

SCOPE OF WORK/TERMS & CONDITIONS

S#	Description	Reference #	Rate	Total rate (inclusive of all Taxes)	Deviation
1	As per attached Scope of Work	MOF-01/02/2024			

SCOPE OF WORK

OGDCL intends to relocate its 1 no. Reciprocating Ariel Compressor integrated with Waukesha Engine skid along with all the auxiliaries & generators from Moolan -01 wellhead facility- KPD to Mela#06 wellhead facility. The scope of work has been prepared for complete dismantling from Moolan well site and installation & commissioning of below mentioned packages at Mela#06 wellhead facility.

Package details are Ariel JGT/2 Compressor, Waukesha Engine F3524GSI ESM, Cooler, On-skid auxiliaries, 02 Nos. Gas Generators, wellhead Separator and 2 no.s Blow case vessels Skid.

Loading Location: Moolan-01 wellhead facility- KPD: Coordinates 25°15'55.6"N 68°34'48.0"E

Unloading Location: Mela#06 wellhead facility Well Shakardara: Coordinates 33°15'40.9"N 71°35'35.4"E

DISMANTLING:

- Dismantle inter-skid piping as per drawings with proper tagging.
- Dismantling of on skid jacket water and auxiliary water lines.
- Dismantling of exhaust mufflers bellows and pipe supports.
- Dismantling of fuel gas lines to be performed.
- Dismantle scrubber drain lines with close drain vessel with ESDV.
- Dismantle all PSVs.
- Dismantling and proper covering of suctions lines to be performed, along with valves, with proper tagging.
- Dismantling and covering of all off skid discharge lines to be performed, with proper tagging, along with valves and ESDV.
- Dismantling of blow case vessels skid pipelines with compressor and wellhead separator skid.
- Dismantling of off skid BDV lines to be performed.
- Working platforms and monkey ladders to be dismantled.
- Cooler day tank tubing/piping to be dismantled.
- Lube oil day tanks to be dismantled (if provided the same).
- Dismantling of ESDVs.
- Dismantle SS tubing on all control valves including isolation valves.
- Dismantle off-skid cables trays.
- Cables to be removed along-with glands, with proper tagging.
- Decouple of Cooler and remove Inlet / outlet lines.

- Dismantle inlet & outlet line of S&B skid.

1. **INSTALLATION**

- Pre-grout leveling of package skid to be performed and shims to be placed.
- Pre-grout Align cooler with engine skid also check leveling of cooler.
- Install inter-skid piping as per drawings with correct new gaskets.
- Installation of on skid jacket water and auxiliary water lines.
- Installation of exhaust mufflers bellows and pipe supports to be performed.
- Installation of fuel gas lines to be performed.
- Install scrubber drain lines with close drain vessel with ESDV.
- Dismantle all PSVs for third party calibration.
- Installation of suction lines to be performed as per P&ID along with valves.
- Installation of off skid discharge lines to be performed as per P&ID along with valves and ESDV.
- Installation of off skid BDV lines to be performed.
- Working platforms and monkey ladders to be installed.
- Cooler day tank tubing/piping to be installed.
- Lube oil day tanks to be installed (if provided the same)
- Installation of ESDVs.
- Install SS tubing on all control valves including isolation valves with instrument air supply.
- Installation of off-skid cables trays.
- Cables to be installed with proper glands and ensure proper dressing of cables.
Proper tightening of all flanges to be performed.

Engine:

- Engine Cylinder head valve tappet adjustments to be performed as per OEM guidelines.
- Inspect and replace spark plugs.
- Inspect and replace ignition coils if required.
- Remove crankcase covers and perform bump checks and record clearances.
- Crankcase cleaning to be performed.
- Replace Engine oil and air filters and lube oil make up.
- Inspect turbo chargers and replace if required
- Refill jacket water and auxiliary water in surge tanks, coolant to be added as per OGDCL guidelines.
- Remove all leakages if any.
- Install cooler belts and adjust tightening.
- Guard covers to be installed back.
- Remove any fault status from ESM

COMPRESSOR:

- Drain crankcase oil, clean the crankcase, and inspect for metal, water, etc.
- Record the compressor crosshead-to-guide clearance.
- Bump check power and compressor connecting rod bearings, replace if necessary.

