

P-3011
LT PUMP
MFG: TUTHILL
MODEL: 2LE
6 GPM @ 50 PSIG

P-3011(M)
LT PUMP MOTOR
HP: 1
RPM: 1745
460VAC/3ø/60Hz
TEFC: 143T
CLS1, DIV.2

V-3010
SUCTION SCRUBBER
24" O.D. X 60" S/S
MAWP: 150 PSIG
@-20/300°F
8" INLET/OUTLET
ASME CODE
SECTION 8 DIV 1

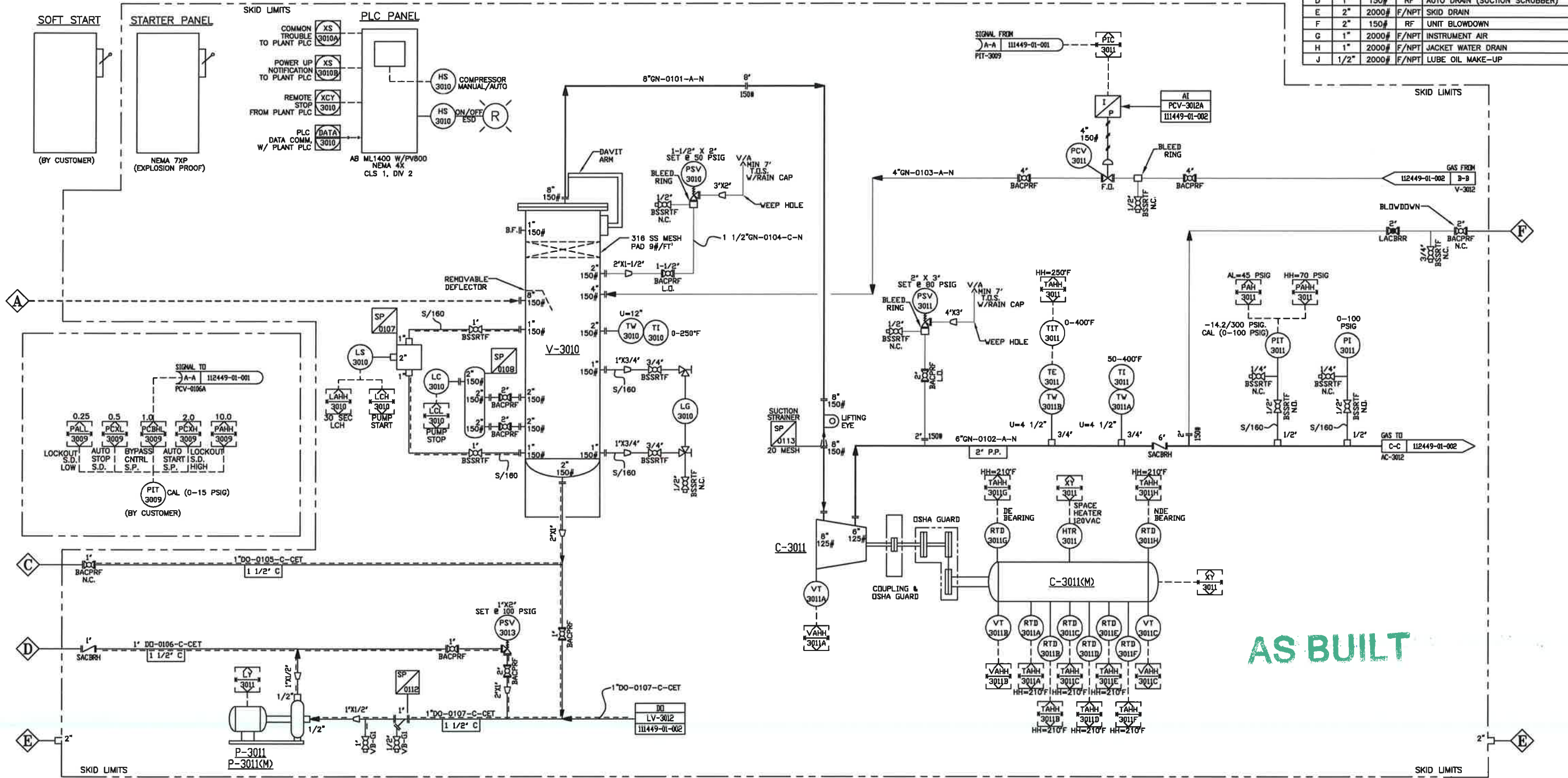
C-3011
COMPRESSOR
MFG: RC-FLO
MODEL: 12L
ROTARY VANE
MAWP: 80 PSIG

C-3011(M)
COMPRESSOR MOTOR
H.P.: 150
RPM: 1800
460VAC/3ø/60Hz
TEFC CLS 1, DIV.2
IEEE 841
NEMA 7??T

DRIVE CONDITIONS
MIN. COMP. SPEED - 380
MAX. COMP. SPEED - 920
REQ. COMP. SPEED - 917
DRIVE RATIO - 1.96
SHEAVE C. DIST. - 36.9"
SHAFT E/E DIST: 2.45"
MOTOR NOT EXCEED 60Hz

CONNECTION SCHEDULE

MARK	SIZE	RATING	FACE	SERVICE
A	8"	150#	RF	GAS INLET
B	6"	150#	RF	GAS DISCHARGE
C	1"	150#	RF	MANUAL DRAIN
D	1"	150#	RF	AUTO DRAIN (SUCTION SCRUBBER)
E	2"	2000#	F/NPT	SKID DRAIN
F	2"	150#	RF	UNIT BLOWDOWN
G	1"	2000#	F/NPT	INSTRUMENT AIR
H	1"	2000#	F/NPT	JACKET WATER DRAIN
J	1/2"	2000#	F/NPT	LUBE OIL MAKE-UP



AS BUILT

DESIGN CONDITIONS:
PL = 0.5-2.0 PSIG
P2 = 30 PSIG
T1 = 120°F
T2 = 120°F
TA = 100°F
SG = 1.83
N = 1.11
EL = 2600 FASL
Q = 1.04-1.28 MMSCFD

