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ASI CRITICAL ORIFICES & ASSEMBLIES (MOST POPULAR)

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Standard Glass Critical Orifice -- P/N CO-STK1-XXXML:

Material ▸ Glass | **Filter** ▸ Quartz Wool/Glass Frit | **Max. Temp.** ▸ 750°F (400°C)
Application: This style of critical orifice (sonic orifice) is for use with standard in-situ and out-of-stack diluting sample probes, and our low-flow direct extractive probes. Most common flows are 20, 50, 100, 150, 200, 250 and 500ml/min. Replace "XXX" in Part Number to specify nom. flow (e.g., CO-STK1-020ML = Nom. 20ml/min glass critical orifice). Special flows upon request.
Basic Dimensions: 110mm LONG, 6mm OD stem (at outlet), 18mm OD (inlet end).

Miniature Quartz Critical Orifice -- P/N CO-STK1B25-XXXML:

Material ▸ Quartz | **Pre-filter** ▸ None | **Max. Temp.** ▸ 1000°F (540°C) … limited by the seal material!!
Application: This style of critical orifice is basically the same style as our STK6 Series, however it is has a smaller OD. Typically used with special application out-of-stack dilution box. The seals are typically made using an o-ring seal (temperature limited).
Basic Dimensions: 3mm OD x 1mm ID x 25mm standard lengths (customer may specify other).

1/4" Monel® Critical Orifice Assembly -- P/N CO-STK2-XXXML:

Material ▸ Monel® | **SS Pre-filter** ▸ Quartz Wool/SS Frit | **Max. Temp.** ▸ 1000°F (540°C)
Application: This style of critical orifice (sonic orifice) is for use with standard in-situ and out-of-stack diluting sample probes, and our low-flow direct extractive probes. For in-situ probes when temp is too high for the standard glass orifice. Most common flows are 20, 50, 100, 150, 200, 250 and 500ml/min. Replace "XXX" in Part Number to specify nominal flow (e.g., CO-STK2-050ML = Nom. 50ml/min Monel® critical orifice assembly). Special flows upon request.
Basic Dimensions: 2.86" Assembled Length x .75"OD (at largest section of the prefilter).

1/4" Monel Critical Orifice -- P/N CO-STK3-XXXML:

Material ▸ Monel® | **Pre-filter** ▸ N/A | **Max. Temp.** ▸ 1000°F (540°C)
Application: This style of critical orifice (sonic orifice) is the same as the above noted Monel® critical orifice assembly, but does not include the Pre-filter. Replacement for the above assembly, or for our DM-100-B2 Diluting Module, and our low-flow direct extractive probes. Most common flows are 20, 50, 100, 150, 200, 250 and 500ml/min. Replace "XXX" in Part Number to specify nominal flow (e.g., CO-STK3-050ML = Nom. 50ml/min Monel® critical orifice assembly). Special flows upon request.
Basic Dimensions: 1.5" Length x 1/4"OD (.65" largest OD with end nut/s installed).

1/4" Stainless Steel 316 Critical Orifice Assembly -- P/N CO-STK2S-XXXML:

Material ▸ Stainless Steel 316 | **SS Pre-filter** ▸ Quartz Wool/SS Frit | **Max. Temp.** ▸ 1000°F (540°C)
Special Application: This style of critical orifice (sonic orifice) is for use with standard in-situ and out-of-stack diluting sample probes, and our low-flow direct extractive probes. For in-situ probes when temp is too high for the standard glass orifice. Most common flows are 20, 50, 100, 150, 200, 250 and 500ml/min. Replace "XXX" in Part Number to specify nominal flow (e.g., CO-STK2S-050ML = Nom. 50ml/min Stainless Steel 316 critical orifice assembly). Special flows upon request.
Application Notes: This special version of metal orifice (SS-316) is typically only used whenever the application requires SS-316 as opposed to our standard Monel® type. ASI will only suggest the SS-316 type when the parts of the sampling system (and orifice) need to have wetted parts treated with inert coatings by SilcoTek® to reduce gas reactions with the metal parts.
Basic Dimensions: 2.86" Assembled Length x .75"OD (at largest section of the prefilter).

