

Starna[®] The Spectroscopy Specialists



Cells/Cuvettes for all
Spectrophotometer
Fluorimeter and
Laser applications



Introduction to Starna®

The wide variety of Starna® products in this catalogue are manufactured in the Optiglass factory founded in 1964, whose lineage of optical expertise is traceable to the early part of the last century.

Optiglass Limited is a wholly owned subsidiary of the international group of Starna® companies whose reputation is synonymous with quality and service in the manufacture and supply of spectrophotometer cells, optical components and certified reference materials around the world.

In the 1950s, the personnel who founded Optiglass developed and perfected the technique of fully fusing component parts by heat alone, without the distortion of optical surfaces. This major advance transformed the design and production of spectrophotometer cells and associated products. Continual development and improvement is reflected in the high quality world class Starna® products illustrated in this catalogue.

All manufacturing processes are carried out in our ISO 9000 certified production facility, from the design and development of products through to customised production machinery. The unique blend of skills including: cutting, slicing, grinding, polishing, conventional drilling, ultrasonic drilling and fusing as well as metallic, multi-layer and anti-reflection coating in one of many coating plants, achieves a complete vertically integrated process.

During manufacture of all component parts, special care is taken to avoid contamination by the use of stringent cleaning processes. Together with mandatory inspection procedures these stringent cleaning processes ensure that all products leave the factory in a pristine contamination-free condition, with an unconditional guarantee against faulty workmanship. This special treatment of cells also reduces bubble adhesion, which is of particular importance in flow cell applications.

In addition to ISO 9000 certification for production, UKAS accreditation has also been achieved for the Optiglass traceable reference material calibration laboratory. Again the unique combination of manufacturing and application skills permits full traceability throughout the whole production process, making Optiglass a much valued partner to instrument manufacturers, dealers and retail customers worldwide.

Cell specifications

Starna® spectrophotometer cells and other complex quartz assemblies, unless precluded by design, are assembled using a fully fused method of construction. This technique, pioneered by Optiglass personnel, ensures that cells are fused into a single homogeneous piece using heat alone, without intermediate bonding materials. All cells are carefully annealed to remove any possible remnants of strain after the fusing process, ensuring that cells achieve maximum physical strength as well as resistance to solvents. With few exceptions, cells can be used safely with pressure differentials of up to 3×10^5 Pa (three atmospheres).

General specifications

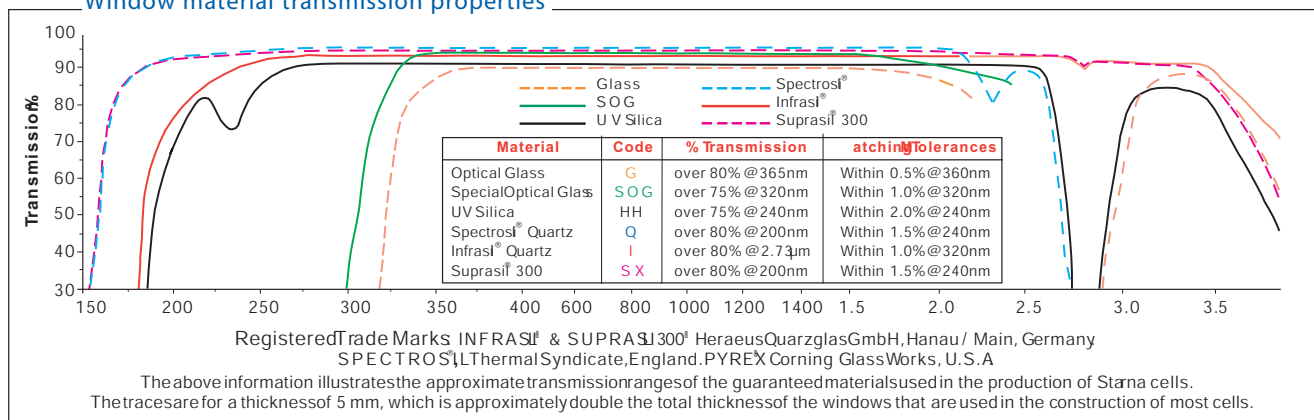
Windows parallel to:	better than 3 minutes of arc	
Window flatness to:	better than 4 Newton fringes	
Window polish, standard:	60/40 scratch/dig	
Window polish, laser:	20/10 scratch/dig	
Material	Path lengths	Tolerance
Glass	less than 10mm	± 0.02mm
Glass	10 to 30mm	± 0.1mm
Glass	40 to 100mm	± 0.2mm
Special Optical Glass	up to 20mm	± 0.01mm
Special Optical Glass	30 to 100mm	± 0.02mm
Quartz	0.01 to 0.05mm	± 0.002mm
Quartz	0.1 to 0.4mm	± 0.005mm
Quartz	0.5 to 100mm	± 0.01mm