- Record the compressor rod pin-to-bushing clearances.
- Inspect crosshead pins and bushings for wear.
- Replace crankcase breather filter elements.
- Inspect compressor piston for damage to OD or ring grooves.
- Replace Compressor Cylinder pressure packing if required.
- Replace compressor cylinder lubricating oil check valves if required.
- Replace compressor cylinder piston rings and rider bands if required.
- Refurbish compressor suction and discharge valves, perform leak test, and install back.
- Replace valve cover gaskets if required.
- Replace top cover gaskets.
- Install back all PSVs after calibration as per GA drawings.
- Capacity Adjustment for required Flow

INSTRUMENTATION & CONTROL PANELS:

- Slight modification in PLC & HMI program is required in Moolan Compressor. In the current scenario the blow case philosophy is working only when the compressor is running. However, we would like to run the blow case logic even if the compressor is in stopped or tripped condition. In addition verification of existing blow case logic to be vetted with the required blow case logic as attached. After all the PLC & HMI development is completed Cause & effect testing to be performed with OGDCL representative and signed report to be submitted before startup. De-terminate all on skid wirings/tubing, necessary for shifting of Engine compressor, separator & Blow case vessels.
- Re-terminate / install all on skid wiring / tubing on all shifted skids.
- Check health of fuses and replace if required.
- After re-termination of all cables perform cold loop testing of panel with all the installed instruments. . Please note that available wiring diagram is not as built therefore record of determination shall be maintained on the available wiring drawing and re-termination shall be done accordingly. As built drawing shall be submitted to OGDCL after commissioning.
- Energize panel and remove fault status if any including replacement of any card etc. Perform hot loop testing for all I/Os and clear alarms if any.
- Check all thermocouples with equipment.
- Additionally, the following separator I/O(s) are required to be configured in PLC along with their HMI development for Mela-6 facility.
 - 03 Nos. Analogue input Pressure transmitters
 - 02 Nos. Analogue output for control valves
 - 01 No. Analogue input for Level Transmitter
 - 01 No. Digital input for pressure switch
- Monitoring & Control of the compressor HMI to be shown in CCR desktop PC through Tight VNC Viewer for Mela-6 facility.

MISC E&I WORKS

1. Cabling/termination/tubing & installation of the following is required:

03 Nos. Pressure transmitters (50 Meter cable in a cable tray, Tubing 1-2 Meter).

02 Nos. installation of control valves (1 no. at Mela 6 facility & 1 No. at Mela Plant) - 50 Meter cable in a cable tray, Tubing 1-2 Meter.

01 No. pneumatic type Level Transmitter along with P to I converter (50 Meter cable in a cable tray).

01 No. Digital input for pressure switch (50 Meter cable in a cable tray).

2. All cables should be de-terminated with proper tagging and should be re-terminated again according to the tags. Available wiring drawings are not as built.

3. The laying termination of power cable (100m) from generator skid till compressor skid.

4. De-termination & re-termination of all power cables coming from generators to UPS & to all the electrical loads. 50mm cable with length of 100m.

5. 100m Ethernet cable laying/termination from UCP to CCR HMI.

6. Laying & termination of 50mm & 16 mm power cable in single trench for 100 meter & laying/termination of 35mm cable in a single trench for 50 meters.

7. Laying of following instrument cables in a cable tray from Blow case vessels to UCP.

- 10 pair (50m)
- 2 pair (50m)
- 16 pair (50m)
- 16 pair (50m)
- 5 pair (50m)

