Coolers & DCF #152 As required by the provisions of the ASME Code rules, Section VIII, Division 1 10105

1. Manufactured and certified by KRUEGER ENGINEERING & MFG. COMPANY, INC. 12091 HIRSCH ROAD HOUSTON, TEXAS 77086
(name and address of manufacturer)

2. Manufactured for REFRIGERATION ENGINEERING HOUSTON, TEXAS
(name and address of purchaser)

3. Location of installation REFRIGERATION ENGINEERING SAN ANTONIO, TEXAS
(name and address)

4. Type: HORIZ HT-EX (horiz. or vert., tank) | 89-128 B (mfr's. serial no.) | - (CRN) | 89-128 (drawing no.) | 2029 (nat'l. bd. no.) | 1989 (year built)

5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction and workmanship conform to ASME Code, Section VIII, Division 1: 1989 (year)

-- (addenda (Date)) | ---------- (Code Case no.) | ---------- (special service per UG-120(d))

Items 6-11 inclusive to be completed for single wall vessels, jackets of jacketed vessels, or shells of heat exchangers.

6. Shell: SA-516-70 (mat'l. (spec. no., grade)) | .875" (nom. thickness (in.)) | .125" (corr. allow. (in.)) | 2'-8" (dia. ID (ft. & in.)) | 27'-4 1/2" (length (overall) (ft. & in.))

7. Seams: DBL. (long. (dbl., sngl.)) | SPOT (RT (spot or full)) | 85 (eff. (%)) | N/A (HT temp. (°F)) | - (time) | DBL. (girth (dbl., sngl.)) | SPOT (RT(spot, partial, or full)) | 4 (no. of courses)

8. Heads: (a) SEE LINE 12 (mat'l. (spec. no., grade)) (b) SEE LINE 12 (mat'l. (spec. no., grade))

	Location (top, bottom, ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (convex or concave)
(a)										
(b)										

If removable, bolts used (describe other fastenings): ---------- (mat'l., spec. no., gr., size, no.)

9. Type of jacket: ---------- Proof test: ----------

10. Jacket closure: ---------- (describe as ogee & weld, bar, etc.) If bar, give dimensions: ---------- If bolted, describe or sketch.

11. MAWP: 600 (psi) at max. temp. 300 (°F). Min design metal temp.: -6 (°F) at 600 (psi). Hydro., pneu. or comb. test pressure XXXXXXXXXX 900 (psi).

Items 12 and 13 to be completed for tube sections.

12. TWO Tubesheets: SA-516-70 (stationary mat'l. (spec. no., gr.)) | 32.000" (dia. (in.) (subject to pressure)) | 3.625" (nom. thickness (in.)) | .250" (corr. allow. (in.)) | WELDED & BOLTED (attachment (welded, bolted))

---------- (floating mat'l. (spec. no., gr.)) | ---------- (dia. (in.)) | ---------- (nom. thickness (in.)) | ---------- (corr. allow. (in.)) | ---------- (attachment)

13. Tubes: SA-214 (mat'l. (spec. no., gr.)) | .750" (OD (in.)) | .065" (nom. thickness (in. or gauge)) | 886 (no.) | STRAIGHT (type (straight or U))

Items 14-17 inclusive to be completed for inner chambers of jacketed vessels or channels of heat exchangers.

14. Shell: SA-516-70 (mat'l. (spec. no., gr.)) | .750" (nom. thickness (in.)) | .125" (corr. allow. (in.)) | 2'-8" (dia. ID (ft. & in.)) | 1'-8 1/2" (length (overall) (ft. & in.))

