

Canadian Natural

ESTEVAN OIL WELLSITE FACILITIES

LSD: XX-XX-XXX-XX W2M

**INJECTION HEADER BUILDING
PIPING & INSTRUMENTATION DIAGRAMS AND PIPING GENERAL
ARRANGEMENT DRAWINGS**

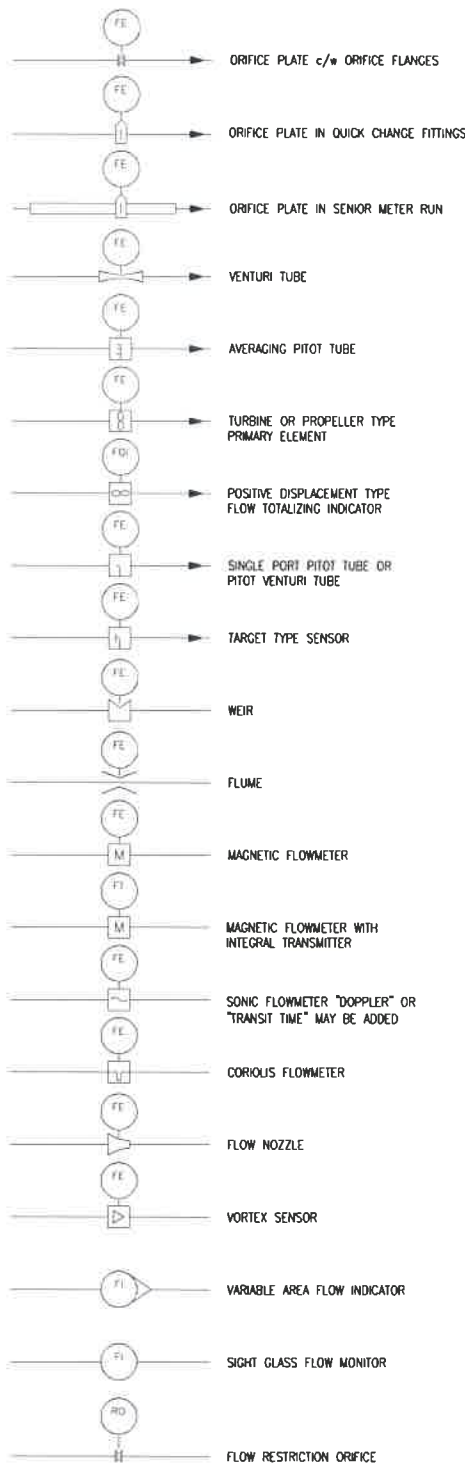
GRDi JOB No: CNRL0009

ISSUED FOR CONSTRUCTION - OCTOBER 10, 2014

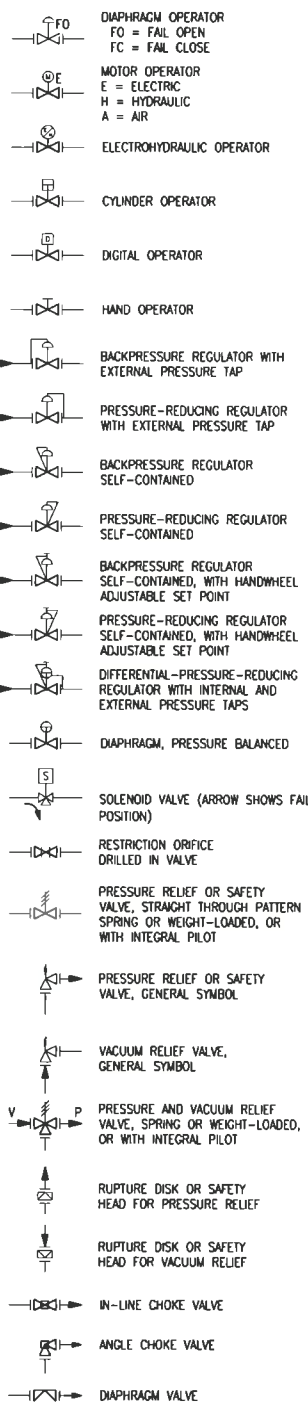

Global Resource Design Inc.

