1.0 SCOPE

Thin locations on the piping from C-1100 #4 Sidecut to P-1148/A inlet block valves require the piping to be replaced. The thin areas are due to sulfidation corrosion. The thinnest location identified is a 0.100" just above the pumps. There is approximately 350 feet of pipe that will be replaced in this EWO. The pipe class is 3CS24.

REVISION 1

Revised drawing 0955-007-007, D308308-21, and D-308309-21 to add a 12" block valve and relocate the flange pair to the piping replacement. This block valve will allow isolation of 4 S/C is necessary.

MOC# 24144

2.0 MATERIAL

- Obtain all piping and valves from **PR 9051785.**
- **Pipe Spec: 3CS24**
- All other materials to be supplied by Maintenance and/or the Piping Contractor.
  - **Maximo Work Order #: 343626-002**

3.0 QUALITY CONTROL REQUIREMENTS

All work in this EWO shall be in strict compliance with the following Richmond Refinery standards:

- All welding in this EWO shall be in compliance with the "Richmond Refinery Metals Craft Manual". The Contractor is responsible for complying with these quality assurance procedures.
- Any repair alternatives to the instructions in this EWO shall be reviewed and approved by a Chevron Designs Engineer.

4.0 WORK INSTRUCTIONS

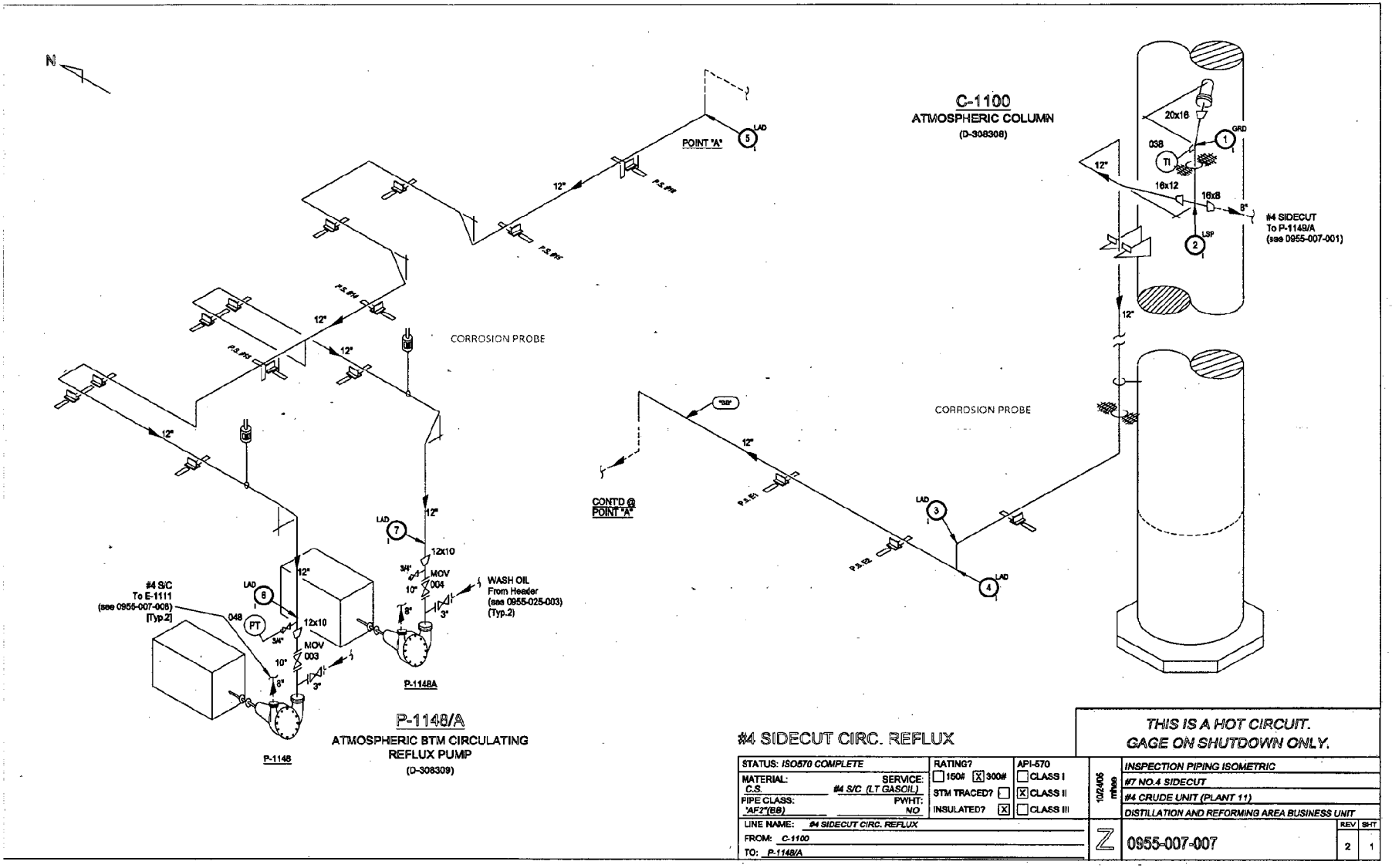
- Refer to **P&ID-308308-21** and **ISO 0955-007-007** for details.
- Field verify all dimensions prior to piping fabrication.
- Inspections to field mark the cut location for new flanges off of C-1100. Inspections must confirm good pipe exists prior to cutting. Ensure there is enough room between the elbow, and the field cut for a hydrotest tool to be installed before cutting.
- Replace the existing #4 Sidecut Reflux piping per **ISO 0955-007-007.**
  - Add new flanges off of C-1100 per inspections marking.
  - Prefabricate as much piping as possible.
  - Disconnect existing corrosion probes as noted in drawing **0955-007**.
- Disconnect existing steam tracing along the system and reuse once work is complete. Reference steam tracing drawing **GF-L99888-1** for any further detail.
  - Hydrotest all new piping @ **1125 psig**.
    - Blind points and vents for the hydrotest to be determined by operations and maintenance. Please engage maintenance and operations to ensure the proper blinds have been installed prior to hydrotesting.

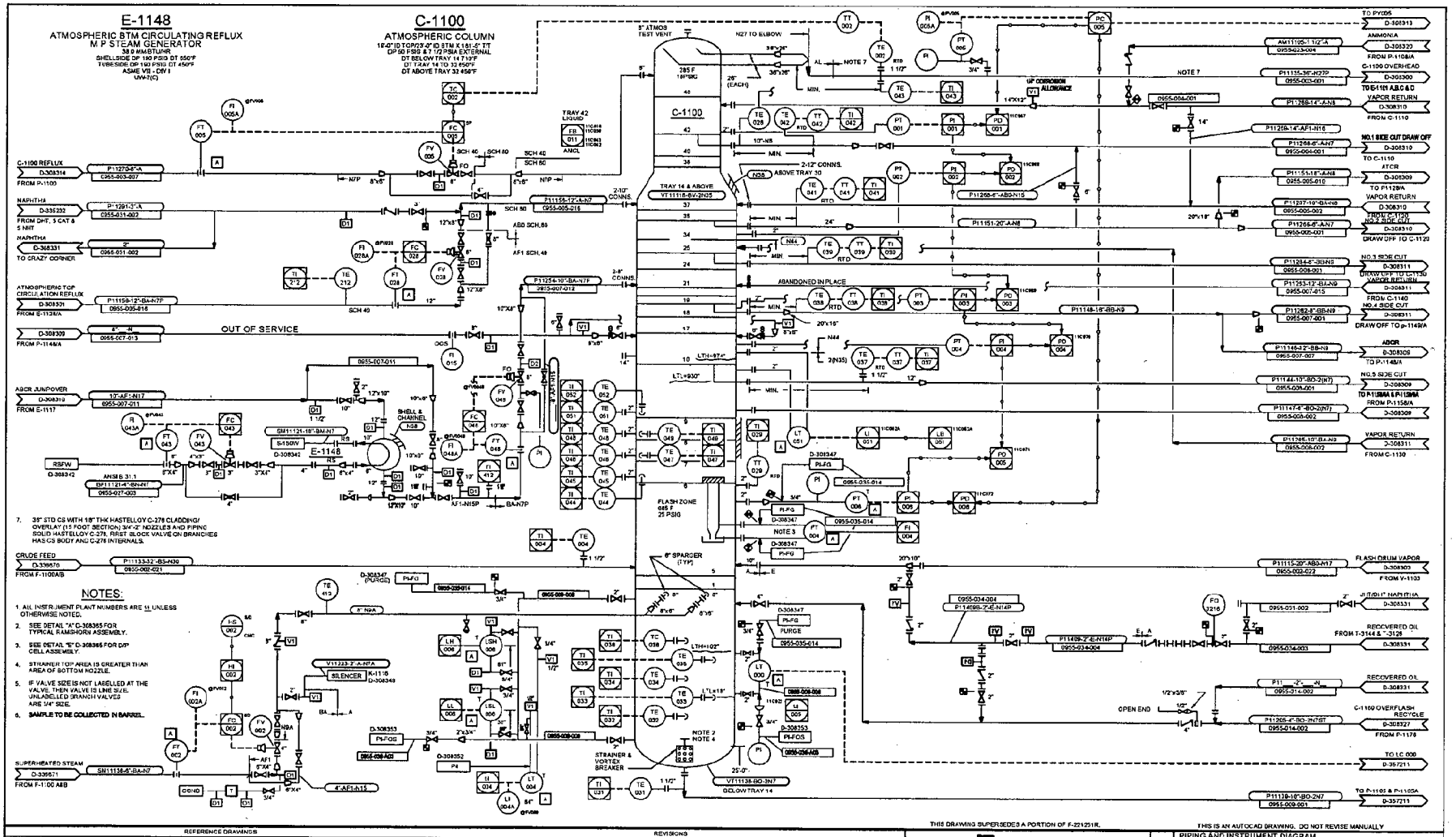
- **PT** the prep on all "old to new welds".
- **RT 5%** random on all butt welds.

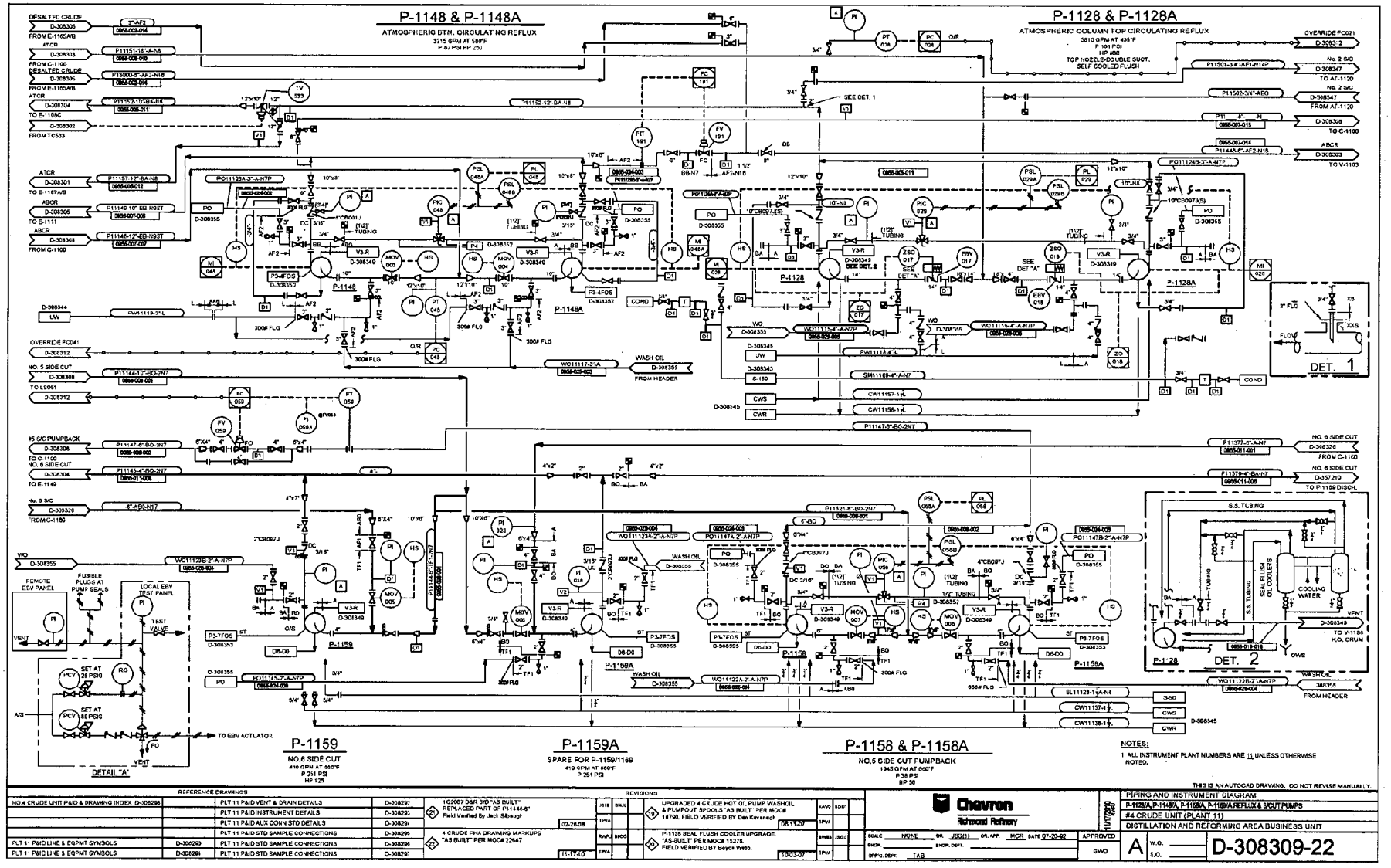
- Insulate all new piping with "N18" per Chevron Standard Drawings **GD-N99993 & GD-N99783**.
  - Use "N18" (3" Calcium Silicate with Aluminum Wrap)
- Re-use all the existing pipe hangers, shoes, and guides.
- Reconnect steam tracing per standard **GF-L99888-1**.

