




|   |   |             |          |            |          |           |   |         |
|---|---|-------------|----------|------------|----------|-----------|---|---------|
|   | <b>LIDCO, Pars SEE Zone, Assaluyeh,<br/>Integrated Methanol and Ammonia<br/>Plant 3000 MTPD MeOH / 900 MTPD NH3 PROJECT</b> |             |          |            |          |           |  |         |
|   | <b>FAT Procedure (incl. full unit mechanical run test procedure)</b>  |             |          |            |          |           |   |         |
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## FAT Procedure (incl. full unit mechanical run test procedure) (K-020)

code-2  
M. Vakili

| REV. | DATE       | DESCRIPTION         | DRAWN | CHECKED | APPROVED |
|------|------------|---------------------|-------|---------|----------|
| 02   | 03-01-2024 | Issued for Approval | TT    | SK      | JJ       |
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**FAT Procedure (incl. full unit mechanical run test procedure)**

Document No. 17735-14




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| 1         | X  | X  |    |    |    | 26        |    |    |    |    |    | 51        |    |    |    |    |    | 76         |    |    |    |    |    |
| 2         | X  | X  |    |    |    | 27        |    |    |    |    |    | 52        |    |    |    |    |    | 77         |    |    |    |    |    |
| 3         | X  | X  |    |    |    | 28        |    |    |    |    |    | 53        |    |    |    |    |    | 78         |    |    |    |    |    |
| 4         | X  | X  |    |    |    | 29        |    |    |    |    |    | 54        |    |    |    |    |    | 79         |    |    |    |    |    |
| 5         | X  | X  |    |    |    | 30        |    |    |    |    |    | 55        |    |    |    |    |    | 80         |    |    |    |    |    |
| 6         | X  | X  |    |    |    | 31        |    |    |    |    |    | 56        |    |    |    |    |    | 81         |    |    |    |    |    |
| 7         | X  | X  |    |    |    | 32        |    |    |    |    |    | 57        |    |    |    |    |    | 82         |    |    |    |    |    |
| 8         | X  | X  |    |    |    | 33        |    |    |    |    |    | 58        |    |    |    |    |    | 83         |    |    |    |    |    |
| 9         | X  | X  |    |    |    | 34        |    |    |    |    |    | 59        |    |    |    |    |    | 84         |    |    |    |    |    |
| 10        | X  | X  |    |    |    | 35        |    |    |    |    |    | 60        |    |    |    |    |    | 85         |    |    |    |    |    |
| 11        | X  | X  |    |    |    | 36        |    |    |    |    |    | 61        |    |    |    |    |    | 86         |    |    |    |    |    |
| 12        | X  | X  |    |    |    | 37        |    |    |    |    |    | 62        |    |    |    |    |    | 87         |    |    |    |    |    |
| 13        |    | X  |    |    |    | 38        |    |    |    |    |    | 63        |    |    |    |    |    | 88         |    |    |    |    |    |
| 14        |    | X  |    |    |    | 39        |    |    |    |    |    | 64        |    |    |    |    |    | 89         |    |    |    |    |    |
| 15        |    | X  |    |    |    | 40        |    |    |    |    |    | 65        |    |    |    |    |    | 90         |    |    |    |    |    |
| 16        |    |    |    |    |    | 41        |    |    |    |    |    | 66        |    |    |    |    |    | 91         |    |    |    |    |    |
| 17        |    |    |    |    |    | 42        |    |    |    |    |    | 67        |    |    |    |    |    | 92         |    |    |    |    |    |
| 18        |    |    |    |    |    | 43        |    |    |    |    |    | 68        |    |    |    |    |    | ATTACHMENT |    |    |    |    |    |
| 19        |    |    |    |    |    | 44        |    |    |    |    |    | 69        |    |    |    |    |    | 1          |    |    |    |    |    |
| 20        |    |    |    |    |    | 45        |    |    |    |    |    | 70        |    |    |    |    |    | 2          |    |    |    |    |    |
| 21        |    |    |    |    |    | 46        |    |    |    |    |    | 71        |    |    |    |    |    | 3          |    |    |    |    |    |
| 22        |    |    |    |    |    | 47        |    |    |    |    |    | 72        |    |    |    |    |    | 4          |    |    |    |    |    |
| 23        |    |    |    |    |    | 48        |    |    |    |    |    | 73        |    |    |    |    |    | 5          |    |    |    |    |    |
| 24        |    |    |    |    |    | 49        |    |    |    |    |    | 74        |    |    |    |    |    | 6          |    |    |    |    |    |
| 25        |    |    |    |    |    | 50        |    |    |    |    |    | 75        |    |    |    |    |    | 7          |    |    |    |    |    |