NOTES:
SEE SHEET 4

NO.	BY	DATE	DESCRIPTION	CHK'D	APP'D
3	J.C.	12/07/18	AS BUILT	JP	JP
2	J.C.	10/17/18	RE-ISSUED FOR CONSTRUCTION	JP	JP
1	J.C.	10/01/18	REVISED PER CHANGE ORDER	JP	JP
0	J.C.	08/15/18	ISSUED FOR CONSTRUCTION	JP	JP
A	J.C.	07/16/18	ISSUED FOR APPROVAL	JP	JP

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PIPING & INSTRUMENT DIAGRAM
VAPOR RECOVERY UNIT
HB-12L-150-12BV

DRAWN: J.C.	DATE: 07/03/18	SCALE: NONE	CHK'D: JP	APP'D: JP	W.O. NO.: 112449
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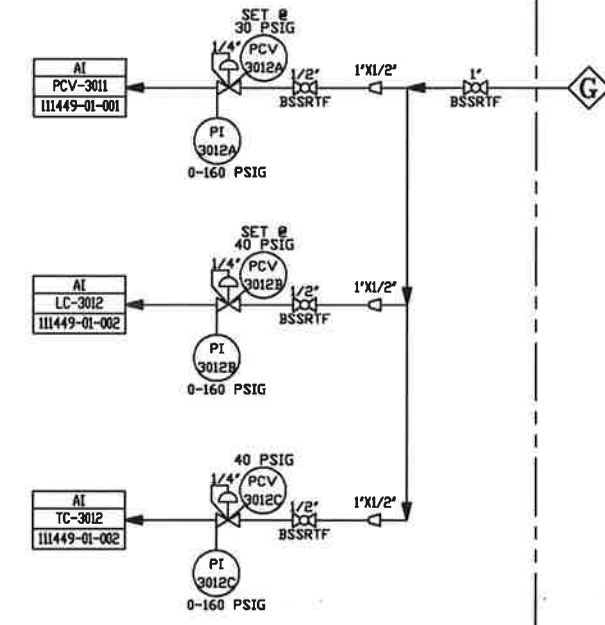
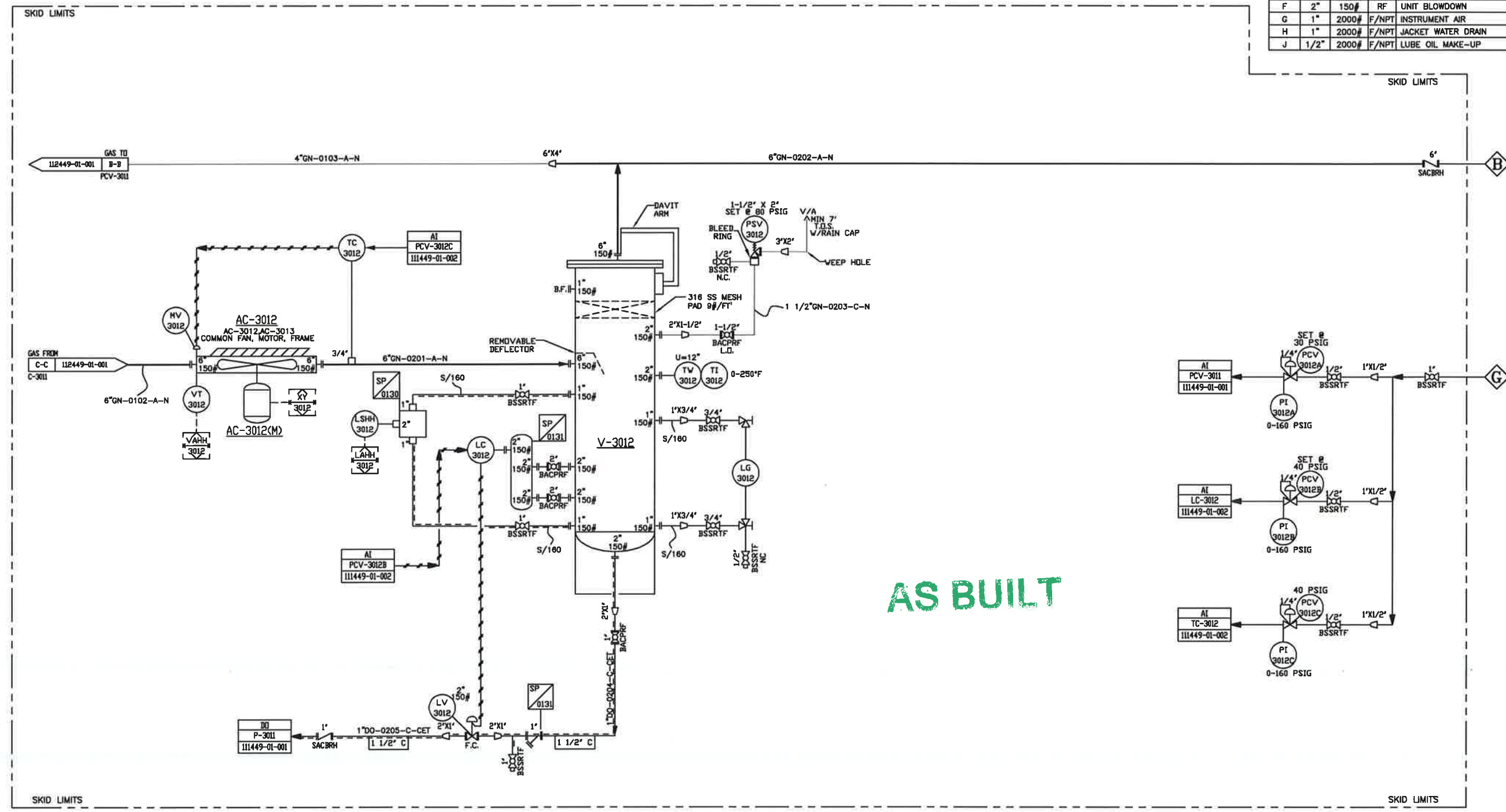
CUSTOMER:
PDC ENERGY

AC-3012
 GAS AFTER COOLER
 MFG: FIN-X
 FLOW: 1.28 MMSCFD
 DUTY: 320498 BUT/HR
 HEADERS: SA516-70
 TUBES: SA449-304 SS
 DESIGN PRESSURE: 150 PSI @ -20/300°F
 MODEL: VT 48-7
 TEMP IN/OUT: 213°F/120°F
 INLET/OUTLET: 4" 150# RF
 ASME CODE
 SECTION 8 DIV 1

AC-3012(M)
 COOLER MOTOR
 H.P.: 5
 RPM: 1800
 480VAC/3Ø/60Hz
 TEFC CLS 1, DIV.2
 IEC B4
 NEMA 1B4T

V-3012
 DISCHARGE SCRUBBER
 16" O.D. X 60" S/S
 MAWP: 150 PSIG
 @ -20/300°F
 6" INLET/OUTLET
 ASME CODE
 SECTION 8 DIV 1

CONNECTION SCHEDULE					
MARK	SIZE	RATING	FACE	SERVICE	
A	8"	150#	RF	GAS INLET	
B	6"	150#	RF	GAS DISCHARGE	
C	1"	150#	RF	MANUAL DRAIN	
D	1"	150#	RF	AUTO DRAIN (SUCTION SCRUBBER)	
E	2"	2000#	F/NPT	SKID DRAIN	
F	2"	150#	RF	UNIT BLOWDOWN	
G	1"	2000#	F/NPT	INSTRUMENT AIR	
H	1"	2000#	F/NPT	JACKET WATER DRAIN	
J	1/2"	2000#	F/NPT	LUBE OIL MAKE-UP	



DESIGN CONDITIONS:
 P1 = 0.5-2.0 PSIG
 P2 = 30 PSIG
 T1 = 120°F
 T2 = 120°F
 TA = 100°F
 SG = 1.83
 N = 1.11
 EL = 2600 FASL
 Q = 1.04-1.28 MMSCFD

NOTES:
 SEE SHEET 4

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2	J.C.	10/17/18	RE-ISSUED FOR CONSTRUCTION	JP	JP
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0	J.C.	08/15/18	ISSUED FOR CONSTRUCTION	JP	JP
A	J.C.	07/16/18	ISSUED FOR APPROVAL	JP	JP

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PIPING & INSTRUMENT DIAGRAM
 VAPOR RECOVERY UNIT
 HB-12L-150-12BV

DRAWN: J.C.	DATE: 07/03/18	SCALE: NONE	CHK'D: JP	APP'D: JP	W.O. NO.: 112449
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CUSTOMER:
PDC ENERGY

DWG. NO.: 112449-01-002 2 OF 5 REV. 3

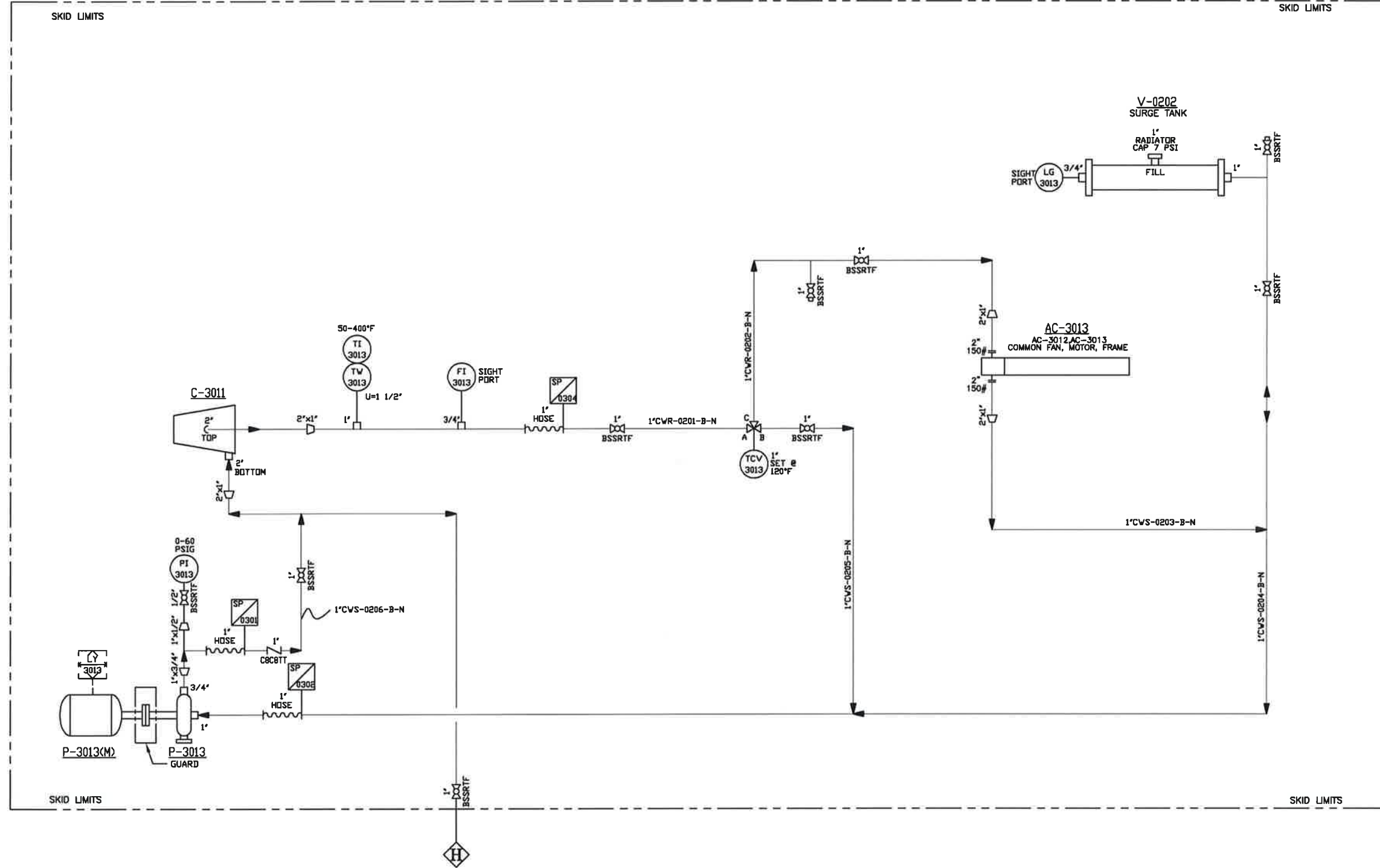
P-3013
 JACKET WATER PUMP
 MFG: MP
 MODEL: 30

P-3013(M)
 JW PUMP MOTOR
 HP: 1
 RPM: 3600
 460VAC/3#/60Hz
 TEFC CLS 1, DIV.2

V-0202
 SURGE TANK
 MFG: HY-BON
 8" O.D. X 45" E/E
 50/50 WATER/GLYCOL
 COLD FILL: 9 GAL

AC-3013
 JACKET WATER COOLER
 MFG: FN-X
 FLOW: 11.4GPM
 DUTY: 85320 BUT/HR
 HEADERS: ASTM A500B
 TUBES: SA214
 DESIGN PRESSURE: 100 PSI @ 300°F
 MODEL: VT 48-7
 TEMP IN/OUT: 137°F/120°F
 INLET/OUTLET: 2" 150# RF

CONNECTION SCHEDULE				
MARK	SIZE	RATING	FACE	SERVICE
A	8"	150#	RF	GAS INLET
B	6"	150#	RF	GAS DISCHARGE
C	1"	150#	RF	MANUAL DRAIN
D	1"	150#	RF	AUTO DRAIN (SUCTION SCRUBBER)
E	2"	2000#	F/NPT	SKID DRAIN
F	1"	150#	RF	UNIT BLOWDOWN
G	1"	2000#	F/NPT	INSTRUMENT AIR
H	1"	2000#	F/NPT	JACKET WATER DRAIN
J	1/2"	2000#	F/NPT	LUBE OIL MAKE-UP



AS BUILT

DESIGN CONDITIONS:
 P1 = 0.5-2.0 PSIG
 P2 = 30 PSIG
 T1 = 120°F
 T2 = 120°F
 TA = 100°F
 SG = 1.03
 N = 1.11
 EL = 2600 FASL
 Q = 1.04-1.28 MMSCFD

NOTES:
 SEE SHEET 4

NO.	BY	DATE	DESCRIPTION	CHK'D	APP'D
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 Vent Gas Management

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PIPING & INSTRUMENT DIAGRAM
 VAPOR RECOVERY UNIT
 HB-12L-150-12BV

DRAWN: J.C.	DATE: 07/03/18	SCALE: NONE	CHK'D: JP	APP'D: JP	W.O. NO.: 112449
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CUSTOMER:
PDC ENERGY

DWG. NO.: 112449-01-003 3 OF 5 REV. 3

P-3014
LUBRICATOR PUMP
PREMIER 3 PINT
80:1 RATIO

F-3011
LUBE OIL FILTER
MFG: ARROW
MODEL: 9052T-90

F-3014
MAKE-UP OIL FILTER
MFG: PARKER
MODEL: 12AT10CN158BH

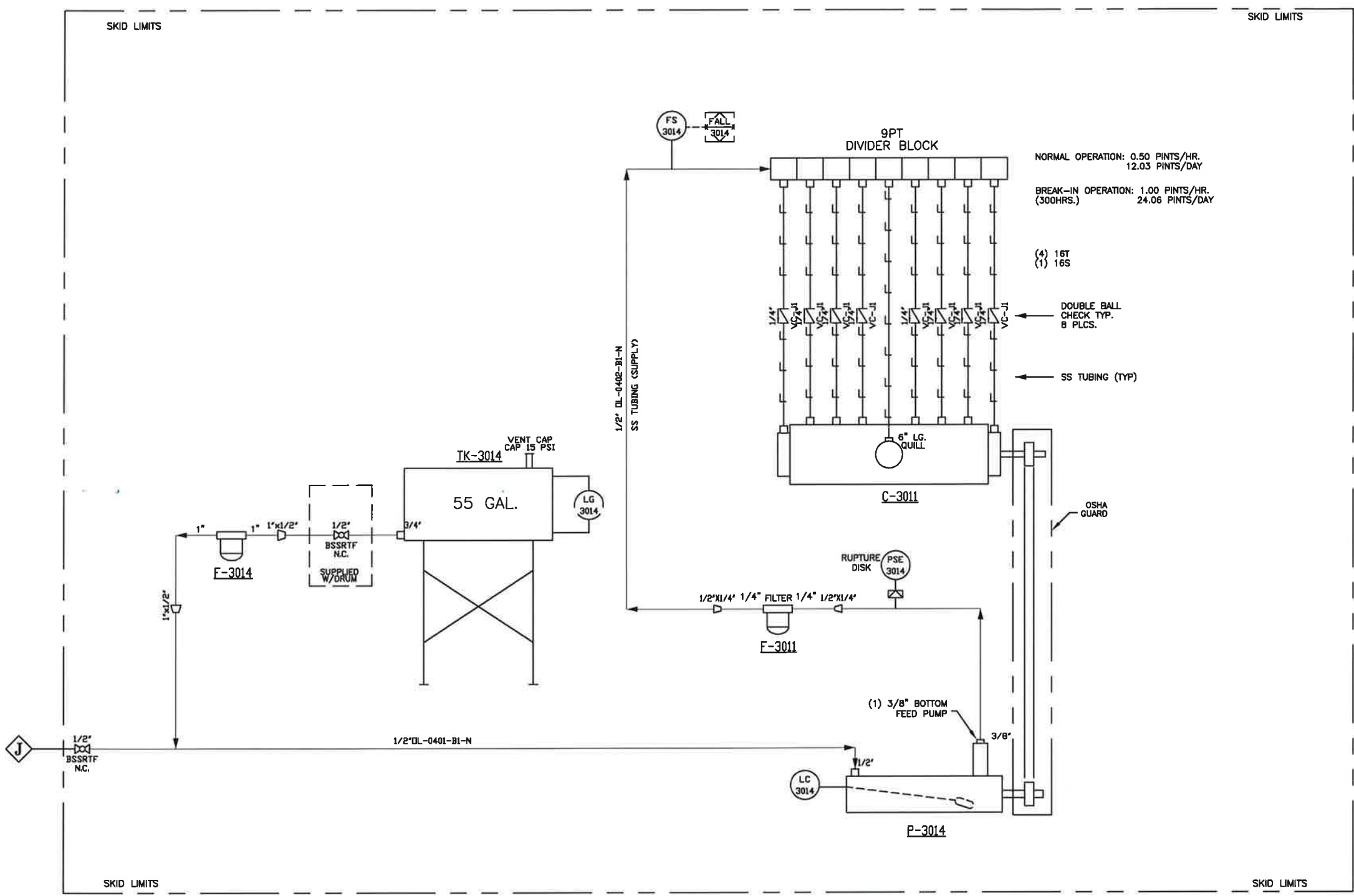
TK-3014
LUBE OIL TANK
MFG: KENCO
MODEL: K55G-36-FS
55 GALLON
SAE30 (ISO VG88-100)

