

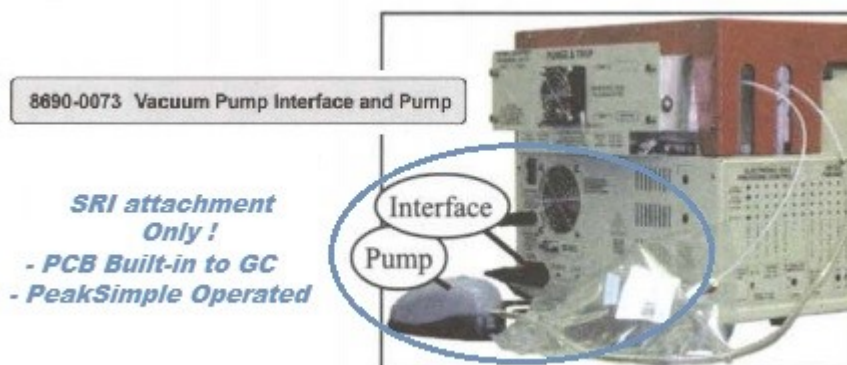
Air Sampling Accessories

Air Sampling Labs cover a diverse range of sampling requirements and accessories—more a matter of detailed methodology

SRI GCs are more generally aimed at analytical laboratories rather than dedicated GC process control applications

offer many as low cost easily installed integrated components based on the range of Multi-Gas Analysers

- **Some built-in to the GC**— generally requires SRI factory installation 1 **Vacuum Pump Interface** (8690-0073);(SRI GC Cat200 p89) including external vacuum pump and gas sampling bag use (for accurate GC calibration)
2 Non-standard Solenoid valves requires extra built-in circuit boards
The SRI GC is relatively “user-friendly” in terms of internal accessibility
- **Recommended but for proficient and suitably “trained “operators)**



- **Add-on — DIY**
- 2 **Gas Purifiers**, [PDF](#) High Purity Gases and gas regulators; particular for trace gas analysis < low ppm levels.
- > many options



OXYTraps are recommended for any GC for all GC type columns to minimise background signals often attributed to bleed even where GC columns are to be operated at high temperatures (even capillary columns at <100degC)

- care required (monitor color , a fast change-over is mandatory !)
- use isolation valves if /when GC is NOT being used > best to leave carrier gas running 24/7 if need be !

H2 generator (2014-HO20-2 new addition [PDF](#)) for FID H2 fuel gas and/or where H2 can be used as carrier gas for safety/ or mobile applications (100ml/min is adequate for a single GC)

- NOT necessarily recommended for spasmodic GC operation but long terms stability (>days) for system stability
Lab applications > where possible Helium or H2 gas bottle supply **might be** preferred
- A Gas Purifier (OXYTrap many options see [PDF](#)) is also recommended installed as close to the GC as possible with a minimum of fittings



H2-100 Hydrogen Generator #2014-H100-2
Hydrogen Generator
 Make GC quality hydrogen from distilled water
 Hydrogen generators are perfect for labs that would prefer, or can't have hydrogen cylinders in them.

- 100mL/min flow, 50 psi outlet pressure
- 22" x 14" x 20", shipping weight 52 lbs
- 115 or 230VAC, 100 watts
- Quiet operation
- One year warranty
- Ideal for FID H2 Fuel with built-in mini Air Compressor
- As H2 Carrier Gas requires OxyTrap for Capillary columns and trace gas analysis



- All SRI **FID GCs** have a built-in **mini Air Compressor as standard** (8690-2270 ([SRI Cat200 p89](#))) enabling a gas bottle-less GC system for that extra portability as carrier gas; Change over of a few fittings may be required.