Standard window thickness is 1.25mm, polished to better than 4 Newton Fringes per centimetre in the viewing area, typically flat to better than 1 micron (0.001mm) over the window area.

Although cells can be used with most solvents and acidic solutions, fluorinated acids such as Hydrofluoric Acid (HF) in all concentrations should be avoided as they will attack the quartz itself. Strong basic solutions (pH 9.0 and above) will also degrade the surface of the windows and shorten the useful life of the cells.

Flow cells with path lengths of less than 0.5mm are measured by an interference method both before and after final fusing. Calculation on this measurement provides an uncertainty of path length better than 0.2 microns (0.0002mm). Path length certification can be supplied for individual cells for a small additional charge. This must be requested at the time of ordering.

Window material transmission properties



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How to order

Essential ordering information is shown under the **Blue headings** throughout the catalogue. Detail shown under the black headings is additional descriptive and dimensional information and need not be included. eg. to order Type **1/I/10** (Standard Rectangular, Infrasil, 10mm Path length)

Type No.	Window Materials	Path Length	Internal Width	External L	External W	External H	Nominal Vol. ml
1	G, SOG, PX, HH, Q, I, SX	10	10	12.5	12.5	45	3.500

eg. to order Type **19.01/Q/1/Z8.5** (Ultra-micro, Spectrosil, 1mm path length, 8.5mm Z dimension)

Type No.	Window Materials	Path Length	Z Height	Sample chamber W	Sample chamber H	External L	External W	External H	Nominal Vol. ml
19.01	SOG, Q	1	8.5, 15, 20	5	1	12.5	12.5	40.5	0.0050

Material specifications

Optiglass offer five primary window materials, Optical Glass (G) and Special Optical Glass (SOG) for the visible range. Spectrosil® Quartz (Q) or equivalent for the far UV range, Infrasil® Quartz (I) or equivalent for the near infra-red (IR) as well as Suprasil® 300 (SX) or equivalent which transmits from the far UV to the near infra-red. Other window materials are also available such as Pyrex (PX) and UV Silica (HH).

If a specific window material is required and is not shown in this catalogue please contact us for availability. All materials used are fully guaranteed to transmit greater than 80% over the following usable wavelength range:

Optical Glass	G	334 through 2500 nm
Special Optical Glass	SOG	320 through 2500 nm
Pyrex	PX	325 through 2500 nm
UV Silica	HH	230 through 2500 nm
Spectrosil® Quartz	Q	190 through 2700 nm
Infrasil®	I	220 through 3800 nm
Suprasil® 300 Quartz	SX	190 through 3500 nm

For fluorescent applications Spectrosil® is the recommended window material, as it does not exhibit any background fluorescence. Some other materials, especially glass and lower grades of quartz may have some background fluorescence.

The meticulous care taken in the quality of the polishing and unique construction of regular Starna® quartz fluorescent cells brings them within tolerances which are sufficiently stringent for them to be used in laser applications. These techniques are particularly relevant in the manufacture of much larger Ultra High Vacuum (UHV) cells.

Cell matching

Modern production and fusing techniques have improved flatness, parallelism and construction tolerances. Together with consistent raw materials, these have virtually eliminated the need for transmission matching in regular standard high grade quartz cells.

The extremely accurate physical path length tolerances used in production, stated on page 2, are essential on very short path lengths, for instance in dissolution measurements where multiple short path length cells may be used. Such flow cells Types 73, 74, 75, 583, 584 and 585 each have a unique fully traceable serial number engraved on the window. Those cells with path lengths less than 0.5mm are measured using an interference method both before and after final fusing to provide a path length uncertainty calculation better than 0.2 microns (0.0002 mm). A certificate of path length and full production traceability can be provided for each individual cell on request, for a small additional charge.