CONNECTION SCHEDULE

MARK	SIZE	RATING	FACE	SERVICE
A	8"	150#	RF	GAS INLET
B	6"	150#	RF	GAS DISCHARGE
C	1"	150#	RF	MANUAL DRAIN
D	1"	150#	RF	AUTO DRAIN (SUCTION SCRUBBER)
E	2"	2000#	F/NPT	SKID DRAIN
F	2"	150#	RF	UNIT BLOWDOWN
G	1"	2000#	F/NPT	INSTRUMENT AIR
H	1"	2000#	F/NPT	JACKET WATER DRAIN
J	1/2"	2000#	F/NPT	LUBE OIL MAKE-UP

- NOTES:
- PLC PANEL ON SKID MOUNTED IN A NEMA 4X ENCLOSURE CLASS 1, DIV 2 W/ 20% SPARE TERMINALS.
 - PLC PANEL COMPONENTS TO BE LABELED AS PER PDCE-GBL-042-00.001.
 - SKID WIRING TO BE CLASS 1 DIV 2 CONDUIT SHALL BE 3/4" MIN W/ WIRE MARKERS ON END DEVICES W/ INSTRUMENT TAG # USING "FROM/TO" CONVENTION.
 - MAIN DRIVER TECO IEEE 841 W/ 120 VAC HEATER & BEARING & WINDING RTDS.
 - SWAGelok FITTINGS ALL TUBING AND FITTING TO BE 316SS.
 - TUBING TO BE 1/2", TUBING CLIP SPACING SHALL NOT EXCEED 4 FEET.
 - SKID TO BE DECKED CHECKERED DECK PLATE W/ 3" DRIP LIP & 2" DRAINS, LIFT LUGS.
 - LIFT LUGS TO BE 100% HT OR PT.
 - SKID TO HAVE ANCHOR AND JACK BOLTS (X4) & GROUND LUGS (X2 OPPOSITE SIDES).
 - SKID PER AWS D11.
 - PAINT PER CUSTOMER SPEC PDCE-GBL-032-00.0002 HI PAINT SYSTEM FOR INSULATED PIPING GREATER THAN 200°F, A PAINT SYSTEM FOR UN-INSULATED PIPING.
 - SANDBLAST ALL SURFACES TO BE PAINTED TO SSPC-SP10 FOR HI PAINT SYSTEM AND SSPC-SP6 FOR A PAINT SYSTEM.
 - THE FOLLOWING SURFACES SHALL NOT BE COATED: ZINC OR TEFLON COATED FLANGE STUD BOLTS, STAINLESS STEEL, RUBBER, TUBING, FLEXIBLE HOSES, SIGHT-GLASSES, GAUGE FACES AND BODIES, NAMEPLATES, CONTROL VALVE TRAVEL AND POSITION INDICATORS, ELECTRICAL ENCLOSURES & VALVE POSITION INDICATORS.
 - CARLSBAD CANYON PAINT COLOR.
 - PIPING TO BE ASME B31.3, HYDRO 1.5X FOR 1 HOUR, BW TO BE 100% X-RAYED, SW TO BE 100% HT OR PT.
 - PROCESS PIPING TO BE ACL, INSTRUMENT AIR PIPING TO BE ACM, JACKET WATER PIPING TO BE ACP.
 - PIPING 2" & LARGER = FLANGED.
 - PIPING COLD SPRING TEST REQUIRED.
 - PIPING NIPPLES FROM PIPING & EQUIPMENT TO BE SCH 160 TO THE FIRST VALVE AS PER PDCE-GBL-032-00.001.
 - PROCESS PIPING (SPEC ACM) THRED-D-LETS 1/2" - 1 1/2" ASTM A105 CLASS 6000 3/4" - 1 1/2" ASTM A105 CLASS 3000, NIPPLES & SWEDGES 1/2" - 1 1/2" ASTM A106 SCH 160, SOCK-D-LETS 1/2" - 1 1/2" ASTM A105 CLASS 6000 3/4" - 1 1/2" ASTM A105 CLASS 3000, 2" FLANGES CLASS 150 RF ASTM A105.
 - INSTRUMENT AIR PIPING (SPEC ACL) THRED-D-LETS 1/2" - 1 1/2" ASTM A105 CLASS 3000, NIPPLES & SWEDGES 1/2" - 1 1/2" ASTM A106 SCH 160, SOCK-D-LETS 1/2" - 1 1/2" ASTM A105 CLASS 3000, 2" FLANGES CLASS 150 RF ASTM A105.
 - JACKET WATER PIPING (SPEC ACP) FITTINGS 1/2" - 4" ASTM A105 CLASS 3000, NIPPLES & SWEDGES 1/2" - 4" ASTM A106 SCH 160, 2" FLANGES CLASS 150 RF ASTM A105.
 - 5 WORKING DAYS' NOTICE PRIOR TO HOLD POINTS & TEST.
 - ALL MATERIALS FROM NORTH AMERICA & WESTERN EUROPE.
 - PIPING ABOVE 140°F TO BE INSULATED FOR PERSONAL PROTECTION, HEAT TRACE AND INSULATION FOR LIQUID DRAIN PIPING.
 - INSULATION & HEAT TRACE TO BE AS PER PDCE-GBL-032-00.003.
 - VESSELS HYDRO 1.5X FOR 1 HOUR, 100% OF WELD TO BE X-RAYED.
 - HEAT EXCHANGER TO MEET API 661.
 - FLEXITALLIC GASKETS. (304 SS GRAPHITE FILLED 1/8" THICK W/ 304 SS IR)
 - CAD PLATED STUDS & NUTS B7/2H.
 - NO PLASTICDATING.
 - PSV'S SIZED PER API 520/521 & APPLICABLE ASME VIII DIV 1 STANDARDS.
 - ROSEMOUNT PRESSURE & TEMPERATURE TRANSMITTERS.
 - BYPASS VALVE FISHER GX 2-WAY TO BE CONTROLLED BY ADV2000 I/P CONTROLLER.
 - MTR'S REVIEW REQUIRED ON ALL MATERIALS.
 - NO YELLOW METALS OR MALLEABLE IRON.
 - ALL CUSTOMER CONNECTIONS TO BE INSIDE SKID CONTAINMENT.

