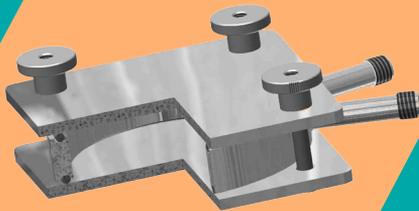




**LABC**

LABORTECHNIK

**Permeation  
Migration  
Sensor  
technology**



**Catalogue No.: 101\_V02**

**LABC-Labortechnik GmbH**

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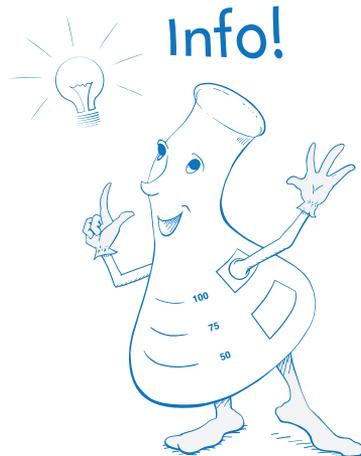
Court of registry: Amtsgericht Siegburg

**Registration number: HRB 14173**

**Tax ID:**

Value added tax identification number according to §27a Umsatzsteuergesetz:

DE309542478



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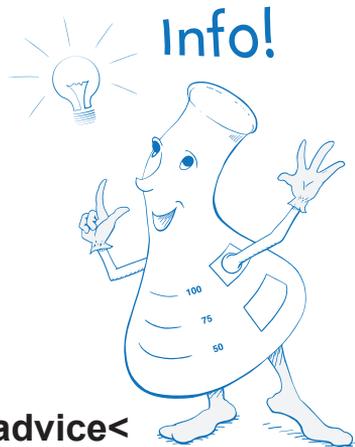
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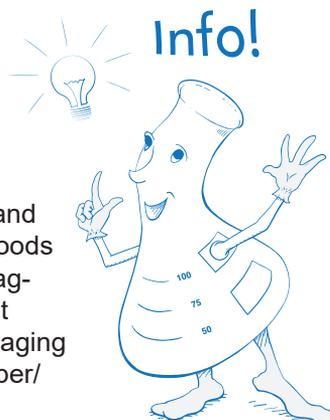


## **Our service >you will receive good advice<**

- If you have any phone questions, we are at your disposal.
- We will process your written supply orders immediately.
- We would gladly send you further information and catalogues upon request.
- All prices are available on request, and we'd be happy to send you a price list.
- These and other products and information available under **www.migrationcell.com** and **www.LABC.de**

## Permeation, Migration and Sensor Technology

Food contact materials such as food packaging protect the contents. They contain information, both for the consumer and the entire supply chain down to the retail business. Many foods cannot be stored and thus marketed without suitable packaging. Consumers first see the packaging on the supermarket shelf. The incentive to buy the product increases with packaging quality. Packaging materials include plastic, cardboard/ paper/ carton, aluminium, tin plate, glass and composite film.



For packing materials to conform with food laws, it is logical for materials and articles to be manufactured in such a way that, under normal or foreseeable conditions of use, they only transfer their material constituents to food in quantities which could not endanger human health and that do not cause any discernible odour or bad taste.

### Permeation

The transport of a substance through personal protective equipment (PPE) to human skin (permeation) should be prevented by wearing a PPE. The maximum time for wearing the equipment depends to a large extent on the resistance of the personal protective equipment (PPE) to the respective pollutant and the type of activity performed. As such, chemical safety gloves and clothing must exhibit a minimum resistance to invisible penetration (permeation) of chemicals for a period of time based on use in practice. This resistance is simulated experimentally according to the test methods of norms EN 16523-1:2015-04 and EN 16523-1:2015-04 (previously DIN EN 374-3) through determination of breakthrough times.

The wide variety of chemical substances encountered, the prescribed recommendations for a PPE material in a chemical safety data sheet and minor changes in the PPE material composition during its manufacture require that numerous permeation tests be carried out.

LABC-Labortechnik develops permeation workstations for standardised measurements.

**Qumat®-Q401-HR with detector: FID or FIP/FPD**

The most widely sold equipment is the Qumat® Q401-HR with FID detector. The analyser measures the permeation rate of chemicals detectable with a built-in FID, such as volatile organic substances. The analyser measures the breakthrough of the test chemicals in 3 permeation measurement cells. The installation of an additional FPD detector enables the determination of organic compounds containing small amounts of sulphur.



**Mobile permeation test stand**

The PERMOBIL can be readily used for real-time production quality controls. The PERMOBIL is a mobile permeation test stand with a measurement cell and a PID detector (photoionisation detector). The PID can also detect volatile organic substances, except for methanol, many chlorinated hydrocarbons and possibly diols with too small of a response factor.



**Fluid-PermCell NW50-liquid**

The product palate is supplemented by the Fluid-PermCell NW50-liquid with its conductivity and pH detectors for measuring acids, bases and salt solutions.



## Migration

Migration tests are carried out as simulation experiments here. They are most successfully carried out using so-called “migration cells”. It has been found that using a wide variety of migration cell sizes appropriate for the problem is better than using cells of a specific unit size. The advantage of a migration cell is that contact from one side can be re-established effectively without any sharp edges or other effects. To obtain comparable results, the tests are performed under standardised test conditions, such as test duration, test temperature and testing medium (food simulant) corresponding to the least favourable usage conditions possible of the material or article from plastic.

To measure migration of packing material substances, good analytical and laboratory know-how is needed, for example in order to obtain reliable analysis data based on high-resolution GC or LC and coupled mass spectrometry.

LABC-Labortechnik has made it its job to provide a broad spectrum of laboratory equipment and accessories related to all aspects of migration testing to analytical laboratories.

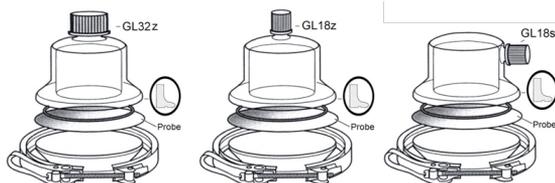
### The Siegwerk (Sieg-Mi-Flex) migration cell system

The most favourite product is the Siegwerk migration cell system (Sieg-Mi-Flex), with which, thanks to its modular design, many package sizes and thicknesses with a wide variety of material characteristics can be mounted as a sealed migration chamber together with all liquid and solid food simulants. The flexibility of the system for solving problems is high due to the selection of cells, including stainless steel, glass or fluoropolymers. So, for example, migration tests can be carried out with food simulants even beyond their boiling points.



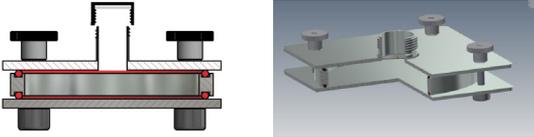
### MigraCubicle migration cell system

The MigraCubicle migration cell system is also available for a wide variety of sample sizes. These glass cells can be used in the testing of food simulants MPPO (Tenax®), 3% acetic acid and oil.



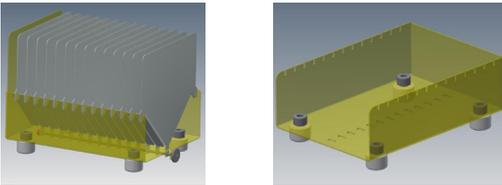
### Migra-Zell Type A migration cell

The stainless steel Migra-Zell Type A migration cell analogue of EN1186-1-2002 (temperature resistance: -15°C to approx. 180°C, pressure resistance up to max. 1 bar, surface contents: approx. 2.5 dcm<sup>2</sup>) completes the assortment of migration chambers.



### Migration testing using a bag

For the migration test analogous to EN1186-6:2002 with bags made through sealing 2 packing film sample specimens, LABC-Labortechnik offers a stainless steel bag holder with PTFE feet for 14 bags.



### Miscellaneous

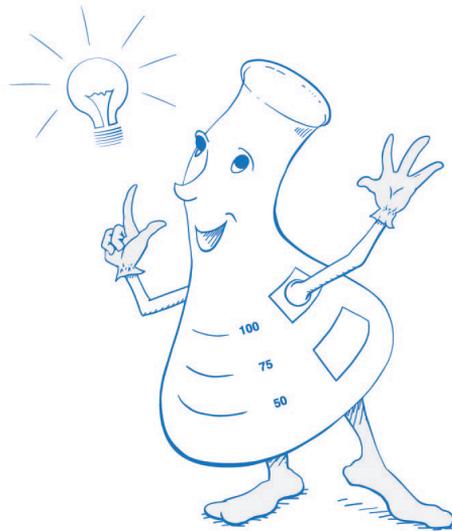
Also part of the assortment are adsorbants, templates and aids for cutting out sample round blanks; pressure-resistant lab screwed connectors for connecting GL male threads to hoses (or glass, plastic or metal tubes!), thermostatically-controlled equipment.

### Sensor technology

Equipment for taste testing of food contact materials with the Siegwerk combination migration cell system (Sieg-Mi-Flex), consisting of a stainless steel fixing plate set and a glass centre ring with water as the food simulant at 130°C, a taste test set for testing the change in taste of packing substances and packing media through the air space using the test substance water according to DIN 55534:2006-08, wide-neck flasks with ground stoppers for odour testing of food packages and the Scharfenberger odour tester for olfactory determination of upper and lower side of food contact materials.



# Permeation



## Qumat®-Q401-HR with detector: FID

The analyser measures the permeation rate in chemical safety gloves and clothing.

The chemicals are detected using a built-in FID.

The analyser measures the breakthrough of the test chemicals in 3 permeation measurement cells (not in the scope of delivery!) according to DIN EN 374-3 and EN 16523-1 (or alternatively in 1" ASTM cells).



Test cells are held in the permeation measurement cells, filled on one side with the fluid to be tested, and continuously permeated on the other side by a gaseous collecting medium. These 3 defined gas streams are analysed one after the other for volatile test substances detectable by an FID. The results are documented in a table. If a test substance traverses the test sample at a permeation rate of  $< 1 \mu\text{g min}^{-1} \text{cm}^{-2}$ , a breakthrough has occurred according to DIN EN 374-3 and EN 16523-1.

### The Qumat®-Q401-HR-FID

- a PC-controlled multiposition valve for analysing 6 gas streams one after the other. In addition to the 3 glass permeation measurement cells (not in the scope of delivery!), the zero gas, a reference gas (such as isobutane/air) and a test gas at the test chemical breakthrough concentration can be measured with the test specimens.
- A plexiglass housing with an exhaust gas nozzle for temperature control of the permeation cells, reference gas cell, test gas cell and the zero gas
- A temperature controller with a fan, a heater (300 W) and a Peltier cooler ( $>100 \text{ W}$ ) to pre-establish the temperatures of  $23^\circ\text{C} \pm 1^\circ\text{C}$  or  $33^\circ\text{C} \pm 1^\circ\text{C}$
- An FID for detecting hydrocarbon-based test substances and (switchably) an FPD for detecting test substances containing P and S.
- An evaluation program that generates Excel-compatible data (prerequisite: the PC must have a USB and Windows 7 (not in the scope of delivery!))

### Note:

Only trained and qualified personnel may operate the equipment. A 2-day training course is recommended. It is offered in German and English. Scope of delivery:

- Qumat®-Q401-HR-FID analyser (width × depth × height: 100 cm × 70 cm × 60 cm)
- 2 PTFE blind flanges for reagent gas and test gas with glass lower part of the permeation measurement cells.

## Qumat®-Q401-HR with detector: FID/FPD

The analyser measures the permeation rate in chemical safety gloves and clothing.

The chemicals are detected using a built-in FID or FPD.

The analyser measures the breakthrough of the test chemicals in 3 permeation measurement cells (not in the scope of delivery!) according to DIN EN 374-3 and EN 16523-1 (or alternatively in 1" ASTM cells).



Test cells are held in the permeation measurement cells, filled on one side with the fluid to be tested, and continuously permeated on the other side by a gaseous collecting medium. These 3 defined gas streams are analysed one after the other for volatile test substances detectable by an FiD or FPD. The results are documented in a table. If a test substances traverses the test sample at a permeation rate of  $< 1 \mu\text{g min}^{-1} \text{cm}^{-2}$ , a breakthrough has occurred according to DIN EN 374-3 and EN 16523-1.

