

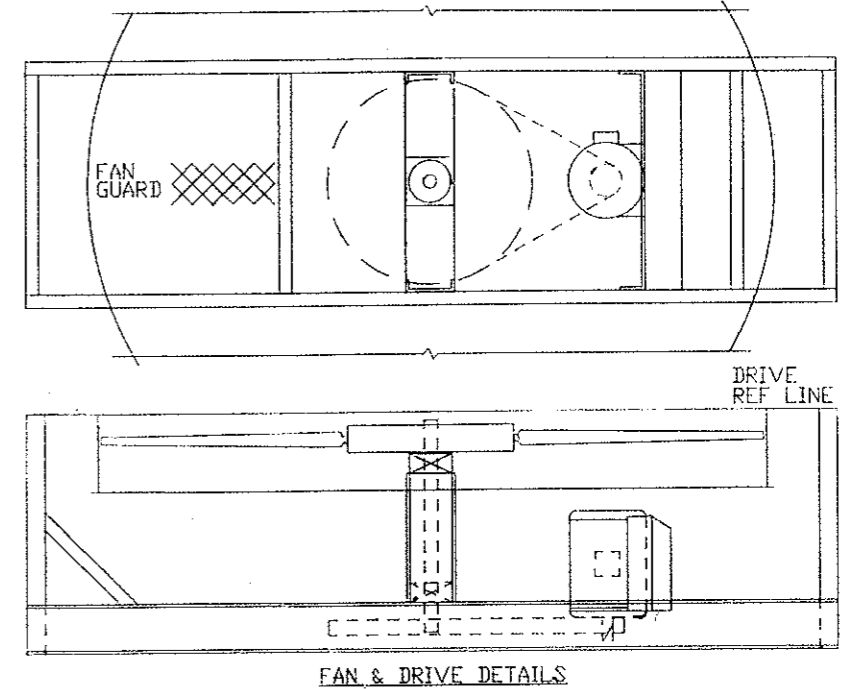
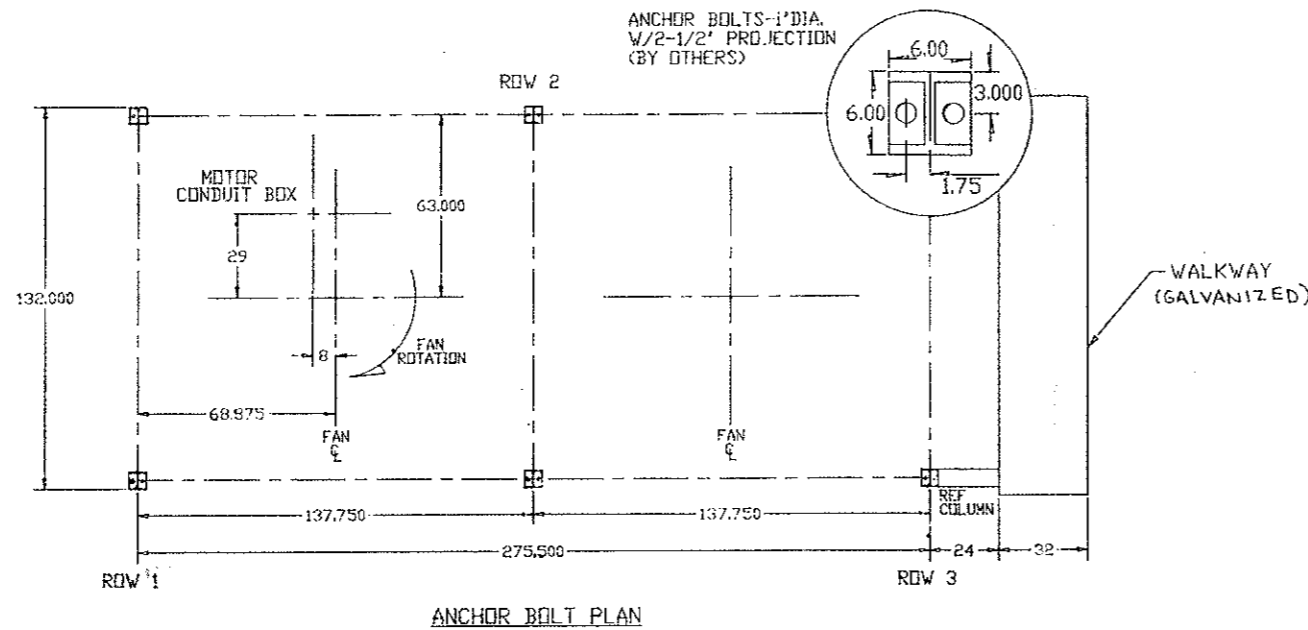
950459

DRY WGT 19078		WIND 30.0		PSF /100		MPH		SEISMIC 4		PLATFORM 100		LBS/SQ-FT LIVE	
COLUMN LOAD (KIPS)	DRY DEAD	WET DEAD	WIND VERT	WIND HDRIZ	SEIS VERT	SEIS HDRIZ	SNOW	PLAT	NOZZ VERT	NOZZ HDRIZ	TOTAL		
ROW 1/COLUMN	2.4	2.7	0.6	0.4	1.2	0.9	0.0	0.0	0.0	0.0	3.9		
ROW 2/COLUMN	4.8	5.3	1.2	0.8	1.7	1.8	0.0	0.0	0.0	0.0	7.1		
ROW 3/COLUMN	2.4	2.7	0.6	0.4	1.2	0.9	0.0	0.9	0.0	0.0	4.8		

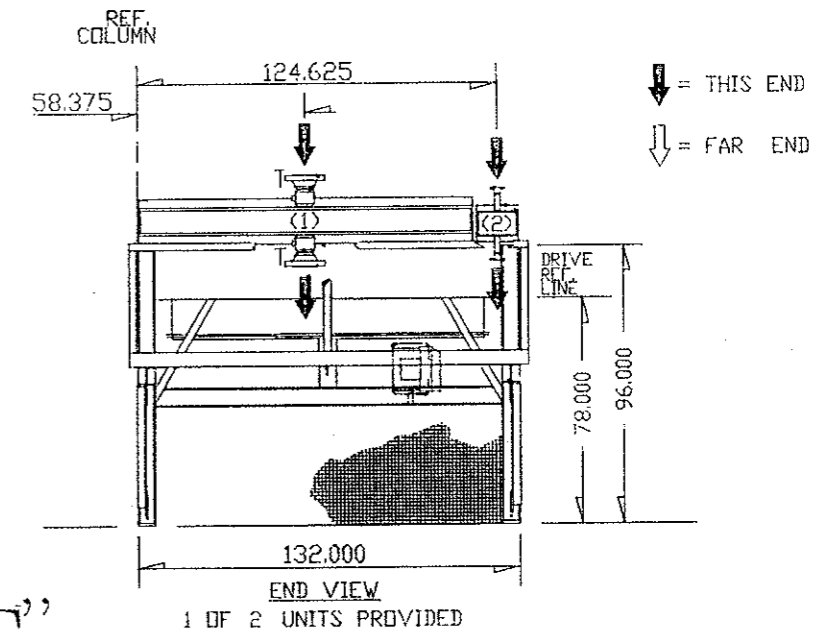
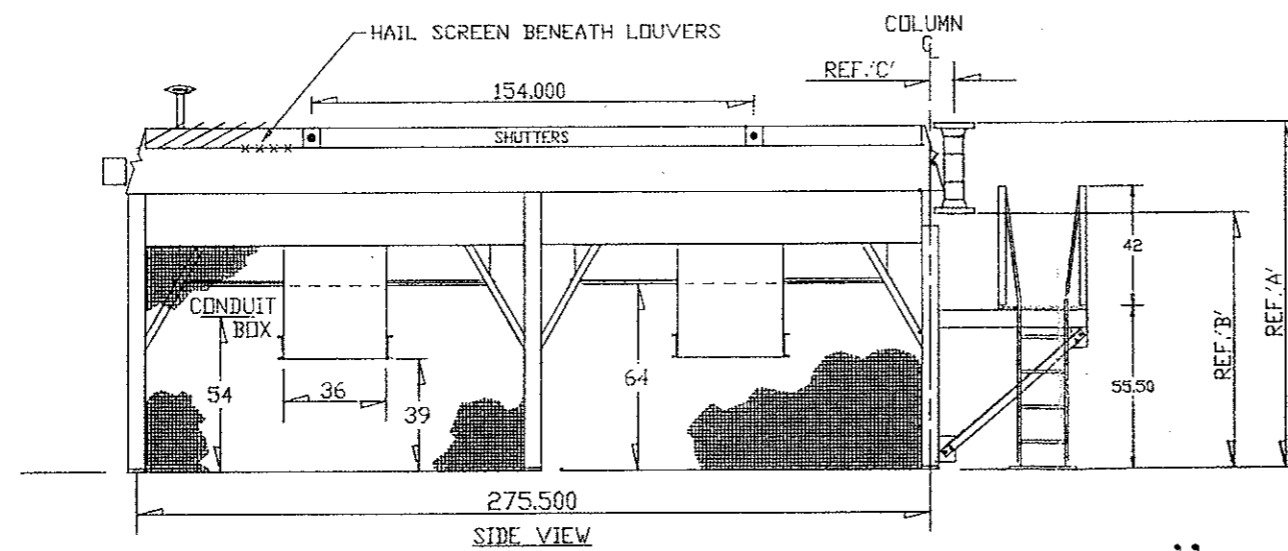
FAN 49 5000
108 IN. DIAMETER 6 BLADE
95000 ACFM 8.5 DEG.
DRIVE REDUCER
BELTS (4) 3VX-1250
SHEAVES FAN 33.5 MOTOR 5.3
BEARINGS 2.1875 IN.

