Air Monitoring Products

air sampling canisters

thermal desorption unit tubes

gas sampling bags

sample cylinders

gas standards

accessories

applications

RESTEK

Chromatography Products

www.restek.com

Bob King, Air Monitoring Products Manufacturing Technician

Air Monitoring Products, From Our Lab to Yours

At Restek, we are proud to offer a diversified line of high quality products for sampling organics in air, for both the environmental ...um markets. Our innovative ...lect our customers' needs and ...chnology. We invite your ...nd ideas.

Air Monitoring Products,

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SilcoCan™ Canisters

Canisters are the gold standard for ambient VOC monitoring.

SilcoCan™ Air Monitoring Canisters

Ideal for low-level reactive sulfur (1-20ppb), TO-14, or TO-15 compounds

Features	Benefits
Siltek® treated.	High inertness—ensures sample stability.
High-purity, 2/3-turn valve with stainless steel diaphragms.	No sample adsorption at the valve, for more accurate results; easy to use.
Vacuum/pressure gauge (optional).	Ascertain internal conditions at a glance.
Variety of sizes.	Meet extensive range of sampling needs.
Stable to 250°C.	Heat canister to 250°C for superior cleaning.
Siltek® valve available (add suffix "-650" to cat.#).	Completely passive sample pathway for maximum sample stability.

Optional gauge
- Quickly confirm vacuum or pressure inside canister.
- Monitor pressure changes.
- Fully protected by canister frame.
- Can be heated to 90°C during cleaning.

Newest surface technology
To ensure sample stability, SilcoCan™ canisters are deactivated with Restek's innovative Siltek® surface treatment, which chemically bonds a fused silica layer to the metal inner surface of the canister. This layer offers unsurpassed inertness for active compounds, including polar and sulfur-containing molecules. It will not crack, chip, or flake off, despite harsh handling in the field or during transport.

Enhanced valve and canister bracket
Canister holder and valve bracket protect canister, tube stub, and valve.

1/4" tube stub
Allows user to interchange valves.

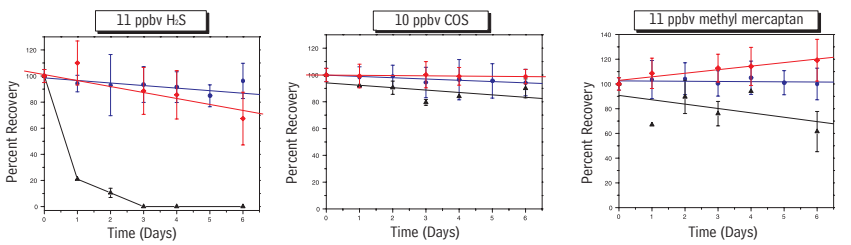
Serial-controlled label
For quick, sure identification.

did you know?

SilcoCan™ Canisters are cleaned prior to shipping.
- Excellent stability for long-term storage of sulfur-containing volatile organic compounds.
- More accurate sampling.

Whether you are monitoring for TO-14, TO-15, or reactive sulfur compounds, SilcoCan™ canisters are your best choice for inertness. In Tedlar® bags, the stability of low-level (100ppbv) sulfur volatile organic compounds (VOCs) is poor, even within 24 hours of sampling. Sulfur compounds react with the metal surface in electropolished canisters, so these canisters are unsuitable for collecting and storing low-level sulfur VOCs. SilcoCan™ air monitoring canisters, which feature a Siltek® treated surface, offer excellent storage stability for sulfur VOCs at very low levels (1–20ppbv), under dry or humid conditions. The versatility of the SilcoCan™ canister makes it an excellent choice for collecting and storing TO-14 or TO-15 compounds (Figure 2).

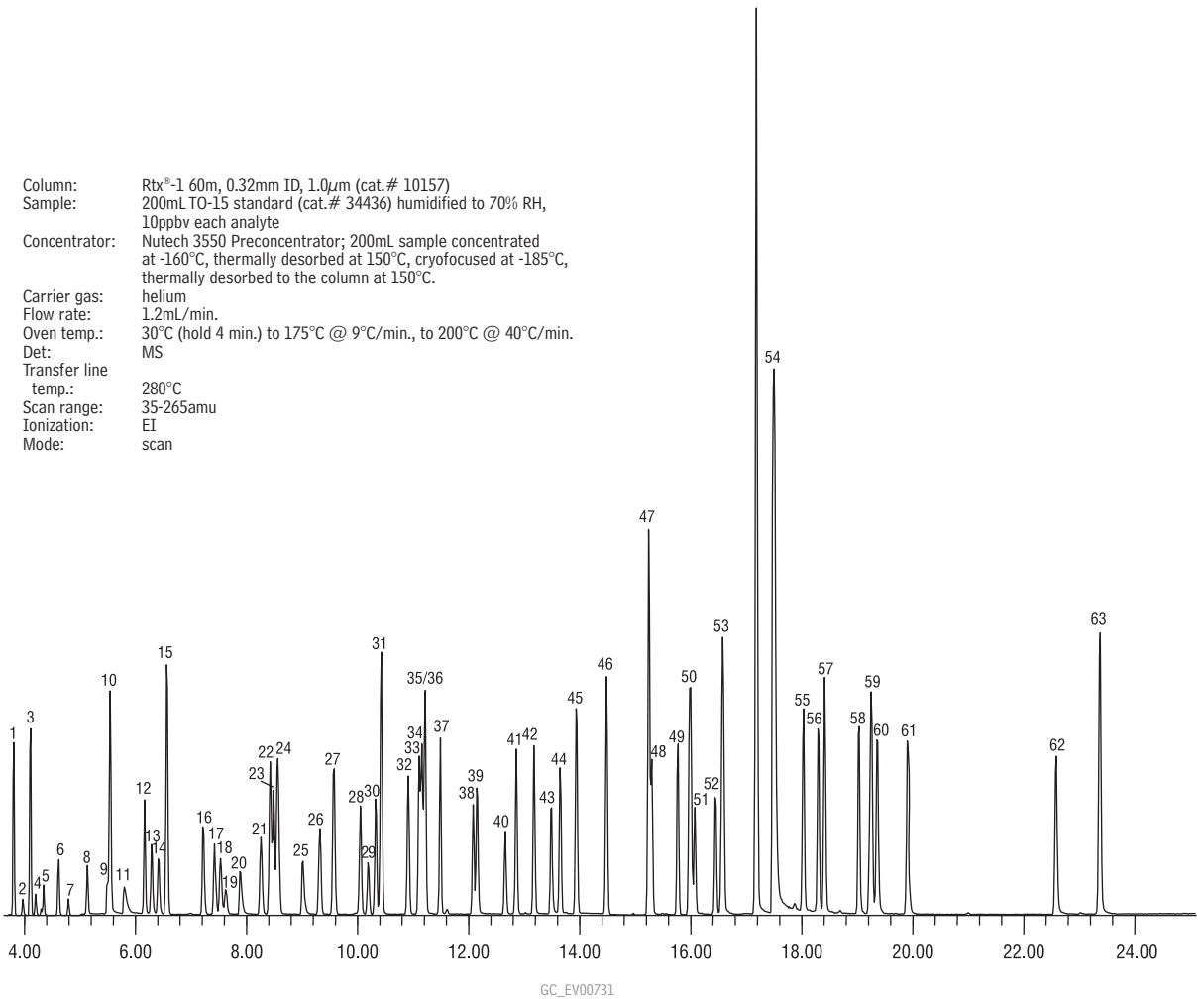
Figure 1 SilcoCan™ canisters effectively store very low levels of sulfur compounds.



Standards: Dry standards were made by adding 2mL of a 100ppm stock sulfur standard to each precleaned and evacuated canister, then pressurizing to 30psi with ultra-pure nitrogen. The resultant concentrations are listed in Applications Note #59347A (download your free copy from www.restek.com). Humidified standards were made by injecting 100µL of deionized water into the evacuated canisters prior to adding 2mL of stock standard. This produced 50% RH.

GC Column: Rtx®-1 , 60m, 0.53mm ID, 7.0µm; **Detector:** Sievers Model 355 Sulfur Chemiluminescence Detector

Figure 2 TO-15 volatile organics at 10ppbv exhibit excellent stability after 15 days in a SilcoCan™ canister.



Compound	ppbv recovered
1. dichlorofluoromethane	9.2
2. chloromethane	9.6
3. dichlorotetrafluoroethane	8.6
4. vinyl chloride	8.5
5. 1,3-butadiene	8.6
6. bromomethane	8.8
7. chloroethane	7.9
8. bromoethene	8.5
9. acetone	8.9
10. trichlorofluoromethane	9.7
11. isopropyl alcohol	9.2
12. 1,1-dichloroethene	9.5
13. methylene chloride	8.7
14. 3-chloropropene	8.7
15. carbon disulfide	8.8
16. Freon® TF	9.6
17. *trans*-1,2-dichloroethene	9.2
18. 1,1-dichloroethane	9.5
19. methyl *tert*-butyl ether	9.2
20. methyl ethyl ketone	9.0
21. *cis*-1,2-dichloroethene	9.3
22. bromochloromethane	10.0
23. *n*-hexane	9.2
24. chloroform	9.9
25. tetrahydrofuran	8.4
26. 1,2-dichloroethane	9.0
27. 1,1,1-trichloroethane	9.4
28. benzene	9.2
29. carbon tetrachloride	8.3
30. cyclohexane	9.3
31. 1,4-difluorobenzene	10.0
32. 1,2-dichloropropane	9.8
33. bromodichloromethane	10.0
34. trichloroethene	9.8
35. 1,4-dioxane	12.0
36. 2,2,4-trimethylpentane	10.0
37. *n*-heptane	9.4
38. *cis*-1,3-dichloropropene	12.0
39. methyl isobutyl ketone	10.0
40. *trans*-1,3-dichloropropene	11.0
41. 1,1,2-trichloroethane	11.0
42. toluene	12.0
43. methyl butyl ketone	11.0
44. dibromochloromethane	12.0
45. 1,2-dibromoethane	12.0
46. tetrachloroethene	12.0
47. chlorobenzene-d5	10.0
48. chlorobenzene	8.0
49. ethylbenzene	9.0
50. *m*- & *p*-xylene	16.0
51. bromoform	8.3
52. styrene	7.6
53. 1,1,2,2-tetrachloroethane	8.3
54. *o*-xylene	8.0
55. 2-chlorotoluene	10.0
56. 4-ethyltoluene	9.4
57. 1,3,5-trimethylbenzene	10.0
58. 1,2,4-trimethylbenzene	10.0
59. 1,3-dichlorobenzene	10.0
60. 1,4-dichlorobenzene	10.0
61. 1,2-dichlorobenzene	10.0
62. 1,2,4-trichlorobenzene	12.0
63. hexachlorobutadiene	11.0

SilcoCan™ Canisters, Canister Carrying Supplies

Get the ultimate insurance plan—order your SilcoCan™ canister with a Siltek® treated valve.

also **available**

For additional gauge and valve options, see **page 9.**

SilcoCan™ Air Monitoring Canisters

- High quality, metal-to-metal seal, 2/3-turn valve with stainless steel diaphragms.
- Sizes to support a wide range of sampling needs.
- 2-port or 3-port valve available; 3-port valve includes 30" Hg/60psi vaccuum/pressure gauge (other gauges available).
- Unsurpassed inertness, even for sulfur-containing or brominated compounds.
- For critical applications, order a Siltek® treated valve—add suffix "-650" to the catalog number of the canister.

		1L Volume	3L Volume	6L Volume	15L Volume
Description	qty.	cat.#	cat.#	cat.#	cat.#
SilcoCan Canister, 1/4" Valve	ea.	24180	24181	24182	24183
SilcoCan Canister, Siltek Treated 1/4" Valve	ea.	24180-650	24181-650	24182-650	24183-650
SilcoCan Canister with Gauge, 1/4" Valve	ea.	24140	24141	24142	24143
SilcoCan Canister with Gauge, Siltek Treated 1/4" Valve	ea.	24140-650	24141-650	24142-650	24143-650
SilcoCan Canister with No Valve	ea.	22090	22091	22092	22093

Restek canisters are originally equipped with high-quality Parker Hannifin diaphragm valves. Each valve is helium leak-tested to 4 x 10^{-9}cc/sec. The all-stainless steel construction eliminates contamination and withstands temperatures from -100°C to 250°C. Other features include a compression outlet fitting and a 1/4" inlet and outlet.

Dimensions/Weights of SilcoCan™ Air Canisters

Can Volume	Dimensions (height x sphere diameter)		Weight	
1 liter	8.5 x 5.25"	21.6 x 13.3cm	2.5 lbs	1.13kg
3 liter	11.5 x 7.25"	29.2 x 18.4cm	4 lbs	1.81kg
6 liter	12.5 x 9.25"	31.8 x 23.5cm	7 lbs	3.18kg
15 liter	17 x 12.25"	43.2 x 31.1cm	13 lbs*	5.90kg

*16 lbs shipped UPS Air, 22 lbs shipped Fed Ex (USA).

for example **applications**

see **pages 26–31**

Quickly confirm vacuum or pressure. Request a high-quality gauge mounted on your SilcoCan™ or TO-Can™ canister.

Alternative Mounted Vacuum/Pressure Gauges

The standard vacuum/pressure range on a SilcoCan™ or TO-Can™ canister fitted with a gauge is 30" Hg to 60psi. To have a different gauge mounted on your canister, add the appropriate suffix number to the canister catalog number.*

Gauge	Suffix
30" Hg/15psi	-651
30" Hg/30psi	-652

*No price difference for these substituted gauges.

Restek canisters are shipped in boxes with handles for easy transportation.

Canister Carrying Supplies

Canister Carrying Box Kit

6-liter carrying boxes with plastic handles simplify canister transport. These boxes also accommodate our passive sampling kit. 4 carrying boxes and one shipping box per kit.

Description	qty.	cat.#
Canister Carrying Box Kit	kit	24215

Canister Carrying Case

- Heavy-duty, all-aluminum design, fits two 6L SilcoCan™ or TO-Can™ canisters tightly without foam.
- Weight: 9 lbs.
- Inside dimensions: length 18", width 9 1/8", height 12 1/2" (46 x 23 x 32cm).
- No organic contaminants from foam or plastics.

Description	qty.	cat.#
Deluxe Canister Carrying Case	ea.	24226

Improved TO-Can™ Air Monitoring Canisters (Summa Can Equivalent)

Optimized for EPA Methods TO-14 and TO-15, and ASTM D5466

- Proprietary electropolished surface that maintains compound stability.
- High quality, metal-to-metal seal, 2/3-turn valve with stainless steel diaphragms.
- 2-port or 3-port valve available; 3-port valve includes 30" Hg/60psi vaccuum/pressure gauge (other gauges available).

Features	Benefits
Metal to metal seat, valve with stainless steel diaphragms.	No sample adsorption, for more accurate results.
Vacuum/pressure gauge (optional).	Ascertain internal conditions at a glance.
Stable to 250°C.	Heat canister to 250°C for superior cleaning.

US EPA Compendium of Air Methods TO-14 and TO-15 regulate the collection, storage, and analysis of volatile organic compounds (VOCs) using treated air sampling canisters. Restek offers a complete line of TO-Can™ canisters (SUMMA can equivalent), electropolished using a proprietary process and extensively cleaned using an ultrasonic method. This ensures a high-quality, passivated surface that maintains the stability of TO-14/TO-15 compounds during storage. The frame surrounds the electropolished canister, eliminating the need for weld marks on the sphere, thereby preventing active sites on the canister. The Parker Hannifin metal-to-metal diaphragm valve supports the excellent performance of the canister.

The unique holder attaches the handle and base to the canister without welds, and protects the canister, tube stub, and valve. The 2/3-turn diaphragm valve has a metal-to-metal seat and a temperature limit of 250°C. We leak check the system with helium to ensure the TO-Can™ canister and valve are leak-tight, then pressurize the canister with contaminant-free nitrogen before we ship it.

please note

- SUMMA® canister equivalent.
- Excellent analyte recovery—even after 14 days of storage.

		1L Volume	3L Volume	6L Volume	15L Volume
Description	qty.	cat.#	cat.#	cat.#	cat.#
TO-Can Canister, 1/4" Valve	ea.	24172	24173	24174	24175
TO-Can Canister with Gauge, 1/4" Valve	ea.	24176	24177	24178	24179
TO-Can Canister with No Valve	ea.	22094	22095	22096	22097

Restek canisters are originally equipped with high-quality Parker Hannifin diaphragm valves. Each valve is helium leak-tested to 4 x 10^{-9}cc/sec. The all-stainless steel construction eliminates contamination and withstands temperatures from -100°C to 250°C. Other features include a compression outlet fitting and a 1/4" inlet and outlet. For additional gauge and valve options, see page 9.

did you know?

TO-Can™ Canisters are cleaned prior to shipping.

Alternative Mounted Vacuum/Pressure Gauges

The standard vacuum/pressure range on a SilcoCan™ or TO-Can™ canister fitted with a gauge is 30" Hg to 60psi. To have a different gauge mounted on your canister, add the appropriate suffix number to the canister catalog number.*

Gauge	Suffix
30" Hg/15psi	-651
30" Hg/30psi	-652

*No price difference for these substituted gauges.

Quickly confirm vacuum or pressure. Request a high-quality gauge mounted on your SilcoCan™ or TO-Can™ canister.

TO-Can™ Canisters with Swagelok® SS4H Bellows-Sealed Valve

new!

- All metal flow path prevents sample adsorption, giving more accurate results.
- Withstands temperatures of up to 300°C.
- Rugged performance in the field.

Restek now offers Swagelok® SS4H canister valves on our TO-Can™ canisters. Valves are bellows-sealed for durability and meet all EPA requirements for air monitoring by methods TO-14 and TO-15.

		1 Liter Volume	3 Liter Volume	6 Liter Volume	15 Liter Volume
Description	qty.	cat.	cat.	cat.	cat.
TO-Can Canister with 1/4" Swagelok SS4H Bellows-Sealed Valve	ea.	22105	22106	22107	22108

Replacement valves are available on page 9.

also available

We also offer sampling kits, sampling bags, and a range of gas reference standards to meet your environmental gas sampling requirements. See **pages 11 and 17–24.**

Canister Maintenance/Canister Reconditioning

Neil Mosesman
Marketing Manager
20+ years of service!

How to Extend Canister Life

What reduces canister performance and longevity? Leakage is the most common reason for canister failure, but contamination and damage to the fused silica lining can also send canisters to the scrap yard prematurely. Here are some tips to protect your investment:

1. **Prevent leaks**
   Use proper handling to avoid these 3 leading causes of leaks.
   a. Particles in the valve
      You can prevent particles from entering the valve by always using a 2 or 7µm particulate filter during sampling and on your canister cleaning equipment. Also, protect the valve inlet by replacing brass dust cap when not in use. The EPA-recommended metal-to-metal sealing valves provide the greatest inertness, but tend to be more sensitive to particulate damage than other valve types.

   b. Galled thread fittings
      Avoid galled thread fittings by using a gap gauge to prevent overtightening of compression fittings. Turning only ¼ turn past finger-tight is another rule of thumb to prevent overtightening. Use brass compression fittings on stainless steel, during nonsampling activities, such as cleaning or calibration, to minimize thread damage. Galled threads may also cause a poor connection to vacuum/pressure gauges, resulting in inaccurate measurement and misleading conclusion that canister leakage exists.

   c. Overtightened valve
      Canister valves are designed to close securely with hand tightening only. Overtightening a valve closure with a wrench can damage the valve seat where the seal is made.

2. **Reduce contamination**
   a. Segregate high concentration (ppm) cans and trace concentration (ppb) cans. Use dedicated canisters, or gas sampling bags, for ppm level sampling, since it is extremely difficult to remove impurities from ppm sampling to a level suitable for trace sampling.

   b. Clean the entire sampling train as you would the can to minimize introduction of contaminants into a clean can. Maximum temperature is 80°C on the gauge and 90°C on Restek's Veriflo flow controller.

   c. High temperature (>100°C) humidified air (steam cleaning) provides the most effective way to remove contamination from electropolished cans (TO-Can™ or SUMMA® canisters), but can damage fused silica lined cans. See #3 below for proper cleaning of fused silica lined cans.

3. **Avoid damage to fused silica lined cans**
   Be sure to follow method recommendations when cleaning your canisters to avoid damaging the fused silica lining. Cleaning studies of SilcoCan™ canisters using humidified air and heat at 80°C and 125°C have shown reduced recoveries of sulfur compounds, when compared to using nitrogen under the same conditions. This irreversible damage is due to oxidation of the surface, creating active sites that may affect the recovery of reactive or polar compounds. Strong acids and bases may also result in damage to the internal can surface.

Reconditioning Service for SilcoCan™ or TO-Can™ Canisters

Normal wear and tear on a canister may result in valve damage and leakage. We offer a reconditioning service in which we will replace the valve, clean, and leak test the canister for much less than the cost to replace the entire canister. If you would like this service, please follow the instructions below:

1. Contact Customer Service at 800-356-1688, ext. 3, or contact your Restek representative and place an order for part number 560838 using your company purchase order.
2. Obtain a return authorization number to affix on the outside of the shipping container.
3. Clean canister before shipment to Restek.
4. Return canister intact. Do not remove valves or gauges that were part of the original canister.

Alternative Gauges and Valves for Air Monitoring Canisters

1/4" Replacement Valves for Air Monitoring Canisters*

- High quality, metal-to-metal seal, 2/3-turn valve with stainless steel diaphragms.
- 2-port or 3-port valve available; 3-port valve includes 30" Hg/60psi vaccuum/pressure gauge (other gauges available).

Canister valve (Siltek®-treated)

	Non-Treated Valve		Siltek®-Treated Valve	
Description	qty.	cat.#	qty.	cat. #
1/4" Replacement Valve (2-port)	ea.	24145	ea.	24144
1/4" Replacement Valve (3-port)	ea.	24147	ea.	24146

*All Restek canisters are originally equipped with high-quality Parker Hannifin diaphragm valves. Each valve is helium leak-tested to 4 x 10^{-9}cc/sec. The all-stainless steel construction eliminates contamination and withstands temperatures from -100°C to 250°C. Other features include a compression outlet fitting and a 1/4" inlet and outlet.

new!

Swagelok® SS4H Bellows-Sealed Valve, 1/4-inch, 2-Port, Stainless Steel

- All metal flow path prevents sample adsorption, giving more accurate results.
- Unique serial number on each valve for complete traceability.
- Withstands temperatures of up to 300°C.
- Rugged performance in the field.
- Fast delivery from Restek!

Restek now offers Swagelok® SS4H canister valves. These popular, rugged valves are available separately or already assembled on our TO-Can™ canisters. Valves are bellows-sealed for durability and meet all EPA requirements for air monitoring by methods TO-14 and TO-15.

Description	qty.	cat.
Replacement 1/4" Swagelok SS4H Bellows-Sealed Valve	ea.	24148

Replacement 1/4" Swagelok SS4H Bellows-Sealed Valves are available on SilcoCan™ canisters as a custom product. Contact Technical Service for more information.

Replacement Combination Vacuum/Pressure Gauges

2-inch vacuum/pressure gauges, 316 stainless steel with 1/8" NPT fitting and center back mount.

Description	qty.	cat.#
30"Hg/15psi Vacuum/Pressure Gauge	ea.	24100
30"Hg/30psi Vacuum/Pressure Gauge	ea.	24104
30"Hg/60psi Vacuum/Pressure Gauge	ea.	24108

Vacuum Gauges

High-quality vacuum gauges with 316 stainless steel wetted surfaces. 30" Hg.

Description	qty.	cat.#
2-Inch Vacuum Gauge; 1/8" NPT	ea.	24269
2-Inch Vacuum Gauge; 1/4" NPT	ea.	24270
1 1/2-Inch Vacuum Gauge; 1/8" NPT	ea.	24120

Ashcroft Test Gauges

new!

- Accurate measurement of vacuum to 30"Hg and pressure to 60psi.
- Available in both analog and digital formats.
- Accuracy to +/- 0.25%.

High accuracy test gauges are recommended for verifying the vacuum/pressure in canisters before and after sampling. The 6-inch face on the analog gauge allows for easy reading. The digital gauge operates on two AAA batteries and offers an unambiguous readout. Both gauges have an accuracy of +/- 0.25% and all metal wetted parts.

Description	qty.	cat.#
Analog Test Gauge, 6" diameter, 1/4" NPT	ea.	24285
Digital Test Gauge, 3" diameter, 1/4" NPT	ea.	24268

Canister Supplies

Canister and passive air sampling kit must be purchased separately.

new! Canister Air Sampling Timer

- Program up to 12 timed events!
- Capable of both manual and automated operation.
- Perfect for either grab or time-integrated sampling.
- Long battery life; recharges conveniently using the USB port on any PC.
- All stainless steel sample flow path ensures inertness, improving accuracy.

These timers are designed to simplify both automated and manual air sampling. The easy-to-use keypad and graphic display facilitate the programming of up to 12 timed events. They offer the convenience of remote start/stop sampling and permit intermittent sampling throughout a test period. The LCD remains in sleep mode when not in use, greatly extending battery life. Timers are compatible with any canister and flow controller.

Features include: solenoid valve for sampling control, 1/4" Swagelok® inlet and outlet fittings, highly inert stainless steel flow path, and water-proof exterior for outdoor use.

Description	qty.	cat.#
Canister Air Sampling Timer	ea.	24267

did you know?

SilcoCan™ and TO-Can™ Canisters are Cleaned Prior to Shipping

After assembly, every Restek SilcoCan™ and TO-Can™ canister is evacuated to 50mTorr, then pressurized with humidified nitrogen to 30psi. The cleaning system is programmed to repeat this cycle three times to ensure thorough cleaning. We ship our canisters clean and under pressure at 30psi with dry nitrogen.

The ultimate in controlled heating, for reliably cleaning your air canisters!

Air Canister Heating Jacket

- Closely simulates oven environment—heats entire canister and valve.
- Two temperature settings, 75°C and 150°C.*
- Prevents sample condensation, for accurate subsampling.
- Easily fits canister up to 6 liters.
- Lightweight; comfortable to the touch when heated.
- Connect up to five Canister Heating Jackets to one 15 amp circuit.

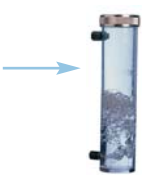
Description	qty.	cat.#
Air Canister Heating Jacket (110 volt)	ea.	24123

*Not CE certified.

Humidification Chamber

When cleaning SilcoCan™ or TO-Can™ canisters, it is important to use humidified air or nitrogen to help remove volatile organic contaminants. We incorporated our humidification chamber into the design of our cleaning system. Restek's humidification chamber is made of acrylic and withstands pressure up to 90psi. The 1/4-inch inlet and outlet compression fittings allow easy connection to pressure lines on your cleaning system. Our humidification chamber also has an easy-to-open lid for filling with water.

Restek's canister cleaning system with humidification chamber.



Humidification Chamber

Description	qty.	cat.#
Humidification Chamber	ea.	24282

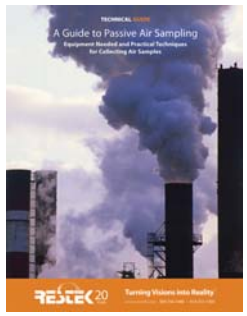
Passive Air Sampling Kits

- Provide accurate integrated sampling without a sampling pump.
- Siltek® treated components ensure a very inert surface.
- Excellent for sampling times from 0.5 hour to 125 hours.

