Airpack B.V. - Air Compressor –

Integrated Methanol and Ammonia Plant

17735-COM (Pre-) Commissioning Procedure (K020)

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REV.	**DATE**	**DESCRIPTION**	**DRAWN**	**CHECKED**	**APPROVED**

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1. Purpose

Checking the installation and operation of the package at site against the approved engineering documents.

2. Reference documents

Please find below the reference vendor documents that will be used during the (pre) commissioning of the package.

N-278-VD-6019-PR-PID-0002-01	17735-03	P&ID
N-278-VD-6019-PR-GAD-0003-01	17735-04	General Arrangement Drawing
N-278-VD-6019-IN-DIA-0005-01	17735-05	Wiring Diagram (including Terminal Diagram) for LCP Panel and Junction Box
N-278-VD-6019-IN-DWG-0007-01	17735-07	Outline Dimensional Drawings for LCP Panel and Junction Box
N-278-VD-6019-GN-ITP-0008-01	17735-08	Inspection & Test Plan (ITP)
N-278-VD-6019-GN-UFD-0009-01	17735-09	Utility Consumption List
N-278-VD-6019-GN-PRO-0022-01	17735-21	Control philosophy and Interlock Description

3. Scope

The scope of supply is as follows:

Single package with one oil-free, air cooled, vertical piston compressor for compression of instrument air.
- The air inlet flow is 35Nm3 at a pressure of 9,5 bar(g) with a temperature of 46°C.
- The outlet flow is 35Nm3 at a pressure of 30 bar(g) with a temperature of max 60°C. The outlet flow is air.
- The water system inlet flow is 1m3/h at a pressure of 4,5 bar(g) and a temperature of 36°C.
- The water system outlet flow is 1Nm3/h at a pressure of 5 bar(g) and a max temperature of 46°C.
- The compressor outlet creates a pressure more then 3 times inlet.

The package consists of the following main Items:
- 4x 100% Pulsation damper KV-020-001/2/3/4.
- 1x 100% Intercooler KE-020-001.
- 1x 100% Aftercooler KE-020-002.
- 1 x 100% Main motor KM-020.

The package is equipped with a LPS (Local pushbutton station) to operate the package locally. The package is controlled by the DCS.

The package is equipped with a JB (Junction Box) to connect the instruments to the DCS.

4. HSE

Standard safety precautions have to be taken since we are working with pressurised air.

- Proper PPE has to be worn when working on or testing the package
- The test area needs cordoned off to make sure non-authorized personnel does not enter this area.
- As minimum the safety rules of the site has to be followed
- Additional safety instructions as per Airpack site supervision engineer has to be followed.

5. Test instruments

The following test instruments are required during the SAT:

- Sound level meter
- Ambient pressure / temperature meter
- Multi meter (voltage check)

It is client responsibility to provide the required test instrumentation with valid calibration certificate.

6. Pre commissioning

□ Check if all cables are connected to the correct boxes.
□ Check if all piping is connected to the correct location and without stresses
□ Loop-check all cables
□ Visual inspection of the package to check for any damage

7. Commissioning

During commissioning the functionality of the package will be tested. All findings will be tracked in the commissioning checklist.

Please refer to attachment #1: Commissioning checklist, which will be filled in during SAT.

Performance test (4 hours)

During commissioning the functionality of the package will be tested. All findings will be tracked in the commissioning checklist.

Please refer to attachment #2: Performance test results, which will be filled in during SAT.

