



Fraunhofer

TESTED[®] DEVICE

Whale-Tech/SHA THETA
CWCableChain(CW28.068-700)
Report No. WH 2503-1599

DUPLICATE

Statement of
Qualification

Single product
Particle Emission
in Cleanroom
(atmospheric)

Customer	Whale Technology (Shanghai) Co., Ltd Fenghua Rd. 1200 201803 Shanghai China
Tested product	
Category:	Energy Supply
Subcategory:	Cable Guiding Systems
Product name:	Wave-Shape Cleanroom Cable Chain (CW28.068-700) (manufacturing date: 11/11/2024; color: white; serial number: CW28.068-700)

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">Cleanroom Air Cleanliness Class (according to ISO 14644-1):..... ISO 1Airflow velocity:.....0.45 m/sAirflow pattern:..... vertical laminar flowRoom temperature:22 °C ± 0.5 °CRelative humidity: 45 % ± 5 %
Test procedure parameters:	<ul style="list-style-type: none">Bending radius:r = 80 mmStroke length:..... s = 820 mmParameter Set 1:.....$v_1 = 0.5\text{ m/s}$; $a_1 = 1.0\text{ m/s}^2$Parameter Set 2:.....$v_2 = 1.0\text{ m/s}$; $a_2 = 2.0\text{ m/s}^2$Parameter Set 3:.....$v_3 = 2.0\text{ m/s}$; $a_3 = 4.0\text{ m/s}^2$

Test result / Classification	When operated under the specified test conditions (room temperature: 22 °C ± 0.5 °C; relative humidity: 45 % ± 5 %), the Wave-Shape Cleanroom Cable Chain (CW28.068-700) is suitable for use in 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
$v_1 = 0.5\text{ m/s}$; $a_1 = 1.0\text{ m/s}^2$	2
$v_2 = 1.0\text{ m/s}$; $a_2 = 2.0\text{ m/s}^2$	1
$v_3 = 2.0\text{ m/s}$; $a_3 = 4.0\text{ m/s}^2$	1
Overall result	2

Please note: Transport damages, incorrect installation, aging behavior, 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	WH 2503-1599 Report No. first document	Stuttgart, April 7, 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	