

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

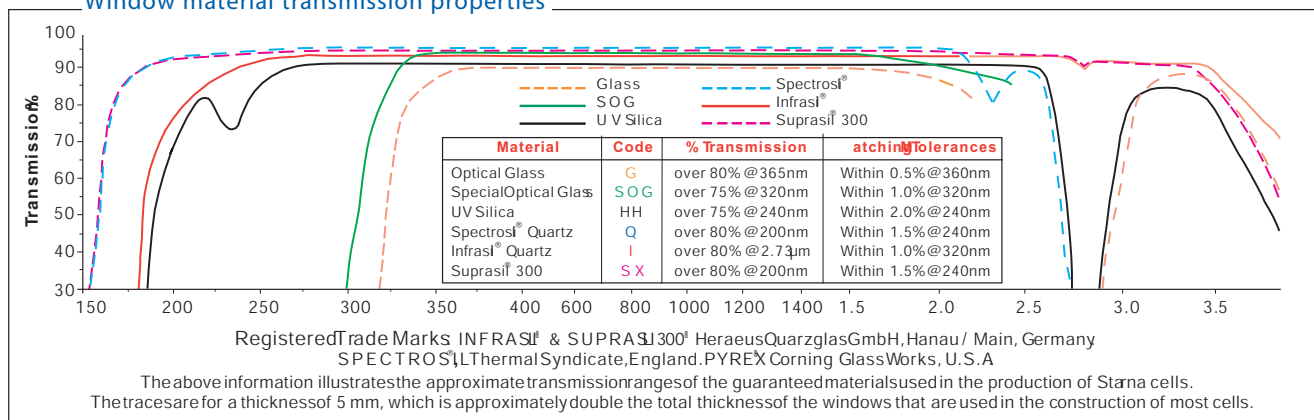
Windows parallel to:	better than 3 minutes of arc	
Window flatness to:	better than 4 Newton fringes	
Window polish, standard:	60/40 scratch/dig	
Window polish, laser:	20/10 scratch/dig	
Material	Path lengths	Tolerance
Glass	less than 10mm	± 0.02mm
Glass	10 to 30mm	± 0.1mm
Glass	40 to 100mm	± 0.2mm
Special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

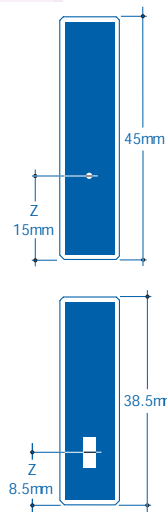
For the most efficient use of energy and sample volume the shape of the cell sample chamber should ideally be of the same shape as the light beam, but slightly larger. The 'Z' height of the cell, the centre of the sample chamber to the base of the cell, should be identical to that of the instrument,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



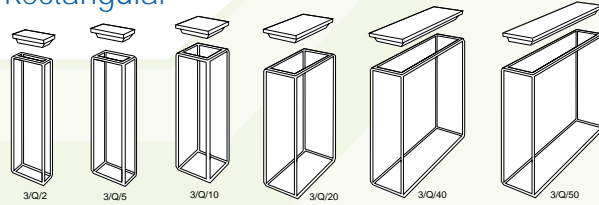
When cells matched for **transmission** are required, mainly but not exclusively for less consistent materials such as Glass and Special Optical Glass where consistency of raw material from melt to melt differs, each measured cell is given a match code relative to its transmission at a given wavelength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

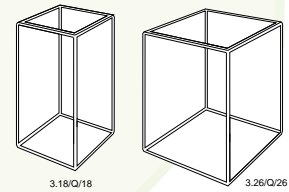
The matching codes are only of real value when comparing new cells as transmission characteristics change during use because of surface contamination or wear due to cleaning processes. Therefore a brand new cell will not necessarily match an older used cell of the same match code.

Type 3. Fluorimeter. Macro/Standard Rectangular

- Open top, with non-sealing PTFE cover.
- Polypropylene vaned lid available on request for 10mm cells only, providing a liquid-tight seal.
- Four windows and base polished.