|   |   |   |                  |                 |                   |                |                |
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|  | <b>FAT Procedure (incl. full unit mechanical run test procedure)</b>  |   |                  |                 |                   |                |                |
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## 1. Purpose

Checking the performance and functioning of the package against the approved documents and specifications.

Separate test reports for each test will be generated; however, this FAT procedure covers only the procedure to be performed on all skids.

## 2. Reference documents

### 2.1. Vendor documents




Please find below the reference vendor documents that will be used during this FAT.

|                              |          |                              |
|------------------------------|----------|------------------------------|
| N-278-VD-6019-PR-PID-0002-01 | 18841-03 | P&ID                         |
| N-278-VD-6019-PR-GAD-0003-01 | 18841-04 | General Arrangement Drawing  |
| N-278-VD-6019-IN-DIA-0005-01 | 18841-05 | Wiring Diagram (LCP and JB)  |
| N-278-VD-6019-IN-DWG-0007-01 | 18841-07 | Panel lay-out (LCP and JB)   |
| N-278-VD-6019-GN-ITP-0008-01 | 18841-08 | Inspection & Test Plan (ITP) |
| N-278-VD-6019-GN-PRO-0022-01 | 18841-21 | Control Philosophy           |
| N-278-VD-6019-GN-SF-0029-01  | 18841-27 | Cause and Effect chart       |

### 2.2. Manufacturing data book

The manufacturing data book will also be available for review during the FAT. The MDB will be checked according to the approved MDB index and ITP.

The client or client TPI will sign the relevant pages as well as all relevant point of the ITP.

|   |   |   |            |          |           |          |                |
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### 3. Scope

One (1) Instrument air booster compressor (K-020), Vertical piston compressor with motor driver (320-KM-020), outlet capacity 35 Nm<sup>3</sup>/hr, 30 bar(g) and inlet, 9,5 bar(g). 1 duty (1x100%). The compressor is water cooled at 4,5 bar(g) inlet pressure.

The test will include:

- Main motor (KM-020)
- Intercooler and aftercooler
- 4x pulsation damper
- Oil system
- Water system
- Local panel

The compressor is equipped with:

- One (1) LPS (Local Push Button Station)
- One (1) JB (Junction Box)




### 4. HSE

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

- Proper PPE has to be worn when working / testing the package
- All visitors for the FAT will be instructed before the FAT, about Airpack safety precautions, by Airpack Safety movie.
- All visitors will be asked to sign a disclaimer to be able to enter the hazardous area during the test.
- The test area is cordoned off to make sure non-authorized personnel does not enter this area.

### 5. FAT Kick off meeting

Before starting the FAT there will be a short kick off meeting, where Airpack will explain the safety rules and regulations as well as what activities and planning will be performed during the FAT.

|   |   |   |                  |                 |                   |                |                |
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Kick-Off Meeting (KOM) Agenda.

- i. Introduction/Sign in (along with the name, role/designation)
- ii. HSE Induction
- iii. FAT organization, roles and responsibilities of the personnel involved.
- iv. Briefing on duration and sequence of tests planned, timing etc.

Also proper PPE will be distributed as required.