COMMISSIONING CHECK LIST INSTRUMENT AIR BOOSTER COMPRESSOR PACKAGE

Description	Airpack	Customer
1. Check the orientation of the air compressor skid in relation to the geological North.		
2. Check instruments and El-panel(s) for direct sunshine.		
3. Check the package(s) for damages and the scope of supply of instrumentation as per P&ID.		
4. Make sure that the package is properly installed to its foundation.		
5. Check if skid compartments, which are not filled with concrete, are provided with foundation drain holes and clear of debris.		
6. Check all customer-piping connections to and from the package.		
7. Cold loop check all customer electrical connections. Make sure that all terminals are tightened properly by pushing against the individual cables. Verify that all connections have been done in an orderly way and no cables are damaged. Compare the interconnection done to the electrical drawings.		
8. Check the earth link from the skid to a protective earth system. An earth cable is to be connected, and no damages or loose cables are found		
9. Check the safety settings according to P&ID: pressure, oxygen content, PCV settings, etc. Verify settings of PSVs by nameplate, verification of transmitters will be done full-loop test and alarms and trips test.		
10. Check power supply to the LPS.		
11. Power up panel and Check if all fuses are closed and ok.		
12. Check if PSV 8204 is not obstructed in dropping water		
13. Check if customer drain connection is correctly mounted and not obstructed.		
14. Carry out a live functional test of all signals to and from customer. Perform a full loop test for all transmitters and sensors.		
15. Make sure that all electrical jumpers for testing have been removed. And register all forces in a force matrix. Verify that the ESD system is working correctly, Arm, disarm and reset.		
16. Check if PSV blow off points are not obstructed.		
17. Alarms and trips test. Run the nitrogen generator under close supervision and verify, first all the trips, by triggering the set point by IE hart communicator.		
18. Grounding check (instruments will be earthed externally)		
19. I/O checks		
20. Alarms (10% random alarms are individually dry tested)		
21. Trips (10% random trips are individually dry tested)		
22. Cause and effect test of the nitrogen package		
23. Operation check (start, stop, etc.)		
24. Test run the air compressor package and check the following (before 4 hours running test):		
25. Check if the outlet is according to P&ID.		
26. Piping, tubing and screwed connections for leakage.		
27. Hand and auto operation according to the logic diagram.		

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28. Alarms and trips test. Run the air compressor package under close supervision and verify, first all trips by triggering the set point by i.e. a Hart-communicator		
29. Perform a four-hour running test according to attachment 2.		

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FAT TEST PROCEDURE

Equipment	Instrument air booster package
Customer	Lavan Industry Development Company (LIDCO)
Project name	Integrated Methanol and Ammonia Plant
Airpack reference number	17735-COM
Date	DD-MM-YYYY
Revision	01
Document number	17735-33
Handled by	TT
Number of pages	01

Performance Test Results 862-U-2501B

	00:00	00:15	00:30	00:45	01:00	01:15	01:30	01:45	02:00	02:15	02:30	02:45	03:00	03:15	03:30	03:45	04:00	UNIT	OPERATING VALUES
320-PT-8201 Pressure transmitter package inlet	START																	bar(g)	9,5
320-PG-8201 Pressure gauge package inlet																		bar(g)	9,5
320-TT-8201 Temperature transmitter package inlet																		ºC	46
320-TG-8206 Temperature gauge package inlet																		ºC	46
320-TT-8202 Temperature transmitter 1st stage discharge																		ºC	157
320-TG-8207 Temperature gauge 1st stage discharge																		ºC	157
320-PG-8202 Pressure gauge 2nd stage suction																		bar(g)	22,1
320-PT-8202 Pressure transmitter 2nd stage suction																		bar(g)	22,1
320-TT-8203 Temperature transmitter 2nd stage suction																		ºC	60
320-TT-8204 Temperature transmitter 2nd stage discharge																		ºC	116
320-TG-8208 Temperature gauge 2nd stage discharge																		ºC	116
320-TT-8205 Temperature transmitter package outlet																		ºC	Max. 60
320-TG-8209 Temperature gauge package outlet																		ºC	Max. 60
320-PG-8203 Pressure gauge package outlet																		bar(g)	30
320-PT-8203 Pressure transmitter package outlet																		bar(g)	30
320-PG-8204 Pressure gauge cooling water inlet																		bar(g)	4,5
320-TG-8210 Temperature gauge cooling water outlet																		ºC	Max. 46
320-TG-8211 Temperature gauge cooling water outlet																		ºC	Max. 46
320-PT-8204 Pressure transmitter oil system																		bar(g)	>1
Running test starting time:																			
Humidity:																		R.H.%	
Ambient temperature:																		ºC	
Ambient pressure:																		hPa	

Airpack Test Engineer	Client Inspector

Notes: