PELHAM BAY LANDFILL
BRONX, NEW YORK

Operation and Maintenance Manual
Volume IIb

Prepared for:

City of New York
Department of Environmental Protection

WCC Project No. 92C4087

November 1996

Prepared by:

Woodward-Clyde Consultants, Inc.
363 Seventh Avenue, 11th Floor
New York, New York 10001

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COMPLETE SYSTEMS DESIGNED AND SUPPLIED
BLOWERS, PUMPS, FANS, SCRUBBERS, OXIDIZERS, & VALVES
AIR, DUST, GAS, LIQUID, & SLURRIES

PO BOX 93
TENNENT, NJ 07763

A ER-X-DUST

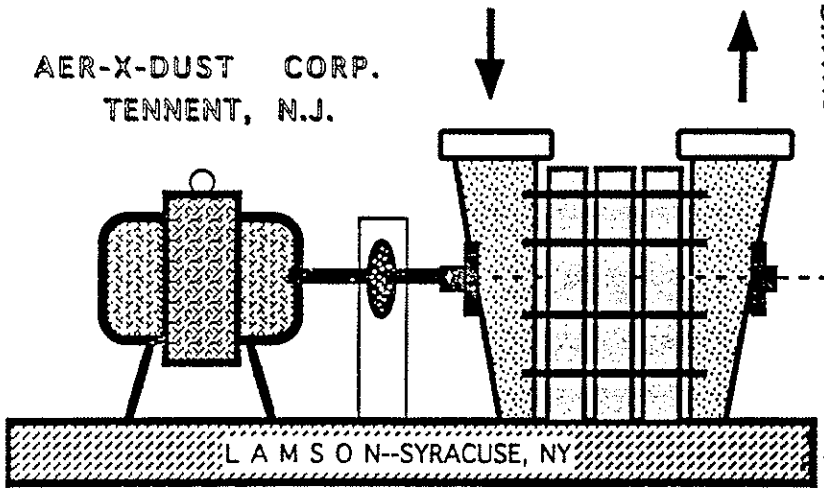
GUY D. CUSUMANO
[908] 431-1505 FAX 308-1367

SUBMITTAL PACKAGE
PELHAM LANDFILL
BRONX, NY

PELHAM BAY LANDFILL, BRONX, NY PROJECT # 876-HP
LAMSON CENTRIFUGAL LFG BLOWERS & CONTROLS
SECTION #15860

BRECO MECHANICAL GROUP
201 SAW MILL RIVER ROAD
YONKERS, NY 10701-6694
ATT: BRIAN R. DYER
PO# 1050, PROJECT # 876-HP
FEB. 1995

AER-X-DUST CORP.
TENNENT, N.J.



BRECO MECHANICAL GROUP, INC.
DATE: 2/13/95
CONTACT: 876-HP
ITEM: Lamson Centrifugal Blowers
SPEC. SECTION: 15860
PARAGRAPH: 2.1 - 2.4
PAGE NO.: 15860-1, 2, 3
DRAWING NO.: GSP 2
LOCATION:
SUBMITTAL NO.: 876-HP-#5
APPROVED BY: BJD

WOODWARD-CLYDE
SUBMITTAL REVIEW

NO EXCEPTIONS TAKEN ☑
REVISE & RESUBMIT ☐

This review has been limited to an evaluation of whether the submittal is in general conformance with the Contract Documents. Contractor is responsible for dimensions and quantities in the field. This review shall not relieve Contractor of responsibility for compliance with the Contract Documents relating to this submittal.

Date 2/16/95 By SHM for AKM

SUBMITTAL ID NUMBER 48

WC PROJECT NO 92C4087

LEADERS IN NON SPARKING LANDFILL GAS BLOWER EQUIPMENT

SO# 65053

GUY D. CUSUMANO, AER-X-DUST CORPORATION
PH-908-431-1505/FAX-908-308-1367

THE KEY TO SUCCESS IS SERVICE AFTER THE SALE!

PRODUCT DATA

1 Lamson Street • P.O. Box 4857 • Syracuse, NY 13221 • Ph. 315-433-5500 • FAX 315-433-5451

LAMSON corporation
Dynamic Innovation Since 1880

CENTRIFUGAL AIR SYSTEMS

BLOWERS/ EXHAUSTERS

☒ For Approval ☐ Certified For

QUANTITY 2

"600" Series Gas, Inlet Driven Direct Drive - Dimensions

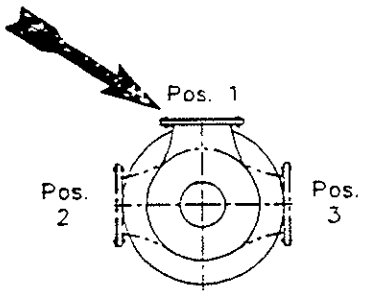
AXD Service Industries

LFG Blowers

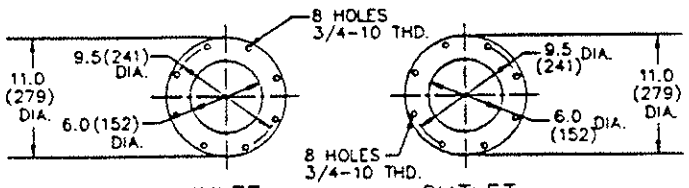
Project Pelham Bay Landfill

Your Order # AXD-050B

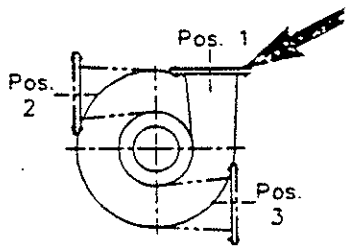
Our Order # 65053 By CS



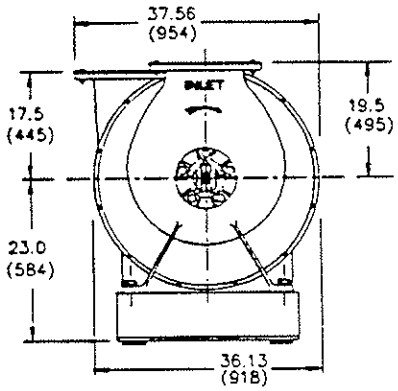
Inlet Positions



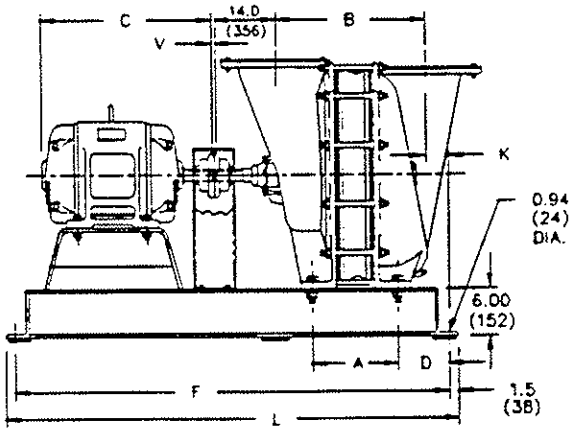
INLET OUTLET

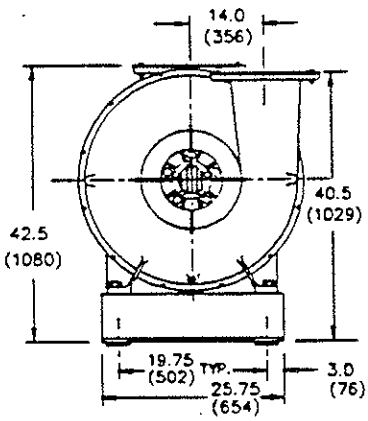


Outlet Positions



(END VIEW OF MACHINE ONLY)





Frame No.	Dimensions						
	A	B	C	D	F	L	K
601	6.00 (152)	8.13 (206)	254T	9.50 (241)	61 (1549)	64 (1626)	9.25 (235)
602	10.50 (267)	12.63 (321)	286TS	9.50 (241)	69 (1753)	69 (1753)	9.25 (235)
603	15.00 (381)	17.13 (435)	286TS	9.50 (241)	72 (1829)	75 (1905)	9.25 (235)
604	19.50 (495)	21.63 (549)	286TS	14.00 (356)	88 (2235)	91 (2311)	13.75 (349)
605	24.00 (610)	26.13 (664)	365TS	9.50 (241)	88 (2235)	91 (2311)	9.25 (235)
606	28.00 (711)	30.63 (778)	405TS	14.00 (356)	100 (2540)	103 (2616)	13.75 (349)
607	33.00 (838)	35.13 (892)	405TS	9.50 (241)	100 (2540)	103 (2616)	9.25 (235)
608	37.50 (953)	39.63 (1006)	444TS	14.00 (356)	112 (2845)	115 (2921)	13.75 (349)
609	42.00 (1067)	44.13 (1121)	445TS	9.50 (241)	112 (2845)	115 (2921)	9.25 (235)

NOTES:
1. Column "C" lists maximum NEMA motor frame typically required for the machine indicated.
2. Dimensions in inches and (mm).
3. Flange dimensions conform to 125 pound ANSI cast iron flanged fittings.
4. Dimension "V" is distance between shaft ends which varies depending on the coupling used. Refer to coupling data sheet for more information.
5. Specifications subject to change without notice.

PRODUCT DATA

1 Lamson Street • P.O. Box 4857 • Syracuse, New York 13221• Ph 315-433-5500 • Fax 315-433-5451

LAMSON corporation
Dynamic Innovation Since 1880

CENTRIFUGAL AIR SYSTEMS

BLOWER EXHAUSTERS

TECHNICAL DATA
600 SERIES

DESIGN

gas
Number of stages ..... 4. (60 HZ)
Inlet driven ..... Inlet standard
Inlet connection ..... 6" flange, matches 125# ANSI
Outlet connection ..... 6" flange, matches 125# ANSI
Operating speed ..... 3,550 RPM (60 Hz)
2,960 RPM (50 Hz)
Maximum casing pressure ..... 15 PSIG (1.03 bar)

Seals (gas) ..... Stuffing box type standard; special seals available
Bearings ..... Ball, life per AFBMA spe. #B-10
Lubrication ..... Grease
Impeller diameter 22.1 (561.3)
Impeller tip speed ..... 20,539 FPM (6,260m/m)
Direct drive ..... Standard shaft diameter at coupling 1.875 (47.63)

Vibration tolerance ..... 1.25 mils measured in vertical plane at top of bearing housing (.032mm)

Unit Weights & Inertia Data				
Stage	Weight Machine & Base		WK^2	
1	1,150	(522)		
2	1,425	(646)	12	(.5)
3	1,700	(771)	18	(.8)
4	1,975	(896)	24	(1.0)
5	2,250	(1,021)	30	(1.3)
6	2,525	(1,145)	36	(1.5)
7	2,800	(1,270)	42	(1.8)
8	3,075	(1,395)	48	(2.0)
9	3,350	(1,520)	54	(2.3)

CAPACITIES

SEE ATTACHED PERFORMANCE CURVE

MATERIALS OF CONSTRUCTION

Casing ..... Cast iron ASTM A48 grade 25/30*
Bearing housings ..... Cast iron with bronze insert
Bearing caps & oil reservoirs ..... Cast iron
Tie rods ..... Steel

Gas seals ..... Braided packing
Labyrinth seals ..... Cast iron, with babbitt insert
Joint sealing compound ..... RTV-Silicone rubber
Shaft ..... Hot rolled carbon steel
Impellers ..... Cast aluminum alloy
Base & pedestal ..... Steel
Bisonite Coated Impellers, Sections and Heads.
Casing Drains
Anchor Bolts

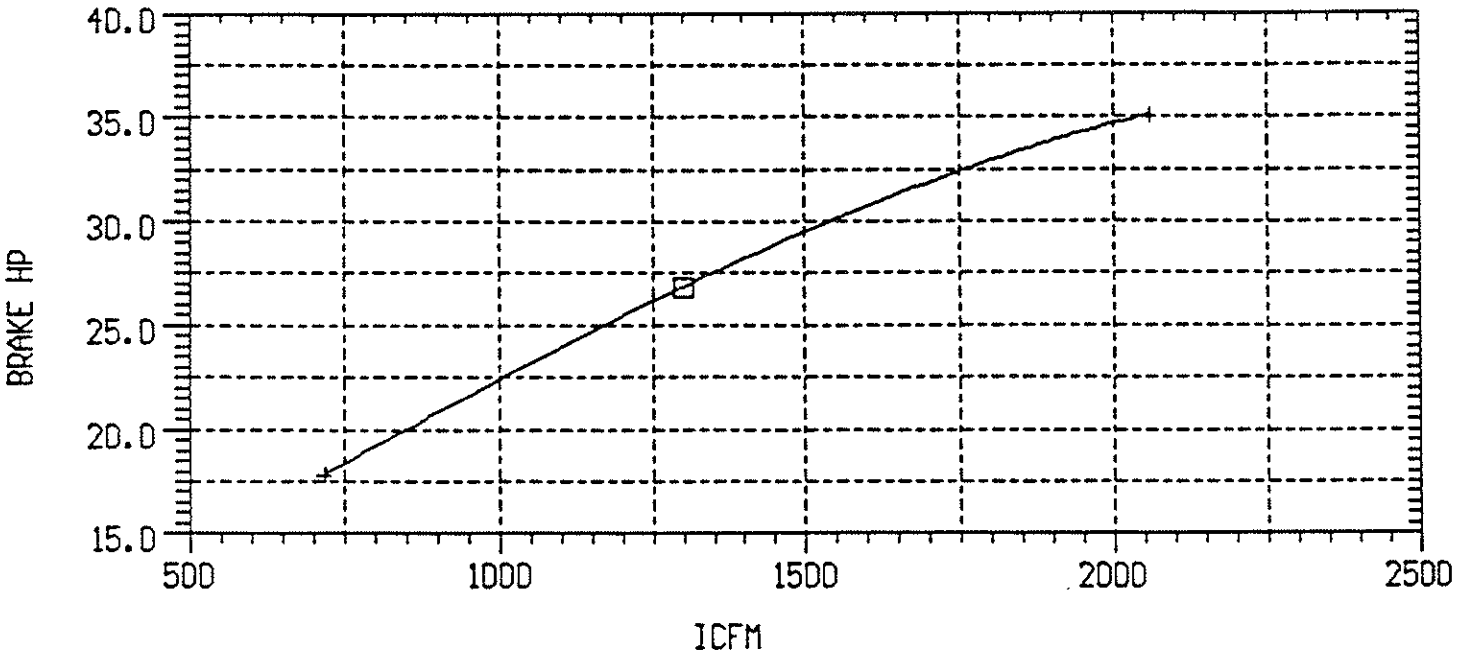
MISCELLANEOUS

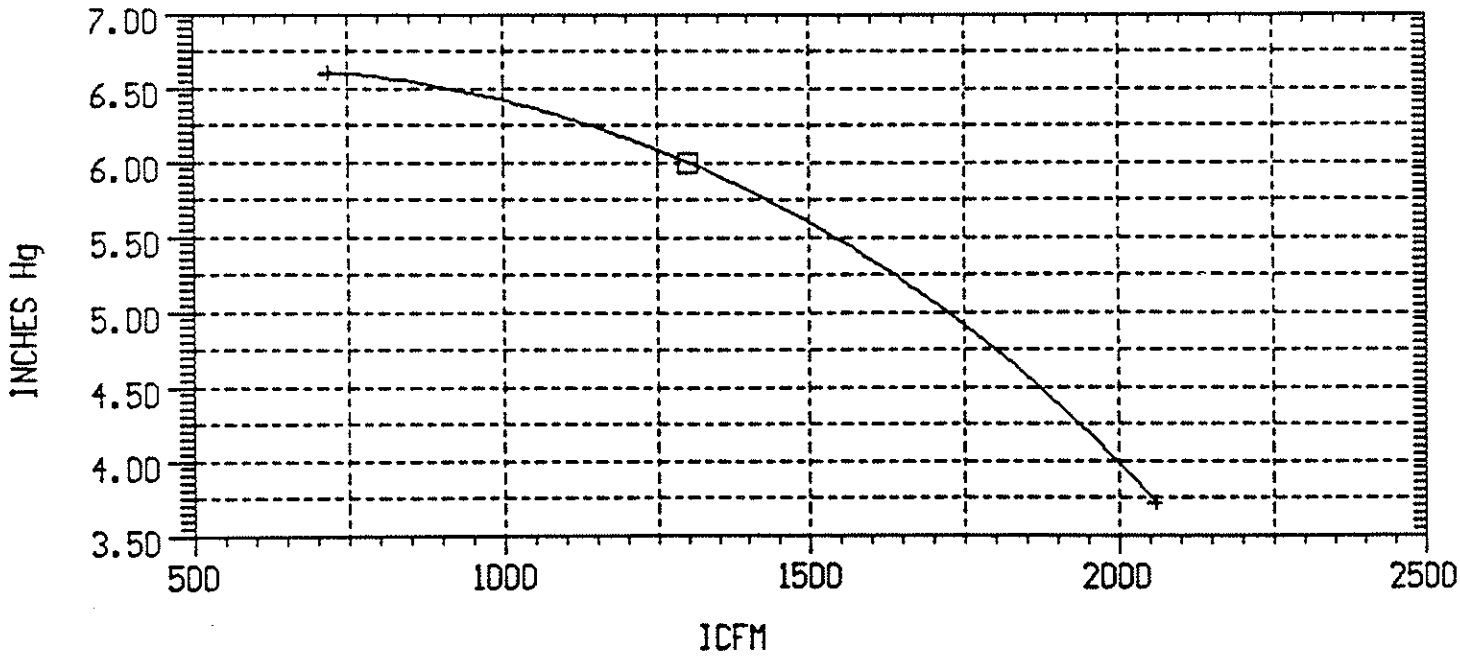
Finish ..... See page 25.10.16
Base pads ..... Molded synthetic rubber 0.5 (13) thick; see page 25.23.09

Notes:
1. Dimensions given in inches and (mm). Weights given in lbs and (kg). WK^2 given in lb-ft² and (kg-m²).
2. Specifications subject to change without notice.
3. *Under Meehanite License.

Lamson Predicted Exhauster Performance (+- 3% on vol.) Ver: 2.52S

LEGEND : Curve -+ = Job
Dsn Point -□ = Job





Model: 600, 4 Stage, 3550 RPM
Impellers: 1 Stage(s) of 1D01
3 Stage(s) of 1D03
Diameter: 22.1D
Gas: Air

1300 ICFM @ 6" HG
14.7 PSIA, 68 DEG. F.
LANDFILL GAS

Project:
Engineer:
S.O. Number:
Date: 05/18/9-

DUTY MASTER ALTERNATING CURRENT MOTORS

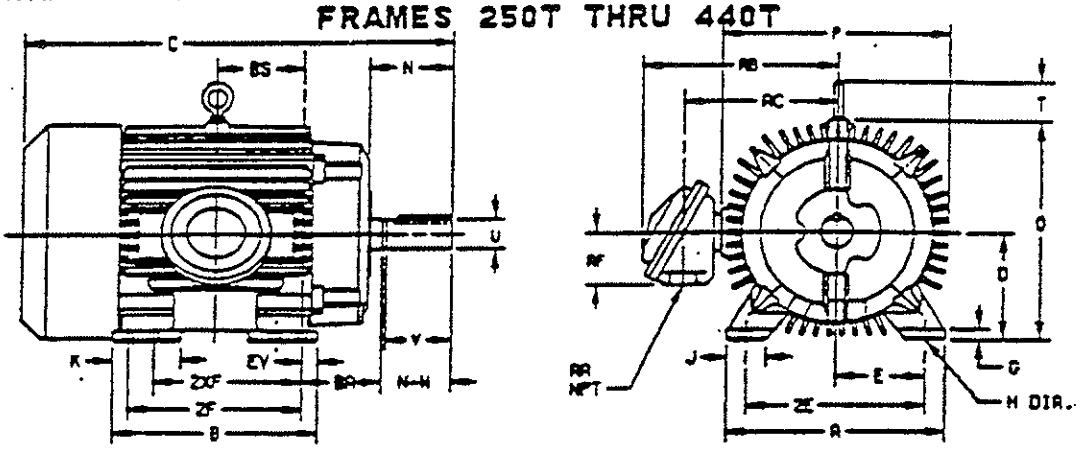
SQUIRREL-CAGE INDUCTION

ENCLOSURE: TOTALLY ENCLOSED — COOLING: FAN COOLED

UNDERWRITERS LISTED MOTOR

MOUNTING: FOOT

FRAMES 250T THRU 440T



DIMENSIONS ARE IN INCHES; SEE SHEET 2 FOR DIMENSIONS IN MILLIMETERS

FRAME	A	D(2)	E	G	H	J	K	O	P	T	AP TERMINAL BOX RR	RB	RC	RF	BA	EY
~~Z5AT-Z5ATS~~	~~12.50~~	~~6.00~~	~~5.00~~	~~.75~~	~~.56~~	~~2.50~~	~~—~~	~~14.75~~	~~14.88~~	~~2.94~~	~~1-1/2~~	~~13.25~~	~~10.56~~	~~3.38~~	~~4.75~~	~~1.00~~
286T-286TS	13.75	7.00	5.50	.75	.56	2.50	—	14.75	14.88	2.94	1-1/2	13.25	10.56	3.38	4.75	1.00
~~324T-326TS~~	~~15.50~~	~~8.00~~	~~8.25~~	~~.88~~	~~.69~~	~~3.25~~	~~5.25~~	~~18.38~~	~~19.50~~	~~3.25~~	~~3~~	~~18.81~~	~~14.25~~	~~4.25~~	~~5.88~~	~~1.38~~
364T-365TS	17.00	9.00	7.00	.88	.69	2.75	4.00	18.50	19.50	2.94	3	18.81	14.25	4.25	5.88	1.38
404T-405TS	19.00	10.00	8.00	1.12	.81	3.25	5.25	21.31	22.50	2.94	3	20.50	15.88	4.25	6.62	1.13
~~444T-445TS~~	~~21.00~~	~~11.00~~	~~9.00~~	~~1.12~~	~~.81~~	~~3.25~~	~~5.25~~	~~23.38~~	~~25.25~~	~~3.25~~	~~3~~	~~25.25~~	~~20.38~~	~~6.00~~	~~7.50~~	~~1.25~~
(1)																

FRAME SIZE	C	BS	B	ZF	Z2F (4)	N	SHAFT AND KEY N-N(6)	U(3)	V	SQ.	LGTH.	WEIGHT LBS. (5)
~~25T~~	~~24.56~~	~~5.00~~	~~12.00~~	~~—~~	~~8.25~~	~~4.06~~	~~4.00~~	~~1.625~~	~~3.75~~	~~.375~~	~~2.88~~	~~335~~
256T	24.56	5.00	12.00	—	—	4.06	4.00	1.625	3.75	.375	2.88	345
~~284T~~	~~27.44~~	~~5.50~~	~~13.00~~	~~—~~	~~9.50~~	~~4.25~~	~~4.00~~	~~1.625~~	~~4.38~~	~~.500~~	~~3.25~~	~~495~~
~~284TS~~	~~26.06~~	~~5.50~~	~~13.00~~	~~—~~	~~9.50~~	~~3.31~~	~~3.25~~	~~1.625~~	~~3.00~~	~~.375~~	~~1.88~~	~~495~~
~~286T~~	~~27.44~~	~~5.50~~	~~13.00~~	~~11.00~~	~~—~~	~~4.25~~	~~4.00~~	~~1.625~~	~~4.38~~	~~.500~~	~~3.25~~	~~510~~
286TS	25.06	5.50	13.00	11.00	—	3.31	3.25	1.625	3.00	.375	1.88	510
~~324T~~	~~28.94~~	~~6.00~~	~~14.75~~	~~—~~	~~10.50~~	~~4.12~~	~~3.75~~	~~1.875~~	~~3.50~~	~~.500~~	~~2.00~~	~~610~~
326T	30.44	6.00	14.75	12.00	—	5.62	5.25	2.125	5.00	.500	3.88	650
326TS	28.94	6.00	14.75	12.00	—	4.12	3.75	1.875	3.50	.500	2.00	650
364T	33.44	6.12	15.00	—	11.25	6.00	5.88	2.375	5.62	.625	4.25	910
364TS	31.31	6.12	15.00	—	11.25	3.88	3.75	1.875	3.50	.500	2.00	904
365T	33.44	6.12	15.00	12.25	—	6.00	5.88	2.375	5.62	.625	4.25	950
365TS	31.31	6.12	15.00	12.25	—	3.88	3.75	1.875	3.50	.500	2.00	934
404T	38.31	6.88	16.00	—	12.25	7.50	7.25	2.875	7.00	.750	5.62	1300
404TS	35.31	6.88	16.00	—	12.25	4.50	4.25	2.125	4.00	.500	2.75	1291
405T	38.31	6.88	16.00	13.75	—	7.50	7.25	2.875	7.00	.750	5.62	1335
405TS	35.31	6.88	16.00	13.75	—	4.50	4.25	2.125	4.00	.500	2.75	1326
444T	44.62	8.25	19.00	—	14.50	8.94	8.50	3.375	8.25	.875	6.88	1770
444TS	40.88	8.25	19.00	—	14.50	5.19	4.75	2.375	4.50	.625	3.00	1754
445T	44.62	8.25	19.00	16.50	—	8.94	8.50	3.375	8.25	.875	6.88	1960
445TS	40.88	8.25	19.00	16.50	—	5.19	4.75	2.375	4.50	.625	3.00	1944
(1)												

(1) SPECIAL DIMENSIONS APPLYING TO THIS ORDER ON THIS LINE.

(2) "D" VARIES — Z5OT - 32OT +.00. -.03. / 36OT - 44OT +.00. -.06.

(3) "U" VARIES — UP TO 1.625 DIA. +.0000. -.0005 / 1.625 AND LARGER +.000. -.001.

(4) ALL FRAMES HAVE EIGHT MOUNTING HOLES FOR DUAL MOUNTING.

(5) MOTOR WEIGHTS MAY VARY BY 15% DEPENDING UPON RATING.

(6) "N-N" VARIES +.00. -.25.

CONDUIT BOX LOCATED ON OPPOSITE SIDE WHEN F-2,M-1, M-4,M-5,M-7, OR C-1 MOUNTING IS SPECIFIED.

IF MOUNTING CLEARANCE DETAILS ARE REQUIRED, CONSULT FACTORY.

MAXIMUM PERMISSIBLE SHAFT RUNOUT WHEN MEASURED AT END OF STD. SHAFT EXTENSION IS .002 T.I.R. UP TO AND INCLUDING 1.625 DIA. AND .003 T.I.R. 1.625 DIA. TO 5 INCH DIA.

FRAME- 286TS TYPE- FCXP CERTIFIED FOR- AXD SERVICE INDUSTRIES

ORDER- 65053 ITEM- 2 HP- 30 RPM- 3600 PH- 3 HZ 60 VOLTS 230-460

RELIANCE SALES ORDER- APPROVED BY- CS DATE 1/20/95

RELIANCE ELECTRIC
CLEVELAND, OHIO 44117 U.S.A.

DR. BY S.BRYANT
CK. BY L.T.FOURNIER
APP. BY J.H.PONTIER
DATE 12-08-89

DIMENSION SHEET 611742-1
SHEET 1 OF 2
ISSUE DATE: JULY 31, 1990

C/R 305861

REL. S.O.	FRAME	HP	TYPE	PHASE/ HERTZ	RPM	VOLTS
-	286TS	30	P	3/60	3535	460

AMPS	DUTY	AMB°C/ INSUL.	S.F.	NEMA DESIGN	CODE LETTER	ENCL.
33.7	CONT	40/F	1.15	B	G	FCXP-XEX

E/S	ROTOR	TEST S.O.	TEST DATE	STATOR RES.@25°C OHMS (BETWEEN LINES)
488306	418139-4JE	---	---	.293

PERFORMANCE

LOAD	HP	AMPERES	RPM	% POWER FACTOR	% EFFICIENCY
NO LOAD	0	8.2	3600	6.79	0
1/4	7.52	11.4	3585	67.4	91.6
2/4	15.0	17.6	3570	84.9	93.9
3/4	22.5	25.2	3554	88.8	93.9
4/4	30.0	33.7	3537	89.5	93.2
5/4	37.5	42.5	3518	89.5	92.2

SPEED TORQUE

	RPM	TORQUE % FULL LOAD	TORQUE LB.-FT.	AMPERES
LOCKED ROTOR	0	175	78.0	217
PULL UP	720	157	70.0	213
BREAKDOWN	3264	270	120	129
FULL LOAD	3537	100	44.5	33.7

AMPERES SHOWN FOR 460. VOLT CONNECTION. IF OTHER VOLTAGE CONNECTIONS ARE AVAILABLE, THE AMPERES WILL VARY INVERSELY WITH THE RATED VOLTAGE

REMARKS: TYPICAL DATA
XE MOTOR-NEMA NOM. EFF. 93.0 %
GUARANTEED MIN. EFF. 92.4%
OVERTEMP SWITCHES, SPACE HEATERS, FUNGUS PROOF & BREATHER.

RELIANCE ELECTRIC
CLEVELAND, OHIO 44117 U.S.A.

DR. BY J.E.SUMRELL
CK. BY D.M.BYRD
APP. BY D.M.BYRD
DATE 10/28/91

A-C MOTOR PERFORMANCE DATA

E09906-A-A002
ISSUE DATE 10/28/91

File Z79232 S

PRODUCT DATA

LAMSON corporation
SINCE 1880
P.O. BOX 4857 SYRACUSE, NEW YORK 13221
(315)432-5500 • TELEX937215 • FAX(315)432-5451

CENTRIFUGAL AIR SYSTEMS

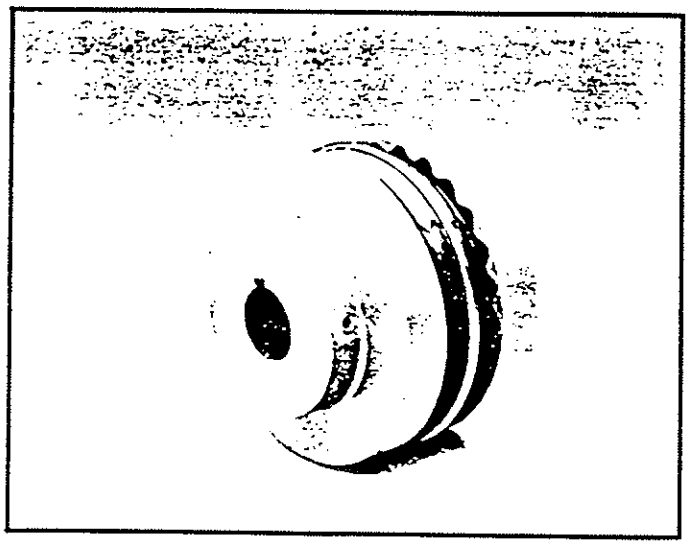
BLOWERS/ EXHAUSTERS

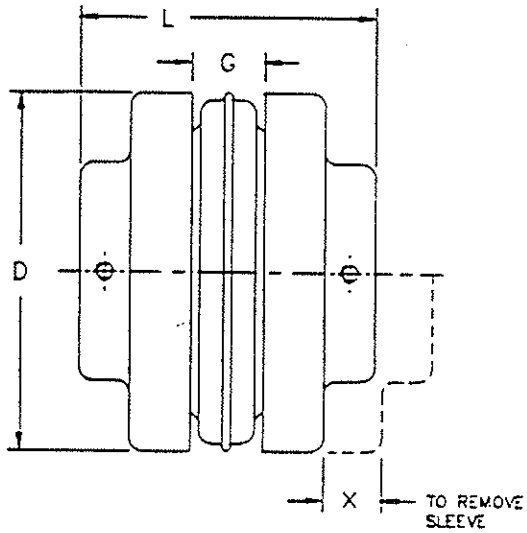
QUANTITY 2

LOVEJOY FLEXIBLE SLEEVE COUPLINGS

☒ For Approval ☐ Certified For

AXD Service Industries
LFG Blowers
Project Pelham Bay Landfill
Your Order # AXD-050B
Our Order # 65053 By CS





ADVANTAGES

The flexible sleeve couplings used on LAMSON blowers/ exhausters have exceptional torsional flexibility. The unique design of the coupling's teeth allows for the absorption of angular misalignment without wear. The lateral flexibility of the coupling sleeve minimizes radial bearing loads normally associated with parallel misalignment. This feature allows for easier installation by the use of components bored for slip fits without fretting corrosion occurring at the shaft.

INSTALLATION

Flexible sleeve couplings can be installed quickly and easily, because there are no bolts, gaskets, covers or seals. Alignment can be checked with a straight edge placed across the outside of the precision – machined flanges. No special tools are needed for installation, alignment or removal.

MAINTENANCE

The teeth of the sleeve lock into the teeth of the flanges without clamps or screws. Under load they tighten to provide smooth transmission of power. There is no rubbing action of metal against rubber to cause wear. Couplings are not affected by abrasives, dirt, or moisture. This eliminates the need for lubrication or maintenance, provides clean, dependable, quiet performance.

ENGINEERING DATA

P/N ▲	DIMENSIONS D	G(4)	L	X	SHAFT GAP	MAX(3) BORE	WT. (lbs) ■
7S	4-5/8	1	3-15/16	1-5/16	1/4	1-7/8	6-3/4
9S	6-11/32	1-7/16	5-1/16 6	1-3/4	1/4 1-7/16	2-1/2 2-7/8	16 14
10S	7-1/2	1-5/8	5-11/16	2	1/4	3-1/8	25-1/4

▲ Type J couplings supplied with one-piece split JES sleeve
Type S couplings supplied with two-piece E sleeve.

■ Approximate weight for complete coupling.

Notes:

(1) Dimensions given in inches.
(2) Specifications subject to change without notice.
(3) Maximum bore with rectangular key.
(4) "G" dimension represents hub separation not shaft dimension.
(5) Spacer couplings available upon request.

