



**Hellma<sup>®</sup>Analytics**  
High Precision in Spectro-Optics

RELIABLE MEASUREMENTS –  
ASSURED!



# Product Catalogue BestCellers 2016

OPTICAL COMPONENTS FOR UV/VIS/NIR SPECTROSCOPY

// CELLS

// TRAYCELL<sup>®</sup>  
MICRO VOLUME ANALYSIS

// REFERENCE MATERIALS

// OPTICAL IMMERSION PROBES

// QUARTZ MICROPLATES





# THE HELLMA Group

High-tech optical products made of glass, quartz glass and calcium fluoride – these serve as the essential key components in systems, instruments and machines, and therefore ensure the best possible results in highly diverse applications. Hellma has been developing unique products and solutions since 1922, and is the top choice worldwide for the most renowned manufacturers in industry, technology and research.



## INTEGRATED RANGE – FROM RAW MATERIALS UP TO COMPLETE SOLUTIONS

Hellma is unique in the market with its integrated product and service range. For many years, industry has trusted in the company's unification of raw material production, component manufacture, technology and solution expertise. Awareness of its responsibilities ensures that the Hellma Group is a competent and reliable partner for their customers.

We take  
Responsibility®.



### Hellma® Materials

#### // OPTICAL MATERIALS

Calcium Fluoride Crystals –  $\text{CaF}_2$   
Barium Fluoride Crystals –  $\text{BaF}_2$

#### // RADIATION DETECTION MATERIALS

$\text{CeBr}_3$ ;  $\text{SrI}_2:\text{Eu}$ ;  $\text{CaF}_2:\text{Eu}$ ;  $\text{BaF}_2$

#### // LASER CRYSTALS

$\text{Yb}^{3+}:\text{CaF}_2$

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### Hellma® Optics

#### // CYLINDRICAL OPTICS

#### // TORIC OPTICS

#### // FLAT OPTICS

#### // SPECIAL OPTICS

#### // OPTICAL GLASS

#### Hellma Optik GmbH Jena

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### Hellma® Analytics

#### // CELLS FOR SPECTROSCOPY AND CYTOMETRY

#### // CERTIFIED REFERENCE MATERIALS FOR SPECTROSCOPY

#### // MICRO VOLUME ANALYSIS

#### // OPTICAL IMMERSION PROBES FOR LABORATORY USE AND PROCESS CONTROL

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## CONTENT

# Product Catalogue BestCellers

## CELLS

// FOR ABSORPTION MEASUREMENTS	PAGE 10-25
// FOR FLUORESCENCE MEASUREMENTS	PAGE 10-17
// FOR SPECIAL APPLICATIONS	PAGE 18-21
	PAGE 22-25

## QUARTZ MICROPLATE

PAGE 26

## TRAYCELL®

// FOR MICRO VOLUME ANALYSIS	PAGE 27
------------------------------	---------

## UV/VIS REFERENCE MATERIALS

// GLASS FILTERS - CALIBRATION STANDARDS	PAGE 28-37
// LIQUID FILTERS - CALIBRATION STANDARDS	PAGE 29
// REFERENCE PLATES FOR MICROPLATE READER	PAGE 30-31
// RECOMMENDATION FOR RECERTIFYING REFERENCE MATERIALS	PAGE 32
	PAGE 34-37

ACCREDITED TO  
DIN EN ISO 17025

## OPTICAL IMMERSION PROBES

PAGE 38-41

## CLEANING CONCENTRATE FOR CELLS AND OPTICAL PARTS

PAGE 42

## TIPS FOR HANDLING AND CLEANING CELLS

PAGE 43-44

## PRODUCT RANGE HELLMA GROUP

PAGE 45

# Product Catalogue BestCellers

You will find our top BestCellers in this product catalogue. These are the products in our range which are most often put into use by our customers. Should you be unable to find a suitable product in this selection, then please contact us or search for the product of your choice on our website with the aid of the cuvette finder or the immersion probe configurator. We will gladly collaborate with you to develop individual and tailor-made solutions for your measurement tasks.

[www.hellma-analytics.com/cuvettefinder](http://www.hellma-analytics.com/cuvettefinder)  
[www.mypatprobe.com](http://www.mypatprobe.com)

## HOW TO REACH US

Select your local  
distribution partner:

[www.hellma-analytics.com/contacts](http://www.hellma-analytics.com/contacts)

Please check your order on completeness referring to the following points:

- ✓ ARTICLE NUMBER
- ✓ NEEDED QUANTITY
- ✓ TRANSMISSION MATCHED ..... YES/NO
- ✓ POLARIMETRIC CERTIFICATION ..... YES/NO
- ✓ ANTIREFLECTION OR REFLECTIVE COATINGS, IF REQUIRED ..... YES/NO

## SPECTRAL AND POLARIMETRIC CHECKING

On request all cells can be spectrally calibrated and assembled into sets of equal transmission values (measuring uncertainty  $\pm 1\%$ ). These cells are provided with a three digit calibration code number containing coded data about the material and the transmission at a wavelength typical for the cell material.

Some cells can be polarimetrically checked on request. They are marked with a »P« and are delivered together with a certificate confirming that the predetermined limit for the rotation angle of  $0.01^\circ$  is not exceeded.

## SPECIAL DESIGNS

Within the scope of technical possibilities we will be pleased to make specially designed cells and immersion probes according to your needs and specifications. For price reasons we endeavor to use standard cells or probes as the basis for these whenever possible. If you are interested in special designs please

send us a technical drawing. Before manufacture commences, you will then receive a drawing from Hellma Analytics and once you acknowledge approval, this drawing will serve as an agreed specification for manufacture.

# OPTICAL PATH LENGTH AND TOLERANCES

The optical path length is a particularly important parameter for some photometric applications.

Please note the following data for tolerances, shown in relation to optical path length and material of the cells:

MATERIAL	OPTICAL PATH LENGTH	TOLERANCE
Quartz	0.01 mm to 0.05 mm	± 0.003 mm
Quartz	0.1 mm to 0.2 mm	± 0.005 mm
Quartz	0.5 mm to 20 mm	± 0.01 mm
Quartz	30 mm to 100 mm	± 0.02 mm
Special Optical Glass	0.1 mm to 10 mm	± 0.01 mm
Special Optical Glass	20 mm to 100 mm	± 0.03 mm
Optical Glass	10 mm to 20 mm	± 0.05 mm
Optical Glass	20 mm to 100 mm	± 0.1 mm

These optical path length tolerances apply to absorption cells.  
For fluorescence cells, both for the direction of excitation and emission the tolerance is ± 0.05 mm.

## MATERIAL AND TRANSMISSION CURVES

Regarding the transmission curves, please note that the measurements were carried out on empty cells. The maximum transmission values (80 % – 90 %) are caused mainly by reflection losses at the four glass/air boundaries. As the losses by reflection depend solely on the refractive index, the reflection losses of the empty cells can be calculated for each wavelength. For example, at a wavelength of 588 nm we obtain the following values:

WINDOW MATERIAL	REFRACTIVE INDEX	REFLECTION LOSSES	TRANSMISSION THEORETICAL	TRANSMISSION MEASURED
SUPRASIL®	1.458	13 %	87 %	87 % ± 1 %
HOQ 310H	1.458	13 %	87 %	87 % ± 1 %
Borofloat®	1.473	14 %	86 %	85 % ± 1 %
UK 5/B 270	1.523	16 %	84 %	84 % ± 1 %

The table shows that the measured transmission values within the measuring uncertainty accord with the theoretical values. From this it can be concluded that the absorption in the material at a window thickness of 1.25 mm can be disregarded.

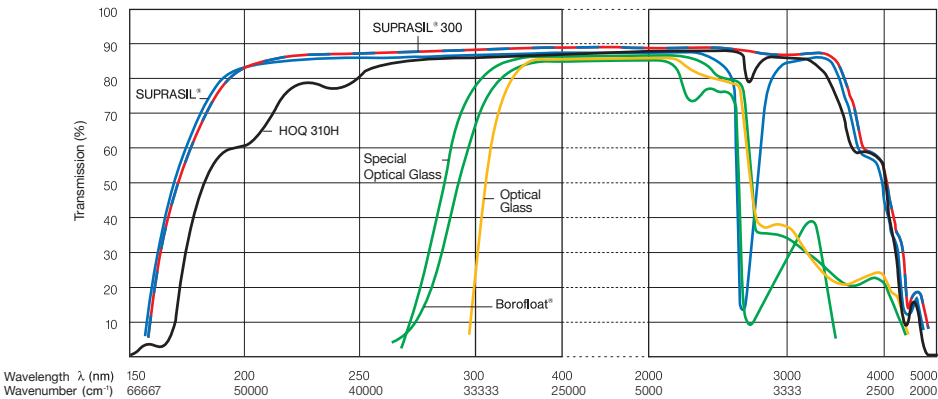
When comparing transmission data, it is absolutely essential that identical measuring conditions prevail. Should a measurement with a clean, empty cell yield significantly higher transmission values, it is likely that this is due to a measuring error.

MATERIAL	TRADEMARKS	WAVELENGTH
Optical glass	OG	360 nm–2500 nm
Borofloat®	BF	330 nm–2500 nm
Special optical glass	OS	320 nm–2500 nm
HOQ 310H	UV	260 nm–2500 nm
Quartz SUPRASIL®	QS	200 nm–2500 nm
Quartz SUPRASIL® 300	QX	200 nm–3500 nm

We can supply, on request, data sheets detailing the physical and chemical properties of the materials used.

SUPRASIL® is a registered trademark of Heraeus Quartz GmbH & Co. KG. DURAN® and Borofloat® are registered trademarks of Schott AG.

Transmission of empty cells made of different materials



TOP INNOVATION



### More versatile, flexible and efficient



Thanks to its two optical path lengths and the innovative internal thread cut directly in the quartz glass cuvette.



// transmission  
// fluorescence  
// 2 optical path lengths  
**all in one single cuvette**

**NEW! Additional optical  
path lengths available!**

# All-quartz flow-through cuvette.

**IDEALLY SUITED FOR TABLET DISSOLUTION TESTS (TDA)  
AND FLOW-THROUGH SPECTROSCOPIC ANALYSIS**

## Product description

The All-quartz flow-through cuvette is a high-precision cell for applications in spectroscopy. New technology enables the positioning of precise internal threads into the quartz glass, thus making the aluminum frame typically used unnecessary. Tubes can now be connected very easily and securely directly to the cuvette. Cleaning efficiency and temperature stability are also significantly enhanced. The cell comes with two different optical path lengths that provide meaningful advantages in terms of costs and use. Furthermore, it is possible to measure the fluorescence with each optical path length. Time-consuming switching of cells is no longer necessary – the All-quartz flow-through cell is simply turned by 90° – all tubes remain screwed in place.



## Clear advantages due to the innovative all-quartz design

- // Flexibility in applications, as the cuvette has two path lengths
- // Fluorescence measurement possible for each path length
- // No liquid leakage, monolithic quartz glass construction prevents this by design
- // Stressfree and extremely chemically resistant tanks to 100% quartz glass construction
- // Suitable for high and low temperatures
- // Fully autoclavable
- // Secure tube connection is ensured due to the innovative quartz glass internal threads

## Special features for TDA applications:

- // Second path length can be set without time consuming changing of the cuvette respectively no longer screwing and unscrewing of the tubings necessary
- // Red point mark for the quick detection of the path length position

**SEE PAGE 21 FOR  
TECHNICAL DETAILS.**



# A CUVETTE IS NOT JUST A CUVETTE! MAXIMUM PRECISION MAKES ALL THE DIFFERENCE.

## STABILITY

Very high temperature stability and chemical resistance due to thermal bonding of individual components (effectively monolithic).  
Not glued or fritted!

## TRANSMISSION

Guaranteed transmission of at least 85% from 200 nm to 3500 nm, depending on the material.

## SELECTION

A very extensive range of products with optical path lengths from 0.01 mm to 100 mm and more.

## DESIGN

A function-optimized design with beveled edges and corners. This significantly reduces damage caused by splitting or chipping as well as the risk of injury at work.

## PARALLELISM

The parallelism of the windows is extremely high, with a maximum tolerance of  $\pm 0.01$  mm.

## ACCURACY

Exceptional optical path length accuracy down to 0.003 mm (3  $\mu$ m) for high dimensional accuracy and reproducible measurement results.

## FLATNESS

Hellma quartz windows have an optical window surface flatness of 0.001 mm (1  $\mu$ m). This sets the standard in cuvette production.



Thomas Brenn, Product Manager Cuvettes

» It is not so much the “what” as the “how” that makes the difference between an original Hellma cuvette and other cuvettes. Our production specialists’ many years of experience make it possible to achieve minimum tolerances and maximum precision. The goal is to lay the foundations for precise and reliable measurement results in optical analysis, because this is the basis for safe and reliable end products — whether it is a matter of food, chemical products or raw materials, component products or end products. «



## UV/Vis/NIR spectroscopy

Cuvettes are not all the same, even if they sometimes appear identical. The difference lies in the details and can be crucial for measurement results. Take our cuvette windows, for example, which boast outstanding quality and a flatness tolerance of more than 0.001 mm (**1 $\mu$ m**).

The parallelism of both window surfaces relative to one another is just as important.

Our high-precision production guarantees that the frontal deformation of the wave of a cuvette window is less than 4 lambda, which works out at approximately **0.001 mm (1 $\mu$ m) if lambda = 546 nm**. The high level of flatness demonstrates that the cuvettes from Hellma Analytics are setting new standards. Overall, an ideal foundation for conducting reliable, reproducible and exact measurements.