Restek's passive air sampling kit incorporates all the hardware necessary to collect air samples, and is easy to assemble for field sampling.* The improved filter design greatly reduces the number of potential leak sites. The passive air sampling kit is available in seven sampling flow ranges, and in stainless steel or Siltek® treated finish. The stainless steel kit is ideal to partner with TO-Can™ air sampling canister for TO-14A and TO-15 methods. Use the Siltek® treated version with SilcoCan™ canisters, when collecting low-level volatile sulfur compounds, or other active compounds.

Canister Volume*/Sampling Time					Flow	Orifice	Siltek® Treated	Stainless Steel
400cc	1 Liter	3 Liter	6 Liter	15 Liter	(sccm)	size	Sampling Kits	Sampling Kits
8 hour	24 hour	48 hour	125 hour	—	0.5–2	0.0008"	24217	24216
2 hour	4 hour	12 hour	24 hour	60 hour	2–4	0.0012"	24160	24165
1 hour	2 hour	6 hour	12 hour	30 hour	4–8	0.0016"	24161	24166
—	1 hour	4 hour	8 hour	20 hour	8–20	0.0020"	24162	24167
—	—	2 hour	3 hour	8 hour	20–40	0.0030"	24163	24168
—	—	—	1.5 hour	4 hour	40–80	0.0060"	24164	24169
—	—	—	0.5 hour	1 hour	80–350	0.0090"	22101	22100

*Air sampling canisters sold separately.



free literature

A Guide to Passive Air Sampling: Equipment Needed and Practical Techniques for Collecting Air Samples

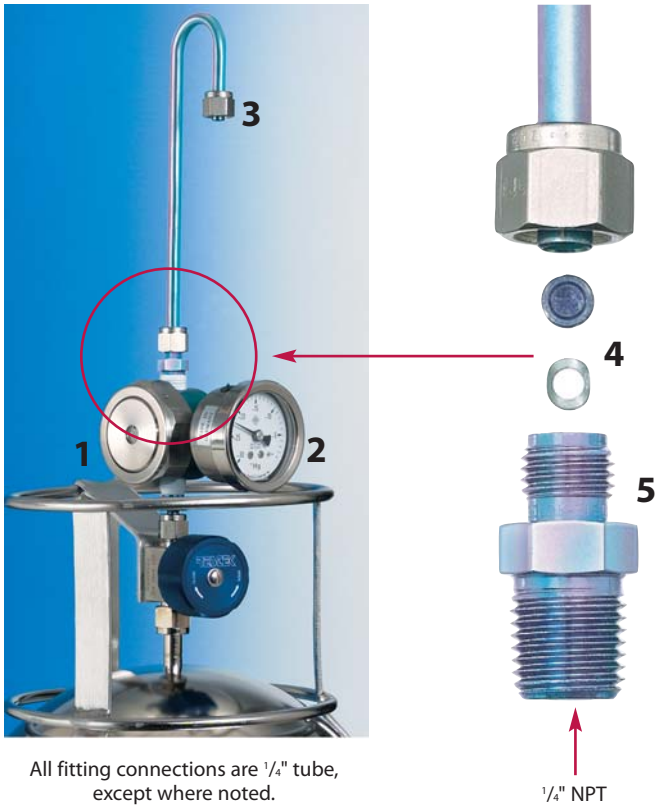
Download your free copy from www.restek.com.

Technical Guide
lit. cat.# 59977B

1. Veriflo® SC423XL flow controller
This flow controller is the heart of the sampling train. It is a high-quality device designed to maintain a constant mass flow as the pressure changes from 30" Hg to 5" Hg (we recommend you stop sampling at or before 5" Hg of vacuum). All wetted parts of the flow controller can be Siltek® treated.

2. Stainless steel vacuum gauge
Fitted to the flow controller, the gauge monitors canister vacuum change during sampling.

3. 1/4-inch Siltek® sample inlet
The 0.3m x 1/4-inch tubing includes a stainless steel nut on the inlet end, to prevent water droplets from accumulating at the edge of the tubing, where they could be pulled into the sampling train.



All fitting connections are 1/4" tube, except where noted.

4. 2-micron frit filter and washer
Located prior to the critical orifice to prevent airborne particles from clogging the critical orifice. Replaceable. Available in stainless steel, or Siltek® treated for optimum inertness.

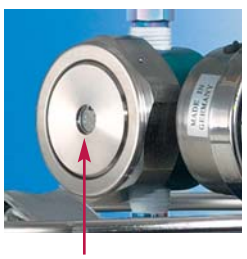
5. Interchangeable critical orifice
An interchangeable ruby critical orifice allows you to control the flow with very high precision. To select the correct critical orifice for your sample, see table above. Available in stainless steel, or Siltek® treated for optimum inertness.

please note

For individual components, see **page 12**.

Critical orifice

Frit filters
(top: Siltek® treated)
(bottom: stainless steel)



Flow controller

new!

Buy only the parts you need!

Replacement Orifices

Use these orifices with a Veriflo® 423XL flow controller to change the flow range for alternative sampling times.

Flow (sccm)	Orifice size	Siltek® Treated cat.#	Stainless Steel cat.#
0.5–2	0.0008"	24219	24218
2–4	0.0012"	24233	24245
4–8	0.0016"	24234	24246
8–20	0.0020"	24235	24247
20–40	0.0030"	24236	24248
40–80	0.0060"	24237	24249
80–350	0.0090"	22099	22098

2µm Frit Filters

For use in critical orifice fitting. Includes washers.

Description	qty.	cat.#
Siltek Replacement Frit Filter	3-pk.	24171
Stainless Steel Replacement Frit Filter	3-pk.	24170

Veriflo® Flow Controllers

Veriflo® 423XL flow controllers are offered in a Siltek® and a stainless steel version. The flow device is available with or without a critical orifice. (Vacuum gauge sold separately.)

The critical orifice in a Veriflo® flow controller is interchangeable. Order orifices for alternate sampling times, or replacement orifices, separately.

Flow (sccm)	Orifice size	Siltek® Treated cat.#	Stainless Steel cat.#
0.5–2	0.0008"	24232	24229
2–4	0.0012"	24255	24260
4–8	0.0016"	24256	24261
8–20	0.0020"	24257	24262
20–40	0.0030"	24258	24263
40–80	0.0060"	24259	24264
80–350	0.0090"	22103	22102
—	no orifice	24238	24239

7µm In-Line Filter

This 316 stainless steel filter is designed to collect particles larger than 7 microns. We offer a Siltek® version and a stainless steel version. 1/4" compression fitting on both ends.

Description	qty.	cat.#
Siltek 7µm In-Line Filter	ea.	24265
Stainless Steel 7µm In-Line Filter	ea.	24266

Note: frit only is not replaceable.

Sample Inlets

- 1/4" stainless steel compression fitting on each end.
- One end connects to flow controller or canister; nut on other end serves as rain guard.
- Includes nuts and ferrules.
- Two different lengths for use with large canisters and miniature canisters.

Description	qty.	Siltek® Treated cat.#	Stainless Steel cat.#
Sample Inlet, 6" Length	ea.	26210	26209
Sample Inlet, 1.5" Length	ea.	26212	26211

Miniature Air Sampling Canisters

- Ideal for indoor air, personal, emergency response, or soil gas sampling.
- 400cc or 1,000cc.
- Low pressure applications not exceeding 40psig.
- Available with quick-connect fitting that is compatible with sampling and analysis instruments.
- Also available with nontreated or Sulfinert® treated valve.

These small canisters are designed for controlled sampling, such as personal air sampling, as an alternative to tube and pump samplers. The 1,000cc canister is suitable for sampling volatile organic compounds in air according to US EPA Methods TO-14 and TO-15.

Restek offers these products in stainless steel or with Sulfinert® treatment, for greatest inertness. We continue to offer passive coating technologies that are unmatched in the air sampling industry—try a Sulfinert® treated canister and achieve the ultimate in analyte stability.

Dimensions:
400cc = 2.75" diameter, 5.35" long (7 x 13.6cm)
1,000cc = 2.75" diameter, 11.92" long (7 x 30cm)

Miniature Air Sampling Canisters with Quick-Connect Stem Fittings

Description	Volume	qty.	cat.#
Electro-Polished Miniature Canister with Quick-Connect Stem Fitting	400cc	ea.	24188
	1000cc	ea.	24194
Sulfinert Treated Miniature Canister with Quick-Connect Stem Fitting	400cc	ea.	24189
	1000cc	ea.	24195
	400cc	ea.	24190
Sulfinert Treated Miniature Canister with Sulfinert Treated Quick-Connect Stem Fitting	1000cc	ea.	24196

Quick-Connect Fittings for Miniature Air Sampling Canisters

Connection: 1/4" tube fitting.

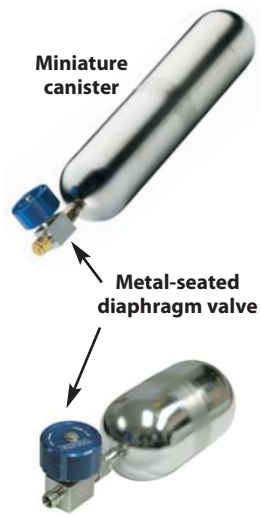
Description	qty.	cat.#
Quick-Connect Stem Fitting	ea.	24185
Sulfinert Treated Quick-Connect Stem Fitting	ea.	24186
Quick-Connect Stem Protector, Stainless Steel	ea.	24121
Quick-Connect Body Fitting	ea.	24187

Note: Quick-connect body fitting (cat.# 24187) must be ordered separately to sample with quick-connect stem fitting.

Attach quick-connect body fitting to stem fitting to open canister. Attach quick-connect stem protector to stem fitting when not sampling to prevent canister from accidentally opening.

Miniature Air Sampling Canisters with Metal-Seated Diaphragm Valve

Description	Volume	qty.	cat.#
Electro-Polished Miniature Canister with Metal-Seated Diaphragm Valve	400cc	ea.	24191
	1000cc	ea.	24197
Sulfinert Treated Miniature Canister with Metal-Seated Diaphragm Valve	400cc	ea.	24192
	1000cc	ea.	24198
Sulfinert Treated Miniature Canister with Sulfinert Treated Diaphragm Valve	400cc	ea.	24193
	1000cc	ea.	24199



Miniature Air Sampling Canisters with Nut & Ferrule

Description	Volume	qty.	cat.#
Electro-Polished Miniature Canister with Nut & Ferrule	400cc	ea.	24205
	1000cc	ea.	24206
Sulfinert Treated Miniature Canister with Nut & Ferrule	400cc	ea.	24207
	1000cc	ea.	24208

Gap Inspection Gauge

- Confirm that fittings are sufficiently tightened.
- For use with 1/4", 3/8", 1/2" Swagelok® fittings.
- For Swagelok® fittings in new installations only.

Description	qty.	cat.#
Gap Inspection Gauge	ea.	22624

Thermal Desorption Unit Tubes

new!

Thermal Desorption Unit (TDU) Tubes

- Variety of sorbents to collect a wide range of VOCs.
- Use glass tubes for maximum inertness in active sampling.
- Choose stainless steel tubes for either active or passive sampling. No sampling pump necessary for passive sampling with diffusion caps!
- Individually etched with unique serial number for convenient sample identification.
- Available unconditioned or preconditioned and ready to sample. Tubes are reusable after thermal desorption.

method applications

Method	Application
US EPA	TO-17
ASTM	D-6196
NIOSH	2549
DIN EN ISO	16017

Specifications

Dimensions: 1/4" OD x 3-1/2" long
Low sampling rates:
0.01-0.20 L/min.
(<10L total volume)
Long-term storage caps are supplied with conditioned tubes

High-quality thermal desorption tubes by Markes International are now available from Restek. These sorbent tubes are suitable for ppt to ppm concentrations of volatile organic compounds (VOCs) in ambient, indoor, and industrial hygiene environments. Available in both stainless steel and glass (for thermally labile VOCs), they fit Markes ULTRA-UNITY, PerkinElmer, and Shimadzu thermal desorbers. Packed tubes come with a report detailing the total mass of sorbent in the tube; conditioned tubes also include a blank chromatogram.

Thermal Desorption Tube Sorbent	Applications
Tenax TA	Vapor phase organics from C6/7 to C26
Graphitized Carbon	Vapor phase organics from C5/6 to C14
Tenax GR/Carbopack B	Vapor phase organics from *n*-C5/6 to *n*-C20 (EPA Methods TO-14/TO-15/TO-17)
Carbopack B/Carbosieve SIII	Vapor phase organics from *n*-C2/3 to *n*-C12/14 (EPA Methods TO-14/TO-15/TO-17)
Tenax TA/Graphitized Carbon/Carboxen 1000	Vapor phase organics from C2/3 to C20
Carbopack C/Carbopack B/Carbosieve SIII	Vapor phase organics from *n*-C2/3 to *n*-C16/20 (EPA Methods TO-14/TO-15/TO-17)

24061

24062

24067

Thermal Desorption Unit Tubes, Unconditioned and Conditioned & Capped

		Unconditioned		Conditioned & Capped	
		Stainless Steel	Glass	Stainless Steel	Glass
Description	qty.	cat.#	cat.#	cat.#	cat.#
TDU Tubes, Tenax TA	10-pk.	24056	24062	24080	24086
TDU Tubes, Graphitized Carbon	10-pk.	24057	24063	24081	24087
TDU Tubes, Tenax GR/Carbopack B	10-pk.	24058	24064	24082	24088
TDU Tubes, Carbopack B/Carbosieve SIII	10-pk.	24059	24065	24083	24089
TDU Tubes, Tenax TA/Graphitized Carbon/Carboxen 1000	10-pk.	24060	24066	24084	24090
TDU Tubes, Carbopack C/ Carbopack B/Carbosieve SIII	10-pk.	24061	24067	24085	24091

24054

24055

Thermal Desorption Unit Tubes, Empty

- Empty tubes for direct desorption of VOCs in liquids, solids, or pastes.
- Stainless steel: front sorbent retaining gauze fitted, rear gauze and gauze retaining spring supplied.
- Glass: with glass frit positioned 15mm from sampling end.

		Stainless Steel	Glass
Description	qty.	cat.#	cat.#
TDU Tubes, Empty	10-pk.	24054	24055

Thermal Desorption Unit Tubes, Calibration

		Stainless Steel	Glass
Description	qty.	cat.#	cat.#
TDU Tubes, Calibration, Tenax TA 1cm Bed	10-pk.	24075	24076

Description	qty.	cat.
Calibration Solution Loading Rig	ea.	24077
Calibration Solution Loading Rig 9.5mm Replacement Septa	10-pk.	24078
Certified Reference Standard, 100ng BTX on Tenax TA	10-pk.	24079

24071

24070

24074

Thermal Desorption Unit Tubes, Accessories

Description	Benefits/Uses	qty.	cat.
1/4" Brass Cap and PTFE Ferrules	Use for long-term storage of blank/sampled tubes.	20-pk.	24068
1/4" PTFE Ferrules	Long-term storage caps.	20-pk.	24069
CapLok Tool	Use for tightening long-term storage caps.	ea.	24070
Pen Clip		10-pk.	24071
TubeMate Tool	Assists with tube packing.	ea.	24072
1/4" Stainless Steel Union and PTFE Ferrules	Use for connecting tubes in series.	10-pk.	24073
Diffusion Caps	Required for diffusive sampling with stainless steel tubes.	10-pk.	24074

Thermal Desorption Tubes vs. Canister Sampling

Which VOC Sampling Technique is Right for You?

Thermal desorption tubes provide a complementary option to canisters for sampling VOCs. Both techniques have advantages and disadvantages, and their features must be evaluated for suitability relative to the sampling environment and analytical capabilities. Table I outlines the similarities and differences between these techniques; use this handy comparison to determine which equipment is best for you.

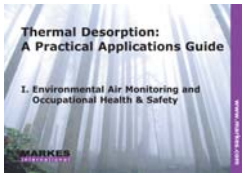
Table I Comparison of thermal desorption tube and canister sampling for VOCs.

Similarities Between Thermal Desorption Tubes and Canisters

- Reusable sampling device.
- Long product lifetime.
- Long-term sample stability.
- Blank certification required prior to sampling.
- Sample concentration required before GC/MS analysis.
- Dry purge helpful to remove moisture before GC injection.
- Ppt sensitivity.
- Method acceptance.
- Collection of wide range of VOCs with single device.
- Useful for screening of unknowns.
- Leak tightness critical to maintaining sample integrity and preventing contamination of a clean device.

Differences Between Thermal Desorption Tubes and Canisters

	Thermal Desorption Tubes	Canisters
Methods	US EPA TO-17 ASTM D6196 ISO 16017 ISO 16000-6 NIOSH 2549	US EPA TO-14, TO-15 ASTM D5466 OSHA PV2120 NIOSH Protocol Draft
	World-wide acceptance	Gold standard for US ambient air market
Applications	Ambient air, indoor air, industrial hygiene Material emissions Food & flavor Chemical weapons	Ambient air, indoor air, vapor intrusion, emergency response
	C3 to C30	<C3 to ~C10
Handling	Light weight for personal monitoring and general ease of use	Larger and heavier; more costly to ship
Sampling	Active sampling with sampling pump or diffusive sampling without pump is possible with determined diffusion coefficients for each compound.	Passive sampling, no sampling pump required. Long-term sampling possible without battery to recharge.
	Integrated sampling only	Grab & integrated sampling
	Concentrated sample	Whole air
	Proper sorbent selection recommended in methodology.	N/A
	Must sample below sorbent breakthrough volumes to avoid sample loss and irreversible adsorption on sorbent	N/A
	Large sample volumes >100L	Sample volume is function of canister size, 15L max
Analysis	Tube dimensions are instrument specific	Compatible with all manufacturer sample concentrators
	1 injection, more injections possible for some instrumentation	Multiple sample injections
	Concentration range ppt to ppm	Ppt to ppm
	Some sorbents prone to artifact formation.	Low blanks when properly cleaned.
Storage	Sample storage at 4°C recommended for multi-bed tubes to prevent potential migration of compounds to more retentive sorbent which maybe difficult to recover.	Room temperature
Cleaning	Analytical process automatically cleans tube for reuse. Cleans as it analyzes. Conditioning/cleaning and analysis incorporated in one thermal desorption unit.	Canister cleaning requires separate equipment as additional step prior to background certification and sampling.
Cost	-130 each	-700 each



tech guides

Thermal desorption application guides are available for a broad range of markets. Request your FREE copy today using these part numbers.

Environmental Air Monitoring and Occupational Health & Safety
EVTG1034

Residual Volatiles & Materials Emissions Testing
GNTG1035

Defense & Forensic
CFTG1036

Food, Flavor, Fragrance & Odor Profiling
FFTG1037

Ultra-Clean Resin, PUFs

Sampling Supplies for Semivolatiles in Air

Everything you need for sampling semivolatile compounds in air: Ultra-Clean resin, PUF sampling cartridges.

Restek's Ultra-Clean resin eliminates the hassle of cleaning and testing resin for air sampling.

Ultra-Clean Resin: Equivalent to XAD-2 Resin; Exclusively from Restek!

- For adsorbing semivolatiles in air.
- Cleaned, GC tested and certified by TO-13 protocol.
- Available in 100 gram quantities.

Although resin is an excellent adsorbent for trapping PAHs, it requires extensive clean-up because many of its impurities are PAH compounds. To enable you to eliminate time-consuming clean-up but still meet TO-13 method requirements, we do the cleaning for you! Ultra-Clean resin complies with the specified maximum contamination levels—we test each batch by capillary GC/flame ionization detector to ensure cleanliness.

method **applications**

Method	Applications
EPA 23	Dioxins
EPA TO-13A	PAHs
ASTM D6209	PAHs

Description	cat.#	1-4 bottles	5-9 bottles	10+ bottles
Ultra-Clean Resin, 100 grams	24230			

SDVB Resin

- Styrene/divinylbenzene, equivalent to XAD-2 resin.
- Untreated, packaged in 1kg plastic containers.
- Spherical, 20 to 60 mesh particles.

Description	qty.	cat.#
SDVB Resin	1kg	24053

Cleaned Polyurethane Foam (PUF) Cartridges

- Precleaned and ready to use for collection of semivolatiles (pesticides, PCBs, PAHs).
- Both large high-volume (220-280L/min.) and small low-volume (1-5L/min.) PUFs available.
- Suitable for ambient, indoor, and industrial hygiene applications.
- PUF/XAD-2 "sandwiches" capture a wider range of semivolatiles.

Large PUF Cartridge

Small PUF Cartridge

new!

method **applications**

Method	Applications	cat.#
EPA TO-10A	Organochlorine and organophosphorous pesticides, carbamate, pyrethrin, triazine, and urea pesticides	22116
EPA IP-7	Polycyclic aromatic hydrocarbons (PAHs)	22114
EPA IP-8	Organochlorine and organophosphorous pesticides, carbamate, pyrethrin, triazine, and urea pesticides	22116
ASTM D4861	Organochlorine and organophosphorous pesticides, PCB	22116
ASTM D4947	Chlordane and heptachlor residues	22116
Research	Pesticides	22117
EPA TO-4A	Organochlorine pesticides, PCBs	22114
EPA TO-9A	Polychlorinated dibenzo-*p*-dioxins (PCDDs)	22114
EPA TO-13A	Polycyclic aromatic hydrocarbons (PAHs)	22114
EPA 600/8-80-038	Organochlorine pesticides, PCBs, PAHs	22115
ASTM D6209	Polycyclic aromatic hydrocarbons (PAHs)	22114

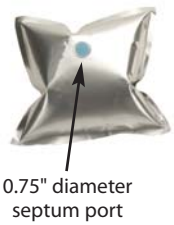
Description	qty.	cat.#
Cleaned PUF Plug (7.6cm length, 6cm diameter)	ea.	24295
Large PUF Cartridge, 65mm OD x 125mm length, 75mm PUF	ea.	22114
Large PUF/XAD Cartridge, 65mm OD x 125mm length, 25mm PUF/10g XAD-2/50mm PUF	ea.	22115
Small PUF Cartridge, 22mm OD x 100mm length, 76mm PUF	ea.	22116
Small PUF/XAD Cartridge, 22mm OD x 100mm length, 30mm PUF/1.5g XAD-2/30mm PUF	ea.	22117

Cali-5-Bond Gas Sampling Bags

new!

- Totally nonpermeable and opaque, providing UV protection.
- Chemically inert—extremely rugged and portable.
- Extra strength—5 mil (0.14mm) thick.
- Easy to use.

Cali-5-Bond air and gas sampling bags provide a simple, reliable, and economic method of collecting air, gas, and liquid samples. The 5-layer construction (made by a patented process) ensures the physical integrity of any sample taken, providing a truly representative sample of the collection environment. Both grab and time-integrated samples can be taken with the use of a sampling pump. The twist-type valve with hose-barb connection enables secure attachment of $^{3}/_{16}$" ID sample tubing. The septum port allows easy access via a gas-tight syringe. Bags should not be used at temperatures above 50°C (125°F) and should never be over inflated.



	Description	qty.	cat.#
0.5L	6" x 8"	5-pk.	24092
1L	8" x 8"	5-pk.	24093
2L	8" x 12"	5-pk.	24094
5L	8" x 23"	5-pk.	24095
10L	16" x 15"	5-pk.	24096
22L	16" x 25"	5-pk.	24097
44L	24" x 25"	5-pk.	24098

Tedlar® Sampling Bags

- Find the bags you need—we offer sizes from 0.5 liters to 100 liters.
- Unique all-in-one septum and valve fitting make these lightweight and easy to use.
- Polypropylene or stainless steel valve.

The unique design of these Tedlar® sample bags incorporates the sampling septum directly in the valve, providing easier use and lighter weight than other styles. We offer two types of bags: one with a polypropylene valve and one with a stainless steel valve. Both valves conveniently connect to $^{3}/_{16}$" ID Teflon® tubing.

			Polypropylene Valve	Stainless Steel Valve
	Description	qty.	cat.#	cat.#
0.5L	6" x 6"	10-pk.	22049	22038
1L	7" x 7"	10-pk.	22050	22039
3L	9.5" x 10"	10-pk.	22051	22040
5L	12" x 12.5"	10-pk.	22052	22041
10L	11.75" x 22"	10-pk.	22053	22042
12L	13" x 24"	10-pk.	22054	22043
25L	17.5" x 24"	5-pk.	22055	22044
40L	24" x 24.25"	5-pk.	22056	22045
80L	28.25" x 32.5"	5-pk.	22057	22046
100L	28" x 36"	3-pk.	22058	22047
Replacement Septum		10-pk.	22059	22048

Gas Standards

please note

Gas standards are subject to hazardous materials shipping fees by most freight carriers.

it's a fact

Higher concentration = **MORE STANDARD** for your money!

cylinder design

Spectra 104L Cylinders:

Aluminum construction
Size: 8 x 24 cm.
Volume/Pressure:
104 liters of gas
@ 1,800psi
CGA-180
outlet fitting.
Weight:
1.5 lbs./0.7 kg

Scotty 110L Cylinders (Pi-marked Cylinders for EU Regulations):

Aluminum construction
Size: 8.3 x 29.5 cm.
Volume/Pressure:
110 liters of gas
@ 1,800psi
CGA-180
outlet fitting.
Weight:
2.2 lbs./1 kg
U.S. D.O.T. Specs:
3AL2216

ordering note

Other cylinder sizes available on request.

also available

See **page 20** for high-purity regulator.

Environmental Air Monitoring Gas Standards

Our high-quality air monitoring gas calibration standards are provided by Spectra Gases and Scott Specialty Gases. Mixes are produced gravimetrically using NIST (National Institute of Science and Technology) traceable weights. Each comes with a Certificate of Analysis and unique serial number. All cylinders are disposable and do not require rental or demurrage fees. Recertification of cylinders is available directly with our suppliers. All cylinders are drop-shipped from our suppliers to provide fast delivery and the "freshest" standard possible. 12-month stability on all cylinders unless otherwise specified.

TO-14A Calibration Mix (39 components)

benzene
bromomethane
carbon tetrachloride
chlorobenzene
chloroform
chloromethane
1,2-dibromoethane
m-dichlorobenzene
o-dichlorobenzene
p-dichlorobenzene
dichlorodifluoromethane
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethene
cis-1,2-dichloroethene
1,2-dichloropropane
cis-1,3-dichloropropene
trans-1,3-dichloropropene
dichlorotetrafluoroethane
ethyl benzene
ethyl chloride
hexachloro-1,3-butadiene
methylene chloride
styrene
1,1,2,2-tetrachloroethane
tetrachloroethylene
toluene
1,2,4-trichlorobenzene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethene
trichlorofluoromethane
1,1,2-trichlorotrifluoroethane
1,2,4-trimethylbenzene
1,3,5-trimethylbenzene
vinyl chloride
m-xylene
o-xylene
p-xylene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34400 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34400-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34421 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34421-PI (ea.)

TO-14A 41 Component Mix (41 components)

acrylonitrile
benzene
bromomethane
1,3-butadiene
carbon tetrachloride
chlorobenzene
chloroform
chloromethane
1,2-dibromoethane
m-dichlorobenzene
o-dichlorobenzene
p-dichlorobenzene
dichlorodifluoromethane
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethene
cis-1,2-dichloroethene
1,2-dichloropropane
cis-1,3-dichloropropene
trans-1,3-dichloropropene
dichlorotetrafluoroethane
ethyl benzene
ethyl chloride
hexachloro-1,3-butadiene
methylene chloride
styrene
1,1,2,2-tetrachloroethane
tetrachloroethylene
toluene
1,2,4-trichlorobenzene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethene
trichlorofluoromethane
1,1,2-trichlorotrifluoroethane
1,2,4-trimethylbenzene
1,3,5-trimethylbenzene
vinyl chloride
m-xylene
o-xylene
p-xylene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34430 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34430-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34431 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34431-PI (ea.)