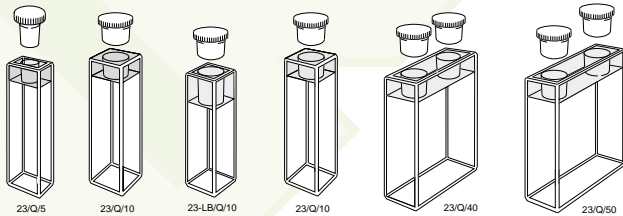


Type No.	Window Materials	Path Length	Internal Width	External			Nominal Vol. ml
				L	W	H	
3	Q	2	10	4.5	12.5	45	0.800
3	G, SOG, Q, I, SX	5	10	7.5	12.5	45	1.700
3	G, SOG, PX, Q, I, SX	10	10	12.5	12.5	45	3.500
3	G, SOG, Q, I	20	10	22.5	12.5	45	7.000
3	G, SOG, Q, I	40	10	42.5	12.5	45	14.000
3	G, SOG, Q, I	50	10	52.5	12.5	45	17.500
3.18	Q	18	18	22	22	50	14.600
3.26	Q	26	26	30	30	50	30.500



Type 23. Fluorimeter with stopper(s). Macro/Standard Rectangular

- Closed by PTFE stopper(s), providing a liquid-tight seal.
- Four windows and base polished.



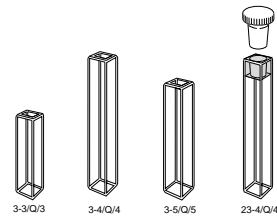
Type No.	Window Materials	Path Length	Internal Width	External			Nominal Vol. ml
				L	W	H	
23	G, SOG, Q, I, SX	5	10	7.5	12.5	48	1.700
23	G, SOG, PX, Q, I, SX	10	10	12.5	12.5	48	3.500
23	G, SOG, Q, I	20	10	22.5	12.5	48	7.000
23	G, SOG, Q, I	40	10	42.5	12.5	48	14.000
23	G, SOG, Q, I	50	10	52.5	12.5	48	17.500
23-LB	Q	10	10				

Type 3-. Fluorimeter. Micro, supplied without lid

Type 23-4. Fluorimeter. Micro with stopper

- Open top cell.
- Type 23-4 is closed by PTFE stopper, providing a liquid-tight seal.
- Four windows and base polished.

Type No.	Window Materials	Path Length	Internal Width	External			Nominal Vol. ml
				L	W	H	
3-3	SOG, Q	3	3	5.5	5.5	30	0.270
3-4	SOG, Q	4	4	6	6	50	0.720
3-5	SOG, Q	5	5	6.8	6.8	40	0.875
23-4	SOG, Q	4	4	6	6	50	0.720

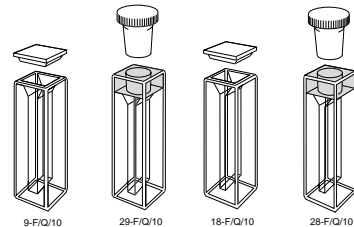


Type 9-F & 29-F Fluorimeter. Semi-micro

Type 18-F & 28-F Fluorimeter. Micro

- Fits 12.5mm square cell holder.
- Four windows and base polished.
- Type 18-F & 9-F have open top with non-sealing PTFE cover.
- Type 28-F & 29-F are closed by PTFE stopper, providing a liquid-tight seal.
- Base thickness - 3mm.
- Suitable for use with all standard cell holders.

Type No.	Window Materials	Path Length	Internal Width	External			Nominal Vol. ml	Remarks
				L	W	H		
9-F	SOG, Q	10	4	12.5	12.5	45	1.400	Semi-micro with lid
29-F	SOG, Q	10	4	12.5	12.5	48	1.400	Semi-micro with stopper
18-F	SOG, Q	10	2	12.5	12.5	45	0.700	Micro with lid
28-F	SOG, Q	10	2	12.5	12.5	48	0.700	Micro with stopper

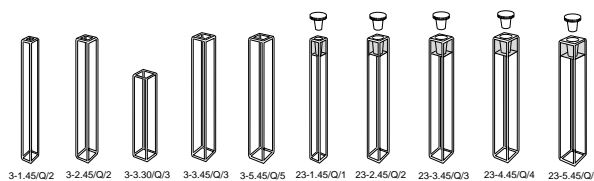


G = Optical Glass 334-2500nm SOG = Special Optical Glass 320-2500nm PX = Pyrex 325-2500nm HH = UV Silica 220-2500nm
 Q = Far UV Quartz 170-2700nm I = Near Infra- red Quartz 220-3800nm SX = Far UV to Near IR Quartz (Water free) 170-3500nm

