1998 FES Plate Heat Exchanger	
Mfg: FES	**Model: 12WP-C6-1**
Stock No. 30.AR2.90	**Serial No. 33827.3**

1998 FES Plate Heat Exchanger. Model: 12WP-C6-1, S/N: 33827.3. Hot side MAWP: 150 psig @ 185 °F, MDMT: -20 °F @ 150 psig, hydrotest pressure: 225 psig. Cold side MAWP: 250 psig @ 185 °F, MDMT: -20 °F @ 250 psig, hydrotest pressure: 375 psig. Maximum frame capacity: 356 plate pairs. Plates: (560) 316 stainless steel. Heat transfer area: approx. 8000 sq. ft. 304 stainless steel heat shield. Inlets/outlets: (4) 12 in. Overall dimensions: 173 in. L x 80 in. W x 107 in. H.

Previous operating conditions:

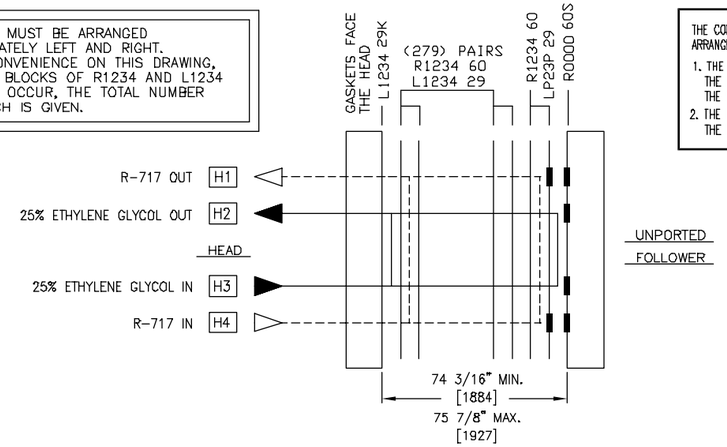
Liquid	Flow Rate	Temp (deg F)	Delta P (psig)
25% Ethylene Glycol	3,052,926 lb/hr	33 - 24.5	12.1
R-717	122,745 lb/hr	21.1	1.8

MATERIALS OF CONSTRUCTION

ITEM NO.	DESCRIPTION	MATERIAL
1	HEAD	SA516 GR70
2	FOLLOWER	SA516 GR70
3	END SUPPORT	A36
4	TOP BAR	A36
5	BOTTOM BAR	C1018
6	M36 DIA. TIE BAR	SA193 GRB7
7	TIE BAR HEX NUTS	SA194 GR2H ZINC PLATED
8	HEAT TRANSFER PLATES	SA240 GR316
9	STUDS	SA193 GRB7
10	NOZZLES	316L STAINLESS STEEL
11	FLANGES	CARBON STEEL GALVANIZED

APV
FACTORY SERVICE
FOR PARTS AND SERVICE
CALL OUR CUSTOMER
SERVICE DEPARTMENT
1-800-828-7391

PLATES MUST BE ARRANGED ALTERNATELY LEFT AND RIGHT. FOR CONVENIENCE ON THIS DRAWING, WHERE BLOCKS OF R1234 AND L1234 PLATES OCCUR, THE TOTAL NUMBER OF EACH IS GIVEN.

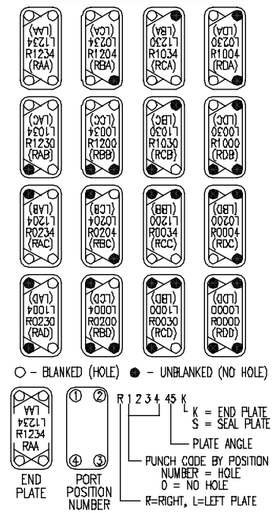


PASSES
25% ETHYLENE GLYCOL - 1 OF 281
R-717 - 1 OF 280

THE CONVENTIONS USED TO SHOW THE PLATE ARRANGEMENT HAVE CHANGED AS FOLLOWS:

1. THE HEAD (FIXED COVER) IS NOW SHOWN ON THE LEFT OF BOTH THE ARRANGEMENT AND THE SIDE VIEW OF THE FRAME.
2. THE PLATE PUNCH CODE IS SIMPLIFIED. SEE THE PLATE IDENTIFICATION KEY FOR DETAILS.

PLATE IDENTIFICATION
VIEWED FROM GASKETED SIDE OF PLATE



DESIGN SPECIFICATIONS

DESIGN CODE	ASME SECTION VIII DIV 1 1995 EDITION 1996 ADDENDA	
SECTION	HOT SIDE	COLD SIDE
MAX. ALLOWABLE WORKING PRESSURE	150 PSIG.	250 PSIG.
MINIMUM DESIGN METAL TEMPERATURE	-20 °F. @ 150 PSIG.	-20 °F. @ 250 PSIG.
HYDROTEST PRESSURE	225 PSIG.	375 PSIG.
MINIMUM OPERATING TEMPERATURE	-20°F.	
MAXIMUM OPERATING TEMPERATURE	185°F.	
SERIAL NUMBER	33827.1 THRU 33827.3	
HEAT TRANSFER AREA	8,063.7 SQ. FT.	
FRAME SIZE	NO. 6-1 (SEE NOTE 8)	
MAXIMUM FRAME CAPACITY	356 PLATE PAIRS	
DRY WEIGHT	20,735 LBS.	
FLOODED (OPERATING) WEIGHT	26,230 LBS.	
TOTAL LIQUID VOLUME	662.0 GALS.	
FINISH	APV STANDARD PAINT 3196	
ACCESSORIES	304 STAINLESS STEEL HEAT SHIELD	