MOTOR HP 15.0 RPM 1750. /0.
254T EXPLOSION PROOF
INSULATION CLASS F /8 TEMP RISE
600/3/60 SINGLE WINDING VARIABLE TORQUE
AMPS(40%)FLA 16. LRA 93.

SHOP RUN IN TEST



Certified Correct
 Date 7-25-95
 By David Harvey



AS-BUILT

NOTE: UNIT WILL BE ENCLOSED BY A BUG SCREEN.

ITEM	SERVICE	INLET	NOZZLES	OUTLET	REFERENCE DIMENSIONS				BUNDLE WEIGHT	COUPLINGS		SHUTTER-OPERATOR	HAIL SCRNS	CODE	DESIGN PRESS.
					A	B	C	D		V&D	TEMP				
1	AC	AC	(1) 6.00 -600 # RF SCH 160	(1) 6.00 -600 # RF SCH 160	120.250	88.500	7.750		11100	1-3000		JSN D-3153-4	YES	CRN	1315
2	CCW	CCW	(1) 1.50 -150 # RF SCH XS	(1) 1.50 -150 # RF SCH XS	115.125	89.500	7.125		1200	1-3000		MANUAL	YES	NONE	65

TOLERANCES: (ALL DIMENSIONS IN INCHES)
MECHANICAL EQUIPMENT ±1/8" PER 10' -0"
NOZZLE ±1/8"

STRUCTURAL, FRAME, AND
HEADER FINISH- COMMERCIAL BLAST CLEAN
WITH 2 COATS ZINC-RICH PRIMER
1 COAT ENAMEL FINISH
(COLOR - LIGHT GREEN)

CUSTOMER UNIVERSAL COMPRESSION
LOCATION CALGARY
REFERENCE UCS PD# 0265-8

CERTIFIED BY DATE

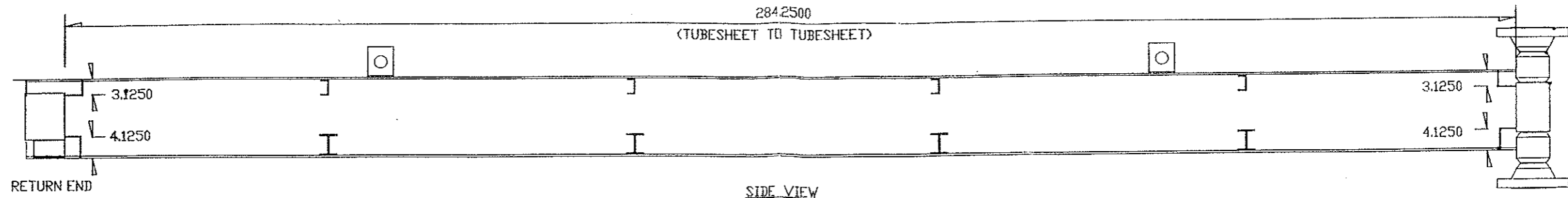
AMERCOOL
AIR COOLED DIVISION
TYLER, TEXAS