Type 3-. Fluorimeter. Micro

Type 23-. Fluorimeter. Micro, with stopper

- Four polished windows.
- This range of micro fluorimeter cells is specially designed to be used with the FCA adaptors (see below). The appropriate adaptor for the path length correctly aligns the cell in a standard 12.5mm square cell holder to maximise excitation and emission energy utilisation.

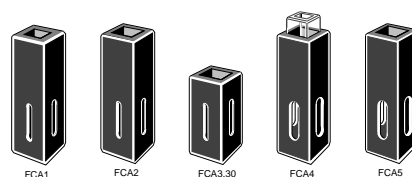


Type No.	Window Materials	Path Length	Internal		External			Adaptor	Nominal Vol. ml	Remarks
			W	L	W	L	H			
Square open top										
3-1.45	SOG, Q	1	1	1	3.5	3.5	45	FCA1	0.035	
3-2.45	SOG, Q	2	2	2	4.5	4.5	45	FCA2	0.140	
3-3.30	SOG, Q	3	3	3	5.5	5.5	30	FCA3.30	0.225	Short
3-3.45	SOG, Q	3	3	3	5.5	5.5	45	FCA3	0.315	
3-4.45	SOG, Q	4	4	4	6.5	6.5	45	FCA4	0.560	
3-5.45	SOG, Q	5	5	5	7.5	7.5	45	FCA5	0.875	
With stopper										
23-1.45	SOG, Q	1	1	1	3.5	3.5	48	FCA1	0.031	
23-2.45	SOG, Q	2	2	2	4.5	4.5	48	FCA2	0.125	
23-3.45	SOG, Q	3	3	3	5.5	5.5	48	FCA3	0.280	
23-4.45	SOG, Q	4	4	4	6.5	6.5	48	FCA4	0.500	
23-5.45	SOG, Q	5	5	5	7.5	7.5	48	FCA5	0.780	

FCA Adaptors for Types 3- & 23- micro

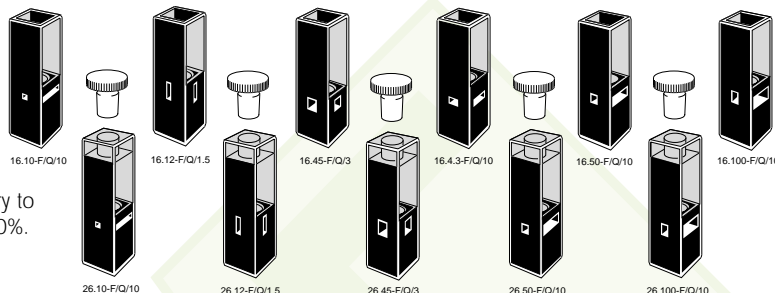
- Exterior dimensions to fit standard fluorimeter sample compartments.
- Black anodised aluminium to reduce stray light.
- Three machined apertures suitable for 8.5 or 15mm Z height dimension.

Type No.	Internal		External			Fits cell types
	W	L	W	L	H	
FCA1	3.55	3.55	12.5	12.5	45	3-1.45, 23-1.45
FCA2	4.55	4.55	12.5	12.5	45	3-2.45, 23-2.45
FCA3.3	5.55	5.55	12.5	12.5	30	3-3.30
FCA3	5.55	5.55	12.5	12.5	45	3-3.45, 23-3.45
FCA4	6.55	6.55	12.5	12.5	45	3-4.45, 23-4.45
FCA5	7.55	7.55	12.5	12.5	45	3-5.45, 23-5.45



