



Fraunhofer

TESTED[®] DEVICE

eltherm GmbH
ELPH-Cleanroom ID 40 mm
Report No. EL 2211-1363

DUPLICATE

Statement of
Qualification

Single product
Outgassing Behavior
VOC/SVOC

Customer	eltherm production GmbH Ernst-Heinkel-Strasse 6-10 57299 Burbach Germany
Component tested	
Category:	Process Equipment
Subcategory:	Heating and Cooling
Product name:	ELPH-Cleanroom ID 40 mm (manufacturing date: week 41/2022; color: gray; serial number: JCF0149 34/2022-01)

Emission measurements with purge-and-trap thermodesorption method and gas chromatography combined with mass spectrometry (TD-GC/MS)	
Standards/Guidelines:	ISO 14644-8, -15; ISO 16000-6, -9, -11, -25 The norms stated generally refer to the version valid at the time of the tests.
Testing equipment:	Measuring station: PerkinElmer Clarus 600, Clarus SQ8, ATD 650
Test procedure parameters:	<ul style="list-style-type: none">Retention range (VOC): C6 to C16Outgassing test temperatures: 23 °C and 180 °CDuration of preconditioning: 24 hHeating sleeve surface: 0.1 m²Sampling gas: pure nitrogenDuration of sampling: 1 h (23 °C) and 10 min (180 °C)Volume of the emission cell: 2.5 lAir change rate: 40/hEmission cell material: stainless steelSampling flow rate: 167 ml/min


Test result / Classification	The outgassing behavior of ELPH-Cleanroom ID 40 mm at room and operating temperature was investigated according to ISO 14644-15. Based on the outgassing rates determined for the specific equipment, the following material classification was made for the corresponding Contaminant Category:
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Contaminant Category (x)	SER _a ¹⁾ 23 °C [g/m²s]	ISO-ACC _m Class (x) based on 23 °C	SER _a ¹⁾ 180 °C [g/m²s]	ISO-ACC _m Class (x) based on 180 °C
VOC	3.2 x 10 ⁻¹⁰	-9.5	1.4 x 10 ⁻⁸	-7.9
SVOC	< 2.8 x 10 ⁻¹¹	< -10.6	2.6 x 10 ⁻⁷	-6.6
Amines	< 2.8 x 10 ⁻¹¹	--	< 1.7 x 10 ⁻¹⁰	--
Organophosphates	< 2.8 x 10 ⁻¹¹	--	< 1.7 x 10 ⁻¹⁰	--
Siloxanes	3.2 x 10 ⁻¹⁰	--	3.5 x 10 ⁻⁹	--
Phthalates	< 2.8 x 10 ⁻¹¹	--	< 1.7 x 10 ⁻¹⁰	--

¹⁾SER_a: Area-specific emission rate

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	EL 1603-812 Report No. first document	Stuttgart, May 31, 2016 Place, date of first document issued
Department of Ultraclean Technology and Micromanufacturing	EL 2211-1363 Report No. current document	Stuttgart, March 30, 2023 Place, current date
Nobelstrasse 12 70569 Stuttgart Germany	on behalf of  Dr.-Ing. Frank Bürger, Project Manager Fraunhofer IPA	