- VALVES**
- PINCH
 - GATE
 - GLOBE
 - BALL
 - PLUG
 - NEEDLE
 - BUTTERFLY
 - ROTARY
 - ANGLE (GATE)
 - THREE-WAY (GATE)
 - FOUR-WAY (GATE)
 - SWING CHECK
 - PISTON CHECK
 - STOP CHECK
 - BALL CHECK
 - WAFFER CHECK
 - VELOCITY CHECK
 - INTERNAL
 - EXCESS FLOW

FLOW INSTRUMENT SYMBOLS



CONTROL VALVES



ABBREVIATIONS

- AC - AIR CLOSE
- AO - AIR OPEN
- AS - AIR SUPPLY
- CC - CORROSION COUPON
- CHD - CHAIN OPERATED
- CO - CLEAN OUT
- CSC - CAR SEAL CLOSED
- CSO - CAR SEAL OPEN
- ESD - EMERGENCY SHUTDOWN
- ESDV - EMERGENCY SHUTDOWN VALVE
- FC - FAIL CLOSED
- FO - FAIL OPEN
- FOB - FLAT ON BOTTOM
- FOT - FLAT ON TOP
- FP - FULL PORT
- GO - GEAR OPERATED
- I/A - INSTRUMENT AIR
- I/P - CURRENT/PRESSURE TRANSDUCER
- LEL - LOWER EXPLOSIVE LIMIT
- LCP - LOCAL CONTROL PANEL
- MCP - MAIN CONTROL PANEL
- NC - NORMALLY CLOSED
- NO - NORMALLY OPEN
- OSB - OUTSIDE BUILDING
- pH - ACID CONCENTRATION
- PO - PUMP OUT
- Q - TOTALIZING
- RCP - REMOTE CONTROL PANEL
- S - STRAIGHT THROUGH (DIAPHRAGM VALVE)
- SC - SAMPLE CONNECTION
- SD - SHUTDOWN (INDIVIDUAL EQUIPMENT)
- SP - SET POINT
- S/S - SEAM TO SEAM
- TL - TANGENT LINE
- T/T - TANGENT TO TANGENT
- W - WEIR (DIAPHRAGM VALVE)

