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DEVICE

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

Statement of
Qualification

Particle Analysis

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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

SEM-EDX analysis of emitted particles

Methodology:
1. Deposition of airborne particles in ultra-pure water (impinger)
2. Filtration of sample liquid (nylon filter, 0.1 µm pore size)
3. Automated particle analysis with SEM-EDX

Test devices: Zeiss SUPRA 40 VP with SmartPI and measuring range ≥ 1 µm

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 ± 0.5 °C
- Relative humidity: .....45 % ± 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:.....after 12 million cycles

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Test result / Classification

For the Solenoid valve MHA1-M1LCH-2/26-0.95-HC the following numbers of particles (size range from 1 µm up to 100 µm) were detected and classified:

Classification	Filter 1 – blank value	Filter 2 – valve
C-F content	23	65
Cu content	1	3
Al content	212	148
Fe-Ni	0	200
Fe content	40	151
Si	731	637
Non-classified	37	404

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
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i. A.
Frank Bürger, Project Manager Fraunhofer IPA

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