

FORM U-3 MANUFACTURER'S CERTIFICATE OF COMPLIANCE COVERING PRESSURE VESSELS
TO BE STAMPED WITH THE UM SYMBOL. SEE U-1(j)
As Required by the Provisions of the ASME Code Rules, Section VIII, Division 1

1. Manufactured and certified by ALFA LAVAL THERMAL INC., 300 CHESTNUT STREET, LYKENS, PENNSYLVANIA 17048
(Name and address of manufacturer)

2. Manufactured for Celanese Ltd., P. O. Box 937, Pampa, TX 79065
(Name and address of purchaser)

3. Location of installation Celanese Ltd., Hwy. 60 West, Pampa, TX 79065
(Name and address)

4. Type Horizontal Spiral Heat Exchanger .504 CuFt 23484
(Horiz., vert. or sphere) (Tank, separator, etc.) (Capacity) (Mfg's serial No.)
1H-23484, Rev.1 1998
(CRN) (Drawing no.) (Year built)

5. ASME Code, Section VIII, Div. 1 Edition 1995, Addenda 1997
Edition and Addenda (Date) Code Case No.

6. Shell: (a) No. of course(s): 1 (b) Overall length (ft & in.): 0' 6"

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time
1	16-1/2"	0' 6"	SA-240 Ty 316		.187"	.119"	*	None		*	None			

7. Heads: (a) SA-516 Gr 70 None (b) SA-516 Gr 70 None
(Mat'l Spec No., Grade or Type) H.T. - Time & Temp.

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A	
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None
(a)	H-End	.84"	-						18"				
(b)	C-End	.84"	-						18"				

If removable, bolts used (describe other fastening) SA-193,B7 (14) 3/4"D.ea.hd.
(Mat'l Spec. No., Grade, Size, No.)

8. Type of Jacket Jacket Closure
(Describe as ogee & weld, bar, etc.)

9. MAWP 150 + FV psi at max. temp. 400 ° F Min. design metal temp. 20 ° F at 150 + FV psi.
Internal External Internal External

10. Impact test No, exempt per UCS-66(a) & UHA-51(d)(1) & (e)(2)(a)
(Indicate yes or no and the component(s) impact tested)

11. Hydro., pneu., or comb. test press. 234 psi Proof test

12. Nozzles, inspection, and safety valve openings:

Purpose (Inlet Outlet, Drain)	No.	Diameter or Size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
Inlet	1	1" 150#	LJ	SA-312 TP316L	SA-105	Sch.80	-	None	Welded	Loose	
Outlet	1	1" 150#	LJ	SA-312 TP316L	SA-105	Sch.80	-	None	Welded	Loose	
Inlet	1	1" 150#	LJ	SA-312 TP316L	SA-105	Sch.80	-	None	Welded	Loose	
Outlet	1	1" 150#	LJ	SA-312 TP316L	SA-105	Sch.80	-	None	Welded	Loose	
Drain	2	1"	NPT	SA-312 TP316L	-	Sch.80	-	None	Welded	-	

13. Supports: Skirt (Yes or no) Lugs (No.) Legs (No.) Other (No.) Gussets (Describe) Attached (Where and how) Welded to Shell

14. Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report:
 (List the name of part, item number, mfg's. name and identifying number)

15. Remarks: Hydro-tested per UG 99(b).
*No seams in outer spiral shell. Hoop load transferred by braces. Weld efficiency of 55%.
Heads are faced with SA-240,316L SS.