PIPING EQUIPMENT OUTLINE & ANCHOR BOLT PLAN
MODEL 1 F24-110 -2 QUANTITY 2

BWN HP CKD DATE 3-23-1995

REV 2 JOB 95C 459-A

- 2 ADDED WALKWAY AND LADDER TO INLET END. 05-05-95 RLB
- 1 CORRECTED MOTOR INFORMATION AND PD NUMBER. 04-07-95 DMH

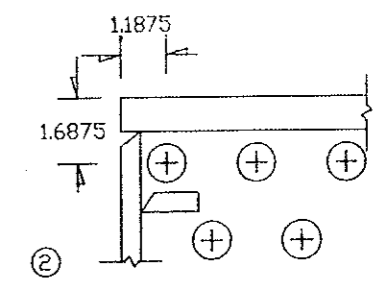
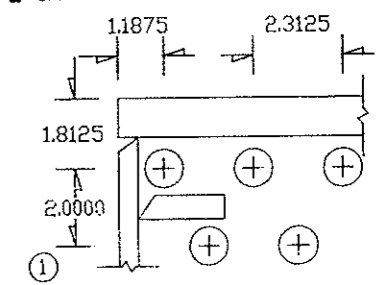
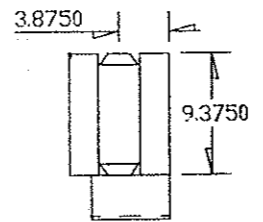
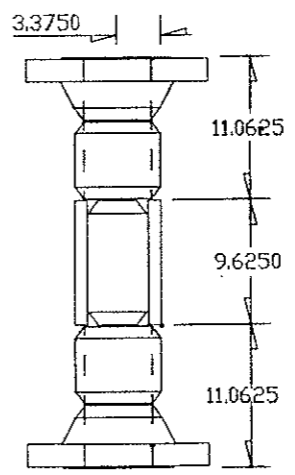
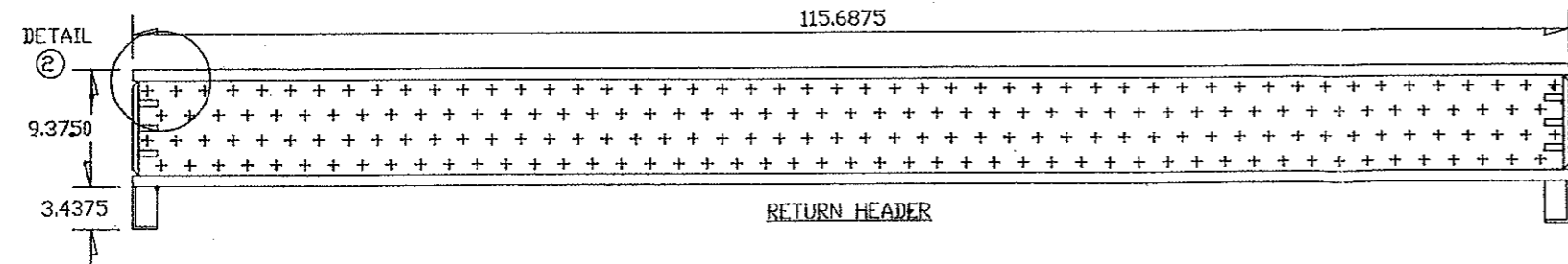
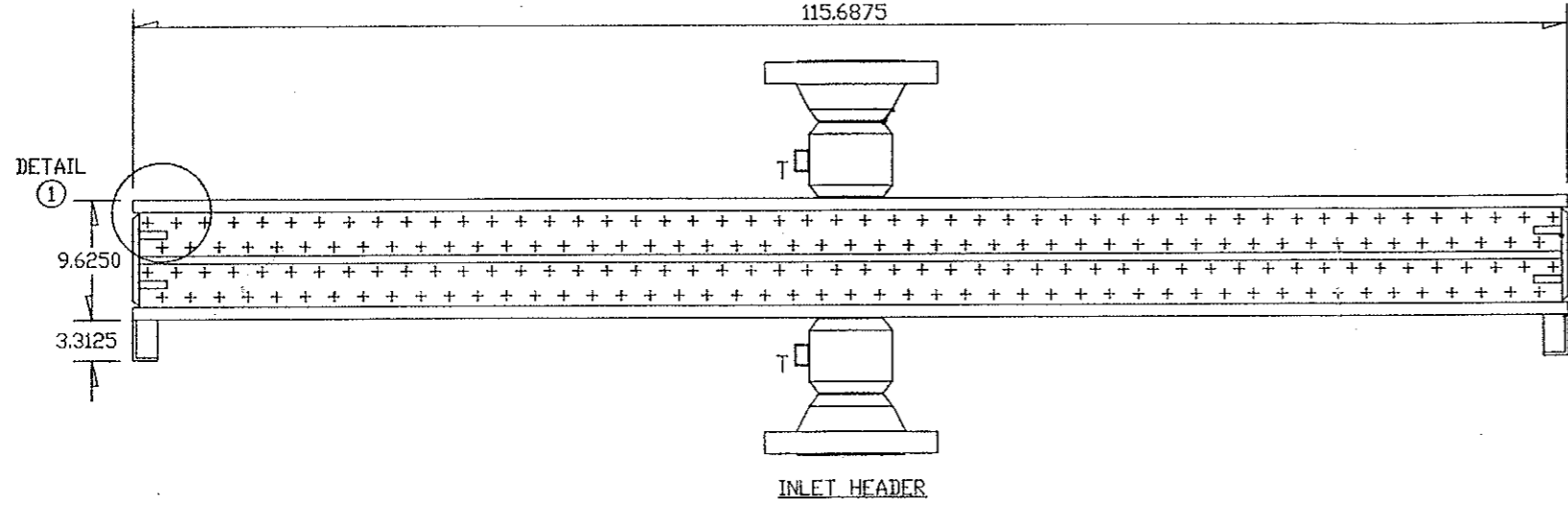


DESIGN CONDITIONS
 DESIGN TEMP = 300° F
 DESIGN PRES = 1315 PSI
 MDMT = -20° F
 CORR ALLOW = .1250"

APPROVAL PRINT

RETURN ONE COPY WITH OR WITHOUT COMMENTS.
 SIGN _____ DATE _____
 FABRICATION WILL NOT BEGIN UNTIL SIGNED COPY HAS BEEN RECEIVED BY AMERCOOL

A.S.M.E.



TUBE SHEET SIDE

"AS-BUILT"

MACHINING	DRILL	REAM	SPECIAL
TUBE HOLE	0.9375	1.010±0.002	DG
PLUG HOLE	1.0312	SF 1.375	TAP 1.1875
NOZZLE IN(1)	6.00	# 600	# RF SCH160
OUT(1)	6.00	# 600	# RF SCH160
TEMP	1-3000	PRESS	
WEIGHT	2900		

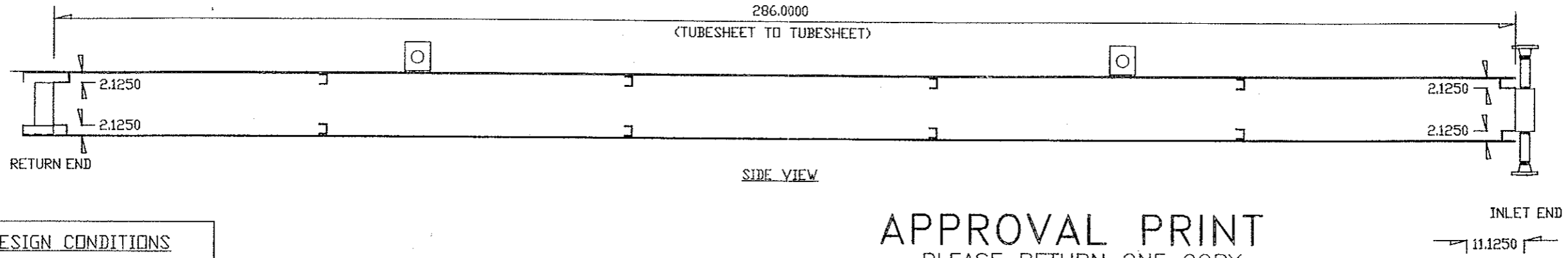
INLET TUBE PLUG	1.0000	115.6875	9.6250	NONE
INLET COVER	1.0000	115.6875	4.4375	LONG SIDES
INLET END	0.5000	4.4375	7.3750	ALL SIDES
INLET STAY	0.6250	114.5000	4.5000	ALL SIDES
INLET TIE	0.6250	4.5000	2.2500	3 SIDES
RETURN TUBE PLUG	2.2500	115.6875	9.3750	NONE
RETURN COVER	0.8750	115.6875	2.9375	LONG SIDES
RETURN END	0.5000	2.9375	7.3750	ALL SIDES
RETURN TIE	0.5000	3.0000	1.5000	3 SIDES

MATERIAL SPECIFICATIONS	
PLATE	SA-516 GR-70N
FLG	SA-105
PIPE	SA-106B STOCK
CPLG	SA-105 STOCK
WELD PROCEDURES	
PIPE-FLANGE	P1-1-2/P1-1-2
FLANGE-HEAD	P1-1-2/P1-1-2
HAND WELD	P1-1 /P1-1
AUTO WELD	P1-6 /P1-6
PLATE TOLERANCES ±1/16"	

TUBES	198 TF 50 ROWS 4 PASS 2 LGTH 288 IN.
TUBE DD	1.000 X0.065 MATL SA-214 WLD
FIN TYPE	L-TENSION 100 - 0.625 - ALUM
PLUG QTY	396 TYPE CS-1822
GASKET	CS-1813
EXPANDER	0.8700 LENGTH 8.0000
FRAME THICK	0.1793
LENGTH	298 IN. DEPTH 15.7500 X 3
SUPPORT	4 BINDER- 4 CLOSER- 4 115.063
SUPPORT TYPE	WIGGLE STRIP
F.FOOT	6' X 3.3125 B.FOOT: 6' X 3.4375

STOCKO	TEST PRESSURE: 1973 TIME: 60 MIN.
STOCKO	HEADS: HAND TOOL CLEAN
STOCKO	w/ 1 COAT SHOP PRIMER
STOCKO	FRAME: HAND TOOL CLEAN
STOCKO	w/ 1 COAT SHOP PRIMER
STOCKO	COIL VOLUME: 29 CUBIC FT.
STOCKO	NORMALIZE ALL PLATE <1.625'
TOLERANCES LENGTH & WIDTH ±0.125' PER 10' -0'	
TUBE PROJECTION 0.25 ±0.125	

AMERCOOL						
APPRV	RB	REV	0	3	-16	-95
BUNDLE DETAILS						
SERVICE : AC						
ITEM : AC						
MFG	WELD	FIN	ASMBL	STRUC	INSP	CUST
1	2		2	1	1	0
QTY	2	WEIGHT	11000	95C4591		

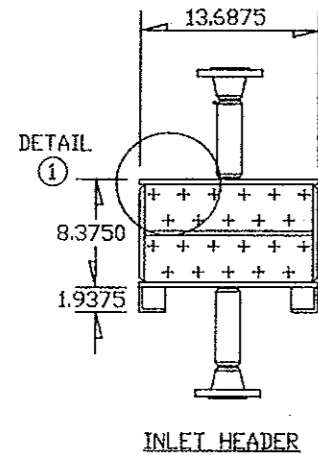


DESIGN CONDITIONS
 DESIGN TEMP = 200° F
 DESIGN PRES = 65 PSI
 MDMT = -20° F
 CORR ALLOW = .0000"

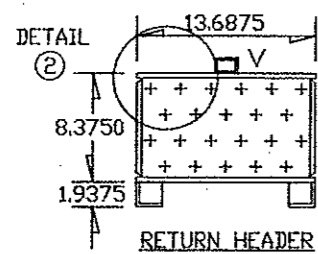
APPROVAL PRINT

PLEASE RETURN ONE COPY
 WITH OR WITHOUT COMMENTS.

