KRUEGER ENGINEERING & MFG. CO.
P.O. BOX 11308
12001 HIRCH RD.
HOUSTON, TEXAS 77293

101089

CUSTOMER REFRIGERATION ENGINEERING - AMOCO — REF NO MD
ADDRESS HOUSTON, TEXAS — PROP NO 89-176
PLANT LOC FOB SHOP — DATE 3-21-89 REV 5
SERVICE OF UNIT LUBE OIL COOLER Full Load — ITEM 68-321-1&2
SIZE 32.00X240.00 TYPE BEM HORIZONTAL CONNECTED IN 1 PARALLEL 1 SERIES
SURF/UNIT(G/E) 3479/ 3368FT2 SHELLS/UNIT 1 SURF/SHELL(G/E) 3479/ 3368FT2

PERFORMANCE OF ONE UNIT

TYPE OF PROCESS		SENSIBLE	FORCED EVAPOR
FLUID ALLOCATION		SHELL SIDE	TUBE SIDE
FLUID NAME		LUBE OIL	AMMUNIA
FLOW	LB/HR	177511.	54785.
LIQUID	LB/HR	177511.	54785.
VAPOR	LB/HR	0.	0.
NON-COND	LB/HR	0.	0.
STEAM	LB/HR	0.	0.
EVAP/COND	LB/HR	0.	18079.
DENSITY	LB/FT3	61.9700	1.020 / 35.500
CONDUTIV BTU/(HR*FT2*OF)/FT		.0960	.012 / .247
SPECIFIC HEAT	BTU/LB*OF	.5000	.656 / 1.205
VISCOSITY AT AVERAGE TEMP CP		27.4016	.011 / .100
ENTHALPY	BTU/LB	.00	452.00
TEMPERATURE(IN/OUT)	OF	228.000 / 135.000	126.000 / 126.000
OPERATION PRESSURE	PSIG	500.00	326.00
FOULING FACTOR HR*FT2*OF/BTU		.00200	.00100
VELOCITY	FT/SEC	1.13	4.60
PRES DROP ALLOW/CALC	PSIG	16.00 / 12.30	5.00 / 1.01

HEAT EXCHANGED 81784/8. BTU/HR LMTD 38.31 OF
SERVICE COEFF BTU/HR*FT2*OF 63.37 DIRTY 63.30

CONSTRUCTION DATA/SHELL

		SHELL SIDE	TUBE SIDE
DESIGN/TEST PRESS	PSIG	600/CODE	400/CODE
DESIGN TEMPERATURE	OF	-6 & 300.	-6 & 300.
NO. PASSES PER SHELL		1	4
CORROSION ALLOWANCE	IN	.1250	.1250
CONNECTIONS SIZE & RATING	IN	6 300#	4 300#
	OUT	6 300#	10 300#
	INTERMEDIATE		

SKETCH

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TUBES: 886 DIA .750 IN THK(MIN).065 IN LENGTH 20.00
TUBE TYPE BARE MATERIAL A214
SHELL 516-70 ID 32.00 OD IN SHELL COVER
CHANNEL OR BONNET 516-70 CHANNEL COVER C.S.
TUBESHEET STATIONARY 516-70 TUBESHEET FLOATING
FLOATING HEAD COVER IMPINGEMENT PROTECTION NO
BAFFLES CROSS C.S. HORIZ. SEG. 25% (D) SPACING C/C 6.4"
BAFFLES LONG SEAL TYPE YES INLET 12"
SUPPORTS TUBE C.S. U-BEND TYPE
BYPASS SEAL ARRANGEMENT TUBE-TUBESHEET JOINT EXPANDED
EXPANSION JOINT NO TYPE
RHO-V2-INLET NOZZLE 1018. BUNDLE ENTRANCE 791. BUNDLE EXIT 791.
GASKETS SHELL SIDE -- TUBE SIDE ST'L. JACKETED
FLOATING HEAD
CODE REQUIREMENTS ASME-TEMA TEMA CLASS R
WEIGHT/SHELL - 23,400 # FILLED WITH WATER - 30,600 # BUNDLE --- LB

