

INSTRUMENT LETTER IDENTIFICATION					
	FIRST-LETTER		SUCCEEDING-LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYZER		ALARM		
B	BURNER				
C	USER'S CHOICE	CONTROL	USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
D	USER'S CHOICE	DIFFERENTIAL			
E	VOLTAGE		PRIMARY ELEMENT		
F	FLOW	RATIO			
G	USER'S CHOICE		GLASS		
H	HAND				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME			CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	USER'S CHOICE	MOMENTARY			MEDIUM
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE		OPEN
P	PRESSURE		POINT TEST CONN.		
Q	QUANTITY	INTEGRATE/TOTALIZE			
R	RADIATION	RELIEF	RECORD		
S	SPEED	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTI-VARIABLE		MULTI-FUNCTION	MULTI-FUNCTION	MULTI-FUNCTION
V	VIBRATION			VALVE, DAMPER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED	X-AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE	Y-AXIS		RELAY, COMPUTE	
Z	POSITION	Z-AXIS		DRIVER, ACTUATOR UNCLASSIFIED FINAL CONTROL ELEMENT	

**INSTRUMENT SYMBOL IDENTIFICATION**

**NOTE:**  
TABLE IS BASED ON ANSI/ISA-5.1-1984 (R1992).

**TRANSDUCER FUNCTIONS**

E/E	VOLTAGE TO VOLTAGE
E/I	VOLTAGE TO CURRENT
E/P	VOLTAGE TO PNEUMATIC
I/P	CURRENT TO PNEUMATIC
P/I	PNEUMATIC TO CURRENT

**LEVEL TABLE**

WHERE X = DISTANCE ABOVE TANGENT OR FROM BOTTOM OF STRAIGHT SIDE WALL. EXAMPLE TABLE BELOW; MODIFY AS REQUIRED.

ALARM HIGH	LAH####=X'
START 2103	LSH####=X'
STOP 2103	---
START 2104	LSM####=X'
STOP 2104	---
ALARM LOW	LAL####=X'

REFERENCE ELEVATION  
SWITCH TAG  
SWITCH FUNCTION

2708

**INSTRUMENT SYMBOLS**

	LOCALLY MOUNTED (FIELD)		INSTRUMENTS SHARING COMMON HOUSING
	FRONT OF PANEL MOUNTED		NOT BY VEOLIA WATER
	LOCAL PANEL MOUNTED		PILOT LIGHT
	BACK OF PANEL MOUNTED OR INACCESSIBLE		HOST COMPUTER NOT NORMALLY ACCESSIBLE TO THE OPERATOR
	SHARED DISPLAY FUNCTION NOT NORMALLY ACCESSIBLE TO THE OPERATOR		HOST COMPUTER NORMALLY ACCESSIBLE TO THE OPERATOR
	SHARED DISPLAY FUNCTION NORMALLY ACCESSIBLE TO THE OPERATOR		RESET
	SHARED DISPLAY FUNCTION REMOTE LOCATION		INTERLOCK
	PLC FUNCTION		PURGE

**COMPUTING FUNCTION IDENTIFICATION**

	ADD		BIAS		VELOCITY LIMITER
	AVERAGE		DIVIDE		NEGATIVE GAIN
	DIFFERENCE		HIGH SELECTOR		PROPORTIONAL GAIN
	BOOSTER		LOW SELECTOR		PROPORTIONAL
	HIGH LIMIT		MULTIPLY		TIME FUNCTION
	LOW LIMIT		INTEGRATE		ROOT EXTRACTION
	RATE OF CHANGE		EXPONENTIAL		CONVERT

**INSTRUMENT ABBREVIATIONS**

AI	ANALOG INPUT	FWD	FORWARD
AO	ANALOG OUTPUT	KT	K-TYPE THERMOCOUPLE
BCD	BINARY CODED DECIMAL	LC	LOCKED CLOSED
C	COMPUTER	LO	LOCKED OPEN
CPT	CONTROL POWER TRANSFORMER	MN	MODBUS NETWORK
DI	DIGITAL INPUT	MS	MOTOR STARTER
DL	DATA LOGGER	NC	NORMALLY CLOSED
DO	DIGITAL OUTPUT	NO	NORMALLY OPEN
FB	FEEDBACK	PLC	PROGRAMMABLE LOGIC CONTROLLER
FC	FAIL CLOSED	PV	PROCESS VARIABLE
FI	FAIL INTERMEDIATE	RSP	REMOTE SETPOINT
FLP	FAIL LAST POSITION	REV	REVERSE
FO	FAIL OPEN	SP	SETPOINT
FP	FILL PORT	EL	ELEVATION
		IAR	INSTRUMENT AIR