15. Seams: DBL. (long (dbl., sngl.)) | SPOT (RT (spot or full)) | 85 (eff. (%)) | N/A (HT temp. (°F)) | - (time) | DBL. (girth (dbl., sngl.)) | SPOT (RT (spot, partial, or full)) | 1 (no. of courses)

16. Heads: (a) SA-516-70 (mat'l. (spec. no., grade)) (b) SA-516-70 (mat'l. (spec. no., grade))

	Location (top, bottom, ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (convex or concave)
(a)	END	.805"	.125"	-	-	2:1	-	-	-	CONCAVE
(b)	END	.805"	.125"	-	-	2:1	-	-	-	CONCAVE

18. Openings, inspection and safety valve openings: PAPA: UG-125 NOTE 39 SERIAL NO. 89-129 & 10105

Purpose (flange, outlet, drain, etc.)	Number	Diameter or Size	Type	Material	Thickness	Reinforcement Material	How Attached	Location
TUBE IN	ONE	4"-300#	RF-WN	SA-106-B	.438"	SA-516-70	WELDED	CHAN
TUBE OUT	ONE	10"-300#	RF-WN	SA-106-B	.500"	SA-516-70	WELDED	CHA
SHELL IN	ONE	8"-300#	RF-WN	SA-106-B	.500"	SA-516-70	WELDED	SHE
SHELL OUT	ONE	8"-300#	RF-WN	SA-106-B	.500"	SA-516-70	WELDED	SHELL
	EIGHT	3/4"	CPLG.	SA-105	6000#	-	WELDED	CHAN/SHELL
	TWO	3/4"	CPLG.	SA-105	6000#	-	WELDED	SHELL
	TWO	1"	CPLG.	SA-105	6000#	-	WELDED	SHELL

19. Supports: Skirt NO (yes or no) Lugs -- (no.) Legs -- (no.) Other SADDLES (describe) Attached WELD TO SHELL (where and how)

20. Remarks: Manufacturers' Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report: _____ (name of part, item number, mfr's. name and identifying stamp)

VAPORIZER 32 X 336 BEM ITEM NO.

MIN. TEMP. UG-20 (f)

CERTIFICATE OF SHOP COMPLIANCE

We certify that the statements made in this report are correct and that all details of design, material, construction and workmanship of this vessel conform to the ASME Code for Pressure Vessels, Section VIII, Division 1.

"U" Certificate of Authorization no. 20962 expires JAN. 10, 19 92.

Date 1-26-90 Name KRUEGER ENGINEERING & MFG. COMPANY, INC. (manufacturer) Signed _____ (representative)

CERTIFICATE OF SHOP INSPECTION

Vessel constructed by KRUEGER ENGINEERING & MFG. COMPANY, INC. at HOUSTON, TEXAS.

I, the undersigned, holding a valid commission issued by The National Board of Boiler and Pressure Vessel Inspectors and the state or province of TEXAS and employed by H.S.B.I. & I. CO. of CONN. have inspected the pressure vessel described in this Manufacturers' Data Report on 1-31, 19 90, and state that, to the best of my knowledge and belief, the manufacturer has constructed this pressure vessel in accordance with ASME Code, Section VIII, Division 1.

By signing this certificate neither the inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in the Manufacturers' Data Report. Furthermore, neither the inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 1-31-90 Signed _____ (Authorized Inspector) Commissions NB4579 NST (Nat'l. Bd. (incl. endorsements) state, prov. and no.)

CERTIFICATE OF FIELD ASSEMBLY COMPLIANCE

We certify that the field assembly construction of all parts of this vessel conforms with the requirements of Section VIII, Division 1 of the ASME BOILER AND PRESSURE VESSEL CODE.

"U" Certificate of Authorization no. _____ expires _____, 19_____.

Date _____ Name _____ (assembler that certified and constructed field assembly) Signed _____ (representative)

CERTIFICATE OF FIELD ASSEMBLY INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and the state or province of _____ and employed by _____ of _____ have compared the statements in this Manufacturers' Data Report with the described pressure vessel and state that parts referred to as data items _____ not included in my certificate of shop inspection have been inspected by me and that to the best of my knowledge and belief the construction of these parts conforms with the applicable rules of the ASME Boiler and Pressure Vessel Code.