Built-in "Whisper Quiet" Air Compressor

- Built into the GC Chassis
 - Powerful enough to supply FID air (300mL/minute)
 - Convenient—Recommended for Field Work
- NO Air Cylinder Required !**



8690-2270 Built-in "Whisper Quiet" Air Compressor 220 VAC

- **Sample stream in-line accessories**

- 4 **Sample Stream "Nafion" Drier** (8670-5870, [SRI Cat200 p88](#)) for "wet" humid samples (% water) tends to deactivate MolSieve and adsorbent type columns over-time requiring periodic high temperature re-activation. Similarly with many high concentration samples of CO2(%) will also deactivate MolSieve columns .



"Nafion" Sample Stream Drier

- Uses rechargeable Molecular Sieve dessicant beads and Nafion tubing
- Water is absorbed while gases pass through unaffected
- For use with water sensitive columns
- A simple, economic way to dry gas samples for GC



8670-5850 Sample Stream Drier

- 5 **10 vial Gas Autosampler** (8690-0047 [PDF](#)) for external field collection of gas samples in VOA glass vials (requires Any pre-installed auto GSV GC system)

10 Vial Gas Autosampler 8690-0048

- 20/40ml Screw VOA Vials x10
- fit to any SRIGC with a built-in auto GSV - SRI factory fitted



- 6 **7ml custom vials - 500ea Bandalero Belt 7ml Gas Tube Sampler** [PDF](#) - typically custom sample tubes
- > field loaded (onto an "ammunition-type-belt") for automated injection into a suitably modified SRI GC back in the lab - requires some expertise level for operation, setup and use]
 - > extra unique skill in getting "vacuum safe vial seal !

GC Multi-Tube Autosampler
- as fitted to a standard GC



"Unique" Crimp Top Evacuation Chamber

- A GC Attachment
- for Any GC with GSV Data SYS Control eg SRI 8610 Greenhouse Gas GC
- To 500 tubes per belt
- With many options !



- & Tends to be a one shot analysis per vial ! (any duplicates of same sample can be problematic !
(2nd is under a reduced pressure)

GC run time per sample - can be 2-6mins up to 15mins if temperature programming is required for typical simple MG#5

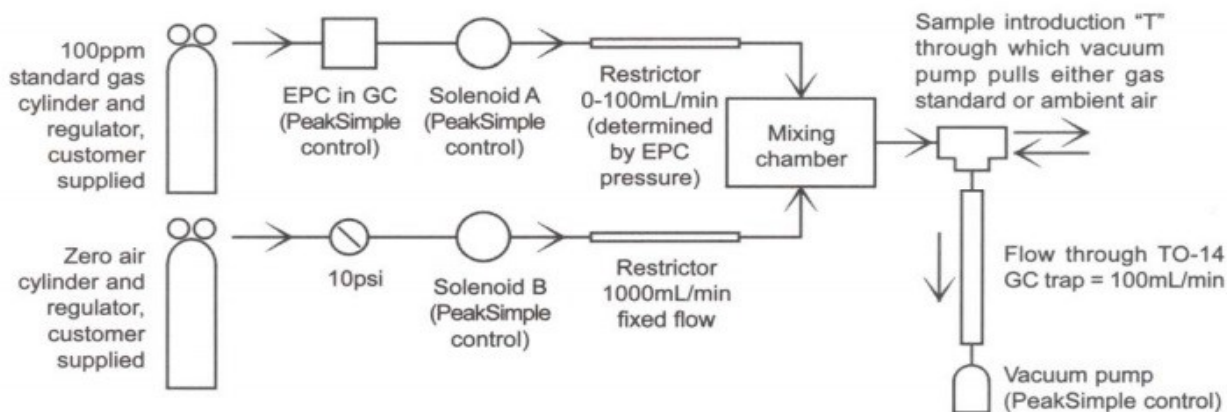
- as a brief test sample you can use ambient air or as a dilute Natural Gas.

