Starna Scientific
The Spectroscopy Specialists

Cell/Cuvettes for all
Spectrophotometer
Fluorimeter and
Laser applications

Starna scientific

Introduction to Starna®

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

Starna Scientific is the manufacturing division of the international group of Starna® companies, who have a recognised world-wide reputation for quality, service, innovation and co-operation in the production and supply of spectrophotometer cells, optical components and certified reference materials.

During the 1950s, the founding members of the company developed and perfected the technique of fully fusing optically polished component parts by heat alone, without distortion. 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.

All manufacturing processes are carried out in an ISO 9000 certified production facility, from design and development of product 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 manufacturing 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 all products leave the factory in a pristine contamination-free condition, with an unconditional guarantee against faulty workmanship. This special treatment of cells together with internally profiled cells reduces bubble adhesion, particularly important in flow cell applications.In addition to the **ISO 9001** certified manufacturing facility, the **Starna Reference Material Calibration Laboratory** which has been **UKAS** accredited to **ISO 17025** since 2001, also achieved **ISO guide 34** in 2006, the highest level of accreditation, recognised world-wide. The unique combination of manufacturing, application and laboratory skills, permits full traceability throughout the whole production process, making Starna Scientific a unique partner to instrument manufacturers, dealers and retail customers worldwide who require completely independent guaranteed validation reference materials for analytical equipment.

Cell specifications

Starna® spectrophotometer cells and other quartz and glass assemblies, unless precluded by design, are assembled using a fully fused method of construction. This technique, pioneered and used by Starna Scientific since the mid 1950s, ensures that cells are fused into a single homogeneous entity using heat alone, without intermediate bonding materials. All cells are then carefully annealed to remove any residual strain from the fusing process. This ensures maximum physical strength as well as resistance to solvents. With few exceptions, most cells can be used safely with pressure differentials of up to 3 x 105Pa (3 Bar) and some up to10x105Pa (10 Bar).

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 30mm	± 0.01mm
Quartz	40 to 100mm	± 0.02mm

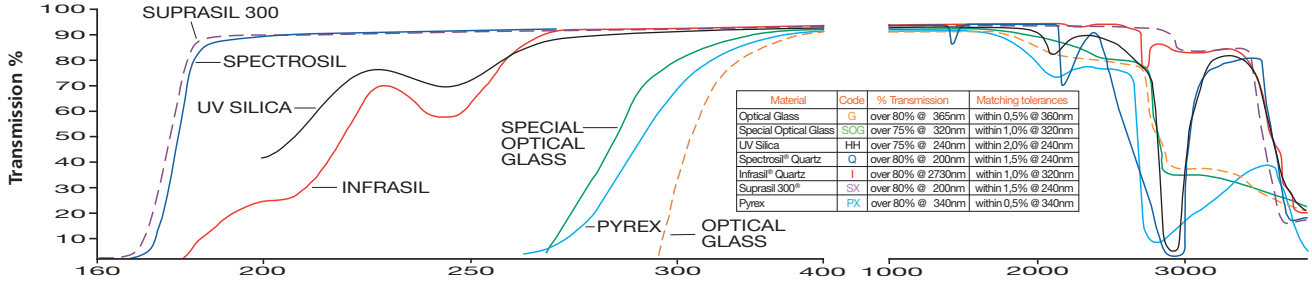
Standard window thickness is 1.25mm, polished to better than 4 Newton Fringes per centimetre in the viewing area, typically flat to better than 1 micron (0.001mm) over the window area.

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 should be requested at the time of ordering.

Water absorption band OH content ppm (mg/g) Infrasil ≤ 8, Suprasil 300 ≤ 1.

Window material transmission properties



Registered Trade Marks: INFRASIL® & SUPRASIL 300® Heraeus Quarzglas GmbH, Hanau Germany.
SPECTROSIL®, Vitreosil® & TSC3® Heraeus Quartz UK Ltd, Wallsend, England. PYREX® Corning Glass Works, U.S.A.

The above information illustrates the approximate transmission ranges of the guaranteed materials used in the production of Starna cells. The spectra does not take into account reflective losses from optical window surfaces which may vary depending on the material measured, resulting in actual measured transmission between 80%T and 90%T. Windows are normally 1.25mm thick and therefore the absorption of the windows themselves can be disregarded for normal analytical purposes.

Contents

How to order

Essential ordering information is shown under the **Blue column 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

Starna Scientific 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
Borosilicate	PX	325 through 2500 nm
UV Silica	HH	220 through 2500 nm
Spectrosil® Quartz	Q	190 through 2700 nm
Infrasil®	I	220 through 3800 nm
Suprasil 300® Quartz	SX	190 through 3500 nm

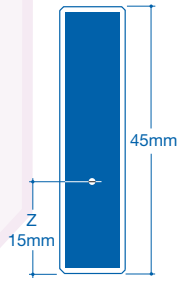
For fluorescent applications Spectrosil® is the recommended window material, as it does not exhibit any background fluorescence. Some other materials, especially glass and lower grades of quartz may have some background fluorescence.

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.

Z Height dimension - IMPORTANT!

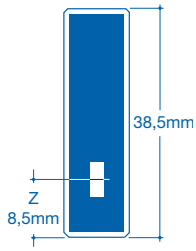
The 'Z' height is the distance from the bottom of the cell holder cavity to the centre of the incident light beam profile, which can be round, rectangular or curved. For the most efficient use of energy and sample volume the sample chamber aperture should ideally encompass the light beam with a small extra margin to avoid beam clipping.

The 'Z' height of the cell, the distance from the centre of the cell sample chamber aperture to the base of the cell, should match to that of the instrument.



Manufacturers have generally designed their instruments with 'Z' dimensions ranging from 5 to 20mm with 8.5 or 15mm being the most popular.

Choosing the correct cell 'Z' height is very important when the aperture in the cell is very small, as in sub-micro cells and micro flow cells.



The standard 'Z' heights for any cell, where this information is critical, are shown in a separate column in the information tables, headed 'Z' Height. Other 'Z' dimensions can be supplied on request.
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 at the time of ordering, it is beneficial to state the instrument make and model number for which the cell is required.

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

Cell matching

Modern production and fusing techniques, together with consistent raw materials, 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 especially 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. 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.

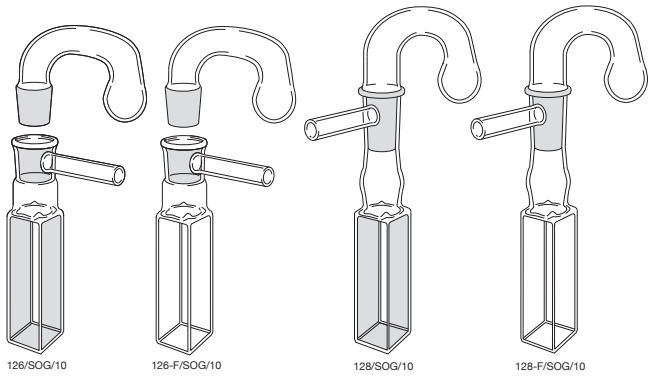
When cells matched for transmission are required, mainly but not exclusively for less consistent materials such as Glass and Special Optical Glass where transmission characteristics from melt to melt differ, each measured cell is given a match code relative to its transmission at a given wavelength as 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
Borosilicate	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 may not identically match an older used cell of the same match code.

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

- Two polished windows except 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 ≅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.

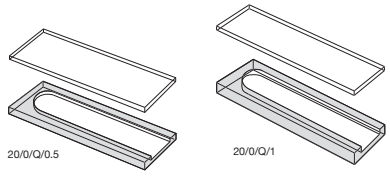


Type No.	Window Materials	Path Length	Internal Width	External L	W	H	Nominal Vol. ml	Remarks
126 & 126-F	SOG, Q, I	2	2	4.5	12.5	70	0.700	Macro/Standard Rectangular. Short socket. Fluorimeter
126 & 126-F	SOG, Q, I	5	5	7.5	12.5	70	1.750	Macro/Standard Rectangular. Short socket. Fluorimeter
126 & 126-F	SOG,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

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 28)**

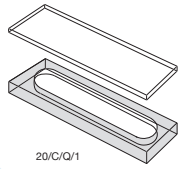
Type No.	Window Materials	Path Length	Internal W	H	External L	W	H	Nominal Vol. ml
20/O	Q, I	0.01	10	43.5	2.5	12.5	45	0.004
20/O	Q, I	0.05	10	43.5	2.5	12.5	45	0.020
20/O	Q, I	0.1	10	43.5	2.6	12.5	45	0.040
20/O	Q, I	0.2	10	43.5	2.7	12.5	45	0.080
20/O	Q, I	0.5	10	43.5	3.0	12.5	45	0.190
20/O	G, SOG, Q, I	1	10	43.5	3.5	12.5	45	0.390



Type 20/C & Type 30. Short path length. Demountable, closed

- Totally enclosed when assembled.
- Two polished windows.
- **Type 20/C** intended for use with **Type CH/2049** cell holder. **(see page 28)**

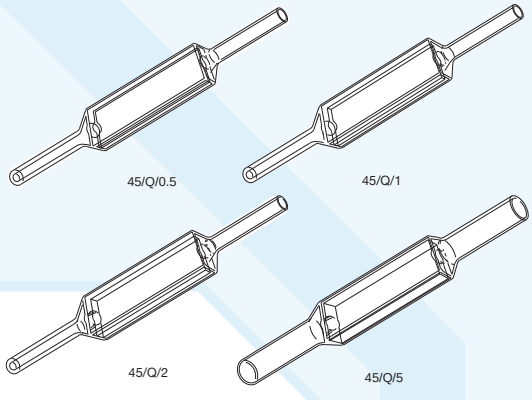
Type No.	Window Materials	Path Length	Internal W	H	External L	W	H	O.D.	I.D.	Thickness	Nominal Vol. ml
20/C	Q	0.008	8	38	2.5	12.5	45				0.002
20/C	Q, I	0.01	8	38	2.5	12.5	45				0.003
20/C	Q, I	0.05	8	38	2.5	12.5	45				0.015
20/C	Q, I	0.1	8	38	2.6	12.5	45				0.030
20/C	Q, I	0.2	8	38	2.7	12.5	45				0.060
20/C	Q, I	0.5	8	38	3.0	12.5	45				0.150
20/C	G, SOG, Q, I	1	8	38	3.5	12.5	45				0.310
30	Q	0.01						22	16	2.5	0.002
30	Q	0.1						22	16	2.6	0.020
30	Q	0.2						22	16	2.7	0.040
30	Q	0.5						22	16	3.0	0.100



Type 45 & 45-F. Flow cells. In-line or microscope analysis

- **Type 45** two polished windows. Type 45-F has four polished windows.
- Tubes may be bent at angles to sample compartment if required.
- Up to 2mm Path length. Inlet/Outlet tubes - 2mm I.D., 4mm O.D. x 25mm long.
- Up to 5mm Path length. Inlet/Outlet tubes - 5mm I.D., 7mm O.D. x 25mm long.

