IPA

valid until: November 18, 2027

Fraunhofer

TESTED®
DEVICE

LAPPKOREA LLC
CR 8211 MC 3X0.14SQ
Report No. LA 2208-1345

Statement of
Qualification

Single product
Particle Emission

Fraunhofer
IPA

Fraunhofer
IPA

Statement of Qualification · Single product

Customer

LAPPKOREA LLC
42, JANGANGONGDAN 8-GIL
18579 JANGAN-MYEON, HWASEONG-SI, GYEONGGI-DO
Korea

Component tested

Category: Energy Supply

Subcategory: Cable Systems

Product name: UNITRONIC CLEANROOM FD 8211 MC 3 X 0.14SQ
(manufacturing date: 6/24/2022; color: black; batch number: C/25; serial number: 85132401)

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 ≥0.1 µm, ≥0.2 µm, ≥0.3 µm, ≥0.5 µm, ≥1.0 µm and ≥5.0 µm

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:

- Energy chain: Igus E61.29.02.150
- Bending radius: r = 150 mm
- Stroke length: s = 820 mm
- Parameter Set 1: v_1 = 0.5 m/s; a_1 = 1.0 m/s²
- Parameter Set 2: v_2 = 1.0 m/s; a_2 = 2.0 m/s²
- Parameter Set 3: v_3 = 2.0 m/s; a_3 = 4.0 m/s²

Test result / Classification

When operated under the specified test conditions, the cable UNITRONIC CLEANROOM FD 8211 MC 3 X 0.14SQ is suitable for use in cleanrooms fulfilling the specifications of the following Air Cleanliness Classes according to ISO 14644-1:

Test parameter(s)	Air Cleanlines Class
v_1 = 0.5 m/s; a_1 = 1.0 m/s²	1
v_2 = 1.0 m/s; a_2 = 2.0 m/s²	1
v_3 = 2.0 m/s; a_3 = 4.0 m/s²	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

Department of Ultraclean Technology and Micromanufacturing

Nobelstrasse 12
70569 Stuttgart
Germany

LA 2208-1345 — Report No. first document
Stuttgart, November 18, 2022 — Place, date of first document issued

-- — Report No. current document
-- — Place, current date

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

This document only applies to the named product in its original state and is valid for a period of 5 years from the date the first document was issued. The document can be verified under **www.tested-device.com**.