**CONNECTIONS**

	THREADED (GENERAL)
	BUTT WELDED
	SOCKET WELDED
	FLANGED

**VALVE SYMBOLS**

	BALL		ANGLE THREE-WAY (Ball type shown)
	BUTTERFLY		CHECK, GENERAL
	CHECK, GENERAL		CHECK, SPLIT DISK
	DIAPHRAGM		PRESSURE REDUCING (EXTERNAL SENSOR)
	GATE		PRESSURE REDUCING (INTERNAL SENSOR)
	GLOBE		HAND WHEEL ADJ. SETPOINT
	KNIFE GATE		PRESSURE RELIEF VACUUM VENT
	NEEDLE		
	PINCH		
	PLUG		

**NOTE:** VALVE COLOR DURING TYPICAL OPERATION IS GREEN=OPEN AND RED=CLOSED.

**LINE SYMBOLS**

	MAJOR PROCESS PIPING
	MINOR/INSTRUMENT PIPING
	EXISTING PIPING
	ELECTRICAL SIGNAL
	CAPILLARY TUBING
	SOFTWARE OR DATA LINK
	MECHANICAL LINK
	PNEUMATIC SIGNAL/PIPING
	HYDRAULIC SIGNAL
	GUIDED WAVE
	UNGUIDED WAVE

**NOTE:** PROCESS LINES ARE COLOR-KEYED IN ACCORDANCE WITH THE PFD LINE COLOR KEY TABLE.

**CONTROL VALVE ACTUATORS**

	PISTON WITH SPRING RETURN		VALVE MOUNTED I/P CONVERTER
	FAIL OPEN		DIAPHRAGM ACTUATOR
	PISTON		SOLENOID
	FAIL CLOSED		
	ELECTRIC FAIL INDETERMINATE		

**TYPICAL I/O SYMBOLS**

	DIGITAL INPUT TO PLC
	DIGITAL OUTPUT FROM PLC
	ANALOG INPUT TO PLC
	ANALOG OUTPUT FROM PLC
	MODBUS COMMUNICATIONS
	K-TYPE THERMOCOUPLE

**PRIMARY FLOW ELEMENTS**

	ORIFICE PLATE WITH FLANGE PIPE TAPS OR VENA CONTRACTA		ORIFICE PLATE IN QUICK-CHANGE FITTING		AVERAGING PITOT TUBE
	TURBINE OR PROPELLER TYPE		PITOT TUBE		POSITIVE DISPLACEMENT
	VENTURI TUBE		ROTAMETER		VORTEX SENSOR
	FLOW NOZZLE		MAGNETIC		WEIR (V-NOTCH SHOWN)
	ULTRASONIC (DOPPLER)		CORIOLIS		FLUME
	TRANSIT TIME				

NO.	REVISIONS	BY	DATE	APP	NO.	REVISIONS	BY	DATE	APP	SCALE: None	ISSUE DATE: August 2010	[COMPANY NAME]
0	Engineering	RGC	07/18/05							APPVD: _____	ISSUE FOR: General Training	
										DESIGNED RGC	This drawing, copies of this drawing and all information contained on this drawing is and shall remain the sole and exclusive property of [COMPANY NAME]. It is submitted only in connection with the transaction to which it pertains and may not be used or distributed for any purpose other than to accomplish the purpose of said transaction without the expressed written permission. This drawing or any copy of this drawing is not to be copied in any manner and must be returned upon request. ALL RIGHTS RESERVED. Copyright 2010 [COMPANY NAME]	P&ID LEGEND SHEET 1 OF 2 INSTRUMENTATION AND VALVES
									DRAFTED RGC	DRAWING NO. D001		
									CHECKED			

## FLUID SERVICE CODES

ALM - ALUMINUM SULFATE	NAG - NATURAL GAS
AMN - AMMONIUM NITRATE	NIA - NITRIC ACID
AMH - AMMONIUM HYDROXIDE	N2 - NITROGEN
ABF - AMMONIUM (BI)FLUORIDE	OIL - OIL (GENERAL USE)
AMS - AMMONIUM SULFATE	PAR - PROCESS AIR
ASO - ACID SOLUBLE ORGANICS	PFD - POLYMER FEED
BAR - BACKWASH AIR	PHA - PHOSPHORIC ACID
CAF - CALCIUM FLUORIDE	KF - POTASSIUM FLUORIDE
CAR - COMPRESSED AIR	KOH - POTASSIUM HYDROXIDE
CBW - CLEAN BACKWASH WATER	PSL - PROCESS SLURRY/SLUDGE
CFD - CAUSTIC RAW FEED (GEN. USE)	PVP - PROCESS VAPOR
CO2 - CARBON DIOXIDE	PWR - POTABLE WATER
CHC - CALCIUM HYPOCHLORITE	SAH - SULFURIC ACID, >75%
CL2 - CHLORINE	SAL - SULFURIC ACID, <75%
DBW - DIRTY BACKWASH WATER	SHC - SODIUM HYPOCHLORITE
DRN - PROCESS DRAIN	SOC - SODIUM CARBONATE
DSL - DIESEL FUEL	SOH - SODIUM HYDROXIDE
EFF - EFFLUENT (GENERAL USE)	SLP - STEAM, <125#
FEC - FERRIC CHLORIDE	SMB - SODIUM METABISULFITE
FEW - FILTER EFFLUENT WATER	STM - STEAM, 125-220 #
FIW - FILTER INFLUENT WATER	SNY - SANITARY SEWER
FOL - FUEL OIL	STO - STORM DRAIN
HCL - HYDROCHLORIC ACID	SWR - SERVICE WATER
HF - HYDROFLUORIC ACID	TFL - THERMAL FLUID
HPX - HYDROGEN PEROXIDE	UAR - UTILITY AIR
IAR - INSTRUMENT AIR	UWR - UTILITY WATER
IFD - INDUSTRIAL RAW FEED	VNT - VENT (GENERAL USE)
LSY - LIME SLURRY	WOL - WASTE OIL
MEL - METHANOL	WWR - WASTEWATER (GENERAL USE)