5.0 ATTACHMENTS

	Dwg No	Sheets
• **Welding Procedures**	**CVX-109, CVX-114**	**See Maintenance Personnel**
• **P&ID**	**D308308-21 REV1, D-308309-21 REV1**	**2**
• **Drawing**	**0955-007-007 REV1**	**1**
• **Pipe Spec**	**3CS24**	**3**
• **Std. Insulation for Hot Piping**	**GD-N99783**	**1**
• **Std. Insulation Item Numbers**	**GD-N99993**	**1**
• **Std. Steam Tracing Detail:**	**GF-L99888-1**	**2**


N
POINT "A"
LAD
5
12"
P.S. #16
P.S. #15
P.S. #14
P.S. #13
CORROSION PROBE
C-1100
ATMOSPHERIC COLUMN
(D-308308)
20x16
GRD
1
038
TI
12"
16x12
16x8
8"
LSP
2
#4 SIDECUT
To P-1149/A
(see 0955-007-001)
CORROSION PROBE
"SIP"
CONT'D @
POINT "A"
P.S. E1
P.S. E2
3
4
7
12x10
3/4"
4"
MOV
004
10"
8"
3"
WASH OIL
From Header
(see 0955-025-003)
(Typ.2)
P-1148A
#4 S/C
To E-1111
(see 0955-007-008)
[Typ.2]
8
048
PT
MOV
003
P-1148
P-1148/A
ATMOSPHERIC BTM CIRCULATING
REFLUX PUMP
(D-308309)
#4 SIDECUT CIRC. REFLUX
THIS IS A HOT CIRCUIT.
GAGE ON SHUTDOWN ONLY.
STATUS: ISO570 COMPLETE
RATING7
150# 300#
API-570
CLASS I
MATERIAL: C.S.
SERVICE: #4 S/C (LT GASOIL)
STM TRACED?
CLASS II
PIPE CLASS: "AF2"(BB)
PWHT: NO
INSULATED?
CLASS III
LINE NAME: #4 SIDECUT CIRC. REFLUX
FROM: C-1100
TO: P-1148/A
10/24/05
mhoa
INSPECTION PIPING ISOMETRIC
#7 NO.4 SIDECUT
#4 CRUDE UNIT (PLANT 11)
DISTILLATION AND REFORMING AREA BUSINESS UNIT
0955-007-007
REV
SHT
2
1


E-1148
ATMOSPHERIC BTM CIRCULATING REFLUX
M P STEAM GENERATOR
C-1100
ATMOSPHERIC COLUMN
C-1100 REFLUX
NAPHTHA
ATMOSPHERIC TOP CIRCULATION REFLUX
OUT OF SERVICE
ABOR JUMPOVER
RBFW
CRUDE FEED
SUPERHEATED STEAM
NOTES:
1. ALL INSTRUMENT PLANT NUMBERS ARE 11 UNLESS OTHERWISE NOTED.
2. SEE DETAIL "A" D-308365 FOR TYPICAL RAMSHORN ASSEMBLY.
3. SEE DETAIL "B" D-308365 FOR D/P CELL ASSEMBLY.
4. STRAINER TOP AREA IS GREATER THAN AREA OF BOTTOM NOZZLE.
5. IF VALVE SIZE IS NOT LABELLED AT THE VALVE, THEN VALVE IS LINE SIZE. UNLABELLED BRANCH VALVES ARE 3/4" SIZE.
6. SAMPLE TO BE COLLECTED IN BARREL.
7. 36" STD CS WITH 1/8" THK HASTELLOY C-276 CLADDING/ OVERLAY (15 FOOT SECTION) 3/4"-2" NOZZLES AND PIPING SOLID HASTELLOY C-276. FIRST BLOCK VALVE ON BRANCHES HAS CS BODY AND C-276 INTERNALS.
THIS DRAWING SUPERSEDES A PORTION OF F-221251R.
THIS IS AN AUTOCAD DRAWING. DO NOT REVISE MANUALLY
REFERENCE DRAWINGS
REVISIONS
Chevron
Richmond Refinery
PIPING AND INSTRUMENT DIAGRAM
C-1100 ATMOSPHERIC COLUMN, E-1148, P-1105, P-1105A
#4 CRUDE UNIT (PLANT 11)
DISTILLATION AND REFORMING AREA BUSINESS UNIT
D-308308-21


P-1148 & P-1148A
ATMOSPHERIC BTM. CIRCULATING REFLUX
P-1128 & P-1128A
ATMOSPHERIC COLUMN TOP CIRCULATING REFLUX
DETAIL "A"
DET. 1
DET. 2
P-1159
NO.6 SIDE CUT
P-1159A
SPARE FOR P-1159/1169
P-1158 & P-1158A
NO.5 SIDE CUT PUMPBACK
NOTES:
1. ALL INSTRUMENT PLANT NUMBERS ARE 11 UNLESS OTHERWISE NOTED.
THIS IS AN AUTOCAD DRAWING. DO NOT REVISE MANUALLY.
REFERENCE DRAWINGS
REVISIONS
Chevron
Richmond Refinery
PIPING AND INSTRUMENT DIAGRAM
P-1128/A,P-1148/A, P-1158/A, P-1159/A REFLUX & S/CUT PUMPS
#4 CRUDE UNIT (PLANT 11)
DISTILLATION AND REFORMING AREA BUSINESS UNIT
D-308309-22

		LIMITED BY:	Flanges
SERVICE:	Process	MATERIAL:	Carbon Steel
RATING CLASS:	300 RF, ASME B16.5-2009	DESIGN CODE:	ASME B31.3-2008
TEMPERATURE LIMIT:	Min. to 750F	STRESS RELIEF:	NONE
NOMINAL CORROSION ALLOWANCE:	0.125 in. (0.100 in. MIN)	EXAMINATION:	5% RT, PT & Visual
VALVE TRIM:	API Trim #8 (13CR & HF)		

*LIMITATIONS: Pressure limits for steels in hydrogen service. See Note 302.

PRESSURE - TEMPERATURE RATINGS			NOTE: HYDROTEST @ AMBIENT = 1125 psig					
TEMP F	Min. to 100	200	300	400	500	600	700	750
psig	740	675	655	635	600 (280)*	550 (65)*	535 (50)*	505 (50)*
TEMP C	Min. to 38	93	149	204	260	316	371	399
kPag	5100	4655	4515	4380	4135	3795	3690	3480

For NPS 3/4 through NPS 24 (Full flange ratings per ASME B16.5, Table 2-1.1.)

MINIMUM TEMPERATURE (see Note 300)				
SIZE:	¼" - 16"	18"	20"	24"
°F:	-20	-7	-2	+9
°C:	-29	-21	-19	-12

ITEM	NOTES	NPS	SCH/RAT	ENDS	DESCRIPTION	ITEM CODE
PIPE	20					
		3/4 – 1-1/2	160	PE	CS, SMLS, ASTM A106-B	L11LA1B
		2 – 3	XS	BE	CS, SMLS, ASTM A106-B	L11NA2A
		4 – 10	STD WT	BE	CS, SMLS, ASTM A106-B	L11MA2A
		12 – 24	40	BE	CS, SMLS, ASTM A106-B	L11EA2A
NIPPLES	03, 20					
Branch		3/4 – 1-1/2	160	PE	CS, SMLS, ASTM A106-B	L34LAEJ
Branch		3/4 – 1-1/2	XXS	TOE-POE	CS, SMLS, ASTM A106-B	L34PAHJ
Swage (CONC)		3/4 – 1-1/2	160	BBE	CS, ASTM A234-WPB-S, MSS SP-95	L55LA1VA
Swage (CONC)		3/4 – 1-1/2	XXS	BLE-TSE	CS, ASTM A234-WPB-S, MSS SP-95	L35PBMQ
FITTINGS						
Sockolet		3/4 – 1-1/2	Class 6000	SW	CS, ASTM A105, MSS SP-97	L36VBDT
Thredolet	03	3/4 – 1-1/2	Class 6000	THRD	CS, ASTM A105, MSS SP-97	L36VBAT
SW Elbolet		3/4 – 1-1/2	Class 6000	SW	CS, ASTM A105	L36VBDU
Latrolet	92	3/4 – 1-1/2	160	Weld	CS, ASTM A105	L56LA1K
Weldolet	05	3/4 – 1-1/2	160	Weld	CS, ASTM A105, MSS SP-97	L56LA1H
90 ELL		3/4 – 1-1/2	Class 6000	SW	CS, ASTM A105, ASME B16.11	L30VBDB
45 ELL		3/4 – 1-1/2	Class 6000	SW	CS, ASTM A105, ASME B16.11	L30VBDA
Tee		3/4 – 1-1/2	Class 6000	SW	CS, ASTM A105, ASME B16.11	L31VBD
Tee	03	3/4 – 1-1/2	Class 6000	THRD	CS, ASTM A105, ASME B16.11	L31VBA
Tee (RED)		3/4 – 1-1/2	Class 6000	SW	CS, ASTM A105, ASME B16.11	L31VBDD
Plug	03	3/4 – 1-1/2		THRD	CS, ASTM A105, round head, ASME B16.11	L370ABW
Plug		3/4 – 1-1/2		PE	CS, ASTM A105, round head, ASME B16.11	L370AEW
Coupling		3/4 – 1-1/2	Class 6000	SW	CS, ASTM A105, ASME B16.11	L34VBDH
Cap		3/4 – 1-1/2	Class 6000	SW	CS, ASTM A105, ASME B16.11	L37VBDX
Reducer (CONC)		2 – 3	XS	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L55NA1DA
Reducer (ECC)		2 – 3	XS	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L55NA1DB
Weldolet	05	2 – 3	XS	Weld	CS, ASTM A105, MSS SP-97	L56NA1H
90 LR ELL		2 – 3	XS	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L50NA1BC
45 LR ELL		2 – 3	XS	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L50NA1AC
Tee		2 – 3	XS	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L51NA1
Tee (RED)		2 – 3	XS	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L51NA1D
Cap		2 – 3	XS	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L57NA1R
Reducer (CONC)		4 – 10	STD WT	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L55MA1DA
Reducer (ECC)		4 – 10	STD WT	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L55MA1DB
Weldolet	05	4 – 8	STD WT	Weld	CS, ASTM A105, MSS SP-97	L56MA1H
90 LR ELL		4 – 10	STD WT	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L50MA1BC
45 LR ELL		4 – 10	STD WT	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L50MA1AC
Tee		4 – 10	STD WT	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L51MA1
Tee (RED)		4 – 10	STD WT	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L51MA1D