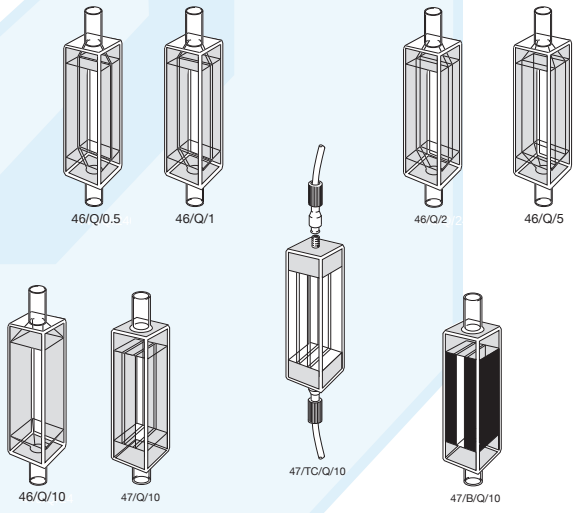
Type No.	Window Material	Path Length	Internal Width	External L	W	H	Nominal Vol. ml
45 & 45-F	Q	0.1	10	2.6	12.5	40 + tubes	0.040
45 & 45-F	Q	0.2	10	2.7	12.5	40 + tubes	0.080
45 & 45-F	Q	0.5	10	3.0	12.5	40 + tubes	0.200
45 & 45-F	Q	1.0	10	3.5	12.5	40 + tubes	0.400
45 & 45-F	Q	2.0	10	4.5	12.5	40 + tubes	0.800
45 & 45-F	Q	5.0	10	7.5	12.5	40 + tubes	4.000



Type 46, 46-F Fluorimeter & 47 Flow cells. In-line

- Two polished windows. Type 46-F have 4 windows and base polished.
- Tubulations intended for push-on flexible tubing.
- Profiled inlet and outlet
- Inlet/outlet tubes - 2mm I.D., 4mm O.D. and 10mm long.
- **TYPE 47/TC** Screw-on connections

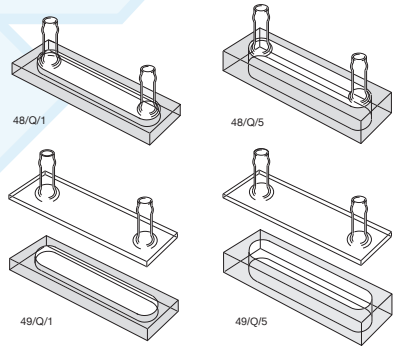
Type No.	Window Materials	Path Length	Internal Width	External L	External W	External H	Nominal Vol. ml
Clear walls							
46 & 46-F	Q	0.5	10	12.5	12.5	65	0.185
46 & 46-F	Q	1	10	12.5	12.5	65	0.370
46 & 46-F	Q	2	10	12.5	12.5	65	0.740
46 & 46-F	Q	5	10	12.5	12.5	65	1.850
46 & 46-F	G, SOG, Q	10	10	12.5	12.5	65	3.700
Semi-micro. Clear walls							
47	G, SOG, Q	10	4	12.5	12.5	65	1.480
47/TC	Q	10	4	12.5	12.5	65	1.480
Semi-micro. Self-masking. Black walls							
47/B	Q	10	4	12.5	12.5	65	1.480



Type 48 Flow cells & Type 49 demountable Flow cells. Short path length

- Two polished windows.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 16mm long intended for push-on flexible tubing.
- Intended for use with Type **CH/2049** cell holder. **(see page 28)**

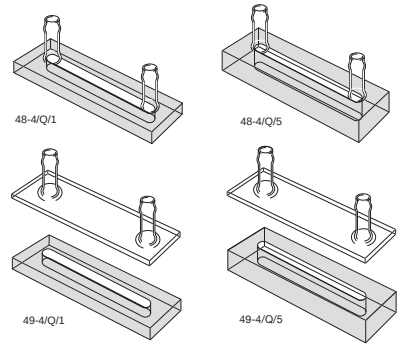
Type No.	Window Materials	Path Length	Internal W	Internal H	External L	External W	External H	Nominal Vol. ml
48 or 49	Q, I	0.01	8	38	2.6	12.5	45	0.003
48 or 49	Q, I	0.1	8	38	2.6	12.5	45	0.030
48 or 49	Q, I	0.2	8	38	2.7	12.5	45	0.060
48 or 49	Q, I	0.5	8	38	3.0	12.5	45	0.150
48 or 49	G, SOG, Q, I	1	8	38	3.5	12.5	45	0.300
48 or 49	G, SOG, Q, I	2	8	38	4.5	12.5	45	0.600
48 or 49	G, SOG, Q, I	5	8	38	7.5	12.5	45	1.560



Type 48-4 Flow cells & Type 49-4 demountable Flow cells. Short path length

- Two polished windows.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 16mm long intended for push-on flexible tubing.
- Intended for use with **Type CH/2049** cell holder. **(see page 28)**

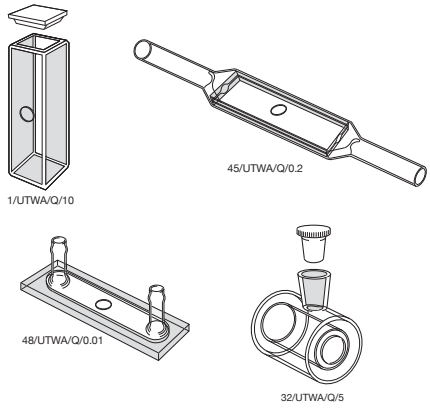
Type No.	Window Materials	Path Length	Internal W	Internal H	External L	External W	External H	Nominal Vol. ml
48-4 or 49-4	Q, I	0.01	4	38	2.6	12.5	45	0.002
48-4 or 49-4	Q, I	0.1	4	38	2.6	12.5	45	0.015
48-4 or 49-4	Q, I	0.2	4	38	2.7	12.5	45	0.030
48-4 or 49-4	Q, I	0.5	4	38	3.0	12.5	45	0.075
48-4 or 49-4	G,SOG,Q, I	1	4	38	3.5	12.5	45	0.150
48-4 or 49-4	G,SOG,Q, I	2	4	38	4.5	12.5	45	0.300
48-4 or 49-4	G,SOG,Q, I	5	4	38	7.5	12.5	45	0.780



Types UTWA & UTWA2. Ultra thin wall aperture cells

- Two polished windows.
- Aperture window - 0.2mm (200 microns)
- For use with high magnification systems
- **UTWA/2** has two thin window apertures, one in each window.

Type No.	Window Materials	Path Length	Internal Width	External L	External W	Internal HDia.	External Dia.
1/UTWA	Q	All Path Lengths	10	12.5	12.5	45	-
1/UTWA2	Q		10	12.5	12.5	45	-
45/UTWA	Q		10	12.5	12.5	45	-
45/UTWA2	Q		10	12.5	12.5	45	-
48/UTWA	Q		10	2.6	12.5	45	-
48/UTWA2	Q		10	2.6	12.5	45	-
32/UTWA	Q		-	22.5	-	-	15	22
32/UTWA2	Q		-	22.5	-	-	15	22

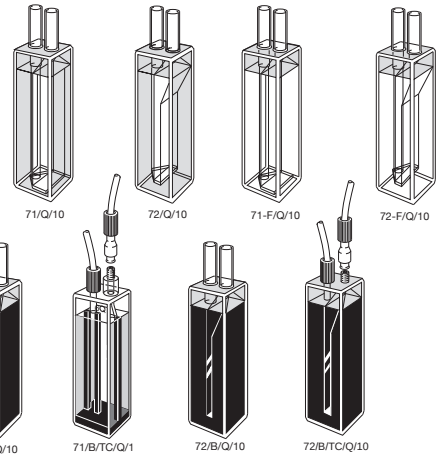


G = Optical Glass 334-2500nm SOG = Special Optical Glass 320-2500nm PX = Borosilicate 325-2500nm HH = UV Silica 220-2500nm
Q = Far UV Quartz 170-2700nm I = Near Infra-Red Quartz 220-3800nm SX = Far UV to Near IR Quartz (Water free) 170-3500nm

Type 71, 71B, 71F, 72, 72B & 72F Flow cells. Standard and semi-micro

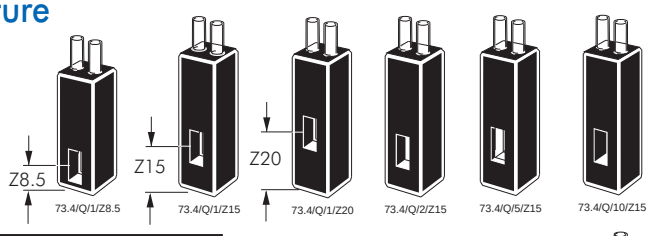
- 71, 71B, 72 & 72B have two polished windows.
- Long sample compartment suitable for all Z dimensions.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 16mm long intended for push-on flexible tubing.
- Also available with TC threaded connectors.
- 71-F & 72-F fluorescence cells have three polished windows.