Type 16-F & 26-F. Fluorimeter. Sub-micro

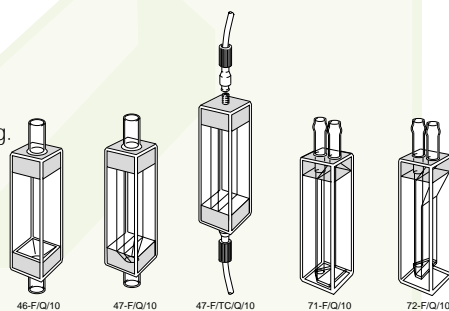
- Three polished windows.
- Sub-micro volumes from 10µl to 160µl.
- Type 16 has a top; comprising two black walls, two translucent side walls and a square internal cross section.
- Open top, supplied with non-sealing PTFE cover as well as a vaned lid to provide a liquid-tight seal.
- To avoid possible meniscus errors; it may be necessary to increase the nominal sample fill volume by at least 20%.
- May be used with all standard cell holders.
- Filling and emptying with a pipette is recommended.



Type No.	Window Material	Path Length	Z Height	Sample chamber		External			Nominal Vol. ml
				W	H	L	W	H	
Square open top									
16.10-F	Q	10	8.5, 15, 20	1	1	12.5	12.5	45	0.010
16.12-F	Q	1.5	8.5, 15, 20	1.5	5	12.5	12.5	45	0.012
16.40-F	Q	10	8.5, 15, 20	2	2	12.5	12.5	45	0.040
16.45-F	Q	3	8.5, 15, 20	3	5	12.5	12.5	45	0.045
16.4.3-F	Q	10	8.5, 15, 20	4	3	12.5	12.5	45	0.120
16.50-F	Q	10	8.5, 15, 20	2	2.5	12.5	12.5	45	0.050
16.100-F	Q	10	8.5, 15, 20	2	5	12.5	12.5	45	0.100
16.160-F	Q	10	8.5, 15, 20	2	8	12.5	12.5	45	0.160
With stopper									
26.10-F	Q	10	8.5, 15, 20	1	1	12.5	12.5	48	0.010
26.12-F	Q	1.5	8.5, 15, 20	1.5	5	12.5	12.5	48	0.012
26.40-F	Q	10	8.5, 15, 20	2	2	12.5	12.5	48	0.040
26.45-F	Q	3	8.5, 15, 20	3	5	12.5	12.5	48	0.045
26.50-F	Q	10	8.5, 15, 20	2	2.5	12.5	12.5	48	0.050
26.100-F	Q	10	8.5, 15, 20	2	5	12.5	12.5	48	0.100
26.160-F	Q	10	8.5, 15, 20	2	8	12.5	12.5	48	0.160

Type 46-F, 47-F, 71-F & 72-F. Fluorimeter flow cells

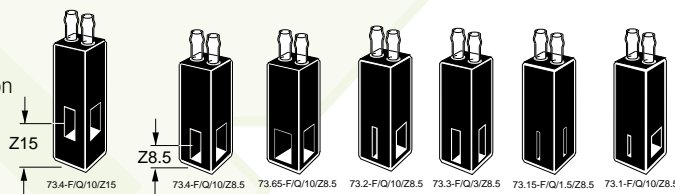
- Four polished windows.
- Profiled inlet/outlet blocks.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 16mm long intended for push-on flexible tubing.



Type No.	Window Materials	Path Length	External Height	Sample chamber			Nominal Vol. ml	Polished Windows	Remarks
				W	H	L			
46-F	SOG, Q	10	65	10	35		4.000	4	Macro
47-F	SOG, Q	10	65	4	35		1.600	4	Semi-micro
47-F/TC	Q	10	65	4	35		1.600	4	Semi-micro with screw-on fittings
71-F	Q	10	48	7	37.5		3.000	3	Semi-micro
72-F	Q	10	48	4	37.5		1.800	3	Semi-micro

Type 73-F. Fluorimeter flow cells

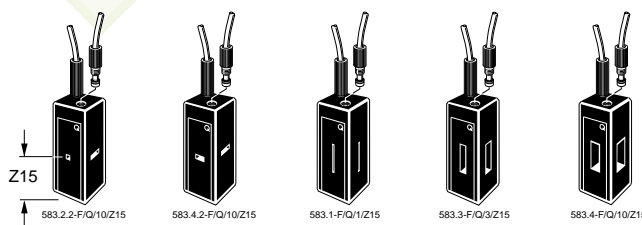
- Three polished windows.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 16mm long intended for push-on flexible tubing.
- Cells with a Z height of 8.5mm have an overall height of 40mm.



