

# Calibrated Leak Devices

## Equivalent Channel (EC) & Equivalent Diameter (ED)

### Applications

ATC's calibrated leak devices help you comply with industry standards when qualifying your test system. Calibrated leak devices are also known as verification orifices or leak masters. They ensure that your leak test system is capable of detecting your specified leak rate regardless of your leak test method.



ATC's Equivalent Channels utilize geometric approach

### Features

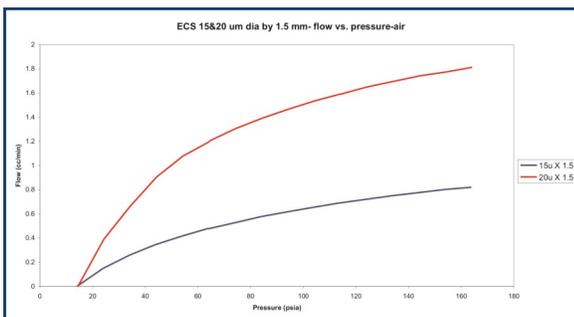
From many years of experience, our engineers have found that geometric definition is the most reliable way to specify, set up, and challenge your product's leak test integrity requirements as well as its leak test systems.

Calibrated leak devices can be used to:

1. Set up leak testing equipment based on the leak rate to be detected.
2. Verify or validate a leak test system's capability to detect leaks.
3. Compare leak test methods and machines.

- Equivalent Channel Standard (ECS)
- Equivalent Channel Device (ECD)

Equivalent channels meet the requirements of US-CAR, SAE J2045, SAE J2587, & SAE J2973 for US-CARB LEV II + PZEV, EURO-5 Hydrocarbon Emission Standards and Major OEM Leak Tightness Specifications. The Equivalent Channel should be used as your calibrated leak due to its unique flow response properties.



#### Notes:

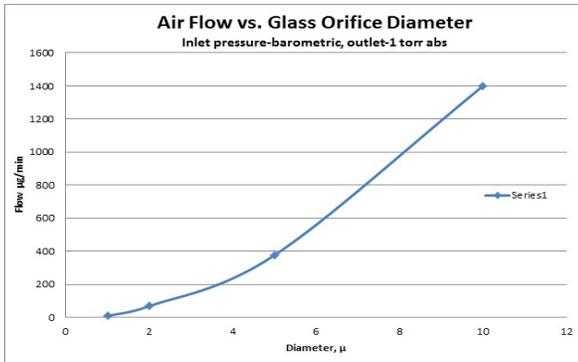
1. Leak flow is measured in actual cc/min, pressure in absolute pressure psia. Both are measured upstream (inlet) to the orifice.
2. Flow rate and EC sizes are used for reference only. Actual value may change from EC to EC.
3. The enclosed data is not applicable to vacuum applications.

# Calibrated Leak Devices

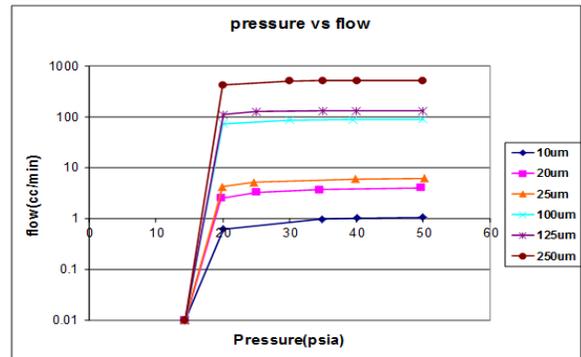
- **Equivalent Diameter (ED) and Sharp Edge Orifice (SE)**

Sharp Edge (SE) orifices, known also as Equivalent Diameters (ED), are built to size and flow calibrated. As a geometric definition of leak tightness and recognized by USP <1207>, they offer the most generic and conservative way to simulate pinholes or leak paths.

*Glass Orifice—Typical Performance Curves*



*Sapphire Orifice—Typical Performance Curves*



**Notes:**

1. Leak flow is measured in actual cc/min or mm<sup>3</sup>/min, pressure is in absolute pressure psia. Both orifices are measured upstream (inlet) of the orifice.
2. Flow rate and orifice sizes are for reference only. Actual value may change from orifice to orifice.

Contact ATC for Mass Extraction specification sheet for vacuum applications.

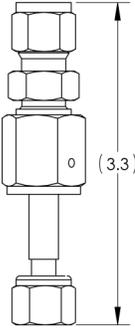
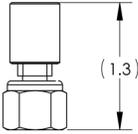
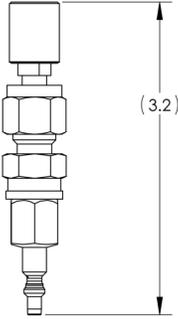
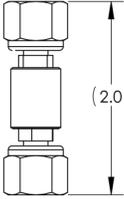
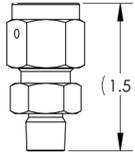
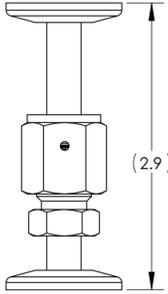
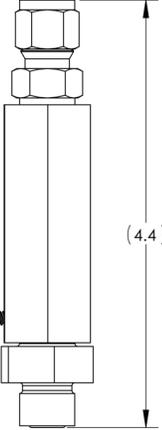
FEATURE	EQUIVALENT CHANNEL STANDARD		EQUIVALENT DIAMETER (SHARP EDGE ORIFICE)
	ECS	ECD	
TYPE	ECS	ECD	ED/SE
MICRO CHANNEL	L/D > 100	L/D > 100	L/D < 50
GEOMETRY	Certified diameter roundness & length	Derived from flow, gas type, & pressure	Certified to size
FLOW	Built to size and flow calibrated at test pressure & gas type	Calibrated to gas flow rate at inlet & outlet pressure	Built to size and flow calibrated at test pressure & gas type

