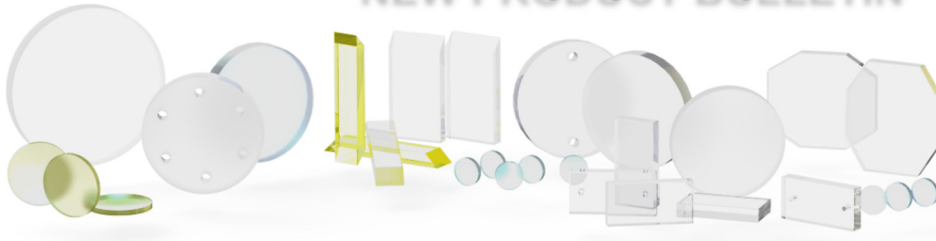
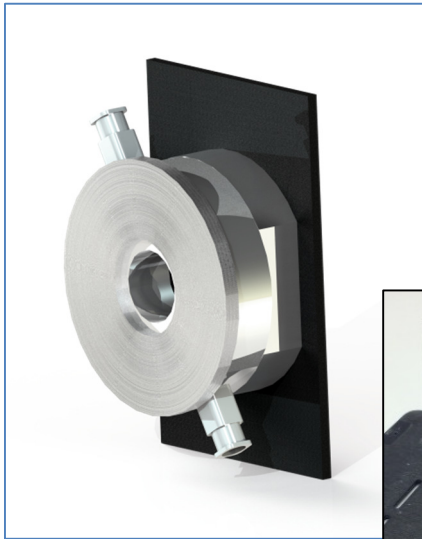


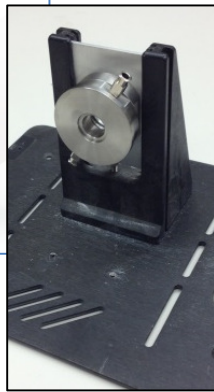
NEW PRODUCT BULLETIN



New Liquid Cell Design Promises to Revolutionize Infrared Spectroscopy No More Leaking Liquid Cells!



Dynamic Sealed Liquid Cell SL-15 (above) and mounted in a cell holder (right) on a universal baseplate.



ICL's new RoHS compliant Model SL-15 sealed liquid cell (patent pending) employs a dynamic o-ring sealing system employing fluoropolymer seals that enable us to produce precisely calibrated cells that completely eliminate mercury and lead amalgam seals from the fabrication process. These cells are fully compliant with RoHS Directive 2011/65/EU. The SL-15 can be employed in any general lab application as stand-alone accessories or key components of a complete system.

The SL-15 cell is so robust that it is also suitable for high internal pressure environments such as flow cells used for viscous samples like oil.

Where there are internal cell pressures as high as 40 psi, cells with suitable windows will remain leak free and maintain their path length integrity with long service life.

The configuration of the cell optics using o-rings as seals, does not rely on the spacer itself to be a sealing element; therefore the amalgams and other undesirable adhesives and materials including mercury and lead have been eliminated.

The seal configuration also permits innovative cell configurations for UV/VIS spectroscopy and Raman which usually employ cuvettes comprised of glass or fused silica.

The innovative sealing scheme is made possible by the DuroStep™ design and features O-Ring-Only™ seals which are exclusive to the SL-15 cell from ICL.

Cells can be provided at a wide range of pathlengths: 0.025mm, 0.05mm, 0.1mm, 0.2mm, 0.5mm and 1mm pathlengths are all available.

Any window can be used, the most common being BaF₂, CaF₂, KBr, ZnSe, and IR Quartz.

Various types of o-rings can be used, most commonly Viton is provided, but also Kal Rez is available for extreme chemical compatibility.

Cells come with a variety of sample fitting configurations as well. For high vacuum or high pressure performance, Swagelok™ brand fluid connections are provided. Other common connections like Luer-Lock and Beswick hose connections are also available.