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ITEM	NOTES	NPS	SCH/RAT	ENDS	DESCRIPTION	ITEM CODE
Cap		4 – 10	STD WT	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L57MA1R
Reducer (CONC)		12 – 24	40	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L55EA1DA
Reducer (ECC)		12 – 24	40	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L55EA1DB
90 LR ELL		12 – 24	40	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L50EA1BC
45 LR ELL		12 – 24	40	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L50EA1AC
Tee		12 – 24	40	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L51EA1
Tee (RED)		12 – 24	40	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L51EA1D
Cap		12 – 24	40	Weld	CS, ASTM A234-WPB-S, ASME B16.9	L57EA1R
VALVES						
Gate	67	1/2 – 1/2	Class 800	MSW/FSW	CS body, API #8 trim, BB, RP, EXTD BDY	L20KAXHDM
Gate	15	3/4 – 1-1/2	Class 300	RF	CS body, API #8 trim, BB, RP	L20FA3DD
Gate	06	3/4 – 1-1/2	Class 800	T/SW	CS body, API #8 trim, BB, RP	L20KA7DD
Gate		3/4 – 1-1/2	Class 800	SW	CS body, API #8 trim, BB, RP	L20KA1DD
Gate	325	3/4 – 1-1/2	Class 800	SW	CS body, API #8 trim, BB, FP	L20KA1DD
Gate	161	3/4 – 1-1/2	Class 800	T/SW	CS body, API #8 trim, BELLOW SEAL, BB, RP	L20KA7DDL
Gate	161	3/4 – 1-1/2	Class 800	SW	CS body, API #8 trim, BELLOW SEAL, BB, RP	L20KA1DDL
Gate	161,325	3/4 – 1-1/2	Class 800	SW	CS body, API #8 trim, BELLOW SEAL, BB, FP	L20KA1DDL
Gate	06	3/4 – 1-1/2	Class 800	MSW/FNPT	CS body, API #8 trim, BB, RP, EXTD BDY	L20KAYHDM
Gate		2 - 6	Class 300	RF	CS body, API #8 trim, BB, FP	L20FA3DD
Gate		8 - 24	Class 300	RF	CS body, API #8 trim, BB, FP, GO	L20FA3DDF
Globe	161, 307	3/4 – 1-1/2	Class 800	SW	CS body, API #8 trim, BELLOW SEAL, WB	L21KA1JEL
Globe	307	3/4 – 1-1/2	Class 800	SW	CS body, API #8 trim, BB	L21KA1DE
Globe	307	2 - 2	Class 300	RF	CS body, API #8 trim, BB	L21FA3DE
Globe	307	3 - 8	Class 300	RF	CS body, API #8 trim, BB, GO	L21FA3DEB
Check	61,328	3/4 – 1-1/2	Class 800	SW	CS body, API #8 trim, BC, piston, HORIZ	L22KA1TEF
Check	62,328	2 – 24	Class 300	RF	CS body, API #8 trim, BC, Swing	L22FA3PE
Check	62,328	2 – 24	Class 300	RF	CS body, API #8 trim, Dual Plate	L22FA3LEH
Ball	26, 101, 164	2 - 12	Class 300	RF	CS, body T3 MOD, Orbit H8 seat	L25FB3FD
Ball	26, 63, 101	2 - 12	Class 300	RF	CS, body T3 MOD, Orbit H seat	L25FB3FF
Butterfly	101	2 – 24	Class 300	RF	CS body, 316 SS trim, Flg, Triple Offset GO	L26FA3TJM
FLANGES	02					
Socket Weld		3/4 – 1-1/2	Class 300	RF	CS, ASTM A105, ASME B16.5, 160 Bore	L40FA3BL
Blind		3/4 – 24	Class 300	RF	CS, ASTM A105, ASME B16.5	L43FA3
Blind Spectacle		3/4 – 14	Class 300	RF	CS, ASTM A516-70, ASME B16.48	L45FA3E
Spacer Ring		16 – 24	Class 300	RF	CS, ASTM A516-70, ASME B16.48	L45FA3FZ
Blind Plate		16 – 24	Class 300	RF	CS, ASTM A516-70, ASME B16.48	L45FA3GZ
Weld Neck		2 – 3	Class 300	RF	CS, ASTM A105, ASME B16.5, XS Bore	L40FA3DN
Weld Neck		4 – 10	Class 300	RF	CS, ASTM A105, ASME B16.5, STD WT Bore	L40FA3DM
Weld Neck		12 – 24	Class 300	RF	CS, ASTM A105, ASME B16.5, 40 Bore	L40FA3DE
Pair WN Orifice		2 – 3	Class 300	RF	CS, ASTM A105, ASME B16.36, ½ SW taps, XS Bore	L42FA3DNL
Pair WN Orifice		4 – 10	Class 300	RF	CS, ASTM A105, ASME B16.36, ½ SW taps, STD WT Bore	L42FA3DML
Pair WN Orifice	17	12 – 18	Class 300	RF	CS, ASTM A105, ASME B16.36, ½ SW taps, 40 Bore	L42FA3DEL
GASKETS						
		3/4 - 24	Class 300	RF	Spiral wound type 316L SS w/ flexible Inhibited Graphite filler, ASME B16.20, w/inner ring.	L61FF1CAC
	301	3/4 – 24	Class 300		KAM style, 316LSS w/APX-2 Graphite, EXH-SU-5151	L61FF1ZA
BOLTING						
Stud Bolts	310	3/4 – 24			ASTM A193, Gr B7 stud w/ 2 heavy hex nuts ASTM A194, Gr 2H	L620BM
Stud Bolts	311	3/4 - 24			ASTM A193, Gr B16 stud w/ 2 heavy hex nuts ASTM A194, Gr 7	L620CM

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90° BRANCH CONNECTION, Legend and Chart

BRANCH \ HEADER SIZE	24	20	18	16	14	12	10	8	6	4	3	2	1-1/2	1	3/4	1/2
24	T															
20	E	T														
18	E	E	T													
16	E	E	E	T												
14	E	E	E	E	T											
12	E	E	E	E	E	T										
10	E	E	E	E	E	E	T									
8	W	E	E	E	E	E	E	T								
6	W	W	W	E	E	E	E	E	T							
4	W	W	W	W	W	W	E	E	E	T						
3	W	W	W	W	W	W	W	E	E	E	T					
2	W	W	W	W	W	W	W	W	W	E	E	T				
1-1/2	S	S	S	S	S	S	S	S	S	S	S	S	T			
1	S	S	S	S	S	S	S	S	S	S	S	S	E	T		
3/4	S	S	S	S	S	S	S	S	S	S	S	S	E	E	T	
1/2	S	S	S	S	S	S	S	S	S	S	S	S	E	E	E	T

E Reducing Tee
P Branch Weld w/ Reinforcing Pad (Pad thickness equals run pipe thickness. Pad width equals 1/2 branch OD.)
T Equal Tee
S Sockolet
W Weldolet (Note 05)

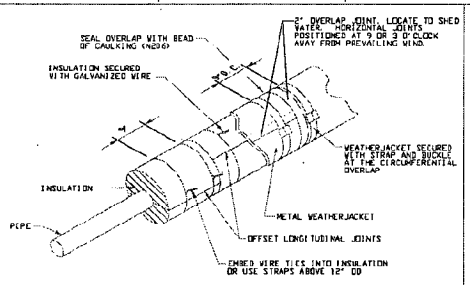
NOTES:

03 THREADED JOINTS ARE PERMITTED ONLY AT OUTLET OF VENT AND DRAIN VALVES, AT HYDROSTATIC CONNECTIONS, AT OUTLET OF INSTRUMENT TAKE-OFF VALVES, AND TO MATCH EQUIPMENT.
05 INTEGRALLY REINFORCED BRANCH CONNECTIONS ARE PERMITTED OUTSIDE THE SIZES SHOWN IN THE BRANCH CONNECTION TABLE. DESIGNER SHALL CHECK WELD THICKNESS OF INTEGRALLY REINFORCED CONNECTIONS TO DETERMINE IF PWHT IS REQUIRED.
06 THESE VALVES SHALL BE USED FOR VENT, DRAIN AND INSTRUMENT CONNECTIONS ONLY.
09 PRESSURE AND TEMPERATURE RATING MAY BE LIMITED BY CERTAIN COMPONENTS PERMITTED BY THIS SPECIFICATION. REFER TO MANUFACTURER'S RECOMMENDED PRESSURE-TEMPERATURE RESTRICTIONS.
15 TO BE USED WHEN MATING TO FLANGED NOZZLES.
20 SCH XXS PIPE AND PIPE NIPPLES SHALL BE USED FOR THREADED CONNECTIONS FOR SIZES NPS 1/2 – 1-1/2.
26 TO BE USED ONLY WHEN INDICATED ON THE P&ID.
61 INSTALL IN HORIZONTAL POSITION WITH COVER UP.
62 INSTALL IN HORIZONTAL POSITION WITH COVER UP OR IN VERTICAL POSITION WITH UPWARD FLOW.
300 FOR PIPING SYSTEM MAWP LOWER THAN PIPE CLASS MAX. PRESSURE, SEE FIG. 323.2.2B IN ASME B31.3 FOR REDUCTION IN MINIMUM DESIGN METAL TEMPERATURE.
301 FOR USE IN VOC REGULATED SERVICES; IN FLANGES WITH SLIGHTLY DAMAGED GASKET SEATING FACES; OR IN FLANGES WITH A HISTORY OF LEAKING.
302 MAXIMUM HYDROGEN PARTIAL PRESSURE FOR STEELS IN HYDROGEN SERVICE. PRESSURE LIMITS ARE BASED ON FIGURE 1 IN API 941 WITH A REQUIRED SAFETY FACTOR OF -50°F (-10°F) AND -50 PSI (-345 KPA).
307 LIMITED TO THROTTLING SERVICES UP TO 150 PSI DIFFERENTIAL PRESSURE. FOR SERVICE APPLICATIONS WITH DIFFERENTIAL PRESSURES GREATER THAN 150 PSI, CONSULT WITH THE VALVE MANUFACTURER AND CHEVRON PIPING & VALVE SME FOR SUITABILITY.
310 ASME A193/SA193 GR. B7 STUD BOLTING IS LIMITED TO PROCESS SERVICE TEMPERATURES NOT GREATER THAN 700°F TO AVOID THERMAL FATIGUE CRACKING.
311 ASME A193/SA193 GR. B16 STUD BOLTING SHOULD BE USED IN ALL PROCESS SERVICES WITH TEMPERATURES GREATER THAN 700°F. FLANGES SHOULD NOT BE INSULATED AT PROCESS SERVICE TEMPERATURES ABOVE 850°F TO AVOID THERMAL FATIGUE CRACKING. AT TEMPERATURES GREATER THAN 850°F, WEATHER SHIELDS OVER FLANGES ARE ACCEPTABLE.
325 USE FULL PORT VALVES IN LOCATIONS REQUIRING FULL OPENINGS SUCH AS UPSTREAM AND DOWNSTREAM OF RELIEF VALVES OR IN HORIZONTAL LINES CONTAINING HAZARDOUS LIQUIDS.
328 SIZING AND LOCATION OF CHECK VALVES IS CRITICAL FOR RELIABLE OPERATION. SEE SECTION 6.0 (25) IN THE GENERAL SPECIFICATION FOR MORE INFORMATION.
17 USE WELD NECK FLANGES AND THROAT TAPS NPS 20 INCH AND LARGER
63 ORBIT VALVE WITH TYPE "H" SEATS LIMITED TO 500F.
67 USE RESTRICTED ORIFICE FLANGE TAP CONNECTIONS. THREADED NIPPLES TO BE SEAL WELDED. NIPPLE LENGTHS SHALL BE IN ACCORDANCE WITH STANDARD DRAWING D-601407.
92 USE RESTRICTED TO THERMOWELL ASSEMBLIES.
101 TO BE USED WHERE TIGHT SHUT-OFF IS REQUIRED.
161 USE BELLOW SEAL GATE VALVES FOR ALL IN-KIND REPLACEMENT ONLY. INSTALL NEW BELLOW SEALVALVES WHEN REQUIRED BY PROJECT FOR PERMIT PURPOSES.
164 USE ORBIT VALVES WITH T7 (CORROSIVE) TRIM & TYPE h8 SEAT IN 500 F TO 650 F TEMP RANGE.