TO-14A 43 Component Mix (43 components)

acrylonitrile
benzene
bromomethane
1,3-butadiene
carbon tetrachloride
chlorobenzene
chloroform
chloromethane
3-chloropropene
1,2-dibromoethane
m-dichlorobenzene
o-dichlorobenzene
p-dichlorobenzene
dichlorodifluoromethane
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethene
cis-1,2-dichloroethene
1,2-dichloropropane
cis-1,3-dichloropropene
trans-1,3-dichloropropene
dichlorotetrafluoroethane
ethyl benzene
ethyl chloride
4-ethyltoluene
hexachloro-1,3-butadiene
methylene chloride
styrene
1,1,2,2-tetrachloroethane
tetrachloroethylene
toluene
1,2,4-trichlorobenzene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethene
trichlorofluoromethane
1,1,2-trichlorotrifluoroethane
1,2,4-trimethylbenzene
1,3,5-trimethylbenzene
vinyl chloride
m-xylene
o-xylene
p-xylene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34432 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34432-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34433 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34433-PI (ea.)

TO-14A GC/MS Tuning Mix

4-bromofluorobenzene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34406 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34406-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34424 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34424-PI (ea.)

TO-14A Aromatics Mix (14 components)

benzene
chlorobenzene
m-dichlorobenzene
o-dichlorobenzene
p-dichlorobenzene
ethyl benzene
styrene
toluene
1,2,4-trichlorobenzene
1,2,4-trimethylbenzene
1,3,5-trimethylbenzene
m-xylene
o-xylene
p-xylene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34404 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34404-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34423 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34423-PI (ea.)

TO-14A Chlorinated Hydrocarbon Mix
(19 components)

carbon tetrachloride
chloroform
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethene
cis-1,2-dichloroethylene
1,2-dichloropropane
cis-1,3-dichloropropene
trans-1,3-dichloropropene
ethyl chloride
hexachloro-1,3-butadiene
methyl chloride
methylene chloride
1,1,2,2-tetrachloroethane
tetrachloroethylene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethene
vinyl chloride

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34402 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34402-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34422 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34422-PI (ea.)

TO-14A Internal Standard Mix

bromochloromethane
chlorobenzene-d5
1,4-difluorobenzene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34412 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34412-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34427 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34427-PI (ea.)

TO-14A Internal Standard/Tuning Mix

bromochloromethane
1-bromo-4-fluorobenzene (4-bromofluorobenzene)
chlorobenzene-d5
1,4-difluorobenzene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34408 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34408-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34425 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34425-PI (ea.)

TO-15 Subset 25 Component Mix (25 components)

acetone
allyl chloride
benzyl chloride*
bromodichloromethane
bromoform
1,3-butadiene
2-butanone (MEK)
carbon disulfide*
cyclohexane
dibromochloromethane
trans-1,2-dichloroethene
1,4-dioxane
ethyl acetate
4-ethyltoluene
heptane
hexane
2-hexanone (MBK)
4-methyl-2-pentanone
methyl *tert*-butyl ether (MTBE)
2-propanol
propylene
tetrahydrofuran
2,2,4-trimethylpentane
vinyl acetate
vinyl bromide

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34434 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34434-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34435 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34435-PI (ea.)

*Stability of this compound cannot be guaranteed.

TO-15 64 Component Mix updated!
(64 components)

acetone
acrolein
benzene
benzyl chloride*
bromodichloromethane
bromoform
bromomethane
1,3-butadiene
2-butanone (MEK)
carbon disulfide*
carbon tetrachloride
chlorobenzene
chloroethane
chloroform
chloromethane
cyclohexane
dibromochloromethane
1,2-dichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethene
cis-1,2-dichloroethene
trans-1,2-dichloroethene
1,2-dichloropropane
cis-1,3-dichloropropene
trans-1,3-dichloropropene
1,4-dioxane
ethanol*
ethyl acetate
ethyl benzene
ethylene dibromide (1,2-dibromoethane)
4-ethyltoluene
trichlorofluoromethane (Freon® 11)
dichlorodifluoromethane (Freon® 12)
1,1,2-trichloro-1,2,2-trifluoroethane (Freon® 113)
1,2-dichlorotetrafluoroethane (Freon® 114)
heptane
hexachloro-1,3-butadiene
hexane
2-hexanone (MBK)
4-methyl-2-pentanone (MIBK)
methylene chloride
methyl *tert*-butyl ether (MTBE)
methyl methacrylate
2-propanol
propylene
styrene
1,1,2,2-tetrachloroethane
tetrachloroethene
tetrahydrofuran
toluene
1,2,4-trichlorobenzene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethene
1,2,4-trimethylbenzene
1,3,5-trimethylbenzene
vinyl acetate
vinyl chloride
m-xylene
o-xylene
p-xylene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34436 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34436-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34437 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34437-PI (ea.)

*Stability of this compound cannot be guaranteed.

TO-14A/TO-15/TO-17 Performance Test Standard

Restek is pleased to offer the Performance Testing/VOC Audit Sample Program in cooperation with Spectra Gases. This is an on-going testing program in which laboratories, and/or other users of VOC standards, are able to evaluate their own capabilities, as well as compare their results and accuracy against other laboratories. As a participant in the program, you will receive a disposable cylinder, directly from Spectra Gases, containing multiple unknown TO-14A/TO-15 components at varying concentrations that are to be identified, quantified, and reported via the Spectra Gases P-T Audit Program forms. The results will be published and distributed for peer review. To ensure confidentiality, all participating laboratories will be anonymous, and only the individual laboratory will know their own results. To provide statistical analysis, the audit sample will be shipped to all laboratories at the same time, once a year during the fourth quarter.

170 liters @ 2,015psi
cat. # 34560 (ea.)

new!

Pi-marked Gas Cylinders Now Available for EU Countries

Our new Pi-marked gas standards from Scott Specialty Gases meet the requirements of Transportable Pressure Equipment Directive (TPED) implemented in 2001 that regulates the safe transport of pressurized containers used throughout the European community.

please note

Gas standards are subject to hazardous materials shipping fees by most freight carriers.

new!

cylinder design

TO-14A/TO-15/TO-17 Performance Test Standard

Size: 5A disposable (3.2" x 12")
Volume/Pressure: 170L @ 2,015psi
CGA 180 outlet fitting
Weight: 2.2lbs.

Gas Standards/Regulators

cylinder design

Spectra 104L Cylinders:

Aluminum construction
Size: 8 x 24 cm.
Volume/Pressure:
104 liters of gas
@ 1,800psi
CGA-180
outlet fitting.
Weight:
1.5 lbs./0.7 kg

Scotty 110L Cylinders (Pi-marked Cylinders for EU Regulations):

Aluminum construction
Size: 8.3 x 29.5 cm.
Volume/Pressure:
110 liters of gas
@ 1,800psi
CGA-180
outlet fitting.
Weight:
2.2 lbs./1 kg
U.S. D.O.T. Specs:
3AL2216

BTEX Gas Mix

benzene
ethylbenzene
toluene
m-xylene
o-xylene
p-xylene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34414 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34414-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34428 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34428-PI (ea.)

BTEX and MTBE Gas Mix

benzene
ethylbenzene
methyl *tert*-butyl ether (MTBE)
toluene
m-xylene
o-xylene
p-xylene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34541 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34541-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34542 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34542-PI (ea.)

Sulfur 5-Component Mix new!

12-month stability. +/- 10% accuracy.

carbonyl sulfide
dimethyl sulfide
ethyl mercaptan
hydrogen sulfide
methyl mercaptan

1ppm in nitrogen, 110 liters @ 1,800psi
cat. # 34561 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34561-PI (ea.)

Massachusetts APH Mix (26 components)

benzene
1,3-butadiene
butylcyclohexane
cyclohexane
n-decane
2,3-dimethylheptane
2,3-dimethylpentane
n-dodecane
ethylbenzene
n-heptane
n-hexane
isopentane
isopropylbenzene
p-isopropyltoluene
methyl *tert*-butyl ether
1-methyl-3-ethylbenzene
n-nonane
n-octane
toluene
toluene-d8 (IS)
1,2,3-trimethylbenzene
1,3,5-trimethylbenzene
n-undecane
o-xylene
m/*p*-xylene (combined)

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34540 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34540-PI (ea.)

Japan Calibration Mix (9 components)

acrylonitrile
benzene
1,3-butadiene
chloroform
1,2-dichloroethane
dichloromethane
tetrachloroethylene
trichloroethylene
vinyl chloride

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34418 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34418-PI (ea.)

ordering note

Other cylinder sizes available on request.

Spectra Gas 7621 High-Purity VOC Regulator

- Single-stage, stainless steel.
- Two pressure gauges and CGA-180 fitting.
- 3,000psig maximum inlet pressure.
- Stainless steel diaphragm and Kel-F® seat.
- 1/8-inch tube compression outlet.
- Low internal volume: 3.03cc.
- Accurate pressure control even at low flow rates.
- Individually tested for leaks and impurities.

Description	qty.	cat.#
0–30psig outlet pressure gauge	ea.	21572
0–100psig outlet pressure gauge	ea.	21572-R100

for reference books

Visit **www.restek.com**

Ozone Precursor Mixture/PAMS (57 components)

acetylene	isopropylbenzene
benzene	methylcyclohexane
n-butane	methylcyclopentane
1-butene	2-methylheptane
cis-2-butene	3-methylheptane
trans-2-butene	2-methylhexane
cyclohexane	3-methylhexane
cyclopentane	2-methylpentane
n-decane	3-methylpentane
m-diethylbenzene	*n*-nonane
p-diethylbenzene	*n*-octane
2,2-dimethylbutane	*n*-pentane
2,3-dimethylbutane	1-pentene
2,3-dimethylpentane	*cis*-2-pentene
2,4-dimethylpentane	*trans*-2-pentene
n-dodecane	propane
ethane	*n*-propylbenzene
ethylbenzene	propylene
ethylene	styrene
m-ethyltoluene	toluene
o-ethyltoluene	1,2,3-trimethylbenzene
p-ethyltoluene	1,2,4-trimethylbenzene
n-heptane	1,3,5-trimethylbenzene
n-hexane	2,2,4-trimethylpentane
1-hexene	2,3,4-trimethylpentane
isobutane	*n*-undecane
isopentane	*o*-xylene
isoprene	*m*/*p*-xylene (combined)

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34420 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (PI-marked Cylinder)
cat. # 34420-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34429 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (PI-marked Cylinder)
cat. # 34429-PI (ea.)

Ozone Precursor/PAMS Mix (57 components at EPA concentrations: ppbC)

acetylene	40	isopropylbenzene	40
benzene	30	methylcyclohexane	30
n-butane	40	methylcyclopentane	25
1-butene	30	2-methylheptane	25
cis-2-butene	35	3-methylheptane	25
trans-2-butene	25	2-methylhexane	25
cyclohexane	40	3-methylhexane	25
cyclopentane	20	2-methylpentane	20
n-decane	30	3-methylpentane	40
m-diethylbenzene	40	*n*-nonane	25
p-diethylbenzene	25	*n*-octane	30
2,2-dimethylbutane	40	*n*-pentane	25
2,3-dimethylbutane	50	1-pentene	25
2,3-dimethylpentane	50	*cis*-2-pentene	35
2,4-dimethylpentane	40	*trans*-2-pentene	25
n-dodecane	40	propane	40
ethane	25	*n*-propylbenzene	30
ethylbenzene	25	propylene	25
ethylene	20	styrene	40
m-ethyltoluene	25	toluene	40
o-ethyltoluene	30	1,2,3-trimethylbenzene	25
p-ethyltoluene	40	1,2,4-trimethylbenzene	40
n-heptane	25	1,3,5-trimethylbenzene	25
n-hexane	30	2,2,4-trimethylpentane	30
1-hexene	60	2,3,4-trimethylpentane	25
isobutane	25	*n*-undecane	30
isopentane	40	*o*-xylene	25
isoprene	40	*m*/*p*-xylene (combined)	40

20-60ppb C in nitrogen, 104 liters @ 1,800psi
cat. # 34445 (ea.)

20-60ppb C in nitrogen, 110 liters @ 1,800psi (PI-marked Cylinder)
cat. # 34445-PI (ea.)

Silvia Martinez
Innovations Chemist
5+ years of service!

also available

Custom air standards!
Visit www.restek.com for our custom air standards ordering form.

Jumbo Syringe

Clear acrylic syringes, ideal for holding and dispensing large volumes of gas. An adjustable plunger on the O-ring ensures that the syringe is gas-tight over a long period of time. The central port is supplied with a luer-lock fitting; the secondary port is supplied with a septum nut. This enables access to the gas sample for adding standards or removing a sub-sample. The plunger stem is detachable, making sample storage easy.

1,000mL Jumbo Syringe

	SGE			Restek
Volume	Model	cat.#	qty.	cat.#
500mL	500MAR-LL-GT	009910	ea.	21275
1000mL	1000MAR-LL-GT	009920	ea.	21276
2000mL	20000MAR-LL-GT	009930	ea.	21277

Syringe O-Rings

O-Rings for 1000mL & 500mL Syringes

Syringe Volume	SGE cat.#	qty.	Restek cat.#
500mL	032527	ea.	21278
1000mL	032532	ea.	21279

Gas Standards

Scott Transportable Pure Gases and Mixtures in 14-, 48-, and 110-Liter Sizes

We offer a wide range of Scott Transportable Gases, from pure gases for purging or calibrating to multi-component mixes which are ideal for peak identification work.

The 14-liter container has a CGA 160 connection for more precise integration with analytical systems. The 48-liter cylinder has a CGA 165 connection, and can deliver large volumes of sample. The 110-liter cylinder has a CGA 180 connection.

Scotty® 14

Contents: 14 liters
Pressure: 240psig (17 bar)
Outlet Fitting: CGA 160

Weight: 1.5 lbs/0.7 kg
Dimensions: 3" diameter x 11" height (7.6 x 28cm)
D.O.T. Specifications: 4B240

Please note: this cylinder is not approved for use in Canada.

Scotty® 48

Contents: 48 liters
Pressure: 300psig (21 bar)
Outlet Fitting: CGA 165

Weight: 1.75 lbs/0.8 kg
Dimensions: 4" diameter x 16 1/4" height (10.2 x 41cm)
D.O.T. Specifications: 39 NRC

Scotty® 110 (Pi-marked Cylinders for EU Regulations)

Contents: 110 liters
Pressure: 1800psig (124 bar)
Outlet Fitting: CGA 180

Weight: 2.2 lbs/1 kg
Dimensions: 3.25" diameter x 11.625" height (8.3 x 29.5cm)
D.O.T. Specifications: 3AL2216

Description	Shelf Life	Scotty® 14 (14 Liter) cat.#	Scotty® 48 (48 Liter) cat.#	Scotty® 110 (110 Liter) cat.#
Pure Gases				
Air, zero (THC < 1ppm)	2 yrs.	34448	34449	34449-PI
Argon, 99.995%	2 yrs.	34457	—	34457-PI
Carbon dioxide, 99.80%	2 yrs.	34451	34452	34452-PI
Hydrogen, 99.99%	2 yrs.	34453	—	34453-PI
Methane, 99.00%	2 yrs.	34454	—	34454-PI
Oxygen, 99.60%	2 yrs.	34455	—	34455-PI
Two-Component Mixtures				
Benzene in air (1ppm)	1 yr.	—	34458	34458-PI
Benzene in air (100ppm)	1 yr.	—	34459	34459-PI
1,3-Butadiene in nitrogen (10ppm)	2 yrs.	34460	34461	34461-PI
Carbon dioxide in helium (100ppm)	2 yrs.	34462	—	34462-PI
Carbon dioxide in nitrogen (100ppm)	2 yrs.	34463	34464	34464-PI
Carbon dioxide in nitrogen (1000ppm)	2 yrs.	34465	34466	34466-PI
Ethylene in air (8-10ppm)	2 yrs.	34467	34468	34468-PI
Ethylene in helium (100ppm)	2 yrs.	34489	—	34489-PI
Hydrogen in helium (100ppm)	2 yrs.	34469	—	34469-PI
Hydrogen in nitrogen (1%)	2 yrs.	34471	34472	34472-PI
Hydrogen in nitrogen (100ppm)	2 yrs.	34473	34474	34474-PI
Methane in helium (100ppm)	2 yrs.	34476	34477	34477-PI
Methane in nitrogen (100ppm)	2 yrs.	34478	—	34478-PI
Methane in nitrogen (1%)	2 yrs.	34482	34483	34483-PI
Nitrogen in helium (100ppm)	2 yrs.	34479	—	34479-PI
Nitrous oxide in nitrogen (1ppm)	2 yrs.	34484	34485	34485-PI
Oxygen in helium (100ppm)	2 yrs.	34480	—	34480-PI
Oxygen in nitrogen (2%)	2 yrs.	34487	34488	34488-PI
Oxygen in nitrogen (6%)	2 yrs.	34491	34492	34492-PI
1,1,1-Trichloroethane in nitrogen (10ppm)	2 yrs.	—	34493	34493-PI
Trichloroethylene in nitrogen (10ppm)	2 yrs.	34494	34495	34495-PI
Vinyl chloride in nitrogen (1ppm)	2 yrs.	34496	34497	34497-PI
Vinyl chloride in nitrogen (10ppm)	2 yrs.	34498	34499	34499-PI
Vinyl chloride in nitrogen (50ppm)	2 yrs.	34500	—	34500-PI
Vinyl chloride in nitrogen (100ppm)	2 yrs.	34501	—	34501-PI
Vinyl chloride in nitrogen (1000ppm)	2 yrs.	34502	—	34502-PI

new!

Pi-marked Gas Cylinders Now Available for EU Countries

Our new Pi-marked gas standards from Scott Specialty Gases meet the requirements of Transportable Pressure Equipment Directive (TPED) implemented in 2001 that regulates the safe transport of pressurized containers used throughout the European community.

Description	Shelf Life	Scotty® 14 (14 Liter) cat.#	Scotty® 48 (48 Liter) cat.#	Scotty® 110 (110 Liter) cat.#
Multi-Component Mixtures				
Carbon monoxide, carbon dioxide, hydrogen and oxygen in nitrogen (0.5% each)	2 yrs.	34504	34505	34505-PI
Carbon monoxide, carbon dioxide, hydrogen and oxygen in nitrogen (1% each)	2 yrs.	34507	34508	34508-PI
Carbon monoxide, carbon dioxide, methane, ethane, ethylene and acetylene in nitrogen (1% each)	1 yr.	—	34511	34511-PI
Carbon monoxide, carbon dioxide, nitrogen, and oxygen, (5% each) and methane and hydrogen (4% each) in helium	2 yrs.	34512	—	34512-PI
Carbon monoxide (7%), carbon dioxide (15%) and oxygen (5%) in nitrogen	2 yrs.	34514	—	34514-PI
Carbon monoxide (7%), oxygen (4%), carbon dioxide (15%) and methane (4.5%) in nitrogen	2 yrs.	34515	34516	34516-PI
C1-C6 *n*-Paraffins: methane, ethane, propane, butane, pentane, hexane in nitrogen (15ppm each)	2 yrs.	34518	34519	34519-PI
C1-C6 *n*-Paraffins: methane, ethane, propane, butane, pentane, hexane in helium (100ppm each)	2 yrs.	34521	34522	34522-PI
C1-C6 *n*-Paraffins: methane, ethane, propane, butane, pentane, hexane in helium (1000ppm each)	2 yrs.	34524	34525	34525-PI
C1-C6 *n*-Paraffins: methane, ethane, propane, butane, pentane, hexane in nitrogen (100ppm each)	2 yrs.	34527	34528	34528-PI
C2-C6 Olefins: ethylene, propylene, 1-butene, 1-pentene, 1-hexene in helium (100ppm each)	2 yrs.	34529	34530	34530-PI
C2-C6 Olefins: ethylene, propylene, 1-butene, 1-pentene, 1-hexene in nitrogen (100ppm each)	2 yrs.	34531	34532	34532-PI
Branched Paraffins: 2,2-dimethylbutane, 2,2-dimethylpropane, isobutane, 2-methylbutane, 2-methylpentane, 3-methylpentane in nitrogen (15ppm each)	2 yrs.	34534	—	34534-PI
Methane, ethane, ethylene, acetylene, propane, propylene, *n*-butane, propyne in nitrogen (15ppm each)	1 yr.	—	34537	34537-PI
n-butane, isobutane, *cis*-2-butene, *trans*-2-butene, 1-butene, isobutylene, 1,3-butadiene, ethyl acetylene in nitrogen (15ppm each)	1 yr.	—	34539	34539-PI

also **available**

Custom air standards!
Visit www.restek.com for our custom air standards ordering form.

Regulators for use with 14-liter and 48-liter Scott Transportable Gases

Specifications:
Maximum Inlet Pressure: 300psig
Outlet Pressure Range: 2–10psig
Maximum Delivery Pressure: 25psig
Operating Temperature Range: 35°F to 150°F (2°C to 65°C)
Outlet Connection: 1/4" female NPT

Materials of Construction:
Body: Brass
Diaphragm: Viton®
Seat: Acetal
Seal: Viton®

Use the CGA 160 inlet connection with 14-liter Scott Transportable Gases. Use the CGA 165 inlet connection with 48-liter Scott Transportable Gases.

also **available**

Regulators with CGA-180 connections for the 110L cylinders are listed on **page 20**.

Description	qty.	cat.#
Regulator with CGA 160 Inlet Connection	ea.	22690
Regulator with CGA 165 Inlet Connection	ea.	22691

Syringe Adapter Kit for Single-Stage VOC Regulator

Use to withdraw sample from a high-pressure cylinder after pressure reduction through the high-purity VOC single-stage regulator.

Kit contains one nickel-plated brass 1/4" NPT to female luer fitting, which can be used with an A-2 Luer syringe (cat.# 20162 or 20163), and one stainless steel 1/4" NPT x 1/8" compression fitting with septum (can be used with any syringe needle).

Description	qty.	cat.#
Syringe Adapter Kit	kit	21118

Natural Gas and Refinery Gas Standards

Natural Gas and Refinery Gas Standards

- Each available in three varying concentrations.
- Mini-regulator designed specially for these standards.

Please note: gas standards on this page are not available in Pi-marked cylinders for EU countries.

Natural Gas Standards

Available in three mixes, from lean to rich. Each has an extended list of C6+ components.

	Natural Gas Standard #1 cat.# 34438, ea. % each compound**	Natural Gas Standard #2 cat.# 34439, ea. % each compound**	Natural Gas Standard #3 cat.# 34440, ea. % each compound**
nitrogen	1.000	2.500	5.000
carbon dioxide	0.500	1.000	1.500
methane UHP	94.750	85.250	70.000
ethane UHP	2.000	5.000	9.000
propane	0.750	3.000	6.000
isobutane	0.300	1.000	3.000
n-butane	0.300	1.000	3.000
isopentane	0.150	0.500	1.000
n-pentane	0.150	0.500	1.000
hexanes plus EX2*	0.100	0.250	0.500
Concentration	mole	mole	mole
Volume	13.16L @ 200psig	13.16L @ 200psig	5.5L @ 75psig
Ideal Heating Value (Dry BTU/SCF)	1048 gross	1142 gross	1317 gross

*Contact Restek or your Restek representative for a complete list of hexanes plus EX2.

**Precise concentrations are provided on the data sheet included with each cylinder and may vary slightly from those listed here.

cylinder design

DCG Partnership Cylinders:

Size: 7.6 x 24 cm.
CGA-170/110 connection.
U.S. D.O.T. Specs:
DOT-4B-240ET

Please note: This cylinder is not approved for use in Canada.

Refinery Gas Standards

Available in three mixes with varying C5 unsaturates or extended C6+ components.

	Refinery Gas Standard #1 cat.# 34441, ea. % each compound**	Refinery Gas Standard #2 cat.# 34442, ea. % each compound**	Refinery Gas Standard #5 cat.# 34443, ea. % each compound**
hydrogen	40.750	12.500	12.500
argon	0.500	1.000	1.000
nitrogen	4.000	37.200	37.200
carbon monoxide	1.000	1.000	1.000
carbon dioxide	3.000	3.000	3.000
methane	8.500	5.000	5.000
ethane	6.000	4.000	4.000
ethylene	2.000	2.000	2.000
acetylene	—	1.000	1.000
propane	7.000	6.000	6.000
propylene	3.000	3.000	3.000
propadiene	0.850	1.000	1.000
cyclopropane	—	0.040	—
isobutane	6.000	5.000	5.000
n-butane	4.000	4.000	4.000
isobutylene	2.000	1.000	1.000
1,3 butadiene	3.000	3.000	3.000
cis-2-butene	2.000	2.000	2.000
trans-2-butene	2.000	3.000	3.000
butene-1	2.000	2.000	2.000
2-methyl-2-butene	—	0.200	0.200
isopentane	1.000	1.000	1.000
n-pentane	1.000	1.000	1.000
cis-2-pentene	—	0.400	0.400
trans-2-pentene	—	0.160	0.200
pentene-1	—	0.400	0.400
n-hexane	0.500	0.100	—
hexanes plus EX	—	—	0.100
Concentration	mole	mole	mole
Volume	5.2L @ 70psig	4.9L @ 60psig	4.6L @ 60psig

**Precise concentrations are provided on the data sheet included with each cylinder and may vary slightly from those listed here.

Mini-Regulator for natural gas and refinery gas standards

- 0–300psig inlet pressure range.
- 0–15psig outlet pressure range.
- Supplied with 0–15psig outlet pressure gauge, brass CGA 170 nut and nipple.

Description	qty.	cat.#
Mini-Regulator	ea.	22032

RESTEK

Sulfinert® Treated Swagelok® Sample Cylinders

- Stable storage of samples containing ppb levels of sulfur compounds.
- Manufactured by Swagelok®; US DOT rated to 1,800psi (12,411kPa) at room temperature.
- 304 grade stainless steel with 1/4" female NPT threads on both ends.

Ideal for collecting and storing samples, such as natural gas or beverage-grade carbon dioxide, because active compounds remain stable during transport.

Description	Size	qty.	cat.#
Sulfinert Sample Cylinder	75cc	ea.	24130
Sulfinert Sample Cylinder	150cc	ea.	24131
Sulfinert Sample Cylinder	300cc	ea.	24132
Sulfinert Sample Cylinder	500cc	ea.	24133
Sulfinert Sample Cylinder	1000cc	ea.	24134
Sulfinert Sample Cylinder	2250cc	ea.	21394

also available

Certificates are available upon request.

Sulfinert® Treated Alta-Robbins Sample Cylinder Valves

- All wetted parts are Sulfinert® treated for inertness.
- Compatible with Sulfinert® treated Swagelok® sample cylinders.
- Large, durable, Kel-F® seat ensures leak-free operation; temperature range: -40°C to 120°C.
- Valves rated to 3,500psig.

Description	qty.	cat.#
1/4" NPT Exit	ea.	21400
1/4" Compression Exit	ea.	21401
1/4" NPT with Dip Tube*	ea.	21402
1/4" NPT with 2,850psi Rupture Disc	ea.	21403
1/4" NPT Male Inlet x 1/4" Female Outlet with 2,850psi Rupture Disc	ea.	21404

*To order catalog #21402 (Sulfinert Alta-Robbins Sample Cylinder Valve, 1/4" NPT with Dip Tube), please call Customer Service at 800-356-1688, ext. 3, or contact your Restek representative. Specify dip tube length or % outage when ordering (maximum length = 5.25"/ 13.3cm). Note: End of part will not be treated after cutting tube to length.

