OPERATION AND MAINTENANCE MANUAL

SOIL VAPOR EXTRACTION SYSTEM

HANGER D, BAY 2
WESTCHESTER COUNTY AIRPORT
WHITE PLAINS, NEW YORK

March 2004

Prepared for:
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APPENDICES

1.0 OBJECTIVE

This Operation and Maintenance Manual was prepared for ExxonMobil Corporation and is intended to be a comprehensive guide to operation and maintenance of the Soil Vapor Extraction (SVE) remediation system at the former Texaco Hanger (Hangar D, Bay 2,) Westchester County in White Plains, New York. It is subject to revision and update as required to ensure an accurate description of system equipment, operation and required maintenance. Information provided by this manual includes: project information (Section 2.0), system operation and maintenance (Section 3.0), design practices and standards (Section 4.0), training requirements and documentation (Sections 5.0 and 6.0), relevant figures and drawings (Appendix A), an equipment list (Appendix B), a sample inspection log (Appendix C), a System Lockout/Tagout Plan (Appendix D), Critical Safety Devices Inspection and Maintenance (Appendix E), Design Basis/Review Checklist (Appendix F), Pre-Startup Safety Review Checklist (Appendix G) and equipment manufacturers' literature (Appendix H).

A Site-Specific Health and Safety Manual is available as a separate document and shall be adhered to for all site activities, including operation and maintenance of the SVE remediation system.

2.0 PROJECT INFORMATION

2.1 Site Description and Background Information

The Westchester County Airport is located in the Town of Harrison, Westchester County, New York. Refer to Figure 1-1 for a site locus. The site is located near residential and industrial/commercial property located both in Westchester County, New York and Fairfield County, Connecticut, that the airport abuts.

Hangar D was constructed in 1952, when airport operations began. During the first 30 years of operation, the airport hangers were managed by Gulf Oil under a long term lease from Westchester County. Hangar D, Bay 2 was used by ExxonMobil until 1990 as a base for corporate flight operations as well as other air travel related functions.

Numerous environmental investigations have been implemented at the hangar. Results indicate the presence of chlorinated hydrocarbons in the soil and groundwater beneath the hanger at concentrations above applicable NYSDEC standards. The suspected source area for the chlorinated volatile organic compounds (CVOCs) detected in soils and groundwater appears to be in the vicinity where limited quantities of drummed chlorinated solvents were stored. Refer to Figure 1-2 for a site plan. The chlorinated solvents were previously used by ExxonMobil for routine airplane maintenance. In an effort to further address the environmental issues at the hangar, a Work Plan defining required remedial investigation (RI) activities was prepared in May 1996. The work outlined in the NYSDEC-approved Work Plan was completed and, based on the results of the initial field work, subsequent field investigations have been completed, all with NYSDEC approval, through August 2001. The results of all field investigations were summarized in the RI Report submitted to NYSDEC in December 2001. Along with the RI Report, a Feasibility Study (FS) was completed and submitted in December 2001. The FS reviewed remedial technologies that would be applicable to the residual CVOCs in the soil and

groundwater beneath the hangar. As a result of the review, the FS identified in-situ oxidation as the most feasible alternative for groundwater in the saturated zone and SVE for impacted soils in the vadose zone located beneath the former source area. An overview of the site wide remediation approach is presented in the January 2003 Remedial Design/Remedial Action Final Work Plan. This operation and maintenance manual is developed to be a guide for the operation and maintenance of the SVE system.

The NYSDEC is administering the Westchester County Airport Hangar D, Bay 2 Site under Article 27; Title 13 of the Environmental Conservation Law of the State of New York ("ECL") entitled "Inactive Hazardous Waste Disposal Sites". This program addresses hazardous waste sites, including abandoned sites where no current owner is able to address contamination and sites where the responsible parties have been completing the work with NYSDEC approval.

2.2 Personnel and Important Phone Numbers

Woodard & Curran Inc. Personnel:		
Project Director:	Nicholas Hastings	Office: (203) 271-0379
Project Manager:	Jake O'Neill	Office: (781) 251-0200
Project Engineer:	Anne Proctor	Office: (203) 271-0379
ExxonMobil Corporation Personnel:		
Client Contact:	Steven Trifiletti	Office: (516) 239-5232
Site Contacts:		
Airport Emergency Contact:	Mike Parletta	Office: (914) 995-4858
Hangar Emergency Contact:	Hangar Maintenance	Office: (914) 761-8028
Fire, Rescue, Police		911
US EPA (24-hr. Hotline)		(800) 424-9346
New York Department of Environmental Conservation (24-hrs.)		(800) 457-7362 (518) 457-7362

3.0 REMEDIATION SYSTEM DESIGN, OPERATION, AND MAINTENANCE

3.1 SVE System Description

The SVE system consists of a vacuum blower, extraction wells, system piping, vapor treatment system, and treatment system controls. A schematic of the SVE system is provided as the Piping and Instrumentation Diagram, Drawing P2 in Appendix A. A layout of the system is provided as Drawing C-01 in Appendix A. An overview of system components and operation follows and an equipment list is provided in Appendix B.

3.1.1 Soil Vapor Extraction Wells

A total of five (5) extraction wells will be used for the extraction of soil vapor from the unsaturated soils at the site. The extraction wells, all of which are all located in Hangar D, are 4-inches diameter and are installed to approximately 12 to 15 feet below the ground surface. Locations of the extraction wells are given on Drawing C-01. Specific details regarding the construction of the extraction wells are given on Drawing M-02.

3.1.2 Extraction System Piping

The SVE wells are individually connected, via a 4-inch schedule 40 PVC pipe, from each well location to a main header line located on the southern wall of Hangar D. Manual ball valves are used to isolate wells from the header and to control the flow from a given well.

3.1.3 Soil Vapor Extraction Blower

The SVE blower consists of a 5-hp regenerative blower (Rotron EN6) capable of 225 scfm at a vacuum of 85 inches of water. Electrical service required to operate the blower is 240V/3-phase. The vacuum blower induces air flow of soil gas from beneath the hangar slab by generating a vacuum at the extraction wells.

3.1.4 Particulate Filters and Moisture Separator

A moisture separator, on the vacuum side of the blower, removes groundwater or condensate entrained in the air flow. The moisture separator has a gravity-flow discharge line that will be drained manually. The moisture separator will also be equipped with a float ball as a mechanical fail-safe overflow protection mechanism. In the event that the collection drum is full, a float ball will plug the outlet to the moisture separator. This will block all flow from the SVE wells and activate the built-in vacuum relief valve on the moisture separator. If this occurs, the high water level switch (LSH-1) in the moisture separator will also be triggered, activating an alarm condition and subsequently shutting down the SVE blower.

For the blower system, a polyester air filter will clean the air stream of virtually all particulate matter greater than 10 microns to protect the blower and vapor phase GAC from fouling. A similar, but separate filter is provided for the bleed air inlet.

3.1.5 Vapor Phase Granular Activate Carbon

Removal of the target compounds from the air stream will be accomplished using four (4), 200-lb vapor-phase GAC units. The GAC units will be kept under pressure by locating the blower upstream of the units. The GAC units, piped in parallel sets of two, will treat the filtered air from the blower. The configuration of the GAC units is designed for the front units to treat most of the CVOCs and the secondary units to polish remaining CVOCs. The GAC units shall be capable of accepting a flow of at least 300 scfm.

3.1.6 Process Controls

The process controls are designed to shut down operation of the SVE system in the event of an alarm condition, and contact Woodard & Curran project personnel by an automated telephone messaging system. When an alarm condition is reported, Woodard & Curran will mobilize to the site to troubleshoot the problem and conduct necessary maintenance. One process alarm is incorporated into the design of the SVE remediation system:

- LSH: Moisture Separator Level Switch High.

A smoke alarm is located on the SVE system shed exterior, above one of the shed vents. This alarm will sound locally. If the alarm goes off, local personnel should implement the response procedures normally done for a potential fire emergency condition. Local fire response personnel should be contacted first, then call the emergency contacts identified on the shed signage.

3.2 Maintenance and Monitoring Schedule

A summary of routine monitoring and maintenance tasks is presented below. Personnel trained in the operation of the remediation system complete appropriate inspection logs to record pertinent operation and maintenance information, included in Appendices C, D, and E. This monitoring plan provides an assessment of risk and management of various operations associated with environmental remediation activities. The monitoring plan also provides a framework to document and continuously improve operating procedures affecting Safety, Health and Environmental (SH&E) exposures.

Monthly:

- Systems check to monitor operating condition of system and document information.
- Complete an inspection log (Appendix C).

Quarterly:

- Test electrical controls and lights in accordance with the System Lockout/Tagout Plan (Appendix D). The P&ID for the remediation system is provided in Appendix A, and Emergency Shutdown procedures are marked on instrumentation devices of the system as needed.
- Inspect critical safety devices and document information (Appendix E).
- Check proper operation of high level switch in the moisture separator. Remove any accumulated water or particulate scaling from the moisture separator interior, as needed.

3.3 Spare Parts List

Recommended spare parts are included in the vendors' operation and maintenance information in Appendix H.

3.4 Troubleshooting

3.4.1 Moisture Separator Level Switch High

The SVE blower being off as a result of the high level switch in the moisture separator is indicative of a high level of accumulated condensate in the moisture separator. With the system off, drain the condensate from the moisture separator into a container and transfer into a condensate collection drum. Make sure to check that level switch (LSH) returns to the down position after the tank is drained. If the level switch does not reset to the down position, the switch may be clogged due to biological growth or inorganic particulate scaling. Clear the obstruction and confirm proper system operation.

3.4.2 Soil Vapor Extraction Blower

If the SVE blower shuts down for a reason other than the moisture separator level switch (LSH-1001), refer to the blower manufacturer's operation and maintenance manual in Appendix H.

4.0 DESIGN PRACTICES AND STANDARDS

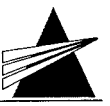
The SVE system was designed and installed in substantial accordance with the January 2003 *Remedial Design/Remedial Action Work Plan,* the August 2003 *Soil Vapor Extraction System Equipment Building Basis of Design Report*, and the December 2003 letter to AvPorts detailing the concrete slab design. The SVE system was designed to be flexible and to allow for modifications, as necessary, based on the actual operating conditions. Components such as the SVE wells and vapor phase GAC units can be modified as required to provide for the most flexible, effective and efficient mode of operation.

The Design Basis/Review Checklist (Appendix F) was completed in accordance with the specifications provided in the Remedial Design/Remedial Action Work Plan. In addition, the Pre-Startup and Safety Review (PSSR) checklist (Appendix G) was also completed and documented. The objective of this review was to ensure that specific environmental factors, safety, and other project complexities were considered and implemented. Quality control inspection procedures were in place and documented as warranted, and SH&E issues were addressed prior to system start-up.

5.0 TRAINING REQUIREMENTS AND DOCUMENTATION

Training is required for all W&C employees working on the SVE system, including, at a minimum:

- 40-hour OSHA training
- Three days of supervised field experience
- Annual OSHA refresher training (as needed)



Documentation of training and related experience required for W&C employees working at a hazardous waste site is kept in the Woodard & Curran corporate health and safety files at our Portland, Maine office.

Employees are also trained in the operating procedures and maintenance schedules set forth in this manual. All personnel must acknowledge understanding of these requirements and sign the Acknowledgment page in Section 6.0 after reading through this manual.

6.0 ACKNOWLEDGMENT

I have read and understand the Operations and Maintenance Manual for Hangar D, Westchester County Airport in White Plains, New York. I agree to abide by these safety rules and understand that any violation may result in my removal from the site.

Name (Print)	Date	Name (sign)

APPENDIX A

FIGURES AND DRAWINGS

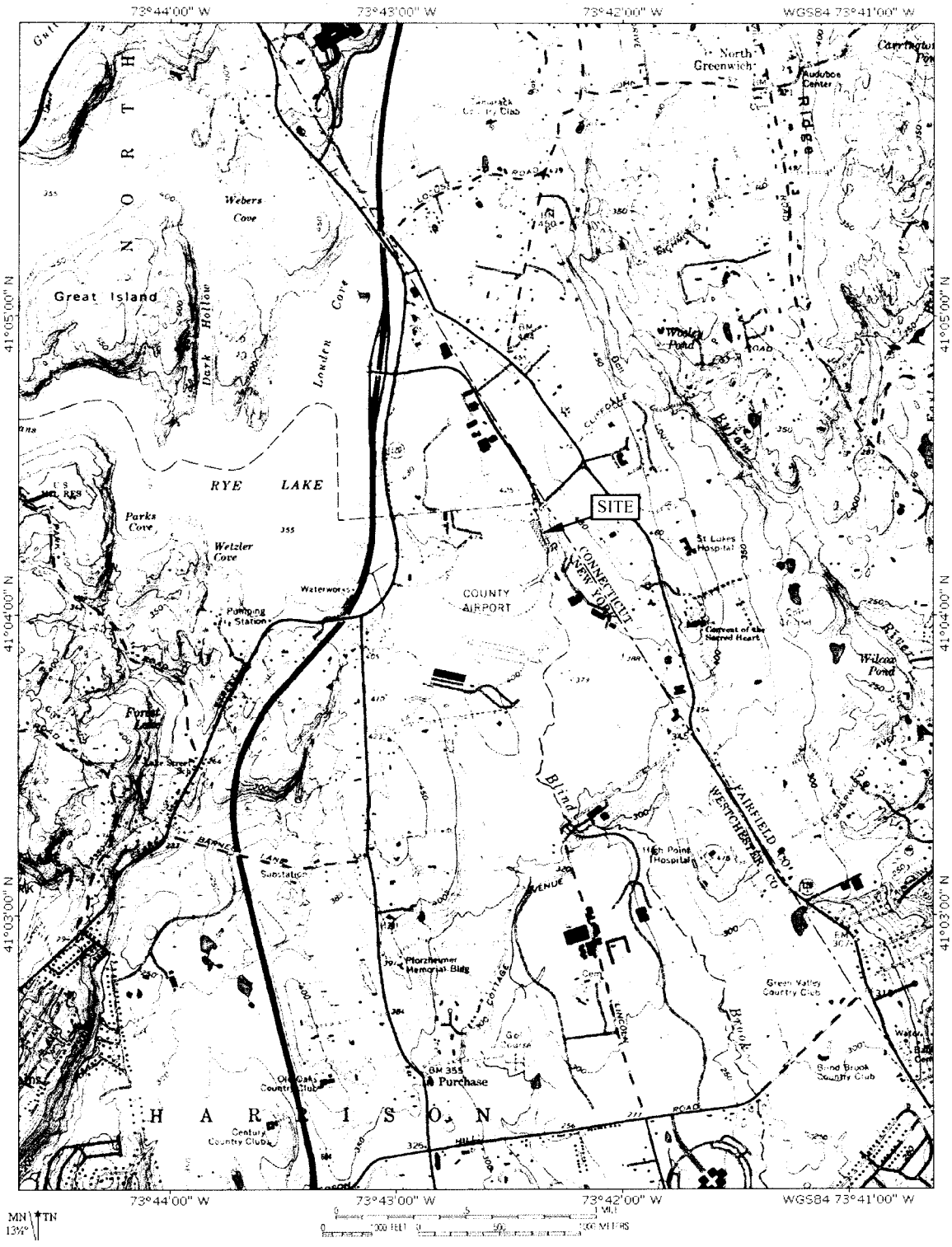
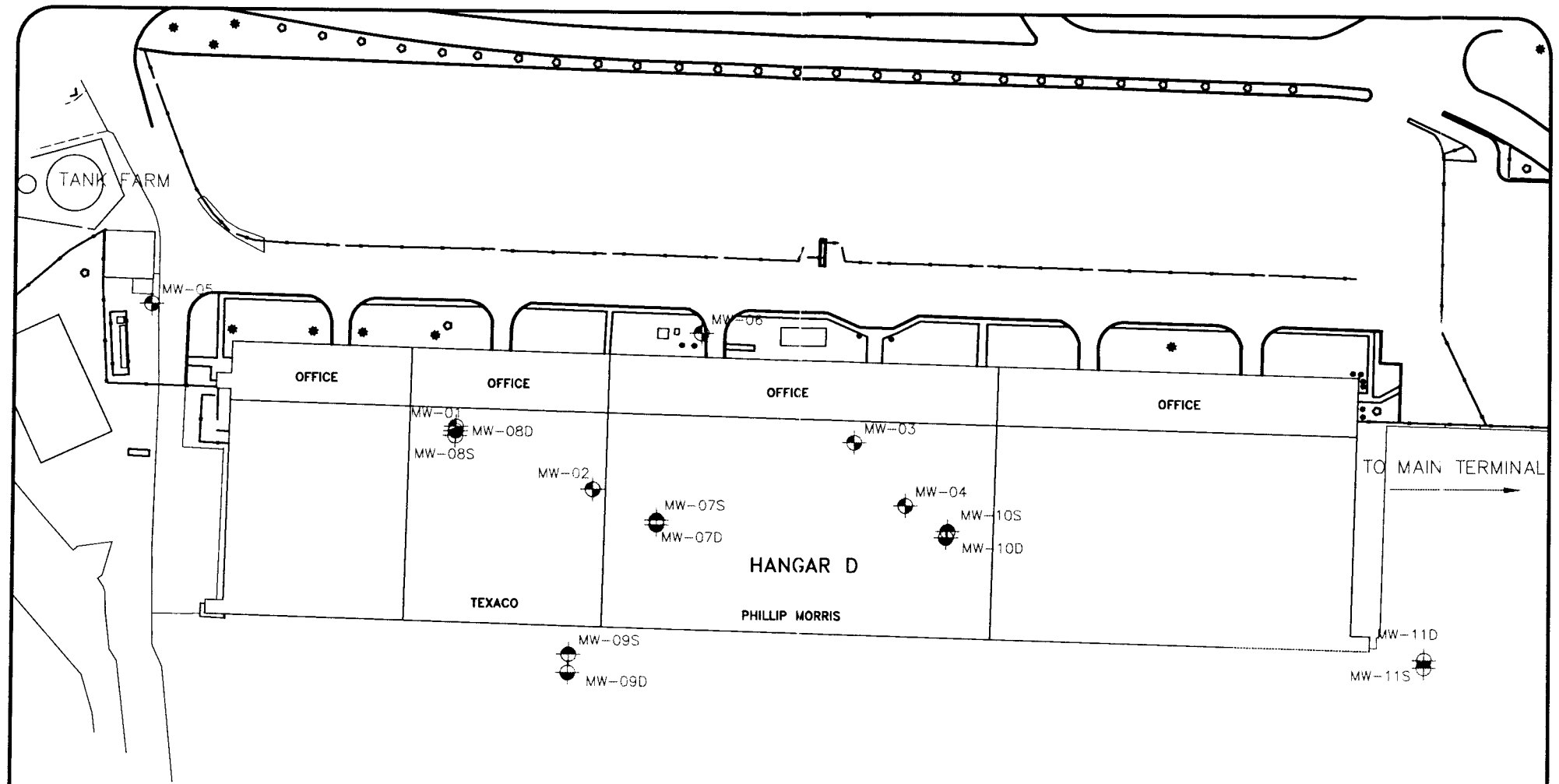


FIGURE 1
SITE LOCATION MAP
Texaco Hangar (Former Mobil Corporation)
Westchester County Airport
Site Number 360037



NOTES

1. ALL LOCATIONS & DIMENSIONS OF SITE FEATURES, PROPERTY LINES & SAMPLING LOCATIONS ARE APPROX.
2. BASE MAP PROVIDED ELECTRONICALLY FROM XDD, INC. IN FEBRUARY 2001.

LEGEND

MW-01 – OVERBURDEN MONITORING WELL

MW-08S – SHALLOW BEDROCK MONITORING WELL

MW-08D – DEEP BEDROCK MONITORING WELL

DES.BY: JWO	DR.BY: JWO	CK.BY:

EXXONMOBIL REFINING & SUPPLY
INWOOD, NY

WESTCHESTER COUNTY AIRPORT
CITIZEN PARTICIPATION PLAN

FIGURE 2
HANGAR D SITE MAP

SCALE: 1" = 100'	JOB NO.: 205265
DATE: MARCH 2001	SHEET: CPP FIG 2

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EXXONMOBIL GLOBAL REFINING

WESTCHESTER COUNTY AIRPORT

WESTCHESTER, NEW YORK

PROPOSED SOIL VAPOR EXTRACTION SYSTEM

JULY 2002
REVISED FEBRUARY 2004

DRAWING LIST

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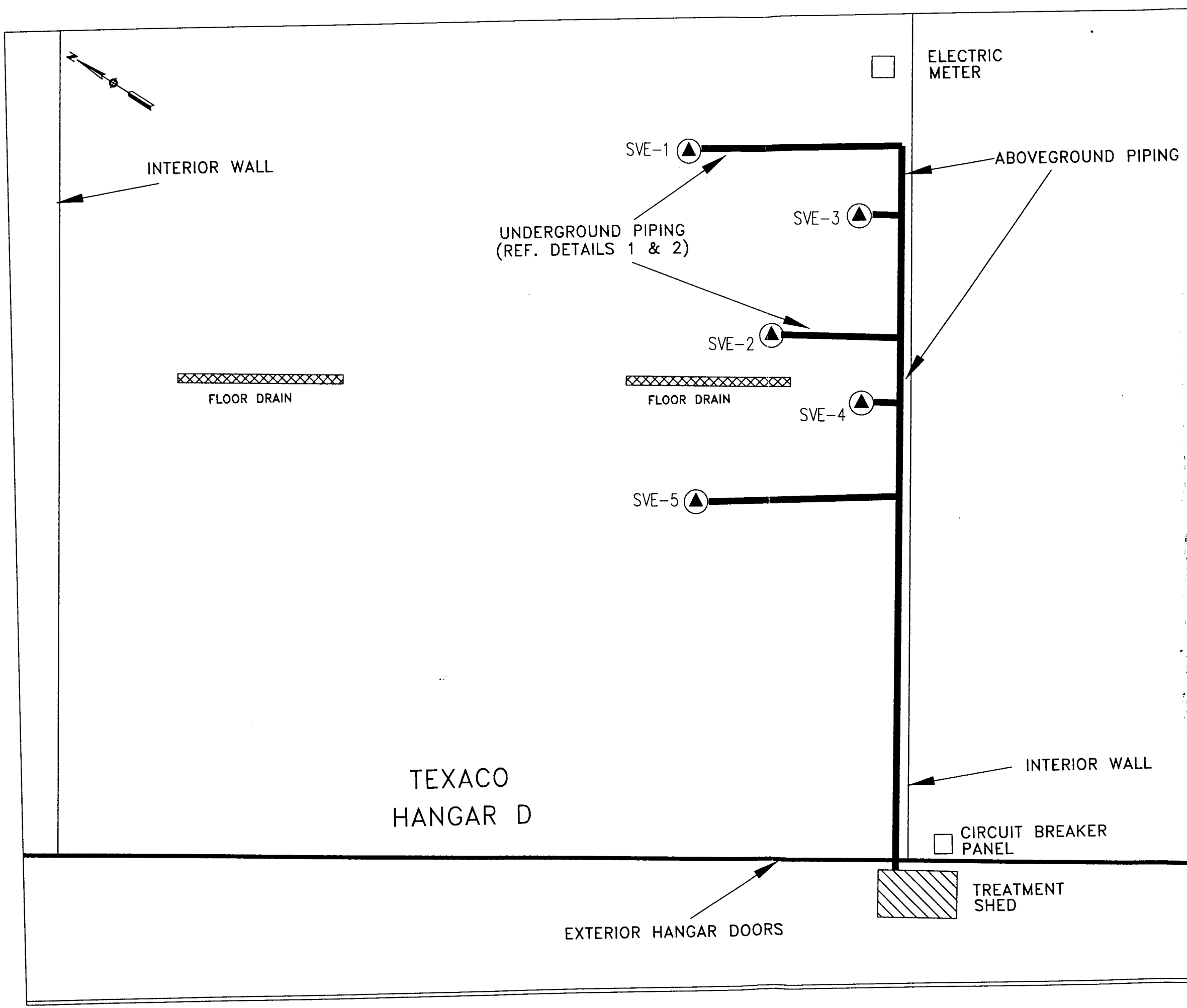