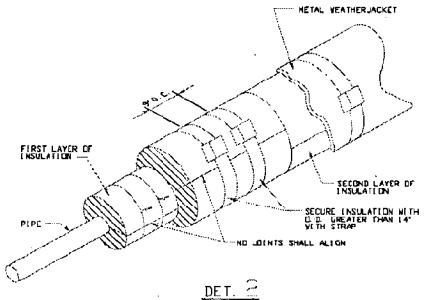
SERVICE:

- HC Liquid Gas & Vapor (Corrosive)
- HC Liquid Gas & Vapor (Corrosive) w/ Trace H2S
- LPG (Corrosive) & LPG w/ Trace H2S
- LPG w/HC Mixtures (Corrosive)
- LPG w/HC Mixtures (Corrosive) w/ Trace H2S
- H2 & H2/HC to 450F (232C)
- H2 & H2/HC w/ Trace H2S to 450F (232C)

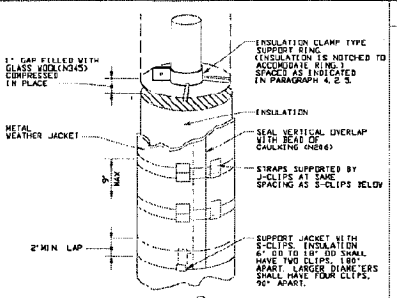
CUSA-CSB-0001302
EPA



DET. 1
SINGLE LAYER PIPE INSULATION
USE WITH PARAGRAPH 4.2.2 AND 4.2.3



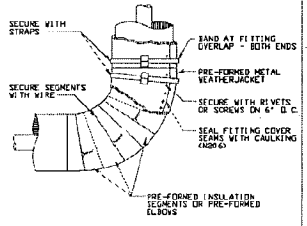
DET. 2
DOUBLE LAYER PIPE INSULATION
(USE WITH PARAGRAPH 4.2.2, 4.2.3 AND 4.2.4)



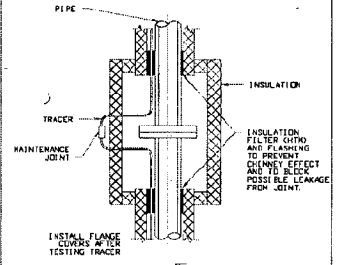
DET. 3
VERTICAL PIPE INSULATION
USE WITH PARAGRAPH 4.2.5 AND 4.3.6

NOTES

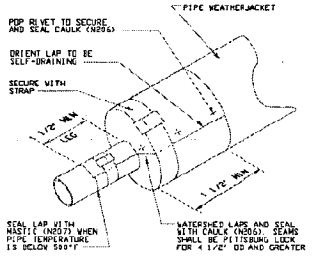
1. DELETED
2. ITEM DESCRIPTIONS (i.e. 'N' NUMBERS) ARE DETAILED ON GD-N99993, STANDARD INSULATION ITEM NUMBERS.
3. WHEN LINE IDENTIFICATION SHEET SPECIFIES "INSULATED VALVES", FLANGES AND FITTINGS ARE TO BE INSULATED AS WELL.
4. INSULATION IS GENERALLY SHOWN AS SINGLE LAYER, BUT THE DETAILS APPLY TO THE NUMBER AND THICKNESS OF LAYERS AS DESCRIBED IN SUMMARY.



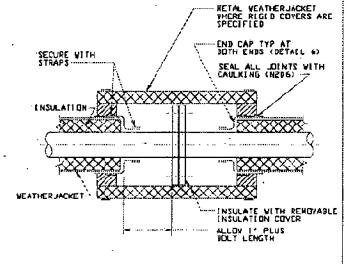
DET. 4
INSULATION OF PIPE BENDS
USE WITH PARAGRAPH 4.2.8 AND 4.3.1c



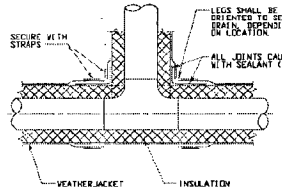
DET. 5
TRACED VERTICAL PIPE INSTALLATION



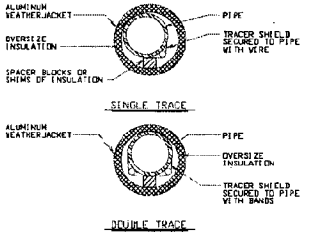
DET. 6
END CAP CONSTRUCTION AT INSULATION TERMINATION
USE DRAWING WITH PARAGRAPH 4.3.4



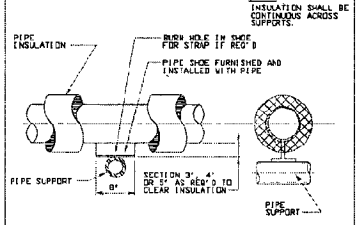
DET. 7
INSULATION OF FLANGED FITTINGS, TWO-PIECE RIGID OR SOFT REMOVABLE PER CHEVRON DIRECTION



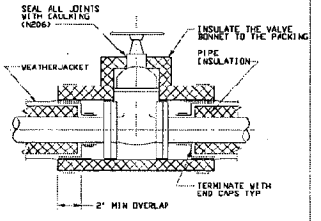
DET. 8
INSULATION OF VALVES AND FITTINGS



DET. 9
INSULATION OF STEAM TRACED LINES SUPPORTED BY HANGERS
USE DRAWING WITH PARAGRAPH 4.4



DET. 10
PIPE SUPPORTS
(NOT APPLICABLE TO ALLOY PIPE)



DET. 11
INSULATION OF VALVES, TWO-PIECE RIGID OR SOFT REMOVABLE PER CHEVRON DIRECTION

REFERENCE DRAWINGS		
STANDARD INSULATION ITEM NUMBERS	GD-N99993	
STANDARD INSULATION FOR HOT VESSELS	GD-N99985	
STEAM TRACING DETAILS SHEET 1 & 2	GF-L99888	

REVISIONS			
6	REVISED DET 1,2,3,4,6,7,9 AND 11. REPLACED DETAIL 5. ADDED NEW BORDER. DELETED NOTE 1.	5-12-95	LNT
3	REVISED AND REDRAWN ON CAD FOR MANUALS RESTRUCTURING TASK FORCE	3-14-99	WS REK 3/24 / WM DJC 3/23 / DM DM 3/31

Chevron Research and Technology

SCALE NONE DATE 5-20-86 APPROVED RPM
DR AT CH CMV DR. APP CEZ ENGR FB
OPR'G DEPT. ENG. DEPT. DRL

STANDARD INSULATION FOR HOT PIPING

N C.S. S.D.

GD-N99783 6

STANDARD DRAWING

NOTESAND.DWG JBG 04/28/97 T-STDDWGS

CUSA-CSB-0001303
EPA

ITEM NO.	DESCRIPTION
	MODERATE TEMPERATURE PIPE INSULATION - SEE NOTE IA1
N1	1" THICK SECTIONAL TYPE
N2	1 1/2" THICK SECTIONAL TYPE
N3	2" THICK SECTIONAL TYPE
	HIGH TEMPERATURE PIPE INSULATION - SEE NOTE IA2
N14	1" THICK SECTIONAL TYPE
N15	1 1/2" THICK SECTIONAL TYPE
N16	2" THICK SECTIONAL TYPE
N17	2 1/2" THICK SECTIONAL TYPE
N18	3" THICK SECTIONAL TYPE
N19	3 1/2" THICK SECTIONAL TYPE, DOUBLE LAYER
N20	4" THICK SECTIONAL TYPE, DOUBLE LAYER
	VERY HIGH TEMPERATURE PIPE INSULATION - SEE NOTE IA3
N21	1" THICK TYPE
N22	1 1/2" THICK TYPE
N23	2" THICK TYPE
N24	2 1/2" THICK TYPE
N25	3" THICK TYPE
N26	3 1/2" THICK TYPE, DOUBLE LAYER
N27	4" THICK TYPE, DOUBLE LAYER
N28	4 1/2" THICK TYPE, DOUBLE LAYER
N29	5" THICK TYPE, DOUBLE LAYER
	INSULATION FOR SMALL STEAM TRACER SUPPLY LINES AND STEAM TRAP RETURN LINES
N100	PREINSULATED TUBING - FURON, DEKORON/UNITHERM DIV. OR THERMON
	HIGH TEMPERATURE EQUIPMENT INSULATION - SEE NOTE IA2
N42	1 1/2" THICK BLOCK TYPE
N43	2" THICK BLOCK TYPE
N44	2 1/2" THICK BLOCK TYPE
N45	3" THICK BLOCK TYPE
N46	3 1/2" THICK BLOCK TYPE, DOUBLE LAYER
N47	4" THICK BLOCK TYPE, DOUBLE LAYER
N48	4 1/2" THICK BLOCK TYPE, DOUBLE LAYER
N49	5" THICK BLOCK TYPE, DOUBLE LAYER
	VERY HIGH TEMPERATURE EQUIPMENT INSULATION - SEE NOTE IA3
N50	1 1/2" THICK BLOCK TYPE
N51	2" THICK BLOCK TYPE
N52	2 1/2" THICK BLOCK TYPE
N53	3" THICK BLOCK TYPE
N54	3 1/2" THICK BLOCK TYPE, DOUBLE LAYER
N55	4" THICK BLOCK TYPE, DOUBLE LAYER
N56	4 1/2" THICK BLOCK TYPE, DOUBLE LAYER
N57	5" THICK BLOCK TYPE, DOUBLE LAYER
N58	5 1/2" THICK BLOCK TYPE, DOUBLE LAYER
N59	6" THICK BLOCK TYPE, DOUBLE LAYER
	COLD PIPE SECTIONAL TYPE INSULATION - SEE NOTE 1B
N60	1" THICK CELLULAR GLASS
N61	1 1/2" THICK CELLULAR GLASS
N62	2" THICK CELLULAR GLASS
N63	2 1/2" THICK CELLULAR GLASS
N64	3" THICK CELLULAR GLASS, DOUBLE LAYER
N65	3 1/2" THICK CELLULAR GLASS, DOUBLE LAYER
N66	4" THICK CELLULAR GLASS, DOUBLE LAYER
N67	4 1/2" THICK CELLULAR GLASS, DOUBLE LAYER
N68	5" THICK CELLULAR GLASS, DOUBLE LAYER
N69	5 1/2" THICK CELLULAR GLASS, DOUBLE LAYER
N70	6" THICK CELLULAR GLASS, DOUBLE LAYER
N71	6 1/2" THICK CELLULAR GLASS, TRIPLE LAYER
N72	7" THICK CELLULAR GLASS, TRIPLE LAYER
N73	7 1/2" THICK CELLULAR GLASS, TRIPLE LAYER
	COLD EQUIPMENT BLOCK TYPE INSULATION - SEE NOTE 1B
N465	1" THICK CELLULAR GLASS
N466	1 1/2" THICK CELLULAR GLASS
N467	2" THICK CELLULAR GLASS
N468	2 1/2" THICK CELLULAR GLASS
N469	3" THICK CELLULAR GLASS