Type No.	Window Materials	Path Length	Internal W	Internal H	External L	External W	External H	Nominal Vol. ml
Clear walls								
71	Q	10	7	37.5	12.5	12.5	48	3.000
71-F	Q	10	7	37.5	12.5	12.5	48	3.000
72	Q	10	4	37.5	12.5	12.5	48	1.800
72-F	Q	10	4	37.5	12.5	12.5	48	1.800
Self masking. Black walls								
71/B	Q	1	7	37.5	12.5	12.5	48	0.300
71/B	Q	10	7	37.5	12.5	12.5	48	3.000
72/B	Q	1	4	37.5	12.5	12.5	48	0.180
72/B	Q	10	4	37.5	12.5	12.5	48	1.800

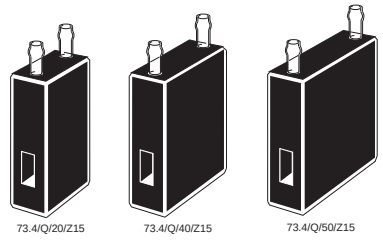


Type 73.4. Flow cells. Dissolution, medium aperture

- Two polished windows.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 10mm long intended for push-on flexible tubing.
- Cells with a Z height of 8.5mm have an overall height of 38.5mm.



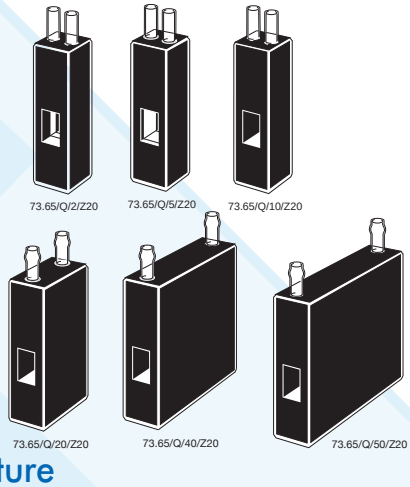
Type No.	Window Material	Path Length	Z Height	Internal W	Internal H	External L	External W	External H	Nominal Vol. ml
73.4	Q	1	8.5, 15, 20	4	11	12.5	12.5	45	0.045
73.4	Q	2	8.5, 15, 20	4	11	12.5	12.5	45	0.090
73.4	Q	5	8.5, 15, 20	4	11	12.5	12.5	45	0.225
73.4	SOG, Q, SX	10	8.5, 15, 20	4	11	12.5	12.5	45	0.450
73.4	Q	20	8.5, 15, 20	4	11	22.5	12.5	45	0.900
73.4	Q	40	8.5, 15, 20	4	11	42.5	12.5	45	1.800
73.4	Q	50	8.5, 15, 20	4	11	52.5	12.5	45	2.250



Type 73.65 Flow cells. Dissolution, wide aperture

- Two polished windows.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 10mm long intended for push-on flexible tubing.
- Cells with a Z height of 8.5mm have an overall height of 38.5mm.

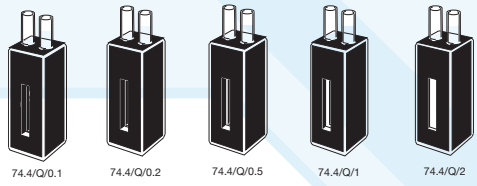
Type No.	Window Material	Path Length	Z Height	Internal W	Internal H	External L	External W	External H	Nominal Vol. ml
73.65	Q	1	8.5, 15, 20	6.5	11	12.5	12.5	45	0.072
73.65	Q	2	8.5, 15, 20	6.5	11	12.5	12.5	45	0.144
73.65	Q	5	8.5, 15, 20	6.5	11	12.5	12.5	45	0.360
73.65	Q	10	8.5, 15, 20	6.5	11	12.5	12.5	45	0.720
73.65	Q	20	8.5, 15, 20	6.5	11	22.5	12.5	45	1.440
73.65	Q	40	8.5, 15, 20	6.5	11	42.5	12.5	45	2.880
73.65	Q	50	8.5, 15, 20	6.5	11	52.5	12.5	45	3.600



Type 74.4 Flow cells. Dissolution. Short path length, long aperture

- Two polished windows.
- Path lengths of 0.5mm or less incorporate by-pass tubes to avoid back pressure and assist laminar flow through the sample compartment. Profiled sample compartment to optimise flow characteristics, reduces carry-over and bubble retention.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 10mm long intended for push-on flexible tubing.

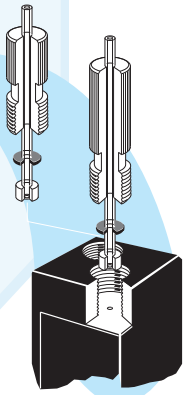
Type No.	Window Material	Path Length	Z Height	Internal W	Internal H	External L	External W	External H	Nominal Vol. ml
74.4	Q	0.1	15	4	17.5	12.5	12.5	35	0.042
74.4	Q	0.2	15	4	17.5	12.5	12.5	35	0.049
74.4	Q	0.5	15	4	17.5	12.5	12.5	35	0.100
74.4	Q	1	15	4	17.5	12.5	12.5	35	0.135
74.4	Q	2	15	4	17.5	12.5	12.5	35	0.200



Advantages of Starna® Type 583, 584, 576, 577 & 585 series flow cells

(for 576, 577 & 583 see page 20)

- Fully fused body, accurately located in precisely formed extruded CNC drilled enclosure.
- Superior design, firm and accurate positioning of screw-in M6 gripper fittings with PTFE tubing, without reliance on the shear strength of intermediate bonding material.
- Polished top surface of the cell creates a positive seal with the PTFE face of the M6 gripper fitting, (see illustration), ensures a leak proof seal without dislodging the cell body or damaging the cell surface.
- A gap of ≈300 microns between the top of the cell body and the enclosure allows confirmation of a positive seal before use.
- Internally profiled inlet and outlet to each sample chamber optimises flow characteristic and performance, providing a smooth laminar flow wherever possible and reduces bubble retention.
- All cells are pressure tested to more than 5 bar after final assembly.
- Each cell is engraved with the path length and a unique identifying number, for full traceability throughout the manufacturing process.
- Cells with path lengths of less than 0.5mm or less are checked on a reference spectrophotometer before and after final assembly using an interference method. The path length is determined to an uncertainty better than 0.2 microns (0.0002mm). Path lengths of 0.5mm or greater are verified by physical measurement during the production processes.
- Flanged fittings, FEP tubing, and special adaptors Type TJ/G/038 for use with normal silicone tubing are available, see page 29.
- Short path length flow cells may be used as static short path length using a syringe and luer lock adaptor (see illustration).



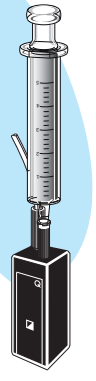
Type 583.2.8 Flow cells. Dissolution. Micro aperture

- Two polished windows.
- M6 Screw-in connections.
- Profiled sample compartment to optimise flow characteristics, reduces carry-over and bubble retention.

Type No.	Window Material	Path Length	Z Height	Internal W	Internal H	External L	External W	External H	Nominal Vol. ml
583.2.8	Q	10	8.5, 15	2	8	12.5	12.5	35	0.160


583.2.8/Q/10/Z8.5


583.2.8/Q/10/Z15



Type 583.3.3. Flow cells. Sub-micro. Small aperture

- Two polished windows.
- Overflow tube attached to outlet side of cell.
- M6 fittings as described, included with cell.
- Also designed for use with luer lock fitting and syringe for introduction and extraction of sample.

Type No.	Window Materials	Path Length	Z Height	Internal W	Internal H	External W	External H	Nominal Vol.ml
583.3.3	Q	1	15	3	3	12.5	35	0.009
583.3.3	Q	2	15	3	3	12.5	35	0.018
583.3.3	Q	5	15	3	3	12.5	35	0.045


583.3.3/Q/1


583.3.3/Q/1/LL/Z15

Z Dimension per instrument

Manufacturer	Z Dimension
Agilent®	15mm
Beckman®	8.5mm
Bio-Rad®	8.5mm
Eppendorf®	8.5mm
GBC®	15mm
Hewlett-Packard®	15mm
Hitachi®	8.5mm
Jasco®	12mm
Perkin-Elmer®	15mm
Pharmacia®	15mm
Scinco®	15mm
Shimadzu®	15mm
Spectronics®	8.5mm
Turner®	8.5mm
Varian® (Cary®/Agilent®)	20mm

Type 583.4 & 583.4.14 Flow cells. Dissolution. Medium Aperture

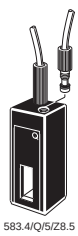
- Two polished windows.
- M6 Screw-in connections.
- Profiled sample compartment to optimise flow characteristics, reduces carry-over and bubble retention.


583.4.14/Q/1/Z15


583.4.14/Q/2/Z15


583.4.14/Q/5/Z15


583.4.14/Q/10/Z15


583.4/Q/5/Z8.5

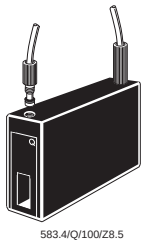
Type No.	Window Materials	Path Length	Z Height	Internal W	Internal H	External W	External H	Nominal Vol. ml
583.4.14	Q	1	15, 20	4	14	12.5	35	0.056
583.4.14	Q	2	15, 20	4	14	12.5	35	0.112
583.4.14	Q	5	15, 20	4	14	12.5	35	0.280
583.4.14	Q	10	15, 20	4	14	12.5	35	0.560
583.4	Q	5	8.5, 15, 20	4	11	12.5	35	0.225
583.4	Q	10	8.5, 15, 20	4	11	12.5	35	0.450
583.4	Q	20	8.5, 15, 20	4	11	12.5	35	0.900
583.4	Q	40	8.5, 15, 20	4	11	12.5	35	1.800
583.4	Q	50	8.5, 15, 20	4	11	12.5	35	2.250
583.4	Q	100	8.5, 15, 20	4	11	12.5	35	4.500


583.4/Q/10/Z8.5


583.4/Q/20/Z8.5


583.4/Q/40/Z8.5

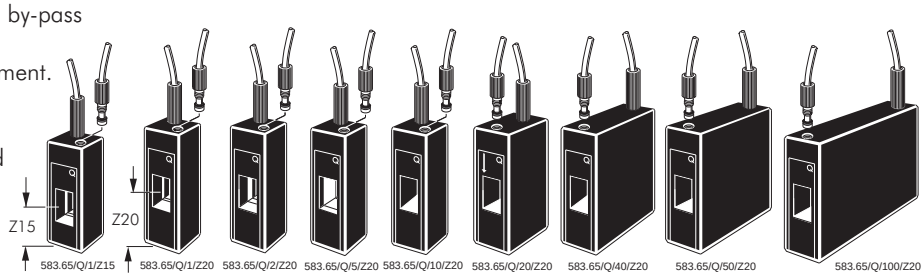

583.4/Q/50/Z8.5


583.4/Q/100/Z8.5

G = Optical Glass 334-2500nm SOG = Special Optical Glass 320-2500nm PX = Borosilicate 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 583.65 Flow cells. Dissolution. Wide aperture

- Two polished windows.
- Cells with a Z height of 20mm have overall an height of 40mm.
- Path lengths of 0.5mm or less incorporate by-pass tubes to avoid back pressure and assist laminar flow through the sample compartment.
- M6 Screw-in connections.
- Profiled sample compartment to optimise flow characteristics, reduce carry-over and bubble retention.