The Qumat®-Q401-HR-FID/FPD

a PC-controlled multiposition valve for analysing 6 gas streams one after the other. In addition to the 3 glass permeation measurement cells (not in the scope of delivery!), the zero gas, a reference gas (such as isobutane/air) and a test gas at the test chemical breakthrough concentration can be measured with the test specimens.

A Plexiglass housing with an exhaust gas nozzle for temperature control of the permeation cells, reference gas cell, test gas cell and the zero gas

A temperature regulator with a fan, a heater (300 W) and a Peltier cooler ( $>100 \text{ W}$ ) for pre-establishing the temperatures of  $23^\circ\text{C} \pm 1^\circ\text{C}$  or  $33^\circ\text{C} \pm 1^\circ\text{C}$ , an FID for detecting hydrocarbon-based test substances and (switchably) an FPD for detecting test substances that contain P and S.

An evaluation program that generates Excel-compatible data (prerequisite: the PC must have a USB and Windows 7. (not in the scope of delivery!))

### Note:

Only trained and qualified personnel may operate the equipment. A 2-day training course is recommended. It is offered in German and English. Scope of delivery:

- Qumat®-Q401-HR-FID/FPD analyser (width × depth × height: 100 cm × 70 cm × 60 cm)
- 2 PTFE blind flanges for reagent gas and test gas with glass lower part of the permeation measurement cells.

**Item No.: 170-0360517**

## Mobile IFA\* permeation test stand according to EN 16523-1 (replaces EN374-3)

The measurement is done in a temperature-controlled permeation measurement cell according to EN 16523-1 (replaces EN374-3). The sample is held in the measurement cell and the test substances acts on the front side. Purified ambient air passes through the measurement space on the back side, with some of the air being routed to a suitable detector (such as a PID\*\*) for concentration measurement. The record of the detector signal provides the permeation curve of the material-chemical pair under investigation, and facilitates the determination of the permeation rate. The equipment was developed specifically for testing chemical safety glove and chemical safety clothing materials for chemical permeability.



**\*IFA = Institute for Workplace Safety of the DGUV**  
[German Social Accident Insurance];  
**\*\*PID = Photoionisation detector**



### The PERMOBIL:

- portable housing made of aluminium profiles and plexiglass
- integrated, ventilation-supported temperature controller to ensure that the required EN test temperature of  $23^{\circ}\text{C} \pm 1^{\circ}\text{C}$  is maintained at normal ambient temperature using a heater (300 W) and a Peltier cooler (>100 W)
- integrated pump with a volumetric flow meter and controller for drawing in ambient air through a commercially-available combination filter (gas- and particulate filter)
- Permeation cell according to EN 16523-1 (replaces EN374-3)
- Compensation vessel for removing the tested air stream
- Technical specifications: 230 V, weight: approx. 13 kg,
- Dimensions: Height=365 mm (460 mm with filter!), width=450 mm, depth=300-375 mm

PERMOBIL without PID detector

**Item No.: 250-0289047**

PERMOBIL work station with PID detector

**Item No.: 280-0407564**

## Permeation measurement cell NW50

with different film holders for liquid test chemicals and gaseous or liquid collection media.

Permeation measuring cell NW50 in accordance with EN 16523-1 (replaces EN 374-3) for testing PPE films (safety gloves, safety clothing) in relation to the permeability of liquid test substances and gaseous collection media.

### The permeation measurement cell:

made of glass, complete in support with three support feet and PTFE holder (for films < 0.2 mm) NW50 incl. silicone FEP-coated O-ring seals (2 × 56 mm + 1 × 62 mm)

### PTFE holders:

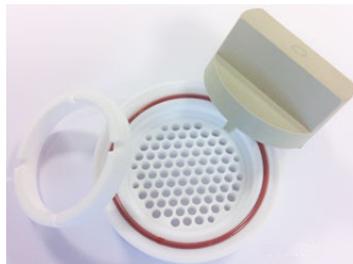
**Product no.: 250-0088978**

- **for films > 0.2 mm with seams** with textured, very structured surfaces and/or with seams (for safety gloves/safety clothing) in accordance with EN 16523-1 (replaces EN 374-3), ID: Ø50 mm with perforated plate as a film support for LABC permeation cell NW50 with 2 each O-rings (VQM coated with FEP), PTFE threaded ring for fixing the sample and a PPH screw-attachment tool

**Product no.: 250-0342773**



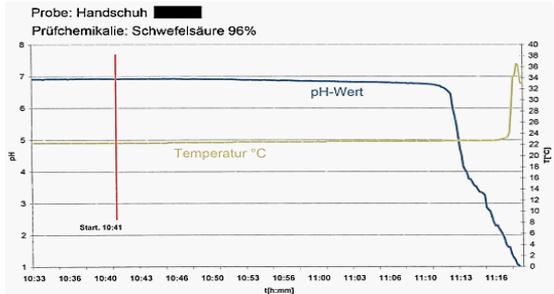
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250-0088978

## Fluid-PermCell NW50-liquid

Determination of chemical permeation of liquid test chemicals under continuous contact relative to safety clothing or safety glove material samples and a liquid collection medium.



The test of resistance of safety clothing materials against permeation is described in norms EN 16523-1 (replaces EN 374-3), ASTM F-739 and draft norm DIN EN ISO 6529, for example. The temperature-controlled Fluid-PermCell NW50 liquid permeation cell has a closed collection chamber (corresponding to: a closed system (circuit)) in which the liquid collection medium is thoroughly mixed with a magnetic stirring rod and the concentration of the permeated test chemical is measured as a function of time through a built-in conductivity or pH sensor “in situ”. The measurements are stored in the Multi3410 datalogger (manual conductivity and pH meter). The evaluation of the measured data can be done via tabular calculation on a PC.

In addition to the test chemicals recommended in draft norm DIN EN ISO 6529 (30% sodium hydroxide solution, 96% and 18% sulphuric acid), inorganic and organic acids and bases can be measured using an aqueous collection medium as an alternative. The Fluid-PermCell NW50-liquid with a temperature control jacket made of DURAN® laboratory glass is thermostatically maintained using the digital Peltier thermostat PT31 (heating/cooling liquid: water) to a test temperature of 23°C (+1°C). Other test temperatures can be selected as well, such as 33°C (up to max. 35°C and min. +13°C)! The material sample to be tested is placed in a PTFE sample holder (PTFE clamp).

**Item No.: 280-0354356**

## for determining the resistance of materials against permeation of chemicals during sustained contact:

- a) for the list of test chemicals in normative Appendix A of EN 374-1:2003
- b) for the list of suitable technologies for detecting chemicals in informative Appendix C of EN 16523-1:2015-04
- b) for the list of suitable technologies for determining gaseous chemicals in informative Appendix A of EN16523-2:2015-04

concerning a)

	<b>Test chemicals</b>	<b>CAS</b>	<b>Class</b>	<b>LABC analysers</b>	
A	Methanol	67-56-1	Primary alcohol	Qumat® Q401-HR with FID detector	
B	Acetone	67-64-1	Ketone	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector
C	Acetonitrile	75-05-8	Nitrile	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector
D	Dichloromethane	75-09-2	Chlorinated paraffin	Qumat® Q401-HR with FID detector	
E	Carbon disulphide	75-15-0	sulphur-containing organic compounds	Qumat® Q401-HR with FPD/FID detector	
F	Toluene	109-88-3	Aromatic hydrocarbon	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector
G	Diethylamine	109-89-7	Amine	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector
H	Tetrahydrofuran	109-99-9	Heterocyclic and ether compounds	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector
I	Ethyl acetate	141-78-6	Ester	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector
J	n-Heptane	142-85-5	Aliphatic hydrocarbon	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector
K	Sodium hydroxide 40%	1310-73-2	Inorganic base	Fluid-PermCell NW50-liquid with pH electrode*	
L	Sulphuric acid 96%	7664-93-9	Inorganic acid	Fluid-PermCell NW50-liquid with pH electrode*	

\* 1 conductivity electrode is part of the scope of delivery!

concerning b)

Test chemicals	CAS	Class	LABC analysers		
Methanol	67-56-1	Primary alcohol	Qumat® Q401-HR with FID detector		
Acetone	67-64-1	Ketone	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector	
Acetonitrile	75-05-8	Nitrile	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector	
Dichloromethane	75-09-2	Chlorinated paraffin	Qumat® Q401-HR with FID detector		
Carbon disulphide	75-15-0	sulphur-containing organic compounds	Qumat® Q401-HR with FPD/FID detector		
Toluene	109-88-3	Aromatic hydrocarbon	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector	
Diethylamine	109-89-7	Amine	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector	
Tetrahydrofuran	109-99-9	Heterocyclic and ether compounds	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector	
Ethyl acetate	141-78-6	Ester	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector	
n-Heptane	142-85-5	Aliphatic hydrocarbon	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector	
Sodium hydroxide 40%	1310-73-2	Inorganic base	Fluid-PermCell NW50-liquid with pH electrode*		
Sulphuric acid 96%	7664-93-9	Inorganic acid	Fluid-PermCell NW50-liquid with pH electrode*		
Acetic acid (99+1%)	64-19-7	Organic acid	Fluid-PermCell NW50-liquid with pH electrode*	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector
Ammonia solution (25+1%)	1336-21-6	Alkaline solution	Fluid-PermCell NW50-liquid with pH electrode*		
Hydrogen peroxide (30+1Vol.%)	124-43-6	Peroxide	Fluid-PermCell NW50-liquid with redox electrode		
Isopropanol	67-63-0	Aliphatic hydrocarbon	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector	
Sodium hypochlorite (13+1% active chlorite)	7681-52-9	Hypochlorite	Fluid-PermCell NW50-liquid with pH electrode*		

\* 1 conductivity electrode is part of the scope of delivery!

concerning c)

Test chemicals	CAS	LABC analysers	
Ammonia NH <sub>3</sub>	7664-41-7	Fluid-PermCell NW50-liquid with pH electrode*	
Hydrochloric acid HCl	7647-01-0	Fluid-PermCell NW50-liquid with pH electrode*	
Chlorine gas Cl <sub>2</sub>	7782-50-5	Fluid-PermCell NW50-liquid with pH electrode*	
Ethylene oxide (Oxirane) C <sub>2</sub> H <sub>4</sub> O	75-21-8	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector
Methyl chloride CH <sub>3</sub> Cl	74-97-3	Qumat® Q401-HR with FID detector	
Hydrofluoric acid HF	7664-39-3	in planning!	
Phosphine PH <sub>3</sub>	7803-51-2	Qumat® Q401-HR with FPD/FID detector	
Phosgene COCl <sub>2</sub>	75-44-5		
Methyl bromide CH <sub>3</sub> Br	74-83-9	Qumat® Q401-HR with FID detector	
Carbon monoxide CO	630-08-0		
Nitrogen dioxide NO <sub>2</sub>	10102-44-0	Fluid-PermCell NW50-liquid with pH electrode*	
Sulphur dioxide SO <sub>2</sub>	7446-09-5	Fluid-PermCell NW50-liquid with pH electrode*	Qumat® Q401-HR with FPD/FID detector
Sulphuryl fluoride SO <sub>2</sub> F <sub>2</sub>		Qumat® Q401-HR with FPD/FID detector	
1-3 butadiene	106-99-0	Qumat® Q401-HR with FID detector	PERMOBIL with PID detector
Ozone O <sub>3</sub>	10028-15-6		
Cyanogen chloride ClCN	506-77-4		

\* 1 conductivity electrode is part of the scope of delivery!

## Further information on LABC analysers (glove testers):

### **Qumat® Q401-HR with FID detector:**

- 3 measurement points, temperature-controlled, open cycle, gas collection medium
- used as permanent installations in research and testing laboratories
- Energy used is electricity, hydrogen (for FID) and nitrogen or compressed air (collection medium)



### **Qumat® Q401-HR with FID/FPD detector (switchable):**

- 3 measurement points, temperature-controlled, open cycle, gas collection medium
- used as permanent installations in research and testing laboratories
- Energy used is electricity, hydrogen (for FID) and nitrogen or compressed air (collection medium)



### **PERMOBIL with PID detector**

- 1 measurement point, temperature-controlled, open cycle, gas collection medium
- used in testing laboratories or in process controls
- can be used as a mobile unit
- as energy, only electricity is used



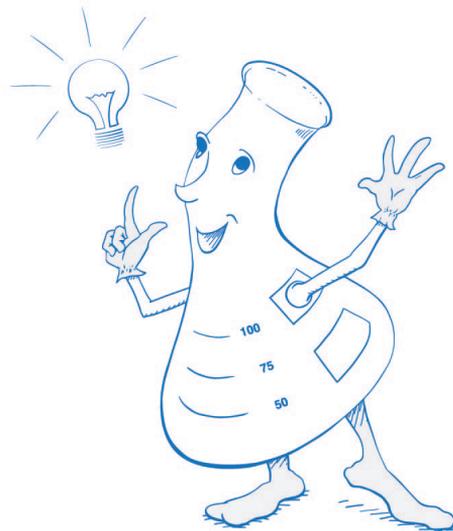
### **Fluid-PermCell NW50-liquid with pH electrode (1 conductivity electrode is included in the scope of delivery!)**

- 1 measurement point, temperature-controlled, closed circuit, water as collection medium
- used as permanent installation in research, testing laboratories or in process controls
- as energy, only electricity is used



All LABC analysers should be operated by trained specialists with solid knowledge in analytical chemistry. LABC-Labortechnik offers bookable training stages or product instructions.

