

★ FOURSTAR ★ RESOURCES ★ INC. ★

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PROJECT DATA LIST

JOB NO. **221054**

PO#: 23258

03 August 2023

Date: 20 June 2023

Quote#: 235026.5

Company: **ENERGERA**
11551 Bevington Road
Acheson, Alberta. T7X 6C1

Point of Manufacturer:
Terms: Net 30 days

Attention: **Rizwan Al-Rahman, MSc, P.Eng, PMP**
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From: **Troy Clayton**
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Re.: (2) INDIRECT FIRED LINE HEATERS AND MISC. SPOOLS.

Subject to all of the terms and conditions stated within, we are pleased to submit the following quotation:

LINEHEATER PACKAGE complete as follows

1

2

ONLY FSR INDIRECT FIRED LINE HEATERS

**Model: FSR750IH (750 000 BTU/HR) Size: 36"OD x 14'-0" lg.
c/w the following equipment:**

- heater shell Nominal water capacity: **approx. 552 us gal.**
- 10¾" Removable firetube, 4 pc. miter (**79sq. ft.** heating surface area, Heat Flux: **9,518 BTU/hr/sq.ft., Heat Density: 12,985 BTU/hr/sq.in.)**
- 10¾" x 16ft. Removable T" type Stack with Clean out Down Draft Diverter.
- Removable Coil consisting of: (10)-4" SCH 160 tubes
(4) 4"-1,500# RTJ WN Flanges, 10% Radiography, 1/16" C.A., **3270 Psig. @ 300°F,**
and fabricated in accordance with the B31.3 Piping Code
- 1"NPT Fuel Gas Preheat Coil.
- Water Saver Pot w/ Thief Hatch and Sight Glass
- 750,000 BTU FSR Flasharrestor w/ Main Burner and Pilot Assy.
- Set of instrumentation, controls, valves as listed below.
- Fiberglass 2"th. Insulation with Aluminum Jacket on Shell.
- Heavy Duty Heater Skid.
- Misc. items as required by FSR heater design.

PROCESS COIL

PREHEAT PASS: 4 tubes of 4" sch. 160 x 12' – 6"
3270 psig @ 300 F (Ltd. by flanges) per ANSI B31.3 and B16.5
4" CL.1500 ANSI RFWN inlet/outlet connections
Corrosion Allowance: 1/16", 10% X-Ray.
Materials: SA-333-6 / SA-350LF2 / SA-420WPL6
MDMT: -50°F
Coil volume: 6.19 cu.ft.
Coil area: 66.0 sq.ft.

REHEAT PASS: 6 tubes of 4" sch. 160 x 12' – 6"
3270 psig @ 300 F (Ltd. by flanges) per ANSI B31.3 and B16.5
4" CL.1500 ANSI RFWN inlet/outlet connections
Corrosion Allowance: 1/16", 10% X-Ray.
Materials: SA-333-6 / SA-350LF2 / SA-420WPL6
MDMT: -50°F
Coil volume: 9.28 cu.ft.
Coil area: 98.95.0 sq.ft.

F.G. PRE-HEAT
COIL:

1 tube of 1" sch. 80 x 8' – 0" (approx. length)
1,350 psig @ 200 F per ANSI B31.3 and B16.5
1"-3000#NPT inlet/outlet connections
Corrosion Allowance: 1/16", 10% X-Ray.
Materials: SA-333Gr.6, SA-350LF2CL.1, SA-420WPL6

Coil bundle will be ABSA inspected and registered in the Province of Alberta,
British Columbia and Saskatchewan.

LINE HEATER

36" OD x 14'-0" LG., 0.750 MMBTU/Hr. heat rating

- 20" OD x 2'-6" long vertical expansion pot c/w FSR vacuum hatch and access ladder.
- Glycol/water immersed bath type heating, Atmospheric design pressure.
- Full support saddles.
- 1 1/2" thick Fibreglass insulation c/w Stucco Embossed 0.020" thick banded aluminium cladding. (Ends not included)

