Fraunhofer

TESTED®
DEVICE

Thomas Engineering Co., Ltd.
ThomPod ThomCL4435 + ThomFlat
Report No. TH 1606-833

DUPLICATE

Statement of
Qualification

Particle Emission

Fraunhofer
IPA

Fraunhofer
IPA

Statement of Qualification

Customer

Thomas Engineering Co., Ltd.
#206, Yeochon-3 gil
Ochang-Eup, Cheongwon-Gu,
Cheongju-si, Chung-buk, 363-884
Korea

Component tested

Category:	Energy Supply
Subcategory:	Cable Systems
Product name:	ThomPod (F22-03R0205, F22-03R0205, F25-04R0205) ThomCL4435 with ThomFlat (F11-W1009) (manufacturing date: 15/6/2016; color: white)

Random sampling of particle emissions (airborne) at representative sites

Standards/Guidelines:	VDI 2083-9.1; ISO 14644-1 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: ..... none • Bending radius: ..... r = 110 mm • Stroke length: ..... s = 820 mm • Cable length: ..... approx. l = 1000 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

Fraunhofer IPA

Test result / Classification

When operated under the specified test conditions, the ThomPod (F22-03R0205, F22-03R0205, F25-04R0205) ThomCL4435 with ThomFlat (F11-W1009) is suitable for use in cleanrooms fulfilling the specifications of the following Air Cleanliness Class according to ISO 14644-1:

Test parameter(s)	Air Cleanliness 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	2
v_3 = 2.0 m/s; a_3 = 4.0 m/s²	3
Overall result	**3**

DUPLICATE

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.

For further information about the test environment and parameters, please refer to the Fraunhofer IPA test report.

Fraunhofer Institute for Manufacturing Engineering and Automation IPA

Department of Ultraclean Technology and Micromanufacturing

Nobelstrasse 12
70569 Stuttgart
Germany

Stuttgart, August 10, 2016
Place, date of first document issued

--
Place, current date

on behalf of
Frank Bürger, Project Manager Fraunhofer IPA