Type No.	Window Material	Path Length	Z Height	Internal W	Internal H	External L	External W	External H	Nominal Vol. ml
583.65	Q	0.1	15, 20	6.5	11	12.5	12.5	35	0.029
583.65	Q	0.2	15, 20	6.5	11	12.5	12.5	35	0.036
583.65	Q	0.5	15, 20	6.5	11	12.5	12.5	35	0.072
583.65	Q	1	15, 20	6.5	11	12.5	12.5	35	0.072
583.65	Q	2	15, 20	6.5	11	12.5	12.5	35	0.290
583.65	Q	5	15, 20	6.5	11	12.5	12.5	35	0.360
583.65	Q	10	15, 20	6.5	11	12.5	12.5	35	0.720
583.65	Q	20	15, 20	6.5	11	22.5	12.5	35	1.400
583.65	Q	40	15, 20	6.5	11	42.5	12.5	35	2.900
583.65	Q	50	15, 20	6.5	11	52.5	12.5	35	3.600
583.65	Q	100	15, 20	6.5	11	102.5	12.5	35	7.200

Type 583.65.65 Flow cells. Dissolution. Wide square aperture

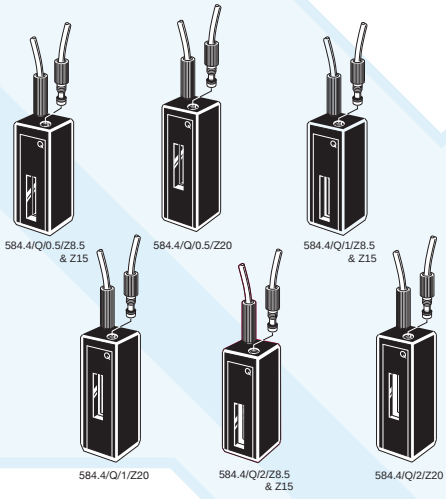
- Two polished windows.
- Cells with a Z height of 20mm have overall an height of 40mm.
- M6 Screw-in connections.
- Profiled sample compartment to optimise flow characteristics, reduces carry over and bubble retention.
- Aperture with reduced height and volume for specific instruments such as Agilent 8453 and Varian Cary 50.

Type No.	Window Material	Path Length	Z Height	Internal W	Internal H	External L	External W	External H	Nominal Vol. ml
583.65.65	Q	1	15, 20*	6.5	6.5	12.5	12.5	35	0.076
583.65.65	Q	2	15, 20*	6.5	6.5	12.5	12.5	35	0.160
583.65.65	Q	5	15, 20*	6.5	6.5	12.5	12.5	35	0.210
583.65.65	Q	10	15, 20*	6.5	6.5	12.5	12.5	35	0.420

* When Z height is 20mm, external height is 40mm

Type 584.4 Flow cells. Dissolution. Short path length, long aperture

- Two polished windows.
- Long aperture.
- Path lengths of 0.5mm or less incorporate by-pass tubes to avoid back pressure and assist laminar flow through the sample compartment.
- M6 Screw-in connections.
- Profiled sample compartment to optimise flow characteristics, reduces carry over and bubble retention.

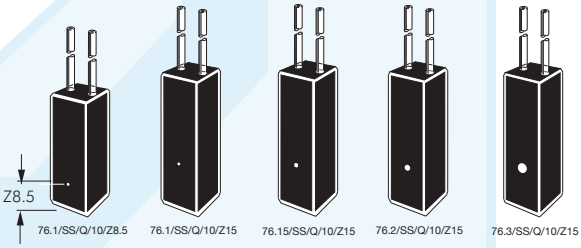


Type No.	Window Material	Path Length	Z Height	Internal W	Internal H	External L	External W	External H	Nominal Vol. ml
584.4	Q	0.01	8.5,15,20*	4	17.5	12.5	12.5	35	0.036
584.4	Q	0.05	8.5,15,20*	4	17.5	12.5	12.5	35	0.039
584.4	Q	0.1	8.5,15,20*	4	17.5	12.5	12.5	35	0.041
584.4	Q	0.2	8.5,15,20*	4	17.5	12.5	12.5	35	0.047
584.4	Q	0.5	8.5,15,20*	4	17.5	12.5	12.5	35	0.095
584.4	Q	1	8.5,15,20*	4	17.5	12.5	12.5	35	0.120
584.4	Q	2	8.5,15,20*	4	17.5	12.5	12.5	35	0.240

* When Z height is 20mm, external height is 40mm

Type 76. Flow cells HPLC, round aperture with stainless steel tubes

- Two 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 Materials	Path Length	Z Height	Internal Dia.	External L	W	H	Nominal Vol. ml	Stainless steel tubes Inlet I.D.	O.D.	Outlet I.D.	O.D.	Length
76.1	Q	10	8.5, 15	1	12.5	12.5	45	0.008	0.25	1.6	0.5	1.6	100
76.15	SOG, Q	10	8.5, 15	1.5	12.5	12.5	45	0.018	1.0	1.6	1.0	1.6	100
76.2	SOG, Q	10	8.5, 15	2	12.5	12.5	45	0.040	1.0	1.6	1.0	1.6	100
76.3	SOG, Q	10	8.5, 15	3	12.5	12.5	45	0.080	1.0	1.6	1.0	1.6	100

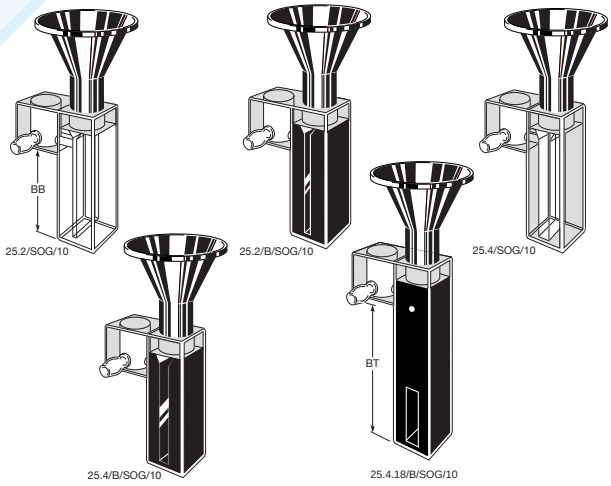
Type 15. Micro aspiration

- Two polished windows.
- Open top.
- Filling and emptying with a pipette is recommended.

Type No.	Window Material	Path Length	Z Height	Internal W	H	External L	W	H	Nominal Vol. ml
15.50A	Q	10	8.5	-	13.5	12.5	12.5	15	0.050

Type 25. Micro & semi-micro. Vacuum suction/aspiration

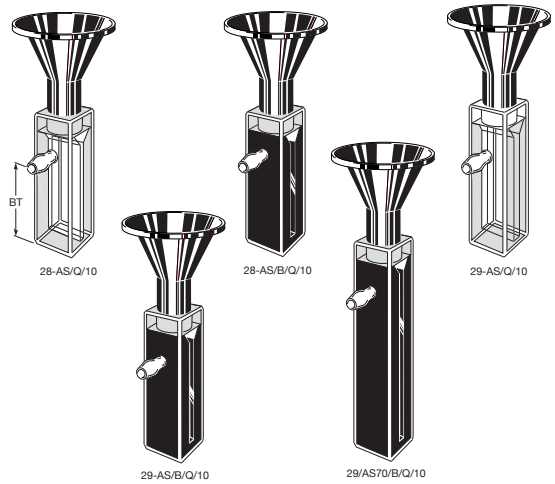
- Two polished windows.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 10mm long intended for push-on flexible tubing.
- Funnel supplied with cell.



Type No.	Window Materials	Path Length	Internal W	External L	W	H	Base to Block (BB)	Nominal Vol. ml
Micro. Clear walls								
25.2	SOG, Q	10	2	12.5	12.5	45	26	0.500
Micro. Black walls. Self-masking								
25.2/B	SOG, Q	10	2	12.5	12.5	45	26	0.500
Semi-micro. Clear walls								
25.4	SOG, Q	10	4	12.5	12.5	45	26	1.000
Semi-micro. Black walls. Self-masking								
25.4/B	SOG, Q	10	4	12.5	12.5	45	26	1.000
25.4.18/B	SOG, Q	10	4	12.5	12.5	64	44	0.750

Type 28-AS. Micro, suction outlet
Type 29-AS. Semi-micro, suction outlet

- Two polished windows.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 10mm long intended for push-on flexible tubing.
- Funnel supplied with cell.