CERTIFICATE OF SHOP COMPLIANCE

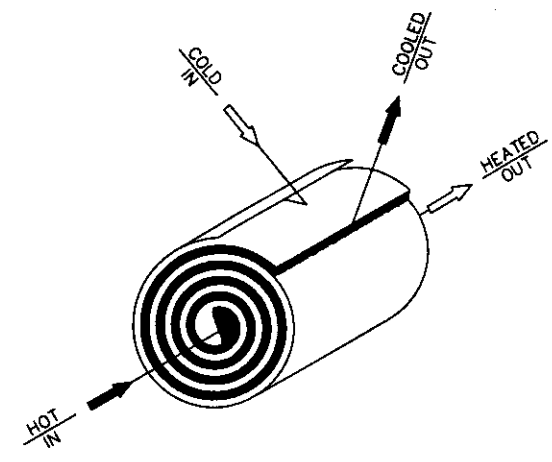
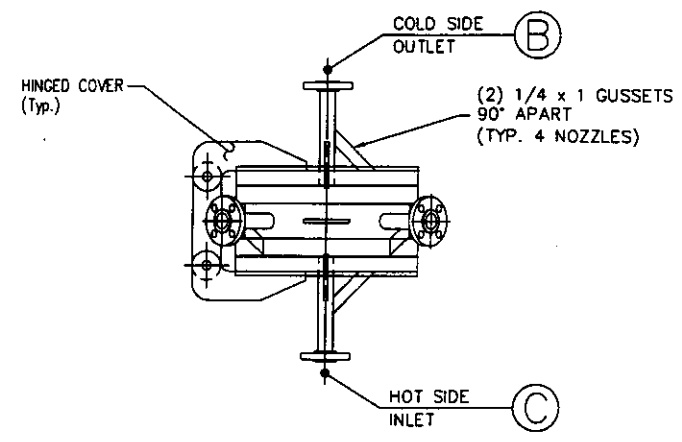
We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME Code for Pressure Vessels, Section VIII, Division 1.

UM Certificate of Authorization No. 23,027 Expires March 30 99

Date 10-30-98 Name ALFA LAVAL THERMAL INC. Signed [Signature]
(Manufacturer) (Representative)

20502

WT-28974

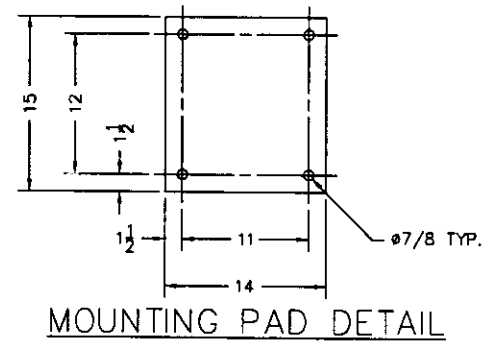
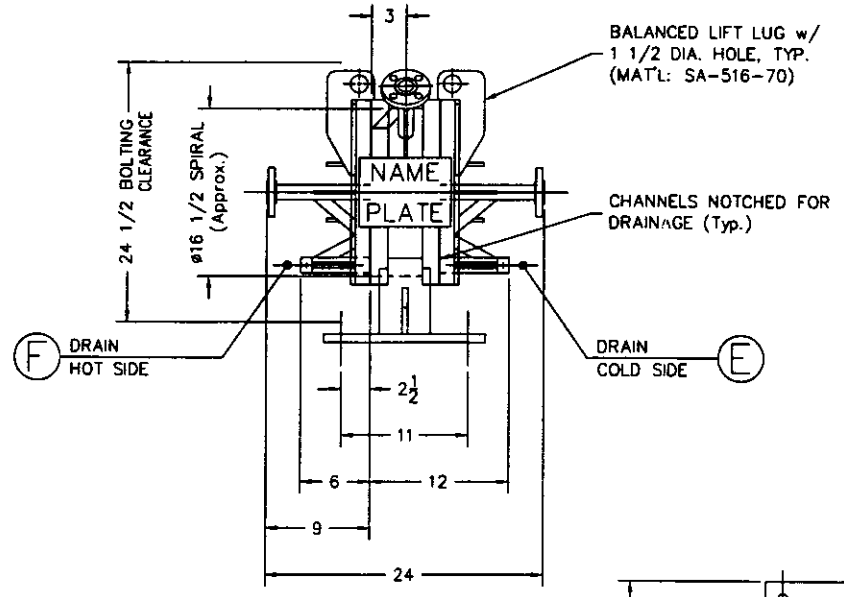
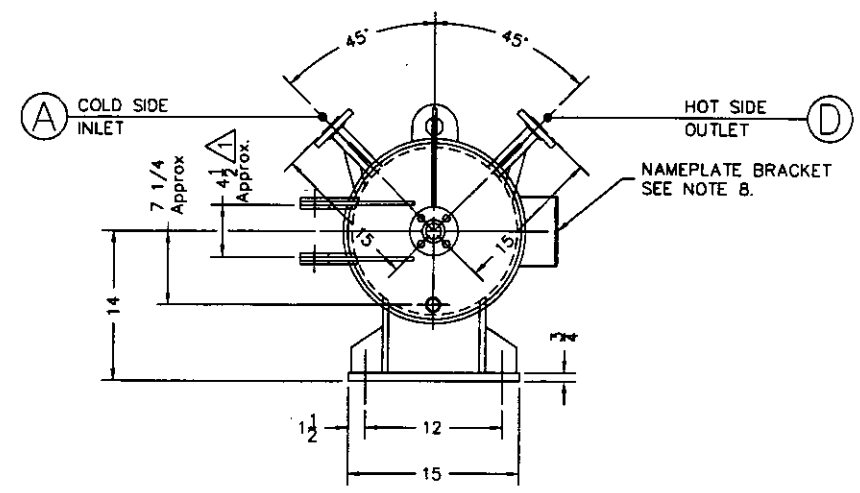