## 6. Roles and responsibilities

The project manager is responsible for the complete FAT. The project manager will arrange the persons who are required for each part of the FAT.

A qualified AIRPACK Technician who is familiar with the operational parameters of the Package will perform all FAT tasks

### 6.1. Problem resolution

If there are any problems during the FAT, they will be rectified immediately if possible, if not possible they will be recorded in the FAT punch list and resolved before shipment / commissioning of the package.




Please find attachment 1: Punch list format.

## 7. Test Instruments

The following test instruments will be used during the FAT, all instruments will have a valid calibration certificate which will be supplied as part of the FAT test results for checking and signing.




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

## 8. Utilities

|   |   |   |                  |                 |                   |                |                |
|---|---|---|------------------|-----------------|-------------------|----------------|----------------|
|   | <b>LIDCO, Pars SEE Zone, Assaluyeh,<br/>Integrated Methanol and Ammonia<br/>Plant 3000 MTPD MeOH / 900 MTPD NH3 PROJECT</b> |  |                  |                 |                   |                |                |
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The utilities that are available during FAT are:

- Power: 400V, 50Hz, 3ph and 230V, 50Hz, 1ph
- Cooling water supply: 4,5 bar(g), ~36 °C

|   |   |   |                  |                 |                   |                |                |
|---|---|---|------------------|-----------------|-------------------|----------------|----------------|
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## 9. Test procedure

Test may not be done in below order; it is subject to availability of personnel and equipment.

### 9.1. Mechanical checks

The Following will be tested / checked and recorded as part of the FAT. All checks are mentioned in attachment 2: Equipment checklist

#### Quality

- 1 Verify all equipment are installed in accordance with approved P&ID and GAD.
- 2 Visual inspection of the complete package for quality.
- 3 Verify piping, tubing location, orientation in accordance with approved GA Drawing.

#### P&ID review

- 1 Verify all components are installed as per the GA Drawing.
- 2 Check that all components are tagged according to the P&ID.
- 3 Check that the location is of the components is as per the GAD.

#### Dimensions

- 1 Dimensional check of the complete package for compliance to approved GA Drawing.
- 2 Verification and dimensional check of Tie-in Point, lifting points
- 3 Verification and dimensional check of foundation holes.

#### Painting




- 1 Check the overall paint for damages and overall quality.
- 2 Randomly check the thickness as per the approved paint procedure.
- 3 Check the paint color as per the paint procedure.

#### LPS and JB

- 1 Check for any loose connection in the control panel
- 2 Verify all control panel BOM, GA, wiring, I/O etc., matches approved drawings.
- 3 Check the installation and type of cable glands
- 4 Check the installation of the cable trays
- 5 Check the cable type

#### Instruments

- 1 Check for any loose connection of cables or wires in the instruments
- 2 Check the installation of the instruments as per approved drawings
- 3 Check if all instruments are tagged
- 4 Check the quantity of the instruments

|   |   |   |            |          |           |          |         |
|---|---|---|------------|----------|-----------|----------|---------|
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### 9.2. Performance test (four hours)

Test set-up for the package is as follows:

- The power from the package will come from internal power supply
- 400V / 50Hz / 3ph and 230V / 50Hz / 1ph
- Power is ON

The following measurements will be taken during the performance test.

This should be clarified. please provide the related calculation in this doc.

- Sound level at 1 metre distance from skid (max. 85 dB(A))
- The performance test will be done with ambient air. Therefor a calculation is provided with the related outlet pressure.
- Refer to Attachment 1 for an example of the performance test results sheet, which will be filled in during FAT.
- The piping will be sprayed and checked for leakage.

All in house instruments required / used during the test will have recent calibration certificated, which will be attached to the FAT test report.

The FAT recordings can be found in attachment 3: Performance test results

### 9.3. Noise level measurement

Noise test will be done during the performance test. Measuring points will be defined by a distance of 1 metre from the package and measured round the package. Final measuring point will be the same as start measure point. This is for checking correct functioning of the noise level meter.