REMARKS Full Load
cu. 3 4-3-89 Corrections

G8-321-1,2

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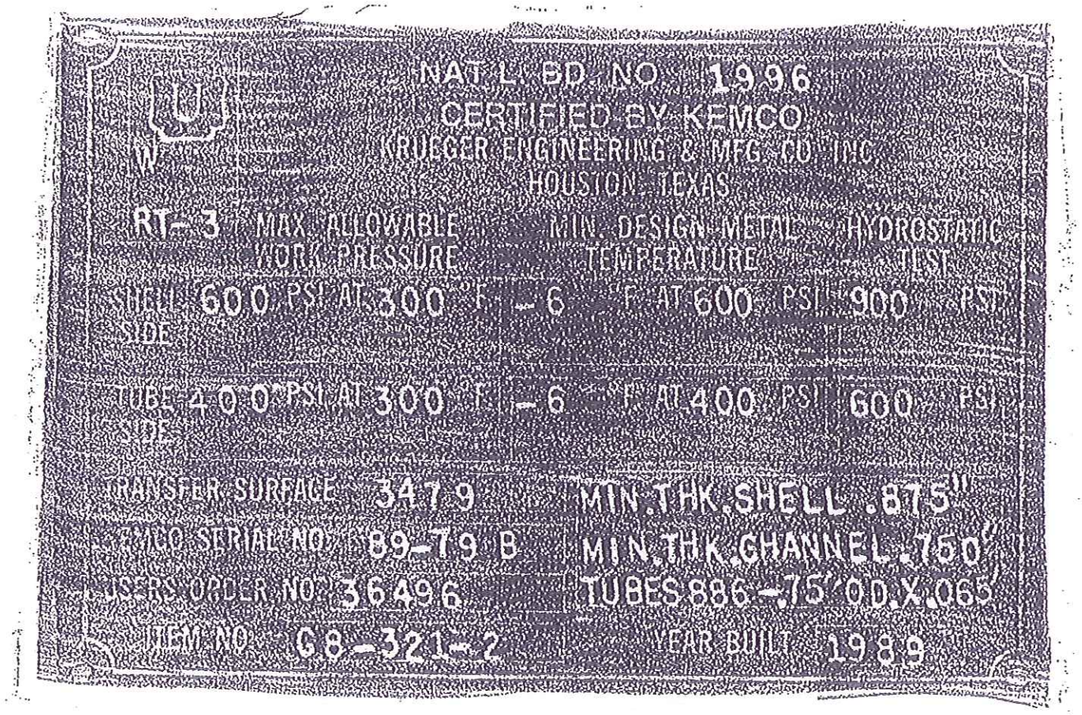

Refrigeration Engr.
O.K
10-25-89

KRUEGER ENGINEERING & MFG. CO.
HOUSTON, TEX.

CUSTOMER REFRIGERATION ENGINE
P.O. NUMBER 36496
ITEM NUMBER 68-321-1 & 68-321-2
CUSTOMER REFERENCE AMOCO G-8-C
ALL QUANTITIES (UNITS) ARE IN ENGLISH

DESIGN FILE # CD89079
REVISION NO.(2)
FILE DATE 4-12-89
SIZE & TYPE 32X240 BEM
JOB NUMBER 89-79

DESIGN CONDITIONS

	SHELL SIDE	TUBE SIDE
MINIMUM DESIGN PRESSURE (PSI)	600	400
MAXIMUM TEMPERATURE (F)	300	300
MINIMUM TEMPERATURE (F)	-6	-6
TUBESHEET TEMPERATURE (F)	300	300
DIFFERENTIAL PRESSURE (PSI)	0	0
MAX. ALLOW. WORKING PRESSURE (PSI)	600	400
EXTERNAL PRESSURE (PSI)	0	0
CORROSION ALLOWANCE (IN)	.125	.125
MAX. PRESSURE NEW & COLD (PSI)	600	400
TEST PRESSURE (HYDROSTATIC) (PSI)	900	600
RADIOGRAPH REQUIRED	SPOT	SPOT
STRESS RELIEF REQUIRED	NO	NO
IMPACT TEST REQUIRED	NO UG-20(f)	NO UG-20(f)

