

	Client:		Issue Date:	July 30, 2012	
	Project:		Proposal Number:		
	End User:		Revision:	REV. 0	
	Document Ref:	Technical & Commercial Proposal – (Equipment Only - FIRM)			

2.0 Process Description

Process description and simulations can be provided after receipt of Client design basis, gas composition and product spec.

Exterrnan's Standard 60 MMSCFD Cryogenic Plant is designed to support the processing of 60 MMSCFD of 2.1 to 6.0 GPM gas @ 850PSIG and 100F. It is also assumed that the gas is provided to the inlet of the cryogenic plant with less than 70lb H₂O/MMSCFD and less than 1% CO₂.



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3.0 Equipment Summary List

See attached equipment list for further details. Please note that some items on the list are clearly marked by Others and are not included in Exterran's base bid. Once Exterran has a better understanding of needs and, if requested Exterran can provide further pricing for equipment, engineering, and installation services as required.



ENG-FRM-US-PTR-001

CLIENT: Exterran Strategic Inventory		JOB NO. TBD		DATE: 10/26/2011	
SUBJECT: Standard C6 "GSP" Cryo Plant		BY: RJM			
EQUIPMENT LIST					
TAG NO.	SERVICE				
	<u>Dehydration System</u>				
	<u>Compressors</u>				
C-111	Regeneration Gas Compressor		8.8 MMSCFD @ 60 PSID		
	<u>Fired Heaters</u>				
H-711	Regeneration Gas Heater		8.5 MMBTU/HR		
	<u>Air Coolers</u>				
A-311	Regeneration Gas Cooler		8.6 MMBTU/HR		
	<u>Vessels/Filters</u>				
V-410	Inlet Gas Separator		48" ID x 12'-0" s/s, Mesh-Vane Unit		
V-418	Regeneration Gas Scrubber		20" ID x 7'-6" s/s, Mesh-Vane Unit		
F-412	Dehydration Inlet Filter / Coalescer		28" OD x 107" S/S		
V-413/414	Dehydration Adsorbers		78" ID x 24'-0" s/s		
F-416/417	Dehydration Dust Filter		18" OD x 55" S/S		
F-411	Seal Gas Coalescer		Associated with C-111		
REVISION	0				
ENGINEER/DATE	PR	6/29/2012			
ISSUED FOR	Vault				

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CLIENT: Exterran Strategic Inventory		JOB NO. TBD		DATE: 10/26/2011	
SUBJECT: Standard C6 "GSP" Cryo Plant		BY: RJM			
EQUIPMENT LIST					
TAG NO.	SERVICE				
	<u>Liquids Recovery System</u>				
	<u>Turbo-Expanders</u>				
EX/C-121	Expander/Compressor Package & Optional SRA				
	Hold for Process Data for custom designed components				
	<u>Heat Exchangers</u>				
E-220	Product Heater				818 MBTU/HR
E-221	Gas/Gas Exchanger				Combined in Common Core with E-222
E-222	Reflux Condenser				Combined in Common Core with E-221
E-223	Demethanizer Bottom Reboiler				Combined in Common Core with E-224
E-224	Demethanizer Side Reboiler				Combined in Common Core with E-223
E-225	Trim Reboiler				2.25 MMBTU/HR
E-227	Seal Gas Heater				12 KW Electric Immersion Heater
	<u>Air Coolers</u>				
A-321	Expander Compressor Discharge Cooler				2.27 MMBTU/HR
A-322	Deethanized Product Cooler				689 MBTU/HR
	<u>Vessels</u>				
V-421	Cold Separator				48" ID x 13'-0" s/s
V-422	Demethanizer Surge Tank				72" ID x 32'-0" s/s
	<u>Towers</u>				
T-521	Demethanizer				60" / 42" ID x 91'-9" s/s
	Demethanizer Internals and Packing				
	<u>Pumps</u>				
P-619/620	Product Booster Pumps (Option A)				237 GPM @ 171.5 FT TDH. 2 x 100%
P-629	Methanol Injection Pump				21 GPH @ 2000 PSID
REVISION	0				
ENGINEER/DATE	PR	6/29/2012			
ISSUED FOR	Vault				

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	Project:		Proposal Number:		
	End User:		Revision:	REV. 0	
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ENG-FRM-US-PTR-001

CLIENT: Exterrnan Strategic Inventory		JOB NO. TBD		DATE: 10/26/2011	
SUBJECT: Standard C6 "GSP" Cryo Plant		BY: RJM			
EQUIPMENT LIST					
TAG NO.	SERVICE				
	<u>Fuel Gas System</u>				
V-460	Fuel Gas Scrubber				12.75" OD x 6'-0" s/s
	<u>Flare and Drain System</u>				
	<u>Chemical Storage System</u>				
	<u>Misc.</u>				
	MCC for Cryo Plant Motors				Optional
	MCC Building				Optional
	PLC based Control System with UPS				
	Three (3) Stream Gas Chromatograph				
REVISION	0				
ENGINEER/DATE	PR	6/29/2012			
ISSUED FOR	Vault				

	Client:		Issue Date:	July 30, 2012	
	Project:		Proposal Number:	OPP-52963	
	End User:		Revision:	REV. 0	
	Document Ref:	Technical & Commercial Proposal – (Equipment Only - FIRM)			

6.0 Utility Requirements

When operating at conditions no less favorable than design, the plant equipment will have the following estimated utility consumption:



CLIENT: Exterran Strategic Inventory				JOB NO.:		DATE: 5/1/2012		
				TRACKING NO.:		BY: LJS		
SUBJECT: C6 "GSP" Cryo Plant						CHECKED:		
POWER SUMMARY								
TAG NO.	SERVICE	VFD OR SOFT START	4160 Volt	Qty.	480 Volt / 3 Phase / 60 Hz			
					Per Motor		Total Motors	
					Operating HP	Connected HP	Operating HP	Connected HP
C-111	Regen Gas Compressor	Soft Start		1	100	125	100	125
	lube oil pump			1	2	2	2	2
	lube oil cooler			1	1	1	1	1
A-311	Regen Gas Cooler	VFD		1	30	40	30	40
H-711	Regen Gas Heater Blower Motor (HOLD)			1	17	20	17	20
EX/C-121	Expander / Compressor Skid							
	lube oil cooler			1	4	5	4	5
	lube oil pump			1	6	8.0	6	8
	lube oil pump			1	0	8.0	0	8
	lube oil heater			1	6	6	6	6
A-322	Deethanized Product Cooler	2-speed		1	12	15	12	15
P-619	Product Booster Pump (HOLD)			1	8	10	8	10
P-620	Product Booster Pump (HOLD)			1	0	10	0	10
E-227	Seal Gas Heater (12 kW)			1	16	16	16	16
A-321	Expander/Compressor Discharge Cooler	2-speed		1	24	30	24	30
	TOTAL						226	296
	TOTAL 480 V						226	296
	TOTAL 4160V						0	0
REVISION		0						
ENGINEER/DATE		LJS	5/1/2012					
ISSUED FOR		Construction						

	Client:		Issue Date:	July 30, 2012	
	Project:		Proposal Number:		
	End User:		Revision:	REV. 0	
	Document Ref:	Technical & Commercial Proposal – (Equipment Only - FIRM)			

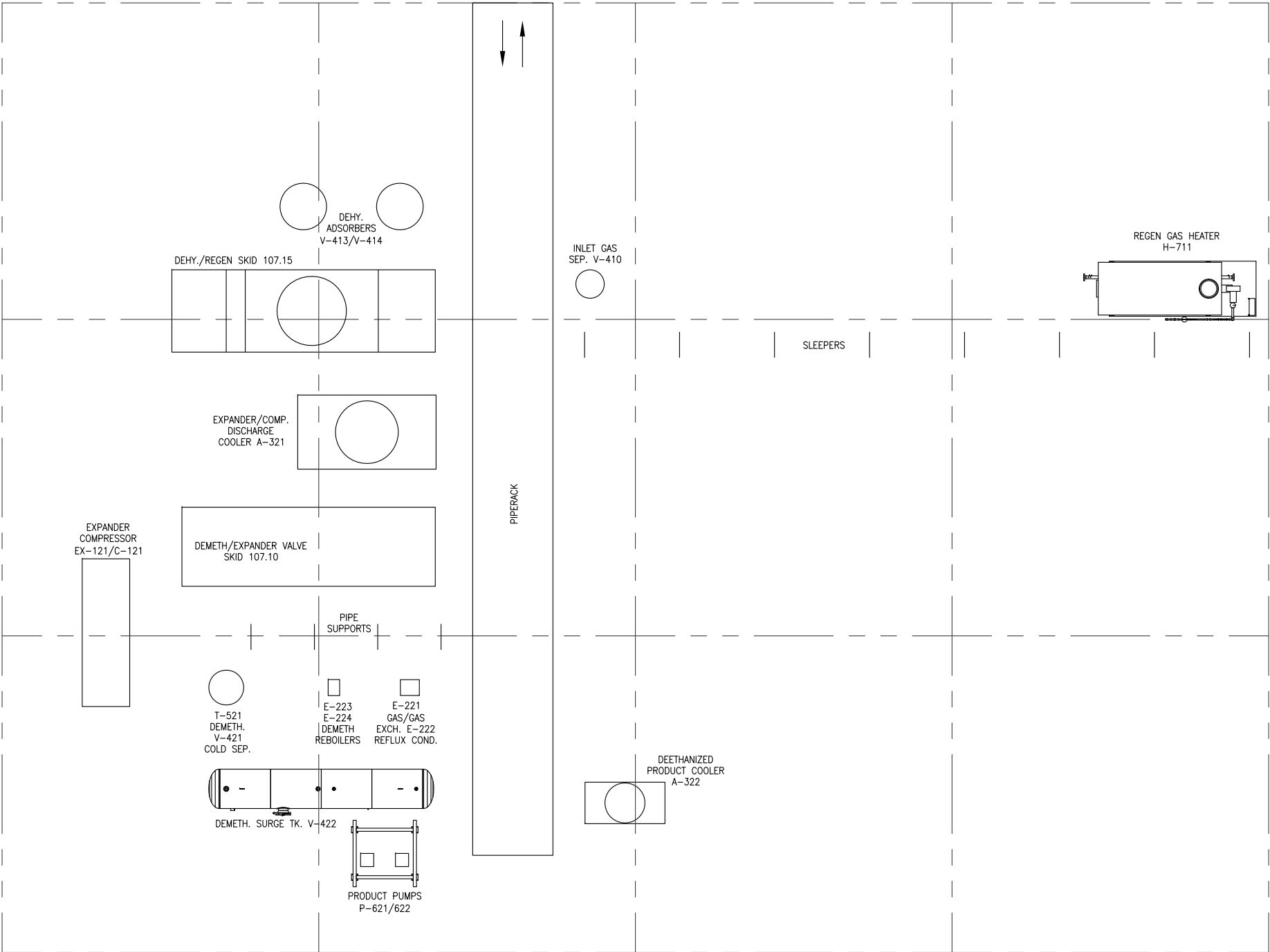


CLIENT: Exterran Strategic Inventory		JOB NO.:		DATE: 5/1/2012	
		TRACKING NO.:		BY: LJS	
SUBJECT: C6 "GSP" Cryo Plant				CHECKED:	
FUEL GAS SUMMARY					
Fuel Gas LHV (BTU/SCF) = 876					
TAG NO.	FUEL GAS USERS	BHP OR BTU/HR	EFFICIENCY OR HEAT RATE % OR BTU/HR/HP	FUEL USAGE MSCFD	
	<i>Gas Engines or Turbines</i>				
				0.0	
	<i>Heaters or Incinerators with burners</i>				
			100%	0.0	
			100%	0.0	
H-711	Regen Gas Heater (HOLD)	8,510,000	84%	277.6	
			100%	0.0	
	TOTAL FUEL USAGE			277.6	
	INCLUDING GUARANTEE MARGIN 5%			291.4	
REVISION	0				
ENGINEER/DATE	JPG 9/6/2011				
ISSUED FOR	Construction				

	Client:		Issue Date:	July 30, 2012	
	Project:		Proposal Number:	OPP-52963	
	End User:		Revision:	REV. 0	
	Document Ref:	Technical & Commercial Proposal – (Equipment Only - FIRM)			



CLIENT: Exterran Strategic Inventory		JOB NO.:		DATE: 5/1/2012	
		TRACKING NO.:		BY: LJS	
SUBJECT: C6 "GSP" Cryo Plant				CHECKED:	
INSTRUMENT AIR SUMMARY					
				Instrument	Control Panel
Instrument Air Usage Per User (SCFM):				0.5	2.0
P & ID DRAWING NO.	P & ID TITLE	USER QTY.	CONTROL PANEL USERS	FUEL USAGE SCFM	
				0	
014	Inlet Gas Separator	1		1	
015	Dehydration Filters	2		1	
016	Dehydration Adsorbers	8		4	
017	Dehydration Regeneration	3		2	
018	Regeneration Gas Heater	0	1	2	
019	Gas/Gas Exchanger & Reflux Condenser	3		2	
020	Cold Separator	3		2	
021	Reboilers & Product Heater	2		1	
022	Expander / Compressor	4	1	4	
023	Demethanizer & Methanol Pump	50	1	27	
024	Demethanizer Surge & Product Cooler	2		1	
025	Product Pumps	0		0	
026	Product Pumps	0		0	
027	Seal Gas Heater	2		1	
90	Fuel Gas System	1		1	
090	Fuel Gas Scrubber	2		1	
				0	
	Total Air Usage			48	
	Including Guarantee Margin 10%			52	
REVISION	0				
ENGINEER/DATE	JPG 9/6/2011				
ISSUED FOR	Construction				

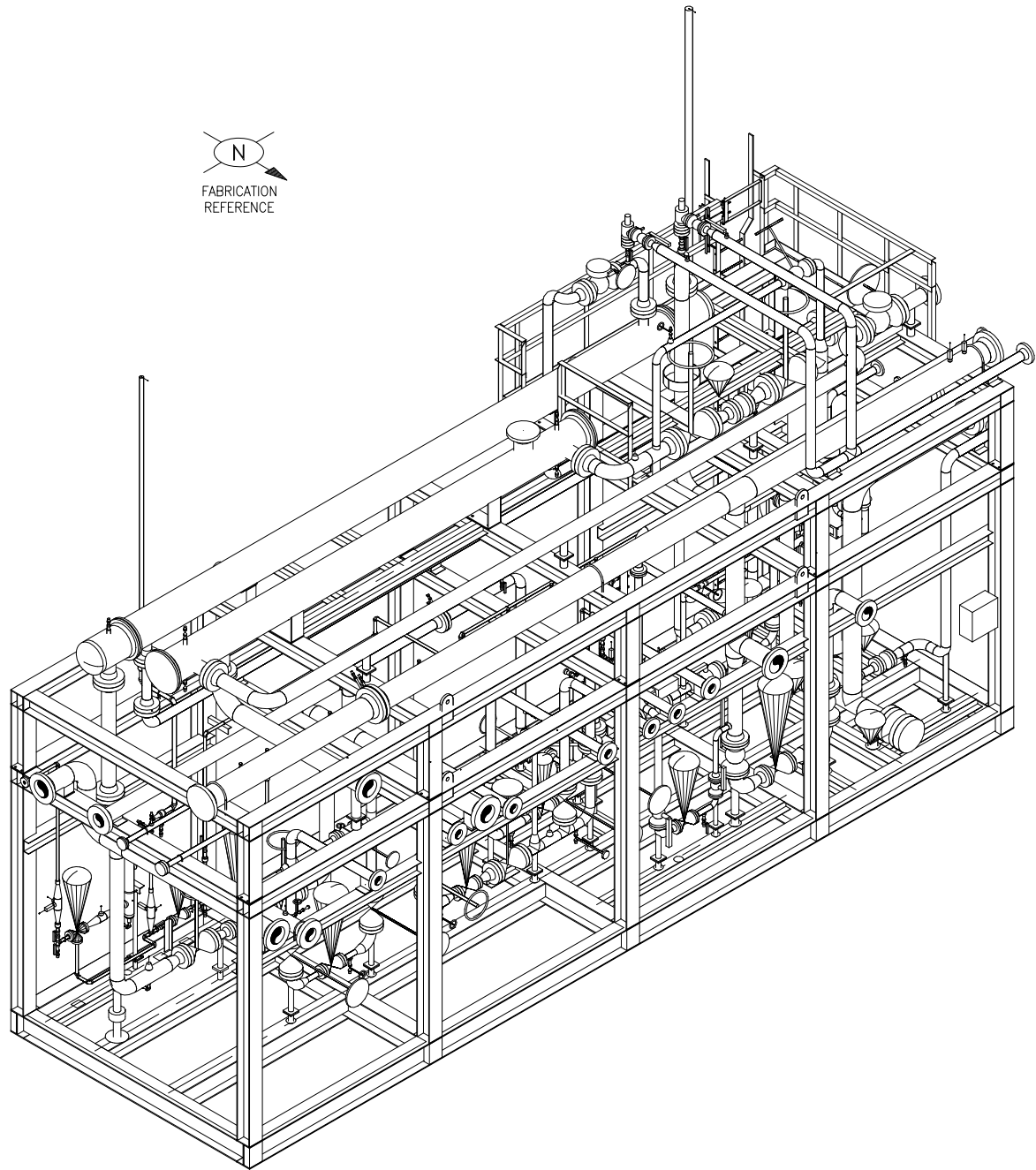
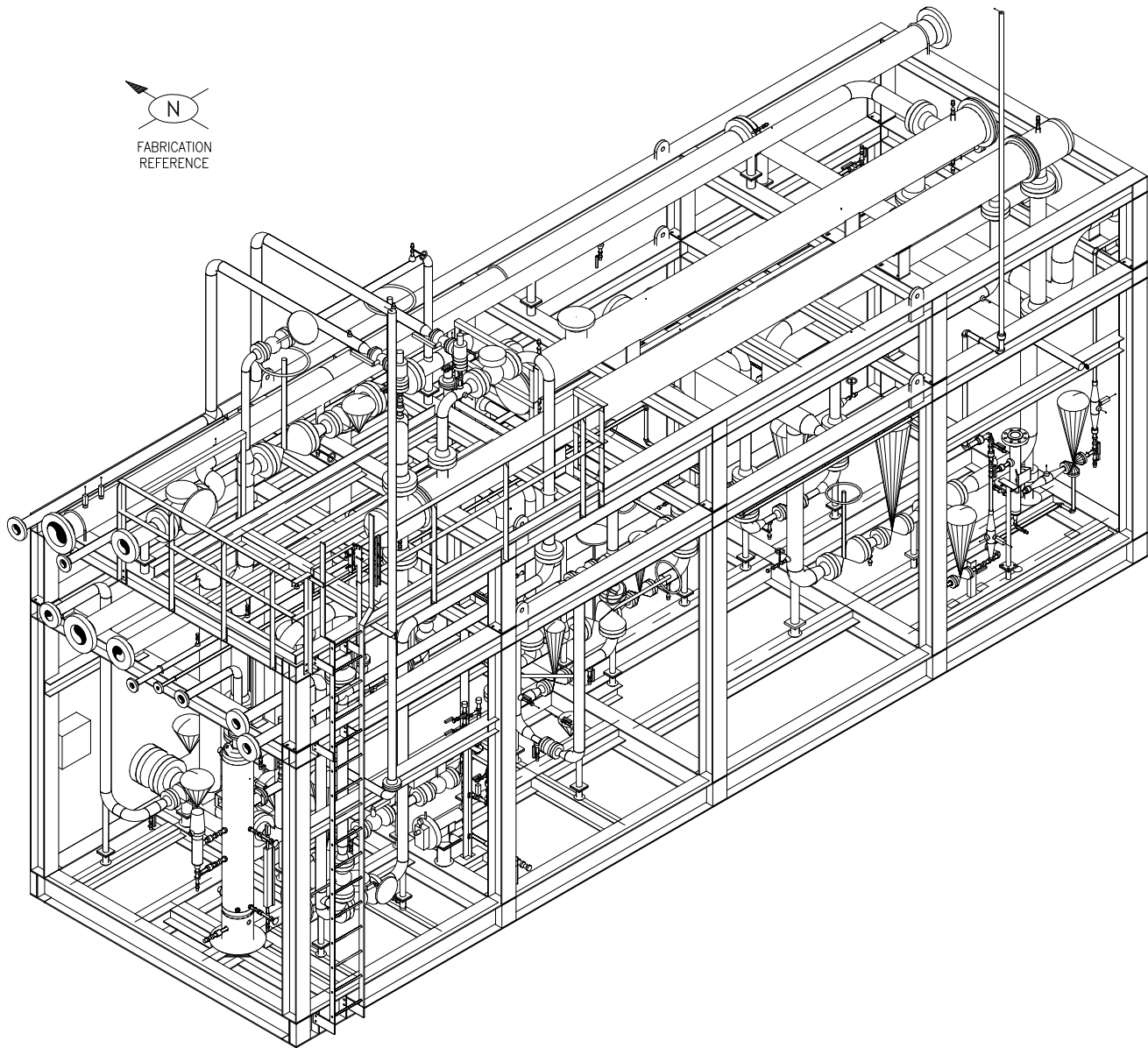


- NOTES:
- GRID SPACING IS 50'-0".
 - EQUIPMENT LOCATION/LAYOUT IS PRELIMINARY & IS SUBJECT TO CHANGE BASED ON CLIENT SPACING REQUIREMENTS AND EQUIPMENT SIZES.
 - EXTERRAN RESERVES THE RIGHT TO CHANGE EQUIPMENT PER MARKET DEMAND.