Automated Gas Calibration System (ACS 8640-0050 SRI 200Cat p73)

- strictly for experts process control Apps requiring high accuracy & regular calibration at low ppm>ppB levels (~AUD6000) eg for auto-generation of non-linear calibration curves

Automated Calibration System (ACS)

For the SRI TO-14 Air Monitoring GC



Other Consumables

- **Columns** (generally packed columns for gases > also PLOT .
> long term life with care >> 12months)
- **Gas Syringes** - for simple gas apps plastic **Norm-Ject** type ([PDF](#))are adequate 1ml manual injection larger syringes for "spot" sample dilution. Via plastic fitting Connectors

Norm-Ject Syringes

re-Usable

NOT necessarily throw-a-way
NO "black tip" to clog or dry-out
NO Built-in obsolescence

Gas-Tight ALLPolyProp

also similar up to 140cc
and Jumbo 1-2 liter



- **Carrier Gas Lines** 1/8"OD High Purity pre-cleaned Copper is adequate except for ECD Detectors
- ◇ **Sample transfer Lines**—simple applications 1/8"OD Teflon or SS is adequate
- ◇ For <ppm > ppB and for reactive compounds eg (S-Cpds) Silcosteel/Sulfinert is mandatory—also for faster response for moisture at <ppM levels compared to SS

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

- ◇ **Calibration Gas Standards**
A multitude of possibilities (All generally customised but some standardised) and in different size cylinders — depending on your anticipated use-age rate ?

Specify ; matrix; components to be analysed, concentration (ppM v/v) of each component to be quantitated

for SRI MG#5# & TO14 GC

see **Restek Gas Standards**>

Natural Gas Standard 34438 x10 components,13litre cylinder (AUD1100)

Refinery Gas #1 34441(x28components)AUD1600) Restek PDF (p431) but we also get from Linde Gas, Air Liquide . . . depending . . . ! see p11 for Typical Refinery-type

- **Some “unique” SRI GC Features**

SRI GCs have a built-in Operating System **Peak Simple Data System (1-channel per Detector, 1or6 CH-system built-in)** via a s'ware “timed events” Table Manual GC Injection Port / gas sampling timing, column switching on/off switching of external or built-in solenoid switches or valves

- also for control of conventional GC Autosamplers (*Liquid & Headspace*)

- ◇ Each MGA GC configuration is a completely function internally automated as required with all valves, solenoids, multiple columns if/as required and installed for the designed application

- **New features MGA#5**

Methaniser - High Capacity Methaniser FID jet now standard to automate many aspects of the overall GC system

- ◇ Additional Gas sample injection by syringe via the septum injection port or by sample loop Gas Sampling Valve (GSV) automated injection normally 1ml max **Dual GSVs** now standard

Detectors : **TCD, FID-Methaniser**

TCD 200ppM-% Concentrations—all permanent gases (plus C1-C6 HCs); except H2 in simple MG#5 system (requires Argon carrier gas); % to low ppM

FID low ppM to mid % **for HCs ONLY !**

FID/Methaniser low ppm CO and CO2

cont from p5

- ◇ Standard SRI GC MGA GCs use SS packed columns 1/8"OD.
- ◇ 3 Columns Mol Sieve, HaySepD and a 3rd Haysep G for back-flushing requirement.
- ◇ Optional 4th Column capability - MXT-1 capillary column for higher MW components and/or S-Compounds (requiring an extra optional **Dual FID/FPD** Detector).
- ◇ Marked improvement can be achieved with high resolution capillary GC columns reLimits of detection and component resolution .

— BUT WITH THE ADDED NEED FOR DETAIL ATTENTION

**Limit of Detection — largely determined by baseline noise drift etc,
a function of carrier gas purity.**

This PDF is but a brief summary of gas analysis as implemented by SRI-GC & some of our Other Suppliers

- *NOT exhaustive !*
- *VERY Generalised !*
- NOT ALL Options are necessarily still available — ASK!
- Please select options judiciously before placing you Order —be prepared to discuss full details of your APP
Our DISCLAIMER APPLIES !
- ANY Prices quoted here are in AUD Ex-GST and INDICATIVE ONLY
- Some options are difficult to install in Australia / retrofit after “initial” delivery has been made
- internal GC components may be required
Generally the GC needs to be Return to the SRI Factory in CA-USA— IN THE ORIGINAL PACKING CASE > ALL freight costs are customer responsibility

Come back later ! we add to this PDF from time - to - time !