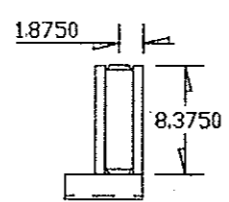
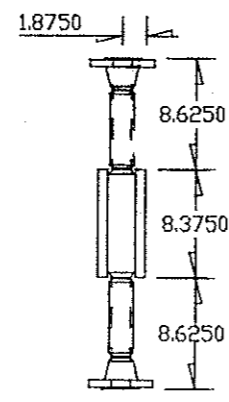
SIGN _____ DATE _____
 FABRICATION WILL NOT BEGIN UNTIL SIGNED
 COPY HAS BEEN RECEIVED BY AMERCOOL



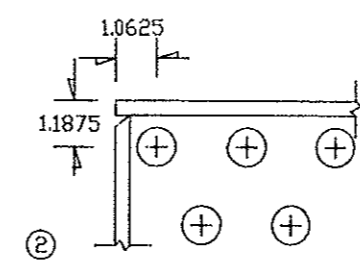
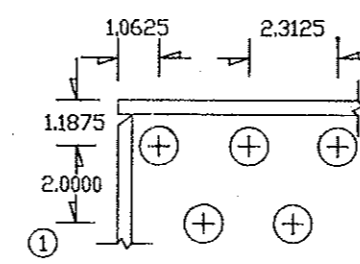
INLET HEADER



RETURN HEADER



TUBE SHEET SIDE



MACHING	DRILL	REAM	SPECIAL	INLET TUBE PLUG	THICK	LENGTH	WIDTH	BEVELS	MATERIAL SPECIFICATIONS	TUBES 22 TF 6 ROWS 4 PASS 2 LGTH 288 IN.	STOCK	TEST PRESSURE: 98	TIME: 60 MIN.	
TUBE HOLE	0.9375	1.010±0.002	SG	INLET COVER	0.3750	13.6875	8.3750	NONE	PLATE SA-516 GR-70N	TUBE OD 1.000 X0.060 MATL SA-214 WLD	STOCK	HEADS: HAND TOOL CLEAN		
PLUG HOLE	1.0312	SF 1.375	TAP 0.7500	INLET END	0.3750	1.9375	1.9375	LONG SIDES	FLG SA-105	FIN TYPE L-TENSION 10.0 - 0.625 - ALUM	STOCK	w/ 1 COAT SHOP PRIMER		MFG WELD FIN ASMBL STRUC INSP CUST 1 2 2 1 1 0
NOZZLE IN(1)	1.50	# - 150	# RF SCHXS	RETURN TUBE PLUG	0.3750	12.7500	2.1875	ALL SIDES	PIPE SA-106B STOCK	PLUG QTY 44 TYPE CS-1818	STOCK	w/ 1 COAT SHOP PRIMER		
GUT(1)	1.50	# - 150	# RF SCHXS	RETURN COVER	0.3750	13.6875	8.3750	NONE	CPLG SA-105 STOCK	GASKET CS-1813	STOCK	COIL VOLUME: 3 CUBIC FT.		
VENT	1-3000	DRAIN		RETURN END	0.3750	1.9375	1.9375	LONG SIDES	WELD PROCEDURES	EXPANDER 0.8800 LENGTH 6.0000				
WEIGHT	200						7.3750	ALL SIDES	PIPE-FLANGE P1-1-2/P1-1-2	FRAME -THICK 0.1344				
									FLANGE-HEAD P1-1-2/P1-1-2	LENGTH 298 IN. DEPTH 12.7500 X 2				
									HAND WELD P1-1 /P1-1	SUPPORT- 4 ,BINDER- 4 ,CLOSER- 4 13.062				
									AUTO WELD P1-6 /P1-6	SUPPORT TYPE - WIGGLE STRIP				
									PLATE TOLERANCES ±1/16"	F.FOOT: 6' X 1.9375 B.FOOT: 6' X 1.9375				
												TOLERANCES LENGTH & WIDTH ±0.125' PER 10' -0'		
												TUBE PROJECTION 0.25 ±0.125		

JAB

* DRAWING & DATA TRANSMITTAL SHEET *

AMERCOOL MANUFACTURING, INC. 12783 FM 346 EAST WHITEHOUSE, TX 75791
(903) 839-2451 FAX (903) 839-2463

VIA: UPS / RED LABEL

DATE: 10-24-95

JOB: 95C459

TO: UCS
2612-37 AVE. NE
CALGARY AB T1Y 5L2

REF: UCS PO#94-0003

ATTN: GREG BAKER

GENTLEMEN:

ENCLOSED ARE THE FOLLOWING CERTIFIED PRINTS:

AMERCOOL DRW. NO.	QTY	TYPE OF DRAWING
95C459-A	1	OUTLINE DRAWING
	1	CANADIAN REGISTRATION NOTIFICATION
95C4591	1	BUNDLE DETAILS
95C4592	1	BUNDLE DETAILS

AS BUILT

AMERCOOL MANUFACTURING, INC.

CC: H2 MARKETING
JOB FILE

PLEASE SEND ALL DOCUMENTS TO ATTN: RANDY BALLARD, DOCUMENT CONTROL



6th Floor, 10808 - 99 Avenue

Edmonton, Alberta

T5K 0G5

Tel (403) 427-6855

Fax (403) 422-3562

FAXED
8/10/3

1995 10 13

Amercool Manufacturing Inc
P.O. Box 620
Whitehouse, TX 75791 USA

Attention: Mr. R. Ballard

Dear Sir:

The drawings, specifications and/or information submitted on 1995-10-04 are accepted for registration as follows:

Reg. No.	Drawing No.	Design Pressure	Design Temperature	Fee
M-9827.2	95C4591 Rev 0	9067 kPa	-29/+149°C	\$88.50

Enclosed are stamped prints for your reference.

An Invoice covering survey and registration fees will be forwarded from our Revenue Accounts.

Yours truly,

M. V. S. Shaikh, P.Eng.
Design Survey Engineer

MVSS/bp
Encl.

25001

AMERCOOL Manufacturing Inc.

Air-Cooled Heat Exchangers

October 4, 1995

Mr. Bei Yang
MINISTRY OF CONSUMER & COMMERCIAL RELATIONS
TECHNICAL STANDARDS DIVISION
PRESSURE VESSEL BRANCH
Shipp Centre, 3rd Floor, West Tower
3300 Bloor Street West
Toronto, Ontario, Canada M8X 2X2

RE: Canadian Registration of 95C4591

Mr. Yang,

Submitted for your approval is the following coil section we have constructed for Universal Compression of Calgary. The unit will be installed in Ontario but, as the ultimate user is Nuvo Pignone/Transcanada Pipeline, we were informed last week that the section must be registered in five separate provinces, including yours.

	DESIGN PRESSURE	DESIGN TEMPERATURE
95C4591	9067 kPa	149/-29°C

Enclosed please find a Weld Map and Weld Procedures. There are also two copies of the Bundle Detail Prints, folded around the Specification Sheet and Header Calculations.