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PROPOSED SOIL VAPOR EXTRACTION

DESIGNED BY: EVR
DRAWN BY:
CHECKED BY:
FILE: C1-ASB.DWG

STATE OF NEW YORK
ANNE E. PROCTOR
070786
LICENSED PROFESSIONAL ENGINEER
3/1/04

WESTCHESTER COUNTY AIRPORT
HANGAR D

PROPOSED SOIL VAPOR EXTRACTION SYSTEM

JOB NO: 206565
DATE: 2/24/04
SCALE: 1" = 15'

C-01

FUNCTIONAL DESCRIPTION OF INSTRUMENT IDENTIFICATION

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS	ANALOG	ALARM		
B	BURNER FLAME		USERS CHOICE	USERS CHOICE	USERS CHOICE
C	CHLORINE			CONTROL	
D	USERS CHOICE	DIFFERENTIAL OR DIGITAL			
E	VOLTAGE (EMF)		PRIMARY ELEMENT		
F	FLOW RATE	RATIO (FRACTION)			
G	GAGING (DIMENSIONAL)		GLASS		
H	HAND (MANUALLY INITIATED)				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME OR TIME SCHEDULE			CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOISTURE OR HUMIDITY	MOTOR			MIDDLE OR INTERMEDIATE
N	USERS CHOICE		USERS CHOICE	USERS CHOICE	RUN
O	USERS CHOICE	OPERATED	ORIFICE (RESTRICTION)		OPEN
P	PRESSURE OR VACUUM		POINT (TEST CONNECTION)		
Q	QUANTITY OR EVENT	INTEGRATE OR TOTALIZE			
R	RADIOACTIVITY	REGULATE	RECORD OR PRINT		
S	SPEED OR FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VISCOSITY			VALVE, DAMPER OR LOUVER	
W	WEIGHT OR FORCE		WELL		
X	UNCLASSIFIED		UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	RUN			RELAY OR COMPUTE	
Z	POSITION			DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT	

THE FOLLOWING DESIGNATIONS ARE USED TO BETTER IDENTIFY AN INSTRUMENT FUNCTION

I/P	–	CURRENT TO PNEUMATIC CONVERTER
E/I	–	VOLTAGE TO CURRENT CONVERTER
Σ	–	ADD OR TOTALIZE
√	–	SQUARE ROOT
X	–	MULTIPLY
÷	–	DIVIDE
>	–	HIGH SELECT
MV	–	MEASURED VARIABLE
<	–	LOW SELECT
S.P.	–	SET POINT
∫	–	INTEGRATE
f(x)	–	CHARACTERISTIC
P	–	PROPORTIONAL CONTROL MODE
D	–	DERIVATIVE
∫	–	INTEGRAL CONTROL MODE
pH	–	HYDROGEN ION CONCENTRATION

HAND SWITCH POSITION SYMBOLS

(UNLABELLED SWITCHES ARE TO BE ON–OFF)

A	AUTOMATIC	L	LOCAL
C	CLOSE	M	MANUAL
H	HAND	O	OPEN OR OFF
J	JOG	R	REMOTE

LINE SYMBOLS

- FLEXIBLE PVC HOSE
- ELECTRIC INSTRUMENT LINE (ANALOG)
- ELECTRICAL SIGNAL (DISCRETE)
- HYDRAULIC CONTROL LINE
- PNEUMATIC SIGNAL
- PROCESS FLOW – MINOR
- PROCESS FLOW – MAJOR
- SOFTWARE OR DATA LINK
- MECHANICAL LINK
- CAPILLARY TUBE
- OPTICAL SIGNAL
- MAGNETIC SIGNAL
- UNDEFINED SIGNAL
- TELEPHONE LINE

TYPICAL SYMBOLS

- FLOATING MIXER
- FLOATING DECANTER
- PROGRESSIVE CAVITY PUMP
- CENTRIFUGAL PUMP
- GEAR PUMP
- DIAPHRAGM PUMP
- METERING PUMP
- SUBMERSIBLE PUMP
- EXHAUST FAN
- ROTARY COMPRESSOR
- BLOWER
- INLET AIR FILTER
- INLET/OUTLET AIR SILENCER
- AGITATOR
- BACK FLOW PREVENTER
- GAS INJECTOR
- MOTOR
- MAGNETIC FLOWMETER
- ROTAMETER
- PROPELLER FLOWMETER
- VENTURI FLOWMETER
- FLOW TOTALIZER
- ULTRASONIC LEVEL ELEMENT
- MERCURY FLOAT SWITCH
- SQUARE–D LEVEL SWITCH
- PIPE DIAMETER
- PIPE MATERIAL (1/4"-SWR-FRP)
- FLUID CARRIED
- FROM – TO ARROW

- PLUG VALVE
- BUTTERFLY VALVE
- GATE VALVE
- GLOBE VALVE
- BALL VALVE
- 3–WAY VALVE
- NEEDLE VALVE
- PINCH VALVE
- DIAPHRAGM VALVE
- PRESSURE REGULATING VALVE
- RELIEF VALVE
- COMBINATION AIR RELEASE VALVE AND AIR/VACUUM VALVE
- COMBINATION SAFETY RELIEF, BACKPRESSURE, ANTI–SIPHON VALVE
- INLINE PRESSURE REDUCING VALVE
- CHECK VALVE
- MOTORIZED VALVE
- FAIL CLOSED VALVE
- FAIL OPEN VALVE
- FAIL LOCKED VALVE (POSITION DOES NOT CHANGE)
- SLIDE GATE VALVE
- NORMALLY CLOSED VALVE
- SOLENOID ACTUATOR
- MODULATING ACTUATOR
- REDUCER
- PIPE CAP
- UNION
- QUICK DISCONNECT COUPLING
- HOSE BIBB CONNECTION
- PITOT TUBE CONNECTION
- MONITORING PORT
- FLEXIBLE CONNECTION
- DRESSER COUPLING
- Y–STRAINER
- FLANGE
- TRAP
- LUBRICATOR (OILER)
- INLINE AIR FILTER
- PULSATION DAMPENER
- PRESSURE INDICATOR WITH DIAPHRAGM
- FLOW CALIBRATION STANDPIPE
- COMPRESSED AIR LINE PRESSURE
- EQUIPMENT TAG

TYPICAL INSTRUMENT SYMBOLS

PI 500 – FUNCTIONAL IDENTIFICATION (SEE LEGEND TABLE); LOOP IDENTIFICATION NUMBER

- FIELD MOUNTED
- AUXILIARY LOCATION
- FRONT PANEL MOUNTED
- REAR PANEL MOUNTED
- STATUS INDICATION
- INCLUDED WITH PURCHASED EQUIPMENT
- COMPUTER CONTROL SYSTEM CONFIGURABLE FUNCTION (DISPLAYED ON CRT)
- COMPUTER CONTROL SYSTEM CONFIGURABLE FUNCTION (NOT DISPLAYED ON CRT)
- PROGRAMMABLE LOGIC CONTROLLER I/O
- PROGRAMMABLE LOGIC CONTROL, PRIMARY LOCATION
- PROGRAMMABLE LOGIC CONTROL, FIELD MOUNTED
- UNDEFINED INTERLOCK LOGIC

TYPICAL PIPE, VALVES AND EQUIPMENT ABBREVIATIONS

FLUID DESIGNATION

AI – INSTRUMENT AIR
APL – PLANT AIR
CAL – ALUM
CONC – CAUSTIC, 50%
CPL – POLYMER
DE – EQUIPMENT DRAIN
DTO – TANK OVERFLOW
E – EFFLUENT
EF – EFFLUENT, FILTER
EP – EFFLUENT, PRIMARY
F – FILTRATE
SG – SOIL GAS
SGC – SOIL GAS CONDENSATE
SLO – OILY WASTE
SL – SLUDGE
V – VENT
WD – DECANT WATER
WG – GROUNDWATER
WPL – PLANT WATER
WWP – PROCESS WASTEWATER
WST – STORMWATER

PIPE MATERIAL

ALDI – LINED DUCTILE IRON
CPVC – CHLORINATED POLYVINYLCHLORIDE
CS – CARBON STEEL
CU – COPPER
DI – DUCTILE IRON
FRP – FIBERGLASS REINFORCED PLASTIC
HDPE – HIGH DENSITY POLYETHYLENE
PE – POLYETHYLENE
PVC – POLYVINYLCHLORIDE
SS – STAINLESS STEEL – 304L
TT – TYGON (PLASTIC) TUBING

GENERAL ABBREVIATIONS

AIR – AMBIENT AIR
ACFM – ACTUAL CUBIC FEET PER MINUTE
AFF – ABOVE FINISHED FLOOR
BF – BLIND FLANGE
ECC – ECCENTRIC
EL – ELEVATION
FF – FINISHED FLOOR
FLG – FLANGE
FL – FLOOR
FOB – FLAT ON BOTTOM
FOT – FLAT ON TOP
GPD – GALLONS PER DAY
GPH – GALLONS PER HOUR
GPM – GALLONS PER MINUTE
HWL – HIGH WATER LEVEL
ICFM – INLET CUBIC FEET PER MINUTE
INV – INVERT
LWL – LOW WATER LEVEL
MGD – MILLION GALLONS PER DAY
Mg/L – MILLIGRAMS PER LITER
MHW – MEAN HIGH WATER
MLW – MEAN LOW WATER
MSL – MEAN SEA LEVEL
OC – ON CENTER
PPD – POUNDS PER DAY
PSIA – POUNDS PER SQUARE INCH ABSOLUTE
PSIG – GAUGE POUNDS PER SQUARE INCH
RED. – REDUCER
SCFM – CUBIC FEET PER MINUTE – STD COND.
SP – SET POINT (TYPICAL)
TDH – TOTAL DYNAMIC HEAD
TOS – TOP OF STRUCTURE
TYP – TYPICAL
VTA – VENT TO ATMOSPHERE
WS – WATER SURFACE
mA – MILLI AMP
S/S/LO – START, STOP, LOCKOUT
H/O/A – HAND, OFF, AUTO

EQUIPMENT DESIGNATIONS

AC – AIR COMPRESSOR
B – BLOWER
BS – BAR SCREEN
E – GENERAL EQUIPMENT
F – FILTER
FP – FILTER PRESS
GC – GRIT CHANNEL
MX – MIXER
P – PUMP
PS – PUMP STATION
S – SUMP
T – TANK
G – GRINDER
MCP – MAIN CONTROL PANEL
MS – MOISTURE SEPARATOR
CP – CONTROL PANEL
GAC – GRANULAR ACTIVATED CARBON UNIT
PPIS – POTASSIUM PERMANGANATE IMPREGNATED SILICA UNIT

VALVE TAG SYMBOL

VALVE – SPECIFICATION & REFERENCE No. – SEQUENCE No. – SYSTEM NUMBER

VALVE TYPE

1	GATE	6	CHECK
2	BALL	7	ANGLE
3	BUTTERFLY	8	PINCH OR DIAPHRAGM
4	PLUG	9	3–WAY OR 4–WAY
5	GLOBE	0	SPECIAL

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REV	DESCRIPTION	DATE
DESIGNED BY:	CHECKED BY:	
DRAWN BY: EVR	FILE:	

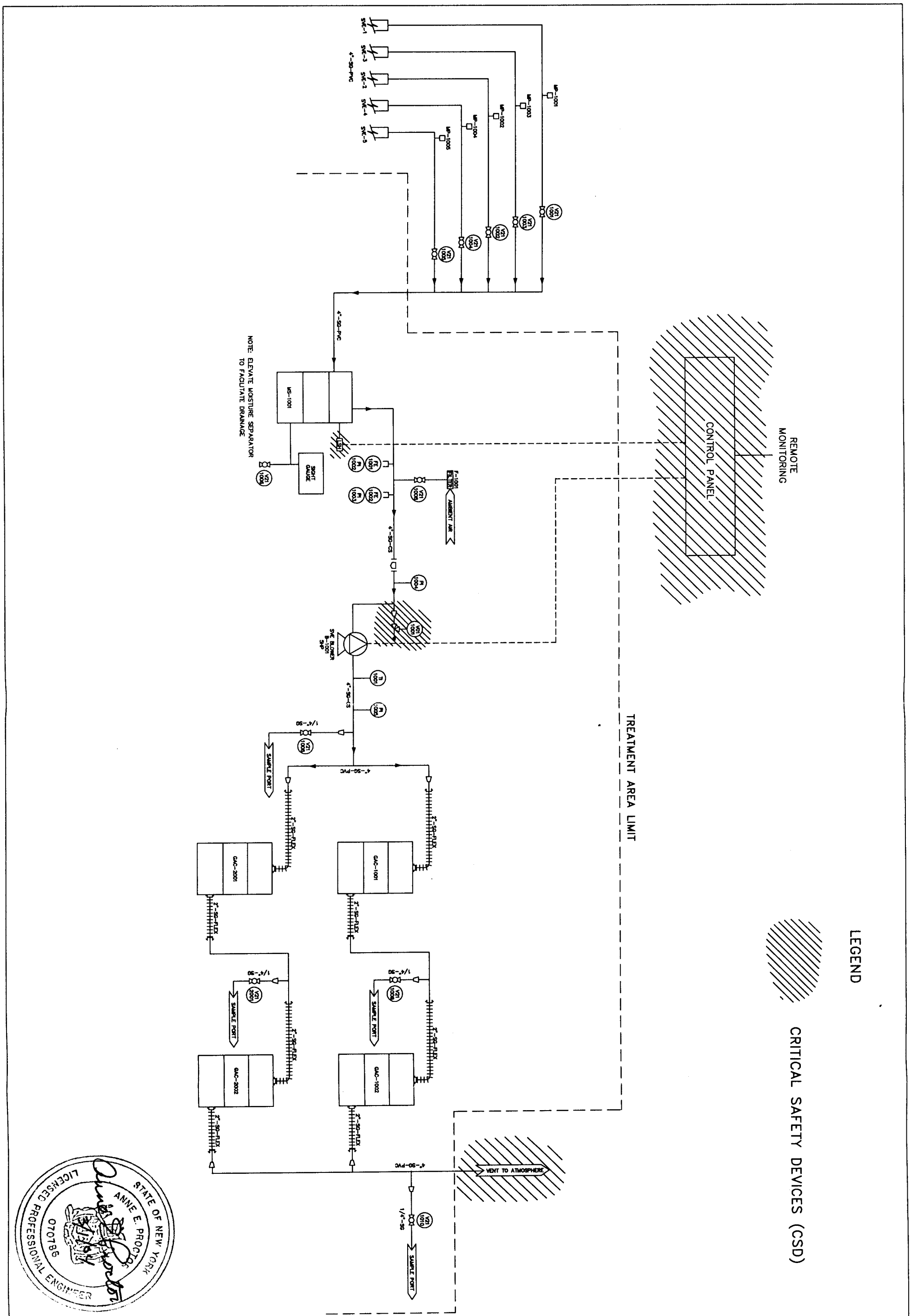
PIPING & INSTRUMENTATION LEGEND

WESTCHESTER COUNTY AIRPORT
HANGAR D

PROPOSED SOIL VAPOR EXTRACTION SYSTEM

JOB NO.: 208585
DATE: 2/24/04
SCALE:
SHEET: OF

P-01



LICENSED PROFESSIONAL ENGINEER
070786
STATE OF NEW YORK
ANNE E. PROCTOR

P-02	WESTCHESTER COUNTY AIRPORT HANGAR D	PIPING AND INSTRUMENTATION DIAGRAM	WOODARD & CURRAN Engineering · Science · Operations
JOB NO: 206565			
DATE: 2/24/04	PROPOSED SOIL VAPOR EXTRACTION SYSTEM	DESIGNED BY:	CHECKED BY:
SCALE:NOT TO SCALE		DRAWN BY: EVR	FILE: P2-ASB.dwg

10'-0" I.D.

BOLLARD

6' DOUBLE SWING DOOR

LIGHT SWITCH

BOLLARD

NOTE:
REFER TO DETAIL 3 ON DWG. M-02 FOR CONCRETE PAD CONSTRUCTION.

VENT AND SMOKE DETECTOR

SVE BLOWER (B-1001)

7'-5" I.D.

VENTILATION FAN & CONTROL

GAC-2002

GAC-2001

GAC-1002

GAC-1001

CONTROL PANEL

PARTICULATE FILTER (F-1001)

FILTER SILENCER

VENT

MOISTURE SEPARATOR (MS-1001)

VENT TO ATMOSPHERE

FROM SVE WELLS

STATE OF NEW YORK
ANNE E. PROCTOR
LICENSED PROFESSIONAL ENGINEER
Anne E. Proctor
3/1/04
070705

WOODARD & CURRAN
Engineering · Science · Operations

TREATMENT SHED LAYOUT

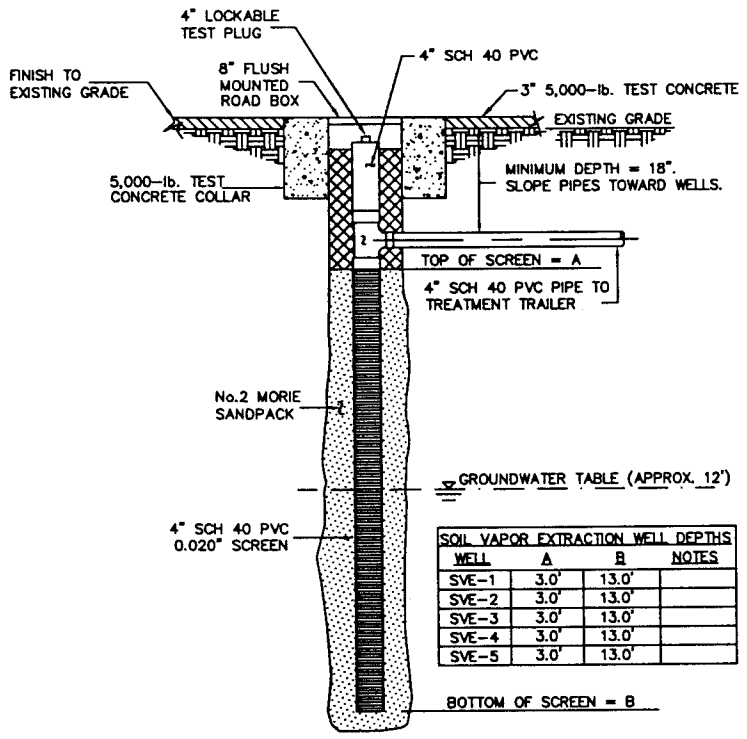
DESIGNED BY: EVR
DRAWN BY:
CHECKED BY:
FILE: M1-ASB.dwg

WESTCHESTER COUNTY AIRPORT
HANGAR D

PROPOSED SOIL VAPOR EXTRACTION SYSTEM

JOB NO: 206565
DATE: 2/24/04
SCALE: 1" = 1'

M-01

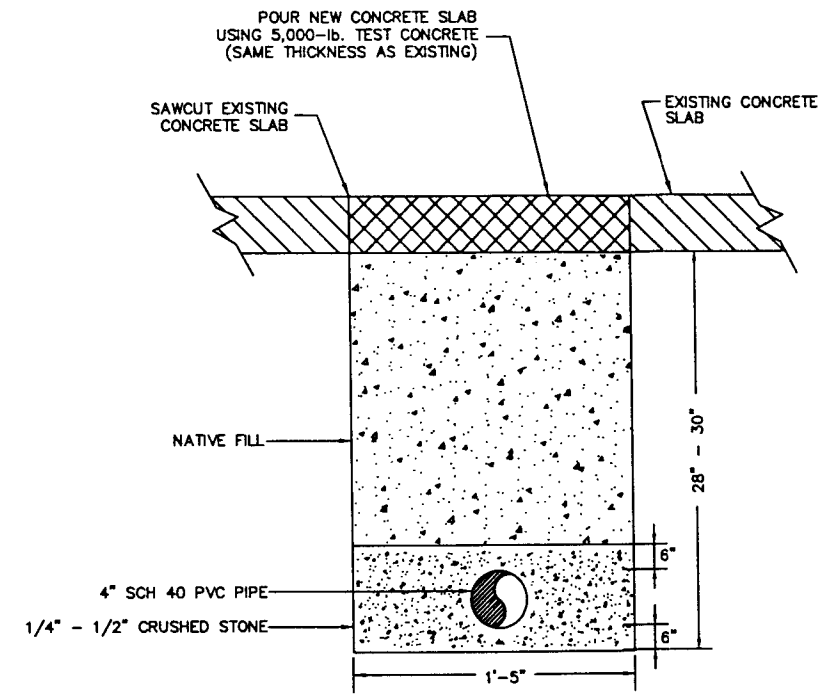


SOIL VAPOR EXTRACTION WELL DEPTHS			
WELL	A	B	NOTES
SVE-1	3.0'	13.0'	
SVE-2	3.0'	13.0'	
SVE-3	3.0'	13.0'	
SVE-4	3.0'	13.0'	
SVE-5	3.0'	13.0'	

DETAIL 1

SOIL VAPOR EXTRACTION WELL DETAIL FOR VERTICAL WELLS

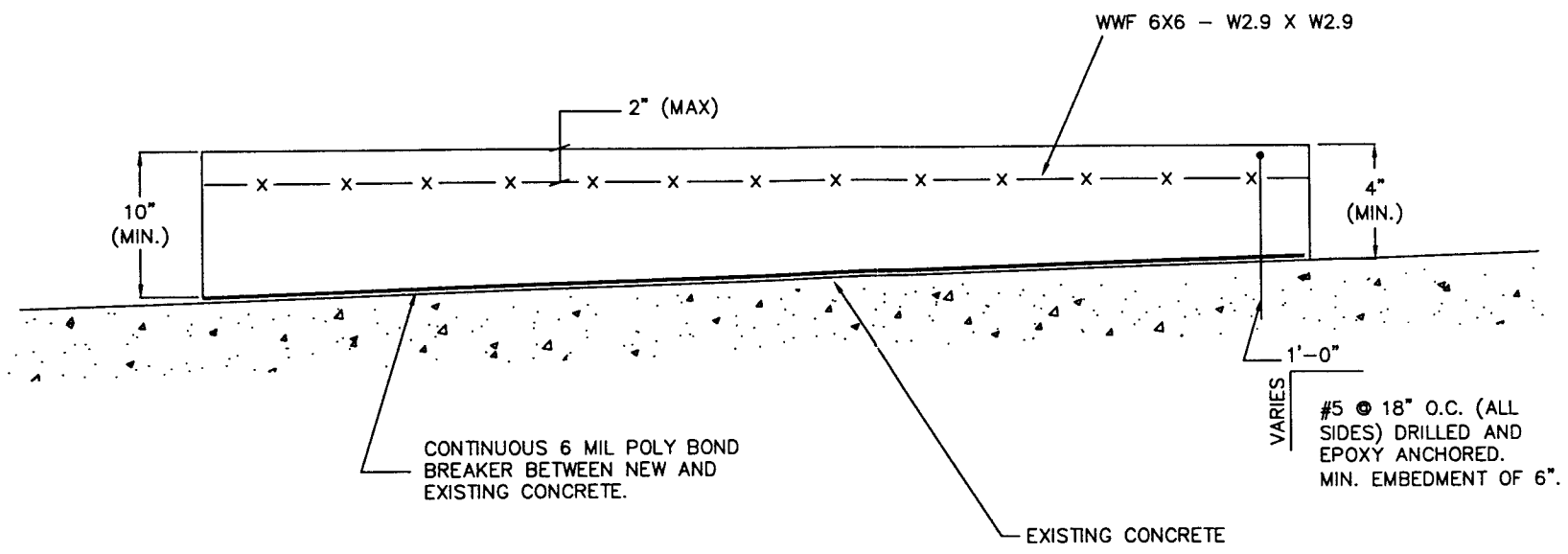
NOT TO SCALE



DETAIL 2

SVE TRENCH DETAIL

NOT TO SCALE



DETAIL 3

CONCRETE PAD

NOT TO SCALE

STATE OF NEW YORK
ANNE E. PROCTOR
LICENSED PROFESSIONAL ENGINEER
070786
3/1/04

WOODARD & CURRAN
Engineering · Science · Operations

MECHANICAL DETAILS

DESIGNED BY:
DRAWN BY: EVR
CHECKED BY:
FILE: M2-ASB

WESTCHESTER COUNTY AIRPORT
HANGAR D

PROPOSED SOIL VAPOR EXTRACTION SYSTEM

JOB NO: 206565
DATE: 2/24/04
SCALE: AS NOTED

M-02

APPENDIX B

EQUIPMENT LIST

1.0 MOISTURE SEPARATOR
Tag number: MS-1001

• Quantity:	1
• Type:	Cyclonic separator with integral mechanical overflow protection
• Capacity:	Max. 300 scfm flow; 7-gallon min. liquid storage
• Maximum pressure drop:	<6 inch water gage (iwg) at 300 scfm
• Connections:	Inlet, outlet and drain
• Controls for Separator:	High level float switch, ball float overflow protector, and vacuum relief valve.
• Manufacturer or equal:	EG & G Rotron
• Model or equal:	MS300P

2.0 IN-LINE AIR FILTER
Tag number: F-1001

• Quantity:	1
• Type:	In-line with replaceable corrugated filter media, suitable for vacuum service
• Capacity:	97% removal of particles 8 to 10 microns
• Maximum pressure drop:	< 2 iwg for clean filter at 100 cfm
• Materials of construction:	Housing - steel; Filter media - polyester
• Connections:	Inlet and outlet = 2" NPSC
• Manufacturer or equal:	Solberg
• Model or equal	CSL-851-200HC

3.0 MOISTURE SEPARATOR HIGH LEVEL SWITCH
Tag number: LSH

• Quantity:	1
• Function:	Liquid level switch for moisture seperator
• Type:	Finger Type Liquid Level Switch
• Manufacturer or equal:	Flotect
• Model or equal	L6
• Preferred Distributor	Dwyer

4.0 SOIL VAPOR EXTRACTION BLOWER
Tag number: B-1001

• Quantity:	1
• Type:	Environmental regenerative blower
• Capacity:	225 scfm at 85 iwg
• Connections:	inlet and outlet
• Power:	5 HP, 230 VAC, 3 phase, 60 Hz
• Motor:	Explosion-proof, thermal overload protection, local reset
• Manufacturer or equal:	EG & G Rotron
• Model or equal:	EN6F72L

5.0 VAPOR PHASE GRANULAR ACTIVATED CARBON

- Quantity: 4
- Function: Vapor Phase VOC treatment
- Capacity: 200 lb. carbon
- Manufacturer or equal: US Filter
- Model or equal T-1
- Preferred Distributor ServiceTech, Inc.

