



Fraunhofer

**TESTED[®]
DEVICE**

montratec GmbH
montrac + TracSwitch CR
Report No. MO 1706-920

DUPLICATE

Statement of
Qualification

Particle Emission

Statement of Qualification

Customer

montratec GmbH
Johann-Liesenberger-Strasse 7
78078 Niedereschach
Germany

Component tested

Category:

Automation Components

Subcategory:

Transfer Systems and Bearing

Product name:

montrac Transfersystem + TracSwitch CR
(manufacturing date: 4/13/2017; color: anodized aluminum (E6/EV1);
serial number: TracSwitch-divide R: 2078887-001;
serial number: TracSwitch-collect R: 2078887-002)

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 $\geq 0.1\text{ }\mu\text{m}$, $\geq 0.2\text{ }\mu\text{m}$,
 $\geq 0.3\text{ }\mu\text{m}$, $\geq 0.5\text{ }\mu\text{m}$, $\geq 1.0\text{ }\mu\text{m}$ 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
- Temperature:22 °C \pm 0.5 °C
- Relative humidity: 45 % \pm 5 %

Test procedure parameters:

- montrac single-axle MSH4 CR:..... $v_1 = 30.0\text{ m/min}$; $v_2 = 12.0\text{ m/min}$
Load capacity: $m_1 = 0\text{ kg}$
Shuttle route: smaller inner loop
- montrac dual-axle MSH4 CR: $v_1 = 30.0\text{ m/min}$; $v_2 = 12.0\text{ m/min}$
Load capacity:..... $m_2 = 29.7\text{ kg}$
Shuttle route: larger outer loop

Test result / Classification

When operated under the specified test conditions, the montrac Transfer-system + TracSwitch CR 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
montrac single-axle MSH4 CR; $m_1 = 0\text{ kg}$ montrac dual-axle MSH4 CR; $m_2 = 29.7\text{ kg}$	6
Overall result	6

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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on behalf of

Dr.-Ing. Frank Bürger, Project Manager Fraunhofer IPA

Stuttgart, November 7, 2017

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