DESCRIPTION OF EQUIPMENT

SERVICE LUBE OIL COOLER INSTALLED HORIZONTAL
NO.UNITS REQ'D. TWO
NO.SHELLS/UNIT ONE
CONNECTED IN ---
SHELL TUBE SIDE PASSES ONE/FOUR
SURFACE/SHELL (SQ.FT.) 3479

CONSTRUCTION REQUIREMENTS

ASME CODE SECTION 8 W/STAMP YES NAT'L.BD. YES
TEMA CLASS R API-660 YES H.E.I. NO
NAMEPLATE PROJECTION 3
WEIGHTS (LBS) PER SHELL
EMPTY WT. 23400
FLOODED WT. 30600
BUNDLE WT. ---

DESIGN NOTES

SPOT RADIOGRAPH REQUIRED SHELL SIDE (UW-52)
SPOT RADIOGRAPH REQUIRED TUBE SIDE (UW-52)
NOZZLE FLANGES-SHELL SIDE 300 # ANSI RATING MAWP= 655 PSI AT 300 F.
NOZZLE FLANGES-TUBE SIDE 300 # ANSI RATING MAWP= 655 PSI AT 300 F.

GENERAL NOTES

1 ALL BOLT HOLES TO BE EQUALLY SPACED & STRADDLE VESSEL CENTERLINE UNLESS NOTED
2 T-MATCH MARK FOR FABRICATION & ASSEMBLY REFERENCE. STENCIL PARTS AS REQUIRED
3 FOR WELDING PROCEDURE USAGE SEE WELD MAP DWG. NO.89-79 WMT
4 LUBRICATE ALL BOLTING W/METALLIC BASE WATERPROOF THREAD LUBRICANT. (APPLY FULL LTH. OF STUDS)

6 PROVIDE NAMEPLATE & BRACKET IN ACCORDANCE WITH KEMCO STANDARD
7 ALL EXTERIOR SURFACES OF EXCHANGER TO BE PREPARED AND PAINTED IN ACCORDANCE WITH CUSTOMER SPECIFICATIONS.
EXTERNAL SURFACE PREPARATION: SANDBLAST SP-6 (COMMERCIAL).
EXTERNAL SURFACE PAINT:

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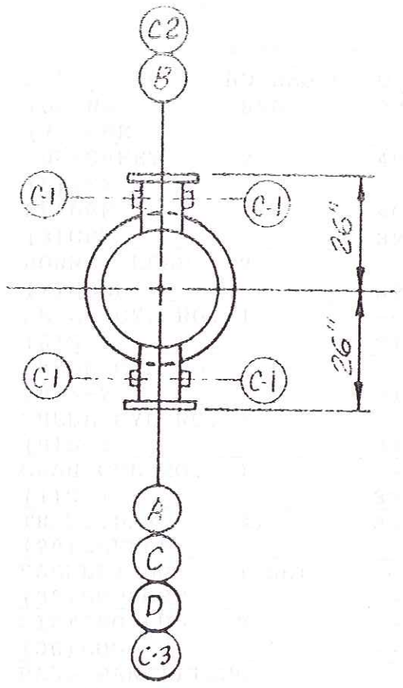