Noise level shall not exceed 85 dB(A) for complete package at 1 metre distance (with package test blow off muffler closed).

The measurement will be recorded in attachment 4: Noise test results.

### 9.4 Vibration measurement

Vibration measurement will be done with job vibration transmitter unless they cannot be used. In that case a handheld analyser will be used.

The vibration is measured on the points as stated in attachment 4: Vibration test results, the values are recorded there as well.

The vibration level should not exceed 10 mm/s

Is this applicable to all measuring points?



**Punch List Air Compressor Package**

**Project: 17735-GEN**

|                 |           |
|-----------------|-----------|
| <b>Revision</b> | <b>02</b> |
| Dry Test        |           |
| Inhouse Test    |           |
| FAT             |           |
| F. Inspection   |           |
| Shipment        |           |
| Commissioning   |           |

| Item | Description | Point raised by | Action by | Completion before | Closed [date] [name] |
|------|-------------|-----------------|-----------|-------------------|----------------------|
|      |             |                 |           |                   |                      |
| 001  |             |                 |           |                   |                      |
| 002  |             |                 |           |                   |                      |
| 003  |             |                 |           |                   |                      |
| 004  |             |                 |           |                   |                      |
| 005  |             |                 |           |                   |                      |
| 006  |             |                 |           |                   |                      |
| 007  |             |                 |           |                   |                      |
| 008  |             |                 |           |                   |                      |
| 009  |             |                 |           |                   |                      |
| 010  |             |                 |           |                   |                      |
| 011  |             |                 |           |                   |                      |
| 012  |             |                 |           |                   |                      |
| 013  |             |                 |           |                   |                      |
| 014  |             |                 |           |                   |                      |
| 015  |             |                 |           |                   |                      |
| 016  |             |                 |           |                   |                      |
| 017  |             |                 |           |                   |                      |
| 018  |             |                 |           |                   |                      |
| 019  |             |                 |           |                   |                      |
| 020  |             |                 |           |                   |                      |
| 021  |             |                 |           |                   |                      |
| 022  |             |                 |           |                   |                      |
| 023  |             |                 |           |                   |                      |
| 024  |             |                 |           |                   |                      |
| 025  |             |                 |           |                   |                      |
| 026  |             |                 |           |                   |                      |

## FAT TEST PROCEDURE

|                          |  |
|--------------------------|--|
| Equipment                | K-020                                      |
| Customer                 | Lavan Industry Development Company (LIDCO) |
| Serial number            | T-2023-00799                               |
| Project name             | Integrated Methanol and Ammonia Plant      |
| Airpack reference number | 17735-COM                                  |
| Date                     | 3-1-2024                                   |
| Revision                 | 02   |
| Document number          | 17735-14 Attachment 2                      |
| Handled by               | SK   |
| Number of pages          | 01 of 01                                   |

| INSPECTION                               | DOCUMENT                       | COMPLETED | REMARKS |
|--|--------------------------------|-----------|---------|
| <b>Quality</b>                           |                                |           |         |
| 1. Installation of main equipment        | GAD / PID                      |           |         |
| 2. Visual inspection of overall quality  | GAD / PID                      |           |         |
| 3. Piping, tubing location / orientation | GAD / PID                      |           |         |
| <b>P&amp;ID review</b>                   |                                |           |         |
| 1. Component check                       | P&ID                           |           |         |
| 2. Tagging of all components             | P&ID                           |           |         |
| 3. Component location                    | P&ID                           |           |         |
| <b>Dimensions</b>                        |                                |           |         |
| 1. Overall skid dimensions               | GAD                            |           |         |
| 2. Tie-in point dimensions               | GAD                            |           |         |
| 3. Foundation bolt holes                 | GAD                            |           |         |
| <b>Painting</b>                          |                                |           |         |
| 1. Overall Paint quality                 | Paint procedure                |           |         |
| 2. Paint DFT measurement                 | Paint procedure                |           |         |
| 3. Paint color                           | Paint procedure                |           |         |
| <b>Control Panel</b>                     |                                |           |         |
| 1. Loose connections                     | Wiring diagram / Panel lay-out |           |         |
| 2. BOM                                   | Wiring diagram / Panel lay-out |           |         |
| 3. Cable glands                          | Wiring diagram / Panel lay-out |           |         |
| 4. Cable trays                           | Wiring diagram / Panel lay-out |           |         |
| 5. Cable type                            | Wiring diagram / Panel lay-out |           |         |
| <b>Instruments</b>                       |                                |           |         |
| 1. Loose connections                     | Wiring diagram                 |           |         |
| 2. Installation                          | P&ID                           |           |         |
| 3. Tagging                               | P&ID                           |           |         |
| 4. Quantity                              | P&ID                           |           |         |