PRODUCT DATA

1 Lamson Street • P.O. Box 4857 • Syracuse, NY 13221 • Ph. 315-433-5500 • FAX 315-433-5451

LAMSON corporation
Dynamic Innovation Since 1880

CENTRIFUGAL AIR SYSTEMS

ACCESSORIES

☒ For Approval ☐ Certified For

AXD Service Industries

LFG Blowers

Project Pelham Bay Landfill

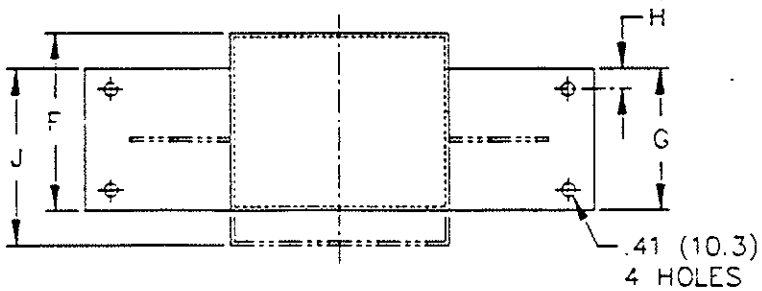
Your Order # AXD-050B

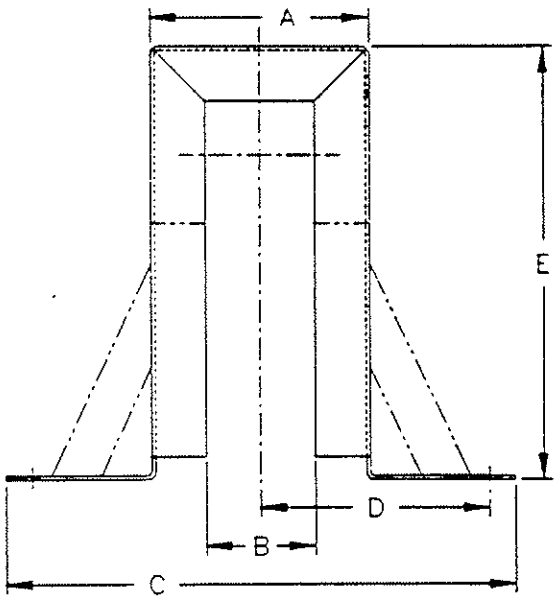
Our Order # 65053 By CS

QUANTITY 2

COUPLING GUARDS

Dimensions in Inches and (mm)





Notes:

1. Material: 12 gauge sheet steel, alternate material available upon request.
2. Gussets on Part Nos. BC4239990000 and BC4239980000 only.
3. Specifications subject to change without notice.

Blower/Exhauster Series	Part Number	A	B	C	D	E	F	G	H	J
310	BC3338990000	5 (127)	3.13 (79.4)	12.25 (311.2)	5.13 (130.2)	12 (304.8)	4.25 (108)	3.88 (98.4)	.5 (12.7)	6.25 (158.8)
400	BC3439010000	6 (152.4)	2 (50.8)	15.5 (393.7)	7 (177.8)	15 (381)	5.75 (146.1)	4.75 (102.7)	.75 (19.1)	– –
510, 550	BC3639010000	8 (203.2)	2.75 (69.9)	17 (431.8)	7.5 (190.5)	18.5 (469.9)	8.5 (215.9)	7.5 (190.5)	1 (25.4)	–
600, [illegible]	BC4039010000	10.25 (260.4)	3 (76.2)	23 (584.2)	8.5 (215.9)	23.38 (593.7)	8.5 (215.9)	7 (177.8)	.88 (22.2)	– –
800, 870, 1210 (250, 1200	BC4239990000 BC4239980000	11 (279.4)	2.75 (69.9)	24 (609.6)	10.75 (273.1)	25.5 (647.7)	7.75 (169.9)	7 (177.8)	1 (25.4)	7.75 (169.9)

For 1210, 1255, 1260 Series, see #3 outlet, outlet driven only.

PRODUCT DATA

1 Lamson Street • P.O. Box 4857 • Syracuse, NY 13221 • Ph. 315-433-5500 • FAX 315-433-5451

LAMSON corporation
Dynamic Innovation Since 1880

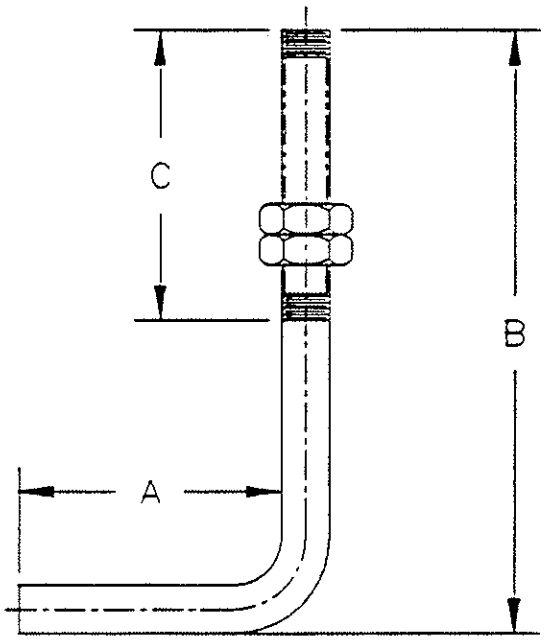
CENTRIFUGAL AIR SYSTEMS

ACCESSORIES

☒ For Approval ☐ Certified For

AXD Service Industries
LFG Blowers
Project Pelham Bay Landfill
Your Order # AXD-050B
Our Order # 65053 By CS

ANCHOR BOLT ASSEMBLY (WITH 2 HEX NUTS)



NOTES:

1. DO NOT TIGHTEN DOWN – USE SECOND NUT TO LOCK IN PLACE.

Part No.	DIMENSIONS				
	Thread	Material	A	B	C
BA1083940000	1/2-7	STN. STL.	2	6-3/4	3 (76.2)
BA1083950000	1/2-7	CARBON STL.	2	6-3/4	3 (76.2)
BA1083960000	3/4-10	STN. STL.	2-1/2	6-3/4	4 (101.6)
BA1083970000	3/4-10	CARBON STL.	2-1/2	6-3/4	4 (101.6)
BA1083980000	7/8-9	STN. STL.	3-1/8	8-1/2	4 (101.6)
BA1083990000	7/8-9	CARBON STL.	3-1/8	8-1/2	4 (101.6)

PRODUCT DATA

1 Lamson Street • P.O. Box 4857 • Syracuse, New York 13221 • Ph 315-433-5500 • Fax 315-433-5451

LAMSON corporation
Dynamic Innovation Since 1880

CENTRIFUGAL AIR SYSTEMS

BLOWER EXHAUSTERS

☒ For Approval ☐ Certified For

AXD Service Industries

LFG Blowers

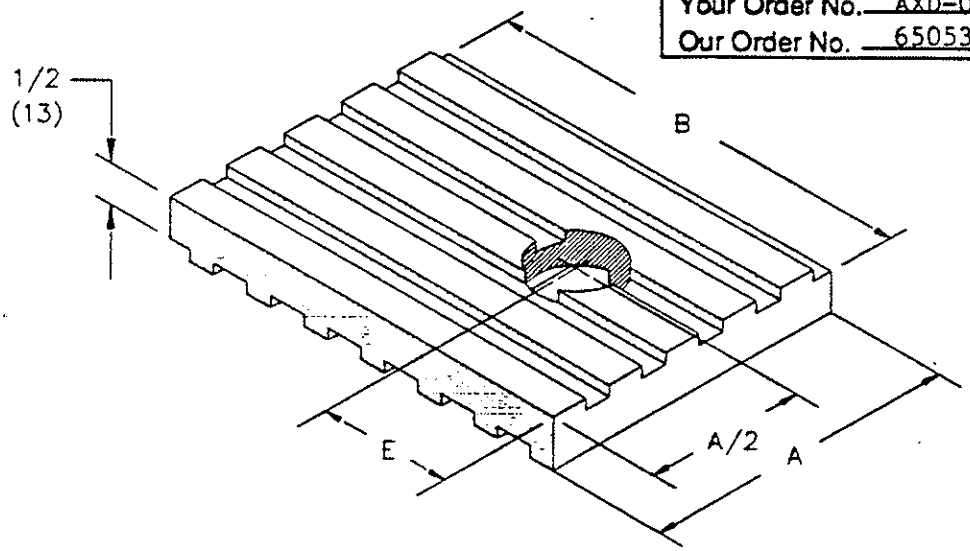
Project Pelham Bay Landfill

Your Order No. AXD-050B

Our Order No. 65053 By CS

12,-BASE PADS

(6 Per Blower)



Part No.	A	B	D Dia.	E
BC3016010000	3/4 (19)	1 (25)	———	———
BC3016020000	1-1/2 (38)	1-1/2 (38)	15/16 (23)	3/4 (19)
BC3016030000	1-1/2 (38)	2 (50)	15/16 (23)	1 (25)
BC3016040000	2 (50)	2 (50)	15/16 (23)	1 (25)
BC3016050000	2 (50)	2 (50)	15/16 (23)	1 (25)
BC3016060000	3 (76)	3 (76)	15/16 (23)	1 (25)
BC3016070000	3 (76)	4 (101)	15/16 (23)	1 (25)
BC3016080000	3 (76)	5 (127)	15/16 (23)	1 (25)
BC3016090000	4 (101)	5 (127)	15/16 (23)	1 (25)
BC3016100000	5 (127)	6 (152)	15/16 (23)	1 (25)
BC3016110000	6 (152)	6 (152)	15/16 (23)	1 (25)
BC3016120000	7 (178)	8 (203)	15/16 (23)	1 (25)

NOTES:

1. Material: Ribbed isolation pad, neoprene, loading 60 PSI to 85 PSI max.
2. Approximate Durometer: 40 ± 5 shore "A" scale.
3. All notations in (parenthesis) are metric.
4. See page 2 for the cast blower/exhauster base pad requirement listing.
5. Specifications subject to change without notice.

CAST BL/EX BASE PAD REQUIREMENT LISTING

UNIT SERIES	SIZE PAD	PART NO.	NO. OF PADS	NO. OF STAGES
200 BD	3/4 x 1	BC3016010000	4	2-3
250F BD	1-1/2 x 1-1/2	BC3016020000	6	3-6
310 DD	1-1/2 x 2	BC3016030000	6	1-6
	2x2	BC3016040000	6	7-11
310 BD	1-1/2 x 2	BC3016030000	6	1-6
	2x2	BC3016040000	6	7-11
400/D/DS/DD	2x2	BC3016040000	6	1-6
	2x3	BC3016050000	6	7-10
400/D/DS/BD	2x2	BC3016040000	6	1-6
	2x3	BC3016050000	6	7-10
510/550 DD	2x3	BC3016050000	6	1-5
	3x3	BC3016060000	6	6-10
510/550 BD	3x3	BC3016060000	6	2-4
	3x3	BC3016060000	9	5-7
600 DD	3x3	BC3016060000	6	1-4
	3x4	BC3016070000	6	5-9
810/850 DD	3x3	BC3016060000	6	1-3
	3x5	BC3016080000	6	4-9
860 DD	3x5	BC3016080000	6	1-5
	4x5	BC3016090000	6	6-10
1210/1250 DD	3x4	BC3016070000	6	1-2
	4x5	BC3016090000	6	3-8
1260 DD	4x5	BC3016090000	6	4-6
	5x6	BC3016100000	6	7-8
1400/1800 DD	4x5	BC3016090000	6	1-3
	5x6	BC3016100000	6	4-5
	6x6	BC3016110000	6	6-8
1850 DD	4x5	BC3016090000	6	1-3
	5x6	BC3016100000	6	4-5
	6x6	BC3016110000	6	6-7
2000 DD	5x6	BC3016100000	6	1-3
	6x6	BC3016110000	6	4-5
	7x8	BC3016120000	6	6-8

COATING SYSTEMS - CHEMICAL PROTECTION

Acid - Solvent - Alkali Resistant Phenolic Coatings for Corrosion and Contamination Resistance

Purpose:

Phenolic coatings can augment our capabilities in gas handling by protecting the iron, steel, and aluminum blower/exhauster components from substances which would otherwise reduce the serviceable life of the machine to an unacceptably short period of time.

These coatings have been developed to produce a protective film with a maximum range of chemical resistance to acids, alkalies and solvents. They are superior to most types of heat reactive coatings in that there is greater resistance to impact shock and thermal shock, being composed of resins of unusually high molecular weight.

Manner of Application:

This material is generally applied in uniform coats of 1.5 to 2 mils dry film thickness by either spraying or dipping, and baked at 300° F for ten minutes between coats to drive off all solvents. Four to six coats may be applied depending on the type and kind of service required. After the full coating system is applied, the work is placed in an oven for 30 minutes to finally cure at temperatures of 375° F to 450° F.

Properties and Characteristics:

The coatings produced being a combination of thermal setting resins, are characterized by extreme smoothness, gloss and chemical insolubility. The films show excellent bonding capability not only to clean, sandblasted iron, steel and aluminum, but to copper and other metals and alloys. They are tough and provide some abrasion resistance.

At the same time, they are relatively flexible for this class of material and will withstand expansion and contraction from thermal change. Films can be built up by a series of coats to a homogenous, continuous film of high dialectric value and low moisture vapor permeability.

The performance of these coatings in offering chemical resistance remains excellent at temperatures from freezing up to 300° F.

Film decomposition does not begin to take place, except to become embrittled, at temperatures reaching 400° F, and in certain applications intermittent service has reached 600° F to 700° F. It must be stated, however, that the coating will not resist all the chemicals at these temperatures that it will at room temperature.

Chemical Resisting Properties:

	Fumes	Spillage or Intermittent Immersion	Continuous Immersion
ACIDS			
Acetic—to 5%	R	R	R
Aqua Regia	R	R	NR
Arsenious (any conc.)	R	R	R
Boric—to 5%	R	R	R
Hydrochloric (comm.)	R	R	R
Hydrofluoric (comm.)	R	R	L
Latic—to 42%	R	R	R
Maleic—aqueous sols.	R	R	R
Maleic—anhydride	R	R	R
Nitric—to 10%	R	R	R
Nitric—to 70%	R	R	L
Oxalic—comm. or sol.	R	R	R
Oleic—comm. or sol.	R	R	R
Phosphoric 10%	R	R	R
Phosphoric 85%	R	R	R
Sulphuric—to 40%	R	R	R
Tannic—comm. or sol.	R	R	R
SALTS AND THEIR SOLUTIONS			
In general, all inorganic salts, acid neutral or basic both dry and in solution.			
There are however a few salts containing nitrogen or halogen groups which in some cases are limited for immersion conditions; for example:			
Cyanide Salts	R	R	R
Hypochlorite Salts of:			
Calcium (Solid) Sodium 16%	R	R	L
Calcium 5% Sodium 5%	R	R	R
Calcium Hydroxide—Sat.	R	R	R

	Fumes	Spillage or Intermittent Immersion	Continuous Immersion
ALKALIS AND BASES			
Ammonium Hydroxide 5%	R	R	R
Ammonium Hydroxide 28%	R	R	R
Calcium Hydroxide (Lat.)	R	R	R
Potassium Hydroxide 50%	R	R	R
Sodium Hydroxide 50%	R	R	R
ORGANIC MATERIALS			
Alcohols (aliphatic)	R	R	R
Chlorinated Hydrocarbons (Ambient Temperature)	R	R	R
At Elevated Temperature	L	L	L
Diesel Fuel, Gasoline, Lubricating Oil—Aromatic	R	R	R
Diesel Fuel, Gasoline, Lubricating Oil—Aliphatic	R	R	R
Formaldehyde—40% sol.	R	R	R
Latex	R	R	R
Phenol	R	R	L
Sour Crude Oil	R	R	R
MISCELLANEOUS			
Hydrogen Chloride, Hydrogen Fluoride, Chlorine, Ammonia:			
Anhydrous	R	R	R
Wet	R	R	R
Dilute (Air)	R	R	R
Hydrogen Sulphide	R	R	R
Hydrogen Peroxide 30%	R	R	L
Hydrogen Peroxide 3%	R	R	R
Sea Water	R	R	R
Tap Water, Mineral Water	R	R	R
Demineralized Water	R	R	R
Boiler Condensate	R	R	R
Detergents	R	R	R
Tanning Solutions	R	R	R

R — Recommended—entirely satisfactory performance.

L — Limited—will perform for a reasonable length of time but will suffer eventual failure due to reaction of chemicals with coating or permeation of film.

NR — Not recommended

ND — No data

Notes:

1. For exceptional applications or service conditions, advise the Syracuse office making reference to temperature, corrosive solutions and concentrations thereof to which the protected area will be exposed. This will enable us to make specific recommendations for the individual problem.

[redacted]

3. Specifications subject to change without notice.

PRODUCT DATA

1 Lamson Street • P.O. Box 4657 • Syracuse, New York 13221 • Ph 315-433-5500 • Fax 315-433-5451

LAMSON corporation
Dynamic Innovation Since 1880

CENTRIFUGAL AIR SYSTEMS

BLOWERS EXHAUSTERS

PAINT SPECIFICATION

CUSTOMER TO SELECT COLOR.

ST-7144 LAMSON ~~GRAY~~ FAST DRY ENAMEL
(Lamson Reference Number MS-100163)

DESCRIPTION

This material is a modified Alkyd with very fast drying properties and an unusually good combination of resistance to many chemicals. Pigmentation is with completely inert colors ensuring excellent color fastness and resistance to leaching etc.. It is free of lead and other toxic ingredients.

PHYSICAL PROPERTIES

Solids Concentration by weight	48.5+/- 1%
Solids Concentration by volume	36.0%
Reduced viscosity #2 Zahn cup	27-32 seconds
Weight per gallon	8.31+/- 0.1 lb.
Reduction	4:1 Xylene
Clean up solvent	Toluol/Xylol

DRY FILM PROPERTIES

Dry to handle	10-15 minutes
Gloss Reading 60 Meter (72 hour air dry)	35-40
Mandrel Bdng 3/8"	Pass
Adhesion Cross Hatch	100%
Impact 30"/lbs Front	Pass
Impact 30"/lbs Rev.	Pass
5% NaOH 1 hour	Recovers
Household Ammonia	Recovers
Perspiration (24 hours)	Pass
Lipstick 1 hour	Removal OK Increase in gloss
Nail Polish	No lifting
Ink (washed with water)	Pass
Ajax Liquid Detergent	Pass

MOISTURE RESISTANCE

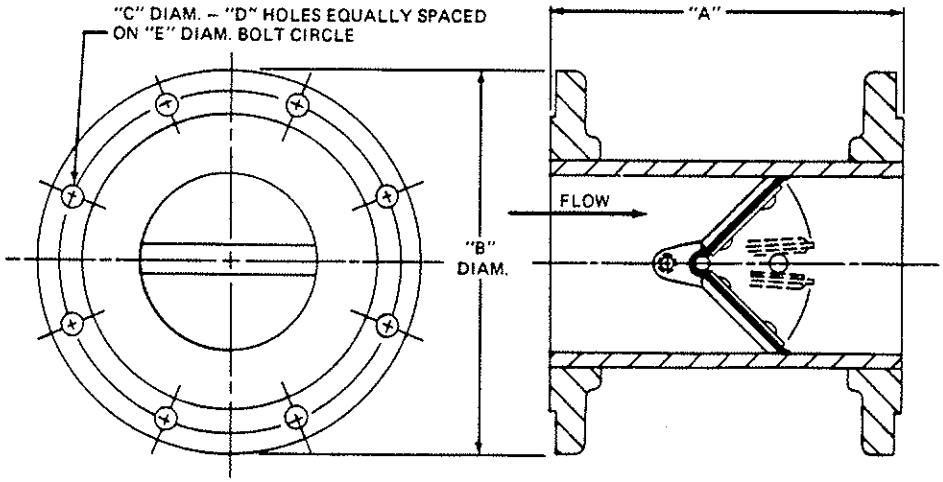
124 Hours - 100% humidity, 100 F	Recovers OK
100 Hours - 5% Salt Fog, ASTM B-117-64	Pass

CONCLUSION

ST-7144 presents an excellent package of rapid drying properties combined with resistance to common chemicals, both acid and alkaline. It is tough, durable and will provide good protection to ferrous metals for long periods of time.

TECHNOCHECK
FULL FLANGED
150 # CLASS

STYLE 5003



GENERAL DIMENSIONS FOR STYLE 5003

VALVE SIZE	"A"	"B"	"C"	"D"	"E"	VALVE SIZE	"A"	"B"	"C"	"D"	"E"
1	3	4-1/4	5/8	4	3-1/8	12	13	19	1	12	17
1-1/4	4-1/2	4-5/8	5/8	4	3-1/2	14	15	21	1-1/8	12	18-3/4
1-1/2	4-1/2	5	5/8	4	3-7/8	16	17	23-1/2	1-1/8	16	21-1/4
2	4-1/2	6	3/4	4	4-3/4	18	19	25	1-1/4	16	22-3/4
2-1/2	5	7	3/4	4	5-1/2	20	21	27-1/2	1-1/4	20	25
3	5	7-1/2	3/4	4	6	24	25	32	1-3/8	20	29-1/2
4	5-1/2	9	3/4	8	7-1/2	30	31	38-3/4	1-3/8	28	36
5	6	10	7/8	8	8-1/2	36	37	46	1-5/8	32	42-3/4
6	7	11	7/8	8	9-1/2	42	43	53	1-5/8	36	49-1/2
8	9	13-1/2	7/8	8	11-3/4	48	49	59-1/2	1-5/8	44	56
10	11	16	1	12	14-1/4						

ALL DIMENSIONS IN INCHES

STANDARD MODELS & MATERIALS

STYLE	BODY	INTERNALS	PSI C.W.P.
5003	STEEL	CADMIUM PLATED STEEL	150
5003-304	304 STAINLESS STEEL	304 STAINLESS STEEL	150
5003-316	316 STAINLESS STEEL	316 STAINLESS STEEL	150
STANDARD ELASTOMER: BUNA-N			

OPTIONAL MATERIAL SELECTION

INTERNAL MATERIALS

- Aluminum
- Bronze
- 304 Stainless Steel
- 316 Stainless Steel
- Cadmium Plated Steel
- Electroless Nickel Plated Steel or Aluminum
- Monel*
- Titanium*
- Hastelloy*

*Non stock item – Available upon request.

SPRING MATERIALS

- 304 Stainless Steel
- 316 Stainless Steel

Monel and Inconel springs available upon request.

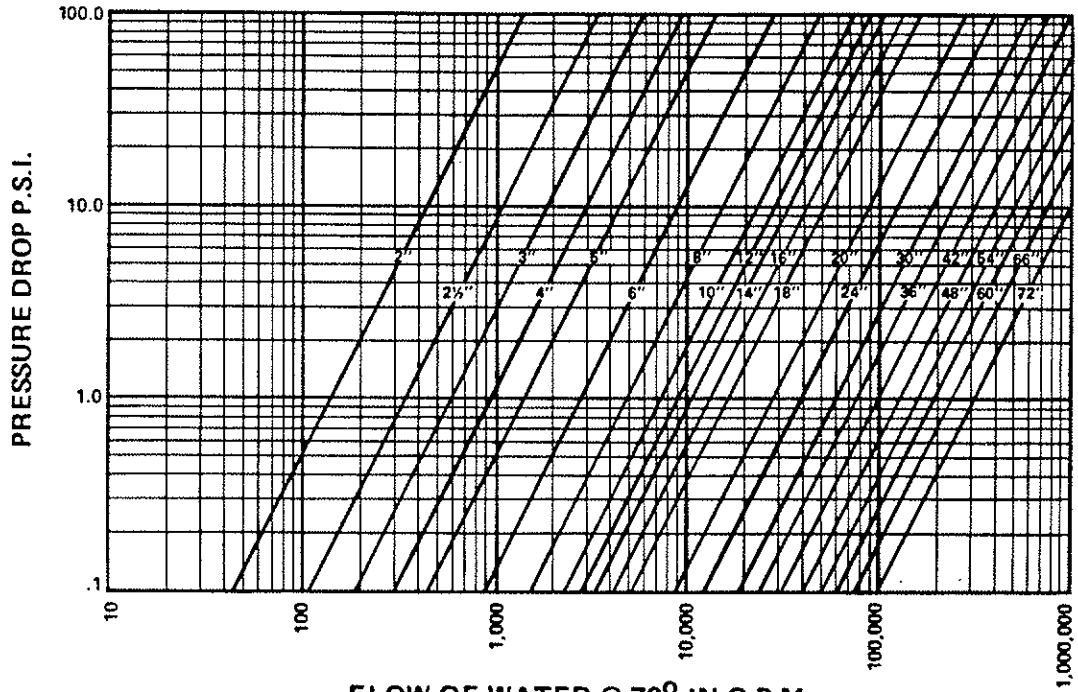
SEALING MEMBER MATERIALS

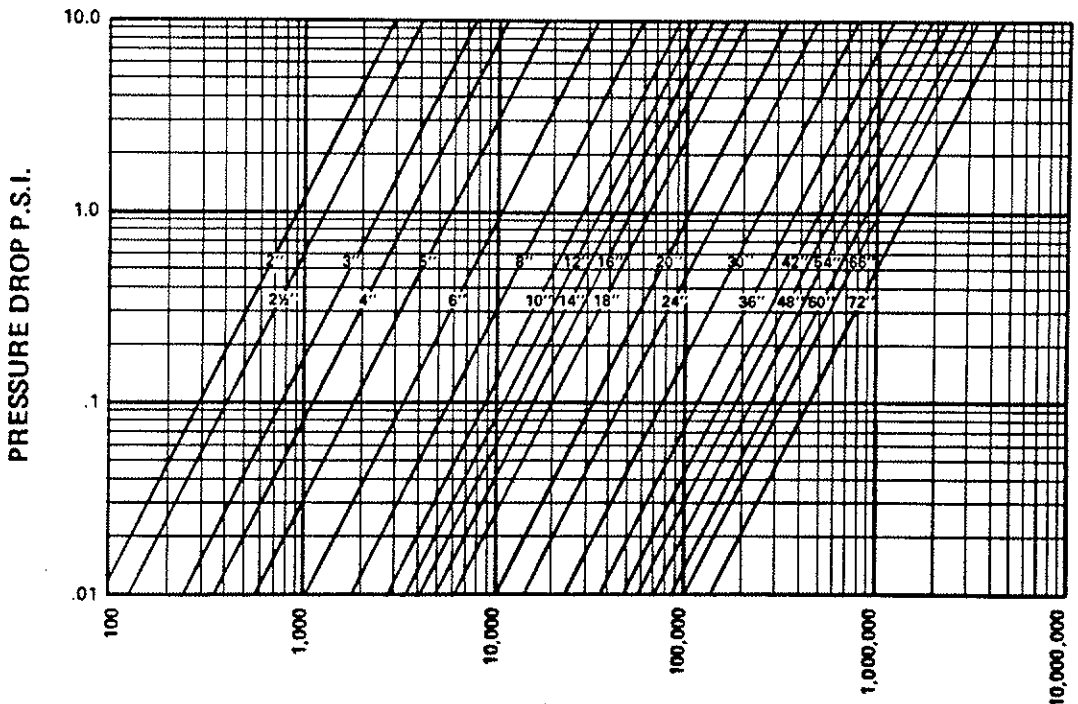
MATERIAL	*TEMPERATURE RANGE
• Buna-N	–60 to 225° F
• Neoprene	–40 to 225° F
• Butyl	–65 to 300° F
• Hypalon	–20 to 300° F
• EPDM	–40 to 300° F
• Viton	–20 to 400° F
• Teflon	–20 to 450° F
• Silicone	–100 to 500° F
• FDA Approved White Neoprene	–40 to 225° F

*This temperature range is for general guidance. The figures may vary with application.

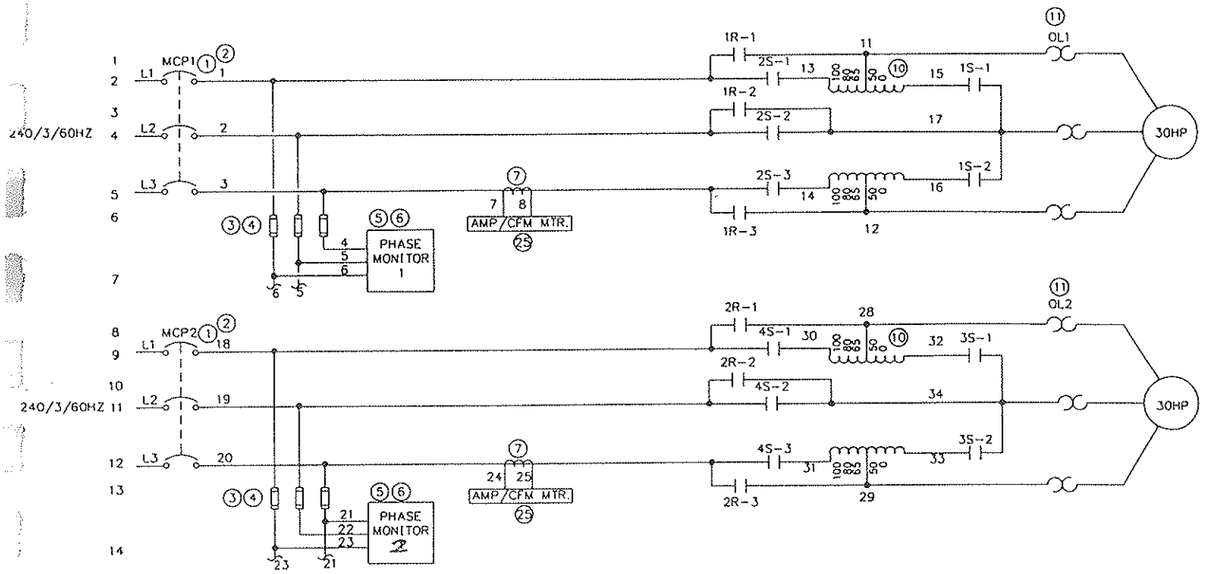
CONSULT FACTORY FOR MATERIALS, SIZES AND PRESSURE RATINGS NOT SHOWN.