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

101105

CUSTOMER SW REFRIGERATION - AMOCO — REF NO 19029
ADDRESS HOUSTON, TEXAS — PROP NO 89- 496
PLANT LOC — DATE 6-02-89 REV 00
SERVICE OF UNIT VAPORIZER — ITEM E- 4
SIZE 32.00X336.00 TYPE BEM HORIZONTAL CONNECTED IN 1 PARALLEL 1 SERIES
SURF/UNIT(G/E) 4871/ 4760FT2 SHELLS/UNIT 1 SURF/SHELL(G/E) 4871/ 4760FT2

PERFORMANCE OF ONE UNIT

		SENSIBLE	FORCED EVAPOR
TYPE OF PROCESS			
FLUID ALLOCATION		SHELL SIDE	TUBE SIDE
FLUID NAME		LUBE OIL	AMMONIA
FLOW	LB/HR	258135.	79669.
LIQUID	LB/HR	258135.	79669.
VAPOR	LB/HR	0.	0.
NON-COND	LB/HR	0.	0.
STEAM	LB/HR	0.	0.
EVAP/COND	LB/HR	0.	26556.
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	1.35	6.76
PRES DROP ALLOW/CALC	PSIG	16.00 / 16.24	10.00 / 2.49

HEAT EXCHANGED 11892100. BTU/HR LMTD 38.31 OF
SERVICE COEFF BTU/HR*FT2*OF 65.21 DIRTY 68.55

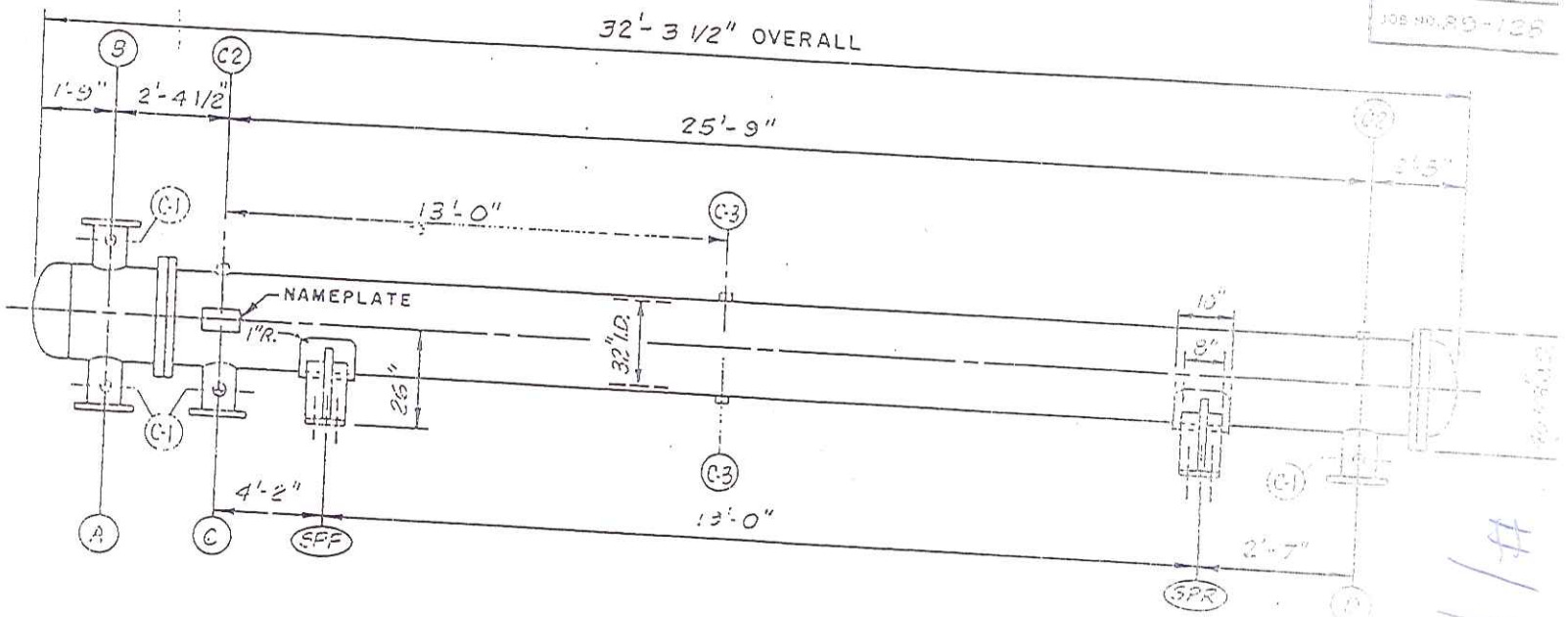
CONSTRUCTION DATA/SHELL

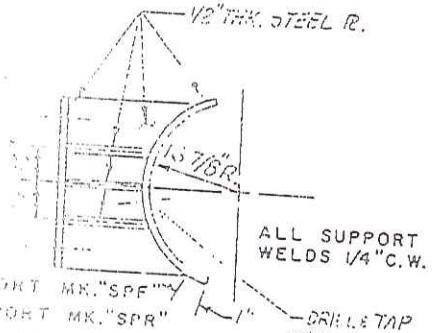
		SHELL SIDE	TUBE SIDE
DESIGN/TEST PRESS	PSIG	600/CODE	400/CODE
DESIGN TEMPERATURE	OF	300.	300.
NO. PASSES PER SHELL		1	4
