



**Fraunhofer**

**TESTED<sup>®</sup>  
DEVICE**

FlexLink AB  
X85 Conveyor-Clean (prototype)  
**Report No. FL 1606-830**

DUPLICATE

Statement of  
Qualification

Particle Emission

# Statement of Qualification

**Customer**  
 FlexLink AB  
 Byfogdegatan 11  
 415 50 Göteborg  
 Sweden

**Component tested**

Category: Automation Components  
 Subcategory: Transfer Systems and Bearing  
 Product name: X85 Conveyor-Clean (prototype)  
 Wax slide rail, POM B chain, X85X wheel disk, no GF drive wheel

## Random sampling of particle emissions (airborne) at representative sites

Standards/Guidelines: VDI 2083-9.1; ISO 14644-1  
 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:

- Chain velocities: ..... $v_1 = 5 \text{ m/min}$ ;  $v_2 = 10 \text{ m/min}$ ;  $v_3 = 15 \text{ m/min}$
- Load situation:..... payload cylinders blocked
- Number of payload cylinders: ..... 12
- Weight per payload cylinder: .....approx. 300 g

## Test result / Classification

When operated under the specified test conditions, the X85 Conveyor-Clean (Wax slide rail, POM B chain, X85X wheel disk, no GF drive wheel; prototype) is suitable for use in cleanrooms fulfilling the specifications of the following Air Cleanliness Class according to ISO 14644-1:

Test parameter(s)	Air Cleanliness Class
$v_1 = 5 \text{ m/min}$ ; payload cylinders blocked	7
$v_2 = 10 \text{ m/min}$ ; payload cylinders blocked	7
$v_3 = 15 \text{ m/min}$ ; payload cylinders blocked	7
<b>Overall result</b>	<b>7</b>

The drive fitted to the conveyor was used for test purposes only and was therefore not assessed regarding its particle emission behavior. In production environments the combination of conveyor and drive should be reassessed.

A visual inspection of the test piece according to VDI 2083 Part 9.1 has shown slight sign of abrasion on the plastic components of the conveyor. The generated particles are not getting airborne immediately. They rather stick to the surfaces due to electrostatic effects or sediment due to gravity and are therefore not detectable by optical particle counters. But in case of an uncontrolled discharge of the surfaces or unpredictable air currents large amounts of particles can be emitted. This has to be considered as critical in cleanroom environments.

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.

For further information about the test environment and parameters, please refer to the Fraunhofer IPA test report.

Fraunhofer Institute for Manufacturing Engineering and Automation IPA

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on behalf of   
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