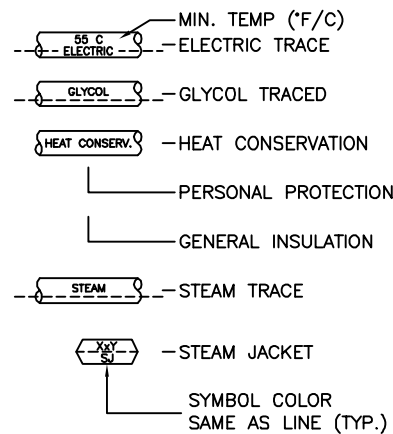
## EQUIPMENT TYPE CODES

- 1- FLUID TRANSPORT (BLOWERS, COMPRESSORS AND ALL TYPES OF PUMPS)
- 2- SOLIDS TRANSPORT (BELT AND SCREW CONVEYORS, FEEDERS, ETC.)
- 3- PHYSICAL SEPARATION (PHASE SEPARATION EQUIPMENT, FILTERS, SCREENS, GRAVITY SEPARATORS, CENTRIFUGES, MICRO/ULTRAFILTERS, ETC.)
- 4- MIXERS (AGITATORS, IN-LINE MIXERS, SHREDDERS, BLENDEES, ETC.)
- 5- HEAT TRANSFER (HEAT EXCHANGERS, HEATERS, COOLING TOWERS, BURNERS, ETC.)
- 6- MASS TRANSFER (AD/ABSORBERS, ION EXCHANGE, SCRUBBERS, STRIPPERS, COLUMNS, EVAPORATORS, ETC.)
- 7- CONTAINMENT (TANKS, VESSELS, PITS, SUMPS, SILOS, ETC.)
- 8- REACTORS (CHEMICAL REACTORS OR PRECIPITATORS, CRYSTALLIZERS, ETC.)
- 9- VENDOR PACKAGES & MISC. (PREFABRICATED SYSTEMS FROM 3RD PARY SUPPLIERS, SPECIALTY EQUIPMENT UNCLASSIFIED ELSEWHERE)

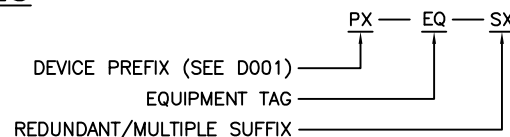
## TRACING AND INSULATION CODES

- ET - ELECTRIC TRACE
- FP - FIRE PROTECTION
- HC - HEAT CONSERVATION
- I - INSULATED, GENERAL
- PP - PERSONAL PROTECTION
- S - STEAM TRACE
- SJ - STEAM JACKET

## INSULATION SYMBOLS



## INSTRUMENT/DEVICE TAGS

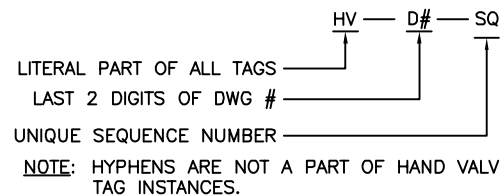


NOTE: HYPHENS ARE NOT RQD BETWEEN PX AND EQ.

### REDUNDANT/MULTIPLE SUFFIX RULES:

1. UTILIZE SEQUENTIAL NON-HYPHENATED ALPHABETIC SUFFIXES FOR REDUNDANT DEVICES.
2. FOR MULTIPLE ITEMS OF SAME TYPE, EMPLOY A SEQUENTIAL, HYPHENATED NUMERIC SUFFIX.

## HAND VALVE TAGS

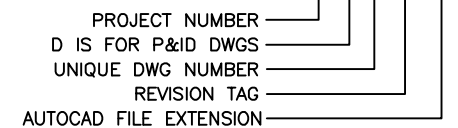


NOTE: HYPHENS ARE NOT A PART OF HAND VALVE TAG INSTANCES.