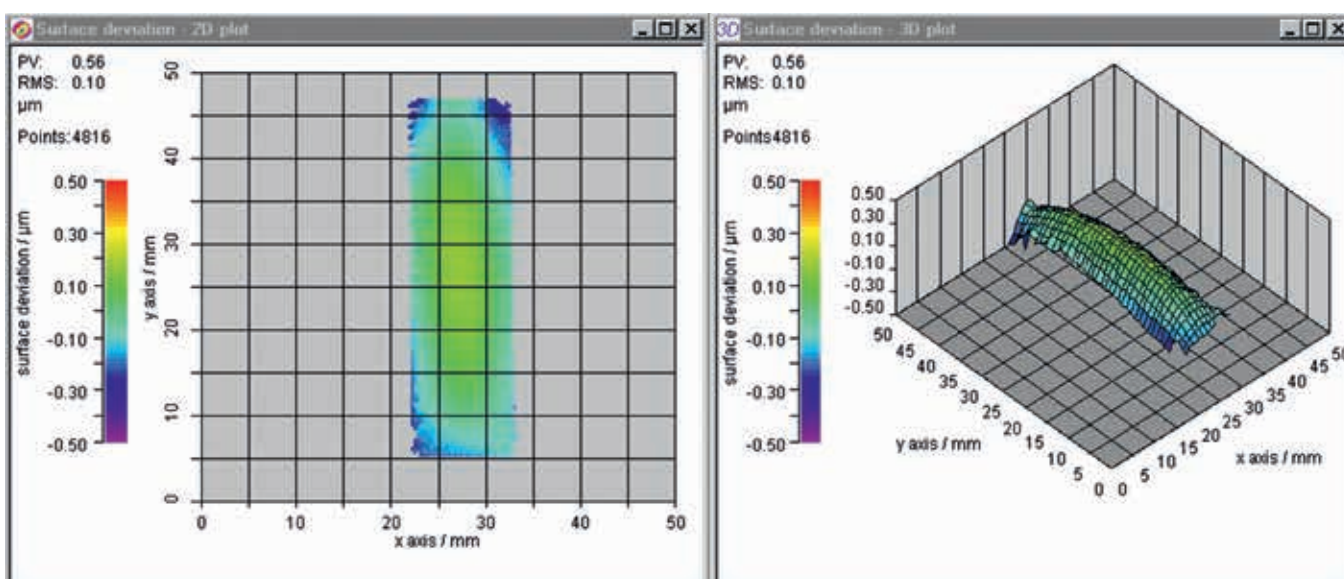
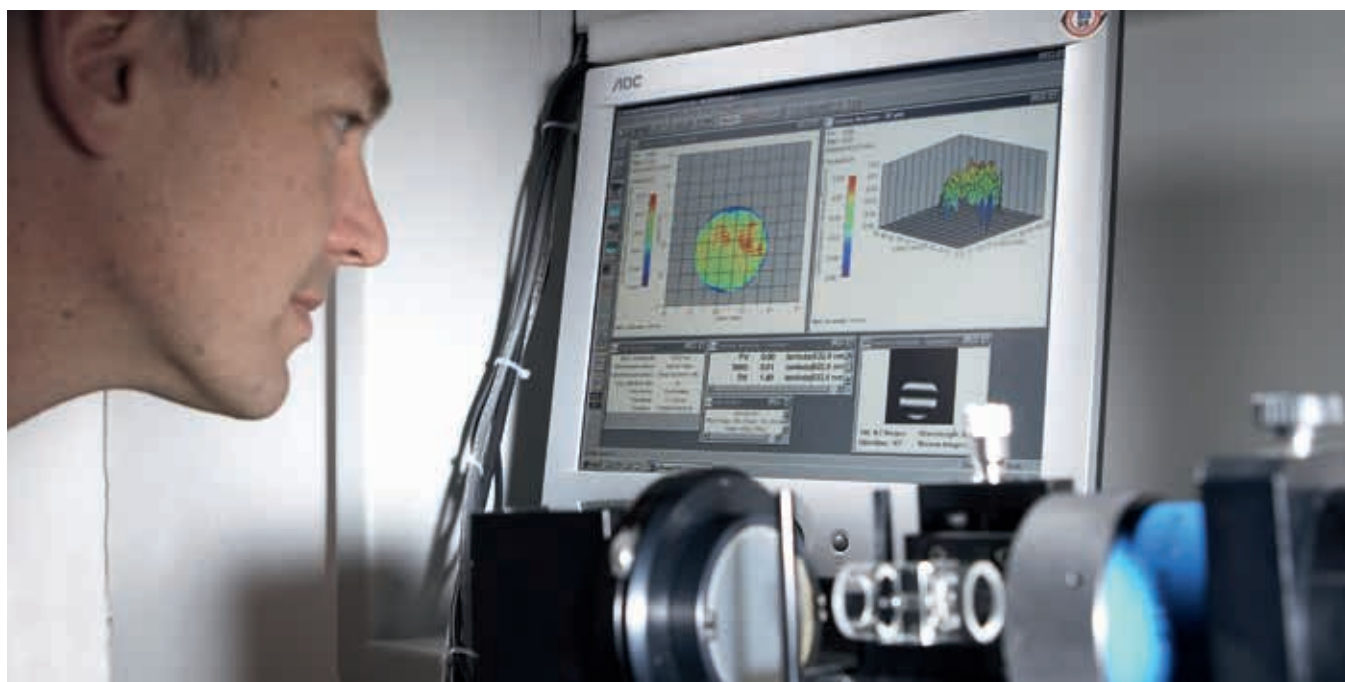


Figure 1: Measurement of the flatness of a Hellma cuvette – the frontal deformation of the wave is extremely low.





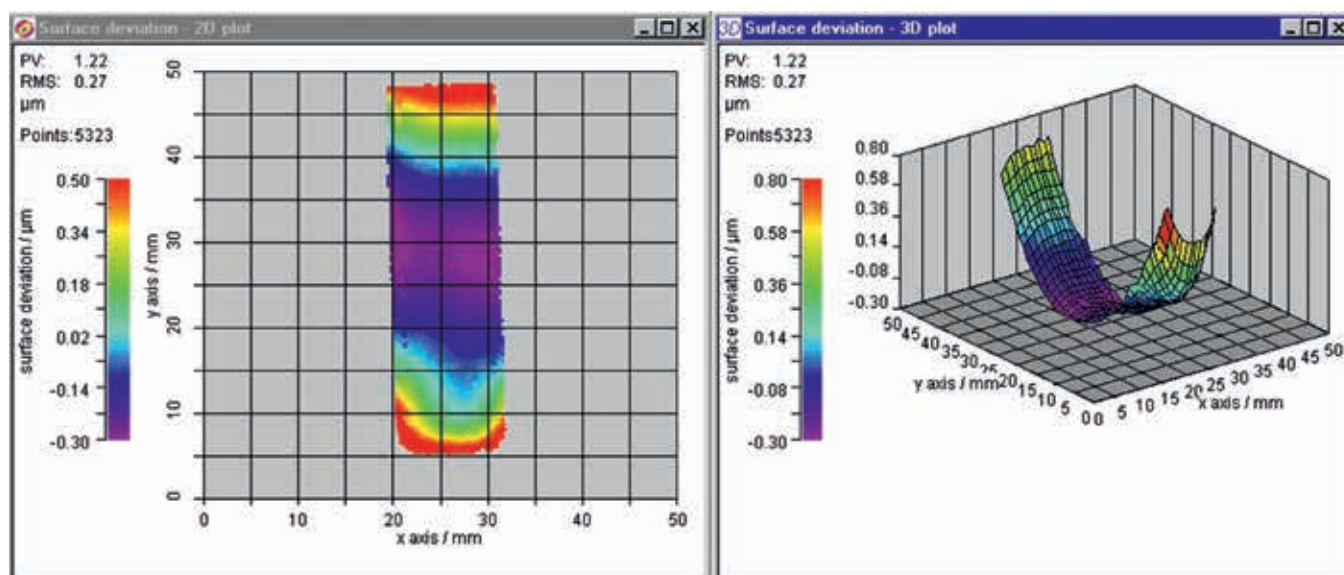


Figure 2: Measurement of the flatness of a competitor's cuvette — the frontal deformation of the wave is more than twice as high compared to a Hellma cuvette.

THE  
ORIGINAL

## Trust the original

After decades of experience in glass techniques, Hellma Analytics produces cuvettes of unrivalled quality, which are used in absorption measurements, fluorescence measurements and special applications such as cytometry, diffused light or reflection measurements, and guarantee precise results and maximum reproducibility. **With over 1.000 different products**, there is one to suit almost every requirement. Hellma Analytics also works with its customers to develop customized solutions.



Tobias Kagermann,  
Market Development Manager

»During UV/Vis/NIR analysis, products from Hellma Analytics are always in direct interaction with analysis samples. This makes it all the more important that reliable data from analyses are already available at this stage. Defects can be catastrophic at this stage and continue to multiply. That's why we see it as our duty and responsibility to manufacture only the best possible products for these analyses. We accept this wholeheartedly. Visit our website at [www.hellma-analytics.com](http://www.hellma-analytics.com) to find out more about our motto "We take responsibility".«

# ABSORPTION CELLS

## MACRO CELLS

with PTFE lid or stopper

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. µl	ARTICLE-NO.	REMARKS
100-OS	1	45 x 12.5 x 3.5	9.5	1.5	350	100-1-20	glass lid
	2	45 x 12.5 x 4.5	9.5	1.5	700	100-2-20	
	5	45 x 12.5 x 7.5	9.5	1.5	1750	100-5-20	
	10	45 x 12.5 x 12.5	9.5	1.5	3500	100-10-20	
	20	45 x 12.5 x 22.5	9.5	1.5	7000	100-20-20	
	40	45 x 12.5 x 42.5	9.5	1.5	14000	100-40-20	
	50	45 x 12.5 x 52.5	9.5	1.5	17500	100-50-20	
	100	45 x 12.5 x 102.5	9.5	1.5	35000	100-100-20	glass lid
100-QS	1	45 x 12.5 x 3.5	9.5	1.5	350	100-1-40	glass lid
	2	45 x 12.5 x 4.5	9.5	1.5	700	100-2-40	
	5	45 x 12.5 x 7.5	9.5	1.5	1750	100-5-40	
	10	45 x 12.5 x 12.5	9.5	1.5	3500	100-10-40	
	20	45 x 12.5 x 22.5	9.5	1.5	7000	100-20-40	
	40	45 x 12.5 x 42.5	9.5	1.5	14000	100-40-40	
	50	45 x 12.5 x 52.5	9.5	1.5	17500	100-50-40	
	100	45 x 12.5 x 102.5	9.5	1.5	35000	100-100-40	glass lid
100-QX	1	45 x 12.5 x 3.5	9.5	1.5	350	100-1-46	glass lid
	2	45 x 12.5 x 4.5	9.5	1.5	700	100-2-46	
	5	45 x 12.5 x 7.5	9.5	1.5	1750	100-5-46	
	10	45 x 12.5 x 12.5	9.5	1.5	3500	100-10-46	
	20	45 x 12.5 x 22.5	9.5	1.5	7000	100-20-46	
	40	45 x 12.5 x 42.5	9.5	1.5	14000	100-40-46	
	50	45 x 12.5 x 52.5	9.5	1.5	17500	100-50-46	
	100	45 x 12.5 x 102.5	9.5	1.5	35000	100-100-46	glass lid
110-OS	1	52 x 12.5 x 3.5	9.5	1.5	350	110-1-20	from 40 mm with 2 stoppers
	2	52 x 12.5 x 4.5	9.5	1.5	700	110-2-20	
	5	46 x 12.5 x 7.5	9.5	1.5	1750	110-5-20	
	10	46 x 12.5 x 12.5	9.5	1.5	3500	110-10-20	
	50	46 x 12.5 x 52.5	9.5	1.5	17500	110-50-20	
110-QS	1	52 x 12.5 x 3.5	9.5	1.5	350	110-1-40	from 40 mm with 2 stoppers
	2	52 x 12.5 x 4.5	9.5	1.5	700	110-2-40	
	5	46 x 12.5 x 7.5	9.5	1.5	1750	110-5-40	
	10	46 x 12.5 x 12.5	9.5	1.5	3500	110-10-40	
	20	46 x 12.5 x 22.5	9.5	1.5	7000	110-20-40	
	40	46 x 12.5 x 42.5	9.5	1.5	14000	110-40-40	
	50	46 x 12.5 x 52.5	9.5	1.5	17500	110-50-40	
	100	46 x 12.5 x 102.5	9.5	1.5	35000	110-100-40	
110-QX	1	52 x 12.5 x 3.5	9.5	1.5	350	110-1-46	
	2	52 x 12.5 x 4.5	9.5	1.5	700	110-2-46	
	5	46 x 12.5 x 7.5	9.5	1.5	1750	110-5-46	
	10	46 x 12.5 x 12.5	9.5	1.5	3500	110-10-46	
	20	46 x 12.5 x 22.5	9.5	1.5	7000	110-20-46	

### WINDOW MATERIAL

■ OG Optical Glass  
■ OS Special Optical Glass

360 nm–2500 nm  
 320 nm–2500 nm

■ QS Quartz SUPRASIL®  
■ QX Quartz SUPRASIL® 300

200 nm–2500 nm  
 200 nm–3500 nm



100  
10 mm

100  
50 mm

100  
100 mm



110  
10 mm

110  
50 mm

110  
100 mm

## MACRO CELLS

with PTFE lid or stopper

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H × W × D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	ARTICLE-NO.	REMARKS
402.000-OG	10	40 x 23.6 x 15	18.5	2.5	6000	402-10-10	
	20	40 x 23.6 x 25	18.5	2.5	12000	402-20-10	
	50	40 x 23.6 x 55	18.5	2.5	30000	402-50-10	
404.000-QX	1	47.5 x 23.6 x 7.5	18.5	2.5	700	404-1-46	with 2 stoppers
	2	47.5 x 23.6 x 7.5	18.5	2.5	1400	404-2-46	
	10	47.5 x 23.6 x 12.5	18.5	2.5	7000	404-10-46	
6030-OG	10	45 x 12.5 x 12.5	9.5	1.5	3500	6030-10-10	
	20	45 x 12.5 x 22.5	9.5	1.5	7000	6030-20-10	
	40	45 x 12.5 x 42.5	9.5	1.5	14000	6030-40-10	
	50	45 x 12.5 x 52.5	9.5	1.5	17500	6030-50-10	
6030-UV	10 (± 0.05)	45 x 12.5 x 12.5	9.5	1.5	3500	6030-UV-10-531	

## SEMI-MICRO CELLS

with PTFE lid or stopper

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H × W × D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	ARTICLE-NO.	REMARKS
6040-OG	10	45 x 12.5 x 12.5	4	3.2	1400	6040-10-10	
6040-UV	10 (± 0.05)	45 x 12.5 x 12.5	4	3.2	1400	6040-UV-10-531	
104-OS	10	45 x 12.5 x 12.5	4	3.2	1400	104-10-20	
	50	45 x 12.5 x 52.5	4	3.2	7000	104-50-20	
104-QS	5	45 x 12.5 x 7.5	4	3.2	700	104-5-40	
	10	45 x 12.5 x 12.5	4	3.2	1400	104-10-40	
	20	45 x 12.5 x 22.5	4	3.2	2800	104-20-40	
	50	45 x 12.5 x 52.5	4	3.2	7000	104-50-40	
104-QX	10	45 x 12.5 x 12.5	4	3.2	1400	104-10-46	