INSTRUMENT IDENTIFICATION

VARIABLE	PRIMARY ELEMENT	INDICATOR	RECORDER	CONTROLLER			TRANS-MITTER	ALARM-SHUTDOWN		CONTROL VALVE	SELF-ACTIVATED OR REGULATOR VALVE	RELAY TRANSDUCER OR CONVERTER
				BLIND	INDICATING	RECORDING		SWITCH	ALARM			
ANALYSIS	AE	AI	AR	AC	AIC	ARC	AT	AS()	AA()	AV		AY
BURNER FLAME	BE	BI	BR	BC			BT	BS()	BA()	BV		BY
CONDUCTIVITY	CE	CI	CR		CIC	CRC	CT	CS()	CA()	CV		CY
DENSITY	DE	DI	DR		DIC	DRC	DT	DS()	DA()	DV		DY
VOLTAGE (EMF)	EE	EI	ER	EC	EIC	ERC	ET	ES()	EA()	EV		EY
FLOW	FE	FI	FR	FC	FIC	FRC	FT	FS()	FA()	FV	FCV	FY
FLOW RATIO		FFI	FFR	FFC	FFIC	FFRC		FFS()	FFA()	FFV		
GAUGING (DIMENSIONAL)	GE	GI	GR	GC	GIC	GRC	GT	GS()	GA()	GV		
HAND				HC	HIC			HS()		HV	HCV	
CURRENT	IE	II	IR	IC	IIC	IRC	IT	IS()	IA()	IV		IY
POWER	JE	JI	JR	JC	JIC	JRC	JT	JS()	JA()			JY
TIME		KI	KR	KC	KIC	KRC	KT	KS()	KA()			KY
LEVEL	LE	LI	LR	LC	LIC	LRC	LT	LS()	LA()	LV	LCV	LY
MOISTURE	ME	MI	MR	MC	MIC	MRC	MT	MS()	MA()	MV		MY
USER'S CHOICE	NE											
TORQUE	OE	OI	OR	OC	OIC	ORC	OT	OS()	OA()	OV		OY
PRESSURE	PE	PI	PR	PC	PIC	PRC	PT	PS()	PA()	PV	PCV	PY
PRESSURE DIFFERENTIAL	PDE	POI	PDR	PDC	PDIC	PDRC	PDT	PDS()	POA()	POV	PDCV	
QUANTITY OR EVENT	QE	QI	QR	QC	QIC	QRC	QT	QS()	QA()	QV		QY
RADIATION	RE	RI	RR	RC	RIC	RRC	RT	RS()	RA()			RY
SPEED OR FREQUENCY	SE	SI	SR	SC	SIC	SRC	ST	SS()	SA()			SY
TEMPERATURE	TE	TI	TR	TC	TIC	TRC	TT	TS()	TA()	TV	TCV	TY
TEMPERATURE DIFFERENTIAL	TDE	TDI	TDR	TDC	TDIC	TDRC	TDT	TDS()	TDA()	TDV	TDCV	
MULTI-VARIABLE	UE	UI	UR	UC	UIC	URC				UV		UY
VISCOSITY OR VIBRATION	VE	VI	VR	VC	VIC	VRC	VT	VS()	VA()	VV		VY
WEIGHT	WE	WI	WR	WC	WIC	WRC	WT	WS()	WA()	WV		WY
UNCLASSIFIED	XE	XI	XR	XC	XIC	XRC	XT	XS()	XA()	XV		XY
USER'S CHOICE												
POSITION	ZE	ZI	ZR	ZC	ZIC	ZRC	ZT	ZS()	ZA()			ZY