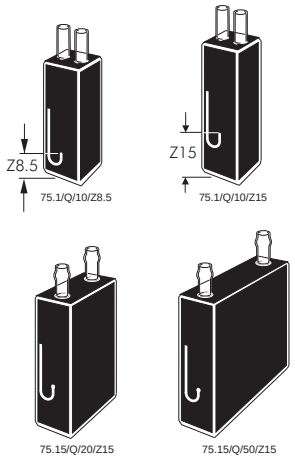


Type No.	Window Materials	Path Length	Internal W	External L	W	H	Base to Tube (BT)	Nominal Vol. ml
Micro. Clear walls								
28-AS	SOG, Q	10	2	12.5	12.5	48	31	0.500
Micro. Black walls. Self-masking								
28-AS/B	SOG, Q	10	2	12.5	12.5	48	31	0.500
Semi-micro. Clear walls								
29-AS	SOG, Q	10	4	12.5	12.5	48	31	1.000
Semi-micro. Black walls. Self-masking								
29-AS/B	SOG, Q	10	4	12.5	12.5	48	31	1.000
29/AS60/B	Q	10	4	12.5	12.5	60	46.5	1.200
29/AS70/B	SOG, Q	10	4	12.5	12.5	70	55	1.800

G = Optical Glass 334-2500nm SOG = Special Optical Glass 320-2500nm PX = Borosilicate 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 75.1, 75.15 Flow cells. Ultra-micro, round aperture

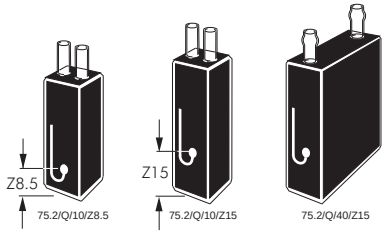
- Two polished windows.
- Cells with a Z height of 8.5mm have an overall height of 38.5mm.
- Bore specially treated to reduce bubble formation and/or retention.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 10mm long intended for push-on flexible tubing.



Type No.	Window Material	Path Length	Z Height	Internal Dia.	External L	W	H	Nominal Vol. ml
75.1	Q, SX	5	8.5,15	1	12.5	12.5	35	0.036
75.1	SOG, Q, SX	10	8.5,15	1	12.5	12.5	35	0.039
75.15	Q, SX	1	8.5,15	1.5	12.5	12.5	35	0.041
75.15	Q, SX	2	8.5,15	1.5	12.5	12.5	35	0.047
75.15	Q, SX	5	8.5,15	1.5	12.5	12.5	35	0.095
75.15	SOG, Q, SX	10	8.5,15	1.5	12.5	12.5	35	0.120
75.15	Q, SX	20	8.5,15	1.5	22.5	12.5	35	0.240
75.15	Q, SX	50	8.5,15	1.5	52.5	12.5	35	0.600

Type 75.2 Flow cells. Sub-micro, round aperture

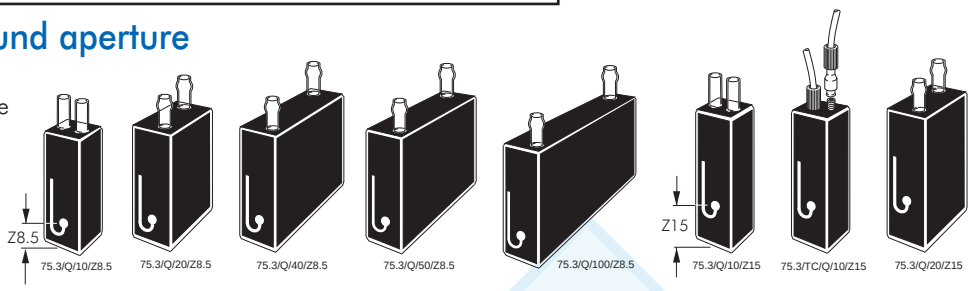
- Two polished windows.
- Cells with a Z height of 8.5mm have an overall height of 38.5mm.
- Bore specially treated to reduce bubble formation and/or retention.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 10mm long intended for push-on flexible tubing.



Type No.	Window Material	Path Length	Z Height	Internal Dia.	External L	W	H	Nominal Vol. ml
75.2	SOG, Q, SX	2	8.5,15	2	12.5	12.5	45	0.007
75.2	SOG, Q, SX	5	8.5,15	2	12.5	12.5	45	0.016
75.2	SOG, Q, SX	10	8.5,15	2	12.5	12.5	45	0.032
75.2	SOG, Q, SX	40	8.5,15	2	42.5	12.5	45	0.128

Type 75.3 Flow cells. Round aperture

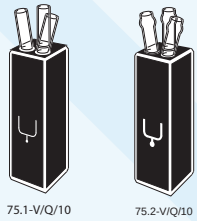
- Two polished windows.
- Cells with a Z height of 8.5mm have an overall height of 38.5mm.
- Bore specially treated to reduce bubble formation and/or retention.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 10mm long intended for push-on flexible tubing.



Type No.	Window Material	Path Length	Z Height	Internal W	H	External L	W	H	Nominal Vol. ml	Remarks
75.3	SOG, Q	1	8.5,15	3	1	12.5	12.5	45	0.007	
75.3	SOG, Q	2	8.5,15	3	2	12.5	12.5	45	0.014	
75.3	SOG, Q	5	8.5,15	3	5	12.5	12.5	45	0.035	
75.3	SOG, Q,SX	10	8.5,15	3	10	12.5	12.5	45	0.070	
75.3/TC	Q	10	15, 20	3	10	12.5	12.5	45	0.070	Screw-on connections
75.3	SOG, Q	20	8.5,15	3	20	22.5	12.5	45	0.140	
75.3	SOG, Q	40	8.5,15	3	40	42.5	12.5	45	0.280	
75.3	SOG, Q	50	8.5,15	3	50	52.5	12.5	45	0.350	
75.3	SOG, Q	100	8.5,15	3	100	102.5	12.5	45	0.700	

Type 75.1-V Flow cells. Ultra-micro, sub-micro, round aperture vacuum/debubbler

- Two polished windows.
- Cells with a Z height of 8.5mm have an overall height of 38.5mm.
- Bore specially treated to reduce bubble formation and/or retention.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 10mm long intended for push-on flexible tubing.
- Third outlet debubbler tube - 2 I.D, 4 O.D, 10mm long.

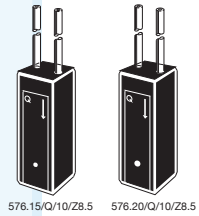


Type No.	Window Material	Path Length	Z Height	Internal Dia.	External L	W	H	Nominal Vol. ml
75.1-V	Q	10	8.5,15	1	12.5	12.5	45	0.008
75.2-V	Q	10	8.5,15	2	12.5	12.5	45	0.040

Type 576 Ultra micro, round aperture with stainless steel tubes

- Two polished windows.
- Bore specially treated to reduce bubble formation and/or retention.
- Stainless steel inlet/outlet tubes. Nominal length 100mm.

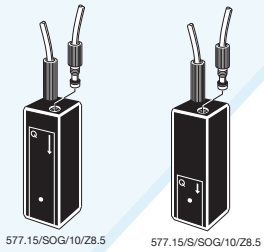
Type No.	Window Material	Path Length	Z Height	Internal Dia.	External L	W	H	Nominal Vol. ml	Stainless steel tubes Inlet I.D.	O.D.	Outlet I.D.	O.D.	L
576.15	SOG, Q	10	8.5	1,5	12.5	12.5	35	0.018	1.0	1.6	1.0	1.6	100
576.20	SOG, Q	10	8.5	2,0	12.5	12.5	35	0.032	1.0	1.6	1.0	1.6	100


576.15/Q/10/Z8.5 576.20/Q/10/Z8.5

Type 577 Ultra micro round aperture

- Two polished windows.
- Bore specially treated to reduce bubble formation and/or retention.
- M6 screw-in connections.
- Long body or short body 576.15/S.

Type No.	Window Material	Path Length	Z Height	Internal Dia.	External L	W	H	Nominal Vol. ml
577.15	SOG	10	8.5	1,5	12.5	12.5	35	0.018
577.15/S	SOG	10	8.5	1,5	12.5	12.5	35	0.018

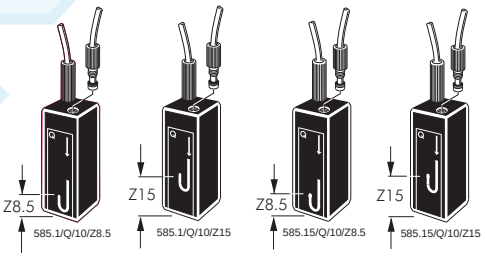

577.15/SOG/10/Z8.5 577.15/S/SOG/10/Z8.5

Type 585.1, 585.15 Flow cells. Ultra-micro, round aperture

- Two polished windows.
- Bore specially treated to reduce bubble formation and/or retention.
- M6 screw-in connections.

Type No.	Window Material	Path Length	Z Height	Internal Dia.	External L	W	H	Nominal Vol. ml
585.1	SOG, Q	10	8.5,15, 20*	1	12.5	12.5	35	0.008
585.15	SOG, Q	10	8.5,15, 20*	1.5	12.5	12.5	35	0.018

* When Z height is 20mm, external height is 40mm

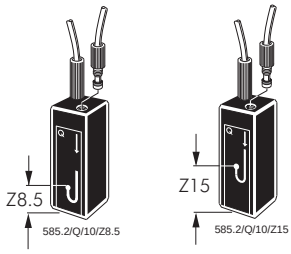


Type 585.2 Flow cells. Sub-micro, round aperture

- Two polished windows.
- Bore specially treated to reduce bubble formation and/or retention.
- M6 screw-in connections.

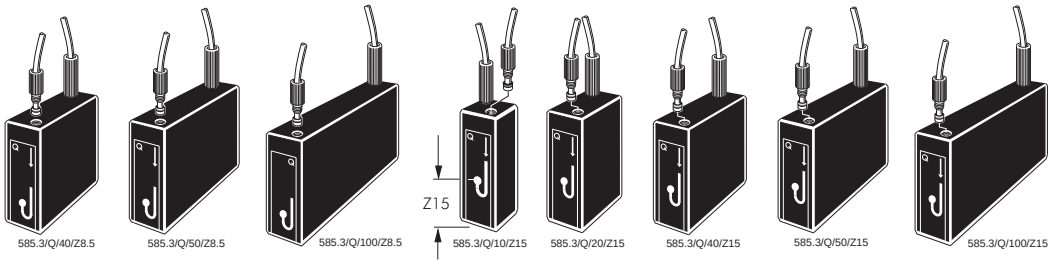
Type No.	Window Material	Path Length	Z Height	Internal Dia.	External L	W	H	Nominal Vol. ml
585.2	SOG, Q, SX	10	8.5,15, 20*	2	12.5	12.5	35	0.032

* When Z height is 20mm, external height is 40mm



Type 585.3 Flow cells, round aperture

- Two polished windows.
- Bore specially treated to reduce bubble formation and/or retention.
- M6 screw-in connections.



