



Fraunhofer

**TESTED[®]
DEVICE**

igus GmbH
Energy chain E4.32.10.063.0.CR
Report No. IG 1303-640

DUPLICATE

Statement of
Qualification

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Customer: igus GmbH
Spicher Strasse 1a
51147 Cologne
Germany

Test results / Classification:
(according to ISO 14644-1)

The energy chain E4.32.10.063.0.CR is suitable for use in cleanrooms fulfilling Air Cleanliness Class 2.

Component tested:

Category: Energy Supply
Subcategory: Cable Guiding System
Type: Energy chain E4.32.10.063.0.CR

Random check measurements of particle emission (airborne) at representative points

Test procedure: According to VDI 2083-9.1; ISO 14644-1
Each standard states refers to the version valid at the time of testing.

Measuring instruments: Optical Particle Counter:
LasAir II 110 (PMS) with measuring channels of $\geq 0.1 \mu\text{m}$, $\geq 0.2 \mu\text{m}$,
 $\geq 0.3 \mu\text{m}$, $\geq 0.5 \mu\text{m}$, $\geq 1.0 \mu\text{m}$, and $\geq 5.0 \mu\text{m}$

Test parameters of the test environment:

- Cleanroom Air Cleanliness Class (according to ISO 14644-1):..... ISO 1
- Air flow velocity:..... 0.45 m/s
- Air flow guidance:vertical unidirectional air flow
- Temperature:22 °C \pm 0.5 °C (71.6 °F \pm 0.9 °F)
- Relative humidity: 45 % \pm 5 %

Test parameters of the test execution:

- Number of chain links:..... 15
- Total chain length (incl. brackets): l=985 mm
- Bending radius of the chain: r=63 mm
- Stroke length:..... s=820 mm
- Parameter set 1: $v_1=0.5 \text{ m/s}$; $a_1=1.0 \text{ m/s}^2$
- Parameter set 2: $v_2=1.0 \text{ m/s}$; $a_2=2.0 \text{ m/s}^2$
- Parameter set 3: $v_3=2.0 \text{ m/s}$; $a_3=4.0 \text{ m/s}^2$

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The measuring equipment used for the qualification is regularly calibrated and is based on national and international standards. In the case where no national standards exist, the measuring procedure used corresponds with technical regulations and norms valid at the time of the measurement. The documents drawn up for this procedure are available for viewing.

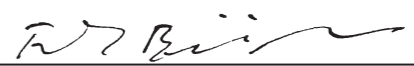
The validity of this certificate applies only to the mentioned product in this particular condition for a duration of 5 years.
Further information: www.tested-device.com.

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Manufacturing Engineering and Automation IPA

Department Ultraclean Technology
and Micromanufacturing

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Stuttgart, June 21, 2013
Place, Date


i. A.
Project manager