



Fraunhofer

TESTED[®] DEVICE

KUKA Deutschland GmbH
KR 10 R1440-2

Report No. KU 2012-1197

DUPLICATE

Statement of
Qualification

Single product
Particle Emission

Customer	KUKA Deutschland GmbH Zugspitzstrasse 140 86165 Augsburg Germany
Component tested	
Category:	Automation Components
Subcategory:	Robotics
Product name:	KR 10 R1440-2 (manufacturing date: 10/15/2020; color: orange; article number: 355816; serial number: 4325010; weight: app. 160 kg; max. reach: 1440 mm)

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:	<ul style="list-style-type: none">• 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:	<ul style="list-style-type: none">• Velocity: 40 % and 80 % of maximum velocity• Attached payload: 10 kg• Break between cycles: 1 s• Operation of each axis:..... separately• Movement of each axis:<ul style="list-style-type: none">– Axis 1: -150° to 150°– Axis 2: -160° to -40°– Axis 3: -60° to 90°– Axis 4: -150° to 150°– Axis 5: -115° to 35°– Axis 6: -250° to 250°

Test result / Classification

When operated under the specified test conditions, the robot KR 10 R1440-2 is suitable for use in cleanrooms fulfilling the specifications of the following Air Cleanliness Classes according to ISO 14644-1:

Test parameter(s)	Air Cleanlines Class
Velocity = 40 %	5
Velocity = 80 %	5
Overall result	5

Please note: Transport damages, incorrect installation, oil leakage, aging behavior, corrosion 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	KU 2012-1197 Report No. first document	Stuttgart, February 19, 2021 Place, date of first document issued
Department of Ultraclean Technology and Micromanufacturing	-- Report No. current document	-- Place, current date
Nobelstrasse 12 70569 Stuttgart Germany	on behalf of Dr.-Ing. Frank Bürger, Project Manager Fraunhofer IPA	