6.0 PRESSURE GAGES

Tag number(s): PI-1002, PI-1003

- Quantity: 2
- Function: Differential pressure measurement for pitot tube
- Type: Magnehelic
- Range: 0 to 4 inches water column, 0.1" minor divisions
- Accuracy ± 2% of full scale
- Temperature Range 20 to 140° F
- Materials of construction: Die cast aluminum housing, plastic face
- Connections: 1/8" NPT
- Manufacturer or equal: Dwyer
- Model or equal: 2004

Tag number(s): PI-1001, PI-1004, PI-1005

- Quantity: 3
- Function: Pressure gage
- Type: Indicating gage
- Range: 0 to 100 inches water column
- Accuracy ± 3% of full scale
- Temperature Range -40 to 160° F
- Materials of construction: Steel housing, aluminum dial, bronze diaphragm
- Connections: 1/4" NPT mounting
- Manufacturer or equal: Dwyer
- Model or equal 61100

7.0 TEMPERATURE ELEMENT

Tag number: TI-1001

- Quantity: 1
- Function: Monitor discharge temperature of SVE blower
- Type: Bimetal thermometer
- Range: 0 - 250°F
- Accuracy: ± 1% of full scale
- Size: 2.5" stem, 2" dial
- Materials of construction: Stainless steel stem, aluminum dial, glass face
- Connections: 1/2" NPT
- Manufacturer or equal: Trend

8.0 SAMPLE / MONITORING POINTS

- Quantity: 5
- Function: Monitoring point
- Type: Male thread + hose
- Materials of construction: PVC
- Connections: 1/4" NPT
- Manufacturer or equal: Labcock

9.0 VALVE SPECIFICATIONS

Spec Reference #	V01	V21
Service	Soil Vapor	Soil Vapor, Condensate
Valve type	Relief	Ball
Body	Aluminum	PVC
Body type	Two piece	True union
Pressure at temperature	1.0 - 4.5 psi adjustable	110 psi/ 120°F
Size range	1" NPT	½" - 4"
Seat		TFE backed EPDM
Screen Size		
Seal	Nitrile	EPDM
Disc/Ball	Steel	PVC
Stem		PVC
Actuator	Adjustable spring	Hand lever
Manufacturer or equal	EG & G Rotron	ASAHI, NIBCO, Hayward
Model or equal	289H Spring Model 1B5366-27052	Varies based on line size

APPENDIX C

SAMPLE INSPECTION LOG

MONTHLY INSPECTION LOG

SOIL VAPOR EXTRACTION SYSTEM
HANGAR D, BAY 2, WESTCHESTER COUNTY AIRPORT

System Inspected by: _____ Date:_____ Time:_____

Inspection Point	**Result**	**Notes**
Blower/Treatment Area		
SVE Blower Operation		
SVE Discharge Temperature (°F)		
Discharge Pressure (in. H_2O)		
Pitot Tube Measurement (in. H_2O)		
Pre-filter, FE-1001		
Post-filter, FE-1002		
Condensate Discharge Flow Total (gal.)		
SVE Extraction/Treatment System		
Soil Vapor Monitoring Points:	Vac / VOCs / % Open (in. H_20 / ppm / %)	
SVE-1 (MP-1001)	/ /	
SVE-2 (MP-1002)	/ /	
SVE-3 (MP-1003)	/ /	
SVE-4 (MP-1004)	/ /	
SVE-5 (MP-1005)	/ /	
Blower Eff.. (V21-1008)	/ / ----	
GAC1-BTWN (V21-1009)	/ / ----	
GAC2-BTWN (V21-2001)	/ / ----	
GAC-EFF. (V21-1010)	/ / ----	
Area Monitoring Wells		
Wells:	DTW (feet)	Well Head Vacuum (in. H_20)
MW-01		
MW-02		
MW-07S		

Other Notes:_____

_____

_____

_____

_____

APPENDIX D

SYSTEM LOCKOUT/TAGOUT PLAN

SYSTEM LOCKOUT/TAGOUT PLAN

Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Soil Vapor Extraction System

EQUIPMENT	OPERATION	LOCKOUT METHOD/LOCATION
Soil Vapor Extraction Blower, B-1001	– Maintenance – Trouble shooting	Shut off at breaker panel. Lock and tag breaker. Check for stored energy using volt meter.
Light	– Maintenance – Trouble shooting	Shut off at breaker panel. Lock and tag breaker. Check for stored energy using volt meter.
Fan	– Maintenance – Trouble shooting	Shut off at breaker panel. Lock and tag breaker. Check for stored energy using volt meter.
System Control Panel	– Maintenance – Trouble shooting	Shut off at breaker panel. Lock and tag breaker. Check for stored energy using volt meter.

APPENDIX E

CRITICAL SAFETY DEVICES INSPECTION AND MAINTENANCE

CRITICAL SAFETY DEVICES
INSPECTION AND MAINTENANCE
CHECKLIST
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Rev. 1, February 2004

March: Date: _____ Time: _____ Name: _____

June: Date: _____ Time: _____ Name: _____

September: Date: _____ Time: _____ Name: _____

December: Date: _____ Time: _____ Name: _____

Critical Device	March	June	September	December
Locks				
Signs				
Smoke Alarm				
Electrical Control Panel				
Moisture Separator				
SVE Blower				
Discharge Stack				
Extraction and Monitoring Wells				

Initial when completed.

If a critical device fails, the system should be shut-off until the CSD component or components are repaired, or a decision to disarm, deactivate or by-pass has been approved.

CRITICAL SAFETY DEVICES
INSPECTION AND MAINTENANCE
PROCEDURE
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Rev. 1, February 2004

Critical Device	Inspection Procedure
Locks	Check all locked monitoring well caps and enclosures for missing or damaged locks. Check the operation of each lock. Lubricate with a non-petroleum based lubricant. Repair or replace locks as required.
Signs	Ensure warning signs, such as for lockout/tagout, are legible, secure and accurate. Repair or replace signs as required.
Smoke Alarm	Ensure alarm is in good working order by using test button on unit. Replace battery as needed. *Note: Notify local personnel prior to testing alarm.*
Electrical Control Panel	Visually check circuit breakers and wiring for good appearance. Test circuit breakers to ensure good working order. Contract a licensed electrician for repairs or replacement as needed.
Moisture Separator	Remove the ball float assembly and ensure that the ball check travels freely in the assembly. Manually lift the level switch LSH and confirm proper alarm trigger to SVE blower and that float moves freely. Drain and drum any condensate from the separator. Clean, repair, or replace components as required.
SVE Blower	Inspect blower for proper operation. Measure influent and effluent vacuum and pressure readings and total system flow readings against blower performance curve. Test start components. Inspect influent filters for fouling. Clean, make repairs, or replace as necessary.
Discharge Stack	Inspect base of stack for accumulation of condensate, remove as required. Inspect top of stack for proper alignment and visually inspect support lines and anchors; make adjustments as needed. Monitor effluent to ensure GAC units are treating off-gas; replace GAC units as necessary.
Extraction and Monitoring Wells	Inspect road box and well cap for proper tightness and security. Remove and replace bolts, covers and well caps as required.

If a critical device fails, the system should be shut-off until the CSD component or components are repaired, or a decision to disarm, deactivate or by-pass has been approved.

APPENDIX F

DESIGN BASIS / REVIEW CHECKLIST

DESIGN BASIS / REVIEW CHECKLIST

Westchester County Airport, Hangar D
White Plains, New York
Rev. 1, 5/19/03

Part 1 - Design Basis

Check basis used: (could be more than one, add text describing standards or equipment)

___	International Practices:	
___	US Retail System Design Manual:	
x	Industry / Consensus Standards:	In accordance with Final RD/RA Work Plan dated 1/13/03
x	Governmental:	NYDEC Order of Consent signed 7/15/02.
___	Other:	

Part 2 - Checklist

No.	Checklist Item for the Review of Design Specifications	
	Process:	Y, N, N/A
1	Have the physical properties of streams defined in design specifications, especially those given on specification sheets for pumps, process systems, etc.,	Y
2	Are operating temperature, pressure, and flow correct and consistent with operating modes / conditions?	Y
3	Are there any plant/site modifications or likely to be raised in the foreseeable future, which might have an impact on the design / operation?	N
4	Are important streams and equipment shown on flow and plot plans?	Y
5	Are there sufficient sample points? Are they in correct, safe locations? (If they are sufficient and in the right place this is implicit)	Y
6	Is the control scheme adequate for all operating conditions, e.g., normal/startup/shutdown, etc.?	Y
7	Are there sufficient temperature, level, and pressure indicators?	Y
	Safety, Industrial Hygiene and Environmental:	
1	Does the project present potential worker exposure to a new waste stream, chemical or product? (If yes, may affect IH issues, water permit, air permit, toxics reporting.)	N
2	Does the project result in increased chemical storage (such as: addition of a tank, or change tankage service? If yes, check spill plans, permitting issues.)	N
3	Does the project result in any additional water streams being treated and/or discharged? (If yes, check water permit requirements.)	N
4	Does the project significantly change the flow of water through the plant? (If yes, may impact water permit, water balance allocations or spill plans.)	N
5	Will the project cover 1 acres or more? (If yes, check storm water permit.)	N
6	Will project increase or add "new" wastes? (May impact waste minimization plan, hazardous waste handling and storage permits/status.)	Y (carbon)
7	Will the project involve asbestos, benzene, lead-based paints or PCBs? (If yes, may need IH review, or may require environmental notification/permits.)	N

No.	Checklist Item for the Review of Design Specifications	
	Safety, Industrial Hygiene and Environmental:(cont'd)	Y, N, N/A
8	Will the project involve excavation in contaminated areas? (If yes, may involve IH, safety, waste handling, spill reporting review)	Y
9	Will the project involve any new or modified emission sources? (oxidizers, strippers, well venting, etc) (If yes, may involve IH, air permit, toxics reporting.)	Y
10	Will the project involve excavation in hydrocarbon or metals contaminated areas? (If yes, may involve IH, waste handling, spill reporting,	Y (VOCs)
11	Will the project result in new or modified equipment which should have Ergonomics/Human Factors review? (If yes, may involve IH.)	N
12	Will equipment generate noise levels greater than 85 dB(A)? (If yes, may involve IH.)	Y (possible at close range)
13	Where highly toxic materials are involved, are proper engineering controls considered (e.g. pump seals, gasket materials, valve seals, vents, sewer discharge, supply ports etc.) Check industry practices/ IH recommendations.	NA
14	Is a review with the Environmental Regulatory Agencies required? Are environmental permits required to construct/operate?	Y
	Control Systems/Applications:	
1	Is the proposed equipment compatible with existing control equipment?	Y
2	Is the control and/or measurement system adequate to cover the process?	Y
3	Is the control system design acceptable?	Y
4	Is the installation plan correct? (In operating plants check local protocols)	Y
5	Are the instruments properly tagged? (CSD's identified?)	Do at start-up
6	Are there any plant/site modifications likely in the foreseeable future which might have an impact on the design / construction/ siting?	N
7	Are there enough indicators and controllers to operate effectively/safely?	Y
8	Are all manipulated variables independent of each other, e.g., no two control valves on the same line?	NA
9	Is each control loop that is linked to a controlled variable (measurement) tied to a manipulated variable (valve). Are the control loops paired correctly by considering the following: • rangeability of manipulated variable? • sensitivity of controlled variable to changes in manipulated variable? • dynamics? • Interaction between control loops?	NA
10	Are local instruments versus remote instrumentation optimally selected? (check plant emergency alarm or remote function checks, i.e. call-up modem)	NA
11	Are additional instruments/analyzers needed for startup/shutdown?	N
12	Are protective systems (cut-in/cut-out) needed for critical equipment?	Y
13	Are there sufficient alarms/shut-offs? Redundancy and prioritization addressed?	Y

No.	Checklist Item for the Review of Design Specifications	
	Mechanical:	Y, N, N/A
1	Are the design pressure and temperature shown for existing equipment correct?	Y
2	Are there any limitations on existing equipment (e.g. hydrotest pressure/temperature/ chemical compatibility, foundations adequate for filling vessel with water, etc.)?	N
3	Are pressure relief arrangements (e.g., method, setting), correct?	Y
4	Are all materials including linings, insulation, and coatings suitable for the relevant operating conditions and environment? Are corrosion issues addressed? (especially for sub-surface equipment/lines)	Y
5	Are there any special bolting requirements?	N
6	Do any tie-ins, hot or cold, conform to current plant/site practice?	Y
7	Have auxiliary connections (e.g., for chemical cleaning), been specified?	Y
8	Are adequate corrosion probes specified?	NA
9	Has instrumentation on critical equipment (e.g., compressor) and the logic of emergency shutdown systems been checked?	Y
10	Have machinery sections, i.e. pumps, compressors, and blowers, been checked in detail for service and site location's electrical classification (if applicable)?	Y
	Operations	
1	Is the valving adequate for all anticipated operations?	Y
2	Can Startup and Shutdown be done safely?	Y
3	Is the instrumentation adequate for safe operation?	Y
4	Are utility connections properly isolated?	Y
5	Is there adequate access for safe operation?	Y
6	Has adequate fire protection and/or fire cover been provided?	Y
7	Is the installation method acceptable, e.g., hot work, hot taps?	Y
8	Is equipment adequately isolated?	Y
9	Are the utilities adequate (e.g., for purging, electrical service, natural gas supply pressure)?	Y
10	Are any plant/site modifications submitted or planned which might influence the design?	N
11	Are all relevant streams and major equipment shown on the flow and plot plans?	Y
12	Are the set points of controllers/alarms and the failure actions of control valves acceptable?	Y

No.	Checklist Item for the Review of Design Specifications	
	Maintenance:	Y, N, N/A
1	Is there adequate provision for maintenance activity or inspection, e.g., equipment isolation, equipment spacing/orientation, platforming?	Y
2	Are vessel openings / entry points adequate?	Y
3	Is there adequate access for day-to-day maintenance?	Y
4	Are engineering details compatible with local restrictions on construction (e.g., hot work permitted for field welds)?	Y
5	Does the facility conform to equipment handling requirements for maintenance (e.g. crane access)?	Y
	Project Implementation:	
1	Has there been a review showing that the design is cost-effective?	Y
2	Is Design Specification sufficiently detailed for the type of engineering envisaged?	Y
3	Where practicable, does the Design Specification allow for use of "standard" or previously proved equipment, to minimize procurement or operability concerns?	Y
4	Are engineering details compatible with local restrictions, e.g., hot work permitted for field welds?	Y
5	Are all new Equipment Identity Numbers shown?	Y
6	Is all new/revised Instrument Set Point information supplied?	NA
7	Are new service tie-ins properly identified, i.e., steam, air, water?	Y
8	If required, are the heat tracing/insulation requirements addressed?	NA
9	Is the presence of toxic elements in the process highlighted?	NA
10	Does welding methods meet construction/site requirements?	Y
11	Are alarm priorities specified in the operating manual?	Y
12	Have instrumentation and alarm cable routes been established	Y
13	Can proposed tie-ins be completed without major shutdown? (This would impact schedule.)	Y
14	Do engineering details reflect other planned adjacent projects?– e.g., electrical area classification may change.	NA
15	Will new facilities affect mechanical design parameters of existing equipment (e.g., stressed pipework, structure, civil loads)?	N
19	Can equipment be transported and positioned as required?	Y
20	Are there adequate existing access and facilities for construction activities, e.g. movement of cranes, plant and equipment/laydown areas, stores, etc.	Y
21	Is interaction with other planned construction activity unfeasible?	NA
22	Are underground services or obstructions adequately addressed (it may be advisable to specify that test digs be made)	Y
23	Are any waivers from site or planned engineering practices fully documented and approved?	NA

No.	Checklist Item for the Review of Design Specifications	
	Electrical	Y, N, N/A
1	Are all electrical supply points adequately defined and security level specified?	Y
2	Is the electrical load demand quantified, and can it be supplied?	Y
3	Are the Contractor's responsibilities spelled out regarding: • Area classification • System design and documentation • Engineering • Installation • Testing • Tie-ins	Y
4	Are there more practical and/or economic options than the Design Specification spells out?	None known
5	Are the Startup electrical resource requirements known / acceptable?	Y
6	Are there any Owner actions, e.g. refurbishment of equipment, tests, which should be specified? Should the Owner be asked to comment on the plant layout?	Done
7	Are all motor/ starters, cable trays, transformers, conduits, etc. properly grounded?	Y
	Documentation / Manuals	Y, N, N/A
1	Are design and/or as-built drawings readily available?	Y
2	Are operating, maintenance, inspection, shut-down/start-up and emergency procedures adequately developed and maintained/available at the site?	Y
3	Are all required permits available/at the site as required?	Y
4	Are all required sign-offs/approvals or certifications obtained for the system design	Y

Note below potential follow-up items/actions or Management of Change Items

_____

_____

_____

_____

_____

APPENDIX G

PRE-STARTUP SAFETY REVIEW (PSSR) CHECKLIST

GLOBAL REMEDIATION
PRE-STARTUP SAFETY REVIEW (PSSR) CHECKLIST
Hangar D, Bay 2
Westchester Country Airport, White Plains, New York

No.	Item	Y, N, N/A.
Section 1.0 Location, Access and Spacing		
1.1	Are access routes clear of piping, valves, headknockers (less than 7 feet vertical clearance), debris, construction materials or tripping hazards?	Y
1.2	Is there more than one escape route from any sizable work area and/or platform?	NA
1.3	Are signs properly posted to keep vehicles from blocking escape routes?	NA
1.4	Is all new equipment accessible for maintenance?	Y
1.5	Are obstacles such as low overheads, step-ups, and step downs clearly marked?	N
Section 2.0 Piping		
2.1	Are lines and valves properly identified?	Y
2.2	Is piping properly supported? Have pipe supports been securely attached with allowance for pipe movement where needed?	N
2.3	If HPDE/PVC piping is used, are the materials and bonding agents compatible with potential streams/temperatures? Is material rated for extended exterior use / are coatings needed	Y
2.4	Are valve wheels and valve stems oriented properly to prevent obstruction and provide adequate access for operation?	Y
2.5	Have all small bore piping connections been seal welded and gusseted where required?	NA
2.6	Have the correct materials and sizes for gaskets, studs, and nuts been used? • at least one full thread of stud exposed beyond the nut? • material for studs and nuts same as material for flanges?	Y
2.7	Is winterization adequate?	Y
2.8	Are check valves properly installed? (flow in right direction, don't rely on backflow to close, etc.)	NA
2.9	Have plastic thread protectors been removed from control valves and properly plugged or piped?	NA
2.10	Are adequate bleeders provided on control valve stations?	NA
2.11	Are there vents on all high points and drains on all low points where required?	Y
2.12	Has all pipe been inspected and hydrotested as per standards?	Y
2.13	Is the work on coating system application completed and does it meet requirements?	NA
2.14	Has insulation been properly applied (materials, weather-proofing, identification of non-asbestos insulation)?	Y
Section 3 Safety and Relief Facilities		
3.1	Have all safety valves been inspected, tested, and tagged within 30 days of startup date?	NA
3.2	Are safety valve block valves oriented with stems horizontal or downwards to guard against gate dropping into the line? Are valves car sealed as necessary (SV inlet, outlet, bypass, etc.)?	NA
3.3	Are safety valves and inlet/outlet blocks painted per Site Safety Standards?	NA
3.4	Do atmospheric safety valve discharge stacks have drain hole at the bottom?	NA
3.5	Can safety valves be reached without scaffolding?	NA
3.6	Does inlet line allow unrestricted flow to the safety valve or rupture disc? (i.e. Was full port block valve used? Has liquid leg been avoided?)	NA
3.7	Is safety valve discharge piping sloped away from safety valves?	NA
3.8	Are bleeders installed where required?	Y
3.9	Has adequate thermal relief been provided for long runs of pipe or equipment that can be blocked in?	NA
3.10	Has winterization of safety relief equipment including safety valves, seal drums, blowdown vessels, etc. been properly considered?	NA
Section 4.0 Utility Systems		
4.1	Have utility stations been properly identified?	NA
4.2	Do utility stations have proper hoses and fittings?	NA