2. COMMISSIONING:

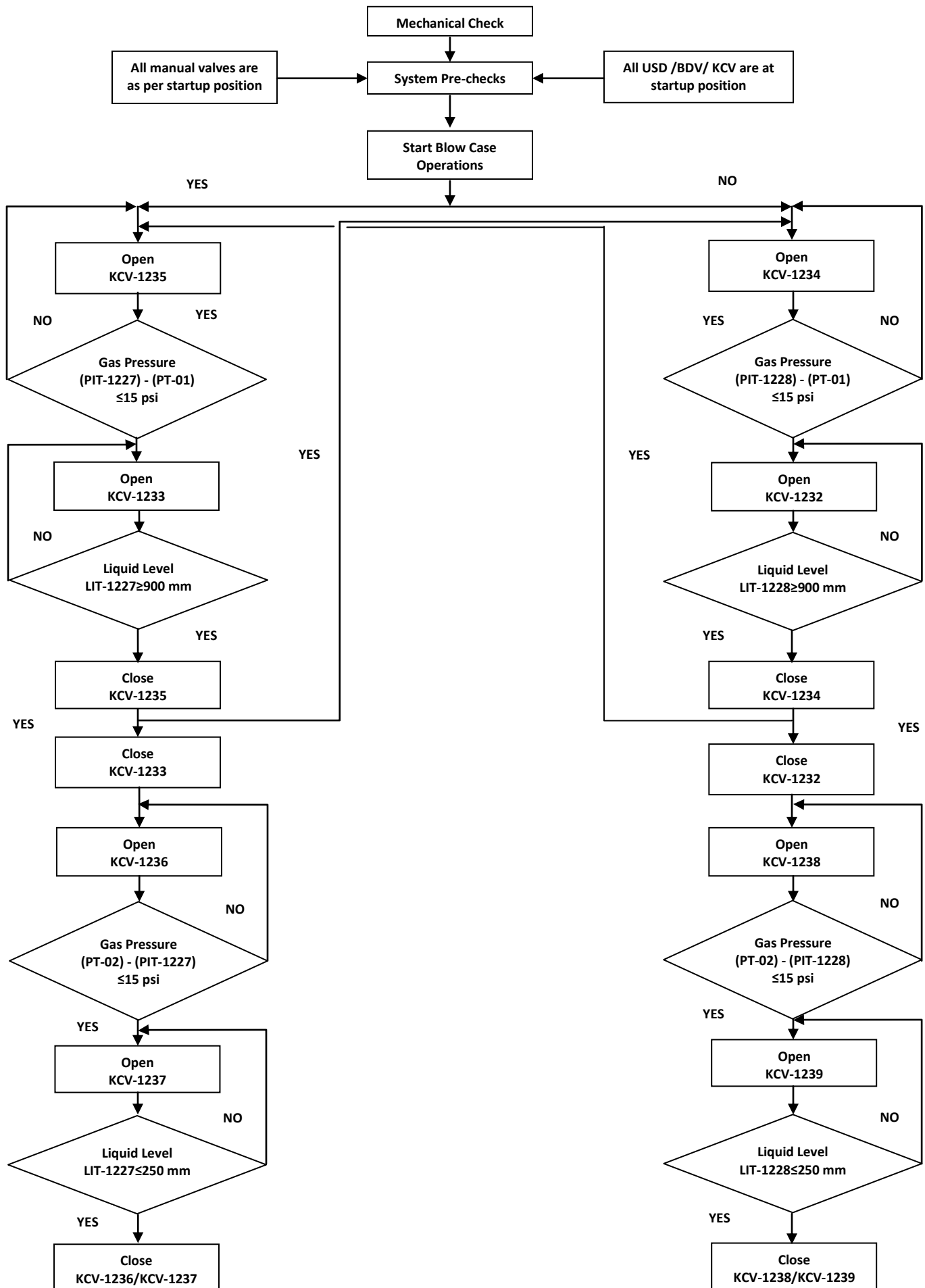
PRE Commissioning

- Check terminations as per drawings.
- Cold loop testing to be performed and troubleshoot issues if any.
- Supply instrument air to ESDV's as per OEM recommended pressure.
- Hot loop testing to be performed and remove all alarms in panel.
- Functional testing of all ESDVs to be perform and trouble shoot issues if any.
- Re-check set points as per OEM document.
- C&E to be perform as per matrix provided by OEM.
- OEM Pre-Commissioning check list to be filled and ensure all points are closed.
- Ensure leak test conducted and all leakages removed.
- Prestart up safety check list to be follow considering all safety measures.
- Fuel Gas supply to the engine and initiate start up and trouble shoot the issues.
- Once started ensuring all parameters normal and within limits.