Cells manufactured for **Circular Dichroism(CD)** must have strain-free oriented windows and the complete cell carefully annealed. This process incurs an additional charge for each cell. Cells required for **CD** must have this suffix **CD** added to the part number e.g. 34/Q/50/CD.

Z Height dimension - IMPORTANT!

In any instrument the 'Z' height is the distance from the bottom of the cell holder cavity to the centre of the incident light beam. This applies whether the cross-section of the beam is round or rectangular.

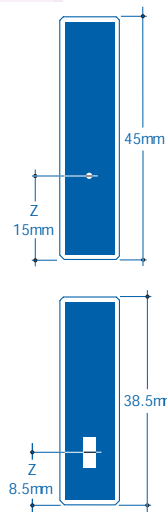
For the most efficient use of energy and sample volume the shape of the cell sample chamber should ideally be of the same shape as the light beam, but slightly larger. The 'Z' height of the cell, the centre of the sample chamber to the base of the cell, should be identical to that of the instrument, see diagram.

Typically instrument manufacturers have designed their instruments with a 'Z' height dimension of either 8.5 or 15mm, exceptions ranging from 5 to 20mm.

The 'Z' height is very important when the aperture in the cell is very small, such as sub-micro cells and micro flow cells. Standard 'Z' heights available for any given cell where this information is essential are shown in a separate column in the information tables, headed 'Z' Height.

The correct 'Z' height should be added to the part number e.g. if 8.5mm is required it should be shown as follows 73.4/SOG/10/Z8.5. As a double check it is helpful to state the instrument and model number, if available, in which the cells are intended to be used at the time of ordering.

All dimensions stated in this catalogue are in millimetres unless otherwise indicated



When cells matched for **transmission** are required, mainly but not exclusively for less consistent materials such as Glass and Special Optical Glass where consistency of raw material from melt to melt differs, each measured cell is given a match code relative to its transmission at a given wavelength as measured on a spectrophotometer. The transmission matching tolerances at measured wavelengths are shown as follows:

Window Material	Matching Tolerance	Measured at Wavelength
Optical Glass	0.5 %	350nm
Special Optical Glass	1.0%	320nm
Pyrex®	1.0%	320nm
UV Silica	1.5 %	240nm
Spectrosil® Quartz	1.5 %	200nm
Infrasil® Quartz	1.5 %	240nm
Suprasil® 300	1.5 %	240nm

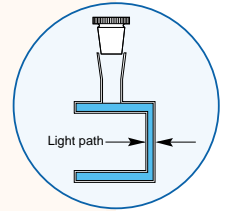
The matching codes are only of real value when comparing new cells as transmission characteristics change during use because of surface contamination or wear due to cleaning processes. Therefore a brand new cell will not necessarily match an older used cell of the same match code.

Type 31. Cylindrical. Short path length

- Two polished windows.
- Closed by PTFE stopper, providing a liquid-tight seal.



31/Q/1



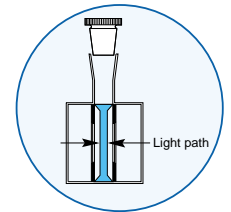
Type No.	Window Materials	Path Length	Internal Diameter	External Dia.	External L.	Nominal Vol. ml
31	Q, I, SX	0.01	15	22	22.5	2.150
31	Q, I, SX	0.05	15	22	22.5	2.150
31	SOG, Q, I, SX	0.10	15	22	22.5	2.150
31	SOG, Q, I, SX	0.20	15	22	22.5	2.180
31	SOG, Q, I, SX	0.50	15	22	22.5	2.220
31	SOG, Q, I, SX	1	15	22	22.5	2.310
31	SOG, Q, I, SX	2	15	22	22.5	2.490
31	SOG, Q, I, SX	5	15	22	22.5	3.020

Type 31/B. Cylindrical. Short path length, micro.

- Reduced sample volume.
- Two polished windows.
- Two filling ports, closed by PTFE stopper, providing a liquid-tight seal.