### WINDOW MATERIAL

**OG** Optical Glass  
**OS** Special Optical Glass  
**UV** HQQ310H

360 nm–2500 nm  
 320 nm–2500 nm  
 260 nm–2500 nm

**QS** Quartz SUPRASIL®  
**QX** Quartz SUPRASIL® 300

200 nm–2500 nm  
 200 nm–3500 nm



402.000  
10 mm



404.000  
10 mm



6030  
10 mm



6030-UV  
10 mm



6040  
10 mm



6040-UV  
10 mm



104  
10 mm

# ABSORPTION CELLS

## SEMI-MICRO CELLS

with PTFE lid or stopper

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	ARTICLE-NO.	REMARKS
104B-OS	10	45 x 12.5 x 12.5	4	3.2	1400	104B-10-20	black side walls and base
104B-QS	10	45 x 12.5 x 12.5	4	3.2	1400	104-B-10-40	black side walls and base
108-QS	10	45 x 12.5 x 12.5	4	9	1000	108-000-10-40	
108B-QS	10	45 x 12.5 x 12.5	4	9	1000	108B-10-40	black side walls and base
114-OS	10	46 x 12.5 x 12.5	4	3.2	1400	114-10-20	
114-QS	10	46 x 12.5 x 12.5	4	3.2	1400	114-10-40	
114B-QS	10	46 x 12.5 x 12.5	4	3.2	1400	114B-10-40	black side walls and base

## MICRO CELLS

with PTFE lid or stopper

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	ARTICLE-NO.	REMARKS
104.002-OS	10	45 x 12.5 x 12.5	2	3.2	700	104-002-10-20	
104.002-QS	10	45 x 12.5 x 12.5	2	3.2	700	104-002-10-40	
104.002B-OS	10	45 x 12.5 x 12.5	2	3.2	700	104002B-10-20	black side walls and base
104.002B-QS	10	45 x 12.5 x 12.5	2	3.2	700	104002B-10-40	black side walls and base
105-QS	10	25 x 12.5 x 12.5	2	1.5	300	105-10-40	
105B-QS	10	25 x 12.5 x 12.5	2	1.5	300	105-B-10-40	black side walls and base
108.002-QS	10	45 x 12.5 x 12.5	2	9	500	108-002-10-40	

### WINDOW MATERIAL

■ OS ■ Special Optical Glass

320 nm–2500 nm

■ QS ■ Quartz SUPRASIL®

200 nm–2500 nm



104B  
10 mm



108  
10 mm



108B  
10 mm



114  
10 mm



114B  
10 mm



104.002  
10 mm



104.002B  
10 mm



105  
10 mm



105B  
10 mm



108.002  
10 mm

## MICRO CELLS

with PTFE lid or stopper

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H × W × D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	ARTICLE-NO.	REMARKS
108.002B-QS	10	45 x 12.5 x 12.5	2	9	500	108002B-10-40	black side walls and base
115-QS	10	40 x 12.5 x 12.5	2	1.25	400	115-10-40	
115B-QS	10	40 x 12.5 x 12.5	2	1.25	400	115B-10-40	black side walls and base

## ULTRA-MICRO CELLS

with PE stopper or open with pipette tips

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	CENTER HEIGHT mm	OUTSIDE DIM. H × W × D mm	APERTURE H × W mm	CHAMBER VOL. μl	FILLING VOL. μl	ARTICLE-NO.	REMARKS
105.200-QS	10	15	45 x 12.5 x 12.5	8 x 2	160	180	105-200-15-40	
	10	8.5	45 x 12.5 x 12.5	8 x 2	160	180	105-200-85-40	
105.201-QS	10	15	45 x 12.5 x 12.5	5 x 2	100	120	105-201-15-40	
	10	8.5	45 x 12.5 x 12.5	5 x 2	100	120	105-201-85-40	
105.202-QS	10	15	45 x 12.5 x 12.5	2.5 x 2	50	70	105-202-15-40	
	10	8.5	45 x 12.5 x 12.5	2.5 x 2	50	70	105-202-85-40	
105.020-QS	10	4.5	8.1 x 12.6 x 12.6	6 x 2	120	130	105-020-40	
105.025-QS	10	4.5	12 x 12.5 x 12.5	5 x 2	120	320	105-025-40	
105.210-QS	5	15	40 x 12.5 x 12.5	Ø 0.8	2.5	5	105210-515-40	
	5	8.5	40 x 12.5 x 12.5	Ø 0.8	2.5	5	105210-585-40	
	10	15	40 x 12.5 x 12.5	Ø 0.8	5	10	1052101015-40	
	10	8.5	40 x 12.5 x 12.5	Ø 0.8	5	10	1052101085-40	

### WINDOW MATERIAL

■ QS ■ Quartz SUPRASIL®

200 nm–2500 nm



# ABSORPTION CELLS

## CELLS FOR MAGNETIC STIRRERS

macro, semi-micro, with PTFE lid or stopper

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	ARTICLE-NO.	REMARKS
109.000-QS	10	45 x 12.5 x 12.5	9.5	5	3500	109-000-10-40	
109.004-QS	10	45 x 12.5 x 12.5	4	5	1500	109-004-10-40	
119.000-QS	10	49.5 x 12.5 x 12.5	9.5	5	3500	119-10-40	
119.004-QS	10	49.5 x 12.5 x 12.5	4	5	1500	119-004-10-40	
332.300		6 x 3				332-300-VE10	10-pack PTFE coated magnetic stir bar

## SEALABLE CELLS

macro, semi-micro, for anaerobic applications

(with ISO thread GL 14 and screw cap with silicone rubber seal)

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	ARTICLE-NO.	REMARKS
117.100-QS	10	56 x 12.5 x 12.5	9.5	1.5	3500	117-100-10-40	Open screw cap
117.200-QS	10	56 x 12.5 x 12.5	9.5	1.5	3500	117-200-10-40	Closed screw cap
117.104-QS	10	56 x 12.5 x 12.5	4	1.25	1400	117-104-10-40	Open screw cap
117.204-QS	10	56 x 12.5 x 12.5	4	1.25	1400	117-204-10-40	Closed screw cap

## CELLS WITH TUBES

macro, tube Ø 8 mm, tube length 80 mm

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	ARTICLE-NO.	REMARKS
220-QS	10	40 x 12.5 x 12.5	9.5	1.5	3500	220-10-40	Quartz DURAN® tube

### WINDOW MATERIAL

■ QS ■ Quartz SUPRASIL®

200 nm–2500 nm



109.000  
10 mm



109.004  
10 mm



119.000  
10 mm



119.004  
10 mm



117.100  
10 mm



117.104  
10 mm



220  
10 mm



## CYLINDRICAL CELLS

### macro, with PTFE stopper

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE-DIAMETER mm	INSIDE-DIAMETER mm	OUTSIDE DEPTH mm	VOL. μl	ARTICLE-NO.	REMARKS
120-OS	10	22	19	12.5	2800	120-10-20	from 50 mm with 2 stoppers
	50	22	19	52.5	14000	120-50-20	
	100	22	19	102.5	28000	120-100-20	
120-QS	1	22	19	3.5	280	120-000-1-40	from 50 mm with 2 stoppers
	2	22	19	4.5	560	120-000-2-40	
	5	22	19	7.5	1400	120-5-40	
	10	22	19	12.5	2800	120-10-40	
	20	22	19	22.5	5600	120-20-40	
	50	22	19	52.5	14000	120-50-40	
	100	22	19	102.5	28000	120-100-40	
120-QX	10	22	19	12.5	2800	120-10-46	
121.000-QS	0.1	22	13	20	160	121-0.10-40	2 ports and stoppers
	0.2	22	13	20	170	121-0.20-40	
	0.5	22	13	20	210	121-0.50-40	
	1	22	13	20	280	121-1-40	

## TEMPERATURE CONTROLLED CELLS

### macro

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE-DIAMETER mm	INSIDE-DIAMETER mm	OUTSIDE DEPTH mm	VOL. μl	ARTICLE-NO.	REMARKS
165-QS	1	22	9	30	160	165-1-40	2 stoppers
	10	22	10	12.5	800	165-10-40	1 port and stopper

## CELL WITH TWO CHAMBERS

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	ARTICLE-NO.	REMARKS
238-QS	2 x 4.375	46 x 12.5 x 12.5	9.5	1.5	2 x 1000	238-000-40	with 2 stoppers

### WINDOW MATERIAL

■ OS ■ Special Optical Glass  
■ QS ■ Quartz SUPRASIL®

320 nm–2500 nm  
200 nm–2500 nm

■ QX ■ Quartz SUPRASIL® 300

200 nm–3500 nm



120  
1 mm



120  
10 mm



120  
50 mm



121.000  
1 mm



165  
1 mm



165  
10 mm



238  
2 x 4.375 mm

# ABSORPTION CELLS

## CELLS FOR FLOW-THROUGH MEASUREMENTS

### macro, with in/outlet tubes

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	CENTER HEIGHT mm	OUTSIDE DIM. H x W x D mm	APERTURE H x W mm	VOL. µl	ARTICLE-NO.	REMARKS
130-QS	10		45 x 12.5 x 12.5	33 x 9.5	3200	130-10-40	
137-QS	1 2 5 10		45 x 12.5 x 3.5 45 x 12.5 x 4.5 45 x 12.5 x 7.5 45 x 12.5 x 12.5	20 x 9 20 x 9 20 x 9 20 x 9	260 520 1300 2600	137-1-40 137-2-40 137-5-40 137-10-40	
170-QS	1 2	all dim.	35 x 12.5 x 12.5 35 x 12.5 x 12.5	17.5 x 6.5 17.5 x 6.5	120 240	170-000-1-40 170-000-2-40	
175.000-QS	10 10	15 8.5	45 x 12.5 x 12.5 38.5 x 12.5 x 12.5	11 x 6.5 11 x 6.5	750 750	175-000-10-20 175-85-10-20	
175.000-QS	10 10	15 8.5	45 x 12.5 x 12.5 38.5 x 12.5 x 12.5	11 x 6.5 11 x 6.5	750 750	175-15-10-40 175-85-10-40	

### COMPACT, WITH 2 SCREW CONNECTORS M 6 X 1 AND FEP TUBES

(outside Ø 1.9 mm, inside Ø 1.1 mm, 500 mm long)

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	CENTER HEIGHT mm	OUTSIDE DIM. H x W x D mm	APERTURE H x W mm	VOL. µl	ARTICLE-NO.	REMARKS
170.700-QS	0.1 0.2 0.5 1 2	all dim.	35 x 12.5 x 12.5 35 x 12.5 x 12.5 35 x 12.5 x 12.5 35 x 12.5 x 12.5 35 x 12.5 x 12.5	17.5 x 3.5 17.5 x 3.5 17.5 x 3.5 17.5 x 3.5 17.5 x 3.5	6.2 12.4 31 62 124	170700-0.1-40 170700-0.2-40 170700-0.5-40 170-700-1-40 170-700-2-40	up to 0.5 mm with bypass for flow optimisation

### SEMI-MICRO, WITH IN/OUTLET TUBES

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	CENTER HEIGHT mm	OUTSIDE DIM. H x W x D mm	APERTURE H x W mm	VOL. µl	ARTICLE-NO.	REMARKS
174-QS	10		48 x 12.5 x 12.5	36 x 4	1500	174-10-40	
176.000-QS	10 10 50 50	15 8.5 15 8.5	45 x 12.5 x 12.5 38.5 x 12.5 x 12.5 45 x 12.5 x 52.5 38.5 x 12.5 x 52.5	11 x 4 11 x 4 11 x 4 11 x 4	450 450 2250 2250	176-15-10-40 176-85-10-40 176-50-40 176-50-85-40	

#### WINDOW MATERIAL

■ OS ■ Special Optical Glass

320 nm–2500 nm

■ QS ■ Quartz SUPRASIL®

200 nm–2500 nm

Subject to change without notice.



130  
10 mm



137  
10 mm



170  
1 mm



175.000  
10 mm



170.700  
1 mm



174  
10 mm



176.000  
10 mm

## CELLS FOR FLOW-THROUGH MEASUREMENTS

### compact, with 2 screw connectors M 6 x 1 and FEP tubes

(outside Ø 1.9 mm, inside Ø 1.1 mm, 500 mm long)

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	CENTER HEIGHT mm	OUTSIDE DIM. H x W x D mm	APERTURE H x W mm	VOL. µl	ARTICLE-NO.	REMARKS
176.700-QS	5	15	35 x 12.5 x 12.5	11 x 3.5	195	1767005-15-40	
	5	8.5	35 x 12.5 x 12.5	11 x 3.5	195	1767005-85-40	
	10	15	35 x 12.5 x 12.5	11 x 3.5	390	1767001510-40	
	10	8.5	35 x 12.5 x 12.5	11 x 3.5	390	1767008510-40	
	50	15	35 x 12.5 x 52.5	11 x 3.5	1950	1767001550-40	
	50	8.5	35 x 12.5 x 52.5	11 x 3.5	1950	1767008550-40	
176.703-QS	10	15	35 x 12.5 x 12.5	8 x 2	160	176703-Z15-40	
	10	8.5	35 x 12.5 x 12.5	8 x 2	160	176703-10-85-4	

### micro, ultra-micro, with in/outlet tubes

178.010-OS	10	15	45 x 12.5 x 12.5	Ø 3	80	1780101015-20	optical path length 50 mm on request
	10	8.5	38.5 x 12.5 x 12.5	Ø 3	80	178010-85-20	
178.010-QS	10	15	45 x 12.5 x 12.5	Ø 3	80	1780101015-40	
	10	8.5	38.5 x 12.5 x 12.5	Ø 3	80	178-010-10-40	
	50	15	45 x 12.5 x 52.5	Ø 3	370	178-010-50-40	
	50	8.5	38.5 x 12.5 x 52.5	Ø 3	370	178010-50-85-40	
178.011-OS	10	15	45 x 12.5 x 12.5	Ø 2	30	178011-15-20	
	10	8.5	38.5 x 12.5 x 12.5	Ø 2	30	178011-85-20	

### compact, with 2 screw connectors M 6 x 1 and FEP tubes

(outside Ø 1.9 mm, inside Ø 1.1 mm, 500 mm long)

178.710-OS	10	15	35 x 12.5 x 12.5	Ø 3	80	178-710-20	
	10	8.5	35 x 12.5 x 12.5	Ø 3	80	178-710-10-20	
178.710-QS	10	15	35 x 12.5 x 12.5	Ø 3	80	178-710-10-40	
	10	8.5	35 x 12.5 x 12.5	Ø 3	80	1787108510-40	
	50	15	35 x 12.5 x 52.5	Ø 3	370	1787101550-40	
	50	8.5	35 x 12.5 x 52.5	Ø 3	370	178-710-50-40	
178.711-OS	10	15	35 x 12.5 x 12.5	Ø 2	30	178-711-10-20	
	10	8.5	35 x 12.5 x 12.5	Ø 2	30	1787118510-20	
178.712-OS	10	8.5	35 x 12.5 x 12.5	Ø 1.5	18	178712-10-20	
178.712-QS	10	15	35 x 12.5 x 12.5	Ø 1.5	18	1787121510-40	
	10	8.5	35 x 12.5 x 12.5	Ø 1.5	18	1787128510-40	
178.765-OS*	10	8.5	45 x 12.5/17 x 12.5	Ø 1.5	18	178-765-10-20	without tubes

\*Please order tubes separately – see page 25.