PRESSURE DROP CHARTS
FOR WATER AND AIR SERVICE

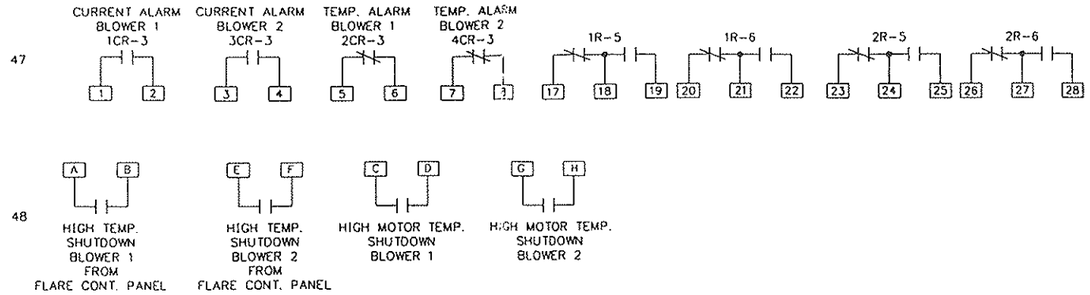


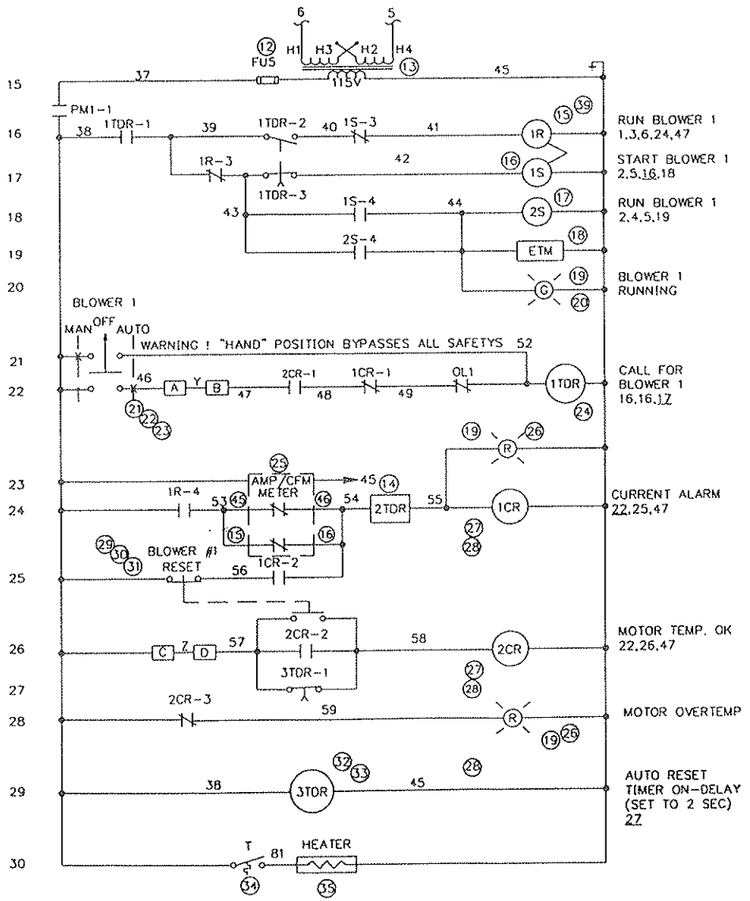


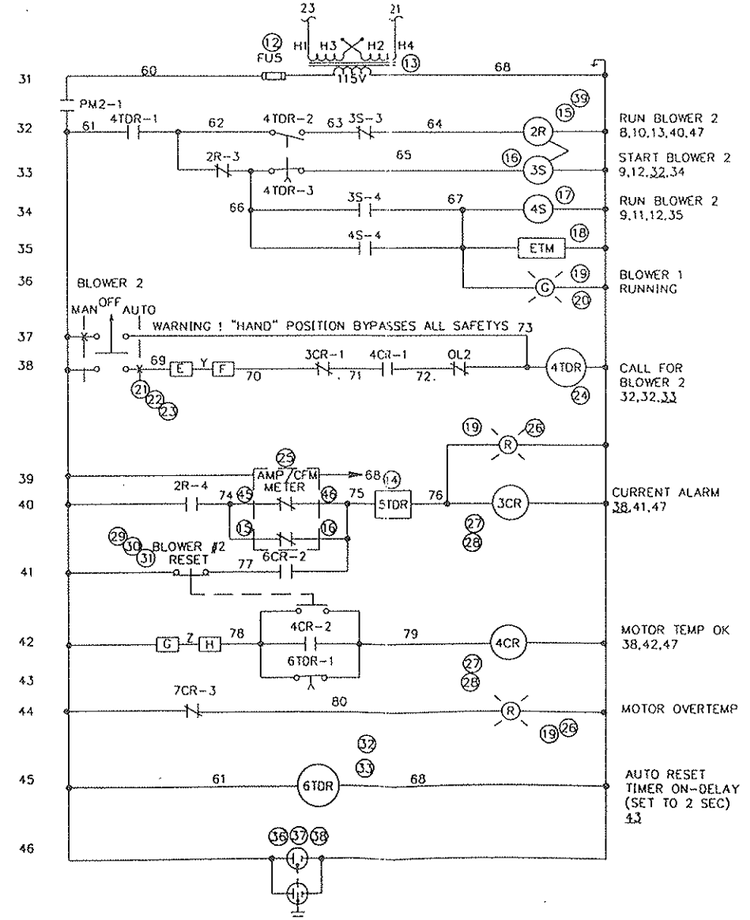
TECHNO CORPORATION
2709 WEST 10TH ST.
P.O. BOX 1416
ERIE, PA 16512
PHONE: 814-838-4561
FAX: 814-838-6963



CUSTOMER CONNECTIONS

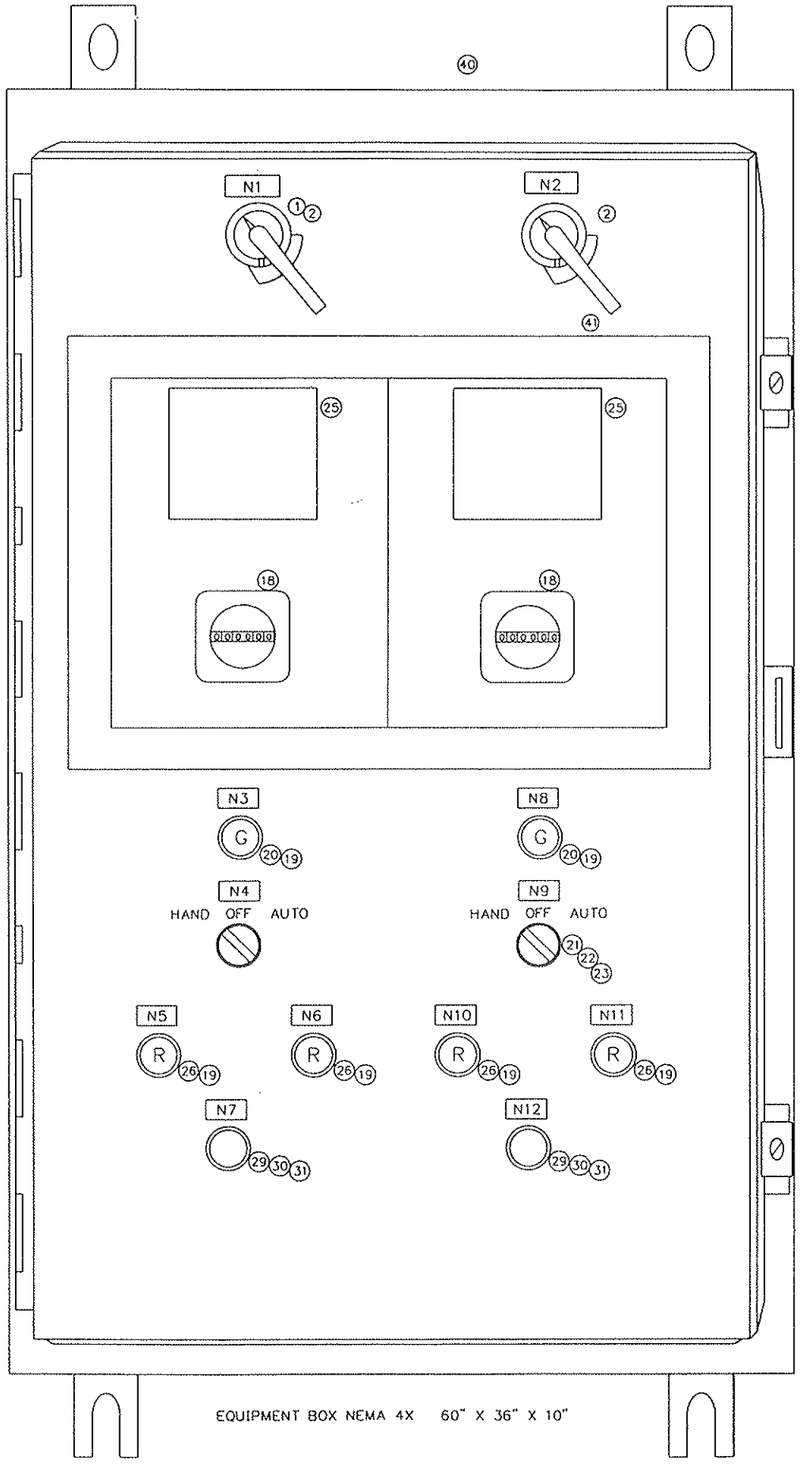


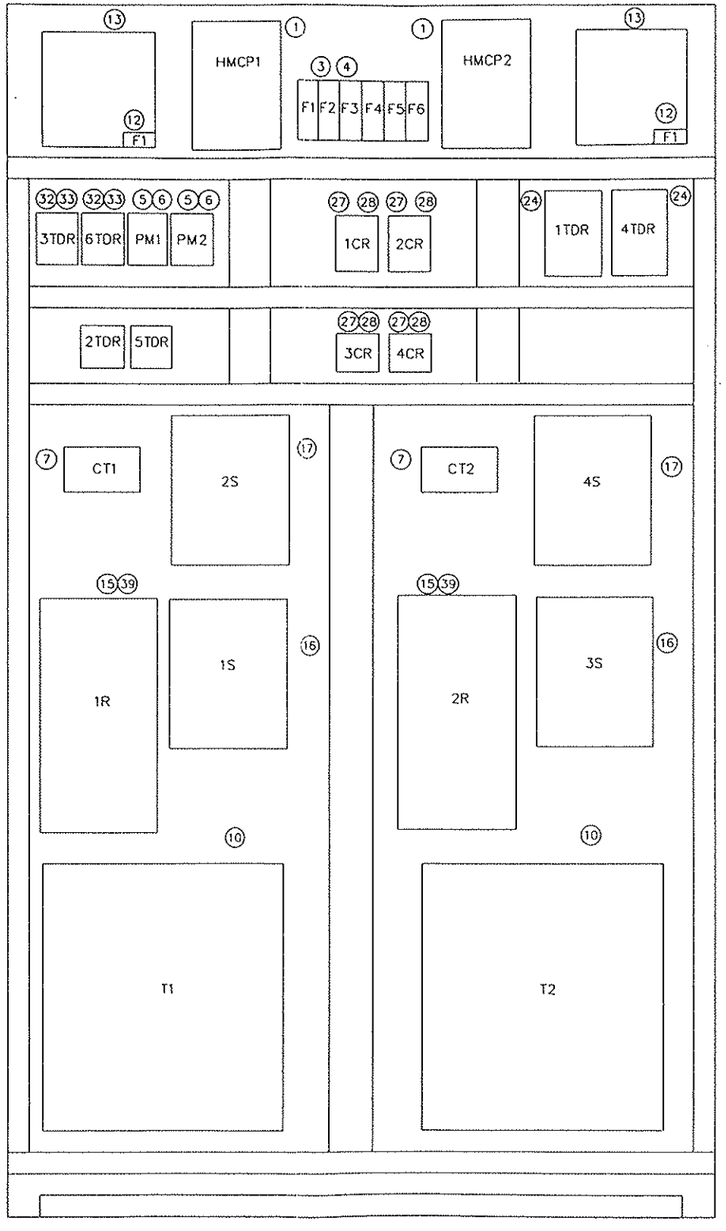




WARNING
PROPRIETARY AND CONFIDENTIAL: THIS DOCUMENT AND THE INFORMATION CONTAINED HEREIN IS THE PROPERTY OF LINK CONTROL SYSTEMS, INC. AND MAY NOT BE USED FOR ANY PURPOSE NOR DISCLOSED TO ANY PARTY WITHOUT THE PRIORS WRITTEN CONSENT OF LINK CONTROL SYSTEMS, INC.

PROJECT: N.Y.C.D.E.P. PELHAM BAY		LINK CONTROL SYSTEMS INC 16 COLT COURT RONKONKOMA, NY 11779 (516) 471-3950 (516) 471-2390 (FAX	
CUSTOMER: AER-X-DUST			
DFTSMN: DLT	ENGR: RJC	CHKD:	S. O. NO: 3-9453 / 9502-16
EQUIP: DUPLEX BLOWER PANEL			DWG. NO: 3-9453-1 / REV: 1
TITLE: ELECTRICAL SCHEMATIC/LAYOUT			DATE: 02/01/95 / 02/03/95





N	LABEL DISCRIPTION
1	DISCONNECT BLOWER 1
2	DISCONNECT BLOWER 2
3	BLOWER 1 RUNNING
4	BLOWER 1
	HAND OFF AUTO
5	BLOWER 1
	CURRENT ALARM
6	BLOWER 1
	HIGH MOTOR TEMP.
7	RESET ALARMS
8	BLOWER 2 RUNNING
9	BLOWER 2
	HAND OFF AUTO
10	BLOWER 2
	CURRENT ALARM
11	BLOWER 2
	HIGH MOTOR CURRENT
12	RESET ALARMS

ITEM	DESCRIPTION	PART NO	MANUFACTURER	QUAN
1	MOTOR CIRCUIT PROTECTOR	HMCP150T4C	WESTINGHOUSE	2
2	MECHANISM	373D958G22	"	2
	HANDLE	504C323G04	"	2
	SHAFT	47A444G37	"	2
3	FUSE BLOCK	3743	BUSS	6
	END SEC	3742	"	2
4	FUSE	FNM4	"	6
5	PHASE MONITOR	A258B240	TIME MARK	2
6	SOCKET 8PIN OCT.	SR2P-06	IDEC	2
7	CURRENT TRANSFORMER	5SFT-500	ELECTRIC METERING	2
8				
9				
10	AUTOTRANSFORMER	52911-071-51	SQUARE D	2
11	OVERLOAD HEATER	CC167	"	6
12	FUSE	FNM5	BUSS	2
13	TRANSFORMER	B350MBT713XK	MICRON	2
14	TIME DELAY RELAY	TDU3000A	SSAC	2
15	MAGNETIC STARTER (2R-1R)	8536 2V02S	SQUARE D	2
16	MAGNETIC STARTER (1S-3S)	8502SEO1V02	"	2
17	MAGNETIC STARTER (2S-4S)	8502SEO2V02S	"	2
18	ELAP. TIME METER	63510063	"	2
19	PILOT LIGHT	FVLU120	CONTROL CONCEPTS	4
20	LENS CAP (GRN)	PLLGNT	"	2
21	SWITCH	SSO3	"	2
22	OPERATOR	SH4-BK	"	2
23	CONTACT	CBNO	"	4
24	TIME DELAY RELAY	9050A012EV02	SQUARE D	2
25	CURRENT/CFM METER	CROMAX-239	AIR-X-DUST	2
26	LENS CAP	PLLRDT	CONTROL CONCEPTS	2
27	RELAY	RH4BUL120	IDEC	4
28	RELAY SOCKET	SH48-05	"	4
29	PUSH-BUTTON	PB4	CONTROL CONCEPTS	2
30	OPERATOR	FC4-BK	"	2
31	CONTACT	CBNC	"	2
32	TIME DELAY RELAY	TDM120VACL	SSAC	2
33	RELAY SOCKET	SR2P-06	IDEC	2
34	TEMP. CONTROL	M7D	MEARS	1
35	HEATER 150W	OT-715	CROMALOX	1
36	DUPLEX. RECEPT	6598-HDI	LEVITON	1
37	HANDY BOX	#420	RACO	1
38	COVER	864	"	1
39	AUX. CONTACT	9999SX8	SQUARE D	4
40	EQUIPMENT BOX	1418N4T10	HAMMOND	1
41	WINDOW KIT	1481W1711	"	1

PROJECT: N.Y.C.D.E.P. PELHAM BAY
CUSTOMER: AER-X-DUST
DFTSMN: DLT ENGR: RJC CHKD:
EQUIP: DUPLEX BLOWER PANEL
TITLE:

LINK CONTROL SYSTEMS INC.
16 COLT COURT
RONKONKOMA, NY 11779
(516) 471-3950 (516) 471-2390 (FAX)

S. O. NO: 3-9453 9502-16
DWG. NO: 3-9453-2 REV: 1
DATE: 02/01/95 02/03/95

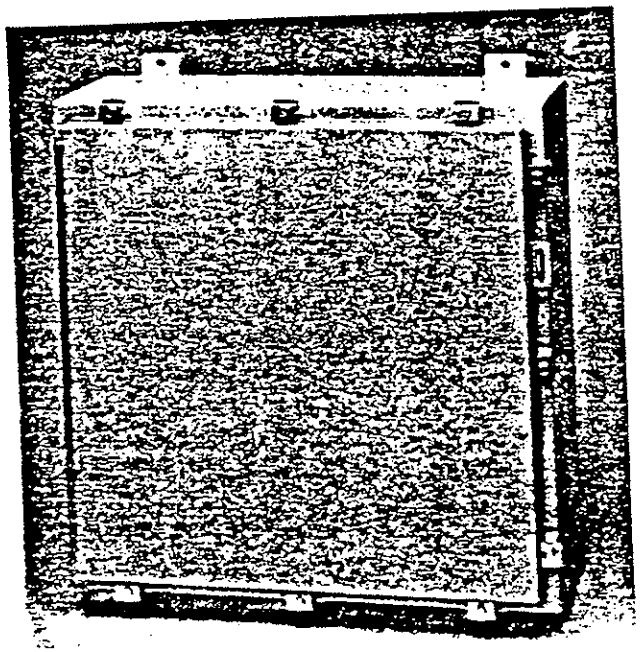
NEMA / EEMAC Type 4, 4X

Single Door Enclosures

1418 N4 Series

Panel Included

B14



Panel Included

Application

- Designed for use as instrument enclosures, electric, hydraulic or pneumatic control housings, electrical junction boxes or terminal wiring enclosures. Provides protection where equipment may be hosed down or otherwise be very wet, or in outdoor applications for full weather protection

Standards

- JIC EGP-1-1967
- IEC 529, IP66

USA:

- NEMA / EEMAC Type 12, Type 13, Type 4 and Type 4X
- UL 508 Type 12, Type 4, and Type 4X
- CSA Type 4 and Type 4X

Canada:

- NEMA / EEMAC Type 12, Type 13 and Type 4
- CSA Type 4

Construction

- Formed 16 gauge steel bodies with 14 gauge steel doors up to sizes 4" x 24". Larger sizes are all formed 14 gauge steel
- Smooth, continuously welded seams, without knockouts, cutouts or holes
- Door and body stiffeners are rovided in the larger enclosures for extra rigidity
- Welded brackets provide for enclosure mounting
- Formed lip on door and enclosure exclude flowing liquids and contaminants
- Stainless steel continuous hinge on door may be removed by pulling the stainless steel hinge pin
- Door is secured with easily operated stainless steel clamps
- Provision for padlocking
- Oil resistant gaskets are permanently secured and mechanically retained
- A removable 12 gauge inner panel is included
- Collar studs are provided for mounting inner panels
- A bonding stud is provided on the door and a grounding stud is provided in the enclosure
- A literature pocket is provided for the inside of the door

Finish

- Cover and enclosure are phosphatized, primed and finished in ANSI / ASA 61 grey
- Removable inner panel is finished in white enamel

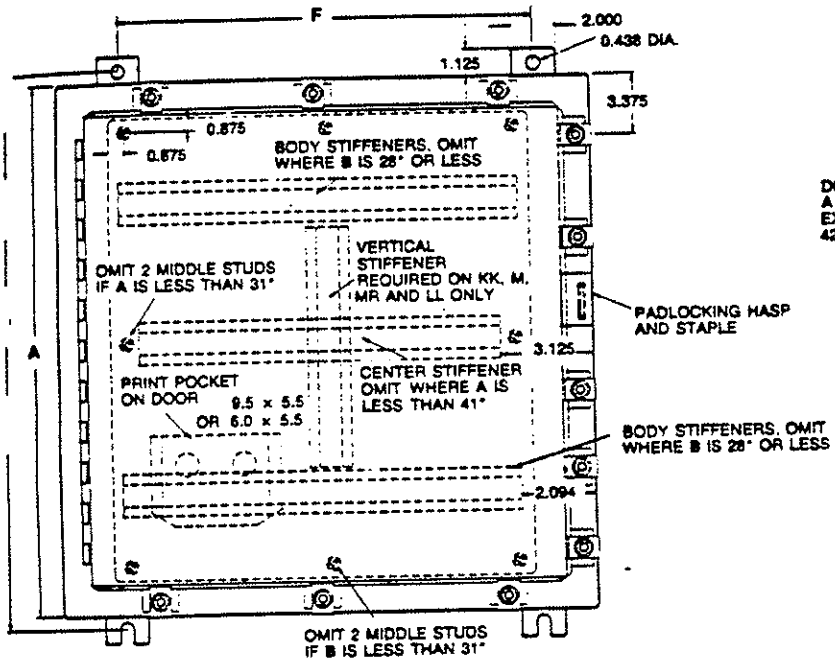
Accessories

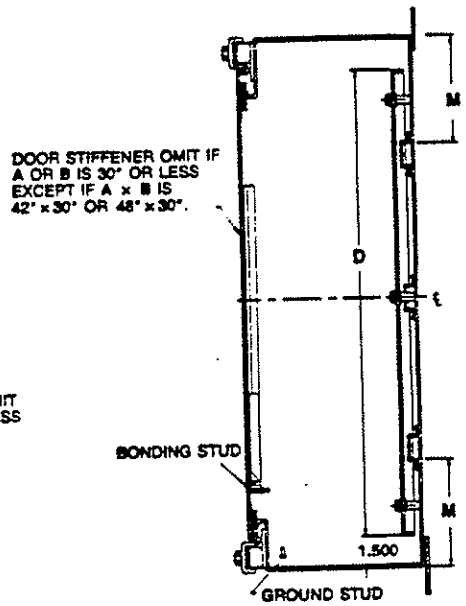
- Air conditioners
- Door stop kit
- Enclosure stabilizers
- Locking handles
- Mounting feet kit
- Quick clamp assemblies
- Spare door clamping hardware
- Spare inner panels
- Terminal kit assembly
- Window kit

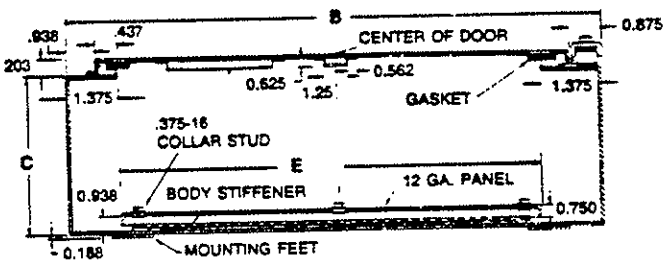
Single Door Enclosures

1418 N4 Series

Panel Included







NOTE:
NUMBER OF DOOR CLAMPS VARIES TO ENCLOSURE SIZE.

When A =	M =
30	7
36	9
42	9.875
48	11.375
60	14.375

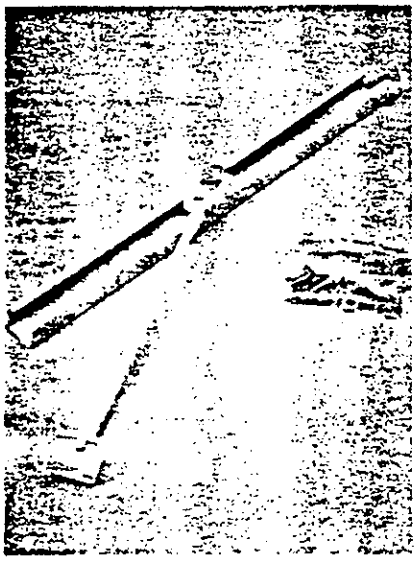
Part No.	A	B	C	Panel Size D	Panel Size E	Mtg. Centers F	Mtg. Centers G	Ship Wt. lbs.
1418 N4 B6†	18	12	6	13	9	9.5	17.25	27
1418 N4 G6†	16	16	6	13	13	10	17.25	34
1418 N4 CR6†	16	20	6	13	17	14	17.25	41
1418 N4 C6†	20	16	6	17	13	10	21.25	40
1418 N4 D6†	20	20	6	17	17	14	21.25	40
1418 N4 AR6†	24	12	6	21	9	9.5	25.25	41
1418 N4 H6	24	16	6	21	13	10	25.25	42
1418 N4 E6	24	20	6	21	17	14	25.25	56
1418 N4 J6	24	24	6	21	21	18	25.25	65
1418 N4 F6	30	20	6	27	17	14	31.25	70
1418 N4 K6	30	24	6	27	21	18	31.25	80
1418 N4 L6	36	24	6	33	21	18	37.25	91
1418 N4 B8†	16	12	8	13	9	9.5	17.25	29
1418 N4 C8†	20	16	8	17	13	10	21.25	44
1418 N4 D8†	20	20	8	17	17	14	21.25	51
1418 N4 ER8	20	24	8	17	21	18	21.25	55
1418 N4 E8	24	20	8	21	17	14	25.25	60
1418 N4 J8	24	24	8	21	21	18	25.25	70
1418 N4 KR8	24	30	8	21	27	24	25.25	74
1418 N4 F8	30	20	8	27	17	14	31.25	79
1418 N4 K8	30	24	8	27	21	18	31.25	88
1418 N4 KK8	30	30	8	27	27	24	31.25	106
1418 N4 L8	36	24	8	33	21	18	37.25	101

Part No.	A	B	C	Panel Size D	Panel Size E	Mtg. Centers F	Mtg. Centers G	Ship Wt. lbs.
1418 N4 M8	36	30	8	33	27	24	37.25	121
1418 N4 D8*	42	30	8	39	27	24	43.25	132
1418 N4 P8*	42	36	8	39	33	30	43.25	177
1418 N4 S8*	48	36	8	45	33	30	49.25	207
1418 N4 T8*	60	36	8	57	33	30	61.25	245
1418 N4 C10†	20	16	10	17	13	10	21.25	47
1418 N4 E10	24	20	10	21	17	14	25.25	66
1418 N4 K10	30	24	10	27	21	18	31.25	91
1418 N4 M10	36	30	10	33	27	24	37.25	125
1418 N4 R10*	48	30	10	45	27	24	49.25	175
1418 N4 S10*	48	36	10	45	33	30	49.25	183
1418 N4 T10*	60	36	10	57	33	30	61.25	252
1418 N4 E12	24	20	12	21	17	14	25.25	71
1418 N4 K12	30	24	12	27	21	18	31.25	95
1418 N4 L12	36	24	12	33	21	18	37.25	106
1418 N4 M12	36	30	12	33	27	24	37.25	136
1418 N4 P12*	42	36	12	39	33	30	43.25	202
1418 N4 S12*	48	36	12	45	33	30	49.25	225
1418 N4 K16	30	24	16	27	21	18	31.25	100
1418 N4 M16	36	30	16	33	27	24	37.25	149
1418 N4 S16*	48	36	16	45	33	30	49.25	290
1418 N4 T16*	60	36	16	57	33	30	61.25	232

Flat panel

All dimensions in inches

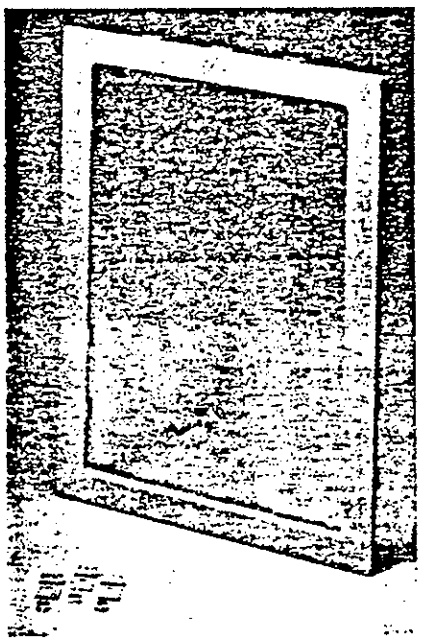
* Do not meet JIC requirements



Door Stop Kit

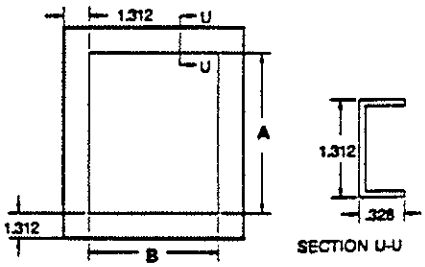
- Designed for use on Hammond 1418, 1422, UD and UHD Series enclosures where the door width is 16 inches or more and is positioned to open horizontally
- Easily installed in the top or bottom of the enclosure
- Adjusts by means of a thumb screw at any desired angle
- Finished in white baked enamel

Part No.
1481 DSK



Steel and Stainless Steel Window Kits

- Designed for use on NEMA 12 and 4 enclosures in indoor applications
- Window is .25 inch thick, clear acrylic
- Frame is heavy gauge steel, or 304 stainless steel with integral weld studs, compression clips and all required mounting hardware
- Oil resistant neoprene gasket ensures a watertight seal
- Finished in grey recoatable enamel or natural brushed stainless steel



Part No.	Description	Window Dim. A x B	No. of Clips	Recommended Cut-out Size	Wt. Lbs.
1481 W0503	Steel	5 x 3	6	6.75 x 4.75	1.4
1481 W0905	Steel	9 x 5.5	10	10.75 x 7.25	2.8
1481 W1303	Steel	13 x 3	10	14.75 x 4.75	2.7
1481 W1308	Steel	13 x 8	14	14.75 x 9.75	4.3
1481 W1705	Steel	17 x 5.5	16	18.75 x 7.25	4.8
1481 W1711	Steel	17 x 11	20	18.75 x 12.75	6.4
1481 W2315	Steel	23 x 15	24	24.75 x 16.75	9.2
1481 W2919	Steel	29 x 19	30	30.75 x 20.75	13.3
1481 W3523	Steel	35 x 23	36	36.75 x 24.75	23.9
1481 WSS0503	Stainless Steel	5 x 3	6	6.75 x 4.75	1.5
1481 WSS0905	Stainless Steel	9 x 5.5	10	10.75 x 7.25	3.0
1481 WSS1308	Stainless Steel	13 x 8	14	14.75 x 9.75	5.1
1481 WSS1711	Stainless Steel	17 x 11	20	18.75 x 12.75	8.0
1481 WSS2315	Stainless Steel	23 x 15	24	24.75 x 16.75	13.1
1481 WSS2919	Stainless Steel	29 x 19	30	30.75 x 20.75	19.4

Molded Case Breakers

Series C Type HMCP

Motor Circuit Protector

3 to 600 Amperes
600 Volts Ac Max.
3 Poles Only

Underwriters' Laboratories, Inc. Listing
Series C Type HMCP Motor Circuit Protectors (MCPs) are recognized components in UL Listed control assemblies which include contactors and overload relays.

Interrupting Ratings
Testing in combination with a specific contactor and overload relay is required to establish the maximum interrupting capacity of the combined devices.

Application
The HMCP motor circuit protector is designed for application to individual motor circuits in combination with a magnetic motor starter. MCP's operate on the magnetic principle with a current sensing coil in each of the 3 poles to provide short circuit protection. The magnetic trip setting is adjustable from the front of the device.

The MCP is shipped with the adjusting button(s) on the low setting. MCP's are sized to correspond with NEMA starter sizes.

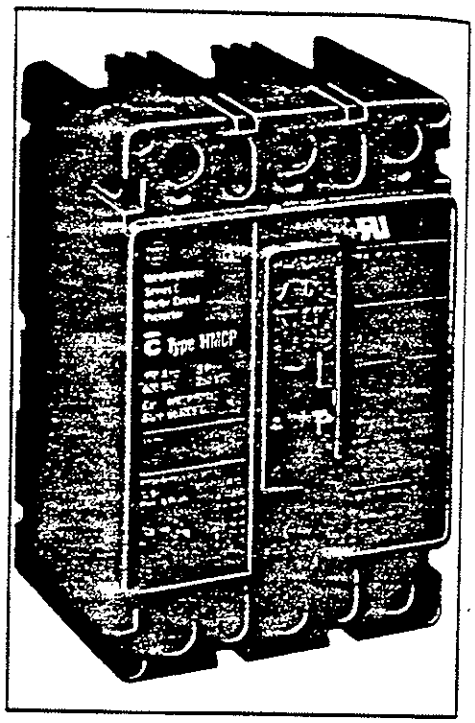
The MCP design permits the fastest tripping time possible on low level faults while offering circuit breaker convenience, quick make-quick break action, dead front safety and protection against single phasing. The size 0-4 Type HMCPs incorporate a unique transient inrush trip suppressor mechanism which allows the MCP to sustain the high transient inrush levels commonly associated with energy efficient motors.

Trip Setting
Determine motor full load current from the motor nameplate data. Refer to the table in Instruction Sheet and determine appropriate trip setting. Depress the adjusting button(s) and turn to selected setting.

For maximum protection, the adjusting button(s) should be turned to successively lower positions until the MCP trips on motor starting. After this position is determined, turn adjusting button(s) to the next higher setting for normal operations. If MCP does not trip at minimum setting leave pointer at this setting.

Current Limiter Attachment (Size 0-4)
Because of the increased interrupting ratings of combination starters using the Series C Type HMCP motor circuit protector, the need for add-on current limiters has been significantly reduced. However, current limiters are available for use with the Type HMCP to provide even higher interrupting capacities. The combination of the Type HMCP plus limiter is covered as a UL recognized component for application in electrical systems with available fault current up to 200,000 amperes at 600 VAC. The current limiters bolt to the load end of the MCP and are provided with terminals suitable for copper or aluminum conductors.

Accessories and Modifications
Accessories and modifications for the MCP include shunt trip, auxiliary switch, alarm switch, undervoltage release, handle locks, line terminal shield, electrical operator and handle mechanisms.



Ratings and Trip Settings

Motor Full Load Current Amperes	MCP Cont. Rating	MCP Catalog Number	Starter Size	MCP Trip Settings								
				A	B	C	D	E	F	G	H	I
.69- 2.5	3	HMCP003A0	0	9	12	15	18	21	24	27	30	....
1.5 - 5.7	7	HMCP007C0	0	21	28	35	42	49	56	63	70	....
3.4 - 12.6	15	HMCP015E0	0	45	60	75	90	105	120	135	150	....
6.9 - 25.2	30	HMCP030H1	1	90	120	150	180	210	240	270	300	....
11.5 - 42.1	50	HMCP050K2	2	150	200	250	300	350	400	450	500	....
16.1 - 59.1	70	HMCP070M2	2	210	280	350	420	490	560	630	700	....
23.0 - 84.5	100	HMCP100R3	3	300	400	500	600	700	800	900	1000	....
34.6 -126.7	150	HMCP150T4	4	450	600	750	900	1050	1200	1350	1500	....
27.0 - 57.2	250	HMCP250A5	4,5	350	400	440	480	525	570	610	660	700
34.7 - 73.5	250	HMCP250C5	5	450	505	565	620	680	735	790	845	900
38.5 - 81.6	250	HMCP250D5	5	500	565	625	690	750	810	875	935	1000
48.1 -102.0	250	HMCP250F5	5	625	700	780	860	940	1020	1090	1170	1250
57.7 -122.4	250	HMCP250G5	5	750	840	935	1030	1125	1220	1315	1410	1500
38.5 - 81.6	400	HMCP400D5	5	500	565	625	690	750	810	875	935	1000
48.1 -102.0	400	HMCP400F5	5	625	700	780	860	940	1020	1090	1170	1250
57.7 -122.4	400	HMCP400G5	5	750	840	935	1030	1125	1220	1315	1410	1500
67.4 -142.8	400	HMCP400J5	5	875	980	1090	1200	1310	1420	1530	1640	1750
77.0 -163.3	400	HMCP400K5	5	1000	1125	1250	1375	1500	1625	1750	1875	2000
86.6 -183.6	400	HMCP400C5	5	1125	1265	1410	1545	1690	1830	1970	2110	2250
96.2 -204.0	400	HMCP400W5	5	1250	1405	1560	1720	1875	2030	2185	2340	2500
115.4 -244.9	400	HMCP400N5	5	1500	1690	1875	2060	2250	2440	2625	2810	3000
134.7 -285.7	400	HMCP400R5	5	1750	1970	2190	2410	2625	2845	3065	3285	3500
153.9 -326.9	400	HMCP400X5	5,6	2000	2250	2500	2750	3000	3250	3500	3750	4000
134.5 -507.7	600	HMCP600L6W	6	1800	2400	3000	3600	4200	4800	5400	6000	....

Series C Type HMCP
Motor Circuit Protector

Typical Specifications

Electrical circuits shall be protected by a 3-pole Series C motor circuit protector (Type HMCP) as manufactured by Westinghouse Electric Corporation, or approved equal. MCPs shall be component-recognized under UL 489 and comply with the applicable requirements of IEC 157-1.