				TOLERANCES		THIS DRAWING IS THE PROPERTY OF EXTERRAN AND IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED	CUSTOMER					
				CUTS	±1/8"		STANDARD DOMESTIC DESIGN					
				ANGLES	±1/2"		STD - C6 CRYOGENIC GAS PLANT					
				WELD ASS'Y.	±1/4"		TITLE					
A	PRELIMINARY	-	CWW	-		Edited by: hboen01 May 08, 2012 - 7:08am File Name: STD-C6-201.01-BA-06-100.dwg	OVERALL PLOT PLAN					
REV.	DESCRIPTION	DATE	BY	CK			DRAWN	DATE	APPROVED	SCALE	NO. REQ'D	
REVISIONS							C.WHITE	-	-	1" = 20'	1	
							20602 E. 81st STREET					
							Broken Arrow, Oklahoma, 74014 (918) 251-8571					
							DRAWING NO.		STD-C6-201.01-BA-06-100		SHT. NO.	REV.
											-	-

DRT-FRM-US-CBL-004, REV. A

File: STD-C6-107.10-BA-02-401.dwg



UPPER DEMETH EXP VALVE SKID		SHIP LOOSE ITEMS
	HNDRAIL & LDR.	= 818#
APPROX. WEIGHTS:	MISC PIPING	= 1,772#
SHIPPING =	50,000#	=
OPERATING =	58,000#	=
APPROX. SHIPPING DIMENSIONS:		
41'-0" L. x	12'-6" W. x	11'-5" H.
TOTAL		= 2590#

LOWER DEMETH EXP VALVE SKID		SHIP LOOSE ITEMS
		=
APPROX. WEIGHTS:		=
SHIPPING =	53,000#	=
OPERATING =	56,000#	=
APPROX. SHIPPING DIMENSIONS:		
41'-2" L. x	12'-6" W. x	14'-0" H.
		=

REV.	DESCRIPTION	DATE	BY	CK	APP'D
0	APPROVED FOR CONSTRUCTION		SEE LOG	JPC	CWW
				HB	
REVISIONS					

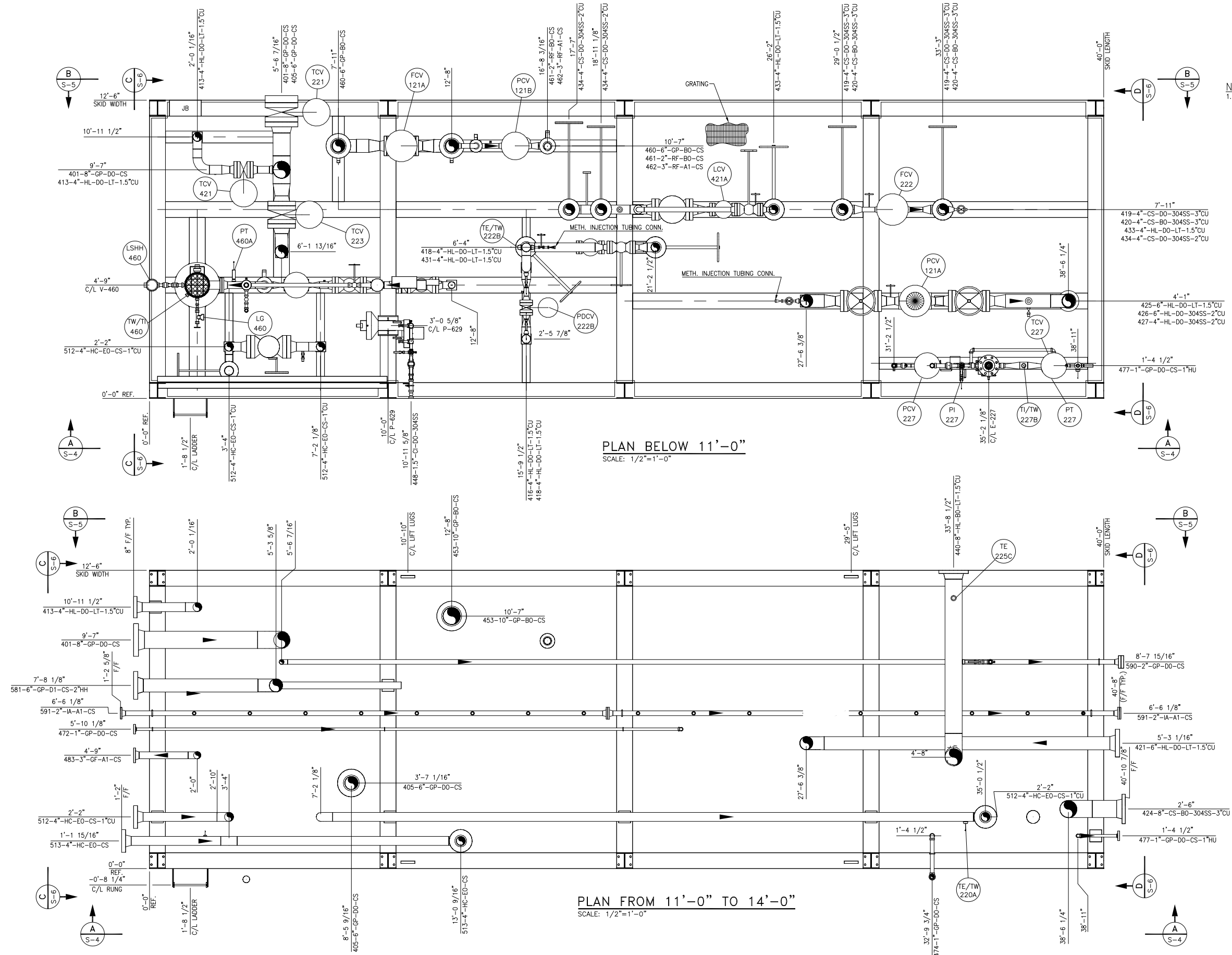
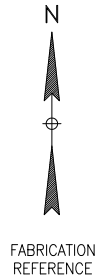
TOLERANCES	
CUTS	±1/8"
ANGLES	±1/2"
WELD ASS'Y.	±1/4"

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Jul 25, 2012 - 7:55am
File Name: STD-C6-107.10-BA-02-401.dwg



CUSTOMER		STANDARD DOMESTIC DESIGN			
		STD - C6 CRYOGENIC GAS PLANT			
TITLE		DEMETH/EXPANDER VALVE SKID			
		GENERAL ARRANGMENT ISOMETRIC VIEWS			
DRAWN	DATE	APPROVED	SCALE	NO. REQ'D	
J.CALLAHAN	12/5/11	C. WHITE	NTS	ONE (1)	
DRAWING NO.		SHT. NO.		REV.	
STD-C6-107.10-BA-02-401		1		0	



NOTES:
1. GRATING NOT SHOW FOR SAKE OF CLARITY.

TOLERANCES					
CUTS	±1/8"				
ANGLES	±1/2°				
WELD ASS'Y.	±1/4"				
0	APPROVED FOR CONSTRUCTION	SEE LOG	JPC	CWW	HB
REV.	DESCRIPTION	DATE	BY	CK	APP'D
REVISIONS					

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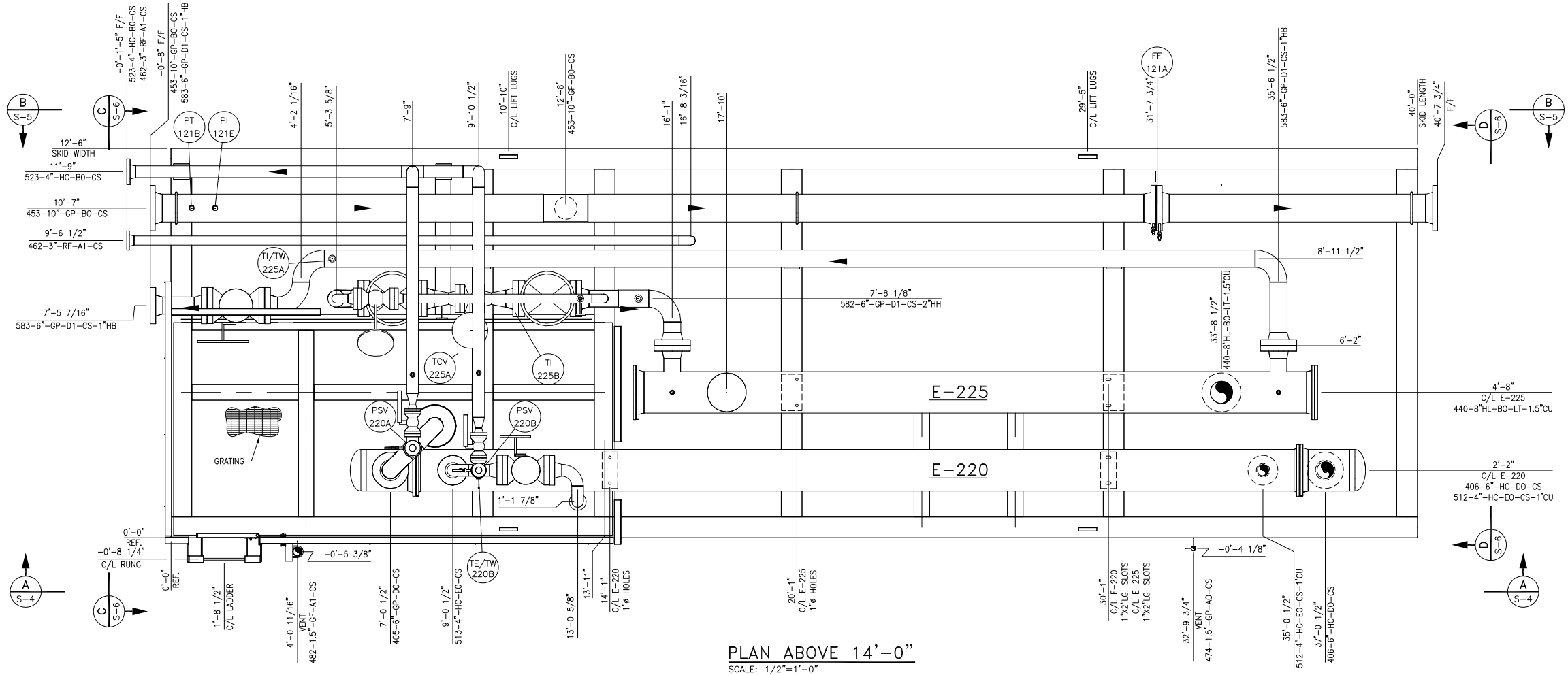
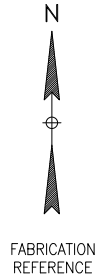
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CUSTOMER		STANDARD DOMESTIC DESIGN			
TITLE		STD - C6 CRYOGENIC GAS PLANT			
		DEMETH/EXPANDER VALVE SKID			
		GENERAL ARRANGMENT PLAN VIEWS			
DRAWN	DATE	APPROVED	SCALE	NO. REQ'D	
J.CALLAHAN	12/5/11	C. WHITE	NTS	ONE (1)	
DRAWING NO.	STD-C6-107.10-BA-02-401			SHT. NO.	REV.
				2	0

DRT-FRM-US-CBL-004, REV. A

File: STD-C6-107.10-BA-02-401.dwg



NOTES:
1. GRATING NOT SHOW FOR SAKE OF CLARITY.

REV.	DESCRIPTION	DATE	BY	CK	APP'D
0	APPROVED FOR CONSTRUCTION	SEE LOG	JPC	CWW	HB
REVISIONS					

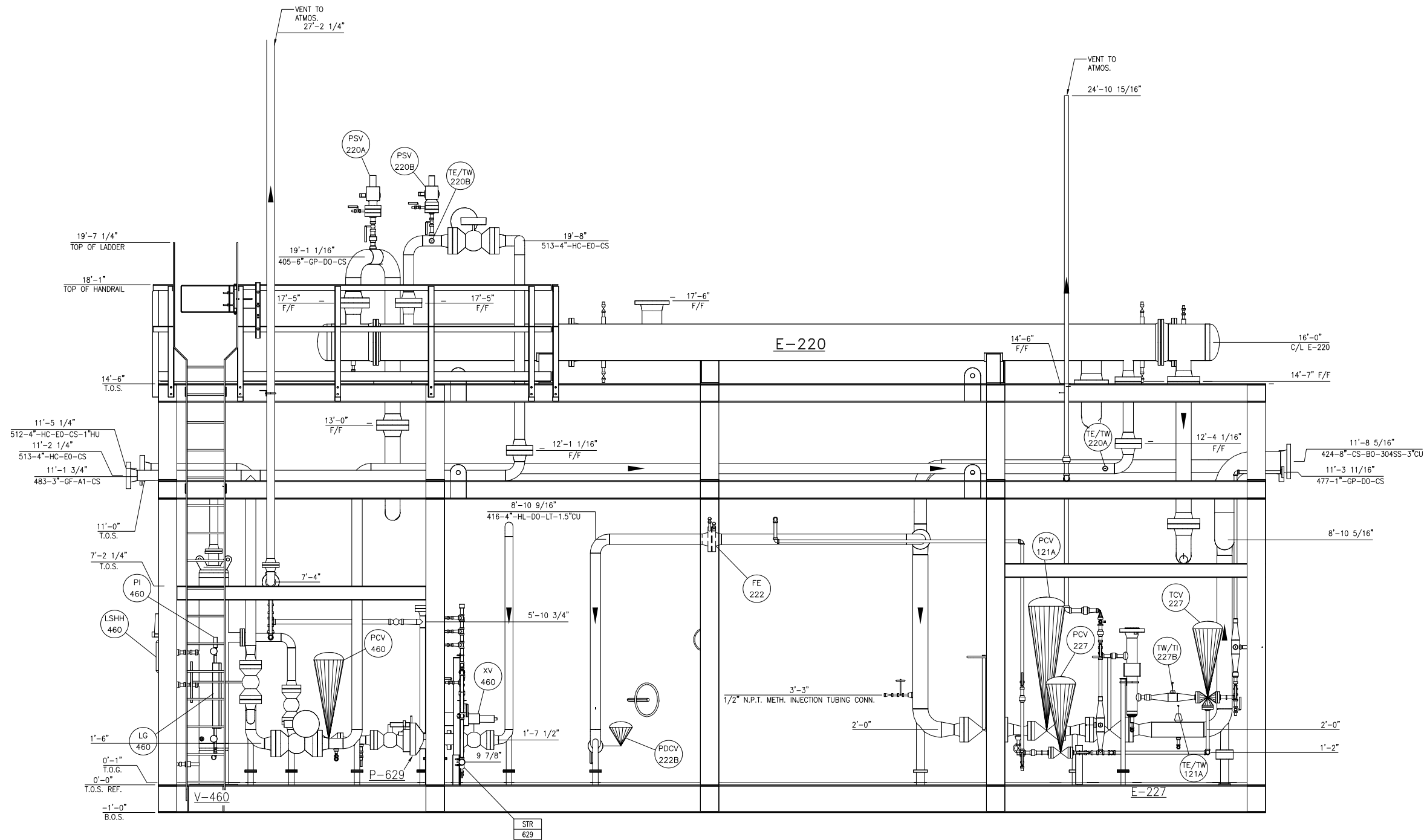
TOLERANCES					
CUTS	±1/8"				
ANGLES	±1/2"				
WELD ASS'Y.	±1/4"				

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CUSTOMER		STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT			
TITLE		DEMETH/EXPANDER VALVE SKID GENERAL ARRANGMENT ISOMETRIC VIEWS			
DRAWN J.CALLAHAN	DATE 12/5/11	APPROVED C. WHITE	SCALE NTS	NO. REQ'D ONE (1)	
DRAWING NO. STD-C6-107.10-BA-02-401				SHT. NO. 3	REV. 0



ELEVATION A
SCALE 1/2"=1'-0"

REV.	DESCRIPTION	DATE	BY	CK	APP'D
0	APPROVED FOR CONSTRUCTION	SEE LOG	JPC	CWW	HB
REVISIONS					

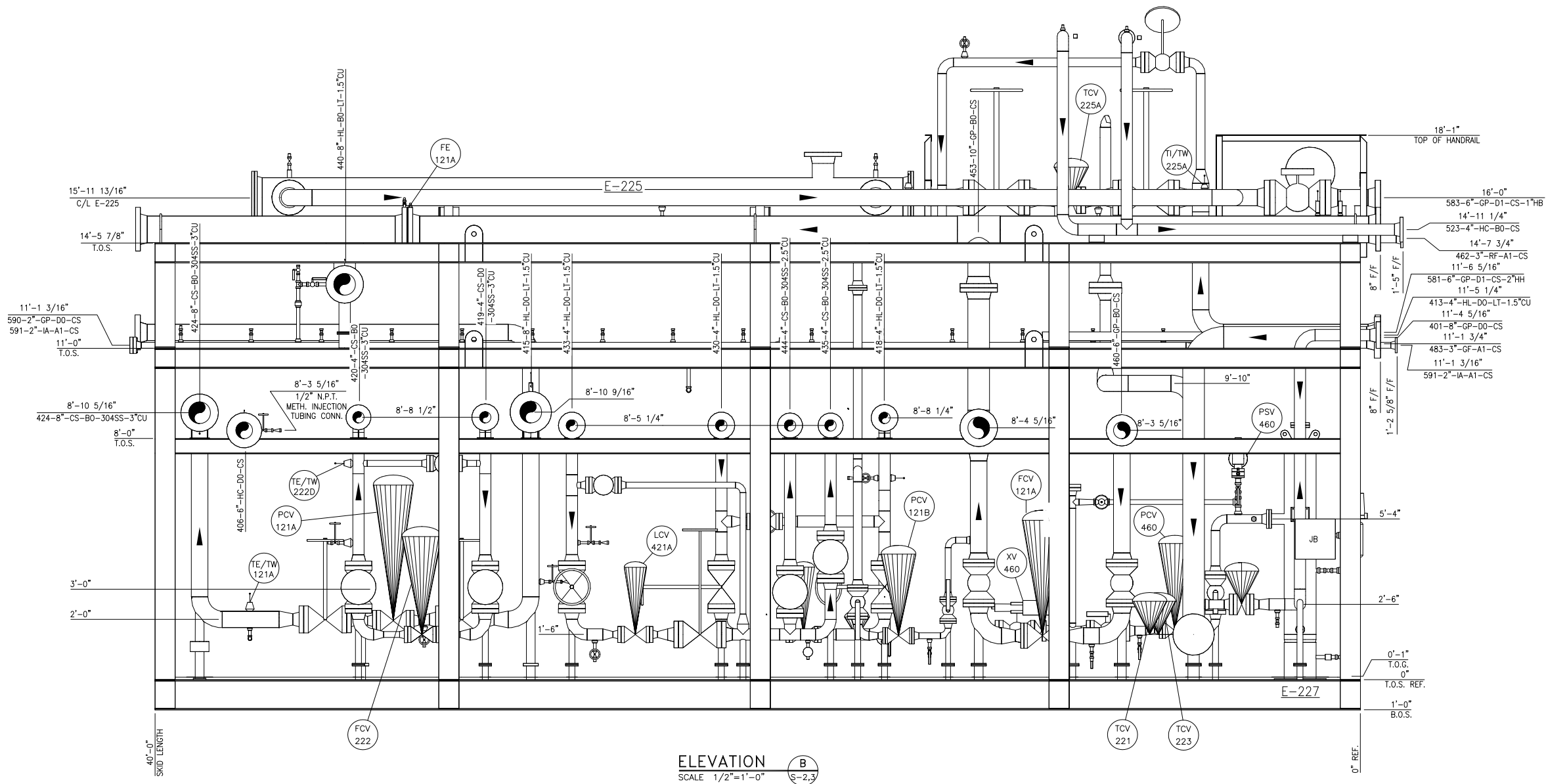
TOLERANCES					
CUTS	±1/8"				
ANGLES	±1/2°				
WELD ASS'Y.	±1/4"				

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CUSTOMER		STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT			
TITLE		DEMETH/EXPANDER VALVE SKID GENERAL ARRANGMENT ELEVATION VIEWS			
DRAWN J.CALLAHAN	DATE 12/5/11	APPROVED C. WHITE	SCALE NTS	NO. REQ'D ONE (1)	REV. 0
DRAWING NO. STD-C6-107.10-BA-02-401				SHT. NO. 4	REV. 0



ELEVATION B
SCALE 1/2"=1'-0"

DRT-FRM-US-CBL-004, REV. A

File: STD-C6-107.10-BA-02-401.dwg

REV.	DESCRIPTION	DATE	BY	CK	APP'D
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REVISIONS					

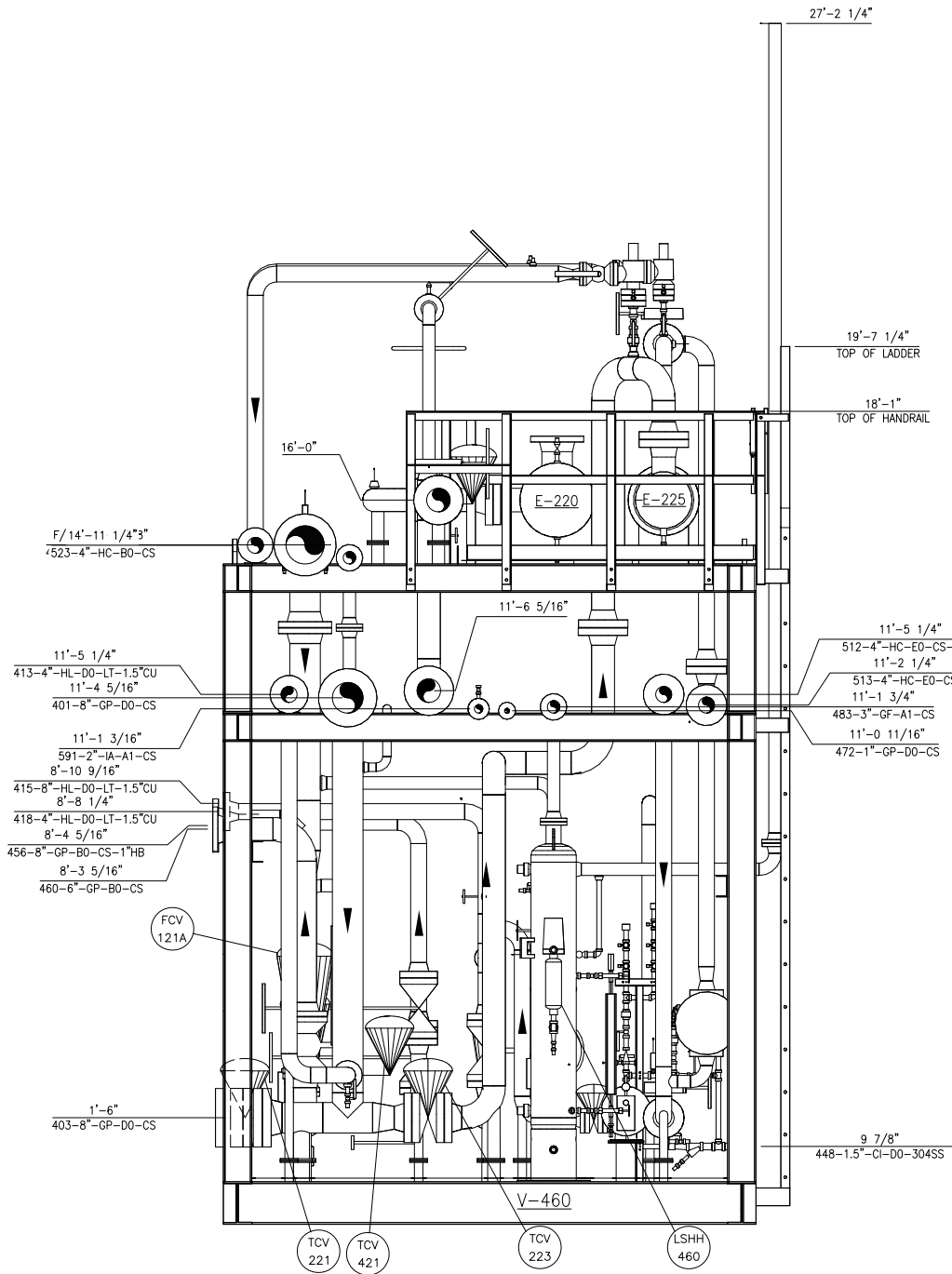
TOLERANCES					
CUTS	±1/8"				
ANGLES	±1/2°				
WELD ASS'Y.	±1/4"				