CORROSION ALLOWANCE	IN	.1250	.1250
CONNECTIONS SIZE & RATING	IN	8 300#	4 300#
	OUT	8 300#	10 300#
	INTERMEDIATE		

SKETCH

TUBES: 886 DIA .750 IN THK(MIN).060 IN LENGTH 28.00 FT PIT .9375 IN TR160
TUBE TYPE BARE — MATERIAL A214
SHELL A106B ID 32.00 OD IN — SHELL COVER
CHANNEL OR BONNET A106B — CHANNEL COVER C.S.
TUBESHEET STATIONARY 516-70 — TUBESHEET FLOATING
FLOATING HEAD COVER — IMPINGEMENT PROTECTION NO
BAFFLES CROSS C.S. TYPE SEG H % CUT(D) 25.0 SPACING C/C 9.0 IN
BAFFLES LONG — SEAL TYPE — INLET 16.0 IN
SUPPORTS TUBE C.S. — U-BEND — TYPE
BYPASS SEAL ARRANGEMENT — TUBE-TUBESHEET JOINT EXPANDED
EXPANSION JOINT NO — TYPE
RHO-V2-INLET NOZZLE 681. BUNDLE ENTRANCE 839. BUNDLE EXIT 839
GASKETS SHELL SIDE — TUBE SIDE
FLOATING HEAD
CODE REQUIREMENTS ASME-TEMA — TEMA CLASS R
WEIGHT/SHELL FILLED WITH WATER — BUNDLE LB
REMARKS

#101105





MARK	NO. REQ'D.	SIZE	SERIES	TYPE	SERVICE
C-3	TWO	1"	6000#	CPLG.	
C-2	TWO	3/4"	6000#	CPLG.	
C-1	EIGHT	3/4"	6000#	CPLG.	
D	ONE	8"	300#	RF-WN	SHELL OUT
C	ONE	8"	300#	RF-WN	SHELL IN
B	ONE	10"	300#	RF-WN	TUBE OUT
A	ONE	4"	300#	RF-WN	TUBE IN