Gas Sampling Devices

Gas Sampling Bags are a Cost-Effective Alternative to Cans and Tubes for Many Applications

TO-14 Can
> SilcoCanisters



	Canister	Gas Sampling Bag	Solvent Desorption Tube
Media Type	whole air	whole air	adsorption
Sensitivity	ppb	<ul style="list-style-type: none"> • Quickly confirm vacuum or pressure inside canister. • Monitor pressure changes. • Fully protected by canister frame. • Can be heated to 90°C during cleaning. 	ppm
Technique	passive (no pump)		active
Sample Type	grab or integrated		integrated
Analyte	wide range of VOCs		permanent gases
Applications	ambient, IAQ, emergency response, IH	ambient, IAQ emission	IAQ, IH
Durability	reusable	one time use	one time use
Inertness	excellent	<ul style="list-style-type: none"> • Quickly confirm vacuum or pressure inside canister. • Monitor pressure changes. • Fully protected by canister frame. • Can be heated to 90°C during cleaning. 	fair
Stability	30 day		varies by analyte
Sample Volume	0.4-6 L		varies by analyte
Sampling Time	minutes to days		minutes to hours

Gas Sampling - Devices

SS Canister : 0.5, 1.0, 6.0, 15liter

- TO-14 : for permanent gases and VOCs > generally >100ppB to %

- **Silco Canisters** : [PDF](#) ultimate inertness - Sulfinert > H2S <10ppB, VOCs < 1ppM requires extensive cleaning between sampling.

(multiple Vacuum heat cycling purging to EPA "protocols ")

Gas Sampling Bags : [PDF](#)

0.5, 3, 5, 10, 25liter in **Altef** (Tedlar) LowppM VOCs (NOT ketones, acetates, H2S)

1.3.5, 10liter in **Multi-Layer Foil** > low MW VOCs (but NOT <lowppM), permanent ga



ALTEF Gas Sampling Bags



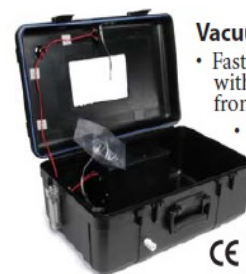
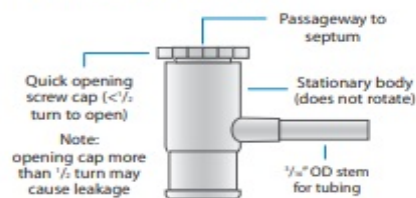
Multi-Layer Foil Gas Sampling Bags



Get the convenience of having both a hose connection and a syringe port in a single valve!

Polypropylene Combo Valve

- Inert polypropylene
- 1/8" diameter valve stem
- Replaceable Teflon®-faced septum



Vacuum Bag Sampler

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

22118



Solvent Desorption Tubes - high MW VOCs in air

> similar in principle to simple : DRAEGAR Tubes

(Color change tubes > concentration dependant, crude OH&S industrial use)

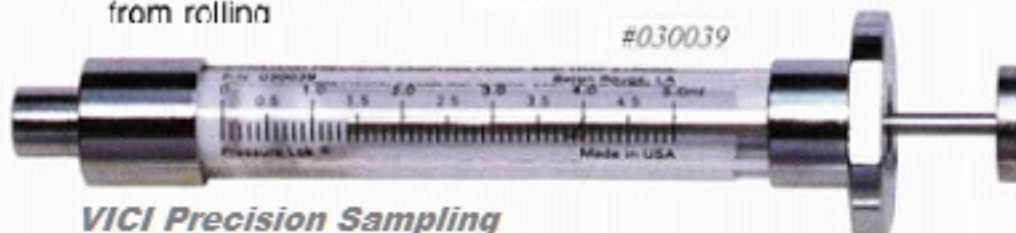
(> see elsewhere NOT Chromalytic)

