



Fraunhofer

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DEVICE

M. Braun Inertgas-Systeme  
IV12-091 test box with FFU  
**Report No. MB 1403-696**

DUPLICATE

Statement of  
Qualification

Particle Emission

Statement of Qualification

Customer:	M. Braun Inertgas-Systeme GmbH Dieselstr. 31 85748 Garching Germany
Component tested	
Category:	Services
Sub-category:	Services / Cleanroom Acceptance
Product name:	IV12-091 Lightweight-construction test box with FFU and auxiliary blowers (Manufacturing date: June 2013; prototype)

Random sampling of particle emissions (airborne) at representative sites

Standards/Guidelines:	ISO 14644-1; VDI 2083-31 The norms stated refer to the relevant editions applicable at the time of the tests.
Test devices:	Optical particle counter: LasAir II 110 with measuring ranges $\geq 0.1\text{ }\mu\text{m}$ , $\geq 0.2\text{ }\mu\text{m}$ , $\geq 0.3\text{ }\mu\text{m}$ , $\geq 0.5\text{ }\mu\text{m}$ , $\geq 1.0\text{ }\mu\text{m}$ und $\geq 5.0\text{ }\mu\text{m}$
Test environment parameters:	<ul style="list-style-type: none"><li>• Process gas:..... Air</li><li>• Mode of the test box:<ul style="list-style-type: none"><li>– 12 filter fan units (FFU) with class U15 HEPA filters</li><li>– CG-distributor</li><li>– Recirculation over two side channels with auxiliary blowers</li></ul></li></ul>
Test procedure parameters:	<ul style="list-style-type: none"><li>• FFU speed:..... 100 %</li><li>• Auxiliary blower speed:..... 70 %</li><li>• Total volumetric flow: ..... 23000 m³/h</li><li>• Airflow velocity:..... 0.3 m/s</li></ul>

Test result / Classification: (in acc. with ISO 14644-1)	The system IV12-091 Lightweight-construction test box with FFU and auxiliary blowers is fulfilling the specifications of cleanrooms with ISO Class 1.  <ul style="list-style-type: none"><li>• Airflow velocity (30 cm beneath the ceiling):..... 0.28 to 0.32 m/s</li><li>• Recovery time and cross contamination: .....OK</li></ul> To fulfill the specifications of ISO Class 1, all gaps between the filters and their mounting strips must be sealed.
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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.

For further information about the test environment and parameters, please refer to the Fraunhofer IPA test report.