# Migration



Sample preparation with the modular and flexible Siegwerk (Sieg-Mi-Flex) migration cell system for analytical measurement and organoleptic testing of the migration of packaging contents “Extractables and Leachables” (E&L) and MOSH/MOAH in food simulants, the headspace or pharmaceutical formulations for the purpose of compliance with legal regulations.



In the EU, packaging that comes into direct contact with food is subject to Regulation (EC) No 1935/2004. Article 3 lists the general requirements. Logically, the most important of these states that materials and articles must be manufactured in such a way that, under normal or foreseeable conditions of use, they only transfer their constituents to food in quantities which could not endanger human health. Supplemental individual requirements include: VO (EG) 450/2009 (active and intelligent packages), RL 2007/42/EG (cellulose film), VO (EG) 2023/2006 (good manufacturing practices), RL 2005/31/EG (ceramics).

For materials made of plastic, 2002/72/EG (“Plastic Guidelines”), EU ordinances 975/2009, 282/2008 (recyclable plastics) and 10/2011 (PIM), and 2016/1416 (for amending and correcting 10/2011) apply where specific requirements for the migration of substances is described.

Providing the food has not yet been placed in the packaging, testing occurs under unfavourable “worst case” contact conditions with food simulants that describe the properties of the food to be packaged. The total of all released constituents (global migration) must not exceed the limit of 10 mg per dm<sup>2</sup> of packaging area. Certain substances are also subject to specific migration limits (SMLs), which stipulate the maximum permitted amount in the food.

Migration cells or chambers for preparing the samples for the migration analyses with defined surface/volume ratios should have a high level of impermeability and be chemically resistant against the food simulants established in Regulation No 10/2011 (PIM) as well as the substitute food simulants ethanol 95%, iso-octane and water for organoleptic tests.

The Siegwerk (Sieg-Mi-Flex) migration cell system complies with Norm EN 1186-1, EU Regulation No. 1935/2004 and No. 10/2011 and 2016/1416 and makes it easier to prepare samples when using migration analytics or an organoleptic assessment.

## Food categories and simulants in Regulation (EU) No 10/2011 (PIM)

Food properties	Food simulant
Hydrophilic	(A) Ethanol 10% (v/v)
Hydrophilic; < pH 4.5	(B) Acetic acid 3% (w/v)
Hydrophilic/lipophilic; alcohol content up to 20%	(C) Ethanol 20% (v/v)
Lipophilic; alcohol content > 20%; oil in water emulsion	(D1) Ethanol 50% (v/v)
Lipophilic; free fats	(D2) Vegetable oil with specific fatty acid distribution
Dry foods	(E) Poly(2,6-diphenyl-p-phenylene oxide) (MPPO)

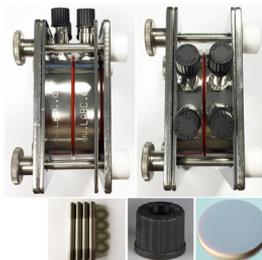
Thanks to the flexibility and modular structure of the Siegwerk (Sieg-Mi-Flex) migration cell system, many packaging sizes and thicknesses with a wide range of material properties can be used for migration tests with all liquid and solid food simulants, food simulants for substitute tests (iso-octane, ethanol 95 (v/v)) or solvents from pharmaceutical formulations, even above their boiling point, on a defined sample area plus subsequent storage depending on the time and temperature.

The Siegwerk (Sieg-Mi-Flex) migration cell system, in conformity with European Norm EN 1186-1:2002 (D), Appendix C (informative), Figure C.4 Cell type B and Figure C.5 Cell type C has been developed and tested in cooperation with the analytical department at Siegwerk Druckfarben AG & Co. KGaA.



Eva Holster and Dr Dieter Franke from Siegwerk Druckfarben AG & Co. KGaA: "The Siegwerk (Sieg-Mi-Flex) migration cell system not only facilitates sample preparation but is also the system with the greatest impermeability."

- The Siegwerk (Sieg-Mi-Flex) migration cell system is available in the following materials: stainless steel (VA 1.4571), borosilicate glass and PFA-coated stainless steel (on request!).
- The materials can be combined.
- The Siegwerk (Sieg-Mi-Flex) migration cell system fixing plate set with a size of 140 × 140 mm (European Norm EN 1186-1:2002, Figure C.5 Cell type C) is suitable for use with all centre rings and all size reduction plates from the Siegwerk system for testing sample areas of different sizes with defined surface/volume ratios.
- The system can also be rapidly adapted to special sample sizes using the stainless steel (VA 1.4571) “reduction plates” in conjunction with the centre rings.
- It is furthermore possible to add two packaging samples (top/bottom) to the migration cell System-Siegwerk (Sieg-Mi-Flex).
- The migration cell System-Siegwerk (Sieg-Mi-Flex) is then stored standing upright rather than lying down horizontally.
- The barrier effect of packaging materials can also be tested, e.g. with the “sandwich format” test setup.
- The following section presents the available versions of the modular migration cell System-Siegwerk (Sieg-Mi-Flex), examples of test setups and how these are used.



By using the migration cell System-Siegwerk (Sieg-Mi-Flex), a migration estimate of the packaging contents from food packaging can already be conducted using the finished rolls of material.

Tests have shown that the diffusion-induced temperature compensation is sufficient if a Siegwerk (Sieg-Mi-Flex) migration cell system filled with a simulant stays upright for 24 hours.

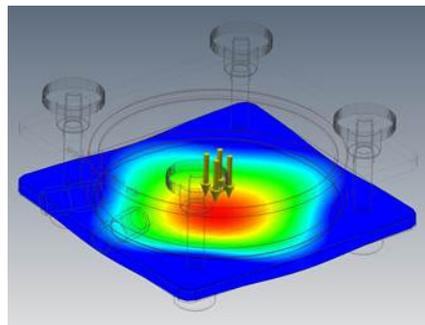
No rotation is required. The Siegwerk (Sieg-Mi-Flex) migration cell system can be easily opened and closed using stainless steel knurled screws. During temperature conditioning in drying cabinets or bath/circulating thermal regulators, its compact design enables it to be stored both horizontally and vertically.

The Siegwerk (Sieg-Mi-Flex) migration cell system can be used to test many packaging sizes and strengths with the broadest range of material properties with all liquid and solid food simulants.

For tests with solid food simulants (E) poly(2,6-diphenyl-p-phenylene oxide) (MPPO), the Tenax kit is used (see next page). Some customers also use the Tenax kit for migration tests with oil as the fixing plate with the GL45 connecting pieces is easier to clean in a dishwasher than the central rings with GL14 cast-in and cast-out connecting pieces. In this case, the Siegwerk (Sieg-Mi-Flex) migration cell system is subjected to the test conditions while positioned horizontally one test specimen at a time. Thanks to the high temperature resistance (-20° to 180°C) and the high pressure seal up to 9 bar, stainless steel Siegwerk (Sieg-Mi-Flex) migration cell systems can also be used for liquid food simulants under testing conditions above their boiling point.

### Pressure test for a stainless steel Siegwerk (Sieg-Mi-Flex) migration cell system

HERSTELLERBESCHEINIGUNG	
Hersteller	LABC-Labortechnik Josef-Dietzgen-Str. 1 D-53773 Hennef
Komm.-Nr.	247665/11135
Behälter-Nr.	M001
Beschreibung	Migrationszelle DN 120 „Sieg-Mi-Flex“ (Edelstahl)
<b>Technische Angaben</b>	
zulässiger Betriebsüberdruck des Innenraumes	9 bar
zulässige Betriebstemperatur	max 180°C
Inhalt	0,22 ltr.
Werkstoff	Edelstahl 1.4571
Hiermit wird bescheinigt, daß diese Migrationszelle ordnungsgemäß hergestellt wurde. Es wurden keine Beanstandungen festgestellt.	
Der Prüfdruck beträgt bei der Flüssigkeitsdruckprüfung nach unseren Werkdruckprüfrichtlinien mindestens das 1,33 fache des zulässigen Betriebsüberdruckes. Der Innenraum (Reaktionsraum) des Gefäßes wurde für 30 Minuten bei Raumtemperatur dem Prüfdruck von 13 bar ausgesetzt.	
Die Druckprüfung ergab keine Beanstandung.	
Das vorliegende Gerät ist ein Druckgerät nach den technischen Anforderungen der Druckgeräterichtlinien nach §3 Absatz 3 und im angegebenen Druckbereich für den Einsatz bei Flüssigkeiten und Gasen geeignet. Vor jedem Einsatz ist eine Sichtkontrolle auf einwandfreien Zustand vorzunehmen. Beschädigte Gefäße dürfen nicht eingesetzt werden. Wir weisen darauf hin, dass der Anwender für die beim Betrieb notwendigen Sicherheitsmaßnahmen verantwortlich zeichnet.	
Hennef, 12.02.2014 LABC-Labortechnik	
	
(Hersteller)	



A fixing plate made from V4A stainless steel has been subjected to 10 bar pressure using the finite element method (FEM). Result: the maximum deflection in the centre of the fixing plate was < 0.2 mm. A liquid pressure test was also carried out under at least 1.33 times the test pressure of 9 bar at room temperature, and at the test pressure of 13 bar. The pressure test did not result in any objections.

- Temperature resistant -15°C to 180°C, pressure-tight up to **9 bar**
- The Sieg-Mi-Flex cells are placed standing upright when used with two test specimens and lying horizontally when used with one test specimen
- The highest selling migration chamber



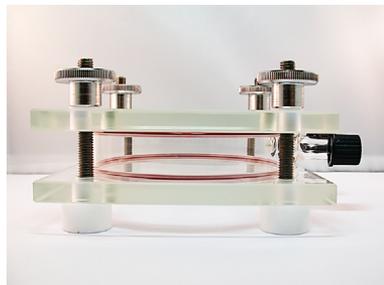
	Item No.	Nominal diameter	Approx. area with 1 test specimen / with 2 test specimens [dm <sup>2</sup> ]	Fill volume with 2 test specimens [mL]	Image
centrerings	<b>250-0235693</b>	DN120	1.0/2.0	Approx. 200	
	<b>250-0342940</b>	DN110	0.95/1.9	Approx. 190	
	<b>250-0218665</b>	DN100	0.75/1.5	Approx. 150	
	<b>250-0342926</b>	DN90	0.60/1.2	Approx. 120	
	<b>250-0218672</b>	DN80	0.50/1.0	Approx. 100	
	<b>250-0218689</b>	DN70	0.35/0.7	Approx. 70	
	<b>250-0218696</b>	DN60	0.25/0.5	Approx. 50	
	<b>250-0218702</b>	DN30	0.05/0.1	Approx. 10	
<b>Stainless steel centre ring for the Siegwerk (Sieg-Mi-Flex) migration cell system, consisting of:</b> <ul style="list-style-type: none"> <li>• 1x stainless steel central ring (V4A 1.4571) with cast-in and cast-out connecting pieces with GL14 threads</li> <li>• 2x FEP/silicone O-rings that fit in the central ring's groove (top and bottom)</li> <li>• 2x GL14 seal caps (PPS housing incl. PTFE/sil. gasket)</li> <li>• 1x positioning aid made from 2 mm stainless steel (V2A 1.4301) (except DN120!)</li> </ul>					
Fixing plate set	<b>250-0239899</b>	<b>Stainless steel fixing plate set for the Siegwerk (Sieg-Mi-Flex) migration cell system, consisting of:</b> <ul style="list-style-type: none"> <li>• 1x stainless steel (V4A 1.4571) upper plate with holes, polished inner, 140×140 mm</li> <li>• 1x stainless steel (V4A 1.4571) lower plate with threaded holes (M8), polished inner, 140×140 mm</li> <li>• 4x stainless steel knurled screws (M8)</li> <li>• 4x pin thread M8, stainless steel (VA 1.4571), Length: 66,5mm</li> <li>• 4x stainless steel "Sieg-Mi-Flex" washers</li> <li>• 4x PTFE feet, natural</li> </ul> <b>Note: All Sieg-Mi-Flex centre rings fit in the fixing plate set!</b>			

**Uses:**

the following simulants can be used in the stainless steel Siegwerk (Sieg-Mi-Flex) migration cell system:

(A) Ethanol 10% (v/v), (B) Acetic acid 3% (w/v), (C) Ethanol 20% (v/v), (D1) Ethanol 50% (v/v), (D2) Vegetable oil with specific fatty acid distribution from Regulation (EU) No 10/2011 (PIM). Furthermore, pursuant to European Norm EN1186 and Commission Directive 97/48/EC it is possible to use substitute simulants such as the solvents iso-octane and ethanol 95% (v/v) plus other alternative simulants that do not chemically attack the materials stainless steel (V4A 1.4571), PTFE and FEP (tetrafluoroethylene-hexafluoropropylene copolymer).