Gas-Tight Syringes

Gas Syringe for VOCs

Purge and Trap Syringe Accept standard Luer hub needles

- ▶ **Luer lock** – for use with purge and trap analysis
- ▶ **Frosted glass on syringe barrel** – allows easy volume reading and accepts writing
- ▶ **Plunger tip of stress-formed virgin PTFE** – self-lubricating and durable.....
- ▶ **Heavy duty rear flange** – flat edges keep the syringe from rolling



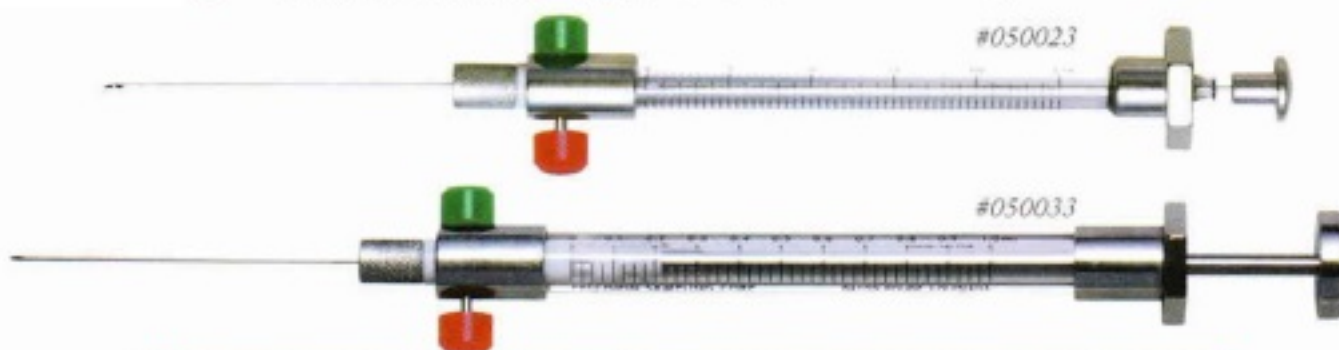
VICI Precision Sampling

5 ml	10 ml	Luer needles
030039	030040	Size: .028" x .016" x 2"
Luer needles must be ordered separately.		Type: Bevel, open end
		Pkg. of 3: 943061

Precision Sampling Gas-Tight Syringes

Series A-2 Removable needles: .028" x .005" x 2", bevel, open end on 25, 50, and 100 µl
.029" x .012" x 2", bevel, open end on all others

- ▶ **Push-button valve** – allows instantaneous injection
- ▶ **Smaller volumes** – great for small volatile samples



	25 µl	50 µl	100 µl	250 µl	500 µl
Standard:	050023	050024	050025	050031	050032
Luer:	050043	050044	050045	050051	050052
	1 ml	2 ml	5 ml	10 ml	
Standard:		050033	050034	050035	050036
Luer:		050053	050054	050055	050056

Replacement needles for standard syringes (Luer needles on page 11)

Size:	.028" x .005" x 2"	.029" x .012" x 2"	.029" x .012" x 2"
Type:	Bevel, open end	Bevel, open end	Side port, taper
Pkg. of 3:	943050	943051	943052

more Syringes - devices

Jumbo Syringes

*Polycarbonate Body
Silicone O-ring*

Jumbo Syringes (500mL to 2L)

- Designed for holding and dispensing large volumes of gas
- Heavy duty acrylic barrels
- Easy access to sample for the addition of standards or removal of subsample via secondary port
- Plunger stem can be unscrewed for ease of transportation and storage