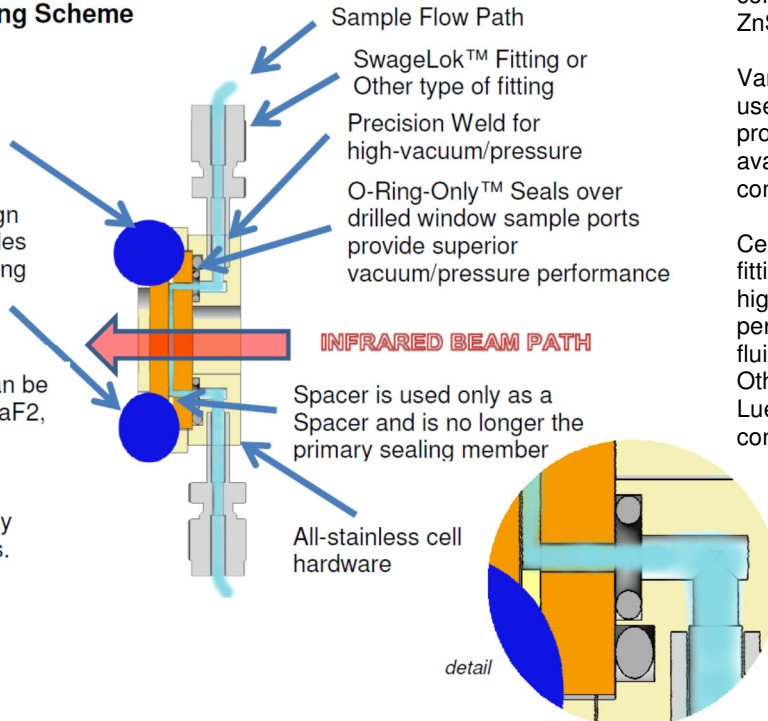
SL-15 Flow Path and O-Ring Sealing Scheme

DuroStep™ O-ring seals on windows design details REDACTED in this graphic.

Innovative DuroStep™ design is patent pending and provides O-ring-Only Sealing™ needing no amalgams, epoxies, or sealants.

IR transmitting windows can be any type, such as CaF₂, BaF₂, KBr, ZnSe, IR-Quartz, etc.

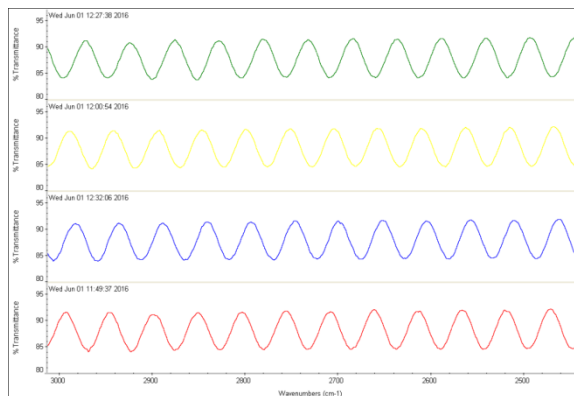
O-rings can be Viton or extreme duty KalRez or any other standard o-ring types.



detail

Features Of New SL-15 Dynamic Sealed Liquid Cell

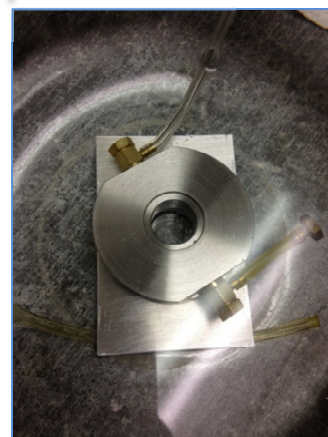
ICL's new RoHS compliant Model SL-15 sealed liquid cell (patent pending) employs a dynamic o-ring sealing system employing fluoropolymer seals that enable us to produce precisely calibrated cells that completely eliminate mercury and lead amalgam seals from the fabrication process. These cells are fully compliant with RoHS Directive 2011/65/EU. The SL-15 can be employed in any general lab application as stand-alone accessories or key components of a complete system.



Test results demonstrating superior pathlength stability

Quality tests of the new design show the cells exhibit extraordinary vacuum/pressure capability. These tests include a hydrostatic pressure test which demonstrates high pressure capability for an extended period of time.

The new SL-15 configuration with appropriate fittings is capable of passing high vacuum tests like the ones we performed with a VEECO MS-40 Helium Leak Detector. In a typical test, ultimate pressure achieved was 10MT, sensitivity of the machine was 2×10^{-9} . The testing was certified by an independent lab that specializes in high vacuum welding and leak testing.



Hydrostatic testing proves outstanding pressure capability

Eliminating all amalgams, epoxies, and sealants from the scheme in favor of high performance o-ring seals makes this possible. Clearly past versions of the sealed liquid cells with amalgamated flat gaskets and unsuitable fittings were not sufficiently vacuum capable to test in this manner.