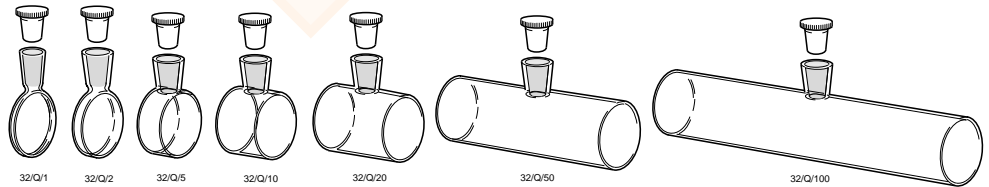
31/B/Q/1



Type No.	Window Material	Path Length	Internal Diameter	External Dia.	External L.	Nominal Vol. ml
31/B	Q	0.01	13	22	22.5	0.140
31/B	Q	0.05	13	22	22.5	0.151
31/B	Q	0.10	13	22	22.5	0.165
31/B	Q	0.20	13	22	22.5	0.194
31/B	Q	0.50	13	22	22.5	0.278
31/B	Q	1	13	22	22.5	0.420
31/B	Q	2	13	22	22.5	0.703
31/B	Q	5	13	22	22.5	1.552

Type 32. Cylindrical. Standard

- Two polished windows.
- Closed by one PTFE stopper, providing a liquid-tight seal.



32/Q/1

32/Q/2

32/Q/5

32/Q/10

32/Q/20

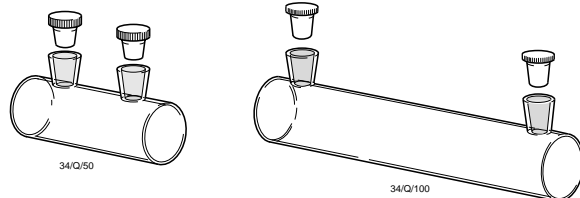
32/Q/50

32/Q/100

Type No.	Window Materials	Path Length	Internal Diameter	External Dia.	External L.	Nominal Vol. ml
32	SOG, PX, Q, I, SX	1	19	22	3.5	0.280
32	SOG, PX, Q, I, SX	2	19	22	4.5	0.560
32	SOG, PX, Q, I, SX	5	19	22	7.5	1.400
32	SOG, PX, Q, I, SX	10	19	22	12.5	2.800
32	SOG, PX, Q, I, SX	20	19	22	22.5	5.600
32	SOG, PX, Q, I, SX	50	19	22	52.5	14.100
32	SOG, PX, Q, I, SX	100	19	22	102.5	28.200

Type 34. Cylindrical. Standard

- Two polished windows.
- Closed by two PTFE stoppers, providing a liquid-tight seal.



34/Q/50

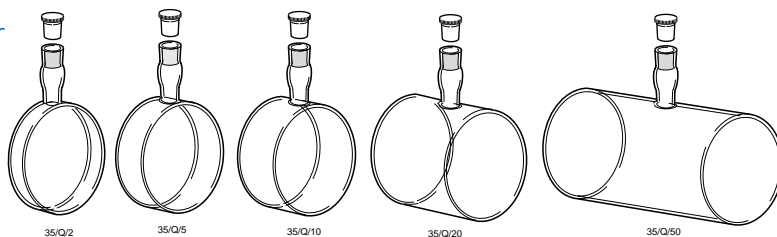
34/Q/100

Type No.	Window Materials	Path Length	Internal Diameter	External Dia.	External L.	Nominal Vol. ml
34	SOG, PX, Q, I, SX	50	19	22	52.5	14.100
34	SOG, PX, Q, I, SX	100	19	22	102.5	28.200

G = Optical Glass 334-2500nm SOG = Special Optical Glass 320-2500nm PX = Pyrex 325-2500nm HH = UV Silica 220-2500nm
 Q = Far UV Quartz 170-2700nm I = Near Infra- red Quartz 220-3800nm SX = Far UV to Near IR Quartz (Water free) 170-3500nm

Type 35. Cylindrical. Large diameter

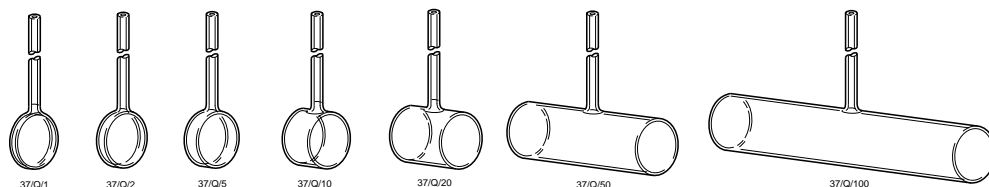
- Two polished windows.
- Closed by PTFE stopper, providing a liquid-tight seal.



