Statement of Qualification

Customer
Mobile Industrial Robots ApS
Emil Neckelmanns Vej 15F
5220 Odense
Denmark

Component tested
Category: Automation Components
Subcategory: Robotics
Product name: Mobile robot MiR100
(manufacturing date: 2018; color: white; serial number: 18010000200000
MiR100 2.0; max. load: 100 kg)

Random sampling of particle emissions (airborne) at representative sites

Standards/Guidelines:
ISO 14644-1, -14
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:
- Test load: m = 100 kg
- Parameter Set 1 (180°-straight-180°):
  - Velocity: v₁ = 0.8 m/s
  - Acceleration: a₁ = 0.5 m/s²
  - Distance: s₁ = 2 m
- Parameter Set 2 (back-forth):
  - Velocity: v₂ = 0.8 m/s
  - Acceleration: a₂ = 0.5 m/s²
  - Distance: s₂ = 4 m

Test result / Classification

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.

When operated under the specified test conditions, the mobile robot MiR100 is suitable for use in cleanrooms fulfilling the specifications of the following Air Cleanliness Classes according to ISO 14644-1:

<table>
<thead>
<tr>
<th>Parameter set(s)</th>
<th>Air Cleanliness Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter Set 1 (180°-straight-180°):</td>
<td></td>
</tr>
<tr>
<td>Test load: m = 100 kg</td>
<td>4</td>
</tr>
<tr>
<td>Velocity: v₁ = 0.8 m/s</td>
<td></td>
</tr>
<tr>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Distance: s₂ = 4 m</td>
<td></td>
</tr>
</tbody>
</table>

Overall result 4