- Temperature resistant from -15°C to 130°C, pressure seal up to **1 bar**, transparent and highly chemical resistant thanks to the use of borosilicate 3.3 laboratory glass
- The Sieg-Mi-Flex cells are placed standing upright when used with two test specimens and lying horizontally when used with one test specimen



	Item No.	Nominal diameter	Approx. area with 1 test specimen / with 2 test specimens [dm <sup>2</sup> ]	Fill volume with 2 test specimens [mL]	Image
Central ring	<b>250-0277600</b>	DN120	1.0/2.0	Approx. 200	
	<b>Glass centre ring for the Siegwerk (Sieg-Mi-Flex) migration cell system, consisting of:</b> <ul style="list-style-type: none"> <li>• 1x borosilicate glass centre ring with cast-in and cast-out fittings with GL14 threads</li> <li>• 2x FEP/silicone O-rings that fit in the central ring's groove (top and bottom)</li> <li>• 2x GL14 seal caps (PPS housing incl. PTFE/sil. gasket)</li> </ul>				
Fixing plate set	<b>250-0277594</b>	<b>Glass fixing plate set for the Siegwerk (Sieg-Mi-Flex) migration cell system, consisting of:</b> <ul style="list-style-type: none"> <li>• 2x borosilicate glass plates with holes, protective inserts for screws</li> <li>• 4x stainless steel screws (M8), with stainless steel knurled screws</li> <li>• 4x PTFE threaded feet, white (M8)</li> </ul>			

**Uses:**

Detecting discolouration during the migration test. Sensor determination in packaging materials of abnormal aromas in water (such as styrene, p-methylbenzaldehyde). Migration investigations of cardboard with a barrier coating as a function of time and temperature through headspace analysis, with the two GL-14 screwed connections at the glass centre ring being very helpful. By olfactory means or via TENAX® adsorption tubes, PowerSorb or SPME Fiber Holder (>Thermodesorption > GC /MS).

To date, there is only one borosilicate glass central ring with cast-in and cast-out connecting pieces in version DN120. Sizes DN50, DN70 and DN80 are planned and feasible. Please ask us about the size you require.

- Temperature resistant from -15°C to 130°C, pressure seal up to **1 bar** and a transparent glass fixing plate set.
- The chemical resistance corresponds to the stainless steel migration cell.
- The Sieg-Mi-Flex cells are placed standing upright when used with 2 test specimens and lying horizontally when used with one test specimen!

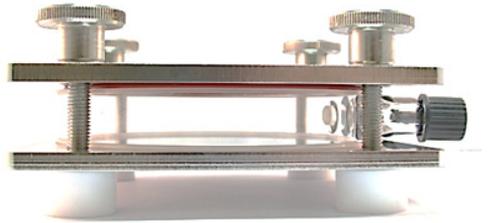


	Item No.	Nominal diameter	Approx. area with 1 test specimen / with 2 test specimens [dm <sup>2</sup> ]	Fill volume with 2 test specimens [mL]	Image
Central ring	250-0235693	DN120	1.0/2.0	Approx. 200	
	250-0342940	DN110	0.95/1.9	Approx. 190	
	250-0218665	DN100	0.75/1.5	Approx. 150	
	250-0342926	DN90	0.60/1.2	Approx. 120	
	250-0218672	DN80	0.50/1.0	Approx. 100	
	250-0218689	DN70	0.35/0.7	Approx. 70	
	250-0218696	DN60	0.25/0.5	Approx. 50	
	250-0218702	DN30	0.05/0.1	Approx. 10	
<p><b>Stainless steel centre ring for the Siegwark (Sieg-Mi-Flex) migration cell system, consisting of:</b></p> <ul style="list-style-type: none"> <li>• 1x stainless steel central ring (V4A 1.4571) with cast-in and cast-out connecting pieces with GL14 threads</li> <li>• 2x FEP/silicone O-rings that fit in the central ring's groove (top and bottom)</li> <li>• 2x GL14 seal caps (PPS housing incl. PTFE/sil. gasket)</li> <li>• 1x positioning aid made from 2 mm stainless steel (V2A 1.4301) (except DN120!)</li> </ul>					
Fixing plate set	250-0277594	<p><b>Glass fixing plate set for the Siegwark (Sieg-Mi-Flex) migration cell system, consisting of:</b></p> <ul style="list-style-type: none"> <li>• 2x borosilicate glass plates with holes, protective inserts for screws</li> <li>• 4x stainless steel screws (M8), with stainless steel knurled screws</li> <li>• 4x PTFE threaded feet, white (M8)</li> </ul>			

**Uses:**

Monitoring the wetting capacity with liquid food simulants of test sample films that tend towards static charging or hydrophobic behaviour. Monitoring and documenting migration tests through the use of photographs. Detecting discolouration and air bubbles during the migration test.

- Temperature resistant from -15°C to 130°C, pressure seal up to **4 bar**
- A transparent glass central ring.
- The chemical resistance corresponds to the stainless steel migration cell.
- The Sieg-Mi-Flex cells are placed standing upright when used with 2 test specimens and lying horizontally when used with one test specimen!

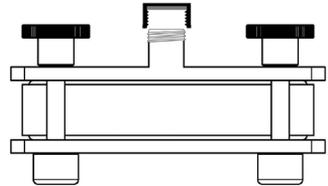


	Item No.	Nominal diameter	Approx. area with 1 test specimen / with 2 test specimens [dm <sup>2</sup> ]	Fill volume with 2 test specimens [mL]	Image
Central ring	250-0277600	DN120	1.0/2.0	Approx. 200	
		<b>Glass central ring for the migration cell System-Siegwerk (Sieg-Mi-Flex) comprising:</b> <ul style="list-style-type: none"> <li>• 1x borosilicate glass centre ring with cast-in and cast-out fittings with GL14 threads</li> <li>• 2x FEP/silicone O-rings that fit in the central ring's groove (top and bottom)</li> <li>• 2x GL14 seal caps (PPS housing incl. PTFE/sil. gasket)</li> </ul>			
Fixing plate set	250-0239899	<b>Stainless steel fixing plate set for the Siegwerk (Sieg-Mi-Flex) migration cell system, consisting of:</b> <ul style="list-style-type: none"> <li>• 1x stainless steel (V4A 1.4571) upper plate with holes, polished inside, 140×140 mm</li> <li>• 1x stainless steel (V4A 1.4571) lower plate with threaded holes (M8), polished inside, 140×140 mm</li> <li>• 4x stainless steel knurled screws (M8)</li> <li>• 4x stainless steel "Sieg-Mi-Flex" washers</li> <li>• 4x PTFE feet, natural</li> </ul> <b>Note: All Sieg-Mi-Flex centre rings fit in the fixing plate set!</b>			

**Uses:**

For organoleptic and analytic migration investigations above the boiling point with water as the food simulant, such as in the testing of packaging materials for taste changes of water as a food simulant at 130°C. So far, a borosilicate glass centre ring with cast-in and cast-out fittings is the only thin available in the DN120 design. Sizes DN50, DN70 and DN80 are planned and feasible. Please ask us about the size you require.

- Temperature resistant -15°C to 180°C, pressure-tight up to **1 bar**
- This Sieg-Mi-Flex cell design takes one test specimen (on bottom!) and it is laid horizontally



	Item No.	Nominal diameter	Approx. area with 1 test specimen [dm <sup>2</sup> ]	Fill Volume max. [mL]	Image
Tenax®/oil kit* for the Siegwerk (Sieg-Mi-Flex) migration	<b>250-0591775</b>	DN120	1 dm <sup>2</sup>	Approx. 220	
	<b>stainless steel centre ring for the Tenax®/oil kit* for the Siegwerk migration cell system, consisting of:</b>				
	<ul style="list-style-type: none"> <li>• 1x stainless steel central ring (V4A 1.4571) without GL14 cast-in and cast-out connecting pieces</li> <li>• 2x FEP/silicone O-rings that fit in the central ring's groove (top and bottom)</li> </ul>				
	<b>250-0649100</b>	DN120	1 dm <sup>2</sup>	Approx. 220	
	<b>glass centre ring for the Tenax®/oil kit* for the Siegwerk migration cell system, consisting of:</b>				
<ul style="list-style-type: none"> <li>• 1x glass centre ring (borosilicate glass 3.3) without GL14 cast-in and cast-out fittings</li> <li>• 2x FEP/silicone O-rings that fit in the central ring's groove (top and bottom)</li> </ul>					
Tenax®/oil kit* for the Siegwerk (Sieg-Mi-Flex) migration	<b>250-0649049</b>	<b>borosilicate glass upper fixing plate for the Tenax® /oil kit* for the Siegwerk migration cell system, consisting of:</b>			
	<ul style="list-style-type: none"> <li>• 1x borosilicate glass upper fixing plate and centric GL45 fitting with 4x holes, without M8 inner thread, 140×140 mm</li> <li>• 4x PTFE hole inserts</li> </ul>				
	<b>120-0649056</b>	PPS screw cap with easy-to-grip edging, black, GL45 closed, with PTFE-coated silicone seal for the GL45 fitting on the borosilicate glass upper fixing plate with central GL45 fitting, Packaging unit = 1 each			
Ergänzend dazu erhalten Sie unser <b>Edelstahl-Fixierplatten-Set (Artikel Nr.: 250-0277600)</b> und das <b>Glas-Fixierplatten-Set (Artikel Nr. 250-0277594)</b> .					

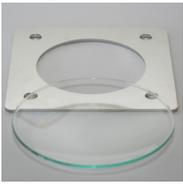
**Uses:**

In addition to tests using the Tenax®, the Tenax® / oil kit is also used for migration tests with vegetable oil since for many customers the fixing plate with the GL45 fitting is easier to clean in a dishwasher than the centre ring with GL14 cast-in and cast-out fittings.

Tenax® EcoKit for the Siegwerk (Sieg-Mi-Flex) migration cell system for determining mass transfer through paper and cardboard, using modified Tenax® (polyphenylene oxides(MPPO)) as the simulant according to EN 14338:2004-03.