1/4" Stainless Steel 316 Critical Orifice -- P/N CO-STK3S-XXXML:

Material ▸ Stainless Steel 316 | **Pre-filter** ▸ N/A | **Max. Temp.** ▸ 1000°F (540°C)
Special Application: This style of critical orifice (sonic orifice) is the same as Stainless Steel critical orifice assembly noted above, but does not include the Pre-filter. Replacement for the above assembly, or for our DM-100-B2 Diluting Module, and our low-flow direct extractive probes. Most common flows are 20, 50, 100, 150, 200, 250 and 500ml/min. Replace "XXX" in Part Number to specify nominal flow (e.g., CO-STK3S-050ML = Nom. 50ml/min Stainless Steel 316 critical orifice assembly). Special flows upon request.
NOTE: The 1/4" end fittings may not be included as per the part number noted. Customer must specify if nuts and ferrules needed at time of order, part number will be provided.
Application Notes: This special version of metal orifice (SS-316) is typically only used whenever the application requires SS-316 as opposed to our standard Monel® type. ASI will only suggest the SS-316 type when the parts of the sampling system (and orifice) need to have wetted parts treated with inert coatings by SilcoTek® to reduce gas reactions with the metal parts.
Basic Dimensions: 1.5" Length x 1/4"OD (.65" largest OD with end nut/s installed).

Quartz Critical Orifice -- P/N CO-STK4-XXXML:

Material ▸ Quartz | **Pre-filter** ▸Quartz Wool/Quartz Frit | **Max. Temp.** ▸ 1000°F (540°C)
Application: This style of critical orifice (sonic orifice) is for use with the original "High Temperature" version of the in-situ diluting sample probes. This specially made critical orifice has a ball end on the stem end, and is secured to the diluting probe tip using a special Inconel® treated compression spring (with SS adaptor piece) which seats the orifice ball end into a cup fitting (against a gold foil washer) on the probe tip. Most common flows are 20, 50, 100, 150, 200, 250 and 500ml/min. Replace "XXX" in Part Number to specify nominal flow (e.g., CO-STK4-050ML = Nom. 50ml/min Quartz critical orifice). Special flows upon request.
Basic Dimensions: 108mm LONG, 12mm OD x 3mm ID ball (at outlet), 18mm OD (inlet end).

Notes: *Although we do not have them noted,* ***we do supply*** *the special connecting parts for this quartz orifice configuration (special compression spring, adaptor ring, cup fitting with gold washer), contact ASI for more info!*

Diluter Glass Critical Orifice -- P/N CO-STK5-XXXML:

Material ▸ Glass | **Filter** ▸ Glass Frit (no wool) | **Max. Temp.** ▸ 750°F (400°C)
Application: This style of critical orifice (sonic orifice) is for use with our DM-100-B Diluting Module or other special lab or process sampling instruments. These are configured with a 6mm OD stem inlet and outlet. The maximum Operating Temperature (as noted above) is for the critical orifice only ... actual operating temperatures may be limited to a lesser maximum temperature by the orifice joining fittings and/or aspirator pump materials, mounting brackets, connective sample lines etc. Most common flows are 20, 50, 100, 150, 200, 250 and 500ml/min. Replace "XXX" in Part Number to specify nom. flow (e.g., CO-STK5-020ML = Nom. 20ml/min glass critical orifice). Special flows upon request.
Basic Dimensions: ~120mm LONG, 6mm OD stems (at inlet & outlet), 18mm OD section (around frit section).

