



Fraunhofer

**TESTED[®]
DEVICE**

igus GmbH
energy chain P4.42.15CR.150.0
Report No. IG 1607-838

DUPLICATE

Statement of
Qualification

Particle Emission

Statement of Qualification

Customer igus GmbH
Spicher Strasse 1a
51147 Cologne
Germany

Component tested

Category: Energy Supply

Subcategory: Cable Guiding Systems

Product name: P4.42.15CR.150.0 - profile-rol e-chain clean room
(manufacturing date: week 24/2016; color: black/beige)

Random sampling of particle emissions (airborne) at representative sites

Standards/Guidelines: VDI 2083-9.1; ISO 14644-1
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:

- Number of chain links: 202
- Total chain length (incl. brackets):..... l = 13534 mm
- Bending radius:r = 150 mm
- Stroke length: s = 2000 mm
- Parameter Set 1:.....v₁ = 0.5 m/s; a₁ = 1.0 m/s²
- Parameter Set 2:.....v₂ = 1.0 m/s; a₂ = 2.0 m/s²
- Parameter Set 3:.....v₃ = 2.0 m/s; a₃ = 4.0 m/s²

Test result / Classification

When operated under the specified test conditions, the P4.42.15CR.150.0 - profile-rol e-chain clean room is suitable for use in cleanrooms fulfilling the specifications of the following Air Cleanliness Class according to ISO 14644-1:

Test parameter(s)	Air Cleanliness Class
v ₁ = 0.5 m/s; a ₁ = 1.0 m/s ²	6
v ₂ = 1.0 m/s; a ₂ = 2.0 m/s ²	6
v ₃ = 2.0 m/s; a ₃ = 4.0 m/s ²	7
Overall result	7

A visual inspection of the test piece according to VDI 2083 Part 9.1 has shown massive signs of abrasion from the plastic components of the energy chain. The generated particles are too large to get airborne and are therefore not detectable by optical particle counters. Nevertheless, these particles make any classification based on the concentrations of airborne particles obsolete and the use of the energy chain in any kind of cleanroom cannot be recommended.

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

on behalf of 
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