



Fraunhofer

TESTED[®]
DEVICE

CP SYSTEM CO., LTD.

G Clean Chain

Report No. CP 2607-1788

DUPLICATE

Cleanroom Suitability

Product series

Particle Emission
in Cleanroom
(atmospheric)

Customer

CP SYSTEM CO., LTD.
21-31, Jeonggwansanggok 1-gil, Jeonggwan-eup, Gijang gun
46018 Busan
Korea

Tested product

Category:

Energy Supply

Subcategory:

Cable Guiding Systems

Product name:

G Clean Chain
Tested Products:
nsb020CRG.20.R28 /F-1000L (50LK); nsb020CRG.40.R38 /F-1000L (50LK);
nsb020CRG.40.R48 /F-1000L (50LK); nsb022CRG.27.R35 /F-1012L (46LK);
nsb022CRG.47.R45 /F-1012L (46LK); nsb022CRG.77.R75 /F-1012L (46LK);
nsb028CRG.35.R50 /F-1008L (36LK); nsb028CRG.100.R70 /F-1008L (36LK);
nsb028CRG.200.R90 /F-1008L (36LK); nsb035CRG.35.R60 /F-1015L (29LK);
nsb035CRG.75.R75 /F-1015L (29LK); nsb035CRG.125.R100 /F-1015L
(29LK); nsb035CRG.200.R125 /F-1015L (29LK); nsb045CRG.75.R75
/F-1035L (23LK); nsb045CRG.125.R100 /F-1035L (23LK); nsb045CRG.175.
R120 /F-1035L (23LK); nsb045CRG.200.R140 /F-1035L (23LK);
nsb060CRG.100.R125 /F-1020L (17LK); nsb060CRG.150.R140 /F-1020L
(17LK); nsb060CRG.250.R190 /F-1020L (17LK); nsb060CRG.200.R220
/F-1020L (17LK); nsb060CRG.250.R270 /F-1020L (17LK)
(manufacturing date: 5/21/2026 and 8/1/2026)

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:

- Cleanroom Air Cleanliness Class (according to ISO 14644-1):..... ISO 1
- Airflow velocity:.....0.45 m/s
- Airflow pattern:..... vertical laminar flow
- Room temperature: 22 °C ± 0.5 °C
- Relative humidity: 45 % ± 5 %

Test procedure parameters:

- Bending radius: r = 28 mm to 270 mm
- Stroke length:..... s = 820 mm
- Parameter 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

The cable chain series G Clean Chain with inserted cable is suitable for use under the specified test parameters (room temperature: 22 °C ± 0.5 °C; relative humidity: 45 % ± 5 %) in cleanrooms 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, 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

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Business unit Testing and Certification

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Report No. current document

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Place, current date

Nobelstrasse 12
70569 Stuttgart
Germany

on behalf of
Dr.-Ing. Frank Bürger, head of business unit Testing and Certification

 **Fraunhofer**
IPA

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