AS BUILT



DESIGN CONDITIONS:
P1 = 0.5-2.0 PSIG
P2 = 30 PSIG
T1 = 120°F
T2 = 120°F
TA = 100°F
SG = 1.03
N = 1.11
EL = 2600 FASL
Q = 1.04-1.28 MMSCFD

NOTES:
SEE SHEET 4

NO.	BY	DATE	DESCRIPTION	CHK'D	APP'D
3	J.C.	12/07/18	AS BUILT	JP	JP
2	J.C.	10/17/18	RE-ISSUED FOR CONSTRUCTION	JP	JP
1	J.C.	10/01/18	REVISED PER CHANGE ORDER	JP	JP
0	J.C.	08/15/18	ISSUED FOR CONSTRUCTION	JP	JP
A	J.C.	07/16/18	ISSUED FOR APPROVAL	JP	JP

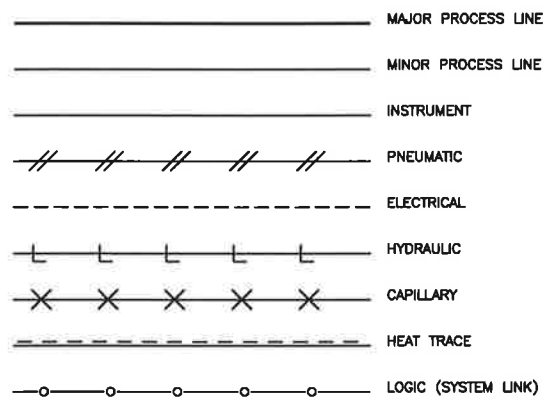
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PIPING & INSTRUMENT DIAGRAM
VAPOR RECOVERY UNIT
HB-12L-150-12BV

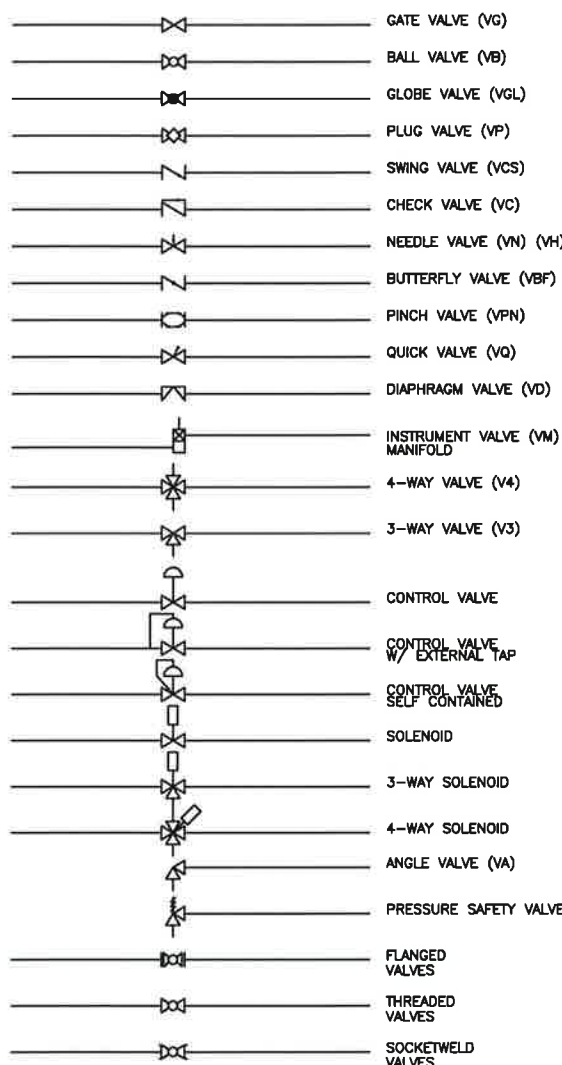
DRAWN: J.C.	DATE: 07/03/18	SCALE: NONE	CHK'D: JP	APP'D: JP	W.O. NO.: 112449
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CUSTOMER:
PDC ENERGY
DWG. NO.: 112449-01-004 4 OF 5 REV. 3