OPERATING CONDITIONS

LIQUID	FLOW RATE	TEMP. °F.	ΔP(PSIG)
25% ETHYLENE GLYCOL	3,052926.5 lb/hr	33.0° → 24.5°	12.1
R-717	122,745.6 lb/hr	21.1°	1.6

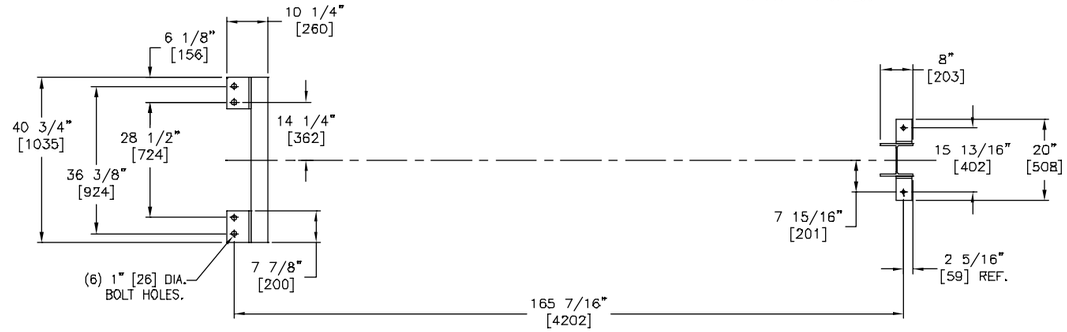
NOZZLE SCHEDULE

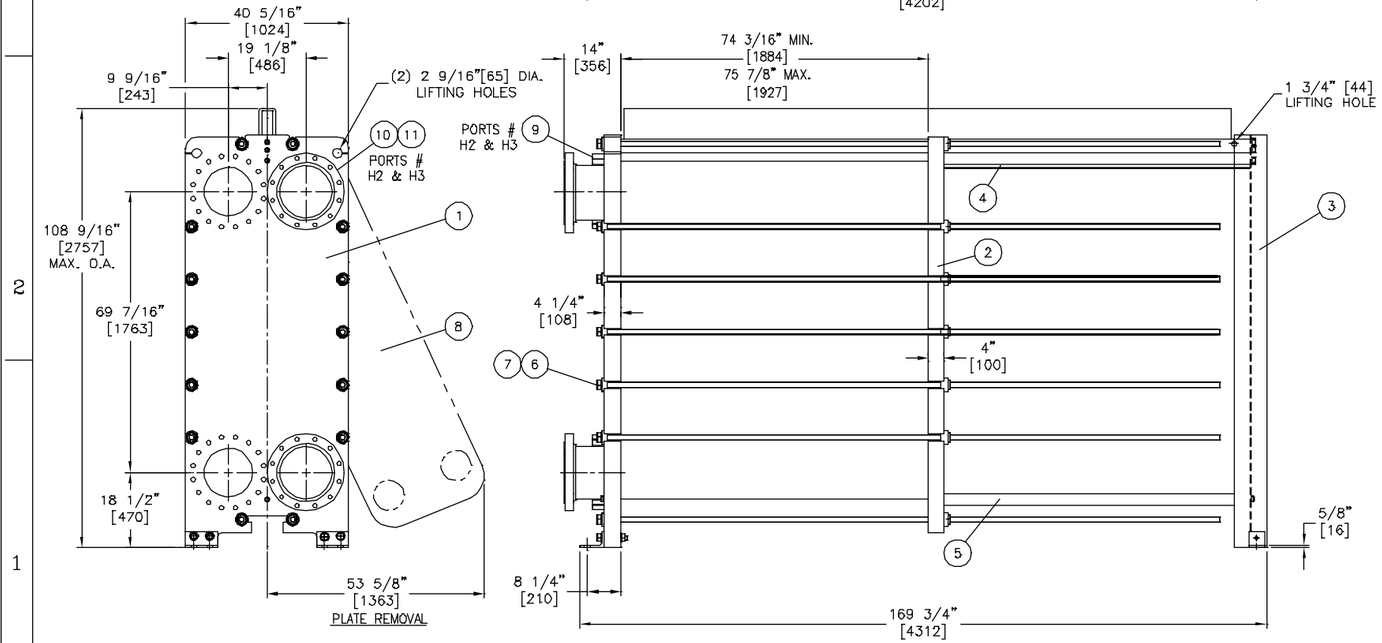
PORT	SIZE	TYPE	CLASS	SERVICE
H1	12"	FLAT FACED CARBON STEEL STUDDED BOLT PATTERN	300# ANSI B16.5	R-717 OUT
H2	12"	SCH. 10S 316L S.S. STUB END W/ C.S. LAP JT. FLG. (SEE NOTE 4)	150# ANSI B16.5	25% ETHYLENE GLYCOL OUT
H3	12"	SCH. 10S 316L S.S. STUB END W/ C.S. LAP JT. FLG. (SEE NOTE 4)	150# ANSI B16.5	25% ETHYLENE GLYCOL IN
H4	12"	FLAT FACED CARBON STEEL STUDDED BOLT PATTERN	300# ANSI B16.5	R-717 IN