- Temperature-resistant from -15°C to 180°C, **not pressure sealed!**
- This Sieg-Mi-Flex cell design takes one test specimen (on bottom!) and it is laid horizontally

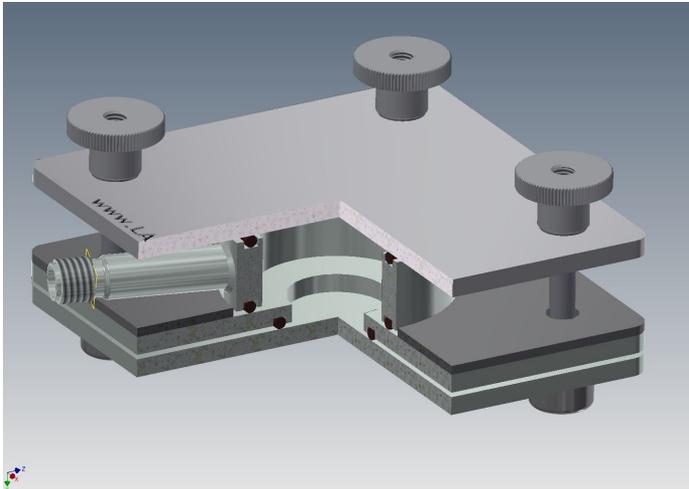


Item No.	Nominal diameter	Approx. area with 1 test specimen [dm <sup>2</sup> ]	Max. fill volume [mL]	Image
250-0643030	DN120	1 dm <sup>2</sup>	Approx. 200	
<p><b>Tenax® EcoKit* for the Siegwerk (Sieg-Mi-Flex) migration cell system, consisting of:</b></p> <ul style="list-style-type: none"> <li>• 1x DN100 positioning aid (ID=111.5 mm) made of V2A(1.4301)</li> <li>• 1x watch glass made of soda-lime laboratory glass, Ø=125 mm</li> </ul> <p><b>for an existing DN120 stainless steel centre ring for the Siegwerk migration cell system consisting of:</b></p> <ul style="list-style-type: none"> <li>• 1x stainless steel centre ring DN120 (V4A 1.4571) with GL14 cast-in and cast-out fittings</li> <li>• 2x FEP/silicone O-rings that fit in the DN120 centre ring's groove (top and bottom)</li> </ul>				

In the test using Tenax® as the food simulant, the test specimen and a DN120 centre ring are fixed using a DN100 positioning aid. Then, the Tenax® is poured in and distributes evenly onto the specimen. Then, the wide opening is closed with a watch glass and sealed shut with aluminium foil (un-coated, flame-treated)



In the Siegwerk (Sieg-Mi-Flex) migration cell system there are eight standard centre rings of various sizes included in the assortment. In practice, test specimens are of a size that requires the cell surface to be precisely matched. Fast and cost-effective solutions include the stainless steel reduction plates (VA 1.4571).



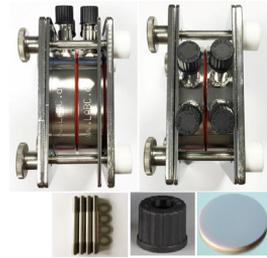
The figure shows a Siegwerk (Sieg-Mi-Flex) migration cell system using a Sieg-Mi-Flex reduction plate (DN40) in conjunction with a stainless steel centre ring (DN60).

Stainless steel reduction plates for the Siegwerk (Sieg-Mi-Flex) migration cell system can only be used with a larger centre ring!  
It is also possible to use two stainless steel reduction plates together with one larger central ring. In such cases, the migration cells System-Siegwerk are positioned standing upright rather than lying down horizontally.

Item No.	Nominal diameter	Approx. area 1 test specimen + 1 reduction plate / 2 test specimens + 2 reduction plates [dm <sup>2</sup> ]	Fill volume with 2 test specimens + 2 reduction plates [mL]	Image
250-0584210	DN50*	0.19/0.38	Approx. 55	
250-0584104	DN40*	0.12/0.24	Approx. 52	
250-0584203	DN20**	0.075/0.15	Approx. 10	
<p>*DN40 + DN50 stainless steel reduction plates may only be used with a DN60 centre ring, **DN20 stainless steel reduction plates may only be used with a DN30 centre ring. The stainless steel reduction plates are temperature resistant up to max. 180°C.</p>				

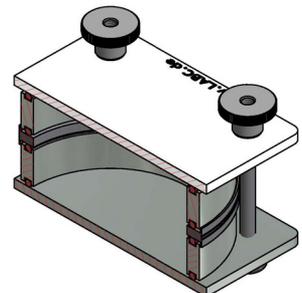
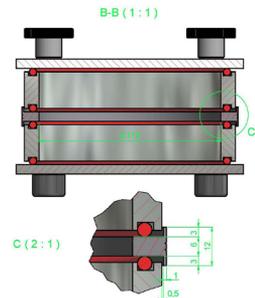
## “Sandwich format” without centring ring

For the “sandwich format” without centring ring, in addition to a second centre ring another set of extension connectors is needed to double the size of the reaction chamber in order to achieve two tightly sealed reaction chambers with the characteristically-defined surfaces and volumes. Two laterally attached GL14 screw fittings on the centre ring (sealed, e.g. with GL14 perforated caps and inserted septa), create two fittings (inlet and outlet) to each of the two steam areas formed by the connection of the fixing plate set and the fitting of a test sample film between the two centre rings. The “sandwich format” of the Siegwark (Sieg-Mi-Flex) migration cell system can be used in a temperature range of  $-15^{\circ}$  to  $+180^{\circ}\text{C}$ . The test specimen does not need to be precisely cut out for this test setup, and can protrude slightly past the centre ring.



## “Sandwich format” with centring ring

For the “sandwich format” with a stainless steel centring ring, in addition to a second centre ring and a centring ring, another set of extension connectors is also needed to double the size of the reaction chamber in order to achieve two tightly sealed reaction chambers with the characteristically-defined surfaces and volumes. 2x laterally attached GL14 screw fittings on the centre ring, sealed with GL14 perforated caps and inserted septa, for example, create two fittings (inlet and outlet) to each of the two steam areas formed by the connection of the fixing plate set and the fitting of a test sample film between the centring ring and a centre ring. In the “sandwich format”, in order to also reduce the dead volume the centre ring can be employed without the 2x lateral GL14 screw fittings. The “sandwich format” with stainless steel centring ring of the Siegwark (Sieg-Mi-Flex) migration cell system can be used in a temperature range of  $-15^{\circ}$  to  $+180^{\circ}\text{C}$ . The test specimen must be precisely cut out for this test setup.



## Combination “sandwich format” with centring ring for a migration test with TENAX® without direct contact with the package

The test setup depicted in the figure tests the mass transfer through an open space from a packaging test specimen (fixed centrally in the centring ring!) to the TENAX® distributed on the bottom of the cells.

The “sandwich format” also allows one to combine components of the Sieg-Mi-Flex system consisting of borosilicate glass and stainless steel and thereby to be able to flexibly adapt to a particular situation (temperature-resistant from -15°C to 130°C, pressure seal up to 1 bar).



## Additional components needed for a “sandwich format” of the Siegwerk (Sieg-Mi-Flex) migration cell system

necessary	Item No.	Description	Image
absolutely necessary	<b>250-0584258</b>	Stud bolt set VA 1.4571 (the “extension connectors”! length: 109 mm) consisting of: 4x M8 stud bolts and 4x M8 stainless steel spring collars for use in the Siegwerk (Sieg-Mi-Flex) migration cell system with the fixing plate set, a) with 2 each reduction plates and a centre ring for modular adaptation to pre-existing sample film sizes b) for doubling the “sandwich format” reaction chamber with and without centring ring by arranging 2 stainless steel or borosilicate glass centre rings one atop the other, VPE= 4 each	
optional	<b>250-0591782</b>	DN120 centring ring and film holder (for the inner bag barrier test and sandwich arrangement, for example), made of stainless steel VA 1.4571 and inner diameter of 112 mm +/-0.1 mm as an intermediate ring for 2 DN120 centre rings (including or not including the filling/pouring fittings!), VPE=1 each	
optional	<b>130-0668255</b>	Migra spring clamp for fastening a positioning aid for the centre ring, made of V2A (1.4301, 3 mm thickness) to a fixing plate, Siegwerk (Sieg-Mi-Flex) system VPE=1 each	
optional	<b>120-0592109</b>	Migra screw perforated cap closure with easy-to-grip PPS edging, black, GL 14 with hole (Ø 9.2 mm) and silicone/PTFE gasket (approx. 3 mm thickness), VPE=1 ea.	

## Further testing of mass transfers with the “sandwich format” test setup in the headspace:

- The headspace of the food contact side of packaging versus the outside can be tested simultaneously (the film to be tested (test sample) is positioned between the two centre rings and clamped into place).
- The barrier effect (permeation) of inner bags in folding cardboard boxes can be tested in the headspace. The box’s cardboard (donator) is placed between a fixing plate and a centre ring and the inner bag film (test sample) to be tested is positioned between the two centre rings and clamped into place.
- The barrier effect of “cardboard boxes” (coated cardboard) can be tested with the option of analysing the food contact side versus the outside. The test sample is positioned between the two centre rings and clamped into place.
- The barrier properties (permeation) (H<sub>2</sub>O, CO<sub>2</sub>; N<sub>2</sub>, O<sub>2</sub>) of composite packaging can be tested.

When using the “sandwich format” test setup, sample preparation generally occurs without a food simulant matrix although liquid or solid simulants can also be used here as well. The sampling and accumulation from the test space/spaces optionally occurs using an inert carrier gas that rinses the steam space(s) and concentrates the volatile substances on a TENAX® adsorption tube. The analysis then occurs using thermal desorption and GC/MS or GC/TOF.

**A further method uses the adsorbent SPME (solid phase microextraction), for example 24 h at RT SPME fibre holder with Stableflex/SS and Carboxen/PDMS.**



SPME fibre holder –  
solid phase not visible



SPME fibre holder –  
solid phase visible



SPME fibre holder for  
CTC auto-sampler

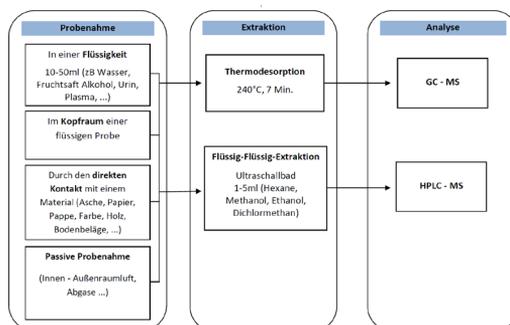
A new method is trace analysis using the disposable universal adsorbent PowerSorb. The disposable polymer PowerSorb has outstanding analytical abilities. It was specially developed for applications using thermal desorption or for fluid extraction by means of solvents. Sample preparation is simplified by the new innovative solution for trace analyses.

## Areas of use for PowerSorb

- Food industry
- Packaging industry
- Cosmetics industry
- Environmental analysis
- Water analysis (mineral, surface, spring, waste water...)
- Taste and fragrance analysis

## Benefits of PowerSorb

- Ultra-pure, non-polar polymer
- Large adsorption surface
- Ready to use
- Alternative to SPME and SBSE techniques
- Excellent price-to-performance ratio
- Packaged under inert gas
- Clear reduction in sample preparation time
- Much more sensitive than SPME



The ultrapure PowerSorb polymer offers many options for use to accumulate traces in solid, liquid or gaseous matrices. The polymer is placed into contact with the sample for a fixed duration of 1 to 4 hours. Stirring takes place during the transfer time in order to achieve the best transfer and adsorption of molecules possible. The material can also be used as a passive adsorbent under the effect of ambient air in public spaces, in particular for benzene measurements and other VOCs. There are also specific passive sampling systems available as well.

Item No.	Description		Image
110-0649001	PowerSorb Universal Disposable Polymer in the size: L: 20 mm*, Ø2 mm for trace analysis in solid, liquid and gaseous matrices, packaged individually in inert gas.	50 × 2 ml brown glass screwed vials with an ND9 threaded perforated cap and SiI/PTFE gasket	

\*alternative lengths, VPE size, vial sizes and vial seals on request!

Positioning aids for centre ring (made of V2A (1.4301), 3 mm thick) are also useful as templates for cutting out test samples. The test samples from which the test specimens are cut, with a film knife and a glass cutting plate, as a cut-resistant base, must be clean and free of surface contaminants. Dust may be removed through wiping the sample with a lint-free cloth or a soft brush. We recommend wearing cotton gloves.



Item No.	Description and scope of delivery	
250-0643092	Positioning aid made of V2A(1.4301) for DN30 centre ring (Sieg-Mi-Flex), 3 mm and also useful as a template for cutting out sample specimens, ID(mm): 41.5	
250-0643085	Positioning aid made of V2A(1.4301) for DN60 centre ring (Sieg-Mi-Flex), 3 mm and also useful as a template for cutting out sample specimens, ID(mm): 72.5	
250-0643078	Positioning aid made of V2A(1.4301) for DN70 centre ring (Sieg-Mi-Flex), 3 mm and also useful as a template for cutting out sample specimens, ID(mm): 82.5	
250-0643061	Positioning aid made of V2A(1.4301) for DN80 centre ring (Sieg-Mi-Flex), 3 mm and also useful as a template for cutting out sample specimens, ID(mm): 94.5	
250-0643054	Positioning aid made of V2A(1.4301) for DN90 centre ring (Sieg-Mi-Flex), 3 mm and also useful as a template for cutting out sample specimens, ID(mm): 101.5	
250-0643016	Positioning aid made of V2A(1.4301) for DN100 centre ring (Sieg-Mi-Flex), 3 mm and also useful as a template for cutting out sample specimens, ID(mm): 111.5	
250-0643047	Positioning aid made of V2A(1.4301) for DN110 centre ring (Sieg-Mi-Flex), 3 mm and also useful as a template for cutting out sample specimens, ID(mm): 116.5	
250-0643023	Positioning aid made of V2A(1.4301) for DN120 centre ring (Sieg-Mi-Flex), 3 mm and also useful as a template for cutting out sample specimens, ID(mm): 131.0	
130-0643115	Migra cutting tool for cutting out test samples for migration measurements, consisting of: 1x film knife with aluminium handle (130 mm long) and 10 each spare blades	
130-0643115	Migra stainless steel cutting board 250x250mm. Unbreakable cutting stand for cutting test pieces from 3mm electropolished stainless steel (1.4301) with 4 feet and rounded corners.	

