



Fraunhofer

**TESTED[®]
DEVICE**

Bosch Rexroth AG
Chain conveyor VF+120
Report No. BO 2501-1585

DUPLICATE

Statement of
Qualification

Single product
Particle Emission
in Dry-Cleanroom

Customer	Bosch Rexroth AG Löwentorstrasse 74 70376 Stuttgart Germany
Tested product	
Category:	Automation Components
Subcategory:	Transfer Systems and Bearing
Product name:	Chain conveyor system VarioFlow plus 120 (manufacturing date: 1/2025 color: white/gray; weight: approx. 100kg; dimensions: 900 x 1300 x 1300 mm; article numbers: 3842546122, 3842547518, 3842546071)

Random sampling of particle emissions (airborne) at representative sites in dry-cleanroom

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">Dry-Cleanroom Air Cleanliness Class (according to ISO 14644-1): ISO 3Airflow velocity: $0.1\text{ m/s} \pm 0.05\text{ m/s}$Airflow pattern: displacement flowRoom temperature: $22\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$Relative humidity/dew point: $-40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$
Test procedure parameters:	<ul style="list-style-type: none">Conveying length: $l_c = 2300\text{ mm}$Conveying width: $w = 120\text{ mm}$Conveying height: $h = 850\text{ mm}$System length: $l_s = 2400\text{ mm}$Number of strands: $n = 1$Carrier medium: Plastic conveyor chainBelt pitch: $l_b = 34.5\text{ mm}$Attached Payload: $m = 16\text{ mm}$Parameter Set 1: $v_1 = 5\text{ m/min}$Parameter Set 2: $v_2 = 10\text{ m/min}$Parameter Set 3: $v_3 = 27\text{ m/min}$Parameter Set 4: $v_4 = 60\text{ m/min}$

Test result / Classification	When operated under the specified test conditions (room temperature of $22\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$; dew point: $-40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$), the chain conveyor system VarioFlow plus 120 is suitable for use in dry-cleanrooms fulfilling the specifications of the following Air Cleanliness Classes according to ISO 14644-1:
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Test parameter(s)	Air Cleanlines Class
$v_1 = 5\text{ m/min}$; $m = 16\text{ kg}$	4
$v_2 = 10\text{ m/min}$; $m = 16\text{ kg}$	6
$v_3 = 27\text{ m/min}$; $m = 16\text{ kg}$	6
$v_4 = 60\text{ m/min}$; $m = 16\text{ kg}$	6
Overall result	6

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	BO 2501-1585 Report No. first document	Stuttgart, February 10, 2025 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	