



**Fraunhofer**

**TESTED<sup>®</sup>  
DEVICE**

KUKA Roboter GmbH  
KR AGILUS - 2 series  
**Report No. KU 1707-926**

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: KR AGILUS - 2 series consisting of:

- KR6 R700-2 (manufacturing date: 7/2017; color: white; serial number: 1023004)
- KR10 R1100-2 (manufacturing date: 9/2017; color: white; serial number: 1023013)

## 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  $\geq 0.1 \mu\text{m}$ ,  $\geq 0.2 \mu\text{m}$ ,  $\geq 0.3 \mu\text{m}$ ,  $\geq 0.5 \mu\text{m}$ ,  $\geq 1.0 \mu\text{m}$  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:

- Capacity: .....40 % and 80 % of maximum capacity
- Attached payload: .....6 kg and 10 kg
- Pause between cycles: .....1 s
- Operation of each axis: ..... separately
- Movement of each axis:
  - Axis 1: ..... -150° until 150°
  - Axis 2: ..... -180° until 0°
  - Axis 3: ..... -90° until 120°
  - Axis 4: ..... -150° until 150°
  - Axis 5: ..... -90° until 100°
  - Axis 6: ..... -200° until 200°

## Test result / Classification

When operated under the specified test conditions, the KR AGILUS - 2 series is suitable for use in cleanrooms fulfilling the specifications of the following Air Cleanliness Classes according to ISO 14644-1:

| Test parameter(s)     | Air Cleanliness Class |
|-----------------------|-----------------------|
| Capacity 40 %         | 3                     |
| Capacity 80 %         | 4                     |
| <b>Overall result</b> | <b>4</b>              |

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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Department of Ultraclean Technology and Micromanufacturing

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Nobelstrasse 12  
70569 Stuttgart  
Germany

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