## PLC Control Scheme

Pipeline evacuation – draw target volume down to selected pressure
Discharge pressure up to 1100 psi

- Operator selects desired final pressure and initiates PLC control
- Operation begins with inlet connected to reciprocating compressor and Screw compressor offline
- The reciprocating compressor will draw pipeline pressure down to 250 psi
- At 250 psi automated ball valves will reconfigure the flow path for series operation. Inlet flowing to screw compressor, screw compressor discharge flowing to reciprocating compressor.
- A pressure reducing valve will limit screw compressor inlet to 70 psi
- PLC will control compressor speed to maintain maximum flow throughout operation
- Compression will stop upon reaching operator selected final pressure

### Pig Pushing

Supply large volume of gas at low differential pressure
Discharge pressure up to 1500 psi

- Operator selects operating pressure limits (upper and lower) and speed (if desired)
- The Compressor will operate with inlet connected directly to the reciprocating compressor
- Screw compressor will be left offline and isolated from pressure
- PLC will control compressor speed to stay within operational limits

## Screw Compressor

<table>
<thead>
<tr>
<th>Type</th>
<th>Oil flooded rotary screw gas compressor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Gardner Denver Enduro 25</td>
</tr>
<tr>
<td>Suction P</td>
<td>70 psi maximum</td>
</tr>
<tr>
<td>Discharge P</td>
<td>250 psi maximum</td>
</tr>
<tr>
<td>Vi</td>
<td>4.5</td>
</tr>
<tr>
<td>Drive</td>
<td>Hydraulic Variable Speed Closed Loop</td>
</tr>
<tr>
<td>Oil filter</td>
<td>Donaldson Duramax c/w diff. P indicator</td>
</tr>
</tbody>
</table>

## Reciprocating Compressor

<table>
<thead>
<tr>
<th>Type</th>
<th>2 Throw single stage reciprocating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Arrow VRC2</td>
</tr>
<tr>
<td>Suction P</td>
<td>1500 psi maximum</td>
</tr>
<tr>
<td>Discharge P</td>
<td>1500 psi maximum</td>
</tr>
<tr>
<td>Drive</td>
<td>Hydraulic Variable Speed Closed Loop</td>
</tr>
<tr>
<td>Oil filter</td>
<td>Spin on</td>
</tr>
</tbody>
</table>
Driver

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Natural gas fueled</td>
</tr>
<tr>
<td>Model</td>
<td>KEM 10.3</td>
</tr>
<tr>
<td>Horsepower</td>
<td>175 HP @ 2400 rpm available to compressor</td>
</tr>
<tr>
<td>Cylinders</td>
<td>8</td>
</tr>
<tr>
<td>Displacement</td>
<td>628 cubic inch</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>10.5:1</td>
</tr>
<tr>
<td>Aspiration</td>
<td>Natural</td>
</tr>
<tr>
<td>Ignition</td>
<td>Coil near plug</td>
</tr>
<tr>
<td>Radiator</td>
<td>Bolted construction</td>
</tr>
<tr>
<td>Silencer</td>
<td>Critical Grade</td>
</tr>
<tr>
<td>Governor</td>
<td>Electronic</td>
</tr>
</tbody>
</table>

Controls and Instrumentation

PLC

- Siemens S7-1200

Shutdowns

- Low suction pressure
- High suction pressure
- Low discharge pressure
- High discharge pressure
- High compressor discharge temperature
- Low engine oil pressure
- High engine coolant temperature
- ESD

Warnings

- Compressor oil filter differential pressure
- Oil coalescing element differential pressure

Indicators

- PLC – Web HMI
- Engine rpm
- Hour meter
- Engine oil pressure
- Engine fuel pressure
- Inlet pressure
- Screw Suction pressure
- Inter-stage Pressure
- Discharge pressure
- Compressor discharge temperature
- Oil coalescing element differential pressure
- Separator level
- Engine oil level
- Engine glycol level
- Engine vacuum pressure
- Engine glycol temperature

Screw Compressor Cooling System

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Aftercooler/oil cooler combination</td>
</tr>
<tr>
<td>Model</td>
<td>Global Heat Transfer AOX-100</td>
</tr>
<tr>
<td>Rating</td>
<td>250 psi @ 325 °F</td>
</tr>
<tr>
<td>CRN</td>
<td>AB, BC, SK</td>
</tr>
<tr>
<td>Thermostat</td>
<td>Set @ 180 °F</td>
</tr>
</tbody>
</table>
Reciprocating Compressor Cooling System

Type: Finned Tube
Model: CCI Custom Assembly
Rating: 1500 psi @ 350 °F

Inlet/Outlet
Inlet flange: 3” 600# RFF
Outlet flange: 3” 600# RFF
Inlet valve: 3” FP ball valve
Discharge check: 2” Piston check

Oil Separator
Rated pressure: 285 psi @ 250 °F
Size: 14” diameter
Design code: ASME Sect VIII, Div I
PSV: 285 psi
Corrosion allowance: 1/8”
Sight glass: Glass 10” viewing length
CRN: AB, BC, SK

Piping
Process piping: SA-106B threaded piping
Other piping: SA-106B threaded spools
Vent header: Header for PSV’s, and auto blow down

All process valves unioned or flanged for easy replacement

Enclosure
Dimensions: Length 20’, width 8’, height 8’ (Approximate)
Service doors: 1 - engine, 1 - compressor
Louvers: 4 gravity louvers, lockable for transport
Coating: Galvanized steel
Sound proofing: Critical Grade Muffler
Low Speed Cooling fans

Compliance
Process Piping: B31.3
Electrical: CSA C22.1 (Canadian Electrical Code)