

A guide to Gas Detection & Ventilation in Confined Spaces



Designed for

- Employers of those working in Hazardous Areas
- Health and Safety Personnel
- Maintenance Teams
- Operatives
- Electrical Engineers
- Mechanical Engineers

Working in

- Oil refineries
- Offshore platforms
- Utilities
- Confined Spaces
- Fire and Rescue
- Emergency Response
- Petrochemical
- Vessel Entry
- Sewer and tunnel inspection
- Marine/Shipping
- Tank cleaning and painting
- Water treatment

This user-friendly guide to Gas Detection & Ventilation Equipment in Confined Spaces, contains the essential elements of best working practice.

The purpose is to educate as to the importance and correct use of Gas Detection & Ventilation Equipment.

Please note - SA Equip does not take any responsibility for the information and guidance contained within this document.

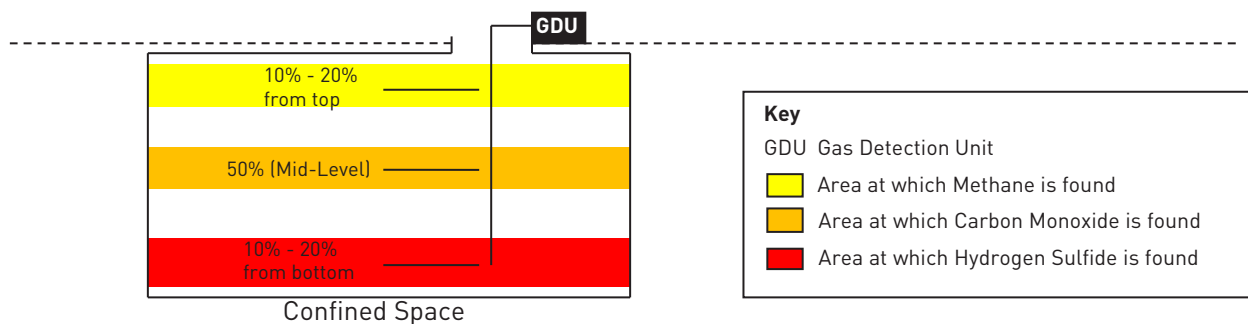
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GAS DETECTION

It is important to check that the confined space is free from both toxic and flammable vapours and that it is fit to breathe. Monitoring the air in the confined space should be carried out by a responsible person using a gas detection device, either a hand aspirator or an electric pump, integrated or in line. Where the risk assessment indicates that conditions may change, or as a further precaution, continuous monitoring of the air may be necessary.

Stratospheric Gases to be monitored are Methane (CH₄), Carbon Monoxide (CO) and Hydrogen Sulfide (H₂S).

As Methane is lighter than air, Carbon Monoxide is the same density as air and Hydrogen Sulfide is heavier than air it is very important to monitor the air at the three levels that these gases would be found. It is recommended to sample the air at 10%-20% from top, at 50% (Mid-Level) and at 10%-20% from bottom, as shown below.



To work effectively and safely, you often have to move air. The **SA CYCLONE** range of fans, ducting, couplers and adaptors allow you to make an inhospitable, dangerous environment into a safe workplace.

Designed as plug-and-play devices, they allow easy movement and quick installation wherever the ventilation system is required.

For further information on SA Equip's ventilation range please contact info@saequip.com



Your gas detector will be fitted with preset gas alarms, which will omit visual and audible warnings if any of the following circumstances occur.

Oxygen (O₂) – Low (-19.5%) and High (+23%)
Carbon Monoxide (CO) Low -35 ppm
Hydrogen Sulfide (H₂S) Low -10ppm
LEL* – 10%

*LEL is the Combustible **Lower Explosive Limit**, which occurs when Air and Fuel create an exact combustible mixture, which is considered 100% LEL.

If the alarm sounds you must exit immediately, and then identify the cause of the alarm. When you have corrected the alarm condition you must always remember to re-monitor the confined space before re-entering.

Review – Checkpoints for effective Gas Detection in Confined Spaces

Check air at three levels

Maintain Gas Detector, carrying out all necessary Bump Tests

Remember to re-monitor the confined space before re-entering when the Gas detector alarm has sounded.

