

Crowcon Technical Note

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Subject: Pumped sampling of gases

The following instructions should be observed when using our instruments in Pumped or Manual Sampling modes.

- It is strongly recommended before proceeding that a function check is performed using the pump and sample tube with the gas/vapour to be detected.
- To reduce the risk of absorption of the gas/vapour in the sample tube, ensure the temperature of the sampling tube is above the flash-point temperature of the target vapour.
- Ensure the monitor is correctly calibrated for the target gas/vapour.
- Only use the sample tube supplied by Crowcon. It is strongly recommended that 'reactive gas tubing' (part no.: AC0301) is used for sampling gases/vapours that are likely to be adsorbed (examples: toluene, chlorine, ammonia, hydrogen sulphide, ozone, hydrogen chloride NOx etc).
- Keep the sample tube length as short as possible.

Allow sufficient time for the gas/vapour to reach the sensor, allow at least 3 seconds per metre plus the normal T90 response time of the sensor (typically 30-40 seconds).

Some of the gases which can be measured by our gas detection products are classified as "Reactive" gases.

A "Reactive gas" is described as a gas which will react with, or be absorbed by, the material with which it comes into contact. As a result, the gas concentration reaching the sensor can be reduced, leading to an incorrect reading.

Reactive gases include the following (listed with the appropriate calibration gas: contact Crowcon for specific gas concentration information and cross-calibration values):

<u>Target Gas</u>	<u>Calibration Gas</u>
Ozone (O ₃)	Ozone (via O ₃ generator)
Hydrogen Chloride (HCL)	Hydrogen Chloride
Hydrogen Fluoride (HF)	Hydrogen Chloride or Sulphur Dioxide
Chlorine (Cl ₂)	Chlorine (via Cl ₂ generator)
Fluorine (F ₂)	Chlorine (via Cl ₂ generator)
Chlorine Dioxide (ClO ₂)	Chlorine (via Cl ₂ generator)
Phosgene (COCl ₂)	Chlorine (via Cl ₂ generator)
Sulphur Dioxide (SO ₂)	Sulphur Dioxide
Nitrogen Dioxide (NO ₂)	Nitrogen Dioxide
Nitrogen Monoxide (NO)	Nitrogen Monoxide
Ammonia (NH ₃)	Ammonia

It is therefore very important that the appropriate accessories and precautions are applied when measuring, calibrating or bump testing sensors targeting reactive gases.



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For some gases, the bore size and length of tubing can be an issue, particularly with rubber tubing. If there is a large enough Surface Area to Volume ratio, then gases such as the following VOCs can adsorb into rubber.

If rubber tubing must be used, the tubing should be kept as short as possible, and use a large diameter tube.

Warning: Acetone and rubber will react: the acetone attacks the rubber, and hose will be damaged.

The “Flash Point” for each gas has been included in the table. This detail is important because the tubing temperature must be greater than the flash point for the whole length of the tubing at all times.

If the tubing is cooler than the gas, the hydrocarbon will condense on the inside of the cool part of the tube and not reach the sensor. Examples:

<u>Gas</u>	<u>Characteristic</u>	<u>Flash Point (Deg C)</u>
Acetone	ketones including acetone harm rubber tubing	-20
Cyclohexane	can adsorb into rubber tubing if small bore or long length	-20
Ethyl Acetate	can adsorb into rubber tubing if small bore or long length	-4
Hexane	can adsorb into rubber tubing if small bore or long length	-22
Isopropyl Alcohol	can adsorb into rubber tubing if small bore or long length	12
Isopropyl Acetate	can adsorb into rubber tubing if small bore or long length	2
Methanol	can adsorb into rubber tubing if small bore or long length	11
Xylene	can adsorb into rubber tubing if small bore or long length	17 to 25

When taking sample measurements:

- Use Teflon, FEP or PTFE tubing; the tube length must be kept as short as possible and avoid connectors and unions.
- Allow the sample to flow through the regulator/pipe for at least three minutes for initial absorption to occur before attempting to get a reading.

For more information please contact +44 (0)1235 557711, technicalsupport@crowcon.com