



**Fraunhofer**

**TESTED<sup>®</sup>  
DEVICE**

igus GmbH  
e-skin

**Report No. IG 1504-755**

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: e-skin  
 (manufacturing date: 9/12/2015; color: white; article number: SK28.068.0500.02.1)

## Random sampling of particle emissions (airborne) at representative sites

Standards/Guidelines: VDI 2083-9.1; ISO 14644-1  
 The norms stated refer to the relevant editions applicable at the time of the tests.

Test devices: Optical particle counter:  
 LasAir II 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:

- Length (incl. end pieces): ..... l = 1115 mm
- Interior: ..... empty
- Bending radius: .....r = 200 mm
- Stroke length:..... s = 820 mm
- Parameter Set 1:.....v<sub>1</sub> = 0.5 m/s; a<sub>1</sub> = 1.0 m/s<sup>2</sup>
- Parameter Set 2:.....v<sub>2</sub> = 1.0 m/s; a<sub>2</sub> = 2.0 m/s<sup>2</sup>
- Parameter Set 3:.....v<sub>3</sub> = 2.0 m/s; a<sub>3</sub> = 4.0 m/s<sup>2</sup>

## Test result / Classification

When operated under the specified test conditions, the cable guiding system e-skin 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 <sub>1</sub> = 0.5 m/s; a <sub>1</sub> = 1.0 m/s <sup>2</sup>	1
v <sub>2</sub> = 1.0 m/s; a <sub>2</sub> = 2.0 m/s <sup>2</sup>	1
v <sub>3</sub> = 2.0 m/s; a <sub>3</sub> = 4.0 m/s <sup>2</sup>	1
<b>Overall result</b>	<b>1</b>

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   
 Frank Bürger, Project Manager Fraunhofer IPA