Type No.	Window Materials	Path Length	Internal Diameter	External Dia.	L	Nominal Vol. ml
35	SOG, PX, Q, I	2	47	50	4.5	3.40
35	SOG, PX, Q, I	5	47	50	7.5	8.50
35	SOG, PX, Q, I	10	47	50	12.5	17.00
35	SOG, PX, Q, I	20	47	50	22.5	35.00
35	SOG, PX, Q, I	50	47	50	52.5	86.00

Type 37. Cylindrical with tube

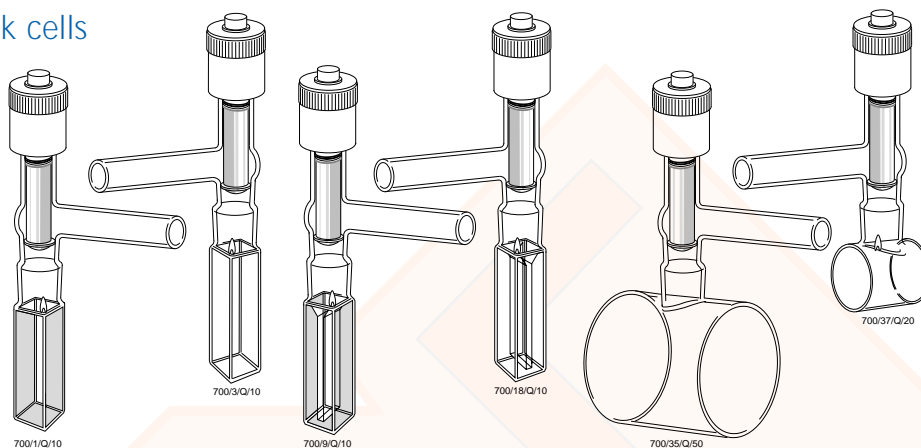
- Two polished windows.
- Tube material the same as cell body.
- Available on request with restriction for easy seal.



Type No.	Window Materials	Path Length	Internal Diameter	External Dia.	L	Tube ID.	Tube OD.	Tube Length	Nominal Vol. ml
37	SOG, PX, Q, I	1	19	22	3.5	2	4	70	0.28
37	SOG, PX, Q, I	2	19	22	4.5	2	4	70	0.56
37	SOG, PX, Q, I	5	19	22	7.5	2	4	70	1.40
37	SOG, PX, Q, I	10	19	22	12.5	2	4	70	2.80
37	SOG, PX, Q, I	20	19	22	22.5	2	4	70	5.60
37	SOG, PX, Q, I	50	19	22	52.5	2	4	70	14.00
37	SOG, PX, Q, I	100	19	22	102.5	2	4	70	28.00

Type 700. UHV Stopcock cells

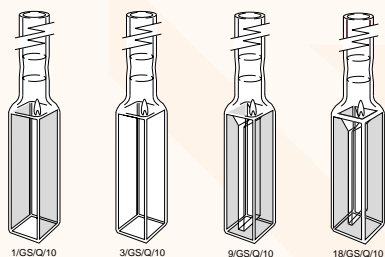
- High vacuum patented stopcock.
- PTFE threaded.
- Can be fused to most quartz cells.
- Stopcock itself can withstand pressure up to 5 bar (5×10^5 Pa).
- For cell pressure guidance; please enquire.
- All cells will withstand evacuation $< 10^{-11}$ Tor.



Type No.	Window Material	Path Length	W	External L	H	Side arm ID.	Side arm OD.	Side arm Length	Remarks
700/1	Q	10	12.5	12.5	≈ 135/150	10	13	50	Type 1 Macro
700/3	Q	10	12.5	12.5	≈ 135/150	10	13	50	Type 3 Fluorimeter
700/9	Q	10	12.5	12.5	≈ 135/150	10	13	50	Type 9 Semi micro
700/18	Q	10	12.5	12.5	≈ 135/150	10	13	50	Type 18 Micro
700/37	Q	10	22Ø	22.5	≈ 135/150	10	13	50	Type 32 Cylindrica
700/37	Q	20	22Ø	22.5	≈ 135/150	10	13	50	Type 32 Cylindrical
700/37	Q	40	22Ø	42.5	≈ 135/150	10	13	50	Type 32 Cylindrical
700/37	Q	50	22Ø	52.5	≈ 135/150	10	13	50	Type 32 Cylindrical
700/37	Q	100	22Ø	102.5	≈ 135/150	10	13	50	Type 32 Cylindrical
700/35	Q	50	50Ø	54.0	≈ 135/150	10	13	50	Type 35 Cylindrical
700/35	Q	100	22Ø	102.5	≈ 135/150	10	13	50	Type 37 Cylindrical

Rectangular with straight tube (SBT)

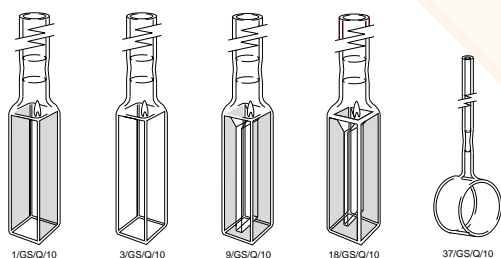
- Quartz tube fully fused to quartz cell.
- Pyrex tube fully fused to pyrex cell
- Different diameters of straight bore tube available on request.



Type No.	Window Materials	Path Length	Int. W	Ext. L	Ext. W	Ext. H	Tube ID.	Tube OD.	Tube L	Nom. Vol. ml
1/SBT	Q, I	1	10	3.5	12.5	115	8	10	70	0.400
1/SBT	Q, I	2	10	4.5	12.5	115	8	10	70	0.700
1/SBT	Q, I	5	10	7.5	12.5	115	8	10	70	1.700
1/SBT	Q, I	10	10	12.5	12.5	115	8	10	70	3.500
3/SBT	Q, I	10	10	12.5	12.5	115	8	10	70	3.500
9/SBT	Q, I	10	4	12.5	12.5	115	8	10	70	1.400
18/SBT	Q, I	10	2	12.5	12.5	115	8	10	70	0.700

Rectangular & Cylindrical with Quartz to Pyrex graded seal (GS)

- Quartz to pyrex graded seal fully fused to cell.
- Different diameters and lengths of graded seals available on request.

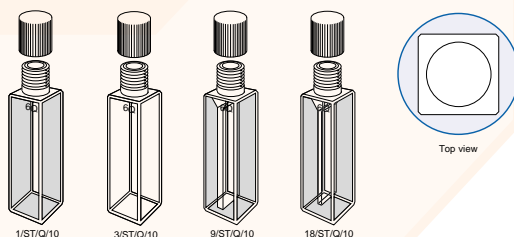


Type No.	Window Materials	Path Length	Int. W	Ext. L	Ext. W	Ext. H	Tube ID.	Tube OD.	Tube L	Nom. Vol. ml
1/GS	Q, I	1	10	3.5	12.5	115	8	10	70	0.400
1/GS	Q, I	2	10	4.5	12.5	115	8	10	70	0.700
1/GS	Q, I	5	10	7.5	12.5	115	8	10	70	1.700
1/GS	Q, I	10	10	12.5	12.5	115	8	10	70	3.500
3/GS	Q, I	10	10	12.5	12.5	115	8	10	70	3.500
9/GS	Q, I	10	4	12.5	12.5	115	8	10	70	1.400
18/GS	Q, I	10	2	12.5	12.5	115	8	10	70	0.700

Type No.	Window Materials	Path Length	Int. Dia.	Ext. Dia.	L	Tube ID.	Tube OD.	Tube L	Nom. Vol. ml
37/GS	Q, I	1	19	22	3.5	2	4	70	0.28
37/GS	Q, I	2	19	22	3.5	2	4	70	0.56
37/GS	Q, I	5	19	22	3.5	2	4	70	1.40
37/GS	Q, I	10	19	22	3.5	2	4	70	2.80
37/GS	Q, I	20	19	22	3.5	2	4	70	5.60
37/GS	Q, I	50	19	22	3.5	2	4	70	14.00
37/GS	Q, I	100	19	22	3.5	2	4	70	28.00