The MCP shall be operated by a toggle type handle and shall have a quick-make, quick-break overcenter switching mechanism that is mechanically trip free from the handle so that the contacts cannot be held closed against short circuits and abnormal currents which cause the MCP to trip. Tripping shall be clearly indicated by the handle automatically assuming a position midway between the manual ON and OFF positions. All latch surfaces shall be ground and polished. All poles shall be so constructed that they open, close, and trip simultaneously.

The MCP status shall be clearly indicated by the handle position and by color-coded flags: Red for ON, Green for OFF and White for TRIP. The on and off positions shall be identified by using the English words On and Off and the international symbols I and 0 respectively.

MCPs must be completely enclosed in a high-strength glass polyester molded case. Ampere ratings shall be clearly visible. Contacts shall be of nonwelding silver alloy. Arc extinction must be accomplished by means of DE-ION® arc chutes, consisting of metal grids mounted in an insulating support.

A manual push-to-trip button shall be provided for manual exercising of the trip mechanism.

Each pole of these MCPs shall provide instantaneous short circuit protection by means of an adjustable magnetic-only element.

The MCP (through 150A) mechanism shall be the transient inrush suppressor type appropriate for the protection of energy efficient motors.

MCPs (through 150A) shall be suitable for use with current limiters, with a built-in trip indicator, that are fully coordinated with the MCP so that the MCP will open all three phases if the limiter operates. Current limiters shall be so constructed that they can only be replaced by an identical or similar limiter having the same interrupting capacity.

MCPs shall be applied in circuits with available fault currents not exceeding those listed by the control manufacturer for the MCP in combination with a contactor and overload relay.

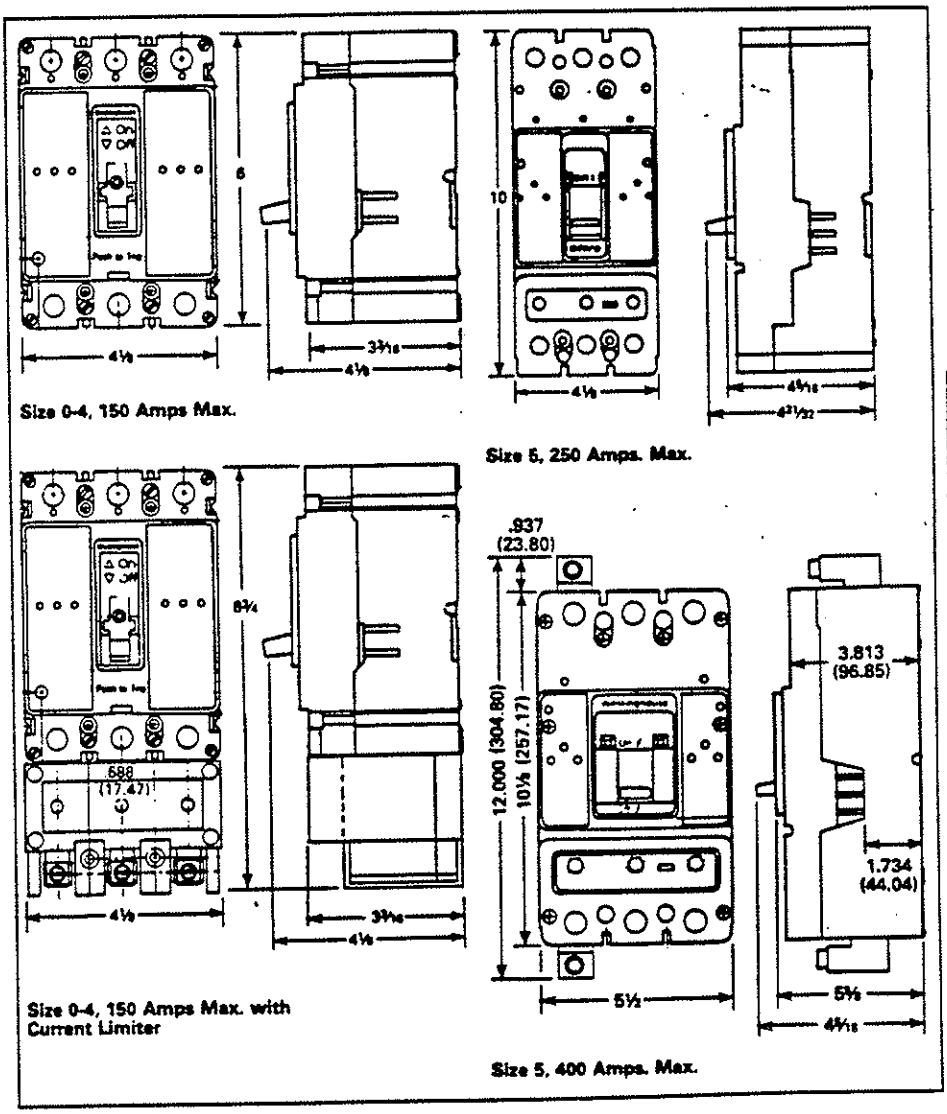
Internally mounted accessories shall be of the plug-in type with pigtail leads or terminal blocks as shown on the drawing.

Provisions shall be available for cross-routing of accessory leads through an integral trough where handle mechanisms obstruct normal exit.

Provisions shall be available for field installation of key interlock and padlocking devices.

MCP ratings, modifications etc. shall be as indicated on the drawings.

Outline Dimensions, Inches
Not to be used for construction purposes unless approved.



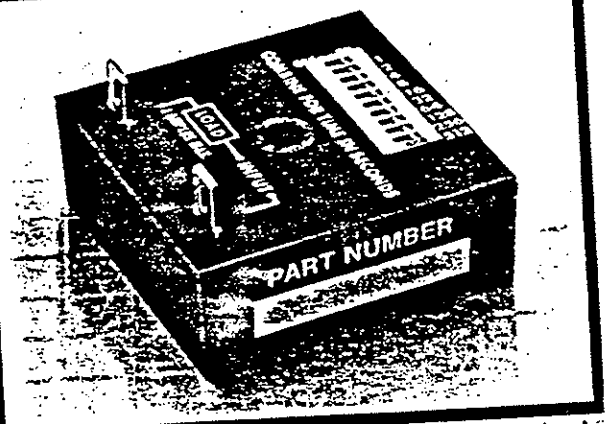
F

Digi-Set

SOLID STATE TIMER

TDU Series
(Delay On Make)

- ☐ Digital Integrated Circuitry
- ☐ Switch selectable delays from 0.1 seconds to 2.8 hours in specific increments
- ☐ ±0.5% repeat accuracy
- ☐ No first-shot effect
- ☐ Two models operate from 19 to 288 volts AC or DC
- ☐ Full Solid State and Encapsulated
- ☐ UL and CSA Recognized



DIN Track Adaptor available; see *Accessories*, Section I.

DESCRIPTION

Digi-Set timers are a combination of state-of-the-art technology and time proven factors. The result is a control unequalled in performance, features, and reliability.

A. C/MOS digital circuitry that incorporates a stable oscillator and a counting/storage arrangement to provide high repetitive accuracy and stability over a wide range of voltage and temperature. No long first-shot effect or shelf life to consider.

B. Digital selection of time delay by use of ten (10) binary switches. No trial-by-error adjustments or meaningless dials. Set the desired time delay the first time and every time. Provides delays from 0.1 seconds to 2.8 hours.

SPECIFICATIONS

1. **Time Delay**
   - 1.1 Type: C/MOS Digital Circuitry
   - 1.2 Range:
     - a. 0.1 to 102.3 seconds in 0.1 second increments
     - b. 1 to 1023 seconds in 1 second increments
     - c. 10 to 10230 seconds in 10 second increments
   - 1.3 Repeat Accuracy: ± 0.5%
   - 1.4 Tolerance (Factory Calibration): ± 10%
   - 1.5 Recycle Time: 150 milliseconds
   - 1.6 Time Delay vs. Temperature & Voltage: ± 5%

2. **Input**
   - 2.1 Operating Voltage: 19 to 144 volts AC or DC and 80 to 288 volts AC or DC
   - 2.2 Line Frequency: 50/60 Hertz

3. **Output**
   - 3.1 Type: Solid State
   - 3.2 Form: Single pole single throw normally open
   - 3.3 Maximum Load Current: 1 ampere steady state at 60°C. 10 amperes inrush
   - 3.4 Minimum Holding Current: 40 milliamperes
   - 3.5 Voltage Drop: 2.5 volts typical at 1 ampere

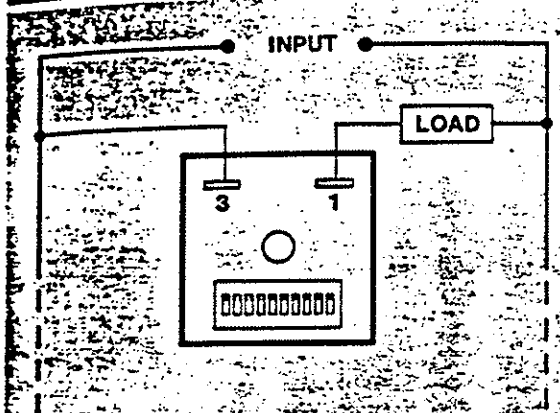
4. **Protection**
   - 4.1 Transient protected
   - 4.2 Dielectric: 1500 volts RMS minimum
   - 4.3 Insulation Resistance: 100 megohms minimum

5. **Mechanical**
   - 5.1 Mounting: Surface with #8 or #10 screw
   - 5.2 Package: Plastic housing with totally encapsulated circuitry
   - 5.3 Termination: 1/4 inch male quick connect terminals

6. **Environmental**
   - 6.1 Operating Temperature: -40°C to +80°C
   - 6.2 Storage Temperature: -40°C to +85°C
   - 6.3 Humidity: 95% relative

SSAC inc P.O. Box 1000 Baldwinsville, NY 13027 (315)638-

CONNECTION



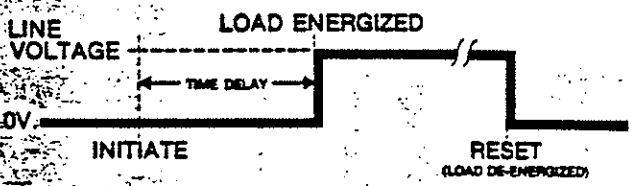
NOTE: The load may operate in either side of line.

OPERATION

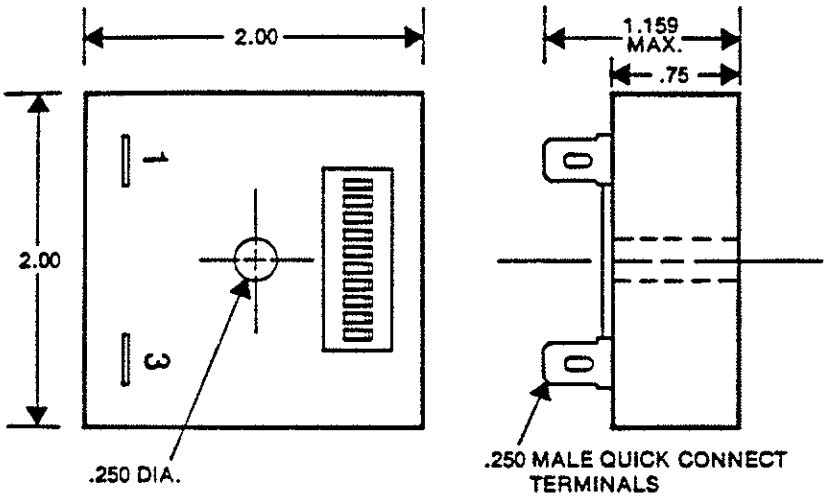
Delay on Make: Upon application of power the time delay is initiated. On completion of the delay period the load becomes energized.

To reset, remove power.

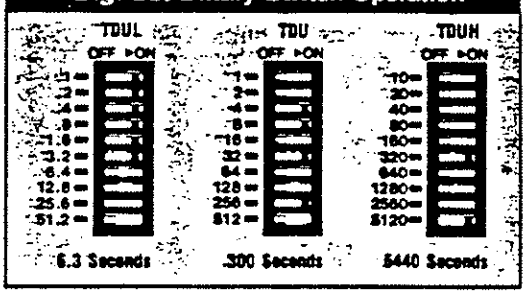
Time Diagram



MECHANICAL



Digi-Set Binary Switch Operation



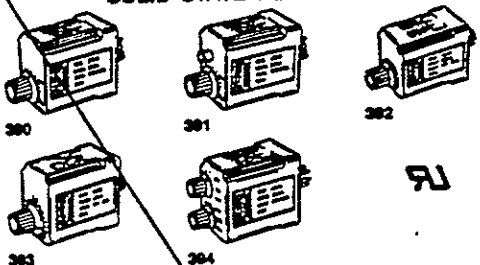
ORDERING INFORMATION

Part Number	Time Range Seconds	Operating Voltage Range AC or DC
TDUL3000A	0.1 to 102.3	19 to 144
TDUL3001A	0.1 to 102.3	80 to 288
TDU3000A	1 to 1023	19 to 144
TDU3001A	1 to 1023	80 to 288
TDUH3000A	10 to 10230	19 to 144
TDUH3001A	10 to 10230	80 to 288

ETI'S AND TIMERS

CRAMER COMPANY

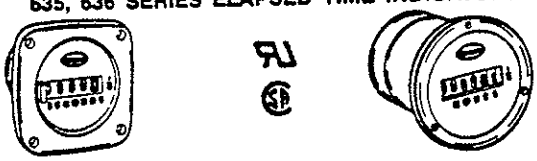
SOLID STATE PLUG-IN TIMERS



Programmable timers with adjustment of delay, interval or cycle timing. Isolated DPDT relay contact output, rated 10A resistive @ 120VAC. 50-60 Hz. Compact 2.813H x 1.750W x 2.375"D (71.45 x 44.45 x 60.32), exclusive of knobs. UL recognized. Potter & Brumfield type 27E122 8-pin socket fits 390, 391 and 394 series timers; Potter & Brumfield type 27E123 11-pin socket fits 392 series timers.

Stock No.	Type	Time Range	1-4
390 SERIES ON DELAY TIMERS, REPEATABILITY ±2%			
55F3118	20003	0.05-2.0 Seconds	$1.35
55F3119	20004	0.1-10 Seconds	$1.35
55F3120	20005	0.3-30 Seconds	$1.35
55F3121	20006	0.6-60 Seconds	$6.17
55F3122	20007	3-300 Seconds	$6.17
55F3123	20008	6-600 Seconds	107.74
391 SERIES EXTENDED ON DELAY TIMERS WITH INDICATOR LIGHT			
55F3124	20009	180-1800 Seconds	181.42
55F3125	20010	300-3600 Seconds	181.42
392 SERIES OFF DELAY TIMERS			
55F3126	20011	0.1-10 Seconds	$7.63
55F3127	20012	0.3-30 Seconds	$7.63
55F3129	20014	3-300 Seconds	109.81
393 SERIES INTERVAL TIMERS			
55F3130	20015	0.05-5 Seconds	$7.63
55F3131	20016	0.1-10 Seconds	$7.63
55F3132	20017	0.3-30 Seconds	$7.63
55F3134	20019	0.3-300 Seconds	109.81
394 SERIES REPEAT CYCLE TIMERS			
55F3135	20020	0.05-5 Seconds	142.33
55F3136	20021	0.1-10 Seconds	142.33
55F3137	20022	0.3-30 Seconds	142.33
55F3138	20023	0.6-60 Seconds	142.33

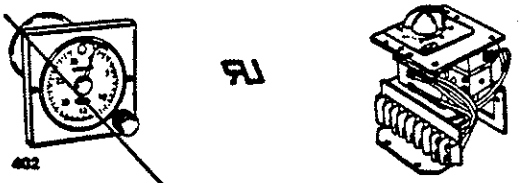
635, 636 SERIES ELAPSED TIME INDICATORS



635 series non-resettable indicators with induction motors for faster starts and stops. Large, six-digit readout. 636 series resettable, with five-digit readout. Both models 115VAC, 60Hz. Case styles: "E" is 3.50" (88.90) round bezel; "S" 3.50" (88.90) square bezel; "X" 2.50" (63.50) round bezel; "Y" 2.50" (63.50) square bezel; "G" 2.50" (63.50) utility type round bezel; "K" 2.50" (63.50) utility type square bezel. UL recognized, CSA certified.

Stock No.	Type	Case Style	Total Count	1-9
635 SERIES SIX-DIGIT ETI'S				
55F4397	10053	E	99,999.9 Minutes	$4.41
55F4399	10055	E	99,999.9 Hours	$4.41
55F3141	10061	S	99,999.9 Minutes	$4.41
55F3143	10063	S	99,999.9 Hours	$4.41
55F3146	10069	G	99,999.9 Minutes	$2.74
55F3148	10071	G	99,999.9 Hours	$2.74
35F3803	10184	K	99,999.9 Minutes	$2.74
35F3805	10186	K	99,999.9 Hours	$2.74
636 SERIES FIVE-DIGIT				
55F4444	10072	X	9,999.9 Seconds	103.23
55F4447	10074	X	9,999.9 Minutes	103.23
55F4450	10075	X	9,999.9 Hours	103.23
55F4460	10076	E	9,999.9 Seconds	103.23
55F4463	10078	E	9,999.9 Minutes	103.23
55F4466	10079	E	9,999.9 Hours	103.23
55F4452	10080	Y	9,999.9 Seconds	103.23
55F4455	10082	Y	9,999.9 Minutes	103.23
55F4458	10083	Y	9,999.9 Hours	103.23
55F4468	10084	S	9,999.9 Seconds	103.23
55F4471	10086	S	9,999.9 Minutes	103.23
55F4474	10087	S	9,999.9 Hours	103.23

402 AND 472 SERIES RESET TIMERS



402 series plug-in model with pilot light feature adjustable interval or delay timing between operation of a control circuit and closing of load circuits. Repeat accuracy: ±0.4%. 115VAC, 60Hz. Power input: motor 3.0 watts, clutch 5 watts. Snap action SPDT switches rated 10A resistive. 3.875" square x 4.156" deep (98.42 x 105.56). UL recognized. 472 series bracket mount models feature external clutch reset and interval or delay timing. Operate from momentary or sustained contact switch. SPDT load switches rated 10A resistive at 125/250VAC. 3.844H x 3.656W x 2.875"D (97.63 x 92.86 x 73.02). UL recognized, CSA certified.

Stock No.	Type	Time Range	1-4
402 SERIES PLUG-IN RESET TIMERS WITH PILOT LIGHT			
35F3806	10006	6 Seconds	223.25
35F3807	20002	15 Seconds	223.25
35F3808	10007	30 Seconds	223.25
35F3809	10008	60 Seconds	223.25
35F3810	10009	5 Minutes	223.25
35F3811	10010	60 Minutes	223.25
35F3812	10011	5 Hours	223.25
472 SERIES BRACKET MOUNT RESET TIMERS			
20F899	10021	5 Minutes	170.00
20F900	10022	15 Minutes	170.00
20F901	10023	30 Minutes	170.00
20F903	10025	5 Hours	170.00
20F904	10026	24 Hours	170.00

241 SERIES PUSHBUTTON RESET INTERVAL TIMERS

- High Visibility 300° Dial
- Silver-Cadmium Load Contacts
- Repeat Accuracy: ±0.25%

Integral start button turns on load and starts timer. Silver-cadmium oxide snap-action load SPDT contacts rated 15A @ 115VAC, 60Hz; 10A @ 250V, non-inductive, 60Hz. Repeat accuracy: ±0.25% except 15 second time range ±0.5%. 3-hole mount 1.687" (42.84) radius. UL recognized, CSA certified.

Stock No.	Type	Time Range	Calibration	1-4
55F351	10000	60 Seconds	1 Second	181.46
35F3800	10001	5 Minutes	5 Seconds	181.46
55F352	10002	15 Minutes	15 Seconds	181.46
55F378	20001	30 Minutes	30 Seconds	181.46
55F353	10003	60 Minutes	1 Minute	181.46
35F3801	10004	5 Hours	5 Minutes	181.46
55F4476	10005	24 Hours	30 Minutes	181.46

561 SERIES PERCENTAGE CYCLE TIMERS

On or off time may be set at any portion of total cycle between 4% and 96%. Continuous repeating; repeat accuracy within 1%. Load switch rated 20A @ 115/220VAC resistive, 50/60 Hz. 3.750" diameter x 3.093" behind panel (95.25 x 78.56). UL recognized.

Stock No.	Type	Time Range	1-4
35F3818	10180	30 Seconds	156.46
35F3819	10181	60 Seconds	156.46
35F3820	10182	5 Minutes	156.46

Digi-Set TIME DELAY RELAY

TDML, TDM, TDMH Series
(Delay On Make)

- ☐ Digital Integrated Circuitry
- ☐ Switch Setable Time Delay
- ☐ Three Time Ranges from 100 Milliseconds to Over 2.8 Hours
- ☐ ±0.1% Repeat Accuracy, No First-Shot Effect
- ☐ ±2% Setting Accuracy
- ☐ DPDT, 10 Amperes Output Contacts
- ☐ LED Indication ☐ UL and CSA

DESCRIPTION

Digi-Set timers are a combination of state-of-the-art technology and time proven factors. The result, a control unequalled in performance, features, and reliability.

A. C/MOS digital circuitry that incorporates a stable oscillator and a counting/storage arrangement to provide high repetitive accuracy and stability over a wide range of voltage and temperature. No long first-shot effect or shelf life to consider.

B. Digital selection of time delay by use of ten (10) binary switches. No trial-by-error adjustments or meaningless dials. Set the desired time delay the first time and every time. Three ranges to choose from.

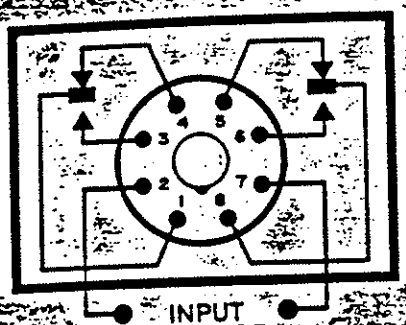
C. Proven electromechanical relay provides isolated double-pole-double-throw output switching. Contacts are 10 ampere silver cadmium oxide that provide millions of reliable operations.

SPECIFICATIONS

1. **Time Delay**
   - 1.1 Type: Digital C/MOS circuitry
   - 1.2 Range: Three ranges (see *Ordering Information*). Selection of the desired time delay is made by means of ten (10) binary switches located at the top end of the unit. To obtain the desired time delay, the time periods for each switch in the ON position are *added* together.
   - 1.3 Repeat Accuracy: ±0.1% or ±8.3 milliseconds, whichever is greater (no first shot effect)
   - 1.4 Setting Accuracy: ±2% or ±50 milliseconds, whichever is greater
   - 1.5 Reset Time: 50 milliseconds maximum
   - 1.6 Recycle Time: 500 milliseconds—TDMH, 300 milliseconds—TDM, and TDML max during timing. 16 milliseconds after timing.
   - 1.7 Time Delay vs. Temperature and Voltage: ±2%
   - 1.8 Indicator: LED indicates during timing
2. **Input**
   - 2.1 Operating Voltage: 12, 24, 120 and 230 volts
   - 2.2 Tolerance: ±20% of nominal
   - 2.3 Frequency: 50 or 60 Hertz
   - 2.4 Power Consumption: 2.25 watts maximum
3. **Output**
   - 3.1 Type: Electromechanical relay
   - 3.2 Form: Double pole double throw
   - 3.3 Rating: 10 amperes resistive at 240VAC
   - 3.4 Life: Mechanical - 10,000,000 operations
     Full load - 1,000,000 operations
4. **Protection**
   - 4.1 Transient: ±1500 volts for 150 microseconds
   - 4.2 Polarity: DC units are reverse polarity protected
   - 4.3 Dielectric Breakdown: 1500 volts RMS minimum at 60 Hertz between input and output terminals
5. **Mechanical**
   - 5.1 Mounting: Plug-in
   - 5.2 Termination: Standard octal plug (8 Pin)
6. **Environmental**
   - 6.1 Operating Temperature: -20° to +65°C
   - 6.2 Storage Temperature: -30°C to +85°C
7. **Panel Mounting Accessory**

BZ1 PANEL MOUNT KIT available for SSAC Plug-in Controls. Also, Octal 8 pin and 11 pin flush mount sockets. See *Accessories*.

CONNECTION

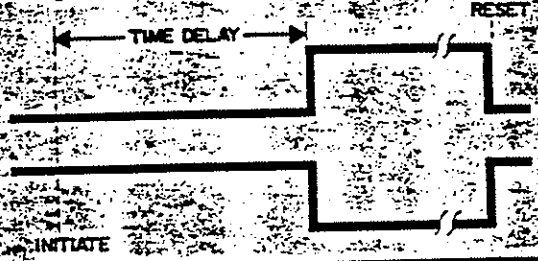


Note: Relay contacts are isolated from input voltage.

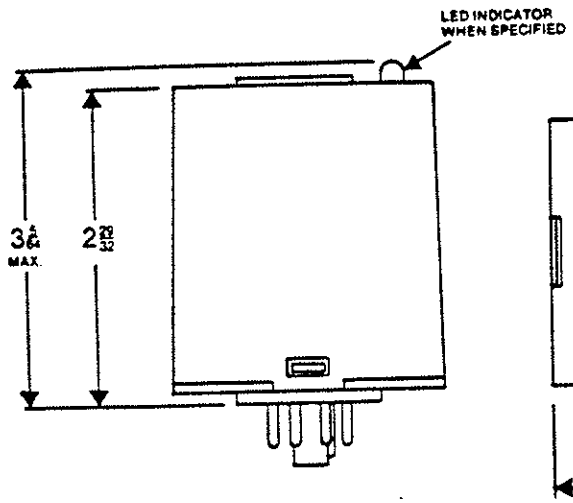
OPERATION

Delay on Make: The Series TDML, TDM and TDMH Time Delay is initiated when power is applied to the input terminals. At the end of the delay period, the output contacts transfer. Reset is accomplished by removal of input power. There is no false output when reset during timing.

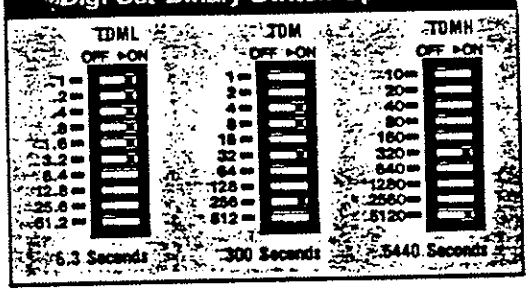
Time Diagram: Output Contacts

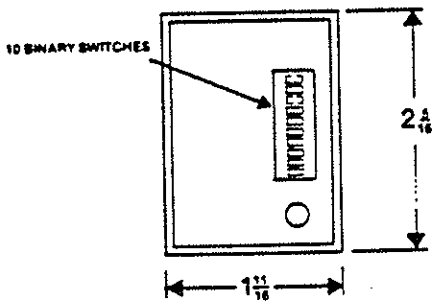


MECHANICAL



Digi-Set Binary Switch Operation





ORDERING INFORMATION

Series/Time Range	Input Voltage	LED Indication
TDML 0.1 to 102.3 seconds in 0.1 second increments	12VDC	
☆ TDM 1 to 1023 seconds in 1 second increments	24VDC/28VDC	
TDMH 10 to 10,230 seconds in 10 second increments	110VDC	
	24VAC	
	☆ 120VAC	☆ L
	230VAC	

☆ **Example Part Number:** TDM120AL is a delay-on-make Digi-Timer, 120 volt AC operating, LED indication and a time range of 1 to 1023 seconds.

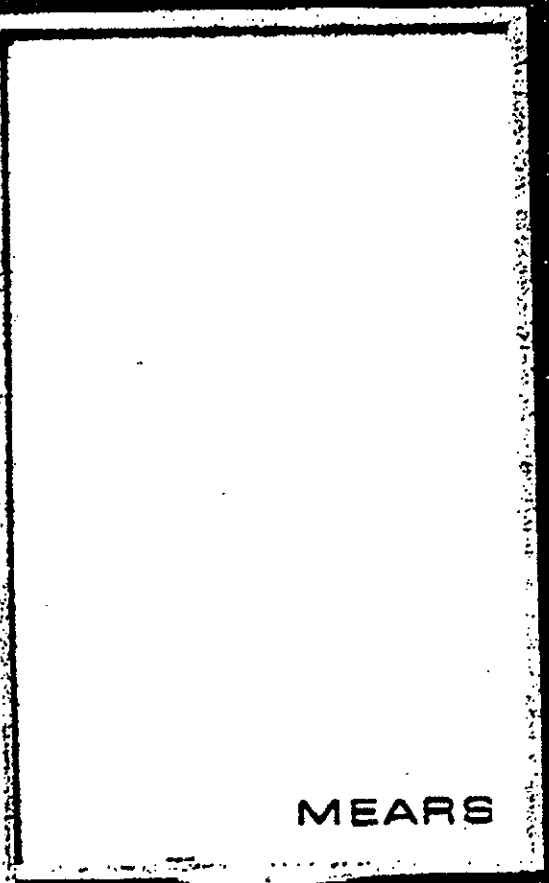
For Application Assistance Call (315)638-1300

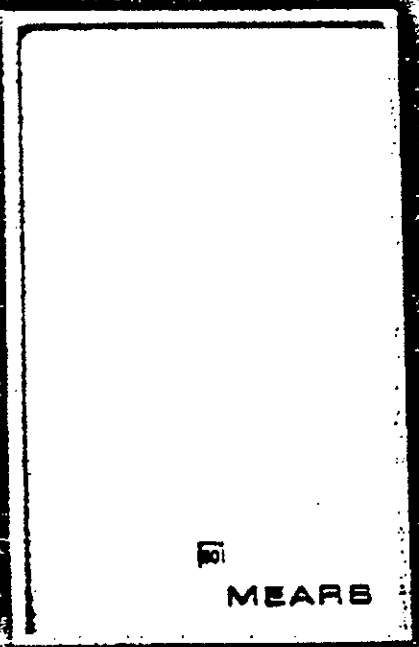
Mears

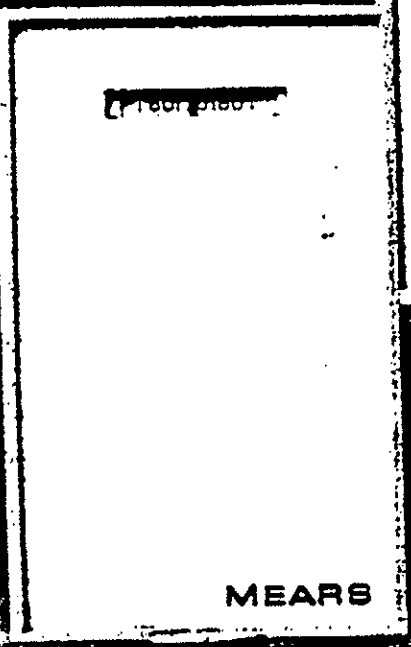
M7 Series

Top quality thermostats designed and engineered for years of dependable temperature regulation.

M7 STANDARD SERIES
Also available in Jumper Proof and Setback design options

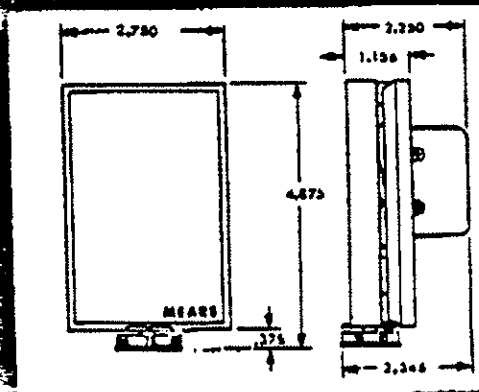






M7 JUMPER PROOF SERIES
Also available with optional thermometer/faceplate

M7 STANDARD SERIES
Shown with 45°F to 75°F range to meet code where required and optional thermometer/faceplate



All Mears thermostats mount in standard outlet boxes with a recommended volume of 21 cubic inches (344 cc).

EATON

Get the dependable Mears M7 electric heat control you want: Standard, Tamper Proof and Setback designs, plus other options.

Mears M7 Series thermostats combine precision engineering with quality materials and construction to provide outstanding performance and long life. You get efficient snap-action switching that reduces arcing and eliminates TV interference. There's a bimetal sensor that accurately interprets and responds to room temperature conditions. The durable cast metal base resists changes in calibration, and an optional heat anticipator furnishes close, even temperature regulation day in and day out.

M7 Design Options:

Standard M7 Series—designed and built for reliable control of electric heating. Optional limit stops permit limited user temperature selection.

Tamper Proof M7 Series—eliminate tampering by unauthorized persons in schools, hospitals, theaters, other buildings. Adjust setting with a screwdriver after removing faceplate and trim ring with an Allen wrench (provided). Set-point indicator is visible through small window in faceplate.

Setback M7 Series—when thermostats are used in conjunction with setback panels such as the Mears Heatminder System, temperature settings can be regulated from a remote location in schools, motels, hotels, hospitals, rest homes and private residences.

M7 Models:

M7, M7A Single Line Break—Switch breaks only one leg of the circuit—the simplest, most economical electric heating control. M7A model features optional heat anticipation.

M7D Double Line Break—Breaks both legs of circuit in OFF setting. Controls one heating load only; meets all electrical codes.

M7L Load Transfer—For applications where service capacity is limited or demand rates prevail. Used in conjunction with a second thermostat to give priority to one zone of a two-zone heating system.

M7M Modulation (Two Stage)—Reduces input during light load periods. A single thermostat controls two separate heating circuits. Second stage activates when temperature drops to approximately 1½° below first-stage turn-on temperature.