Item No.	Description and scope of delivery	Size	corresponding to the international glove size (men)	Image
140-0668187	Migra cotton gloves, white, dry, free of dust and grease. Protective gloves for cutting test piece blanks to migration tests. Pairwise in the foil bag.	7	S	
140-0668224		8	M	
140-0668217		9	L	
140-0668200		10	XL	
140-0668194		11	XXL	

## GL14 laboratory screw connectors

pressure-resistant - for connecting GL male threads to hard-walled hoses or glass, plastic or metal tubes.

### Technical specifications:

Temperature-resistance: -50°C to +250°C, Chem. resistance: +++ universal

Pressure: 10 bar, vacuum compatible, FDA compliant

### Product description:

Black PPS screw cap, inner parts consisting of clamping ring (PPS), sealing wedge and sealing plate (both made of PTFE), as well as an additional O-ring (FKM) for screwed connectors for hose outside diameters of less than 3 mm (no contact with the flow medium). Good chemical resistance, the medium only comes into contact with PTFE.

A GL threaded fitting

B sealing plate

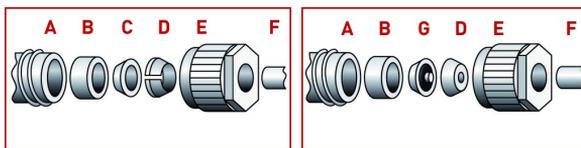
C sealing wedge

D clamping wedge

E conical screw cap

F hose or tube

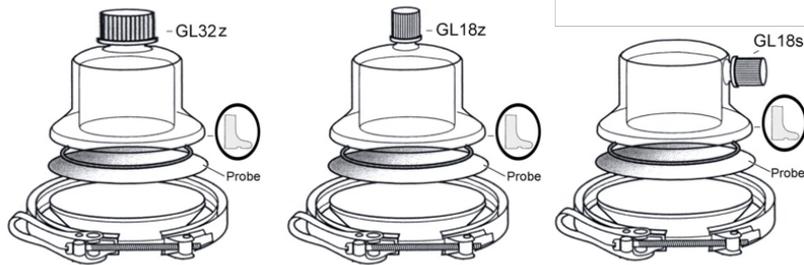
G sealing wedge with O-ring behind the PTFE lip (only for screwed connectors with hose outside diameters of less than 3 mm)



### Installation:

1. Place the conical screw cap onto the hose
2. Place the clamping wedge, followed by the sealing wedge and the sealing plate, onto the hose
3. Screw the screw cap onto the GL threaded fitting – finished

Item No.	for hose outside diameters	GI threads	Image
120-0671330	(1/32") - 0.8 mm	14	
120-0671408	1 mm	14	
120-0671392	(1/16") - 1.6 mm	14	
120-0671385	2 mm	14	
120-0671378	3 mm	14	
120-0671361	(1/8") - 3.2 mm	14	
120-0671354	4 mm	14	
120-0671347	5 mm	14	
120-0671439	6 mm	14	
120-0671422	(1/4") - 6.35 mm	14	
120-0671415	8 mm	14	



**MigraCubicle migration cell system based on cell type D (Figure C.6, EN1186-1:2002), consisting of:**

- Quick-locking closure made of CrNi steel,
- massive glass base made of DURAN® glass,
- Glass cover with GL threads (central (z) or lateral (s) made of DURAN® glass,
- O-ring made of seamless silicone rubber coated with FEP\* (FEP\*/Sil, (FEP\*= Fluorinated Ethylene Propylene)) and
- a GL screw cap made of PPS, black, with no holes and PTFE-coated silicone rubber gasket inlay.

Due to 6 different cell sizes and three different cover designs, the MigraCubicle migration cell system can be adapted to the size of the sample specimen and food simulant.

The MigraCubicle migration cell system makes reproducible sample preparation of migration measurements possible. The migration cells made of DURAN® glass have proven themselves effective in the experimental mass transfer measurement of the ingredients of packaging contact materials onto solid food testing simulants, such as Tenax®, and liquid food testing simulants (3% solution of acetic acid, water and oil such as olive oil or sunflower oil). The Siegwerk migration cell system (Sieg-Mi-Flex) is better suited for liquid food simulants, even above their boiling point.

In the MigraCubicle migration cell system, very smooth and thin foils, such as 2-4 mm-thick polystyrene foam (e.g., from meal boxes), with a one-sided contact can be processed.

Also see the application instructions below. In addition, the MigraCubicle migration cell system demonstrates high stability due to the massive base plate made of DURAN® borosilicate glass 3.3 and requires less space in the drying cabinet due to its low design.



The MigraCubicle migration cell system is very well suitable for use with the solid food simulant MPPO (modified polyphenylene oxide. e.g., poly(2.6-diphenylphenylene oxide), particle size 60-80 mesh, pore size 200nm MPPO (Tenax ®, Regulation (EU) No. 10/2011(PIM))) and for the testing of sample specimens of polystyrene foam meal boxes (here, no O-ring is used, whereby the surfaces also change!). If the MigraCubicle migration cell system is filled with liquid food simulants, losses of the liquid food simulants may occur depending on the cell size, testing temperature, surface tension or viscosity, as well as the thickness and composition of the sample specimens to be tested. Tip for practice: In the case of very thin and smooth foils, underlaying the sample specimen with laboratory aluminium foil or pure filter paper provides better seal tightness. For liquid food simulants, even above their boiling point, the Siegwerk LABC migration cell system (Sieg-Mi-Flex) is better suited.

In case of liquid food simulants, the steam pressure in the migration cell increases along with the temperature. As a result, the cell can become leaky or destroyed. The operation of the MigraCubicle migration cell system is absolutely not suitable for tests above the boiling point of a food simulant. Here, the Siegwerk LABC migration cell system (Sieg-Mi-Flex) is suitable for this purpose.

**Legal bases:**

Food contact materials such as food packaging must be tested by the manufacturer for conformity with the European Framework Regulation 1935/2004 EC and/or specific directives or regulations (e.g., plastic regulation 10/2011 EC (PIM)) or the U.S. Code of Federal Regulations (CFR), Volume 21, Sections 175 through 178, to which they are also legally obliged.

In addition, standards EN 14338-2004-03 (paper and cardboard) and EN 1186-1 through 13:2002 "Materials and articles in contact with foodstuffs. Plastics", a guideline for selecting testing conditions and test methods for migration measurements, must be observed.

**Application:**

MOSH/MOAH, Extractables and Leachables, Migration Tests and Sensor technology.

Empirical values for the suitability of the MigraCubicle migration cell system depending on the medium and tests at 20°C.

Food simulant	Abbreviation	MC 35	MC 60	MC 100	MC 120	MC 150	MC 200
Ethanol 10 vol. %	Food simulant A	Yes	Yes	No	No	No	No
Acetic acid 3 weight %	Food simulant C	Yes	Yes	Yes	Yes	Yes	Yes
Ethanol 20 vol. %	Food simulant D	Yes	Yes	No	No	No	No
Ethanol 50 vol. %	Food simulant D1	Yes	Yes	No	No	No	No
Vegetable oil	Food simulant D2	Yes	Yes	Yes	No	No	No
MPPO	Food simulant E	Yes	Yes	Yes	Yes	Yes	Yes
Water	Food simulant H <sub>2</sub> O/H <sub>2</sub> O dist.	Yes	Yes	Yes	Yes	Yes	Yes
Ethanol 95 vol. %	Food simulant for replacement tests	No	No	No	No	No	No
Iso-octane	Food simulant for replacement tests	No	No	No	No	No	No

**Information subject to change. An independent leak test is absolutely necessary!**

Cell type MC	Approx. area [dm <sup>2</sup> ]	FEP/Sil-O-ring ID [dm]	Real surface with seal ring [dm <sup>2</sup> ]	Glass cell cover ID [dm]	Real surface without seal ring [dm <sup>2</sup> ]
MC35	Approx. 0.15	0.46	0.165	0.35	0.096
MC60	Approx. 0.5	0.75	0.442	0.60	0.283
MC100	Approx. 1	1.10	0.950	1.00	0.785
MC120	Approx. 1.5	1.33	1.39	1.20	1.131
MC150	Approx. 2	1.57	1.94	1.50	1.767
MC200	Approx. 3.5	2.15	3.63	2.00	3.142

The real migration surfaces of the respective MigraCubicle cell size depend on the inner diameters of the FEP/Sil O-rings.

In case of measurement without seal rings (e.g., when testing meal boxes made of polystyrene foam), the surfaces depend on the inner diameter of the glass cell cover (inner edge to inner edge!).

GL32z	GL18z	GL18s	Cell size	approx. surface areas [dm <sup>2</sup> ]
250-0635141	250-0586481	250-0586283	MC35	Approx. 0.15
250-0635172	250-0585885	250-0586252	MC60	Approx. 0.5
250-0635189	250-0586498	250-0586290	MC100	Approx. 1
250-0635196	250-0586504	250-0586542	MC120	Approx. 1.5
250-0635202	250-0586511	250-0586306	MC150	Approx. 2
250-0635219	250-0586528	250-0586313	MC200	Approx. 3.5

## Migra-Zell Type A migration cell analogous to EN1186-1-2002

In the Migra-Zell Type A, a surface/volume ratio of 2.5 dm<sup>2</sup> of food contact surface to 125 ml of test food substance (simulant) can be used, which is what is normally used.

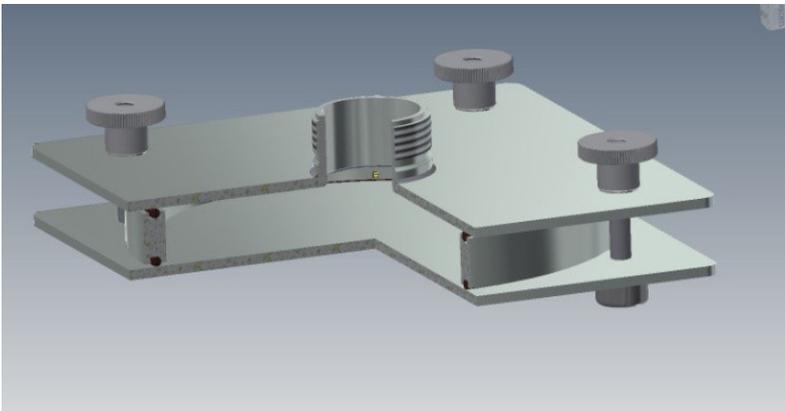
The Migra-Zell Type A is ultra seal tight and chemically resistant to the simulant foods described in regulation 10/2011 (PIM) and 2016/1416 (which amends and corrects 10/2011), and to the alternative food simulants ethanol 95%, isooctane or water for organoleptic tests.

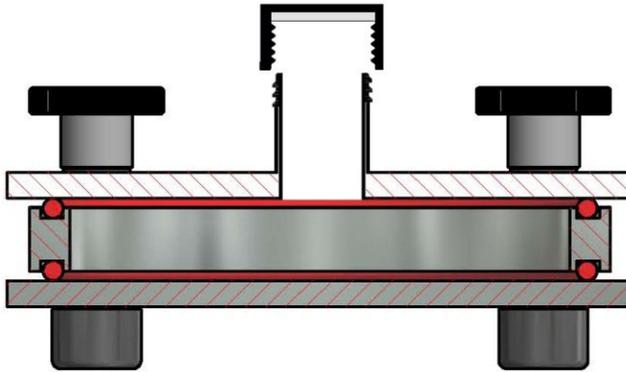
The advantage of a migration cell is that contact from one side can be re-established without any sharp edges or other effects.