H=HIGH, HH=HIGH HIGH, L=LOW, LL=LOW LOW, HL=HIGH/LOW, C=CLOSED, O=OPENED

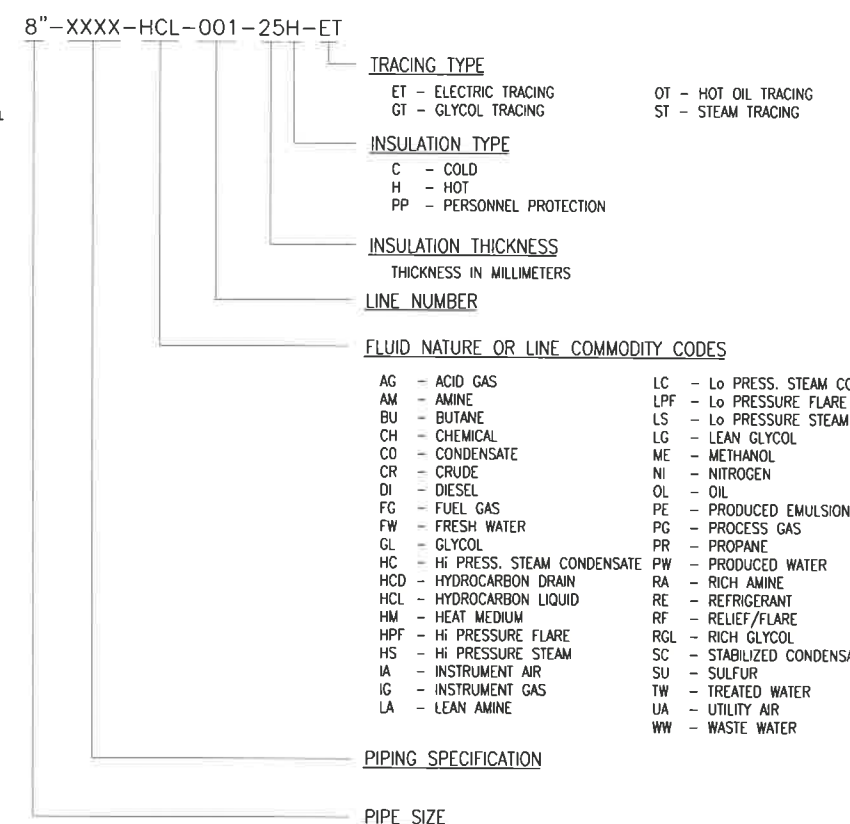
INSTRUMENT LINE CODE

- INSTRUMENT SUPPLY OR CONNECTION TO PROCESS
- UNDEFINED SIGNAL
- PNEUMATIC SIGNAL
- ELECTRIC SIGNAL
- HYDRAULIC SIGNAL
- CAPILLARY TUBING SIGNAL
- ELECTROMAGNETIC OR SONIC SIGNAL * (NOT GUIDED)
- ELECTROMAGNETIC OR SONIC SIGNAL * (GUIDED)
- INTERNAL SYSTEM LINK (SOFTWARE OR DATA LINK)
- MECHANICAL LINK
- OPTIONAL BINARY (ON - OFF) SYMBOLS
- PNEUMATIC BINARY SIGNAL
- ELECTRIC BINARY SIGNAL

LINE CODE

- PRIMARY PROCESS PIPING
- SECONDARY PROCESS PIPING
- BUILDING/PACKAGE LIMITS
- PACKAGE LIMITS (INSIDE BLDG.)
- EXISTING OR FUTURE EQUIP. AND LINES (USE A TEXT QUALIFIER FOR CLARITY)

LINE NUMBERING SYSTEM



GENERAL INSTRUMENT OR FUNCTION SYMBOLS

	FIELD MOUNTED SHARED CONTROL	PRIMARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR	PRIMARY LOCATION NORMALLY INACCESSIBLE TO OPERATOR OR BEHIND PANEL	AUXILIARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR	AUXILIARY LOCATION NORMALLY INACCESSIBLE TO OPERATOR OR BEHIND PANEL
DISCRETE INSTRUMENTS					
SHARED DISPLAY SHARED CONTROL					
COMPUTER FUNCTION					
PROGRAMMABLE LOGIC CONTROL					
SHARING COMMON HOUSING *					
PURGE OR FLUSHING DEVICE					
EMERGENCY SHUTDOWN					
PILOT LIGHT (SHOW COLOR INSIDE SYMBOL)					
RESET FOR LATCH-TYPE ACTUATOR					
LOGIC INTERFACE					
PANEL MOUNTED PATCHBOARD POINT 12					
DIAPHRAGM SEAL					
UNDEFINED INTERLOCK LOGIC					
LOW SELECT					
HIGH SELECT					

* IT IS NOT MANDATORY TO SHOW A COMMON HOUSING.
** FOR SPECIFIC LOGIC SYMBOLS, SEE ANSI/ISA STANDARD 55.2.

DRAWING NUMBER	REFERENCE DRAWINGS	DRAWING PREPARED BY	GLOBAL RESOURCE DESIGN Inc. CNRL0009	REV	ISSUED FOR INFORMATION	DATE	14/10/10	CHK	RS	JG	AV	DRAWN	A. W. SMITH	DATE	14/09/09	DESIGNED		DATE		CHECKED	R. STONE	DATE	14/09/09	APPROVED	J. GERLITZ	DATE	14/09/09	ENG. MANAGER	A. VAHDATY	DATE	14/09/09	SCALE	NTS	WBS No.		DRAWING NUMBER	CNRL-0009-010-PID-0001-01	REV.	A
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**EF-100
EXHAUST FAN**