No.	Item	Y, N, N/A.
Section 5 Sewers		
5.1	Are catch basins and sewer manways accessible and not blocked by stairways, ladders etc.?	NA
5.2	Are manhole covers and gratings of adequate strength to support loads and properly fitted to avoid tripping hazards and to prevent excessive vapor leakage?	NA
5.3	Are inlets to manholes and catch basins below the discharge?	NA
5.4	Have sewers been sealed correctly?	NA
5.5	Are sewer vents adequately located, identified and discharge away from equipment and overhead pipe racks	NA
5.6	Are accurate maps of the sewer system available if required?	NA
Section 6.0 Foundations, Undergrounds, Paving and Grading		
6.1	Do all areas have adequate drainage to avoid pooled areas and the fire hazard of drainage to low points under equipment?	Y
6.2	Have all anchor bolts and nuts been installed and is thread engagement adequate?	Y
6.3	Have abandoned foundations/supports/old equipment been removed to eliminate tripping hazards?	NA
Section 7.0 Structures		
7.1	Have structural members been fireproofed where required?	NA
7.2	Have 1/2 inch drain holes been provided for each 15 square feet of steel floor plate?	NA
7.3	Are openings in platforms sized properly for pipe or conduit penetrations and are they banded? Have unused openings been covered?	Y
7.4	Have ladder gates been installed across top entrance/all ladders as dictated by height?	NA
7.5	Do ladders have adequate toe clearance between the backside of rungs and the nearest object?	NA
7.6	Are escape ladders painted yellow?	NA
7.7	Are handrails, ladder rails, etc., free of abrupt finger catchers, galvanizing burrs, and do they have adequate clearance from nearby piping , etc.?	NA
7.8	Are toe plates installed around platforms?	NA
7.9	Is work on coating system application completed/does it meet requirements?	NA
Section 8.0 Buildings / Structures		
8.1	Are buildings /structures identified properly?	N
8.2	Is there more than one exit?	NA
8.3	Is the source of air intake for buildings taken from a safe location?	Y
8.4	Is the building properly pressurized if necessary, and has the operation of HVAC system been checked?	Y
8.5	Have fire extinguisher requirements been reviewed?	Y
8.6	Have the required alarm systems been installed and tested?	N
8.7	Are all doors equipped with crash bars?	NA
8.8	Is all pertinent emergency information posted?	N
Section 9.0 Vessels (Towers, Drums, Tanks, Heat Exchangers)		
9.1	Are vessels properly numbered and nameplates visible?	Y
9.2	Have the correct materials and sizes for gaskets, studs, and nuts been used (See 2.6 Piping)? **Note**: Recognizing the fact that it may not be feasible to visually inspect all flanged joints, try to look at a sample of flanges to ensure compliance.	Y
9.3	Had vessel internals been checked prior to closure?	Y
9.4	Is the winterization adequate?	Y
9.5	Has insulation been properly applied (materials, weather-proofing, etc	Y
9.6	Is the work on coating system application completed and does it meet requirements?	NA
9.7	Have thermal expansion signs been posted where required? Expansion joints are below grade.	NA
9.10	Are stairways in good condition?	NA
9.11	Is drainage within diked areas adequate?	NA
9.12	Have presser vacuum vents been installed correctly?	NA
9.13	Is fire protection/fireproofing adequate?	Y

No.	Item	Y, N, N/A.
9.14	Have inspection ports been provided at the correct locations on insulated vessels?	NA
9.15	Is the work on coating system application completed and does it meet requirements?	NA
9.16	Has level instrumentation been properly installed?	Y
9.17	Are handrails provided on tank roofs where required?	NA
9.18	Has secondary containment been properly installed?	NA
9.19	Is a hydrocarbon sample point available and installed in an environmentally sound fashion?	NA
Section 10 Combustion Devices		
10.1	Are dampers, air registers and operators properly installed and marked to indicate open/closed?	NA
10.2	Are sewer vent locations far enough away from combustion unit?	NA
10.3	Are locations and access to critical isolation valves adequate	NA
10.4	Have drain holes been drilled in structural steel to prevent accumulation of water?	NA
10.5	Is internal/external insulation or refractory properly installed?	NA
10.6	Has all construction materials, tools and debris been removed from inside before closure?	NA
10.7	Are fuel / gas safety shut-down valves and shutdown panels properly identified?	NA
10.8	Can device be easily removed for cleaning and maintenance?	NA
Section 11.0 Machinery		
11.1	Are all pumps, blowers, compressors, etc., and associated drivers properly numbered?	Y
11.2	Is switchgear associated with machinery properly labeled?	NA
11.3	Have coupling guards been provided/installed/bolted down?	NA
11.4	Has the equipment been properly lubricated?	Y
11.5	Are vents from lube and seal systems piped to a safe location?	NA
11.6	Has motor rotation been checked?	Y
11.7	Are seal flush lines correctly installed?	NA
11.8	Have all plastic thread protectors been removed from equipment such as pump casings and properly plugged or piped?	Y
11.9	Has alignment of machinery been checked?	Y
11.10	Has fit up of piping at machines been checked?	Y
11.11	Have permanent or temporary strainers been installed?	Y
Section 12.0 Instrumentation		
12.1	Are all items UL or FM approved and suitable for the area classification?	Y
12.2	Is labeling completed on instrument wires, terminals, etc.?	Y
12.3	Have instrument control loops been checked and verified?	Y
12.4	Are control valves oriented properly?	Y
12.5	Have control valves been stroked for proper response?	NA
12.6	Is there proper maintenance access to all instrument leads and transmitters?	Y
12.7	Can shutdown circuits be tested?	Y
12.8	Have the appropriate number of instrument bleeder valves been installed?	NA
12.9	Is instrument tubing adequately supported and leak checked?	NA
12.10	Has winterization of instruments and leg lines been done correctly?	Y
12.11	Have control and shut-off valves been checked to ensure fail safe operation in the event of instrument air or electrical disruption? (check P & ID)	NA
12.12	Are thermowells installed where temperature instruments are used in flammable, toxic, or otherwise hazardous pressurized or vacuum systems?	NA
12.13	Do pressure gauges meet area standards?	Y
12.14	Do insertion flow meters and analyzer sample probes have a blowout device, e.g. stop or safety chain? Does the prevention device prohibit the complete removal of the flow element or probe under pressure?	NA
12.15	Are excess flow valves installed in those gauge glass columns in toxic or flammable service?	NA
12.16	Are all flange ratings and facings in accordance with pipe specs?	Y

No.	Item	Y, N, N/A.
12.17	Are facilities in place to allow for on-line testing of trip elements on critical instruments?	N
12.18	Are all alarms installed to prioritize by distinguishing location and/or color?	N
12.19	Are alarm acknowledge buttons provided?	Y
12.20	Has aboveground wiring been fireproofed where required?	Y

Section 13 Electrical		
13.1	Are all items UL or FM approved and suitable for the area classification?	Y
13.2	Are all breakers, panels, starters, motors, etc., properly labeled to identify the equipment served?	Y
13.3	Are underground cables and duct banks properly marked, labeled, and identified?	NA
13.4	If the installation is in a corrosive environment, are adequate steps being taken to maintain electrical equipment reliability?	NA
13.5	Are the spacings and routings of power/control/ instrumentation cables and cable trays adequate and safe for the application?	Y
13.6	Is the lighting of the proper type and rating to provide a safe working environment?	Y
13.7	Are lighting fixtures and guards properly installed and supported?	Y
13.8	Are hydrocarbon detectors provided as required?	NA
13.9	Are all items properly mounted and installed and is there safe access for equipment maintenance?	Y
13.10	Are Vendor drawings, Startup procedures and test values available for Startup?	Y
13.11	Have all conduits been properly sealed and their covers installed?	Y
13.12	Are all motors, starters, cable trays, transformers, conduits, etc., properly grounded?	Y
13.13	Are all motor start/stop stations and switches with on/off positions properly labeled?	Y
13.14	Have all bolts and seals been installed on explosion-proof enclosures?	Y
Section 14.0 Personnel and Fire Protection		
14.1	Is lighting adequate?	Y
14.2	Are escape routes/emergency exits provided from all locations?	Y
14.3	Is safety equipment such as fire blankets/extinguishers and other safety equipment as needed for the equipment/service (gloves, respirators, etc.) located at/near the unit?	Y
14.4	Have safety showers, eye wash baths, air packs, blankets, face shields, etc. been properly identified?	NA
14.5	Have signs warning for noise, presence of hazardous materials, etc., been prominently displayed?	N
14.6	Has insulation for personnel protection been installed on all surfaces over 150 ^{O}F located within one foot horizontally of and seven vertically above a normal access, walkway, or work area?	NA
14.7	Are fire hydrants and monitors strategically located throughout the unit? (example: Is blockage of water streams by equipment avoided?)	Y
14.8	Is the number, type, and location of fire extinguishers adequate?	Y
14.9	Have locations of fire fighting equipment been reviewed by the project manager?	Y
Section 15.0 OIMS Items		
15.1	Does the facility match approved P&IDs (including approved changes)?	Y
15.2	Are the tie-in locations correct?	Y
15.3	Are all operating, maintenance, inspection, start-up/shutdown and emergency procedures complete and available at the site?	Y
15.4	Have operations and maintenance personnel been trained on the new unit/equipment and procedures?	Y
15.5	Has the following information been updated and provided to site personnel? • Site HAZCOM database, • MSDS Database, • Have Critical Safety Devices, been identified on all as built drawings, labeled/marked in the field, and incorporated into operating, maintenance and inspection procedures. • Others required by Site.	Y
15.6	Have emergency response plans been updated to reflect the new facilities (both unit and site)?	Y

15.7	Have project review comments been addressed (HAZOP and other safety reviews)?	Y
15.8	Have deviations from applicable Design Standards been approved?	Y
15.10	Has all required baseline inspection data been obtained (e.g. metal thickness etc.)?	NA
15.11	Have all unit P&IDs been updated to reflect the new or modified facilities (at least marked up on copies)? Are "as built" drawings in the Project Files?	Y

PSSR Followup Items

Item No.	Action Required	Date Completed	Responsibility
1.	Confirm checklist during pre-startup engineering inspection	2/17/04	AEP
2.	Install signage: Emergency Contacts, "Watch Step", "Hearing Protection Required Inside", "Authorized Personnel Only"		CG
3	Follow up installation tasks: 2 bollards at shed corners, support effluent pipe, install smoke alarm, install telephone messaging system		CG

Review Conducted by (name/date)

Michael Doherty	7/24/03
Anne Proctor	2/25/04

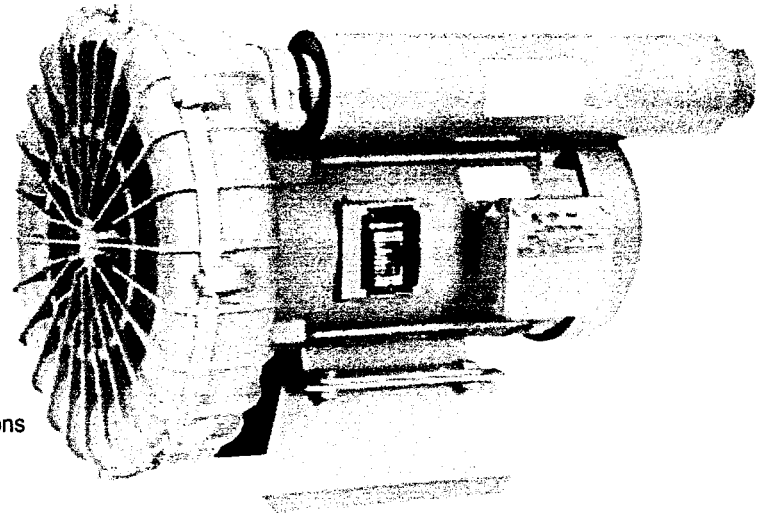
APPENDIX H

MANUFACTURER'S LITERATURE

Table of Contents

EN 6 & CP 6
Sealed Regenerative Blower w/Explosion-Proof Motor

FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 225 SCFM
- Maximum pressure: 104 IWG
- Maximum vacuum: 85 IWG
- Standard motor: 5.0 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

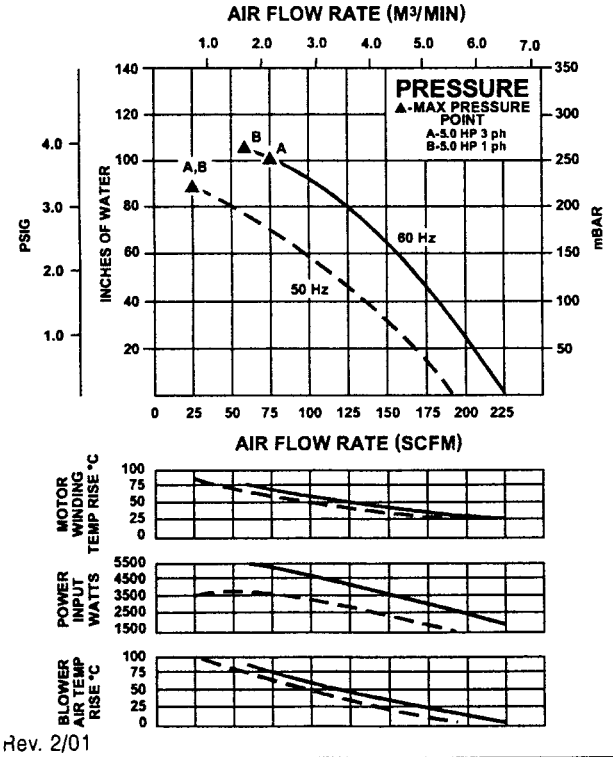


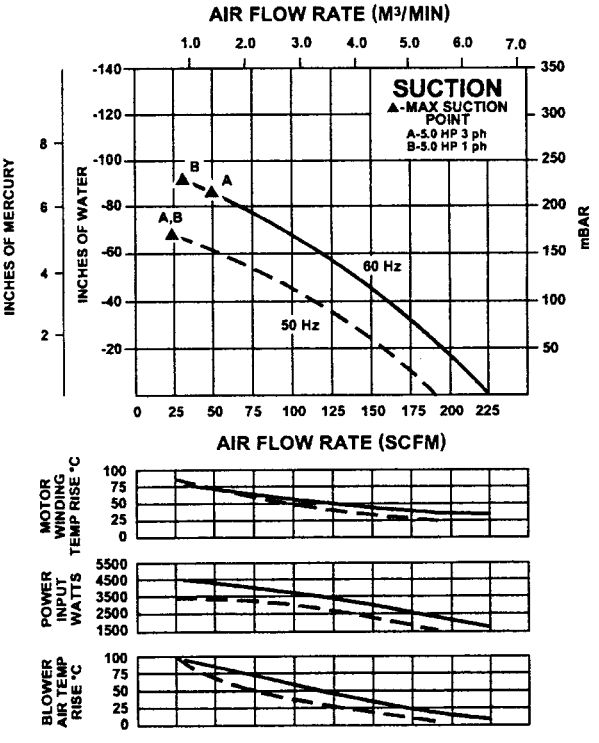
MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
  Air knives (used on blow-off applications)
- Variable frequency drive package

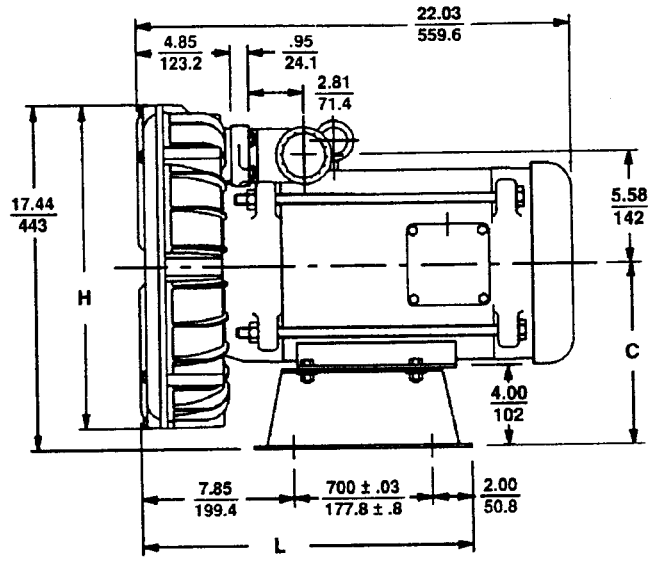
BLOWER PERFORMANCE AT STANDARD CONDITIONS

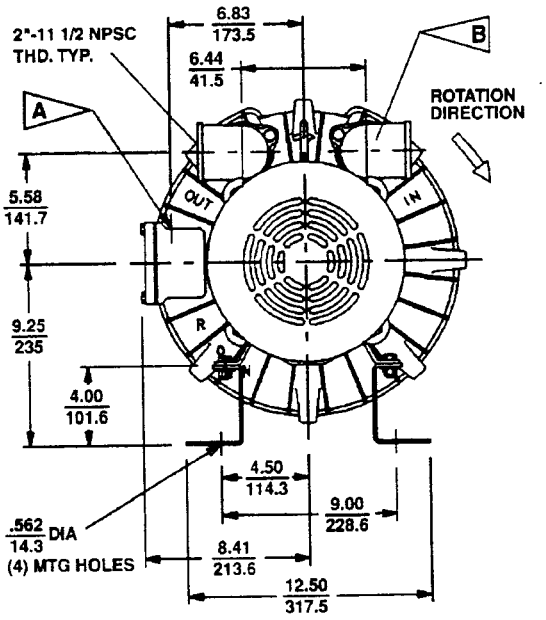




EN 6 & CP 6
Sealed Regenerative Blower w/Explosion-Proof Motor

Scale CAD drawing available upon request.





DIMENSIONS: IN / MM
TOLERANCES: .XX ± .12 / 3
(UNLESS OTHERWISE NOTED)

MODEL	L (IN/MM)	C (IN/MM)	H (IN/MM)
EN/CP6F72L	20.37/517	8.5/216	16.7/424
EN/CP6F5L	22.0/560	10.21/259	17.5/443

A — 0.75" NPT CONDUIT CONNECTION AT 12 O'CLOCK POSITION

B — 90° ELBOW SUPPLIED ON 1 PHASE MODEL ONLY

SPECIFICATIONS

ALL PRODUCTS LISTED INCLUDE MUFFLER PN 522948

MODEL	EN6F5L	EN6F72L		EN6F86L	CP6FW5LR	CP6FW72LR
Part No.	038361	038180		038438	–	038978
Motor Enclosure – Shaft Material	Explosion-proof – **CS**	Explosion-proof – **CS**		Explosion-proof – **CS**	Chem XP – **SS**	Chem XP – **SS**
Horsepower	5.0	5.0		5.0	Same as EN6F5L – 038361 except add Chemical Processing (CP) features from catalog inside front cover	Same as EN6F72L – 038180 except add Chemical Processing (CP) features from catalog inside front cover
Phase – Frequency [1]	Single - 60 Hz	Three - 60 Hz		Three - 60 Hz		
Voltage [1]	230	230	460	575		
Motor Nameplate Amps	19.5	14	7	5.7		
Max. Blower Amps [3]	23	15.8	7.9	6.3		
Inrush Amps	175	152	76	38		
Starter Size	2	1	0	0		
Service Factor	1.0	1.0		1.0		
Thermal Protection [2]	Class B - Pilot Duty	Class B - Pilot Duty		Class B - Pilot Duty		
XP Motor Class – Group	I-D	I-D, II-F&G		I-D, II-F&G		
Shipping Weight	232 lb (105 kg)	160 lb (73 kg)		160 lb (73 kg)		

[1] Rotron motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **190-208/380-415 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

[2] Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

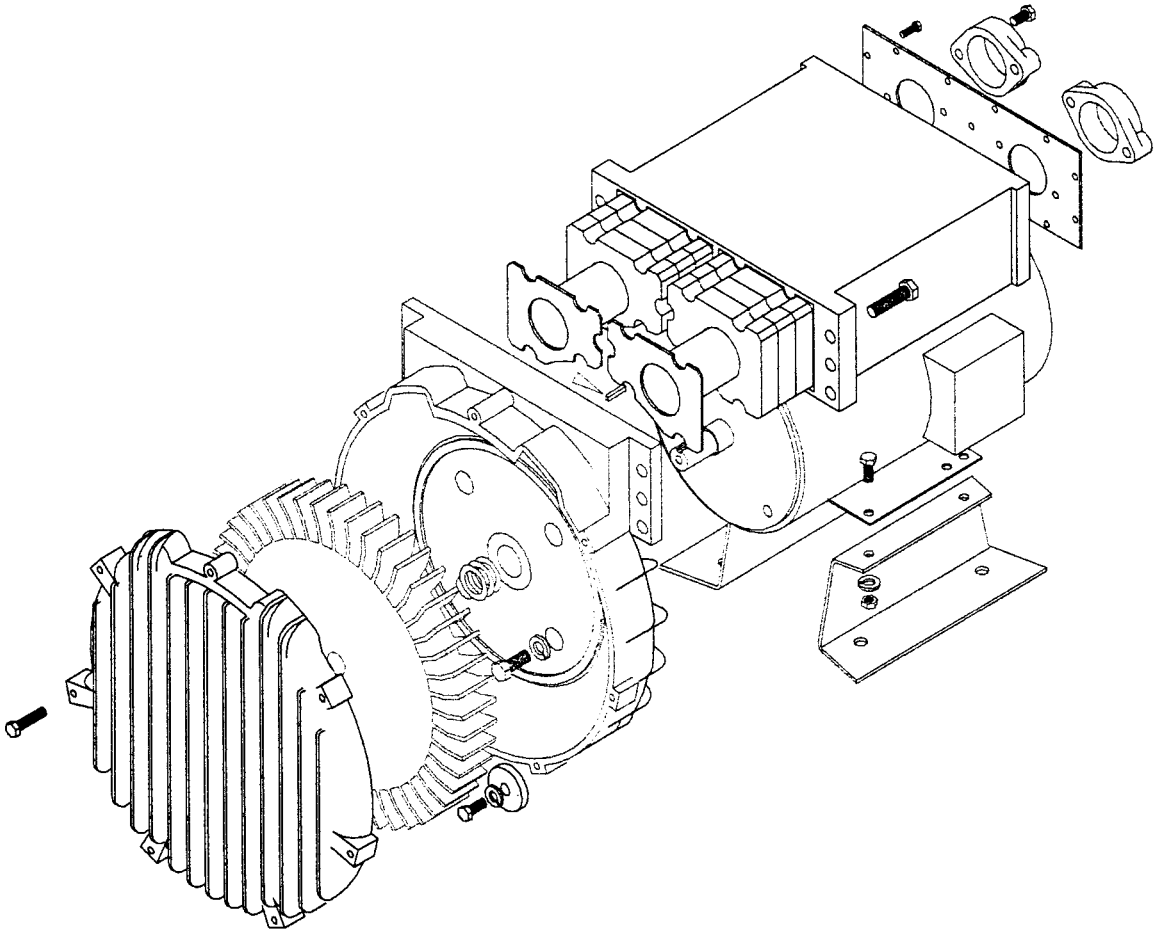
[3] Maximum blower amps corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

Specifications subject to change without notice. Please consult your Local Field Sales Engineer for specification updates.

SERVICE AND PARTS MANUAL FOR BLOWER MODEL

EN6, EN858, EN909, EN14

DIRECT DRIVE REGENERATIVE BLOWER



AMETEK

Technical & Industrial Products
627 Lake Street, Kent, OH 44240 U.S.A.
Telephone: 330-673-3452 Fax: 330-677-3306
e-mail: info@ametektmd.com
internet: www.ametektmd.com

Your Choice. Our Commitment.™

WARRANTY, INSTALLATION, MAINTENANCE AND TROUBLESHOOTING INSTRUCTIONS

AMETEK

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e-mail: info@ametektmd.com web site: internet: www.ametektmd.com

1. **No Fault Policy** - AMETEK Rotron DR, EN and HiE regenerative direct drive blowers are guaranteed for one full year from the date of installation (limited to 18 months from the date of shipment.) to the original purchaser only. Should the blower fail, **regardless of the cause of failure**, we will at our option repair or replace the blower.

2. **Standard Policy** - AMETEK Rotron Minispiral, Revaflow, Multiflow, Nautilair, remote drive blowers, moisture separators, packaged units, CP blowers, Nasty Gas™ models and special built (EO) products are guaranteed for one full year from date of shipment for workmanship and material defect to the original purchaser only. Should the blower fail, we will evaluate the failure. If failure is determined to be workmanship or material defect related, we will at our option repair or replace the blower.