|                       |                  |
|-----------------------|------------------|
| Airpack Test Engineer | Client Inspector |
|-----------------------|------------------|

Notes:



# Integrated Methanol and Ammonia Plant

Document n° : 17735-14 attachment 4

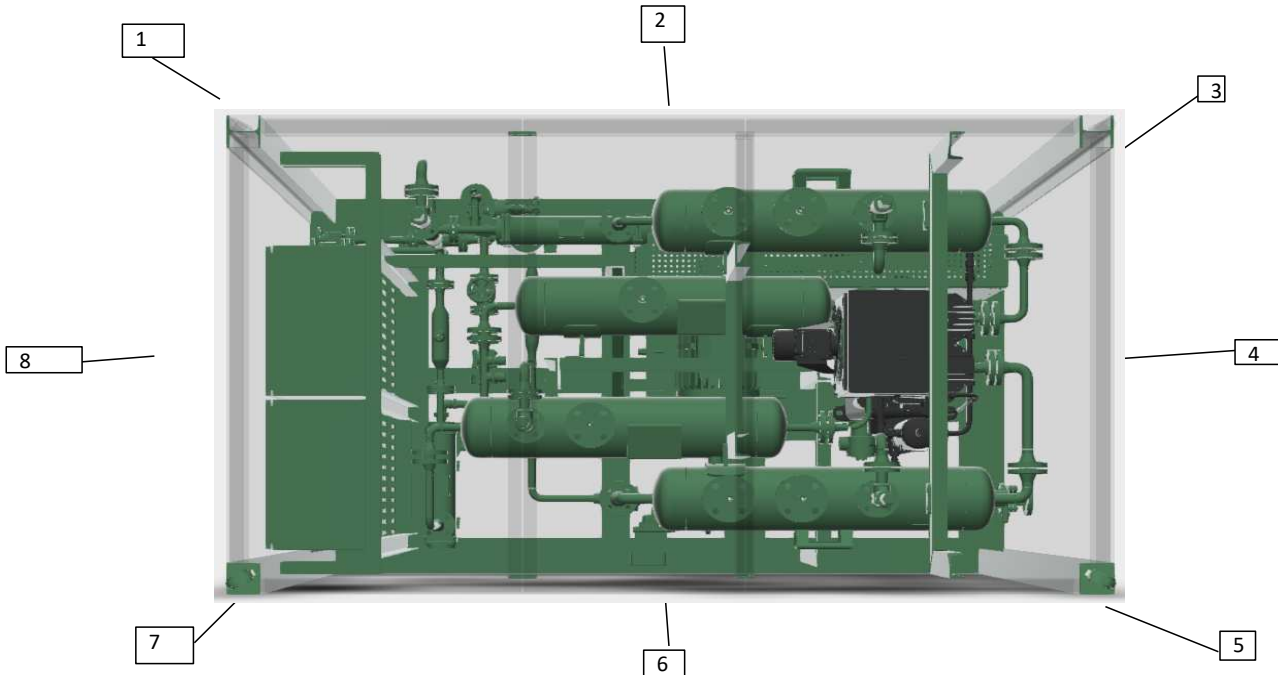
Revision : 02

## NOISE LEVEL

Unit : K-020  
 Service : Air booster compressor  
 Supplier : Airpack  
 Serial No. : T-2023-00799