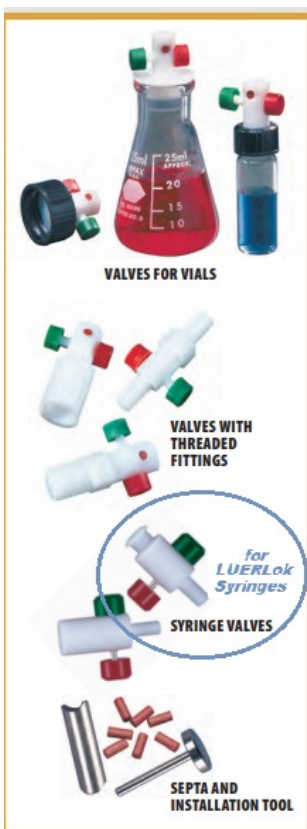


Part no. ▲ ▼	Syringe Volume ▲ ▼	Syringe Code ▲ ▼	Replacement O-Ring
009910	500mL	500MAR-LL-GT	032527
009920	1L	1000MAR-LL-GT	032532
009930	2L	2000MAR-LL-GT	032537



MININERT™ VALVES

Mininert™ push-button valves are highly dependable, leak-tight closures for screw-cap vials and other laboratory containers. When used with a glass vial, only PTFE and glass are in contact with the contents. Their unique features make Mininert valves the ideal closure



VALVES FOR VIALS

VALVES WITH
THREADED
FITTINGS

for
LUERLok
Syringes

SYRINGE VALVES

SEPTA AND
INSTALLATION TOOL



LUERlok
Polycarbonate body
PE rotor

Stopcock Valves 3-Way
(also 2-Way)

*inert gases ONLY
NOT necessarily for
Trace Gases
< ~ 100ppM*



Plastic Syringes
"Terumo" -type

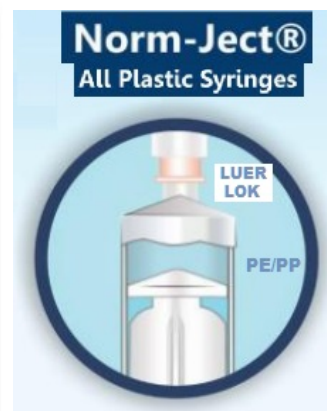
limited Use?

Various
Sizes
1-140cc

*depends on
siliconised
"O-ring" seal*

LUERLok preferred

"slides" more easily !



Norm-Ject®
All Plastic Syringes

LUER
LOK

PE/PP

more Robust Multi-use

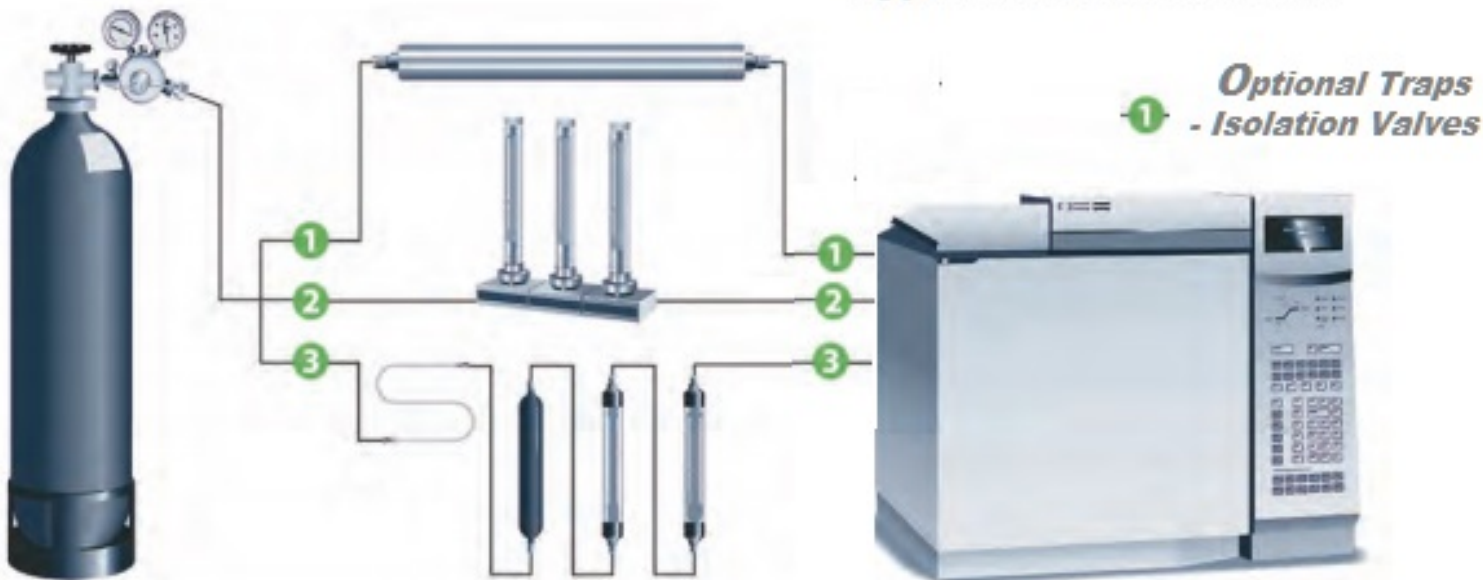
*both OK for "inert" gases - pressure to > 50psi / Vacuum Use
short term Only re inertness / leak-tight !*

