



Fraunhofer

**TESTED[®]
DEVICE**

RK Rose+Krieger GmbH
RK DuoLine Z80 Clean
Report No. RK 2011-1187

DUPLICATE

Statement of
Qualification

Single product
Particle Emission

Customer	RK Rose+Krieger GmbH Potsdamer Strasse 9 32423 Minden Germany
Component tested	
Category:	Automation Components
Subcategory:	Linear Units
Product name:	RK DuoLine Z80 Clean (manufacturing date: 6/2020; article number: TD15A2F1A12C02468; weight: 24.44 kg; range: 2000 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 $\geq 0.1\text{ }\mu\text{m}$, $\geq 0.2\text{ }\mu\text{m}$, $\geq 0.3\text{ }\mu\text{m}$, $\geq 0.5\text{ }\mu\text{m}$, $\geq 1.0\text{ }\mu\text{m}$ and $\geq 5.0\text{ }\mu\text{m}$
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:	<ul style="list-style-type: none">Installation position: vertical, power unit beneathTravel length:..... s = 1920 mmPayload:noneSuction:.....none<ul style="list-style-type: none">Velocities: $v_1 = 0.5\text{ m/s}$; $v_2 = 1.0\text{ m/s}$; $v_3 = 2.0\text{ m/s}$Acceleration (consistent): a = 4.0 m/s²Suction: Q = ~ 75 l/min<ul style="list-style-type: none">Velocities: $v_4 = 0.25\text{ m/s}$; $v_5 = 0.5\text{ m/s}$; $v_6 = 1.0\text{ m/s}$Acceleration (consistent): a = 4.0 m/s²

Test result / Classification

When operated under the specified test conditions, the linear axis RK DuoLine Z80 Clean 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
$v_1 = 0.5\text{ m/s}$; $a_1 = 4.0\text{ m/s}^2$; without suction	5
$v_2 = 1.0\text{ m/s}$; $a_2 = 4.0\text{ m/s}^2$; without suction	7
$v_3 = 2.0\text{ m/s}$; $a_3 = 4.0\text{ m/s}^2$; without suction	7
Overall result without suction	7
$v_4 = 0.25\text{ m/s}$; $a_4 = 4.0\text{ m/s}^2$; with suction	1
$v_5 = 0.5\text{ m/s}$; $a_5 = 4.0\text{ m/s}^2$; with suction	1
$v_6 = 1.0\text{ m/s}$; $a_6 = 4.0\text{ m/s}^2$; with suction	3
Overall result with suction	3

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	RK 1404-704 Report No. first document	Stuttgart, March 4, 2015 Place, date of first document issued
Department of Ultraclean Technology and Micromanufacturing	RK 2011-1187 Report No. current document	Stuttgart, February 26, 2021 Place, current date
Nobelstrasse 12 70569 Stuttgart Germany	on behalf of Dr.-Ing. Frank Bürger, Project Manager Fraunhofer IPA	