Rectangular with small screw cap (ST)

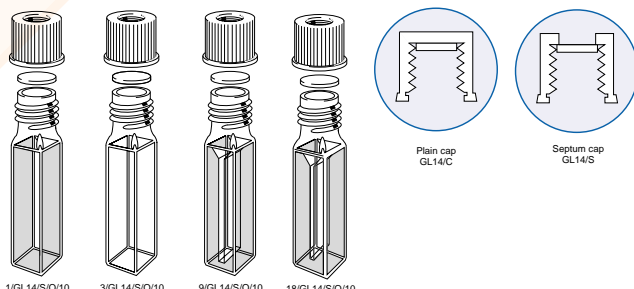
- Closed with screw cap, with or without septum aperture.
- Outside diameter of cap is less than the cross-section of the cell.
- Septum aperture diameter - 6mm.
- ST/C closed cap.
- ST/S septum cap to allow filling, extraction or gas flow with syringe needle(s) through silicone seal which has a PTFE face.



Type No.	Window Materials	Path Length	Int. W	Ext. L	Ext. W	Ext. H	Nom. Vol. ml	Remarks
1/ST	Q, I	10	10	12.5	12.5	58	3.500	Macro/Std.Rect.
3/ST	Q, I	10	10	12.5	12.5	58	3.500	Fluorimeter
9/ST	Q, I	10	4	12.5	12.5	58	1.400	Semi-micro
18/ST	Q, I	10	2	12.5	12.5	58	0.700	Micro

Rectangular Anaerobic with screw cap (GL14)

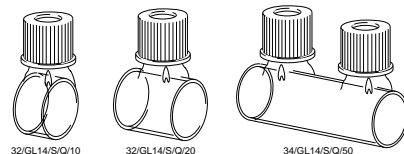
- Closed by screw cap or septum cap.
- GL14/C closed cap.
- GL14/S septum cap to allow filling, extraction or gas flow with syringe needle(s) through the silicone seal.
- Septum aperture diameter 9mm.
- Cap withstands pressure up to 5×10^5 Pa (5 bar).



Type No.	Window Materials	Path Length	Int. W	Ext. L	Ext. W	Ext. H	Nom. Vol. ml	Remarks
1/GL14	SOG, Q, I	10	10	12.5	12.5	66	3.500	Macro/Rect.
3/GL14	SOG, Q, I	10	10	12.5	12.5	66	3.500	Macro/Rect.
9/GL14	SOG, Q, I	10	4	12.5	12.5	66	1.400	Macro/Rect.
18/GL14	SOG, Q, I	10	2	12.5	12.5	66	0.700	Macro/Rect.

Cylindrical Anaerobic with screw cap(s) (GL14)

- Two polished windows.

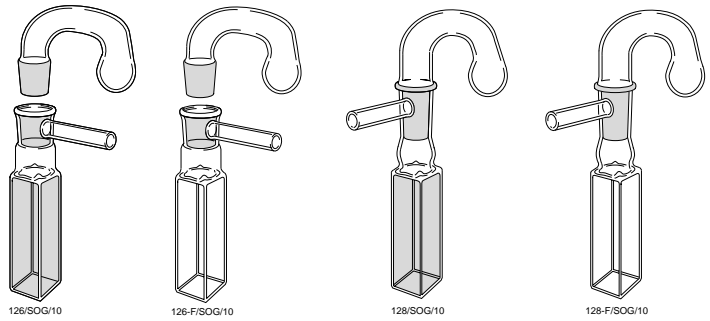


Type No.	Window Materials	Path Length	Ext. L	Int. Dia.	Nominal Vol. ml
32/GL14	SOG, PX, HH, Q, I, SX	10	12.5	19	2.800
32/GL14	SOG, PX, HH, Q, I, SX	20	22.5	19	5.600
34/GL14	SOG, PX, HH, Q, I, SX	50	52.5	19	14.100
34/GL14	SOG, PX, HH, Q, I, SX	100	102.5	19	28.200

