



Fraunhofer

**TESTED[®]
DEVICE**

Festo AG & Co. KG
MHA1-M1LCH-2/26-0.95-HC
Report No. FE 1407-713

DUPLICATE

Statement of
Qualification

Particle Emission

Statement of Qualification

Customer
Festo AG & Co. KG
Ruiter Straße 82
73734 Esslingen - Berkheim
Germany

Component tested

Category: Process Equipment
Subcategory: Pneumatic Components
Product name: Solenoid valve MHA1-M1LCH-2/26-0.95-HC

Test result / Classification

The Solenoid valve MHA1-M1LCH-2/26-0.95-HC generates the following average number of particles $\geq 0.1 \mu\text{m}$ per cycle:

24 h measurement	Average number and standard deviation particles $\geq 0.1 \mu\text{m}$ per cycle
on new valve	78 \pm 135
after 1 million cycles	705 \pm 353
after 5 million cycles	1325 \pm 613
after 12 million cycles	1368 \pm 567

Random sampling of particle emissions (airborne) at representative sites

Standards/Guidelines: Based on VDI 2083-9.1, without 24-hour running-in period. The norm stated refers to the version that was applicable at the time of testing.

Test devices: Optical particle counter: LasAir II 110 with measuring ranges $\geq 0.1 \mu\text{m}$, $\geq 0.2 \mu\text{m}$, $\geq 0.3 \mu\text{m}$, $\geq 0.5 \mu\text{m}$, $\geq 1.0 \mu\text{m}$ and $\geq 5.0 \mu\text{m}$

Test environment parameters:

- Cleanroom Air Cleanliness Class (according to ISO 14644-1):..... ISO 1
- Airflow velocity:..... 0.45 m/s
- Airflow pattern:..... vertical laminar flow
- Temperature:..... 22 °C \pm 0.5 °C
- Relative humidity: 45 % \pm 5 %

Test procedure parameters:

- Operating pressure: 6 bar (ultra-pure compressed air)
- Volume flow rate:..... 14.4 l/min
- Switching frequency: 3 Hz
- Sampling time per measurement: 24 h
- Measurement 1: on new valve
- Measurement 2: after 1 million cycles
- Measurement 3: after 5 million cycles
- Measurement 4: after 12 million cycles

The measuring devices used for the qualification tests are calibrated at regular intervals; their results can be traced back to national and international standards. In cases where no national standards exist, the test procedure implemented complies with the technical regulations and norms applicable at the time of the test. The relevant documentation can be viewed on request at any time.

For further information about the test environment and parameters, please refer to the Fraunhofer IPA test report.

Fraunhofer Institute for
Manufacturing Engineering and Automation IPA

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Place, date of first document issued

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Place, current date

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