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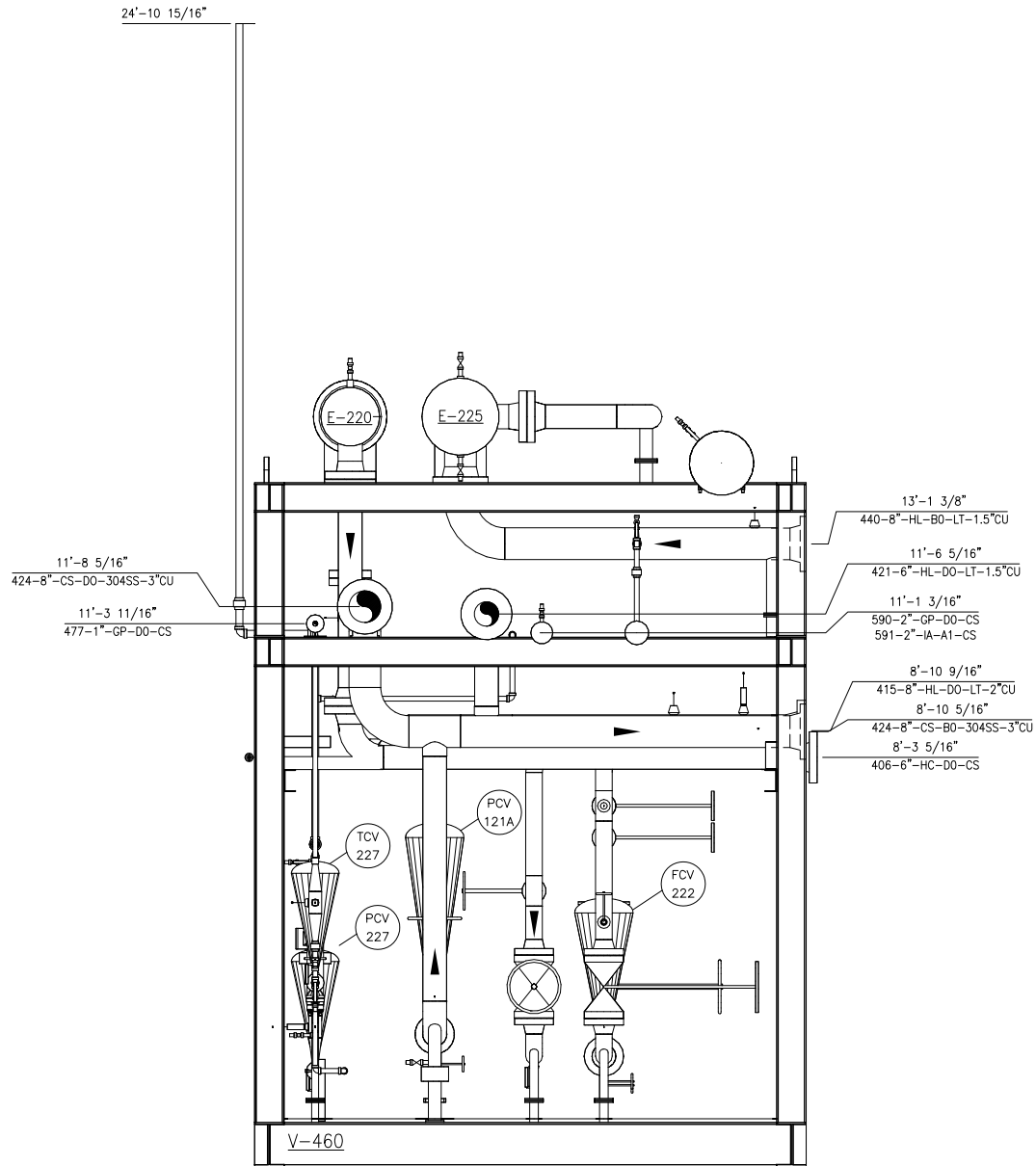
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File Name: STD-C6-107.10-BA-02-401.dwg



CUSTOMER		STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT			
TITLE		DEMETH/EXPANDER VALVE SKID GENERAL ARRANGMENT ELEVATION VIEWS			
DRAWN J.CALLAHAN	DATE 12/5/11	APPROVED C. WHITE	SCALE NTS	NO. REQ'D ONE (1)	REV.
DRAWING NO. STD-C6-107.10-BA-02-401				SHT. NO. 5	REV. 0



ELEVATION C
SCALE 1/2"=1'-0"

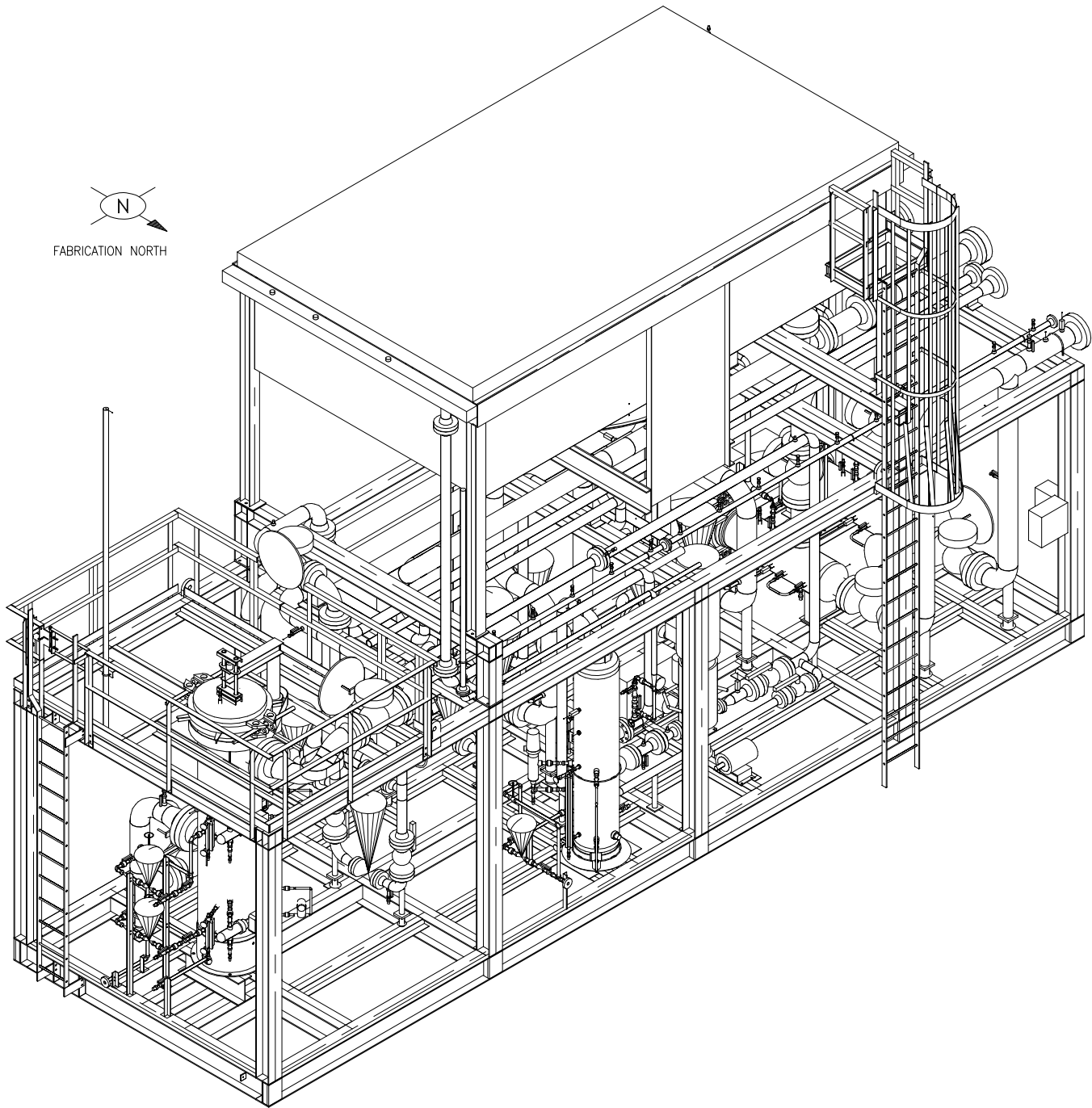
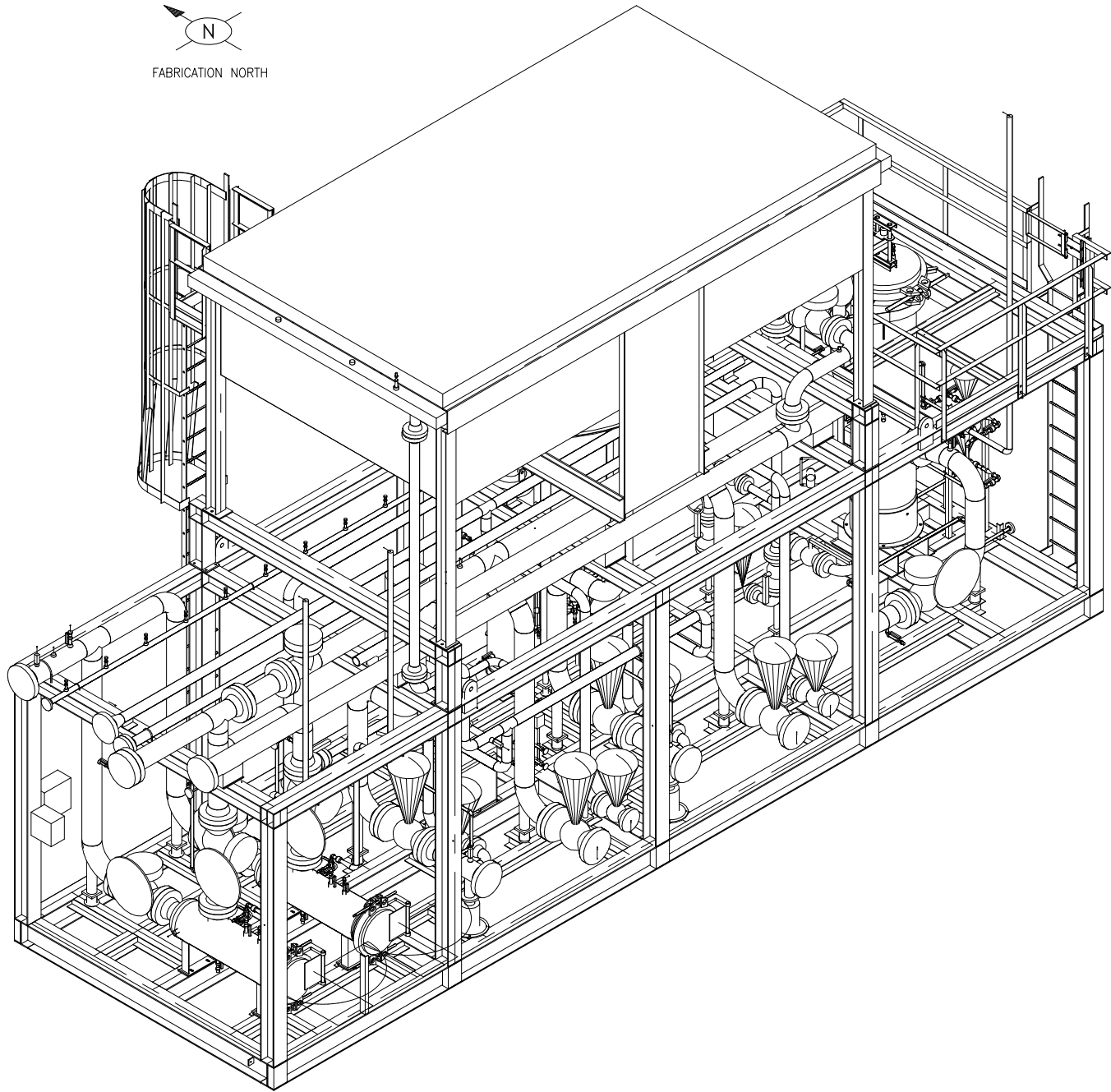


ELEVATION D
SCALE 1/2"=1'-0"

DRT-FRM-US-CBL-004, REV. A

File: STD-C6-107.10-BA-02-401.dwg

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DEHY/REGEN SKID		SHIP LOOSE ITEMS	
	A-311 W/ LADDER	=	18,600 #
	LOWER LADDER & H.R.	=	949 #
APPROX. WEIGHTS:	F-412 CLOSURE W/DAVIT	=	600 #
SHIPPING = 114,000 #	LINE # 328 & 329	=	442 #
OPERATING = 116,000 #	LINE # 306 & 307	=	945 #
APPROX. SHIPPING DIMENSIONS:	LINE 314 & 315	=	1,127 #
41'-7" L. x 13'-0" W. x 13'-8" H.	VENT LINES	=	237 #

REV.	DESCRIPTION	DATE	BY	CK	APP'D
0	APPROVED FOR CONSTRUCTION	SEE LOG	JPC	CWW	HB
REVISIONS					

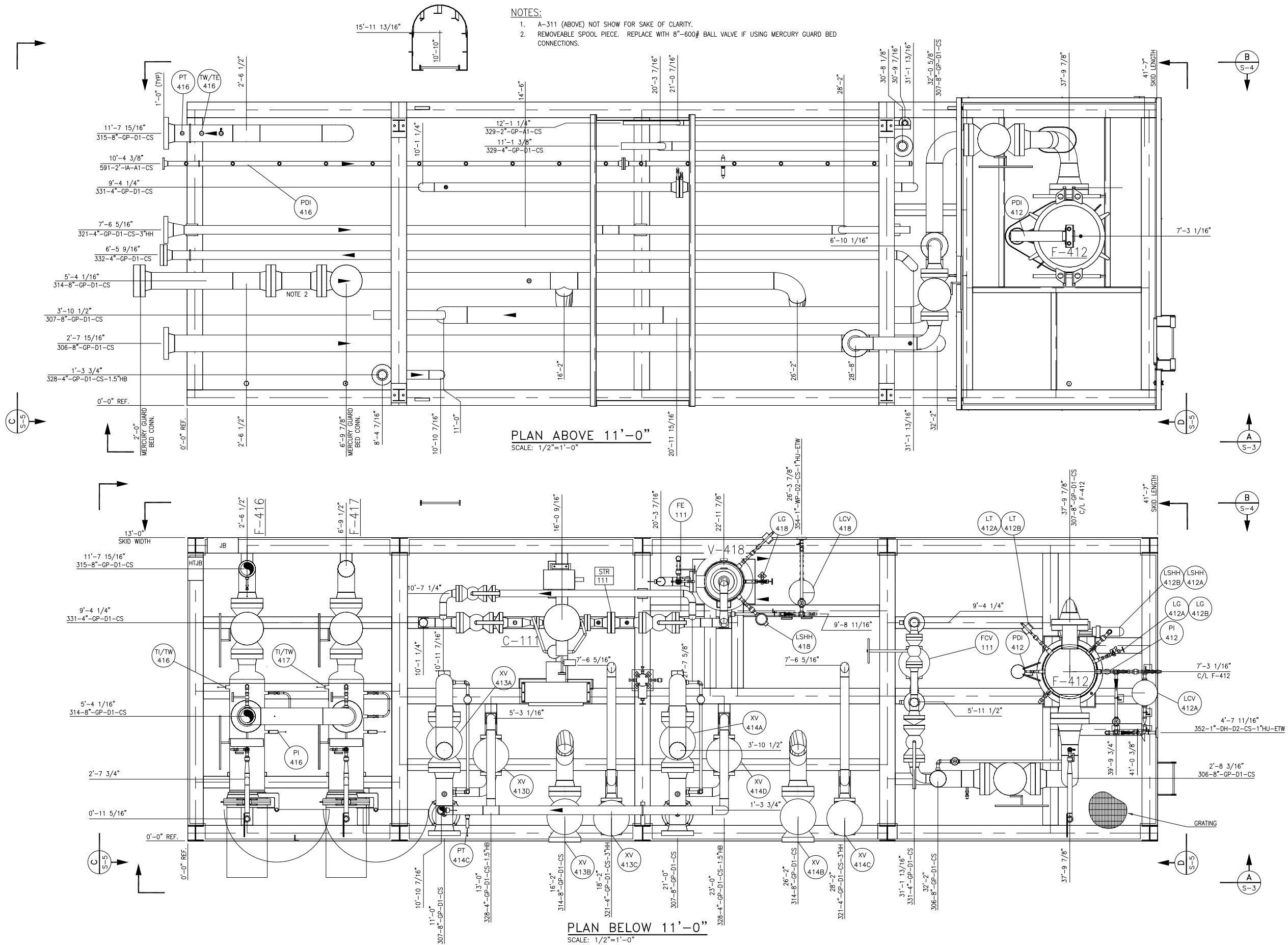
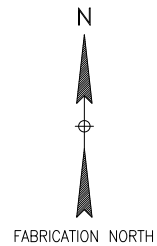
TOLERANCES	
CUTS	±1/8"
ANGLES	±1/2"
WELD ASS'Y.	±1/4"

THIS DRAWING IS THE PROPERTY OF EXTERRAN AND IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED

Edited by: hboen01
Jul 25, 2012 - 8:06am
File Name: STD-C6-107.15-BA-02-402.dwg



CUSTOMER		STANDARD DOMESTIC DESIGN			
		STD - C6 CRYOGENIC GAS PLANT			
TITLE		DEHYDRATION SWITCH VALVE/REGEN SKID			
		GENERAL ARRANGEMENT ISOMETRIC VIEWS			
DRAWN	DATE	APPROVED	SCALE	NO. REQ'D	
J.CALLAHAN	12/5/11	C. WHITE	NTS	ONE (1)	
DRAWING NO.	STD-C6-107.15-BA-02-402			SHT. NO.	REV.
				1	0



0	APPROVED FOR CONSTRUCTION	SEE LOG	JPC	CWW	HB
REV.	DESCRIPTION	DATE	BY	CK	APP'D
REVISIONS					

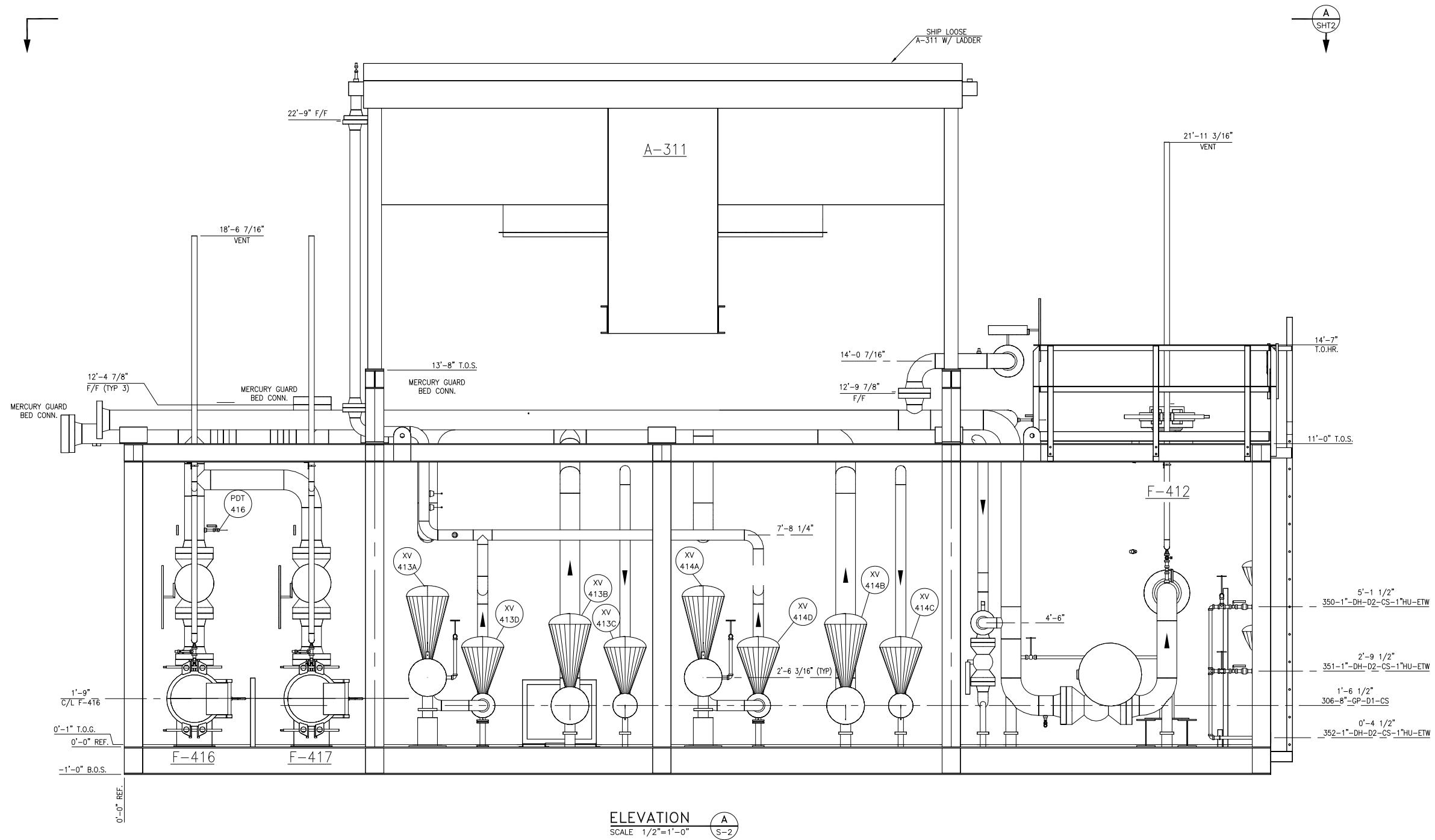
TOLERANCES	
CUTS	±1/8"
ANGLES	±1/2"
WELD ASS'Y.	±1/4"

THIS DRAWING IS THE PROPERTY OF EXTERRAN AND IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED

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Jul 25, 2012 - 8:06am
File Name: STD-C6-107.15-BK-02-402.dwg



CUSTOMER		STANDARD DOMESTIC DESIGN			
TITLE		STD - C6 CRYOGENIC GAS PLANT			
DRAWN		DATE		APPROVED	
J. CALLAHAN		12/5/11		C. WHITE	
SCALE		NTS		NO. REQ'D	
DRAWING NO.		STD-C6-107.15-BA-02-402		ONE (1)	
SHT. NO.		2		REV.	
				0	

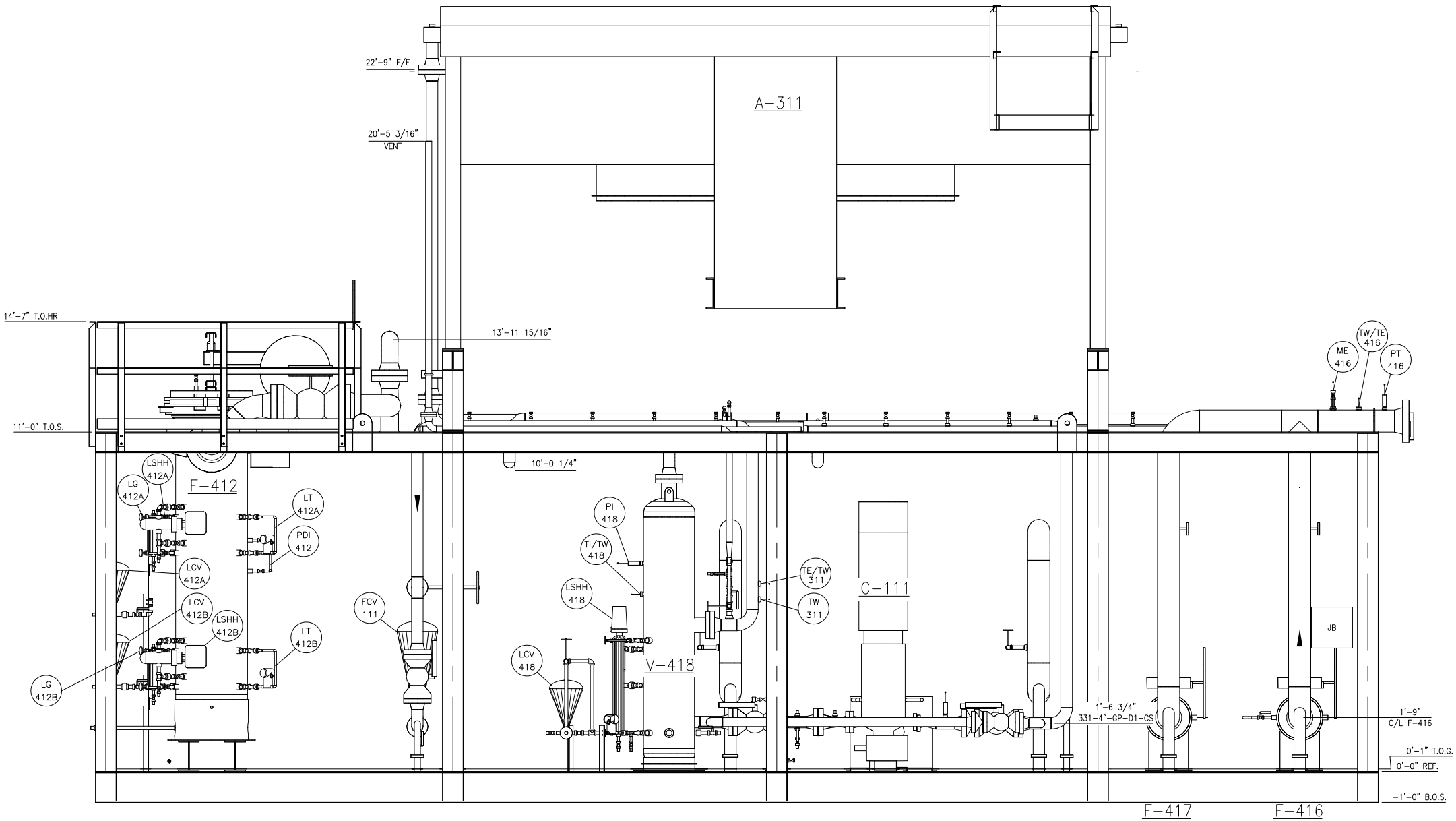


ELEVATION
SCALE 1/2"=1'-0" A
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DRT-FRM-US-CBL-004, REV. A