3. **Parts Policy** - AMETEK Rotron spare parts and accessories are guaranteed for three months from date of shipment for workmanship and material defect to the original purchaser only. If failure is determined to be workmanship or material defect related we will at our option repair or replace the part.

Corrective Action - A written report will be provided indicating reason(s) for failure, with suggestions for corrective action. Subsequent customer failures due to abuse, misuse, misapplication or repeat offense will not be covered. AMETEK Rotron will then notify you of your options. Any failed unit that is tampered with by attempting repair or diagnosis will void the warranty, unless authorized by the factory.

Terms and Conditions - Our warranty covers repairs or replacement of regenerative blowers only, and will not cover labor for installation, outbound and inbound shipping costs, accessories or other items not considered integral blower parts. Charges may be incurred on products returned for reasons other than failures covered by their appropriate warranty. Out-of -warranty product and in warranty product returned for failures determined to be caused by abuse, misuse, or repeat offense will be subject to an evaluation charge. Maximum liability will in no case exceed the value of the product purchased. Damage resulting from mishandling during shipment is not covered by this warranty. It is the responsibility of the purchaser to file claims with the carrier. Other terms and conditions of sale are stated on the back of the order acknowledgement.

Installation Instructions for SL, DR, EN, CP, and HiE Series Blowers

1. **Bolt It Down** - Any blower must be secured against movement prior to starting or testing to prevent injury or damage. The blower does not vibrate much more than a standard electric motor.

2. **Filtration** - All blowers should be filtered prior to starting. Care must be taken so that no foreign material enters the blower. If foreign material does enter the blower, it could cause internal damage or may exit at extremely high velocity.

   Should excessive amounts of material pass through the blower, it is suggested that the cover(s) and impeller(s) be removed periodically and cleaned to avoid impeller imbalance. Impeller

imbalance greatly speeds bearing wear, thus reducing blower life. Disassembling the blower will void warranty, so contact the factory for cleaning authorization.

3. **Support the Piping** - The blower flanges and nozzles are designed as connection points only and are not designed to be support members.

   Caution: Plastic piping should not be used on blowers larger than 1 HP that are operating near their maximum pressure or suction point. Blower housing and nearby piping temperatures can exceed 200°F. Access by personnel to the blower or nearby piping should be limited, guarded, or marked, to prevent danger of burns.

4. **Wiring** - Blowers must be wired and protected/fused in accordance with local and national electrical codes. All blowers must be grounded to prevent electrical shock. Slo-Blo or time delay fuses should be used to bypass the first second of start-up amperage.

5. **Pressure/Suction Maximums** - The maximum pressure and/or suction listed on the model label should not be exceeded. This can be monitored by means of a pressure or suction gage (available from Rotron), installed in the piping at the blower outlet or inlet. Also, if problems do arise, the Rotron Field representative will need to know the operating pressure/suction to properly diagnose the problem.

6. **Excess Air** - Bleed excess air off. DO NOT throttle to reduce flow. When bleeding off excess air, the blower draws less power and runs cooler.

   Note: Remote Drive (Motorless) Blowers - Properly designed and installed guards should be used on all belts, pulleys, couplings, etc. Observe maximum remote drive speed allowable. Due to the range of uses, drive guards are the responsibility of the customer or user. Belts should be tensioned using belt gauge.

Maintenance Procedure

When properly piped, filtered, and applied, little or no routine maintenance is required. Keep the filter clean. Also, all standard models in the DR, EN, CP, and HiE series have sealed bearings that require no maintenance. Bearing should be changed after 15,000 to 20,000 hours, on average. Replacement bearing information is specified on the chart below.

Bearing Part Number	Size	Seal Material	Grease	Heat Stabilized
510217 510218 510219	205 206 207	Polyacrylic	Nye Rheotemp 500 30% +/- 5% Fill	Yes – 325 F
510449 516440 516648	203 202 307	Buna N	Exxon Polyrex Grease	NO
516840 516841 516842 516843 516844 516845 516846 516847	206 207 208 210 309 310 311 313	Buna N	Exxon Polyrex Grease	NO

Troubleshooting

		POSSIBLE CAUSE	OUT OF WARRANTY REMEDY ***
IMPELLER DOES NOT TURN	Humming Sound	1. * One phase of power line not connected 2. * One phase of stator winding open 3. Bearings defective 4. Impeller jammed by foreign material 5. Impeller jammed against housing or cover 6. ** Capacitor open	1. Connect 2. Rewind or buy new motor 3. Change bearings 4. Clean and add filter 5. Adjust 6. Change capacitor
	No Sound	1. * Two phases of power line not connected 2. * Two phases of stator winding open	1. Connect 2. Rewind or buy new motor
IMPELLER TURNS	Blown Fuse	1. Insufficient fuse capacity 2. Short circuit	1. Use time delay fuse of proper rating 2. Repair
	Motor Overheated Or Protector Trips	1. High or low voltage 2. * Operating in single phase condition 3. Bearings defective 4. Impeller rubbing against housing or cover 5. Impeller or air passage clogged by foreign material 6. Unit operating beyond performance range 7. Capacitor shorted 8. * One phase of stator winding short circuited	1. Check input voltage 2. Check connections 3. Check bearings 4. Adjust 5. Clean and add filter 6. Reduce system pressure/vacuum 7. Change capacitor 8. Rewind or buy new motor
	Abnormal Sound	1. Impeller rubbing against housing or cover 2. Impeller or air passages clogged by foreign material 3. Bearings defective	1. Adjust 2. Clean and add filter 3. Change bearings
	Performance Below Standard	1. Leak in piping 2. Piping and air passages clogged 3. Impeller rotation reversed 4. Leak in blower 5. Low voltage	1. Tighten 2. Clean 3. Check wiring 4. Tighten cover, flange 5. Check input voltage

* 3 phase units

** 1 phase units

*** Disassembly and repair of new blowers or motors will void the Rotron warranty. Factory should be contacted prior to any attempt to field repair an in-warranty unit.

Blower Disassembly:

WARNING: Attempting to repair or diagnose a blower may void Rotron's warranty. It may also be difficult to successfully disassemble and reassemble the unit.

1) Disconnect the power leads. **CAUTION:** Be sure the power is disconnected before doing any work whatsoever on the unit.

2) Remove or separate piping and/or mufflers and filters from the unit.

3) Remove the cover bolts and then the cover. **NOTE:** Some units are equipped with seals. It is mandatory that these seals be replaced once the unit has been opened.

4) Remove the impeller bolt and washers and then remove the impeller. **NOTE:** Never pry on the edges of the impeller. Use a puller as necessary.

5) Carefully note the number and location of the shims. Remove and set them aside. NOTE: If the disassembly was for inspection and cleaning the unit may now be reassembled by reversing the above steps. If motor servicing or replacement and/or impeller replacement is required the same shims may not be used. It will be necessary to re-shim the impeller according to the procedure explained under assembly.

6) Remove the housing bolts and remove the motor assembly (arbor/.housing on remote drive models).

7) Arbor disassembly (Applicable on remote drive models only):
   a) Slide the bearing retraining sleeve off the shaft at the blower end.
   b) Remove the four (4) screws and the bearing retaining plate from the blower end.
   c) Lift the shaft assembly far enough out of the arbor to allow removal of the blower end snap ring.
   d) Remove the shaft assembly from the arbor.
   e) If necessary, remove the shaft dust seal from the pulley end of the arbor.

Muffler Material Replacement:

1) Remove the manifold cover bolts and them manifold cover.

2) The muffler material can now be removed and replaced if necessary. On blowers with fiberglass acoustical wrap the tubular retaining screens with the fiberglass matting before sliding the muffler pads over the screens.

3) Reassemble by reversing the procedure.

NOTE: On DR068 models with tubular mufflers it is necessary to remove the cover and impeller accessing the muffler material from the housing cavity.

Blower Reassembly:

1) Place the assembled motor (assembled arbor assembly for remote drive models) against the rear of the housing and fasten with the bolts and washer.

2) To ensure the impeller is centered within the housing cavity re-shim the impeller according to the procedure outlined below.

3) If blower had a seal replace the seal with a new one.

4) Place the impeller onto the shaft making sure the shaft key is in place and fasten with the bolt, washer and spacer as applicable. Torque the impeller bolt per the table below. Once fastened carefully rotate the impeller to be sure it turns freely.

5) Replace the cover and fasten with bolts.

6) Reconnect the power leads to the motor per the motor nameplate.

Bolt Size	Torque
1/4-20	6.25 +/- 0.25
5/16-18	11.5 +/- 0.25
3/8-16	20.0 +/- 0.5
½-13	49.0 +/- 1
5/8 –11	90.0 +/- 2

Impeller Shimming Procedure:

WARNING: This unit may be difficult to shim. Extreme care may be exercised.

Tools Needed:Machinist's Parallel Bar
Vernier Caliper with depth measuring capability
Feeler gauges or depth gauge

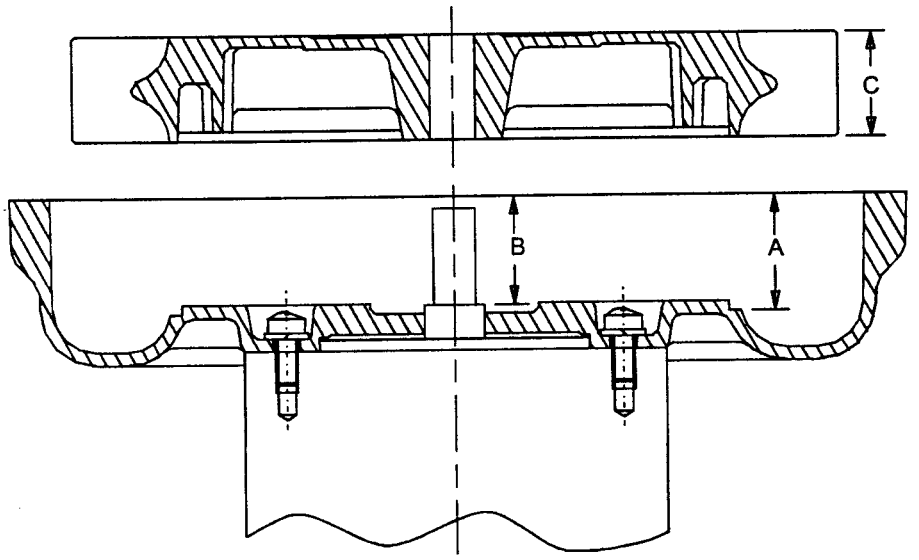
Measure the Following:

Distance from the flange face to the housing (A)
Distance from the flange face to the motor shaft shoulder (B)
Impeller Thickness (C)

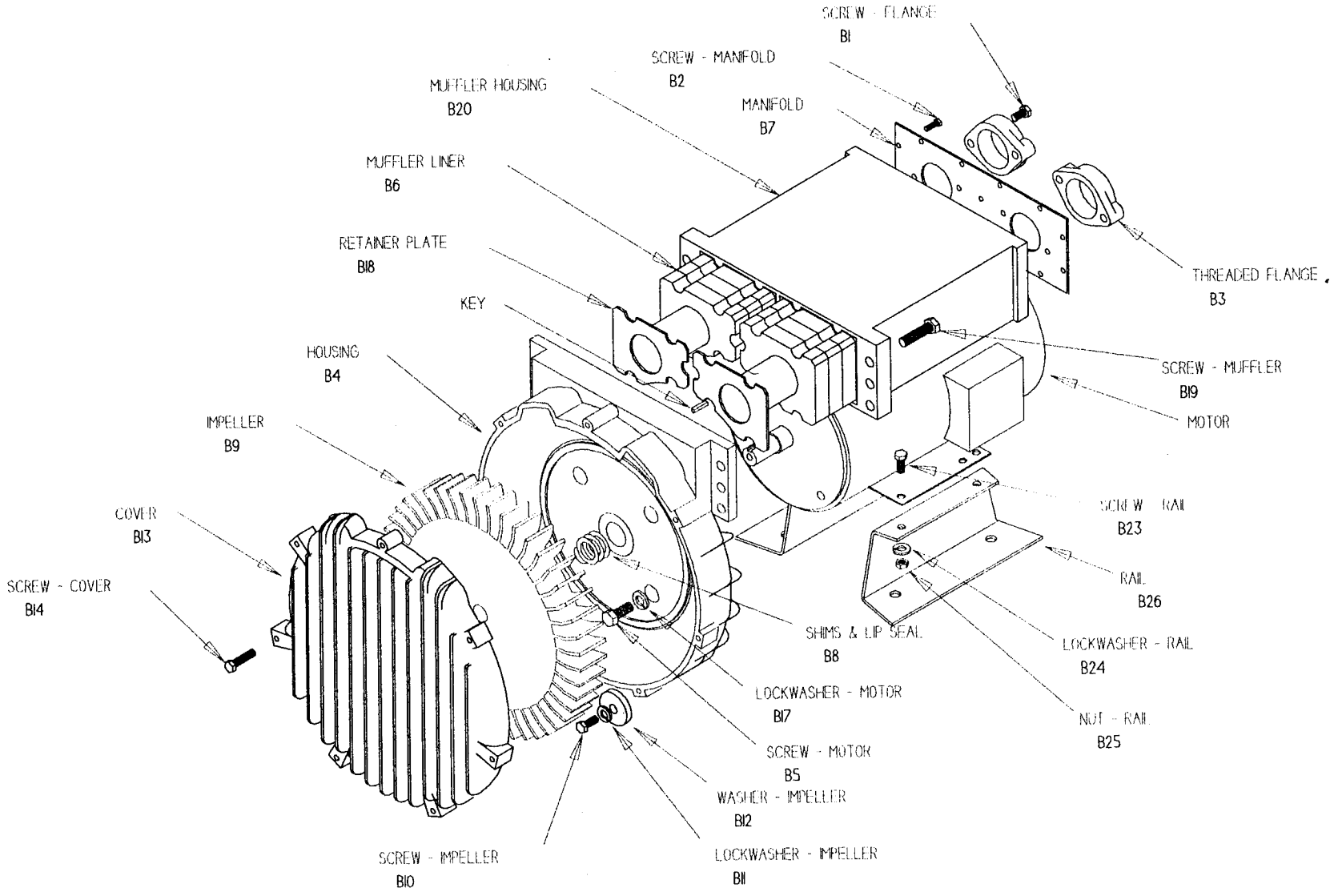
Measurements (A) and (B) are made by laying the parallel bar across the housing flange face and measuring to the proper points. Each measurement should be made at three points, and the average of the readings should be used.

Shim Thickness = B – (A+C)/2

After the impeller installation (step #4 above) the impeller/cover clearance can be checked with feeler gauges, laying the parallel bar across the housing flange face. This clearance should nominally be (A+C)/2.



ASSEMBLY DIAGRAM
EN6 EN808 EN909 EN14



Parts Breakdown

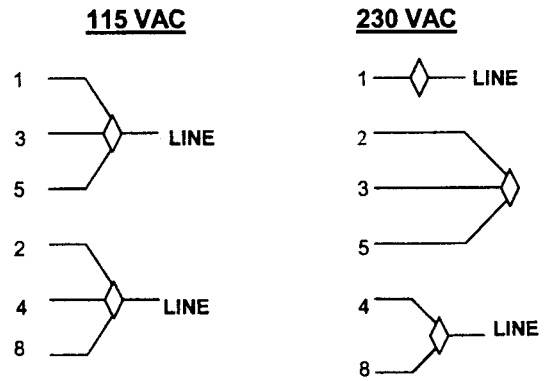
Item No.	Qty. Req'd	Description	EN6 038361 / 038180 / 038438	EN858 038744 / 038745 / 080070	EN909 038629 / 038634 / 080071	EN14 038762 / 038761	EN14 038760
M3	1	Key Motor Shaft	510212	511532	511532	155066	511532
B1	6	Screw, Flange	(4 pcs) 120255	(4 pcs) 155067	140016	140016	140016
B2		Screw, Manifold	Not Used	Not Used	Not Used	Not Used	Not Used
B3	2	Flange	See Next Page	511614	529912	529912	529912
	2	O-ring	Not Used	Not Used	155377	155377	155377
		Elbow 90°	See Next Page	Not Used	Not Used	Not Used	Not Used
B4	1	Housing	516747	516764	515356	516799	516797
B5	4	Screw, Hsg /Motor	251792	155034	140014	120205	120205
B6	54	Muffler Material	Not Used	(32) 550020	(40 pcs) 529943	550073	550073
	2	Matting, Fiberglass	Not Used	550075	550077	550116	550116
B7		Manifold Plate	Not Used	Not Used	Not Used	Not Used	Not Used
B8	*	Shim .002"	272703	511547	511547	515991	511547
	*	Shim .005"	272704	511548	511548	515992	511548
	*	Shim .010"	272705	511549	511549	515993	511549
	*	Shim .020"	272706	511550	511550	515994	511550
	*	Shim .030"	Not Used	Not Used	Not Used	Not Used	Not Used
B9	1	Impeller	515484	515249	515270	515509	515683
B10	1	Bolt, Impeller	251791	120210	140015	155068	120251
B11	1	Lockwasher, Impeller	251787	251788	251788	251788	251788
B12	1	Washer, Impeller	Not Used	Not Used	Not Used	Not Used	Not Used
B13	1	Cover	515488	515247	515359	515910	515910
B14	8	Screw, Cover	251790	140016	140016	155069	155069
B15	1	Eye Bolt	Not Used	140019	140019	140019	140019
B16	1	Spacer, Impeller Bolt	478336	515555	511529	515990	515990
		Shaft Sleeve	Not Used	Not Used	Not Used	Not Used	Not Used
B17		Lockwasher, Housing	Not Used	Not Used	Not Used	Not Used	Not Used
B18	1	Screen, Muffler Retaining, Right (**)	Not Used	515407	529939	550040	550040
	1	Screen, Muffler Retaining, Left (**)	Not Used	515408	529940	550042	550042
B19	6	Bolt, Muffler Hsg/Hsg	Not Used	155025	155025	155067	155067
B19A	4	Bolt, Muffler/Housing	Not Used	120214	120214	120214	120214
B20	1	Muffler Housing	Not Used	550019	529932	550039	550039
	1	Muffler Discrete	522948	Not Used	Not Used	Not Used	Not Used
		Bolt, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used
		Lockwasher, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used
		Washer, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used
		Spacer, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used
B21		Heat Slinger	Not Used	Not Used	Not Used	Not Used	Not Used
B22		Guard Heat slinger	Not Used	Not Used	Not Used	Not Used	Not Used

B23	4	Bolt, Rail	251791	120007	155095	120256	155025
B24	4	Lockwasher Rail	251787	251787	251787	251788	251788
B24A	8	Washer, Rail/Motor	Not Used	Not Used	155091	Not Used	Not Used
B25	6	Nut, Rail	251789	251789	251789	155070	155070
B26	2	Rail Mounting	478338	595301	595301	516242	516242
	1	Lip Seal	516691	516693	516693	516694	516693

Model	Part No.	Motor	Wiring Diagram	Specific Parts	Rear (M1)	Impeller End (M2)
EN6F5L	038361	529475	M + L	B3 Flange 511480 (2 pcs)	510217	510218
EN6F72L	038180	500297	K + L	B3 Flange 478341 (2 pcs) Elbow Not Used Screen Guard, Flange 511479 (2		
EN6F86L	038438	529634	N + L	B3 Flange 478341 (2 pcs) Elbow Not Used Screen Guard, Flange 511479 (2		
EN858BD72WL	038744	515556	K + L		516840	516844
EN858BD86WL	038745	529627	N + L			
EN858BA72W	080070	515558	K + L			
EN909BG72WL	038629	511512	K + L		516842	516844
EN909BG86WL	038634	529631	N + L			
EN909BD72WL	080071	550675	K + L			
EN14DX86MWL	038762	529632	N + L		516844	516846
EN14DX72MWL	038761	516095	K + L			
EN14BK72MWL	038760	511513	K + L		516842	516844

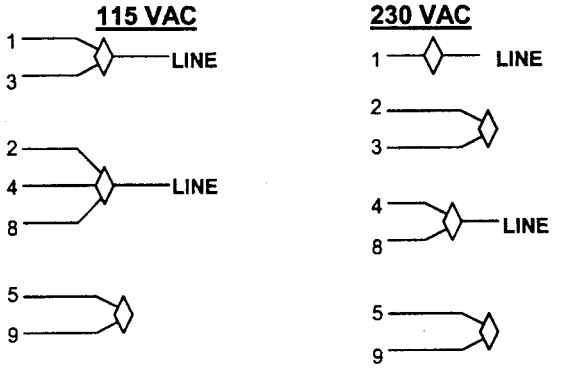
WIRING DIAGRAMS, XP MOTORS

H. 1Ø, 6 WIRE



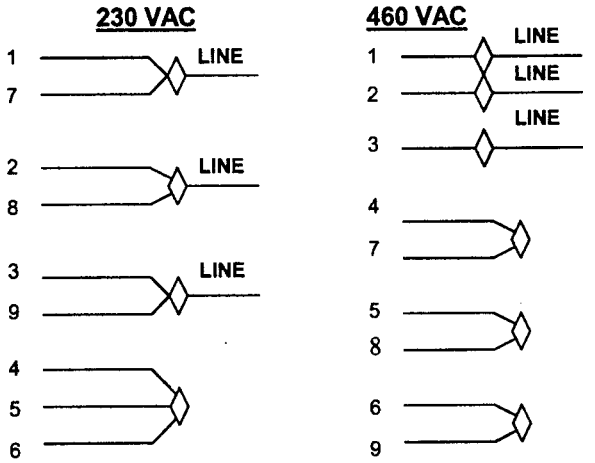
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

I. 1Ø, 7 WIRE



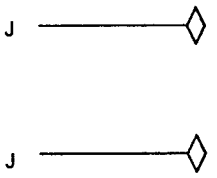
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

K. 3Ø, 9 WIRE



INTERCHANGE ANY TWO LEAD LINES TO REVERSE ROTATION

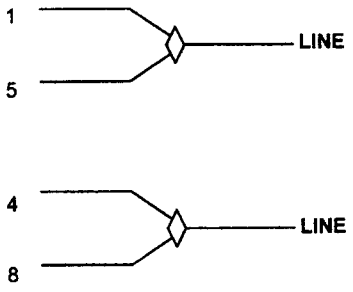
L. PILOT DUTY THERMAL OVERLOADS



HOOK J LEADS TO CONTROL CIRCUITRY

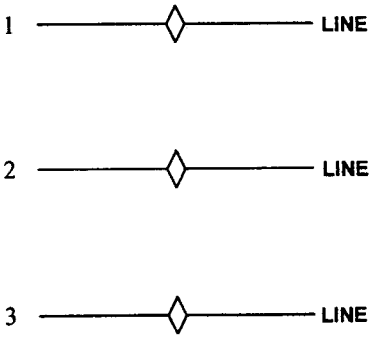
M. 1Ø 230 VAC

SINGLE VOLTAGE



INTERCHANGE LEADWIRES 5 & 8 TO REVERSE ROTATION

N. 3Ø 575 VAC



INTERCHAGE ANY TWO LEAD LINES TO REVERSE ROTATION

GENERAL INSTALLATION INSTRUCTIONS

AMETEK

ROTRON INDUSTRIAL PRODUCTS
75 North Street, Saugerties, NY 12477 U.S.A.
Telephone: 845 -246-3401 Fax: 845-246-3802
e-mail: rotronindustrial@ametek.com website: www.rotronindustrial.com

Rotron Regenerative Blowers

Installation Instructions for SL, DR, EN, CP, and HiE Series Blowers

1. **Bolt It Down** - Any blower must be secured against movement prior to starting or testing to prevent injury or damage. The blower does not vibrate much more than a standard electric motor.

2. **Filtration** - All blowers should be filtered prior to starting. Care must be taken so that no foreign material enters the blower. If foreign material does enter the blower, it could cause internal damage or may exit at extremely high velocity.

