Noise Emission Measurement

Process Description

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1 Noise emission measurement

1.1 Application range

- Rotary piston blower
- Screw compressor

1.2 Definition

The noise emission measurement determines the acoustic characteristic values of rotary piston blowers and screw compressors – under defined operating and installation conditions – that are representative of the maximum noise levels generated during conventional use.

Several individual measurements are performed on a measurement surface (enveloping surface) that surrounds the machine. The quantity and positioning of the measuring points are dependent on the outer dimensions of the machine. Using foreign noise correction and ambient correction, the temporally and energetically generated A-weighted measuring-surface noise level L_{pA} is determined across all microphone positions in dB(A). This value is generally classified as machine noise.

1.3 Aim of the test

The noise emission measurement serves to determine whether the overall noise emitted from the machine adheres to a specified upper limit.

1.4 Test conditions

Test procedure

The measurement is performed using the enveloping surface method with Accuracy Class 2 based on the product-specific noise measurement standard DIN EN ISO 2151 and the basic standard DIN EN ISO 3744.

Tester

The test is carried out by trained personnel.

Test environment

RKR test facility

- 50 m above NHN (“Normalhöhennull” / “standard elevation zero” as per DHHN92)
- Predominantly-open sound field above a reflective surface
- Reflective installation surface (smooth concrete floor)
- Side walls and roof with perforated metal sheet panels with mineral wool
- Roller shutter soundproofed

Test medium

The test is always executed with air.

Step speed

n_G / n_{SV} = as per machine performance data sheet (full load)

Inlet pressure

p_1 ~1.0 bar abs. (atmospheric pressure)

Discharge pressure

p_2 = as per machine performance data sheet (full load)

Measuring device

- Brüel & Kjaer Type 2250 Light Sound Level Meter, Class 1
  Serial number: 3006481
- Brüel & Kjaer Type 4950 Microphone, Class 1
  Serial number: 2940769
- Brüel & Kjaer Type ZC 0032 Microphone Pre-amplifier
  Serial number: 20931
- Brüel & Kjaer Type 4231 Sound calibrator, Class 1
  Serial number: 2642769

Measuring points

The quantity and positioning of the measuring points are dependent on the outer dimensions of the machine and are determined in accordance with the standard specifications. The quantity of microphones is 9. At the same time, the reference square should only include the noise-relevant parts of the machine. The discharge connection line is located outside the reference square. The distance between the measuring surface and the reference square is 1 metre.

Test duration

The test lasts for approx. one hour and is divided into two time periods:

- Period 1
  Starting up the machine until the discharge temperature reaches a steady state: approx. 45 minutes
- Period 2
  Individual measurements of all microphone positions: approx. 10 to 15 minutes

1.5 Test sequence

1. Setup the machine so it is at a sufficient distance from the side walls of the test facility
2. Connect the discharge nozzle to the outlet channel supplied for the test

   Note: for machines with an intake connection, there must be an individual assessment as to whether suction can take place inside the acoustic hood, or if the intake line needs to be guided to the outside via an additional line.

3. Assign identification points to the measuring points in accordance with the standard specifications
4. Prepare and calibrate the measuring system
5. Measure the environmental noise
6. Start up the machine and set it to the operating point that is to be assessed (full load)
7. When discharge temperature reaches a stable state: record the ambient conditions
8. Perform a noise measurement using all microphone positions

1.6 Measured values

The measuring values at the individual microphone positions are measured in frequency bands as a temporally determined noise level using A-weighting (L_{piA} in dB(A)). The measuring period is 10 seconds for every microphone.

1.7 Evaluation of the measurement results

The energetically determined, A-weighted measuring surface noise level (machine noise) L_{pA} in dB(A) is calculated across all microphone positions from the temporally determined individual measurements, which are corrected for foreign noise and the influence of the measuring environment.

1.8 Documentation

The test results are supported by a manufacturer's inspection certificate as per DIN EN 10204 3.1.