A key benefit of the SL15 design is that the DuroStep™ design with O-Ring-Only™ sealing cancels the need for the window spacer to double as a sealing element. This design limitation plagues virtually all previous versions of sealed liquid cells.

An additional benefit of the system is the pressure and temperature stability inherent in the all-stainless design. The elimination of the amalgamated spacer allows for an inert Teflon spacer that is not relied on to either seal the cell, nor index the precision pathlength.

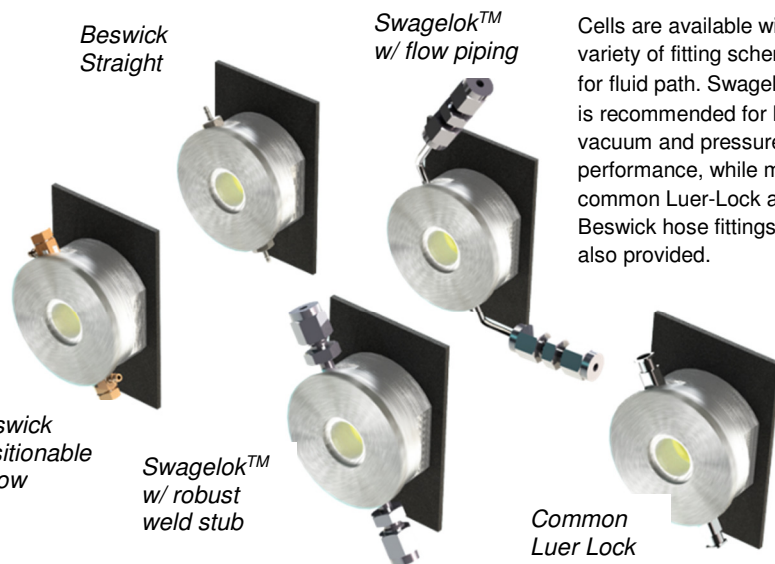
The above graphic demonstrates pathlength (as a function of sine-wave spacing) in the test subject cell exactly 0.105mm pathlength under vacuum, pressure, room temperature, and high temperature conditions.

This type of cell performance has never been claimed by other makers of sealed liquid cells, and is exclusive to the ICL SL-15 design.

Cells can be provided at a wide range of pathlengths: 0.025mm, 0.05mm, 0.1mm, 0.2mm, 0.5mm and 1mm pathlengths are all available.

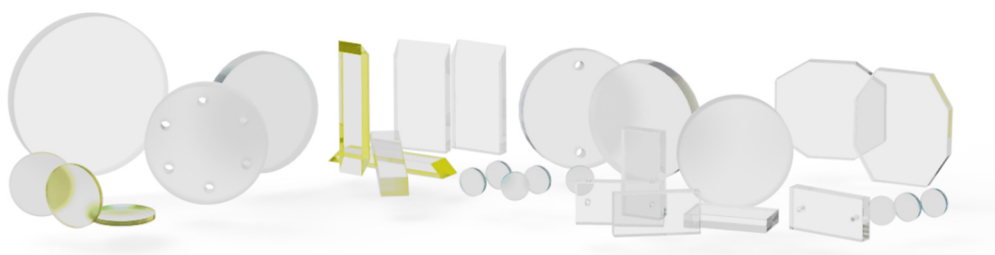
Any window can be used, the most common being BaF₂, CaF₂, KBr, ZnSe, and IR Quartz.

Various types of o-rings can be used, most commonly Viton is provided, but also KalRez™ is available for extreme chemical compatibility.



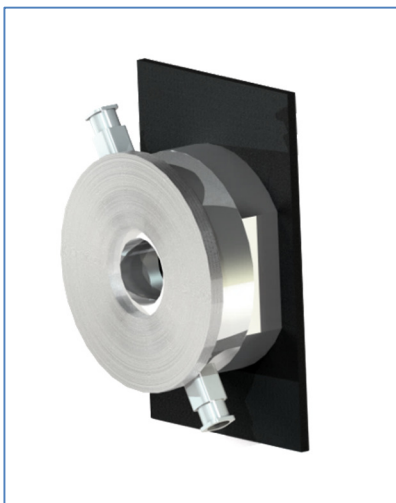
Cells are available with a variety of fitting schemes for fluid path. Swagelok™ is recommended for high vacuum and pressure performance, while more common Luer-Lock and Beswick hose fittings are also provided.