   Should excessive amounts of material pass through the blower, it is suggested that the cover(s) and impeller(s) be removed periodically and cleaned to avoid impeller imbalance. Impeller imbalance greatly speeds bearing wear, thus reducing blower life. Disassembling the blower will void warranty, so contact the factory for cleaning authorization.

3. **Support the Piping** - The blower flanges and nozzles are designed as connection points only and are not designed to be support members.

   Caution: Plastic piping should not be used on blowers larger than 1 HP that are operating near their maximum pressure or suction point. Blower housing and nearby piping temperatures can exceed 200°F. Access by personnel to the blower or nearby piping should be limited, guarded, or marked, to prevent danger of burns.

4. **Wiring** - Blowers must be wired and protected/fused in accordance with local and national electrical codes. All blowers must be grounded to prevent electrical shock. Slo-Blo or time delay fuses should be used to bypass the first second of start-up amperage.

5. **Pressure/Suction Maximums** - The maximum pressure and/or suction listed on the model label should not be exceeded. This can be monitored by means of a pressure or suction gage (available from Rotron), installed in the piping at the blower outlet or inlet. Also, if problems do arise, the Rotron Field representative will need to know the operating pressure/suction to properly diagnose the problem.

6. **Excess Air** - Bleed excess air off. DO NOT throttle to reduce flow. When bleeding off excess air, the blower draws less power and runs cooler.

   Note: Remote Drive (Motorless) Blowers - Properly designed and installed guards should be used on all belts, pulleys, couplings, etc. Observe maximum remote drive speed allowable. Due to the range of uses, drive guards are the responsibility of the customer or user. Belts should be tensioned using belt gauge.

For further information regarding Rotron regenerative blowers (including service & parts manuals), please contact your local field sales engineer.

Revised 12/10/98

Maintenance Procedure

When properly piped, filtered, and applied, little or no routine maintenance is required. Keep the filter clean. Also, all standard models in the DR, EN, CP, and HiE series have sealed bearings that require no maintenance. Bearing should be changed after 15,000 to 20,000 hours, on average. Replacement bearing information is specified on the chart below.

Bearing Part Number	Size	Seal Material	Grease	Heat Stabilized
510217 510218 510219	205 206 207	Polyacrylic	Nye Rheotemp 500 30% +/- 5% Fill	Yes – 325 F
510449 516440 516648	203 202 307	Buna N	Shell Dolium "R" 25-40% Fill	NO
516840 516841 516842 516843 516844 516845 516846 516847	206 207 208 210 309 310 311 313	Buna N	Shell Dolium "R" 30%+/- 5% Fill	NO

Troubleshooting

		POSSIBLE CAUSE	OUT OF WARRANTY REMEDY ***
IMPELLER DOE NOT TURN	Humming Sound	1. * One phase of power line not connected 2. * One phase of stator winding open 3. Bearings defective 4. Impeller jammed by foreign material 5. Impeller jammed against housing or cover 6. ** Capacitor open	1. Connect 2. Rewind or buy new motor 3. Change bearings 4. Clean and add filter 5. Adjust 6. Change capacitor
	No Sound	1. * Two phases of power line not connected 2. * Two phases of stator winding open	1. Connect 2. Rewind or buy new motor
IMPELLER TURNS	Blown Fuse	1. Insufficient fuse capacity 2. Short circuit	1. Use time delay fuse of proper rating 2. Repair
	Motor Overheated Or Protector Trips	1. High or low voltage 2. * Operating in single phase condition 3. Bearings defective 4. Impeller rubbing against housing or cover 5. Impeller or air passage clogged by foreign material 6. Unit operating beyond performance range 7. Capacitor shorted 8. * One phase of stator winding short circuited	1. Check input voltage 2. Check connections 3. Check bearings 4. Adjust 5. Clean and add filter 6. Reduce system pressure/vacuum 7. Change capacitor 8. Rewind or buy new motor
	Abnormal Sound	1. Impeller rubbing against housing or cover 2. Impeller or air passages clogged by foreign material 3. Bearings defective	1. Adjust 2. Clean and add filter 3. Change bearings
	Performance Below Standard	1. Leak in piping 2. Piping and air passages clogged 3. Impeller rotation reversed 4. Leak in blower 5. Low voltage	1. Tighten 2. Clean 3. Check wiring 4. Tighten cover, flange 5. Check input voltage

* 3 phase units
** 1 phase units
*** Disassembly and repair of new blowers or motors will void the Rotron warranty. Factory should be contacted prior to any attempt to field repair an in-warranty unit.

Revised 12/10/98

AMETEK®
ROTRON TECHNICAL MOTOR DIVISION
REGENERATIVE BLOWER GROUP

75 North Street
Saugerties, New York 12477
Phone: (845) 246-3401
Fax: (845) 246-3802

EXPLOSION-PROOF BLOWERS

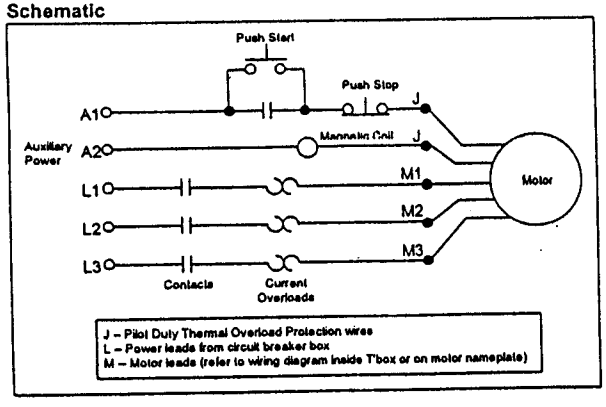
IMPORTANT: Read before wiring this Explosion-proof Blower

This AMETEK Rotron Explosion-proof Regenerative Blower may be equipped with Pilot Duty Thermal Overload (PDTO) or Automatic Thermal Overload (ATO) protection. When properly wired to a motor starter, this protection limits the motor winding temperature rise per the National Electric Code (NEC) article 500. Failure to properly wire this blower is an NEC violation and could cause an explosion. AMETEK Rotron assumes no responsibilities for damages incurred by negligent use of this product, and will not warranty a blower on which the PDTO is not properly connected. Some blowers 1 HP and under do not require PDTO and have built in ATO. Consult the factory if verification of wiring connections is required.

In all cases, follow the motor controller manufacturer's instructions. The following schematic is for conceptual understanding only, and may not apply to all motor/controller combinations.

The manufacturer's wiring diagram found on the motor takes precedent over reference diagrams supplied by AMETEK Rotron Technical Motor Division.

Schematic



The schematic is shown for a three phase motor. For a single phase motor disregard L3 and M3. Pushing the START button completes the auxiliary control circuit, allowing current to flow through the magnetic coil. The contacts are magnetically closed, starting the motor and latching the auxiliary circuit. The motor will continue to run until the STOP push button is depressed, the motor reaches the overload temperature, or the current sensing overloads trip out.

If you have any questions, contact AMETEK Rotron at 914-246-3401 for the location of your area representative.

POLICY REGARDING INSTALLATION OF AMETEK ROTRON REGENERATIVE BLOWERS IN HAZARDOUS LOCATIONS

AMETEK Rotron will not knowingly specify, design or build any regenerative blower for installation in a hazardous, explosive location without the proper NEMA motor enclosure. AMETEK Rotron does not recognize sealed blowers as a substitute for explosion-proof motors. Sealed units with standard TEFC motors should never be utilized where local, state, and/or federal codes specify the use of explosion-proof equipment.

AMETEK Rotron has a complete line of regenerative blowers with explosion-proof motors. Division 1 & 2, Class I, Group D; Class II, Groups F & G requirements are met with these standard explosion-proof blowers.

AMETEK Rotron will not knowingly specify, design or build any regenerative blower for installation in a hazardous, corrosive environment without the proper surface treatment and sealing options.

AMETEK Rotron has a complete line of Chemical Processing and Nasty Gas™ regenerative blowers with Chem-Tough™, stainless steel parts, and seals.

AMETEK Rotron offers general application guidance; however, suitability of the particular blower selection is ultimately the responsibility of the purchaser, not the manufacturer of the blower.

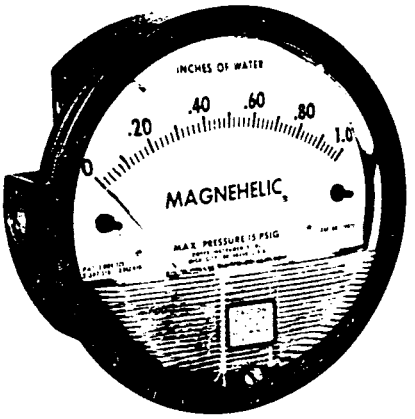
FS2 Rev B 3/10/98

02/20/02 Rev. E

BULLETIN NO. A-27B

Magnehelic® Differential Pressure Gage

OPERATING INSTRUCTIONS



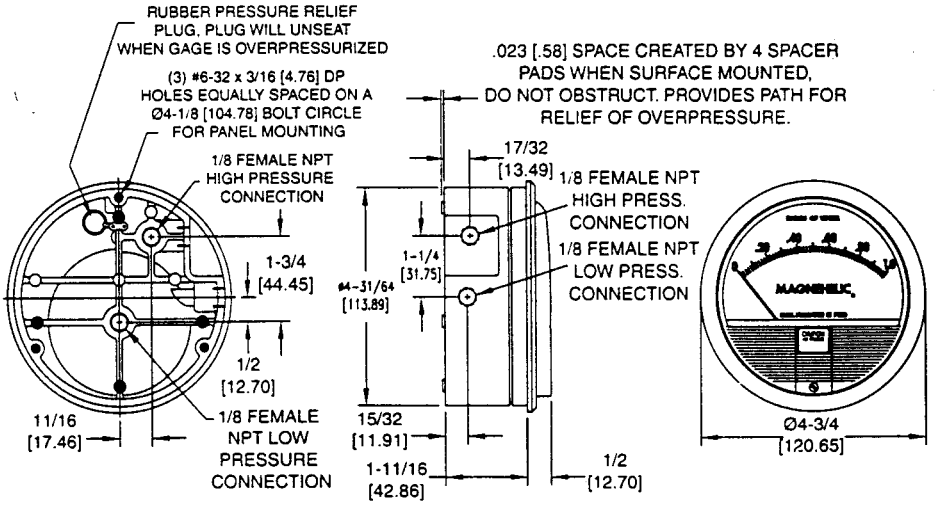
SPECIFICATIONS

Dimensions: 4-3/4" dia. x 2-3/16" deep.
Weight: 1 lb. 2 oz. (510 g)
Finished: Baked dark gray enamel.
Connections: 1/8" female NPT high and low pressure taps, duplicated, one pair side and one pair back.
Accuracy: Plus or minus 2% of full scale, at 70°F (21.1°C). (Model 2000-0, 3%; 2000-00, 4%).
Pressure Rating: 15 PSI (1.03 bar)
Ambient Temperature Range: 20° to 140°F (-7 to 60°C).
Standard gage accessories include two 1/8" male NPT plugs for duplicate pressure taps, two 1/8" male NPT pipe thread to rubber tubing adapters, and three flush mounting adapters with screws.

Caution: For use with air or compatible gases only.

For repeated over-ranging or high cycle rates, contact factory.

Not for use with Hydrogen gas. Dangerous reactions will occur.



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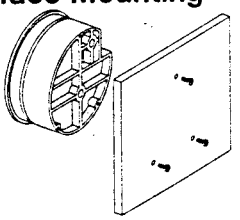
Lit-By Fax: 888/891-4963

Overpressure Protection: Standard Magnehelic gages are rated for a maximum pressure of 15 psig and should not be used where that limit could be exceeded. Newer models employ a rubber plug on the rear which functions as a relief valve by unseating and venting the gage interior when over pressure reaches approximately 25 psig. To provide a free path for pressure relief, there are four spacer pads which maintain .023" clearance when gage is surface mounted. Do not obstruct the gap created by these pads.

1.Select a location free from excessive vibration and where the ambient temperature will not exceed 140°F (60°C). Also, avoid direct sunlight which accelerates discoloration of the clear plastic cover. Sensing lines my be run any necessary distance. Long tubing lengths will not affect accuracy but will increase response time slightly. Do not restrict lines. If pulsating pressures or vibration cause excessive pointer oscillation, consult the factory for ways to provide additional damping.

2. All standard Magnehelic gages are calibrated with the diaphragm vertical and should be used in that position for maximum accuracy. If gages are to be used in other than vertical position, this should be specified on the order. Many higher range gages will perform within tolerance in other positions with only rezeroing. Low range Model 2000-00 and metric equivalents must be used in the vertical position only.

3. Surface Mounting



Locate mounting holes, 120° apart on a 4-1/8" dia. circle. Use No. 6-32 machine screws of appropriate length.

4. Flush Mounting

Provide a 4-9/16" dia. opening in panel. Insert gage and secure in place with No. 6-32 machine screws of appropriate length, with adapters, firmly secured in place. To mount gage on 1-1/4"-2" pipe, order optional A-610 pipe mounting kit.

5. To zero the gage after installation

Set the indicating pointer exactly on the zero mark, using the external zero adjust screw on the cover at the bottom. Note that the zero check or adjustment can only be made with the high and low pressure taps both open to atmosphere.

Operation

Positive Pressure: Connect tubing from source of pressure to either of the two high pressure ports. Plug the port not used. Vent one or both low pressure ports to atmosphere.

Negative Pressure: Connect tubing from source of vacuum or negative pressure to either of the two low pressure ports. Plug the port not used. Vent one or both high pressure ports to atmosphere.

Differential Pressure: Connect tubing from the greater of two pressure sources to either high pressure port and the lower to either low pressure port. Plug both unused ports.

When one side of the gage is vented in dirty, dusty atmosphere, we suggest an A-331 Filter Vent Plug be installed in the open port to keep inside of gage clean.

A. For portable use of temporary installation use 1/8" pipe thread to rubber tubing adapter and connect to source of pressure with rubber or Tygon tubing.

B. For permanent installation, 1/4" O.D., or larger, copper or aluminum tubing is recommended. See accessory bulletin S-101 for fittings.

MAINTENANCE

Maintenance: No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally disconnect pressure lines to vent both sides of gage to atmosphere and re-zero. Optional vent valves, (Catalog S-101), should be used in permanent installations.

Calibration Check: Select a second gage or manometer of known accuracy and in an appropriate range. Using short lengths of rubber or vinyl tubing, connect the high pressure side of the Magnehelic gage and the test gage to two legs of a tee. Very slowly apply pressure through the third leg. Allow a few seconds for pressure to equalize, fluid to drain, etc., and compare readings. If accuracy unacceptable, gage may be returned to factory for recalibration. To calibrate in the field, use the following procedure.

Calibration:

1. With gage case, held firmly, loosen bezel, by turning counterclockwise. To avoid damage, a canvas strap wrench or similar tool should be used.
2. Lift out plastic cover and "O" ring.
3. Remove scale screws and scale assembly. Be careful not to damage pointer.
4. The calibration is changed by moving the clamp. Loosen the clamp screw(s) and move slightly toward the helix if gage is reading high, and away if reading low. Tighten clamp screw and install scale assembly.
5. Replace cover and O-ring in position. Make sure the hex shaft on inside of cover is properly engaged in zero adjust screw.
6. Secure cover in place by screwing bezel down snug. Note that the area under the cover is pressurized in operation and therefore gage will leak if not properly tightened.
7. Zero gage and compare to test instrument.

Make further adjustments as necessary.

Ordering Instructions:

When corresponding with the factory regarding Magnehelic® gage problems, be sure to include model number, pressure range, and any special options. Field repair is not recommended; contact the factory for repair service.

Caution: If bezel binds when installing, lubricate threads sparingly with light oil or molybdenum disulphide compound.

Warning: Attempted field repair may void your warranty. Recalibration or repair by the user is not recommended. For best results, return gage to the factory. Ship prepaid to:

Dwyer Instruments, Inc.

Attn: Repair Dept.

102 Indiana Highway 212

Michigan City, IN 46360

Trouble Shooting Tips:

•*Gage won't indicate or is sluggish.*

1. Duplicate pressure port not plugged.
2. Diaphragm ruptured due to overpressure.
3. Fittings or sensing lines blocked, pinched, or leaking.
4. Cover loose or "O"ring damaged, missing.
5. Pressure sensor, (static tips, Pitot tube, etc.) improperly located.
6. Ambient temperature too low. For operation below 20°F (-7°C), order gage with low temperature, (LT) option.

•Pointer stuck-gage can't be zeroed.

1. Scale touching pointer.
2. Spring/magnet assembly shifted and touching helix.
3. **Metallic particles clinging to magnet and interfering with helix movement.**
4. Cover zero adjust shaft broken or not properly engaged in adjusting screw.

We generally recommend that gages needing repair be returned to the factory. Parts used in various sub-assemblies vary from one range of gage to another, and use of incorrect components may cause improper operation. After receipt and inspection, we will be happy to quote repair costs before proceeding.

Consult factory for assistance on unusual applications or conditions.

Use with air or compatible gases only.

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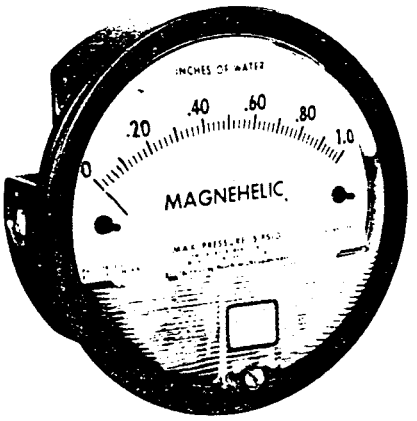
BULLETIN NO. A-27B

Manometro Diferencial Magnehelic®

INSTRUCCIONES Y LISTA DE PARTES



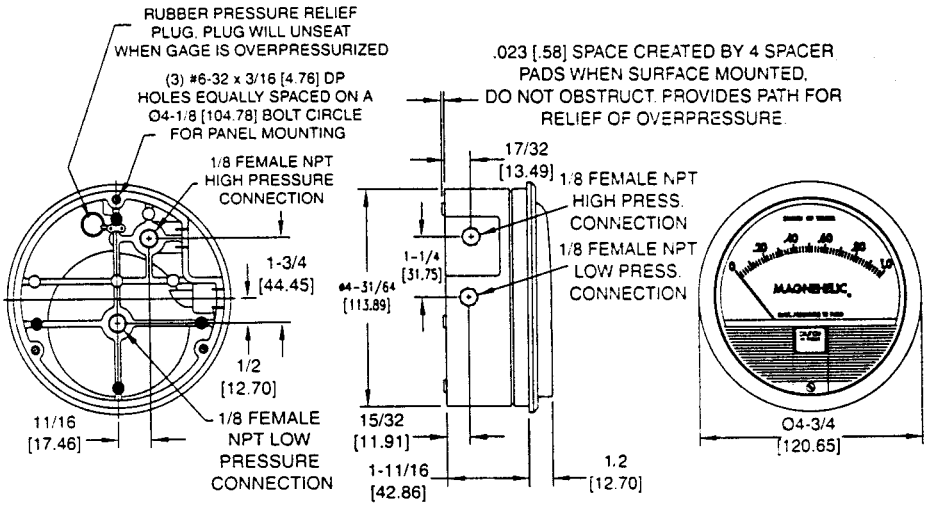
ESPECIFICACIONES

Dimensiones: diam. 120.65 mm x 55.6 pr[illegible]
Peso: 510 g.
Terminación: esmalte horneado gris oscuro.
Conexiones: 1/8" hembra NPT para alta y baja presión, duplicadas (atrás, a los lados).
Exactitud: ± 2% de fondo de escala a 21 °C
Mod. 2000-0 3%; Mod. 2000-00 4%
Presión máxima: 15 PSI (0.35 bar)
Temperatura: -7 a +60 C
Accesorios: Tapones 1/8" hembre NPT para las conexiones duplicadas, dos adaptadores de rosca 1/8" hembre NPT a tubo de goma; y tres adaptadores para montaje al ras y tornillos.

Atencion: solo para uso con aire o gases compatibles.

Para indicaciones de sobrerango repetidas u otras contacte a Fábrica.

Precaución para uso con hidrogeno: el imán del instrumento puede en presencia de hidrógeno liberar gases tóxicos y explosivos. Para este caso, consulte a fábrica.



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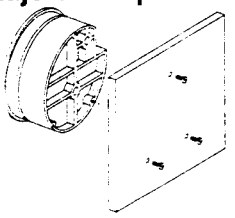
La Protección de presión excesiva: Calibrador uniforme de Magnehelic son valorado por un presión de 15 PSIG y no deben ser usado donde eso límite pueda ser excedido. Los modelos m·s nuevos usan un t[illegible]del caucho en la espalda del calibrador que funciona como una válvula del alivio para desarzonando y descargando el interior del calibrador cuándo una presiÛn excesiva alcanza aproximadamente 25 PSIG. Para proporcionar un sendero libre para el alivio de la presión. son quatro espaciadores acolchas que mantiene un espacio libre de .023 pulgada cuándo el calibrador es montado en la superficie. No obstruya el espacio que estas almohadillas crean.

1. Seleccione un lugar libe de exceso de vibraciones. y donde la temperatura ambiente no supere los 60°C. Evite luz solar directa. para evitar decoloración de la cubierta plástica. Las conexiones de proceso pueden tener cualquier longitud sin afectar la exactitud, pero pueden extender el tiempo de respuesta del instrumento. Si hay pulsación de presión o vibración, consulte a fábrica sobre medios de amortiguación.

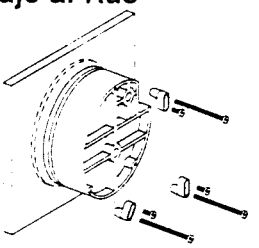
2. Los MAGNEHELIC han sido calibrados con el diafragma vertical. y deben ser usados en esas condiciones. Para otras posiciones. se debe especificar en la orden de pr[illegible]ión. Los de rango elevado pueden ser u[illegible] en diversas posiciones. pero se debe reajustar el cero. Los modelos de la serie 2000-00 y equivalentes métricos deben ser usados solo verticalmente.

3. Montaje en Superficie



Perfore tres orificios separados 120° sobre una circunferencia de 105 mm de diám. y sostenga el instrumento con tres tornillos 6-32 de long. apropiada.

4. Montaje al Ras



Perfore un circulo de 115 mm de diám. en el panel, y sostenga el instrumento mediante los. Para montaje sobre caño, ordene el adaptador A-610 apto para caños de 32 a 50 mm de diám.

5. Puesta a Cero Después de Instalar

Deje las conexiones de presión abiertas a atmósfera y ajuste a cero desde tornillo del panel frontal.

Operacion

Presión Positiva: Conecte la tubería desde la fuente de presión a cualquiera de las dos conexiones de alta presión (HIGH), bloqueando la no usada; Las conexiones de baja (LOW) presión pueden dejarse uno o los dos abiertos a la atmósfera.

Presión Negativa: Repita el procedimiento anterior, conectado en este caso las conexiones de baja presión (LOW). Deje las otras conexiones abiertas.

Presión diferencial: Conecte el tubo correspondiente a la presión más positiva al cualquiera de los conectores de alta presión (HIGH) bloqueando el no usado, y la más baja presión o presión negativa (vacío) al conector de baja presión (LOW). Puede usarse cualquier conector de cada par, dejando siempre uno bloqueado. Si se deja una conexión abierta a la atmósfera, se recomienda el uso de un filtro tipo A-331 en el lugar correspondiente para mantener limpio el interior del instrumento. Para uso portable, o instalación temporaria, uso adaptadores para rosca de tubo de 1/8" a tubo flexible, y conecte a proceso mediante una tubería de goma o Tygon, o equivalente. Para instalación permanente, se recomienda el uso de tubo de cobre o aluminio de por lo menos 1/4" de diám. exterior. Vea el boletín S-101 para accesorios.