ITEM NO.	DESCRIPTION
	COLD EQUIPMENT BLOCK TYPE INSULATION - CONTINUED
N470	3 1/2" THICK CELLULAR GLASS, DOUBLE LAYER
N471	4" THICK CELLULAR GLASS, DOUBLE LAYER
N472	4 1/2" THICK CELLULAR GLASS, DOUBLE LAYER
N473	5" THICK CELLULAR GLASS, DOUBLE LAYER
N474	5 1/2" THICK CELLULAR GLASS, DOUBLE LAYER
N475	6" THICK CELLULAR GLASS, DOUBLE LAYER
N476	6 1/2" THICK CELLULAR GLASS, TRIPLE LAYER
N477	7" THICK CELLULAR GLASS, TRIPLE LAYER
N478	7 1/2" THICK CELLULAR GLASS, TRIPLE LAYER
N479	8" THICK CELLULAR GLASS, TRIPLE LAYER
	HOT TANK INSULATION - SEE NOTES IC & ID
N30	2" BLOCK TYPE TANK INSULATION
N31	3" BLOCK TYPE TANK INSULATION
	MISCELLANEOUS MATERIALS FOR HOT AND COLD INSULATION
N202	HIGH TEMPERATURE INSULATING CEMENT - 'SUPER-STICK' P.K. INSULATION
N203	HIGH TEMPERATURE INSULATION CEMENT - 'QUICK-COTE' P.K. INSULATION
N206	WEATHERJACKET CAULKING - DOW-CORNING '732' (SILICONE), FOSTER '95-44' (BUTYL), CHILDERS 'CP-76' (BUTYL), GE '1009' (-100°F TO +250°F)
N207	HIGH TEMPERATURE SEMI-VISCOUS WEATHERCOAT - (-75°F TO +500°F) CHILDERS 'CP-79 CHILASTIC'
N208	GENERAL PURPOSE MASTIC - (-20°F TO +180°F) '46-51' H.B. FULLER (FOSTER), 'CP-11-1' CHILDERS
N209	WEATHERCOAT - TROWEL GRADE '90-07', H.B. FULLER (FOSTER), 'CP-25' CHILDERS
N210	AMORPHOUS WOOL BLANKET, (TO 1800°F) 6# DENSITY, 1" THICK 'SF 607' THERMAL CERAMICS; AMORPHOUS WOOL BLANKET, (TO 1800°F) 8# DENSITY, 1" THICK 'INSULFRAX 1800' CARBORUNDUM (PREFERRED)
N211	REFACTORY CERAMIC FIBER 8# DENSITY
N212	FIBERGLASS BLANKET, (TO 1200°F) 10# DENSITY, 1/2" THICK 'INSUL-BATTE/TEMPMAT' J.P. STEVENS
N213	MODIFIED ACRYLIC OR POLYESTER FABRIC; UNCOATED, OPEN WEAVE, 8 x 8 MESH 'MAST-A-FAB' 9 x 8 SYNTHETIC MEMBRANE - FOSTER
N214	GLASS FABRIC; ASPHALT IMPREGNATED, OPEN WEAVE, 10 x 10 MESH
N215	GLASS FABRIC; UNCOATED, OPEN WEAVE, 10 x 10 MESH
N219	0.010" THICK STAINLESS STEEL SMOOTH SHEET WITH MOISTURE BARRIER
N220	0.010" THICK SMOOTH PRE-FORMED STAINLESS STEEL GORE SEGMENTS FOR SWEEPING ELLS WITH MOISTURE BARRIER, 'GORE ELL-JAC' CHILDERS OR EQUAL
N221	0.010" THICK 1 1/4" PITCH CORRUGATED STAINLESS STEEL SMOOTH SHEETS WITH MOISTURE BARRIER
N222	22 GAGE SMOOTH GALVANIZED STEEL SHEET
N223	16 GAGE SMOOTH GALVANIZED STEEL SHEET
N224	0.040" SMOOTH ROLL ALUMINUM JACKETING WITH MOISTURE BARRIER
N225	0.016" THICK, 3/16" CROSS-CRIMPED CORRUGATED ALUMINUM WEATHER JACKET WITH MOISTURE BARRIER
N226	0.020" THICK SMOOTH ALUMINUM WEATHER JACKET, HEMMED, WITH MOISTURE BARRIER
N227	0.024", 1 1/4" PITCH CORRUGATED ALUMINUM WEATHER JACKET WITH MOISTURE BARRIER - SMOOTH
N228	0.024", 3/16" CORRUGATED ALUMINUM WEATHER JACKET WITH MOISTURE BARRIER
N229	0.024" SMOOTH ROLL ALUMINUM JACKETING WITH MOISTURE BARRIER
N230	0.020" THICK, 1 1/4" PITCH CORRUGATED ALUMINUM WEATHER JACKET WITH MOISTURE BARRIER - SMOOTH
N231	0.024" THICK, SMOOTH, PRE-FORMED ALUMINUM GORE SEGMENTS FOR SWEEPING ELLS WITH MOISTURE BARRIER, 'GORE ELL-JAC' CHILDERS OR EQUAL
N232	END CAPS FOR PIPING - 0.016" SMOOTH ALUMINUM WITH MOISTURE BARRIER
N233	STAINLESS STEEL END CAPS FOR PIPING - 0.010" THICK WITH MOISTURE BARRIER
N240	0.016" THICK STAINLESS STEEL SMOOTH SHEET WITH MOISTURE BARRIER
N241	0.020" THICK STAINLESS STEEL SMOOTH SHEET WITH MOISTURE BARRIER
N242	0.016" THICK ALUMINUM SMOOTH SHEET, HEMMED, WITH MOISTURE BARRIER, 22 GAGE,
N243	300 SERIES STAINLESS STEEL SMOOTH SHEET, 22 GAGE
N244	GLASSFIBER TAPE, (TO 1000°F), 2" x 1/8", WOVEN, PLAIN WRAP, BOTH EDGES SELVAGED
N245	EXPANDED METAL, GALVANIZED, 1", 16 GAGE FLATTENED
N246	0.024" THICK 2-PIECE PRE-FORMED ALUMINUM (1100 ALLOY) ELBOW COVERS
N247	0.024" THICK x 2 1/2" PITCH, CORRUGATED ALUMINUM SHEETS WITH MOISTURE BARRIER
N248	0.032" THICK SMOOTH ROLL ALUMINUM JACKETING WITH MOISTURE BARRIER
N249	ALUMINUM FOIL, EXTRA HEAVY DUTY, ITEM 'W' 38
N250	0.016" THICK STEEL, SMOOTH ROLL JACKETING, AZ-60 GALVALUME COATED WITH MOISTURE BARRIER
N251	0.024" THICK 4-PIECE ALUMINUM ELBOW COVERS FOR SIZE 10 x 4 THRU 18 x 2, '4-PIECE ELL-JACS' CHILDERS

ITEM NO.	DESCRIPTION
	MISCELLANEOUS MATERIALS FOR HOT AND COLD INSULATION - CONT'D
N252	GALVANIZED STEEL CHANNEL FOR TUBING TRACERS
N253	0.024" THICK SMOOTH PRE-FORMED ALUMINUM GORE SEGMENTS FOR VESSEL HEADS, 'GORE HEAD-JACS' CHILDERS OR EQUAL
N330	1" x 0.020" STAINLESS STEEL HEXAGONAL POULTRY NETTING
N331	16 GAGE BLACK IRON WIRE
N333	16 GAGE, TYPE 300 SERIES STAINLESS STEEL, DEAD-SOFT, WIRE
N334	3/4" x 0.020" TYPE 302 STAINLESS STEEL STRAPPING
N335	TYPE 302 STAINLESS STEEL BUCKLE FOR 3/4" x 0.020 STRAPPING
N336	1/2" x 0.015" TYPE 302 STAINLESS STEEL STRAPPING
N337	TYPE 302 STAINLESS STEEL BUCKLE FOR 1/2" x 0.015" STRAPPING
N338	TYPE 304 STAINLESS STEEL DUAL SPRING EXPANSION UNIT - SEE DETAIL 6 DRAWING GD-N99995 - SUPER-MITY BY CHILDERS
N340	STAPLE, TINNED AND COPPERIZED
N341	STAINLESS STEEL FLAT SPRING EXPANSION UNIT - 4" CHIL-SPRING CHILDERS
N342	CHERRY T RIVETS - 'BAPTS 6-062' ALUMINUM 3/16"
N343	CHERRY N RIVETS - 'AAP42' ALUMINUM 1/8"
N344	#8 x 1/2", TYPE 300 STAINLESS STEEL SLOTTED HEX HEAD SHOULDERED, TYPE AB SELF DRILLING OR SELF TAPPING
N345	OWENS-CORNING 'THERMAL INSULATING WOOL (TIW) TYPE I'
N346	LAYBAR WELDING STUDS - STAINLESS STEEL, 3/8" DIAMETER
N347	WEATHERJACKET IMPALEMENT STUDS - 5/16" DIAMETER, STAINLESS STEEL OR STAINLESS STEEL COMPOSITE, - NELSON 'SET-LOCK' TYPE WITH STAINLESS STEEL OR ALUMINUM CAPS
N348	CHERRY N RIVETS - 'CCP-42' 1/8" STAINLESS STEEL
N349	18 GAGE, TYPE 300 SERIES STAINLESS STEEL, DEAD SOFT, WIRE
N350	3/4" x 0.025" TYPE 304 STAINLESS STEEL CLOSED SEALS, HEAVY DUTY
N351	CHEERY N RIVETS- 'CCP62' 3/16" STAINLESS STEEL
N352	CHEERY N RIVETS- 'AAP62' 3/16" ALUMINUM
N353	1 1/4" x 0.020" TYPE 304 STAINLESS STEEL STRAPPING AND 1 1/4" HEAVY DUTY CLOSED SEALS - CHILDERS
N449	FIBROUS ADHESIVE - CHILDERS 'CP-97', FOSTER '81-27'
N450	JOINT SEALER AND BEDDING COMPOUND, TEMPERATURE RANGE - 100°F TO 300°F - H.B. FULLER (FOSTER) 'FOAMSEAL 30-45', CHILDERS 'CP-70'
N453	FIBRATED ASPHALT CUTBACK MASTIC VAPOR BARRIER '30-90' H.B. FULLER (FOSTER), 'CP-22' CHILDERS, 'NOKORODE SEAL-KOTE' TOSCO CORPORATION
N454	FORMGLASS, BORE COATING, TEMPERATURE RANGE -300°F TO 300°F - U.S. GYPSUM 'HYDROCAL B-11', FOSTER '30-16'
N455	1/16" NEOPRENE RUBBER SHEET, 20" WIDE
N456	50 MIL THICK VAPOR BARRIER MEMBRANE SHEET, 36" WIDE, 'INSULRAP 50' POLYGUARD PRODUCTS INC
N501	3/8" DIAMETER STAINLESS STEEL ROD

NOTES (CONTINUED)

II. MANUFACTURER'S 'BRAND NAMES' OR 'TRADE NAMES' SHOWN ON THIS DRAWING ARE PRODUCTS ACCEPTABLE TO COMPANY. COMPARABLE PRODUCTS BY OTHER MANUFACTURERS MAY BE PROPOSED, BUT THE USE OF ANY SUBSTITUTES MUST HAVE COMPANY APPROVAL.