## P&I DRAWING FILENAME

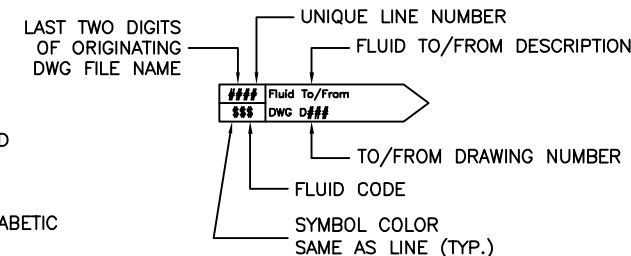
FIRST TWO DIGITS OF ALL INSTRUMENT LOOPS ON DWG.

EXAMPLE FILE NAME: 0253D109RA.DWG

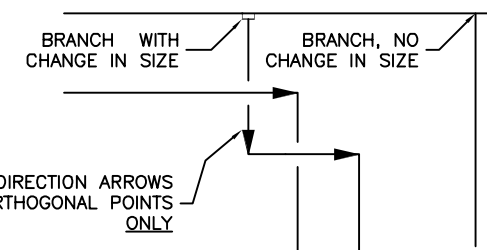


## MISC. TAGS & LABELS

### LINE ON/OFF PAGE CONNECTOR



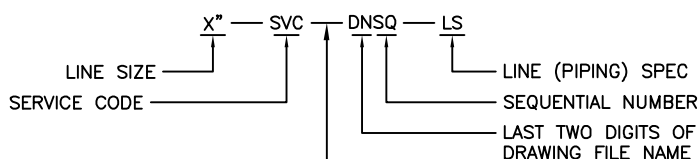
### FLOW ARROWS, BRANCHES AND LINE BREAKS



### LINE BREAK RULES:

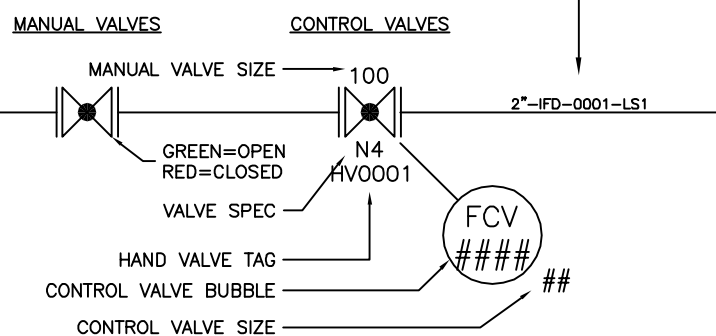
1. MAJOR PROCESS LINE CROSSES BREAK AT THE VERTICAL LINE.
2. MINOR LINES WILL YIELD AND BREAK AT ANY MAJOR PROCESS LINE CROSS.
3. ANY MINOR OR MAJOR LINE MAY BE BROKE, AS REQUIRED, TO ACCOMMODATE NOTES OR LEADERS.
4. ALL INSTRUMENTATION SIGNALS YIELD AND BREAK TO MAJOR AND MINOR PROCESS LINES.

## LINE NUMBERS

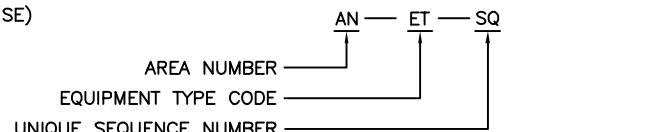


LABEL COLOR = BLACK

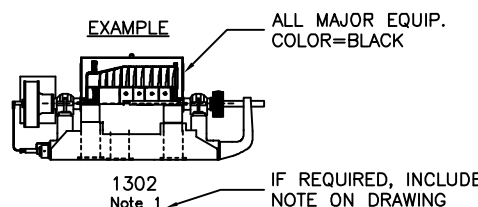
## VALVE TAGS



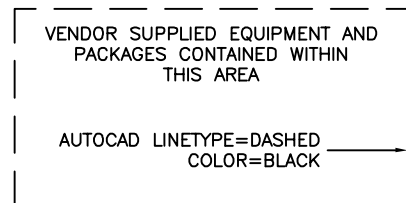
## EQUIPMENT TAG FORMAT



NOTE: HYPHENS ARE NOT A PART OF EQUIPMENT TAG INSTANCES.



## VENDOR DELINEATION



## EQUIPMENT LABELS

### EXAMPLE FOR PUMP

1105  
PUMP NAME  
NOMINAL CAP: X M3/HR @ Y M TDH  
TYPE: HORIZONTAL CENTRIFUGAL  
MOTOR: X KW 420V/3 PH/50 HZ TEFC  
SPEED: 1500 RPM  
CONSTRUCTION: 316 SS  
MANUFACTURER: ACME  
MODEL: ABC-3XR9

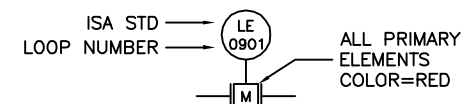
### EXAMPLE FOR TANK

1705  
NAME OF TANK  
TYPE: VERTICAL CYLINDRICAL  
NOMINAL CAP: 40 M3  
SIZE: X M DIA X Y M HIGH  
CONSTRUCTION: A36 CARBON STEEL  
DESIGN: API 650  
OTHER: NEOPRENE RUBBER LINED  
MANUFACTURER: ACME FABRICATORS

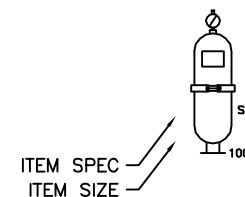
NOTE: LABELS VARY IN ACCORDANCE WITH EQUIPMENT DESCRIBED. ALL LABELS ARE LOCATED ALONG BOTTOM OF THE P&I DIAGRAM.