Norm-Ject see PDF

Typical GC Installation [>PDF](#)

High Purity Gas Regulator

Typical GC Installation



High Purity Gas

Carrier Gas

High Capacity OxyTrap

Moisture Indicating Trap

also GC Detector Dependant

many options > depending on App : eg Trace Gas Analysis

Oxytrap on Carrier **IMPORTANT** for Most GC Apps - & Minimise Fittings re leaks !

some Purity Specs

[see PDF](#)

Gas Purification Hints

[see PDF](#)

Gas Purity for ANY instrumentation purpose IS Important !

> many compromises

- depends on the Gas type

Analytical requirements

GC Transfer Lines Ultra-clean Copper is required)

NOT for ECD (use Silcosteel)

Type of Detector and sensitivity required

Trace Gas analysis are ultra-sensitive vs macro gases

GC : TCD < FID < ECD & GC/MS

Gas Samples

Reactivity of components and sampling device compatability

Syringes need to be Gas-Tight > time dependant

Inert for VOCs (Glass / Teflon vs Polyprop for simple Air Analysis ?

Process Control APPS

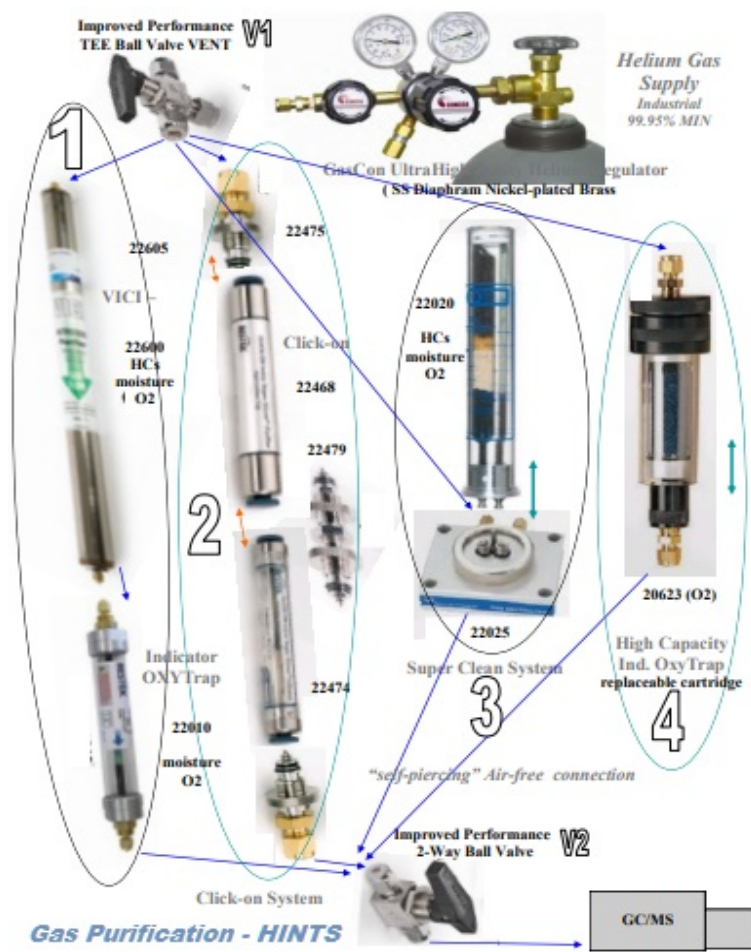
- Transfer Line dependant > even moisture in SS > Silcosteel required

> re response to stabilise !

