



# Fraunhofer

## TESTED<sup>®</sup> DEVICE

Brooks CCS RS AG  
Handling Unit X/Y/R  
**Report No. BR 2504-1613**

DUPLICATE

Statement of  
Qualification

Single product  
Particle Emission  
in Cleanroom  
(atmospheric)

Customer	Brooks CCS RS AG High TechCenter 1 Lohstampfstrasse 11 8274 Tägerwilen Switzerland
Tested product	
Category:	Automation Components
Subcategory:	Positioning Systems
Product name:	EUV GUARDIAN LEAP HANDLING UNIT X/Y/R (manufacturing date: 2/7/2025; serial number: Prototype)

Random sampling of particle emissions (airborne) at representative sites in cleanroom under atmospheric conditions

Standards/guidelines:	ISO 14644-1, -14 The norms stated generally refer to the version valid at the time of the tests.
Test equipment:	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"><li>Cleanroom Air Cleanliness Class (according to ISO 14644-1):..... ISO 1</li><li>Airflow velocity:.....0.45 m/s</li><li>Airflow pattern:..... vertical laminar flow</li><li>Room temperature: .....22 °C ± 0.5 °C</li><li>Relative humidity: ..... 45 % ± 5 %</li></ul>
Test procedure parameters:	<ul style="list-style-type: none"><li>X-Axis:<ul style="list-style-type: none"><li>– Parameter Set 1: .....<math>v_{x,1} = 1.0\text{ m/s}</math>; <math>a_{x,1} = 1.0\text{ m/s}^2</math></li><li>– Parameter Set 2: .....<math>v_{x,2} = 0.6\text{ m/s}</math>; <math>a_{x,2} = 0.6\text{ m/s}^2</math></li><li>– Parameter Set 3: .....<math>v_{x,3} = 0.3\text{ m/s}</math>; <math>a_{x,3} = 0.3\text{ m/s}^2</math></li></ul></li><li>Y-Axis:<ul style="list-style-type: none"><li>– Parameter Set 4: .....<math>v_{y,1} = 0.5\text{ m/s}</math>; <math>a_{y,1} = 1.0\text{ m/s}^2</math></li><li>– Parameter Set 5: .....<math>v_{y,2} = 0.5\text{ m/s}</math>; <math>a_{y,2} = 0.5\text{ m/s}^2</math></li><li>– Parameter Set 6: .....<math>v_{y,3} = 0.3\text{ m/s}</math>; <math>a_{y,3} = 0.3\text{ m/s}^2</math></li></ul></li><li>All-Axes:<ul style="list-style-type: none"><li>– Parameter Set 7: .....<math>v_{x,1} = 1.0\text{ m/s}</math>; <math>a_{x,1} = 1.0\text{ m/s}^2</math>; <math>v_{y,1} = 0.5\text{ m/s}</math>; <math>a_{y,1} = 1.0\text{ m/s}^2</math>; <math>w_{r,1} = 180^\circ/\text{s}</math>; <math>w'_{r,1} = 180^\circ/\text{s}^2</math></li><li>– Parameter Set 8: .....<math>v_{x,2} = 0.6\text{ m/s}</math>; <math>a_{x,2} = 0.6\text{ m/s}^2</math>; <math>v_{y,3} = 0.3\text{ m/s}</math>; <math>a_{y,3} = 0.3\text{ m/s}^2</math>; <math>w_{r,2} = 90^\circ/\text{s}</math>; <math>w'_{r,2} = 90^\circ/\text{s}^2</math></li></ul></li></ul>

Test result / Classification	The EUV GUARDIAN LEAP HANDLING UNIT X/Y/R is suitable for use under the specified test parameters (room temperature: 22 °C ± 0.5 °C; relative humidity: 45 % ± 5 %) in cleanrooms of the following Air Cleanliness Classes according to ISO 14644-1:
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Test parameter(s)	Air Cleanlines Class
X-Axis	5
Y-Axis	4
All-Axes $v_{x,1} = 1.0\text{ m/s}$ , $a_{x,1} = 1.0\text{ m/s}^2$ ; $v_{y,1} = 0.5\text{ m/s}$ , $a_{y,1} = 1.0\text{ m/s}^2$ ; $w_{r,1} = 180^\circ/\text{s}$ , $w'_{r,1} = 180^\circ/\text{s}^2$	5
All-Axes $v_{x,2} = 0.6\text{ m/s}$ , $a_{x,2} = 0.6\text{ m/s}^2$ ; $v_{y,3} = 0.3\text{ m/s}$ , $a_{y,3} = 0.3\text{ m/s}^2$ ; $w_{r,2} = 90^\circ/\text{s}$ ; $w'_{r,2} = 90^\circ/\text{s}^2$	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.

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Business unit Testing and Certification	-- Report No. current document	-- Place, current date
Nobelstrasse 12 70569 Stuttgart Germany	on behalf of Dr.-Ing. Frank Bürger, head of business unit Testing and Certification	