M7S Simultaneous Switching (Double Circuit)—Provides simultaneous control of two heating loads. For use where total load slightly exceeds capacity of a single switch, where two thermostats are impractical, and where the circuit can be divided into equal or nearly equal loads. Both switches are calibrated to operate at approximately the same temperature.

M7C Cooling or Heating—One thermostat controls either cooling or heating, but it cannot be used for combination cooling *and* heating UNLESS an extra switch is installed for the changeover between the cooling circuit and the heating circuit.

Ordering Information:

Orders should include model number and options desired. For 25-amp. switch option, add -25 after model number. For setback option, add -SB. For Tamper Proof option, add -TP. Other options, such as thermometer faceplate or limit/stop option, should also be noted on your order. Tamper Proof and Setback features may be combined on any M7 model.

Specifications:

Temperature range: 40° F to 90° F
45° F to 75° F*
Type of sensor: bimetal.
Type of switch: snap action.
Base material: cast metal.
Listings: UL, CSA.
Electrical ratings:

U.L. listed @
22 amps, 125-250 VAC**
16 amps, 277 VAC**

C.S.A. listed @
17 amps, 125, 240, 277 VAC**

MEARS LINE VOLTAGE THERMOSTATS — MODEL LISTINGS AND OPTIONS

Model Series	With Heat Anticipator		Without Heat Anticipator		Temperature Range				Therm. Cover (Opt.)	Limit Stop (Opt.)	25-Amp. Switch (Opt.)	Specialty Function Options				Setback (Opt.)	Tamper Proof (Opt.)
	SP	DP	SP	DP	90° F max.		80° F max.	75° max. (Code)*				Modulation	Simultaneous	Load Transfer	Cooling/ Heating		
M400	M411	M412	M401	M402			50° F-80° F	45° F-75° F	●	●	●	M400M M400M1	M400S M400S1	M400L	M400C	●	●
M7	M7A	M7D	M7		40° F-90° F			45° F-75° F	●	●	●	M7M	M7S	M7L	M7C	●	●
M21	M21SP	M21DP				50° F-90° F		45° F-75° F		●							

* Mears thermostats are available with a 75° max. temperature range for applications requiring B.O.C.A. code compliance.

** Ratings shown are for non-inductive loads. 25 amp models (available at additional cost) are U.L. rated at 25 amps, 125, 250 VAC and 16 amps, 277 VAC. Loads less than 22 amps are not recommended on 25 amp models.

Eaton Corporation
Controls Division
Beaverton Plant
13725 S.W. Millikan Way
Beaverton, Oregon 97005
Telephone (503) 644-0131

EATON

Printed in U.S.A.
253-02241-00
9-1-88

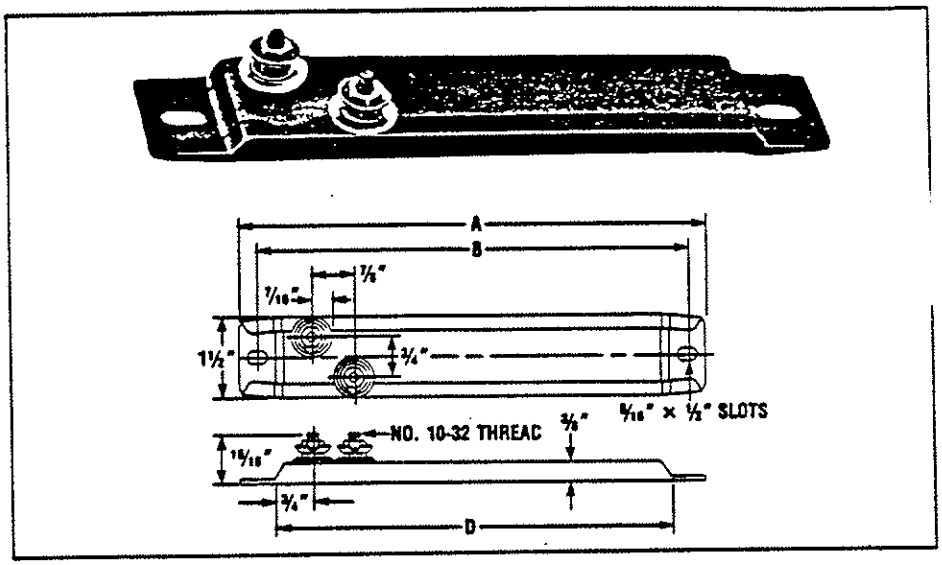
1½" strip

150 to 1250 Watts

2 offset bolt terminals at one end

U.L. Component Recognized and C.S.A. Certified

Type OT



Dimensions — Inches			Rust-resisting Iron Sheath*							Chrome Steel Sheath*							
						PCN		PCN					PCN		PCN		
A	B	D	Watts	W/in²	Catalog No.	120V	Status	240V	Status	Watts	W/in²	Catalog No.	120V	Status	240V	Status	Wt. lbs.
7½	6½	6	150	11	OT-715	129314	S	129322	S	200	15	OT-702	129613	S	129621	S	.5
8	7	6½	150	10	OT-815	129330	S	129349	S	250	17	OT-802	129630	S	129648	S	.56
8	7	6½	175	12	OT-817	129357	S	129365	S	400	27	OT-804	129656	S	129664	S	.56
10½	9½	9	250	10	OT-1025	129373	S	129381	S	350	15	OT-1003	129672	S	129680	S	.75
10½	9½	9	—	—	—	—	S	—	—	400	17	OT-1004	129699	S	129701	S	.88
12	11	10½	250	8	OT-1225	129390	S	129402	S	250	8	OT-1202	129710	S	129728	S	.88
12	11	10½	—	—	—	—	S	—	—	350	14	OT-1203	129736	S	129744	S	.88
12	11	10½	—	—	—	—	S	—	—	500	17	OT-1205	129752	S	129760	S	.88
14	13	12½	300	8	OT-1430	129410	S	129429	S	500	14	OT-1405	129779	S	129787	S	1.0
15¼	14¼	13¾	325	8	OT-1532	129437	S	129445	S	500	12	OT-1505	129795	S	129808	S	1.13
17⅞	16⅞	16⅜	350	6.5	OT-1835	129453	S	129461	S	500	10	OT-1805	129816	S	129824	S	1.38
17⅞	16⅞	16⅜	375	7	OT-1837	129470	S	129488	S	750	15	OT-1807	129832	S	129840	S	1.38
17⅞	16⅞	16⅜	500	10	OT-1850	129496	S	129509	S	1000	19	OT-1801	129859	S	129867	S	1.38
19½	18½	18	350	6	OT-1935	129517	S	129525	S	500	9	OT-1905	129875	S	129883	S	1.5
19½	18½	18	500	8	OT-1950	129533	S	129541	S	750	13.5	OT-1907	129891	S	129904	S	1.5
19½	18½	18	—	—	—	—	S	—	S	1000	18	OT-1901	129912	S	129920	S	1.5
21	20	19½	500	8	OT-2150	129550	S	129568	S	750	12	OT-2107	129939	S	129947	S	1.63
23¾	22¾	22¼	500	7	OT-2450	129576	S	129584	S	500	7	OT-2405	129955	S	129963	S	1.81
23¾	22¾	22¼	750	10	OT-2475	129592	S	129605	S	750	10	OT-2407	129971	S	129980	S	1.81
23¾	22¾	22¼	—	—	—	—	—	—	—	1000	14	OT-2401	129998	S	130008	S	1.81
23¾	22¾	22¼	—	—	—	—	—	—	—	1500	19	OT-2415	129226	S	129234	S	1.81
25½	24½	24	500	6	OT-2550	121005	S	121013	S	750	9	OT-2507	121208	S	121216	S	2.06
25½	24½	24	750	9	OT-2575	121021	S	121030	S	1000	13	OT-2501	121224	S	121232	S	2.0
26¾	25¾	25¼	700	8	OT-2670	121048	S	121056	S	1000	12	OT-2601	121240	S	121259	S	2.19
26¾	25¾	25¼	750	9	OT-2675	121064	NS	121072	S	—	—	—	—	—	—	—	2.19
30½	29⅜	28	750	8	OT-3075	121080	S	121099	S	750	8	OT-3607	121267	S	121275	S	2.38
30½	29⅜	28	—	—	—	—	—	—	—	1000	11	OT-3001	121283	S	121291	S	2.38
30½	29⅜	28	—	—	—	—	—	—	—	1250	13	OT-3012	—	S	121304	S	2.38
33½	32⅜	31	750	7	OT-3375	121101	S	121110	S	750	7	OT-3307	121312	S	121320	S	2.69
35⅞	34¾	33½	1000	9	OT-3610	121128	S	121136	S	1500	13	OT-3601	121339	S	121347	S	2.88
38½	37½	36	800	6	OT-3880	121144	S	121152	S	1000	8	OT-3801	121355	S	121363	S	3.19
38½	37½	36	1000	8	OT-3810	121160	S	121179	S	1500	12	OT-3815	121371	S	121380	S	3.19
42½	41⅜	40	1250	9	OT-4312	121187	S	121195	S	1500	11	OT-4315	121398	S	121400	S	3.38
47⅞	46¾	45⅜	—	—	—	—	—	—	—	1350	9	OT-4813	—	S	121419	S	3.75
47⅞	46¾	45⅜	—	—	—	—	—	—	—	2250	14	OT-4822	—	S	121427	S	3.75

*See page A/6 for maximum sheath temperatures.
Specify: Quantity, catalog no., PCN, watts, volts, strip heaters.
Delivery: S, stock; NS, two weeks.

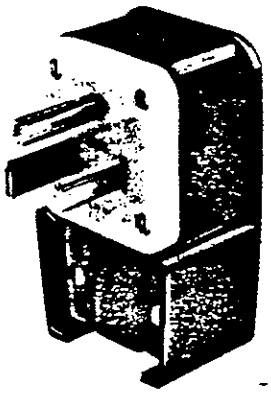
30, 50 and 60 Amp Power Receptacles and Angle Plugs

Flush-mounted power receptacles find widespread use in the industrial environment. Leviton's devices are designed to shrug off impacts and abuse and deliver top performance.

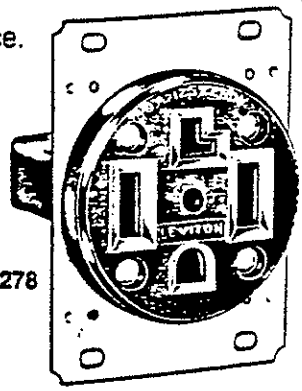
Matching Angle plugs are sturdy and built to last in industrial applications. Rugged cord clamps hold cable securely without tearing conductor jacket.

Power receptacles feature:

- Heavy-gauge double-wipe contacts for maximum conductivity and longevity
- Heavy-gauge steel mounting strap is specially plated to provide outstanding corrosion resistance
- Pressure terminals with 3-point pressure contacts accept up to #4 AWG conductors
- Devices fit standard two-gang wallbox and 4-inch square outlet boxes
- UL Listed, backed by ten-year warranty, Fed. Spec. where applicable



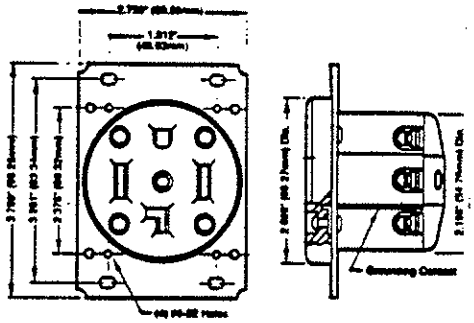
Cat. No. 9550-P



Cat. No. 278

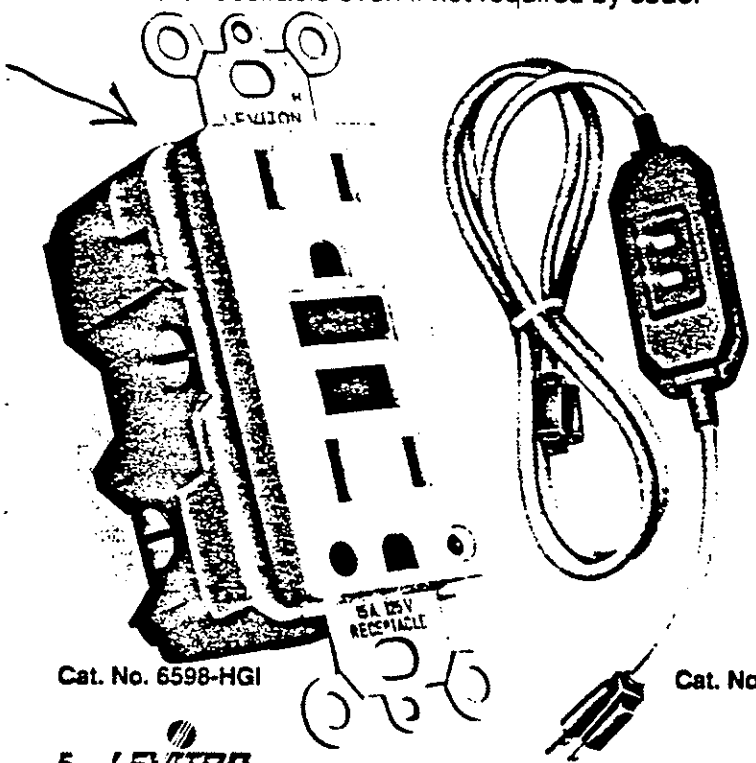
Angle plugs feature:

- Tough, heavy-duty nylon construction for long service life
- Solid brass blades for maximum conductivity
- Broad selection of 17 ratings and NEMA configurations
- UL Listed



GFCI'S

GFCI's are required by the National Electric Code in an increasing number of applications. They are essential in industrial facilities where protection against injury due to ground faults is mandated by the NEC or desirable even if not required by code.



Cat. No. 6598-HGI

GFCI receptacle features:

- Available in Brown, Ivory,White and Gray
- Available in UL Listed Hospital Grade
- Conform to UL Standard 943 Class A
- Impact-resistant construction
- Feed-through ready
- Shallow 1 1/8-inch deep body
- Vertically-positioned outlets
- Metal mounting strap with break-off plaster ears
- Silver alloy terminals contacts
- Temperature tolerance level of -31°F to 158°F
- Trip threshold of 5mA

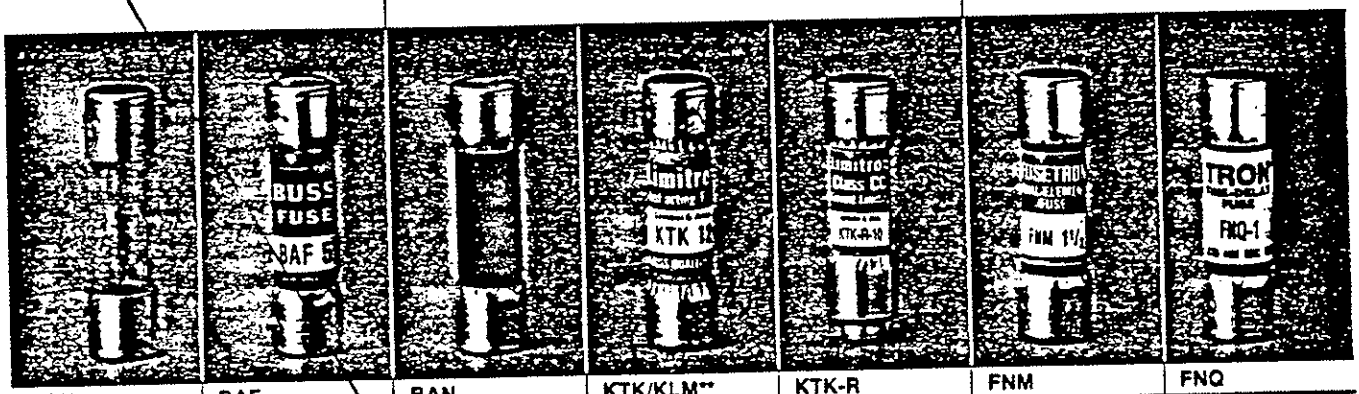
GFCI cord set features:

- Ground fault and open neutral protection
- Equipped with high-visibility yellow 14/3 SJTW-A outdoor cable
- Automatic reset each time the GFCI cord set is plugged in
- Built-in TEST and RESET buttons w/indicator light
- Water resistant enclosure sealed by ultrasonic welding
- Available in 2 ft., 6 ft. and 25 ft. lengths
- Complies with NEC article # 305-6a
- UL Listed

Cat. No. 66591

BUSS

Ferrule Fuses

13/32" × 1½" Non-Time Delay		13/32" × 1½" Non-Time Delay			Time-Delay	
						
AGU	**BAF**	**BAN**	**KTK/KLM****	**KTK-R**	**FNM**	**FNQ**
Glass. Formerly 5AG.	Laminated.	Fibre. Formerly 5AB.	Melamine. For circuits having high fault I. 100,000 AIC (KLM's have d-c rating of 500V).	KTK with rejection feature. U.L. Class CC. Branch circuit fuse. 200,000 AIC.	Fusetron. Fibre. For circuits with high inrush currents. 10,000 AIC.	Fibre. For motor control transformers. Circuits with inrush I's. 10,000 AIC. Single element above 3 3/10A.
(page 3-3-13)	(page 3-3-13)	(page 3-3-14)	(page 3-3-14)	(page 3-3-15)	(page 3-3-16)	(page 3-3-16)
—	—	—	—	—	—	—
—	—	—	KTK/KLM-1/10 600VUC	KTK-R-1/10 600VUC	FNM-1/10 250VUC	FNQ-1/10 500VUC
—	—	—	KTK/KLM-1/8 600VUC	KTK-R-1/8 600VUC	—	FNQ-1/8 500VUC
—	—	—	—	—	FNM-15/100 250VUC	FNQ-15/100 500VUC
—	—	—	—	—	—	—
—	—	—	KTK/KLM-3/10 600VUC	KTK-R-3/10 600VUC	FNM-3/10 250VUC	FNQ-3/10 500VUC
—	—	—	—	—	—	FNQ-3/16 500VUC
—	—	—	KTK/KLM-1/4 600VUC	KTK-R-1/4 600VUC	FNM-1/4 250VUC	FNQ-1/4 500VUC
—	—	—	KTK/KLM-3/10 600VUC	KTK-R-3/10 600VUC	FNM-3/10 250VUC	FNQ-3/10 500VUC
—	—	—	—	—	—	—
—	—	—	—	KTK-R-4/10 600VUC	FNM-4/10 250VUC	FNQ-4/10 500VUC
—	—	—	KTK/KLM-1/2 600VUC	KTK-R-1/2 600VUC	FNM-1/2 250VUC	FNQ-1/2 500VUC
—	BAF-1/2 250VUC	—	—	KTK-R-5/10 600VUC	FNM-5/10 250VUC	FNQ-5/10 500VUC
—	—	—	KTK/KLM-3/4 600VUC	KTK-R-3/4 600VUC	—	—
—	—	—	—	—	FNM-6/10 250VUC	FNQ-6/10 500VUC
AGU-1 250VU	BAF-1 250VUC	BAN-1 250V	KTK/KLM-1 600VUC	KTK-R-1 600VUC	FNM-1 250VUC	FNQ-1 500VUC
—	—	—	—	—	—	—
—	—	—	—	—	FNM-1 1/8 250VUC	FNQ-1 1/8 500VUC
—	—	—	—	—	FNM-1 1/4 250VUC	FNQ-1 1/4 500VUC
—	—	—	—	—	FNM-1 4/10 250VUC	—
—	BAF-1 1/2 250VUC	—	KTK/KLM-1 1/2 600VUC	KTK-R-1 1/2 600VUC	FNM-1 1/2 250VUC	FNQ-1 1/2 500VUC
—	—	—	—	—	FNM-1 6/10 250VUC	FNQ-1 6/10 500VUC
—	—	—	—	—	FNM-1 8/10 250VUC	—
AGU-2 250VU	BAF-2 250VUC	BAN-2 250V	KTK/KLM-2 600VUC	KTK-R-2 600VUC	FNM-2 250VUC	FNQ-2 500VUC
—	—	—	—	—	FNM-2 1/4 250VUC	FNQ-2 1/4 500VUC
—	BAF-2 1/2 250VUC	—	KTK/KLM-2 1/2 600VUC	—	FNM-2 1/2 250VUC	FNQ-2 1/2 500VUC
—	—	—	—	—	FNM-2 6/10 250VUC	—
AGU-3 250VU	BAF-3 250VUC	BAN-3 250V	KTK/KLM-3 600VUC	KTK-R-3 600VUC	FNM-3 250VUC	FNQ-3 500VUC
—	—	—	—	—	FNM-3 3/10 250VUC	FNQ-3 3/10 500VUC
—	—	—	KTK/KLM-3 1/2 600VUC	—	FNM-3 1/2 250VUC	FNQ-3 1/2 500VUC
AGU-4 32V	BAF-4 250VUC	BAN-4 250V	KTK/KLM-4 600VUC	KTK-R-4 600VUC	FNM-4 250VUC	FNQ-4 500VUC
—	—	—	—	—	FNM-4 1/2 250VUC	FNQ-4 1/2 500VUC
AGU-5 32V	BAF-5 250VUC	BAN-5 250V	KTK-KLM-5 600VUC	KTK-R-5 600VUC	FNM-5 250VUC	FNQ-5 500VUC
—	—	—	—	—	FNM-5 5/10 250VUC	FNQ-5 5/10 500VUC
—	BAF-6 250VUC	BAN-6 250V	KTK/KLM-6 600VUC	KTK-R-6 600VUC	FNM-6 250VUC	FNQ-6 500VUC
—	BAF-6 1/4 250VUC	—	—	—	FNM-6 1/4 250VUC	FNQ-6 1/4 500VUC
—	BAF-7 250VUC	—	KTK/KLM-7 600VUC	KTK-R-7 600VUC	FNM-7 250VUC	FNQ-7 500VUC
—	—	—	—	—	—	—
AGU-8 32V	BAF-8 250VUC	BAN-8 250V	KTK/KLM-8 600VUC	KTK-R-8 600VUC	FNM-8 250VUC	FNQ-8 500VUC
—	BAF-9 250VUC	—	KTK/KLM-9 600VUC	KTK-R-9 600VUC	FNM-9 250VUC	FNQ-9 500VUC
AGU-10 32V	BAF-10 250VUC	BAN-10 250V	KTK/KLM-10 600VUC	KTK-R-10 600VUC	FNM-10 250VUC	FNQ-10 500VUC
—	BAF-12 250VUC	BAN-12 250V	KTK/KLM-12 600VUC	KTK-R-12 600VUC	FNM-12 125VUC	FNQ-12 500VUC
AGU-15 32V	BAF-15 250VUC	BAN-15 250V	KTK/KLM-15 600VUC	KTK-R-15 600VUC	FNM-15 125VUC	FNQ-15 500VUC
AGU-20 32V	BAF-20 125V	BAN-20 250V	KTK/KLM-20 600VU	KTK-R-20 600VUC	FNM-20 32V	FNQ-20 500VU
AGU-25 32V	BAF-25 125V	BAN-25 250V	KTK/KLM-25 600VU	KTK-R-25 600VUC	FNM-25 32V	FNQ-25 500VU
AGU-30 32V	BAF-30 125V	BAN-30 250V	KTK/KLM-30 600VU	KTK-R-30 600VUC	FNM-30 32V	FNQ-30 500VU

[U]U.L. Listed; [R]U.L. Recognized under Component Program; [C]CSA Listed.
*Also FNQ-14
**U.L. and CSA Listings applicable only to KTK fuses.

CONTROL CONCEPTS

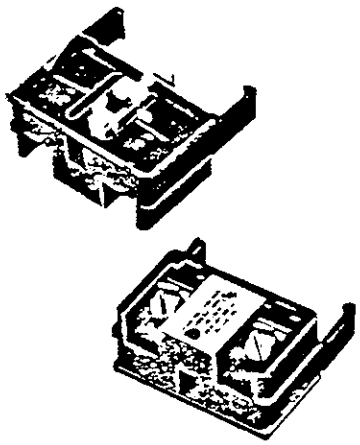
Pushbutton Components

Operators

Operators are available in 2 types to most economically suit the enclosure requirements.

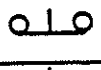
Operator Type	Catalog Number [1]	List Price
NEMA 12 & 13	PB0	$ 8.40
NEMA 3, 3R, 4, 4X	PB4	10.40

Contact Blocks



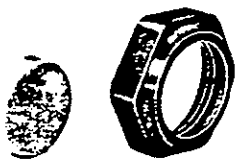
All contact blocks feature convenient snap-on assembly and are stackable to 4 deep for a total of 8 circuits per operator. Sealed reed and standard blocks may be intermixed. Reed blocks are ideally suited for logic level reliable switching and adverse environments. All blocks are color coded for ready circuit identification.

Mechanical Contact Blocks

	Contact Description	Contact Symbol	Standard Blocks [2]	Fiber Optic Blocks
Catalog Number List Color Code	Normally Open		CBNO [3] $6.00 Green / Clear	FONO $20.00 Green / Black
Catalog Number List Color Code	Normally Closed		CBNC [3] $6.00 Red / Clear	FONC $20.00 Red / Black
Catalog Number List Color Code	Early Make		CBEM [3] $8.00 White / Clear	FOEM $22.00 White / Black
Catalog Number List Color Code	Delayed Break		CBDB [3] $8.00 Black / Clear	FODB $22.00 Black / Black

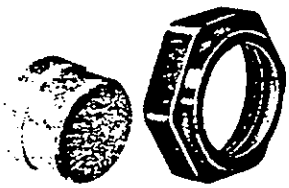
Color Caps and Operating Heads [2]

Flush Cap [1]



Color	Catalog Number	List Price
Black	FC-BK	$2.40
Green	FC-GN	2.40
Red	FC-RD	2.40
Yellow	FC-YW	2.40
Blue	FC-BE	2.40
Gray	FC-GY	2.40
Orange	FC-OE	2.40
White	FC-WE	2.40

Extended Cap [1]



Color	Catalog Number	List Price
Black	XC-BK	$2.40
Green	XC-GN	2.40
Red	XC-RD	2.40
Yellow	XC-YW	2.40
Blue	XC-BE	2.40
Gray	XC-GY	2.40
Orange	XC-OE	2.40
White	XC-WE	2.40

Mushroom Cap [1]

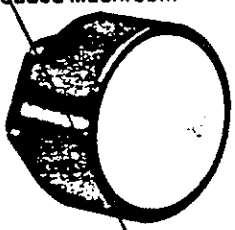
Color	Catalog Number	List Price
Black	MC-BK	$8.00
Green	MC-GN	8.00
Red	MC-RD	8.00
Yellow	MC-YW	8.00
Blue	MC-BE	8.00
Gray	MC-GY	8.00
Orange	MC-OE	8.00
White	MC-WE	8.00

Reed Contact Blocks

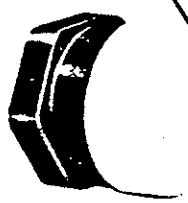
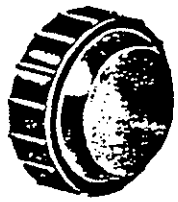
	Contact Description	Logic [5] Reed	Medium [5] Reed	Power [5] Reed
Catalog Number List Color Code	Normally Open	LRNO $17.00 Green / Blue	MRNO $20.00 Green /Yellow	PRNO $33.00 Green
Catalog Number List Color Code	Normally Closed	LRNC $17.00 Red / Blue	MRNC $20.00 Red /Yellow	PRNC $33.00 Red
Catalog Number List Color Code	2 Normally Open			2 PRNO $50.00 Green/Green
Catalog Number List Color Code	2 Normally Closed			2 PRNC $50.00 Red / Red
Catalog Number List Color Code	Normally Open Normally Closed			PRNONC $50.00 Green / Red

Fiber Optic Contact Blocks operate by making (FONO) or interrupting (FONC) a fiber optic light source to provide logic switching signals. As no electricity is used, FO blocks are an ideal application in hazardous locations or very wet remote stations including possible submersion. Blocks use 1/8" SMA905 connectors with screw-on collar and ferrule supplied with cable. Fiber Optic blocks may be intermixed with sealed reed and standard contact blocks.

Color Caps and Operating Heads [7] [11]

	Color	Catalog Number	List Price
Shrouded Mushroom 	Black	SMC-BK	$12.00
	Green	SMC-GN	12.00
	Red	SMC-RD	12.00
	Yellow	SMC-YW	12.00
Jumbo Mushroom [9] 	Black	JMC-BK	$10.00
	Green	JMC-GN	10.00
	Red	JMC-RD	10.00
	Yellow	JMC-YW	10.00
Shrouded Jumbo 	Black	SJC-BK	$14.00
	Green	SJC-GN	14.00
	Red	SJC-RD	14.00
	Yellow	SJC-YW	14.00
Push-Pull Maintained [12] [9] 	Black	PPMC-BK	$24.00
	Green	PPMC-GN	24.00
	Red	PPMC-RD	24.00
	Yellow	PPMC-YW	24.00
Push-Pull Momentary [12] [9] 	Black	PPMOM-BK	$24.00
	Green	PPMOM-GN	24.00
	Red	PPMOM-RD	24.00
	Yellow	PPMOM-YW	24.00

NEMA 4-4X Color Caps [9]

	Color	Catalog Number	List Price
NEMA 4X Flush Cap [10] [11] 	Black	FC4-BK	$ 8.00
	Green	FC4-GN	8.00
	Red	FC4-RD	8.00
	Yellow	FC4-YW	8.00
NEMA 4X Extended Cap [10] [11] 	Black	XC4-BK	$ 8.00
	Green	XC4-GN	8.00
	Red	XC4-RD	8.00
	Yellow	XC4-YW	8.00
NEMA 4X Mushroom Cap [10] [11] 	Black	MC4-BK	$12.00
	Green	MC4-GN	12.00
	Red	MC4-RD	12.00
	Yellow	MC4-YW	12.00
NEMA 4X Shrouded Mushroom Cap [10] [11] 	Black	SMC4-BK	$16.00
	Green	SMC4-GN	16.00
	Red	SMC4-RD	16.00
	Yellow	SMC4-YW	16.00
NEMA 4-4X Rubber Boot [10] 	Black	RB4-BK	$15.00
	Green	RB4-GN	15.00
	Red	RB4-RD	15.00
	Yellow	RB4-YW	15.00

Contact Block Ratings

- Standard blocks are rated Nema A-600 Heavy Duty, 600 Volt, 10 Amp. continuous, 7200 VA make, 720 VA Break, 250 Volt, 5 Amp. continuos D.C.
- Power Reed blocks are rated 240 Volts A.C. / 220 Volts D.C., 5 Amps. continuous, 1800 VA make, 360 VA break (AC) and 70 VA break (DC).
- Logic Reed blocks are rated 150 Volt, .25 Amps. max., 10 watts D.C..,15 Watts A.C.
- Medium Power Reed blocks are rated 150 Volt, 1.0 Amps. max., 40 Watts D.C., 50 Watts A.C.

Footnotes

[1] All operators accept all color caps listed below and on Page 3. Clamp ring is supplied with color cap.

[2] Standard blocks are rated NEMA A600 heavy duty, 600 volt, 10A continuous, 7200VA make, 720 VA break AC.

[3] Any NC reed blocks should be mounted to operator first.

[4] Gold plated contacts are available on standard blocks. Add suffix "G" to catalog number and increase the price $4.00 list. The cover will be gold (amber) in place of clear. Example—CBNC-G would be $10.00 list.

[7] All caps and heads may be used with either PBO, or PB4 operators.

[9] To substitute 1¾" round aluminum clamp ring in place of standard hexagonal clamp ring, add prefix letter "A" to catalog number and increase price $2.00 list. Example—AFC-BK would be priced at $4.40.

[9] NEMA 4-4X caps provide outfront sealing to prevent entry of foreign material into the operator in hostile environments. Normally PB4 with standard cap(s) would be recommended.

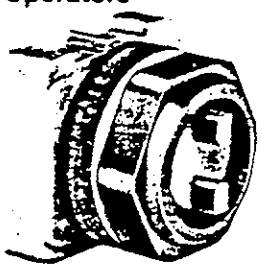
[10] Should be used with PBO operators only.

[11] Also available in blue, gray, orange and white.

[12] Jumbo Mushroom Operating Head also available. Add letter J following PP and add $2.00 List. Example—PPMC-BK would be PPJMC-BK, $26.00 List

Selector Switch Components

Operators



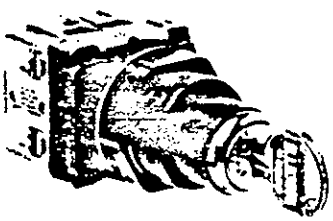
Operators are NEMA 12-13 as standard. They may be converted to NEMA 3, 3R, 4, 4X rating by selecting NEMA 4X handle or lever in place of standard handle or lever in chart on Page 5.

Positions	Operation	Catalog Number	List Price
2	Maintained	SSO2R [1]	$10.00
2	Spring Return—Left to Right	SRO-LR	18.00
2	Spring Return—Right to Left	SRO-RL	18.00
3	Maintained	SSO3	10.00
3	Spring Return—Left to Center	SRO-LC	18.00
3	Spring Return—Right to Center	SRO-RC	18.00
3	Spring Return—Left and Right to Center	SRO-LRC	18.00
4	Maintained	SSO4	10.00
4	Spring Return—Position 4 to Position 3	SRO-43	18.00

Reed Contacts

Logic, Medium, and Power Reed blocks listed on Page 2 may be installed in place of either CBNO or CBNC on standard 2 position selector switches. For 3 position, select operator from Page 5. Any NC Reed blocks should be mounted to operator first.

Key Operators



Key operators are available as NEMA 12-13 and NEMA 4X. All operators feature polyester housings and all locks are premium quality brass for superior corrosion resistance. Keys are extra heavy double bitted brass for long life. Contact sequences are the same as for standard selector switches and should be selected from the tables to the right.

Keyed Different

Up to 250 different key combinations are available. To order locks keyed differently, specify on order and add $28.00 list per operator.