After Commissioning

- Perform load test.
- Check Securities
- Set Operational parameters and level Controllers/Gauges.

- Observe Unit for 48Hrs
- Note:
 - All bidders are requested to perform site visit. Wiring drawing, HMI & logic program will only be shared with the interested bidders upon site visit.



MELA -06 COMPRESSOR BLOW CASE CONTROL PHILOSOPHY:

Mela Reciprocating compressor is equipped with 2 nos of blow case vessels (V-1227 and V-1228). Blow case vessels are being used to push liquid (crude oil) to Mela Plant at reception pressure of 90 to 100 psig.

Control Philosophy of Blow Case Vessels V-1227 and V-1228:

Operations Cycles

Draining	D
Equalization	E
Filling	F
Pressurization	P
Standby	S

Operations Cycle	P	D	E	S	F
Cycle Time (Min)	1	2.4	1	9.16	13.56

$$01 \text{ Cycle Time} = P + D + E + F + S = 27.12 \text{ mins}$$

Valve Position during each cycle

Vessel #	KCV #	P	D	E	S	F
V-1227	KCV-1233	C	C	C	C	O
	KCV-1235	C	C	O	O	O
	KCV-1236	O	O	C	C	C
	KCV-1237	O	O	C	C	C
V-1228	KCV-1232	C	C	C	C	O
	KCV-1234	C	C	O	O	O
	KCV-1238	O	O	C	C	C
	KCV-1239	O	O	C	C	C

V-1227	P	D	E	S	F	P	D	E	S
V-1228	F	P	D	E	S	F			

Note: Vessel V-1227 will always set at default position for starting blow case control logic.

Step 1: Open KCV-1235 to equalize the pressure of blow case vessel V-1227 with HP Separator keeping in view of the difference between (PIT-1227)-(PT-01) ≤ 15 psig

Step 2: Open KCV-1233 for liquid level make up till level transmitter reading reaches LIT-1227 ≥ 900 mm

Step 3: Close KCV-1235

Step 4 A: Open KCV-1234 to equalize the pressure of blow case vessel V-1228 with HP Separator keeping in view of the difference between (PIT-1228)-(PT-01) ≤ 15 psig

Step 4 B: Close KCV-1233

Step 5 A: Open KCV-1232 for liquid level make up till level transmitter reading reaches LIT-1228 ≥ 900 mm

Step 5 B: Open KCV- 1236 to pressurize the vessel V-1227 keeping in view of the difference between (PT-02) - (PIT-1227) ≤ 15 psig.

Step 6: Open KCV-1237 and drop liquid level LIT-1227 ≤ 250 mm.

Step 7: Close KCV-1236

Step 8: Close KCV-1237.