Type No.	Window Materials	Path Length	Z Height	Sample chamber			External Height	Nominal Vol. ml	Remarks
				H	W	L			
73.1-F	Q	10	8.5, 15	11	1	10	45	0.110	Micro
73.2-F	Q	10	8.5, 15	11	2	10	45	0.220	Micro
73.4-F	Q	10	8.5, 15	11	4	10	45	0.440	Semi-micro
73.65-F	Q	10	8.5, 15	11	6.5	10	45	0.715	
73.1.8-F	Q	1	8.5, 15	8	1	1	43.5	0.008	Ultra-micro
73.15-F	Q	1.5	8.5, 15	11	1.5	1.5	45	0.025	Micro
73.3-F	Q	3	8.5, 15	11	3	3	45	0.100	Semi-micro

Type 583-F. Fluorimeter flow cells

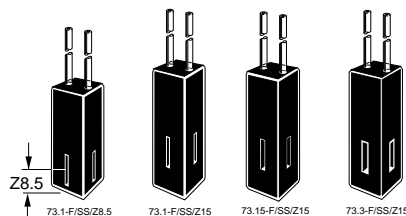
- Three polished windows.
- M6 screw-in connections.
- Cells with a Z height of 20mm have an overall height of 40mm.



Type No.	Window Materials	Path Length	Z Height	Sample chamber			External			Nominal Vol. ml
				H	W	L	L	W	H	
583.2.2-F	Q	10	15, 20	2	2	10	12.5	12.5	35	0.040
583.4.2-F	Q	10	15, 20	2	4	10	12.5	12.5	35	0.080
583.1-F	Q	1	15	11	1	1	12.5	12.5	35	0.011
583.3-F	Q	3	15	11	3	3	12.5	12.5	35	0.100
583.4-F	Q	10	15	11	4	10	12.5	12.5	35	0.440

Type 73-F/SS. Fluorimeter flow cells, HPLC

- Three polished windows.
- Stainless steel inlet/outlet tubes.
- Cells with a Z height of 8.5mm have an overall height of 38.5mm.



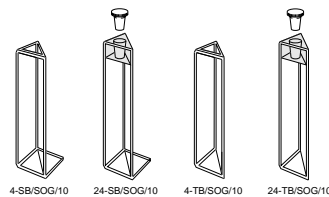
Type No.	Window Material	Path Length	Z Height	Sample chamber			External			Nominal Vol. ml	Stainless steel tubes				
				H	W	L	L	W	H		Inlet I.D.	O.D.	Outlet I.D.	O.D.	Length
73.1-F/SS	Q	1	8.5, 15	11	1	1	12.5	12.5	45	0.011	0.25	1.6	0.50	1.6	100
73.15-F/SS	Q	1.5	8.5, 15	11	1.5	1.5	12.5	12.5	45	0.025	1.0	1.6	1.0	1.6	100
73.3-F/SS	Q	3	8.5, 15	11	3	3	12.5	12.5	45	0.100	1.0	1.6	1.0	1.6	100

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 4. Fluorimeter. Triangular, open top

Type 24. Fluorimeter. Triangular with stopper

- Fits 12.5mm square cell holder.
- Three windows and base polished.

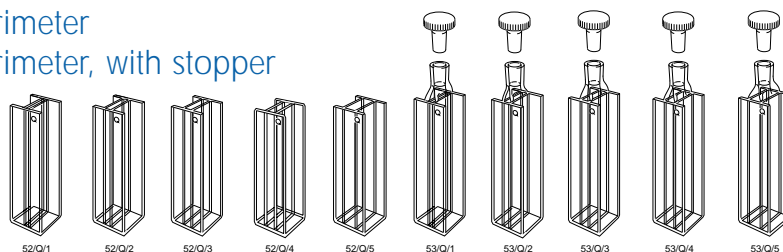


Type No.	Window Materials	Internal		External			Nominal Vol. ml	Remarks
		L	W	L	W	H		
Open top								
4-SB	SOG, Q	10	10	12.5	12.5	45	1.700	Square base
4-TB	SOG, Q	10	10	12.5	12.5	45	1.700	Triangular base
With stopper								
24-SB	SOG, Q	10	10	12.5	12.5	48	1.700	Square base
24-TB	SOG, Q	10	10	12.5	12.5	48	1.700	Triangular base

Type 52. Dual path length or Fluorimeter

Type 53. Dual path length or Fluorimeter, with stopper

- All windows and base polished.
- May be used as dual path length absorption cells or fluorimeter cells.
- Volumes equivalent to micro and semi-micro cells depending on internal width.