III. COLORED STRAPPING FOR JACKETING OVER NON-ASBESTOS INSULATION, (E.G. CHILDERS 'BLUE').

IV. CONSIDER USING COLORED STRAPPING FOR INDICATING NON-ASBESTOS INSULATION (E.G. CHILDERS 'ROYAL BLUE').

V. FOR HOT PIPING AND EQUIPMENT INSULATION GREATER THAN 3" THICK, USE DOUBLE LAYER INSULATION.

NOTES

1. ACCEPTABLE INSULATION BRANDS (SEE NOTE II):
   - A. HOT PIPING (N1-N29) AND EQUIPMENT (N42-N59) INSULATION
     - 1. MODERATE TEMPERATURE INSULATION FOR USE UP TO 450°F
       - a. FIBERGLASS WITH BINDER (TO 450°F)
         - (1) MANVILLE/SCHULLER 'MICRO-LOK WITH ASJ/SSL JACKET'
         - (2) OWENS CORNING 'ASJ/SSL-II'
         - (3) KNAUF FIBERGLASS 'KNAUF PIPE INSULATION W/ASJ JACKET'
     - 2. HIGH TEMPERATURE INSULATION FOR USE UP TO 1200°F
       - a. CALCIUM SILICATE
         - (1) CALSILITE - MADE BY THE FILTERED PRESSED METHOD AT THE BRUNSWICK, GA PLANT (PREFERRED)
         - (2) MANVILLE 'THERMAL 12'
         - (3) CALSILITE - MADE BY THE CAST METHOD AT THE RUSTON, LA PLANT.
       - b. MINERAL WOOL
         - (1) OWENS CORNING HIGH TEMP 1200°AND INDUSTRIAL BOARD (PREFERRED)
         - (2) FIBREX INC 'EPITHERM 1200'
       - c. PERLITE SILICATE
         - (1) KNAUF INNOVA 'TEMPERLITE 1200'
         - (2) CALSILITE/SPROULE 'WR 1200'
         - (3) HOWRED CORP 'GOODTEMP'
       - d. PERLITE SILICATE MOLDED FITTING COVERS
         - (1) CALSILITE/SPROULE 'WR 1200 FITTING COVERS'
         - (2) KNAUF INNOVA 'TEMPERLITE 1200 FITTING COVERS'
     - 3. VERY HIGH TEMPERATURE INSULATION FOR USE TO 1800°F
       - a. SOLUBLE AMORPHOUS MINERAL WOOL BLANKET TO 1800°F
         - (1) CARBORUNDUM '8#, INSULFRAX 1800 BLANKET' (PREFERRED)
         - (2) THERMAL CERAMICS '6#, SF607 BLANKET'
       - b. CERAMIC FIBER BLANKET FOR USE TO 2300°F
         - (1) THERMAL CERAMICS 'KAOWOOL'
         - (2) CARBORUNDUM 'FIBERFRAX DURABLANKET'
         - (3) A.P. GREEN 'INSWOOL'
       - c. HIGH TEMPERATURE BLOCK
         - (1) A.P. GREEN INSBLOCK 19, 8# DENSITY
         - (2) U.S. G KFAC 19, 18# DENSITY
   - B. COLD PIPING (N60-N73) AND EQUIPMENT (N465-N479) INSULATION
     - 1. CELLULAR GLASS INSULATION, SECTIONAL AND SEGMENTAL, WITHOUT JACKETS, CURVED SEGMENTS, BEVELED LAGS, FLAT BLOCKS AND HEAD SEGMENTS.
       - a. PITTSBURGH-CORNING 'FOAMGLASS' (-290°F TO +250°F)
       - b. CELL-U-FOAM
     - 2. POLYISOCYANURATE FOAM INSULATION FABRICATED IN PIPE SECTIONS, BOARD AND BLOCK. TEMPERATURE RANGE (-100°F TO +300°F).
       - a. DOW 'TRYMER 2000'
       - b. APACHIE PRODUCTS ISO-25
   - C. HOT TANK SHELL INSULATION (N30-N31) FOR USE UP TO 450° F
     - 1. FIBERGLASS WITH BINDER
       - a. OWENS-CORNING 'INSUL-QUICK'
       - b. MANVILLE/SCHULLER 'PRECIPITATOR SPIN-GLAS'
       - c. CERTAINTEED - 850 BOARD
     - 2. MINERAL WOOL
       - a. OWENS CORNING INDUSTRIAL BOARD 1240 ? (PREFERRED)
       - b. FIBREX 'FBX 1200 BOARD'
       - c. ROCK WOOL MFG CO 'DELTA 10 BOARD'
   - D. HOT TANK ROOF INSULATION
     - 1. FIBERGLASS WITH BINDER, 11-13 LB. DENSITY (TO 450° F)
       - a. OWENS-CORNING 'ROOF DECK'
     - 2. MINERAL WOOL BINDER, 8 LB. DENSITY (TO 1200°F)
       - a. OWENS CORNING 'CAP BOARD'
     - 3. POLYISOCYANURATE FOAM BOARD, 2 LB. DENSITY (TO 300°F)
       - a. DOW 'THYMER 2000'
       - b. CELOTEX 'THERMAX'
       - c. POLYMER BUILDING SYSTEMS 'PBS/800'
       - d. RMAX 'TSX 2000'
     - 4. PRE-ENGINEERED ROOF SYSTEM
       - a. THERMACON-SECURUS BY THERMACON INDUSTRIES INC.
   - E. PREFABRICATED INSULATION PANELS FOR USE UP TO 300°F ON CYLINDRICAL EQUIPMENT
     - 1. THERMACON BRAND POLYISOCYANURATE FOAM WITH ALUMINUM BACKING

REFERENCE DRAWINGS	
STANDARD INSULATION FOR HOT PIPING	GD-N99783
STANDARD INSULATION FOR COLD PIPING	GD-N99784
STANDARD INSULATION FOR HOT VESSELS	GD-N99785
STANDARD INSULATION FOR COLD VESSELS	GD-N99786
STANDARD STEAM TRACING DETAILS	GF-L99889

REVISIONS

Rev.	Description	Date	By	Chk.
9	UPDATED AND REARRANGED ENTIRE DRAWING	9-21-92	DDL	RSD
10	UPDATED INFORMATION ON NOTES A2a(1), A2b(1), A3c(2), B1a, B2b, C2a, D2a AND ITEM NO. N338	3-29-01	MFH	LIL
8	REVISED NOTES IA, IB, IC, ID & III AND ITEM NUMBERS N21-9, N 00, N202, N203, N206-9, N220, N221, N224, N227, N229, N230-2, N250-3, N330-1, N333-8, N341-4, N346, N453 & N456. ADDED ITEM NUMBERS N210-2, N233, N243-9 & N348-53. DELETED ITEM NUMBERS N332 & N505.	5-5-95	AAV	TDU

Chevron
Research and Technology

SCALE NONE DATE 6-1-66 APPROVED RPH
DR. SMI CH. PHL DR. APP RVE ENGR.
DPR G DEPT. ENG. DEPT. RDS

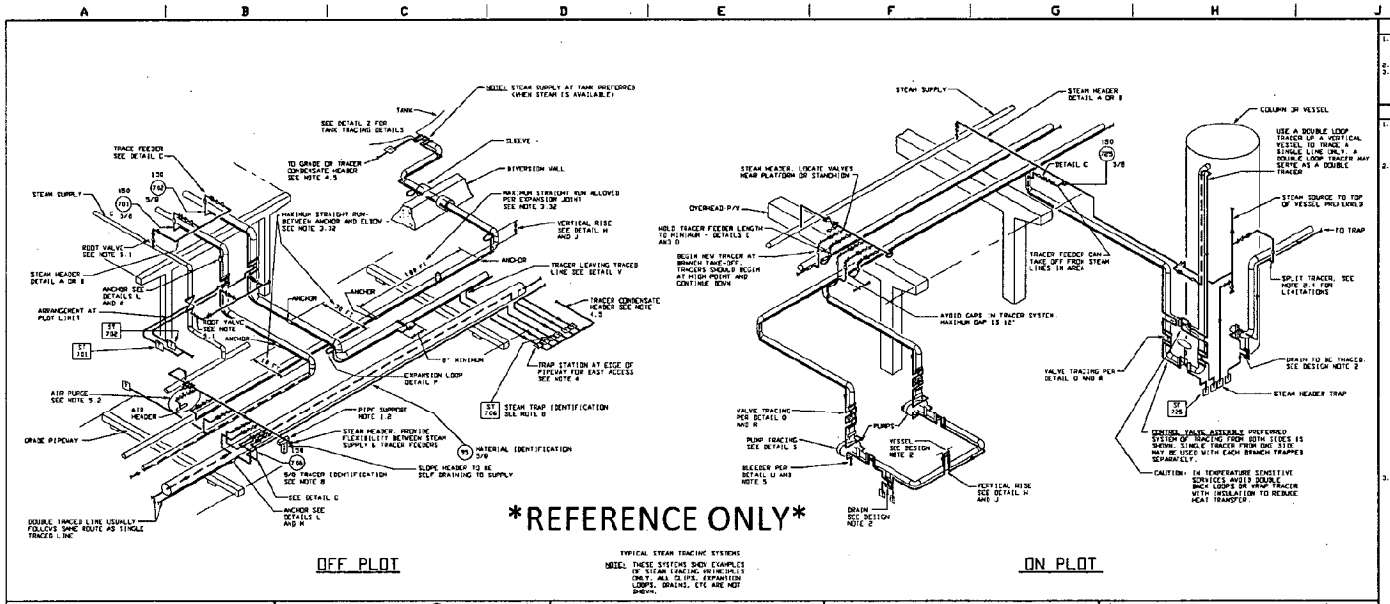
STANDARD INSULATION ITEM NUMBERS

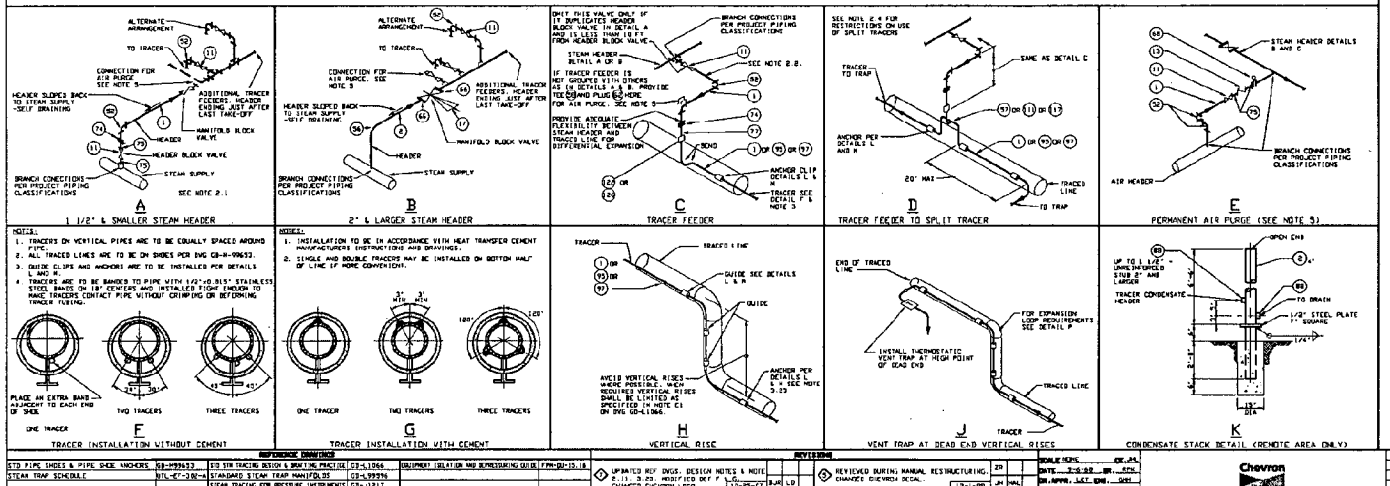
N C.C. S.D. **GD-N99993** 10

STANDARD DRAWING

N99993OO.DWG 4/23/01 MHAO T:\STDDWGS\WIRMSTD

CUSA-CSB-0001304
EPA





DESIGN NOTES

1. IT IS IMPORTANT TO NOTE THAT THESE TYPICAL DETAILS ARE PRESENTED AS SAMPLES. ALL INSTALLATIONS SHALL FOLLOW UTL-DU-5993, STEAM TRACING, S13-DU-5106, SAFETY IN DESIGN AND INSTALLATION STANDARDS AS PRECEDENCE.
2. SEE DRAWING GS-1966.
3. TRACING OF VENT AND DRAIN VALVES, VESSEL NOZZLES, AND CLEAN-OUT CONNECTIONS IS NORMALLY NOT REQUIRED. THE PROJECT ENGINEER IS TO SPECIFY WHEN IT IS REQUIRED. STEAM TRACING DRAWINGS ARE TO CLEARLY NOTE THESE INSTANCES.