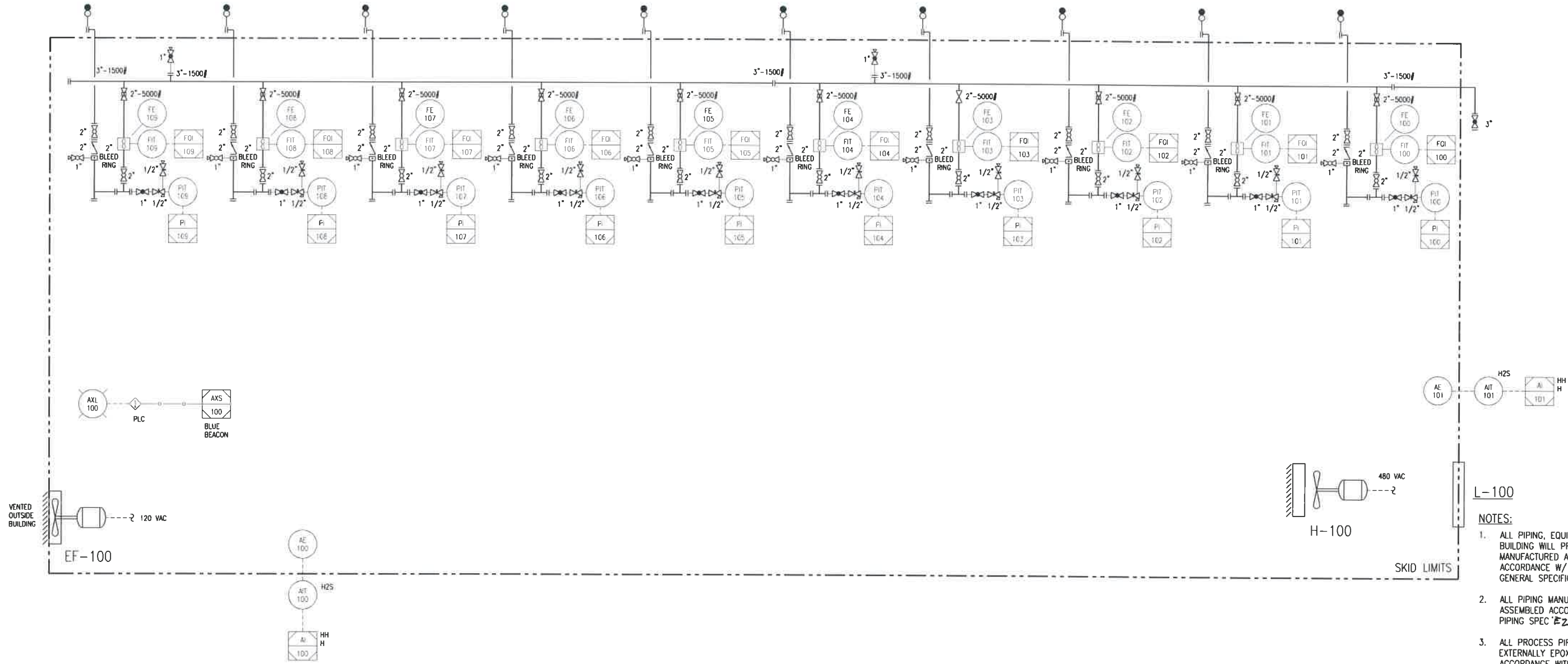
MAKE: ACME
1/4 HP/120 VAC/XP
AIR FLOW: 12 AC/hr