Type No.	Window Material	Path Length	Z Height	Internal Dia.	External L	W	H	Nominal Vol. ml
585.3	SOG, Q	10	8.5,15, 20*	3	12.5	12.5	35	0.070
585.3	SOG, Q	20	8.5,15, 20*	3	22.5	12.5	35	0.140
585.3	SOG, Q	40	8.5,15, 20*	3	42.5	12.5	35	0.280
585.3	SOG, Q	50	8.5,15, 20*	3	52.5	12.5	35	0.350
585.3	SOG, Q	100	8.5,15, 20*	3	102.5	12.5	35	0.700

* When Z height is 20mm, external height is 40mm

Z Dimension per instrument

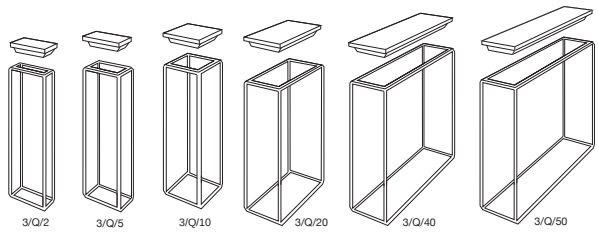
Manufacturer	Z Dimension
Agilent®	15mm
Beckman®	8.5mm
Bio-Rad®	8.5mm
Eppendorf®	8.5mm
GBC®	15mm
Hewlett-Packard®	15mm
Hitachi®	8.5mm
Jasco®	12mm
Perkin-Elmer®	15mm
Pharmacia®	15mm
Scinco®	15mm
Shimadzu®	15mm
Spectronics®	8.5mm
Turner®	8.5mm
Varian® (Cary®/Agilent®)	20mm

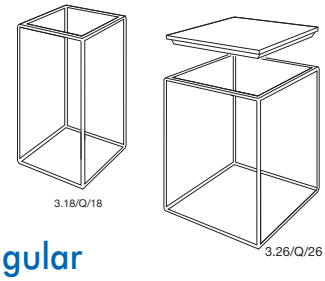
G = Optical Glass 334-2500nm SOG = Special Optical Glass 320-2500nm PX = Borosilicate 325-2500nm HH = UV Silica 220-2500nm
Q = Far UV Quartz 170-2700nm I = Near Infra-Red Quartz 220-3800nm SX = Far UV to Near IR Quartz (Water free) 170-3500nm

Type 3. Fluorimeter. Macro/Standard Rectangular

- Open top, with non-sealing PTFE cover.
- Polyethylene 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 L	W	H	Nominal Vol. ml
3	Q	2	10	4.5	12.5	45	0.800
3	G,SOG, Q,I,SX	5	10	7.5	12.5	45	1.70
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	G,SOG, Q,I,SX	100	9.5	102.5	12.5	45	35.000
3.18	Q	18	18	22	22	50	14.600
3.26	Q	26	26	30	30	50	30.500



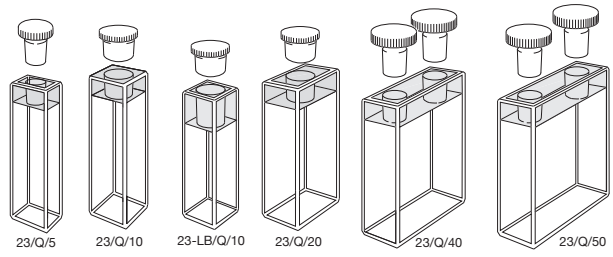


Type 23. Fluorimeter with stopper(s). Macro/Standard Rectangular

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

* LB = Long stopper block

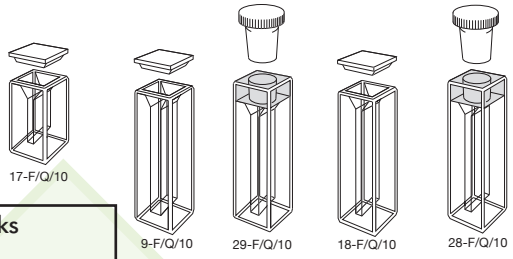
Type No.	Window Materials	Path Length	Internal Width	External L	W	H	Nominal Vol. ml
23	G, SOG, Q, I, SX	5	10	7.5	12.5	48	1.700
23	G, SOG, Q, I, SX	10	10	12.5	12.5	48	3.500
23	G, SOG, Q, I	20	10	22.5	12.5	48	7.000
23	G, SOG, Q, I	40	10	42.5	12.5	48	7.00
23	G, SOG, Q, I	50	10	52.5	12.5	48	17.500
23	Q	100	10	102.5	12.5	48	35.000
23-LB *	Q	10	10	12.5	12.5	42	3.000



Type 9-F & 29-F Fluorimeter. Semi-micro. Type 17-F, 18-F & 28-F Fluorimeter. Micro

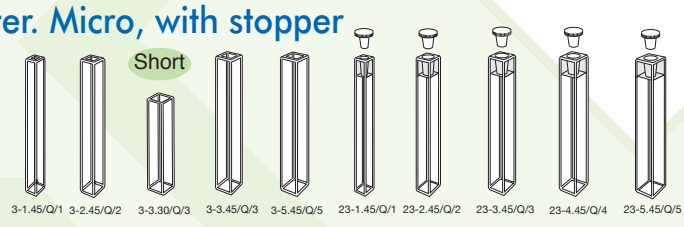
- Fits 12.5mm square cell holder.
- Four windows and base polished.
- **Type 9-F, 17-F & 18-F** have open top with non-sealing PTFE cover.
- **Type 28-F & 29-F** are closed by PTFE stopper, providing a liquid-tight seal.
- Base thickness - 3mm
- Suitable for use with all standard cell holders.

Type No.	Window Materials	Path Length	Internal Width	External L	W	H	Nominal Vol. ml	Remarks
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
17-F	G, Q	10	2	12.5	12.5	25	0.400	Micro with lid
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



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. 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.

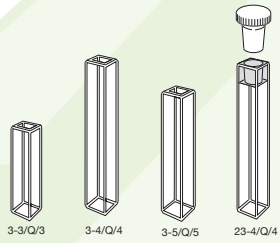


Type No.	Window Materials	Path Length	Internal Width	External L	W	H	Adaptor	Nominal Vol. ml
Square open top								
3-1.45	Q	1	1	3.5	3.5	45	FCA1	0.035
3-2.45	SOG, Q	2	2	4.5	4.5	45	FCA2	0.140
3-3.30	SOG, Q	3	3	5.5	5.5	30	FCA3.30	0.225
3-3.45	SOG, Q	3	3	5.5	5.5	45	FCA3	0.315
3-4.45	SOG, Q	4	4	6.5	6.5	45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

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 L	W	H	Nominal Vol. ml
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



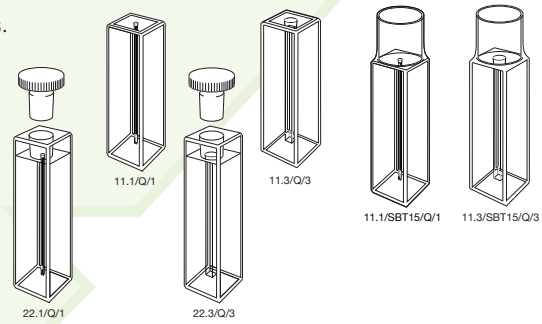
Z Dimension for some fluorimeters

Manufacturer	Z Dimension
Jasco®	18mm
Molecular Devices®	15mm
Perkin-Elmer®	15mm
Pharmacia®	15mm
PTI (Photo Technology)®	15mm
Shimadzu®	15mm
SLM/Spectronics®	15mm
Hewlett-Packard®	15mm
Spectra Max®	15mm
Spex®	15mm
TSS®	15mm
Varian® (Cary®/Agilent®)	20mm

Type 11. Open top. Type 22 with stopper. Fluorimeter. Micro.

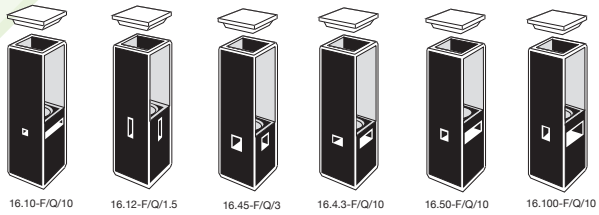
- Open top cell.
- **Type SBT15** with 10mm I.D. tube for rubber septa seal for Anærobic environments.
- All sides and base polished.

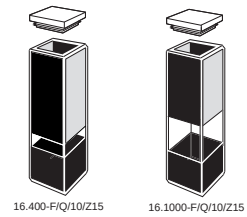
Type No.	Window Materials	Path Length	Internal Width	External L	W	H	Nominal Vol. ml
11.1	Q	1	1	12.5	12.5	45	0.040
11.2	Q	2	2	12.5	12.5	45	0.160
11.3	Q	3	3	12.5	12.5	45	0.360
22.1	Q	1	1	12.5	12.5	48	0.040
22.2	Q	2	2	12.5	12.5	48	0.160
22.3	Q	3	3	12.5	12.5	48	0.360
11.1/SBT15	Q	1	1	12.5	12.5	59	0.040
11.2/SBT15	Q	2	2	12.5	12.5	59	0.160
11.3/SBT15	Q	3	3	12.5	12.5	59	0.360



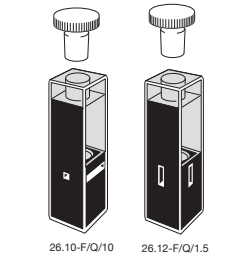
Type 16-F & 26-F. Fluorimeter. Sub-micro

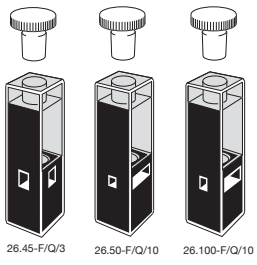
- Three polished windows.
- Sub-micro volumes from 10µl to 160µl.
- **Type 16** has a top; comprising two black walls, two translucent side walls and a square internal cross section.
- Open top, supplied with non-sealing PTFE cover as well as a vaned lid to provide a liquid-tight seal.
- To avoid possible 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 16.10-F4** has four polished windows.





