



Fraunhofer

**TESTED[®]
DEVICE**

REIKU GmbH
cor tubing system NW23
Report No. RE 1805-1038

DUPLICATE

Statement of
Qualification

Particle Emission

Statement of Qualification

Customer
 REIKU GmbH Kabelschutzsysteme
 Robert-Bosch-Strasse 3
 51674 Wiehl-Bomig
 Germany

Component tested

Category: Energy Supply
 Subcategory: Cable Guiding Systems
 Product name: Sample construction clean room corrugated tubing system NW23 incl. fasteners and connectors (manufacturing date: 2017; color: black; system consisting of: conductible tubing: LPRRB-23G, gripping clamps: PASSB-29K, straight connectors: VPGRB-23M32, middle jaws: PAMBB-23F/G)

Random sampling of Particle Emissions (airborne) at representative sites

Standards/Guidelines: ISO 14644-1, -14
 The norms stated generally refer to the version valid at the time of the tests.

Test devices: Optical particle counter:
 LasAir II 110 and LasAir III 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:

- Bending radius:28.0 mm
- Stroke length:.....820 mm
- Parameter Set 1
 - Velocity: $v_1 = 0.5 \text{ m/s}$
 - Acceleration: $a_1 = 1.0 \text{ m/s}^2$
- Parameter Set 2
 - Velocity: $v_2 = 1.0 \text{ m/s}$
 - Acceleration: $a_2 = 2.0 \text{ m/s}^2$
- Parameter Set 3
 - Velocity: $v_3 = 2.0 \text{ m/s}$
 - Acceleration: $a_3 = 4.0 \text{ m/s}^2$

Test result / Classification

When operated under the specified test conditions, the sample construction clean room corrugated tubing system NW23 incl. fasteners and connectors is suitable for use in cleanrooms fulfilling the specifications of the following Air Cleanliness Classes according to ISO 14644-1:

Test parameter(s)	Air Cleanliness Class
$v_1 = 0.5 \text{ m/s}; a_1 = 1.0 \text{ m/s}^2$	4
$v_2 = 1.0 \text{ m/s}; a_2 = 2.0 \text{ m/s}^2$	5
$v_3 = 2.0 \text{ m/s}; a_3 = 4.0 \text{ m/s}^2$	5
Overall result	5

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.

Detailed information and parameters of the test environment can be found in the Fraunhofer IPA test report.

Fraunhofer Institute for Manufacturing Engineering and Automation IPA

RE 1805-1038
 Report No. first document

Stuttgart, June 18, 2018
 Place, date of first document issued

Department of Ultraclean Technology and Micromanufacturing

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 Report No. current document

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 Place, current date

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on behalf of 
 Dr.-Ing. Frank Bürger, Project Manager Fraunhofer IPA