Compact Quartz Critical Orifice -- P/N CO-STK6-XXXML:

Material ▸ Quartz | **Pre-filter** ▸ None | **Max. Temp.** ▸ 1000°F (540°C) limited by the seal material!
Application: This style of critical orifice (sonic orifice) is a new addition to our orifice product line. Developed for special applications, and also used in some of our low-flow direct extractive sample probes. Most common flows are 20, 50, 100, 150, 200, 250 and 500ml/min. Replace "XXX" in Part Number to specify nom. flow (e.g., CO-STK5-020ML = Nom. 20ml/min glass critical orifice). Special flows upon request.
Notes: The Maximum Temperature is shown as "1000°F (540°C)" ... please know that this is for the orifice material only. The material of the connective fittings as selected by the customer will, in most cases, decrease the maximum temperature allowed!!
Basic Dimensions: 44mm LONG x 6mm OD x 1.5mm WALL. *Standard and Special Fittings sold separately.*
▸ *Picture below shows the orifice stem with graphite ferrule and 1/4" tube nut (one example of connection)*

- **1/8" Stainless Steel 316 Critical Orifice -- P/N CO-STK7-XXXML:**

Material ▸ Stainless Steel 316 | **Pre-filter** ▸ N/A | **Max. Temp.** ▸ 1000°F (540°C)
Special Application: This style of critical orifice (sonic orifice) is the same as the other Stainless Steel critical orifices we offer, but comes in a 1/8" diameter and rounded (domed) inlet. Developed for our low-flow direct extractive sample probes and other special applications. This series orifice does not include a Pre-filter. Most common flows are 20, 50, 100, 150, 200, 250 and 500ml/min. Replace "XXX" in Part Number to specify nominal flow (e.g., CO-STK7-200ML = Nom. 200ml/min Stainless Steel 316 critical orifice, 1/8"OD). Special flows upon request. *Standard length is 1.5", but we can make up to a 3.0" long. Please specify during order.
NOTE: Customer must specify if end nut(s) with SS ferrules are needed at time of order, special part number will be provided.
Application Notes: This special version of metal orifice (SS-316) is typically only used whenever the application requires the SS-316 as opposed to our standard Monel® type. Further, ASI will only suggest the SS-316 type critical orifice when the parts of the sampling system (and critical orifice) need to have the wetted parts treated with inert coatings by SilcoTek® to reduce gas reactions to the metal parts (www.silcotek.com)

CRITICAL ORIFICE PRE-FILTERS & IN-LINE FILTERS

- **Prefilter -- P/N FM-STK2-40M:**

Material ▸ SS-316 | **Filter** ▸ Quartz Wool & 40 Micron Sintered Element
Application: Prefilter Assembly which consists of SS-316/316L Housing, SS-316/316L filter disc (40u), packed with .5g pure quartz wool fine filter. For use with 1/4" Monel or SS Critical Orifices (comes with the CO-STK2 & CO-STK2S, and can be used also with the CO-STK3 & CO-STK3S Series Metal Orifices). **Basic Dimensions:** 1.90" Length x .75"OD (at largest section of the prefilter).

- **In-Line Filter -- P/N 5000.234-05:**

Material ▸ SS-316 | **Filter** ▸ .5 Micron Sintered Element
Application: This in-line filter serves as a standard “pre-filter” for the ASI Model DM-100-B2 Diluting Module.
Notes: For use with Monel Critical Orifices (CO-STK3 Series) having nominal flow rates of up to 200ml/min.

- **In-Line Filter -- P/N 5000.234-2:**

Material ▸ SS-316 | **Filter** ▸ 2 Micron Pleated Element
Application: This in-line filter serves as a standard “pre-filter” for the ASI Model DM-100-B2 Diluting Module.
Notes: Same as the 5000.234-05, but allows higher flow for orifices above 200ml/min, up to 500ml/min.

CONSUMABLE PARTS

- **Pure Quartz Wool -- P/N FM-QWOOL-2M-10G:**

Micron Size ▸ 2µ/Ultra-fine | **Qty.** ▸ 10g Bulk Bag
Application: For fine-filter replacement in the glass critical orifice, or in Monel® critical orifice pre-filter. Note: approximately .7 to 1g of quartz wool is used to for refilling the above noted parts. ***about 14+ recharges if packing .7g for glass/quartz orifices, about 20 recharges for Monel® orifices (using .5g).