Master Keying

Locks keyed different may also be master keyed. Specify master keying for locks keyed differently on order. Add $28.00 list each to key differently plus $16.00 per set of 2 master keys.

Extra Keys

To order extra or replacement keys add $4.00 per set of 2 keys. When ordering replacement keys, include key number stamped on existing key.

Contact Block Selection
2 Position Selector Switches [1]

Circuit Designation	Handle Position		Block Catalog Number	[2] Mounting Position	List Price
	Left	Right			
G	O	X	CBNO	Either	$6.00
H	X	O	CBNC	Either	6.00

Contact Block Selection
3 Position Selector Switches

Circuit Designation	Handle Position			Block Catalog Number	Mounting [2] Position	List Price
	Left	Center	Right			
A	X	O	O	CBNO	Left	$6.00
B	O	X	O	CBNC	Either	6.00
C	O	O	X	CBNO	Right	6.00
D	O	X	X	CBDB	Left	8.00
E	X	O	X	CBEM	Either	8.00
F	X	X	O	CBDB	Right	8.00

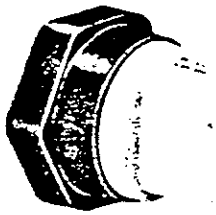
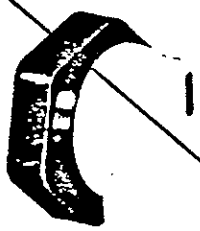
Contact Block Selection
4 Position Selector Switches

Circuit Designation	Handle Position				Block Catalog Number	Mounting [2] Position	List Price
	Left	Left Center	Right Center	Right			
1	X	O	O	O	CBNO	Left	$6.00
2	O	X	O	O	CBNC	Right	6.00
3	O	O	X	O	CBNC	Left	6.00
4	O	O	O	X	CBNO	Right	6.00
5	O	X	X	X	CBDB	Left	8.00
6	X	O	X	X	CBEM	Right	8.00
7	X	X	O	X	CBEM	Left	8.00
8	X	X	X	O	CBDB	Right	8.00

Positions	Operation	Catalog Number	List Price
2	Maintained	KOSS2-[5]	$52.00
2	Spring Return—Left to Right	KOSRLR-[5]	60.00
3	Maintained	KOSS3-[5]	52.00
3	Spring Return—Left to Center	KOSRLC-[5]	60.00
3	Spring Return—Right to Center	KOSRRC-[5]	60.00
3	Spring Return—Left and Right to Center	KOSRLRC-[5]	60.00

Key Removable Position(s)	Catalog Number Suffix
All	-KA
Right Only	-KR
Left Only	-KL
Center Only	-KC
Left and Right Only	-KLR
Left and Center Only	-KLC
Right and Center Only	-KRC

Operating Handles and Levers [1]

	Color	Catalog Number	List Price
Standard Handle 	Black	SH-BK	$4.80
	Blue	SH-BE	4.80
	Green	SH-GN	4.80
	Gray	SH-GY	4.80
	Orange	SH-OE	4.80
	Red	SH-RD	4.80
	White	SH-WE	4.80
	Yellow	SH-YW	4.80
NEMA 4X Handle 	Black	SH4-BK	$6.80
	Blue	SH4-BE	6.80
	Green	SH4-GN	6.80
	Gray	SH4-GY	6.80
	Orange	SH4-OE	6.80
	Red	SH4-RD	6.80
	White	SH4-WE	6.80
	Yellow	SH4-YW	6.80
Lever Handle 	Black	SL-BK	$6.80
	Blue	SL-BE	6.80
	Green	SL-GN	6.80
	Gray	SL-GY	6.80
	Orange	SL-OE	6.80
	Red	SL-RD	6.80
	White	SL-WE	6.80
	Yellow	SL-YW	6.80
NEMA 4X Lever 	Black	SL4-BK	$8.80
	Blue	SL4-BE	8.80
	Green	SL4-GN	8.80
	Gray	SL4-GY	8.80
	Orange	SL4-OE	8.80
	Red	SL4-RD	8.80
	White	SL4-WE	8.80
	Yellow	SL4-YW	8.80

Coin Slot Operators Complete [3]

Description	Catalog Number	List Price
2 Position Maintained	CSO-2	$14.80
3 Position Maintained	CSO-3	$14.80

3 Position Reed Operators

Operation	Catalog Number	List Price
Maintained	SSOR3	$10.00
Spring Return—Left to Center	SROR3LC	18.00
Spring Return—Right to Center	SROR3RC	18.00
Spring Return—Left and Right to Center	SROR3LRC	18.00

Reed Contact Block Selection Type LR, MR or PR 3 Position Position Reed Operator

Circuit Designation	Handle Position			Block Suffix	Mounting [4] [2] Position
	Left	Center	Right		
A	X	O	O	NO	Left
B	O	X	O	2-NC	Both Series
C	O	O	X	NO	Right
D	O	X	X	NC	Left
E	X	O	X	2-NO	Both Parallel
F	X	X	O	NC	Right

Footnotes

[1] Spring return left to right operator (Cat#SRO-LR) has contact sequence opposite of standard shown in table. For maintained selector switch with opposite contact sequence, order Cat# SSO2.

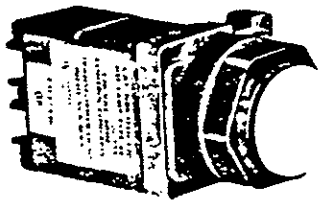
[2] Viewed from front of operator.

[3] To substitute 1⅜" round aluminum clamp ring in place of standard hexagonal clamp ring, add prefix letter "A" to catalog number and increase price $2.00 list. Example ASH-BK would be priced at $6.80.

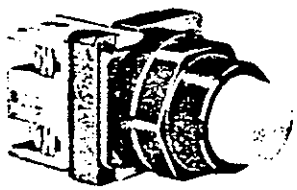
[4] Any NC reed blocks should be mounted to operator before NO blocks are mounted. Position is as viewed from front of operator.

[5] Add key removable suffix from table to right of price list table. If not specified, operators will be supplied with key removable all position for maintained operators and all non-spring return position for spring return operators.

Pilot Lights—All pilot lights and illuminated pushbuttons are rated NEMA 4X as standard.



Transformer Pilot Light Catalog Number TFLU-120-RDL



Illuminated Pushbutton Full Voltage Type Shown With Contact Block Catalog Number FVLU-120-GNC-NO

Unit Complete Less Lens[1][2]				Color Lens or Cap[2][3][4]					Lamp Only[3]		
					Pilot Light Lens		Illum. PB Cap				
Type	Volts	Catalog Number	List Price	Color	Catalog Number	List Price	Catalog Number	List Price	Catalog Number	Manufacturers Type	List Price
Transformer 50/60 Hz	120	TFLU-120	$38.00								
	240	TFLU-240	38.00								
	480	TFLU-480	38.00								
	277	TFLU-277	42.00								
Full Voltage Type	6	FVLU-6	$18.00	Opaque					FVB6	44 or 1866	$2.00
	12	FVLU-12	18.00						FVB6	44	$2.00
	24	FVLU-24	18.00	Green	PLLGN	$4.80	IPBCGN	$8.00	FVB12	756	2.00
	120	FVLU-120	20.00	Red	PLLRD	4.80	IPBCRD	8.00	FVB24	757	2.00
	less lamp	FVLU[3]	16.00	White	PLLWE	4.80	IPBCWE	8.00	FVB120	120MB	4.00
				Yellow	PLLYW	4.80	IPBCYW	8.00	—	—	—
Neon Type[1]	120	FVLU-120N[5]	$18.00	Transparent					FVB120N[7]	—	$2.00
	240	RLU-240N[6]	28.00						FVBN	B2A	2.00
	480	RLU-480N[6]	28.00	Amber	PLLAR	$4.80	IPBCAR	$8.00			
Incandescent Resistor Type	120	RLU-120I	$30.00	Clear	PLLCR	4.80	IPBCCR	8.00			
	240	RLU-240I	30.00	Green	PLLGNT	4.80	IPBCGNT	8.00	FVB55	1835	$4.00
				Red	PLLRDT	4.80	IPBCRDT	8.00	FVB120	120MB	4.00
				Blue	PLLBET	4.80	IPBCBET	8.00			
Dual Input Remote Test[8]	120	RTLU-120	$34.00						FVB55	1835	$4.00
	240	RTLU-240	34.00						FVB120	120MB	4.00
	less lamp	RTLU[3]	30.00						—	—	—

Color Lenses and Caps

Caps and lenses are offered in opaque and transparent colors. Transparent colors are recommended in areas of high ambient light. Transparent colors must be used on neon lights.

Illuminated Mushroom Caps

A 1½" diameter mushroom cap is available in place of the standard IPBC cap for use on illuminated pushbuttons and push-to-test lights.

To order use catalog number IMC-plus color suffix from table above. List price $12.00. Example—catalog number IMC-RDT would be red transparent.

Flashing Lamp

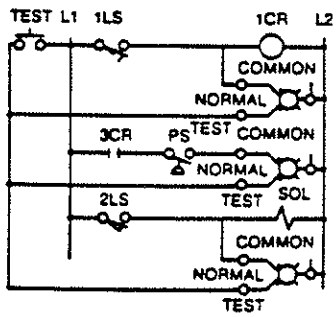
Transformer lights and 6 volt full voltage lights may be supplied with a flashing lamp in place of the standard lamp. To order, add suffix letter "F" to the catalog number and increase the price $4.00 list. Example—catalog number TFLU-120F would be priced at $42.00 list.

Dual Input Pilot Light

This type of pilot light permits testing a number of lights from a single pushbutton. A diode circuit isolates the test supply from the normal supply. The schematic at right represents a typical dual input application.

Schematic Diagram

Dual Input Light



LED Lamps

Transformer lights and full voltage 6, 12, and 24 volt lights can be provided with solid state long life LED lamps in place of the standard incandescent lamps. Control Concepts LED lamps are in a miniature bayonet base for direct interchangeability and feature an ultra bright 4 LED cluster with light output comparable to a standard type 755 incandescent lamp. The 4 LEDs are built into 2 circuits for redundancy and include internal current limiting resistors. Lamps are available in red, green and yellow. To order, add the letter "L" plus the first letter of the color to the light catalog number and add $12.00 list.

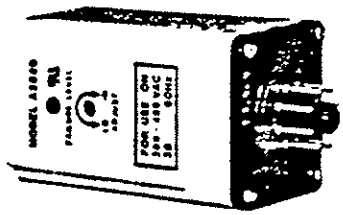
Example—Catalog number TFLU-120LR would be a transformer light with red LED lamp. List price would be $50.00 ($38.00 + $12.00).

LED Lamp Only Price Table			
Voltage	Color	Catalog Number	List Price
6	Red	FVB4CL6RD	$14.00
6	Green	FVB4CL6GN	14.00
6	Yellow	FVB4CL6YW	14.00
12	Red	FVB4CL12RD	14.00
12	Green	FVB4CL12GN	14.00
12	Yellow	FVB4CL12YW	14.00
24	Red	FVB4CL24RD	14.00
24	Green	FVB4CL24GN	14.00
24	Yellow	FVB4CL24YW	14.00

Model 258

Made with Pride in the U.S.A.

3-PHASE POWER MONITOR

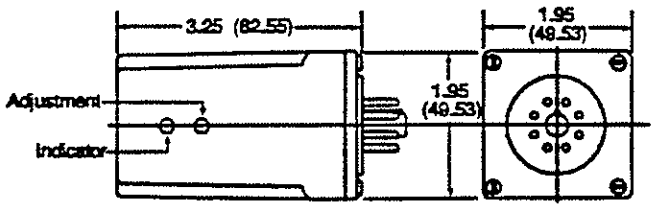


- **Detects phase loss, low voltage, phase reversal and phase unbalance**
- **60 Hz and 50 Hz models**
- **Automatic or optional manual reset**

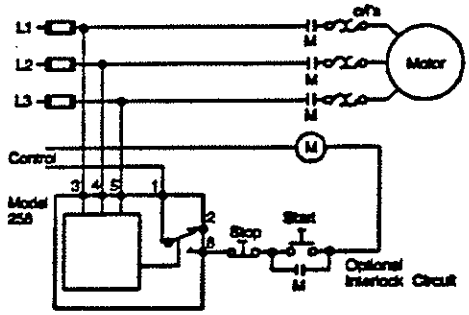
DESCRIPTION

The Model 258 continuously monitors 3-phase power lines for abnormal conditions. When properly adjusted, the Model 258 will detect phase loss on a loaded motor even when regenerated voltage is present. The device consists of a solid-state voltage and phase-angle sensing circuit driving an electromechanical relay. When correct voltage and phase rotation are applied, the internal relay will energize. A fault condition will de-energize the relay; when the fault is corrected the 258 will automatically reset (a manual reset version is available). The 258 does not require a neutral connection and can be used with Wye or Delta systems. Four versions cover 120vac, 208/240vac and 480vac, 60 Hz, and 380vac, 50 Hz. Adjustment ranges are sufficiently wide to allow for proper adjustment to existing conditions. A failure indicator is provided to aid in adjustment and system troubleshooting. Special voltage and frequency ranges are available.

DIMENSIONS



TYPICAL APPLICATION



SPECIFICATIONS

Model No.	B258B	258B	A258B	EX258B
Nominal AC Voltage (phase-to-phase)	120vac	208/240vac	480vac	380vac
Adjustment Range	85-120vac	160-240vac	380-480vac	300-380vac
Frequency	60 Hz	60 Hz	60 Hz	50 Hz
Power consumption	.25 W/ph.	.50 W/ph.	1.5 W/ph.	1.25 W/ph.
Transient protection	2500 VRMS for 10ms			
Repeat Accuracy (fixed conditions)	±0.1% of set point			
Response Time	50 milliseconds			
Reset Time	.05 seconds			
Reset Type	Automatic (optional manual reset)			
Dead Band	2%			
Output Contacts	SPDT			
Contact Rating	Resistive:	15A at 150VAC 10A at 240 VAC 15A at 28VDC		
	Inductive:	4A at 120VAC 2A at 240VAC		
	Pilot Duty:	480VA at 240VAC		
	Tungsten lamp operation:	600W on N.O. contacts 240W on N.C. contacts		
Expected Relay Life	Mechanical:	50,000,000 operations		
	Electrical:	100,000 at rated load		
Operating Temperature	-40° to 55° C			
Humidity Tolerance	97% w/o condensation			
Case Material	ABS plastic			
Mounting	8-pin socket #51X00120-01 (order separately)			
Weight	5 oz. (141.74 grams)			
Agency approval	UL Recognized/CSA Certified condition of acceptability: A258B & EX258B must be used with a UL Recognized, 600 volt socket			

ORDERING INFORMATION

258 ___ ___

- Voltage Code
  - B= 120VAC
  - None= 208/240VAC
  - A= 480VAC
  - EX= 380VAC
- Model No.
- Adjust.
  - A= Fact. set
  - B= screwdriver
- Reset
  - Blank= Auto
  - M= Manual

TIME MARK® CORPORATION

11440 East Pine Street
Tulsa, Oklahoma 74116
Tel:(918)438-1220
FAX (918)437-7584

TITLE: MODEL 258 3-PHASE POWER MONITOR

Dimensions are in inches and millimeters unless otherwise specified. Drawings show no power applied.

FORM 87A123 10/91

Electromechanical Reduced Voltage Starters

Autotransformer Starters

Selection and Pricing

Class 8606

3-Pole Polyphase – 600 Volts AC Maximum – 50-60 Hz

Thermal Units – Prices shown do not include thermal units. Devices require 3 thermal units (Sizes 00-6). Standard trip thermal units are $9. each.

See pages 23-18 – 23-39 for selection.

Motor Voltage (Starter Voltage)	Max. Hp	NEMA Size	NEMA Type 1 General Purpose Enclosure		NEMA Type 4▲ Watertight and Dusttight Enclosure		NEMA Type 12 Dusttight & Driptight Industrial Use Enclosure		Open Type		O.E.M. Kit	
			TYPE	PRICE	TYPE	PRICE	TYPE	PRICE	TYPE	PRICE	TYPE	PRICE
200 (208)	10	2	SDG1C*	3402	SDW1C*	5262	SDA1C*	4482	SDO1C*	3258	SDK1C*	2859
	15 20 25	3	SEG1D* SEG1E* SEG1F*	4002	SEW1D* SEW1E* SEW1F*	5862	SEA1D* SEA1E* SEA1F*	5142	SEO1D* SEO1E* SEO1F*	3546	SEK1D* SEK1E* SEK1F*	3156
	30 40	4	SFG1G* SFG1H*	7758	SFW1G* SFW1H*	11178	SFA1G* SFA1H*	9198	SFO1G* SFO1H*	7098	SFK1G* SFK1H*	5553
	50 75	5	SGG1J* SGG1L*	12777	SGW1J* SGW1L*	16197	SGA1J* SGA1L*	14397	SGO1J* SGO1L*	11445	SGK1J* SGK1L*	9783
	100 125 150	6	SHG1M* SHG1N* SHG1P*	23805	SHW1M* SHW1N* SHW1P*	28305	SHA1M* SHA1N* SHA1P*	26055	SHO1M* SHO1N* SHO1P*	21669	SHK1M* SHK1N* SHK1P*	17475
230 (240)	10 15	2	SDG1C* SDG1D*	3402	SDW1C* SDW1D*	5262	SDA1C* SDA1D*	4482	SDO1C* SDO1D*	3258	SDK1C* SDK1D*	2859
	20 25 30	3	SEG1E* SEG1F* SEG1G*	4002	SEW1E* SEW1F* SEW1G*	5862	SEA1E* SEA1F* SEA1G*	5142	SEO1E* SEO1F* SEO1G*	3546	SEK1E* SEK1F* SEK1G*	3156
	40 50	4	SFG1H* SFG1J*	7758	SFW1H* SFW1J*	11178	SFA1H* SFA1J*	9198	SFO1H* SFO1J*	7098	SFK1H* SFK1J*	5553
	75 100	5	SGG1L* SGG1M*	12777	SGW1L* SGW1M*	16197	SGA1L* SGA1M*	14397	SGO1L* SGO1M*	11445	SGK1L* SGK1M*	9783
	125 150 200	6	SHG1N* SHG1P* SHG1Q*	23805	SHW1N* SHW1P* SHW1Q*	28305	SHA1N* SHA1P* SHA1Q*	26055	SHO1N* SHO1P* SHO1Q*	21669	SHK1N* SHK1P* SHK1Q*	17475
	250 300	7	SJG1R* SJG1S*	40773	SJW1R* SJW1S*	45273	SJA1R* SJA1S*	43023	—	—	—	—
460 (480) / 575 (600)	10 15 20 25	2	SDG1C* SDG1D* SDG1E* SDG1F*	3402	SDW1C* SDW1D* SDW1E* SDW1F*	5262	SDA1C* SDA1D* SDA1E* SDA1F*	4482	SDO1C* SDO1D* SDO1E* SDO1F*	3258	SDK1C* SDK1D* SDK1E* SDK1F*	2859
	30 40 50	3	SEG1G* SEG1H* SEG1J*	4002	SEW1G* SEW1H* SEW1J*	5862	SEA1G* SEA1H* SEA1J*	5142	SEO1G* SEO1H* SEO1J*	3546	SEK1G* SEK1H* SEK1J*	3156
	75 100	4	SFG1L* SFG1M*	7758	SFW1L* SFW1M*	11178	SFA1L* SFA1M*	9198	SFO1L* SFO1M*	7098	SFK1L* SFK1M*	5553
	125 150 200	5	SGG1N* SGG1P* SGG1Q*	12777	SGW1N* SGW1P* SGW1Q*	16197	SGA1N* SGA1P* SGA1Q*	14397	SGO1N* SGO1P* SGO1Q*	11445	SGK1N* SGK1P* SGK1Q*	9783
	250 300 400	6	SHG1R* SHG1S* SHG1T*	23805	SHW1R* SHW1S* SHW1T*	28305	SHA1R* SHA1S* SHA1T*	26055	SHO1R* SHO1S* SHO1T*	21669	SHK1R* SHK1S* SHK1T*	17475
	500 600	7	SJG1U* SJG1W*	40773	SJW1U* SJW1W*	45273	SJA1U* SJA1W*	43023	—	—	—	—

▲ NEMA Type 4 Enclosures are painted sheet steel. Where required, stainless steel enclosures are available at extra cost. Specify as Form Y56. See "Modifications & Forms" for price adder.

How To Order:

To Order Specify:	Catalog Number			
• Class Number • Type Number • Voltage Code • Form(s) see pg. 12-161–12-169	Class	Type	Line/ Control Code	Form(s)
	8606	SFG1M	V81	S
	Description: 100hp, 480V line, 120V separate control, 60Hz			

* Both line and control voltage must be specified to order this product. Select the appropriate Line/Control Voltage CODE from the table. If control voltage is different than line supply, indicate control configuration by FORM as indicated in table.

Line/Control Voltage Codes (60Hz) ▼

All Coils At Line Voltage

Line	Control	Code	Forms – None Required
208	208	V06	– Standard(common control)
240	240	V03	
380	380	V05*	NOTE: Sizes 6 & 7 - Select voltage code from list
480	480	V06	below (Sizes 6 & 7 are supplied with a fused
600	600	V07	transformer with 120Vac secondary as standard.)

Coils At Different Voltage Than Line Supply

Line	Control	Code	Forms – Select Only One
208	120	V84	— indicate control configuration
240	24■	V82	
240	120	V80	S - Separate control of timing relay only
480	24■	V83	Y195 - Separate control for all coils
480	120	V81	F4T - Fused CPT for timing relay only
600	120	V87	F4T40 - Fused CPT for all coils
other	specify	V99	

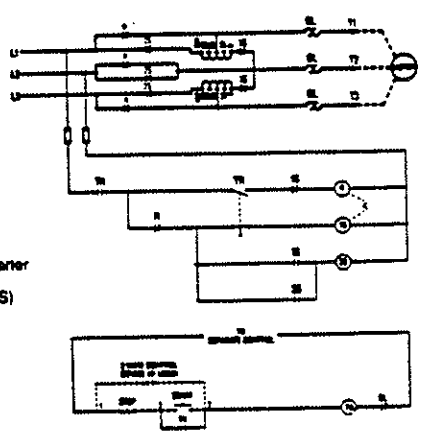
▼Refer to Page 12-63 for 50 Hz control voltage code

*Refer to page 12-63 for sizing and pricing of 380V starters

■24 V coils not available on sizes 4 - 7 with form Y195 or F4T40

Note:
Class 8606 starters are supplied with a NEMA rated medium duty autotransformer. Medium duty service includes applications to motors which drive loads such as fans, pumps, compressors, line shafts, etc.
(NEMA Sizes 2 - 5: Autotransformer is rated for 15, 15 second starts per hour)
(NEMA Sizes 6 - 7: Autotransformer is rated for 3, 30 second starts per hour)

Contact Square D Sales Office for applications which require frequent starting, jogging or have extremely high inertia.



Typical Autotransformer Starter
Sizes 2-5
Separate Control (Form S)

CP1 | Discount Schedule

CURRENT TRANSFORMERS

Model 5

Window Diameter 1.56"

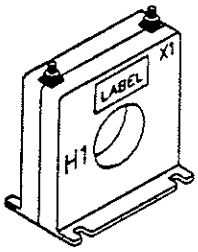
APPLICATION:
With Ammeters, Wattmeters, Relays, and cross current compensation.

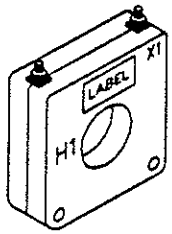
FREQUENCY:
50–400 Hz.

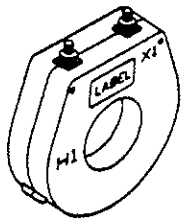
INSULATION CLASS:
0.6 kV. BIL 10 kV. full wave.

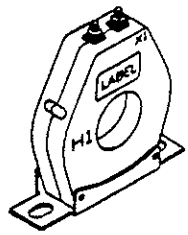
E93779 LR89403

- Flexible leads are UL 1015 105 ° C, CSA approved, #16 AWG, 24 " long.
- Non–standard length to be specified.
- Terminals are brass studs No. 8–32 UNC with one flat washer, lockwasher and regular nut.
- SHT and SFT case styles also available as SHL and SFL with leads.
- Also available as special ratios, i.e. 100:0.2, for use in energy management.
- Mounting bracket kit 0221B00180 when required for Model 5SHT.
- Approximate weight: 1.0 lb.

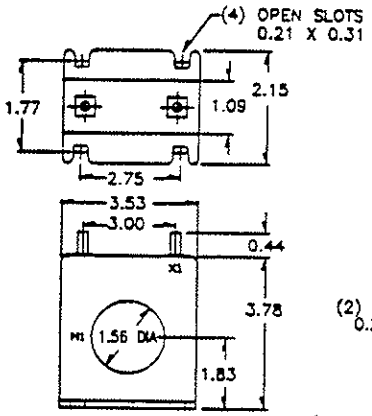




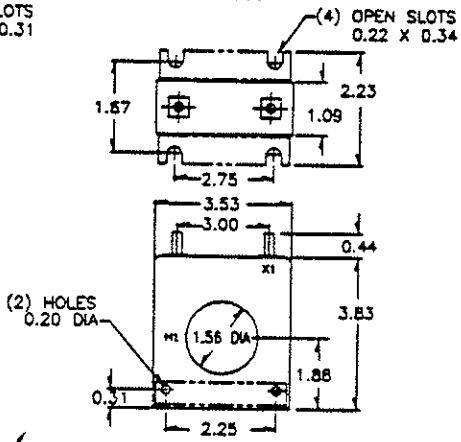




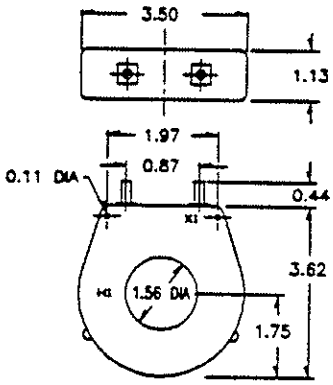
5SFT



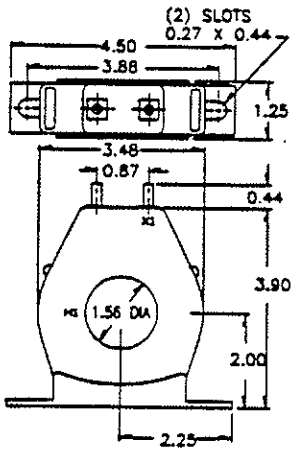
5SHT

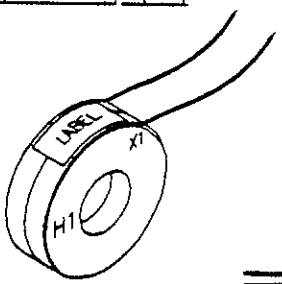


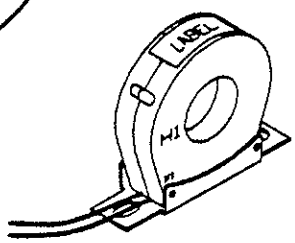
5RT



5RBT







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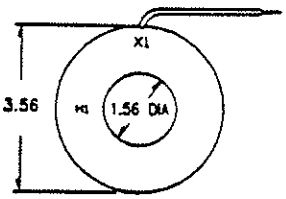
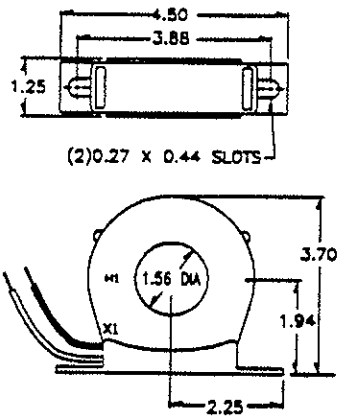


5RBL



CATALOG NUMBER	CURRENT RATIO	ACCURACY AT 60 Hz	BURDEN VA at 60 Hz
5 **– 500	50:5	± 2 %	1.0
5 **– 750	75:5	± 2 %	1.5
5 **– 101	100:5	± 2 %	2.0
5 **– 151	150:5	± 1 %	5.0
5 **– 201	200:5	± 1 %	5.0
5 **– 251	250:5	± 1 %	10.0
5 **– 301	300:5	± 1 %	12.5
5 **– 401	400:5	± 1 %	12.5
5 **– 501	500:5	± 1 %	20.0
5 **– 601	600:5	± 1 %	25.0
5 **– 751	750:5	± 1 %	25.0
5 **– 801	800:5	± 1 %	25.0
5 **– 102	1000:5	± 1 %	25.0
5 **– 122	1200:5	± 1 %	30.0

** NOTE: When ordering, prefix Cat No. with model designation required, i.e. 5SFT–500, 5RL–500, etc.

Technical Submittal
Tensar Drainage Composite
Pelham Bay Landfill Closure
Bronx, New York

Table of Contents

TENSAR Environmental Systems, Inc.

5775-B Glenridge Drive
Lakeside Center, Suite 450
Atlanta, Georgia 30328-5363
404 • 250 • 1290
Fax: 404 • 250 • 9056
1 • 800 • 292 • 4459

February 11, 1995

Mr. Brian Dyer
Breco Mechanical Group
870 Nepperhan Avenue
Yonkers, New York 10703

Subject: **Technical Submittal - Tensar Drainage Composite for Pelham Bay Landfill Closure**

Dear Mr. Dyer:

Tensar has reviewed in detail the specification for the above project. This letter and attached documentation represent the required material submittal for the Drainage Composite on the project. The composite is a geonet structure with geotextile materials heat-bonded to both one and two sides. Production capacity is readily available to meet material requirements throughout the expected construction schedule. This letter is formatted to follow the specification and address each specified and implied material requirement for ease of review and approval.

OVERVIEW:

Tensar first introduced the concept of stranded heavy net structures as a planar flow substitute for granular soil drainage layers in 1984. Under a joint development program with EPA, Tensar tested and proved the concept and materials performance resulting in full EPA approval of geosynthetic geonets in landfills across the United States in early 1986. In 1987, Tensar introduced the first drainage geocomposite product to the industry by thermally bonding a filtration geotextile to a geonet. Since then, over 200 million square feet of Tensar Drainage Nets and Composites have been successfully installed in solid and hazardous waste facilities in all fifty states in every application including pore pressure relief, leachate collection, leak detection, gas venting and storm water control *without a single failure.*

SPECIFIC MATERIAL ASSERTIONS

Per paragraph 1.4.E - Samples have previously been submitted for interface friction testing. Additional samples can be provided for transmissivity conformance testing as required by the engineer.

Per paragraph 1.5.A-E - Geocomposite provided to the Pelham Bay Landfill project will be 21' in width if available at the time. Otherwise, our standard 14' wide product will be provided. Standard roll lengths for these products are 225' in length. The geocomposite will be delivered to the jobsite in opaque protective covers and will be marked with product name, lot number, roll number and product dimensions.

Per paragraph 1.6.A - Tensar has in excess of 5 years experience in the manufacture of geonets and geocomposite materials. Attached for your review is a partial listing of projects recently completed by Tensar. (end of section

Per paragraph 2.1.A&B - Corresponding to the change order issued for this project pertaining to the geotextile to be used, Tensar DC4105 and DC4205 geocomposite will be supplied to this project. Each material is manufactured utilizing Tensar NS1405 as the core geonet structure and heat bonding Trevira 011/280 geotextile to either one or both sides of the geonet. The bond between the geonet and the geotextile in both products will exceed a minimum peel strength of 2 pounds per inch per ASTM F904.

Per paragraph 2.2 - Attached for your review is the Material Property Data Sheet for Hoechst Celanese Trevira 011/280 geotextile as requested in the change order.

Per paragraph 2.3 - The drainage net core, NS1405, is a three dimensional polyethylene net structure formed by intersecting strands and providing uniform channels, open area and thickness to assure uniform flow throughout the structure. It is crush resistant and has a low compressibility capable of maintaining high transmissivity under a range of loading conditions. The geonet is manufactured with carbon black to provide ultra violet stabilization. Tensar NS1405 meets all material properties listed under geonet properties. Appended hereto is the MPDS for Tensar NS1405.

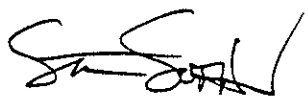
Per paragraph 3.1.A-J - Tensar has reviewed the placement and handling directions and found them to be in conformance with our suggested procedures. Attached is a copy of our installation guidelines for your review.

Per paragraph 3.3.A-D - The proposed method for overlap and tying of the geonet cores is per our recommended procedures. However, seaming of the geotextile overlaps should not be necessary in this case. Included for your review are detailed drawings outlining the proposed method for overlapping of the geonet cores and geotextile materials.

Tensar looks forward to providing our high quality drainage composite for the Pelham Bay Landfill Closure. We are certain that you will find our materials, delivery and service to be of the highest caliber. Please feel free to contact me directly at (800) 292-4459 if any further information or documentation is required.

Sincerely,

Tensar Environmental Systems, Inc.



Scott Sothen

Sales Engineer

THE TENSAR CORPORATION

COMPANY AND BUSINESS FOCUS

The Tensar Corporation ("Tensar" or the "Company") was founded in Atlanta, Georgia in 1983 as a joint venture investment by Gulf Canada Limited and Netlon Limited of Blackburn, England. Tensar's principal business has been the manufacturing and marketing of high performance, premium quality polymeric products for use in a wide variety of heavy construction, environmental management, fencing and fabrication applications. The Company's unique "Tensar" manufacturing technology produces various polymeric products in a wide range of strengths and grid configurations. Since commercial introduction of these products into The United States and Canadian markets, a large number of applications have been developed, principally in markets related to the highway and heavy construction and environmental management industries. The Company also serves similar markets in Caribbean and South American countries.

In August 1988, the four senior executives of the Gulf/Netlon joint venture purchased the operating assets of the previous company. In addition, the new company entered into a licensing agreement with Netlon Limited to acquire exclusive rights to Tensar technology in the countries of North, Central and South America and the Caribbean Sea. The Company also manufactures and markets products under Netlon process technology through a similar licensing arrangement.