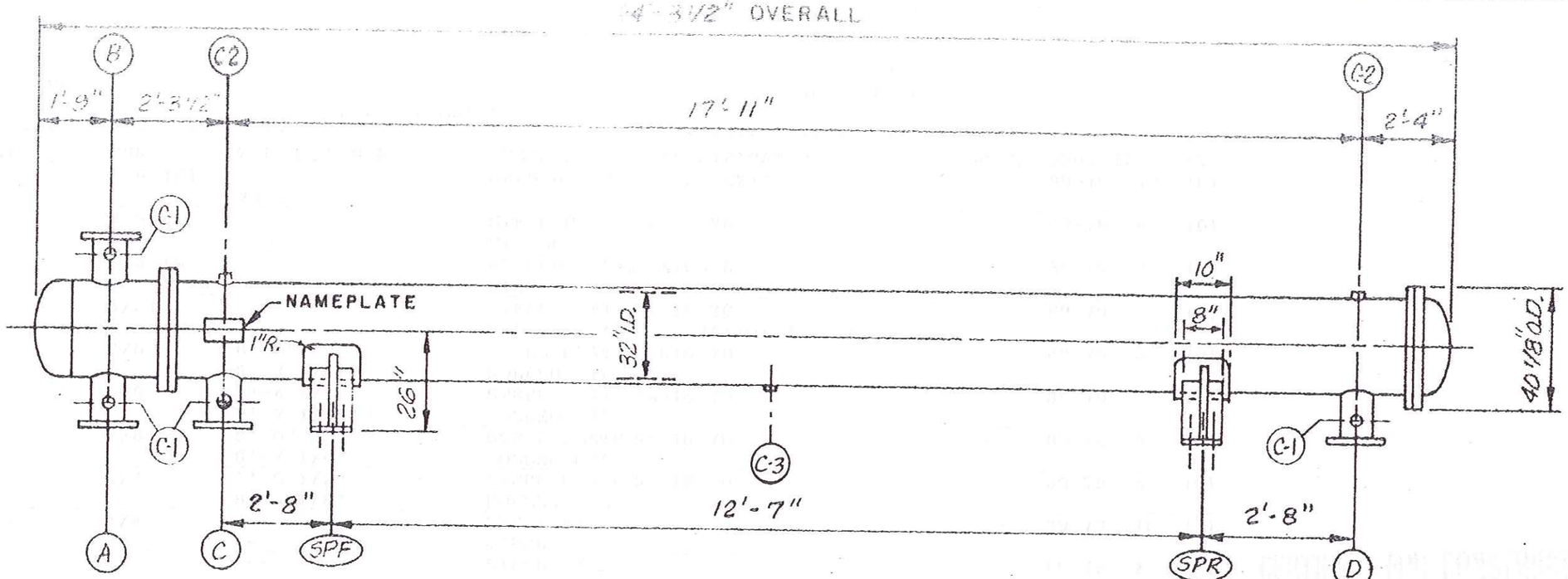

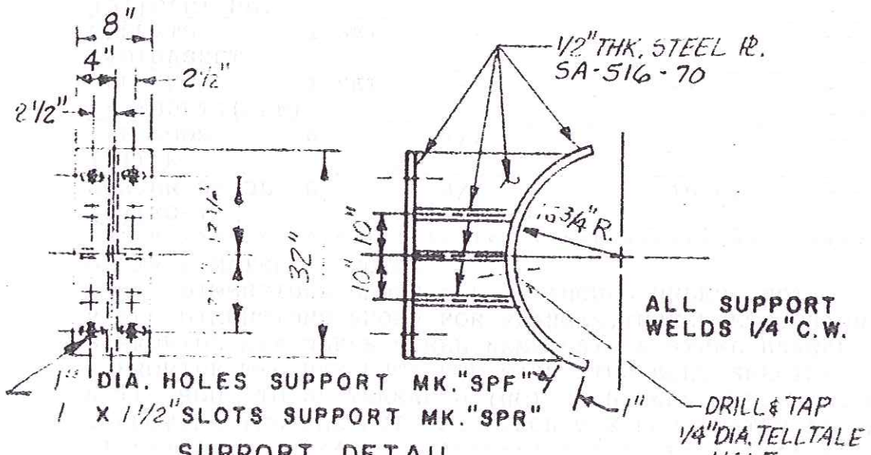

SUPPORT DETAIL

(1)-REQ'D. MK."SPF"

(1)-REQ'D. MK."SPR"

MARK	NO. REQ'D.	SIZE	SERIES	TYPE	SERVICE
C-3	ONE	1"	6000#	CPLG.	
C-2	TWO	3/4"	6000#	CPLG.	
C-1	EIGHT	3/4'	6000#	CPLG.	
D	ONE	6"	300#	RF-WN	SHELL IN
C	ONE	6"	300#	RF-WN	SHELL OUT
B	ONE	10"	300#	RF-WN	TUBE OUT
A	ONE	4"	300#	RF-WN	TUBE IN

SCHEDULE OF OPENINGS

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GENERAL NOTES

ALL BOLT HOLES TO BE EQUALLY SPACED AND STRADDLE VESSEL CENTERLINES.
ALL MACHINED SURFACES TO BE PROTECTED DURING SHIPMENT AND ALL THREADED CONNECTIONS PROPERLY PLUGGED.
VESSEL TO BE DRAINED AND CLEANED BEFORE SHIPMENT.