Subject to change without notice.

#### WINDOW MATERIAL

■ OS ■ Special Optical Glass

320 nm–2500 nm

■ QS ■ Quartz SUPRASIL®

200 nm–2500 nm



# FLUORESCENCE CELLS

## MACRO CELLS

with PTFE lid or stopper, triangular cell

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	NO. OF WINDOWS	ARTICLE-NO.	REMARKS
101-OS	10 x 10	45 x 12.5 x 12.5	10	1.25	3500	4	101-10-20	
101-QS	10 x 10 10 x 20	45 x 12.5 x 12.5 45 x 12.5 x 22.5	10 10	1.25 1.25	3500 7000	4 4	101-10-40 101-20-40	
111-OS	10 x 10	46 x 12.5 x 12.5	10	1.25	3500	4	111-10-20	
111-QS	10 x 10	46 x 12.5 x 12.5	10	1.25	3500	4	111-10-40	

## SEMI-MICRO CELLS

with PTFE lid or stopper

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	ARTICLE-NO.	REMARKS
104F-OS	10 x 4	45 x 12.5 x 12.5	4	1.25	1400	104F-10-20	
104F-QS	10 x 4	45 x 12.5 x 12.5	4	1.25	1400	104F-10-40	
108F-QS	10 x 4	45 x 12.5 x 12.5	4	9	1000	108-F-10-40	
114F-QS	10 x 4	46 x 12.5 x 12.5	4	1.25	1400	114F-10-40	

## MICRO CELLS

with PTFE lid or stopper

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	ARTICLE-NO.	REMARKS
104.002F-QS	10 x 2	45 x 12.5 x 12.5	2	1.25	700	104002F-10-40	
108.002F-QS	10 x 2	45 x 12.5 x 12.5	2	9	500	108002F-10-40	
115F-QS	10 x 2	40 x 12.5 x 12.5	2	1.25	400	115-F-10-40	

### WINDOW MATERIAL

■ OS ■ Special Optical Glass

320 nm–2500 nm

■ QS ■ Quartz SUPRASIL®

200 nm–2500 nm



101  
10x10mm



111  
10x10mm



104F  
10x4mm



108F  
10x4mm



114F  
10x4mm



104.002F  
10x2mm



108.002F  
10x2mm



115F  
10x2mm

## MICRO CELLS

with and without PTFE stopper

TYPE/ WINDOW MATERIAL	OPTICAL PATH LENGTH mm	CENTER HEIGHT mm	OUTSIDE DIM. H × B × D mm	INSIDE DIM. H × B × D mm	BASE- PATH mm	VOL. μl	NO. OF WINDOWS	ARTICLE-NO.	REMARKS
101.015-QS	3 x 3		21 x 5.4 x 5.4	19.9 x 3 x 3	1.1	130	5	101-015-40	
013.013		15 8.5	50.5 x 12.5 x 12.5 44 x 12.5 x 12.5					013-013-15-71 013-013-85-71	holder for cell type 101.015
101.016-QS	5 x 5		33.5 x 6.9 x 6.9	32.7 x 5 x 5	0.8	600	5	101-016-40	
013.016			44 x 12.5 x 12.5					013-016-71	holder for cell type 101.016
101.057-QS	5 x 5		45 x 7.5 x 7.5	43.75 x 5 x 5	1.25	850	5	101-057-40	
111.057-QS	5 x 5		46 x 7.5 x 7.5	38.75 x 5 x 5	1.25	850	5	111-057-40	
013.011			44 x 12.5 x 12.5					013-011-71	holder for cell type 111.057 and 101.057

## ULTRA-MICRO CELLS

with PE stopper

TYPE/ WINDOW MATERIAL	OPTICAL PATH LENGTH mm	CENTER HEIGHT mm	OUTSIDE DIM. H × B × D mm	APERTURE H × D mm	CHAMBER VOLUME μl	FILLING VOLUME μl	NO. OF WINDOWS	ARTICLE-NO.	REMARKS
105.250-QS	10 x 2 10 x 2	15 8.5	45 x 12.5 x 12.5 45 x 12.5 x 12.5	5 x 2 5 x 2	100 100	120 120	3 3	105-250-15-40 105-250-85-40	
105.251-QS	3 x 3 3 x 3	15 8.5	45 x 12.5 x 12.5 45 x 12.5 x 12.5	5 x 3 5 x 3	45 45	70 70	3 3	105-251-15-40 105-251-85-40	
105.252-QS	1.5 x 1.5 1.5 x 1.5	15 8.5	45 x 12.5 x 12.5 45 x 12.5 x 12.5	5 x 1.5 5 x 1.5	12 12	30 30	3 3	105-252-15-40 105-252-85-40	

### WINDOW MATERIAL

■ QS ■ Quartz SUPRASIL®

200 nm–2500 nm



# FLUORESCENCE CELLS

## FLUORESCENCE CELLS FOR MAGNETIC STIRRERS

macro, semi-micro, with PTFE lid or stopper

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	NO. OF WINDOWS	ARTICLE-NO.	REMARKS
109.000F-QS	10 x 10	45 x 12.5 x 12.5	10	5	3500	4	109000F-10-40	
119.000F-QS	10 x 10	49.5 x 12.5 x 12.5	10	5	3500	4	119F-10-40	
109.004F-QS	10 x 4	45 x 12.5 x 12.5	4	5	1500	4	109004F-10-40	
119.004F-QS	10 x 4	49.5 x 12.5 x 12.5	4	5	1500	4	119004F-10-40	
332.300		6 x 3					332-300-VE10	10-pack PTFE coated magnetic stir bar

## SEALABLE CELLS

macro, semi-micro, for anaerobic applications

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	NO. OF WINDOWS	ARTICLE-NO.	REMARKS
117.100F-QS	10 x 10	56 x 12.5 x 12.5	10	1.25	3500	4	117100F-10-40	Open screw cap
117.200F-QS	10 x 10	56 x 12.5 x 12.5	10	1.25	3500	4	117200F-10-40	Closed screw cap
117.104F-QS	10 x 4	56 x 12.5 x 12.5	4	1.25	1400	4	117104F-10-40	Open screw cap
117.204F-QS	10 x 4	56 x 12.5 x 12.5	4	1.25	1400	4	117204F-10-40	Closed screw cap

With ISO thread GL 14 and screw cap with silicone rubber seal.

## CELLS WITH TUBES QUARTZ/DURAN®

macro, tube Ø 8 mm, tube length 80 mm

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	BASE THICKN. mm	VOL. μl	NO. OF WINDOWS	ARTICLE-NO.
221-QS*	10 x 10	40 x 12.5 x 12.5	10	1.25	3500	4	221-10-40
221.001-QS**	10 x 10 Tol.+/- 0.2	40 x 12.5 x 12.5	10	1.25	3500	4	221001-10-80

\* on request with a polished base

\*\* for measurements at high and low temperatures

WINDOW MATERIAL

■ QS ■ Quartz SUPRASIL® 200 nm–2500 nm



109.000F  
10 x 10 mm



119.000F  
10 x 10 mm



109.004F  
10 x 4 mm



119.004F  
10 x 4 mm



117.200F-QS  
10 x 10 mm



117.204F-QS  
10 x 4 mm



221  
10 x 10 mm



221.001  
10 x 10 mm



## CELLS FOR FLOW-THROUGH MEASUREMENTS

### macro, with in/outlet tubes

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	APERTURE H x W mm	VOL. μl	NO. OF WINDOWS	ARTICLE-NO.	REMARKS
131-QS	10 x 10	45 x 12.5 x 12.5	33 x 10	3300	4	131-10-40	base and lid 6 mm

### semi-micro, with in/outlet tubes

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	CENTER HEIGHT mm	OUTSIDE DIM. H x W x D mm	APERTURE H x W mm	VOL. μl	NO. OF WINDOWS	ARTICLE-NO.
176.050-QS	10 x 4 10 x 4	15 8.5	45 x 12.5 x 12.5 38.5 x 12.5 x 12.5	11 x 4 11 x 4	450 450	3 3	176-050-40 176050-10-85-40

### compact, with 2 screw connectors M 6 x 1 and FEP tubes

(outside Ø 1.9 mm, inside Ø 1.1 mm, 500 mm long)

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	CENTER HEIGHT mm	OUTSIDE DIM. H x W x D mm	APERTURE H x W mm	VOL. μl	NO. OF WINDOWS	ARTICLE-NO.
176.751-QS	3 x 3 3 x 3	15 8.5	35 x 12.5 x 12.5 35 x 12.5 x 12.5	11 x 3 11 x 3	100 100	3 3	176-751-15-40 176-751-85-40
176.754-QS	10 x 2.5 10 x 2.5	15 8.5	35 x 12.5 x 12.5 35 x 12.5 x 12.5	11 x 2.5 11 x 2.5	275 275	4 4	176-754-10-15-40 176-754-10-85-40

## ALL-QUARTZ FLOW-THROUGH CELL WITH TWO OPTICAL PATH LENGTHS



### with screw connectors M6 x 1, with FEP tubing 500 mm length

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	CENTER HEIGHT mm	OUTSIDE DIM. H x W x D mm	APERTURE H x W mm	VOL. μl	NO. OF WINDOWS	ARTICLE-NO.	REMARKS
176.760-QS	5 and 10	15 8.5	35 x 12.5 x 12.5	11 x 6/11 x 5	550	4	176-760-15-40 176-760-85-40	Further details see page 6
176.761-QS	2.5 and 5	15 8.5	35 x 12.5 x 12.5	11 x 4/11 x 2.5	140	4	176-761-15-40 176-761-85-40	
176.762-QS	1.5 and 3	15 8.5	35 x 12.5 x 12.5	11 x 2.5/11 x 1.5	50	4	176-762-15-40 176-762-85-40	
176.765-QS	1 and 10	15 8.5	35 x 12.5 x 12.5	11 x 6/11 x 1	110	4	176-765-15-40 176-765-85-40	
176.766-QS	2 and 10	15 8.5	35 x 12.5 x 12.5	11 x 6/11 x 2	220	4	176-766-15-40 176-766-85-40	

#### WINDOW MATERIAL

■ QS ■ Quartz SUPRASIL® 200 nm–2500 nm

Subject to change without notice.



131  
10 x 10 mm



176.050  
10 x 4 mm



176.751  
3 x 3 mm



176.754  
10 x 2.5 mm



176.760-QS  
5 and 10 mm



# CELLS AND OPTICAL ELEMENTS FOR SPECIAL APPLICATIONS

## DYE-LASER CELL

macro, with PTFE stoppers

TYPE/WINDOW MATERIAL	OUTSIDE DIM. H x W x D mm	INSIDE CROSS SECTION mm	VOL. μl	NO. OF WINDOWS	ARTICLE-NO.	REMARKS
111.070-QS	46 x 12.5 x 12.5	10 x 10	3500	4	111-070-40	on request with a polished base

## CELL FOR CYTOMETRY

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE CROSS SECTION mm	VOL. μl	ARTICLE-NO.	REMARKS
131.050-QS	0.25 x 0.25	20.3 x 4.2 x 4.2	0.25 x 0.25	1.3	131-050-40	flow channel surfaces polished

## CELLS FOR LIGHT-SCATTERING MEASUREMENTS

with PTFE stoppers

TYPE/WINDOW MATERIAL	OUTSIDE DIM. H x DIAMETER mm	INSIDE DIM. H x DIAMETER mm	VOL. μl	ARTICLE-NO.	REMARKS
540.110-QS	75 x 10	74 x 8	3200	540-110-80	
540.111-QS	75 x 10	74 x 8	3200	540-111-80	polished outer cylinder
540.114-QS	75 x 25	73 x 22.6	22000	540-114-80	
540.115-QS	75 x 25	73 x 22.6	22000	540-115-80	polished outer cylinder
540.135-QS	75 x 20	74 x 18	14000	540-135-20-40	

### WINDOW MATERIAL

■ QS ■ Quartz SUPRASIL®

200 nm–2500 nm



111.070  
10 x 10 mm



131.050



540.110



540.115



540.135

## CELL FOR TURBIDITY MEASUREMENTS

### rectangular cell

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE DIM. H x W x D mm	VOL. μl	ARTICLE-NO.	REMARKS
402.013-OG	25 x 25	70 x 30 x 30	67 x 25 x 25	35000	402-013-10	25 ml marking, 5 windows

## CELLS FOR REFLECTION MEASUREMENTS

### cylindrical cells, without lids

TYPE/WINDOW MATERIAL	OUTSIDE DIM. H x DIAMETER mm	INSIDE DIM. H x DIAMETER mm	VOL. μl	ARTICLE-NO.	REMARKS
692.091-OG	25 x 34	23 x 31.6	12000	692-091-12	
692.103-BF	30 x 50	27.5 x 45	32000	692-103-23	
692.104-BF	40.5 x 60	39 x 55.6	73000	692-104-23	
692.455-BF	52 x 65	50 x 60	110000	692-455-23	acc. to ISO 17223 with markings at 25 mm and 45 mm

New

#### WINDOW MATERIAL

■ OG ■ Optical Glass

360 nm–2500 nm

■ BF ■ Borofloat®

330 nm–2500 nm



402.013



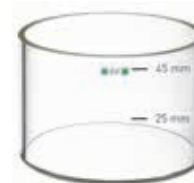
692.091



692.103



692.104



692.455

# CELLS AND OPTICAL ELEMENTS FOR SPECIAL APPLICATIONS

## LARGE CELLS

with glass lids

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	INSIDE WIDTH mm	VOL. $\mu$ l	ARTICLE-NO.	REMARKS
700.000-OG	10 $\pm$ 0.2 20 $\pm$ 0.2	53 x 55 x 15 53 x 55 x 25	50 x 50 x 10 50 x 50 x 20	20000 40000	700-000-10-10 700-000-20-10	
700.010-OG	20 $\pm$ 0.2	82 x 44.4 x 24.4	80 x 40 x 20	56000	700-010-20-10	without lid
700.015-OG	28 $\pm$ 0.2	35 x 35 x 32	33 x 31 x 28	22000	700-015-10	without lid
700.016-OG	18 $\pm$ 0.2	38 x 22 x 22	36 x 18 x 18	10000	700-016-10	without lid
700.061-OG	50 $\pm$ 0.5	100 x 150 x 55	96.5 x 143 x 50	600000	700-019-10	without lid
704.000-OG	20 $\pm$ 0.2	22.5 x 25 x 25	20 x 20 x 20	6000	704-000-20-10	
704.001-OG	30 $\pm$ 0.2	32.5 x 35 x 35	30 x 30 x 30	22500	704-001-30-10	
704.002-OG	40 $\pm$ 0.2	42.5 x 45 x 45	40 x 40 x 40	56000	704-002-40-10	
704.003-OG	50 $\pm$ 0.5	52.5 x 55 x 55	50 x 50 x 50	88000	704-003-50-10	
740.000-OG	34.5 $\pm$ 0.2	100 x 50 x 39.5	97 x 44 x 34.5	100000	740-000-10	without lid

