on the findings will be tabulated in a standard format. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain all items specified in the USEPA SW-846 appropriate for the analyses to be performed, and be reported in standard format.

The completed copies of the Chain-of-custody records (both external and internal) accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the analytical reports.

8.2 DATA REDUCTION

Two copies of the analytical data packages and an electronic disk deliverable will be provided by the laboratory approximately 30 days after receipt of a complete sample delivery group. The Project Manager will immediately arrange for filing one package; a second copy, and the disk deliverable, will be used to generate summary tables. These tables will form the database for assessment of the site contamination condition.

Each diskette deliverable must be formatted and copied using an MS-DOS operating system. To avoid transcription errors, data will be loaded directly into the ASCII format from the laboratory information management system (LIMS). If this can not be accomplished, the consultant should be notified via letter of transmittal indicating that manual entry of data is required for a particular method of analysis. All diskette deliverables must also undergo a QC check by the laboratory before delivery. The original data, tabulations, and electronic media are stored in a secure and retrievable fashion.

The Project Manager or Task Manager will maintain close contact with the QA reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA review has been completed, the Project Manager may direct the Team Leaders or others to initiate and finalize the analytical data assessment.

8.3 DATA VALIDATION

Data validation will be performed in accordance with the USEPA validation guidelines for organic and inorganic data review. Validation will include the following:

- Verification of 100% of all QC sample results (both qualitative and quantitative),
- Verification of the identification of 100% of all applicable sample results (both positive hits and non-detects),
- Recalculation of 10% of all investigative sample results, and
- Data Usability Summary Report (DUSR).

A DUSR will be prepared and reviewed by the Quality Assurance Officer before issuance. The DUSR will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and COC procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. A detailed assessment of each SDG will follow. For each of the organic analytical methods, the following will be assessed:

- Holding times;
- Instrument tuning;
- Instrument calibrations;
- Blank results;
- System monitoring compounds or surrogate recovery compounds (as applicable);
- Internal standard recovery results;
- MS and MSD results;
- Target compound identification;
- Chromatogram quality;
- Pesticide cleanup (if applicable);
- Compound quantitation and reported detection limits;
- System performance; and
- Results verification.

For each of the inorganic compounds, the following will be assessed:

- Holding times;
- Calibrations;
- Blank results;
- Interference check sample;
- Laboratory check samples;
- Duplicates;
- Matrix Spike;

- Furnace atomic absorption analysis QC;
- ICP serial dilutions; and
- Results verification and reported detection limits.

Based on the results of data validation, the validated analytical results reported by the laboratory will be assigned one of the following usability flags:

- "U" - Not detected at given value;
- "UJ" - Estimated not detected at given value;
- "J" - Estimated value;
- "N" – Presumptive evidence at the value given;
- "E" - concentrations exceed the calibration range of the HRGC/HRMS instrument for that specific analysis;
- "D" - compounds identified in an analysis at a secondary dilution factor;
- "B" - analyte is found in the associated blank, as well as in the sample;
- "H" - analyte in question was quantitated using peak heights rather than peak areas for both the analyte and its internal standard;
- "R" - Result not useable; and
- No Flag - Result accepted without qualification.

All data that is qualified after the results from the lab are evaluated should be included as part of the final data presentation that is received as part of the DUSR.

SECTION 9

INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

9.1 QUALITY ASSURANCE BATCHING

Each set of samples will be analyzed concurrently with calibration standards, method blanks, matrix spikes (MS), matrix spike duplicates (MSD) or laboratory duplicates, and QC check samples (if required by the protocol). The MS/MSD samples will be designated by the field personnel. If no MS/MSD samples have been designated, the laboratory will contact the Langan Project Manager for corrective action.

9.2 CALIBRATION STANDARDS AND SURROGATES

All organic standard and surrogate compounds are checked by the method of mass spectrometry for correct identification and gas chromatography for degree of purity and concentration. All standards are traceable to a source of known quality certified by the USEPA or NIST, or other similar program. When the compounds pass the identity and purity tests, they are certified for use in standard and surrogate solutions. Concentrations of the solutions are checked for accuracy before release for laboratory use. Standard solutions are replaced monthly or more frequently, based upon data indicating deterioration.

9.3 ORGANIC BLANKS AND MATRIX SPIKE

Analysis of blank samples verifies that the analytical method does not introduce contaminants or detect "false positives". The blank water can be generated by reverse osmosis and Super-Q filtration systems, or distillation of water containing $KMnO_4$. The matrix spike is generated by addition of surrogate standard to each sample.

9.4 TRIP AND FIELD BLANKS

Trip blanks and field blanks will be utilized in accordance with the specifications in Section 4. These blanks will be analyzed to provide a check on sample bottle preparation and to evaluate the possibility of atmospheric or cross contamination of the samples.