Client: Lavan Industry Development Company (LIDCO)  
 Contractor: Nargan Company  
 Project: Integrated Methanol and Ammonia Plant

### Supplier to Complete Expected Noise Level Data



Noise test has been performed during performance test:

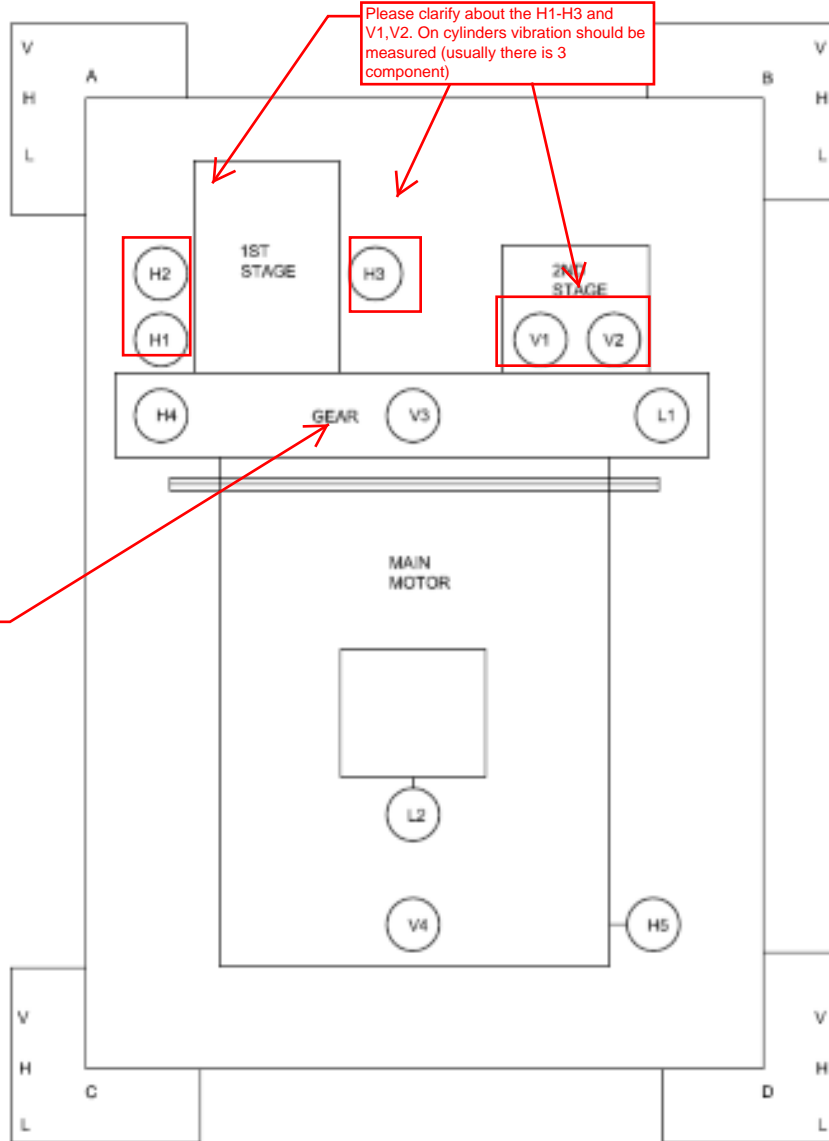
Procedure:  
 Measure point will be defined by a distance of 1 metre from the package and 1,5 metre above the ground level to measured round the package. Final measure points will be the same as start measure points. This is for checking correct functioning of the noise level meter. Noise shall not exceed 85 dB(A) for complete package. Noise meter calibration certificate is available during test