File: STD-C6-107.15-BA-02-402.dwg



ELEVATION B
SCALE 1/2"=1'-0" S-2

REV.	DESCRIPTION	DATE	BY	CK	APP'D
0	APPROVED FOR CONSTRUCTION	SEE LOG	JPC	CWW	HB
REVISIONS					

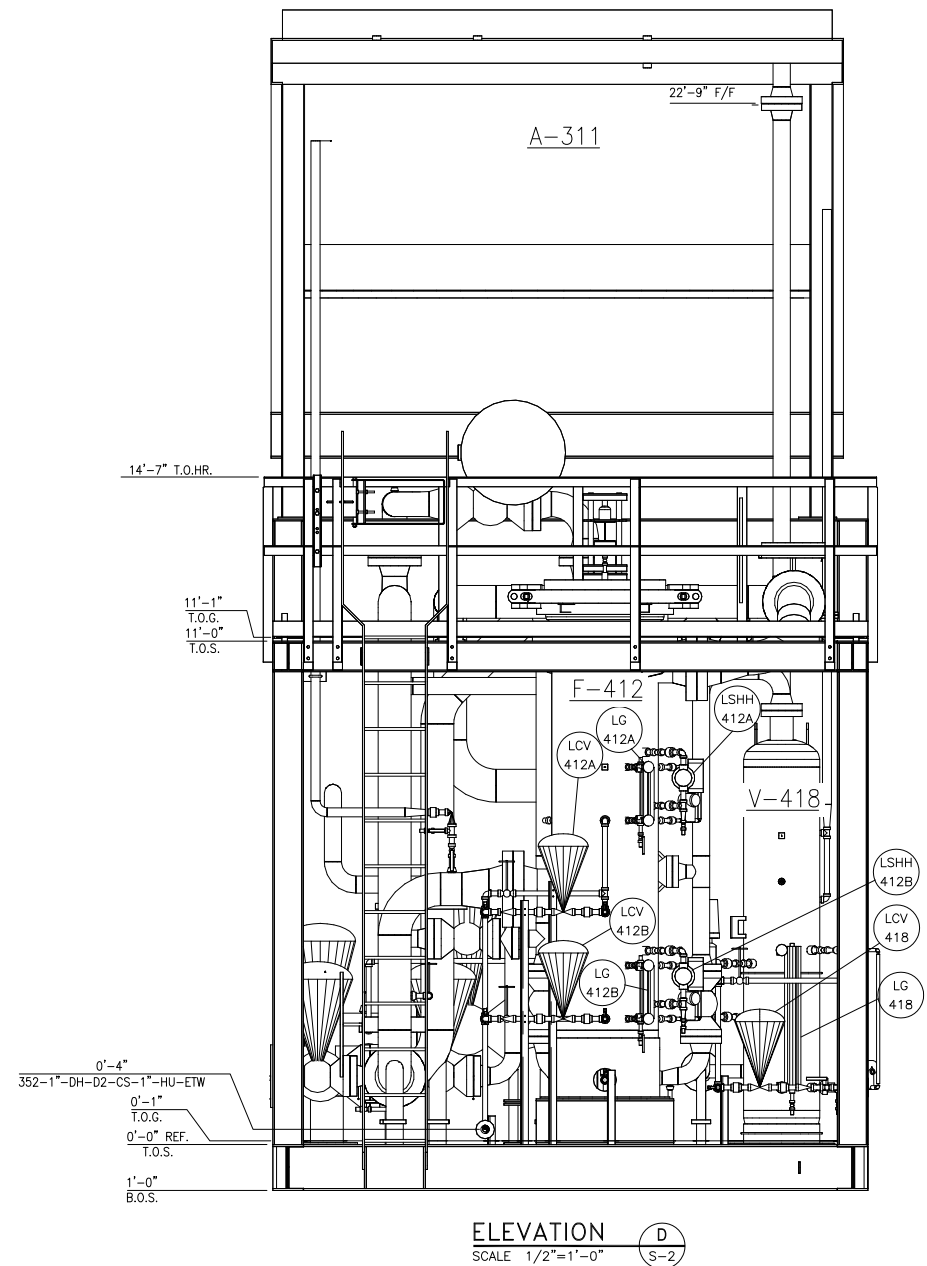
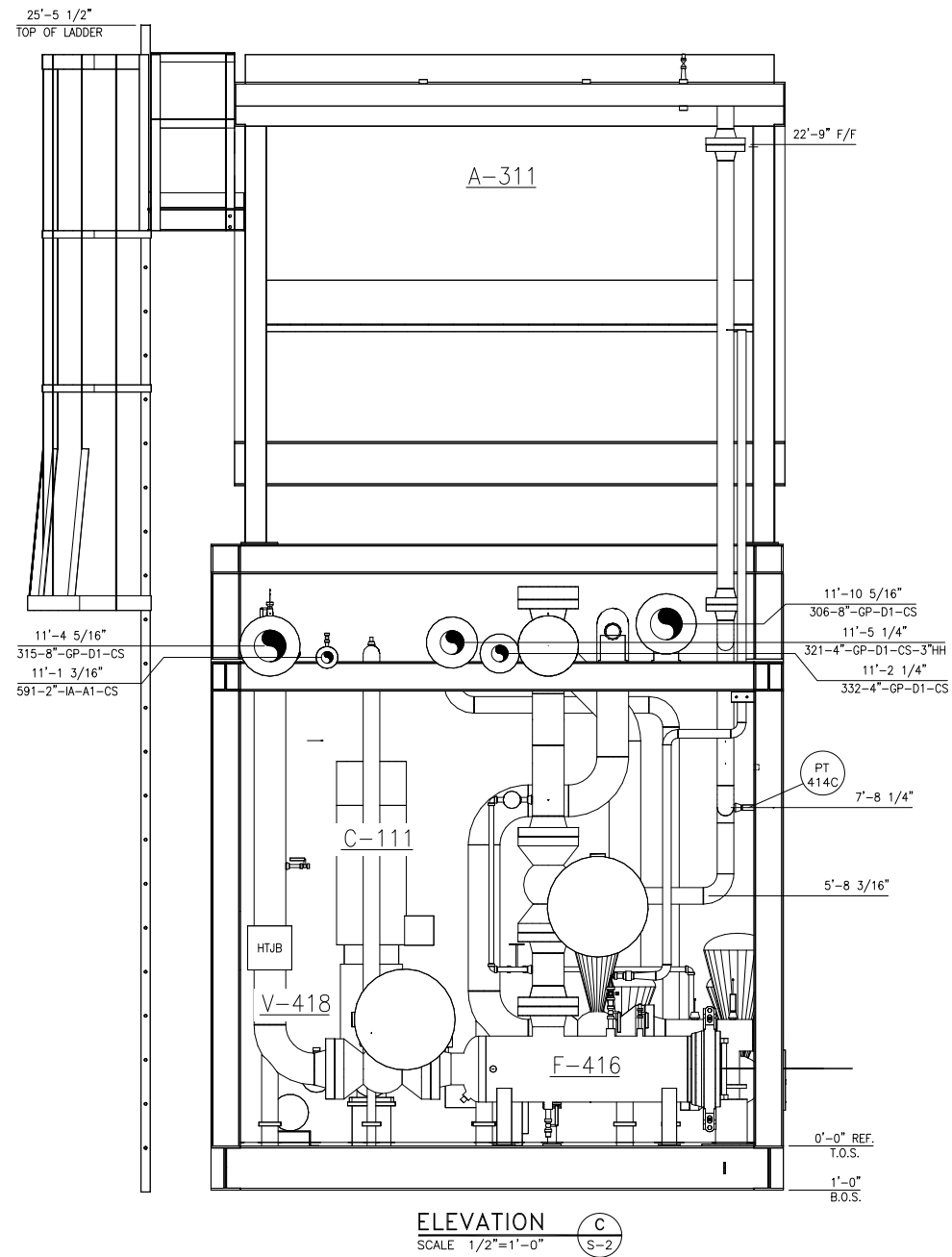
TOLERANCES					
CUTS	±1/8"				
ANGLES	±1/2°				
WELD ASS'Y.	±1/4"				

THIS DRAWING IS THE PROPERTY OF EXTERRAN AND IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED

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File Name: STD-C6-107.15-BA-02-402.dwg

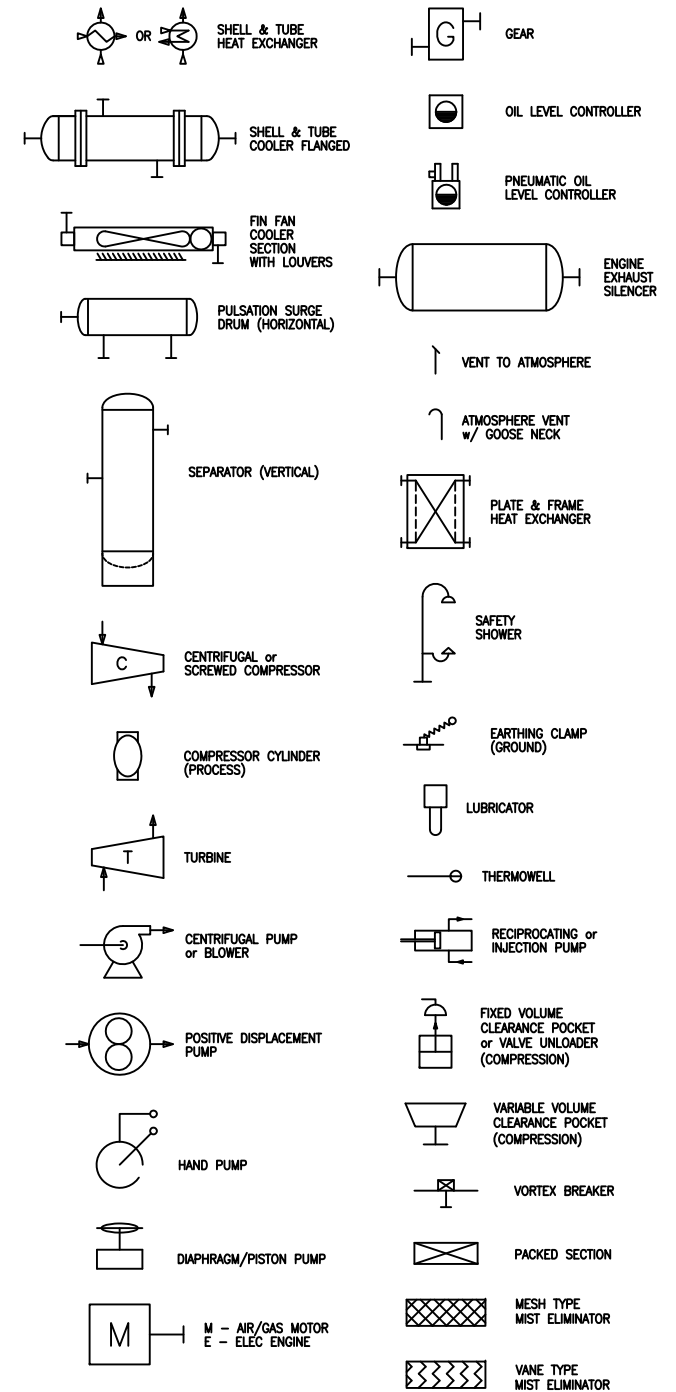


CUSTOMER					
STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT					
TITLE					
DEHYDRATION SWITCH VALVE/REGEN SKID GENERAL ARRANGEMENT ELEVATION VIEW					
DRAWN	DATE	APPROVED	SCALE	NO. REQ'D	
J.CALLAHAN	12/5/11	C. WHITE	NTS	ONE (1)	
DRAWING NO.				SHT. NO.	REV.
STD-C6-107.15-BA-02-402				4	0



						TOLERANCES		THIS DRAWING IS THE PROPERTY OF EX TERRAN AND IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED		CUSTOMER									
						CUTS ±1/8"				STANDARD DOMESTIC DESIGN									
						ANGLES ±1/2"				STD - C6 CRYOGENIC GAS PLANT									
						WELD ASS'Y. ±1/4"				DEHYDRATION SWITCH VALVE/REGEN SKID GENERAL ARRANGEMENT ELEVATION VIEWS									
0	APPROVED FOR CONSTRUCTION				SEE LOG	JPC	CWW	HB											
REV.	DESCRIPTION				DATE	BY	CK	APP'D											
REVISIONS											DRAWING NO.		STD-C6-107.15-BA-02-402			SHT. NO.	REV.		
																5	0		
											Edited by: hboen01 Jul 25, 2012 - 8:06am File Name: STD-C6-107.15-BA-02-402.dwg								

EQUIPMENT SYMBOLS



	THREADED or WELDED
	FLANGED
	SOCKET WELDED

DWG NUMBER	DESCRIPTION	REV.	0 APPROVED FOR CONSTRUCTION	SEE LOG	DMM	AR
REFERENCE DRAWINGS			REVISIONS			

THIS DRAWING IS THE
PROPERTY OF EXTERNAN
AND IS NOT TO BE
USED FOR ANY PURPOSE
OTHER THAN THAT
FOR WHICH IT IS
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16666 Northchase Drive
Houston, Texas, 77060 (281) 836-7000

CUSTOMER				STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT				G
TITLE				STANDARD P&ID LEGEND VALVE & EQUIPMENT SYMBOLS				
DRAWN D.MOEN	DATE 08/01/2011	APPROVED A.RAO	SCALE NONE	NO. REQ'D N/A				
DRAWING NO. STD-C6-01-BA-00-000				SHT. NO. 1 OF 3		REV. 0		

6" — VALVE SIZE
OW-A1 — VALVE TAG
001 — VALVE NUMBER
[] — VALVE SEQUENCE NUMBER PER SHEET
P&ID SHEET NUMBER

101-4"-AL-A1-CS-1.5"H-ST

LINE NUMBER

LINE SIZE

LINE SERVICE

LINE CLASS/CORROSION ALLOWANCE (PROCESS)
or SCHEDULE (COMPRESSION, EXAMPLE: 150#)

MATERIAL TYPE

INSULATION THICKNESS/TYPE (OPTIONAL)

HEAT TRACE (OPTIONAL)

AL	- AMINE	LV	- LP. RELIEF
ALN	- LEAN AMINE	NP	- NITROGEN PURGE
AP	- AIR PURGE	OC	- CRUDE OIL
AR	- RICH AMINE-CARBON STEEL	OD	- CRUDE OIL
AS	- AIR AMINE-CARBON STEEL	OF	- DIESEL/KEROSENE FUEL
AUX	- AUXILIARY WATER	OK	- KEROSENE PRODUCT
AV	- ATMOSPHERIC VENT	OL	- LUBE OIL
AW	- ACID WATER	OP	- DIESEL PRODUCT
BG	- BLANKET GAS	OR	- RESID OIL
BL	- BLOWDOWN / VENT	OT	- DESALTED/TREATED OIL
C	- CRYOGENIC	OW	- WASTE OIL
CA	- COMBUSTION AIR	PB	- LUBE PRODUCT (PROPANE/PLANE MIX)
CC	- CLOSED DRAIN	PC	- COLD PROPANE REFRIGERANT
CH	- CHEMICAL	PF	- WELL STREAM
CI	- CHEMICAL INJECTION	PI	- PROCESS LIQUID
CO	- COMPRESSOR LUBE OIL	PR	- PROPANE REFRIGERANT
CLO	- CLOSURE	PL	- PURGE GAS
CS	- CRYOGENIC SERVICE (LIQUID or GAS)	PW	- WARM PROPANE REFRIGERANT
CW	- COOLING WATER	PY	- Y-GRADE or INGL. PRODUCT
DA	- AMINE DRAIN	RA	- LOCAL RELIEF/VENT
DC	- DIESEL DRAIN	RF	- TO ATMOSPHERE
DG	- GLYCOL DRAIN	RR	- RELIEF/BLOWDOWN TO FLARE
DH	- HYDROCARBON DRAIN	RG	- RECYCLE GAS
DO	- OPEN DRAIN	RH	- H.P. RELIEF
DS	- PROCESS DRAIN	RV	- RELIEF/BLOWDOWN TO VENT STACK
DW	- WASTE DRAIN	S	- SULFUR
EM	- EMULSION	SA	- STARTING AIR
EX	- EXHAUST	SAS	- START AIR SUPPLY
FD	- FLARE	SG	- STARTING GAS
FX	- DIESEL FUEL	SGS	- START GAS SUPPLY
FGS	- FUEL GAS SUPPLY	SH	- STEAM (HP)
FK	- KEROSENE FUEL	SI	- STEAM (LP)
FL	- LP FLARE	SU	- LIQUID SULFUR
G	- GAS	SW	- SEA WATER
GA	- ACID GAS-CARBON STEEL	UA	- UTILITY AIR
GB	- BLANKET GAS	UG	- UTILITY DRAIN
GD	- DOMESTIC GAS (ODOORIZED)	UU	- UTILITY GAS
GF	- FUEL GAS	V	- VENT
GL	- GLYCOL LEAN	VG	- VENT GAS
GN	- SOUR GAS	W	- DOMESTIC WATER
GP	- FRIGGING GAS	WA	- W/ SOUR (ACID) WATER
GPT	- PILOT GAS	WB	- BOILER FEED WATER
GR	- GLYCOL RICH	WBK	- BLACK WATER
GS	- ACID GAS-STEANLESS STEEL	WBS	- STEAM CONDENSATE
GW	- WASTE GAS	WD	- DEIONIZED WATER
HZ	- GAS WITH CO ₂	WDL	- DILUTION WATER
HC	- HYDROCARBON FLUID (LIQUID and/or VAPOR)	WF	- FIRE WATER
HD	- HYDROCARBON DRAIN	WU	- JACKET WATER
HQ	- HYDROCARBON, LOW TEMP.	WGR	- GRAY WATER
HL	- HYDROCARBON LIQUID	WI	- INJECTION WATER
HM	- HEAT MEDIUM	WP	- PRODUCED WATER
HO	- HOT OIL or HEAT MEDIUM	WPT	- POTABLE WATER
HR	- HYDROGEN RICH	WS	- STEAM (HP)
IV	- H.P. RELIEF	WSL	- STEAM (LP)
IA	- INSTRUMENT AIR	WU	- UTILITY WATER
IG	- INSTRUMENT GAS	WV	- WATER VAPOR
ILG	- LIQUID LUBE SERVICE - NACE	WW	- WASTE WATER
LPG	- LIQUID PETROLEUM GAS	WWD	- WASHDOWN WATER

A - 150# ANSI	L - 10000# API
B - 300# ANSI	M - 15000# API
C - 400# ANSI	N - 6000# API
D - 600# ANSI	X - 800# API
E - 900# ANSI	0 - ZERO CORROSION
F - 1500# ANSI	1 - 1/16" CORROSION
G - 2500# ANSI	2 - 1/8" CORROSION
H - 2000# API	3 - 3/16" CORROSION
J - 3000# API	(.05) - OTHER THEN 1/16" INCREMENT
K - 5000# API	

CS - CARBON STEEL	PVC - ASTM D1785 POLY VINYL CHLORIDE
CSSR - CARBON STEEL STRESS RELIEVE	A106 - ASTM A106 GRADE B
LT - LOW TEMPERATURE	X60 - API 5L X60
316L - 316L STAINLESS STEEL	X52 - API 5L X52
316 - 316 STAINLESS STEEL	X42 - API 5L X42
304L - 304L STAINLESS STEEL	
304 - 304 STAINLESS STEEL	

TYPE:	SERVICE:	MATERIAL:
HU	- HOT	URETHANE, UNSEALED 140°-200°F
HH	- HOT	CALCIUM SILICATE ABOVE 200°F
HB	- HOT	BURN PROTECTION (CALCIUM SILICATE or URETHANE)
CU	- COLD	URETHANE, SEALED
CF	- COLD	FOAM GLASS, SEALED
MW	- COLD	MINERAL WOOL

ET - ELECTRICAL TRACE	HO - HOT OIL
ETP - ELECTRICAL TRACE PROCESS	JW - JACKET WATER
ETW - ELECTRICAL TRACE WINTERIZATION	SJ - STEAM JACKET
GJ - GLYCOL JACKET	ST - STEAM TRACE
GT - GLYCOL TRACE	