**H-100
BUILDING HEATER**

MAKE: HAZLOCK HEATERS
ELECTRIC 10KW
480 VAC/3ø/60Hz

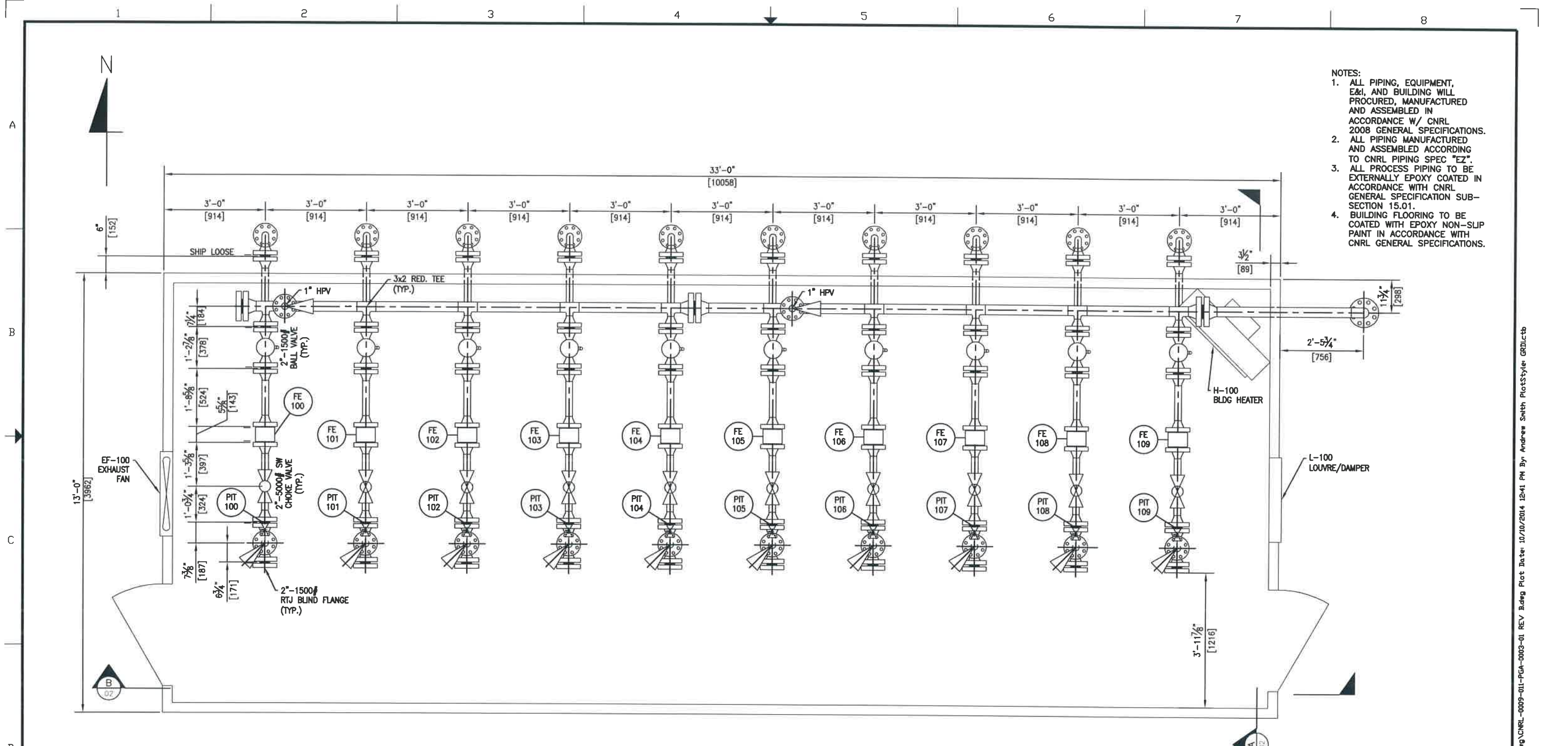
**L-100
LOUVRE/BACKDRAFT DAMPERS**

FREE AREA :SIZED FOR 12 AC/hr AT 1000fpm



- NOTES:**
1. ALL PIPING, EQUIPMENT, E&I, AND BUILDING WILL PROCURED, MANUFACTURED AND ASSEMBLED IN ACCORDANCE W/ CNRL 2008 GENERAL SPECIFICATIONS.
 2. ALL PIPING MANUFACTURED AND ASSEMBLED ACCORDING TO CNRL PIPING SPEC '2'.
 3. ALL PROCESS PIPING TO BE EXTERNALLY EPOXY COATED IN ACCORDANCE WITH CNRL GENERAL SPECIFICATION SUB-SECTION 15.01.