For tests of mass transfer from packing surfaces to food simulants, the Type A migration cell was described in EN 1186-1 as a standard migration cell.

Comparative studies on the performance of cells of types A, B, C, D, E and F have shown that these cells have achieved similar results and should be considered to be equivalent (1186-1-2002, 9.4).

In the practise of migration testing, it has been found that using a wide variety of migration cell sizes appropriate for the problem is better than using cells of a specific unit size. In addition to so-called Migra-Zell Type A standard migration cells, LABC-Labortechnik offers a large assortment for simulation experiments in its Siegwerk (Sieg-Mi-Flex) system and MigraCubicle migration cell series.




**Technical data for the migration cell:**

- Temperature-resistance: -15°C to approx. 180°C,
- Pressure seal up to max. 1bar,
- Surface area: approx. 2.5 dcm<sup>2</sup>

**Migra-Zell Type A migration cell analogous to EN1186-1-2002 complete with inner cylinder and holding plate set:**
**Stainless steel holding plate set consisting of:**

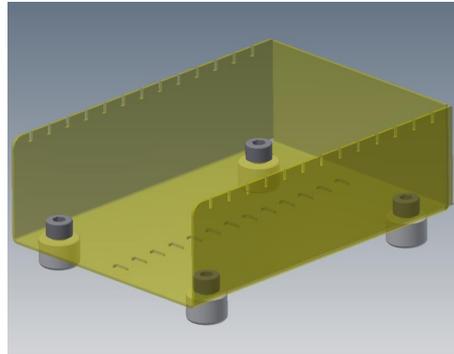
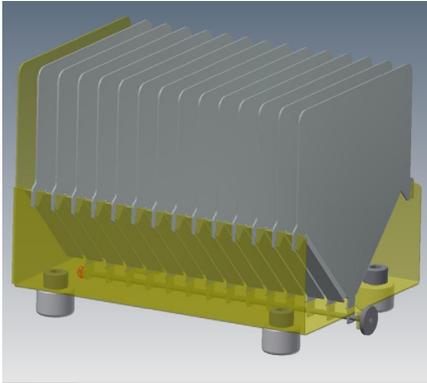
- 1x stainless steel (VA 1.4571) plates with 4x holes, each plate 200 mm × 200 mm × 4 mm, polished inside
- 1x stainless steel (VA 1.4571) plates with 4x holes, each 200 mm × 200 mm × 4 mm, polished inside and with a central GL45 fill and pour fitting incl. screw cap closure with easy-to-grip PPS edging, black and with PTFE-coated silicone gasket inlay
- 4x stainless steel knurled screws and DIN 125B A2 screws
- 4x PTFE feet, white
- 4x washers

**Inner cylinder:**

- Inner cylinder made of stainless steel (VA 1.4571), h=20 mm, each with an upper and lower groove, with 1 each FEP-coated O-ring seal and silicone core, Ø=178 mm (measured from centre to centre)

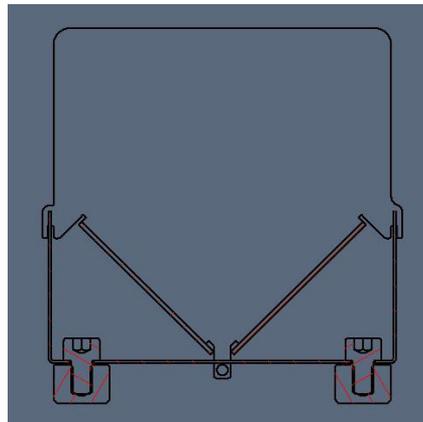
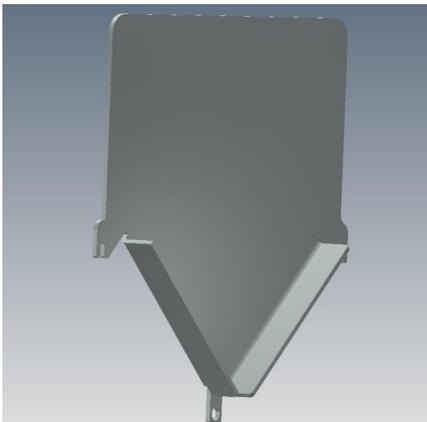
**Product no.: 250-0668514**

## Migration testing using a bag (EN 1186-6:2002)



LABC stainless steel bag holder with PTFE feed for 14 bags as test specimens manufactured by sealing two 120x120 mm packing film sample specimens for a migration test according to EN1186-6:2002.

Description: In a box with 4x PTFE feet, individual separations are placed in prescribed openings. The box and the separations are made of 1 mm stainless steel sheet. With an inserted pin, the lower brackets are kept from falling out. The bag holder can be easily removed for cleaning.



**Product no.: 250-0649407**

## Thermostatically-controlled equipment for migration tests

To achieve reproducible results, the test conditions depend substantially on time and temperature. Therefore, when selecting the temperature control equipment, be careful that the temperature control for the entire medium surrounding the sample vessel, the cells or bags corresponds to that established in Table B.2 of EN 1186-1:2002.

**In the practice of migration tests, the following equipment are used:**

### Cabinets:

- Safety dryer for limited amounts of solvent (Model FDL115), meeting the safety requirements of EN 1539:2010-08
- Hot/cold test cabinet with explosion-proof test spaces for Zone 1 of the RUMED® Safety T-Line

### Laboratory autoclaves:

- They are usually used for migration tests in the temperature range of 90°C to 130°C and are present in many laboratories as standard equipment. (Please ask us about them!)

### Bath thermostats:

- With temperature-control liquids water or BASF heating bath liquid, which is miscible with water (please ask us about them!)



230-0331586



230-0672955

## Safety dryer for limited amounts of solvent, Model FDL115, manufacturer: Binder

- Meets the safety requirements of EN 1539:2010-08
- Brief drying times through high temperature precision and defined air exchange (air circulation approx. 20x/min)
- Exhaust air flow according to EN 1539 at 50°C approx. 400 L/min
- Silicone- and dust-free inner space
- Easily exchangeable fresh air cartridges provide a uniform fresh air quality
- Temperature range: Room temperature plus 5°C to 300°C
- APT.line™ pre-heating chamber technology
- Controller with time interval and real-time programming
- 2 chrome-plated grid shelves
- Fresh air monitoring with acoustic and optical alarms and automatic heater shut-off
- Replaceable fresh air filter cartridges Class M6 according to DIN EN 779:2012
- Over-temperature limit controller, Class 2 (DIN 12880) with optical alarm
- Computer interface: RS 422

### TECHNICAL DATA:

- Temperature range 10°C above room temperature to [°C] 300,
- Space temperature deviation at 150°C [± K] 2.5,
- Temporal temperature deviation [± K] 0.8,
- Heat-up time to 150°C [min] 20,
- Recovery time after 30 s of door opening at 150°C [min] 12,
- Air circulation (approx.) [x/min] 20,
- Exhaust air flow according to EN 1539 at 50°C [approx. L/min] 400,
- Rated voltage [V] 230,
- Mains frequency [Hz] 50/60,
- Rated output [kW] 2.9,
- Phase (rated voltage) 1~,
- Net outside width [mm] 830,
- Net outside height [mm] 805,
- Net outside depth [mm] 685,
- Back wall distance [mm] 160,
- Side wall distance [mm] 100,
- Width inside [mm] 600,
- Height inside [mm] 435,
- Depth inside [mm] 435,
- Internal spatial volume [L] 115,
- Net equipment weight (empty) [kg] 90,
- Maximum total load [kg] 60,
- Maximum load per shelf [kg] 30,
- Energy consumption at 150°C 1200 Wh/h,
- Sound level [dB(A)] 57,
- Number of shelves (Std./max.) 2/5



**Item No.: 230-0331586**

## Hot/cold test cabinet with explosion-proof test spaces for Zone 1 of the RUMED® Safety T-Line

For the thermostatically-controlled testing of migration of packing ingredients using the Siegwerk (Sieg-Mi-Flex) migration cell system as a function of time and temperature.

### Type: T500MIGRA

- Test space Ex II 2G EEx IIC T3
- Test space and external cladding of solvent-resistant stainless steel
- Circulating air fan for good spatial temperature distribution
- intuitive handling through the CONTROL2015 touch controls
- Temperature range: from 0°C to +80°C
- Robust and extremely long life



### Optional and not part of the scope of delivery, and only on request!

- Can be calibrated and validated!
- Moistening and drying possible!

In the hot/cold test cabinet Type: T500MIGRA, you can safely carry out migration tests (Siegwerk (Sieg-Mi-Flex) migration cell system) on packing media with explosive food simulants or alternative food simulants - even when an explosive atmosphere could temporarily occur due to leakage. The hot/cold test cabinet Type: T500MIGRA is suitable for storing or testing substances of temperature classes T1, T2 and T3 in explosion groups IIA, IIB and IIC and has an ATEX permit for Zone 1.

### Heating – continuous and non-wear

Temporal and spatial high temperature constancy is ensured through a continuously-running fan. The electrical resistance heater, which has very little residual heating due to its small mass, is located directly in front of the recirculating fan. It is controlled through non-contact means through a solid-state relay and therefore enables very direct and precise control. The advantage: high temperature precision and minimal wear.

### The cooling - energy-saving and high performance

An air-cooled cooling machine is used as standard equipment. The compressor runs quietly and nearly vibration-free. The effectiveness of the heat exchanger is optimal. The overall cooling circuit works with energy-saving solenoid valve bypass technology which only turns off the compressor when no cooling output is required for an extended time. The result: Reliable, high operational safety and long life.



**Control2015 touch – a controller for everything**

**Simple:** The clear 7" colour touchscreen display can be operated intuitively.

**Good:** Highly precise sensors and adjustment enable highly precise work, and can be qualified and validated every time.

**Safe:** The documentation, with the help of the integrated plotter and log book provides transparency, is easy to operate and can be comfortably archived.

(see also: <http://www.rumed.de/control2015-touch/>)



**Hot/cold test cabinet RUMED® , Safety T-Line, Type T500MIGRA  
Test space explosion-proof Ex II 2G EEx IIC T3**

Room contents (l)	500
Minimal temperature	0°C
Maximum temperature	+80°C
Temporal temperature deviation (°C)	±0.5°C
Height (mm)	1500
Width (mm)	610
Depth (mm)	585
Number of shelves, reinforced	4
Maximum load per shelf (kg)	50
<b>Equipment</b>	
Height (mm)	2105
Width (mm)	760
Depth (mm)	1125
Electrical connection (V/Hz)	400/230/50 (three-phase alternating current)



**Item No.: 230-0672955**

<b>Optional raw penetration</b>	
A 45 mm penetration in the side wall makes it possible to introduce measurement lines and hoses to the test space. Supply including sealing cover.	
<b>Product no.: 230-0672962</b>	
<b>Optional guide rolls</b>	
Mobile version of test cabinet with 4 guide rolls, 2 of which can be locked with brakes.	
<b>Product no.: 230-0672979</b>	

## Migra wide-neck test bottle for raw materials with DIN threads

Complies with EC 1935/2004 / EU 10/2011. Universally suitable for: pigment, print dyes-pastes or liquids containing solvents (paints, resins, etc.). The wide opening makes it possible for pulpy or viscous substances to be easily removed, for example with a scoop. The bottle and screw closure can be easily cleaned - even in a dishwasher. The temperature resistance of the PP screw closure with PTFE-coated PE foam seal inlay is: -20 to +70°C.

Item No.	Threads DIN 168	KG/BG	volume [mL]	Height [mm]	Ø [mm]	Packaging unit [ea]
120-0669979	DIN 32	KG	30	72	36	120
120-0669986	DIN 32	KG	50	79	44	85
120-0670036	DIN 32	BG	50	79	44	85
120-0669993	DIN 40	KG	100	97	50	63
120-0670043	DIN 40	BG	100	97	50	56
120-0670005	DIN 55	KG	250	118	70	48
120-0670050	DIN 55	BG	250	118	70	30
120-0670012	DIN 55	KG	500	158	83	20
120-0670067	DIN 55	BG	500	158	83	20
120-0670029	DIN 68	KG	1000	185	103	18



**Scope of delivery:** Only complete packing units are provided (no break-outs possible!). The screw closures with inlaid gaskets are not screwed onto the bottle. The bottles are sealed into PE film and the closures are packaged in PE bags. Both items should be rinsed prior to first use.