Thanks for your assistance.

Sincerely,

Randy Ballard
Randy Ballard



PRESSURE VESSELS SAFETY

Engineering & Standards Branch
Technical Standards Division

Ministry of Consumer & Commercial Relations

THE DESIGNS SUBMITTED UNDER THIS TRANSMITTAL LETTER HAVE BEEN REGISTERED UNDER

CRN: M 9827.25 FITG.

THE INVOICE FOR REGISTRATION WILL BE FORWARDED UNDER SEPARATE COVER.

REGISTERED BY: *J. Seider*

DATE: *OCT 17/95*



SUITE 101, 145 POINT DRIVE N.W. CALGARY, ALBERTA T3B 4W1
PHONE: (403) 571-0370 FAX: (403) 283-1301

FAX TRANSMISSION

DATE: August 17/95.
FAX NO. (918) 445-0400
FOR: AMERCOOL MANUFACTURING INC.
ATTENTION: Ross Young.
FROM: HUGH HUNTER
TOTAL NUMBER OF PAGES INCLUDING COVER SHEET: 1
REFERENCE: UCS. TEAMS CANADA.

MESSAGE:

APPROVAL RECEIVED TO PAINT 2 COATS OF EPOXY
PRIMER & 1 COAT OF EPOXY FINISH COAT. DRY
FILM THICKNESS TOTAL 11 MILS.

CARBOLINE REFERENCE PRIMER # 893
FINISH COAT # 890 - COLOR CODE 5339.

GREG BAKER SAYS YOU CAN CROSS REFERENCE
IF YOU WANT & I SUGGEST ANYTHING CLOSE WOULD
BE OK.

n-Path: <butter@cobra>
Subject: Re: Amercool 95C
From: neil@cobra (Neil Milb
Date: Thu, 17 Aug 95 8:17:20 CDT
To: apurch@cobra, dyanna@cobra, butter@cobra
Status: RO

> >
> > To Distribution:
> >
> > Per conversations with Greg Baker w/ Universal Compression Systems for
> > the above referenced, the following items were resolved
> >
> > 1. The paint system color is to be Light Green and per the specifi-
> > cations. Whatever brand and color scheme, Amercool need to notify
> > Universal what the numbers/brands so they can match the compressor
> > package.
> >
> > 2. The cooler walkways/ladders can be galvanized.
> >
> > ROSS
> >
> >
> >
> > Clint - Please get with RD on the paint finish.
> >
> > Dy - Can you arrange to have OK or Rogers hot dip the diving
> > platform and ladder??
> >
> > Thanks - Neil M
> >
> >

Sherwin Williams
Primer - Kemkromik Universal
Finish - Kem400 Lt. Green enamel (oil base)

AMERCOOL

MANUFACTURING INC.

P.O. BOX 9310, Tulsa, Ok 74157 • Phone: (918) 445-5366 • FAX: (918) 445-0400

Monday, July 31, 1995 04:48 PM

TO:

Name: Greg Baker

Company: Universal Comp.

FAX: (403) 250 8695

FROM:

Name: Jeff Butter

Company: Amercool Manufacturing, Inc.

FAX: (918) 445-0400

SUBJECT: 459/NP/TCPL

Total number of pages, including cover: 1

MESSAGE:

Greg,

These coolers are in production. We are looking at shipment toward the end of August.

I don't have anything in my file on what color the final paint coat should be - do you know?

Thanks,

Jeff Butter



UNIVERSAL COMPRESSION SYSTEMS
2612 - 37 AVENUE NE,
CALGARY, ALBERTA, CANADA
T1Y 5L2

Fax Cover Sheet

DATE: June 20, 1995

TIME: 8:42 AM

TO: JEFF BUTTER
AMERCOOL

PHONE: 918 445-5385
FAX: 918 445-0400

FROM: GREG BAKER
UNIVERSAL COMPRESSION SYSTEMS

PHONE: 403 250-3898
FAX: 403 250-8885

RE: TOP LIFTS

Number of pages including cover sheet: 5
Message

PLEASE SEE THE ATTACHED DRAWINGS RECEIVED FROM NUOVO PIGNONE "APPROVED AS NOTED". PLEASE RESUBMIT AS SOON AS POSSIBLE.

REGARDS,


GREG BAKER

**AIR COOLED EXCHANGER
SPECIFICATION SHEET**

Date	Fri* 3:10 pm*18-JAN-2002
Proposal/Job No.	013-01PY
Reference UCS PO#	94-0003
Item No.	AC

1	Customer	UNIVERSAL COMPRESSION			Item No.	AC
2	Plant Location	CALGARY				
3	Service	AC				
4	Model	1 F14-090-1	Type	FORCED	No. of Bays	1 (2 Units)
5	Surface per Unit-Finned Tube	10,410	Ft ²	Bare Tubes	491.5	Ft ²
6	Heat Exchanged	1,095,000	BTU/Hr	MTD (Eff.)	32.4 (Counter Flow)°F	
7	Transfer Rate-Finned Tube	3.24	Bare Tube, Service	68.70	BTU/Hr. Ft ² °F	

PERFORMANCE DATA-TUBE SIDE

9	Fluid Name	GAS		Lethal Service	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	IN	OUT
10	Total Fluid Entering	Lb/Hr	19,830	Density	Lb/Ft ³	2.28	2.62
11		IN	OUT	Specific Heat (Liq/Vap)	BTU/Lb°F	/ .648	/ .648
12	Temperature	°F	185.0	100.0	Cond. (Liq/Vap)	BTU/HrFt ² °F	.0200
13	Liquid	Lb/Hr			Pour/Freeze Point	°F	
14	Vapor	Lb/Hr (MW)	19,830 (17.7)	19,830 (17.7)	Bubble Point	°F	
15	Nocond	Lb/Hr (MW)			Latent Heat	BTU/Lb	
16	Steam	Lb/Hr			Pressure	Psia	895.00
17	Water	Lb/Hr			Pressure Drop Allow/Calc	Psi	5.00 / 1.31
18	Viscosity (Liq/Vap)	Cp	/ .013	/ .013	Fouling resist, Inside	ft ² hr °F/BTU	0.00200

PERFORMANCE DATA-AIR SIDE

20	Air Quantity	SCFM	56,590	Lb/Hr	254,600	Altitude	Ft	900
21	Air Quantity/Fan	ACFM	83,650			Temperature In	°F	90.0
22						Temperature Out	°F	107.8
23								

DESIGN - MATERIAL - CONSTRUCTION

25	Design Pressure	1,315	Psig	Test Pressure	1,973	Psig	Design Temperature	300 / MDMT -40	°F
26	TUBE BUNDLE	HEADER, Type PLUG BOX				TUBE Material SA-214 WLD			
27	Size	6.6 x 14.0		Material	SA-516 GR-70				
28	No.	1	No. Tube Rows	4	No. Passes	4	Slope	0.0000	In/Ft
29	Bays	1	In Parallel	In Series	Plug	CS1822		No./Bundle	134
30	Bundles	1	In Parallel	In Series	Gasket	CS1813		Pitch	2.3125
31	Pass Arrangement (Top to Bottom)				Corrosion Allowance	0.1250	In	FIN Type	L-TENSION
32	Rows / Pass	4 / 4		Size In Nozzle (1)	6.00	SCH 160 SA-106B	In	Material	ALUM
33		Size Out Nozzle (1)	6.00	SCH 160 SA-106B	In	OD	2.250	In	Stock Thick
34	Steam Coil	NO		Rating & Facing	600 -RF SA-105		No/in	10	Support Chan. / Staple
35	Hailscreens	YES		Vent (0)	Drain (0)		Code-ASME VIII, Div 1	YES	Stamp
36	Louvers	ALUM	(2) JSN D-3153-4		TI	1-3000	PI	Radiograph	N
37	Frame Finish	CMSB 3 Coat Brand Name Paint		Header Finish	CMSB 3 Coat Brand Name Paint		Tube Hole Grooving	YES	