 4. BUILDING FLOORING TO BE COATED WITH EPOXY NON-SLIP PAINT IN ACCORDANCE WITH CNRL GENERAL SPECIFICATIONS.
 5. THIS DRAWING PACKAGE IS INTENDED FOR INJECTION PACKAGES TO BE INSTALLED IN THE ESTEVAN REGION.

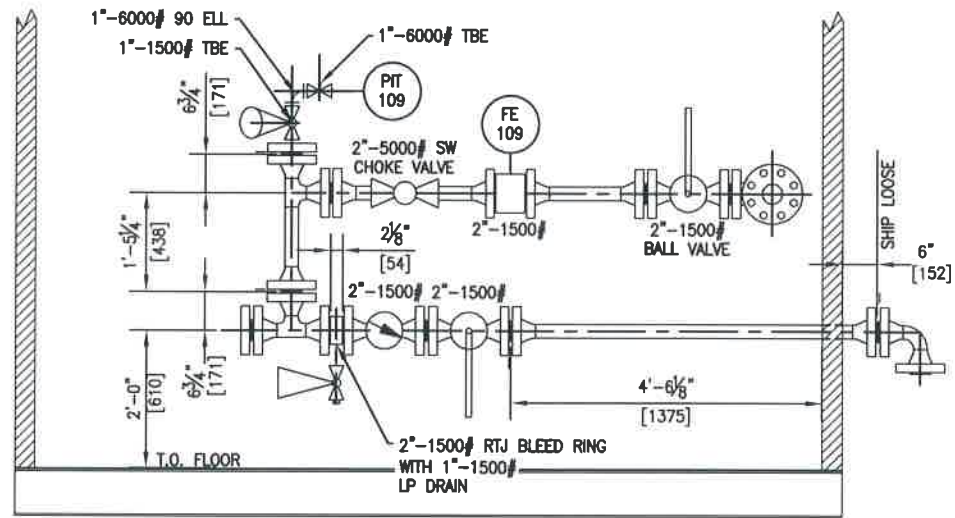
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Association of Professional Engineers & Geoscientists of Saskatchewan S.C. GERLITZ MEMBER 15844 14/10/10 YR. MRL. DAY SASKATCHEWAN				0 ISSUED FOR CONSTRUCTION				BY: A.W.S.		DATE: 14/10/10		CHK: R.S.		APP: J.G.		E.M. J.V.																			