AI	- ANALYSIS ELEMENT	PC	- PRESSURE CONTROLLER
AI	- ANALYSIS INDICATOR	PCV	- PRESSURE CONTROL VALVE
AIAC	- ANALYSIS INDICATING CONTROLLER	PCD	- PRESSURE DIFFERENTIAL CONTROLLER
AIS*	- ANALYSIS INDICATING SWITCH	PDI	- PRESSURE DIFFERENTIAL INDICATOR
AIT	- ANALYSIS INDICATOR AND TRANSMITTER	PDI*	- PRESSURE DIFFERENTIAL INDICATING CONTROLLER
AR	- ANALYSIS RECORDER	PDIS*	- PRESSURE DIFFERENTIAL INDICATING SWITCH
ARC	- ANALYSIS RECORDING CONTROLLER	PDI*	- PRESSURE DIFFERENTIAL INDICATING TRANSMITTER
AS	- ANALYSIS SWITCH	PDR	- PRESSURE DIFFERENTIAL RECORDER
AT	- ANALYSIS TRANSMITTER	PDS*	- PRESSURE DIFFERENTIAL SWITCH
AV	- ANALYSIS (LOOP) CONTROL VALVE	PDT	- PRESSURE DIFFERENTIAL TRANSMITTER
AY	- ANALYSIS RELAY	PD*	- PRESSURE DIFFERENTIAL SIGNAL TRANSDUCER, SOLENOID, RELAY, OR COMPUTING DEVICE
BE	- BURNER FLAME DETECTOR	PE	- PRESSURE PRIMARY ELEMENT
BF	- BURNER FLAME INDICATOR	PE*	- PRESSURE (CLASS OBSERVATION ONLY)
BS	- BURNER FLAME SWITCH	PI	- PRESSURE INDICATOR
BT	- BURNER TRANSMITTER	PI*	- PRESSURE INDICATING CONTROLLER
BX	- BURNER FLAME TV RECEIVER	PIC	- PRESSURE INDICATING TRANSMITTER
CC	- CONDUCTIVITY PRIMARY ELEMENT	PJY	- PRESSURE SCANNING RELAY
CD	- CONDUCTIVITY INDICATOR	PR	- PRESSURE RECORDER
CRI	- CORROSION INDICATOR	PRC	- PRESSURE RECORDING CONTROLLER
CI	- CONDUCTIVITY INDICATING CONTROLLER	PS*	- PRESSURE SWITCH
CP	- CORROSION TEST CONNECTION	PSE	- PRESSURE SAFETY ELEMENT (RUPTURE DISK)
CC	- CONDUCTIVITY CONTROLLER	PSV	- PRESSURE SAFETY VALVE
CR	- CONDUCTIVITY RECORDING CONTROLLER	PT	- PRESSURE TRANSMITTER
CT	- CONDUCTIVITY TRANSMITTER	PY	- PRESSURE SIGNAL TRANSDUCER, SOLENOID, RELAY, OR COMPUTING DEVICE
CRT	- CORROSION TRANSMITTER	PZ	- PRESSURE ACTUATOR
DC	- DENSITY CONTROLLER	PZV	- PRESSURE ACTUATING VALVE
DE	- DENSITY PRIMARY ELEMENT	SC	- SPEED CONTROLLER
DI	- DENSITY INDICATOR	SE	- SENSING ELEMENT (SPEED PICKUP)
DIC	- DENSITY INDICATING CONTROLLER	SI	- SPEED INDICATOR
DIT	- DENSITY TOTALIZER	SI*	- SPEED INDICATING CONTROLLER
DR	- DENSITY RECORDER	SI*	- SPEED INDICATING TRANSMITTER
DRC	- DENSITY RECORDING CONTROLLER	SR	- SPEED RECORDER
DT	- DENSITY TRANSMITTER	SR*	- SPEED RECORDING CONTROLLER
ET	- VOLTAGE TRANSMITTER	SS*	- SPEED SWITCH
FC	- FLOW CONTROLLER	SV	- SPEED TRANSMITTER
FCV	- FLOW CONTROL VALVE (SELF ACTUATED)	SV*	- SPEED (LOOP) CONTROLLER
FE	- FLOW ELEMENT	SZ	- SPEED SIGNAL TRANSDUCER, SOLENOID, RELAY, OR COMPUTING DEVICE
FG	- FLOW SIGHT GAUGE OR GLASS	SY	- SPEED ACTUATING VALVE
FI	- FLOW INDICATOR	TC	- TEMPERATURE CONTROLLER
FIC	- FLOW INDICATING CONTROLLER	TC*	- TEMPERATURE CONTROL SWITCH
FIR	- FLOW INDICATOR RECORDER	TCV	- TEMPERATURE CONTROL VALVE (SELF ACTUATED)
FI*	- FLOW INDICATING TRANSMITTER	TD	- TEMPERATURE DIFFERENTIAL TRANSMITTER
FI*	- FLOW RESTRICTION ORIFICE	TE	- TEMPERATURE ELEMENT
FO	- FLOW TOTALIZER	TE	- TEMPERATURE INDICATOR
FOI	- FLOW TOTALING INDICATOR	TE*	- TEMPERATURE INDICATING CONTROLLER
FR	- FLOW RECORDER	TE*	- TEMPERATURE INDICATING TRANSMITTER
FRC	- FLOW RECORDING CONTROLLER	TE*	- TEMPERATURE MULTIPONT SCANNING RECORDER
FS*	- FLOW SWITCH	TR	- TEMPERATURE RECORDER
FT	- FLOW TRANSMITTER	TRC	- TEMPERATURE RECORDING CONTROLLER
FV	- FLOW COMPUTER (FISCAL METERING)	TS*	- TEMPERATURE SWITCH
FW	- FLOW (LOOP) CONTROL VALVE	TT	- TEMPERATURE TRANSMITTER
FV	- FLOW RELAY, SOLENOID, COMPUTING DEVICE (V/P FOR FLOW)	TV	- TEMPERATURE CONTROL VALVE (NOT SELF ACTUATED)
GC	- GRAVITY CONTROLLER	TW	- TEMPERATURE WELL (THERMOWELL)
GE	- GRAVITY PRIMARY ELEMENT	TY	- TEMPERATURE SIGNAL TRANSDUCER, SOLENOID, RELAY, OR COMPUTING DEVICE
GI	- GRAVITY INDICATOR	TZV	- TEMPERATURE ACTUATED VALVE
GIC	- GRAVITY INDICATING CONTROLLER	UC	- MULTIVARIABLE CONTROLLER
GR	- GRAVITY RECORDER	UCV	- MULTIVARIABLE CONTROL VALVE (SELF CONTAINED)
GRC	- GRAVITY RECORDING CONTROLLER	UV	- MULTIVARIABLE CALCULATION INDICATOR
GT	- GRAVITY TRANSMITTER	UV*	- MULTIVARIABLE INDICATING CONTROLLER
HC	- HAND CONTROLLER	US*	- MULTIVARIABLE SWITCH
HIC	- HAND INDICATOR CONTROLLER (MANUAL)	UT	- MULTIVARIABLE TRANSMITTER
HS	- HAND SWITCH (ON-OFF)	UV*	- MULTIVARIABLE CONTROL VALVE (NOT SELF CONTAINED)
HV	- HAND VALVE	UY	- MULTIVARIABLE SIGNAL CONVERSION ELEMENT
IA	- INSTRUMENT AIR	VA	- VIBRATION ALARM
IS*	- CURRENT SWITCH	VB	- VIBRATION SIGNAL TRANSDUCER, SOLENOID, RELAY, OR COMPUTING DEVICE
IT	- CURRENT TRANSMITTER	VI	- VIBRATION INDICATOR
IT*	- POWER TRANSMITTER	VI*	- VIBRATION INDICATING TRANSMITTER
IC	- TIME CONTROL	VS*	- VIBRATION SWITCH
KCV	- TIME CONTROL VALVE	VT	- VIBRATION TRANSMITTER
KI	- TIME INDICATOR	WE	- WEIGHT PRIMARY ELEMENT
KS	- SEQUENCE RESET SWITCH FUNCTION	WI	- WEIGHT INDICATOR
LV	- TIME (LOOP) CONTROL VALVE	WQ	- WEIGHT TOTALIZER
L	- LEVEL CONTROLLER	WR	- WEIGHT RECORDER
LCS*	- LEVEL CONTROL SWITCH	WT	- WEIGHT TRANSMITTER
LCV	- LEVEL CONTROL VALVE (SELF ACTUATED)	XA	- ANNUNCIATOR POINT OR UNSPECIFIED ALARM OR REMOTE SHUTDOWN
LG	- LEVEL GAUGE	XI	- USER DEFINED INDICATOR
LJ	- LEVEL INDICATOR	XS	- REMOTE STATUS
LJC	- LEVEL INDICATING CONTROLLER	Y	- USER DEFINED VALVE
LIT	- LEVEL INDICATING TRANSMITTER	*XY	- SOLENOID VALVE
LR	- LEVEL RECORDER	ZE	- POSITION ELEMENT
LRC	- LEVEL RECORDING CONTROLLER	ZP	- POSITION INDICATOR (ZIO, ZIC)
LS*	- LEVEL SWITCH	ZH	- POSITION INDICATOR (OPEN)
LT	- LEVEL TRANSMITTER	ZH*	- POSITION INDICATOR (CLOSED)
LV	- LEVEL CONTROL VALVE (NOT SELF ACTUATED)	ZL	- POSITION LIGHT (INDICATOR)
MC	- MOISTURE CONTROLLER	ZS*	- POSITION SWITCH OR LIMIT SWITCH
MCV	- MOTOR CONTROL VALVE (SELF ACTUATED)	ZT	- POSITION TRANSMITTER
ME	- MOISTURE PRIMARY ELEMENT	ZV	- POSITION VALVE (LIMIT VALVE), PROXIMITY SWITCH
MI	- MOISTURE INDICATOR	ZY	- POSITION SIGNAL TRANSDUCER, SOLENOID, RELAY, OR COMPUTING DEVICE
MIC	- MOISTURE INDICATING CONTROLLER		
MR	- MOISTURE RECORDER		
MRC	- MOISTURE RECORDING CONTROLLER		
MS	- MANUAL SHUTDOWN SWITCH		
MT	- MOISTURE TRANSMITTER		
MV	- MOTOR CONTROL VALVE (NOT SELF ACTUATED)		
NE	- NECESSITY ELEMENT		
NV	- VISCOSITY INDICATOR		
NT	- VISCOSITY TRANSMITTER		

A/F - AIR FUEL RATIO CONTROLLER
A/M - AUTOMATIC/MANUAL 2-POSITION SWITCH
AA* - ANALYSIS ANNUNCIATION
ACM - ACCELERATOR METER
ACU - VOLUME BOTTLE (CLEARANCE)
ADV - AIR CONTROL VALVE
AFF- UEOUS FILM FORMING FOAM
ALT - ALTERNATOR
AM - AMP METER
AM - AMPLIFIER
AOV - AUTO VALVE
ARV - AIR RELEASE VALVE
ATC - AUTOMATIC TEMPERATURE COMPENSATOR
BAT - BATTERY
BCV - BLOWDOWN VALVE
CHA - ADJUSTABLE CHOKE
CHF - FIXED CHOKE
DL - DETONATION LEVEL INDICATOR
DM - DETONATION MODULE
EPC - DETONATION LEVEL
EFC - EXTERNAL FLOAT CHAMBER
EP - ENGINE PANEL
FA* - FLOW ANNUNCIATION
FBR - FUEL BURN RATE
FM - FLOW METER
FPR - FLOW PRESSURE RECORDER (2 PEN)
FPTP - FLOW PRESSURE TEMPERATURE RECORDER (3 PEN)
GOV - ENGINE GOVERNOR
HCV - HAND CONTROL VALVE
HE - HEATING ELEMENT
HQA - HAND-OFF-AUTOMATIC
HRM - HOUR METER
I - INSPECTION OPENING
ICP - INSTRUMENT CONTROL PANEL
IGD - IGNITION FAIL DEVICE
IGS - IGNITION GROUNDING SWITCH
IGT - ENGINE IGNITION
JB - JUNCTION BOX
LA* - LIFT ANNUNCIATION
LCB - LOCAL CONTROL BOARD
MA - MANUAL ACTUATOR
MG - MAGNETO

AD - ADAPTER	HTP - HEATER
AF - AIR FILTER	IHC - INSTRUMENT CONTROL PANEL
AN - ANALYZER	LD - LOCKING DEVICE
B - BELT	LU - LUBRICATOR
BD - BETA DRIVE	LV - LOUVERS
BF - BLIND FLANGE	M - MOTOR
BG - BELT GUARD	MB - MANIFOLD BAR (LUBRICATOR)
BKT - BRACKET	MCC - MOTOR CONTROL CENTER
BL - BLOCK (LUBRICATOR)	MOV - MOTOR OPERATED VALVE
BO - BARRING JACK	MS - MOTOR STARTER
BR - BLEED RING	P - PUMP
BU - BUSHING	PA - PNEUMATIC ACTUATOR
C - COMPRESSOR	PLB - PLOW BLOCK
CAP - CAP (PRESSURE)	PD - PULSATION DAMPNER
CB - CLEARANCE BOTTLE	PLS - PRELUBE SYSTEM
CC - CATALYTIC CONVERTER	PM - PNEUMATIC (AIR/GAS) MOTOR
CG - COUPLING GUARD	PMS - PNEUMATIC STARTER
CH - CHAIN OPERATED	PTO - POWER TAKE OFF
CO - COUPLING	PI - PISTON NUT WRENCH
CPI - CYCLE PIN INDICATOR (LUBRICATOR)	SA - STACK ARRESTOR
CS - CYLINDER SUPPORT	SB - SPECTACLE BLIND
CV - CYLINDER VALVE	SH - SHAFT
CW - CROSSHEAD NUT WRENCH	SLB - SLIDE BASE (MOTOR)
CWC - COUNTERWEIGHT	SN - SHRUBBER
CYL - CYLINDER	ST - TANK (STORAGE)
DV - DELUGE VALVE	STR - STRAINER
E - ENGINE	SV - SVEAVE
E/H - ELECTRO/HYDRAULIC ACTUATOR	T - TURBINE
EJ - EXPANSION JOINT	TS - PISTON TRAM
ERO - EXPLOSION RELIEF DEVICE	TT - TEMPORARY STRAINER
ES - EXHAUST SILENCER	UL - UNLOADER
F - FILTER	V - VESSEL (CODED AND NON-CODED)
FA - FLAME ARRESTER	V3W - 3-WAY VALVE
FJ - FILTER ELEMENT	V4W - 4-WAY VALVE
FL - FLEXIBLE JOINT	VBB - BLOCK AND BLEED VALVE
FLT - FLOAT CHAMBER	VF - FIRE SAFE VALVE
FVCP - FIXED VOLUME CLEARANCE POCKET	VI - GAUGE VALVE
G - GEAR	VMP - VANE PACK
GN - GENERATOR	VPD - PULSATION DAMPENER, VALVE
H - HEAT EXCHANGER AIR COOLER	VE - VALVE TEST INSERT
HCP - HOSE CLAMP	WCVP - VARIABLE VOLUME CLEARANCE POCKET
HON - HOSE CONNECTION	VW - VALVE WRENCH
HH - HAND HOLE	XC - CHOKE VALVE
HM - HYDRAULIC MOTOR	XCM - CHOKE NIPPLE
HR - HOSE REEL	XW - CROSSHEAD WEIGHT
HT - HEAT EXCHANGER (COOLER)	

A/G	ABOVE GROUND	MLW	MEAN LOW WATER
AC	AIR TO CLOSE	MMSCFD	= MILLION STANDARD CUBIC FEET PER DAY
AO	AIR TO OPEN	MSCFD	= THOUSAND STANDARD CUBIC FEET PER DAY
AS	AIR SUPPLY	MSL	MEAN SEA LEVEL
BOS	BOTTOM OF PIPE	MW	MANWAY
BSW	BOTTOM OF STEEL	NB	IMPORTANT NOTE (NOTA BIEN)
BSW	BOTTOM SEDIMENT AND WATER	NC	NORMALLY CLOSED
BW	BUTT WELD	NNF	NORMALLY NO FLOW
CA	CORROSION ALLOWANCE	NO	NORMALLY OPEN
CC	CLEAN OUT	NS	NITROGEN SUPPLY
CPC	PRESSURE CONNECTION - PLUGGED	NTS	NOT TO SCALE
CS	CARBON STEEL	NO	OUTSIDE DIAMETER
CSC	CAR SEAL CLOSED	OF	OWNER FURNISHED
CSC	CAR SEAL OPEN	OP	OPERATING TEMPERATURE
CTP	TEMPERATURE CONNECTION - PLUGGED	OT	OPERATING TEMPERATURE
D	DRAIN	PO	POSITIVE DISPLACEMENT
#	DIFFERENTIAL PRESSURE	PGS	POWER GAS SUPPLY
DP	DRAIN PRESSURE	PI	PROPORTIONAL, INTEGRAL, DIFFERENTIAL
DPC	DRAIN PLUG	PO	PUMP OUT
EL	ELEVATION	PP	PERSONNEL PROTECTION
EOP	END OF PIPE	PS	PIPE SUPPORT
ES	ELECTRIC SHUTDOWN	PSD	PROCESS SHUTDOWN
ETR	ELECTRICAL TRACE	PSIG	POUNDS PER SQUARE INCH
EX	EXHAUST	RA	REVERSE ACTING
F	FLARE	REF	REFERENCE
F/F	FACE OF FLANGE	REV	REVISION
FB	FULL BORE	RF	RAISED FACE
FL	FLAT FACE	RP	REDUCED PORT
FLC	FAIL LOCKED (LAST POSITION)	RSP	REMOTE SETPOINT
FW	FITTING MAKE-UP	RT	RING TYPE JOINT
FSD	FLAT SIDE DOWN	S	SAMPLER
FSU	FLAT SIDE UP	S/S	SEAM TO SEAM
FW	FIELD WELD	SD	SHUTDOWN
GJ	GYROVAL JACKET	SP	SETPOINT
GO	GEAR OPERATED	SS	STAINLESS STEEL
GS	GAS SUPPLY	T/T	TANGENT TO TANGENT
H2S	HYDROGEN SULFIDE (SOUR GAS)	TOG	TOP OF GRATING
HP	HORSEPOWER	TOS	TOP OF STEEL
HPS	HIGH PRESSURE	TP	THE-IN POINT
ID	INSIDE DIAMETER	TPP	TEMPERATURE POINT PLUGGED
IG	INSTRUMENT GAS SUPPLY	U/G	UNDER GROUND
IGV	INSTRUMENT GAS VENT	V	VENT
KPSG	KILOPASCAL GAGE	VF	VENTOR FURNISHED
LCD	LOOKED CLOSED	VFD	VARIABLE FREQUENCY DRIVE
LO	LOOKED OPEN	VP	VENT CONNECTION - PLUGGED
LP	LOW PRESSURE	VSA	VENT TO SAFE ATMOSPHERE
MAOP	MAXIMUM ALLOWABLE OPERATING PRESSURE	WN	WELD NECK
MAWP	MAXIMUM ALLOWABLE WORKING PRESSURE	WS	WATER SUPPLY
		Y	RELAY

PLC I/O AI - ANALOG INPUT
 AO - ANALOG OUTPUT
 DI - DIGITAL INPUT
 DO - DIGITAL OUTPUT

PROJECT #

THIS DRAWING IS THE
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Jul 25, 2012 - 7:49am
File: STD-C6-01-BA-00-000-2of3.dwg

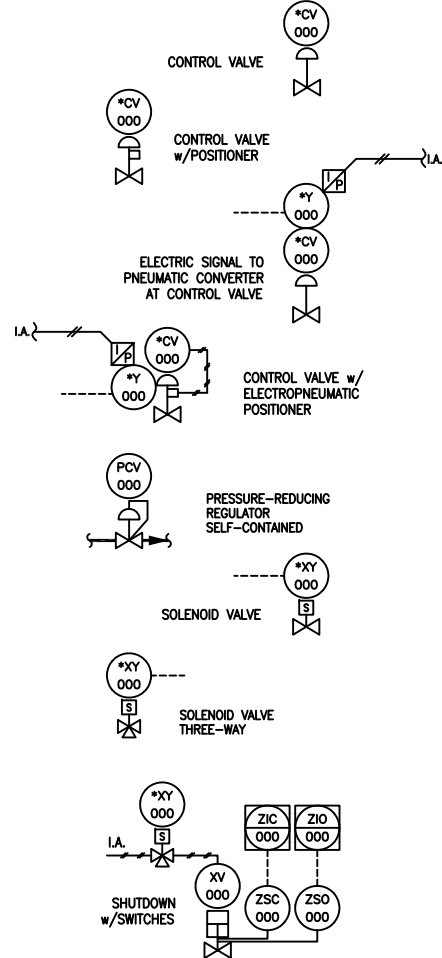
EXTERRAN

16666 Northchase Drive
Houston, Texas, 77060 (281) 836-7000

CUSTOMER		STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT			
TITLE		STANDARD P&ID LEGEND VALVE TAGS, LINE NUMBERS & ABBREVIATIONS			
DRAWN D.MOEN	DATE 08/01/2011	APPROVED A.RAO	SCALE NONE	NO. REQ'D N/A	
DRAWING NO. STD-C6-01-BA-00-000				SHT. NO. 2 OF 3	REV. 0

CONTROL VALVES

* NOTES: F—FLOW
L—LEVEL
P—PRESSURE
T—TEMPERATURE
X—SHUTDOWN

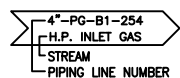


LIQUID LEVELS

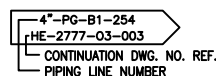
HHLL = HIGH HIGH LIQUID LEVEL (S.D.)
HLL = HIGH LIQUID LEVEL (ALARM)
NLL = NORMAL LIQUID LEVEL
LLL = LOW LIQUID LEVEL (ALARM)
LLLL = LOW LOW LIQUID LEVEL (S.D.)

CONTINUATION IDENTIFIERS

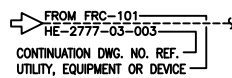
PIPING STREAM ENTERING OR LEAVING EXTERAN SCOPE OF WORK



CONTINUATION OF PIPING ENTERING OR LEAVING P&ID

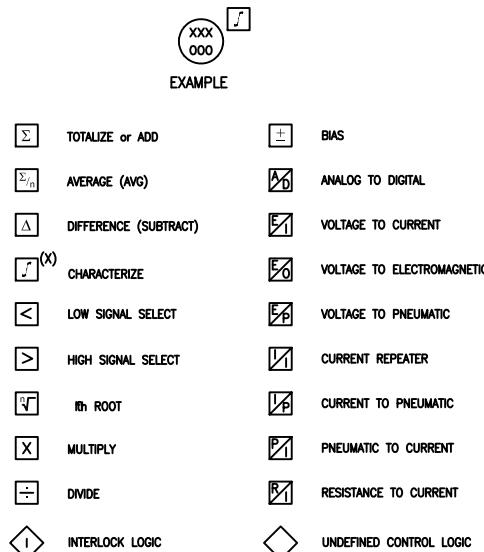


UTILITY OR SIGNAL ENTERING OR LEAVING P&ID



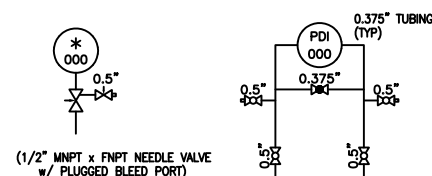
RELAY FUNCTION DESIGNATIONS

(ADJACENT TO INSTRUMENT BALLOON)

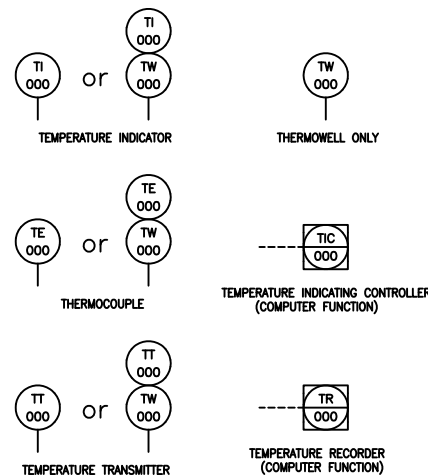


PRESSURE INSTRUMENTS

* DENOTES: PC, PI, PT, PSH, PSL, etc.