- **Pure Quartz Wool -- P/N FM-QWOOL-2M-50G:**

Micron Size ▸ 2µ/Ultra-fine | **Qty.** ▸ 50g Bulk Bag
Application: For fine-filter replacement in the glass critical orifice, or in Monel® critical orifice pre-filter. Note: approximately .7 to 1g of quartz wool is used to for refilling the above noted parts. About 70+ recharges if packing .7g for glass/quartz orifices, about 100 recharges for Monel® orifices (using .5g).

- **Graphite Ferrules -- P/N GS-GFER.25:**

Material ▸ Graphite | **Size** ▸ 1/4" ID | **Qty.** ▸ 10 Piece Pak
Application: For use as seal and protection of the standard glass critical orifice CO-STK1 (having 6mm OD stem) when securing it to in-situ dilution probe tip, or our direct extractive probe tip. The graphite ferrule/s are also used with the ASI CO-STK5 (diluter module) & CO-STK6 (direct extractive or special application) critical orifices.

- **Graphite Ferrule -- P/N GS-GFER.25-PC:**

Material ▸ Graphite | **Size** ▸ 1/4" ID | **Qty.** ▸ 1 Piece Pak
Application: For use as seal and protection of the standard glass critical orifice CO-STK1 (having 6mm OD stem) when securing it to in-situ dilution probe tip, or our direct extractive probe tip. The graphite ferrule/s are also used with the ASI CO-STK5 (diluter module) & CO-STK6 (direct extractive or special application) critical orifices. Same as above, but single piece.

NOTE: ASI does supply the **6mm ID** Graphite ferrules, although we do not normally use them with our 6mm OD stem orifices. The production methods on our orifice stems includes "fire polishing" the end. This typically results in a slight oversize (mushroom effect) at the very tip. This will cause a very tight-fitting ferrule, which can be damaged during installation or can shave off graphite particles which can enter the stem. Please contact ASI for further information.

BASIC DILUTION RATIO RANGES (ORIFICE USED W/DILUTION PUMP)

- **Most Common Dilution Ratios** (special flows upon request)**:**

Note: The actual dilution ratios are dependent on dilution air volume, values in table are based on ASI (or EPM) Standard Diluting Pump Performance. Other dilution probe manufactures may use diluting aspirators (air driven pumps) that have a different performance curve, and different pump flow rates of the primary nozzle, that require a different orifice flow to achieve a desired dilution ratio than what is shown in the table below. Please contact ASI for further information or assistance determining the proper configuration for your specific application and dilution system.

- Table for EPM or ASI Diluting Aspirators -

Average Dilution Ratio Range	Critical Orifice Nominal Flow Rate
215:1 to 350:1	20 ml/min
95:1 to 150:1	50 ml/min
44:1 to 75:1	100 ml/min
32:1 to 50:1	150 ml/min
27:1 to 37:1	200 ml/min
20:1 to 30:1	250 ml/min
12:1 to 16:1	500 ml/min

Dilution Air into Diluting Aspirator: Q_1 *ml/min*
Source Gas into Critical Orifice: Q_2 *ml/min*
Diluted Sample to Analyzer: $Q_1 + Q_2$ *ml/min*

Dilution Ratio is $\frac{Q_1 + Q_2}{Q_2}$

IMPORTANT: Please know that all the standard orifices we supply, and the flow rates noted for each, assume that these parts are going to be used in a typical dilution system ... whereby there is a partial vacuum generated on the outlet end of the orifice (about 1/2 atmos or better), ambient pressure (1 atmos) or close to it, on inlet. The flow rates we publish and mark on the pieces are representative of calibrate done with standard AIR. Any other gases of extreme different molecular weight or density other than AIR can cause obvious issues with your sampling unless you specify proper or corrected flow rates needed before ASI produces the parts for you.