



valid until: August 18, 2028

Fraunhofer

TESTED[®] DEVICE

Pfennig Reinigungstechnik GmbH

2000002195 v2 PW

Report No. PF 2205-1324

DUPLICATE

Statement of
Qualification

Single product
Particle Emission

Statement of Qualification · Single product

Customer
 Pfennig Reinigungstechnik GmbH
 Heubachstrasse 1
 87471 Durach
 Germany

Component tested

Category: Materials
 Subcategory: Consumables
 Product name: 2000002195 v2 PW
 (manufacturing date: 4/2023; pre-treatment: pre-washed; color: white;
 article number: prototype; material: 100% polyester)

Random sampling of particle emissions (airborne)

Standards/Guidelines: ISO 14644-1, -14; VDI 2083 Part 9.2, Part 9.1 (without 24-hour running-in period)
 The norms stated generally refer to the version valid at the time of the tests.

Test devices: Optical particle counter:
 LasAir II 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:

Test bench according to ISO 9073-10:

- Sample clamping position:..... flat
- Length between clamping points: 230 mm
- Motion cycle:
 - Linear compression s:..... 120 mm
 - Torsion: 180°
- Cycle time t: 1 s
- Sampling chamber:..... none
- Duration of stress applied to test piece: 100 min
- Distance between particle counting probe and test piece:..... 130 mm

Test result / Classification

When operated in a dry state using the given test parameters, the mop 2000002195 v2 PW (pre-washed) is suitable for use in cleanrooms up to the following Air Cleanliness Class according to ISO 14644-1:

Test parameter(s)	Air Cleanliness Class
Linear compression = 120 mm Torsion = 180° Cycle time t = 1 s	5
Overall result	

This corresponds with ISO-ACP_c Class 5 according to VDI 2083 Part 9.2.

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

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Stuttgart, August 18, 2023
 Place, date of first document issued

Department of Ultraclean Technology and Micromanufacturing

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 Place, current date

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