



Fraunhofer

TESTED[®] DEVICE

V-Clean
V-CLEAN THFC P205
Report No. VC 2409-1560

DUPLICATE

Statement of
Qualification

Single product
Particle Emission
in Cleanroom
(atmospheric)

Customer	V-Clean Semiconductor Technology (Shanghai) Co., LTD 1304F, Building C6, Hengfeng Industrial City Hangcheng Street; Baoan District 518101 Shenzhen China
Component tested	
Category:	Energy Supply
Subcategory:	Cable Systems
Product name:	V-CLEAN Trackless High Flex Cable P205.3.R40 (manufacturing date: 8/8/2024; color: white; batch number: 20240808001; serial number: 20240808001; charge number: P205.3.R40)

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 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">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 = 40 mmTravel 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 cable system V-CLEAN Trackless High Flex Cable P205.3.R40 is suitable for use in cleanrooms fulfilling the specifications of the following Air Cleanliness Classes according to ISO 14644-1:

Test parameter(s)	Air Cleanlines Class
$v_1 = 0.5\text{ m/s}$; $a_1 = 1.0\text{ m/s}^2$	1
$v_2 = 1.0\text{ m/s}$; $a_2 = 2.0\text{ m/s}^2$	1
$v_3 = 2.0\text{ m/s}$; $a_3 = 4.0\text{ m/s}^2$	1
Overall result	1

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	VC 2409-1560 Report No. first document	Stuttgart, October 18, 2024 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	