



Fraunhofer

TESTED[®]
DEVICE

Pfennig Reinigungstechnik GmbH
mop wipe King GMP
Report No. PF 2407-1538

DUPLICATE

Statement of
Qualification

Single product
Particle Emission

| | |
|------------------|--|
| Customer | Pfennig Reinigungstechnik GmbH Heubachstrasse 1 87471 Durach Germany |
| Component tested | |
| Category: | Materials |
| Subcategory: | Consumables |
| Product name: | mop wipe King GMP (manufacturing date: 4/2023; color: white; material: 100 % polyester; pre-treatment: pre-washed; article number: 3500055) |

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: | <ul style="list-style-type: none">Cleanroom Air Cleanliness Class (according to ISO 14644-1):..... ISO 1Airflow velocity:.....0.45 m/sAirflow pattern:..... vertical laminar flowTemperature:22 °C \pm 0.5 °CRelative humidity: 45 % \pm 5 % |
| Test procedure parameters: | Test bench according to ISO 9073-10: <ul style="list-style-type: none">Sample clamping position:..... flatLength between clamping points: 230 mmMotion cycle:<ul style="list-style-type: none">Linear compression s:..... 120 mmTorsion: 180°Cycle time t:1 sSampling chamber:.....noneDuration of stress applied to test piece: 100 minDistance 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 wipe King GMP is suitable for use in cleanrooms up to the following Air Cleanliness Class according to ISO 14644-1: | | | | | | |
|---|---|-------------------|----------------------|---|---|----------------|--|
| | <table><tr><th>Test parameter(s)</th><th>Air Cleanlines Class</th></tr><tr><td>Linear compression = 120 mm Torsion = 180° Cycle time t = 1 s</td><td>4</td></tr><tr><td>Overall result</td><td></td></tr></table> | Test parameter(s) | Air Cleanlines Class | Linear compression = 120 mm Torsion = 180° Cycle time t = 1 s | 4 | Overall result | |
| Test parameter(s) | Air Cleanlines Class | | | | | | |
| Linear compression = 120 mm Torsion = 180° Cycle time t = 1 s | 4 | | | | | | |
| Overall result | | | | | | | |
| | This corresponds with ISO-ACP _c Class 4 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 | PF 1910-1152 Report No. first document | Stuttgart, November 20, 2019 Place, date of first document issued |
| Department of Ultraclean Technology and Micromanufacturing | PF 2407-1538 Report No. current document | Stuttgart, November 20, 2024 Place, current date |
| Nobelstrasse 12 70569 Stuttgart Germany | on behalf of Dr.-Ing. Frank Bürger, Project Manager Fraunhofer IPA | |