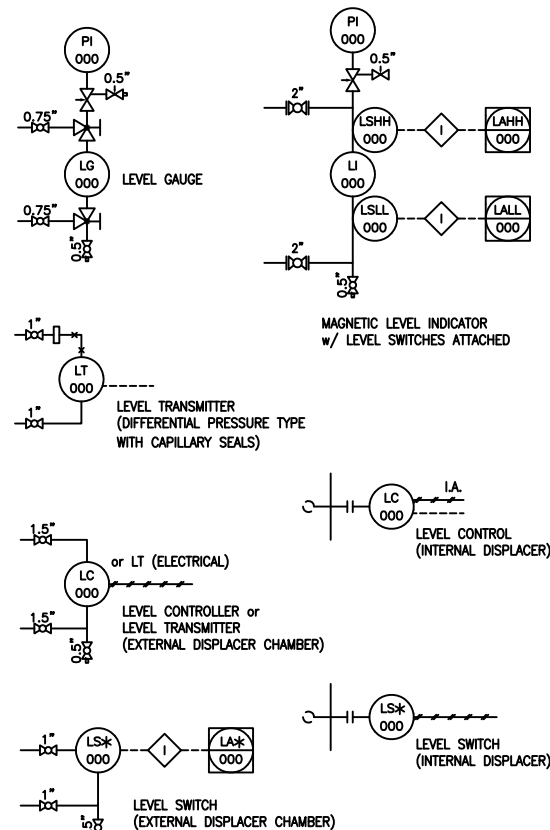


TEMPERATURE INSTRUMENTS

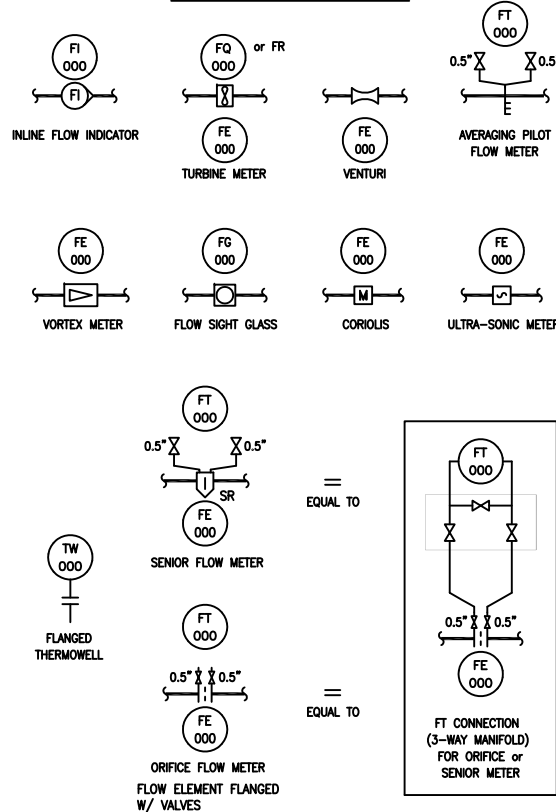


LEVEL INSTRUMENTS

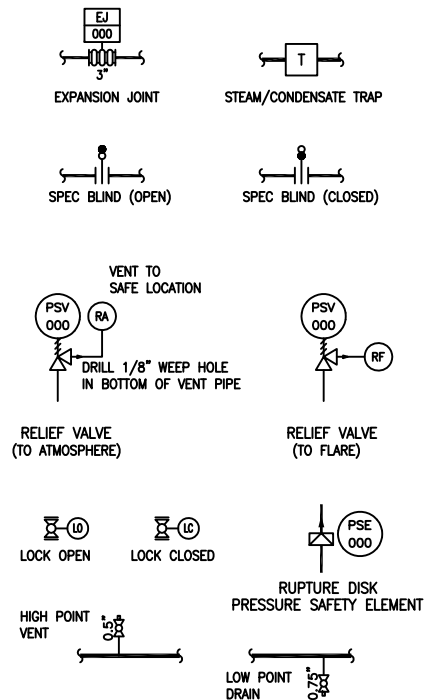
* DENOTES: FCV, LCV, PCV, TCV



FLOW INSTRUMENTS



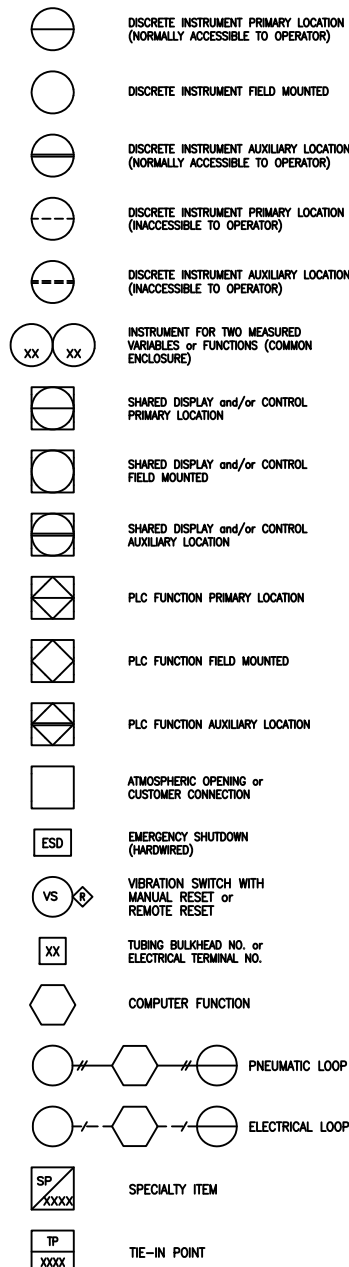
MISCELLANEOUS



MISCELLANEOUS DESCRIPTIONS

- CC CORROSION COUPON
- DHO HOT OIL DRAIN
- DAH HIGH PRESSURE AMINE DRAIN
- DAL LOW PRESSURE AMINE DRAIN
- DC CRYOGENIC DRAIN
- DGH HIGH PRESSURE GLYCOL DRAIN
- DGL LOW PRESSURE GLYCOL DRAIN
- DH HYDROCARBON DRAIN
- DO OPEN DRAIN
- MD DRAIN TO CUST. SYSTEM
- DOL LUBE OIL DRAIN
- GB BLANKET GAS
- GF FUEL GAS
- IA INSTRUMENT AIR
- MI METHANOL INJECTION
- NP NITROGEN PURGE
- RA LOCAL RELIEF/VENT TO ATMOSPHERE
- RF RELIEF/BLOWDOWN TO FLARE
- RV RELIEF/BLOWDOWN TO VENT STACK
- SA STARTING AIR
- SC SAMPLE CONNECTION
- SG STARTING GAS

INSTRUMENT FUNCTION SYMBOLS



DWG NUMBER	DESCRIPTION	REV.	DATE	BY	CK
0	APPROVED FOR CONSTRUCTION				
1	SEE LOG				
2	DATE				
3	BY				
4	CK				

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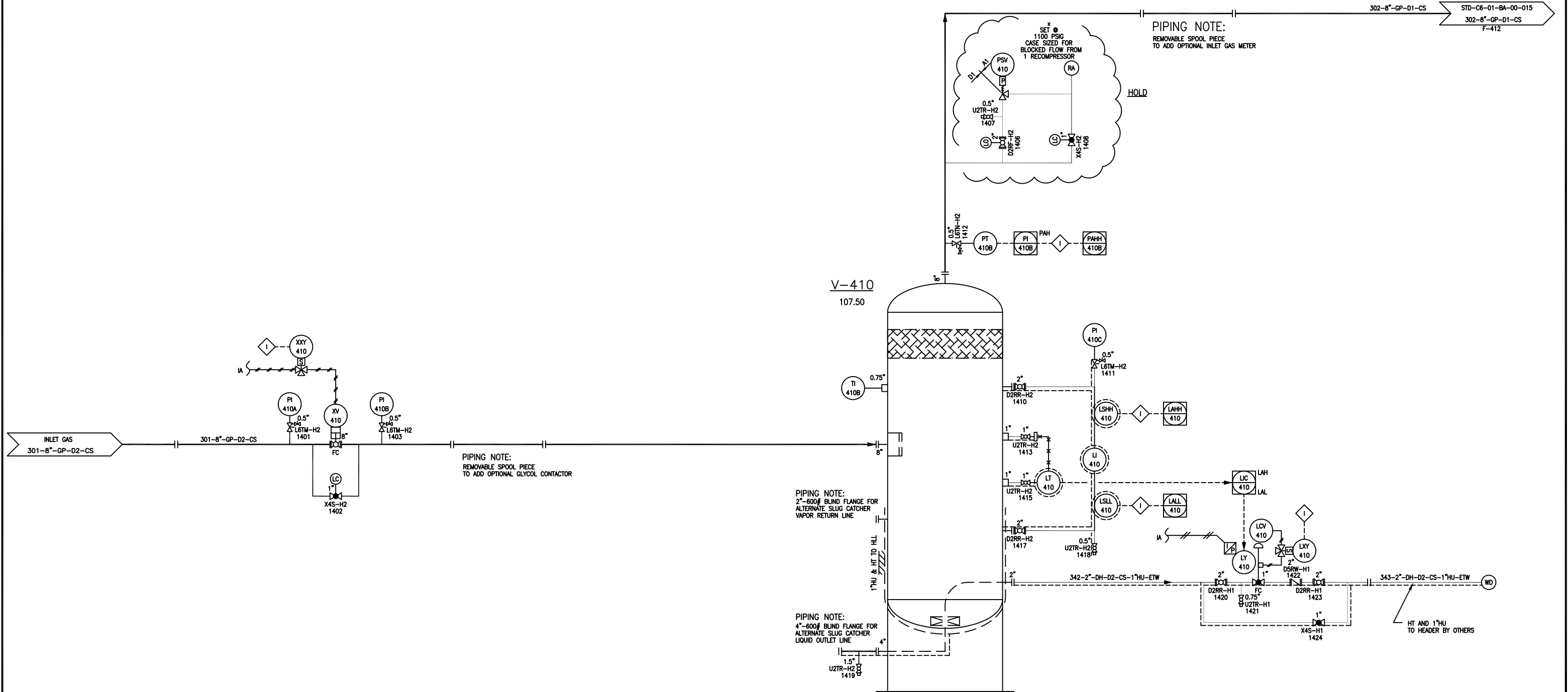
EXTERAN.

16666 Northchase Drive
Houston, Texas, 77060 (281) 836-7000

CUSTOMER	STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT			
TITLE	STANDARD P&ID LEGEND INSTRUMENT SYMBOLS			
DRAWN	DATE	APPROVED	SCALE	NO. REQ'D
D.MOEN	08/01/2011	A.RAO	NONE	N/A
DRAWING NO.	STD-C6-01-BA-00-000			SHT. NO. 3 of 3
				REV. 0

PROJECT #

V-410
INLET GAS SEPARATOR
48" ID x 12'-0" S/S
1100 PSI @ -20/175F
INSUL: 1"HU TO HLL & INSTRU - HT: TO HLL & INSTRU



NOTES:

1. INSTRUMENT LETTER DESIGNATIONS PER ANSI/ISA-S5.1 (LATEST EDITION)
2. FOR BLOCK VALVES - USE BALL OR GATE VALVES UP TO 275°F DESIGN TEMPERATURES AND GATE VALVES FOR HIGHER DESIGN TEMPERATURES.
3. ALL DRAIN PIPING TO BE FREE DRAINING.
4. ALL PIPING TO AND FROM PSV's TO BE FREE DRAINING.
5. PROVIDE VENTS WITH 0.5" VALVES ON ALL HIGH POINTS, AND DRAINS WITH 0.75" VALVES ON ALL LOW POINTS IN HOT OIL PIPING.
6. EXTERRAN INCLUDES IN ITS SCOPE OF SUPPLY ALL MAJOR EQUIPMENT IDENTIFIED ON THE P&ID, (PRESSURE VESSELS, FILTERS, PUMPS, COMPRESSORS, HEAT EXCHANGERS, AND AIR COOLERS). IN GENERAL, EXTERRAN'S SCOPE OF SUPPLY INCLUDES ALL ON-SKID PIPING, INSULATION (EXCLUDES INSULATION ON VALVES AND FLANGES FOR LEAK TEST PURPOSES), VALVES AND INSTRUMENTS INCLUDING ANY WIRING, CONDUIT AND TUBING. EXTERRAN'S SCOPE OF SUPPLY ALSO INCLUDES ALL OFF SKID TAGGED INSTRUMENTS, CONTROL VALVES, MANUAL VALVES AND RELIEF VALVES. EXCLUDED FROM EXTERRAN'S SCOPE OF SUPPLY ARE ALL CIVIL WORKS, OFF-SKID PIPING, INSULATION, HEAT TRACE, CONDUIT, AND WIRING BETWEEN SKIDS OTHER MAJOR EQUIPMENT THAT MAY BE REFERENCED BUT NOT SHOWN ON THE P&ID'S UNLESS EXTERRAN IS CONTRACTED TO PROVIDE SUCH ITEMS AND SERVICES.

LAST USED VALVE No. THIS SHEET: 1424

REV.	DESCRIPTION	DATE	BY	CK
0	APPROVED FOR CONSTRUCTION		SEE LOG	DMM AR
REVISIONS				

TOLERANCES			
CUTS	±1/8"		
ANGLES	±1/2"		
WELD ASS'Y.	±1/4"		

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File Name: STD-C6-01-BA-00-014.dwg



20602 E. 81st STREET
Broken Arrow, Oklahoma, 74014 (918) 251-8571

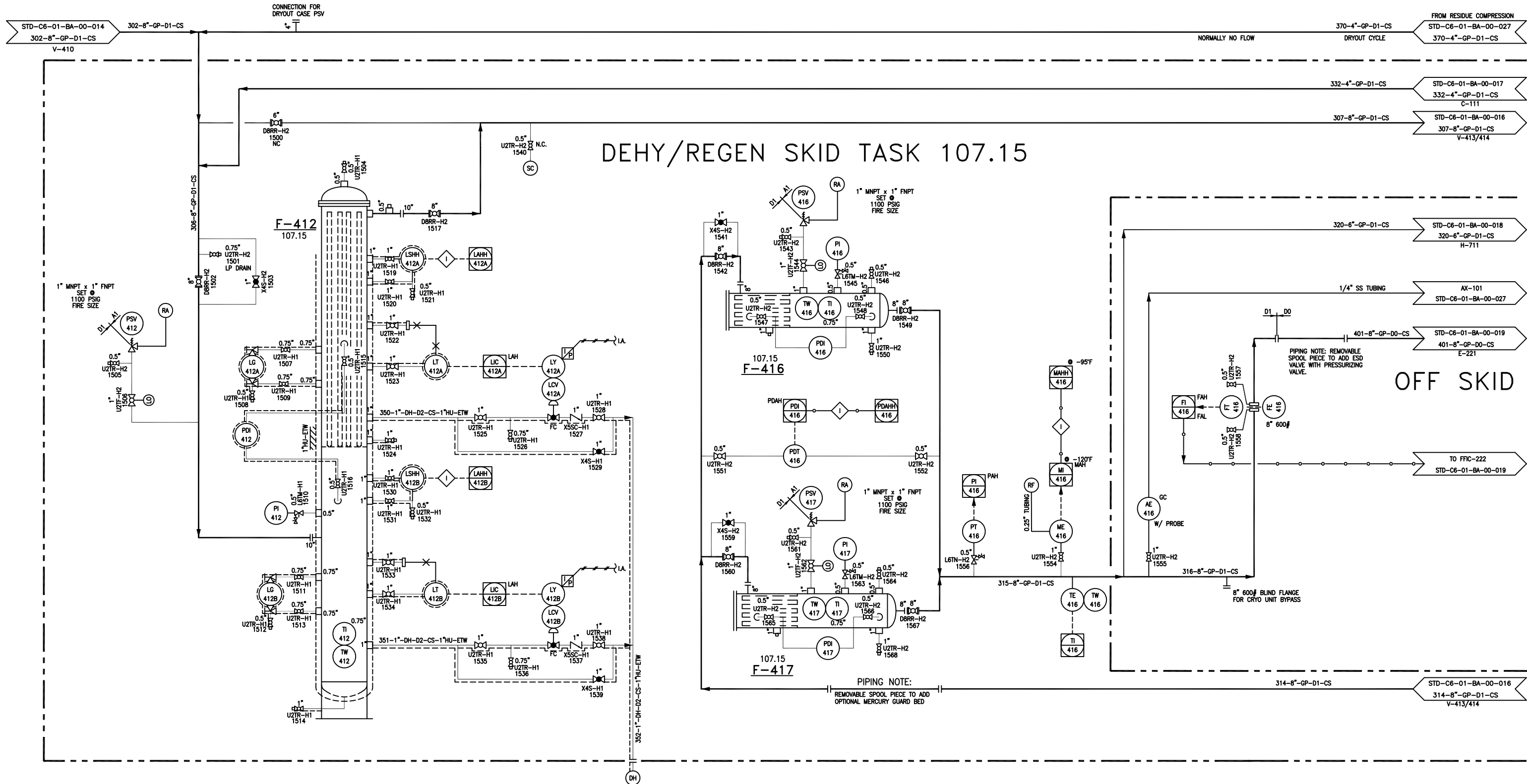
CUSTOMER					
STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT					
TITLE					
PIPING AND INSTRUMENTATION DIAGRAM INLET SEPARATION					
DRAWN	DATE	APPROVED	SCALE	NO. REQ'D	
D.MOEN	08/01/2011	A.RAO	NONE		
DRAWING NO.				SHT. NO.	REV.
STD-C6-01-BA-00-014					0

PROJECT #

F-412
DEHYDRATION INLET FILTER/COALESCER
28" OD x 8'-11" S/S
1100 PSI DP @ -20/175°F
INSUL: 1" HU VESSEL UP TO LSHH-412A AND ALL INSTRU
HT: VESSEL UP TO LSHH-412A AND ALL INSTRU
68.83 MMSCFD @ 0.3 MICRONS DESIGN

F-416
DEHYDRATION DUST FILTER
18" OD x 4'-7" S/S
1100 PSI DP @ -20/175°F
INSUL: NONE - HT: NONE
68.83 MMSCFD @ 3 MICRONS

F-417
DEHYDRATION DUST FILTER
18" OD x 4'-7" S/S
1100 PSI DP @ -20/175°F
INSUL: NONE - HT: NONE
68.83 MMSCFD @ 3 MICRONS



REV.	DESCRIPTION	DATE	BY	CK
0	APPROVED FOR CONSTRUCTION		SEE LOG	DMM AR
REVISIONS				

TOLERANCES	
CUTS	±1/8"
ANGLES	±1/2°
WELD ASS'Y.	±1/4"

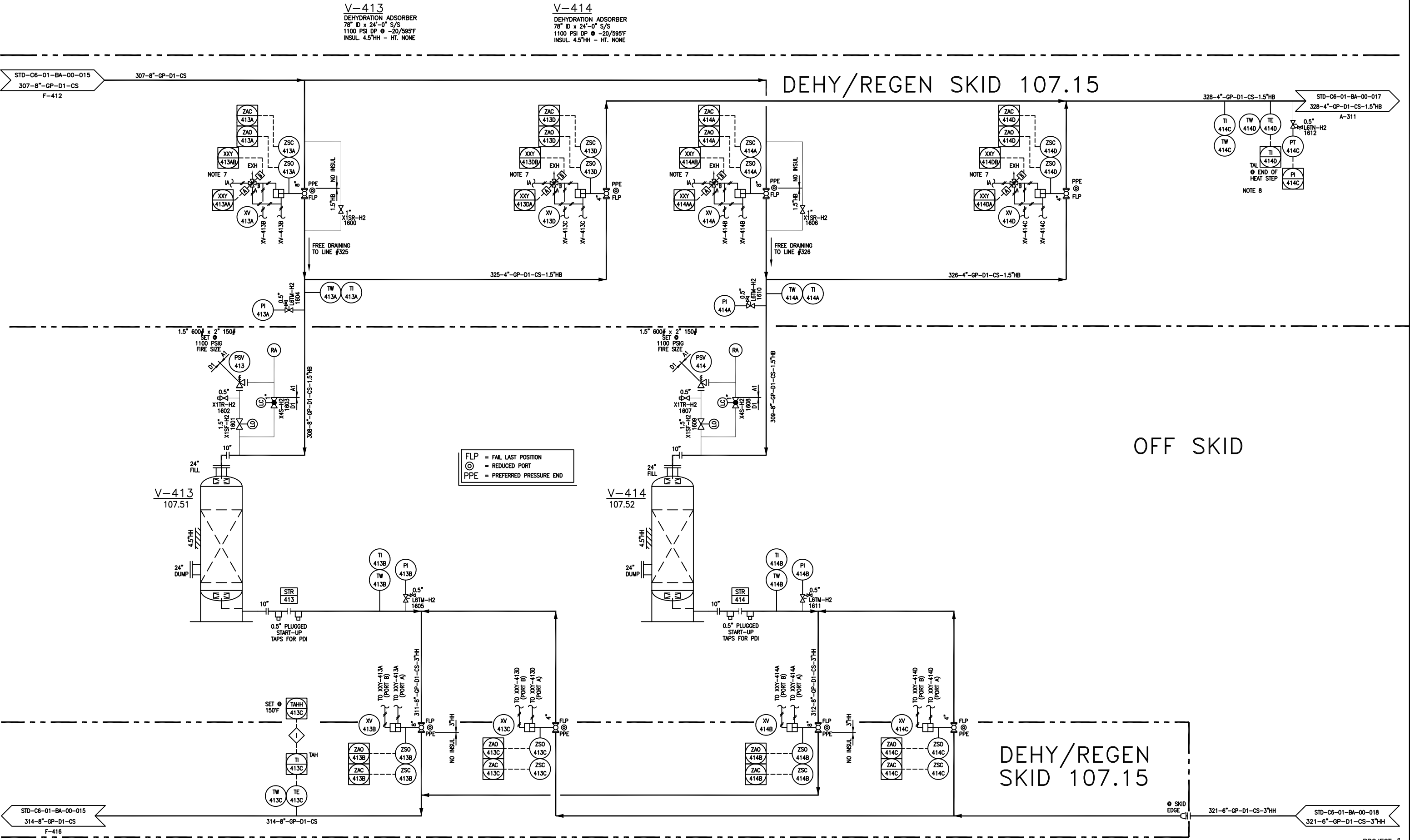
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File Name: STD-C6-01-BA-00-015.DWG



20602 E. 81st STREET
Broken Arrow, Oklahoma, 74014 (918) 251-8571

CUSTOMER		STANDARD DOMESTIC DESIGN	
STD - C6 CRYOGENIC GAS PLANT		TITLE	
DRAWN		PIPING AND INSTRUMENTATION DIAGRAM	
D.MOEN		DEHYDRATION FILTRATION	
DATE	APPROVED	SCALE	NO. REQ'D
08/01/2011	A.RAO	NONE	
DRAWING NO.		SHT. NO.	REV.
STD-C6-01-BA-00-015			0

