



**Fraunhofer**

**TESTED<sup>®</sup>  
DEVICE**

Thomas Engineering Co., Ltd.  
ThomPod ThomCL4433 + ThomFlat  
**Report No. TH 1606-833**

DUPLICATE

Statement of  
Qualification

Particle Emission

# 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, F25-04R0205, F25-04R0205)  
 ThomCL4433 with ThomFlat  
 (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  $\geq 0.1 \mu\text{m}$ ,  $\geq 0.2 \mu\text{m}$ ,  
 $\geq 0.3 \mu\text{m}$ ,  $\geq 0.5 \mu\text{m}$ ,  $\geq 1.0 \mu\text{m}$  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: .....  $22^\circ\text{C} \pm 0.5^\circ\text{C}$
- Relative humidity: .....  $45\% \pm 5\%$

Test procedure parameters:

- Energy chain: ..... none
- Bending radius: .....  $r = 110 \text{ mm}$
- Stroke length: .....  $s = 820 \text{ mm}$
- Cable length:..... approx.  $l = 1000 \text{ mm}$
- 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 ThomPod (F22-03R0205, F25-04R0205, F25-04R0205) ThomCL4433 with ThomFlat 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
$v_1 = 0.5 \text{ m/s}$ ; $a_1 = 1.0 \text{ m/s}^2$	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
<b>Overall result</b>	<b>1</b>

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

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 Place, current date

on behalf of   
 Frank Bürger, Project Manager Fraunhofer IPA