Sulfinert® Treated Rupture Disc Tee

2,850psig (19,650kPa) rating; 1/4" NPT connections.

Description	qty.	cat.#
Sulfinert Treated Rupture Disc Tee (1/4" NPT connections)	ea.	21396
Replacement Rupture Disc (not Sulfinert treated)	ea.	24298

Sulfinert® Treated Ultra-High Pressure Sample Cylinders and Valves

- Stable storage of samples containing sulfur compounds and mercury.
- Cylinders manufactured by Swagelok® and US DOT rated to 5,000psig.
- Valves rated to 6,000psig.
- 316 grade stainless steel with 1/4" female NPT threads on both ends.

new!

Ideal for collecting samples at gas wellhead or other applications requiring sampling at extremely high pressures.

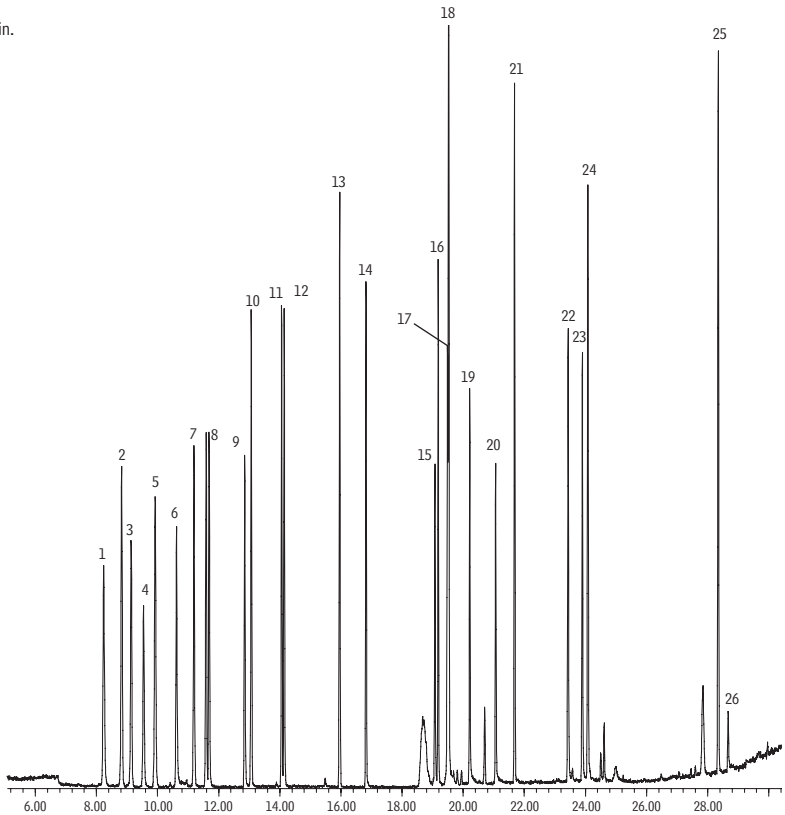
Sample Cylinders	Size	qty.	cat.#
Sulfinert Sample Cylinder	150cc	ea.	22111
Sulfinert Sample Cylinder	300cc	ea.	22112
Sulfinert Sample Cylinder	500cc	ea.	22113
Sample Cylinder Valves		**qty.**	**cat.#**
Sulfinert Treated Sample Cylinder Valve, 1/4" Male NPT (both ends)		ea.	22109
Sulfinert Treated Sample Cylinder Valve, 1/4" Male NPT x 1/4" Female NPT		ea.	22110

Applications

Microbial VOCs on Rxi®-1ms

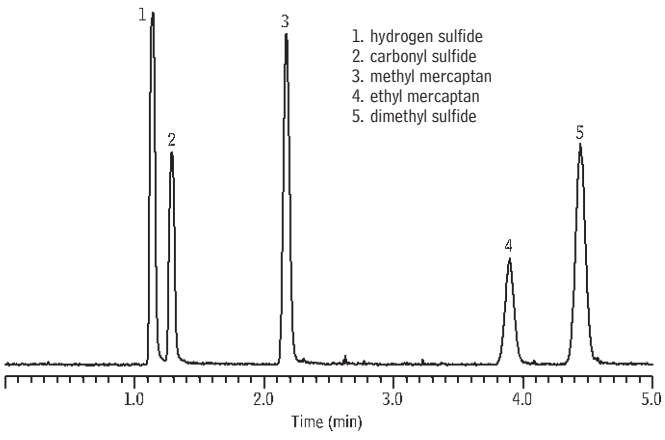
Column:	Rxi®-1ms, 60m, 0.25mm ID, 1.00µm (cat.# 13356)
Sample:	microbial volatile organic compounds, 50 ppbv, 60% RH
Inj.:	1.0µL split (split ratio 10:1), 1mm split inlet liner (cat.# 20972)
Inj. temp.:	200°C
Carrier gas:	helium, constant flow
Flow rate:	1.5mL/min.
Oven temp.:	10°C (hold 1 min.) to 260°C @ 8°C/min.
Det:	HP 6890/5973 GC/MS
	5 min. solvent delay
Transfer line temp.:	260°C
Scan range:	35 to 350amu
Ionization:	EI
Mode:	scan
Other:	Nutech 8900DS Preconcentrator
	Conditions:
	Sample = 200mL from canister
	Cryotrap = -160°C
	Desorb = 20°C
	Cryofocuser = 200°C
	Desorb = 200°C

Compound	Rt (min.)
1. 2-butanone	8.2390
2. 2-methyl-furan	8.8180
3. 3-methyl-furan	9.1400
4. 2-methyl-1-propanol	9.5400
5. 2-methyl-2-butanol	9.9190
6. 1-butanol	10.6270
7. 3-methyl-2-butanol	11.1840
8. 2-pentanol	11.6920
9. 2-methyl-1-butanol	12.8500
10. dimethyl-disulfide	13.0640
11. 3-hexanone	14.0580
12. 2-hexanone	14.1440
13. chlorobenzene-d5	15.9590
14. 2-heptanone	16.8240
15. 1-octen-3-ol	19.0760
16. 3-octanone	19.1760
17. 3-octanol	19.4830
18. 2-pentyl-furan	19.5260
19. 2-ethyl-1-hexanol	20.2120
20. 1-octanol	21.0630
21. 2-isopropyl-3-methoxypyrazine	21.6780
22. isoborneol	23.4290
23. α-terpineol	23.9010
24. 2-methylisoborneol	24.0790
25. geosmin	28.3470
26. 1-dodecanol	28.6680



GC_EV01024

Sulfur Compounds
Rxi®-1ms



1. hydrogen sulfide
2. carbonyl sulfide
3. methyl mercaptan
4. ethyl mercaptan
5. dimethyl sulfide

GC_AR00861

Column:	Rxi®-1ms, 30m, 0.32mm ID, 4.00µm (cat.# 13396)
Sample:	hydrogen sulfide, carbonyl sulfide, methyl mercaptan, ethyl mercaptan, dimethyl sulfide, 100 ppbv each in helium
Inj.:	1mL splitless, direct
Sample loop temp.:	30°C
Carrier gas:	helium, constant pressure
Linear velocity:	48cm/sec. @ 30°C
Oven temp.:	30°C
Det.:	sulfur chemiluminescence detector
Det. temp.:	800°C

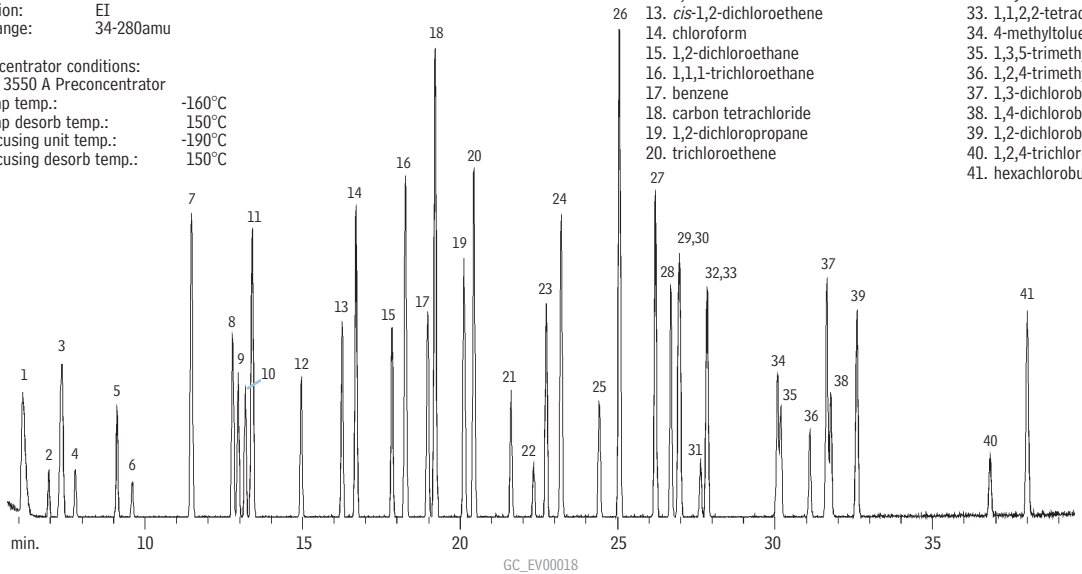
Sample storage & transfer:
SilcoCan™ air monitoring canister with Siltek® treated 1/4" valve (cat.# 24182-650); Sulfinert® treated gas sample loop, 1cc (cat.# 22848); Sulfinert® treated gas sample loop, 10cc (custom order)

US EPA TO-14 Compounds
Rtx®-1

Column: Rtx®-1, 60m, 0.32mm ID, 3.0μm (cat.# 10187)
Sample: 5mL of 2ppmv TO-14 standard.
Oven temp.: 30°C (hold 4 min.) to 250°C @ 7°C/min. (hold 15 min.)
Detector: MS
Det. temp.: 250°C
Carrier gas: helium
Linear velocity: 21cm/sec. set @ 30°C
Ionization: EI
Scan range: 34-280amu

Preconcentrator conditions:
Nutech 3550 A Preconcentrator
Cryotrap temp.: -160°C
Cryotrap desorb temp.: 150°C
Cryofocusing unit temp.: -190°C
Cryofocusing desorb temp.: 150°C

1. dichlorodifluoromethane
2. chloromethane
3. 1,2-dichlorotetrafluoroethane
4. vinyl chloride
5. bromomethane
6. chloroethane
7. trichlorofluoromethane
8. 1,1-dichloroethene
9. methylene chloride
10. 3-chloropropene
11. 1,1,2-trichloro-1,2,2-trifluoroethane
12. 1,1-dichloroethane
13. *cis*-1,2-dichloroethene
14. chloroform
15. 1,2-dichloroethane
16. 1,1,1-trichloroethane
17. benzene
18. carbon tetrachloride
19. 1,2-dichloropropane
20. trichloroethene
21. *cis*-1,3-dichloropropene
22. *trans*-1,3-dichloropropene
23. 1,1,2-trichloroethane
24. toluene
25. 1,2-dibromoethane
26. tetrachloroethene
27. chlorobenzene
28. ethylbenzene
29. *m*-xylene
30. *p*-xylene
31. styrene
32. *o*-xylene
33. 1,1,2,2-tetrachloroethane
34. 4-methyltoluene
35. 1,3,5-trimethylbenzene
36. 1,2,4-trimethylbenzene
37. 1,3-dichlorobenzene
38. 1,4-dichlorobenzene
39. 1,2-dichlorobenzene
40. 1,2,4-trichlorobenzene
41. hexachlorobutadiene

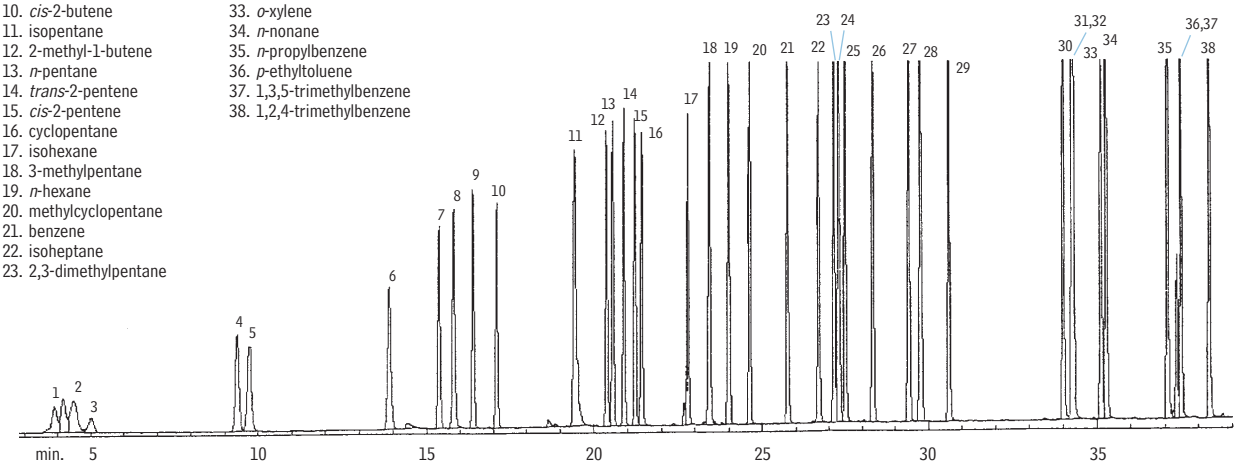


GC_EV00018

Ozone Precursors
Rtx®-1

Column: Rtx®-1, 60m, 0.32mm ID, 3.0μm (cat.# 10187)
Sample: 0.5L of C2-C9 gas standard cryogenically concentrated; 15nL/component desorbed onto column.
Oven temp.: -60°C (hold 5 min.) to 100°C @ 8°C/min., to 150°C @ 6°C/min., then to 240°C @ 8°C/min.
Carrier gas: helium
Linear velocity: 30cm/sec. (flow rate: 1.8cc/min.)
FID sensitivity: 64 x 10^{-12} AFS

1. ethylene
2. acetylene
3. ethane
4. propylene
5. propane
6. isobutane
7. 1-butene
8. *n*-butane
9. *trans*-2-butene
10. *cis*-2-butene
11. isopentane
12. 2-methyl-1-butene
13. *n*-pentane
14. *trans*-2-pentene
15. *cis*-2-pentene
16. cyclopentane
17. isohexane
18. 3-methylpentane
19. *n*-hexane
20. methylcyclopentane
21. benzene
22. isoheptane
23. 2,3-dimethylpentane
24. 3-methylhexane
25. 2,2,4-trimethylpentane
26. *n*-heptane
27. methylcyclohexane
28. 2,2,3-trimethylpentane
29. toluene
30. ethylbenzene
31. *m*-xylene
32. *p*-xylene
33. *o*-xylene
34. *n*-nonane
35. *n*-propylbenzene
36. *p*-ethyltoluene
37. 1,3,5-trimethylbenzene
38. 1,2,4-trimethylbenzene

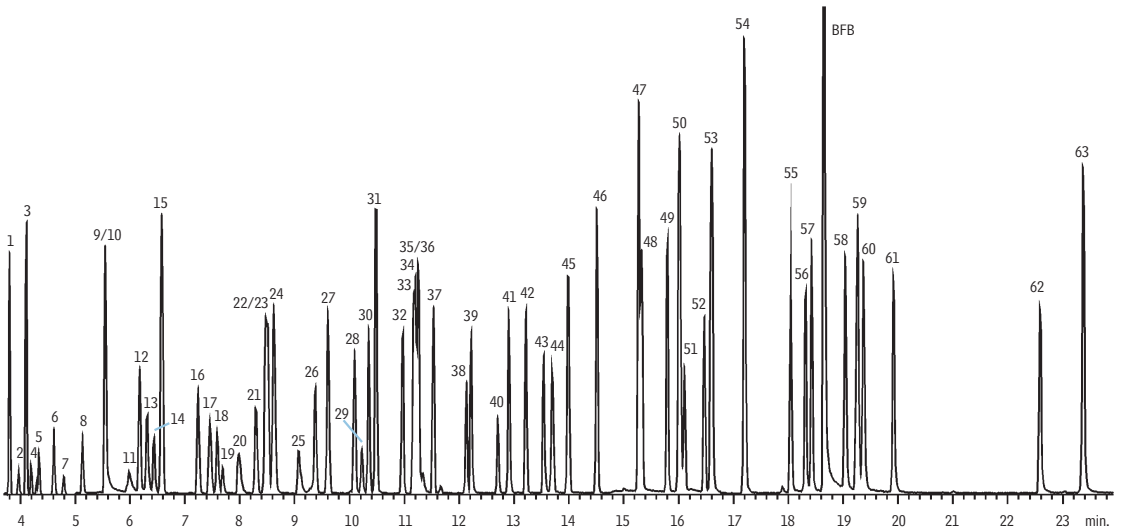


GC_EV00019

Permission to publish this chromatogram granted by Radian Corporation.

Applications

US EPA TO-14/TO-15 Compounds
Rtx®-1



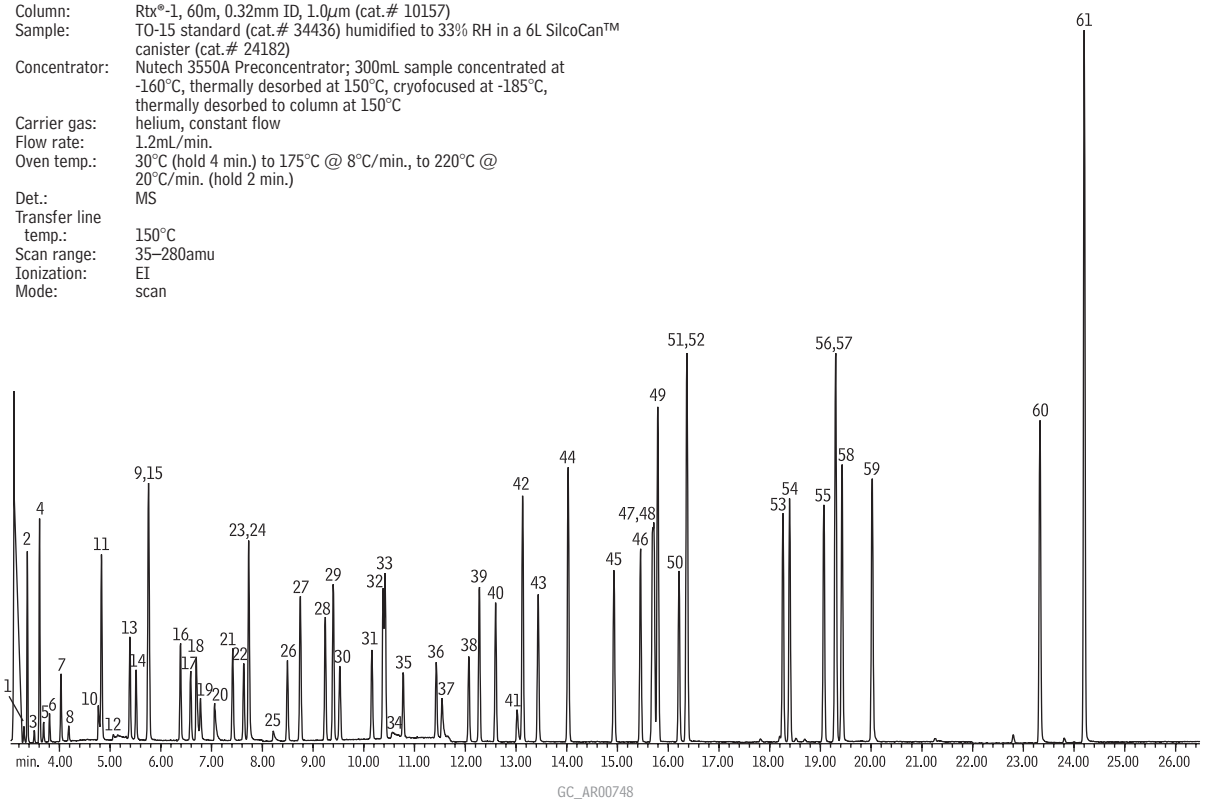
Column:	Rtx®-1, 60m, 0.32mm ID, 1.0µm (cat.# 10157)
Sample:	200mL of 10ppbv TO-15 standard, injected into TO-Can™ canister and humidified to 70% RH.
Concentrator:	Nutech 3550 Preconcentrator 200mL of sample concentrated at -160°C, thermally desorbed at 150°C, and cryofocused at -185°C
Oven temp.:	30°C (hold 4 min.) to 175°C @ 9°C/min. to 220°C @ 40°C/min.
Carrier gas:	helium @ 1.2mL/min.
Det.:	Agilent 5971 MS
Scan range:	35-265amu

1. dichlorofluoromethane
2. chloromethane
3. dichlorotetrafluoroethane
4. vinyl chloride
5. 1,3-butadiene
6. bromomethane
7. chloroethane
8. bromoethene
9. acetone
10. trichlorofluoromethane
11. isopropyl alcohol
12. 1,1-dichloroethene
13. methylene chloride
14. 3-chloropropene
15. carbon disulfide
16. Freon® TF
17. *trans*-1,2-dichloroethene
18. 1,1-dichloroethane
19. methyl *tert*-butyl ether
20. methyl ethyl ketone
21. *cis*-1,2-dichloroethene
22. bromochloromethane (IS)
23. *n*-hexane
24. chloroform
25. tetrahydrofuran
26. 1,2-dichloroethane
27. 1,1,1-trichloroethane
28. benzene
29. carbon tetrachloride
30. cyclohexane
31. 1,4-difluorobenzene (IS)
32. 1,2-dichloropropane
33. bromodichloromethane
34. trichloroethene
35. 1,4-dioxane
36. 2,2,4-trimethylpentane
37. *n*-heptane
38. *cis*-1,3-dichloropropene
39. methyl isobutyl ketone
40. *trans*-1,3-dichloropropene
41. 1,1,2-trichloroethane
42. toluene
43. methyl butyl ketone
44. dibromochloromethane
45. 1,2-dibromoethane
46. tetrachloroethene
47. chlorobenzene-d5 (IS)
48. chlorobenzene
49. ethylbenzene
50a. *m*-xylene
50b. *p*-xylene
51. bromoform
52. styrene
53. 1,1,2,2-tetrachloroethane
54. *o*-xylene
55. 2-chlorotoluene
56. 4-ethyltoluene
57. 1,3,5-trimethylbenzene
58. 1,2,4-trimethylbenzene
59. 1,3-dichlorobenzene
60. 1,4-dichlorobenzene
61. 1,2-dichlorobenzene
62. 1,2,4-trichlorobenzene
63. hexachlorobutadiene

Chromatogram courtesy of Gina Maio, Severn Trent Laboratories, Inc., Burlington, VT.

US EPA TO-15 Compounds
Rtx®-1

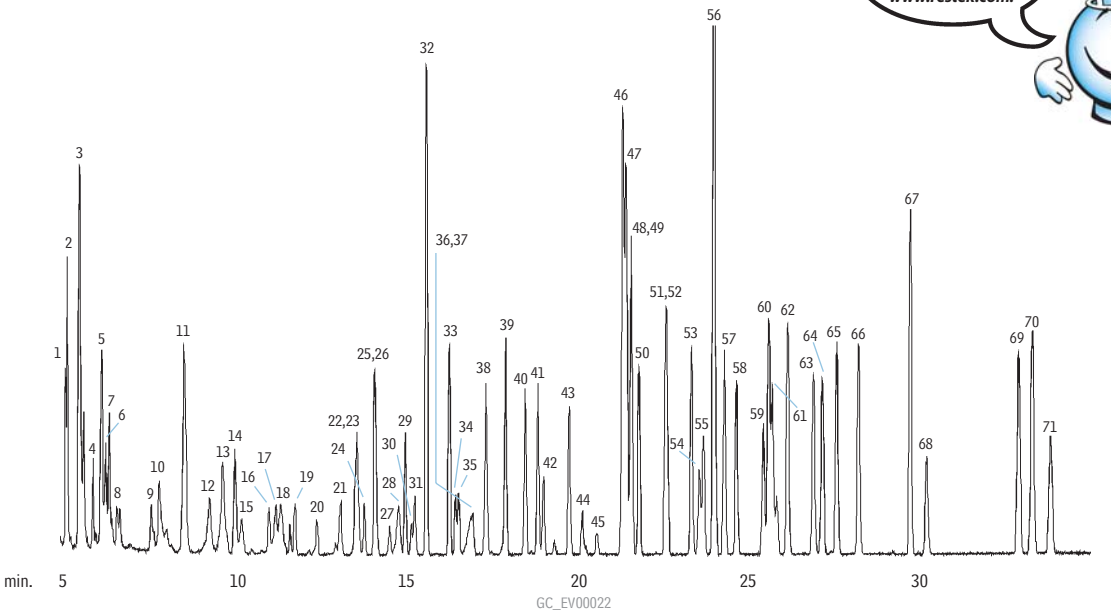
Column:	Rtx®-1, 60m, 0.32mm ID, 1.0µm (cat.# 10157)
Sample:	TO-15 standard (cat.# 34436) humidified to 33% RH in a 6L SilcoCan™ canister (cat.# 24182)
Concentrator:	Nutech 3550A Preconcentrator; 300mL sample concentrated at -160°C, thermally desorbed at 150°C, cryofocused at -185°C, thermally desorbed to column at 150°C
Carrier gas:	helium, constant flow
Flow rate:	1.2mL/min.
Oven temp.:	30°C (hold 4 min.) to 175°C @ 8°C/min., to 220°C @ 20°C/min. (hold 2 min.)
Det.:	MS
Transfer line temp.:	150°C
Scan range:	35–280amu
Ionization:	EI
Mode:	scan



1. propylene
2. Freon®-12 (dichlorodifluoromethane)
3. chloromethane
4. Freon®-114 (dichlorotetrafluoroethane)
5. vinyl chloride
6. 1,3-butadiene
7. bromomethane
8. chloroethane
9. carbon disulfide
10. acetone
11. Freon®-11 (trichlorofluoromethane)
12. isopropyl alcohol
13. 1,1-dichloroethene
14. methylene chloride
15. Freon®-113 (1,1,2-trichloro-1,2,2-trifluoroethane)
16. *trans*-1,2-dichloroethene
17. 1,1-dichloroethane
18. methyl *tert*-butyl ether
19. vinyl acetate
20. methyl ethyl ketone
21. *cis*-1,2-dichloroethene
22. hexane
23. chloroform
24. ethyl acetate
25. tetrahydrofuran
26. 1,2-dichloroethane
27. 1,1,1-trichloroethane
28. benzene
29. carbon tetrachloride
30. cyclohexane
31. 1,2-dichloropropane
32. trichloroethylene
33. bromodichloromethane
34. 1,4-dioxane
35. heptane
36. *cis*-1,3-dichloropropene
37. methyl isobutyl ketone
38. *trans*-1,3-dichloropropene
39. 1,1,2-trichloroethane
40. toluene
41. methyl butyl ketone
42. dibromochloromethane
43. 1,2-dibromoethane
44. tetrachloroethylene
45. chlorobenzene
46. ethylbenzene
47. *p*-xylene
48. *m*-xylene
49. bromoform
50. styrene
51. *o*-xylene
52. 1,1,2,2-tetrachloroethane
53. 4-ethyltoluene
54. 1,3,5-trimethylbenzene
55. 1,2,4-trimethylbenzene
56. 1,3-dichlorobenzene
57. benzyl chloride
58. 1,4-dichlorobenzene
59. 1,2-dichlorobenzene
60. 1,2,4-trichlorobenzene
61. hexachloro-1,3-butadiene