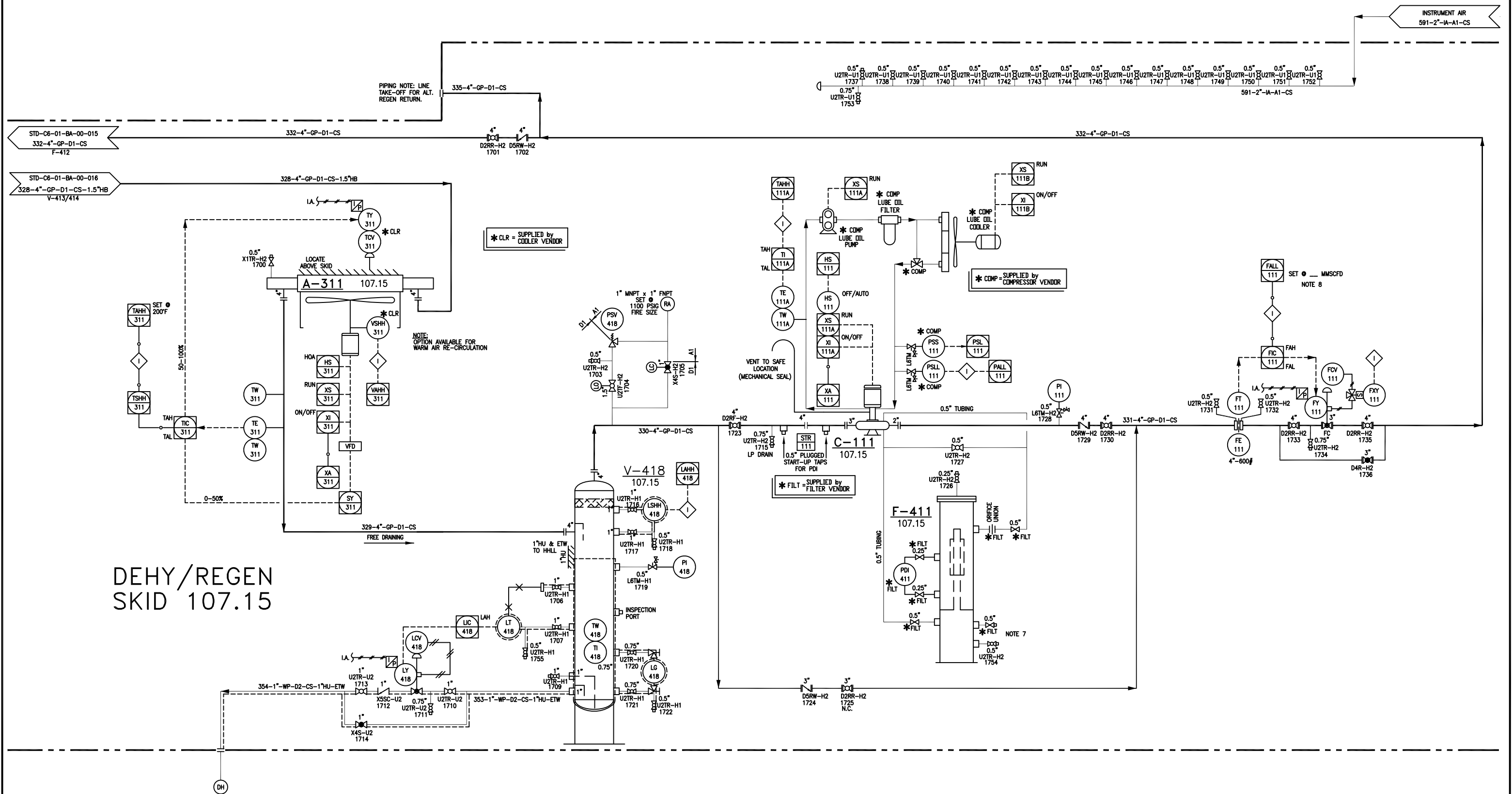


A-311
REGENERATION GAS COOLER
8,655 MBTU/HR (DESIGN)
1100 PSI DP @ -20/595°F
(1) 40 HP MOTOR

V-418
REGENERATION GAS SCRUBBER
20" OD x 7'-6" S/S
1100 PSI DP @ -20/200°F
INSUL. 1"HU TO HHLL - HT, TO HHLL & INSTR

C-111
REGENERATION GAS COMPRESSOR
8.83 MMSCFD @ 60 PSID (DESIGN)
125 HP MOTOR
3/4 HP LUBE OIL COOLER
2 HP LUBE OIL PUMP

F-411
REGEN SEAL GAS FILTER/COALESCER
3.5" DIA x 36.125" OAH
1440 PSI DP @ -20/130°F
INSUL: NONE - HT: NONE



SEE P&ID STD-C6-01-BA-00-014 FOR GENERAL NOTES 1-6.
7. OPERATORS TO REGULARLY CHECK F-411 DRAINS FOR ACCUMULATED LIQUID. DRAINS TO BE PIPED TO SKID EDGE.
8. SHUTDOWN POINTS MUST BE RE-EVALUATED IF OPERATING CONDITIONS VARY FROM DESIGN. SURGE POINT FOR C-111 IS +10% ACFM (SUCTION SIDE). MINIMUM RECOMMENDED AVERAGE VELOCITY FOR H-711 IS ___ FPS AT ___°F MAXIMUM OUTLET TEMPERATURE.

LAST USED VALVE No. THIS SHEET: 1755

REV.	DESCRIPTION	DATE	BY	CK
0	APPROVED FOR CONSTRUCTION		SEE LOG	DMM AR

TOLERANCES	
CUTS	±1/8"
ANGLES	±1/2°
WELD ASS'Y.	±1/4"

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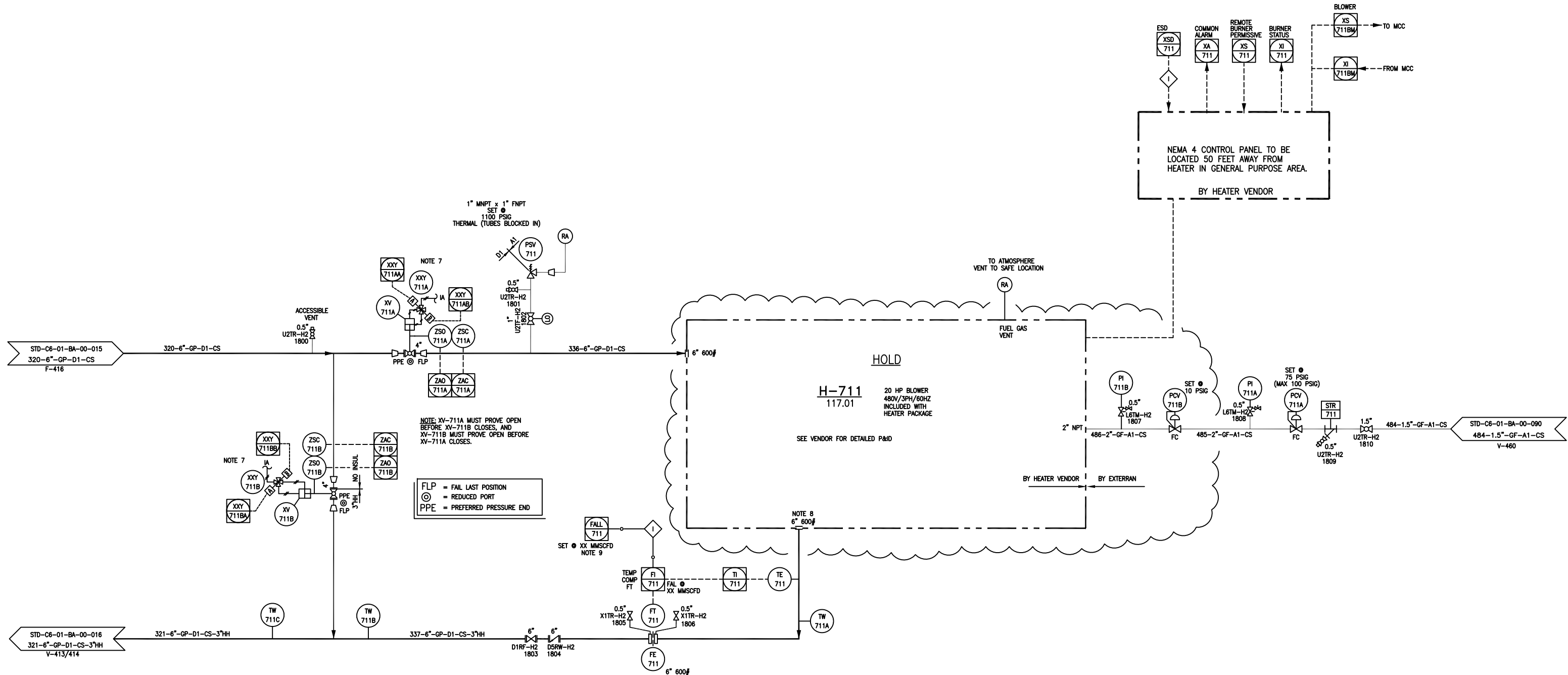


20602 E. 81st STREET
Broken Arrow, Oklahoma, 74014 (918) 251-8571

CUSTOMER		STANDARD DOMESTIC DESIGN	
STD - C6 CRYOGENIC GAS PLANT		TITLE	
DRAWN		PIPING AND INSTRUMENTATION DIAGRAM	
D.MOEN		MOL SIEVE REGENERATION	
DATE	APPROVED	SCALE	NO. REQ'D
08/01/2011	A.RAO	NONE	
DRAWING NO.	STD-C6-01-BA-00-017		SHT. NO.
			REV.
			0

PROJECT #

HOLD
H-711
REGENERATION GAS HEATER
8,510 MBTU/HR (DESIGN)
1100 PSI DP @ -20/650°F
20 HP BLOWER



SEE P&ID STD-C6-01-BA-00-014 FOR GENERAL NOTES 1-6.
7. FOR 4-WAY SOLENOID VALVES: ENERGIZE "A" TO OPEN, ENERGIZE "B" TO CLOSE.
8. H-711'S OUTLET TEMPERATURE IS LOCALLY CONTROLLED BY TIC-1-1 ON H-711'S CONTROL PANEL.
9. SHUTDOWN POINTS MUST BE RE-EVALUATED IF OPERATING CONDITIONS VARY FROM DESIGN. SURGE POINT FOR C-111 IS $\pm 10\%$ ACTM (SUCTION SIDE).
MINIMUM RECOMMENDED AVERAGE VELOCITY FOR H-711 IS $\frac{1}{2}$ FPS AT $\frac{1}{2}$ F MAXIMUM OUTLET TEMPERATURE.

LAST USED VALVE No. THIS SHEET: 1810

REV.	DESCRIPTION	DATE	BY	CK
0	APPROVED FOR CONSTRUCTION		SEE LOG	DMM AR

TOLERANCES
CUTS $\pm 1/8"$
ANGLES $\pm 1/2"$
WELD ASS'Y. $\pm 1/4"$

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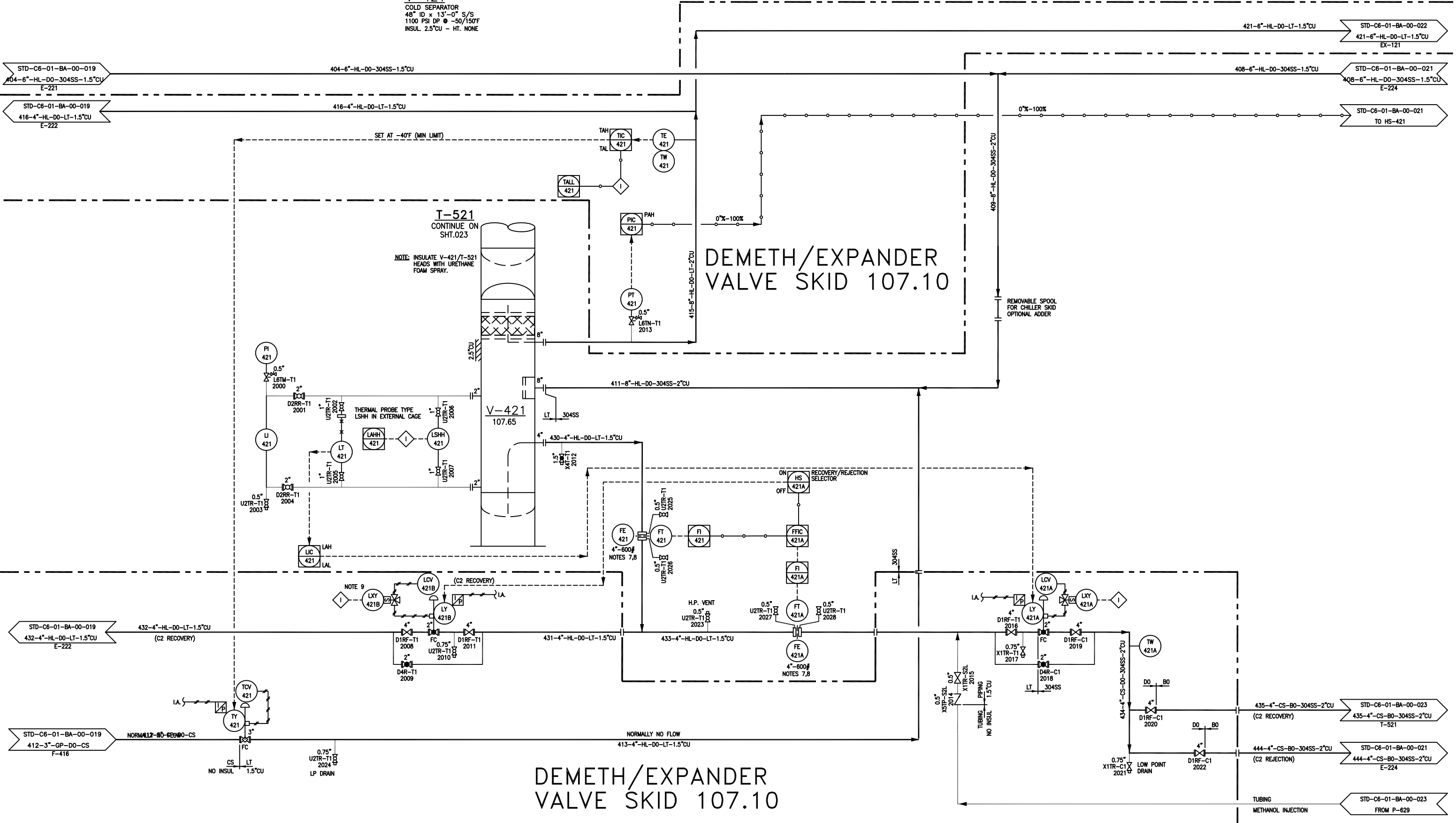
20602 E. 81st STREET
Broken Arrow, Oklahoma, 74014 (918) 251-8571

CUSTOMER		STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT			
TITLE		PIPING AND INSTRUMENTATION DIAGRAM MOL SIEVE REGENERATION GAS HEATER			
DRAWN D.MOEN	DATE 08/01/2011	APPROVED A.RAO	SCALE NONE	NO. REQ'D	
DRAWING NO. STD-C6-01-BA-00-018		SHT. NO.		REV. 0	

PROJECT #

CUSTOMER		STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT			
TITLE		PIPING AND INSTRUMENTATION DIAGRAM GAS/GAS EXCHANGER & REFLUX CONDENSER			
DRAWN D.MOEN	DATE 08/01/2011	APPROVED A.RAO	SCALE NONE	NO. REQ'D	
DRAWING NO. STD-C6-01-BA-00-019			SHT. NO.	REV. 0	

V-421
COLD SEPARATOR
48" ID x 13'-0" S/S
1100 PSI DP @ -50/150°F
INSUL. 2.5"CU - HT. NONE



SEE P&ID STD-C6-01-BA-00-014 FOR GENERAL NOTES 1-6.
7. UPSTREAM/DOWNSTREAM STRAIGHT PIPE DISTANCE @ FE-421 AND FE-421A TO BE A MINIMUM OF 10' UPSTREAM AND 5' DOWNSTREAM.
8. FE-421 & FE-421A TO BE PIPED FLAT, AT AN ELEVATION BELOW LLL OF V-421 (COLD SEPARATOR) AND AT A MINIMUM DISTANCE FROM OUTLET NOZZLE, TO ELIMINATE 2-PHASE FLOW.
9. SHUTDOWN LCV-421B ON LOW FLOW FROM T-222.

LAST USED VALVE No. THIS SHEET: 2028

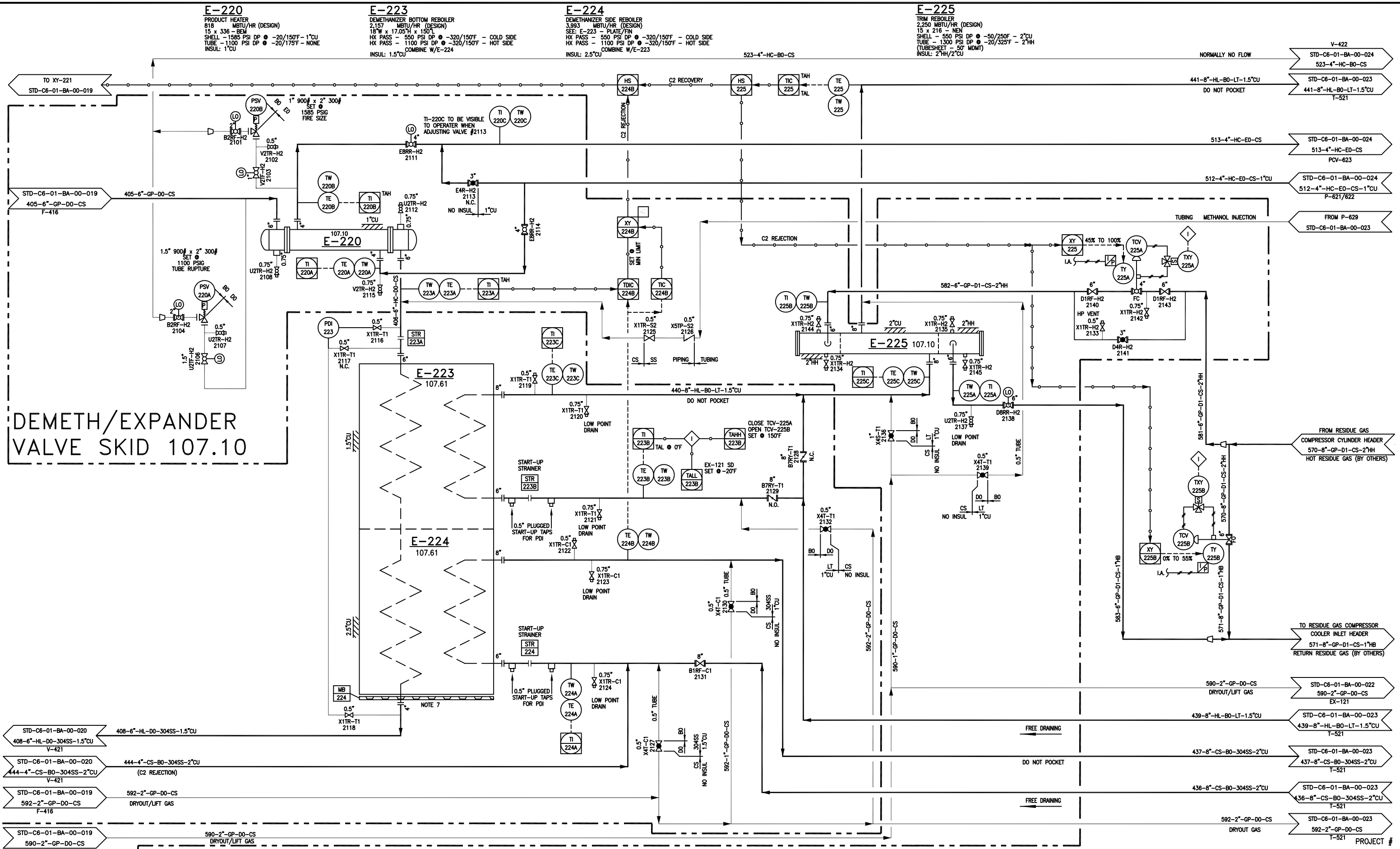
REV.	DESCRIPTION	DATE	BY	CK
0	APPROVED FOR CONSTRUCTION		SEE LOG	DMM AR

TOLERANCES
CUTS ±1/8"
ANGLES ±1/2"
WELD ASS'Y. ±1/4"

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CUSTOMER		STANDARD DOMESTIC DESIGN	
STD - C6 CRYOGENIC GAS PLANT			
TITLE			
PIPING AND INSTRUMENTATION DIAGRAM			
COLD SEPARATOR			
DRAWN	DATE	APPROVED	SCALE
D.MOEN	08/01/2011	A.RAO	NONE
DRAWING NO.		SHT. NO.	
STD-C6-01-BA-00-020		0	



SEE P&ID STD-C6-01-BA-00-014 FOR GENERAL NOTES 1-6.

7. PLACE 0.5" THICK MICARTA BLOCK BETWEEN PLATE-FIN EXCHANGER PEDESTAL BASE PLATES AND CONCRETE. INSULATE LEGS WITH PEDESTAL BASE PLATE SERVING AS INSULATION RING.

LAST USED VALVE No. THIS SHEET: 2145

REV.	DESCRIPTION	DATE	BY	CK
0	APPROVED FOR CONSTRUCTION		SEE LOG	DMM AR

REVISIONS

TOLERANCES

CUTS	±1/8"
ANGLES	±1/2°
WELD ASS'Y.	±1/4"

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CUSTOMER: STANDARD DOMESTIC DESIGN
STD - C6 CRYOGENIC GAS PLANT

TITLE: PIPING AND INSTRUMENTATION DIAGRAM
DEMETHANIZER REBOILERS

DRAWN: D.MOEN	DATE: 08/01/2011	APPROVED: A.RAO	SCALE: NONE	NO. REQ'D
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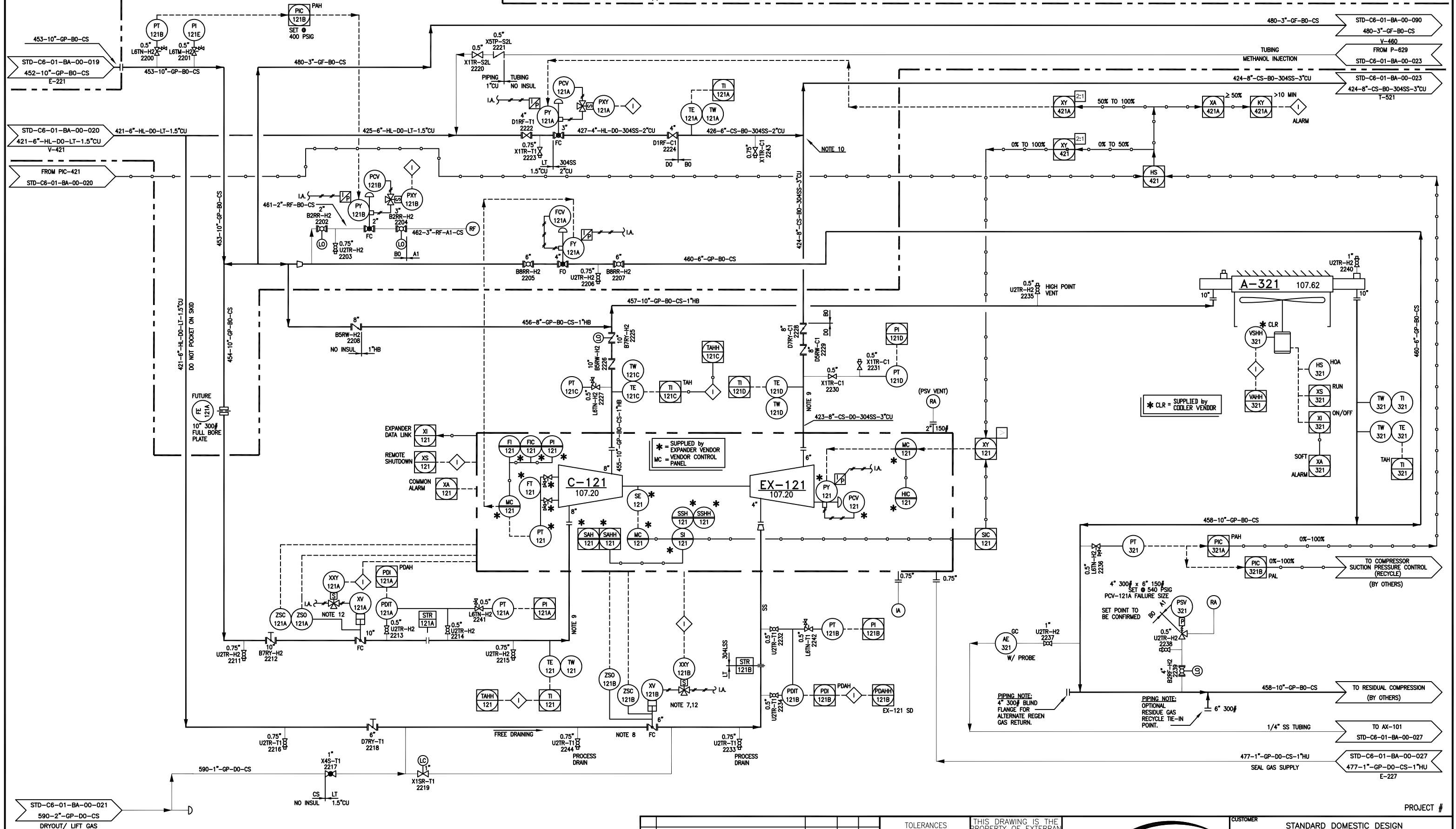
DRAWING NO. STD-C6-01-BA-00-021

SHT. NO. 0

DEMETH/EXPANDER VALVE SKID 107.10

EX/C-121
EXPANDER/COMPRESSOR
1100 PSI DP @ -150/150°F - EXPANDER
550 PSI @ -20/200°F - COMPRESSOR
550 HP / 523 HP
(2) 7.5 HP LUBE OIL PUMPS
(1) 5 HP LUBE OIL COOLER

A-321
EXPANDER/COMPRESSOR DISCHARGE COOLER
2,269 MBTU/HR (DESIGN)
550 PSI DP @ -20/225°F
(1) 30 HP MOTOR



- SEE P&ID STD-C6-01-BA-00-014 FOR GENERAL NOTES 1-6.
7. LOCATE XV-121B AT MINIMUM DISTANCE FROM EX-121 (LESS THAN 10 INLET NOZZLE DIAMETERS).
8. PROVIDE QUICK EXHAUST TO CLOSE XV-121B IN LESS THAN 0.5 SECOND.
9. FIVE STRAIGHT PIPE DIAMETERS REQUIRED ON COMPRESSOR INLET AND EXPANDER OUTLET.
10. KEEP "JT" VALVE (PCV-121A) LOWER THAN EXPANDER OUTLET TO PREVENT LIQUID BACK-UP INTO EX-121 DURING "JT" OPERATION.