SCHEDULE OF OPENINGS

GENERAL NOTES

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

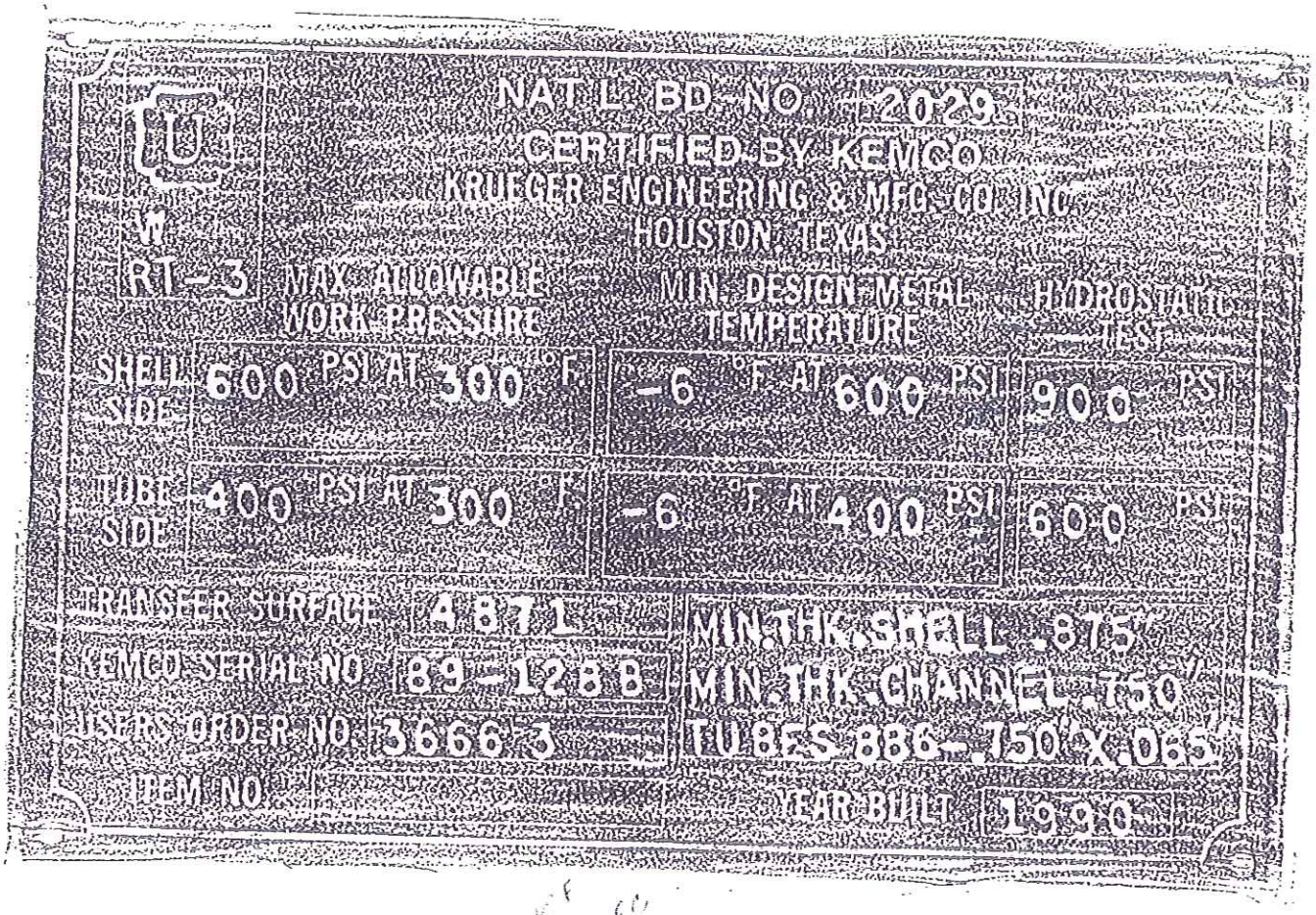
WT. EMPTY - 28,200 #
WT. FLOODED - 37,300 #

KRUEGER ENGINEERING & MFG. CO.
HOUSTON, TEXAS

VAPORIZER
32 X 336 BEM ITEM NO.
TWO-REQ'D.

JOB NO. 89-125

Lube Oil Cooler



B & F

#1+2 FC Lube Oil Coolers @ BCF