Applications

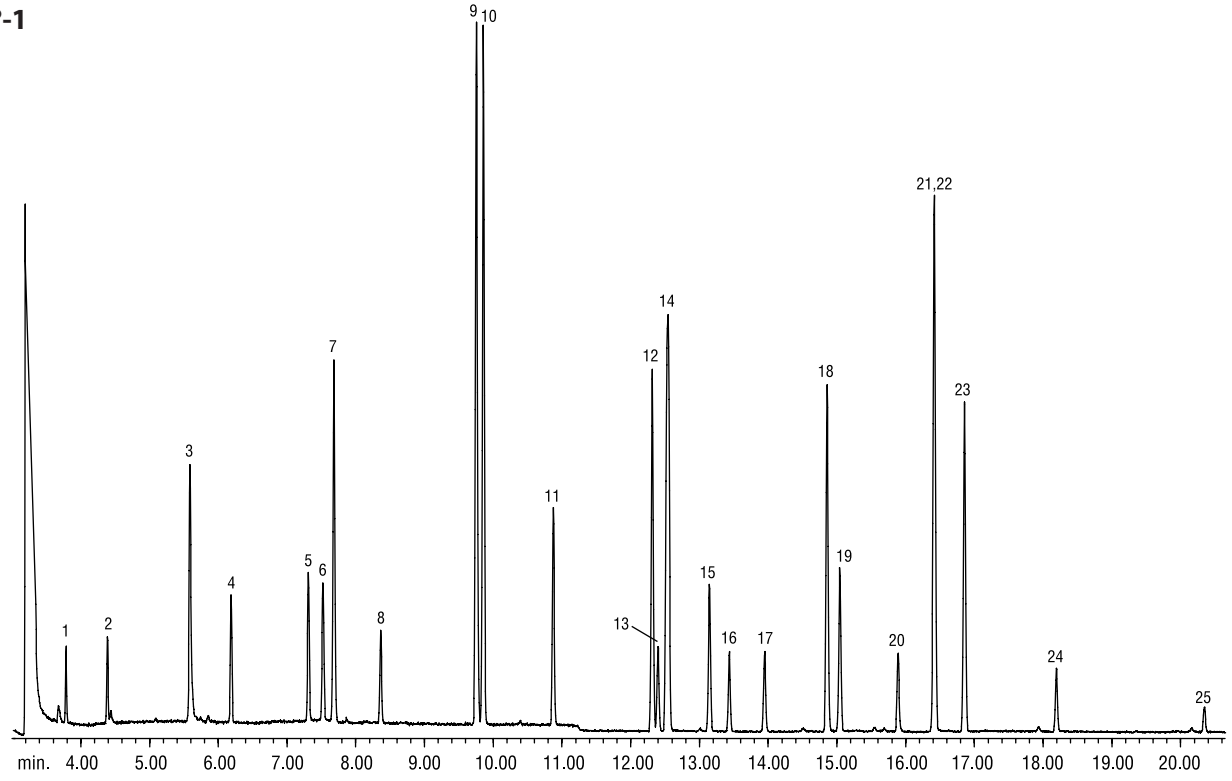
Air Toxins
Rtx®-502.2



1. chlorodifluoromethane
2. dichlorodifluoromethane
3. dichlorotetrafluoroethane
4. chloromethane
5. butane
6. vinyl chloride
7. 1,3-butadiene
8. acetaldehyde
9. bromomethane
10. chloroethane
11. trichlorofluoromethane
12. isopropanol
13. acetone
14. 1,1-dichloroethene
15. acetonitrile
16. dichloromethane
17. acrylonitrile
18. 1-propanol
19. *trans*-1,2-dichloroethene
20. 1,1-dichloroethane
21. methyl ethyl ketone
22. *cis*-1,2-dichloroethene
23. methacrylonitrile
24. chloroform
25. bromochloromethane
26. tetrahydrofuran
27. 1,1,1-trichloroethane
28. *n*-butanol
29. heptane
30. 1,2-dichloroethane
31. benzene
32. 1,4-difluorobenzene
33. trichloroethene
34. ethyl methacrylate
35. 1,2-dichloropropane
36. 1,4-dioxane
37. bromodichloromethane
38. 4-methyl-2-pentanone
39. octane
40. toluene
41. 2-hexanone
42. 1,1,2-trichloroethane
43. tetrachloroethene
44. dibromochloromethane
45. 1,2-dibromoethane
46. chlorobenzene-d5
47. chlorobenzene
48. *m*-xylene
49. *p*-xylene
50. 2-heptanone
51. styrene
52. *o*-xylene
53. isopropylbenzene
54. bromoform
55. 1,1,1,2-tetrachloroethane
56. 4-bromofluoromethane
57. *n*-propylbenzene
58. 1,3,5-trimethylbenzene
59. α-methylstyrene
60. *tert*-butylbenzene
61. 1,2,4-trimethylbenzene
62. *sec*-butylbenzene
63. 1,3-dichlorobenzene
64. 1,4-dichlorobenzene
65. butylbenzene
66. 1,2-dichlorobenzene
67. dodecane
68. dibromochloropropane
69. 1,2,4-trichlorobenzene
70. hexachlorobutadiene
71. naphthalene

Column:	Rtx®-502.2, 60m, 0.32mm ID, 1.8μm (cat.# 10920)
Sample:	500mL of 10ppbv standard concentrated on an AEROCAN 6000 using a glass bead trap at 165°C then desorbed at 200°C for 4 min. @ 1mL/min., cryofocused @ -175°C then desorbed @ 150°C
Oven temp.:	35°C (hold 6 min.) to 120°C @ 15°C/min., then to 200°C @ 5°C/min., then to 220°C @ 25°C/min. (hold 10 min.)
Det. & det. temp.:	Agilent-5971A GC/MS, 280°C
Carrier gas:	helium @ 1mL/min.
Linear velocity:	20cm/sec.
Scan range:	28-260amu
Solvent delay:	4 min.

Massachusetts APH Mix
Rtx®-1



GC_AR00697

Column:	Rtx®-1, 60m, 0.32mm ID, 1.0µm (cat.# 10157)
Sample:	Massachusetts APH Mix, (cat.# 34446)
Concentrator:	Nutech 3550A Air Preconcentrator, 100mL of a 40ppbv standard concentrated at -160°C, thermally desorbed at 150°C and cryofocused at -185°C
Carrier gas:	helium
Flow rate:	1mL/min.
Oven temp.:	35°C (hold 1 min.) to 220°C @ 8°C/min.
Det:	MS, Agilent 5971
Transfer line temp.:	250°C
Scan range:	35-280amu
Ionization:	EI
Mode:	scan

1. 1,3-butadiene
2. isopentane
3. methyl *tert*-butyl ether
4. hexane
5. benzene
6. cyclohexane
7. 2,3-dimethylpentane
8. heptane
9. toluene-D8
10. toluene
11. octane
12. ethylbenzene
13. 2,3-dimethylheptane

14a. *m*-xylene
14b. *p*-xylene
15. *o*-xylene
16. nonane
17. isopropylbenzene
18. 1-methyl-3-ethylbenzene
19. 1,3,5-trimethylbenzene
20. decane
21. 1,2,3-trimethylbenzene
22. *p*-isopropyltoluene
23. butylcyclohexane
24. undecane
25. dodecane

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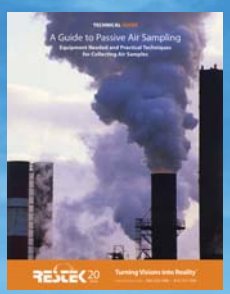
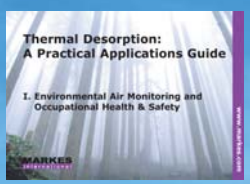
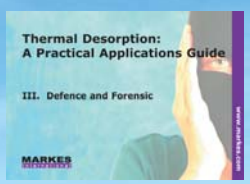


A Guide to Passive Air Sampling
(lit. cat.# 59977B)



TDU Application Guide, Environmental Air Monitoring and Occupational Health & Safety
(lit. cat.# EVTG1034)

TDU Application Guide, Food, Flavor, Fragrance & Odor Profiling
(lit. cat.# FFTG1037)



TDU Application Guide, Defense and Forensic
(lit. cat.# CFTG1036)

TDU Application Guide, Residual Volatiles & Materials Emissions Testing
(lit. cat.# GNTG1035)

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Air Monitoring

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Air Canisters for VOC Monitoring

SilcoCan® & TO-Can® Air Monitoring Canisters

- Get high performance canisters from the innovators of fused silica coating technology.
- Variety of options available, including SUMMA can equivalent.
- Standard fittings compatible with all instrumentation and accessories.
- Exclusive manufacturer of 1 L spherical canister.
- Repair service available to extend canister life.

Canister Options	
Sizes	1, 3, 6, 15 L
Valves	Parker® diaphragm, Swagelok® bellows
Interior Coating	Electropolished, Siltek® treated
Gauges	3 vacuum/pressure ranges

Applications
Ambient Air - US EPA TO-14A, TO-15, ASTM D5466
Indoor Air
Vapor Intrusion
Emergency Response

Dimensions/Weights of Air Canisters

Can Volume	Dimensions (height x sphere diameter)		Weight	
1 liter	8.5 x 5.25"	21.6 x 13.3cm	2.5 lbs	1.13kg
3 liter	11.5 x 7.25"	29.2 x 18.4cm	4 lbs	1.81kg
6 liter	12.5 x 9.25"	31.8 x 23.5cm	7 lbs	3.18kg
15 liter	17 x 12.25"	43.2 x 31.1cm	13 lbs	5.90kg

did you **know**?

SilcoCan® and TO-Can® canisters are cleaned prior to shipping.

- Excellent stability for long-term storage of sulfur-containing volatile organic compounds.
- More accurate sampling.

Canister product listings are on **pages 410-411** or go to **www.restek.com/air** for more air monitoring products and solutions.

Anatomy of a SilcoCan® Canister

Optional gauge
- Quickly confirm vacuum or pressure inside canister.
- Monitor pressure changes.
- Fully protected by canister frame.
- Can be heated to 90°C during cleaning.

Newest surface technology
To ensure sample stability, SilcoCan® canisters are deactivated with Restek's innovative Siltek® surface treatment, which chemically bonds a fused silica layer to the metal inner surface of the canister. This layer offers unsurpassed inertness for active compounds, including polar and sulfur-containing molecules. It will not crack, chip, or flake off, despite harsh handling in the field or during transport.

Enhanced valve and canister bracket
Canister holder and valve bracket protect canister, tube stub, and valve.

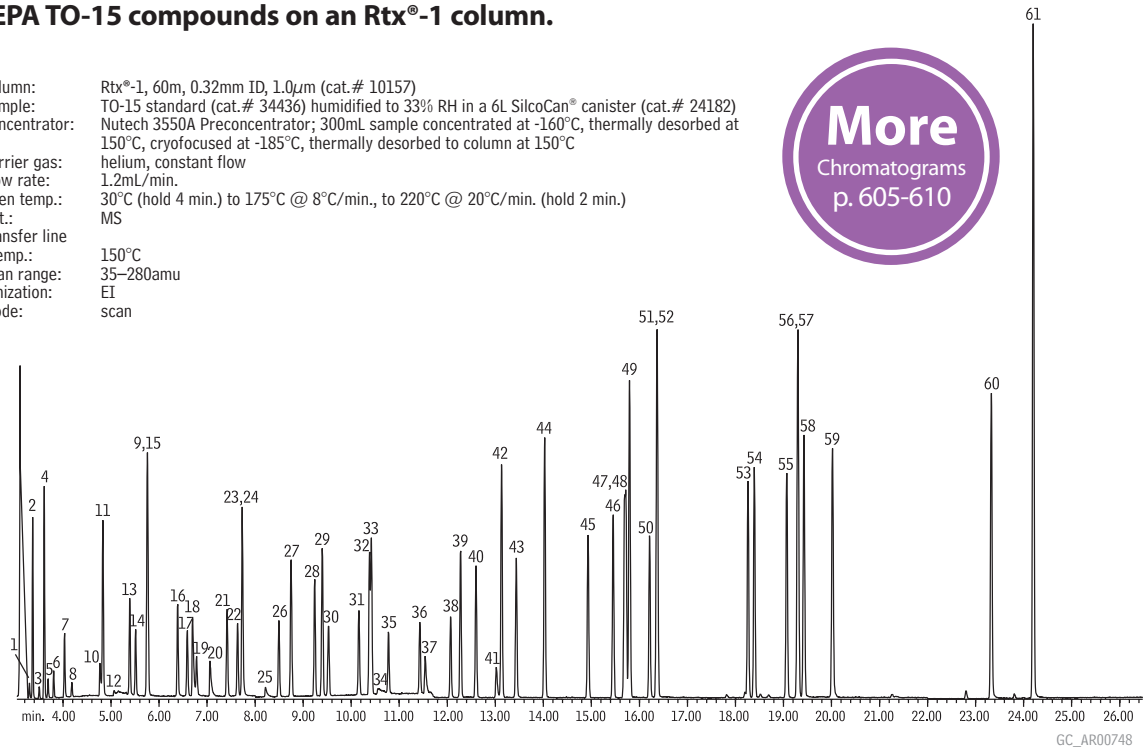
1/4" tube stub
Allows user to interchange valves.

Serial-controlled label
For quick, sure identification.

US EPA TO-15 compounds on an Rtx®-1 column.

Column:	Rtx®-1, 60m, 0.32mm ID, 1.0µm (cat.# 10157)
Sample:	TO-15 standard (cat.# 34436) humidified to 33% RH in a 6L SilcoCan® canister (cat.# 24182)
Concentrator:	Nutech 3550A Preconcentrator; 300mL sample concentrated at -160°C, thermally desorbed at 150°C, cryofocused at -185°C, thermally desorbed to column at 150°C
Carrier gas:	helium, constant flow
Flow rate:	1.2mL/min.
Oven temp.:	30°C (hold 4 min.) to 175°C @ 8°C/min., to 220°C @ 20°C/min. (hold 2 min.)
Det.:	MS
Transfer line temp.:	150°C
Scan range:	35–280amu
Ionization:	EI
Mode:	scan

More Chromatograms p. 605-610



1. propylene
2. Freon® 12 (dichlorodifluoromethane)
3. chloromethane
4. Freon® 114 (dichlorotetrafluoroethane)
5. vinyl chloride
6. 1,3-butadiene
7. bromomethane
8. chloroethane
9. carbon disulfide
10. acetone
11. Freon® 11 (trichlorofluoromethane)
12. isopropyl alcohol
13. 1,1-dichloroethene
14. methylene chloride
15. Freon® 113 (1,1,2-trichloro-1,2,2-trifluoroethane)
16. *trans*-1,2-dichloroethene
17. 1,1-dichloroethane
18. methyl *tert*-butyl ether
19. vinyl acetate
20. methyl ethyl ketone
21. *cis*-1,2-dichloroethene
22. hexane
23. chloroform
24. ethyl acetate
25. tetrahydrofuran
26. 1,2-dichloroethane
27. 1,1,1-trichloroethane
28. benzene
29. carbon tetrachloride
30. cyclohexane
31. 1,2-dichloropropane
32. trichloroethylene
33. bromodichloromethane
34. 1,4-dioxane
35. heptane
36. *cis*-1,3-dichloropropene
37. methyl isobutyl ketone
38. *trans*-1,3-dichloropropene
39. 1,1,2-trichloroethane
40. toluene
41. methyl butyl ketone
42. dibromochloromethane
43. 1,2-dibromoethane
44. tetrachloroethylene
45. chlorobenzene
46. ethylbenzene
47. *p*-xylene
48. *m*-xylene
49. bromoform
50. styrene
51. *o*-xylene
52. 1,1,2,2-tetrachloroethane
53. 4-ethyltoluene
54. 1,3,5-trimethylbenzene
55. 1,2,4-trimethylbenzene
56. 1,3-dichlorobenzene
57. benzyl chloride
58. 1,4-dichlorobenzene
59. 1,2-dichlorobenzene
60. 1,2,4-trichlorobenzene
61. hexachloro-1,3-butadiene

24182

Canisters are the gold standard for ambient VOC monitoring.

SilcoCan® Air Monitoring Canisters

Ideal for low-level reactive sulfur (1-20 ppb), TO-14A, or TO-15 compounds

- High quality, metal-to-metal seal, 2/3-turn valve with stainless steel diaphragms.
- Sizes to support a wide range of sampling needs.
- 2-port or 3-port valve available; 3-port valve includes -30" Hg/60psi vacuum/pressure gauge (other gauges available).
- Unsurpassed inertness, even for sulfur-containing or brominated compounds.
- For critical applications, order a Siltek® treated valve—add suffix "-650" to the catalog number of the canister.

Features	Benefits
Siltek® treated.	High inertness—ensures sample stability.
High-purity, 2/3-turn valve with stainless steel diaphragms.	No sample adsorption at the valve, for more accurate results; easy to use.
Vacuum/pressure gauge (optional).	Ascertain internal conditions at a glance.
Variety of sizes.	Meet extensive range of sampling needs.
Stable to 250°C.	Heat canister to 250°C for superior cleaning.
Siltek® valve available (add suffix "-650" to cat.#).	Completely passive sample pathway for maximum sample stability.

Get the ultimate insurance plan—order your SilcoCan® canister with a Siltek® treated valve.

	1L Volume		3L Volume		6L Volume		15L Volume	
Description	cat.#	price	cat.#	price	cat.#	price	cat.#	price
Parker Diaphragm Valve								
w/ Parker Diaphragm Valve	24180		24181		24182		24183	
w/ Parker Diaphragm Valve, Siltek Treated	24180-650		24181-650		24182-650		24183-650	
w/ Parker Diaphragm Valve, and Gauge*	24140		24141		24142		24143	
w/ Parker Diaphragm Valve, Siltek Treated, and Gauge*	24140-650		24141-650		24142-650		24143-650	
without Valve	22090		22091		22092		22093	

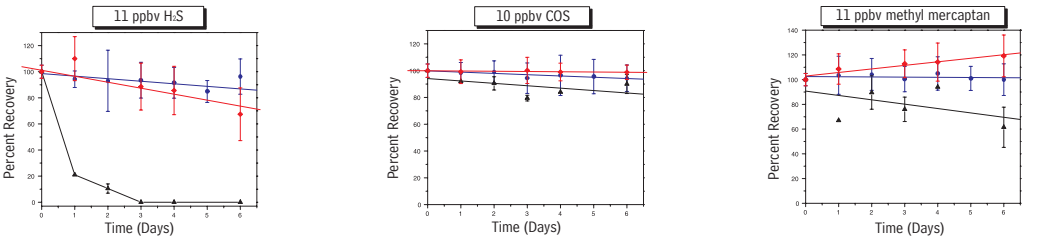
*Range of standard gauge is -30"Hg to 60psi.
For additional gauge and valve options, see pages 412-413.

also **available**

We also offer sampling kits, sampling bags, and a range of gas reference standards to meet your environmental gas sampling requirements. See **pages 414-432.**

Whether you are monitoring for TO-14A, TO-15, or reactive sulfur compounds, SilcoCan® canisters are your best choice for inertness. In Tedlar® bags, the stability of low-level (100 ppbv) sulfur volatile organic compounds (VOCs) is poor, even within 24 hours of sampling. Sulfur compounds react with the metal surface in electropolished canisters, so these canisters are unsuitable for collecting and storing low-level sulfur VOCs. SilcoCan® air monitoring canisters, which feature a Siltek® treated surface, offer excellent storage stability for sulfur VOCs at very low levels (1–20 ppbv), under dry or humid conditions. The versatility of the SilcoCan® canister makes it an excellent choice for collecting and storing TO-14A or TO-15 compounds.

SilcoCan® canisters effectively store very low levels of sulfur compounds.



Standards: Dry standards were made by adding 2mL of a 100ppm stock sulfur standard to each precleaned and evacuated canister, then pressurizing to 30psi with ultra-pure nitrogen. The resultant concentrations are listed in Applications Note #59347A (download your free copy from www.restek.com). Humidified standards were made by injecting 100µL of deionized water into the evacuated canisters prior to adding 2mL of stock standard. This produced 50% RH.
GC Column: Rtx®-1 , 60m, 0.53mm ID, 7.0µm; **Detector:** Sievers Model 355 Sulfur Chemiluminescence Detector

Improved TO-Can® Air Monitoring Canisters (SUMMA Can Equivalent)

Optimized for EPA Methods TO-14A and TO-15, and ASTM D5466

- Proprietary electropolished surface that maintains compound stability.
- High quality, metal-to-metal seal, 2/3-turn valve with stainless steel diaphragms or Bellows design.
- 2-port or 3-port valve available for diaphragm valve; 3-port valve includes -30" Hg/60 psi vacuum/pressure gauge (other gauges available).

Features	Benefits
Metal to metal seat, valve with stainless steel diaphragms.	No sample adsorption, for more accurate results.
Vacuum/pressure gauge (optional).	Ascertain internal conditions at a glance.
Stable to 250°C.	Heat canister to 250°C for superior cleaning.

US EPA Compendium of Air Methods TO-14A and TO-15 regulate the collection, storage, and analysis of volatile organic compounds (VOCs) using treated air sampling canisters. Restek offers a complete line of TO-Can® canisters (SUMMA can equivalent), electropolished using a proprietary process and extensively cleaned using an ultrasonic method. This ensures a high-quality, passivated surface that maintains the stability of TO-14A/TO-15 compounds during storage. The frame surrounds the electropolished canister, eliminating the need for weld marks on the sphere, thereby preventing active sites on the canister. The Parker® Hannifin metal-to-metal diaphragm valve supports the excellent performance of the canister.

The unique holder attaches the handle and base to the canister without welds, and protects the canister, tube stub, and valve. The 2/3-turn diaphragm valve has a metal-to-metal seat and a temperature limit of 250°C. We leak check the system with helium to ensure the TO-Can® canister and valve are leak-tight, then pressurize the canister with contaminant-free nitrogen before we ship it.

24173 22107

please **note**

- SUMMA canister equivalent.
- Excellent analyte recovery—even after 14 days of storage.

did you **know**?

TO-Can® canisters are cleaned prior to shipping.

Description	1L Volume cat.#	1L Volume price	3L Volume cat.#	3L Volume price	6L Volume cat.#	6L Volume price	15L Volume cat.#	15L Volume price
Parker Diaphragm Valve								
w/ Parker Diaphragm Valve	24172		24173		24174		24175	
w/ Parker Diaphragm Valve, and Gauge*	24176		24177		24178		24179	
Swagelok SS4H Bellows Valve								
w/ Swagelok SS4H Bellows Valve	22105		22106		22107		22108	
without Valve	22094		22095		22096		22097	

*Range of standard gauge is -30"Hg to 60psi.
For additional gauge and valve options, see pages 412-413.

Quickly confirm vacuum or pressure. Request a high-quality gauge mounted on your SilcoCan® or TO-Can® canister.

Alternative Mounted Vacuum/Pressure Gauges

The standard vacuum/pressure range on a SilcoCan® or TO-Can® canister fitted with a gauge is -30" Hg to 60 psi. To have a different gauge mounted on your canister, add the appropriate suffix number to the canister catalog number.*

Gauge	Suffix
-30" Hg/15psi	-651
-30" Hg/30psi	-652

*No price difference for these substituted gauges.

free literature

A Guide to Whole Air Canister Sampling:
Equipment Needed and Practical Techniques for Collecting Air Samples
Ambient air sampling involves collecting a representative sample of ambient air for analysis. There are two general approaches: 1) "whole air" sampling with canisters or Tedlar® bags and 2) "in-field concentration" sampling using sorbent tubes or cold traps. In this guide, we focus on collecting whole air samples in canisters, a flexible technique with many applications.

Download your free copy from **www.restek.com**

Technical Guide
lit. cat.# EVTG1073

24144

Valves and Gauges for Air Monitoring Applications

Replacement Parker® Diaphragm Valves

- High quality, metal-to-metal seal, 2/3-turn valve with stainless steel diaphragms.
- 2-port or 3-port valve available.

	Stainless Steel Valve		Siltek-Treated Valve	
Description	cat.#	price	cat. #	price
1/4" Replacement Valve (2-port)	24145	$235	24144	
1/4" Replacement Valve (3-port)	24147	$245	24146	

*All Restek canisters are originally equipped with high-quality Parker Hannifin diaphragm valves. Each valve is helium leak-tested to 4 x 10^{-9}cc/sec. The all-stainless steel construction eliminates contamination and withstands temperatures from -100°C to 250°C. Other features include a compression outlet fitting and a 1/4" inlet and outlet.

Replacement Swagelok® SS4H Bellows Valve

- All metal flow path prevents sample adsorption, giving more accurate results.
- Unique serial number on each valve for complete traceability.
- Withstands temperatures of up to 300 °C.
- Rugged performance in the field.
- Fast delivery from Restek!

24148

Restek offers Swagelok® SS4H canister valves. These popular, rugged valves are available separately or already assembled on our TO-Can® canisters. Valves are bellows-sealed for durability and meet all EPA requirements for air monitoring by methods TO-14A and TO-15.

Description	qty.	cat.	price
Replacement 1/4" Swagelok SS4H Bellows-Sealed Valve (2-port)	ea.	24148	

Replacement 1/4" Swagelok SS4H Bellows-Sealed Valves are available on SilcoCan canisters as a custom product. Contact Technical Service for more information.

Replacement Combination Vacuum/Pressure Gauges

2-inch vacuum/pressure gauges, 316 stainless steel with 1/8" NPT fitting and center back mount. Recommended for use with canisters.

Description	qty.	cat.#	price
-30"Hg/15psi Vacuum/Pressure Gauge	ea.	24100	
-30"Hg/30psi Vacuum/Pressure Gauge	ea.	24104	
-30"Hg/60psi Vacuum/Pressure Gauge	ea.	24108	

Alternative Mounted Vacuum/Pressure Gauges

The standard vacuum/pressure range on a SilcoCan® or TO-Can® canister fitted with a gauge is -30" Hg to 60 psi. To have a different gauge mounted on your canister, add the appropriate suffix number to the canister catalog number.*

Gauge	Suffix
-30" Hg/15psi	-651
-30" Hg/30psi	-652

*No price difference for these substituted gauges.

24120

Vacuum Gauges

High-quality vacuum gauges with 316 stainless steel wetted surfaces. -30" Hg to 0" Hg. Recommended for use with passive sampling kits. All are rear mount.

Description	Fittings	qty.	cat.#	price
2" Vacuum Gauge	1/8" NPT	ea.	24269	
2" Vacuum Gauge	1/4" NPT	ea.	24270	
1 1/2" Vacuum Gauge	1/8" NPT	ea.	24120	

Ashcroft® Test Gauges

- Accurate measurement of vacuum to -30" Hg and pressure to 60 psi.
- Available in both analog and digital formats.
- Accuracy to +/- 0.25%.
- Gauge connector to canister valve available.

High accuracy test gauges are recommended for verifying the vacuum/pressure in canisters before and after sampling. The 6-inch face on the analog gauge allows for easy reading. The digital gauge operates on 2 AAA batteries and offers an unambiguous readout. Both gauges have an accuracy of +/- 0.25% and all metal wetted parts.