## FLOW ELEMENT TAGS

### MAG METER EXAMPLE

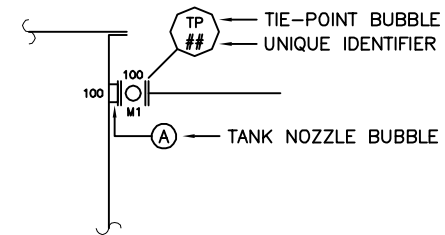


## SPECIALTY ITEMS

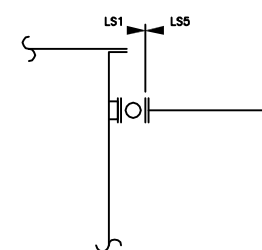


NOTE: THE LOCATION OF TAGGING VARIES WITH THE TYPE OF SPECIALTY ITEM.

### TIE-POINT & NOZZLE TAGS



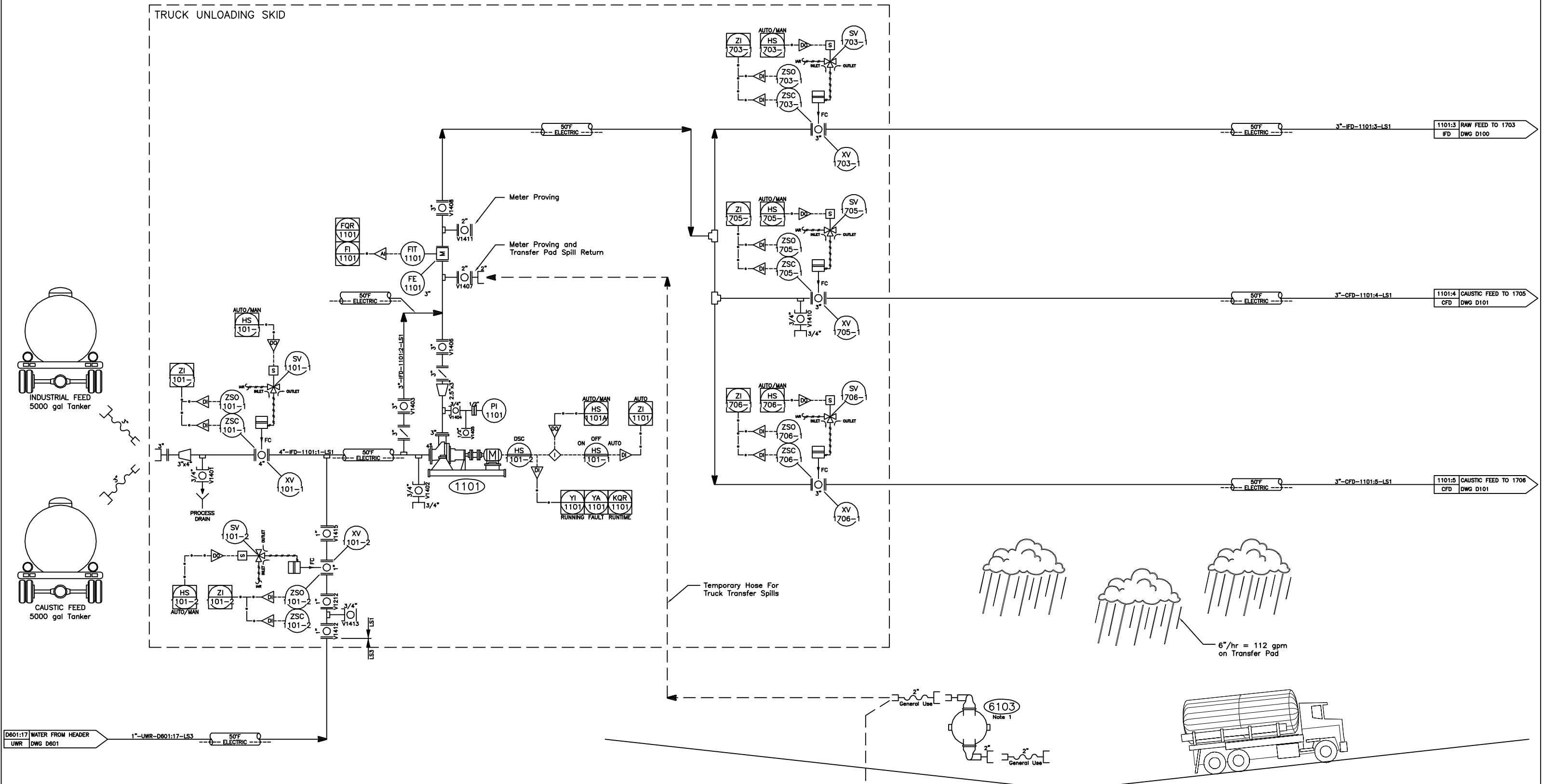
### SERVICE SPEC BREAK



NOTE: THIS IS A STANDARD LEGEND SHEET. THEREFORE, ALL SYMBOLS AND ABBREVIATIONS SHOWN MAY NOT APPEAR ON THE P&I DIAGRAMS.