FLOW PATTERN

UM W	Certified by:			
Alfa Laval Thermal Inc. 800 Chestnut Street Lykens, PA 17048				
MAX. ALLOW. WORKING PRESS.	150 + FV P.S.I.	AT	400 °F	
MIN. DESIGN METAL TEMP.	20 °F	AT	150 + FV P.S.I.	
MFG. NO.	23484	YEAR	1998	
		SURFACE	15 S.F.	
SPIRAL HEAT EXCHANGER		TYPE	1-H	
HEAD MATERIAL	SA-516-70	THK.	.84	
SHELL MATERIAL	SA-240-316	THK.	.187	

ITEM NO. HE-1474
APPROX. 565 LBS. EMPTY
P.O. NO. 2325266
HYDROSTATIC TEST PRESSURE 234 PSIG

NAMEPLATE DETAIL



MOUNTING PAD DETAIL

WEIGHTS (APPROX)			
EMPTY	=	565	lbs
COVER	=	96	lbs
FLOODED	=	595	lbs
PRESSURES			
INNER CHANNEL (HOT SIDE)		OUTER CHANNEL (COLD SIDE)	
MAX. ALLOWABLE = 150 psig + FV WORKING PRESS. (LIMITED BY SHELL)		MAX. ALLOWABLE = 150 psig + FV WORKING PRESS. (LIMITED BY SHELL)	
HYDROSTATIC TEST = 234 psig (HOT & CORRODED COND.)		HYDROSTATIC TEST = 234 psig (HOT & CORRODED COND.)	
DESIGN TEMP			
INNER CHANNEL (HOT SIDE)		OUTER CHANNEL (COLD SIDE)	
MIN	=	20	°F
MAX	=	400	°F
MIN		=	20
MAX		=	400
CHANNELS (ALTERNATE CHANNELS WELDED)			
INNER CHANNEL (HOT SIDE)		OUTER CHANNEL (COLD SIDE)	
SPACING	=	1/4	in
SPACING	=	1/4	in
SPIRAL			
OUTER THICKNESS		MATERIAL	
.187 THICK x 6 WIDE (NOMINAL)		SA-240-316	