MANTENIMIENTO

No se requiere mantenimiento específico alguno, ni lubricación. Periódicamente, desconecte el instrumento, ventee la presión acumulada, y reajuste el cero. Para instalaciones permanentes, se debe usar un juego de válvulas de montaje permanente para el venteo (vea Bol. S-101).

Verificación de Calibración: Desconecte el instrumento de proceso, ventee a atmósfera y deje escurrir condensados. Utilice un manómetro de calidad y exactitud conocidas, y de rango adecuado. Conecte ambos instrumentos en paralelo mediante una T de conexión, y aplique presión lentamente para igualar presiones y eliminar condensados si los hubiera. Compare las lecturas. En caso de discrepancias, el instrumento deberá ser recalibrado en fábrica. Para calibración en campo, siga el siguiente procedimiento.

1. Sujete firmemente la caja del instrumento, y afloje mediante una llave adecuada el anillo de retención de la máscara del mismo. Preste atención de no dañar las partes del mismo.
2. Remueva el frente de plástico y el "O" ring de sello.
3. Desmonte los tornillos de la escala, y la escala con cuidado de no dañar la aguja indicadora.
4. La calibración se efectúa moviendo la traba luego de aflojarla. El movimiento de la misma hacia el helicoide corrige la indicación en exceso y viceversa. Reapriete a traba e instale nuevamente la escala.
5. Rearme el instrumento a su condición original. Preste atención a que el eje hexagonal interno (de ajuste a cero) esté posicionado correctamente frente al tornillo de puesta a cero.
6. Coloque la cubierta en posición y apriete hasta fijar. La cubierta sella la cámara de presión del instrumento, por lo que en funcionamiento puede haber pérdidas de no ser adecuadamente colocada.
7. Ajuste a cero y verifique la calibración. Repita el procedimiento según sea necesario.

Atención: Si el anillo de retención se traba al recolocar, lubrique ligeramente con aceite liviano o compuesto de disulfuro de molibdeno.

Cuidado! : La recalibración en campo puede invalidar la garantía. No se recomienda la recalibracion por parte del usuario. En caso necesario envie el instrumento con transporte pago a:

Dwyer Instruments, Inc.
Attn: Repair Department
102 Indiana Highway 212
Michigan City, IN 46360

Localización De Fallas

• *El instrumento no indica, o es lento en reacción.*

1. Conexión duplicada abierta.
2. Diafragma roto por sobrepresión.
3. Tubería de conexión perforada, con pérdidas o pinchazos.
4. Anillo de retención flojo, u "O " ring dañado.
5. Conexión a proceso indebida o inadecuada.
6. Temperatura muy baja. Para este caso ordene tipos LT (baja temperatura).

• *Aguja indicadora fija; Puesta a cero imposible.*

1. La escala esta en contacto con la aguja.
2. El conjunto imán/resorte están en contacto.
3. Hay partículas metálicas adheridas al imán y bloquean la helicoide.
4. Eje de ajuste a cero de la cubierta roto, o montado en forma incorrecta.

Se recomienda en general abstenerse de efectuar la recalibración o reparación campo, y en cambio enviar el instrumento fábrica para su reparación. Las partes usadas en cada subconjunto varían de acuerdo al modelo y rango, por lo que es factible el uso incorrecto de partes que darán lugar a resultados erróneos, o fallas inesperadas.

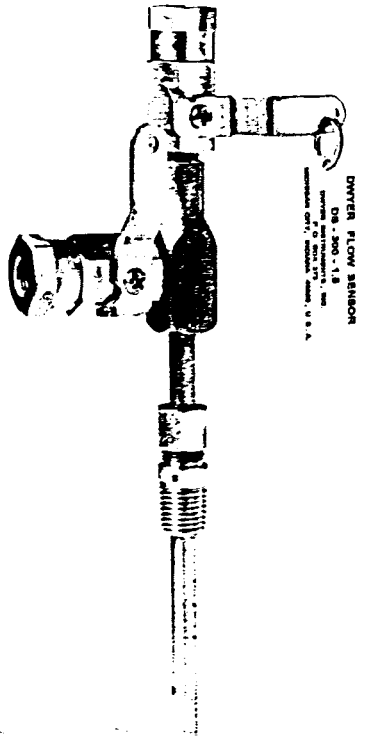
Los instrumentos enviados a fábrica son reparados a nuevo, y nos complacerá enviar un presupuesto de la reparación antes de la misma, previa la inspección del material remitido.

Consulte a fábrica para aplicaciones inusuales o especiales. Utilice estos manómetros solamente con aire o gases compatibles.

DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46361, U.S.A.
Phone: 219/879-8000 www.dwyer-inst.com
Fax: 219/872-9057 e-mail: info@dwyer-inst.com
Lit-By Fax: 888/891-4963

SERIES DS-300 FLOW SENSORS

Installation and Operating Instructions, Flow Calculations



INSPECTION

Inspect the sensor upon receipt of shipment to be certain it is as ordered and not damaged. If damaged, contact carrier.

INSTALLATION

General – The sensing ports of the flow sensor must be correctly positioned for measurement accuracy. The instrument connections on the sensor indicate correct positioning. The side connection is for total or high pressure and should be pointed upstream. The top connection is for static or low pressure.

Location – The sensor should be installed in the flowing line with as much straight run of pipe upstream as possible. This will provide a flow profile as ideal as possible. A rule of thumb is to allow 10-15 pipe diameters upstream and 5 down. The table below lists recommended up and down piping:

PRESSURE AND TEMPERATURE

Maximum 200 psig at 200°F.

UPSTREAM AND DOWNSTREAM DIMENSIONS IN TERMS OF INTERNAL DIAMETER OF PIPE

*SEE NOTE #1

UPSTREAM CONDITION	MINIMUM DIAMETER OF STRAIGHT PIPE		
	UPSTREAM		DOWNSTREAM
	IN-PLANE	OUT OF PLANE	
One Elbow or Tee	7	9	5
Two 90° Bends in Same Plane	8	12	5
Two 90° Bends in Different Plane	18	24	5
Reducers or Expanders	8	8	5
All Valves *See Note 2	24	24	5

*Note #1: Values shown are recommended spacing, in terms of internal diameter for normal industrial metering requirements. For laboratory or high accuracy work, add 25% to values.

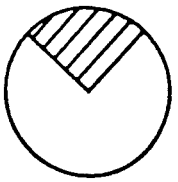
*Note #2: Includes gate, globe, plug and other throttling valves that are only partially opened. If valve is to be fully open, use values for pipe size change. CONTROL VALVES SHOULD BE LOCATED AFTER THE FLOW SENSOR.

POSITION

Be certain there is sufficient clearance between the mounting position and other pipes, walls, structures, etc, so that the sensor can be inserted through the mounting unit once the mounting unit has been installed onto the pipe.

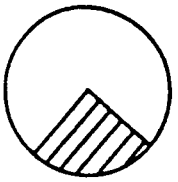
Flow Sensors should be positioned to keep air out of the instrument connecting lines on liquid flows and condensate out of the lines on gas flows. The easiest way to assure this is to install the sensor into the pipe so that air will bleed into, or condensate will drain back to, the pipe.

For air or gas flow:
Install in upper quadrant of pipe



Condensate drains back to pipe

For liquid or steam flow:
Install in lower quadrant of pipe



Air bleeds back to pipe.

INSTALLATION

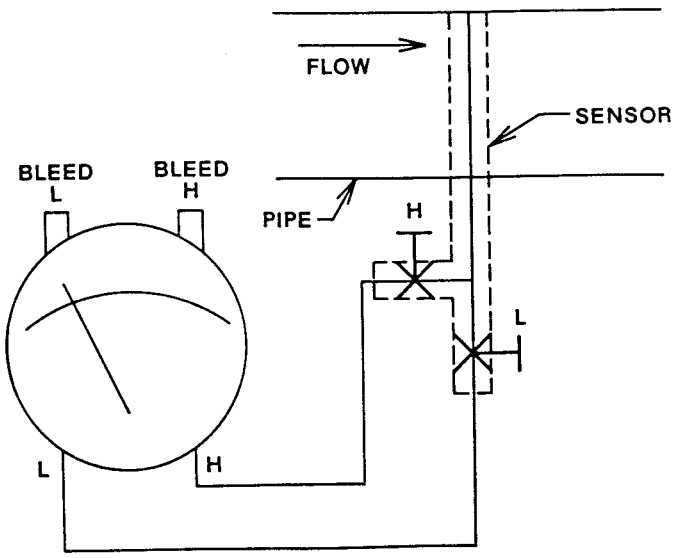
1. When using an A-160 thred-o-let, weld it to the pipe wall. If replacing a DS-200 unit, an A-161 bushing (1/4"×3/8") will be needed.
2. Drill through the center of the thred-o-let into the pipe, with a drill that is slightly larger than the flow sensor diameter.
3. Install the packing gland using proper pipe sealant. If the packing gland is disassembled, note that the tapered end of the ferrule goes into the fitting body.
4. Insert the sensor until it bottoms against the opposite wall of the pipe, then withdraw 1/16" to allow for thermal expansion.
5. Tighten packing gland nut finger tight. Then tighten the nut with a wrench an additional 1 1/4 turns. Be sure to hold the sensor body with a second wrench to prevent the sensor from turning.

INSTRUMENT CONNECTION

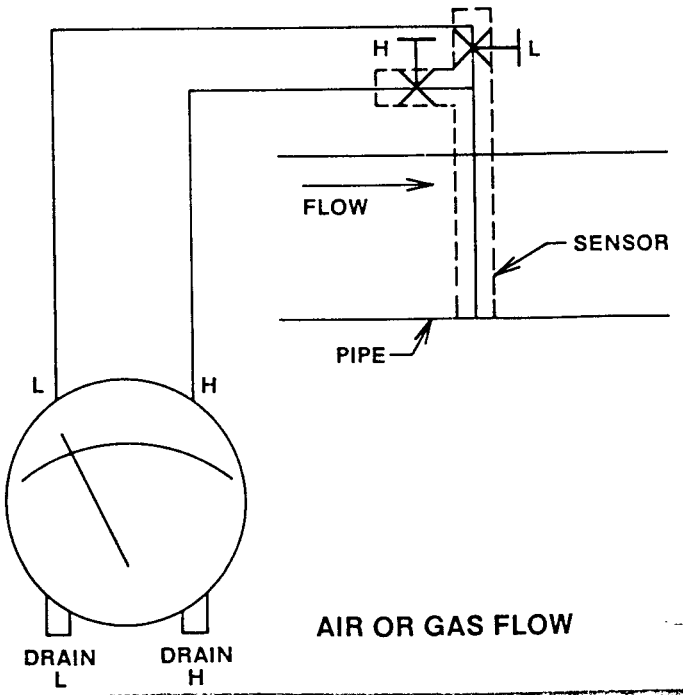
Connect the side pressure tap to the high pressure port of the Magnehelic (air only) or Capsuhelic gage or transmitting instrument and the top connection to the low pressure port. See the connection schematics below.

Bleed air from instrument piping on liquid flows. Drain any condensate from the instrument piping on air and gas flows.

Open valves to instrument to place flow meter into service. For permanent installations, a 3-valve manifold is recommended to allow the gage to be zero checked without interrupting the flow. The Dwyer A-471 Portable Test Kit includes such a device.

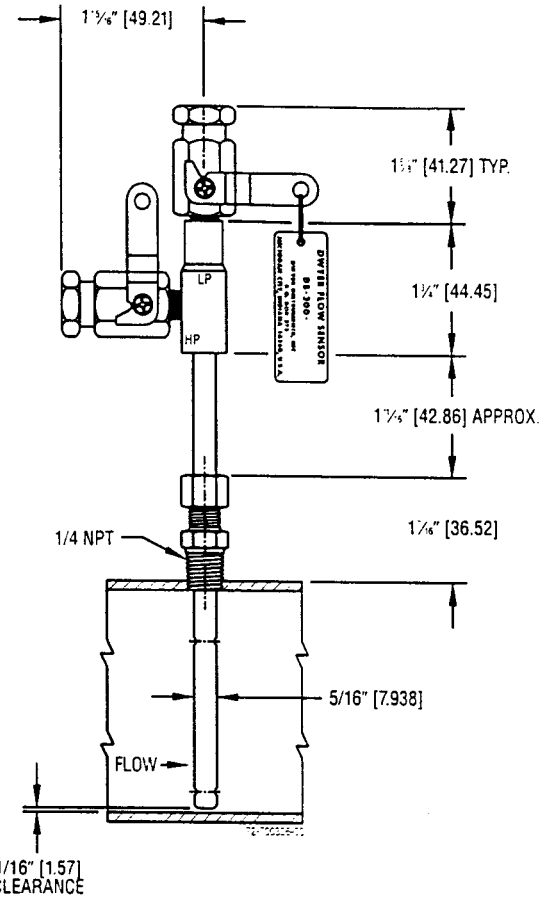


WATER FLOW



AIR OR GAS FLOW

SERIES DS-300 FLOW SENSORS



FLOW CALCULATIONS AND CHARTS

The following information contains tables and equations for determining the differential pressure developed by the DS-300 Flow Sensor for various flow rates of water, steam, air or other gases in different pipe sizes.

This information can be used to prepare conversion charts to translate the differential pressure readings being sensed into the equivalent flow rate. Where direct readout of flow is required, use this information to calculate the full flow differential pressure in order to specify the exact range of Dwyer Magnehelic or Capsuhelic gage required. Special ranges and calculations are available for these gages at minimal extra cost. See bulletins A-30 and F-41 for additional information on Magnehelic and Capsuhelic gages and DS-300 flow sensors.

For additional useful information on making flow calculations, the following reference is recommended: Crane Valve Co. Technical Paper No. 410 "Flow of Fluids Through Valves, Fittings and Pipe." It is available from Crane Valve Co., 104 N. Chicago St., Joliet, IL 60431. Phone 815/727-2600. Price including shipping is $20.00

Using the appropriate differential pressure equation from page 4, calculate the differential pressure generated by the sensor under **normal** operating conditions of the system. Check the chart below to determine if this value is within the recommended operating range for the sensor. Note that the data in this chart is limited to standard conditions of air at 60°F (15.6°C) and 14.7 psia static line pressure or water at 70°F (21.1°C). To determine recommended operating ranges for other gases, liquids and/or operating conditions, consult the factory.

Note the column on the right side of the chart which defines velocity ranges to avoid. Continuous operation within these can result in damage to the flow sensor caused by excess vibration.

Pipe Size (Schedule 40)	Flow Coefficient "K"	Operating Ranges Air @ 60°F & 14.7 psia (D/P Inches W.C.)	Operating Ranges Water @ 70°F (D/P Inches W.C.)	Velocity Ranges Not Recommended (Feet per Second)
1	0.52	1.10 to 186	4.00 to 675	146 to 220
1¼	0.58	1.15 to 157	4.18 to 568	113 to 170
1½	0.58	0.38 to 115	1.36 to 417	96 to 144
2	0.64	0.75 to 75	2.72 to 271	71 to 108
2½	0.62	1.72 to 53	6.22 to 193	56 to 85
3	0.67	0.39 to 35	1.43 to 127	42 to 64
4	0.67	0.28 to 34	1.02 to 123	28 to 43
6	0.71	0.64 to 11	2.31 to 40	15 to 23
8	0.67	0.10 to 10	0.37 to 37	9.5 to 15
10	0.70	0.17 to 22	0.60 to 79	6.4 to 10

FLOW EQUATIONS

1. Any Liquid
$$Q\ (GPM) = 5.668 \times K \times D^2 \times \sqrt{\Delta P / S_f}$$

2. Steam or Any Gas
$$Q\ (lb/Hr) = 359.1 \times K \times D^2 \times \sqrt{p \times \Delta P}$$

3. Any Gas
$$Q\ (SCFM) = 128.8 \times K \times D^2 \times \sqrt{\frac{P \times \Delta P}{(T+460) \times S_s}}$$

DIFFERENTIAL PRESSURE EQUATIONS

1. Any Liquid
$$\Delta P\ (in.\ WC) = \frac{Q^2 \times S_f}{K^2 \times D^4 \times 32.14}$$

2. Steam or Any Gas
$$\Delta P\ (in.\ WC) = \frac{Q^2}{K^2 \times D^4 \times p \times 128{,}900}$$

3. Any Gas
$$\Delta P\ (in.\ WC) = \frac{Q^2 \times S_s \times (T+460)}{K^2 \times D^4 \times P \times 16{,}590}$$

TECHNICAL NOTATIONS

The following notations apply:

ΔP = Differential pressure expressed in inches of water column.
Q = Flow expressed in GPM, SCFM or PPH as shown in equation.
K = Flow coefficient — See Values Tabulated on page 3.
D = Inside diameter of line size expressed in inches. For square & rectangular ducts use $D = \sqrt{\frac{4 \times \text{Height} \times \text{Width}}{\pi}}$

P = Static Line pressure (psia)
T = Temperature in degrees Fahrenheit (plus 460=°Rankin)
p = Density of medium in pounds per cubic foot
S_f = Sp Gr at flowing conditions
S_s = Sp Gr at 60°F

SCFM TO ACFM EQUATION

$$SCFM = ACFM \times \left(\frac{14.7 + PSIG}{14.7}\right)\left(\frac{520^*}{460 + °F}\right)$$

$$ACFM = SCFM \times \left(\frac{14.7}{14.7 + PSIG}\right)\left(\frac{460 + °F}{520}\right)$$

$$\text{POUNDS PER CUBIC FOOT STD.} = \text{POUNDS PER CUBIC FOOT ACT.} \times \left(\frac{14.7}{14.7 + PSIG}\right)\left(\frac{460 + °F}{520}\right)$$

$$\text{POUNDS PER CUBIC FOOT ACT.} = \text{POUNDS PER CUBIC FOOT STD.} \times \left(\frac{14.7 + PSIG}{14.7}\right)\left(\frac{520}{460 + °F}\right)$$

1 CUBIC FOOT OF AIR = 0.076 POUNDS PER CUBIC FOOT AT 60°F AND 14.7 PSIA

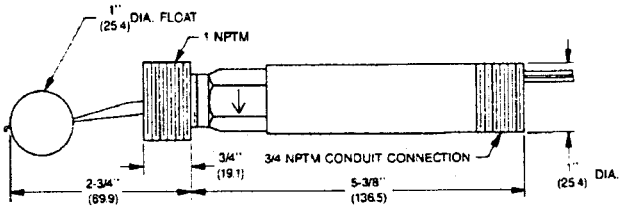
*(520 = 460 + 60°) Std. Temp. Rankine

Printed in U.S.A. 6/96

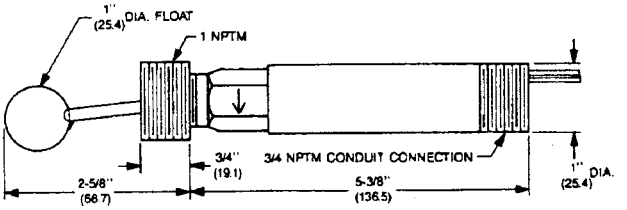
FR 72-440451-01

DWYER INSTRUMENTS, INC.
P.O. Box 373 Michigan City, Indiana 46361 U.S.A.

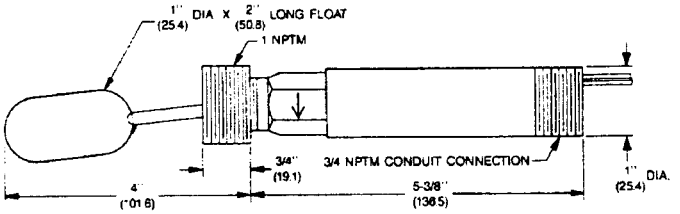
FLOTECT™ MODEL L-6 FLOAT SWITCH — DIMENSION DRAWINGS



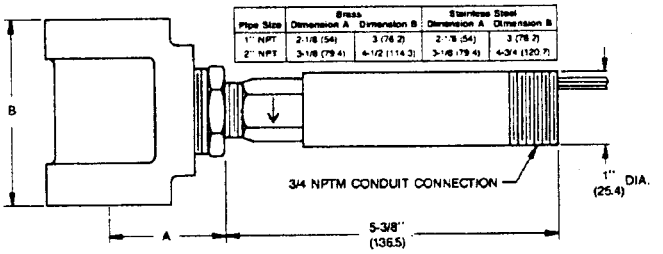
Polypropylene Float



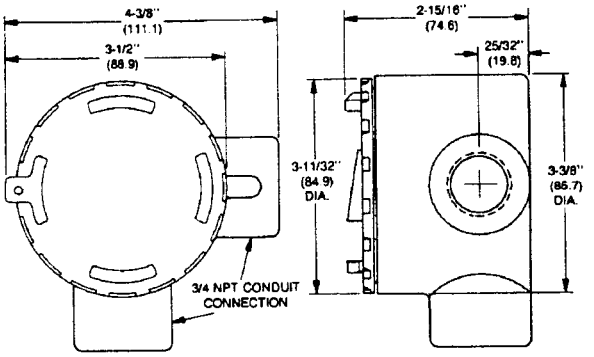
Round Stainless Steel Float



Cylindrical Stainless Steel Float



With External Float Chamber (Tee)



CSA, CENELEC Conduit Enclosure

Limited Warranty: The Seller warrants all Dwyer instruments and equipment to be free from defects in workmanship or material under normal use and service for a period of one year from date of shipment. Liability under this warranty is limited to repair or replacement F.O.B. factory of any parts which prove to be defective within that time or repayment of the purchase price at the Seller's opinion provided the instruments have been returned, transportation prepaid, within one year from the date of purchase. All technical advice, recommendations and services are based on technical data and information which the Seller believes to be reliable and are intended for use by persons having skill and knowledge of the business, at their own discretion. In no case is Seller liable beyond replacement of equipment F.O.B. factory or the full purchase price. This warranty does not apply if the maximum ratings label is removed or if the instrument or equipment is abused, altered, used at ratings above the maximum specified, or otherwise misused in any way.

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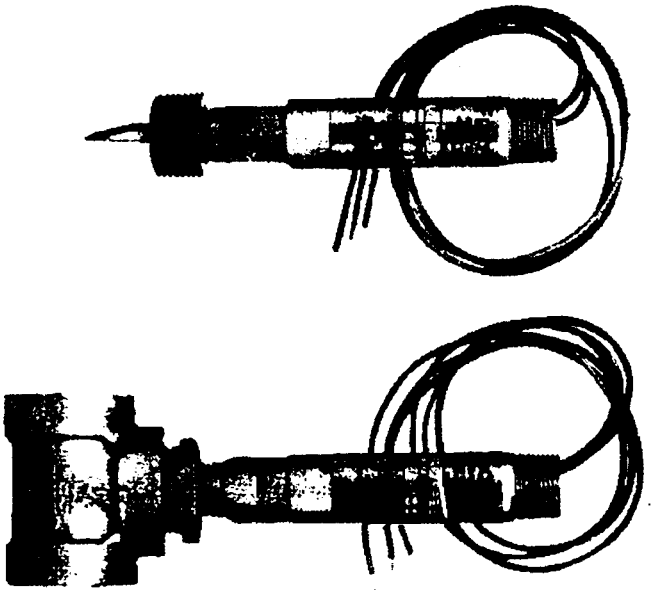
Buyers Remedies: THE BUYER'S EXCLUSIVE AND SOLE REMEDY ON ACCOUNT OF OR IN RESPECT TO THE FURNISHING OF NONCONFORMING OR DEFECTIVE MATERIAL SHALL BE TO SECURE REPLACEMENT THEREOF AS AFORESAID. THE SELLER SHALL NOT IN ANY EVENT BE LIABLE FOR THE COST OF ANY LABOR EXPENDED ON ANY SUCH MATERIAL OR FOR ANY SPECIAL, DIRECT, INDIRECT OR CONSEQUENTIAL DAMAGES TO ANYONE BY REASON OF THE FACT THAT IT SHALL HAVE BEEN NON-CONFORMING OR DEFECTIVE.