SECTION 10

QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS

10.1 INTRODUCTION

Quality assurance audits may be performed by the project quality assurance group under the direction and approval of the PQAM. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). Functioning as an independent body and reporting directly to corporate quality assurance management, the PQAM may plan, schedule, and approve system and performance audits based upon procedures customized to the project requirements. At times, the PQAM may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit.

10.2 SYSTEM AUDITS

System audits may be performed by the PQAM or designated auditors, and encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be system audited. These audits may be performed once during the performance of the project. However, if conditions adverse to quality are detected or if the Project Manager requests, additional audits may occur.

10.3 PERFORMANCE AUDITS

The laboratory may be required to conduct an analysis of Performance Evaluation (PE) samples or provide proof that Performance Evaluation samples submitted by USEPA or a state agency have been analyzed within the past twelve months.

10.4 FORMAL AUDITS

Formal audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formal audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by auditors who have performed the site audit after gathering and evaluating all data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Noncompliances will be logged, and documented through audit findings which

are attached to and are a part of the integral audit report. These audit finding forms are directed to management to satisfactorily resolve the noncompliance in a specified and timely manner.

The Project Manager has overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be submitted to the Project Manager within fifteen days of completion of the audit. Serious deficiencies will be reported to the Project Manager within 24 hours. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the PQAM prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the PQAM will close out the audit report and findings.

SECTION 11

PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES

11.1 PREVENTIVE MAINTENANCE PROCEDURES

Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and written procedure developed by the operators.

A list of critical spare parts will be established by the operator. These spare parts will be available for use in order to reduce the downtime. A service contract for rapid instrument repair or backup instruments may be substituted for the spare part inventory.

11.2 SCHEDULES

Written procedures will establish the schedule for servicing critical items in order to minimize the downtime of the measurement system. The laboratory will adhere to the maintenance schedule, and arrange any necessary and prompt service. Required service will be performed by qualified personnel.

11.3 RECORDS

Logs shall be established to record and control maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced shall be reviewed, maintained, and filed by the operators at the laboratories. The PQAM may audit these records to verify complete adherence to these procedures.

SECTION 12

CORRECTIVE ACTION

12.1 INTRODUCTION

The following procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

12.2 PROCEDURE DESCRIPTION

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor location, the cause of the condition will be determined and corrective action will be taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the PQAM, Project Manager, Field Team Leader and involved contractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Corrective actions will be initiated as follows:

- When predetermined acceptance standards are not attained;
- When procedure or data compiled are determined to be deficient;
- When equipment or instrumentation is found to be faulty;
- When samples and analytical test results are not clearly traceable;
- When quality assurance requirements have been violated;
- When designated approvals have been circumvented;
- As a result of system and performance audits;
- As a result of a management assessment;
- As a result of laboratory/field comparison studies; and
- As required by USEPA SW-846, and subsequent updates, or by the NYSDEC ASP.

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, monitor on-going work performance in the normal course of daily responsibilities. Work may be audited at the sites, laboratories, or contractor locations. Activities, or documents ascertained to be noncompliant with quality assurance requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the Task Manager.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 12.1 or similar). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The CAR is issued to the personnel responsible for the affected item or activity. A copy is also submitted to the Project Manager. The individual to whom the CAR is addressed returns the requested response promptly to the QA personnel, affixing his/her signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QA personnel maintain the log for status of CARs, confirms the adequacy of the intended corrective action, and verifies its implementation. CARs will be retained in the project file for the records.

Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The Project Manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

FIGURE 12.1

CORRECTIVE ACTION REQUEST

Number: _____ Date: _____

TO: _____

You are hereby requested to take corrective actions indicated below and as otherwise determined by you to (a) resolve the noted condition and (b) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by _____

CONDITION:

REFERENCE DOCUMENTS:

RECOMMENDED CORRECTIVE ACTIONS:

_____ _____ _____ _____ _____ _____

Originator Date Approval Date Approval Date

RESPONSE

CAUSE OF CONDITION

CORRECTIVE ACTION

(A) RESOLUTION

(B) PREVENTION

(C) AFFECTED DOCUMENTS

C.A. FOLLOWUP:

CORRECTIVE ACTION VERIFIED BY: _____ DATE:_____

SECTION 13

REFERENCES

USEPA, 1986. SW-846 "Test Method for Evaluating Solid Waste," dated November 1986. U.S. Environmental Protection Agency, Washington, D.C.

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USEPA, 1992b. Evaluation of Metals Data for the Contract Laboratory Program (CLP) based on SOW 3/90. SOP No. HW-2, Revision XI, dated January 1992. USEPA Region II.