



Fraunhofer

**TESTED[®]
DEVICE**

igus GmbH
e-skin flat 3 layers
Report No. IG 2107-1242

DUPLICATE

Statement of
Qualification

Single product
Particle Emission

Statement of Qualification · Single product

Customer
 igus GmbH
 Spicher Strasse 1a
 51147 Cologne
 Germany

Component tested

Category: Energy Supply
 Subcategory: Cable Systems
 Product name: e-skin flat single pod 3 layers with support chain, CFCLEAN3.01.05.02 & CAPU.A.06.0
 (manufacturing date: 10/5/2020; color: white; charge number: 4927146; serial number: SKF120/SKF12C)

Test result / Classification

When operated under the specified test conditions, the e-skin flat single pod 3 layers with support chain, CFCLEAN3.01.05.02 & CAPU.A.06.0 is suitable for use in cleanrooms fulfilling the specifications of the following Air Cleanliness Classes according to ISO 14644-1:

Test parameter(s)	Air Cleanliness 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.

Random sampling of particle emissions (airborne) at representative sites

Standards/Guidelines: ISO 14644-1, -14
 The norms stated generally refer to the version valid at the time of the tests.

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 ± 0.5 °C
- Relative humidity: 45 % ± 5 %

Test procedure parameters:

- Clearance height:.....h = 251 mm
- Stroke length:..... s = 410 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 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 2107-1242

Stuttgart, August 18, 2021

Report No. first document

Place, date of first document issued

Department of Ultraclean Technology and Micromanufacturing

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 Report No. current document

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 Place, current date

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on behalf of 
 Dr.-Ing. Frank Bürger, Project Manager Fraunhofer IPA