



Fraunhofer

**TESTED[®]
DEVICE**

Lindner AG
Crono-I Clean 1200 TW
Report No. LI 1809-1068

DUPLICATE

Statement of
Qualification

Particle Emission

Statement of Qualification

Customer
Lindner AG
Moosstrasse 1
84051 Mettenbach
Germany

Component tested

Category: Cleanroom Facilities
Subcategory: Lighting Systems
Product name: Teardrop luminaire Crono-I Clean 1200 TW
(manufacturing date: 6/19/2018; color: RAL 9016; serial number: IP18/008606)

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:

- 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: The lighting system was subjected to stress as follows:

- Structure-borne noise: approx. 5 to 50 Hz
- Oscillation velocity (\emptyset):.....v = 1.1238 mm/s
- Oscillation acceleration (\emptyset):.....a = 0.3583 m/s²
- Deflection of the system (\emptyset):..... s = 0.0143 mm

Test result / Classification

When operated under the specified test conditions, the teardrop luminaire Crono-I Clean 1200 TW 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
Structure-borne noise = approx. 5 to 50 Hz	1
Overall result	1

It should be noted that cleanrooms of Class 1 to 5 according to ISO 14644-1 have a higher filter occupancy, which may restrict the use of panel lighting systems. Cleanrooms with a horizontal displacement flow form an exception to this.

The test result may be affected by the surrounding ceiling system, in particular the material pairing between lights and ceiling frames, as well as other mounting accessories. Particle emission behavior should be reassessed in each assembly situation.

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

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Department of Ultraclean Technology and Micromanufacturing

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on behalf of 
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