Geometric Definition of Leak Tightness - Simple and Unambiguous Specification Independent of:

- Test method
- Location
- Temperature
- Pressure
- Test fluid

# Calibrated Leak Devices-Configurations

## ATC BODY OPTIONS

						
1/4" Swagelok®	1/4" Swagelok®	EPDQ QD	1/4" Swagelok®	1/8" NPT	1" Flange	VC04
Standard* Swagelok Body	Single Flow ATC Short Body	EPDQ Verification Quick Disconnect	Dual Flow ATC Short Body	Low Profile NPT Plug	NW16 Flange Orifice Assembly	Female Glass Orifice Holder
Body Type: A	Body Type: B	Body Type: BP	Body Type: D	Body Type: N	Body Type: F	ME Orifice

\* Default design unless otherwise specified.

## ATC Configurations

ATC offers a variety of configurations to meet your needs. Available body types are shown above. The standard Swagelok body is the default design unless otherwise specified. Each calibrated leak device is supplied with:

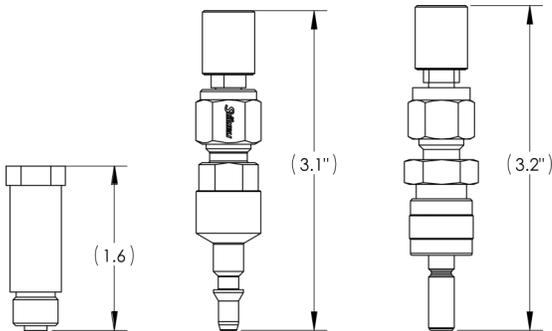
- A filter, as part of a Leak Test Instrument
- A calibration certificate, NIST traceable
- 1/4" Swagelok female connection

Independent pressure tank is required for stand alone verification orifices with low leakage rate.

The ECD/ECS are constructed from Silica (glass) and encapsulated in stainless steel housing. Our unique manufacturing process ensures a uniform and smooth bore.

SE/EDs have sapphire or glass orifices, which offer exceptional long term geometric consistency due to their hardness and excellent stability (low temperature expansion coefficients). The orifices are encapsulated in stainless steel housing.

## OTHER TYPES



7/16"  
Face Seal

ATEQ  
Replacement

USON  
Replacement

024 CTS  
Replacement  
Body

Quick  
Disconnect  
Staubli RBE03

Quick  
Disconnect  
Swagelok QC4

Body Type: C

Body Type: BA

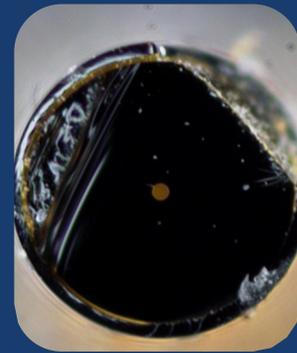
Body Type: BU

### Other Configurations

ATC provides additional configurations for calibrated leak devices that may either have an undefined leak or can be used with other types of leak testers. Please contact ATC directly for more information on these types of products.



The COMPLETE Solution For Your Most Challenging Automatic Leak Flow Testing



*Cross section of 15 micron equivalent channel*

### ECS, ECD, & SE Specifications

Leak Flow Rate (ECD only) +/- 10% of nominal value (tighter tolerances available)

Available diameter: 2, 5, 10, 20, 25, 30, 40  $\mu$  (micrometers, micron)

Length: From 1.25 mm to 5 mm

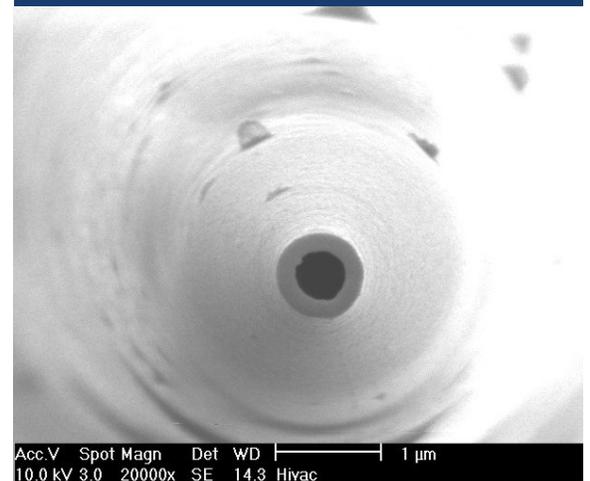
Note: Diameter roundness and tolerance is +/- 5% or +/- 0.53 micron, whichever is larger, length tolerance is +/- 0.25 mm

### ECS, ECD, & SE Calibration

Each ECS is supplied with traceable gaging certificate of the inlet diameter, outlet diameter and minimum length.

Each ECD is certified for flow rate with air/nitrogen or other gasses per customer request (standard 3 points, Air/Nitrogen, Barometric outlet, others available).

Each SE/ED is certified for flow rate with air/nitrogen or other gasses at the size built.



*Glass Orifice - Scanning Electron Microscope Tip image, Diameter: 0.4 micrometer*

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