11. THE EXPANDER INLET SHOULD BE DESIGNED TO PREVENT ANY LIQUID CONDENSATE CARRYOVER BACK INTO THE NOZZLE.
12. XV-121A AND 121B FLOW ARROW ON SIDE OF VALVE WILL POINT UPSTREAM TO ASSIST VALVE SEALING WHEN CLOSED.

LAST USED VALVE No. THIS SHEET: 2244

REV.	DESCRIPTION	DATE	BY	CK
0	APPROVED FOR CONSTRUCTION		SEE LOG	DMM AR

REVISIONS

TOLERANCES
CUTS ±1/8"
ANGLES ±1/2"
WELD ASS'Y. ±1/4"

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EXERRAN.

20602 E. 81st STREET
Broken Arrow, Oklahoma, 74014 (918) 251-8571

CUSTOMER		STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT			
TITLE		PIPING AND INSTRUMENTATION DIAGRAM EXPANDER/COMPRESSOR			
DRAWN D.MOEN	DATE 08/01/2011	APPROVED A.RAO	SCALE NONE	NO. REQ'D	
DRAWING NO. STD-C6-01-BA-00-022		SHT. NO.		REV. 0	

PROJECT #

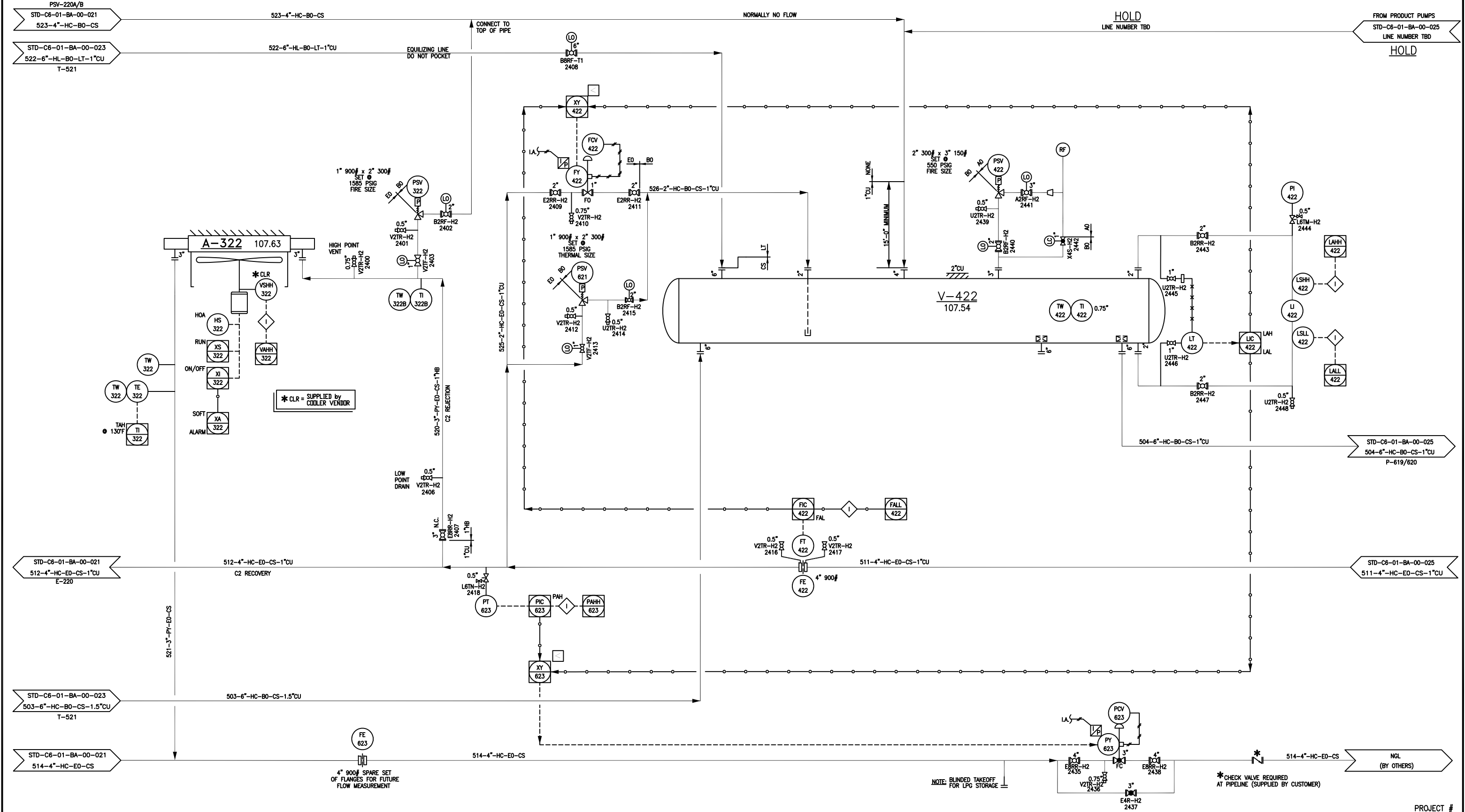
CUSTOMER				
STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT				
TITLE				
PIPING AND INSTRUMENTATION DIAGRAM DEMETHANIZER				
DRAWN D.MOEN	DATE 08/01/2011	APPROVED A.RAO	SCALE NONE	NO. REQ'D
DRAWING NO. STD-C6-01-BA-00-023			SHT. NO.	REV. 0

A-322

DEETHANIZED PRODUCT COOLER
688.7 ID x 32'-0" S/S
1585 PSIG DP @ -20/250°F
(1) 15 HP 2-SPEED MOTOR

V-422

DEMETHANIZER SURGE TANK
72" ID x 32'-0" S/S
550 PSIG DP @ -20/250°F
INSUL. 2"CU - HT. NONE



REV.	DESCRIPTION	DATE	BY	CK
0	APPROVED FOR CONSTRUCTION		SEE LOG	DMM AR

TOLERANCES	
CUTS	±1/8"
ANGLES	±1/2°
WELD ASS'Y.	±1/4"

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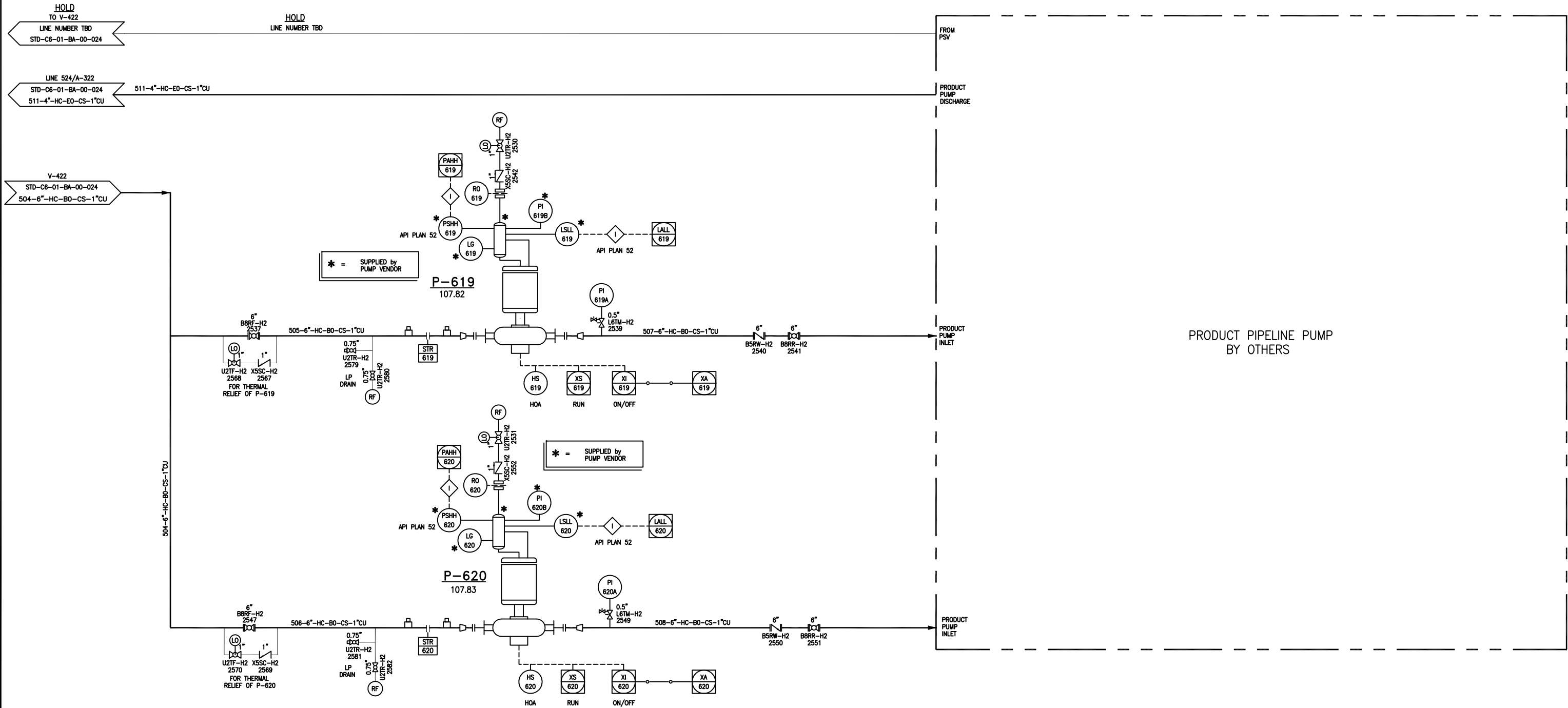
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File Name: STD-C6-01-BA-00-024.DWG



CUSTOMER		STANDARD DOMESTIC DESIGN	
STD - C6 CRYOGENIC GAS PLANT		TITLE	
DRAWN		PIPING AND INSTRUMENTATION DIAGRAM	
D.MOEN		DEMETHANIZER SURGE TANK	
DATE	08/01/2011	APPROVED	A.RAO
SCALE	NONE	NO. REQ'D	
DRAWING NO.	STD-C6-01-BA-00-024	SHT. NO.	0

P-619
PRODUCT BOOSTER PUMP
237 GPM @ 157 FT. TDH
10 HP MOTOR

P-620
PRODUCT BOOSTER PUMP
237 GPM @ 157 FT. TDH
10 HP MOTOR



SEE P&ID STD-C6-01-BA-00-014 FOR GENERAL NOTES, 1 TO 6.

- CHECK SECONDARY SEAL CAVITY LEAKAGE DRAIN FOR LIQUID ACCUMULATION BEFORE PUMP START-UP AND AT LEAST ONCE A WEEK DURING PUMP OPERATION.
- PUMP DISCHARGE VALVE TO BE CLOSED WHENEVER SUCTION VALVE IS CLOSED.

LAST USED VALVE No. THIS SHEET: 2582

REV.	DESCRIPTION	DATE	BY	CK
0	APPROVED FOR CONSTRUCTION	SEE LOG	DM	AR

TOLERANCES
CUTS ±1/8"
ANGLES ±1/2"
WELD ASS'Y. ±1/4"

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File: STD-C6-01-BA-00-025.DWG

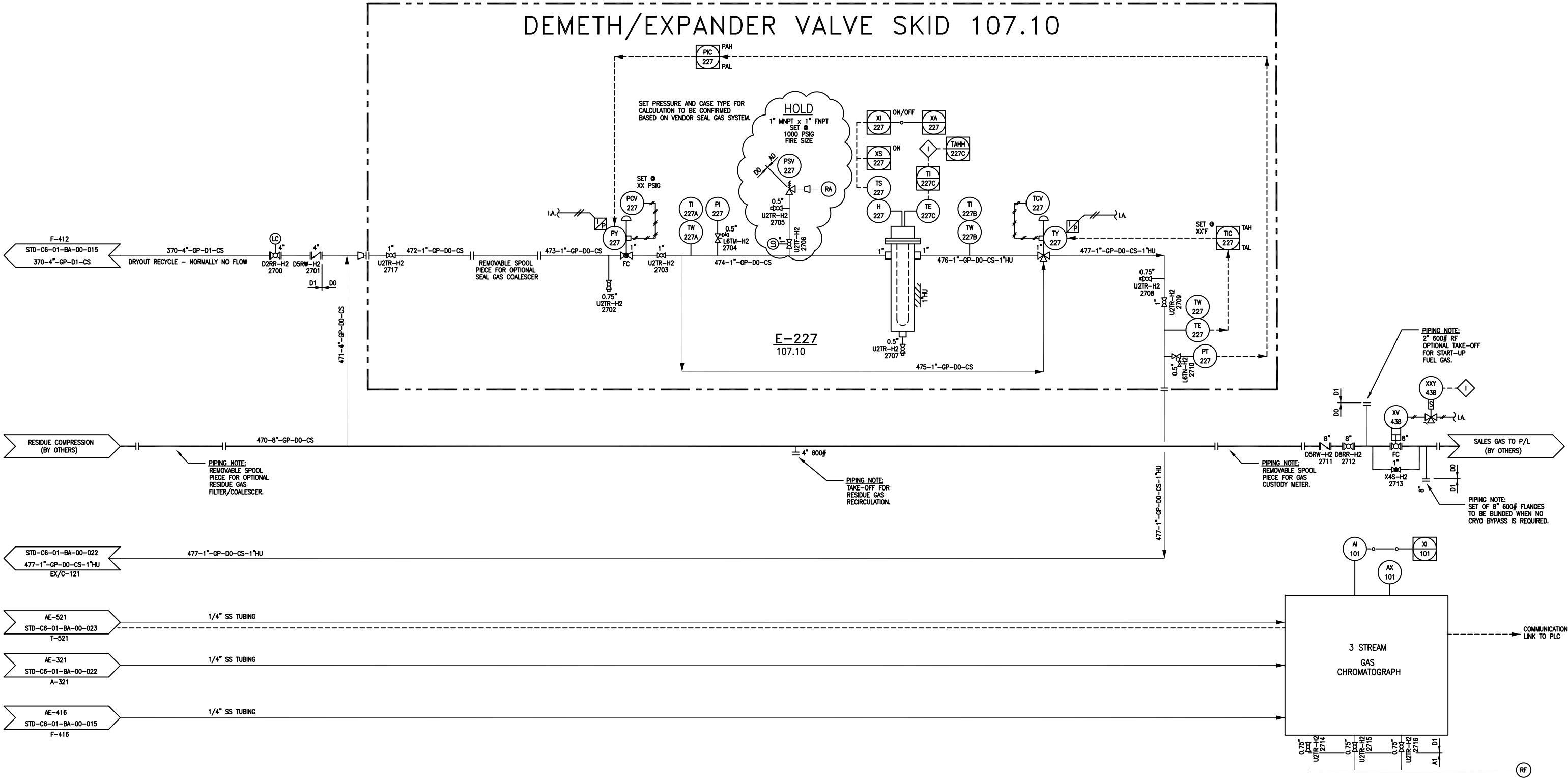


20602 E. 81st STREET
Broken Arrow, Oklahoma, 74014 (918) 251-8571

CUSTOMER		STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT			
TITLE		PIPING AND INSTRUMENTATION DIAGRAM NGL PRODUCT PUMPS			
DRAWN	DATE	APPROVED	SCALE	NO. REQ'D	
D.MOEN	08/01/2011	A.RAO	NONE		
DRAWING NO.		STD-C6-01-BA-00-025		SHT. NO.	REV.
					0

PROJECT #

E-227
EXPANDER SEAL GAS HEATER
4 1/2" OD x 3'-0" F/S
1332 PSI DP @ -20/250°F
12 KW - 480V/3PH/60HZ (DESIGN)
INSUL: 1"HU - HT: NONE



REV.	DESCRIPTION	DATE	BY	CK
0	APPROVED FOR CONSTRUCTION		SEE LOG	DMM AR
REVISIONS				

TOLERANCES	
CUTS	±1/8"
ANGLES	±1/2"
WELD ASS'Y.	±1/4"

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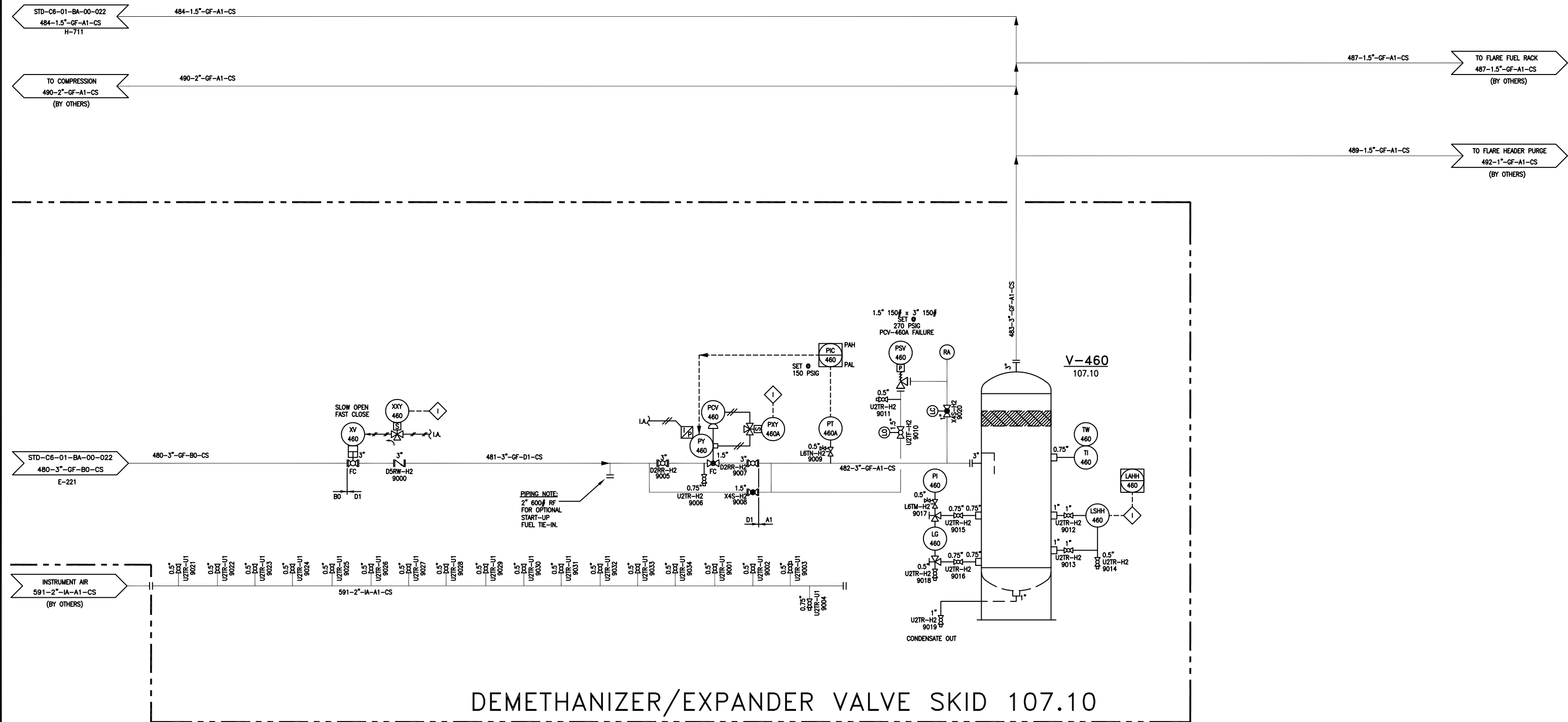
Edited by: hboen01
Jul 25, 2012 - 7:49am
File Name: STD-C6-01-BA-00-027.DWG



20602 E. 81st STREET
Broken Arrow, Oklahoma, 74014 (918) 251-8571

CUSTOMER		STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT			
TITLE		PIPING AND INSTRUMENTATION DIAGRAM RESIDUE GAS			
DRAWN D.MOEN	DATE 08/01/2011	APPROVED A.RAO	SCALE NONE	NO. REQ'D	
DRAWING NO. STD-C6-01-BA-00-027		SHT. NO.		REV. 0	

V-460
FUEL GAS SCRUBBER
12.75"OD x 6'-0" S/S
270 PSI DP @ -20/150°F
INSUL: NONE - HT: NONE



REV.	DESCRIPTION	DATE	BY	CK
0	APPROVED FOR CONSTRUCTION		SEE LOG	DMM AR
REVISIONS				

TOLERANCES			
CUTS	±1/8"		
ANGLES	±1/2"		
WELD ASS'Y.	±1/4"		

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CUSTOMER					
STANDARD DOMESTIC DESIGN STD - C6 CRYOGENIC GAS PLANT					
TITLE					
PIPING AND INSTRUMENTATION DIAGRAM FUEL GAS SYSTEM					
DRAWN	DATE	APPROVED	SCALE	NO. REQ'D	
D.MOEN	08/01/2011	A.RAO	NONE		
DRAWING NO.				SHT. NO.	REV.
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