### WINDOW MATERIAL

OG Optical Glass

360 nm–2500 nm



700.000  
10 mm



700.010  
20 mm



700.015  
30 mm



700.016  
18 mm



704.000  
20 mm



704.001  
30 mm



704.002  
40 mm



704.003  
50 mm



740.000  
34.5 mm

## DEMOUNTABLE CELLS

### cells with detachable windows

TYPE/WINDOW MATERIAL	OPTICAL PATH LENGTH mm	OUTSIDE DIM. H x W x D mm	THICK- NESS mm	INSIDE WIDTH mm	VOL. μl	ARTICLE-NO.	REMARKS
106-QS	0.01 ± 0.003	45 x 12.5	2.5	9	2.6	106-0.01-40	demountable rectangular cells Please order cell holder separately - see article no. 013-000-71
	0.1 ± 0.005	45 x 12.5	2.6	9	26	106-0.10-40	
	0.2 ± 0.005	45 x 12.5	2.7	9	52	106-0.20-40	
	0.5 ± 0.010	45 x 12.5	3	9	130	106-0.50-40	
	1 ± 0.010	45 x 12.5	3.5	9	260	106-1-40	
013.000		45 x 12.5 x 12.5				013-000-71	cell holder for cell type 106
665.000-QS		45 x 12.5 x 12.5				665-000-40	rectangular window from Quartz SUPRASIL
665.000-QX		45 x 12.5 x 12.5				665-000-46	rectangular window from Quartz SUPRASIL 300
124-QS	0.01 ± 0.003	Ø 22	2.51	Ø 15	2	124-0.01-40	demountable circular cell Please order cell holder separately! Article-No.: 020-001-761
	0.1 ± 0.005	Ø 22	2.6	Ø 15	18	124-0.1-40	
	0.2 ± 0.005	Ø 22	2.7	Ø 15	35	124-0.2-40	
	0.5 ± 0.005	Ø 22	3	Ø 15	85	124-0.5-40	
	1.0 ± 0.01	Ø 22	3.5	Ø 15	175	124-000-1-40	
020.001	0.01 - 1	27 x 23.5 x 11.5				020-001-761	cell holder for cell type 124 and 201/202
020.002	2 - 2.5	27 x 23.5 x 11.5				020-002-761	cell holder for cell type 201/202
201	1 ± 0.01	Ø 21				201-1-23	ring from Duran for cell holder 020.001
	2 ± 0.01	Ø 21				201-2-23	ring from Duran for cell holder 020.002
202-QS	1.25	Ø 22				202-40	circular window from Quartz SUPRASIL
202-QX	1.25	Ø 22				202-46	circular window from Quartz SUPRASIL 300

## OTHER ACCESSORIES

TYPE/WINDOW MATERIAL	DESCRIPTION	ARTICLE-NO.	REMARKS
013.101	Aluminium spacer 38 x 12.5 x 9 mm	013-101-71	to fit cells with 1 mm optical path length into 10 mm cell holder
013.102	Aluminium spacer 38 x 12.5 x 8 mm	013-102-71	to fit cells with 2 mm optical path length into 10 mm cell holder
013.105	Aluminium spacer 38 x 12.5 x 5 mm	013-105-71	to fit cells with 5 mm optical path length into 10 mm cell holder
040.111	FEP tubing set 500 mm long; outside Ø 1.9 mm; inside Ø 1.1 mm	040-111-722	for compact and 3-in-1 cells; with one short and one long screw fitting
040.222	PTFE tubing set 500 mm long with Omnifit gripper outside Ø 1.6 mm; inside Ø 1.0 mm	040-222-72	for compact and 3-in-1 cells; with one short and one long Omnifit Gripper

### WINDOW MATERIAL

■ QS ■ Quartz SUPRASIL®

200 nm–2500 nm

■ QX ■ Quartz SUPRASIL® 300

200 nm–3500 nm





# QUARTZ MICROPLATES

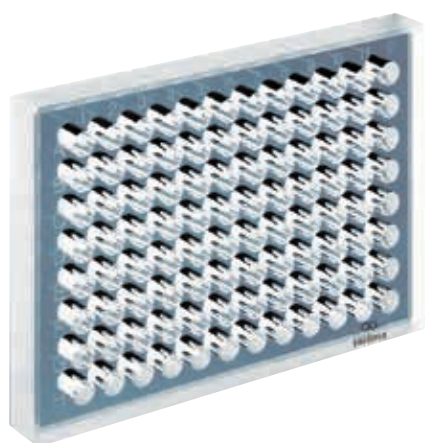
## QUARTZ MICROPLATES

TYPE/WINDOW MATERIAL	DESCRIPTION	OUTSIDE DIM. H x B x L mm	BASE mm	WELLS			ARTICLE-NO.
				DIAMETER mm	DEPTH mm	VOLUME μl	
730.009-QG	Quartz Microplate** with 96 wells Base: Synthetic Quartz Glass	14.5 x 127 x 85.5	2*	6.6	12.5	300	730-009-44
730.009B-QG	Black Quartz Microplate** with 96 wells Base: Synthetic Quartz Glass	14.5 x 127 x 85.5	2*	6.6	12.5	300	730009-B-44

QG is synthetic quartz glass with a transmission over 80% between 200 nm and 2500 nm for an empty cell.

\* On request base with reduced thickness down to 0.5 mm.

\*\* Available made of Borofloat® on request.



730.009-QG



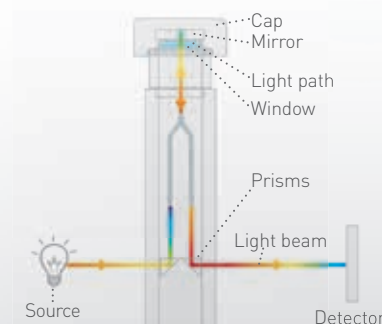
730.009B-QG



The TrayCell is a **fiber-optic ultra-micro measuring cell** designed for the UV/Vis analysis of DNA/RNA and proteins. The dimensions of the TrayCell are equivalent to a standard cuvette in order to work in most spectrophotometers.

### Advantages:

- // Suitable for almost any current spectrophotometers
- // Ideally suited for very small **measurement volumes; 0.7 to 10 µl**
- // Trouble-free measurement of the sample at different optical path lengths simply by exchanging the cap (caps with dilution factors: 5, 10, 50 and 100)
- // Fast and simple cleaning of the optics before measuring the next sample – the TrayCell remains in the cell holder!
- // Samples can be reused after the measurement simply by pipetting them off
- // During measurements, the TrayCell shows excellent reproducibility



**NEW!!**

User Manual for the TrayCell to be available for download: [www.hellma.com/TrayCell](http://www.hellma.com/TrayCell)

TYPE	WINDOW MATERIAL	OPTICAL PATH LENGTH mm	CENTER HEIGHT mm*	EXTERNAL HEIGHT mm*	VOL. µl	ARTICLE-NO.
105.800-UVS	Quartz SUPRASIL®	0.2 mm (factor 50)	8.5	68.5	0.7 – 4	105800-A3-V1-46
		1.0 mm (factor 10) (+/- 0.02 mm)	15 20	75 80		
105.810-UVS	Quartz SUPRASIL®	0.2 mm (factor 50)	8.5	53.0	0.7 – 4	105810-A3-V1-46
		1.0 mm (factor 10) (+/- 0.02 mm)	15 20	59.5 64.5		

Included in delivery: TrayCell (Type: 105.800-UVS or 105.810-UVS), 2 caps with an optical path length of 0.2 and 1.0 mm, 2 adapters for a center height of 15 mm and 20 mm, screwdriver for center height adapter, premium storage box, with built in fibre optics suitable for wavelengths 190 nm to 1.100 nm.



105.800-UVS



105.810-UVS

### CAPS FOR TRAYCELL®

TYPE	MATERIAL	OPTICAL PATH LENGTH (+/- 0.02 mm)	VOL. µl	ARTICLE-NO.
665.703	Cap made of stainless steel with a mirror made of Quartz SUPRASIL® with an aluminum mirror layer	1 mm (factor* 10)	3 – 5	665-703-1-40
665.704		0.2 mm (factor* 50)	0.7 – 4	665-704-0.2-40
665.705		2 mm (factor* 5)	6 – 10	665-705-2-40
665.706		0.1 mm (factor* 100)	0.7 – 3	665-706-0.1-40

\* factor = dilution factor compared to a standard cell with a path length of 10 mm



## UV/VIS CERTIFIED REFERENCE MATERIALS

Quality assurance and quality control regulations, such as ISO 9000, GLP, GMP, and pharmacopoeias, require companies to verify the performance of any spectrophotometer in use. The two most important factors for obtaining precise spectrometer data are the photometric accuracy (absorbance accuracy) and wavelength accuracy of the spectrometer, which should be tested on a regular basis.

In the Hellma Analytics calibration laboratory, which is accredited to DIN EN ISO 17025, we manufacture certified reference materials based on the regulatory codes issued by NIST (National Institute of Standards and Technology), ASTM (American Society for Testing and Materials) and pharmacopoeias (Ph. Eur., DAB, USP). All certified measurement results can be traced back to NIST standard reference materials (SRMs) resp. to the PTB (Physikalisch-Technische Bundesanstalt, the German national test authority). ( Photometric accuracy: NIST SRM 930e and NIST SRM 1930; wavelength accuracy: Hellma UV5, measured by the PTB).

### Hellma Analytics calibration laboratory: accredited to DIN EN ISO 17025

Our lab is certified by the German Accreditation Body (DAkkS) and is accredited to DIN EN ISO 17025, a comprehensive quality management system that acts as a seamless continuation of other systems such as ISO 9000. By achieving this accreditation, we have demonstrated proof of expertise in the calibration activities that we perform and are authorized to issue internationally recognized DAkkS calibration certificates. Accreditation is the key to high quality measurements, international comparability, and trust in both the work of the calibration laboratory and the transparency of results.



**DIN EN ISO 17025**

**NIST  
TRACEABLE**



Look at our Video  
tutorial via smartphone!

**NEW! Guidelines for UV/Vis  
Reference Materials:  
[www.hellma.com/CRM](http://www.hellma.com/CRM)**



## GLASS FILTERS WITH DAkks CERTIFICATE

TYPE	MATERIAL	WAVELENGTH nm	ARTICLE-NO.
Glass Filter for testing the wavelength accuracy			
666-F1	Holmium Glass Filter F1	279; 361; 453; 536; 638	666F1-339
666-F7W	Didymium Glass Filter F7W	329; 472; 512; 681; 875	666F7W-323
Glass Filter for testing the photometric accuracy			
666-F390	Neutral Density Glass Filter F390; 0.04 Abs	440; 465; 546.1; 590; 635	666F390-25
666-F2	Neutral Density Glass Filter F2, 0.25 Abs	440; 465; 546.1; 590; 635	666F2-39
666-F201	Neutral Density Glass Filter F201, 0.3 Abs	440; 465; 546.1; 590; 635	666F201-39
666-F3	Neutral Density Glass Filter F3, 0.5 Abs	440; 465; 546.1; 590; 635	666F3-38
666-F4	Neutral Density Glass Filter F4, 1.0 Abs	440; 465; 546.1; 590; 635	666F4-37
666-F202	Neutral Density Glass Filter F202, 1.5 Abs	440; 465; 546.1; 590; 635	666F202-36
666-F203	Neutral Density Glass Filter F203, 2.0 Abs	440; 465; 546.1; 590; 635	666F203-36
666-F301	Neutral Density Glass Filter F301; 2.5 Abs	440; 465; 546.1; 590; 635	666F301-361
666-F303	Neutral Density Glass Filter F303; 3.0 Abs	440; 465; 546.1; 590; 635	666F303-361
666-F7A	Didymium Glass Filter F7A; ca. 0.5-1.0 Abs	270; 280; 297; 320; 340	666F7A-323
Glass Filter for testing the photometric accuracy and wavelength accuracy			
666-F7	Didymium Glass Filter F7	A: 270; 280; 297; 320; 340 W: 329; 472; 512; 681; 875	666F7-323
Empty filter mount			
666-F0	Reference filter frame made of aluminum (without glass)		666F0-71

TYPE	CONSISTING OF	WAVELENGTH nm	ARTICLE-NO.
Sets for testing the photometric accuracy and wavelength accuracy			
666-S000	Complete Glass Filter Set: F1, F2, F3, F4, F0	A: 440; 465; 546.1; 590; 635 W: 279; 361; 453; 536; 638	666S000
666-S001	Glass Filter Set: F3, F4, F7	A: 270; 280; 297; 320; 340; 440; 465; 546.1; 590; 635 W: 329; 472; 512; 681; 875	666S001
666-S002	Glass Filter Set: F2, F3, F4	A: 440; 465; 546.1; 590; 635	666S002
666-S004	Glass Filter Set: F201, F202, F203, F0	A: 440; 465; 546.1; 590; 635	666S004
666-S300	Glass Filter Set: F390, F301, F303 (Abs: 0.04; 2.5; 3.0)	A: 440; 465; 546.1; 590; 635	666S300

A: Wavelength for Absorbance W: Wavelength for Wavelength accuracy



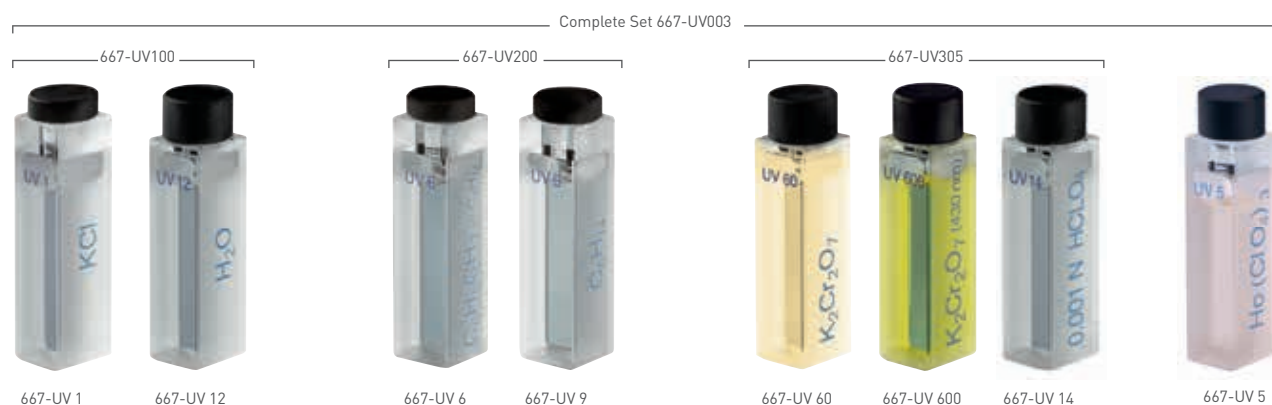
## LIQUID FILTERS WITH DAKKS CERTIFICATE