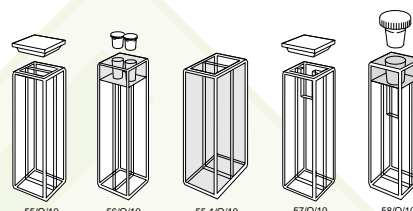


Type No.	Window Materials	Path Length	Internal Width		External			Nominal Vol. ml
			L	W	L	W	H	
Open top								
52	SOG, Q	1 or 10	1	12.5	12.5	45	0.400	
52	SOG, Q	2 or 10	2	12.5	12.5	45	0.800	
52	SOG, Q	3 or 10	3	12.5	12.5	45	1.200	
52	SOG, Q	4 or 10	4	12.5	12.5	45	1.600	
52	SOG, Q	5 or 10	5	12.5	12.5	45	2.000	
With stopper								
53	SOG, Q	1 or 10	1	12.5	12.5	52	0.400	
53	SOG, Q	2 or 10	2	12.5	12.5	52	0.800	
53	SOG, Q	3 or 10	3	12.5	12.5	52	1.200	
53	SOG, Q	4 or 10	4	12.5	12.5	52	1.600	
53	SOG, Q	5 or 10	5	12.5	12.5	52	2.000	

Type 55, 57 with lid & 56, 58 with stopper(s)

Tandem, Divided, Mixing or Fluorimeter

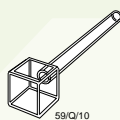
- All windows polished except 55-1/Q/10.
- Types 55 and 56 are for measuring two samples in series in separate compartments.
- Types 57 and 58 are designed for mixing two samples after measuring in series.



Type No.	Window Materials	Path Length	Internal Length	External			Nominal Vol. ml	Remarks
				L	W	H		
55	SOG, Q	2 x 10	2 x 4.375	12.5	12.5	45	2 x 1.500	Tandem or divided with lid
55-1	SOG, Q	2 x 10	2 x 10	23.75	12.5	45	2 x 3.500	Tandem or divided. Frosted sides. Open top
56	SOG, Q	2 x 10	2 x 4.375	12.5	12.5	48	2 x 1.500	Tandem or divided with stoppers
57	SOG, Q	2 x 10	2 x 4.375	12.5	12.5	45	2 x 1.000	Tandem mixing with lid
58	SOG, Q	2 x 10	2 x 4.375	12.5	12.5	48	2 x 1.000	Tandem mixing with stoppers

Type 59. Cube, Fluorimeter with tube

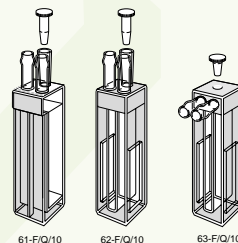
- Five windows polished



Type No.	Window Materials	Path Length	Internal		External			Tube			Nominal Vol. ml
			W	L	L	W	H	ID.	OD.	Length	
59	SOG, Q	10	10	10	12.5	12.5	48	2	4	70	1.00

Type 61-F, 62-F, 63-F. Water-jacketed Fluorimeter cells

- Inlet/outlet tubes - 2 I.D., 4 O.D., 10mm long intended for push-on flexible tubing.
- Stopper length on 61-F and 62-F, 20mm.
- 62-F and 63-F have emission windows 4.5mm x 22mm long.
- Base window 4.5mm x 4.5mm.