Type No.	Window Material	Path Length	Z Height	Internal W	H	Emission window W	H	External L	W	H	Nominal Vol.ml
Square open top											
16.10-F	Q	10	8.5,15, 20	1	1	10	1	12.5	12.5	45	0.010
16.10-F4	Q	10	8.5,15, 20	1	1	10	1	12.5	12.5	45	0.010
16.12-F	Q	1.5	8.5,15, 20	1.5	5	1.5	5	12.5	12.5	45	0.012
16.40-F	Q	10	8.5,15, 20	2	2	10	2	12.5	12.5	45	0.040
16.45-F	Q	3	8.5,15, 20	3	5	3	5	12.5	12.5	45	0.045
16.4.3-F	Q	10	8.5,15, 20	4	3	10	3	12.5	12.5	45	0.120
16.50-F	Q	10	8.5,15, 20	2	2.5	10	2.5	12.5	12.5	45	0.050
16.100-F	Q	10	8.5,15, 20	2	5	10	5	12.5	12.5	45	0.100
16.160-F	Q	10	8.5,15, 20	2	8	10	8	12.5	12.5	45	0.160
16.400-F	Q	10	8.5,15, 20	10	4	10	4	12.5	12.5	45	0.400
16.1000-F	Q	10	8.5,15, 20	10	10	10	10	12.5	12.5	45	1.000
With stopper											
26.10-F	Q	10	8.5,15, 20	1	1	10	1	12.5	12.5	48	0.010
26.12-F	Q	1.5	8.5,15, 20	1.5	5	1.5	5	12.5	12.5	48	0.012
26.40-F	Q	10	8.5,15, 20	2	2	10	2	12.5	12.5	48	0.040
26.45-F	Q	3	8.5,15, 20	3	5	3	5	12.5	12.5	48	0.045
26.4.3-F	Q	10	8.5,15, 20	4	3	10	3	12.5	12.5	48	0.120
26.50-F	Q	10	8.5,15, 20	2	2.5	10	2.5	12.5	12.5	48	0.050
26.100-F	Q	10	8.5,15, 20	2	5	10	5	12.5	12.5	48	0.100
26.160-F	Q	10	8.5,15, 20	2	8	10	8	12.5	12.5	48	0.160
26.400-F	Q	10	8.5,15, 20	10	4	10	4	12.5	12.5	48	0.400

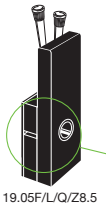




G = Optical Glass 334-2500nm SOG = Special Optical Glass 320-2500nm PX = Borosilicate 325-2500nm HH = UV Silica 220-2500nm
Q = Far UV Quartz 170-2700nm I = Near Infra-Red Quartz 220-3800nm SX = Far UV to Near IR Quartz (Water free) 170-3500nm

Type 19.05F/L/Q/5/Z../MC Ultra-micro lens cell

- Four polished windows, with windows opposite the emission and excitation windows mirror coated to increase performance.
- **Type 19.05F/L** is a patented design with integral lens primarily designed for use with small cross section focussed beam instruments.
- The lens colimates the emission energy leaving the sample chamber onto the detector.
- Sample inserted and retrieved with micro pipette tip.

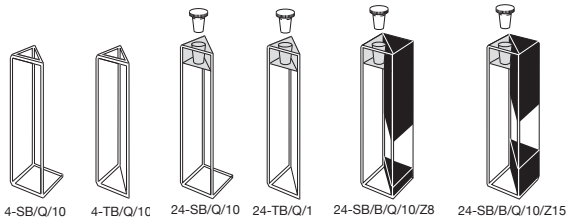

19.05F/L/Q/Z8.5

Type No.	Window Material	Path Length	Z Height	Internal W	Internal H	External L	External W	External H	Nominal Vol. ml	Remarks
19.05F/L	Q	5	8.5*, 15, 20	1	1	12.5	12.5	45	0.0050	*Cell height-38.5mm

Type 4. Fluorimeter. Open top, Type 24 with stopper. Fluorimeter. Triangular

- Fits 12.5mm square cell holder.
- Three windows and base polished.
- **Type 24/SB/B**, self-masking.

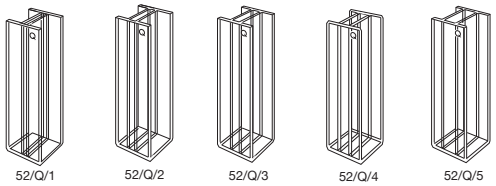
Type No.	Window Material	Internal L	Internal W	External L	External W	External H	Nominal Vol. ml	Remarks
Open top								
4-SB	Q	10	10	12.5	12.5	45	1.700	Square base
4-TB	Q	10	10	12.5	12.5	45	1.700	Triangular base
With stopper								
24-SB	Q	10	10	12.5	12.5	48	1.700	Square base
24-TB	Q	10	10	12.5	12.5	48	1.700	Triangular base
24-SB/B	Q	10	10	12.5	12.5	48	1.700	Z8.5, Z15, Z20

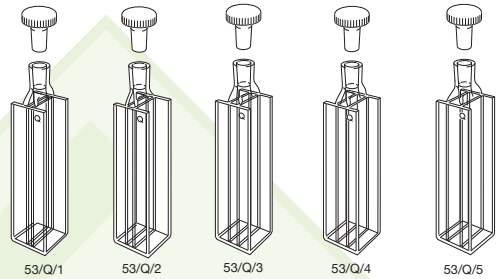

4-SB/Q/10 4-TB/Q/10 24-SB/Q/10 24-TB/Q/1 24-SB/B/Q/10/Z8 24-SB/B/Q/10/Z15

Type 52. with lid. Type 53 with stopper. Dual Path Length or Fluorimeter

- 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 Material	Path Length	Internal Width	External L	External W	External H	Nominal Vol. ml
Open top							
52	SOG,Q	1or 10	1 x 10	12.5	12.5	45	0.400
52	SOG,Q	2 or 10	2 x 10	12.5	12.5	45	0.800
52	SOG,Q	3 or 10	3 x 10	12.5	12.5	45	1.200
52	SOG,Q	4 or 10	4 x 10	12.5	12.5	45	1.600
52	SOG,Q	5 or 10	5 x 10	12.5	12.5	45	2.000
With stopper							
53	SOG,Q	1 or 10	1 x 10	12.5	12.5	48	0.400
53	SOG,Q	2 or 10	2 x 10	12.5	12.5	48	0.800
53	SOG,Q	3 or 10	3 x 10	12.5	12.5	48	1.200
53	SOG,Q	4 or 10	4 x 10	12.5	12.5	48	1.600
53	SOG,Q	5 or 10	5 x 10	12.5	12.5	48	2.000

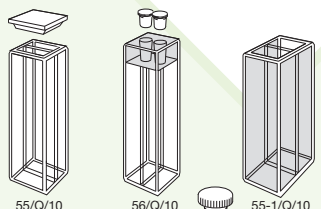

52/Q/1 52/Q/2 52/Q/3 52/Q/4 52/Q/5

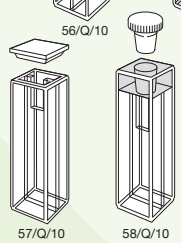

53/Q/1 53/Q/2 53/Q/3 53/Q/4 53/Q/5

Type 55, 57 with lid & 56, 58 with stopper(s). Tandem, Divided, Mixing or Fluorimeter

- All windows polished except **Type 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 Material	Path Length	Internal Length	External L	External W	External H	Nominal Vol. ml	Remarks
55	Q	2 x 10	2 x 4.375	12.5	12.5	45	2 x 1.500	Tandem or divided with lid
55-1	Q	2 x 10	2 x 10	23.75	12.5	45	2 x 3.500	Tandem or divided. Frosted sides. Open top
56	Q	2 x 10	2 x 4.375	12.5	12.5	48	2 x 1.500	Tandem or divided with stoppers
57	Q	2 x 10	2 x 4.375	12.5	12.5	45	2 x 1.000	Tandem mixing with lid
58	Q	2 x 10	2 x 4.375	12.5	12.5	48	2 x 1.000	Tandem mixing with stoppers

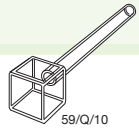

55/Q/10 56/Q/10 55-1/Q/10


57/Q/10 58/Q/10

Type 59. Cube, Fluorimeter with tube

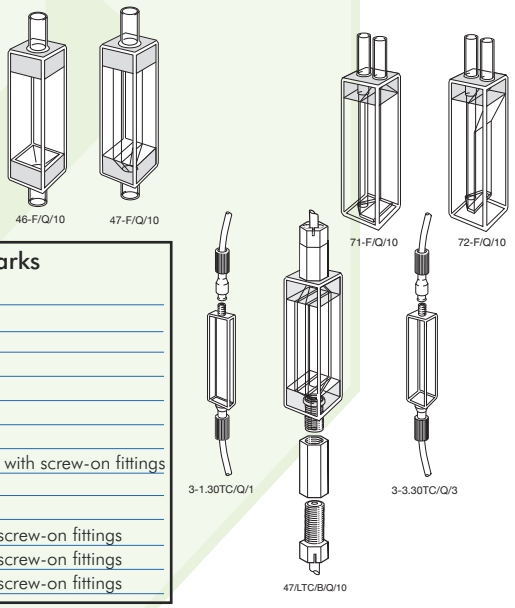
- Five windows polished

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


59/Q/10

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

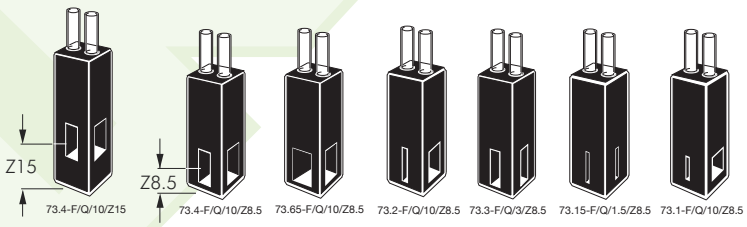
- Four polished windows.
- Profiled inlet/outlet blocks.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 16mm long intended for push-on flexible tubing.
- TC Screw fittings see **Type No. MCTC/1.0**, page 29.
- For LTC Screw fittings see **Type No. LTC/G/0.5**, page 29.