24285

24268

Description	qty.	cat.#	price
Analog Test Gauge, 6" diameter, 1/4" NPT	ea.	24285	
Digital Test Gauge, 3" diameter, 1/4" NPT	ea.	24268	
Ashcroft Gauge Connector to Canister Valve, stainless steel, connects 1/4" male NPT to 1/4" male compression fitting	ea.	22121	

NEW!

Choose the Appropriate Device for Your Sampling Needs



	Canister	Gas Sampling Bag	Solvent Desorption Tube
Media Type	whole air	whole air	adsorption
Sensitivity	ppb	ppm	ppm
Technique	passive (no pump)	active	active
Sample Type	grab or integrated	grab	integrated
Analyte	wide range of VOCs	wide range of VOCs & permanent gases	sorbent specific
Applications	ambient, IAQ, emergency response, IH	ambient, IAQ emission	IAQ, IH
Durability	reusable	one time use	one time use
Inertness	excellent	fair	fair
Stability	30 day	48 hrs	varies by analyte
Sample Volume	0.4–6 L	0.5–100 L	varies by analyte
Sampling Time	minutes to days	minutes to hours	minutes to hours

See pages 408-411 for canisters. See page 423 for gas sampling bags.
See page 425 for canister and thermal desorption tube comparison.

Passive Air Sampling Kits—Integrated

- Provide accurate integrated sampling without a sampling pump.
- Siltek® treated components ensure accurate sampling of active components.
- Excellent for sampling times from 0.5 hour to 125 hours.

Restek's passive air sampling kit incorporates all the hardware necessary to collect air samples, and is easy to assemble for field sampling.* The improved filter design greatly reduces the number of potential leak sites.

The passive air sampling kit is available in seven sampling flow ranges, and in stainless steel or Siltek® treated finish. The stainless steel kit is ideal to partner with the Restek TO-Can® air sampling canister for TO-14A and TO-15 methods. Use the Siltek® treated version with the Restek SilcoCan® air sampling canister when collecting low-level volatile sulfur compounds, or other active compounds.

Canister Volume*/Sampling Time					Flow	Orifice	Siltek Treated	Stainless Steel
400cc	1 Liter	3 Liter	6 Liter	15 Liter	(mL/min.)	size	Sampling Kits	Sampling Kits
8 hour	24 hour	48 hour	125 hour	—	0.5–2	0.0008"	24217	24216
2 hour	4 hour	12 hour	24 hour	60 hour	2–4	0.0012"	24160	24165
1 hour	2 hour	6 hour	12 hour	30 hour	4–8	0.0016"	24161	24166
—	1 hour	4 hour	8 hour	20 hour	8–15	0.0020"	24162	24167
—	—	2 hour	3 hour	8 hour	15–30	0.0030"	24163	24168
—	—	—	1.5 hour	4 hour	30–80	0.0060"	24164	24169
—	—	—	0.5 hour	1 hour	80–340	0.0090"	22101	22100

*Air sampling canisters sold separately. See pages 410-411.

also **available**

Miniature air sampling kits. See **page 420**.

Canister and flow controller repair service. See **page 422**.

1. Veriflo® SC423XL flow controller
This flow controller is the heart of the sampling train. It is a high-quality device designed to maintain a constant mass flow as the pressure changes from -30" Hg to 7" Hg (we recommend you stop sampling at or before 7" Hg of vacuum). All wetted parts of the flow controller can be Siltek® treated.

2. Stainless steel vacuum gauge, 1/8" NPT
Fitted to the flow controller, the gauge monitors canister vacuum change during sampling.

3. 1/4-inch Siltek® sample inlet
The 0.3 m x 1/4-inch tubing includes a stainless steel nut on the inlet end, to prevent water droplets from accumulating at the edge of the tubing, where they could be pulled into the sampling train.

All fitting connections are 1/4" tube, except where noted.

1/4" NPT

4. 2-micron frit filter and washer
Located prior to the critical orifice to prevent airborne particles from clogging the critical orifice. Replaceable. Available in stainless steel, or Siltek® treated for optimum inertness.

5. Interchangeable critical orifice
An interchangeable ruby critical orifice allows you to control the flow with very high precision.

To select the correct critical orifice for your sample, see table above. Available in stainless steel, or Siltek® treated for optimum inertness.

please **note**

For individual components, see **page 415**.

Buy only the parts you need!

Replacement Orifices

Use these orifices with a Veriflo® 423XL flow controller to change the flow range for alternative sampling times.

Flow	Orifice size	Siltek Treated cat.#	Siltek Treated price	Stainless Steel cat.#	Stainless Steel price
0.5–2 mL/min.	0.0008"	24219		24218	
2–4 mL/min.	0.0012"	24233		24245	
4–8 mL/min.	0.0016"	24234		24246	
8–15 mL/min.	0.0020"	24235		24247	
15–30 mL/min.	0.0030"	24236		24248	
30–80 mL/min.	0.0060"	24237		24249	
80–340 mL/min.	0.0090"	22099		22098	

2 µm Frit Filters

For use in critical orifice fitting. Includes washers.

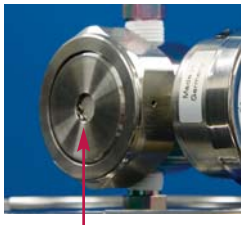
Description	qty.	cat.#	price
Replacement Frit Filter, Siltek Treated	3-pk.	24171	
Replacement Frit Filter, Stainless Steel	3-pk.	24170	

Veriflo® Flow Controllers

Veriflo® 423XL flow controllers are offered in a Siltek® and stainless steel version. The flow device is available with or without a critical orifice. (Vacuum gauge sold separately.)

The critical orifice in a Veriflo® flow controller is interchangeable. Order orifices for alternate sampling times, or replacement orifices, separately.

Flow	Orifice size	Siltek Treated cat.#	Siltek Treated price	Stainless Steel cat.#	Stainless Steel price
0.5–2 mL/min.	0.0008"	24232		24229	
2–4 mL/min.	0.0012"	24255		24260	
4–8 mL/min.	0.0016"	24256		24261	
8–15 mL/min.	0.0020"	24257		24262	
15–30 mL/min.	0.0030"	24258		24263	
30–80 mL/min.	0.0060"	24259		24264	
80–340 mL/min.	0.0090"	22103		22102	
	without orifice	24238		24239	



7µm In-Line Filter

This 316 stainless steel filter is designed to collect particles larger than 7 microns. We offer Siltek® and stainless steel versions (1/4" compression fitting on both ends).

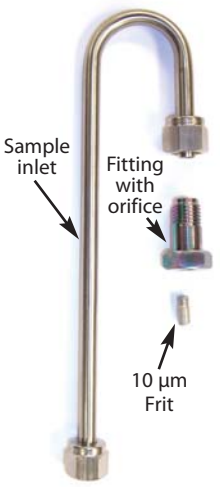
Description	qty.	cat.#	price
7µm In-Line Filter, Siltek Treated	ea.	24265	
7µm In-Line Filter, Stainless Steel	ea.	24266	

Note: frit is not replaceable.

Sample Inlets

- 1/4" stainless steel compression fitting on each end.
- One end connects to flow controller or canister; nut on other end serves as rain guard.
- Includes nuts and ferrules.
- Two different lengths for use with large canisters and miniature canisters.

Description	qty.	Siltek Treated cat.#	Siltek Treated price	Stainless Steel cat.#	Stainless Steel price
Sample Inlet, 6" Length	ea.	26210		26209	
Sample Inlet, 1.5" Length	ea.	26212		26211	



Unassembled kit components

Assembled kit on canister

Air sampling canisters sold separately.

Passive Air Sampling Kits—Grab

- Use with 1, 3, or 6 L canisters, for qualitative grab air sampling.
- Variety of orifice sizes, for fast sampling from 5 to 60 minutes.
- 1/4" compression fitting connects directly to canister valve inlet.
- Replaceable frit protects orifice and valve from particulates.
- Sample inlet design minimizes water entry into sampling train.
- Individual replacement components available.

Canister Volume/Sampling Time (min.)			Flow		Siltek Treated Grab Sampling Kits		Stainless Steel Grab Sampling Kits	
1 L Canister	3 L Canister	6 L Canister	(mL/min.)	Orifice Size	cat.#	price	cat.#	price
60	—	—	15	0.0018"	26280		26263	
30	—	—	20	0.0020"	26281		26264	
15	60	—	45	0.0030"	26282		26265	
—	30	60	80	0.0040"	26283		26266	
5	15	30	150	0.0055"	26284		26267	
—	—	15	300	0.0080"	26285		26268	
—	5	—	390	0.0090"	26286		26269	
—	—	5	>1,000	0.0130"	26287		26270	

Air sampling canisters sold separately. See pages 410-411.

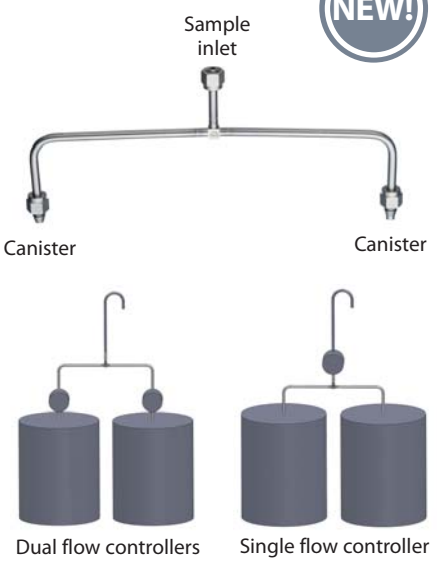
Replacement Fittings for Grab Sampling Kits

Includes fitting and orifice.

Orifice Size	Siltek Treated Replacement Fitting w/Orifice cat.#	price	Stainless Steel Replacement Fitting w/Orifice cat.#	price
0.0018"	26288		26271	
0.0020"	26289		26272	
0.0030"	26290		26273	
0.0040"	26291		26274	
0.0055"	26292		26275	
0.0080"	26293		26276	
0.0090"	26294		26277	
0.0130"	26295		26278	

Replacement 10 µm Frits for Grab Sampling Kits

Description	qty.	Siltek Treated cat.#	price	Stainless Steel cat.#	price
10µm Frit for Grab Sampling Kit	3-pk.	26296		26279	



Dual Canister Sampling Manifold

- Duplicate sampling with all size canisters using 1 or 2 flow controllers.
- Precise dimensions (9.5" wide x 3.5" high) provide accurate splitting of sample between two canisters.
- One-piece design means fewer leaks.
- Thick walled stainless steel tubing is rugged enough for field use.
- 1/4" compression connections.

Field duplicates of canister samples frequently result in analyte concentrations with high relative standard deviations. In addition, field duplicates do not differentiate laboratory performance from sampling variability. Restek's Dual Canister Sampling Manifold (DCSM) minimizes sampling variability through a single sample inlet and flow controller by which the sample is evenly collected between two canisters. Use of a single flow controller eliminates flow rate variability, as well as environmental variables common with collocated samples. The DCSM may also be used with 2 flow controllers to monitor individual canister vacuum.

Description	Stainless Steel cat.#	price	Sulfinert Treated cat.#	price
Dual Canister Sampling Manifold	24998	$112	24999	

Note: Do not use the DCSM as a handle to pick up 2 canisters!

Passive Air Sampling Kits—Soil Gas

This unique grab sampler is specifically designed for soil gas sampling by allowing the connection of tubing coming from the soil gas sample port. The innovative design minimizes connections and leaks and houses a critical orifice in the tee fitting. It also incorporates a vacuum gauge and 2 µm frit filter.

Assembled sampler includes:
- Stainless steel tee with orifice.
- 1½" vacuum gauge (-30" Hg to 0" Hg).
- 2 µm frit filter for insertion into ¼" compression sample inlet.
- ¼" port connector to canister valve.

The ¼" compression inlet and outlet allows easy connection to the canister valve and also to the tubing from the sample port. Several orifice sizes provide sampling times from 20 min. to 10 hours on a 6 L canister. Individual replacement parts are available, providing a cost-effective alternative to replacing the entire sampler.

Sampling Time for 1 L Canister	Sampling Time for 6 L Canister	Flow	Orifice Size	Siltek Treated Soil Gas Samper Kit cat.#	Siltek Treated Soil Gas Samper Kit price	Stainless Steel Soil Gas Samper Kit cat.#	Stainless Steel Soil Gas Samper Kit price
4 min.	20 min.	210 mL/min.	0.0065"	22935		22930	
6 min.	30 min.	150 mL/min.	0.0055"	22936		22931	
10 min.	1 hr.	80 mL/min.	0.0040"	22937		22932	
45 min.	4 hr.	19 mL/min.	0.0020"	22938		22933	
2 hr.	10 hr.	6 mL/min.	0.0014"	22939		22934	

*Air sampling canisters sold separately. See pages 410-411.

Assembled kit on canister

Air sampling canisters sold separately.

Replacement Tees w/Orifice for Soil Gas Sampler Kits

Orifice Size	Siltek Treated Replacement Tee w/Orifice cat.#	Siltek Treated Replacement Tee w/Orifice price	Stainless Steel Replacement Tee w/Orifice cat.#	Stainless Steel Replacement Tee w/Orifice price
0.0065"	22945		22940	
0.0055"	22946		22941	
0.0040"	22947		22942	
0.0020"	22948		22943	
0.0014"	22949		22944	

tech tip

Use Restek's Electronic Leak Detector for tracer gas detection before soil gas sampling. See page 204.

Replacement Parts for Soil Gas Sampler Kits

Description	qty.	cat.#	price
Vacuum Gauge, 1 ½"	ea.	24120	
Replacement Frit Filter, Stainless Steel	3-pk.	24170	
Replacement Frit Filter, Siltek Treated	3-pk.	24171	
Port Connector, ¼", Siltek/Sulfinert Treated	ea.	21549	
Port Connector, ¼", Stainless Steel	2-pk.	21936	
Nut & Ferrule Set, ¼", Stainless Steel	5-pk.	21911	
Nut, ¼", Stainless Steel	10-pk.	21902	

also **available**

VCO® Fittings

- Use VCO® fittings for rapid assembly to cleaning system.
- Protect canister valves, flow controllers, and cleaning system fittings.

See page 322.

Simplify automated and manaul air sampling with a Sampling Timer.

Canister and passive air sampling kit must be purchased separately.

Canister Air Sampling Timer

- Program up to 12 timed events!
- Capable of both manual and automated operation.
- Perfect for either grab or time-integrated sampling.
- Long battery life; recharges conveniently using the USB port on any PC.
- All stainless steel sample flow path ensures inertness, improving accuracy.

These timers are designed to simplify both automated and manual air sampling. The easy-to-use keypad and graphic display facilitate the programming of up to 12 timed events. They offer the convenience of remote start/stop sampling and permit intermittent sampling throughout a test period. The LCD remains in sleep mode when not in use, greatly extending battery life. Timers are compatible with any canister and flow controller.

Features include: solenoid valve for sampling control, 1/4" Swagelok® inlet and outlet fittings, highly inert stainless steel flow path, and water-proof exterior for outdoor use.

Description	qty.	cat.#	price
Canister Air Sampling Timer	ea.	24267	

NEW!

TO-Clean Canister Cleaning System

High capacity, fully automated, easy to use canister cleaning oven dramatically increases lab efficiency.

- EPA Method TO-14A/15 compliant.
- Powerful pump can achieve 50 mTorr in 30 minutes for twelve 6 L canisters.
- Custom-built trays for different canister sizes.
- One year limited warranty.
- Fully assembled and ready to use.

TO-Clean from Wasson-ECE Instrumentation is a revolutionary canister cleaning system designed to take the guesswork out of canister cleaning. The system is fully automated, allowing the user to start a cleaning cycle and walk away. This is a high performance system that is easy to use and consistently produces excellent results.

Feature	Benefit
Large capacity—holds 12 6L cans or 24 1L cans.	Twice the capacity of other ovens for faster turnaround.
Embedded touch screen controller.	No separate computer needed.
Adjustable oven control up to 110 °C.	Cleans canisters AND valves faster and more completely than heating bands.
10 user defined methods.	Each cleaning cycle parameter can be configured separately to minimize overall cycle time.
Edwards RV-8 vacuum pump.	Cheaper to run and maintain than 2 pump alternatives.
Vacuum and pressure stainless steel cold traps.	Keeps the system clean—no contamination from the pump or dirty canisters.

Description	qty.	cat.#	price
TO-Clean Oven, 120V, 60Hz	ea.	22916	
TO-Clean Oven, 220/230V, 50/60Hz	ea.	22917	
Optional Accessories (not included with TO-Clean Oven)	**qty.**	**cat.#**	**price**
Dewar, glass, 4300mL stainless steel u-tube trap	ea.	22918	
Oven Cart, 29"H x 27"W x 49"D, 12 gauge steel, push handle and casters	ea.	22919	
1L Option: includes tubing, fittings, and inserts for 24 1L canisters	ea.	22920	
Humidification Chamber	ea.	24282	

Shipping: FedEx Ground, unless otherwise requested. Costs vary depending on ship-to location.

Note: Ovens are built on demand, therefore, a ten week lead time is required on all orders. A limited cancellation and return policy applies to TO-Clean ovens; contact Restek Customer Service for details.

	Restek	Entech
Capacity	Twelve-6 L cans	Six-6 L cans
Software	Included	Separate

www.restek.com/air

for **more** info

Download **EVTS1186.pdf** from **www.restek.com**

Air Canister Heating Jacket

- Closely simulates oven environment—heats entire canister and valve.
- Two temperature settings, 75 °C and 150 °C.*
- Prevents sample condensation, for accurate sub-sampling.
- Easily fits canister up to 6 liters.
- Lightweight; comfortable to the touch when heated.
- Connect up to five Canister Heating Jackets to one 15 amp circuit.

The ultimate in controlled heating, for reliably cleaning your air canisters!

Description	qty.	cat.#	price
Air Canister Heating Jacket (110 volt)	ea.	24123	

*Not CE certified.

did you **know**?

After assembly, every Restek SilcoCan® and TO-Can® canister is evacuated to 50 mTorr, then pressurized with humidified nitrogen to 30 psi. The cleaning system is programmed to repeat this cycle two times to ensure thorough cleaning. We ship our canisters clean and under pressure at 30 psi with dry nitrogen.

Humidification Chamber

When cleaning SilcoCan® or TO-Can® canisters, it is important to use humidified air or nitrogen to help remove volatile organic contaminants. We incorporated our humidification chamber into the design of our cleaning system. Restek's humidification chamber is made of acrylic and withstands pressure up to 90 psi. The 1/4-inch inlet and outlet compression fittings allow easy connection to pressure lines on your cleaning system. Our humidification chamber also has an easy-to-open lid for filling with water.

Description	qty.	cat.#	price
Humidification Chamber	ea.	24282	

24282

Restek's canister cleaning system with humidification chamber.

Air Canister Tripod

NEW!

- Lightweight (9 pounds) and compact, for easy storage and transport.
- Extends from 6' to 9' high.
- Large base provides enhanced stability, without additional supports.
- Sturdy, rugged metal design, for outdoor sampling and transport.

Restek's Air Canister Tripod holds two canisters simultaneously for collocated ambient air sampling. The custom-designed bracket holds most 1, 3, and 6 L canisters securely, without any tools.*

Description	qty.	cat.#	price
Air Canister Tripod	ea.	24151	

*Air sampling canisters sold separately. See pages 410-411.

Air Canister Tripod conveniently holds 2 air canisters.

Canister Carrying Supplies

Canister Carrying Box Kit

6-liter carrying boxes with plastic handles simplify canister transport. These boxes also accommodate our passive sampling kit. 4 carrying boxes and 1 shipping box per kit.

Description	qty.	cat.#	price
Canister Carrying Box Kit	kit	24215	

24215

Restek canisters are shipped in boxes with handles for easy transportation.

Canister Carrying Case

- Heavy-duty, all-aluminum design, fits two 6 L SilcoCan® or TO-Can® canisters tightly without foam.
- Weight: 9 lbs.
- Inside dimensions: length 18", width 9 1/8", height 12 1/2" (46 x 23 x 32 cm).
- No organic contaminants from foam or plastics.

24226

Description	qty.	cat.#	price
Deluxe Canister Carrying Case	ea.	24226	

Expand Air Sampling with Mini-Cans & Accessories

Replacement Parts . . . . . .page #
Flow Controller 415
Gauge 412
Orifices 415
Sample Inlet 415

- Grab and integrated sampling without sampling pump.
- 8-hr integrated sample possible with 400 cc mini-can.
- Siltek® coating delivers high level of inertness for H_2S & other reactive compounds.
- Versatile enough for many applications:
  - **Indoor air** - **Industrial hygiene**
  - **Soil gas** - **Emergency response**

26252

Miniature Air Sampling Kits

- Provide accurate integrated sampling without a sampling pump.
- Convenient smaller size connects easily to miniature canisters.
- Available in stainless steel or Siltek® treated components for greater inertness.

Restek's passive air sampling kit incorporates all the hardware necessary to collect air samples, and is easy to assemble for field sampling.* Kit includes flow controller, critical orifice, 2 µm frit filter, vacuum gauge, and sample inlet. The gauge (cat.# 24120) and sample inlet (cat.#s 26211, 26212) are downsized for partnering with smaller canisters. Refer to page 414 for sampling kit details and pages 412 and 415 for individual components.

Canister Volume*/Sampling Time			Orifice	Siltek Treated	Stainless Steel
400cc	1 Liter	Flow	size	Sampling Kits	Sampling Kits
8 hour	24 hour	0.5–2 mL/min.	0.0008"	26253	26252
2 hour	4 hour	2–4 mL/min.	0.0012"	26255	26254
1 hour	2 hour	4–8 mL/min.	0.0016"	26257	26256
—	1 hour	8–15 mL/min.	0.0020"	26259	26258

*Air sampling canisters sold separately.

NEW!

Mini-Can Accessories

These accessories enhance mini-can usage and provide flexibility in their application, from personal to area to vapor intrusion sampling.

Sampling Belt & Personal Sample Inlet

Sampling Belt:

- Adjustable up to 50"
- 2 velcro straps securely hold mini-can or other sampling device
- Straps slide anywhere on belt
- Versatile usage for personal wear or hanging for area sampling

Personal Sample Inlet:

- 3' long x 1/16" OD all Teflon® tubing
- Convenient clip can be moved along length of tubing for proper attachment in breathing zone
- Teflon® reducing ferrule allows direct connection from 1/16" tubing to 1/4" flow controller without another fitting

Mini-Can Stand:

- Collapsible for easy storage and transport
- 2 out of 3 legs move to accommodate uneven surfaces
- Holds 2 3/4" diameter cans securely
- Small footprint—12" diameter x 6.5" height

Mini-Can Stand

Mini-Can and Sampling Kit not included.

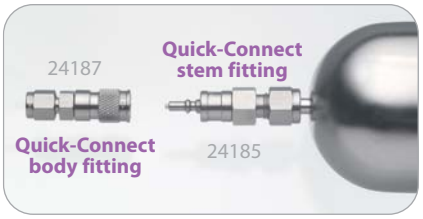
Description	qty.	cat.#	price
Sampling Belt	ea.	22122	
Personal Sample Inlet (includes: 3" x 1/16" OD Teflon tubing, Clip, Teflon Reducing Ferrule, 1/4" SS nut)	ea.	22123	
Mini-Can Stand	ea.	22124	

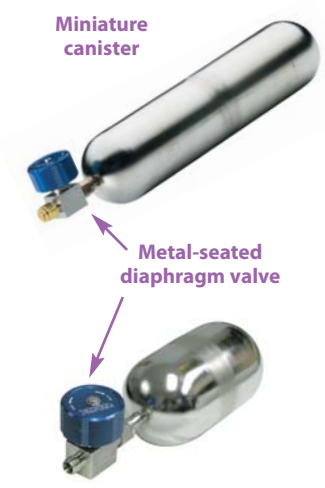
Miniature Air Sampling Canisters

- Ideal for indoor air, personal, emergency response, or soil gas sampling.
- 400 cc or 1,000 cc.
- Available with quick-connect fitting that is compatible with sampling and analysis instruments.
- Also available with nontreated or Siltek® treated valve.

These small canisters are designed for controlled sampling, such as personal air sampling, as an alternative to tube and pump samplers. The 1,000 cc canister is suitable for sampling volatile organic compounds in air according to US EPA Methods TO-14A and TO-15.

Restek offers these products in stainless steel or Siltek® treated, for greatest inertness. We continue to offer passive coating technologies that are unmatched in the air sampling industry—try a Siltek® treated canister to achieve the ultimate in analyte stability.





Dimensions:
400cc = 2.75" diameter, 5.35" long (7 x 13.6cm)
1,000cc = 2.75" diameter, 11.92" long (7 x 30cm)

Description	qty.	400cc cat.#	400cc price	1,000cc cat.#	1,000cc price
Miniature Canister with Quick-Connect Stem Fittings					
Electropolished Stainless Steel	ea.	24188		24194	
Siltek Treated	ea.	24189		24195	
Siltek Treated, with Siltek Treated Quick-Connect Stem Fitting	ea.	24190		24196	
Miniature Canister with Parker Diaphragm Valve					
Electropolished Stainless Steel	ea.	24191		24197	
Siltek Treated	ea.	24192		24198	
Siltek Treated, with Parker Diaphragm Valve, Siltek Treated	ea.	24193		24199	
Miniature Canister without Valve					
Electropolished Stainless Steel	ea.	24205		24206	
Siltek Treated	ea.	24207		24208	

Quick-Connect Fittings for Miniature Air Sampling Canisters

Connection: 1/4" tube fitting.

Description	qty.	cat.#	price
Quick-Connect Stem Fitting	ea.	24185	
Quick-Connect Stem Fitting, Siltek Treated	ea.	24186	
Quick-Connect Stem Protector, Stainless Steel	ea.	24121	
Quick-Connect Body Fitting	ea.	24187	

Note: Quick-connect body fitting (cat.# 24187) must be ordered separately to sample with quick-connect stem fitting.

Attach quick-connect body fitting to stem fitting to open canister. Attach quick-connect stem protector to stem fitting when not sampling to prevent canister from accidentally opening.

tech tip

Use a Gap Inspection Gauge to confirm fittings are sufficiently tightened. See page 325.

How to Extend Canister Life

What reduces canister performance and longevity? Leakage is the most common reason for canister failure, but contamination and damage to the fused silica lining can also send canisters to the scrap yard prematurely. Here are some tips to protect your investment:

1. Prevent leaks

Use proper handling to avoid these 3 leading causes of leaks.

a. Particles in the valve

You can prevent particles from entering the valve by always using a 2 or 7 µm particulate filter during sampling and on your canister cleaning equipment. Also, protect the valve inlet by replacing the brass dust cap when not in use. The EPA-recommended metal-to-metal sealing valves provide the greatest inertness, but tend to be more sensitive to particulate damage than other valve types.

b. Galled thread fittings

Avoid galled thread fittings by using a gap gauge to prevent overtightening of compression fittings. Turning only ¼ turn past finger-tight is another rule of thumb to prevent overtightening. Use brass compression fittings on stainless steel, during nonsampling activities, such as cleaning or calibration, to minimize thread damage. Galled threads may also cause a poor connection to vacuum/pressure gauges, resulting in inaccurate measurement and misleading conclusion that canister leakage exists.

c. Overtightened valve

Canister valves are designed to close securely with hand tightening only. Overtightening a valve closure with a wrench may damage the valve seat where the seal is made.