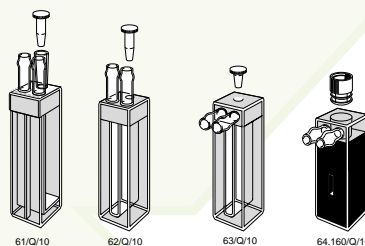
Type No.	Window Material	Path Length	External Height	Sample chamber W	Sample chamber H	Nominal Vol. ml	Polished Windows
61-F	Q	10	48	7.0	37	2.59	3
62-F	Q	10	48	4.5	37	1.66	5
63-F	Q	10	48	4.5	37	1.66	5

Type 61. Constant temperature with stopper

Type 62 & 63. Constant temperature. Semi-micro

Type 64. Constant temperature. Sub-micro

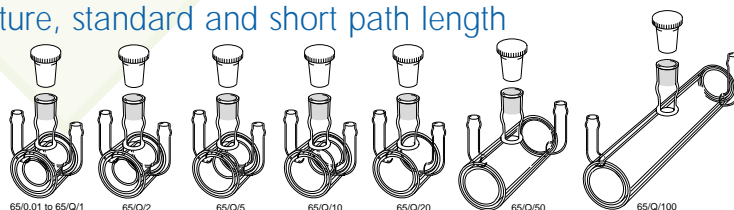
- Two polished windows.
- Type 64 sub-micro for heating small samples typically DNA.
- Type 64 with Z15 overall height 45mm.
- Inlet/outlet tubes - 2 I.D., 4 O.D., 10mm long intended for push-on flexible tubing.



Type No.	Window Material	Path Length	W	External L	External H	Sample chamber W	Sample chamber L	Sample chamber H	Overall Height	Nominal Vol. ml	Remarks
61	Q	10	12.5	12.5	48	7	10	37.5	60	2.100	Vertical flow tubes
62	Q	10	12.5	12.5	48	4.5	10	40	60	1.520	Vertical flow tubes
63	Q	10	12.5	12.5	48	4.5	10	40	60	1.520	Horizontal flow tubes
64.160	Q	10	12.5	12.5	38.5	2	10	8	40	0.160	Z Height - 8.5 or 15mm

Type 65. Cylindrical constant temperature, standard and short path length

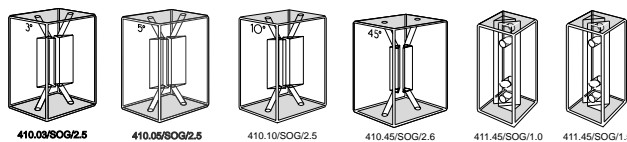
- Two polished windows.
- Maximised surface area contact for temperature controlling medium throughout the range.
- Tubulations intended for push-on flexible tubing.
- Closed by PTFE stopper, providing a liquid-tight seal.



Type No.	Window Material	Path Length	External Dia.	L	Sample chamber Dia.	L	Overall Height	Nominal Vol. ml
65	Q	0.01	22	20	10	0.01	32	0.737
65	Q	0.1	22	20	10	0.1	32	0.747
65	Q	0.5	22	20	10	0.5	32	0.792
65	Q	1	22	20	10	1	32	0.849
65	Q	2	22	20	10	2	32	0.962
65	Q	5	22	20	10	5	32	1.300
65	Q	10	22	10	14	10	32	0.825
65	Q	20	22	20	14	20	32	1.650
65	Q	50	22	50	14	50	32	4.125
65	Q	100	22	100	14	100	32	8.250

Type 410 & 411. Flow through. Refractometer

- Three polished windows.
- Inlet/outlet bores for each chamber via special holders supplied by instrument manufacturers together with connectors and tubing.



Type No.	Window Material	Path Length	Internal W	Internal L	Internal H	External W	External L	External H	Nominal Vol. ml
410.03	SOG, Q	2.5	2.5	1.6	7	10	8	15	2 x 0.01
410.05	SOG, Q	2.5	2.5	1.6	7	10	8	15	2 x 0.01
410.10	SOG, Q	2.5	2.5	1.6	7	10	8	15	2 x 0.01
410.45	SOG, Q	2.6	2.6	1.6	7	10	8	15	2 x 0.01
411.45.1	SOG, Q	1	1.0	1.0	8	5	5.5	11	2 x 0.04
411.45.15	SOG, Q	1.5	1.0	1.5	8	5	5.5	11	2 x 0.09

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 Q = Far UV Quartz 170-2700nm I = Near Infra- red Quartz 220-3800nm SX = Far UV to Near IR Quartz (Water free) 170-3500nm



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