please clarify

| Points   | Unit                                 | Noise Estimated | Noise measured | Average of anti | Noise level | Noise level | Test Result: |
|--|--------------------------------------|-----------------|----------------|-----------------|-------------|-------------|--------------|
| P1   | dB(A)                                | 85              |                |                 |             |             | -2           |
| P2   | dB(A)                                | 84              |                |                 |             |             |              |
| P3   | dB(A)                                | 83              |                |                 |             |             |              |
| P4   | dB(A)                                | 83              |                |                 |             |             |              |
| P5   | dB(A)                                | 83              |                |                 |             |             |              |
| P6   | dB(A)                                | 84              |                |                 |             |             |              |
| P7   | dB(A)                                | 85              |                |                 |             |             |              |
| P8   | dB(A)                                | 85              |                |                 |             |             |              |
| Surrounding Noise measured (dB(A)) : 75                              |                                      |                 |                |                 |             |             | NOTE:        |
| Noise level (After correction (If required) as per 5.3 of ISO 2151): |                                      |                 |                |                 |             |             |              |
| <b>Correction Factor</b>   |                                      |                 |                |                 |             |             |              |
| Level increase due to  | Value to be subtracted from measured |                 |                |                 |             |             |              |
| 5  | 2                                    |                 |                |                 |             |             |              |
| 6 to 9   | 1                                    |                 |                |                 |             |             |              |
| Test Condition : Noise level test as per ISO 2151                    |                                      |                 |                |                 |             |             |              |

There is a discrepancy between noise estimated for points and the noise average measured which is reported as 75 dB(A). Please clarify

|                              |   |          |
|------------------------------|---|----------|
| Project                      | : | 17735-14 |
| Equipment                    | : | K-020    |
| Date                         | : | 3-1-2024 |
| Test Engineer(s)             | : |          |
| <b>Vibration Test Report</b> |   |          |



Please clarify about the H1-H3 and V1,V2. On cylinders vibration should be measured (usually there is 3 component)

Please clarify about other applicable points. According to ISO 10816-8 Fig. 2. (attached) other points (e.g. each frame corner point, each frame location between cylinders, pulsation vessels) are required.

This shall be clarified. Is there any gear between motor and compressor? As far as vendor informed us motor is connected to compressor by V-Belt.

| Measurement points<br>no.as sketch | Measurement quantity: r.m.s. overall values (2 Hz. À 1000 Hz) |              |              |              |       |       |
|------------------------------------|---|--------------|--------------|--------------|-------|-------|
|                                    | Speed   | Power        | H            | V            | L     | Notes |
|                                    |   |              | horizont     |              |       |       |
|                                    |   |              | al           | vertical     | axial |       |
| rev/min.                           | kW.   | mm/s.<br>(M) | mm/s.<br>(M) | mm/s.<br>(M) |       |       |
| <b>Compressor tag no:</b>          |   |              |              |              |       |       |
| 1                                  |   |              |              |              |       |       |
| 2                                  |   |              |              |              |       |       |
| 3                                  |   |              |              |              | X     |       |
| 4                                  |   |              |              |              | X     |       |
| 5                                  |   |              |              | X            | X     |       |
| A                                  |   |              |              |              |       |       |
| B                                  |   |              |              |              |       |       |
| C                                  |   |              |              |              |       |       |
| D                                  |   |              |              |              |       |       |
| <b>Compressor tag no:</b>          |   |              |              |              |       |       |
| 1                                  |   |              |              |              |       |       |
| 2                                  |   |              |              |              |       |       |
| 3                                  |   |              |              |              | X     |       |
| 4                                  |   |              |              |              | X     |       |
| 5                                  |   |              |              | X            | X     |       |
| A                                  |   |              |              |              |       |       |
| B                                  |   |              |              |              |       |       |
| C                                  |   |              |              |              |       |       |
| D                                  |   |              |              |              |       |       |