2. Reduce contamination

a. Segregate high concentration (ppm) cans and trace concentration (ppb) cans. Use dedicated canisters, or gas sampling bags, for ppm level sampling, since it is extremely difficult to remove impurities from ppm sampling to a level suitable for trace sampling.

b. Clean the entire sampling train as you would the can to minimize introduction of contaminants into a clean can. Maximum temperature is 80 °C on the gauge and 90 °C on Restek's Veriflo® flow controller.

c. High temperature (>100 °C) humidified air (steam cleaning) provides the most effective way to remove contamination from electropolished cans (TO-Can® or SUMMA® canisters), but can damage fused silica lined cans. See #3 below for proper cleaning of fused silica lined cans.

3. Avoid damage to fused silica lined cans

Be sure to follow method recommendations when cleaning your canisters to avoid damaging the fused silica lining. Cleaning studies of SilcoCan® canisters using humidified air and heat at 80 °C and 125 °C have shown reduced recoveries of sulfur compounds, when compared to using nitrogen under the same conditions. This irreversible damage is due to oxidation of the surface, creating active sites that may affect the recovery of reactive or polar compounds. Strong acids and bases may also result in damage to the internal can surface.

Canister and Flow Controller Repair Service

Save money and increase performance with Restek's canister and flow controller repair service.

Normal wear and tear on canisters and components can result in damage causing leakage. Restek's repair service allows you to extend the life of your equipment for much less than the cost to replace with new products. Contact Customer Service at 800-356-1688, or your Restek representative, to take advantage of this service. You will be given instructions and an SRV # to return the parts to us.

Sampling Kit/Flow Controller Repair
Includes all new rubber seals in flow controller and orifice and frit replacement
cat.# 550131

Canister Repair
Includes valve replacement, leak test & cleaning
cat.# 560838

Tedlar® Sampling Bags

- Find the bags you need—we offer sizes from 0.5 liters to 100 liters.
- Unique all-in-one septum and valve fitting make these lightweight and easy to use.
- Polypropylene or stainless steel valve.
- Both valves conveniently connect to $^{3}/_{16}$" ID Teflon® tubing.

Description		qty.	Polypropylene Valve cat.#	price	Stainless Steel Valve cat.#	price
0.5L	6" x 6"	10-pk.	22049		22038	
1L	7" x 7"	10-pk.	22050		22039	
3L	9.5" x 10"	10-pk.	22051		22040	
5L	12" x 12.5"	10-pk.	22052		22041	
10L	11.75" x 22"	10-pk.	22053		22042	
12L	13" x 24"	10-pk.	22054		22043	
25L	17.5" x 24"	5-pk.	22055		22044	
40L	24" x 24.25"	5-pk.	22056		22045	
80L	28.25" x 30.5"	5-pk.	22057		22046	
100L	28" x 36"	3-pk.	22058		22047	

Description	qty.	cat.#	price
Teflon Faced Silicone Replacement Septum, 4mm diameter	10-pk.	22104	

tech tip

Use septum puller (cat.# 20117) to replace septum in sampling bag valve.

Description	qty.	cat.#	price
Septum Puller	ea.	20117	$16.25

also available

Multi-layer foil bags
Visit **www.restek.com**

Vacuum Bag Sampler

- Fast bag sampling without sample passing through pump.
- Bag capacity up to 10 L.

The Model 1062 Vacuum Bag Sampler provides fast sampling with zero cross-contamination. A vacuum created in the box draws air into the sampling bag without drawing it through the vacuum pump first, as is the case with standard air sampling pumps, thereby preventing contamination of the sample. This bag sampler can fill a 10 L bag in two minutes with an automatic shut-off switch, which stops the sample bag from overfilling. The filling rate is adjusted with a vent rotometer valve. An external battery recharging port enables continuous operation with battery charger. In addition, the quick exhaust valve allows for fast removal of the sampling bag. The sampler comes with a universal power adapter/charger, battery, instruction manual, and 1-year limited warranty.

Specifications:

Sampling Bag:	1 bag up to 10L size
Running Time:	8 hours
Flow Rate (Fill Rate):	1-5L/min.
Power Requirements:	12V battery, 4.5 amp
Charge Time:	9 hours
Dimensions:	9" x 14.6" x 21.7"
Weight:	17 lbs

Features:

- Observation window on case lid
- Sample inlet accepts $^{1}/_{4}$" OD tubing
- Case designed for rugged outdoor use
- CE certified

Description	qty.	cat.#	price
Vacuum Bag Sampler Model 1062 (includes: power adapter, battery, manual)	ea.	22118	
Replacement Battery for Vacuum Bag Sampler Model 1062	ea.	22119	
Universal Battery Charger for Vacuum Bag Sampler Model 1062 (115/230 VAC)	ea.	22120	

Thermal Desorption Unit Tubes

method **applications**

Method	Application
US EPA	TO-17
ASTM	D6196
NIOSH	2549
DIN EN ISO	16017

Specifications

Dimensions: 1/4" OD x 3 1/2" long

Low sampling rates: 0.01-0.20 L/min. (<10L total volume)

Long-term storage caps are supplied with conditioned tubes

Thermal Desorption Unit (TDU) Tubes

- Variety of sorbents to collect a wide range of VOCs, including Tenax® and carbon sorbents.
- Use glass tubes for maximum inertness in active sampling.
- Choose stainless steel tubes for either active or passive sampling. No sampling pump necessary for passive sampling with diffusion caps!
- Individually etched with unique serial number for convenient sample identification.
- Available unconditioned or preconditioned and ready to sample. Tubes are reusable after thermal desorption.

High-quality thermal desorption tubes by Markes International. These sorbent tubes are suitable for ppt to ppm concentrations of volatile organic compounds (VOCs) in ambient, indoor, and industrial hygiene environments. Available in both stainless steel and glass (for thermally labile VOCs), they fit Markes ULTRA-UNITY™, PerkinElmer, and Shimadzu thermal desorbers. Packed tubes come with a report detailing the total mass of sorbent in the tube; conditioned tubes also include a blank chromatogram.

Thermal Desorption Tube Sorbent	Vapor Phase Organics Applications
Tenax® TA	C6/7 to C26
Graphitized Carbon	C5/6 to C14
Tenax® GR/Carbopack™ B	*n*-C5/6 to *n*-C20 (EPA Methods TO-14A/TO-15/TO-17)
Carbopack™ B/Carbosieve™ SIII	*n*-C2/3 to *n*-C12/14 (EPA Methods TO-14A/TO-15/TO-17)
Tenax® TA/Graphitized Carbon/Carboxen™ 1000	C2/3 to C20
Carbopack™ C/Carbopack™ B/Carbosieve™ SIII	*n*-C2/3 to *n*-C16/20 (EPA Methods TO-14A/TO-15/TO-17)

24061

24062

24067

24054

24055

24071

24070

24074

Thermal Desorption Unit Tubes (Unconditioned and Conditioned & Capped)

		Unconditioned				Conditioned & Capped			
		Stainless Steel		Glass		Stainless Steel		Glass	
Description	qty.	cat.#	price	cat.#	price	cat.#	price	cat.#	price
TDU Tubes, Tenax TA	10-pk.	24056		24062		24080		24086	
TDU Tubes, Graphitized Carbon	10-pk.	24057		24063		24081		24087	
TDU Tubes, Tenax GR/Carbopack B	10-pk.	24058		24064		24082		24088	
TDU Tubes, Carbopack B/Carbosieve SIII	10-pk.	24059		24065		24083		24089	
TDU Tubes, Tenax TA/Graphitized Carbon/Carboxen 1000	10-pk.	24060		24066		24084		24090	
TDU Tubes, Carbopack C/ Carbopack B/Carbosieve SIII	10-pk.	24061		24067		24085		24091	

Thermal Desorption Unit Tubes (Empty)

- Empty tubes for direct desorption of VOCs in liquids, solids, or pastes.
- Stainless steel: front sorbent-retaining gauze fitted, rear gauze and gauze retaining spring supplied.
- Glass: with glass frit positioned 15 mm from sampling end.

		Stainless Steel		Glass	
Description	qty.	cat.#	price	cat.#	price
TDU Tubes, Empty	10-pk.	24054		24055	

Thermal Desorption Unit Tubes (Calibration)

		Stainless Steel		Glass	
Description	qty.	cat.#	price	cat.#	price
TDU Tubes, Calibration, Tenax TA 1cm Bed	10-pk.	24075		24076	

Description	qty.	cat.	price
Calibration Solution Loading Rig	ea.	24077	
Calibration Solution Loading Rig Replacement Septa, 9.5mm	10-pk.	24078	
Certified Reference Standard, 100ng BTX on Tenax TA	10-pk.	24079	

Thermal Desorption Unit Tubes (Accessories)

Description	Benefits/Uses	qty.	cat.	price
1/4" Brass Cap and PTFE Ferrules	Long-term storage of blank/sampled tubes.	20-pk.	24068	
1/4" PTFE Ferrules	Long-term storage caps.	20-pk.	24069	
CapLok Tool	Use for tightening long-term storage caps.	ea.	24070	
Pen Clip		10-pk.	24071	
TubeMate Tool	Assists with tube packing.	ea.	24072	
1/4" Stainless Steel Union and PTFE Ferrules	Use for connecting tubes in series.	10-pk.	24073	
Diffusion Caps	Required for diffusive sampling with stainless steel tubes.	10-pk.	24074	

Thermal Desorption Tubes vs. Canister Sampling

Which VOC Sampling Technique is Right for You?

Thermal desorption tubes provide a complementary option to canisters for sampling VOCs. Both techniques have advantages and disadvantages, and their features must be evaluated for suitability relative to the sampling environment and analytical capabilities. Table I outlines the similarities and differences between these techniques; use this handy comparison to determine which equipment is best for you.

Table I Comparison of thermal desorption tube and canister sampling for VOCs.

Similarities Between Thermal Desorption Tubes and Canisters

- Reusable sampling device.
- Long product lifetime.
- Long-term sample stability.
- Blank certification required prior to sampling.
- Sample concentration required before GC/MS analysis.
- Dry purge helpful to remove moisture before GC injection.
- Ppt sensitivity.
- Method acceptance.
- Collection of wide range of VOCs with single device.
- Useful for screening of unknowns.
- Leak tightness critical to maintaining sample integrity and preventing contamination of a clean device.

Differences Between Thermal Desorption Tubes and Canisters

	Thermal Desorption Tubes	Canisters
Methods	US EPA TO-17 ASTM D6196 ISO 16017 ISO 16000-6 NIOSH 2549	US EPA TO-14A, TO-15 ASTM D5466 OSHA PV2120 NIOSH Protocol Draft
	World-wide acceptance	Gold standard for US ambient air market
Applications	Ambient air, indoor air, industrial hygiene Material emissions Food & flavor Chemical weapons	Ambient air, indoor air, vapor intrusion, emergency response
	C3 to C30	<C3 to ~C10
Handling	Light weight for personal monitoring and general ease of use	Larger and heavier; more costly to ship
Sampling	Active sampling with sampling pump or diffusive sampling without pump is possible with determined diffusion coefficients for each compound.	Passive sampling, no sampling pump required. Long-term sampling possible without battery to recharge.
	Integrated sampling only	Grab & integrated sampling
	Concentrated sample	Whole air
	Proper sorbent selection recommended in methodology.	N/A
	Must sample below sorbent breakthrough volumes to avoid sample loss and irreversible adsorption on sorbent	N/A
	Large sample volumes >100L	Sample volume is function of canister size, 15 L max
Analysis	Tube dimensions are instrument specific	Compatible with all manufacturer sample concentrators
	1 injection, more injections possible for some instrumentation	Multiple sample injections
	Concentration range ppt to ppm	ppt to ppm
	Some sorbents prone to artifact formation.	Low blanks when properly cleaned.
Storage	Sample storage at 4°C recommended for multi-bed tubes to prevent potential migration of compounds to more retentive sorbent, which maybe difficult to recover.	Room temperature
Cleaning	Analytical process automatically cleans tube for reuse. Cleans as it analyzes. Conditioning/cleaning and analysis incorporated in one thermal desorption unit.	Canister cleaning requires separate equipment as additional step prior to background certification and sampling.
Cost	$50–130 each	$200–700 each

free literature

A Guide to Whole Air Canister Sampling: Equipment Needed and Practical Techniques for Collecting Air Samples

lit. cat.# EVTG1073

Thermal Desorption Tubes: Versatile Air Sampling for a Wide Range of Applications

lit. cat.# EVFL1065

Download your copies from **www.restek.com**

tech guides

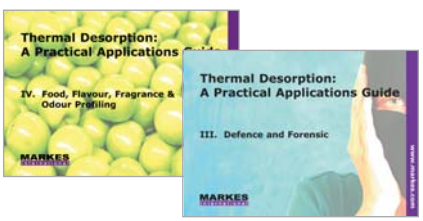
Thermal desorption application guides are available for a broad range of markets. Request your FREE copy today using these part numbers.

Environmental Air Monitoring and Occupational Health & Safety
lit. cat.# EVTG1034

Residual Volatiles & Materials Emissions Testing
lit. cat.# GNTG1035

Defense & Forensic
lit. cat.# CFTG1036

Food, Flavor, Fragrance & Odor Profiling
lit. cat.# FFTG1037



Restek's Ultra-Clean resin eliminates the hassle of cleaning and testing resin for air sampling.

Sampling Supplies for Semivolatiles in Air

Everything you need for sampling semivolatile compounds in air: Ultra-Clean resin, PUF sampling cartridges.

Ultra-Clean Resin

- For adsorbing semivolatiles in air.
- Cleaned, GC tested and certified.
- Available in 100 gram quantities.

Although resin is an excellent adsorbent for trapping PAHs, it requires extensive clean-up because many of its impurities are PAH compounds. To enable you to eliminate time-consuming clean-up, we do the cleaning for you! We test each batch by capillary GC/flame ionization detector to ensure cleanliness.

method applications

Method	Applications
EPA TO-13A	PAHs in Ambient Air
ASTM D6209	PAHs in Ambient Air
EPA Method 23	Dioxins in Stationary Source Emissions
EPA Method 0010	Semivolatiles in Stationary Source Emissions

Description	cat.#	Price-per-bottle 1-4 bottles	5-9 bottles	10+ bottles
Ultra-Clean Resin, 100 grams	24230			

SDVB Resin

- Styrene/divinylbenzene, equivalent to XAD-2 resin.
- Untreated, packaged in 1 kg plastic containers.
- Spherical, 20 to 60 mesh particles.

Description	qty.	cat.#	price
SDVB Resin	1kg	24053	

Larger quantities available upon request.

22114

22115

22116

22117

Cleaned Polyurethane Foam (PUF) Cartridges

- Precleaned and ready to use for collection of semivolatiles (pesticides, PCBs, PAHs).
- Both large high-volume (220-280 L/min.) and small low-volume (1-5 L/min.) PUFs available.
- Suitable for ambient, indoor, and industrial hygiene applications.
- PUF/XAD-2 "sandwiches" capture a wider range of semivolatiles.

method applications

Method	Applications	cat.#
EPA TO-10A	Organochlorine and organophosphorous pesticides, carbamate, pyrethrin, triazine, and urea pesticides	22116
EPA IP-7	Polycyclic aromatic hydrocarbons (PAHs)	22114
EPA IP-8	Organochlorine and organophosphorous pesticides, carbamate, pyrethrin, triazine, and urea pesticides	22116
ASTM D4861	Organochlorine and organophosphorous pesticides, PCB	22116
ASTM D4947	Chlordane and heptachlor residues	22116
Research	Pesticides	22117
EPA TO-4A	Organochlorine pesticides, PCBs	22114
EPA TO-9A	Polychlorinated dibenzo-*p*-dioxins (PCDDs)	22114
EPA TO-13A	Polycyclic aromatic hydrocarbons (PAHs)	22114
EPA 600/8-80-038	Organochlorine pesticides, PCBs, PAHs	22115
ASTM D6209	Polycyclic aromatic hydrocarbons (PAHs)	22114

Description	qty.	cat.#	price
Cleaned PUF Plug (7.6cm length, 6cm diameter)	ea.	24295	
Large PUF Cartridge, 65mm OD x 125mm length, 75mm PUF	ea.	22114	
Large PUF/XAD Cartridge, 65mm OD x 125mm length, 25mm PUF/10g XAD-2/50mm PUF	ea.	22115	
Small PUF Cartridge, 22mm OD x 100mm length, 76mm PUF	ea.	22116	
Small PUF/XAD Cartridge, 22mm OD x 100mm length, 30mm PUF/1.5g XAD-2/30mm PUF	ea.	22117	

also available

Untreated PUF Plugs

Visit **www.restek.com**

Environmental Air Monitoring Gas Standards

Our high-quality air monitoring gas calibration standards are provided by Spectra/Linde and Scott/Air Liquide—meeting lab requirements for two separate sources of calibration standards. Mixes are produced gravimetrically using NIST (National Institute of Science and Technology) traceable weights. Each comes with a Certificate of Analysis and unique serial number. All cylinders are disposable and do not require rental or demurrage fees. Recertification of cylinders is available directly with our suppliers. All cylinders are drop-shipped from our suppliers to provide fast delivery and the "freshest" standard possible. 12-month stability on all cylinders unless otherwise specified.

TO-14A Calibration Mix (39 components)

benzene
bromomethane
carbon tetrachloride
chlorobenzene
chloroform
chloromethane
1,2-dibromoethane
m-dichlorobenzene
o-dichlorobenzene
p-dichlorobenzene
dichlorodifluoromethane
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethene
cis-1,2-dichloroethene
1,2-dichloropropane
cis-1,3-dichloropropene
trans-1,3-dichloropropene
dichlorotetrafluoroethane
ethyl benzene
ethyl chloride
hexachloro-1,3-butadiene
methylene chloride
styrene
1,1,2,2-tetrachloroethane
tetrachloroethylene
toluene
1,2,4-trichlorobenzene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethene
trichlorofluoromethane
1,1,2-trichlorotrifluoroethane
1,2,4-trimethylbenzene
1,3,5-trimethylbenzene
vinyl chloride
m-xylene
o-xylene
p-xylene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34400 (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34421 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34400-PI (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34421-PI (ea.)

TO-14A 41 Component Mix (41 components)

acrylonitrile
benzene
bromomethane
1,3-butadiene
carbon tetrachloride
chlorobenzene
chloroform
chloromethane
1,2-dibromoethane
m-dichlorobenzene
o-dichlorobenzene
p-dichlorobenzene
dichlorodifluoromethane
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethene
cis-1,2-dichloroethene
1,2-dichloropropane
cis-1,3-dichloropropene
trans-1,3-dichloropropene
dichlorotetrafluoroethane
ethyl benzene
ethyl chloride
hexachloro-1,3-butadiene
methylene chloride
styrene
1,1,2,2-tetrachloroethane
tetrachloroethylene
toluene
1,2,4-trichlorobenzene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethene
trichlorofluoromethane
1,1,2-trichlorotrifluoroethane
1,2,4-trimethylbenzene
1,3,5-trimethylbenzene
vinyl chloride
m-xylene
o-xylene
p-xylene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34430 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34430-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34431 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34431-PI (ea.)

TO-14A 43 Component Mix (43 components)

acrylonitrile
benzene
bromomethane
1,3-butadiene
carbon tetrachloride
chlorobenzene
chloroform
chloromethane
3-chloropropene
1,2-dibromoethane
m-dichlorobenzene
o-dichlorobenzene
p-dichlorobenzene
dichlorodifluoromethane
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethene
cis-1,2-dichloroethene
1,2-dichloropropane
cis-1,3-dichloropropene
trans-1,3-dichloropropene
dichlorotetrafluoroethane
ethyl benzene
ethyl chloride
4-ethyltoluene
hexachloro-1,3-butadiene
methylene chloride
styrene
1,1,2,2-tetrachloroethane
tetrachloroethylene
toluene
1,2,4-trichlorobenzene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethene
trichlorofluoromethane
1,1,2-trichlorotrifluoroethane
1,2,4-trimethylbenzene
1,3,5-trimethylbenzene
vinyl chloride
m-xylene
o-xylene
p-xylene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34432 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34432-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34433 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34433-PI (ea.)

please **note**

Gas standards are subject to hazardous materials shipping fees by most freight carriers. All calibration gas standards are nonreturnable due to DOT hazardous shipping requirements.

2nd Source TO-14A/TO-15 Gas Calibration Standards

- Standards from TWO manufacturers provide second source on one order.
- 12 month stability in transportable cylinders.
- Drop shipped for fast delivery and maximum shelf life.

A. Spectra (Linde) 104L Cylinders

B. Scotty (Air Liquide) 110L Cylinders (Pi-marked Cylinders for EU Regulations)

For regulators, see page 433.

For more available gas standards, visit **www. restek.com/air**

Gas Calibration Standards

TO-14A GC/MS Tuning Mix

4-bromofluorobenzene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34406 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34406-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34424 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34424-PI (ea.)

TO-14A Aromatics Mix (14 components)

benzene
chlorobenzene
m-dichlorobenzene
o-dichlorobenzene
p-dichlorobenzene
ethyl benzene
styrene
toluene
1,2,4-trichlorobenzene
1,2,4-trimethylbenzene
1,3,5-trimethylbenzene
m-xylene
o-xylene
p-xylene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34404 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34404-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34423 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34423-PI (ea.)

TO-14A Chlorinated Hydrocarbon Mix (19 components)

carbon tetrachloride
chloroform
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethene
cis-1,2-dichloroethylene
1,2-dichloropropane
cis-1,3-dichloropropene
trans-1,3-dichloropropene
ethyl chloride
hexachloro-1,3-butadiene
methyl chloride
methylene chloride
1,1,2,2-tetrachloroethane
tetrachloroethylene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethene
vinyl chloride

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34402 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34402-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34422 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34422-PI (ea.)

TO-14A Internal Standard Mix (3 components)

bromochloromethane
chlorobenzene-d5
1,4-difluorobenzene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34412 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34412-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34427 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34427-PI (ea.)

TO-14A Internal Standard/Tuning Mix (4 components)

bromochloromethane
1-bromo-4-fluorobenzene
(4-bromofluorobenzene)
chlorobenzene-d5
1,4-difluorobenzene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34408 (ea.) $690

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34408-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34425 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34425-PI (ea.)

TO-15 Subset 25 Component Mix (25 components)

acetone
allyl chloride
benzyl chloride*
bromodichloromethane
bromoform
1,3-butadiene
2-butanone (MEK)
carbon disulfide*
cyclohexane
dibromochloromethane
trans-1,2-dichloroethene
1,4-dioxane
ethyl acetate
4-ethyltoluene
heptane
hexane
2-hexanone (MBK)
4-methyl-2-pentanone
methyl *tert*-butyl ether (MTBE)
2-propanol
propylene
tetrahydrofuran
2,2,4-trimethylpentane
vinyl acetate
vinyl bromide

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34434 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34434-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34435 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34435-PI (ea.)

*Stability of this compound cannot be guaranteed.

TO-15 65 Component Mix (65 components)

acetone
acrolein
benzene
benzyl chloride*
bromodichloromethane
bromoform
bromomethane
1,3-butadiene
2-butanone (MEK)
carbon disulfide*
carbon tetrachloride
chlorobenzene
chloroethane
chloroform
chloromethane
cyclohexane
dibromochloromethane
1,2-dichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethene
cis-1,2-dichloroethene
trans-1,2-dichloroethene
1,2-dichloropropane
cis-1,3-dichloropropene
trans-1,3-dichloropropene
1,4-dioxane
ethanol*
ethyl acetate
ethyl benzene
ethylene dibromide
(1,2-dibromoethane)
4-ethyltoluene
trichlorofluoromethane (Freon 11)
dichlorodifluoromethane (Freon 12)
1,1,2-trichloro-1,2,2-trifluoroethane
(Freon 113)
1,2-dichlorotetrafluoroethane
(Freon 114)
heptane
hexachloro-1,3-butadiene
hexane
2-hexanone (MBK)
4-methyl-2-pentanone (MIBK)
methylene chloride
methyl *tert*-butyl ether (MTBE)
methyl methacrylate
naphthalene
2-propanol
propylene
styrene
1,1,2,2-tetrachloroethane
tetrachloroethene
tetrahydrofuran
toluene
1,2,4-trichlorobenzene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethene
1,2,4-trimethylbenzene
1,3,5-trimethylbenzene
vinyl acetate
vinyl chloride
m-xylene
o-xylene
p-xylene

Now with Naphthalene!

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34436 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34436-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34437 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34437-PI (ea.)

*Stability of this compound cannot be guaranteed.

TO-14A/TO-15/TO-17 Performance Test Standard

Restek is pleased to offer the Performance Testing/VOC Audit Sample Program in cooperation with Spectra/Linde. This is an on-going testing program in which laboratories, and/or other users of VOC standards, are able to evaluate their own capabilities, as well as compare their results and accuracy against other laboratories. As a participant in the program, you will receive a disposable cylinder, directly from Spectra/Linde, containing multiple unknown TO-14A/TO-15 components at varying concentrations that are to be identified, quantified, and reported via the Spectra/Linde P-T Audit Program forms. The results will be published and distributed for peer review. To ensure confidentiality, all participating laboratories will be anonymous, and only the individual laboratory will know their own results. To provide statistical analysis, the audit sample will be shipped to all laboratories at the same time, once a year during the fourth quarter.

cylinder **design**

Performance Test Standard

Size: 5A disposable (3.2" x 12")
Volume/Pressure: 150L @ 1,800 psig
CGA 180 outlet fitting
Weight: 2.2 lbs

150 liters @ 1,800psig
cat. # 34560 (ea.) $1040

BTEX Gas Mix (6 components)

benzene, ethylbenzene, toluene, *m*-xylene, *o*-xylene, *p*-xylene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34414 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34414-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34428 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34428-PI (ea.)

BTEX and MTBE Gas Mix (7 components)

benzene, ethylbenzene, methyl *tert*-butyl ether (MTBE), toluene, *m*-xylene, *o*-xylene, *p*-xylene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34541 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34541-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34542 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34542-PI (ea.)

Higher Concentration = MORE STANDARD for your money!

Sulfur 5-Component Mix (5 components)

12-month stability. +/- 10% accuracy.

carbonyl sulfide, dimethyl sulfide, ethyl mercaptan, hydrogen sulfide, methyl mercaptan

1ppm in nitrogen, 110 liters @ 1,800psi
cat. # 34561 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34561-PI (ea.)

Massachusetts APH Mix (26 components)

Now with Naphthalene!

benzene, 1,3-butadiene, butylcyclohexane, cyclohexane, *n*-decane, 2,3-dimethylheptane, 2,3-dimethylpentane, *n*-dodecane, ethylbenzene, *n*-heptane, *n*-hexane, isopentane, isopropylbenzene, *p*-isopropyltoluene, methyl *tert*-butyl ether, 1-methyl-3-ethylbenzene, naphthalene, *n*-nonane, *n*-octane, toluene, 1,2,3-trimethylbenzene, 1,3,5-trimethylbenzene, *n*-undecane, *o*-xylene, *m*/*p*-xylene (combined)

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34540 (ea.)

140-450ppb in nitrogen, 90 liters @ 1,500psig (Pi-marked Cylinder)
cat. # 34540-PI (ea.)

