



valid until: April 17, 2029

Fraunhofer

TESTED[®] DEVICE

igus GmbH
chainflex CFBUS.LB

Report No. IG 2305-1427

DUPLICATE

Statement of
Qualification

Product series
Particle Emission

Statement of Qualification · Product series

Customer

igus GmbH
Spicher Strasse 1a
51147 Cologne
Germany

Component tested

Category: Energy Supply

Subcategory: Cable Systems

Product name: chainflex Bus cable CFBUS.LB
Tested products:

- CFBUS.LB.001 (manufacturing date: first quarter of 2023)
- CFBUS.LB.020 (manufacturing date: third quarter of 2022)
- CFBUS.LB.060 (manufacturing date: fourth quarter of 2022)

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.

Test devices: 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: $22 \text{ }^\circ\text{C} \pm 0.5 \text{ }^\circ\text{C}$
- Relative humidity: $45 \% \pm 5 \%$

Test procedure parameters:

- Energy chain: E61.29.050.075.0 or E61.29.050.150.0
- Chain bending radius: $r = 75 \text{ mm}$ or 150 mm
- Stroke length:..... $s = 820 \text{ mm}$
- 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:..... $v_3 = 2.0 \text{ m/s}$; $a_3 = 4.0 \text{ m/s}^2$

Test result / Classification

When operated under the specified test conditions, the cable series chainflex Bus cable CFBUS.LB 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
$v_1 = 0.5 \text{ m/s}$; $a_1 = 1.0 \text{ m/s}^2$	3
$v_2 = 1.0 \text{ m/s}$; $a_2 = 2.0 \text{ m/s}^2$	4
$v_3 = 2.0 \text{ m/s}$; $a_3 = 4.0 \text{ m/s}^2$	4
Overall result	4

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

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Department of Ultraclean Technology and Micromanufacturing

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Place, current date

Nobelstrasse 12
70569 Stuttgart
Germany

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