- NOTES:
- DESIGNED, CONSTRUCTED, AND "UM" STAMPED IN ACCORDANCE WITH A.S.M.E. CODE SEC VII-DIV. 1, 1995 EDITION, ADDENDA 1997.
 - ALL DIMENSIONS ARE IN INCHES, UNLESS OTHERWISE NOTED.
 - HEADS ARE SA-516-70(N), .84" MIN. THK., FACED WITH SA-240-316L, .062" THK.
 - GASKETS- GYLON 3500, 1/16" THK x 20 NOM. DIA.
 - HOOKBOLT ASSY, 14 PER COVER, 3/4" DIA x 6" LG, SA-193, B7, ZINC PLATED.
 - PAINT- AMERON AMERLOCK 400FD, COLOR: ALFA LAVAL BLUE, MANUFACTURER'S STANDARD. (CARBON STEEL ONLY)
 - TOLERANCE ON ALL DIMENSIONS ±1/8". TOLERANCE ON ANGULAR DIMENSIONS ±1/2°. BOLT HOLES TO STRADDLE SHOWN CENTER LINES, ±1'.
 - LOCATION OF NAMEPLATE IS MANUFACTURER'S OPTION.
 - FOR WELD DETAILS SEE DRAWING NO. D-101.
 - CORROSION ALLOWANCE ON SPIRAL SHELL = .119"

NOZZLES ARE SA-312-316L TYPE A STUB ENDS, SCH 80.					
DRAINS: E & E ARE SA-312-316L, SCH 80.					
FLANGES ARE SA-105.					
MARK	REQ'D	SIZE	RATING	FACING	REMARKS
F	1	1"	***	NPT	CAPPED, HOT DRAIN
E	1	1"	***	NPT	CAPPED, COLD DRAIN
D	1	1"	150#	LJ	HOT OUTLET
C	1	1"	150#	LJ	HOT INLET (T-143 Res)
B	1	1"	150#	LJ	COLD OUTLET
A	1	1"	150#	LJ	COLD INLET (T-75 OH)
NOZZLE SCHEDULE					

WARNING!!!
WHEN COVER IS REMOVED FOR INSPECTION OF ONE PASSAGE, BE SURE THERE IS NO PRESSURE IN THE OPPOSITE CHANNEL. IF PRESSURE IS TO BE APPLIED FOR TESTING WITH ONE COVER REMOVED, THE UNCOVERED SPIRAL MUST BE RETAINED BY SUITABLE HOLD DOWN BARS TO PREVENT PARTIAL TELESCOPING UNDER PRESSURE.

CERTIFIED PRINT
APPROVED FOR FABRICATION OR ERECTION
BY: _____ DATE: _____

REVIEW		Alfa Laval Thermal Inc. 300 CHESTNUT STREET LYKENS, PA 17048-0010			
QC		CUSTOMER: CELANESE LTD.			
AI		ORDER NO.: 2325266	ITEM NO.: HE-1474		
		2-EHACA 15 SQ. FT. SPIRAL HEAT EXCHANGER			
DATE	SYM.	DESCRIPTION	BY	CHK	APP
9-16-98	1	REVISED DRAWING PER CUSTOMER REQUEST: a) ADDED HINGES TO EACH COVER. b) ADDED GUSSETS TO COVER DRAINS. c) MODIFIED TITLE BLOCK AND ADDED CELANESE DRAWING No. & REFERENCE DRAWING No's. d) CHANGED DRAWING STATUS TO CERTIFIED.	SMY	TW	TW
			JCS		
			JCS		

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WT-28976	STRONGBACK DETAIL	121473	0	ISSUED VENDOR DRAWING	KAT
WT-28975	WELDING & COMPONENT PRODUCTION DETAILS				
DWG. NO.	REFERENCE DRAWINGS				
NOTE: This drawing has been created with AUTOCAD DO NOT MANUALLY DRAFT ON THIS COPY !!!					
CONFIDENTIAL Celanese Chemicals Division Pampa Plant AREA-VIII 2-EHACA UNIT SPIRAL HEAT EXCHANGER HE-1474 T-143 / T-75 P/P PLAN & ELEVATION WT-28974-0 03/01/99					