Reactive gases can be especially problematic !

eg H₂S i Natural Gas or Air (at <1ppm)

even CO₂ in "moist" air at trace levels !



Typical Gas Standards see Restek Catalog PDF

Smoke Stack Plume Gas

- Crude standards can be made in a Syringe Transfer or by Gas Bag to ~>10% accuracy?
- 18Liter - but can be conserved . . . with care !
- Use MinCyl Gas Regulator and Luer Adaptor



Typical Refinery Gas - Type

Description	Shelf Life	Scotty 48 (48 Liter) cat.#
Multi-Component Mixtures		
Carbon monoxide, carbon dioxide, hydrogen and oxygen in nitrogen (0.5% each)	2 yrs.	34505
Carbon monoxide, carbon dioxide, hydrogen and oxygen in nitrogen (1% each)	2 yrs.	34508
Carbon monoxide, carbon dioxide, methane, ethane, ethylene and acetylene in nitrogen (1% each)	1 yr.	34511
Carbon monoxide, carbon dioxide, nitrogen, and oxygen, (5% each) and methane and hydrogen (4% each) in helium	2 yrs.	—
Carbon monoxide (7%), carbon dioxide (15%) and oxygen (5%) in nitrogen	2 yrs.	—
Carbon monoxide (7%), oxygen (4%), carbon dioxide (15%) and methane (4.5%) in nitrogen	2 yrs.	34516
C1-C6 n-Paraffins: methane, ethane, propane, butane, pentane, hexane in nitrogen (15ppm each)	2 yrs.	34529
C1-C6 n-Paraffins: methane, ethane, propane, butane, pentane, hexane in helium (100ppm each)	2 yrs.	34522
C1-C6 n-Paraffins: methane, ethane, propane, butane, pentane, hexane in helium (1000ppm each)	2 yrs.	34525
C1-C6 n-Paraffins: methane, ethane, propane, butane, pentane, hexane in nitrogen (100ppm each)	2 yrs.	34528
C2-C6 Olefins: ethylene, propylene, 1-butene, 1-pentene, 1-hexene in helium (100ppm each)	2 yrs.	34530
C2-C6 Olefins: ethylene, propylene, 1-butene, 1-pentene, 1-hexene in nitrogen (100ppm each)	2 yrs.	34532
Branched Paraffins: 2,2-dimethylbutane, 2,2-dimethylpropane, isobutane, 2-methylbutane, 2-methylpentane, 3-methylpentane in nitrogen (15ppm each)	2 yrs.	—
Methane, ethane, ethylene, acetylene, propane, propylene, n-butane, propyne in nitrogen (15ppm each)	1 yr.	34537
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

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 3/4" height (10.2 x 41cm)
 DOT Specifications:
 39 NRC



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



Syringe Adapter Kit for Single-Stage VOC Regulator



VOC TO-14/15 Standards are far more diverse and multi-components for ambient Air Analysis

for use with FID, HID, ECD etc ultra sensitive GC Detectors,
 FID/Methaniser (for ~10pM Limit of Detection (1cc sample injection)
 often at <100ppM - low ppB

Syringe and Gas Sampling bags are limited by adsorption and permeability problems

- glass OR
- Silcosteel-type Canisters are preferred
- cost depends on . . .

cylinder size, number of components & type, concentration accuracy required (within limits)

Dangerous Goods Freight Charges apply for Import & Local Freight

- **Custom Standards - Quotation required**

GreenHouse Gases

EPA TO-14

Chlorinated Hydrocarbons

S-Compounds