



**Fraunhofer**

**TESTED<sup>®</sup>  
DEVICE**

igus GmbH  
Cleanroom e-chain CRC  
**Report No. IG 1311-677**

DUPLICATE

Statement of  
Qualification

# Statement of Qualification

**Customer:** igus GmbH  
Spicher Strasse 1a  
51147 Cologne  
Germany

**Component tested:**

Category: Energy Supply

Subcategory: Cable Guiding System

Type: Cleanroom e-chain CRC (CRC.E6.29.040.01.0)  
Low Friction FlatCable (8 units cable, white)

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

The cleanroom e-chain CRC (CRC.E6.29.040.01.0) is suitable for use in cleanrooms fulfilling the following Air Cleanliness Class:

Parameters	Air Cleanliness Class
Set 1	1
Set 2	1
Set 3	1
Overall result	<b>1</b>

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

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

Measuring instruments: Optical Particle Counter:  
Model LasAir II 110 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: .....  $22 \text{ }^\circ\text{C} \pm 0.5 \text{ }^\circ\text{C}$  ( $71.6 \text{ }^\circ\text{F} \pm 0.9 \text{ }^\circ\text{F}$ )
- Relative humidity: .....  $45\% \pm 5\%$

Test parameters of the test execution:

- Base chain type: ..... E6.29.40.100.0
- Chain length: .....  $l=2000 \text{ mm}$
- Bending radius: .....  $r=145 \text{ mm}$
- Equipped with: ..... 6 cables
- Stroke length:.....  $s=1500 \text{ mm}$
- 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: .....  $v_3=2.0 \text{ m/s}$ ;  $a_3=4.0 \text{ m/s}^2$

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](http://www.tested-device.com).

Fraunhofer Institute for  
Manufacturing Engineering and Automation IPA

Department Ultraclean Technology  
and Micromanufacturing

Nobelstrasse 12  
70569 Stuttgart  
Germany

Stuttgart, December 10, 2013

Place, Date

*[Signature]*  
i.A. Project manager