G = Optical Glass 334-2500nm SOG = Special Optical Glass 320-2500nm PX = Pyrex 325-2500nm HH = UV Silica 220-2500nm
Q = Far UV Quartz 170-2700nm I = Near Infra-red Quartz 220-3800nm SX = Far UV to Near IR Quartz (Water free) 170-3500nm

Type 126 & 128. Anærobic. Standard Rectangular. 126-F & 128-F Fluorimeter

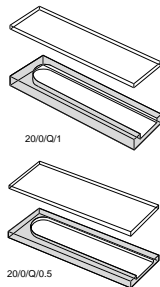
- 126-F and 128-F have four windows and base polished.
- Reservoir has ground cone with evacuation hole to line up with socket outlet tube.
- Reservoir volume \approx 1.5ml.
- Type 126 Evacuation tube is 3mm I.D., 5mm O.D. and 30mm long.
- Type 128 Evacuation tube is 4mm I.D., 6mm O.D. and 30mm long.
- Socket assembly can be fused to other rectangular cells on request.



Type No.	Window Materials	Path Length	Internal Width	External			Nominal Vol. ml	Remarks
				L	W	H		
126	SOG, Q, I	2	2	4.5	12.5	70	0.700	Macro/Standard Rectangular. Short socket
126	SOG, Q, I	5	5	7.5	12.5	70	1.750	Macro/Standard Rectangular. Short socket
126	SOG, Q, I	10	10	12.5	12.5	70	3.500	Macro/Standard Rectangular. Short socket
128	SOG, Q, I	2	2	4.5	12.5	120	0.700	Macro/Standard Rectangular. Extended socket
128	SOG, Q, I	5	5	7.5	12.5	120	1.750	Macro/Standard Rectangular. Extended socket
128	SOG, Q, I	10	10	12.5	12.5	120	3.500	Macro/Standard Rectangular. Extended socket
126-F	SOG, Q, I	2	2	4.5	12.5	70	0.700	Fluorimeter. Short socket
126-F	SOG, Q, I	5	5	7.5	12.5	70	1.750	Fluorimeter. Short socket
126-F	SOG, Q, I	10	10	12.5	12.5	70	3.500	Fluorimeter. Short socket
128-F	SOG, Q, I	2	2	4.5	12.5	120	0.700	Fluorimeter. Extended socket
128-F	SOG, Q, I	5	5	7.5	12.5	120	1.750	Fluorimeter. Extended socket
128-F	SOG, Q, I	10	10	12.5	12.5	120	3.500	Fluorimeter. Extended socket

Type 20/O. Short path length. Demountable, open-ended

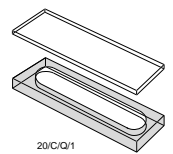
- One end open when assembled.
- Two polished windows.
- Intended for use with Type CH/2049 cell holder. (see page 29)



Type No.	Window Materials	Path Length	Ext.			Sample chamber			Nom. Vol. ml
			W	L	H	W	L	H	
20/O	Q, I	0.01	12.5	2.5	45	10	0.01	43.5	0.004
20/O	G, SOG, Q, I	0.1	12.5	2.6	45	10	0.1	43.5	0.040
20/O	G, SOG, Q, I	0.2	12.5	2.7	45	10	0.2	43.5	0.080
20/O	G, SOG, Q, I	0.5	12.5	3.0	45	10	0.5	43.5	0.190
20/O	G, SOG, Q, I	1	12.5	3.5	45	10	1	43.5	0.390

Type 20/C. Short path length. Demountable, closed

- Totally enclosed when assembled.
- Two polished windows.
- Intended for use with Type CH/2049 cell holder. (see page 29)



Type No.	Window Materials	Path Length	Ext.			Sample chamber			Nom. Vol. ml
			W	L	H	W	L	H	
20/C	Q	0.008	12.5	2.5	45	8	0.008	38	0.002
20/C	G, SOG, Q, I	0.01	12.5	2.5	45	8	0.01	38	0.003
20/C	G, SOG, Q, I	0.1	12.5	2.6	45	8	0.1	38	0.030
20/C	G, SOG, Q, I	0.2	12.5	2.7	45	8	0.2	38	0.060
20/C	G, SOG, Q, I	0.5	12.5	3.0	45	8	0.5	38	0.150
20/C	G, SOG, Q, I	1.0	12.5	3.5	45	8	1.0	38	0.310



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