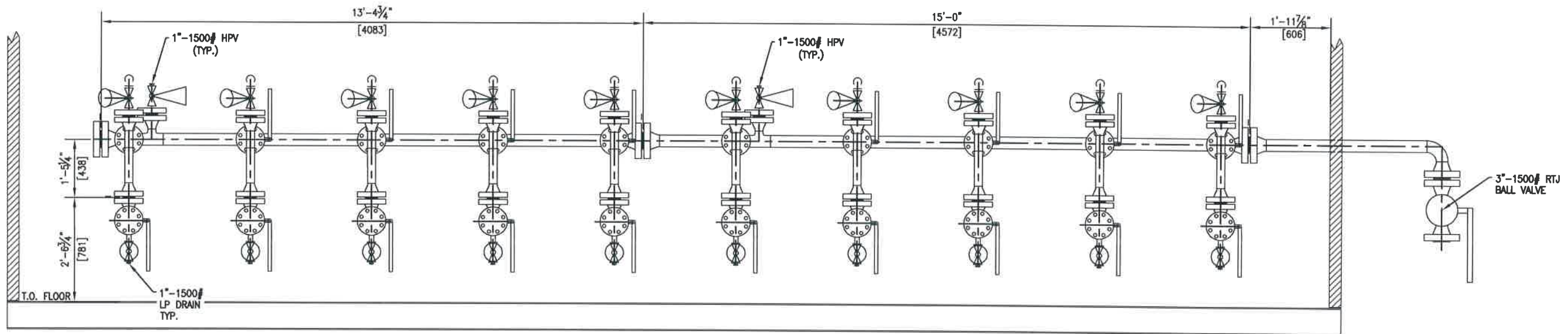
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 2. ALL PIPING MANUFACTURED AND ASSEMBLED ACCORDING TO CNRL PIPING SPEC "EZ".
 3. ALL PROCESS PIPING TO BE EXTERNALLY EPOXY COATED IN ACCORDANCE WITH CNRL GENERAL SPECIFICATION SUB-SECTION 15.01.
 4. BUILDING FLOORING TO BE COATED WITH EPOXY NON-SLIP PAINT IN ACCORDANCE WITH CNRL GENERAL SPECIFICATIONS.

PLAN VIEW

CNRL-0009-011-PGA-0003-02 INJECTION HEADER BUILDING PIPING SECTIONS CNRL-0009-010-PID-0004-01 INJECTION HEADER BUILDING P&ID		Association of Professional Engineers & Geoscientists of Saskatchewan CERTIFICATE OF AUTHORIZATION Global Resource Design Inc. 14/10/10 YR. MM. DAY		PROFESSIONAL ENGINEER MEMBER 16944 14/10/10 YR. MM. DAY SASKATCHEWAN		DRAWN: BJH DATE: 14/09/10 DESIGNED: DATE: CHECKED: WFK DATE: 14/09/10 APPROVED: JG DATE: 14/09/10 ENG. MANAGER: DATE:				TITLE: ESTEVAN OIL WELLSITE FACILITIES LSD-XX-XX-XXX-XX W2M INJECTION HEADER BUILDING PIPING PLAN		SCALE: 3/4"=1'-0" WBS No.: DRAWING NUMBER: CNRL-0009-011-PGA-0003-01 REV. 0		
DRAWING NUMBER		REFERENCE DRAWINGS		DRAWING PREPARED BY: GLOBAL RESOURCE DESIGN INC. CNRL0009		REV. 0		ISSUED FOR CONSTRUCTION		BY: BJH	DATE: 14/10/10	CHK: RS	APP: JG	E.M. [Signature]



A
SECTION
01
LOOKING WEST
SCALE: AS NOTED



B
SECTION
01
LOOKING NORTH
SCALE: AS NOTED

CNRL-0009-011-PGA-0003-01	INJECTION HEADER BUILDING PLAN
CNRL-0009-010-PID-0004-01	INJECTION HEADER BUILDING P&ID
DRAWING NUMBER	REFERENCE DRAWINGS



DRAWING PREPARED BY: GLOBAL RESOURCE DESIGN INC. CNRL0009

0	ISSUED FOR CONSTRUCTION	BJH	14/10/10	RS	UG	AV
REV.	REVISION DESCRIPTION	BY	DATE	CHK.	APP.	E.M.

DRAWN:	DATE
BJH	14/09/03
DESIGNED:	DATE
WFK	14/09/10
APPROVED:	DATE
JG	14/09/10
ENG. MANAGER:	DATE

TITLE: ESTEVAN OIL WELLSITE FACILITIES LSD-XX-XX-XXX-XX W2M INJECTION HEADER BUILDING PIPING SECTIONS			
SCALE:	WBS No.	DRAWING NUMBER:	REV.
3/4'=1'-0'		CNRL-0009-011-PGA-0003-02	0