NOZZLES

Fill Connection	1	8"	Hinged mounted on 20" OD pot
Drain	1	2"	3000# Full Coupling
Firetube	1	10"	Flanged
Fuel Gas Preheat	2	1"	3000# Full Coupling
TC	1	1"	3000# Full Coupling
HTSD	1	1"	3000# Full Coupling
TI	1	1"	3000# Full Coupling
Level Gauge	2	1/2"	3000# T.O.L.'s
LSL	1	2"	3000# Half Coupling
Cold water recirc	1	2"	3000# Full Coupling

HEATING SYSTEM

- A 10 $\frac{3}{4}$ " O.D. horizontal four piece mitre removable firetube.
- (1) 10 $\frac{3}{4}$ "ODx14' type "T" removable Stack w/ Clean out & Down Draft Diverter / Rain cap
- FSR standard hinged Flash Arrestor w/ 0.750 MM Btu/hr. duty Main Burner and Pilot/Ignition/FFSD Assembly rated at 750,000 BTU/hr net Duty to fit an 10 $\frac{3}{4}$ "OD firetube c/w Eclipse air-gas mixer and 1-3BT-2" burner nozzle. Fuel Gas Consumption: 1138 SCF/Hr. (based on rated capacity-full load using 1000 Btu/SCF natural gas)
- Burner to have fuel gas and pilot gas connections @ 12:00 o'clock.
- Burner line inside flame arrested burner to come with a union to provide easier removal of burner. Pilot line to be tubing assembly to provide easier removal.

INSTRUMENTATION (same for each heater) Only one set shown, two would be required.

Note: sweet, dry fuel, I/G. to be provided from off skid.

PR-100 BE-100 IGN-100 TC-2100 HTSD-2100	1	B149.3 COMPLIANT BURNER MANAGEMENT SYSTEM "Profire 2100" FLAME GARD IGNITION CONTROLLER c/w weatherproof enclosure 12" x 10" x 6" IGN 50 Sparker / Flame Sense Module Ignitor / Flame Rod, 10ft. Ignition cable, Pilot Mounting Bracket For applications up to 10 MMBtu per burner CSA rating Class 1 Div. 2 Gr. A, B, C, D & T5 temperature rating Meets Electrical Performance Requirements of Combustion Safety Control as Required by Canadian Standards Display: VFD (Vacuum Fluorescent Display) 2 Line x 20 Character Inputs: 12VDC, 24VDC or 24 VAC (Jumper selectable) Flame Rod, Safety Switches (4), POC (Proof of Closure) Main, POC Low Fire, Remote Start / Stop Communications: RS232 / RS485 Outputs: solenoid control (4), Alarm Factory set configuration: Pre-Purge Timing Factory set Configuration (Palm Pilot): All other parameters 3.8 second Flame fail Response. Thermocouple Assembly for detection of flame quality Type K thermocouple, Shielded Thermocouple Cable included.
EY-101 EY-102	2	ASCO TWO WAY SOLENOID VALVE 1"NPT HV298568002 fuel gas shut off valve 24VDC
EY-100	1	ASCO TWO WAY SOLENOID VALVE 1/4"NPT NACE HV427246002 NC, gas pilot shut off valve 24VDC, 2 Watts, EXP.
LG-100	1	JERGUSON TUBULAR GAUGE GLASS ASSEMBLY Model 125 tubular gauge valves 1/2" MNPT end connections 5/8"φ Pyrex red line sight glass c/w angle iron guard rods
LSLL-100	1	KIMRAY CEC2 2"NPT 2200 SLS SS6 FLOAT M/O 2" MNPT process end connection Horizontal electronic level switch Explosion proof housing Standard Service 2,000 psig M.A.W.P. SPST, CSA certified c/w. manual override