Type No.	Window Material	Path Length	Internal W	Internal H	External Height	Nominal Vol. ml	Polished Windows	Remarks
46-F	Q	0.5	10	35	65	0.185	4	Short path
46-F	Q	1	10	35	65	0.350	4	Short path
46-F	Q	2	10	35	65	0.700	4	Short path
46-F	Q	5	10	35	65	1.750	4	Short path
46-F	Q	10	10	35	65	0.350	4	Macro
47-F	Q	10	4	35	65	1.600	4	Semi-micro
47-F/LTC	Q	10	4	35	65	1.600	4	Semi-micro with screw-on fittings
71-F	Q	10	7	37.5	48	3.000	3	Semi-micro
72-F	Q	10	4	37.5	48	1.800	3	Semi-micro
3-1.30/TC	Q	1	1	30	40	0.030	4	Micro with screw-on fittings
3-2.30/TC	Q	2	2	30	40	0.120	4	Micro with screw-on fittings
3-3.30/TC	Q	3	3	30	40	0.270	4	Micro with screw-on fittings

Type 73-F. Fluorimeter flow cells

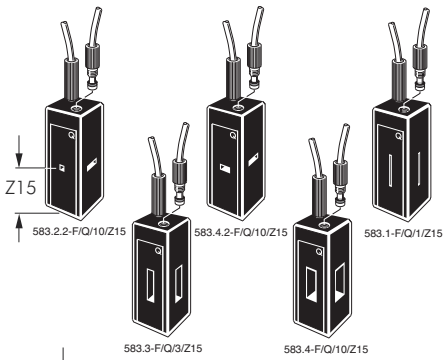
- Three polished windows.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 16mm long intended for push-on flexible tubing.
- Cells with a Z height of 8.5mm have an overall height of 40mm.



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

Type 583-F. Fluorimeter flow cells

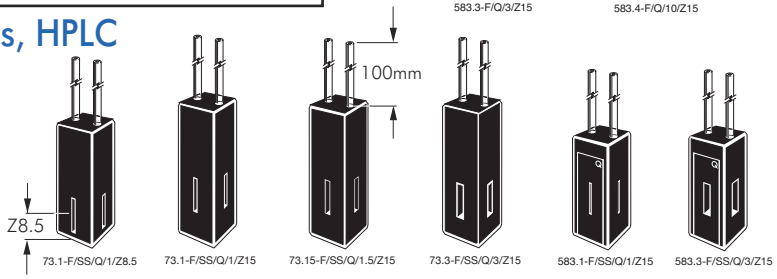
- Three polished windows.
- M6 screw-in connections.
- Cells with a Z height of 20mm have an overall height of 40mm.



Type No.	Window Material	Path Length	Z Height	Internal W	Internal H	Emission window W	Emission window H	External L	External W	External H	Nominal Vol.ml
583.2.2-F	Q	10	15, 20	2	2	7	2	12.5	12.5	35	0.040
583.4.2-F	Q	10	15, 20	4	2	7	2	12.5	12.5	35	0.080
583.1-F	Q	1	15	1	11	1	11	12.5	12.5	35	0.011
583.3-F	Q	3	15	3	11	3	11	12.5	12.5	35	0.100
583.4-F	Q	10	15	4	11	7	11	12.5	12.5	35	0.440

Type 73-F/SS & 583-F Fluorimeter flow cells, HPLC

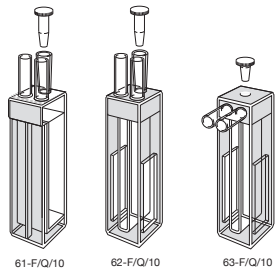
- Three polished windows.
- Stainless steel inlet/outlet tubes.
- Type 73 cells with a Z height of 8.5mm have an overall height of 38.5mm.
- Type 583 cells with a Z height of 20mm have an overall height of 40mm.



Type No.	Window Material	Path Length	Z Height	Internal W	Internal H	External L	External W	External H	Emission window W	Emission window H	Nominal Vol. ml	Stainless steel tubes Inlet I.D.	Inlet O.D.	Outlet I.D.	Outlet O.D.	Length
73.1-F/SS	Q	1	8.5, 15	1	11	12.5	12.5	45	1	11	0.011	0.25	1.6	0.50	1.6	100
73.15-F/SS	Q	1.5	8.5, 15	1.5	11	12.5	12.5	45	1.5	11	0.025	1.0	1.6	1.0	1.6	100
73.3-F/SS	Q	3	8.5, 15	3	11	12.5	12.5	45	3	11	0.100	1.0	1.6	1.0	1.6	100
583.1-F/SS	Q	1	15, 20	1	11	12.5	12.5	35	1	11	0.011	0.25	1.6	0.50	1.6	100
583.3-F/SS	Q	3	15, 20	3	11	12.5	12.5	35	3	11	0.100	1.0	1.6	1.0	1.6	100

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

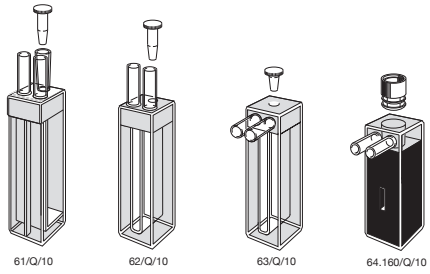
- Inlet/outlet tubes - 2 I.D, 4 O.D, 10mm long intended for push-on flexible tubing.
- Stopper length on 61-F and 62-F, 20mm.
- **Types 62-F and 63-F** have emission windows 4.5mm x 22mm long.
- Base window 4.5mm x 4.5mm.



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

Type 61. Constant temperature with stopper
Type 62 & 63. Constant temperature. Semi-micro
Type 64. Constant temperature. Sub-micro

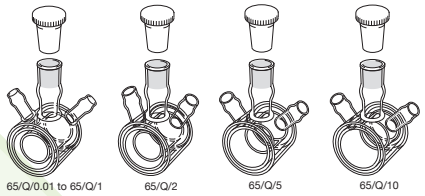
- Two polished windows.
- **Type 64** sub-micro for heating small samples typically DNA.
- **Type 64** with Z15 overall height 45mm.
- Inlet/outlet tubes - 2 I.D, 4 O.D, 10mm long intended for push-on flexible tubing.

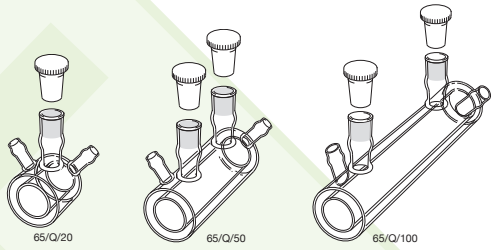


Type No.	Window Material	Path Length	Internal W	Internal H L	External W	External H	External Height	Overall Vol. ml	Nominal	Remarks
61	Q	10	7	37.5	12.5	12.5	48	60	2.100	Vertical flow tubes
62	Q	10	4.5	40	12.5	12.5	48	60	1.520	Vertical flow tubes
63	Q	10	4.5	40	12.5	12.5	48	60	1.520	Horizontal flow tubes
64.160	Q	10	2	8	12.5	12.5	38.5	40	0.160	Z Height - 8.5 or15mm

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. (65 &100mm cells have two stoppers).

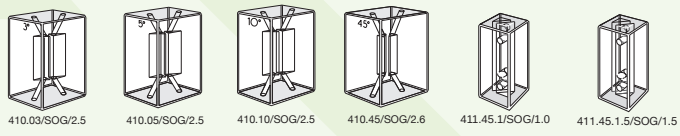




Type No.	Window Material	Path Length	Internal Dia.	External Dia.	L	Overall Height	Nominal Vol. ml
65	Q	0.01	10	22	20	32	0.737
65	Q	0.1	10	22	20	32	0.747
65	Q	0.5	10	22	20	32	0.792
65	Q	1	10	22	20	32	0.849
65	Q	2	10	22	20	32	0.962
65	Q	5	10	22	20	32	1.300
65	Q	10	10	22	12.5	32	0.825
65	Q	20	10	22	22.5	32	1.650
65	Q	50	10	22	52.5	32	4.125
65	Q	100	10	22	102.5	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 H	External L	External W	External H	Nominal Vol. ml
410.03	SOG, Q	2.5	2.5	7	8	10	15	2 x 0.01
410.05	SOG, Q	2.5	2.5	7	8	10	15	2 x 0.01
410.10	SOG, Q	2.5	2.5	7	8	10	15	2 x 0.01
410.45	SOG, Q	2.6	2.6	7	8	10	15	2 x 0.01
411.45.1	SOG, Q	1	1	8	5.5	5	11	2 x 0.04
411.45.15	SOG, Q	1.5	1.5	8	5.5	5	11	2 x 0.09

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Starna® Spectrophotometer and Fluorimeter cells are warranted to meet the specifications shown on page 2 of this catalogue and be equal to or better than the dimensional tolerance for each cell listed. Stringent quality control is exercised throughout production with only guaranteed and brand named raw materials used, so that cells will perform to the highest specification for any given design.

Any goods to be returned under warranty require a Return of Merchandise Authorisation (RMA) number, which can be obtained by calling our Customer Service Department.

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