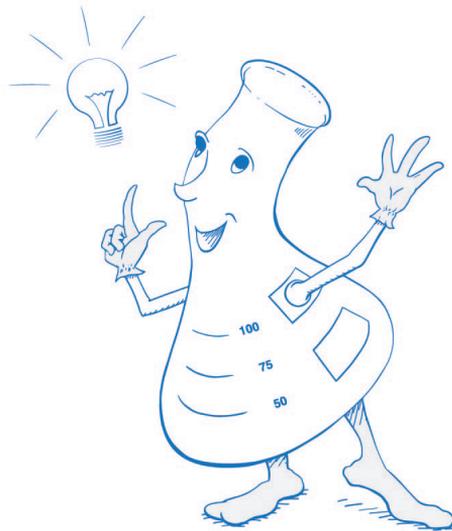
### The heart of the wide-neck sample bottle is the polyethylene foam, PTFE-coated closed cell gasket.

Because of the high elasticity of the PE foam and the excellent recovery ability, the PE foam seal, coated with a migration-compliant PTFE (Teflon®), is perfectly suited for smoothing out tolerances in the interplay between the closure and the container mouth. With the PTFE coating - toward the product side – this gasket provides a very high chemical resistance and it is ideally suited for the sampling, storage and transport of raw material samples due to its excellent seal.

### A progress report on use with the solvent butyl acetate:

Three 50ml wide-neck threaded bottles with DIN threads made of clear glass were filled with butyl acetate and sealed with the orange screw cover with the PE/PTFE gasket. All three sealed bottles were stored for 5 days at 50°C after a weight determination was done on the analysis scale. After cooling, the covers were checked for seating and seal with the result: all three were sealed and seated. The re-weighing showed a difference of >0.005 g (approx. 0.01%).

# Sensor technology

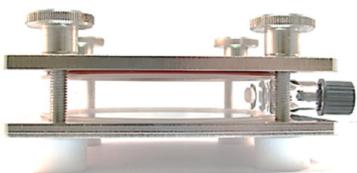


Sensor investigation of food contact materials for organoleptic, relevant migrants using a Siegwerk (Sieg-Mi-Flex) combination migration cell system consisting of: Stainless steel fixing plate set and glass centre ring with water as a food simulant at 130°C.

**Example of how to conduct a taste test for coated films:**

The top and bottom of the migration cell are covered with the film to be tested (test area: approx. 2 dm<sup>2</sup>) and a defined amount of water, e.g. 200 mL, is filled in. The water, as the test medium, only comes into contact with the test film, glass and FEP. (the stainless steel fixing plate is covered by the sample film!) The sealed cell is then heated for 30 minutes in a counter-pressure sterilisation autoclave at 129-130°C. Once the water has cooled down, sensory tests and evaluations are conducted to detect any change in taste.

**This Siegwerk (Sieg-Mi-Flex) combination migration cell system is temperature-resistant from -15°C to 130°C and pressure tight up to 4 bar.**



In the test with this cell construction and with the use of 2 test specimens, the food simulant water only comes into contact with food contact materials (such as the packing material) and the materials glass and FEP!

	Item No.	Nominal diameter	Approx. area with 1 test specimen / with 2 test specimens [dm <sup>2</sup> ]	Fill volume with 2 test specimens [mL]	Image
Central ring	250-0277600	DN120	1.0/2.0	Approx. 200	
		<b>Glass central ring for the migration cell System-Siegwerk (Sieg-Mi-Flex) comprising:</b> <ul style="list-style-type: none"> <li>• 1x borosilicate glass centre ring with cast-in and cast-out fittings with GL14 threads</li> <li>• 2x FEP/silicone O-rings that fit in the central ring's groove (top and bottom)</li> <li>• 2x GL14 seal caps (PPS housing incl. PTFE/sil. gasket)</li> </ul>			
Fixing plate set	250-0239899	<b>Stainless steel fixing plate set for the Siegwerk (Sieg-Mi-Flex) migration cell system, consisting of:</b> <ul style="list-style-type: none"> <li>• 1x stainless steel (V4A 1.4571) upper plate with holes, polished inside, 140×140 mm</li> <li>• 1x stainless steel (V4A 1.4571) lower plate with threaded holes (M8), polished inside, 140×140 mm</li> <li>• 4x stainless steel knurled screws (M8)</li> <li>• 4x stainless steel "Sieg-Mi-Flex" washers</li> <li>• 4x PTFE feet, natural</li> </ul> <b>Note: All Siegwerk (Sieg-Mi-Flex) centre rings fit in the fixing plate set!</b>			

## Test of the taste transfer from the packing materials and packing media through room air using the test substance water according to DIN 55534:2006-08 and the taste test set

This is a quick test, which can be incorporated into an analytical method. This is an additional test method to DIN 10955. This test is therefore a quality control measure during the production of the packing media or the packing process (for example a packing material inlet and outlet check). This sensory quick test allows the quick investigation of packing aids such as pressure media, adhesives, dyes, paints, auxiliary materials and end products.

### Short description:

The sample is located in a glass vessel with a fused glass tube with one side open on the inside, the tube being filled with water. Volatile substances from the packing material are absorbed by the water. Water is a neutral food and has no taste of its own and can be easily tasted. In particular cases, the tasting can be done with a closed nose.\* The water matrix is well-suited for any ongoing analytical investigations.

Test substance: boiled-off, low-salt, commercially available water (boiled for approx. 20 min in the water boiler!) This measure destroys organic substances and off-gasses carbon dioxide.

### Procedure:

50 cm<sup>2</sup> (12.5 × 4 cm) of packing material\*\* are exactly cut out and rolled lengthwise and placed in the glass container around the inner tube so that the broad side stands upright. Deviations must be agreed upon and indicated in the test report. (see figure). Then, 40 ml of water are filled into the fused inner tube using the Fortuna pipette. Then, the vessel is sealed. At least two test batches are prepared for each test and evaluated separately. As a reference sample, another taste test is run - the glass container with 40 ml of water without a packing material sample.



\* Differentiation between the flavour substances and the retronasal sense impression

\*\* The sample surface is adjusted depending on the inherent taste of the packing substance.

Item No. 280-0086707	Favour test set consisting of:
150-0086721	2 each taste test – clear glass container made of DURAN® laboratory glass with inner tube and NS60 stopper
160-0086745	50 each 10 ml PE pipettes
160-0086738	1 each 20-ml suction piston full pipette
120-0673013	100 each PS disposable drinking cups (clear as glass, neutral taste),

## Wide neck bottle with ground stopper

Sensory test of packing materials by means of odour testing and recognition of abnormal aromas can be carried out in glass wide-neck bottles with ground glass stoppers (both sodium glass).

### Sample preparation:

X dm<sup>2</sup> of a representative sample of test material is stored in a 500 or 1000 wide-neck glass (clear or brown glass) at room temperature for 20 to 24 hours.

### Odour test:

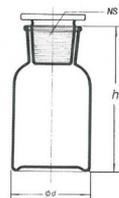
Shake the glass vessel, smell immediately after opening, and evaluate the intensity of the perceived odour using the following scale. Use whole or half numbers:

- 0 no perceivable odour
- 1 Odour is perceptible (but still difficult to determine)
- 2 Moderate odour (describe)
- 3 Somewhat strong odour
- 4 Strong odour

Before the glass is re-opened, wait for 2-3 minutes to pass

### Tip for practice:

To seal the standard ground glass plug and to more easily open the glass-on-glass connection, PTFE sleeves with a grip collar and seal rings on the outside are very suitable. In the process, the PTFE sleeve is first placed on the core of the ground plug.



Item No. Brown glass	Item No. clear glass	vol- ume [mL]	maximum outside Ø d [mm]	Height without stopper h [mm]	NS	Neck opening Ø at least ap- prox. [mm]
120-0452526	120-0452519	500	86	163	45	41
120-0452540	120-0452533	1000	107	201	60	54

Item No.	Description	for NS	Packag- ing unit [ea]
120-0045537	PTFE sleeve with grip edge and seal rings	45	1
120-0673037	PTFE sleeve with grip edge and seal rings	60	1

The known lime-soda glass vessels (lime-sodium glass), which are known as conical shoulder bottles or reagent bottles with ground plugs (also made of glass) are available in brown glass, clear glass and in various volumes. The robust, thick-walled and dishwasher-safe bottles are ideal inert packages, transport and storage containers. For volumes not listed above, please check with us!

**Test of the odour transfer from the food contact materials\* to the air space for olfactory determination of the inherent odour of the upper and lower side using the human nose as a function of storage temperature and storage time.**

The odour perception and quality are evaluated by a test panel based on their hedonic effect. Total contents: 120 ml, contents per chamber: 60 ml,  
Chamber materials: DURAN® laboratory glass

Since the sample specimens (plates, films) of contact materials should only come into contact with an inert material, the odour tester is made of DURAN® laboratory glass according to Scharfenberger. It has 2 chambers, each of which is provided on the inlet side with a flat HV50 glass flange and on the outlet side with an NS45 ground sleeve. These are each sealed with an NS45 ground stopper and secured with an HWS stainless steel bracket. The test specimen is placed between the two HV50 glass flanges as a round blank and secured from the outside with a quick closure made of moulding material with knurled screws made of VA. The NS45 ground stopper has a flattened base in order to guarantee that the chamber volume is 60 ml. For the testing period, the odour tester is stored in an aluminium suspension device for a defined period of time at a defined temperature. After removing the NS45 ground stopper, the odour test is carried out by nose in the NS45 ground sleeve.



\*Contact materials are

1. materials and objects in the sense of Article 1, Paragraph 2 of Regulation (EC) No. 1935/2004 of the European Parliament and the Council of 27 October 2004 concerning materials and objects intended to come into contact with foods and for cancellation of Directives 80/590/EEC and 89/109/EEC (ABI. L 338 dated 13 Nov. 2004, pg. 4), which was amended through regulation (EC) No. 596/2009 (ABI. L 188 dated 18 July, 2009, pg. 14),
  2. packaging, containers or other encasements intended for coming into contact with cosmetic media,
  3. objects intended for coming into contact with mucous membranes of the mouth,
  4. objects intended for body care,
  5. toys and gag gifts,
  6. objects intended for coming into contact with the human body, and not just briefly, such as clothing items, bed linens, masks, wigs, hair pieces, artificial eyelashes, armbands,
  7. cleaning and care media intended for household use or for contact materials in the sense of number 1,
  8. impregnation media and other finishing agents for contact materials in the sense of number 6 intended for household use,
  9. media and objects for odour improvement in rooms intended for human occupation.
- From "Food and Feed Code as amended in the publication" of 3 June, 2013 (Federal Register I pg.1426), amended through Article 1 of the regulation of 24 November, 2016 (FR I pg. 2656).

Item No.	Description	Image
280-0085915	<p>Scharfenberger odour tester, complete with aluminium suspension device for olfactory determination of the inherent odour of the upper and lower side using the human nose as a function of storage temperature and storage time.</p> <p>Technical specifications:            1x glass set made of DURAN® laboratory glass, consisting of 2x NS45 stoppers with sealed flat base and grip collar, 2x HWS stainless steel clamps for conical standard ground connections, 1x quick closure made of moulding material with knurled screws made of stainless steel for the two flat ground flanges HV50 and 1x aluminium suspension device            Total contents: 120 ml, contents per chamber: 60 ml</p>	
120-0085946	<p>Glass set for odour tester according to Scharfenberger, made of DURAN® laboratory glass, consisting of:            2x NS45 stoppers with sealed flat bottom and shaped grip, 2x HWS stainless steel clamps for conical standard ground connections and 2x HV50 flat flanges with fused NS45 ground sleeve, free volume of the lower ground stopper edge (contents per chamber): approx. 60 ml each, total contents: 120 ml</p>	
120-0186452	<p>Quick closure made of moulding material (no feet!) for glass bottle NW 50 /HV 50 with knurled screws made of stainless steel:</p> <ul style="list-style-type: none"> <li>- for permeation measurement cell "BIGA cell/IFA cell" EN 16523-1 (EN 374-3)</li> <li>- for permeation measurement cell "Fluid cell without temperature-control jacket" EN 16523-1 (EN 374-3)</li> <li>- for odour tester according to Scharfenberger</li> </ul>	
120-0174169	<p>Aluminium suspension device silver with 3 bars, h= approx. 250 mm, OD bottom: approx. 170 mm, OD top: approx. 115 mm, ID top: approx. 66 mm can be used:</p> <ul style="list-style-type: none"> <li>- for odour tester according to Scharfenberger</li> <li>- for separatory funnels</li> </ul>	