



Fraunhofer

**TESTED[®]
DEVICE**

Bischof + Klein SE & Co. KG
PE / EVOH / PE

Report No. BI 1801-993

DUPLICATE

Statement of
Qualification

Outgassing Behavior
VOC/SVOC

Statement of Qualification

Customer	Bischof + Klein SE & Co. KG Rahestrasse 47 49525 Lengerich Germany
Component tested	
Category:	Materials
Subcategory:	Consumables
Product name:	PE/EVOH/PE (manufacturing date: 11/16/2017; color: transparent; serial number: 19650219)
Emission chamber 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; VDI 2083 Part 17 The norms stated generally refer to the version valid at the time of the tests.
Testing equipment:	<ul style="list-style-type: none">Measuring station:PerkinElmer Clarus 600, Clarus 600T, ATD 650Sampling chamber:.....Markes International µCTE
Sample storage:	<ul style="list-style-type: none">Age of sample:34 daysPre-conditioning<ul style="list-style-type: none">Cleanroom Air Cleanliness Class (according to ISO 14644-1): ISO 1Airflow velocity:0.45 m/sAirflow type:..... vertical laminar flowTemperature:22 °C ± 0.5 °CRelative humidity: 45 % ± 5 %Purified air: VOC-filtered
Test procedure parameters:	<ul style="list-style-type: none">Retention range (VOC): C6 to C16Outgassing test temperatures: 23 °C and 90 °C

Test result / Classification

The outgassing behavior of PE/EVOH/PE at the stated temperatures was investigated according to VDI 2083 Part 17. Based on the outgassing rates determined for the specific surfaces, the following material classification was made for the corresponding Contaminant Category:


Contaminant Category (x)	SER _a ¹⁾ 23 °C [g/m²s]	SER _a ¹⁾ 90 °C [g/m²s]	ISO-ACC _m Class (x) based on 23 °C
VOC	4.0 x 10 ⁻⁷	3.1 x 10 ⁻⁶	-6.4
SVOC	3.9 x 10 ⁻⁹	1.8 x 10 ⁻⁷	-8.4
Amines	< 2.8 x 10 ⁻¹⁰	< 4.6 x 10 ⁻⁹	--
Organophosphates	< 2.8 x 10 ⁻¹⁰	< 4.6 x 10 ⁻⁹	--
Siloxanes	< 2.8 x 10 ⁻¹⁰	< 4.6 x 10 ⁻⁹	--
Phthalates	< 2.8 x 10 ⁻¹⁰	< 4.6 x 10 ⁻⁹	--

¹⁾ SER_a: Area-specific emission rate

The detection limit at the time of the test was ISO-ACC_m Class = -9.6 (VOC/SVOC). The ISO-ACC_m Class (x) was assigned for the named contaminant categories at the test temperature of 23 °C (room temperature).

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	BI 1801-993 Report No. first document	Stuttgart, February 8, 2018 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	