Japan Calibration Mix (9 components)

acrylonitrile, benzene, 1,3-butadiene, chloroform, 1,2-dichloroethane, dichloromethane, tetrachloroethylene, trichloroethylene, vinyl chloride

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34418 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34418-PI (ea.)

cylinder **design**

Spectra (Linde) 104L Cylinders:

Aluminum construction
Size: 8 x 24 cm
Volume/Pressure: 104 liters of gas @ 1,800 psi
CGA-180 outlet fitting.
Weight: 1.5 lbs/0.7 kg

Scotty (Air Liquide) 110L Cylinders (Pi-marked Cylinders for EU Regulations):

Aluminum construction
Size: 8.3 x 29.5 cm
Volume/Pressure: 110 liters of gas @ 1,800 psi
CGA-180 outlet fitting.
Weight: 2.2 lbs/1 kg
US DOT Specs: 3AL2216

See page 433 for regulators.

did you **know**?

Pi-marked Gas Cylinders for EU Countries

Our Pi-marked gas standards from Scott/Air Liquide meet the requirements of the Transportable Pressure Equipment Directive (TPED) implemented in 2001 that regulates the safe transport of pressurized containers used throughout the European community.

please **note**

Gas standards are subject to hazardous materials shipping fees by most freight carriers. All calibration gas standards are nonreturnable due to DOT hazardous shipping requirements.

Gas Calibration Standards

Ozone Precursor Mixture/PAMS (57 components)

acetylene	isopropylbenzene
benzene	methylcyclohexane
n-butane	methylcyclopentane
1-butene	2-methylheptane
cis-2-butene	3-methylheptane
trans-2-butene	2-methylhexane
cyclohexane	3-methylhexane
cyclopentane	2-methylpentane
n-decane	3-methylpentane
m-diethylbenzene	*n*-nonane
p-diethylbenzene	*n*-octane
2,2-dimethylbutane	*n*-pentane
2,3-dimethylbutane	1-pentene
2,3-dimethylpentane	*cis*-2-pentene
2,4-dimethylpentane	*trans*-2-pentene
n-dodecane	propane
ethane	*n*-propylbenzene
ethylbenzene	propylene
ethylene	styrene
m-ethyltoluene	toluene
o-ethyltoluene	1,2,3-trimethylbenzene
p-ethyltoluene	1,2,4-trimethylbenzene
n-heptane	1,3,5-trimethylbenzene
n-hexane	2,2,4-trimethylpentane
1-hexene	2,3,4-trimethylpentane
isobutane	*n*-undecane
isopentane	*o*-xylene
isoprene	*m*/*p*-xylene (combined)

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34420 (ea.)

1ppm in nitrogen, 30 liters @ 500psi (Pi-marked Cylinder)
cat. # 34420-PI (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34429 (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34429-PI (ea.)

Ozone Precursor/PAMS Mix

(57 components at EPA concentrations: ppbC)

acetylene	40	isopropylbenzene	40
benzene	30	methylcyclohexane	30
n-butane	40	methylcyclopentane	25
1-butene	30	2-methylheptane	25
cis-2-butene	35	3-methylheptane	25
trans-2-butene	25	2-methylhexane	25
cyclohexane	40	3-methylhexane	25
cyclopentane	20	2-methylpentane	20
n-decane	30	3-methylpentane	40
m-diethylbenzene	40	*n*-nonane	25
p-diethylbenzene	25	*n*-octane	30
2,2-dimethylbutane	40	*n*-pentane	25
2,3-dimethylbutane	50	1-pentene	25
2,3-dimethylpentane	50	*cis*-2-pentene	35
2,4-dimethylpentane	40	*trans*-2-pentene	25
n-dodecane	40	propane	40
ethane	25	*n*-propylbenzene	30
ethylbenzene	25	propylene	25
ethylene	20	styrene	40
m-ethyltoluene	25	toluene	40
o-ethyltoluene	30	1,2,3-trimethylbenzene	25
p-ethyltoluene	40	1,2,4-trimethylbenzene	40
n-heptane	25	1,3,5-trimethylbenzene	25
n-hexane	30	2,2,4-trimethylpentane	30
1-hexene	60	2,3,4-trimethylpentane	25
isobutane	25	*n*-undecane	30
isopentane	40	*o*-xylene	25
isoprene	40	*m*/*p*-xylene (combined)	40

20-60ppbC in nitrogen, 104 liters @ 1,800psi
cat. # 34445 (ea.)

20-60ppbC in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34445-PI (ea.)

24129

Small Cylinder Stand

- Supports and stabilizes disposable gas cylinders.
- Fits cylinders up to $3^3/_8$" (8 cm) in diameter.
- Adjustable screw secures cylinder in place.

This cylinder stand is designed to support small diameter cylinders, such as 104 L and 110 L disposable cylinders. It is a simple, safe, and economical way to stabilize the position of small cylinders, while keeping them within close proximity. The stand is constructed of heavyweight painted steel and includes an adjustable screw for safely securing cylinders.

Description	qty.	cat.#	price
Small Cylinder Stand	ea.	24129	

Natural Gas and Refinery Gas Standards

- Each available in three varying concentrations.
- Mini-regulator designed specially for these standards.

Natural Gas Standards

Available in three mixes, from lean to rich. Each has an extended list of C6+ components.

	Natural Gas Standard #1 cat.# 34438, ea. % each compound**	Natural Gas Standard #2 cat.# 34439, ea. % each compound**	Natural Gas Standard #3 cat.# 34440, ea. % each compound**
nitrogen	1.000	2.500	5.000
carbon dioxide	0.500	1.000	1.500
methane UHP	94.750	85.250	70.000
ethane UHP	2.000	5.000	9.000
propane	0.750	3.000	6.000
isobutane	0.300	1.000	3.000
n-butane	0.300	1.000	3.000
isopentane	0.150	0.500	1.000
n-pentane	0.150	0.500	1.000
hexanes plus*	0.100	0.250	0.500
Concentration	mole	mole	mole
Volume	13.16L @ 200psig	13.16L @ 200psig	5.5L @ 75psig
Ideal Heating Value (Dry BTU/SCF)	1048 gross	1142 gross	1317 gross

Refinery Gas Standards

Available in three mixes with varying C5 unsaturates or extended C6+ components.

	Refinery Gas Standard #1 cat.# 34441, ea. % each compound**	Refinery Gas Standard #2 cat.# 34442, ea. % each compound**	Refinery Gas Standard #5 cat.# 34443, ea. % each compound**
hydrogen	40.750	12.500	12.500
argon	0.500	1.000	1.000
nitrogen	4.000	37.200	37.200
carbon monoxide	1.000	1.000	1.000
carbon dioxide	3.000	3.000	3.000
methane	8.500	5.000	5.000
ethane	6.000	4.000	4.000
ethylene	2.000	2.000	2.000
acetylene	—	1.000	1.000
propane	7.000	6.000	6.000
propylene	3.000	3.000	3.000
propadiene	0.850	1.000	1.000
cyclopropane	—	0.040	—
isobutane	6.000	5.000	5.000
n-butane	4.000	4.000	4.000
isobutylene	2.000	1.000	1.000
1,3 butadiene	3.000	3.000	3.000
cis-2-butene	2.000	2.000	2.000
trans-2-butene	2.000	3.000	3.000
butene-1	2.000	2.000	2.000
2-methyl-2-butene	—	0.200	0.200
isopentane	1.000	1.000	1.000
n-pentane	1.000	1.000	1.000
cis-2-pentene	—	0.400	0.400
trans-2-pentene	—	0.160	0.200
pentene-1	—	0.400	0.400
n-hexane	0.500	0.100	—
hexanes plus	—	—	0.100
Concentration	mole	mole	mole
Volume	5.2L @ 70psig	4.9L @ 60psig	4.6L @ 60psig

*Contact Restek or your Restek representative for a complete list of hexanes plus.
**Precise concentrations are provided on the data sheet included with each cylinder and may vary slightly from those listed here.

please **note**

Gas standards on this page are not available in Pi-marked cylinders for EU countries.

cylinder **design**

DCG Partnership Cylinders:

Size: 7.6 x 24 cm
CGA-170/110 connection.
US DOT Specs: DOT-4B-240ET

Please note: This cylinder is not approved for use in Canada.

also **available**

See page 433 for regulators.

Scott/Air Liquide Transportable Pure Gases and Mixtures

We offer a wide range of Scott/Air Liquide transportable gases, from pure gases for purging or calibrating to multi-component mixes which are ideal for peak identification work.

The 14-liter container has a CGA 160 connection for more precise integration with analytical systems. The 48-liter cylinder has a CGA 165 connection, and can deliver large volumes of sample. The 110-liter cylinder has a CGA 180 connection.

See regulators pages 433-434 for cylinder information.

Description	Shelf Life	Scotty 14 (14 Liter) cat.#	price	Scotty 48 (48 Liter) cat.#	price	Scotty 110 (110 Liter) cat.#	price
Pure Gases							
Air, zero (THC < 1ppm)	2 yrs.	34448		34449		34449-PI	
Argon, 99.995%	2 yrs.	34457		—	—	34457-PI	
Carbon dioxide, 99.80%	2 yrs.	34451		34452		34452-PI	
Hydrogen, 99.99%	2 yrs.	34453		—	—	34453-PI	
Methane, 99.00%	2 yrs.	34454		—	—	34454-PI	
Oxygen, 99.60%	2 yrs.	34455		—	—	—	—
Two-Component Mixtures							
Benzene in air (1ppm)	1 yr.	—	—	34458		34458-PI	
Benzene in air (100ppm)	1 yr.	—	—	34459		34459-PI	
1,3-Butadiene in nitrogen (10ppm)	2 yrs.	34460		34461		34461-PI	
Carbon dioxide in helium (100ppm)	2 yrs.	34462		—	—	34462-PI	
Carbon dioxide in nitrogen (100ppm)	2 yrs.	34463		34464		34464-PI	
Carbon dioxide in nitrogen (1000ppm)	2 yrs.	34465		34466		34466-PI	
Ethylene in air (8-10ppm)	2 yrs.	34467		34468		34468-PI	
Ethylene in helium (100ppm)	2 yrs.	34489		—	—	34489-PI	
Hydrogen in helium (100ppm)	2 yrs.	34469		—	—	34469-PI	
Hydrogen in nitrogen (1%)	2 yrs.	34471		34472		34472-PI	
Hydrogen in nitrogen (100ppm)	2 yrs.	34473		34474		34474-PI	
Methane in helium (100ppm)	2 yrs.	34476		34477		34477-PI	
Methane in nitrogen (100ppm)	2 yrs.	34478		—	—	34478-PI	
Methane in nitrogen (1%)	2 yrs.	34482		34483		34483-PI	
Nitrogen in helium (100ppm)	2 yrs.	34479		—	—	34479-PI	
Nitrous oxide in nitrogen (1ppm)	2 yrs.	34484		34485		34485-PI	
Oxygen in helium (100ppm)	2 yrs.	34480		—	—	34480-PI	
Oxygen in nitrogen (2%)	2 yrs.	34487		34488		34488-PI	
Oxygen in nitrogen (6%)	2 yrs.	34491		34492		34492-PI	
1,1,1-Trichloroethane in nitrogen (10ppm)	2 yrs.	—		34493		34493-PI	
Trichloroethylene in nitrogen (10ppm)	2 yrs.	34494		34495		34495-PI	
Vinyl chloride in nitrogen (1ppm)	2 yrs.	34496		34497		34497-PI	
Vinyl chloride in nitrogen (10ppm)	2 yrs.	34498		34499		34499-PI	
Vinyl chloride in nitrogen (50ppm)	2 yrs.	34500		—	—	34500-PI	
Vinyl chloride in nitrogen (100ppm)	2 yrs.	34501		—	—	34501-PI	
Vinyl chloride in nitrogen (1000ppm)	2 yrs.	34502		—	—	34502-PI	
Multi-Component Mixtures							
Carbon monoxide, carbon dioxide, hydrogen and oxygen in nitrogen (0.5% each)	2 yrs.	34504		34505		34505-PI	
Carbon monoxide, carbon dioxide, hydrogen and oxygen in nitrogen (1% each)	2 yrs.	34507		34508		34508-PI	
Carbon monoxide, carbon dioxide, methane, ethane, ethylene and acetylene in nitrogen (1% each)	1 yr.	—	—	34511		34511-PI	
Carbon monoxide, carbon dioxide, nitrogen, and oxygen, (5% each) and methane and hydrogen (4% each) in helium	2 yrs.	34512		—	—	34512-PI	
Carbon monoxide (7%), carbon dioxide (15%) and oxygen (5%) in nitrogen	2 yrs.	34514		—	—	34514-PI	
Carbon monoxide (7%), oxygen (4%), carbon dioxide (15%) and methane (4.5%) in nitrogen	2 yrs.	34515		34516		34516-PI	
C1-C6 *n*-Paraffins: methane, ethane, propane, butane, pentane, hexane in nitrogen (15ppm each)	2 yrs.	34518		34519		34519-PI	
C1-C6 *n*-Paraffins: methane, ethane, propane, butane, pentane, hexane in helium (100ppm each)	2 yrs.	34521		34522		34522-PI	
C1-C6 *n*-Paraffins: methane, ethane, propane, butane, pentane, hexane in helium (1000ppm each)	2 yrs.	34524		34525		34525-PI	
C1-C6 *n*-Paraffins: methane, ethane, propane, butane, pentane, hexane in nitrogen (100ppm each)	2 yrs.	34527		34528		34528-PI	
C2-C6 Olefins: ethylene, propylene, 1-butene, 1-pentene, 1-hexene in helium (100ppm each)	2 yrs.	34529		34530		34530-PI	
C2-C6 Olefins: ethylene, propylene, 1-butene, 1-pentene, 1-hexene in nitrogen (100ppm each)	2 yrs.	34531		34532		34532-PI	
Branched Paraffins: 2,2-dimethylbutane, 2,2-dimethylpropane, isobutane, 2-methylbutane, 2-methylpentane, 3-methylpentane in nitrogen (15ppm each)	2 yrs.	34534		—	—	34534-PI	
Methane, ethane, ethylene, acetylene, propane, propylene, *n*-butane, propyne in nitrogen (15ppm each)	1 yr.	—	—	34537		34537-PI	
n-butane, isobutane, *cis*-2-butene, *trans*-2-butene, 1-butene, iso-butylene, 1,3-butadiene, ethyl acetylene in nitrogen (15ppm each)	1 yr.	—	—	34539		34539-PI	

Gas Regulators for Transportable Cylinders

For this cylinder:

DCG Partnership Cylinders:
Size: 7.6 x 24 cm
CGA-170/110 connection.
US DOT Specs: DOT-4B-240ET

Please note: This cylinder is not approved for use in Canada.

Use this regulator:

Mini-Regulator for natural gas and refinery gas standards

- 0–300 psig inlet pressure range.
- 0–15 psig outlet pressure range.
- Supplied with 0–15 psig outlet pressure gauge, brass CGA 170 nut and nipple.

22032

Description	qty.	cat.#	price
Mini-Regulator	ea.	22032	

For these cylinders:

Spectra (Linde) 104L:
Aluminum construction
Size: 8 x 24 cm
Volume/Pressure:
104 liters of gas
@ 1,800 psi
CGA-180 outlet fitting.
Weight: 1.5 lbs/0.7 kg

Scotty® (Air Liquide) 110L
(Pi-marked Cylinders for EU Regulations):
Aluminum construction
Size: 8.3 x 29.5 cm
Volume/Pressure:
110 liters of gas @ 1,800 psi
CGA-180 outlet fitting.
Weight: 2.2 lbs/1 kg
DOT Specifications: 3AL2216

Use these regulators:

Spectra Gas 7621 High-Purity VOC Regulator

- Single-stage, stainless steel.
- Two pressure gauges and CGA-180 fitting.
- 3,000 psig maximum inlet pressure.
- Stainless steel diaphragm and Kel-F® seat.
- 1/8-inch tube compression outlet.
- Low internal volume: 3.03 cc.
- Accurate pressure control even at low flow rates.
- Individually tested for leaks and impurities.

21572

Description	qty.	cat.#	price
0–30psig outlet pressure gauge	ea.	21572	
0–100psig outlet pressure gauge	ea.	21572-R100	

See next page for a syringe adapter kit.

Continued on next page.

For these cylinders:

Scotty® (Air Liquide) 14
Contents: 14 liters
Pressure: 240 psig (17 bar)
Outlet Fitting: CGA 160
Weight: 1.5 lbs/0.7 kg
Dimensions: 3" diameter x 11" height (7.6 x 28 cm)
DOT Specifications: 4B240
Please note: This cylinder is not approved for use in Canada.

Scotty® (Air Liquide) 48
Contents: 48 liters
Pressure: 300 psig (21 bar)
Outlet Fitting: CGA 165
Weight: 1.75 lbs/0.8 kg
Dimensions: 4" diameter x 16 1/4" height (10.2 x 41 cm)
DOT Specifications: 39 NRC

Use these regulators:

Regulators
for use with 14-liter and 48-liter Scott (Air Liquide) Transportable Gases

Specifications:
Maximum Inlet Pressure: 300 psig
Outlet Pressure Range: 2–10 psig
Maximum Delivery Pressure: 25 psig
Operating Temperature Range: 35 °F to 150 °F (2 °C to 65 °C)
Outlet Connection: 1/4" female NPT

Materials of Construction:
Body: Brass
Diaphragm: Viton®
Seat: Acetal
Seal: Viton®


22690

Use the CGA 160 inlet connection with 14-liter Scott/Air Liquide Transportable Gases. Use the CGA 165 inlet connection with 48-liter Scott/Air Liquide Transportable Gases.

Description	qty.	cat.#	price
Regulator, CGA 160 Inlet Connection	ea.	22690	
Regulator, CGA 165 Inlet Connection	ea.	22691	


21118

Syringe Adapter Kit for Single-Stage VOC Regulator
Use to withdraw sample from a high-pressure cylinder after pressure reduction through the high-purity VOC single-stage regulator.

Kit contains one nickel-plated brass 1/4" NPT to female luer fitting, which can be used with an A-2 Luer syringe (cat.# 20162 or 20163, see page 385), and one stainless steel 1/4" NPT x 1/8" compression fitting with septum (can be used with any syringe needle).

Description	qty.	cat.#	price
Syringe Adapter Kit	kit	21118	

also **available**

Single-Stage and Dual-Stage Ultra-High Purity Gas Regulators
See pages 309–311.

Gas Sampling

Sample Cylinders 435
Sample Cylinder Valves 436
Gas Sampling Valves & Loops 437

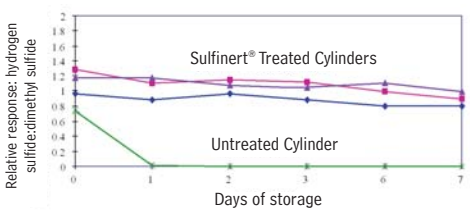
Sample Cylinders

- Range of cylinder sizes, 75 cc to 2,250 cc.
- All cylinders have 1/4" female NPT threads on both ends.
- TPED compliant cylinders available for EU community.

Swagelok® sample cylinders are made of 304L and 316L stainless steel to resist corrosion and DOT rated to 1,800 and 5,000 psig (TPED cylinders rated to 1,450 and 4,350 psig), which allows sampling at gas wellheads as well as on-site refineries. Each cylinder is hydrostatically tested to at least 5/3 the working pressure.

Sulfur compounds are stable in Sulfinert® treated stainless steel systems.

17ppbv hydrogen sulfide in 500mL cylinders



NEW! Sample cylinders now available in stainless steel.

Sample Cylinders, High Pressure

304L stainless steel; DOT rating to 1,800 psig (TPED cylinders to 1,450 psig).

	1,800psig, 304L SS				TPED, 1,450psig, 304L SS			
	Stainless Steel		Sulfinert Treated		Stainless Steel		Sulfinert Treated	
Size	cat.#	price	cat.#	price	cat.#	price	cat.#	price
75cc	22921		24130		22921-PI		24130-PI	
150cc	22922		24131		22922-PI		24131-PI	
300cc	22923		24132		22923-PI		24132-PI	
500cc	22924		24133		22924-PI		24133-PI	
1000cc	22925		24134		22925-PI		24134-PI	
2250cc	22926		21394		22926-PI		21394-PI	

Sample Cylinders, Ultra-High Pressure

316L stainless steel; DOT rating to 5,000 psig (TPED cylinders to 4,350 psig).

	5,000psig, 316L SS				TPED, 4,350psig, 316L SS			
	Stainless Steel		Sulfinert Treated		Stainless Steel		Sulfinert Treated	
Size	cat.#	price	cat.#	price	cat.#	price	cat.#	price
150cc	22927		22111		22927-PI		22111-PI	
300cc	22928		22112		22928-PI		22112-PI	
500cc	22929		22113		22929-PI		22113-PI	

Applications:

- ASTM D1265
- Hydrocarbon sampling in refineries & petrochemical plants

Analyzing sulfur or mercury?

- Our unique Sulfinert® coating provides stable storage of sulfur and mercury at ppb levels.
- Inert coating doesn't flake; more durable than Teflon®.

also available

Certificates are available upon request.

NEW!

Sample Cylinder Valves

- Multiple valve configurations, including dip tube and rupture disks.
- Large, durable, Kel-F® seat ensures leak-free operation.
- Temperature range: -40°C to 120°C

Alta-Robbins' unique valve design incorporates a fully contained soft seat which provides durability and longer lifetime. Tight shut-off is easily achieved with very low torque, yet the valve is rugged enough to withstand overtightening.

Multiple valve configurations are available for both high pressure and ultra-high pressure sample cylinders. An outage tube or dip tube provides a headspace above liquefied gases so that, should expansion occur with an increase in temperature, the pressure is not dramatically increased. Outage is expressesd as a % of the total cylinder volume, based on the ratio of the length of headspace to the total length of the cylinder, with a maximum available outage of 50%. The dip tube is welded directly to the male inlet of the valve and cut to a length of up to 5.25 inches. Rupture discs function to protect sample cylinders from over-pressurization by venting to the atmosphere. The pressure rating on the rupture disc should always be lower than the cylinder.

Description	Stainless Steel cat.#	Stainless Steel price	Sulfinert Treated cat.#	Sulfinert Treated price
,500 psig DOT Pressure Rating				
/4" Male NPT x 1/4" Male NPT	26297		21400	
1/4" Male NPT x 1/4" Female NPT	26298		26299	
1/4" Male NPT x 1/4" Male Compression	26300		21401	
1/4" Male NPT x 1/4" Male NPT w/5.25" Dip Tube*	26301		21402*	
1/4" Male NPT x 1/4" Male NPT w/1,800 psi Rupture Disc	26302		26303	
1/4" Male NPT x 1/4" Female NPT w/1,800 psi Rupture Disc	26304		26305	
Replacement Rupture Disc, 1,800 psig	26320			
5,000 psig DOT Pressure Rating				
1/4" Male NPT x 1/4" Male NPT	26306		26307	
1/4" Male NPT x 1/4" Female NPT	26308		26309	
1/4" Male NPT x 1/4" Male Compression	26310		26311	
1/4" Male NPT x 1/4" Male NPT w/5.25" Dip Tube*	26312		26313	
1/4" Male NPT x 1/4" Male NPT w/2,850 psi Rupture Disc	26314		26315	
1/4" Male NPT x 1/4" Female NPT w/2,850 psi Rupture Disc	26316		26317	
Replacement Rupture Disc, 2,850 psig	26324			

*To order catalog #21402 (Sulfinert Alta-Robbins Sample Cylinder Valve, 1/4" NPT with Dip Tube), please call Customer Service at 800-356-1688, ext. 3, or contact your Restek representative. Specify dip tube length or % outage when ordering (maximum length = 5.25"/ 13.3cm). Note: End of part will not be treated after cutting tube to length.

free
literature

Solutions for Gas Sampling

lit. cat.# PCFL1308

Download your copy from **www.restek.com**

Rupture Disc Tee

NEW!

Unlike other designs, Alta-Robbins rupture disc tee is NOT permanently soldered to the disc, making the discs replaceable. Discs are easily changed without removing the valve or tee from the cylinder. These tees are designed to be installed into existing systems to provide reliable over-pressure protection.

Description	Stainless Steel cat.#	Stainless Steel price	Sulfinert Treated cat.#	Sulfinert Treated price
1,800 psig DOT Pressure Rating				
Rupture Disc Tee, 1/4" Male NPT x 1/4" Female NPT	26318		26319	
Replacement Rupture Disc	26320			
2,850 psig DOT Pressure Rating				
Rupture Disc Tee, 1/4" Male NPT x 1/4" Female NPT	26322		26323	
Replacement Rupture Disc	26324			

Metering Control Valves

NEW!

- Reduces pressure between sample cylinder and GC injector.
- Maintains fine metering control.
- Contains Kel-F® seat.

Description	Stainless Steel cat.#	Stainless Steel price	Sulfinert Treated cat.#	Sulfinert Treated price
3,500 psig DOT Pressure Rating				
Metering Control Valve, 1/4" Male NPT x 1/4" Male NPT	26326		26327	

Gas Sampling Valves and Sample Loops (Sulfinert® Treated)

- Ideal for samples containing low concentrations of sulfur or other active compounds.
- Sample loop sizes from 5 µL to 5 cc.

Sulfinert® treatment eliminates active sites in the valve or loop, for better recovery of active compounds.


20585

Gas Sampling Valves

(1/16" Fittings, 0.40 mm Port Diameter; "W Type" Valve)

Description	qty.	cat.#	price
Sulfinert Gas Sampling Valve; 4-Port	ea.	20584	
Sulfinert Gas Sampling Valve; 6-Port	ea.	20585	
Sulfinert Gas Sampling Valve; 10-Port	ea.	20586	

Replacement Rotors (Not Coated)

Description	qty.	cat.#	price
Replacement Rotor (not coated) for 4-Port Sulfinert Gas Sampling Valve	ea.	20587	
Replacement Rotor (not coated) for 6-Port Sulfinert Gas Sampling Valve	ea.	20588	
Replacement Rotor (not coated) for 10-Port Sulfinert Gas Sampling Valve	ea.	20589	

Gas Sample Loops

(1/16" fittings, for "W Type" valves)

Description	Size	qty.	cat.#	price
Sample Loops, Sulfinert Treated	5µL	ea.	22840	
Sample Loops, Sulfinert Treated	10µL	ea.	22841	
Sample Loops, Sulfinert Treated	20µL	ea.	22842	
Sample Loops, Sulfinert Treated	25µL	ea.	22843	
Sample Loops, Sulfinert Treated	50µL	ea.	22844	
Sample Loops, Sulfinert Treated	100µL	ea.	22845	
Sample Loops, Sulfinert Treated	250µL	ea.	22846	
Sample Loops, Sulfinert Treated	500µL	ea.	22847	
Sample Loops, Sulfinert Treated	1mL	ea.	22848	
Sample Loops, Sulfinert Treated	2mL	ea.	22849	
Sample Loops, Sulfinert Treated	5mL	ea.	22850	

Jumbo Syringe

Clear acrylic syringes, ideal for holding and dispensing large volumes of gas. An adjustable plunger on the O-ring ensures that the syringe is gas-tight over a long period of time. The central port is supplied with a luer-lock fitting; the secondary port is supplied with a septum nut. This enables access to the gas sample for adding standards or removing a subsample. The plunger stem is detachable, making sample storage easy.


21276

	SGE			Restek	
Volume	Model	cat.#	qty.	cat.#	price
500mL	500MAR-LL-GT	009910	ea.	21275	
1000mL	1000MAR-LL-GT	009920	ea.	21276	
2000mL	2000MAR-LL-GT	009930	ea.	21277	

Syringe O-Rings


21279

21278

Syringe Volume	SGE cat.#	qty.	Restek cat.#	price
500mL	032527	ea.	21278	
1000mL	032532	ea.	21279	

For more information on all air monitoring canisters and products,

visit **www.restek.com/air**