PRV-100	1	FISHER 627R PRESSURE REDUCING REGULATOR 1" FNPT end connections DI body Maximum 1,000 psig Inlet pressure 3/8" ϕ orifice 5 <u>to</u> 20psig spring range
PRV-101	1	FISHER 67CFR INSTRUMENT GAS REGULATOR 1/4" FNPT connections Standard service construction 250 psig M.A.W.P. Internal filter 0 <u>to</u> 35 psig spring range
PI-100 PI-101	2	WGI or WIKA PRESSURE GAUGE Model 233.53 liquid filled 2 1/2" diameter face x 1/4" NPT bottom connection Stainless steel case and internals 0 <u>to</u> 30 psig range - Dual scale
PI-102 PI-103	2	WGI or WIKA PRESSURE GAUGE Model 233.53 liquid filled 2 1/2" diameter face x 1/4" NPT bottom connection Stainless steel case and internals 0 <u>to</u> 15 psig range - Dual scale
PI-104	1	WGI or WIKA PRESSURE GAUGE Model 233.53 liquid filled 2 1/2" diameter face x 1/4" NPT bottom connection Stainless steel case and internals 0 <u>to</u> 160 psig range - Dual scale
PSHH-100	1	CCS DUAL-SNAP MODEL 6900GZE12 PRESSURE SWITCH 1/2" FNPT pressure sensing connection Explosion proof housing 24 volt DC input (SPDT) Adjustable set point range: 3 to 20 psig. on increasing pressure 1 <u>to</u> 18 psig. on decreasing pressure Bench set at 18 psig <u>raising</u> CSA certified
PSLL-100	1	CCS DUAL-SNAP MODEL 6900GZE12 PRESSURE SWITCH 1/2" FNPT pressure sensing connection Explosion proof housing 24 volt DC input (SPDT) Adjustable set point range: 3 to 20 psig. on increasing pressure 1 <u>to</u> 18 psig. on decreasing pressure Bench set at 7 psig <u>falling</u> CSA certified
PVSV-100	1	FSR 404 PRESSURE-VACUUM RELIEF HATCH Cast Aluminium body Sweet service 4 oz. Pressure / 0.4 oz. Vacuum relief
TI-100	1	TEMPERATURE INDICATOR 1/2" MNPT back connection 3" ϕ dial with a 6" stem length 0 <u>to</u> 250°F range (dual scale) 1/2" FNPT x 3/4" MNPT x 6" length 304 SST thermowell

MANUAL VALVES

BA-025	01	1/4"	FNPT	2000psi. UNIFIED ALLOYS , Fig. VT2 FP. Ball Valve, 2-pc. 316SS. locking handle, CSA Approved.
BA-050	02	1/2"	FNPT	2,000 PSI R.P. SST ball valve, C&C 2000PSI BVSR,
BA-051	01	1/2"	FNPT	2000psi. UNIFIED ALLOYS , Fig. VT2 FP. Ball Valve, 2-pc. 316SS. locking handle, CSA Approved.
BA-100	01	1"	FNPT	2,000 PSI R.P. SST ball valve, C&C 2000PSI BVSR,
BA-101	01	1"	FNPT	2000psi. UNIFIED ALLOYS , Fig. VT2 FP. Ball Valve, 2-pc. 316SS. locking handle, CSA Approved.
BA-100	01	2"	FNPT	2,000 PSI F.P. CS ball valve, C&C 2000PSI BVSR,
NV-025	04	1/4"	NPT	6,000# FxF Needle Valve, A-316 SST

ELECTRICAL HOOKUP (Class 1 Div.1)

[ALL WIRING OF ELECTRICAL DEVICES TO PROFIRE 2100 INCLUDED.](#)

STRUCTURAL STEEL SKID #1 & SKID #2

- Each Approx. size: 4' wide x 18'-0" long.
- **4" x 6" HSS** main members.
- Lift lugs located at each corner of the skid base.

MATERIAL SPECIFICATION

LINEHEATERS

<u>ITEM</u>	<u>MATERIAL</u>	<u>SCHEDULE/THICKNESS/RATING</u>
Shell / flanges	SA-36 / 44W	3/16" / 1/2"
End Plates (tube sheets)	SA-36 / 44W	3/8"
Wear Pads	SA-36 / 44W	3/16"
Saddle Supports	SA-36 / 44W	3/16"
Base Plates	SA-36 / 44W	3/8"
Internals	SA-36 / 44W	1/4"
Flanges	N/A	N/A
Couplings	SA-105	3,000# FS
Expansion Pot	CS / SA-53B ERW	1/4"
Firetube	SA-53B ERW	10.75" OD
Stack	CS / SA-53B ERW	10.75" OD

