



Savillex PFA Cyclonic Spray Chamber  
with Baffle

## PFA Cyclonic Spray Chamber for ICP-OES and ICP-MS

The Savillex PFA cyclonic spray chamber (CSC) for ICP-OES and ICP-MS is manufactured using Savillex's unique stretch blow molding technology. Its translucent walls allow the user to see inside the chamber during operation, while the very smooth surface finish helps improve washout. The CSC is manufactured independently of the exit port and baffle, so that the same chamber can be used with and without a baffle, and even used on different instruments simply by using a different exit port/connector. The nebulizer port accepts any 6 mm OD nebulizer. The Savillex PFA CSC has excellent stability and sensitivity, and is also available with an optional surface treatment, which further enhances sensitivity, making it comparable to the best glass and quartz cyclonics.

### Design Features

Traditionally, inert cyclonic spray chambers are made by machining parts from PTFE, PFA or PEEK, which are then welded or screwed together. Compared to glass or quartz cyclonics, traditional (machined) inert cyclonics have several drawbacks: they are opaque, so the user cannot see inside to check for correct operation (i.e. uniform wetting, droplet formation, freedom from blockages). Also, machined inert cyclonics are restricted in the design of their internal shape, due to the method of manufacture. A non-ideal internal shape can negatively impact performance through large droplet build up, poor drainage or re-nebulization. Aerosol transport efficiency is significantly lower than glass and quartz cyclonics.

In designing the Savillex PFA CSC, we took a completely different approach, applying our stretch blow molding technology to produce a PFA cyclonic (nominal volume 50 mL) that closely resembles the traditional and well tested shape of glass and quartz cyclonics. Stretch blow molding offers a number of key benefits over other inert cyclonics: the Savillex PFA CSC has thin, translucent walls, allowing the user to see inside the chamber during operation. Stretch blow molding also produces an extremely smooth surface finish, which promotes good drainage and improves washout. In addition, it allows the chamber to be manufactured independently of the exit port and baffle, so that the same chamber can be used with and without a baffle, and even used on different instruments - simply by using a different exit port.

Inside the Savillex PFA CSC, a deep spoiler, molded into the side wall, runs from the neck at the top of the chamber down to the drain. This guides droplets down to drain and also prevent droplets being blown around the chamber side walls and back across the nebulizer port to be re-nebulized. When an exit port with baffle is used, the baffle tip has a protrusion that acts as a drain guide for more consistent draining.

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The nebulizer port features an insert that eliminates dead volume around the nebulizer tip for improved washout. The port accepts any 6 mm OD nebulizer and a PFA ferrule nut secures the nebulizer, eliminating the need for o-rings. Nebulizer insertion depth is optimized for the Savillex C-Flow nebulizer range – simply insert the nebulizer fully and tighten the nut – the optimum insertion depth is automatically set. The Savillex PFA CSC is manufactured from the highest purity grade of virgin PFA, ensuring the lowest trace metal background. No other materials are used.

## Surface Treatment

Like all inert materials, PFA does not wet as effectively as glass or quartz, due to its inherent hydrophobic nature. As a comparative measure of wettability, the water contact angle of quartz is 33°, while for PFA it is 110°. The reduced wettability of PFA (and PTFE, PEEK) impacts spray chamber performance in two ways: build up of large droplets that cause signal instability and poorer washout, and reduced aerosol transport efficiency (due most likely to absorption of aerosol by droplets on side walls). In the case of the Savillex PFA CSC, its smoother surface, optimized internal shape and features such as drain guide and spoiler virtually eliminate the formation of larger droplets. Due to its optimum shape, the Savillex PFA CSC has excellent sensitivity that can be further enhanced by improving wettability. An optionally available, proprietary organic based surface treatment reduces water contact angle to approx. 60°, significantly improving wettability and increasing sensitivity by approx. 40% compared to the standard, untreated version. ICP-MS signal sensitivity for a treated Savillex PFA CSC is equivalent to the highest sensitivity glass or quartz cyclonic spray chambers. For ultratrace applications such as semiconductor using ICP-MS, the untreated version is recommended. For applications that require maximum sensitivity (i.e. all ICP-OES applications), the treated version is recommended.