TYPE	CONTENT	WAVELENGTH nm	ARTICLE-NO.
Liquid Filter for testing the photometric accuracy			
667-UV20	20 mg potassium dichromate in HClO <sub>4</sub> (0.25 Abs)	235; 257; 313; 350	667020
667-UV40	40 mg potassium dichromate HClO <sub>4</sub> (0.5 Abs)	235; 257; 313; 350	667040
667-UV60	60 mg potassium dichromate HClO <sub>4</sub> (0.75 Abs)	235; 257; 313; 350	667060
667-UV80	80 mg potassium dichromate in HClO <sub>4</sub> (1.0 Abs)	235; 257; 313; 350	667080
667-UV0100	100 mg potassium dichromate in HClO <sub>4</sub> (1.25 Abs)	235; 257; 313; 350	6670100
667-UV600	600 mg potassium dichromate in HClO <sub>4</sub> (1.0 Abs)	430	667600
667-UV14	Perchloric acid (reference filter)	235; 257; 313; 350	667014
667-UV301	Filter Set for UV-range: UV60, UV14	235; 257; 313; 350	667301
667-UV304	Filter Set for Vis-range: UV600, UV14	430	667304
667-UV305	Filter Set for UV/Vis-range: UV60, UV600, UV14	235; 257; 313; 350; 430	667305
Liquid Filter Set for testing the linearity of the absorption			
667-UV307	Filter Set: UV20, UV40, UV60, UV80, UV0100, UV14	235; 257; 313; 350	667307
Liquid Filter Set for testing the wavelength accuracy			
667-UV5	Holmium in perchloric acid	241; 287; 361; 536; 640	667005
667-UV400	Filter Set: UV5, UV14	241; 287; 361; 536; 640	667400
667-UV25	Didymium in perchloric acid	329; 469; 575; 740; 864	667025
667-UV35	Rare Earth	201; 211; 222; 239; 252	667035
667-UV45	Holmium/Didymium in perchloric acid	241; 444; 575; 641; 864	667045
Liquid Filter Set for testing the wavelength accuracy acc. to USP 857			
667-UV425	Filter Set: UV5, UV25	UV5: 241; 250; 278; 287; 333; 345; 361; 385; 416; 452; 468; 485; 536; 640 UV25: 732; 740; 794; 801; 864	667425
Liquid Filter for testing stray light			
667-UV1	Potassium chloride in pure water, LP 10 mm	200 (cut-off)	667001
667-UV1H*	Potassium chloride in pure water, reference filter, LP 5 mm	200 (cut-off)	667001H
667-UV10	Sodium iodide in pure water, LP 10 mm	259 (cut-off)	667010
667-UV10H*	Sodium iodide in pure water, reference filter, LP 5mm	259 (cut-off)	667010H
667-UV11	Sodium nitrite in pure water, LP 10 mm	385 (cut-off)	667011
667-UV11H*	Sodium nitrite in pure water, reference filter, LP 5mm	385 (cut-off)	667011H
667-UV12	Pure water, reference filter, LP 10mm	198; 200; 300; 400	667012
667-UV19	Acetone, LP 10 mm	325 (cut-off)	667019
667-UV19H*	Acetone, reference filter, LP 5 mm	325 (cut-off)	667019H
Liquid Filter set for testing stray light according to Ph. Eur.			
667-UV100	Filter Set: UV1, UV12; LP 10 mm	200 (cut-off)	667100
667-UV101	Filter Set: UV10, UV12; LP 10 mm	259 (cut-off)	667101
667-UV102	Filter Set: UV11, UV12; LP 10 mm	385 (cut-off)	667102
667-UV103	Filter Set: UV1, UV10, UV11, UV12; LP 10 mm	200; 259; 385 (cut-off)	667103
667-UV104	Filter Set: UV10, UV11, UV12; LP 10 mm	259; 385 (cut-off)	667104

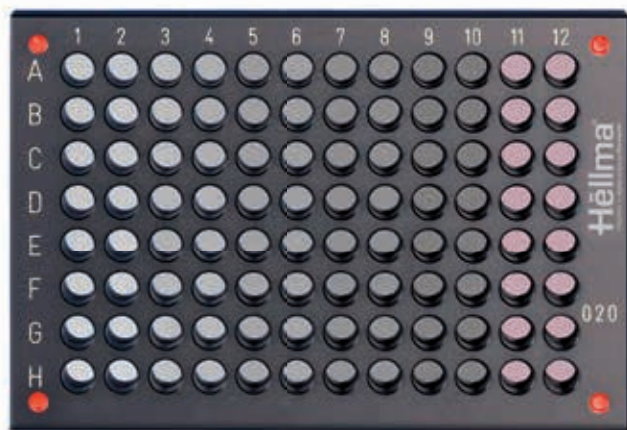
\*with Hellma Analytics calibration certificate

TYPE	CONTENT	WAVELENGTH nm	ARTICLE-NO.
Liquid Filter Sets for testing stray light according to USP 857			
667-UV100H	Filter Set: UV1, UV1H, LP 10 and 5 mm	200 (cut-off)	667100H
667-UV101H	Filter Set: UV10, UV10H, LP 10 and 5 mm	259 (cut-off)	667101H
667-UV102H	Filter Set: UV11, UV11H, LP 10 and 5 mm	358 (cut-off)	667102H
667-UV119H	Filter Set: UV19, UV19H, LP 10 and 5 mm	325 (cut-off)	667119H
667-UV105H	Filter Set: UV1/UV1H; UV10/UV10H; UV11/UV11H; UV19/UV19H, LP 10 and 5 mm	200, 259, 325, 385 (cut-off)	667105H
Liquid Filter for testing the resolution			
667-UV6*	Toluene in n-hexane	Scan: 265 – 270	667006
667-UV9*	n-hexane (Reference Filter)	Scan: 265 – 270	667009
667-UV200*	Filter-Set: UV6, UV9	Scan: 265 – 270	667200
Liquid Filter Set according to USP			
667-UV004	Glass Filter: F2, F3, F4, F0 Liquid Filter: UV60 / UV 14 Liquid Filter: UV5	A: 440; 465; 546.1; 590; 635 A: 235; 257; 313; 350 W: 241; 250; 278; 287; 333; 345; 361; 385; 416; 452; 468; 485; 536; 640	667004
Complete Filter Set for testing the spectrophotometer according to Ph.Eur.			
667-UV003	Complete Filter Set: UV1, UV12, UV6, UV9, UV60, UV600, UV14, UV5	A: 235; 257; 313; 350; 430 W: 241; 287; 361; 536; 640 S: 200 (cut-off) R: Scan 265 – 270	667003

A: Wavelength for absorbance W: Wavelength for wavelength accuracy S: Wavelength for stray light R: Wavelength for spectral resolution \*with Hellma Analytics calibration certificate



## REFERENCE PLATES FOR QUALIFYING MICROPLATE READERS WITH DAKKS CERTIFICATE



666-R113

With reference plates from Hellma Analytics you can check the photometric and wavelength accuracy of microplate readers. They have the same dimensions as a microplate with 96 wells and a 6.6 mm diameter per window (height 14.5 x width 125 x length 85.5 mm).



TYPE	USAGE	MATERIAL Nominal value of absorption (Abs.)	WAVELENGTH nm	ARTICLE-NO.
666-R013	To check photometric accuracy	Neutral Density Glass Filter NG 11 (0.25), NG 5 (0.5), NG 4 (1.0), NG 3 (1.5), (2.5)	A: 405; 450; 490; 650	666R013
666-R113	To check photometric accuracy and wavelength accuracy	Neutral Density Glass Filter NG 5 (0.5), NG 4 (1.0), NG 3 (1.5), (2.0) Holmium Glass Filter	A: 405; 450; 490; 650 W: 279; 361; 453; 536; 638	666R113

A: Wavelength for Absorbance W: Wavelength for Wavelength accuracy

**WE GRANT A 30 YEAR**  
MANUFACTURER'S WARRANTY ON ALL  
CERTIFIED REFERENCE MATERIALS IF  
THEY ARE REGULARLY\* RECERTIFIED IN  
THE HELIMA ANALYTICS CALIBRATION  
LABORATORY.

\*at least every 2 years



# DAkks CALIBRATION CERTIFICATE

**Hellma Analytics**  
High Precision in Spectro-Optics

Hellma GmbH & Co. KG  
Klostermstr. 5, 79379 Müllheim, Germany  
Telefon / Phone: +49 7631 182 0

akkreditiert durch die / accredited by the  
**Deutsche Akkreditierungsstelle GmbH**  
als Kalibrierlaboratorium im / as calibration laboratory in the  
**Deutschen Kalibrierdienst** **DKD**

**Sample**

**DAkks**  
Deutsche  
Akkreditierungsstelle  
D-K-18752-01-00

21112  
D-K-  
18752-01-00  
2014-12

Kalibrierschein  
Calibration certificate

Kalibrierzeichen  
Calibration mark

Gegenstand  
Object: **Neutralglasfilter-Satz**  
Set of Neutral Density Glass Filters

Hersteller  
Manufacturer: **Hellma GmbH & Co. KG**

Typ  
Type: **6665000**  
(666-F2 / 666-F3 / 666-F4)

Fabrikat/Serien-Nr.  
Serial number: **1234**

Auftraggeber  
Customer: **Hellma Analytics GmbH**  
Klostermstr. 5  
79379 Müllheim

Auftragsnummer  
Order No.: **666666**

Anzahl der Seiten des Kalibrierscheines  
Number of pages of the certificate: **3**

Datum der Kalibrierung  
Date of calibration: **22. Dezember 2014**  
22 December 2014

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).  
This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).  
The DAkks is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.  
The user is obliged to have the object recalibrated at appropriate intervals.

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Datum  
Date: **22. Dezember 2014**  
22 December 2014

Leiter des Kalibrierlaboratoriums  
Head of the calibration laboratory: **Birgit Kahl**

Bearbeiter  
Person in charge: **Timo Rapp**

Barcode: **18605**  
Barcode: **D-K-18752-01-00**  
Barcode: **2015-01**

Seite 1/3

**DAkks**  
Deutsche  
Akkreditierungsstelle  
D-K-18752-01-00

21112  
D-K-  
18752-01-00  
2014-12

DAkks-Zertifikat  
DAkks Certificate

Objekt  
Object: **Neutralglasfilter-Satz**  
Set of Neutral Density Glass Filters

Hersteller  
Manufacturer: **Hellma GmbH & Co. KG**

Typ  
Type: **6665000**  
(666-F2 / 666-F3 / 666-F4)

Fabrikat/Serien-Nr.  
Serial number: **1234**

Auftraggeber  
Customer: **Hellma Analytics GmbH**  
Klostermstr. 5  
79379 Müllheim

Auftragsnummer  
Order No.: **666666**

Anzahl der Seiten des Kalibrierscheines  
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Head of the calibration laboratory: **Birgit Kahl**

Bearbeiter  
Person in charge: **Timo Rapp**

Barcode: **18605**  
Barcode: **D-K-18752-01-00**  
Barcode: **2015-01**

## DAkks CALIBRATION CERTIFICATE FROM HELLMA ANALYTICS. GUARANTEE FOR CERTIFIED REFERENCE MATERIALS.

After careful manufacture, the reference materials are measured and certified using a high-performance UV/Vis Spectrometer in the Hellma Analytics' according to DAkks accredited calibration laboratory.



Only if the DAkks calibration certificate has been issued and the calibration mark has been affixed, do the reference materials actually become certified reference materials.



Users are then able to test and calibrate their spectrometers by using the values documented and certified on the calibration certificate. DAkks calibration certificates are certificates from the "Deutsche Kalibrierdienst" (German Calibration Authority) and may only be issued by accredited partners.

The Hellma Analytics calibration laboratory is the only calibration laboratory in Germany accredited for the certification of UV/Vis reference materials.



# RECERTIFICATION

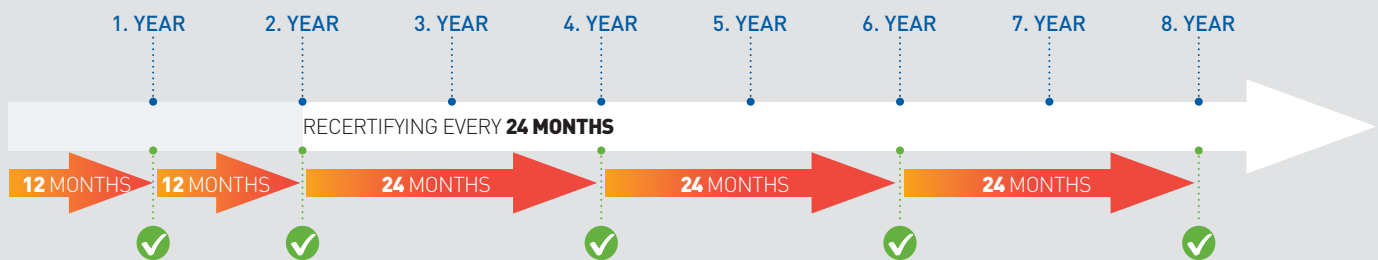
## RECERTIFICATION INTERVALS FOR REFERENCE MATERIALS

As is the case for all measuring devices, the reference materials used to verify spectrophotometers must also be checked and recertified at regular intervals (see for example ISO 9001:2008 "Control of Monitoring and Measuring Equipment"). This allows you to ensure that you consistently fulfill your in-house quality requirements and guarantees high levels of accuracy and reliability in your measurements.

The length of intervals between the recertification of reference materials depends on how frequently materials are used, the wear associated with this, accuracy requirements, and the requirements of a company's internal auditing. Therefore, only clients themselves can determine these. In general, a recertification interval of 12 months is recommended for checking and recertifying glass filters during the first two years of use, with an interval of 24 months thereafter. We recommend verifying and recertifying liquid filters within a maximum of 12 months. Intervals should be specified individually in accordance with your QA system.



