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**TESTED[®]
DEVICE**

Knauf AMF GmbH & Co. KG
TOPIQ Efficient pro Hygena
Report No. KN 1511-790

DUPLICATE

Statement of
Qualification

Particle Emission

Statement of Qualification

Customer Knauf AMF GmbH & Co. KG
 Elsenthal 15
 94481 Grafenau
 Germany

Component tested

Category: Cleanroom Facilities

Subcategory: Wall, Ceiling, Floor

Product name: TOPIQ Efficient pro Hygena
 Exposed System, VENTATEC – Performance T24
 (manufacturing date: 22/9/2015; color: white, similar to RAL 9010;
 article number: 517416; dimensions: 600 x 600mm)

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 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 °C \pm 0.5 °C
- Relative humidity: 45 % \pm 5 %

Test procedure parameters:

- Upper surface of the complete system: sealed with adhesive cleanroom film
 The ceiling system was subjected to stress as follows
- Structure-borne noise approx. 5 to 50 Hz
- Oscillation velocity (\emptyset):..... v = 20 $\mu\text{m/s}$
- Oscillation acceleration (\emptyset):..... a = 8 mm/s²
- Deflection of the system (\emptyset):..... s = 0.06 μm

Test result / Classification

When operated under the specified test conditions, the ceiling system TOPIQ Efficient pro Hygena (Exposed System, VENTATEC – Performance T24) 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
Structure-borne noise = 5 to 50 Hz	4
Overall result	4

Note that Class 1 to 5 cleanrooms according to ISO 14644-1 have a high filter occupancy, with the result that ceiling elements cannot be used in some cases. Cleanrooms with a horizontal displacement flow form an exception to this.

A visual inspection of the test piece according to VDI 2083 Part 9.1 shows that increased particle emission could occur because the cut edges of the ceiling panels are not sealed. This is especially the case when mounting or removing them. The cut edges may not become damaged during handling as this could have a negative effect on particle emission behavior from the ceiling elements, even during operation. Both points are to be viewed as critical if the elements are used in cleanrooms.

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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on behalf of 
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