MECHANICAL EQUIPMENT

39	FAN Mfg & Model	MOORE 40 5000		DRIVER Type	ELECTRIC MOTOR		SPEED REDUCER Type	V-BELT	
40	No./Bay	1	RPM	312	S.F.	1.15	Insul/TR	CLASS F / B	BELTS (4) 3VX-1060. SHEAVES 25.0/4.5
41	Dia.	8.0	Ft.	No. Blades	7	No./Bay	1	Frame	254T HP 15.0
42	Pitch	ADJUSTABLE	Angle°	11.	RPM (1)	1750	Duty	CHEM	HP Rating 21.9 Ratio 5.61
43	Mati, Blade	ALUMINUM	Hub	CATALUM	Enclosure	EXPL	V & D	None	Support: SUSPENDED FROM STRUCTURE
44	HP/Fan, Des.	11.1	DBA	83.	V/P/C	575/3/60	Space Heater	NO	Vibration Switch

STRUCTURE

45	Mounting	GRADE			Inlet Header	in. 30 EXPANDED		
46	Windload - PSF	30.0	Seismic	4	Outlet/Return	in. None		
47	Finish	CMSB 3 Coat Brand Name Paint			Drive Access	in. None		

WALKWAYS

NOTES

48	Items combined:	AC	CCW
49	Coil Volume (ft ³):	12.	
50	Assembled Drive, Structure, Louvers & Bundles		
51			
52			
53			
54			
55	Plot Area	9.0 x 14.0	ft
	Weight Bundle	4,964	Lbs
	Total Shipping	12,190	Lbs

AMERCOOL Manufacturing Inc.

P.O. Box 9310 • Tulsa, OK 74157

Phone: (918) 445-5366 • FAX (918) 445-0400

AIR COOLED EXCHANGER SPECIFICATION SHEET

Date Fri* 3:11 pm*18-JAN-2002

Proposal/Job No. 013-02PY

Reference UCS PO#94-0003

1	Customer	UNIVERSAL COMPRESSION			Item No.	CCW
2	Plant Location	CALGARY				
3	Service	CCW				
4	Model	Type	FORCED		No. of Bays	1 (2 Units)
5	Surface per Unit-Finned Tube	2,485	Ft ²	Bare Tubes	117.4	Ft ²
6	Heat Exchanged	121,700	BTU/Hr	MTD (Eff.)	16.1 (Counter Flow)°F	
7	Transfer Rate-Finned Tube	3.04	Bare Tube, Service	64.27	BTU/Hr. Ft ² °F	

PERFORMANCE DATA-TUBE SIDE

9	Fluid Name	EG50		Lethal Service	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	IN	OUT
10	Total Fluid Entering	Lb/Hr	19,500	Density	Lb/Ft ³		64.9	64.9
11		IN	OUT	Specific Heat (Liq/Vap)	BTU/Lb°F		.490 /	.484 /
12	Temperature	°F	113.0	104.0	Cond. (Liq/Vap)	BTU/HrFt ² °F		.240 /
13	Liquid	Lb/Hr	19,500	19,500	Pour/Freeze Point	°F		
14	Vapor	Lb/Hr (MW)			Bubble Point	°F		
15	Nocond	Lb/Hr (MW)			Latent Heat	BTU/Lb		
16	Steam	Lb/Hr			Pressure	Psia 25.00		
17	Water	Lb/Hr			Pressure Drop Allow/Calc	Psi 5.00 / 0.90		
18	Viscosity (Liq/Vap)	Cp	1.540 /	1.540 /	Fouling resist, Inside	ft ² hr °F/BTU 0.00050		

PERFORMANCE DATA-AIR SIDE

20	Air Quantity	SCFM	21,770	Lb/Hr	97,970	Altitude	Ft	900
21	Air Quantity/Fan	ACFM	.0			Temperature In	°F	90.0
22						Temperature Out	°F	95.2

DESIGN - MATERIAL - CONSTRUCTION

25	Design Pressure	65	Psig	Test Pressure	98	Psig	Design Temperature	200 / MDMT -20	°F
26	TUBE BUNDLE	HEADER, Type PLUG BOX				TUBE Material SA-214 WLD			
27	Size	2.2 x 14.0		Material	SA-516 GR-70				
28	No. 1	No. Tube Rows	3	No. Passes	2	Slope	0.0000	In/Ft	OD 1.000 In Min. Thick 0.0600 In
29	Bays	1	In Parallel	In Series	Plug	CS1818		No./Bundle 32	Length 14.0 Ft
30	Bundles	1	In Parallel	In Series	Gasket	CS1813		Pitch 2.3125	InΔ
31	Pass Arrangement (Top to Bottom)				Corrosion Allowance	0.0000	In	FIN Type L-TENSION	
32	Rows / Pass	3 / 2		Size In Nozzle (1)	1.50	SCH XS SA-106B	In	Material	ALUM
33				Size Out Nozzle (1)	1.50	SCH XS SA-106B	In	OD 2.250 In	Stock Thick 0.016 In
34	Steam Coil	NO		Rating & Facing	150 -RF SA-105		No/In 10	Support	Chan. / Staple
35	Hailscreens	YES		Vent (1)	1-3000	Drain (0)		Code-ASME VIII, Div 1	YES Stamp NONE
36	Louvers	ALUM	(1)	MANUAL	TI	PI		Radiograph	N Heat Treat N
37	Frame Finish	CMSB 3 Coat Brand Name Paint		Header Finish	CMSB 3 Coat Brand Name Paint		Tube Hole Grooving	NO	

MECHANICAL EQUIPMENT

39	FAN Mfg & Model	DRIVER Type			SPEED REDUCER Type				
40	No./Bay	RPM	S.F.	Insul/TR					
41	Dia.	Ft.	No. Blades	No./Bay	Frame	HP	No./Bay		
42	Pitch	Angle°	RPM	Duty	HP Rating		Ratio		
43	Matl, Blade	Hub	Enclosure	V & D		Support:			
44	HP/Fan, Des.	DBA	V/P/C	Space Heater		Vibration Switch			

STRUCTURE

WALKWAYS

45	Mounting	Inlet Header	in.
46	Windload - PSF	Seismic	Outlet/Return in.
47	Finish	Drive Access	in.

NOTES

48	Coil Volume (ft ³):	2.					
49							
50							
51							
52							
53							
54							
55	Plot Area	ft	Weight Bundle 955.0	Lbs	Total Shipping	12,190	Lbs

to: Greg Baker J. S. Jeffrey Butler
(403) 250-8695

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P.O. Box 620
640 West 41st, Tulsa, OK 74107
(918) 445-5366

Customer: UNIVERSAL COMPRESSION
Customer P.O. No.: UCS PO# 0205-8
Item no.: AC
Service :AC

Date: 05-05-95

Approved: _____

Header Design Calculations
Per ASME Code Section VIII Division 1 1992 /A93 Appendix 13
Fig. 13-2(A) Vessels of Rectangular Cross Section
Sketch (7, 8 or 9)

Job No.: 95B4591 (Inlet/Outlet Header)

Design Press. (P): 1315. PSI Test Press.: 1973. PSI
Design Temp.: 300. Deg. F / -20. Deg. F MDMT
Material: sa-516 gr-70 Normalized
Allow. Membrane Stress: 17500. PSI
Allow. Bending and Total Stress: 26250. PSI (1.5 x Membrane Stress)
Corrosion Allowance: .1250 Inch
Tube/Plug Sheet Thickness: 1.0000 Inch
Tube/Plug Sheet Thickness Less Corr. Allow. = t2 = .8750 Inch
Cover Plate Thickness: 1.0000 Inch
Cover Plate Thickness Less Corr. Allow. = t1 = .8750 Inch
Stay Plate Thickness: .6250 Inch
Stay Plate Thickness Less Corr. Allow. = t3 = .3750 Inch
H (corroded) = 4.9375 In
h (corroded) = 3.7500 In
Horz. Tube Pitch (Pitch): 2.3125 In
D (Hole diameter): 1.0790
E= 1.0 (see 13-4-g-1)
eb = em = (Pitch - D)/Pitch = .5334
c = (c1 or c2)
 c1 = t1/2 = .437500 In
 c2 = t2/2 = .437500 In
a = H/h = 1.316667
I1 = t1³/12 = .055827 In**4
I2 = t2³/12 = .055827 In**4
K = (I2/I1) a = 1.316667