WT. EMPTY - 23,400#
WT. FLOODED - 30,600#

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REVISIONS
1 6-2-89 IN ACCORD. W/CUST. APPR'L.
2 6-21-89 CHG. LOCATION SUPPORTS.
3 8-30-89 ADD CPLG. MK."C-3".

KRUEGER ENGINEERING & MFG. CO.
HOUSTON, TEXAS

LUBE OIL COOLER
32 X 240 BEM ITEM NO. G8-321-1 & G8-321-2
TWO REQ'D.

CUSTOMER REFRIGERATION ENGINEERING
F.O.NO. 36496
DRAWN J.M.G. CHKD. E. DATE 4-14-89
REV. NO. 3

...ER REFRIGERATION ENGINEERING
...B NUMBER 36496
...BM NUMBER 38-321-1 & GE-321-2
... UNITS ARE IN ENGLISH
NUMBER REQUIRED TWO(2)

BM NUMBER BMB9C79
REVISION NO. (1)
DATE 5-3-89
SIZE & TYPE 32 X 240 BEM
JOB NUMBER 89-79

**********SCHEDULE OF OPENINGS BILL OF MATERIAL**********

NO. REQ'D	MARK	PART	DESCRIPTION	NOTE	WELD TYPE	WELD SIZE	MAT'L TYPE	MATERIAL SPECIFICATION	REV NO
1	A	FLANGE	4-300# ANSI-RF-WN-FLG SCH 120 BORE	---	FW-1	CBW	STEEL	SA105	(0)
1	A	NECK	4 SCH 120(.438 WALL) SML'S PIPE	---	NW-3	1/2	STEEL	SA106-B	(0)
1	A	REIN PAD	3/4 THK X 2 1/2 WIDE	---	NW-3	5/8	STEEL	SA516-70	(0)
1	B	FLANGE	10-300# ANSI-RF-WN-FLG X-STRG BORE	---	FW-1	CBW	STEEL	SA105	(0)
1	B	NECK	10 X-STRG(.500 WALL) SML'S PIPE	---	NW-3	1/2	STEEL	SA106-B	(0)
1	B	REIN PAD	3/4 THK X 3 1/2 WIDE	---	NW-3	5/8	STEEL	SA516-70	(0)
1	C	FLANGE	6-300# ANSI-RF-WN-FLG X-STRG BORE	---	FW-1	CBW	STEEL	SA105	(0)
1	C	NECK	6 X-STRG(.432 WALL) SML'S PIPE	---	NW-3	1/2	STEEL	SA106-B	(0)
1	C	REIN PAD	7/8 THK X 3 WIDE	---	NW-3	3/4	STEEL	SA516-70	(0)
1	D	FLANGE	6-300# ANSI-RF-WN-FLG X-STRG BORE	---	FW-1	CBW	STEEL	SA105	(0)
1	D	NECK	6 X-STRG(.432 WALL) SML'S PIPE	---	NW-3	1/2	STEEL	SA106-B	(0)
1	D	REIN PAD	7/8 THK X 3 WIDE	---	NW-3	3/4	STEEL	SA516-70	(0)
1	C-1	COUPLING	3/4-6000# SCREWED WELDIN CPLG. W/PLUG (SHELL)	---	CW-2	1/2	STEEL	SA105	(0)
2	C-2	COUPLING	3/4-6000# SCREWED WELDIN CPLG. W/PLUG (SHELL)	---	CW-2	1/2	STEEL	SA105	(0)
4	C-1	COUPLING	3/4-6000# SCREWED WELDIN CPLG. W/PLUG (TUBE)	---	CW-2	1/2	STEEL	SA105	(0)
1	C-3	COUPLING	1-6000# SCREWED WELDIN CPLG. W/PLUG (SHELL)	---	CW-2	1/2	STEEL	SA105	(1)

SPECIAL NOTE

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