PLATES AND GASKETS

(280) - 12WP-C6-60/29, 0.5mm 316 STAINLESS STEEL PLATE PAIRS,
(1) - 12SP-C6-29, 0.5mm 316 STAINLESS STEEL SINGLE END PLATE AND
(1) - 12SP-C6-60, 0.5mm 316 STAINLESS STEEL SINGLE SEAL PLATE WITH
(280) - 12WP-C6, NEOPRENE CLIP-IN FLOW GASKETS.
(1) - 12SP-C6, NEOPRENE CLIP-IN END GASKET.
(1) - 12SP-C6, NEOPRENE CLIP-IN FLOW GASKET.

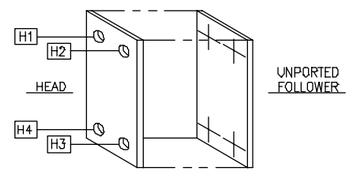
PLATES PROVIDED AS:
(279) 12WP-C6-60/29, R1234/L1234 PLATE PAIRS.
(1) 12WP-C6-60/29, R1234/LP23P PLATE PAIR.
(1) 12SP-C6-29, L1234K SINGLE END PLATE.
(1) 12SP-C6-60, R0000S SINGLE SEAL PLATE.





NOTES

1. THE INSTALLATION, OPERATION AND MAINTENANCE OF THIS HEAT EXCHANGER SHALL BE IN ACCORDANCE WITH THE APV PARAFLOW PLATE HEAT EXCHANGER INSTRUCTION MANUAL.
2. THIS MODEL HEAT EXCHANGER IS TIGHTENED USING A WRENCH ON THE TIE BAR HEX NUTS AT THE HEAD (FIXED COVER) END ONLY. CLEAN AND LUBRICATE THE THREADS BEFORE OPENING OR CLOSING USING A LUBRICANT COMPATIBLE WITH CARBON STEEL. **APV RECOMMENDS NEVER-SEEZ REGULAR GRADE. DO NOT USE COMMON GREASE.**
   THE PLATE PACK IS TO BE TIGHTENED IN ACCORDANCE WITH THE INSTRUCTION MANUAL SUPPLIED. DO NOT TIGHTEN BELOW THE MINIMUM DIMENSION SHOWN.
3. THE CUSTOMER IS RESPONSIBLE FOR PROVIDING:
   - ANCHOR BOLTS PER ASTM A36 MINIMUM WITH A RECOMMENDED DIAMETER OF 7/8".
   - PROTECTION AGAINST START UP OR OPERATING PRESSURES EXCEEDING THE MAXIMUM ALLOWABLE WORKING PRESSURE.
4. NOZZLES ARE PROVIDED WITH A SMOOTH RAISED FACE FINISH.
5. BOLT HOLES STRADDLE CENTERLINES SHOWN.
6. DIMENSIONS ARE SHOWN IN INCHES. DIMENSIONS IN BRACKETS [ ] ARE IN MILLIMETERS.
7. STANDARD TOLERANCES:
   FRAME AND FOUNDATION BOLT LOCATIONS: ±1/4 INCH [±6mm]
   NOZZLE CENTERLINE AND FACE DIMENSIONS: ±1/8 INCH [±3mm]
8. SPECIAL FRAME LENGTH 169 3/4" [4312], FRAME SIZE SIX CARRYING BARS CUT BACK 12".



END USER:
STANFORD UNIVERSITY
STANFORD, CA
(3) FLOODED EVAPORATORS

W.O. NO.: 33827

FES P.O. NO.: 059942 | FES NO.:

FES YORK, PA. U.S.A.
A SUBSIDIARY OF THERMO POWER CORP.
A THERMO ELECTRON COMPANY.
3475 BOARD ROAD
P.O.BOX 2306. YORK, PA 17405
Tel: (717) 767-6411/Fax: (717) 764-3627

Description:
MODEL 12WP-C6-1
PLATE HEAT EXCHANGER

Checked: Date:	Superseded:	Scale:	Sheet:
		N.T.S.	1 OF 1
Approved: Date: JJE 1/5/98	Drawn: Date: DJ NEFF 12/31/97	Drawing No.: 33827D0001	Rev. A

End File: 33827D01 A

REV.	BY / DATE	CK. BY / DATE	DESCRIPTION AND LOCATION
A	DJ NEFF 2/2/98		REVISED NOZZLE LOCATIONS & PLATE ARRANGEMENT.

GA B134-M20A01

AUTO CAD REL. 13