



Fraunhofer

**TESTED[®]
DEVICE**

KUKA Roboter GmbH
KR3 R540 (prototype)
Report No. KU 1607-835

DUPLICATE

Statement of
Qualification

Particle Emission

Statement of Qualification

Customer
 KUKA Roboter GmbH
 Zugspitzstrasse 140
 86165 Augsburg
 Germany

Component tested

Category: Automation Components

Subcategory: Robotics

Product name: KR3 R540 (prototype)
 (manufacturing date: 6/2016; serial number: 495007; payload: 3 kg; reach: 540 mm; 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 $> 5.0 \mu\text{m}$

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:

- Speed:..... 40 % and 80 %
- Attached payload: 3 kg
- Pause between cycles: 1 s
- Operation of each axis:..... separately
- Movement of each axis:
 - Axis 1:150° until -150°
 - Axis 2: -30° until -160°
 - Axis 3:90° until -160°
 - Axis 4:170° until -170°
 - Axis 5:90° until -90°
 - Axis 6:250° until -250°

Test result / Classification

When operated under the specified test conditions, the robot KR3 R540 (prototype) 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
Workload = 40 %	5
Workload = 80 %	6
Overall result	6

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, date of first document issued

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Place, current date

on behalf of 
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