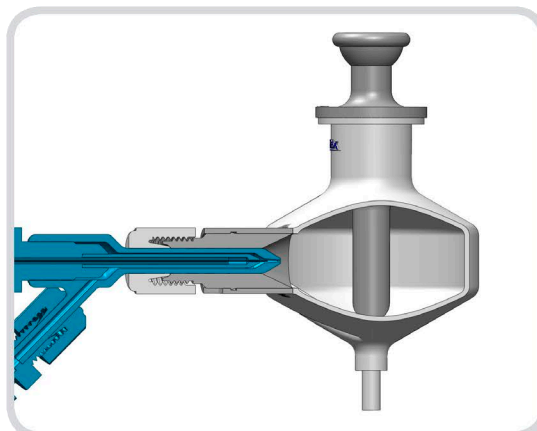
## Exit Ports/Connectors

A range of exit ports and combination exit port/connectors are available to allow the Savillex PFA CSC to be used with a variety of instruments, and usually connect directly to the torch. All exit port/connectors fit both the treated and untreated versions.

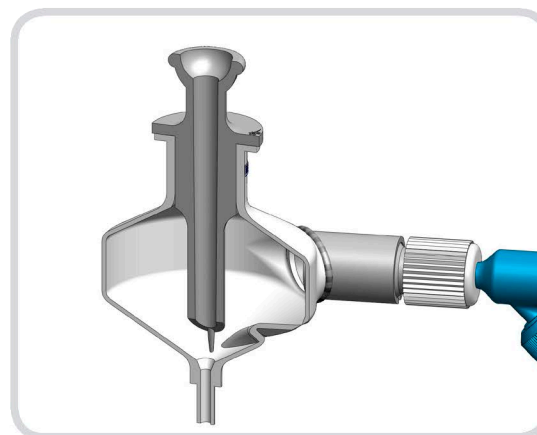
A partial listing of instrument compatibility is given in the ordering instructions. Part numbers 821-103 (with baffle) and 821-104 (without baffle) have a 12/5 socket connector which is commonly used in ICP-OES instruments. Typically, a baffle is used with ICP-MS but not with ICP-OES or MP-AES, since the baffle removes larger droplets which may overload the plasma in ICP-MS. The function of the baffle with the untreated PFA CSC is not as critical as with glass and quartz cyclonics, however, since the larger droplets tend to be removed through absorption by droplets on the side walls.



*Side view of the PFA CSC (no exit port fitted) showing deep spoiler molded into sidewall*



*Cross section drawing of the Savillex PFA CSC with C-Flow nebulizer fitted. Nebulizer port insert eliminates dead space.*



*Drawing shows exit port/connector 821-103 (with baffle and 12/5 socket connector). Protrusion at baffle tip promotes smooth draining. The lower part of the spoiler can be seen in cross section at the base of the chamber.*

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## Ordering Information

Choose a spray chamber version – either 820-01 (untreated) or 820-02 (treated) and then select an exit port or exit port/connector from the list below. All 821-xxx parts can be used with both versions of spray chamber.

## Cyclonic Spray Chambers

| Savillex Part Number | Description                                          | Product Notes                                      | Compatibility                                                   |
|----------------------|------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------|
| 820-01               | PFA cyclonic spray chamber, untreated. No exit port. | Chamber only - requires an exit port/connector     | For ultratrace applications using ICP-MS                        |
| 820-02               | PFA cyclonic spray chamber, treated. No exit port.   | PFA cyclonic spray chamber, treated. No exit port. | For ICP-OES/MP-AES use - treatment gives 40% higher sensitivity |

## Exit Ports/Connectors

| Savillex Part Number | Description                                                                       | Product Notes                                                                             | Compatibility                                                  |
|----------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| 821-101              | Exit port: 9 mm OD tube (with baffle)                                             | Choose 821-102 (no baffle version) for ICP-OES use                                        | Agilent 700 Series and Varian Vista ICP-OES                    |
| 821-102              | Exit port: 9 mm OD tube (no baffle)                                               | Choose this no baffle version for ICP-OES use                                             | Agilent 700 Series and Varian Vista ICP-OES                    |
| 821-103              | Exit port/connector: 12/5 socket (with baffle)                                    | Choose 821-104 (no baffle version) for MP-AES plus ICP-OES that use 12/5 socket           | Agilent 4x00 MP-AES plus ICP-OES that use 12/5 socket          |
| 821-104              | Exit port/connector: 12/5 socket (no baffle)                                      | Choose this no baffle version for MP-AES plus ICP-OES that use 12/5 socket                | Agilent 4x00 MP-AES plus ICP-OES that use 12/5 socket          |
| 821-108              | Thermo Element2/Neptune ICP-MS exit port/connector (with baffle). Twin gas ports. | Jogged tube raises CSC to clear sample intro area deck. Twin 4 mm gas ports on connector. | Thermo Element2/Neptune ICP-MS (requires Savillex inert torch) |
| 821-111              | Thermo iCAP ICP-OES radial exit port/connector (no baffle)                        | Thermo iCAP ICP-OES Radial type only - does not fit duo version                           | Thermo iCAP 6000/7000 ICP-OES (radial version)                 |