NO.	REVISIONS	BY	DATE	APP	NO.	REVISIONS	BY	DATE	APP	SCALE: None	ISSUE DATE: August 2010	[COMPANY NAME]
0	Engineering	RGC	07/18/05							APPVD: _____	ISSUE FOR: General Training	
										DESIGNED RGC		P&I LEGEND SHEET 2 OF 2 CODES, TAGS AND LABELS
										DRAFTED RGC		
										CHECKED		

TRUCK UNLOADING SKID



1101  
UNLOAD PUMP  
TYPE: Centrifugal Slurry  
CAPACITY: 250 gpm @ 78 ft. TDH  
MOTOR: 20 HP 480 V/3 PH/1800 RPM  
CONSTRUCTION: Maxalloy 2  
OTHER:  
MANUFACTURER: Wilfley  
MODEL: 2 1/2 K

DRAWING NOTES:  
1. Pump is supplied loose and may be moved where required. (See also D100)


NO.	REVISIONS	BY	DATE	APP	NO.	REVISIONS	BY	DATE	APP
A	HazOp	RGC	07/21/05						
B	HazOp Recommendations	RGC	07/28/05						
C	General Revisions	RGC	09/12/05						
0	Fabrication	RGC	10/17/05						
1	Construction	RGC	12/27/05						

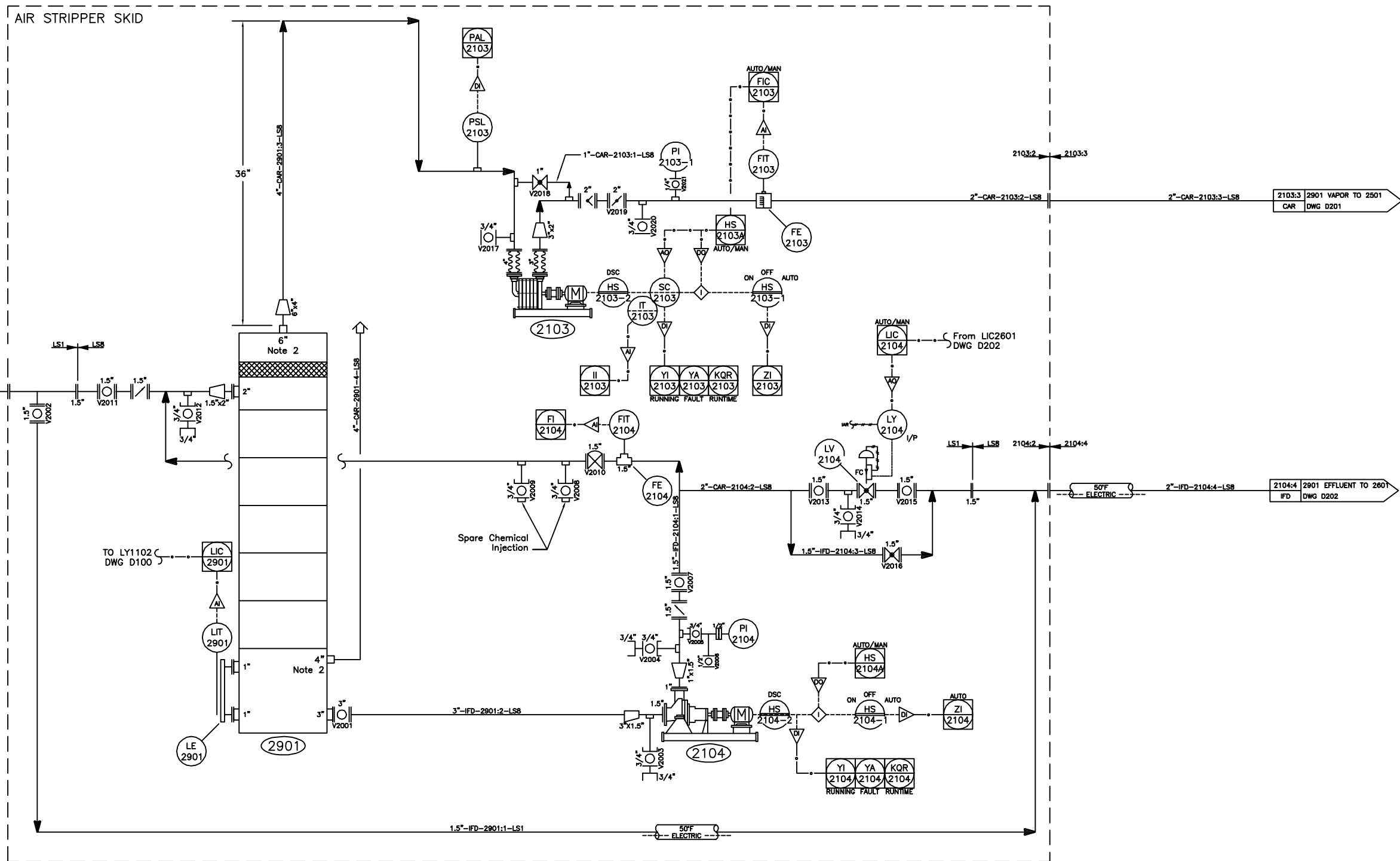
SCALE: None  
APPVD: \_\_\_\_\_  
DATE: \_\_\_\_\_  
DESIGNED RGC  
DRAFTED RGC  
CHECKED