CONSTRUCTION NOTES

1. GENERAL:
   1.1 INSTALL TRACERS AS SHOWN ON THE STEAM TRACING PIPING DRAWINGS.
   1.2 SUPPORT STEAM AND CONDENSATE LINES IN FIELD. MAXIMUM UNSUPPORTED LENGTH FOR 1/2" AND 3/4" STEEL PIPE TO BE 10 FT.
2. STEAM SUPPLY LINES:
   2.1 STEAM HEADER - SEE DETAILS A AND B.
      2.11 THE HEADER BLOCK VALVE IN DETAIL A MAY ALSO SERVE AS THE MANIFOLD BLOCK VALVE IF THE SUPPLY IS ACCESSIBLE FROM THE MANIFOLD LOCATION. IF NOT, TWO VALVES SHOULD BE USED. NOTE ADDITIONAL BLOCK VALVES MAY BE REQUIRED FOR PIPING CLASS ASME 300 AND ABOVE. REFER TO FPM-DU-15.16 CONCERNING ISOLATION AND DEPRESSURIZATION.
      2.12 IF TRACER FEEDERS CANNOT BE MANIFOLDED TOGETHER AS IN DETAIL A AND B PROVIDE INDIVIDUAL HEADER BLOCK VALVES AND RUN TRACER FEEDERS AS IN DETAIL C.
      2.13 THE HEADER SHOULD BE SLOPED BACK TOWARD THE SUPPLY, TO HAVE IT SELF DRAINING. IN CASES WHERE THE HEADER IS LONGER THAN THE SUPPLY, A DRAIN LINE AND STEAM TRAP MUST BE SUPPLIED AT THE END OF THE HEADER FOR CONDENSATE DRAINAGE.
   2.2 TRACER FEEDERS - SEE DETAILS C AND D.
      2.21 TRACER FEEDER SIZE:
         NOT LESS THAN TRACER SIZE WITH A MINIMUM OF 3/4".
      2.22 PROVIDE A SEPARATE FEEDER FOR EACH TRACER.
      2.23 TRACER FEEDERS SHOULD HAVE THEIR ORIGINS MANIFOLDED TOGETHER ALONG COMMON SUPPLY HEADERS FOR EASE OF MAINTENANCE.
   2.3 TRACER CONNECTION TO TRACED LINE - SEE DETAILS C AND D.
   2.4 SPLIT TRACER - SEE DETAIL B.
      2.41 MAY ONLY BE USED WHEN ONE BRANCH IS LESS THAN 20 FT LONG. ALSO BOTH BRANCHES MUST SERVE THE SAME LINE OR PIECE OF EQUIPMENT.
      2.42 TRAP EACH BRANCH SEPARATELY.
      2.43 INSTALL SPLIT TRACERS SPARINGLY; THEY ARE COMPLICATED TO OPERATE AND MAINTAIN AND SHOULD BE AVOIDED.
3. TRACERS:
   3.1 ROUTING - SEE STEAM TRACING PIPING DRAWINGS.
      3.11 ATTACH TRACERS PARALLEL TO PROCESS LINES. DO NOT WRAP TRACERS AROUND PROCESS LINES.
      3.12 EACH TRACER SHOULD CONTINUOUSLY FOLLOW THE LINE TO PROGRESSIVELY LOWER ELEVATIONS AND TERMINATE WITH A TRAP AT THE LOW POINT.
      3.13 NO SPLIT TRACERS ALLOWED, EXCEPT AS NOTED IN 2.4.
      3.14 AVOID VERTICAL RISES IF POSSIBLE. WHEN UNAVOIDABLE HANDLE AS SHOWN OR DETAIL H AND J.
      3.15 SEAL WELD ALL STEEL FITTINGS THAT WILL BE INSULATED WITH TRACED LINES.
      3.16 USE RUBBER FITTINGS, SWAGELOK OR EQUAL, AS APPROVED BY SYSTEM DESIGNER.
      3.17 INSTALL ALL UNIONS OUTSIDE OF INSULATION AND DO NOT SEAL WELD.
   3.2 ATTACHMENT - SEE DETAIL F AND NOTE 8.
      3.21 HOT SPOT PROTECTION IF REQUIRED WILL BE NOTED ON THE STEAM TRACING DRAWINGS WHERE SPECIFIC. SEPARATE TRACER FROM LINE BY INSTALLING A CONTINUOUS STRIP OF THERMAL INSULATION.
      3.22 PROVIDE AND LOCATE GUIDES AS FOLLOWS:
         - ALONG STRAIGHT RUNS OF PROCESS LINE AT INTERVALS OF 30 FT. MAXIMUM.
         - ON BOTH SIDE OF ELLS OR EXPANSION LOOPS.
         - AT VALVES AND FLANGES.
         - AS NEEDED TO RESTRAIN TRACER FROM DAMAGING THE INSULATION.
         - SEE DETAIL L AND M FOR GUIDES AND EXCEPTION.
      3.23 PROVIDE AND LOCATE ANCHORS AS FOLLOWS:
         - BEHIND REDUCED EXPANSION LOOPS.
         - AT ALL POINTS WHERE TRACED ENTERS AND LEAVES THE INSULATION EXCEPT AT EXPANSION LOOPS.
         - SEE DETAIL L AND M.
   3.3 EXPANSION - SEE DETAIL P. (LOOPS NOT REQUIRED WHEN HEAT TRANSFER CEMENT IS USED.)
      3.31 MINIMIZE THE NUMBER OF LOOPS BY CAREFUL CONSIDERATION OF EACH TRACER.
      3.32 THE FOLLOWING SHALL BE USED IN INSTALLING LOOPS: MAXIMUM STRAIGHT RUN BETWEEN ANCHOR AND ELL WHEN EXPANSION LOOP IS 30 FT. WITH NO EXPANSION LOOP IT IS 10 FT. MAXIMUM STRAIGHT RUN ALLOWED PER EXPANSION LOOP IS 100 FT. MAXIMUM STRAIGHT RUN ALLOWED WITHOUT EXPANSION LOOPS FOR 1/2" TRACER IS 200 FT. EXPANSION LOOPS FOR TUBING ARE NOT REQUIRED WHEN HEAT TRANSFER CEMENT IS USED.
      3.33 LOCATE EXPANSION LOOPS TO PREVENT DAMAGE TO INSULATION.
      3.34 LOCATE AT THE POINT WHERE TRACER PENETRATES LINE INSULATION, WHICH GIVES THE BEST PROTECTION FROM THE WEATHER.
      3.35 LOCATE LOOPS AT ELLS OR ABOVE THE LINE TO CREATE THE LEAST NUMBER OF LOW POINTS.
      3.36 PROVIDE SLOTS IN LINE INSULATION TO ALLOW FOR DIFFERENTIAL EXPANSION.
      3.37 INSULATE LOOPS.
   3.4 STEAM TRACING VALVES AND EQUIPMENT
      3.41 TRACE THE FOLLOWING ITEMS PER THE INDICATED DETAILS:
         SERVICED VALVES DETAIL O SHT 2

FOR CONTINUATION SEE DRAWING GF-L99888-7 SHT. 2

REFERENCE DRAWINGS				
STD PIPE SHOES & PIPE SHOE ANCHORS	G9-M99633	STD STM TRACING DESIGN & WORKING PRACTICE	GS-L1066	EQUIPMENT INSULATION AND REWORKING GUIDE / FPM-DU-15.16
STEAM TRAP SCHEDULE	UTL-EC-10G-A	STANDARD STEAM TRAP MANIFOLDS	GS-99936	
		STEAM TRACING FOR PRESSURE INSTRUMENTS	GS-J1217	
LIST OF MATERIAL	UTL-5936.1&C	STEAM TRACING	UTL-DU-5993	
SAFETY IN DESIGNS	S13-DU-5106	THERMAL INSULATION FOR HOT LINES, VESSELS AND EQUIPMENT	FPM-DU-1301	

REVISIONS				
1	UPDATED REF DWGS, DESIGN NOTES & NOTE 2.11, 3.23. MODIFIED OFF / L.G. CHANGED CHEVRON LOGO. 12-23-97	RJR	LD	
2	REVISED DET A, B, C, D, E MANIFOLDS AT OFFPLOT & OFFPLOT PIPEWAYS. ADDED NOTES 2.11, 2.12, 2.13, 3.23, AND 2.43. 7-7-81	JVB	JRL	JCS
3	REVIEWED DURING MANUAL RESTRUCTURING. CHANGED CHEVRON LOGO. 12-1-89	JP	JRL	
4	CHANGE CHEVRON LOGO. 12-31-96	TAV	LJL	

SCALE NONE — DF JA
DATE 7-6-82 — DR. RPM
DR APPR. LAST IDR — DATE
CHK'D. REP. — APPROVED
CHK'D. REP. DLV — TJB

Chevron

STEAM TRACING DETAILS

SHEET 1

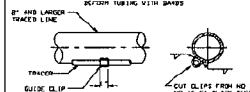
L — G.O. — GF-L99888 — 7

STANDARD DRAWING

GUIDE CLIPS	
SIZE	TRACER
1"x1 3/8"	3/8" NOM (1/2" OD) COPPER TUBE
1"x2 1/8"	5/8" NOM (3/4" OD) COPPER TUBE
1"x2 1/2"	3/4" NOM (7/8" OD) COPPER TUBE

ANCHORS:
GUIDE CLIP BECOMES ANCHOR BY WELDING (WITH STEEL PIPE) OR BRAZING (VIEW COPPER TUBING) TRACER TO GUIDE CLIP. SEE NOTE 3.23 FOR LOCATION

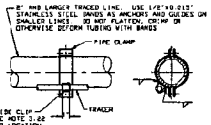
FOR TRACING SYSTEMS USING HEAT TRANSFER CEMENT: GUIDE CLIPS AND ANCHORS ARE NOT REQUIRED. TRACER CHANNEL AND BANDING ARE REQUIRED. USE 1/2"x0.015" STAINLESS STEEL BANDS AS ANCHORS AND GUIDES ON SMALLER LINES. DO NOT FLATTEN, CRIMP OR OTHERWISE DEFORM TUBING WITH BANDS



L

GUIDE AND ANCHOR CLIPS FOR CARBON STEEL LINES

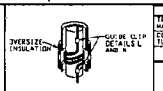
FOR ANCHOR NOTE AND GUIDE CLIPS SEE DETAIL L



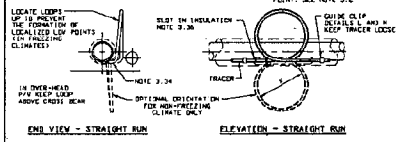
M

GUIDE AND ANCHOR FOR ALLOY AND STRESS RELIEVED LINES

EXPANSION LOOP TABLE		
TRACER MATERIAL	X	RESTRAINED LENGTH
COPPER TUBING	14"	50'
	24"	100'

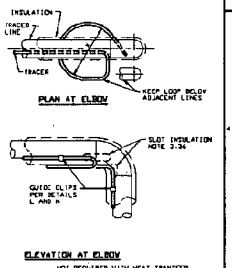


EXPANSION LOOPS FOR LONG VERTICAL RUNS



P

EXPANSION LOOPS - SEE NOTE 3.3



CONSTRUCTION NOTES

FLANGED VALVES — DETAIL R
CENTRIFUGAL PUMPS — DETAIL S
FLANGES — DETAIL X

3.49 SEE NOTE 9.6 FOR HEAT TRANSFER CEMENT REQUIREMENTS.

3.5 CONDENSATE REMOVAL

3.51 FOR ALL TRACER INSTALLATIONS:
- INSTALL STEAM TRAP AT END OF TRACER. SEE NOTE 4.
- INSTALL THERMOSTATIC VENT TRAPS AS REQUIRED PER DETAIL J.

4. STEAM TRAP INSTALLATION

4.1 STEAM TRAPS SELECTED ARE TO BE INSTALLED PER DETAIL SHEETS OF STEAM TRAP SCHEDULE UTL-EF-302A AND CONSTRUCTION NOTES THEREON.

4.2 LOCATE STEAM TRAPS AS NOTED ON STEAM TRACING PIPING DRAWING.

4.3 ARRANGE STEAM TRAPS AS SHOWN ON DRAWING G3-L95796.

4.4 TRAP EACH TRACER OR BRANCH TRACER SEPARATELY.

4.5 DISPOSE OF CONDENSATE AS NOTED ON STEAM TRACING PIPING DRAWINGS AND DETAIL SHEETS OF STEAM TRAP SCHEDULE UTL-EF-302A

4.6 FOR DETAIL OF TRACER LEAVING TRACED LINE SEE DETAIL V.

4.7 IN NON FREEZING CLIMATES INSULATE CONDENSATE DISCHARGE LINE FROM TRAP FOR PERSONNEL PROTECTION ONLY. DO NOT INSULATE TRAP UNLESS OTHERWISE NOTED.