Job No.:95B4591 inlet/Outlet Header)

(1) Membrane Stress

Short-Side Plates

$$S_m = \frac{Ph}{4t1E} \left[4 - \frac{2+K(5-a^2)}{1+2K} \right] = 3192. \text{ PSI} \quad (1)$$

Long-Side Plates

$$S_m = \frac{PH}{2t2em} = 6956. \text{ PSI} \quad (2)$$

Stay Plates

$$S_m = \frac{Ph}{2t3E} \frac{2+K(5-a^2)}{1+2K} = 11402. \text{ PSI} \quad (3)$$

(2) Bending Stress

Short-Side Plates

$$(S_b)N = - \frac{Pc1}{24I1E} \left[3H^2 - 2h^2 \left(\frac{1+2a^2K}{1+2K} \right) \right] = 12906. \text{ PSI} \quad (4)$$

$$(S_b)Q = - \frac{Ph^2c1}{12I1E} \frac{1+2a^2K}{1+2K} = 18498. \text{ PSI} \quad (5)$$

Long-Side Plates

$$(S_b)M = - \frac{Ph^2c2}{12I2eb} \frac{1+K(3-a^2)}{1+2K} = 16621. \text{ PSI} \quad (6)$$

$$(S_b)Q = - \frac{Ph^2c2}{12I2E} \frac{1+2a^2K}{1+2K} = 18498. \text{ PSI} \quad (7)$$

(3) Total Stress

Short-Side Plates

$$(ST)N = EQ(1) + EQ(4) = 16099. \text{ PSI} \quad (8)$$

$$(ST)Q = EQ(1) + EQ(5) = 21690. \text{ PSI} \quad (9)$$

Long-Side Plates

$$(ST)M = EQ(2) + EQ(6) = 23577. \text{ PSI} \quad (10)$$

$$(ST)Q = EQ(2) + EQ(7) = 25453. \text{ PSI} \quad (11)$$

Stay Plates

$$ST = EQ(3) = 11402. \text{ PSI} \quad (12)$$

(4) End Plate Stress UG 34, EQ. (3) & (4)

d (Corroded) = 1.7500

D (Corroded) = 4.9375

c = 0.2 (see 13-4(F))

End Plate Thickness: .5000 Inch

End Plate Thickness Less Corr. Allow. = T4 = .3750 Inch

$$Z = 3.4 - 2.4 \left(\frac{d}{D} \right) = 2.5000 \quad \text{Max } 2.5$$

$$S = \frac{cd^2ZP}{T4^2} = 14319. \text{ PSI}$$

Header Design Calculations
Per ASME Code Section VIII Division 1 1992 /A93 Appendix 13
Fig. 13-2(A) Vessels of Rectangular Cross Section
Sketch (1)

Job No.: 95B4591 (Return header)

Design Press. (P): 1315. PSI Test Press.: 1973. PSI
Design Temp.: 300. Deg. F / -20. Deg. F MDMT
Material: sa-516 gr-70 Normalized
Allow. Membrane Stress: 17500. PSI
Allow. Bending and Total Stress: 26250. PSI (1.5 x Membrane Stress)
Corrosion Allowance: .1250 Inch
Tube/Plug Sheet Thickness: 2.2500 Inch
Tube/Plug Sheet Thickness Less Corr. Allow. = t_2 = 2.1250 Inch
Cover Plate Thickness: .8750 Inch
Cover Plate Thickness Less Corr. Allow. = t_1 = .7500 Inch
 H (corroded) = 3.4375 In
 h (corroded) = 7.8750 In
Horz. Tube Pitch (Pitch): 2.3125 In
 D (Hole diameter): 1.0790
 $E = 1.0$ (see 13-4-g-1)
 $eb = em = (\text{Pitch} - D) / \text{Pitch} = .5334$
 $c = (c_1 \text{ or } c_2)$
 $c_1 = t_1/2 = .375000$ In
 $c_2 = t_2/2 = 1.062500$ In
 $a = H/h = .436508$
 $I_1 = t_1^3/12 = .035156$ In**4
 $I_2 = t_2^3/12 = .799642$ In**4
 $K = (I_2/I_1) a = 9.928535$

Job No.: 95B4591 (Back Header)

- (1) Membrane Stress
Short-Side Plates
 $S_m = Ph / (2t_1E) = 6904. \text{ PSI} \quad (1)$
Long-Side Plates
 $S_m = PH / (2t_2em) = 1994. \text{ PSI} \quad (2)$
- (2) Bending Stress
Short-Side Plates
 $(S_b)_N = \pm \frac{Pc_1}{12I_1E} [1.5H^2 - h^2 \left(\frac{1+a^2K}{1+K} \right)] = 1537. \text{ PSI} \quad (3)$
 $(S_b)_Q = - \frac{Ph^2c_1}{12I_1E} \left(\frac{1+a^2K}{1+K} \right) = 19181. \text{ PSI} \quad (4)$
Long-Side Plates
 $(S_b)_M = - \frac{Ph^2c_2}{12I_2eb} [1.5 - \left(\frac{1+a^2K}{1+K} \right)] = 20913. \text{ PSI} \quad (5)$
 $(S_b)_Q = - \frac{Ph^2c_2}{12I_2E} \left(\frac{1+a^2k}{1+K} \right) = 2389. \text{ PSI} \quad (6)$
- (3) Total Stress
Short-Side Plates
 $(ST)_N = EQ(1) + EQ(3) = 8441. \text{ PSI} \quad (7)$
 $(ST)_Q = EQ(1) + EQ(4) = 26085. \text{ PSI} \quad (8)$
Long-Side Plates
 $(ST)_M = EQ(2) + EQ(5) = 22907. \text{ PSI} \quad (9)$
 $(ST)_Q = EQ(2) + EQ(6) = 4383. \text{ PSI} \quad (10)$

(4) End Plate Stress UG 34, EQ. (3) & (4)
 d (Corroded) = 1.8125
 D (Corroded) = 3.4375
 $c = 0.2$ (see 13-4(F))
End Plate Thickness: .5000 Inch
End Plate Thickness Less Corr. Allow. = $T_4 = .3750$ Inch
 $Z = 3.4 - 2.4 \left(\frac{d}{D} \right) = 2.1345 \quad \text{Max } 2.5$
 $S = \frac{cd^2 Z P}{T_4^2} = 13115. \text{ PSI}$

Tube Wall:

Design Pressure (P): 1315. PSI
Tube OD (D): 1.0000 In.
Tube stress (S): 10000. PSI

Minimum wall = $P * D/2 / (.4 * P + S) = .0625$ In.
Actual wall: .0650 In.

Nozzle neck:

Inlet nozzle:

Design Pressure (P): 1315. PSI
Nozzle OD (D): 6.625 In.
Nozzle stress (S): 15000. PSI
Corrosion (C): .1250 In.

Minimum wall = $P * D/2 / (.4 * P + S) + C = .4056$ In.
Actual wall: .7190 In.

Outlet nozzle:

Design Pressure (P): 1315. PSI
Nozzle OD (D): 6.625 In.
Nozzle stress (S): 15000. PSI
Corrosion (C): .1250 In.

Minimum wall = $P * D/2 / (.4 * P + S) + C = .4056$ In.
Actual wall: .7190 In.