FLOTECT. MODEL L-6 FLOAT SWITCH

Installation and Operating Instructions



Explosion-Proof; U.L. and C.S.A. Listed -
Class I, Groups *A, B, C & D
Class II, Groups E, F & G
CENELEC: EExd IIC T6 (T amb=75°C)
*(Group A, stainless steel body only)

PHYSICAL DATA

Temperature Limit: 220°F (105°C) maximum
Maximum Pressure: See chart below
Switches: One or two SPDT snap switches
Electrical Rating: U.L.: 5A @ 125/250 VAC.
C.S.A. and CENELEC: 5A @ 125/250 VAC, 5A resistive, 3A inductive @ 30 VDC.
Optional ratings: MV option—Gold contacts for dry circuits. Rated 0.1A @ 125 VAC MT option: 400°F (205°C) 5A @ 125/250 VAC (not listed).
Wiring Connections: 3-18" (460mm) wire leads, 18 ga.
CENELEC models only: push-in type terminal blocks
Black = common, blue = N.O., red = N.C.
Minimum Specific Gravity:
Polypropylene float - 0.9
Round SS float - 0.7
Cylindrical SS float - 0.5
Switch Body: Brass 3/4" NPT conduit connection.
For SS switch body, change model no. to L6EPS.
Piping/Mounting Connection: 1" NPT
Installation: Horizontal, index arrow pointing down.
Weight: 1 lb. (.5 KG); w/external chamber 1-3/4 lb. (.8 KG)

WETTED MATERIALS CHART

Model	Brass	Bronze	Ceramic	Polypropylene	301SS	303SS	304SS
B-S-3-A	X		X		X		X
B-S-3-B	X	X	X	X	X		
B-S-3-C	X		X		X		X
B-S-3-H	X	X	X		X		X
B-S-3-O	X		X	X	X		
S-S-3-A			X	X	X		X
S-S-3-C			X		X	X	X
S-S-3-L			X		X	X	X
S-S-3-O			X	X	X	X	
S-S-3-S			X	X	X	X	

MAXIMUM PRESSURE CHART

Model Number	Float	Pressure Rating PSIG (KG/CM²)
L6EPB-B-S-3-A	Cylindrical SS	200 (14)
[illegible]	Polypropylene	250 (18)
L6EPB-B-S-3-C	Round SS	350 (25)
[illegible]	Round SS	250 (18)
L6EPB-B-S-3-O	Polypropylene	1000 (70)
L6EPB-S-S-3-A	Cylindrical SS	200 (14)
L6EPB-S-S-3-C	Round SS	350 (25)
L6EPB-S-S-3-L	Round SS	350 (25)
L6EPB-S-S-3-O	Polypropylene	2000 (140)
L6EPB-S-S-3-S	Polypropylene	2000 (140)

INSTALLATION:

Unpack switch and remove any packing material found inside lower housing or float chamber.

Switch must be installed with body in a horizontal plane and arrow on side pointing down.

If switch has an external float chamber (tee), connect it to vertical sections of 1" NPT pipe installed outside vessel walls at appropriate levels. If unit has no external float chamber, it must be mounted in a 1" NPT half coupling welded to the vessel wall. The coupling must extend through the wall.

Inspect and clean wetted parts at regular intervals.

ELECTRICAL CONNECTIONS:

Connect wire leads in accordance with local electrical codes and switch action required. N.O. contacts will close and N.C. contacts will open when liquid level causes float to rise. They will return to "normal" condition on decreasing liquid level. Black = common, Blue = N.O. and Red = N.C.

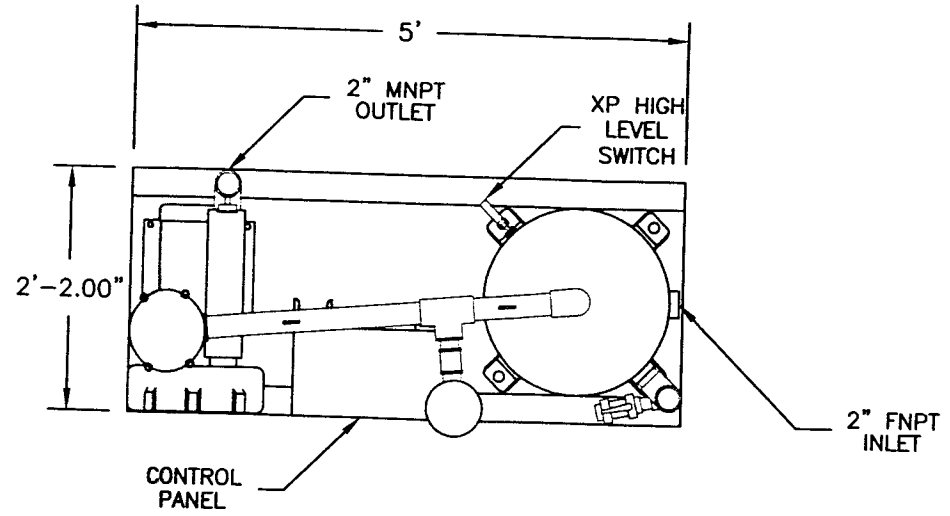
For units supplied with both internal and external grounds, the ground screw inside the housing must be used to ground the control. The external ground screw is for supplementary bonding when allowed or required by local code. Some CSA listed models are furnished with a separate green ground wire. Such units must be equipped with a junction box, not supplied but available on special order.

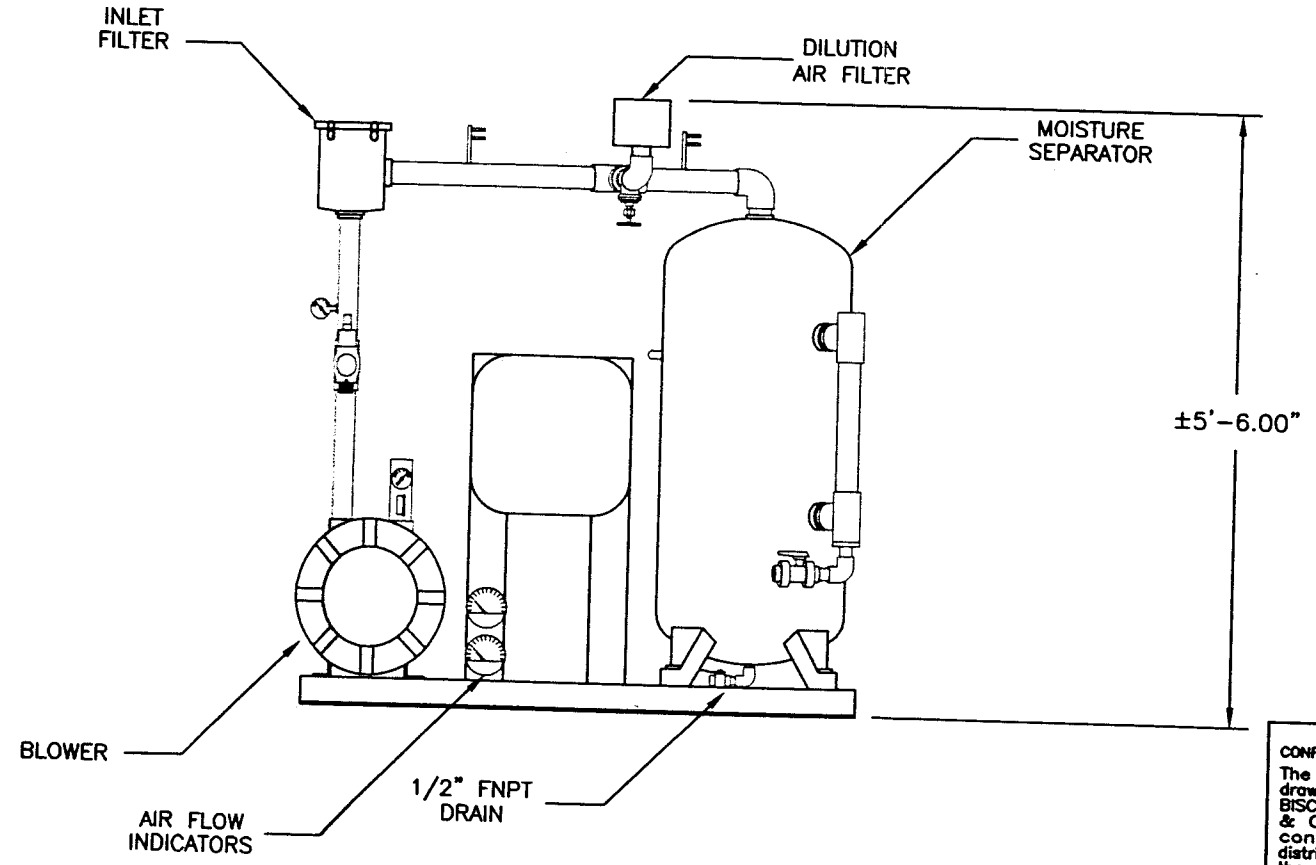
CENELEC certified models include a junction box. Cable should enter enclosure through an approved EX cable gland, not supplied. Push stripped and tinned leads into appropriate openings in terminal block(s). To connect fine stranded leads or to remove any wire, depress spring release with small screwdriver first.

All wiring, conduit and enclosures must meet applicable codes for hazardous areas. Conduits and enclosures must be properly sealed. For outdoor or other locations where temperatures vary widely, precautions should be taken to prevent condensation inside switch or enclosure. Electrical components must be kept dry at all times. **CAUTION:** To prevent ignition of hazardous atmospheres, disconnect the device from the supply circuit before opening. Keep assembly tightly closed when in use.

Dimensions on reverse

REVISIONS			
REV.	DESCRIPTION	DATE	APPR.





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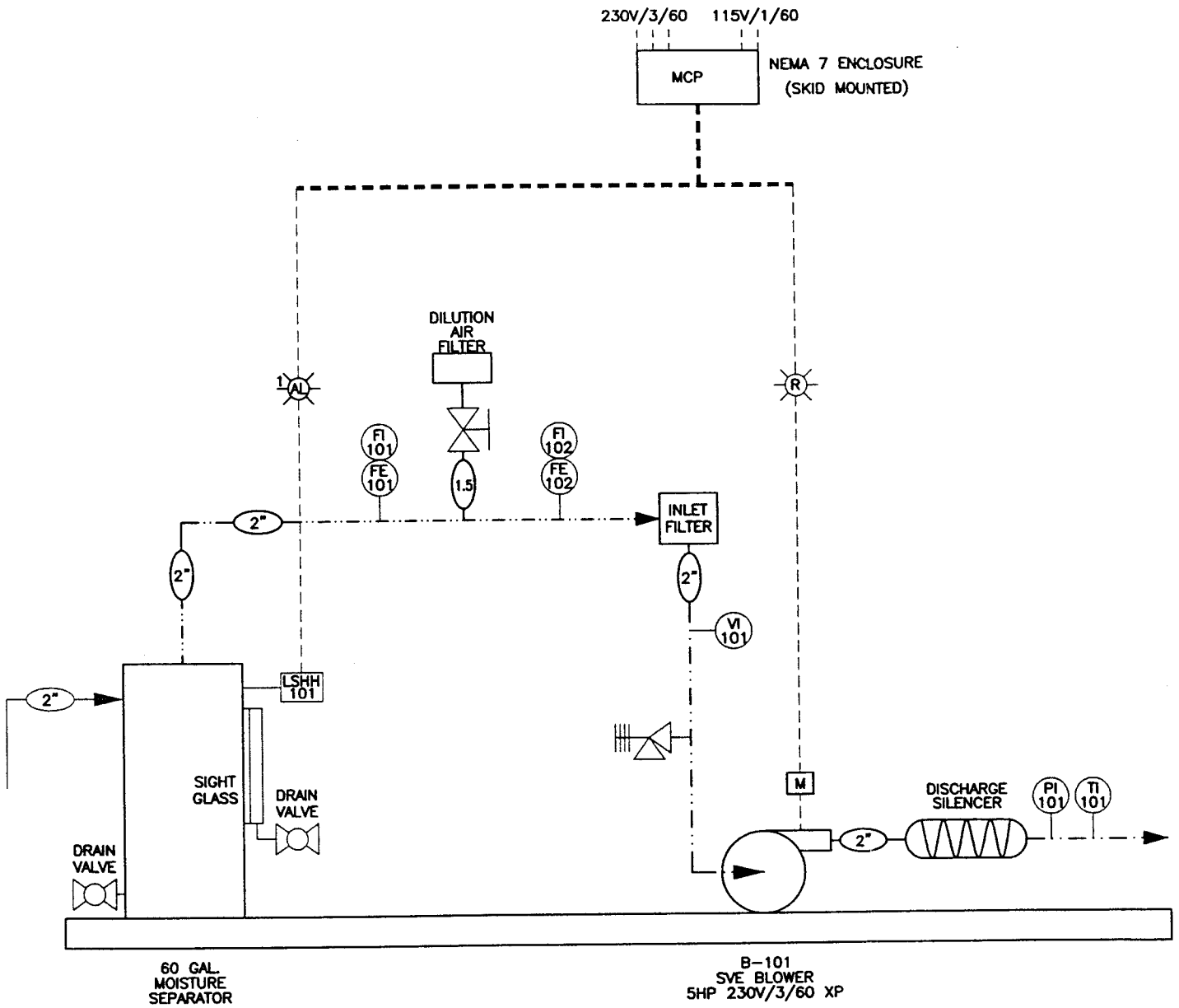
BISCO Environmental
Soil & Groundwater Remediation Equipment
Randolph, Massachusetts 02368

DRWN BY: DRF	DATE: 4/3/03	
CHK BY: JAD	DATE: 4/14/03	
APPR BY: JEH	DATE: 4/14/03	

TITLE: VAPOR EXTRACTION SKID STRUCTURAL DRAWING

WOODARD & CURRAN WESTCHESTER COUNTY | JOB NO. 11184

SCALE	SIZE	DWG NO.	SHEET	REV
1"=20"	B	11184JHL	1 OF 1	



LEGEND

FE	FLOW ELEMENT
FI	FLOW INDICATOR
LSHH	LEVEL SWITCH HIGH HIGH
MCP	MASTER CONTROL PANEL
M	MOTOR
PI	PRESSURE INDICATOR
TI	TEMPERATURE INDICATOR
VI	VACUUM INDICATOR
	BALL VALVE
	GATE VALVE
	RELIEF VALVE
AL	ALARM LIGHT
R	RUN LIGHT
- - - - -	CONTROL LINE
———	WATER LINE
—·—·—	AIR LINE

ALARMS

1 MOISTURE SEPARATOR HIGH HIGH LEVEL

REV.	DESCRIPTION	DATE	APPR.
REVISIONS			

DRWN BY: DRF	DATE: 4/3/03	
CHK BY: JAD	DATE: 4/4/03	
APPR BY: JEH	DATE: 4/4/03	

BISCO Environmental
Soil & Groundwater Remediation Equipment
Randolph, Massachusetts 02368

TITLE: VAPOR EXTRACTION SYSTEM
PROCESS & INSTRUMENTATION DIAGRAM

WOODARD & CURRAN
WESTCHESTER COUNTY

JOB NO.	SCALE	SIZE	DWG NO.	SHEET	REV
11184	N/A	B	11184JHP	1 OF 1	

Limitation of Warranty
&
Limitation of Remedy

All products not manufactured by BISCO Environmental carry the original manufacturer's warranty. Copies are available on request.

BISCO Environmental warrants its packaged and manufactured equipment against any defect in material or workmanship, under normal use and storage for a period of twelve (12) months from date of manufacture. In the event that products are found to be defective within the warranty period, BISCO Environmental's sole obligation and remedy shall be the furnishing of replacements for any defective parts, and such replacement parts shall be furnished but not installed by BISCO Environmental. BISCO Environmental will not be liable for special or consequential damages in any claim, suit or proceedings arising under this warranty, nor will BISCO Environmental accept any liability for claims for labor, loss of profit, repairs or other expenses incidental to replacement. The product warranty expressed above is our only warranty and may not be verbally changed or modified by any representative of BISCO Environmental. All freight costs incurred in shipping parts to or from BISCO Environmental or to the manufacturer if necessary, are at the expense of the customer.

BISCO Environmental expressly disclaims any warranties, expressed or implied, including any warranty of merchantability or fitness for a particular purpose or any warranty arising from a course of dealing or usage of trade. Except to the extent required by applicable law, BISCO Environmental shall not be liable, in tort, contract or otherwise, for any loss or damage, whether direct, consequential or incidental, of any person or entity arising in connections with the equipment.

USFILTER/WESTATES

Carbon Order Form

11711 Reading Road, Red Bluff, CA. 96080

To place an order:
Fill out this form by using the TAB KEY
E-MAIL: ExxonM@USFilter.com
Contact: Sylvia Kunz @ (530) 527-2664 x128
-0R- FAX TO: (530) 528-7718

Date:	4/28/03
Westates Job #:	
ExxonMobil TM	Steve Trifiletti
ExxonMobil P.O. #:	
Consultants P.O.#:	

CONSULTANT:

Company Name:	Woodard & Curran
Address:	1520 Highland Ave.
City:	Cheshire
State, Zip:	CT, 06410
Telephone #:	203-271-0379
Fax #:	203-271-7952
E-Mail:	cgoulet@woodardcurran.com
Contact Name:	Craig Goulet

BILL TO Acct#

Company Name:	Exxon/Mobil
Address:	
City:	
State, Zip:	
Telephone #:	516-239-5232
Fax #:	516-239-2455
E-Mail:	steve.p.trifiletti@exxonmobil.com
Contact Name:	Steve Trifiletti

Site #:	66285
Address:	West Chester Cty Airport
City:	Hanger D, White Plains
State, Zip:	NY.,
Contact Name:	Craig Goulet
Telephone #:	860-883-0197

Requested Service Date:	5/22/03
Requested Service Time:	0900
USFilter Contact Name:	Sylvia Kunz
Confirmed Service Date:	
Confirmed Service Time:	
Profile #	

1) Service (check one): Change-out Service ☐ Fill Only ☐ Empty Only ☐
Sale ☒ Rental ☐ Pick-up ☐ Delivery ☒

2) Carbon Type/Material (check one)

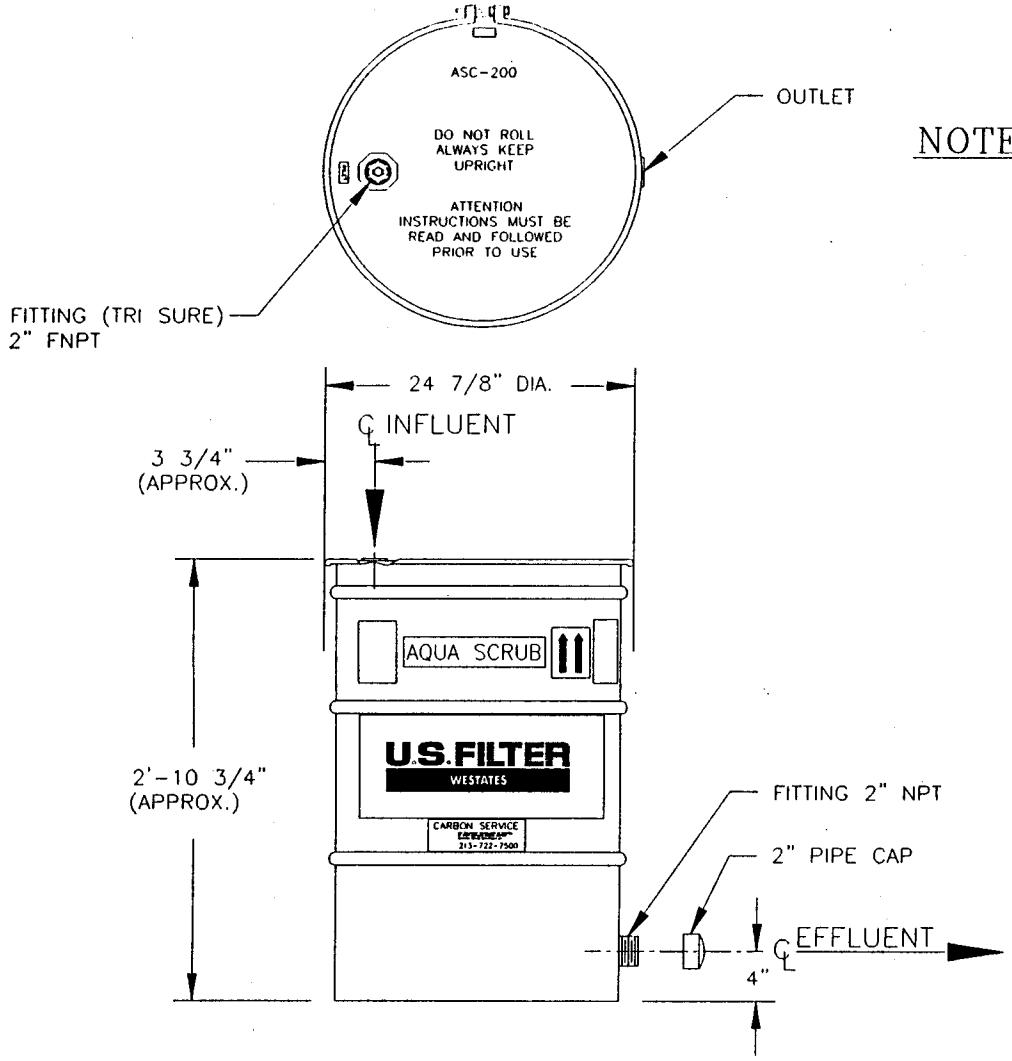
Liquid Phase: ACNS (Reactivated Coal) ☐ ACCNS (Exxon Reactivated Coconut) ☐
AC1230C (Virgin Coconut) ☐ AC830 (Virgin Coal) ☐

Vapor Phase: VCNS (Reactivated Coal) ☒ VC48C (Virgin Coconut) ☐
VCP60 (Virgin Coal) ☐

NUMBER OF VESSELS	SIZE VESSEL (LBS)	TOTAL LBS. OF CARBON	DESCRIPTION	UNIT PRICE	TOTAL
4	-200	720	VCNS	.39	$280.80

Special Instructions/ Unique Site Conditions/Access Restrictions:
Please coordinate delivery with Craig Goulet (860-883-0197) as no one is on-site to accept deliveries.

STD: 2-0600-8X11A | INTL REF:



NOTES:

1. CARBON:
   AS REQUIRED.
2. MATERIALS OF CONSTRUCTION:
   VESSEL: .....CARBON STEEL
   EXTERNAL COATING: .....HIGH GLOSS PAINT, WESTATES BLUE
   INTERNAL COATING: .....CURED EPOXY
   INTERNAL DISTRIBUTION: .....PVC
3. SPECIFICATIONS:

FLOW * - GPM (MAX):	10
PRESSURE - PSIG (MAX):	15
TEMPERATURE - DEG F (MAX):	140
CARBON FILL VOLUME - CU FT:	6.9
CROSS SECTION - SQ FT:	2.8
SHIPPING WEIGHT - LBS: (APPROX,)	250
OPERATING WEIGHT - LBS: (APPROX,)	500

* NOTE: ACTUAL DESIGN SHOULD BE BASED ON SUPERFICIAL BED VELOCITY (SBV) AS REQUIRED FOR SPECIFIC CONTAMINANTS.

DESIGNER	DATE	TITLE: ASC 200 GENERAL ASSEMBLY
AJA	2-13-01	
CHECKER	DATE	
ENGINEER	DATE	CLIENT
MANAGER	DATE	USFilter USFILTER/WESTATES RED BLUFF, CA 1-800-795-2664
FILE:		
SCALE: NONE		PROJECT / DRAWING: ASC200GENASSY / SHEET: OF / REV