PIPING MATERIAL

THREADED

150# ANSI

Pipe SA-333 Grd. 6 Smls. (Sch. XH)
Nipples SA-333 Grd. 6 Smls. (Sch. XH)
Fittings SA-350LF2CL.1 (3,000# FS)
C.A. None

WELDED

CL.1500

Pipe SA-333 6 Smls. (4"Sch. 160.)
Weld Fittings SA-420 WPL6 (2"Sch. XXH.)
Flanges SA-350 LF2 (1,500#RF Sch. 160 bore.)
T.O.L.'s SA-350 LF2 (CL.6,000)
Bolting SA-193 B7 / SA-194 2H
C.A. 1/16"

TUBING SPECIFICATIONS

	Process 150# - 900#	Process 1500# - 2500#	Instruments	Vents
Size	3/8" (.035")	3/8" (.065")	1/4" (.035")	1/4" (.035")
Tubing Material	316SS	316SS	316SS	316SS
Fitting Material	316SS	316SS	316SS	316SS

TESTING - RADIOGRAPHY - P.W.H.T.

PRESSURE TESTING

Coil As per ASME B31.3, latest edition, Paragraph 345.4.2(a)
(i.e. 4,905 psig for CL.1500, ltd. by flanges).

Lineheater F.G. coil As per ASME Section B31.3, latest edition, Paragraph
345.4.2(a) (i.e. 2,160 psig. 600# ANSI piping).

Lineheater Shell Will be air/soap tested to 2 psig.

Firetube Will be air/soap tested to 2 psig.

Threaded Piping As per ASME B31.3, latest edition, Paragraph 345.4.2(a)
(i.e. 375 psig for 150# ANSI piping)

Instrument Tubing Will be air / soap tested to 1.1 x normal operating pressure.

Instrument Operational Test All instruments will be subjected to an operational test to
ensure proper functioning.

Charted Hydrotest Is not included.

RADIOGRAPHY

Lineheater Coil Bundle As per ASME B31.3, latest edition, Paragraph 341.4.1
(i.e. 10%) Interpretation to B31.3 "Normal".

Lineheater Coil None

ULTRASONIC TESTING

Lineheater Coils None

HARDNESS TESTS

Lineheater Coils None

PAINING SPECIFICATIONS

Equipment	Surface Preparation	Primer	Finish
Structural Steel	Commercial Sandblast SSPC-SP7	(1) coat Zinc Chromate Primer	(1) one coat Warm Grey Enamel
Heater/Stack	Commercial Sandblast SSPC-SP7	(1) coat only Zinc Chromate Primer (on heater shell)	(1) coat High Heat Black (selfpriming) (on stack only)
Coil Nozzles/all protrusions	Commercial Sandblast SSPC-SP7	(1) coat Zinc Chromate Primer	(1) one coat Warm Grey Enamel

NOTES: Surface preparation and paint as listed applies to external surfaces of equipment only, insulated surfaces shall be primed only.

The stacks will be finished with a high heat resistant paint – no primer required.

3 2 Bypass Spools

Two Spools to connect preheat and reheat coils on each line heater
4" 1500# ANSI RFWN Flanges with 90° Elbows and 4" Pipe to suit
All Radiography, pressure testing and painting will be included

4 3 Flange Adapters

Two Spools to be 4" 1500# ANSI RFWN x 4" 150# ANSI RFWN
One Spool to be 4" 1500# ANSI RFWN x 3" 1500# ANSI RFWN
All Radiography, pressure testing and painting will be included

5 1 Spool and Regulator

One Spool to be 4" 300# ANSI RFWN x 4" 300# ANSI RFWN With 1" TOL
One 1" NPT CVS Model 627 Pressure Regulator, Steel Body, Nitrile Disk
Steel Diaphragm Casing, 3/16" Orifice set at 40 PSI with 1" NPT Ball Valve
All Radiography, pressure testing and painting will be included

DATA MANUALS

One (1) Data Manual containing copies of the following will be provided for each skid package.

Information supplied to FSR for the purchased components, instruments and manual valves.
Copies of AB-25 and AB-028 forms, name plate facsimile, NDE reports and QC travel sheet.
One (1) set of "As-Built" drawings. One (1) set of "PDL" – Project Data List.

F.O.B. POINT

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