### GLASS FILTERS



### LIQUID FILTERS





## RETURNING YOUR REFERENCE MATERIALS FOR RECERTIFICATION

**RETURN FORM**

Please complete this form and enclose it with the return shipment.  
Recertification in the accredited Hellma Analytics Calibration Laboratory

**COMPANY:** \_\_\_\_\_

**NAME OF CONTACT PERSON:** \_\_\_\_\_

**STREET/STREET NUMBER:** \_\_\_\_\_

**POSTAL CODE/CITY:** \_\_\_\_\_

**COUNTRY:** \_\_\_\_\_

**EMAIL:** \_\_\_\_\_

**PHONE:** \_\_\_\_\_

THIS ADDRESS IS: ☐ SHIPPING ADDRESS ☐ BILLING ADDRESS

**ARTICLE NUMBER/FILTER TYPE\*:** \_\_\_\_\_

**SET/SERIAL NUMBER\*:** \_\_\_\_\_

**YOUR ORDER NUMBER:** \_\_\_\_\_

\*You'll find this information on your calibration certificate

**I'd like to receive the following recertification**

☐ DAKkS Calibration certificate (including a Hellma Analytics calibration certificate, please enclose a copy of it)

☐ Individual recertification with DAKkS Calibration certificate

Please specify:

**SLOT WIDTHS:** \_\_\_\_\_

**WAVELENGTHS:** \_\_\_\_\_

**OTHER:** \_\_\_\_\_

**Additional options**

☐ I'd like to receive a documentation of the measured data upon receipt

☐ Measurement report of the absorption values for neutral density glass filters (at 1 mm slit width and the following wavelengths: 440, 465, 546.1, 590, 633) (charge 18.90 € - depending on the country and exchange rate)

☐ Individual documentation of the measured data upon receipt combined in a measurement report (charges depending on the type of filter and extent of measurement)

**SLOT WIDTHS:** \_\_\_\_\_

**WAVELENGTHS:** \_\_\_\_\_

☐ Documentation of the measured data upon receipt with a DAKkS Calibration certificate for all measurement parameters, according to the recertification stated above (charges depending on the type of filter and extent of measurement)

Thank you very much for trusting the Hellma Analytics Calibration Laboratory!

Return form available for  
download:  
[www.hellma.com/return](http://www.hellma.com/return)



### 01.

Complete the return shipment form in full. When returning several filters or filter sets, please use one form for each.

### 02.

Enclose a copy of the current calibration certificate.

### 03.

Send your filter to the Hellma Analytics calibration laboratory via your local Hellma office. Use the address label printed on the rear of the return shipment form to do so.

### 04.

Filters are cleaned and recertified in the Hellma Analytics calibration laboratory. If necessary, filters will also be repaired or exchanged following a consultation.

### 05.

You will receive your filter with a new DAKkS calibration certificate or a Hellma Analytics calibration certificate in the case of filters for verifying spectral resolution.

## 30-YEAR WARRANTY

All of our reference materials come with a 30-year warranty, provided that they are regularly recertified (at least every two years) at the Hellma Analytics calibration laboratory. Certified reference materials (filters) sent for recertification are carefully cleaned and recertified before being sent back with a new DAKkS calibration certificate and calibration mark. Damaged filters and filters that deviate significantly from nominal values are usually replaced in consultation with the customer.





## RECERTIFYING OF THE FILTERS WITH DAKKS CERTIFICATE

### Glass Filter

TYPE	SERVICE	ARTICLE-NO.
Recertifying of the Glass Filters for checking photometric accuracy		
666-F2	Neutral Density Glass Filter (0.25 Abs)	666F2RE
666-F3	Neutral Density Glass Filter (0.5 Abs)	666F3RE
666-F4	Neutral Density Glass Filter (1 Abs)	666F4RE
666-F201	Neutral Density Glass Filter (0.3 Abs)	666F201RE
666-F202	Neutral Density Glass Filter (1.5 Abs)	666F202RE
666-F203	Neutral Density Glass Filter (2.0 Abs)	666F203RE
666-F301	Neutral Density Glass Filter (2.5 Abs)	666F301RE
666-F303	Neutral Density Glass Filter (3.0 Abs)	666F303RE
666-F390	Neutral Density Glass Filter (0.04 Abs)	666F390RE
666-F7A	Didymium Glass Filter (0.5 – 1.0 Abs)	666F7ARE
Recertifying of the Glass Filters for checking wavelength accuracy		
666-F1	Holmium Glass Filter	666F1RE
666-F7W	Didymium Glass Filter	666F7WRE
Recertifying of the Glass Filters for checking photometric accuracy and wavelength accuracy		
666-F7	Didymium Glass Filter	666F7RE
Recertifying of the Glass Filter Sets		
666-S000	Glass Filter Set: F0, F1, F2, F3, F4	666S000RE
666-S001	Glass Filter Set: F3, F4, F7	666S001RE
666-S002	Glass Filter Set: F2, F3, F4	666S002RE
666-S004	Glass Filter Set: F201, F202, F203, F0	666S004RE
666-S300	Glass Filter Set: F301, F303, F390	666S300RE



### Reference Plates

TYPE	SERVICE	ARTICLE-NO.
Recertifying of the Reference Plates for Microplate Readers		
666-R013	Neutral Density Glass Filter: NG11, NG5, NG4, NG3	666R013RE
666-R113	Neutral Density Glass Filter: NG5, NG4, NG3, Holmium Glass Filter	666R113RE



### Liquid Filters

TYPE	SERVICE	ARTICLE-NO.
Recertifying of the Liquid Filters for checking photometric accuracy		
667-UV20	Potassium Dichromate Filter (20mg)	667020RE
667-UV40	Potassium Dichromate Filter (40mg)	667040RE
667-UV60	Potassium Dichromate Filter (60mg)	667060RE
667-UV80	Potassium Dichromate Filter (80mg)	667080RE
667-UV0100	Potassium Dichromate Filter (100mg)	6670100RE
667-UV600	Potassium Dichromate Filter (600mg)	667600RE

## RECERTIFYING OF THE FILTERS WITH DAKKS CERTIFICATE

### Liquid Filters

TYPE	SERVICE	ARTICLE-NO.
Recertifying of the Liquid Filters for testing the photometric accuracy		
667-UV14	Perchloric acid (Reference Filter)	667014RE
667-UV301	Filter Set: UV60, UV14	667301RE
667-UV304	Filter Set: UV600, UV14	667304RE
667-UV305	Filter Set: UV60, UV600, UV14	667305RE
667-UV307	Filter Set: UV20, UV40, UV60, UV80, UV0100, UV14	667307RE
Recertifying of the Liquid Filters for testing the wavelength accuracy		
667-UV5	Holmium Liquid Filter	667005RE
667-UV25	Didymium Liquid Filter	667025RE
667-UV35	Rare Earth Liquid Filter	667035RE
667-UV45	Holmium/Didymium Liquid Filter	667045RE
667-UV400	Filter Set: UV5, UV14	667400RE
667-UV425	Filter-Set according to USP 857: UV5, UV25	667425RE
Recertifying of the Liquid Filters for testing the resolution		
667-UV6*	Toluene in n-hexane	667006RE
667-UV200*	Filter Set: UV6, UV9	667200RE
Recertifying of the Liquid Filters for testing stray light		
667-UV1	Potassium chloride in pure water	667001RE
667-UV10	Sodium iodide in pure water	667010RE
667-UV11	Sodium nitrite in pure water	667011RE
667-UV12	Pure water	667012RE
667-UV19	Acetone	667019RE
667-UV100	Filter Set: UV1, UV12	667100RE
667-UV101	Filter Set: UV10, UV12	667101RE
667-UV102	Filter Set: UV11, UV12	667102RE
667-UV103	Filter Set: UV1, UV10, UV11, UV12	667103RE
667-UV104	Filter Set: UV10, UV11, UV12	667104RE
Recertifying of the stray light filter set according to USP 857		
667-UV100H	Filter Set: UV1, UV1H	667100HRE
667-UV101H	Filter Set: UV10, UV10H	667101HRE
667-UV102H	Filter Set: UV11, UV11H	667102HRE
667-UV119H	Filter Set: UV19, UV19H	667119HRE
667-UV105H	Filter-Set: UV1/UV1H; UV10/UV10H; UV11/UV11H; UV19/UV19H	667105HRE
Recertifying of the Liquid Filter Complete Sets		
667-UV004	Filter Set: F0, F2, F3, F4, UV60, UV14, UV5	667004RE
667-UV003	Filter Set: UV1, UV12, UV6, UV9, UV60, UV600, UV14, UV5	667003RE



\*with Hellma Analytics calibration certificate

# OPTICAL IMMERSION PROBES

## USAGE

Immersion Probes support engineers, researchers and analysts in several fields where process efficiency is required.

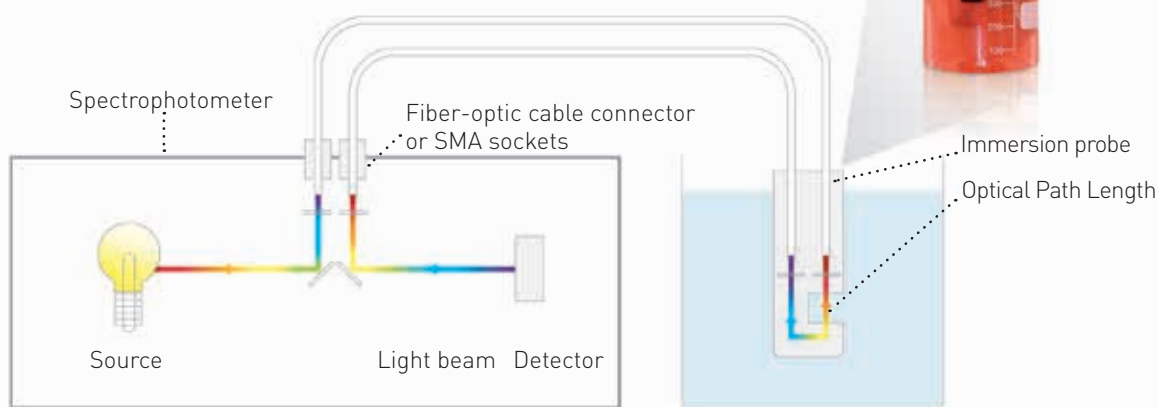
For example:

- // Chemical and Petrochemical Industry
- // Pharmacy and Life Science
- // Food and Beverage
- // Polymers

Hellma Analytics offers a broad product range and utmost competence to support your UV/VIS & NIR measurements.

## BENEFITS

- // Higher process efficiency and performance
- // Simple and safe process monitoring
- // Optimal control of complex reaction processes
- // Proactive process and quality management
- // Provable enhanced product and measurement quality
- // Fast return on investment
- // Professional consulting from highly educated Engineers



## EXCALIBUR STANDARD IMMERSION PROBE

### All-Round Probe

This classic transmission probe features a broad range of possible applications. Whether for use in the lab, for online monitoring in process environment or even for TDA -measurements – it is always the right choice.

Optical Path Length mm (tolerance $\pm 0.01$ )	1 mm, 2 mm, 5 mm, 10 mm, 20 mm
Outer Diameter	probe head 15 mm probe shaft 20 mm protective sleeve 20 mm
Optical Material	Quartz
Probe Body Material	Stainless steel 1.4404 (316 L)
Sealing Technology	Viton Kalrez® 4079
Spectral Range	UV/Vis (190 nm to 1.100 nm, low solarization) NIR (400 nm to 2.300 nm)
Fiber Optical Connection	1.8 m external fiber optical cables with SMA connectors
Temperature Range	5 °C to 150 °C
Pressure Range	-1 bar to 6 bar
Immersion Depth	100 mm (10 mm optical path length)



	UV	NIR
Path Length mm	ARTICLE-NO.	
1	661-002-1-S-46	661-002-1-N-46
2	661-002-2-S-46	661-002-2-N-46
5	661-002-5-S-46	661-002-5-N-46
10	661-002-10-S-46	661-002-10-N-46
20	661-002-20-S-46	661-002-20-N-46



**NOW AVAILABLE ONLINE!**

Configuration, requests, ordering  
and much more information.

[www.myPATprobe.com](http://www.myPATprobe.com)

## EXCALIBUR STANDARD IMMERSION PROBE

### All-Quartz Probe

These Hellma Analytics all-quartz probes are outstanding due to its unique design which makes additional sealing material superfluous. This makes them the ideal tool for measuring aggressive samples even at the lowest temperatures – measuring beyond the limits.



Optical Path Length mm (tolerance $\pm 0.01$ )	1 mm, 2 mm, 5 mm, 10 mm, 20 mm
Outer Diameter	Probe head: 15 mm Quartz barrel: 18 mm
Optical Material	Quartz
Probe Body Material	Quartz
Sealing Technology	Directly fused
Spectral Range	UV/Vis (190 nm to 1.100 nm, low solarization) NIR (400 nm to 2.300 nm)
Fiber Optical Connection	1.8 m external fiber optical cables with SMA connectors
Temperature Range	5 °C to 150 °C (-180 °C to 150 °C with vacuum jack)
Pressure Range	-1 bar to 6 bar
Immersion Depth	210 mm (10 mm optical path length)

	UV	NIR
Path Length mm	ARTICLE-NO.	
1	661-302-1-S-46	661-302-1-N-46
2	661-302-2-S-46	661-302-2-N-46
5	661-302-5-S-46	661-302-5-N-46
10	661-302-10-S-46	661-302-10-N-46
20	661-302-20-S-46	661-302-20-N-46

#### WITH VACUUM JACK FOR LOW TEMPERATURE APPLICATIONS

	UV	NIR
Path Length mm	ARTICLE-NO.	
1	661-202-1-S-46	661-202-1-N-46
2	661-202-2-S-46	661-202-2-N-46
5	661-202-5-S-46	661-202-5-N-46
10	661-202-10-S-46	661-202-10-N-46
20	661-202-20-S-46	661-202-20-N-46

## EXCALIBUR STANDARD IMMERSION PROBE

### All-Quartz Probe Tapered version with ground glass joint NS 19/35

Optical Path Length mm (tolerance $\pm 0.01$ )	1 mm, 2 mm, 5 mm, 10 mm, 20 mm
Outer Diameter	15.5 mm (probe head) Taper NS 19/35
Optical Material	Quartz
Probe Body Material	Quartz
Sealing Technology	Directly fused
Spectral Range	UV/Vis (190 nm to 1.100 nm, low solarization) NIR (400 nm to 2.300 nm)
Fiber Optical Connection	1.8 m external fiber optical cables with SMA connectors
Temperature Range	5 °C to 150 °C
Pressure Range	-1 bar to 6 bar
Immersion Depth	130 mm (10 mm optical path length)



	UV	NIR
Path Length mm	ARTICLE-NO.	
1	661-500-1-S-46	661-500-1-N-46
2	661-500-2-S-46	661-500-2-N-46
5	661-500-5-S-46	661-500-5-N-46
10	661-500-10-S-46	661-500-10-N-46
20	661-500-20-S-46	661-500-20-N-46

## OPTICAL IMMERSION PROBES

These transflection immersion probes have been specifically designed for laboratories and small volume analyses. They are available with fixed path lengths and very small outer diameters e.g. 3.2 mm/4 mm/6 mm. The 6 mm version offers increased flexibility due to interchangeable path length tips.