Tensar products are integrally formed grid structures manufactured by precisely perforating thick continuous sheets of high quality polymers which are then heated and stretched. The stretching process causes a high level of orientation of long chain hydrocarbon molecules throughout the apertured sheet, resulting in a finished grid structure with high tensile strength which is continuous through all ribs and junctions of the structure. Both the science and the manufacturing know how involved in manufacturing these products are quite novel, and continue to develop and expand today. The process under which the products are manufactured and certain applications of the products are protected by several patents.

Tensar products provide broad opportunities for innovation and economy in numerous types of reinforcement, support, containment, and enclosure applications. The key features of the products are their high tensile strength, integral grid structure, durability and light weight. Together, these features have created a premium quality product line with no true competitive equivalent in its major applications. The Company's products do compete against conventional construction materials and practices. However, they compete very effectively since customers are provided with significant economic benefits by increasing the availability of feasible building sites; enabling more efficient utilization of difficult building sites; allowing use of lower quality and reduced quantities

of construction fill materials; enabling more efficient utilization of construction labor and equipment; and enabling improvement of the structural performance of earthwork construction to meet increasing regulatory standards.

The Company has continuously expanded and diversified its market presence. In order to meet the varied and unique demands of the many markets served, three marketing subsidiaries have been established to effectively develop markets in three principal sectors.

(a) Tensar Earth Technologies, Inc. ("TET") serves the transportation, property development, resource extraction, and coastal/waterway protection industries. Addressing numerous heavy construction applications in these industries, TET has established a new state of practice in innovative earthwork construction, achieving higher levels of safety, durability, and cost-efficiency than are possible with conventional construction techniques.

(b) Tensar Environmental Systems, Inc. ("TES") serves the waste management industry. Having pioneered the vertical expansion of landfills and the use of low profile polymeric drainage sections in landfills, TES has significantly advanced the technology of containment facility construction to aid in meeting the current national capacity crisis in solid waste disposal while enabling greater levels of structural security and environmental protection in such facilities.

(c) Tensar Polytechnologies, Inc. ("TPI") serves the agricultural, commercial fencing, residential lawn and garden and fabricated products industries. By applying Tensar's proven construction technologies to these markets, TPI has developed alternatives to traditional steel, wood and stone materials which deliver higher levels of efficiency, safety, and productivity to a broad range of industries and markets.

The Company also has an active Corporate Business Development (CBD) group with responsibility for developing additional new markets for the Company's products.

Tensar's opportunities in its major construction markets, are based on three simple trends: the increasing scarcity of quality building sites; the increasing scarcity and cost of quality construction materials; and the increasing cost of construction labor and equipment -- all of which provide a sound, fundamental basis for sustained long-term demand for the Company's products and services. Tensar has been unique in recognizing and pursuing this market vision, and is pursuing it on a national and multi-application basis with significant investment in manufacturing capacity, direct and distributor sales organizations, active technological development programs and an unparalleled technical service capability to serve its rapidly developing markets.

The Company's products, their methods of use, and their methods of manufacture were all unknown in North America prior to establishment of The Tensar Corporation. As a result, the Company has literally established a new industry. Product sales have been dependent upon gaining industry acceptance of both Tensar's products and the innovative engineering

methodologies made possible by use of the products. The Company's marketing strategies in each market sector have involved the conception and development of novel applications and design technologies for its products as well as the support of these applications through a high level of technical service.

The Company markets its products in each end user market group (i.e. via each subsidiary) by utilizing a combination of direct sales staff, marketing support staff and (generally) exclusive distributors. Early in the Company's history, the Company relied more heavily on distributors in order to gain initial market acceptance. Most of these distributors had historically sold conventional products into the markets the Company wished to penetrate. As the Tensar technology has become more accepted, the Company has broadened and diversified its overall distribution network with additional direct sales staff focused on higher profile sales and emerging market opportunities.

The Company's manufacturing and office facility is 172,000 square feet and the Company employs approximately 75 in administrative and marketing functions and 125 in manufacturing. Approximately 50 additional temporary staff are employed in the third and fourth quarters as manufacturing and shipping workloads peak.

PRODUCTS AND SERVICES

The Tensar Corporation manufactures geogrids, geonets, geocomposites, light weight nets and meshes and purchases and resells various ancillary polymeric products. Since establishing each unique product category in the marketplace, and, in fact, creating the industry in most instances, numerous products have been introduced by others to compete with the Tensar product line. The Company's products have, however, remained unmatched in terms of quality and performance capabilities, as have its technical support capabilities. The Company enjoys a significant majority share in its principal markets and maintains attractive margins on its sales.

Geogrids are a member of a growing family of geosynthetics, which are polymeric materials used in earthwork construction. As high performance aggregate/soil reinforcements, geogrids enable higher safety levels, better land utilization and more economical construction. Tensar products have been used, in many thousands of aggregate/soil reinforcement applications throughout North America and in other parts of the world through affiliated companies in the United Kingdom and Japan.

Geonets and geocomposites are used in the leachate collection and groundwater protection systems of landfills and other waste containment facilities as well as in a variety of earthwork structures. Tensar gained acceptance of these products by the EPA in 1985 and thereby created this industry. These products, now manufactured by Tensar and a variety of other competitors, provide reliable and economical drainage channels for these facilities, achieving superior levels of groundwater protection and construction economy than could be achieved by the use of conventional drainage materials (principally sand).

Tensar fencing products are used as safety fencing in the construction industry and as methods of improving productivity in the agricultural sector. They provide a variety of advantages to the producer including improving access to farmland, preventing erosion, reducing weather-induced stress on livestock, and controlling driving snow. Tensar also manufactures and purchases and resells several polymeric products to the home and garden market which assist the homeowner in landscaping, erosion protection, and non-chemical means of weed prevention.

The Company also serves several new and developing markets for OEM/fabrication applications of its products. These are quietly established and grown with limited awareness of such applications in the general marketplace.

All Tensar products are unified by the concept of providing polymeric materials in forms that offer higher levels of safety, productivity, efficiency, or aesthetics to the end user.

MANAGEMENT TEAM

The Company's key management team today includes seven senior executives. Four of the seven have been with the Company since its inception. Mr. Egan joined the Company in 1990. Messrs. Gilbert and Briggs joined the Company in 1993. Brief biographical profiles of each are outlined below. The Company's management, professional, and technical staff also include numerous additional individuals with exceptional qualifications in business and engineering. Numerous employees of the Company have received national awards and recognition and have their work regularly published in national publications.

D. Garry Fehrman - President and Chief Executive Officer

D. G. Fehrman, 51, President and Chief Executive Officer of The Tensar Corporation, has been responsible for The Tensar Corporation's strategic direction and business performance from the inception of the business. While responsible for Gulf Canada Limited's corporate development activities, Mr. Fehrman negotiated agreements with Netlon Limited in 1981 which lead to the formation of The Tensar Corporation. Mr. Fehrman subsequently managed all aspects of implementation of the new business. In 1988, following an acquisition of Gulf Canada Limited by others, he formed a new corporation and led a management buyout of the assets of the prior business.

Mr. Fehrman's corporate development responsibilities with Gulf Canada also included direction of the corporation's strategic business planning, mergers and acquisitions, diversification and divestment activities. In other positions with Gulf Canada, where he was employed for five years, he had overall responsibility for the corporation's research and development and its financial planning and analysis activities. Prior to joining Gulf Canada, he was employed by Ontario Hydro for 12 years. His initial responsibilities were in nuclear engineering and computer systems development. Following these assignments, he held several senior positions in corporate finance.

Born in Ontario, Canada, Mr. Fehrman received a Bachelor's degree in Engineering Physics and a Masters degree in Business Administration from McMaster University in Hamilton, Ontario.

Daniel J. Harrington - Vice President and Chief Financial Officer

Mr. Harrington, 46, holds a graduate Finance degree from Duke University's Fuqua School of Business and a Professional Accounting degree from Northwestern University's Kellogg School of Management. He is also a CPA and was employed by the public accounting firm of Arthur Young & Company from 1975 to 1978. In 1978, he joined Schlumberger, Ltd., a leading oil field service company. Mr. Harrington held several senior financial positions while at Schlumberger, Ltd., both domestically and in Europe. Prior to leaving Schlumberger, Ltd., Mr. Harrington had overall financial responsibility for financial reporting, taxation, treasury and data processing for the Company's oil field service business in Europe. Mr. Harrington joined Tensar in his present capacity in 1984. His responsibilities include all areas of finance, administration, human resources and data processing.

Richard P. Gilbert - Vice President - Operations

Mr. Gilbert, 43, received a Bachelor of Science degree in General Engineering from the U.S. Naval Academy and a Masters of Science degree in Public Administration from George Washington University. Upon completing his Naval Academy training, Mr. Gilbert served six years in the United States Navy. After leaving the Navy, Mr. Gilbert worked for Mobil Chemical Company for eleven years, primarily in the Plastic Packaging Division. Mr. Gilbert's most recent experience prior to joining Tensar was as President and General Manager of Richmond Technology in Redlands, California. Mr. Gilbert joined Tensar as its Vice President - Operations in June 1993.

Robert F. Briggs - Vice President - Administration and General Counsel

Mr. Briggs, 41, received his B.A. degree from the University of Texas and his law degree from American University in Washington, D.C. Upon graduation from law school, he worked as an attorney for Exxon Corporation. In 1980, he joined Schlumberger Limited, a multinational oilfield service company. Beginning as a corporate attorney in Houston, he held several senior positions, both in the U.S. and abroad. Prior to joining Tensar, Mr. Briggs was Schlumberger's General Counsel in Paris, France for all international operations of the company's principal oilfield service group. Mr. Briggs joined Tensar in July 1993.

Robert J. Easterle - President - Tensar Polytechnologies, Inc.

Mr. Easterle, 50, received undergraduate and graduate degrees in Business Administration from Central Michigan University. From 1969 to 1974, he held various marketing, product development, and sales management positions with the General Electric Company. In 1974, he joined the Vallen Corporation, a leading national

manufacturer/distributor of industrial safety equipment, where he held several senior marketing and management positions. In 1982, he was appointed Vice President of Sales and Marketing and an Officer of Encon Manufacturing Company, a division of Vallen. Mr. Easterle joined Tensar as Vice President - Sales & Marketing in 1984 and was appointed President of Tensar Polytechnologies in October 1991.

Philip D. Egan - President, Tensar Earth Technologies, Inc.

Mr. Egan, 43, received a Bachelor of Science degree in Civil Engineering from Bucknell University in Lewisburg, Pennsylvania, and a Masters of Science degree in Geotechnical Engineering from the University of Illinois. Prior to joining Tensar as President of TES in 1988, Mr. Egan was initially employed by Morrison-Knudsen, Inc., and then for several years by The Reinforced Earth Company of Arlington, Virginia as its Vice President - Engineering & Business Development. During the years 1989-1993 Mr. Egan also acted as President of Tensar Environmental Systems, Inc. Mr. Egan was appointed President - Tensar Earth Technologies, Inc. in January 1990.

Dewey E. Tate - President, Tensar Environmental Systems, Inc.

Mr. Tate, 53, received a Business Administration degree from Jacksonville State University. After spending six years in the Textile Fibers Division of E. I. Dupont de Nemours, Inc., where he held several production and personnel management positions. Mr. Tate joined ICI Americas, Inc. For the next 10 years, he held several progressively more responsible positions in Operations Management. He was then hired by Wabash Datatech Inc., a manufacturer of computer data storage devices, as its Vice President - Operations and remained with this company for three years. Mr. Tate joined Tensar as its Vice President -Manufacturing & Engineering in February of 1984. During the years 1986-1989 Mr. Tate also acted as President of Tensar Earth Technologies, Inc. and Tensar Environmental Systems, Inc. He was re-appointed President of Tensar Environmental Systems, Inc. in February 1993.

TENSAR DRAINAGE PRODUCTS REFERENCE LIST

Project List	Contact	Product	Quantity	Date
Croton Point Landfill Croton-On-Hudson, NY	Briarwood Contracting Group Dan Bautista (914) 936-3600	DC3205	1,250,000 s.f.	9/1/93
Babylon Landfill W. Babylon, NY	Tully Construction Co., Inc. Chris Haverstrom (718) 446-7000	DC6205 NS1605	2,700,000 s.f. 175,000 s.f.	3/9/94
BFI-Lorain County Oberlin, OH	BFI-Mid America Region Bruce Schumucker (216) 774-4060	DC3105 NS1305	430,500 s.f. 414,000 s.f.	8/31/93
Dade County Miami, FL	Poly-America Larry Rowold (214) 647-4374	NS1405	340,000 s.f.	8/30/93
Fox Point State Park Wilmington, DE	Contech, Inc. Jackie Haley (413) 283-7611	DC4105	680,000 s.f.	12/21/93
Millersville Sanitary LF Anne Arundel, MD	Heery - Project Manager Jim Trouba (410) 757-1122	DC4205 NS1405	3,600,000 s.f. 1,850,000 s.f.	4/8/94
Michaelsville Michaelsville, MD	Palco Linings Frank Taylor (908) 753-6262	NS1305	2,260,000 s.f.	7/1/93
Tillman Ridge St. Augustine, FL	Hubbard Construction Co. Mike Morris (904) 260-8009	NS1605	365,000 s.f.	1/15/94
Battle Mt. Mining Battle Mt., NV	Serrot Corp. Frank Strnad (702) 566-8600	NS1405	200,000 s.f.	4/27/94
Union County R.R.F. Union County, NJ	Palco Lining Frank Taylor (908) 753-6262	DC4105	600,000 s.f.	1/18/93
Upper Occoquan Centerville, VA	Gundle Lining Systems Kevin Simms (713) 443-8564	DC6205	1,320,000 s.f.	6/7/93
Hassayampa Landfill Hassayampa, AZ	Serrot Corp. Frank Strnad (702) 566-8600	NS1305	410,000 s.f.	5/3/94

(Geonet)

DRAINAGE NET NS1405

The drainage net shall be an integrally formed polyethylene net structure. It shall have uniform channels, open area and thickness to assure uniform flow throughout the structure. It shall have high tensile strength and tear strength to resist installation damage and loading on steep slopes. It shall also have a low compressibility under high loadings to maintain a high transmissivity under a range of loading conditions. The drainage net shall also be resistant to ultraviolet degradation. The drainage net shall conform to the property requirements listed below.

PROPERTY	TEST METHOD	NOTES	UNITS	VALUE
Flow Capacity				
• Gradient of 1				
• Transmissivity @ 500 psf	ASTM 4716	2.2×10^{-3} ft²/s is specified	$x10^{-3}$ ft²/sec (gpm/ft)	21 (9.55)
• Transmissivity @ 10,000 psf		longer than specified	$x10^{-3}$ ft²/sec (gpm/ft)	16 (7.24)
• Transmissivity @ 20,000psf			$x10^{-3}$ ft²/sec (gpm/ft)	8.6 (3.86)
Mechanical Properties				
• Porosity		1		0.55-0.60
✓ • Peak Tensile Strength MD	ASTM D5035 D1682	2,5	lbs/foot	575 = 48 lb/in
• Compressibility @ 20,000 psf	TTM 2.2	3,4,5	%	50
Material				
✓ • Polyethylene-Specific Gravity	ASTM D792		g/cm³	0.940
✓ • Carbon Black Stabilization	ASTM D4218 D1603		%	2.5
Dimensions				
✓ • Thickness	O.D. Calipered	2,6,7	inches	0.20
• Unit Weight			oz/yd²	29
• Open Area	COE Method Modified		%	58
• Roll Length			ft	300
• Roll Width			ft	14.0
• Roll Weight			lbs	845

Notes:

1. Except where noted all reported test values are nominal.
2. Minimum Value.
3. Compression tests are performed on a 2-inch square sample loaded at a 1mm/minute constant rate of strain.
4. Maximum Value.
5. Tensile Strength and Compressibility properties shall be tested by the manufacturer every 10,000 square yards of products.
6. Thickness is measured by placing the specimen flat on a comparator base and lowering a round 1/2 inch diameter flat end contact surface squarely over a junction.
7. Product thickness shall be measured by the manufacturer every 2,500 square yards of product.

The Tensar Corporation
1210 Citizens Parkway
Morrow, GA 30260
1-800-845-4453

DRAINAGE COMPOSITE DC4205

Trevira 1128

The drainage composite shall consist of a geotextile bonded to each side of a drainage net. The drainage composite shall have a low compressibility in order to maintain high flow capacity over a wide range of confining pressures. The bonding process shall not introduce adhesives or other foreign products. The strength of the bond between the drainage net and the geotextile shall be greater than the friction developed between the geotextile and a soil. The drainage composite shall maintain a high flow under long term loading conditions and shall be resistant to all forms of biological or chemical degradation normally encountered in a soil environment. The drainage composite shall be made from the drainage net and geotextile products whose property requirements are listed below.

PROPERTY	TEST METHOD	NOTES	UNITS	VALUE
Flow Capacity	ASTM 4716	1		
• Gradient of 1				
• Transmissivity @ 500 psf			$x10^{-3}ft^2/sec$	21
			(gpm/ft width)	(9.55)
• Transmissivity @ 10,000 psf			$x10^{-3}ft^2/sec$	16
			(gpm/ft width)	(7.24)
• Transmissivity @ 20,000 psf			$x10^{-3}ft^2/sec$	8.6
			(gpm/ft width)	(3.86)
Mechanical Properties		3,4,5		
• Compression		1,2		
@ 20,000 psf			%	50
• Peak Tensile Strength-MD	ASTM D5035	6	lbs/ft	575
Drainage Net				
• Aperture Size	I.D. Calipered	7	inches	0.3
• Thickness	O.D. Calipered	8,9	inches	0.20
• Polyethylene Polymer				
-Specific Gravity	ASTM D792		g/cm^3	0.940
-Carbon Black Stabilization	ASTM D4218		%	2.5
Geotextile		10		
• Grab Tensile Strength	ASTM D4632		lbs	230
• AOS	ASTM D4751		US Std.Sv.Sz.	70
• Weight	ASTM D1910		oz/sy	8.0
Composite				
• Laminate Bond Strength	ASTM F904	11	g/in	400
• Dimensions - Finished Product				
-Thickness	O.D. Calipered		in	0.24
-Roll Length			ft	225
-Roll Width (Drainage Net)			ft	14
• Roll Weight			lbs	890

Notes

1. Test values are for the core net only.
2. Compression Tests are performed on a 2-inch square sample loaded at a 1mm/minute constant rate of strain.
3. Test values are for drainage net prior to bonding process.
4. All test values are nominal, unless otherwise indicated.
5. MD - Machine (roll) Direction.
6. Minimum value.
7. Inside dimensions in each principal direction are measured by calipers.
8. Outside dimensions in each principal direction are measured by calipers.
9. Thickness is measured by placing the specimen flat on a comparator base and lowering a round 1/2 inch diameter flat end contact surface squarely over a junction.
10. Geotextile splices within each roll of finished goods shall be considered acceptable product. The splicing methods shall include, but are not limited to, stitching or heat bonding. The finished splice shall maintain the continuity of the filtration function of the geotextile. These methods will be considered viable and acceptable unless otherwise specified.
11. Minimum value of a random 5 sample (MD) average between the polyethylene geonet and the needle punched geotextile.

The Tensar Corporation
1210 Citizens Parkway
Morrow, GA 30260
1-800-845-4453

DRAINAGE COMPOSITE DC4105

Trevira 1128

The drainage composite shall consist of a geotextile bonded to one side of a drainage net. The drainage composite shall have a low compressibility in order to maintain high flow capacity over a wide range of confining pressures. The bonding process shall not introduce adhesives or other foreign products. The strength of the bond between the drainage net and the geotextile shall be greater than the friction developed between the geotextile and a soil. The drainage composite shall maintain a high flow under long term loading conditions and shall be resistant to all forms of biological or chemical degradation normally encountered in a soil environment. The drainage composite shall be made from the drainage net and geotextile products whose property requirements are listed below.

PROPERTY	TEST METHOD	NOTES	UNITS	VALUE
Flow Capacity	ASTM 4716	1		
• Gradient of 1				
• Transmissivity @ 500 psf			$x10^{-3}ft^2/sec$	21
			(gpm/ft width)	(9.55)
• Transmissivity @ 10,000 psf			$x10^{-3}ft^2/sec$	16
			(gpm/ft width)	(7.24)
• Transmissivity @ 20,000 psf			$x10^{-3}ft^2/sec$	8.6
			(gpm/ft width)	3.86)
Mechanical Properties		3,4,5		
• Compression @ 20,000 psf		1,2	%	50
• Peak Tensile Strength-MD	ASTM D5035	6	lbs/ft	575
Drainage Net				
• Aperture Size	I.D. Calipered	7	inches	0.3
• Thickness	O.D. Calipered	8,9	inches	0.20
• Polyethylene Polymer				
-Specific Gravity	ASTM D792		g/cm^3	0.940
-Carbon Black Stabilization	ASTM D4218		%	2.5
Geotextile		10		
• Grab Tensile Strength	ASTM D4632		lbs	230
• AOS	ASTM D4751		US Std.Sv.Sz.	70
• Weight			oz/sy	8.0
Composite				
• Laminate Bond Strength	ASTM F904	11	g/in	400
• Dimensions - Finished Product				
-Thickness	O.D. Calipered		in	0.23
-Roll Length			ft	225
-Roll Width (Drainage Net)			ft	14
• Roll Weight			lbs	765

Notes

1. Test values are for the core net only.
2. Compression Tests are performed on a 2-inch square sample loaded at a 1mm/minute constant rate of strain.
3. Test values are for drainage net prior to bonding process.
4. All test values are nominal, unless otherwise indicated.
5. MD - Machine (roll) Direction.
6. Minimum value.
7. Inside dimensions in each principal direction are measured by calipers.
8. Outside dimensions in each principal direction are measured by calipers.
9. Thickness is measured by placing the specimen flat on a comparator base and lowering a round 1/2 inch diameter flat end contact surface squarely over a junction.
10. Geotextile splices within each roll of finished goods shall be considered acceptable product. The splicing methods shall include, but are not limited to, stitching or heat bonding. The finished splice shall maintain the continuity of the filtration function of the geotextile. These methods will be considered viable and acceptable unless otherwise specified.
11. Minimum value of a random 5 sample (MD) average between the polyethylene geonet and the needle punched geotextile.

The Tensar Corporation
1210 Citizens Parkway
Morrow, GA 30260
1-800-845-4453

Hoechst Celanese

Product Description

Trevira® Spunbond Type 011/280

Technical Fibers Group
Hoechst Celanese Corporation
Spunbond Business Unit
Post Office Box 5650
Spartanburg, SC 29304-5650
803 579 5007
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Fax 803 579 5830

Trevira® Spunbond Type 011/280 is a 100% continuous filament polyester nonwoven needlepunched engineering fabric. The fabric is resistant to biological and naturally encountered chemicals, alkalies, acids, and ultraviolet light exposure. Trevira® Spunbond Type 011/280 conforms to the property values listed in the following table:

FABRIC PROPERTY	UNIT	TEST METHOD	TYPICAL VALUE[1]	MINIMUM TEST VALUES[2]
Fabric Weight	oz/yd^2	ASTM D-5261	8.5	8.0
Fabric Thickness, t	mils	ASTM D-5199	120	105
Grab Strength (MD/CD)	lbs	ASTM D-4632	320/260	230
Grab Elongation (MD/CD)	%	ASTM D-4632	75/80	60
Trapezoid Tear Strength (MD/CD)	lbs	ASTM D-4533	110/100	80
Puncture Resistance	lbs	ASTM D-4833	125	100
Mullen Burst Strength	psi	ASTM D-3786	435	380
Water Flow Rate	gpm/ft^2	ASTM D-4491	130	90
Permittivity, Ψ	sec^{-1}	ASTM D-4491	1.76	1.20
Permeability, $k = \Psi xt$	cm/sec	ASTM D-4491	.53	.32
AOS	Sieve Size mm	ASTM D-4751	70-120 .210-.125	70 .210
Standard Roll Widths[3]	ft	12.5 and 15.0		
Standard Roll Lengths[3]	ft	300		

MD = Machine Direction CD = Cross Machine Direction

[1] The values listed are average values.
[2] These minimum values represent minimum test values as determined from Quality Control (QC) testing.
[3] Other width and length rolls are available upon request.

011280
November 17, 1993

Hoechst

Drainage Composite Installation Suggestions

Storage and Handling

The drainage composite should be provided in enclosed plastic bags in order to protect the geotextile portion of the material. Once the drainage composite arrives on site, the contractor may choose to store the product under a tarp or inside a storage facility (if available) for extra protection against damage to the drainage composite, mishandling, or contact with blades or sharp tools.

Installation: Placement and Seaming

* The drainage composite should be secured against wind action by sandbags or an equivalent when required.

* On sloping areas (steeper than 10·), drainage composite should be anchored at the top of the slope to prevent it from sliding down the slope.

* Fill material should be placed, spread, and compacted in such a manner to ensure: 1) that the drainage composite is not damaged; 2) minimal slippage of the drainage composite on the underlying geosynthetics; and 3) no excess tensile stresses in the drainage composite.

* The drainage composite should be protected from mud, dirt, dust, wet cement, and similar materials which may affix to the geotextile or core net.

* When connecting the drainage composite rolls side-to-side: 1) the rolls should be butted against each other; 2) the net should be tied approximately every 5 feet; and 3) the geotextile should be overlapped a minimum of 3 inches.

* When connecting the drainage composite rolls end-to-end: 1) the net should be overlapped approximately one foot; 2) the net should be tied approximately every 6 inches across the roll; and 3) the geotextile should be flapped over to cover the net.

* Any damaged geotextile should be covered with extra geotextile before backfilling.

TENSAR Environmental Systems, Inc.
1992

TENSAR DRAINAGE NET INSTALLATION GUIDE

I. DELIVERY

Drainage Nets from The Tensar Corporation are delivered on-site in lightweight, easy to handle rolls. The width of rolls is 6.33 feet; the standard roll lengths are 98.4 feet or 300 feet, however, longer or shorter rolls can be manufactured.

II. STORAGE

Tensar drainage nets have been stabilized for ultraviolet light by adding carbon black to the polyethylene resin. Consequently, they can be stored outdoors without any protection during all the time necessary for construction. Precautions necessary for geotextiles and some geomembranes, such as protection by opaque wrapping, are not required. However, wrapping or sheltering is recommended to keep the net clean. Dirt or dust in the installed net can be transported by the liquid and conveyed by the net and subsequently deposited, which may cause clogging. If plastic net rolls have not been protected during transportation or storage, they should be washed prior to installation. This requirement is similar to washing aggregate prior to use in a drainage layer or trench.

III. GROUND PREPARATION

Drainage nets are never placed in direct contact with the ground. If a net is placed on a geomembrane, there are strict requirements for ground preparation to ensure that the geomembrane will not be punctured but special preparation need be made for the net. If a net is placed on a geotextile, stones likely to puncture the geotextile should be removed.

In most cases it should be possible to find a geotextile strong enough so that a net/ geotextile system could be put on almost any unprepared subgrade or waste surface. However, when the waste or subgrade surface on which a net/geotextile is placed is too irregular, fine soil or waste particles transported by flowing liquids may accumulate in the empty spaces between irregular subgrade of waste surface and geotextile, thereby locally clogging the geotextile.

IV. INSTALLATION STEPS

Due to their flexibility, plastic nets are easy to place. Due to their tensile strength they can be placed on steep slopes, even vertical walls. Recommendations for placement follows:

Placement on Horizontal Area

On a horizontal area, rolls can be pushed by hand and easily unrolled. An alternative consists of placing the roll on a spindle fixed at the rear of a vehicle.

Placement on a Slope

Several alternative methods can be used:

- *The net roll is placed around a fixed spindle at the top of the slope and is unrolled by pulling the end of the net down the slope.*
- *The net roll is unrolled on a flat area near the top or the bottom of the slope and is pulled into position.*
- *The net roll is unrolled down the slope while the end of the net is temporarily secured at the top by workers standing on it. (By doing so, it is difficult to align nets to ensure uniform overlap of adjacent rolls.)*
- *Several net rolls are: (1) unrolled on a flat area near the top of slope; (2) joined laterally; (3) rolled up again to form a single wide roll that is unrolled down the slope while the end of the net is temporarily secured at the top by several workers standing on it. (This method can overcome the alignment problem mentioned above.)*

Unrolling rolls down a slope can be dangerous. The roll lengths must be known prior to pushing the rolls and the path likely to be followed by the roll must be cleared. Accidents have been caused by a geomembrane roll rolling freely down a 2H:1V slope. Net rolls do not roll down slopes as fast as geomembrane rolls and the above described method has been successfully used on a 1.5H:1V slope.

Nets are usually unrolled after the anchor trench at the top of the slope has been excavated. Care should be taken not to entrap in the net channels small stones from the soil excavated in the anchor trench.

If necessary, net rolls can be unrolled horizontally across a slope. For example, in a landfill where a double layer of net is required at the toe of the slope, the first layer of net will be unrolled from the top of the slope, as discussed above, and the second layer will be unrolled across the slope at the toe.

Placement Against a Vertical Wall

A 1.6m (5.3 ft) or 1.9m (6.3 ft) wide roll may be difficult to place against a vertical wall. Rolls can be cut in halves (0.8m, i.e. 32 in., or .95m, i.e. 38 in.) to facilitate placement.

Against vertical walls, placement may be facilitated by using a net-geotextile composite fabricated in advance.

V. ANCHORING

On a Slope

The net should be anchored at the top of the slope to prevent it from sliding along the slope. A convenient way is to place the top end of the ne tin the anchor trench with the geomembrane(s) placed beneath and/or above the net (see Figure 1). The anchor trench presented in Figure 1(d) provides temporary anchorage of the geomembrane while the net is being installed. Similarly, the anchor trench in figure 1(f) provides temporary anchorage of the lower geomembrane and the net.

On a Vertical Wall

Nets can be nailed or secured to the back of a vertical wall using bolted steei or wooden battens. They can also be draped from the top of the wall where they are secured with sand bags until backfill is in place.

VI. SECURING AGAINST WIND ACTION

Nets placed on a horizontal area or on a slope should be secured against wind action by sand bags or reclaimed tires. On a slope it may be necessary to attach sand bags and tires to the top, using ropes. Although nets can be welded to some geomembranes (especially HDPE) this is not recommended because differential movements between nets and geomembranes can tear the geomembrane.

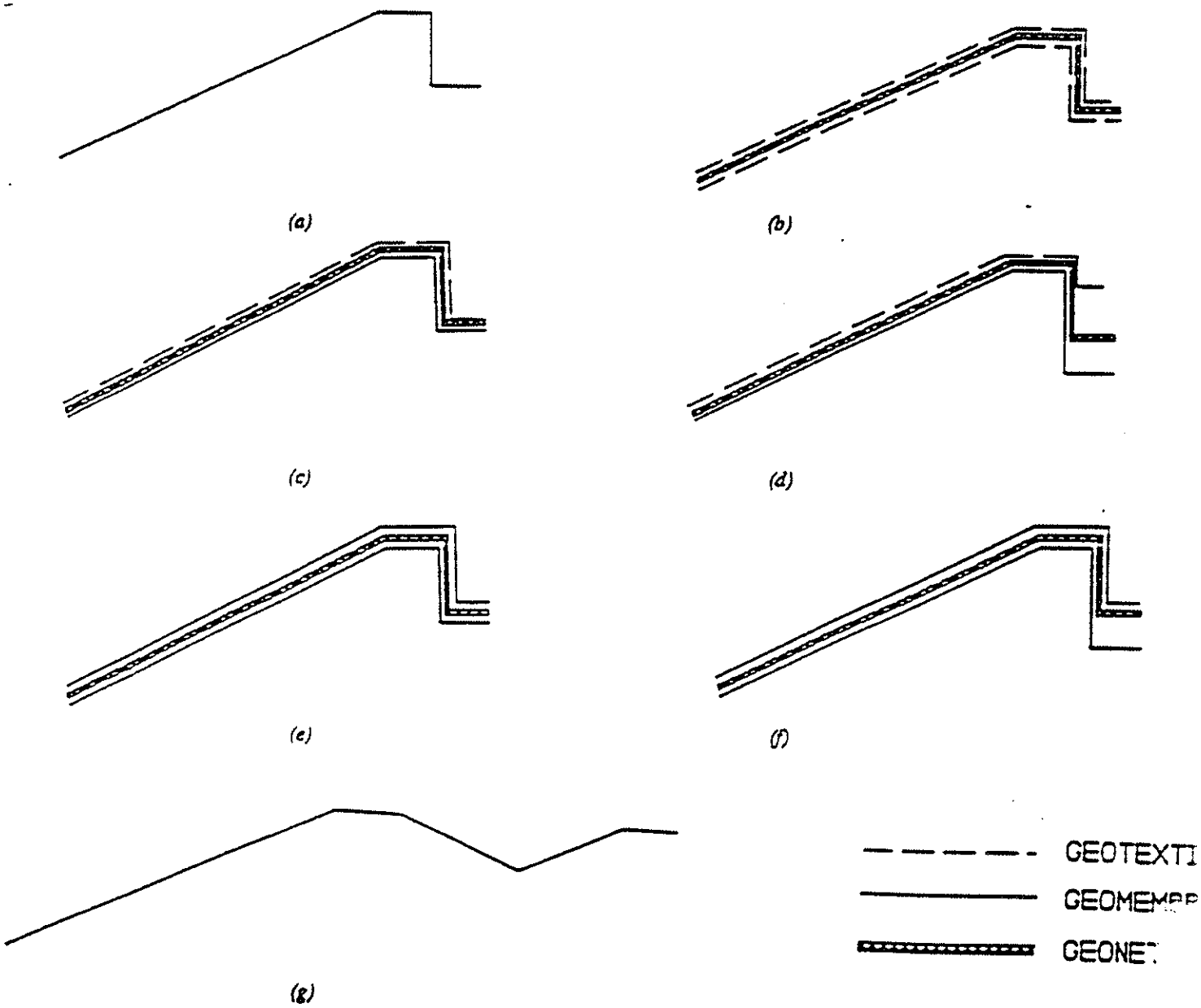


Figure 1:

Cross sections of anchor trenches: (a) traditional anchor trench for a geomembrane; (b) anchorage of geotextile/net/geotextile composite; (c) (d) examples of anchor trenches for leachate collection layer; (e) (f) examples of anchor trenches for a double geomembrane liner with a drainage net used as a leak detection system (Note: it may be useful to vent the air entrapped in the net by making a hole in the top geomembrane liner at the crest; the hole must be sealed after filling the landfill or liquid impoundment); (g) alternate triangular cross-section.

