



# Fraunhofer

## TESTED<sup>®</sup> DEVICE

igus GmbH  
E6.29.060.100.0

**Report No. IG 2304-1412**

DUPLICATE

Statement of  
Qualification

Single product  
Particle Emission  
in Cleanroom  
(atmospheric)

Customer	igus GmbH Spicher Strasse 1a 51147 Cologne Germany
Component tested	
Category:	Energy Supply
Subcategory:	Cable Guiding Systems
Product name:	E6.29.060.100.0 of the e-chain series E6.29 (manufacturing date: 11/25/2022; color: black; article number: E6.29.060.100.0; serial number: E6.29)

Random sampling of particle emissions (airborne) at representative sites in cleanroom under atmospheric conditions

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 $\geq 0.1\text{ }\mu\text{m}$ , $\geq 0.2\text{ }\mu\text{m}$ , $\geq 0.3\text{ }\mu\text{m}$ , $\geq 0.5\text{ }\mu\text{m}$ , $\geq 1.0\text{ }\mu\text{m}$ and $\geq 5.0\text{ }\mu\text{m}$
Test environment parameters:	<ul style="list-style-type: none"><li>Cleanroom Air Cleanliness Class (according to ISO 14644-1):..... ISO 1</li><li>Airflow velocity:.....0.45 m/s</li><li>Airflow pattern:..... vertical laminar flow</li><li>Room temperature: .....22 °C ± 0.5 °C</li><li>Relative humidity: ..... 45 % ± 5 %</li></ul>
Test procedure parameters:	<ul style="list-style-type: none"><li>Installation height: ..... h = 270 mm</li><li>Bending radius: .....r = 100 mm</li><li>Stroke length: ..... s = 800 mm</li><li>Parameter Set 1:.....<math>v_1 = 0.5\text{ m/s}</math>; <math>a_1 = 1.0\text{ m/s}^2</math></li><li>Parameter Set 2:.....<math>v_2 = 1.0\text{ m/s}</math>; <math>a_2 = 2.0\text{ m/s}^2</math></li><li>Parameter Set 3:.....<math>v_3 = 2.0\text{ m/s}</math>; <math>a_3 = 4.0\text{ m/s}^2</math></li></ul>

Test result / Classification	When operated under the specified test conditions (room temperature: 22 °C ± 0.5 °C; relative humidity: 45 % ± 5 %), the E6.29.060.100.0 of the e-chain series E6.29 is suitable for use in cleanrooms fulfilling the specifications of the following Air Cleanliness Classes according to ISO 14644-1:
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Test parameter(s)	Air Cleanlines Class
$v_1 = 0.5\text{ m/s}$ ; $a_1 = 1.0\text{ m/s}^2$	1
$v_2 = 1.0\text{ m/s}$ ; $a_2 = 2.0\text{ m/s}^2$	1
$v_3 = 2.0\text{ m/s}$ ; $a_3 = 4.0\text{ m/s}^2$	1
Overall result	1

Please note: Transport damages, incorrect installation, aging behavior, etc. can influence the test result.

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	IG 2304-1412 Report No. first document	Stuttgart, November 22, 2024 Place, date of first document issued
Department of Ultraclean Technology and Micromanufacturing	-- Report No. current document	-- Place, current date
Nobelstrasse 12 70569 Stuttgart Germany	on behalf of Dr.-Ing. Frank Bürger, Project Manager Fraunhofer IPA	