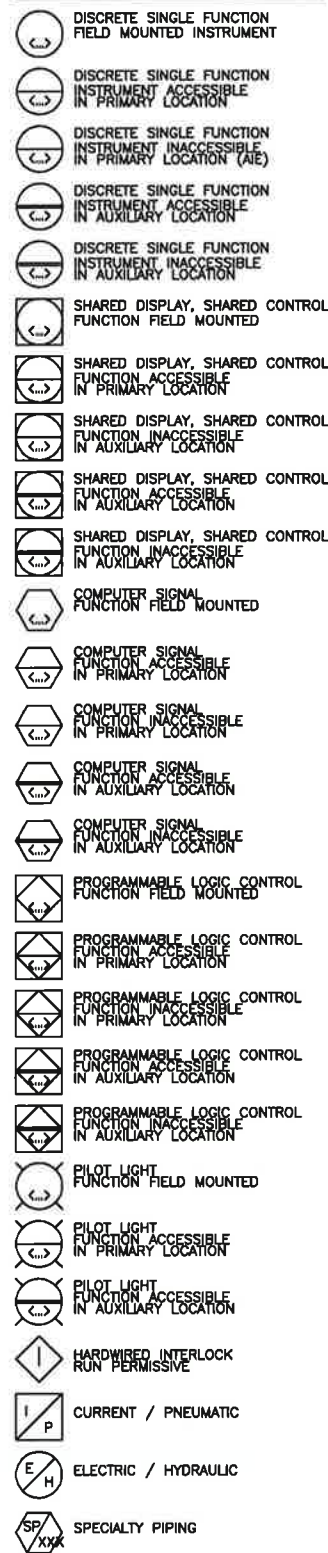
INSTRUMENT LINE SYMBOLS



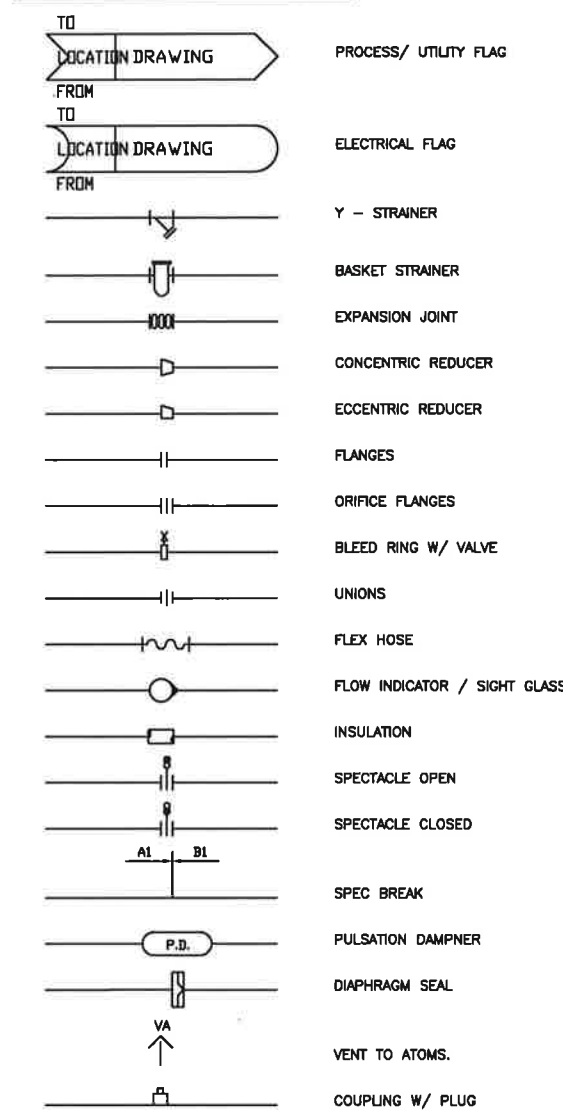
VALVE SYMBOLS / TAGGING



INSTRUMENT SYMBOLS



MISCELLANEOUS SYMBOLS



VALVE SPEC

TYPE OF VALVE: VB-AN

VALVE SPECIFICATION: NACE (IF APPLICABLE)

SPEC. NO.	SCHEDULE	SPEC. NO.	SCHEDULE	SPEC. NO.	SCHEDULE
A	150# C.S.	E	1500# C.S.	J	3000# C.S.
A1	150# S.S.	E1	1500# S.S.	J1	3000# S.S.
A2	150# C.S./S.S.	E2	1500# C.S./S.S.	J2	3000# C.S./S.S.
B	300# C.S.	F	2500# C.S.	K	6000# C.S.
B1	300# S.S.	F1	2500# S.S.	K1	6000# S.S.
B2	300# C.S./S.S.	F2	2500# C.S./S.S.	K2	6000# C.S./S.S.
C	600# C.S.	G	1000# C.S.	L	275# C.S.
C1	600# S.S.	G1	1000# S.S.	L1	275# S.S.
C2	600# C.S./S.S.	G2	1000# C.S./S.S.	L2	275# C.S./S.S.
D	900# C.S.	H	2000# C.S.	M	720# C.S.
D1	900# S.S.	H1	2000# S.S.	M1	720# S.S.
D2	900# C.S./S.S.	H2	2000# C.S./S.S.	M2	720# C.S./S.S.

INSTRUMENT ABBREVIATION LEGEND

FIRST LETTER - PROCESS VARIABLE OR ACTION

A - ANALYSES
 B - BURNER
 C - CONDUCTIVITY (ELECT)
 D - DENSITY (MASS) OR SPECIFIC GRAVITY
 E - VOLTAGE (EMF)
 F - FLOW RATE
 G - GAUGING (DIMENSIONAL)
 H - HAND
 I - CURRENT (ELECTRICAL)
 J - POWER (WATTS)
 K - TIME OR SCHEDULE
 L - LEVEL
 M - MOISTURE OR HUMIDITY
 N - USER CHOICE
 O - USER CHOICE
 P - PRESSURE OR VACUUM
 Q - QUANTITY OR EVENT
 R - RADIOACTIVITY
 S - SPEED, FREQUENCY, OR ROTATION
 T - TEMPERATURE
 U - MULTIVARIABLE
 V - VIBRATION
 W - WEIGHT OR FORCE
 X - UNCLASSIFIED
 Y - USER CHOICE
 Z - POSITION OR STROKE

SUCCEEDING LETTER(S) -
 *(SELECT FIRST LETTER FROM ABOVE)

*AH - ALARM HIGH
 *AHH - SHUTDOWN ALARM HIGH HIGH
 *AL - ALARM LOW
 *ALL - SHUTDOWN ALARM LOW LOW
 *C - CONTROL OR CONTROLLER
 *CV - CONTROL VALVE (SELF ACTUATED)
 *E - ELEMENT
 *I - INDICATOR
 *IC - INDICATION CONTROLLER
 *J - SCAN
 *Q - TOTALIZE INTEGRATE
 *R - RECORDER
 *RC - RECORDER CONTROLLER
 *S - SWITCH
 *SH - SWITCH HIGH
 *SHH - SHUTDOWN SWITCH HIGH HIGH
 *SL - SWITCH LOW
 *SLL - SHUTDOWN SWITCH LOW LOW
 *SV - SAFETY VALVE
 *T - TRANSMITTER
 *UI - MULTI-POINT INDICATOR
 *UR - MULTI-POINT RECORDER
 *V - VALVE
 *W - WELL OR PROBE