### FALCATA STANDARD IMMERSION PROBE

#### with 3.2 mm and 4 mm diameter

These micro immersion probes have been specifically developed for measurements in small volumes. Due to their slim form, less sample material is required for a measurement to be taken.

Optical Path Length mm (tolerance $\pm 0.02$ )	5 mm, 10 mm
Outer Diameter	3.2 mm/4 mm
Optical Material	Quartz
Probe Body Material	Stainless steel 1.4404 (316 L)
Sealing Technology	Epoxy glue
Spectral Range	UV/Vis (190 nm to 1.100 nm, low solarization) NIR (400 nm to 2.300 nm)
Fiber Optical Connection	1.8 m external fiber optical cables with SMA connectors
Temperature Range	5 °C to 150 °C
Pressure Range	-1 bar to 6 bar
Immersion Depth	75 mm/130 mm (10 mm path length)



FALCATA STANDARD IMMERSION PROBE 3.2 mm DIAMETER

	UV	NIR
Path Length mm	ARTICLE-NO.	
5	661-610-5-S-46	661-610-5-N-46
10	661-610-10-S-46	661-610-10-N-46

FALCATA STANDARD IMMERSION PROBE 4 mm DIAMETER

	UV	NIR
Path Length mm	ARTICLE-NO.	
5	661-611-5-S-46	661-611-5-N-46
10	661-611-10-S-46	661-611-10-N-46

### FALCATA STANDARD IMMERSION PROBE

#### with 6 mm diameter

Increased flexibility due to interchangeable path length tips.



Optical Path Length mm (tolerance $\pm 0.02$ )	1 mm, 2 mm, 5 mm, 10 mm, 20 mm through interchangeable tips
Outer Diameter	6 mm
Optical Material	Quartz
Probe Body Material	Stainless Steel 1.4435 (316 L)
Sealing Technology	Epoxy glue
Spectral Range	UV/Vis (190 nm to 1.100 nm, low solarization) NIR (400 nm to 2.300 nm)
Fiber Optical Connection	1.8 m external fiber optical cables with SMA connectors
Temperature Range	5 °C to 150 °C
Pressure Range	-1 bar to 6 bar
Immersion Depth	175 mm (10 mm optical path length)

	UV	NIR
Path Length mm	ARTICLE-NO.	
1/2/5/10/20	661-622-set-S-46	661-622-set-N-46
1	661-622-1-S-46	661-622-1-N-46
2	661-622-2-S-46	661-622-2-N-46
5	661-622-5-S-46	661-622-5-N-46
10	661-622-10-S-46	661-622-10-N-46
20	661-622-20-S-46	661-622-20-N-46

ACCESSORIES INTERCHANGEABLE PATH LENGTH TIPS

	Path Length Tips
Path Length mm	ARTICLE-NO.
1	665-622-1-40
2	665-622-2-40
5	665-622-5-40
10	665-622-10-40
20	665-622-20-40



# ACCESSORIES

## EXTERNAL CELL HOLDER

The external cell holder is useful when the spectrophotometer does not have an internal cell holder or when measurements with cells are to be made at some distance from the spectrophotometer e.g. in a fume hood. To connect this cell holder properly to your system you will require 2 x 1 m fiber optic cables in the corresponding spectral range. You should select the option "SMA-Collimator".



Material	Aluminium, Black Anodised
Dimensions	123 mm x 40 mm x 45 mm
Temperature of solution in cell	Max. 120 °C (Quartz Cells Only)
Ambient temperature	Max. 50 °C
Fiber Optic Cables	These must be ordered separately.
Notes	Suitable for cells with path length 1 mm to 20 mm
ARTICLE-NO.	664-15-71

## FIBER OPTIC INTERFACE

This accessory is to be used when SMA sock available on your spectrophotometer. To connect properly to your system you will require to your probe, 2 x 1 m fiber optic cables responding spectral range. You should select "SMA-Collimator". The SMA end is connect probe via a small SMA/SMA adapter and the other end is plugged into the interface.



Effective Aperture	4 mm Diameter
Outside Dimension	60 mm x 12.5 mm x 12.5 mm
Center Height	8.5/15/20 mm
Wavelength Range	190 nm to 2300 nm, depends on cables used
Notes	Other center heights on request
Center Height	ARTICLE-NO. 8.5 mm 662-85-UVNIR-46 15 mm 662-15-UVNIR-46 29 mm 662-20-UVNIR-46

## FIBER OPTIC CABLES

Fiber optic cables can be supplied with either SMA connectors or special collimating lenses to suit the application that they are being used for.

Core Diameter	600 µm
Numerical Aperture	0.22
Beam Diameter (lens)	3.7 mm
Max. Temperature	150 °C



WAVELENGTH	LENGTH	SMA – SMA	SMA – COLLIMATOR	COLLIMATOR – COLLIMATOR
		ARTICLE-NO.	ARTICLE-NO.	ARTICLE-NO.
NIR 400 nm – 2300 nm	1 m	ALN001LSS	ALN001LSC	ALN001LCC
	2 m	ALN002LSS	ALN002LSC	ALN002LCC
	3 m	ALN003LSS	ALN003LSC	ALN003LCC
	4 m	ALN004LSS	ALN004LSC	ALN004LCC
	5 m	ALN005LSS	ALN005LSC	ALN005LCC
	6 m	ALN006LSS	ALN006LSC	ALN006LCC
	7 m	ALN007LSS	ALN007LSC	ALN007LCC
	8 m	ALN008LSS	ALN008LSC	ALN008LCC
UV/VIS 190 nm – 1100 nm	1 m	ALS001LSS	ALS001LSC	ALS001LCC
	2 m	ALS002LSS	ALS002LSC	ALS002LCC
	3 m	ALS003LSS	ALS003LSC	ALS003LCC
	4 m	ALS004LSS	ALS004LSC	ALS004LCC
	5 m	ALS005LSS	ALS005LSC	ALS005LCC
	6 m	ALS006LSS	ALS006LSC	ALS006LCC
	7 m	ALS007LSS	ALS007LSC	ALS007LCC
	8 m	ALS008LSS	ALS008LSC	ALS008LCC

# CLEANING CONCENTRATE FOR CELLS AND OPTICAL COMPONENTS

## CLEANING

### of cells and optical components

TYPE	DESCRIPTION	ARTICLE-NO.
320.003	Hellmanex® III Liquid cleaning concentrate, for glass, quartz cells and optical components 1.4 kg PE bottle (1.0 l)	9-307-011-4-507
325.000	CleanAssist plastic cell holder for 4 cells with 10 mm optical path length for cleaning purposes	325.000



320.003



325.000

#### APPLICATION

Hellmanex® III is an alkaline liquid concentrate which must simply be mixed with water to yield an effective cleaning solution of quartz and glass cells. It can also be used to clean other sensitive optical components made of glass, quartz, sapphire and porcelain.

#### CHARACTERISTICS

Hellmanex® III significantly reduces the surface tension of water. The removal of dirt particles is also assured by the good wetting action of Hellmanex® III aqueous solution, whilst its high emulsifying and dispersing capabilities prevent the redeposition of the loosened particles. Special surface-active substances facilitate the residue-free rinsing of the optical components once they have been cleaned.

#### CLEANING AND DILUTION

The optimal dilution depends on several factors, such as the hardness of the water, the degree and type of contamination, the temperature etc. The use of demineralised water improves the cleaning characteristics.

CONCENTRATION (% BY VOL.)	TEMPERATURE (°C)	TIME (MINUTES)
0.5–2	20–25	120–180
0.5–2	30–35	30–40
0.5–2	50–60 (Quartz only)	10–15
0.5–2	70–80 (Quartz only)	< 5

# TIPS FOR HANDLING AND CLEANING CUVETTES

## HANDLING CUVETTES

Our precision cuvettes are made of glass and quartz glass and have all of the advantages and disadvantages (such as the proverbial fragility) of such material. We recommend, as a matter of principle, cleaning, drying and storing cuvettes in cases as soon as measurement is complete. Do not store cuvettes in the open in a corrosive atmosphere, and do not leave the polished windows in contact with liquids for an extended period of time, as this could lead to the formation of deposits or stains on the polished surfaces, rendering the cuvettes unusable.

In order to avoid scratching the precision-polished windows, cuvettes should never come into contact with objects made of hard materials, such as glass or metal.



### Care must also be taken at low temperatures:

Though it is possible to cool an empty cuvette down to a few degrees Kelvin without breaking it, when filled with water and cooled to just a few degrees below the freezing point, the same cuvette may burst, even if it is not sealed. The reason for this is that water does not just expand upwards when cooled, but in all directions, which may cause the cuvette to burst when frozen.

Cuvettes containing liquid and sealed with stoppers can break if the internal pressure increases too much.



The most common cause of such an increase in pressure is the expansion of the liquid in the cuvette due to an increase in temperature. A temperature increase may be caused by:

- // heat from an external source, such as thermal conduction from the cuvette holder
- // a chemical reaction in the liquid
- // radiation absorption in the liquid

### The following precautions will help prevent the cuvette from breaking:

- // Fill the cuvette just enough to completely cover the light beam. This allows the liquid to expand into the remaining air volume if the temperature increases.
- // If you fill the cuvette to the rim, place the stopper on loosely so that any excess liquid can escape.
- // Do not try to force the stopper into place, as this will inevitably damage the cuvette.
- // Use stoppers with a capillary hole.

### TIP

#### Important tips:

- // Care is required when inserting cuvettes into a metal cuvette holder.
- // When using a pipette to fill cuvettes with liquids, never touch the polished window with the pipette.
- // Never use metal tweezers or pliers to carry or hold cuvettes.

## CLEANING CUVETTES

Quartz glass and the other types of glass that we use for cuvettes are notable for their excellent chemical resistance. Only hydrofluoric acid (HF) will etch glass surfaces within a short period of time. Conversely, this means that, with few exceptions, all organic, acidic and alkaline solutions may be used to clean cuvettes.

This suggests the following general cleaning recommendations:

**If you know which substance is responsible for the contamination, clean the cuvette with the solvent in which the substance was dissolved. In general and also with respect to the environment, we recommend aqueous cleaning using Hellmanex® III. (Characteristics, see page 42).**



### Proven method:

The following method has proved effective in practice:

- // Place the cuvettes in a bath with a cleaning solution of water and 2% Hellmanex® III. Clean flow-through cuvettes by pumping the cleaning solution through the cuvette. The duration of cleaning depends on the level of contamination and may last up to several hours.
- // Heating the cleaning solution can speed up the cleaning process.

### Please note!



Care must be taken at high temperatures. Avoid abrupt changes in temperature at all costs.

- // Agitating the cleaning solution can also boost cleaning performance.
- // **Ultrasonic cleaning is NOT recommended.** Excessive energy density and/or unfavorable ultrasonic frequencies may break the cuvettes. Cuvettes made of multiple materials (glass, metal, etc.) are especially at risk. Cavitation attacks polished surfaces, rendering cuvettes unusable.

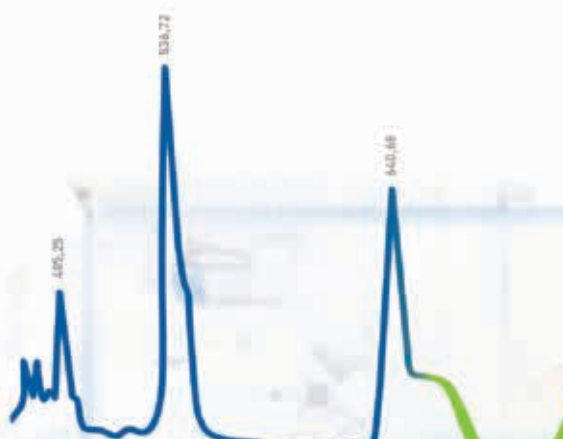
**After cleaning,** the cuvettes must be thoroughly rinsed with water. The contents of the bath should be replaced at least three times. Ultrapure water, which was been additionally micro filtered to remove solid particles, is recommended for rinsing. The following methods have proved effective for drying:



- // blowing dry with clean air,
- // placing in a dust-free environment (drying cabinet) to dry or
- // rinsing with a highly volatile solvent (alcohol) that is subsequently evaporated.

**Make sure that the cleaning solution does not remain in the cuvette at high temperatures long enough to evaporate, as increased concentration and high pH value may damage the surface of the glass.**

**FOLLOW OUR TIPS FOR HANDLING AND CLEANING AND YOUR CUVETTES WILL PROVIDE OPTIMAL MEASUREMENT PERFORMANCE.**



Our brochures provide detailed information about the appropriate product groups and in addition, offer thematic information as well as handling advice.

## Hellma Analytics



[www.hellma-analytics.com/download](http://www.hellma-analytics.com/download)

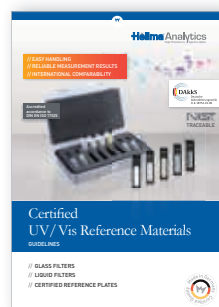
### PRODUCT BROCHURES



Product Catalogue BestCellers



Optical Immersion Probes  
Fiber Optical Flow Cells



UV/Vis Reference Materials

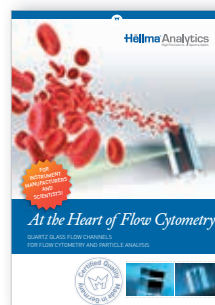


TrayCell  
Ultra-Micro-Cell



Hellmanex III  
Cleaning Concentrate

### THEMATIC INFORMATION



Flow Cytometry and  
Particle Analysis



Technology  
Expertise

## Hellma Optics



[www.hellma-optics.com/download](http://www.hellma-optics.com/download)

### PRODUCT BROCHURES



Cylinder Optics  
Toric Optics

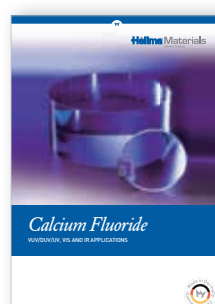
Flat Optics  
Special Optics

## Hellma Materials



[www.hellma-materials.com/download](http://www.hellma-materials.com/download)

### PRODUCT BROCHURES



Calcium Fluoride  
Raw material and optical components



## NOTES



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