



Fraunhofer

**TESTED[®]
DEVICE**

U.I. Lapp GmbH
ÖLFLEX ROBUST FD
Report No. LA 2509-1671

DUPLICATE

Statement of
Qualification

Single product
Particle Emission
in Dry-Cleanroom

Customer	U.I. Lapp GmbH Schulze-Delitzsch Strasse 25 70565 Stuttgart Germany
Tested product	
Category:	Energy Supply
Subcategory:	Cable Systems
Product name:	ÖLFLEX ROBUST FD 5G1,5 (manufacturing date: week 25/2025; color: black; article number: 0026523)

Random sampling of particle emissions (airborne) at representative sites in dry-cleanroom

Standards/guidelines:	ISO 14644-1, -14 The norms stated generally refer to the version valid at the time of the tests.
Test equipment:	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:	- Dry-Cleanroom Air Cleanliness Class (according to ISO 14644-1): ISO 3 - Airflow velocity: $0.1\text{ m/s} \pm 0.05\text{ m/s}$ - Airflow pattern: displacement flow - Room temperature: $22\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ - Dew point: $-40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$
Test procedure parameters:	- Energy chain: igus E61.29.02.075 - Bending radius: $r = 85\text{ mm}$ - 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

The cable system ÖLFLEX ROBUST FD 5G1,5 is suitable for use under the specified test parameters (room temperature: $22\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$; dew point: $-40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$) in dry-cleanrooms of the following Air Cleanliness Classes according to ISO 14644-1:

Test parameter(s)	Air Cleanlines Class
$v_1 = 0.5\text{ m/s}$; $a_1 = 1.0\text{ m/s}^2$	4
$v_2 = 1.0\text{ m/s}$; $a_2 = 2.0\text{ m/s}^2$	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	LA 2509-1671 Report No. first document	Stuttgart, November 13, 2025 Place, date of first document issued
Business unit Testing and Certification	-- Report No. current document	-- Place, current date
Nobelstrasse 12 70569 Stuttgart Germany	on behalf of Dr.-Ing. Frank Bürger, head of business unit Testing and Certification	