VII. STACKING

When several layers of net are stacked, care should be taken to prevent strands from one layer from penetrating the channels of the next layer, thereby significantly reducing the transmissivity. This cannot happen if stacked nets are placed in the same direction.

In the corners of the side slopes of rectangular landfills or liquid impoundments, nets should be overlapped as indicated in Figure 2. An extra roll of net should be unrolled in the corner, after the placement of the regular nets for the following two reasons:

- flow rate is expected to be higher in corners than elsewhere on the slopes; and
- there is more risk in corners than anywhere else that strands from one layer of nets penetrate channels of the next layer.

VIII. ADJOINING ADJACENT ROLLS

Joining adjacent rolls when the joint is in the direction of flow is achieved by butting or overlapping. When joints are not in the direction of flow, adjacent rolls should be overlapped to ensure continuity of flow. Overlaps should be at least 75mm (3 in.). Connections that are expected to be subjected to tensile stresses (during or after installation of materials adjacent to the net such as geomembrane, geotextile or soil) can be made by spot welding or tying adjacent or overlapping net layers using strings, plastic fasteners or polymer braid, preferably white or colored for easy inspection. Typically, adjacent nets are spot welded every 1.5m (5 ft.). Nets are normally welded or bonded to geomembranes, although geomembranes should not be attached using metallic connections because these connections may damage the geomembrane.

IX. QUALITY CONTROL OF PLACEMENT

Quality control of installation can be carried out at a glance by checking the continuity of the net layer, while quality control of particle size, thickness and cleanliness of sand or aggregate drainage layers is time consuming. Contractor mistakes are minimized because Tensar drainage nets are easy to install.

X. INTERACTION WITH ADJACENT MATERIALS

Connection with Pipes

There are three ways to connect a net to a pipe:

- The net can be wrapped around a slotted or perforated pipe (Figure 3(a).
- The net can be embedded in the aggregate bedding surrounding the pipe (Figure 3(b).
- The net can be inserted into a specially designed pipe (Figure 3(c)

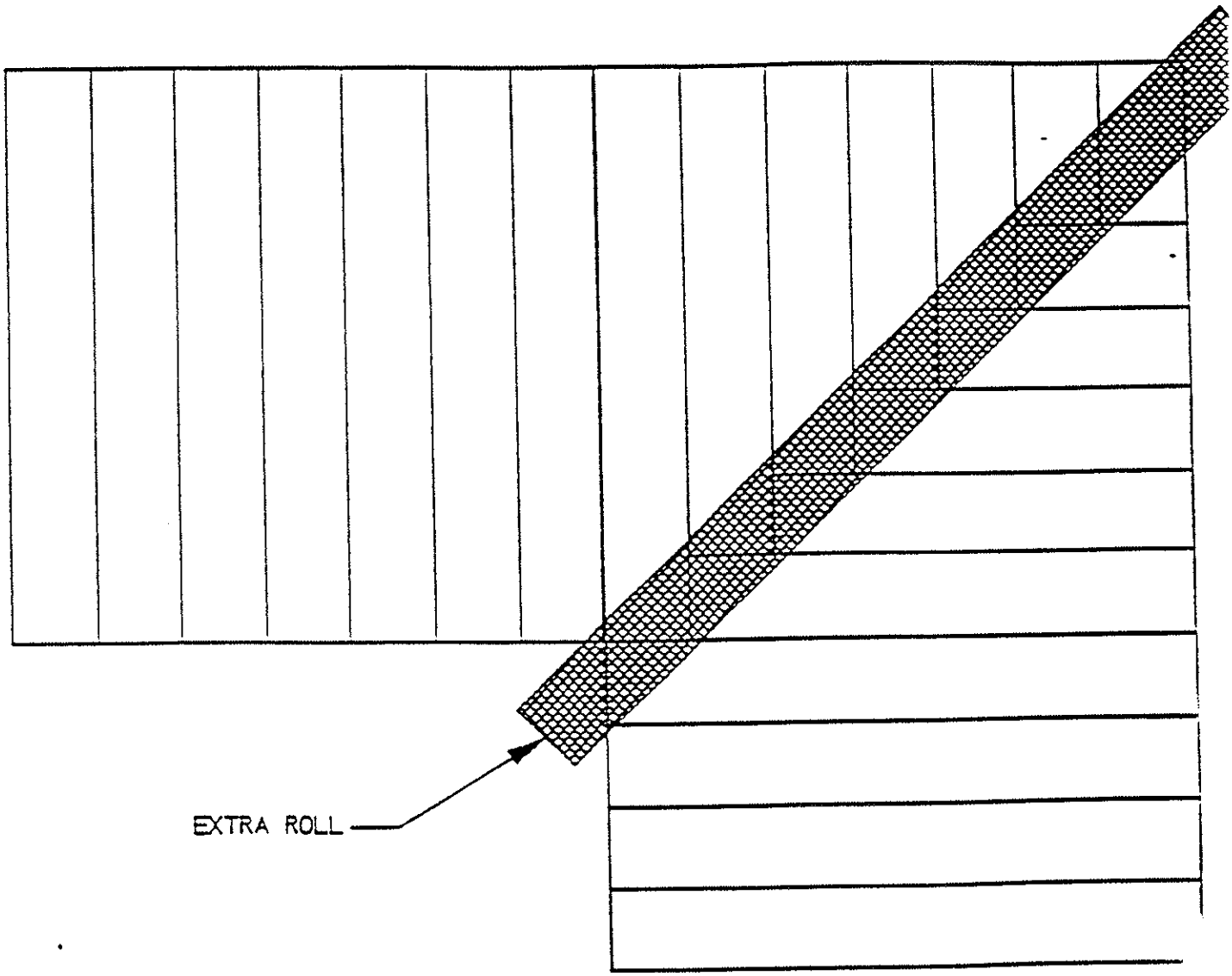


***Figure 2:** Pattern of nets overlapping in the corner of the side slope of a landfill or liquid impoundment.*

Connection with Granular Drainage Layers

Connection of a net with open graded gravel poses no problem. A 0.3m (1 ft) overlap is usually sufficient (Figure 4a). The gravel should be washed prior to placement.

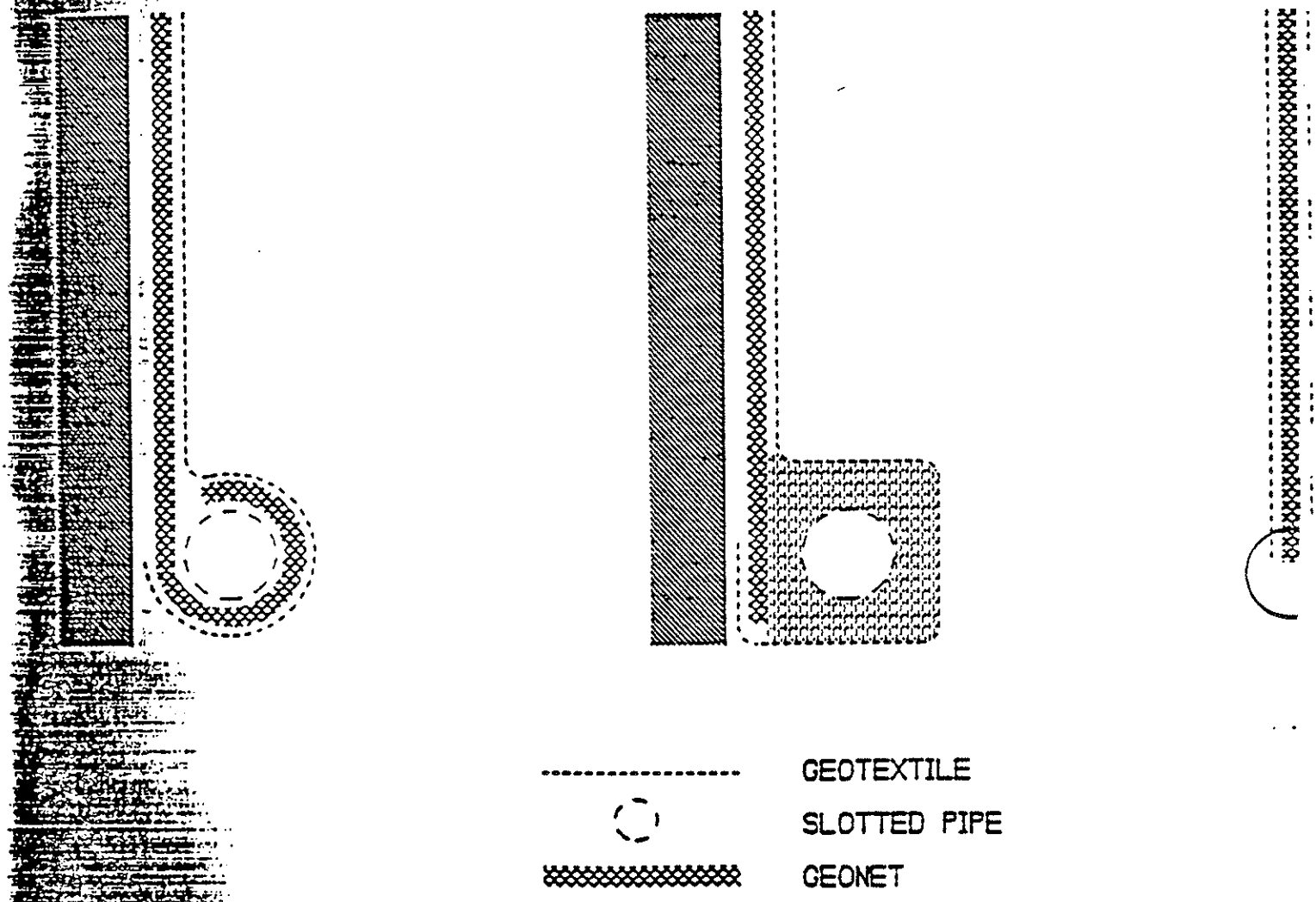
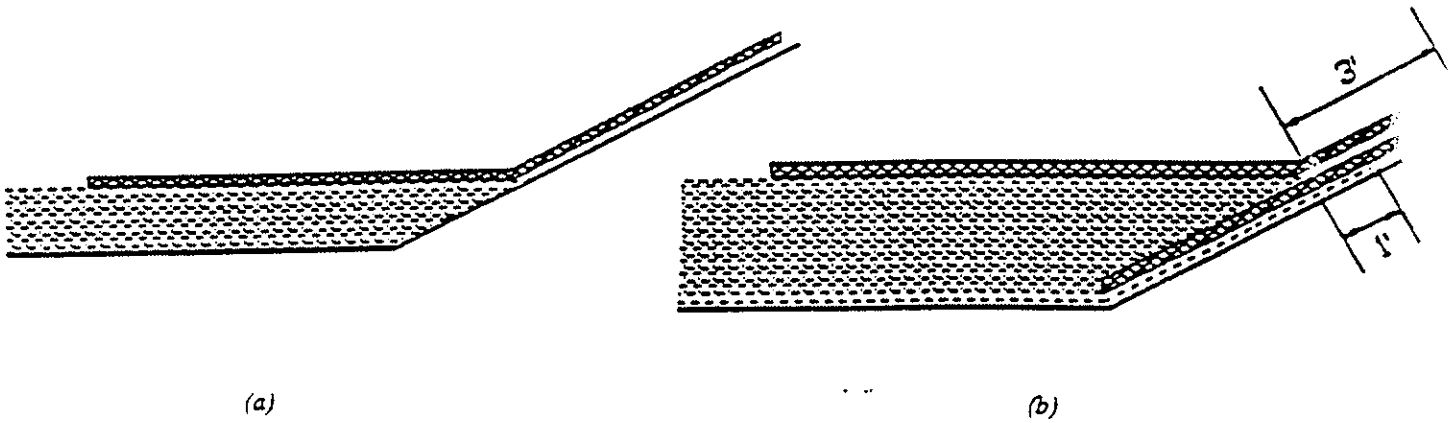


Figure 3: Connection of drainage nets with pipes.



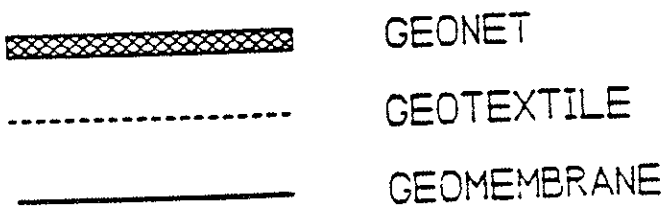
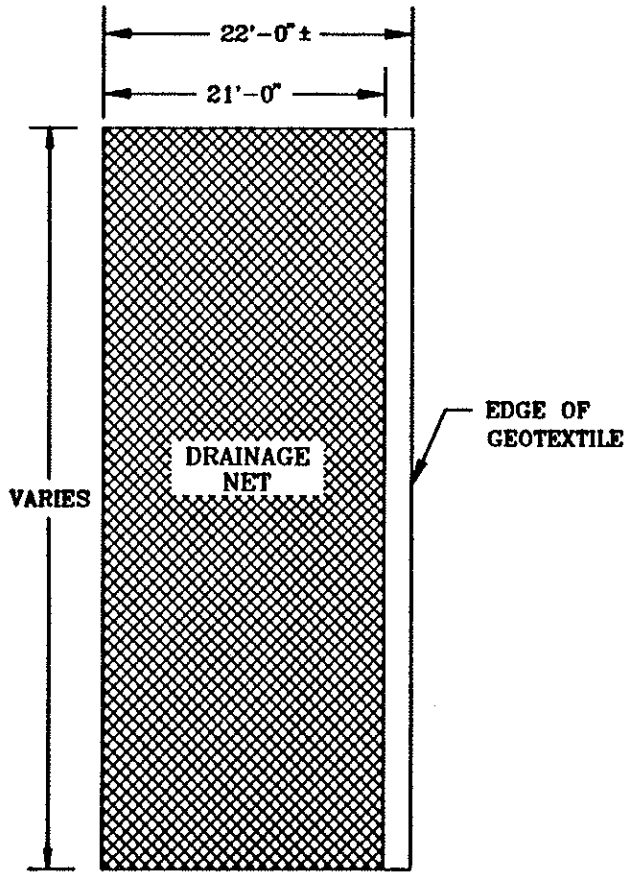
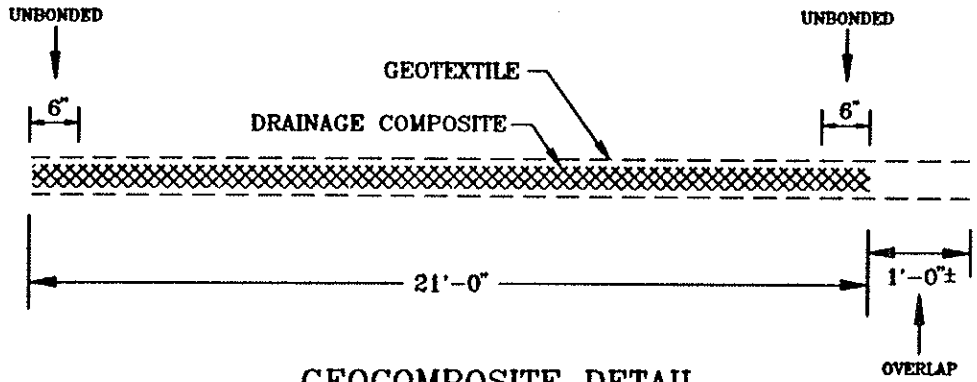


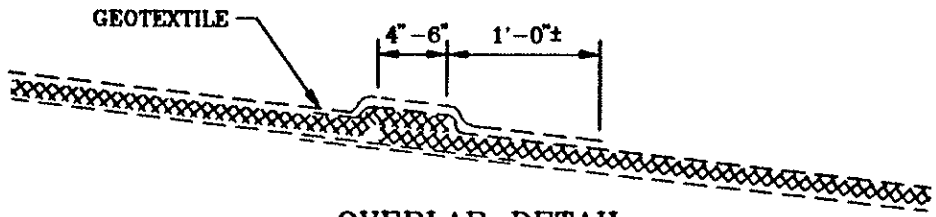
Figure 4: ***Connection of a drainage net with a gravel layer; (a) without a geotextile between gravel and geomembrane; (b) with a geotextile between gravel and geomembrane. In the latter case, an extra layer of net is required because the transmissivity of the net in contact with the geotextile is decreased as compared to its transmissivity in contact with the geomembrane. This extra layer of net can be unrolled across slope.***



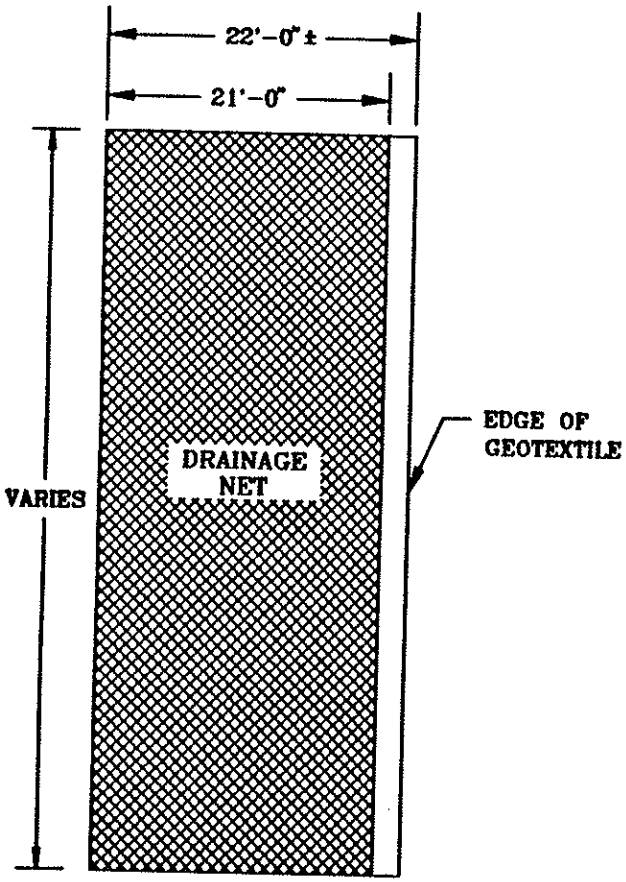
GEOCOMPOSITE DETAIL
(PLAN VIEW)



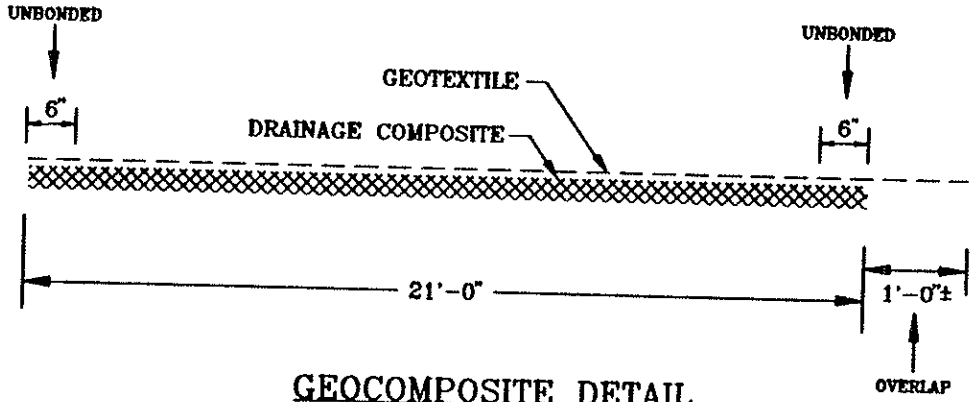
GEOCOMPOSITE DETAIL
(ELEVATION VIEW)



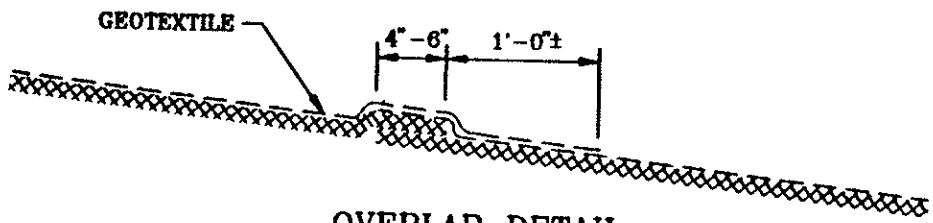
OVERLAP DETAIL



GEOCOMPOSITE DETAIL
(PLAN VIEW)



GEOCOMPOSITE DETAIL
(ELEVATION VIEW)



OVERLAP DETAIL

TENSAR DRAINAGE NET QUALITY CONTROL /

QUALITY ASSURANCE MANUAL

DATE: June 21, 1994
Revision #002

I.

INTRODUCTION

The Quality Control Testing and the Production Testing provide a solid foundation for the assurance that TENSAR DRAINAGE NETS produced by The Tensar Corporation at the Atlanta, Georgia, manufacturing facilities will reliably perform to their design functions.

This manual provides an overview of THE TENSAR CORPORATION DRAINAGE NET PRODUCTS quality assurance program.

II.

QUALITY CONTROL AND PRODUCTION CHECKS

PURPOSE

Allows Operations to improve their capability to maintain a controlled process and to increase production efficiency by routinely monitoring easily measured product characteristics which can be associated with process conditions.

Any production not meeting the measured characteristic's specification is flagged and set aside for further dispositioning by Quality Control personnel.

Quality Control checks and tests are the basis for dispositioning of product, are the source of data for letters of certification, and are checks on Production measurements.

III.

CONTENTS

The information on the following pages is divided into Sections A, B, and C.

Section A details Production quality checks. It lists the product characteristics to be measured or otherwise monitored and the frequency of performing these checks.

Section B details the Quality Control checks and laboratory tests. It lists the measurements and physical tests to be performed on QC samples and the frequency of testing.

Section C is the Appendix. It contains tabulations of the measurements, QC tests, specifications and frequency of tests for typical drainage net products as carried out by Production and by the Quality Control Laboratory of The Tensar Corporation. The chart form provides an easy reference summary to Sections A and B.

SECTION A: PRODUCTION'S QUALITY CHECKS AND SCHEDULE

Rolls will be checked routinely for dimensional and visual parameters felt to be important as factors in preliminary acceptance or rejection of the product. Once in specification, the following scheme will be carried out at a frequency of no less than once per 1,250 square meters of production.

1. Length will be taken from the line's counter and recorded to the nearest 0.1 meter.

2. Weight/Length will be determined from a full width by 1 meter long sample taken directly from the production line.

3. Thickness will be taken from the weight/length sample. The thickness will be taken from each of three areas across the network:

    *) an edge
    *) 1/4 the distance in from an edge
    *) the center

    The sample will be located flatly against the comparator's base with one junction centered under the contact surface of the dial indicator. Three measurements of each area will be taken and an average for each location will be recorded to the nearest 0.01 mm.

4. Mesh Count will also be taken from the weight/length sample and the three values will be recorded individually to the nearest whole mm.

5. Width will be taken from the weight/length sample. Additionally, this parameter is checked many times between scheduled measurements by the use of a scale on the production equipment.

SECTION B: QUALITY CONTROL LABORATORY TESTING AND SCHEDULE

Once a product run has been established as meeting specifications, through Quality Control testing the typical QC sampling schedule as listed will be followed.

Typical QC Sampling Schedule

- Once every 7,440 m^2 of production, a full width by 1 meter long sample is to be taken from the production line to the Quality Control Lab. This sample is to be evaluated for the following:

    1. Tensile Strength (machine direction)
    2. Compressibility
    3. % Weight Carbon Black
    4. Melt Index
    5. Specific Gravity
    6. Appearance
    7. Width
    8. Thickness
    9. Weight per length
    10. Weight per area
    11. Mesh Count on Helix

- Once every 3,720 m^2 of production, a full width by 1 meter long sample is to be taken from the production line to the Quality Control Lab. This sample is to be evaluated for the following:

    1. Appearance
    2. Width
    3. Thickness
    4. Weight per length
    5. Weight per area
    6. Mesh Count on Helix

- Hydraulic Transmissivity testing, although not a Quality Control test, is performed when specifiaclly requested before the production run.

BRIEF DESCRIPTION OF QUALITY CONTROL LAB TEST PROCEDURES

1. Tensile Strength (MD) Network Width (ASTM 5035)

   Five specimens, each being 150mm in the machine direction by 50mm in the cross-machine direction, are individually loaded parallel with the product's machine direction to determine the average maximum strength of the network along the machine direction per meter width.

2. Compressibility (Tensar Method TM2.2)

   a (50 x 50) mm specimen is loaded between flat, parallel surfaces at a rate of 1mm/minute to determine how much the product compresses under given loads. This is an indicator of relative performance regarding transmissivity of the product.

3. % Carbon Black (ASTM D4218-82)

   The % weight of the carbon black additive can be determined by comparing the exact weight of three specimens, before exposure to a high temperature in a muffle furnace, to the weight of their residue.

4. Melt Index (ASTM D1238, Procedure B)

   The rate of extrusion of molten resin through a die of a specified length and diameter at a temperature of 190 degrees centigrade under a load of 2.16 kg is measured via this method and procedure using a melt plastometer meeting the methods requirements.

5a. Specific Gravity (ASTM D792-66)

   The specific gravity is determined via the following ratio:

   $$\frac{\text{the weight, in air, of the melt index extrudate}}{\text{the weight, in IPA, of the melt index extrudate}}$$

   The density of the IPA is determined and accounted for in the actual calculation of the specimen's specific gravity.

BRIEF DESCRIPTION OF QUALITY CONTROL LAB TEST PROCEDURES
(continued)

5b. Density (TM2.5,Foamed Product)

Density of Foamed Product (Tensar TM2.5) is determined by placing a (20 x 200) mm piece of network into a graduated cylinder containing distilled water and dividing the length of the 200mm long specimen, which remains below the water surface, by the 200mm total length.

6. Appearance

Time is taken to ensure that visual aspects remain constant and reflect a quality product.

7. Width (Tensar Method TM2.4)

Network width will be determined while the sample is flat on the floor. Three measurements will be taken, one across each cut end and one across the center. The three measurements will be reported as an average. This value will be recorded to the nearest 1mm.

8. Thickness (Tensar Method TM2.4)

Network thickness is determined by use of a dial gage attached to a comparator stand. Each of the five (2X6)inch tensile specimens are measured at three different sites before the thensile testing is performed. The values are recorded to the nearest 0.01mm.

9. Weight/Length (Tensar Method TM2.4)

Network length will be determined by measuring the sample, while it is flat on the floor, along both edges and along the center. The values will be averaged and reported to the nearest 1mm. The network sample weight is obtained by rolling the product into a tubular configuration applying a 2 inch wide by 16 inch long piece of adhesive tape around this configuration and placing it onto a floor model balance. The weight is divided by the average length and is recorded to the nearest 0.001 lb/m.

BRIEF DESCRIPTION OF QUALITY CONTROL LAB TEST PROCEDURES (continued)

10. Weight/Area (Tensar Method TM2.4)

Network sample weight is divided by the product of its measured average length and its measured average width. The resultant weight/area is recorded to the nearest 0.001 lb/m^2.

11. Mesh Count on Helix (Tensar Method TM2.4)

This is a measurement in the network over a specified number of openings for a given product. This measurement will be determined at the network's edge, center, and 1/4 and 3/4 of the distance across the network from an edge. The locations will be individually reported to the nearest 1mm.

*) Hydraulic Transmissivity (ASTM D4716-87)

Boundaries, gradients, loads are dependent upon customer's needs. Tensar has characterized products using metal boundaries top and bottom. Gradients and loads are listed in published information for each product.

SECTION C: APPENDIX

PRODUCTION CHECKS

NS1405
(Narrow and Wide Product)

PROPERTY	NOMINAL	SPECIFICATION LIMIT(S)	[1]FREQUENCY OF CHECKS (sq. m)	METHOD
Width, m (in)	1.93 4.3	1.91 - 1.95 (75 - 77) 4.26 - 4.45 (167 - 175)	744 1,250	Tensar TM 2.4
Thickness, mm (in)	5.5 (0.216)	5.10 - 5.90 (0.200 - 0.232)	744 1,250	Tensar TM 2.4
Weight/Length, lbs/m	4.00 8.95	3.95 - 4.15 8.90 - 9.10	744 1,250	Tensar TM 2.4
Mesh Count, mm (in) (Over Span of 5 Mesh on Helix)	60 (2.36)	55 - 65 (2.16 - 2.56)	744 1,250	Tensar TM 2.4

1) 744sqm = 1.93width product;1,250sqm = 4.3width product

Q. C. TESTING

NS1405
(Narrow and Wide Product)

PROPERTY	NOMINAL	SPECIFICATION LIMIT(S)	FREQUENCY OF CHECKS (sq. m)	METHOD
Width, m (in)	1.93 4.3	1.91 - 1.95 (75 - 77) 4.26 - 4.45 (167 - 175)	3,720	Tensar TM 2.4
Thickness, mm (in)	5.5 (0.216)	5.10 - 5.90 (0.200 - 0.232)	3,720	Tensar TM 2.4
Weight/Length, lbs/m	4.00 8.95	3.95 - 4.15 8.90 - 9.10	3,720	Tensar TM 2.4
Weight/Area, lbs/m^2	1.93	1.89 - 2.09	3,720	Tensar TM 2.4
Mesh Count, mm (in) (Over Span of 5 Mesh on Helix)	60 (2.36)	55 - 65 (2.16 - 2.56)	3,720	Tensar TM 2.4

Q. C. TESTING

NS1405
(Narrow and Wide Product)

PROPERTY	NOMINAL	SPECIFICATION LIMIT(S)	FREQUENCY OF CHECKS (sq. m)	METHOD
Tensile Strength Kn/m (lbs/ft) width	-----	8.4 minimum (575)	7,440	ASTM [1]D-5035
Compressibility % @ 20,000 psf	-----	50 maximum	7,440	Tensar TM 2.2
% Weight Carbon Black	2.5	2.0 - 3.0	7,440	ASTM D-4218
Melt Index (Grams/10 min)	0.25	0.1 - 1.0	7,440	ASTM D-1238
Specific Gravity (Grams/cc)	0.945	0.940 - 0.950	7,440	ASTM D-792
[2]Hydraulic Transmissivity, X 10-3ft^2/sec	12	-----	As Required	ASTM D-4516

1) Formerly ASTM D-1682

2) Gradient = 1.0;Normal Stress = 500psf;Boundaries = metal plates

$T = 12 \times 10^{-3}$ ft²/sec
$= 1.728$ in²/sec
$= 1 \times 10^{-3}$ m²/s

GUNDLE MATERIAL & INSTALLATION STANDARDS MANUAL

PREFACE

This manual replaces the "Quality Assurance for the Installation of Flexible Membrane Lining Systems" manual currently in circulation. All relevant components of the previous QA/QC manual are incorporated into this document. Additional items have been added as required. The format has been modified for ease of reference and readability.

Limitation of warranty liability: These descriptions are solely for use by engineers as general guidelines in formulating preliminary specifications, and should not be relied upon absent site-specific product testing and manufacturing information. Product designs and specifications are subject to change without advance notice. Any description of the materials contained in this document is for the sole purpose of identifying this material, and no description of the materials has created or amounted to an express warranty that the materials will conform to this description. The materials herein are subject to a printed special material warranty form issued at the time of purchase. This special material warranty supersedes all other warranties, express, implied and statutory, including any implied warranty of merchantability or fitness for a particular purpose.

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QUALITY POLICY STATEMENT

Gundle Environmental Systems Inc. through its operating entities, Gundle Lining Systems, Inc. (GLS) and Gundle Lining Construction Corp. (GLCC), is the leading supplier and installer of quality high and low density polyethylene liner systems for waste containment and other applications. The company has been extremely successful by operating under the philosophy of offering quality products and competitive pricing on a worldwide basis. The company's management is totally committed to its Quality Management System and relies on experienced personnel and "state of the art" processing equipment to achieve the high level of quality in our products and services.

CORPORATE MISSION STATEMENT

The mission of Gundle Environmental Systems, Inc. is to be the world leader in providing innovative, quality barrier systems, products and services to satisfy customer needs in managing and protecting water and other resources.

Gundle Environmental Systems, Inc., through the Quality Management System, will maintain compliance with the requirements of the ISO 9002 Quality System Standard, applicable governmental regulations.

Implementation of the company's Quality Management System will ensure the realization of the following goals:

- Achieving a high degree of customer satisfaction for its products and services,
- Continuous certification under the ISO 9002 Quality System Standard,
- Consistently providing products and services that meet the customer's requirements and expectations,
- Achieving desired product quality through continued process improvement, and
- Continuing growth while maintaining an excellent customer, company, and employee relationship.

POLICY IMPLEMENTATION

Management within Gundle Environmental Systems, Inc. is totally dedicated to achieving these ambitious and challenging goals that will require every employee to share in this total commitment to quality. Management's respect for and recognition of its employees, maintenance of modern processing equipment, and continued commitment to the Quality Management Program will ensure the future success of Gundle Environmental Systems, Inc.

(excerpt from Gundle Environmental Systems, Inc. Quality Assurance Manual, Revision 1).

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