ISSUE DATE: August 2010  
ISSUE FOR: General Training  
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[CLIENT NAME]  
[CLIENT LOCATION]  
[NAME OF PROCESS]  
PIPING & INSTRUMENTATION DIAGRAM  
TRUCK UNLOADING & TRANSFER PAD

[COMPANY NAME]  
Project: 123456  
DRAWING NO. D100





**2107  
T1 DEFOAMER PUMP**  
 TYPE: Solenoid pulse  
 CAPACITY: X LPH  
 MOTOR: 120 V/1 PH/- RPM  
 CONSTRUCTION: 304SS  
 OTHER:  
 MANUFACTURER: LMI  
 MODEL:

**2901  
AIR STRIPPER**  
 TYPE: Sieve Tray  
 CAPACITY: 35 gpm nominal  
 SIZE: Five Trays w/30 gal sump  
 CONSTRUCTION: 304SS  
 DESIGN: 150 SCFM @ <=6" Hg  
 OTHER: Modified T1 SVC  
 MANUFACTURER: [BY COMPANY]

**2103  
STRIPPER BLOWER**  
 TYPE: Multi-Stage Centrifugal  
 CAPACITY: 150 SCFM @ 5" Hg vacuum  
 MOTOR: 480 V/3 PH/Z RPM  
 CONSTRUCTION: Xylan-coated Al turbines  
 OTHER: 2950 rpm operating speed  
 MANUFACTURER: Gardner Denver  
 MODEL: Turbotron

**2104  
STRIPPER EFFLUENT PUMP**  
 TYPE: Horizontal Centrifugal  
 CAPACITY: 35 gpm @ 45 ft. TDH  
 MOTOR: 2HP 480V/3 PH/1800RPM  
 CONSTRUCTION: DCI  
 OTHER:  
 MANUFACTURER: Durco  
 MODEL: 1K1.5x1-82RVM3STFPD

**DRAWING NOTES:**  
 1. Defoamer and 2107 located inside press building.  
 2. Straight pipe connection may be coupled with Fernco.

NO.	REVISIONS	BY	DATE	APP	NO.	REVISIONS	BY	DATE	APP
A	HazOp	RGC	07/21/05						
B	HazOp Recommendations	RGC	07/30/05						
C	Vendor Feedback Updates	RGC	09/13/05						
0	Fabrication	RGC	10/17/05						
1	Construction	RGC	12/27/05						