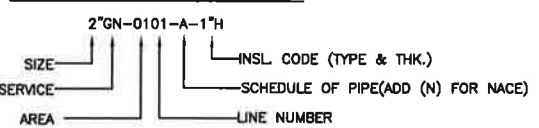
EQUIPMENT DESIGNATION

PRESSURE VESSELS (D)
 ATMOSPHERIC VESSELS (V)
 FILTERS (F)
 COMPRESSORS (K)
 MOTORS (M)
 PUMPS (P)
 EXCHANGERS (E)

CONNECTION SCHEDULE

MARK	SIZE	RATING	FACE	SERVICE
A	8"	150#	RF	GAS INLET
B	6"	150#	RF	GAS DISCHARGE
C	1"	150#	RF	MANUAL DRAIN
D	1"	150#	RF	AUTO DRAIN (SUCTION SCRUBBER)
E	2"	2000#	F/NPT	SKID DRAIN
F	2"	150#	RF	UNIT BLOWDOWN
G	1"	2000#	F/NPT	INSTRUMENT AIR
H	1"	2000#	F/NPT	JACKET WATER DRAIN
J	1/2"	2000#	F/NPT	LUBE OIL MAKE-UP

LINE NUMBER LEGEND



SERVICE DESIGNATION

AIR
 AI - INSTRUMENT AIR

CHEMICAL & CATALYST
 MM - METHANOL

GAS
 GD - REGENERATION GAS
 GF - FUEL GAS
 GI - INSTRUMENT GAS
 GN - NATURAL GAS
 GR - RESIDUE GAS
 GS - STARTING GAS
 GP - PURGE GAS (NITROGEN)

OIL
 OW - SLOP OIL
 OL - LUBE OIL

PROCESS & PRODUCT
 PC - CONDESATE
 PL - PROCESS LIQUID

REFRIGERANT
 CP - PROPANE REFRIGERANT

RELIEF & VENT
 EX - EXHAUST
 RA - RELIEF TO ATMOSPHERE
 RV - RELIEF TO VENT
 V - VENT
 VA - VENT TO ATMOSPHERE

SEWER
 DC - DRAIN TO GRADE

WATER
 WG - GLYCOL
 WW - WASTE WATER
 CWS - COOLING WATER SUPPLY (COLD)
 CWR - COOLING WATER RETURN (HOT)

DRAINS
 DO - OPEN DRAIN SYSTEM
 DC - CLOSED DRAIN SYSTEM

INSULATION CODE
 C - COLD INSULATED
 ET - ELECT TRACE
 H - HOT INSULATED
 N - NOT INSULATED
 OT - OIL TRACE
 PP - PERSONAL PROTECTION

SERVICE CONTINUATION CONN.

AI	SERVICE DESIGNATION
PCV-1264	EQUIP. NO.
XXX-XX-XXX	PAGE

PIPE SCHEDULE SPECIFICATION

SPEC. NO.	SCHEDULE
A	SCH/40 C.S.
A1	SCH/40 S.S.
B	SCH/80 C.S.
B1	SCH/80 S.S.
C	SCH/160 S.S.
C1	SCH/160 S.S.
D1	S.S. TUBING

TITLE BLOCK LABEL

PIPING & INSTRUMENT DIAGRAM
 LEGEND AND SYMBOL SHEET

DATE	8/18/07	REVISED	DATE	REVISED	DATE	REVISED
BY	J.P.	BY	J.P.	BY	J.P.	BY
HY-BON ENGINEERING INC.						
SCALE	100XXX-00-001	SHEET		1	OF	1

ABBREVIATIONS

S/S - SEAM TO SEAM
 CS - CARBON STEEL
 CSC - CAR SEAL CLOSED
 CSO - CAR SEAL OPEN
 SC - SAMPLE CONNECTION
 BF - BLIND FLANGE
 LC - LOCKED CLOSED
 LO - LOCKED OPEN
 COND. - CONDENSATE
 ESD - EMERGENCY SHUTDOWN
 (F) - FURNISHED
 FC - FAIL CLOSED
 FO - FAIL OPEN
 NC - NORMALLY CLOSED
 NO - NORMALLY OPEN
 HGA - HAND/OFF/AUTO
 MW - MANWAY
 SG - SPECIFIC GRAVITY
 SD - SHUTDOWN
 FG - FUEL GAS
 NG - NATURAL GAS
 N2 - NITROGEN
 SS - STAINLESS
 ESD - EMERGENCY SHUT DOWN

AS BUILT

DESIGN CONDITIONS:
 P1 = 0.5-2.0 PSIG
 P2 = 30 PSIG
 T1 = 120°F
 T2 = 120°F
 TA = 100°F
 SG = 1.03
 N = 1.11
 EL = 2600 FASL
 Q = 1.04-1.28 MMSCFD

NOTES:
 SEE SHEET 4

NO.	BY	DATE	DESCRIPTION	CHK'D	APP'D
3	J.C.	12/07/18	AS BUILT	JP	JP
2	J.C.	10/17/18	RE-ISSUED FOR CONSTRUCTION	JP	JP
1	J.C.	10/01/18	REVISED PER CHANGE ORDER	JP	JP
0	J.C.	08/15/18	ISSUED FOR CONSTRUCTION	JP	JP
A	J.C.	07/16/18	ISSUED FOR APPROVAL	JP	JP

HY-BON EDI
 Vent Gas Management

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PIPING & INSTRUMENT DIAGRAM
 VAPOR RECOVERY UNIT
 HB-12L-150-12BV

DRAWN: J.C.	DATE: 07/03/18	SCALE: NONE	CHK'D: JP	APP'D: JP	W.O. NO.: 112449
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CUSTOMER: **PDC ENERGY**

DWG. NO.: 112449-01-005 | 5 OF 5 | REV. 3