Any number of cell configurations with various windows, fittings, or o-rings can be made by combining features with a simple part numbering system as explained in the cell configuration guide.

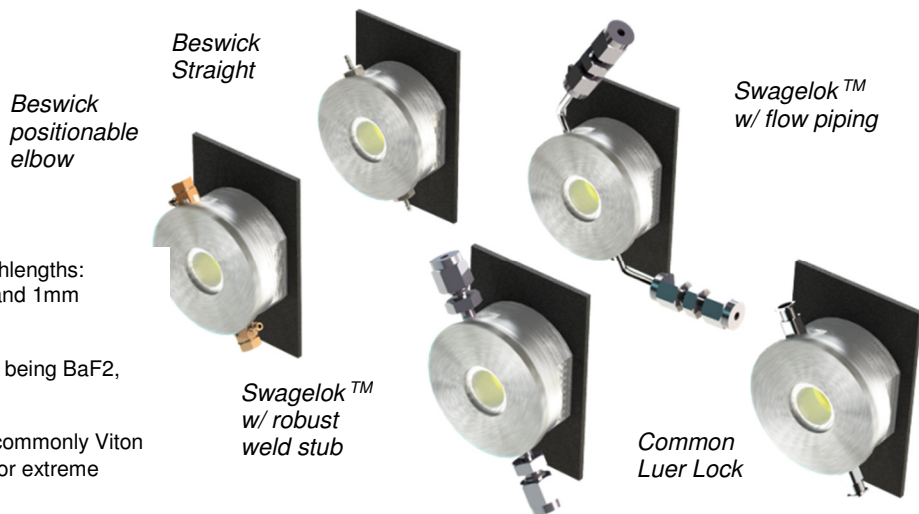


CRYSTAL LABORATORIES
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Configuration Guide for New SL15 Dynamic Sealed Liquid Cells



ICL's new RoHS compliant Model SL-15 sealed liquid cell (patent pending) employs a dynamic o-ring sealing system employing fluoropolymer seals that enable us to produce precisely calibrated cells that completely eliminate mercury and lead amalgam seals from the fabrication process. These cells are fully compliant with RoHS Directive 2011/65/EU. The SL-15 can be employed in any general lab application as stand-alone accessories or key components of a complete system.



Cells can be provided at a wide range of pathlengths: 0.025mm, 0.05mm, 0.1mm 0.2mm, 0.5mm and 1mm pathlengths are all available.

Any window can be used, the most common being BaF2, CaF2, KBr, ZnSe, and IR Quartz.

Various types of o-rings can be used, most commonly Viton is provided, but also KalRez™ is available for extreme chemical compatibility.

Any number of cell configurations with various windows, fittings, or o-rings can be made by combining features with a simple part numbering system. Combine the base SKU number for the cell with Viton or Kal Rez o-rings, Add for pathlength, fittings, and window type according to the chart below. Add the appropriate prices together where applicable: swagelock fittings are extra.

SKUs for Cells:	100's = pathlength	10's = Fitting Scheme	Add for Fittings	1's= Window type	Add For Windows
15,000's = SL-15 Cell	100 = .025mm 200 = .05mm	10 = Beswick Straight 20 = Beswick Elbow		1 = KBr 2 = KCl 3 = NaCl	
16,000's = SL-15 Cell w/ Kal Rez	300 = .1mm 400 = .2mm 500 = 1mm	30 = Luer Lock 40 = Swagelok Robust 50 = Swagelok piping		4 = BaF2 5 = CaF2 6 = ZnSe 7 = IR Qtz	

For example, according to the table above, a cell with a SKU of 15323 would be an SL-15 sealed liquid cell at a path of approx. 0.1mm, with Beswick (positionable) elbow fittings and BaF2 windows. The same configuration with Kal Rez o-rings would be SKU 16323. An SL-15 with Luer Lock fittings and KBr windows at 1mm pathlength would be SKU 15,531 . A complete SKU table of part #s and prices for all available configurations is available.

Other SL-15 SKUs: Item	Desc:
15901	Pressure / Pathlength Calibration Certificate
15902	High Vacuum Certificate
15905	Cell Re-Conditioning Fee