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Customer: UNIVERSAL COMPRESSION
Customer P.O. No.: UCS PO# 0265-8
Item no.: CCW
Service :CCW

Date: 05-05-95

Approved: _____

Header Design Calculations
Per ASME Code Section VIII Division 1 1992 /A93 Appendix 13
Fig. 13-2(A) Vessels of Rectangular Cross Section
Sketch (1)

Job No.:95B4592 (Inlet/Outlet Header)

Design Press.(P): 65. PSI Test Press.: 98. PSI
Design Temp.: 200. Deg. F / -20. Deg. F MDMT
Material: SA-516 GR-70
Allow. Membrane Stress: 17500. PSI
Allow. Bending and Total Stress: 26250. PSI (1.5 x Membrane Stress)
Corrosion Allowance: .0000 Inch
Tube/Plug Sheet Thickness: .7500 Inch
Tube/Plug Sheet Thickness Less Corr. Allow.= t2 = .7500 Inch
Cover Plate Thickness: .3750 Inch
Cover Plate Thickness Less Corr. Allow. = t1 = .3750 Inch
H (corroded) = 2.1875 In
h (corroded) = 7.6250 In
Horz. Tube Pitch (Pitch): 2.3125 In
D (Hole diameter): 1.0790
E= 1.0(see 13-4-g-1)
eb = em = (Pitch - D)/Pitch = .5334
c = (c1 or c2)
c1 = t1/2 = .187500 In
c2 = t2/2 = .375000 In
a = H/h = .286885
I1 = t1³/12 = .004395 In**4
I2 = t2³/12 = .035156 In**4
K = (I2/I1) a = 2.295082

Job No.: 95B4592 (Inlet/Outlet Header)

(1) Membrane Stress
 Short-Side Plates

$$S_m = P_h / (2t_1E) = 661. \text{ PSI} \quad (1)$$

Long-Side Plates

$$S_m = P_h / (2t_2E) = 178. \text{ PSI} \quad (2)$$

(2) Bending Stress
 Short-Side Plates

$$(S_b)_N = \pm \frac{P_c c_1}{12I_1E} [1.5H^2 - h^2 \left(\frac{1+a^2K}{1+K} \right)] = -3189. \text{ PSI} \quad (3)$$

$$(S_b)_Q = - \frac{Ph^2 c_1}{12I_1E} \left(\frac{1+a^2K}{1+K} \right) = 4848. \text{ PSI} \quad (4)$$

Long-Side Plates

$$(S_b)_M = - \frac{Ph^2 c_2}{12I_2E} [1.5 - \left(\frac{1+a^2K}{1+K} \right)] = 7174. \text{ PSI} \quad (5)$$

$$(S_b)_Q = - \frac{Ph^2 c_2}{12I_2E} \left(\frac{1+a^2k}{1+K} \right) = 1212. \text{ PSI} \quad (6)$$

(3) Total Stress
 Short-Side Plates

$$(ST)_N = EQ(1) + EQ(3) = 3850. \text{ PSI} \quad (7)$$

$$(ST)_Q = EQ(1) + EQ(4) = 5509. \text{ PSI} \quad (8)$$

Long-Side Plates

$$(ST)_M = EQ(2) + EQ(5) = 7352. \text{ PSI} \quad (9)$$

$$(ST)_Q = EQ(2) + EQ(6) = 1390. \text{ PSI} \quad (10)$$

(4) End Plate Stress UG 34, EQ. (3) & (4)
 d (Corroded) = 2.1875
 D (Corroded) = 7.6250
 $c = 0.2$ (see 13-4(F))
 End Plate Thickness: .3750 Inch
 End Plate Thickness Less Corr. Allow. = $T_4 = .3750$ Inch

$$Z = 3.4 - 2.4 \left(\frac{d}{D} \right) = 2.5000 \quad \text{Max } 2.5$$

$$S = \frac{cd^2 Z P}{T_4^2} = 1106. \text{ PSI}$$

Header Design Calculations
Per ASME Code Section VIII Division 1 1992 /A93 Appendix 13
Fig. 13-2(A) Vessels of Rectangular Cross Section
Sketch (1)

Job No.:95B4592 (Return header)

Design Press.(P): 65. PSI Test Press.: 98. PSI
Design Temp.: 200. Deg. F / -20. Deg. F MDMT
Material: SA-516 GR-70
Allow. Membrane Stress: 17500. PSI
Allow. Bending and Total Stress: 26250. PSI (1.5 x Membrane Stress)
Corrosion Allowance: .0000 Inch
Tube/Plug Sheet Thickness: .7500 Inch
Tube/Plug Sheet Thickness Less Corr. Allow.= t2 = .7500 Inch
Cover Plate Thickness: .3750 Inch
Cover Plate Thickness Less Corr. Allow. = t1 = .3750 Inch
H (corroded) = 2.1875 In
h (corroded) = 7.6250 In
Horz. Tube Pitch (Pitch): 2.3125 In
D (Hole diameter): 1.0790
E= 1.0(see 13-4-g-1)
eb = em = (Pitch - D)/Pitch = .5334
c = (c1 or c2)
c1 = t1/2 = .187500 In
c2 = t2/2 = .375000 In
a = H/h = .286885
I1 = t1³/12 = .004395 In**4
I2 = t2³/12 = .035156 In**4
K = (I2/I1) a = 2.295082

Job No.:95B4592 Back Header)

- (1) Membrane Stress
Short-Side Plates
 $S_m = Ph / (2t1E) = 661. \text{ PSI} \quad (1)$
- Long-Side Plates
 $S_m = PH / (2t2em) = 178. \text{ PSI} \quad (2)$
- (2) Bending Stress
Short-Side Plates
 $(S_b)N = + \frac{Pc1}{12I1E} [1.5H^2 - h^2 (\frac{1+a^2K}{1+K})] = -3189. \text{ PSI} \quad (3)$
- $(S_b)Q = - \frac{Ph^2c1}{12I1E} (\frac{1+a^2K}{1+K}) = 4848. \text{ PSI} \quad (4)$
- Long-Side Plates
 $(S_b)M = - \frac{Ph^2c2}{12I2eb} [1.5 - (\frac{1+a^2K}{1+K})] = 7174. \text{ PSI} \quad (5)$
- $(S_b)Q = - \frac{Ph^2c2}{12I2E} (\frac{1+a^2k}{1+K}) = 1212. \text{ PSI} \quad (6)$
- (3) Total Stress
Short-Side Plates
 $(ST)N = EQ(1) + EQ(3) = 3850. \text{ PSI} \quad (7)$
 $(ST)Q = EQ(1) + EQ(4) = 5509. \text{ PSI} \quad (8)$
- Long-Side Plates
 $(ST)M = EQ(2) + EQ(5) = 7352. \text{ PSI} \quad (9)$
 $(ST)Q = EQ(2) + EQ(6) = 1390. \text{ PSI} \quad (10)$

(4) End Plate Stress UG 34, EQ. (3) & (4)
d (Corroded) = 2.1875
D (Corroded) = 7.6250
c = 0.2 (see 13-4(F))
End Plate Thickness: .3750 Inch
End Plate Thickness Less Corr. Allow. = T4 = .3750 Inch
 $Z = 3.4 - 2.4(-\frac{d}{D}) = 2.5000 \quad \text{Max } 2.5$

$S = \frac{cd^2ZP}{T4^2} = 1106. \text{ PSI}$

Tube Wall:

Design Pressure (P): 65. PSI
Tube OD (D): 1.0000 In.
Tube stress (S): 10000. PSI

Minimum wall = $P * D/2 / (.4*P + S) = .0032$ In.
Actual wall: .0600 In.

Nozzle neck:

Inlet nozzle:

Design Pressure (P): 65. PSI
Nozzle OD (D): 1.900 In.
Nozzle stress (S): 15000. PSI
Corrosion (C): .0000 In.

Minimum wall = $P * D/2 / (.4*P + S) + C = .0041$ In.
Actual wall: .2000 In.

Outlet nozzle:

Design Pressure (P): 65. PSI
Nozzle OD (D): 1.900 In.
Nozzle stress (S): 15000. PSI
Corrosion (C): .0000 In.

Minimum wall = $P * D/2 / (.4*P + S) + C = .0041$ In.
Actual wall: .2000 In.