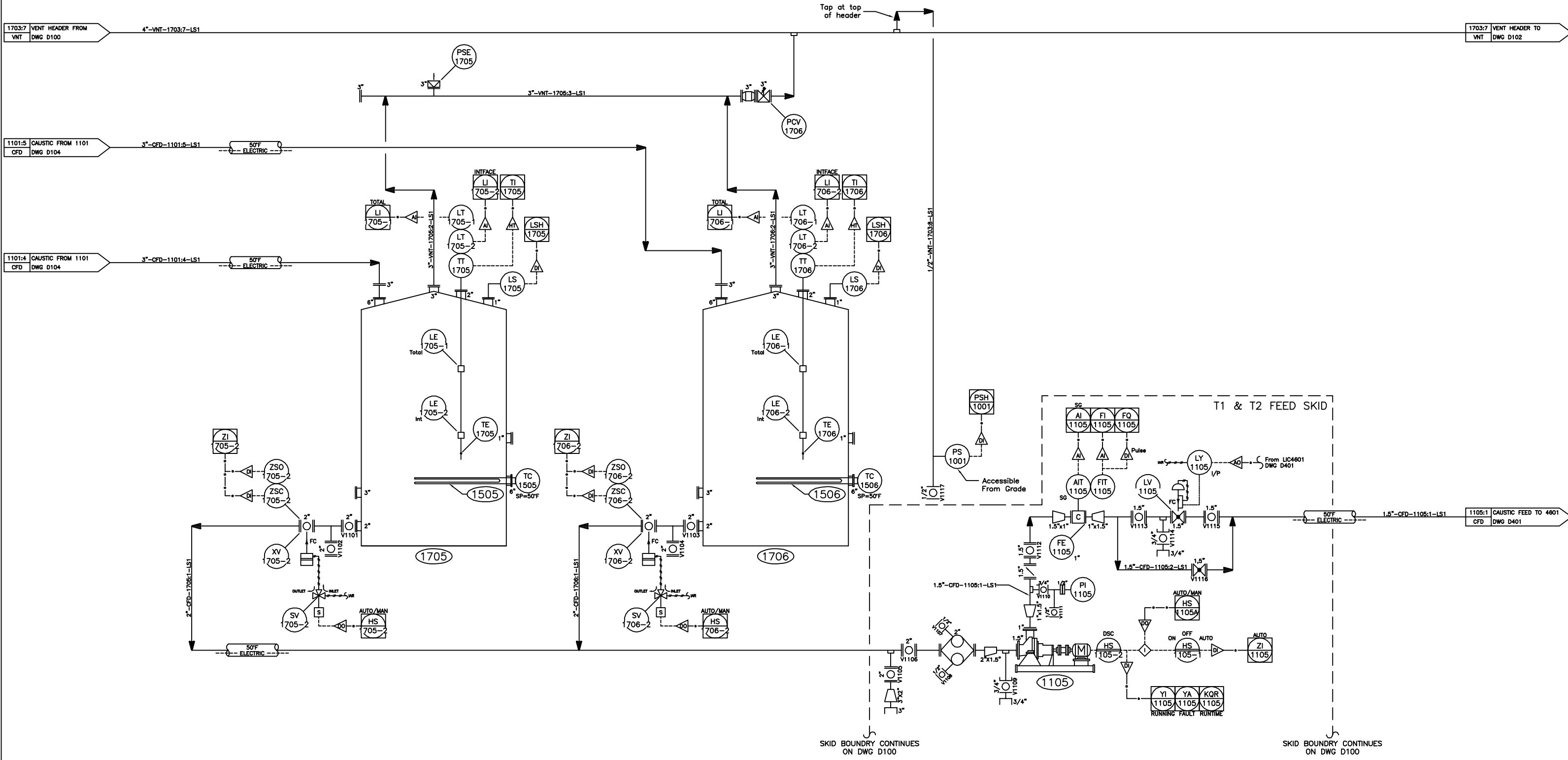
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 APPVD: \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 DESIGNED RGC  
 DRAFTED RGC  
 CHECKED \_\_\_\_\_

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[CLIENT NAME]  
 [CLIENT LOCATION]  
 [NAME OF PROCESS]  
 PIPING & INSTRUMENTATION DIAGRAM  
 AIR STRIPPER AND DEFOAMER

**LIQUID SOLUTIONS LLC**  
 Project: 123456  
 DRAWING NO. D200





**1705/6**  
**T2 FEED TANKS**  
 TYPE: Vertical Cylindrical  
 CAPACITY: 25000 gal  
 SIZE: 12' Dia. x 30' SSW  
 CONSTRUCTION: A36 CS  
 DESIGN: Atm psig at 180°F  
 OTHER: 3/16" Shell & 1/4" Bottom  
 MANUFACTURER: Precision Tank

**1505/6**  
**T2 TANK HEATERS**  
 TYPE: Electric Immersion  
 MOUNT SIZE: 6" Flange  
 ELEMENTS: KW  
 IMMERSION LENGTH: 8 SS  
 OTHER:  
 MANUFACTURER:  
 MODEL:

**1105**  
**T2 FEED PUMP**  
 TYPE: Horizontal Centrifugal  
 CAPACITY: 20 gpm @ 47 ft. TDH  
 MOTOR: 2HP 480V/3PH/1800RPM  
 CONSTRUCTION: DCI  
 OTHER:  
 MANUFACTURER: Durco  
 MODEL: 1K1.5x1-82RVM3STFFPD

NO.	REVISIONS	BY	DATE	APP	NO.	REVISIONS	BY	DATE	APP
A	HazOp	RGC	07/21/05						
B	HazOp Recommendations	RGC	07/28/05						
C	General Revision	RGC	09/12/05						
0	Fabrication	RGC	12/01/05						
1	Construction	RGC	12/27/05						

SCALE: None  
 APPVD: \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 DESIGNED: RGC  
 DRAFTED: RGC  
 CHECKED: \_\_\_\_\_  
 ISSUE DATE: August 2010  
 ISSUE FOR: General Training  
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[CLIENT NAME]  
 [CLIENT LOCATION]  
 [NAME OF PROCESS]  
 PIPING & INSTRUMENTATION DIAGRAM  
 CAUSTIC STORAGE & FEED

[COMPANY NAME]  
 Project: 123456  
 DRAWING NO.  
 D101