Step 9: When LIT-1228 ≥ 900 mm, close KCV-1234

Step 10: Close KCV-1232

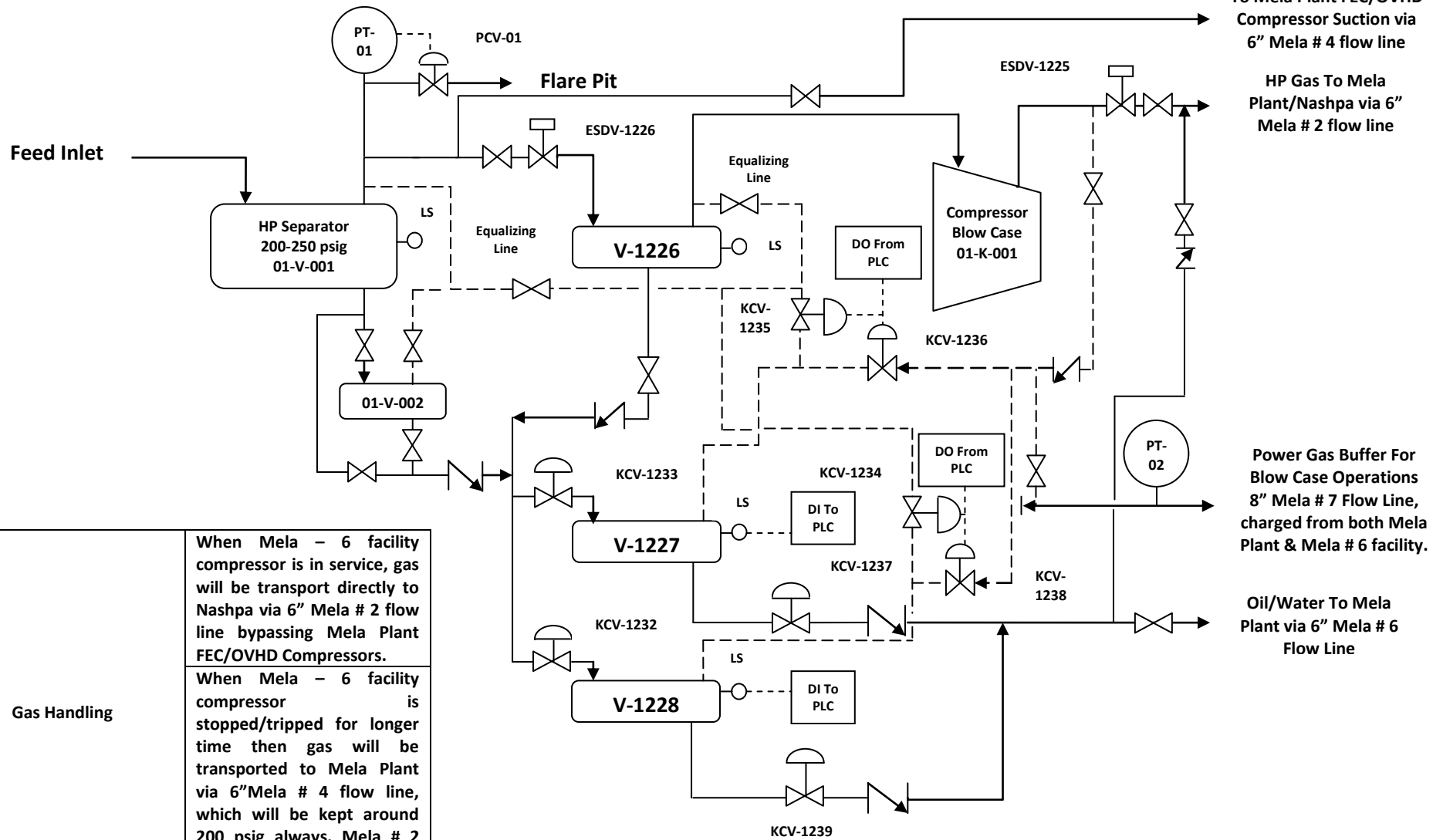
Step 11: Open KCV-1238 to pressurize the vessel V-1228 keeping in view of the difference between (PT-02) - (PIT-1228) ≤ 15 psig.

Step 12: Open KCV-1239 and drop liquid level LIT-1228 ≤ 250 mm.

Step 13: Close KCV-1238

Step 14: Close KCV-1239

BLOW CASE COMPRESSOR UTILIZATION SCHEME



Gas Handling

When Mela - 6 facility compressor is in service, gas will be transport directly to Nashpa via 6" Mela # 2 flow line bypassing Mela Plant FEC/OVHD Compressors.

When Mela - 6 facility compressor is stopped/tripped for longer time then gas will be transported to Mela Plant via 6" Mela # 4 flow line, which will be kept around 200 psig always. Mela # 2 flow line pressure will be kept hold.

Oil + Water Handling (Both will be transport to Mela Plant for separation)

Single phase liquid will be transport to Mela Plant via 6" Mela # 6 flow line.

Provision of liquid transport to Mela Plant together with compressor discharge gases as less pressure drop is anticipated with mixed flow.

Mela Blow Case Control Philosophy Matrix