4.8 LINE SIZE FROM TRACER TO TRAP IS SAME SIZE AS TRACER BUT NOT LESS THAN 3/4".

5 FOR FREEZING CLIMATE

5.1 ALL VALVES SHOULD BE LOCATED IN HORIZONTAL PIPING (IN ORDER TO BE SELF DRAINING) EXCEPT THOSE AT TRAP MANIFOLDS AND HEADER BLOCK VALVES ON HEADERS OF DIAMETER 11-1/2" OR SMALLER WHICH TAKE OFF VERTICALLY FROM THE SUPPLY LINE.

5.2 DEPENDING ON OPERATOR PREFERENCE PROVIDE FOR AIR PURGE OF LOW POINT DRAINS TO EMPTY TRACERS OF WATER.

THE CHOICE BETWEEN TEMPORARY AND PERMANENT AIR PURGE: SHOULD BE MADE WITH OPERATOR INPUT. DETAIL C ILLUSTRATES THE PERMANENT AIR PURGE ARRANGEMENT. TEMPORARY AIR PURGE CONNECTIONS MAY CONSIST OF A TEE AND AND PLUG AS IN DETAIL C OR OF A 1/4 INCH VALVE AND HOSE FITTING AS IN DETAIL B.

DETAIL U SHOWS LOW POINT BLEEDER ARRANGEMENTS. VALVES MUST BE KEPT AS CLOSE TO THE LINE AS POSSIBLE AND INSULATED TO PREVENT FREEZING.

5.3 INSULATE AND HEAT TRACE IF NECESSARY: ALL BLEEDER AND FLOAT TRAPS TO PREVENT FREEZE-UP.

6 INSULATION

6.1 THIS DRAWING COVERS TRACER INSTALLATION ONLY. FOR DETAILS OF INSULATION SEE IRM-SU-1281.

6.2 SEE NOTES 3.36, 3.37, AND 4.7 FOR SPECIAL INSULATION INSTRUCTIONS.

6.3 INSULATE STEAM HEADER, TRACER FEEDERS AND LINE FROM TRACER TO TRAP.

7 TRACER TESTING

7.1 TEST TRACER SYSTEM BEFORE INSULATION IS INSTALLED.

7.2 THOROUGHLY BLOW OUT TRACER WITH STEAM AT MAXIMUM POSSIBLE RATE BEFORE TRAP IS INSTALLED TO REMOVE DIRT, ETC.

7.3 TEST TRACER WITH TRAP INSTALLED USING STEAM AT OPERATING PRESSURE.

7.4 IF STEAM IS NOT AVAILABLE FOR 7.2 AND 7.3 USE CLEAN WATER; HYDROSTATICALLY TEST TO 1-1/2 TIMES STEAM OPERATING PRESSURE.

7.5 REPAIR AND RETEST UNTIL SYSTEM IS PROVED PRESSURE TIGHT.

7.6 AIR SHOULD BE USED FOR TESTING IF FREEZING TEMPERATURES ARE EXPECTED DURING TESTING.

8. PERMANENT IDENTIFICATION OF TRACERS

8.1 PROVIDE THE POINT OF ORIGIN AND THE TRAP FOR EACH TRACER WITH ID TAG OF 18-GAGE BRASS 2"x8" TAGS SHOULD BE AFFIXED TO THE SUPPORT STRUCTURES SINCE TRAPS AND VALVES ARE REMOVED FOR MAINTENANCE. TAG TO SHOW 3 DIGITS NUMBER CORRESPONDING TO TRACER NUMBER SHOWN ON STEAM TRACING PIPING DRAWINGS. SEE LEGEND ON LEFT.

8.2 MARK TRAPS AND SUPPLY VALVES WITH PAINT TO DISTINGUISH BETWEEN "YEAR ROUND" OR "WINTER" TRACERS. PAINT ONE TYPE ONLY.

9. HEAT TRANSFER CEMENT

9.1 WHEN HEAT TRANSFER CEMENT IS SPECIFIED, IT SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTION.

9.2 THE HEAT TRANSFER CEMENT SHALL NOT BE APPLIED UNTIL AFTER THE TRACER HAS BEEN TESTED PER NOTE 7.

9.3 INSTALLATION OF HEAT TRANSFER CEMENT TRACER SYSTEMS WILL GENERALLY REQUIRE THE FOLLOWING STEPS:

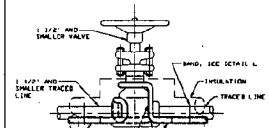
9.31 THE MECHANICAL CONTRACTOR WILL INSTALL, FLUSH AND TEST THE TRACER WITH-OUT TRACER CHANNEL. THE TRACER SHALL BE FIRMLY BUT TEMPORARILY WIRED (USE 14 GA STEEL WIRE) IN PLACE.

9.32 THE INSULATING CONTRACTOR WILL INSTALL THE HEAT TRANSFER CEMENT AND TRACER CHANNEL, BANDING IT TIGHTLY IN PLACE. UPON THE TRACER AFTER REMOVING THE TEMPORARY TIE WIRES. THE TRACER LINE WILL THEN BE INSULATED.

9.4 PRIOR TO APPLICATION OF THE HEAT TRANSFER CEMENT, THE PIPE, VALVE, EQUIPMENT, ETC. SURFACE SHALL BE CLEANED OF DIRT, LOOSE SCALE, OIL, GREASE, PAINTS, AND VARNISH.

9.5 THE HEAT TRANSFER CEMENT SHALL NOT BE APPLIED TO WET SURFACES AND UNTIL INSULATES SHALL BE PROTECTED FROM RAIN AND OTHER WATER SOURCES. A SHEET OF POLYETHYLENE FILM IS SUFFICIENT.

9.6 VALVES, FITTINGS, FLANGES, AND EQUIPMENT ITEMS SHALL HAVE THE HEAT TRANSFER CEMENT APPLIED TO A THICKNESS NOT LESS THAN 1/4" COVERAGE OVER THE SURFACE OF THE EXPANDED ITEM SHALL BE COVERED WITH HEAT TRANSFER CEMENT ITEMS SHALL ALSO COVER AS MUCH EQUAL TO 3 TIMES THE TRACER SIZE. TRACER OF TRACER LOOPS SHALL NOT BE SPACED CLOSER THAN 3 TIMES TRACER OD.



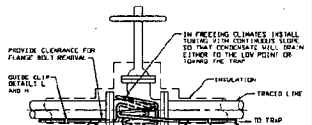
Q

1 1/2" AND SMALLER VALVES

MINIMUM TRACING FOR FLANGED VALVES

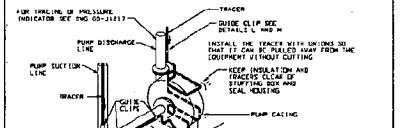
VALVE SIZE	FEET OF TUBING
3"	2'-6"
4"	3'-6"
6"	8'-0"
8"	11'-0"
10"	14'-0"
12"	16'-0"
14"	19'-0"
16"	22'-0"
18"	27'-0"
20"	30'-0"
24"	36'-0"

FOR MULTIPLE TRACERS MULTIPLY THE LENGTH IN THE ABOVE TABLE BY THE NUMBER OF TRACERS ON THE LINE



R

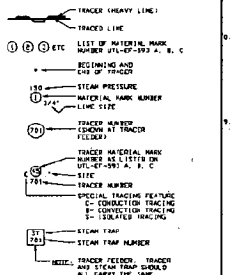
2" AND LARGER VALVES

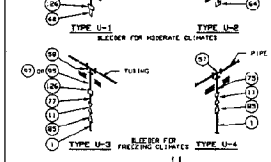


S

CENTRIFUGAL PUMP TRACING

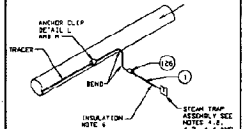
LEGEND FOR STEAM TRACING DRAWINGS





U

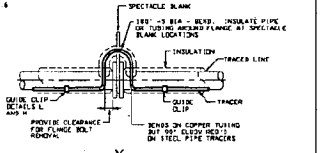
BLEEDER CONNECTIONS - NOTE 5.2



V

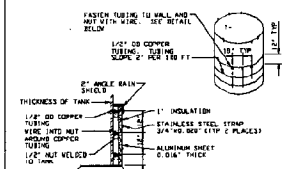
TRACER LEAVING TRACED LINE - NOTE 4

NOTE: FOR HEAT TRANSFER CEMENT SYSTEMS BEND 5 DIA TUBING. BEND DOWN INTO CONTACT WITH FLANGE AND BAND TRACER TUBE EACH SIDE OF FLANGE. HARD APPLY CEMENT OVER TRACER ON FLANGE. SEE NOTE 9.6



X

AT FLANGED LOCATIONS



Z

TANK TRACER INSTALLATION

EWO# 463283

REFERENCE ONLY

REFERENCE DRAWINGS

SEE SHEET 1 FOR REFERENCES	GF-L99885

REVISIONS

1	MODIFIED DET L, P, Q, R, & S. UPDATED LEGEND. NOTES 4.1, 3.1, 6. 7.1.3.3. CHANGED CHEVRON LOGO.	11-04-97	FJH LB
2	CHANGED TRACER ROUTING IN DET P.Q.& R. DELETED NOTE 3.321 ADDED FREEZING CLIMATE NOTE 5, REVISED & RENUMBERED SUBSEQUENT NOTES & DET. U.	7-7-01	ALL TFB JWB JCS
3	REVISED DURING MANUAL RESTRUCTURING CHANGED CHEVRON DECAL.	12-1-99	ZP JH
4	CHANGED CHEVRON DECAL.	12-11-96	TAY LTL

SCALE NONE — DR. JA
DATE 7-9-98 — DR. RFA
DR. APPR. LTL ENG. — CHK.
CHK'D. DEPT. — APPROVED
DR'D. DEPT. DAY — TJB

Chevron

STEAM TRACING DETAILS

SHEET 2

L C.C. 8.0 GF-L99888 7

STANDARD DRAWING

REV 1: 6" PIPE WAS FOUND TO BE THIN BY INSPECTIONS AND NEEDS TO BE REPLACED. REPLACING ~60 FT OF 6" CS PIPE PER 3CS24.

1.0 SCOPE

Thin locations located above the P-1148/P-1148A pumps need to be addressed due to sulfidation corrosion. The thinnest location identified is a 0.100" just above the pumps. There is approximately 80 feet of pipe that needs to be addressed on this circuit. There is approximately 350 feet of pipe that will be replaced in this EWO. The pipe class is 3CS24.

2.0 MATERIAL

- Obtain all piping and valves from **PR 9051581.**
- **Pipe Spec: 3CS24**
- All other materials to be supplied by Maintenance and/or the Piping Contractor.
  - **Maximo Work Order #: 343627-002**

3.0 QUALITY CONTROL REQUIREMENTS

All work in this EWO shall be in strict compliance with the following Richmond Refinery standards:

- All welding in this EWO shall be in compliance with the "Richmond Refinery Metals Craft Manual". The Contractor is responsible for complying with these quality assurance procedures.
- Any repair alternatives to the instructions in this EWO shall be reviewed and approved by a Chevron Designs Engineer.

4.0 WORK INSTRUCTIONS

- Refer to **P&ID-308309-22** and **ISO 0955-007-008** for details.
- Field verify all dimensions prior to piping fabrication.
- Inspections to field mark the cut location for new flanges off the vertical run as shown in the isometric drawing. Inspections must confirm good pipe exists prior to cutting. Ensure there is enough room between the elbow, and the field cut for a hydrotest tool to be installed before cutting.
- Replace the existing circulating reflux discharge piping in kind per **ISO 0955-007-008 & 014 REV 1.**
  - Add new flanges off of the vertical run per inspections marking.
  - Prefabricate as much piping as possible.
  - Disconnect any existing corrosion probes along the piping that is being replaced.
- Disconnect existing steam tracing located at the P-1148/A pump casing and reuse once work is complete. Reference steam tracing drawing **GF-L99888-1** for any further detail.
  - Hydrotest all new piping @ **1125 psig**.
    - Blind points and vents for the hydrotest to be determined by operations and maintenance. Please engage maintenance and operations to ensure the proper blinds have been installed prior to hydrotesting.
  - **PT** the prep on all "old to new welds".