VENTILATION AND IMPORTANT KEY RULES

Efficient ventilation needs to do the following:

- 1. Avoid introducing polluted air inside the confined space**
- 2. Provide sufficient airflow**
- 3. Reach the entire confined space**

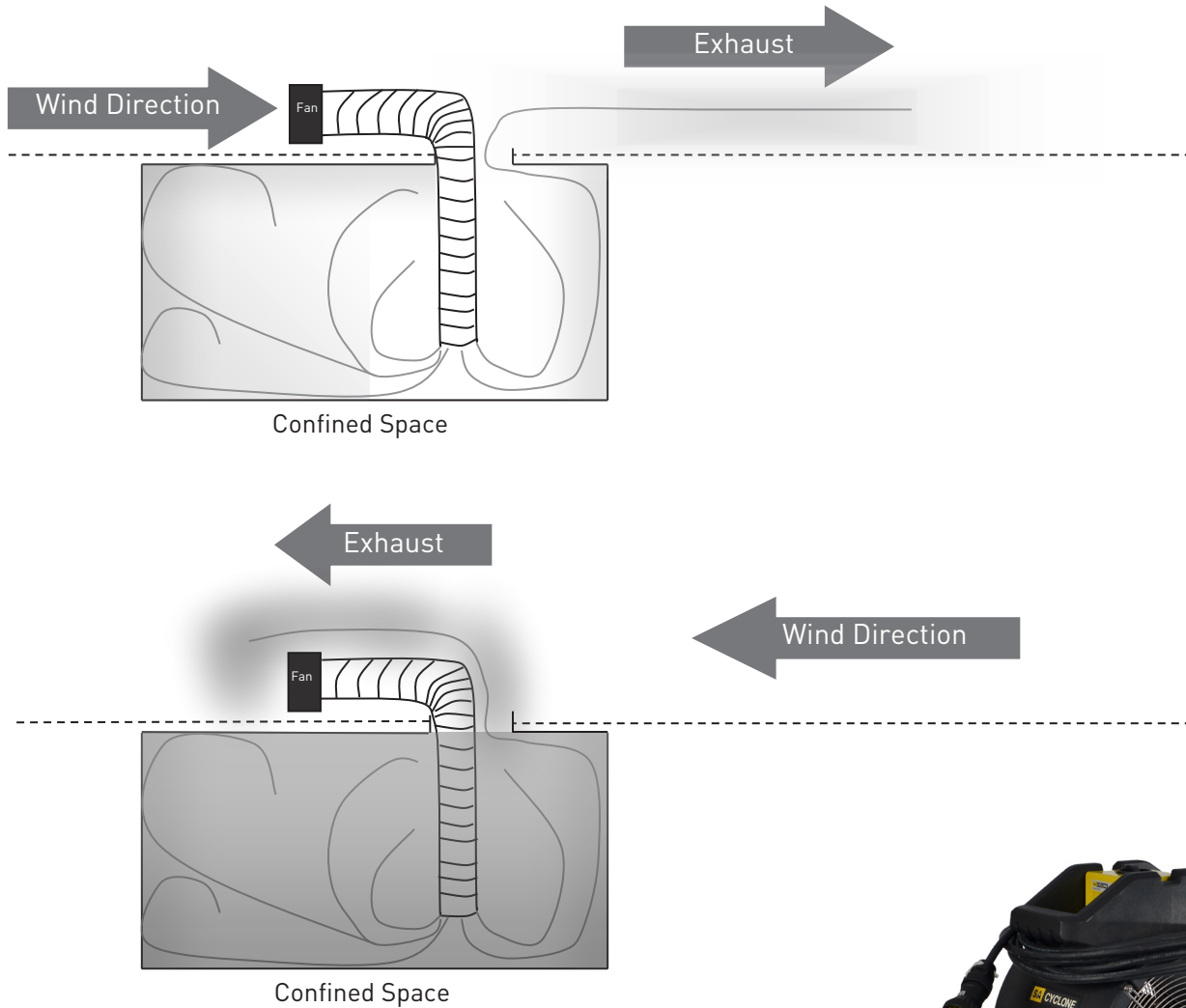
The **SA CYCLONE** venturi air mover has no moving parts, and instead uses high velocity compressed air to create a pulling action and a subsequent large volume displacement through a diffuser, connecting to ducting or hoses where required.

For further technical specifications please contact info@saequip.com or call 0333 240 6111.



1. Avoid introducing polluted air inside the confined space

It is important to be sure that the air pushed inside the confined space is not polluted. The ventilator should therefore not be placed very close to the confined space, as it could simply push the polluted air back into the confined space. Checking the wind direction before setting up the ventilator is also recommended to avoid this.



With the use of interchangeable duct adaptors our **SA CYCLONE EX Air Mover** can be configured for 30cm and 40cm applications. The unit is also stackable which reduces storage use.

2. To provide sufficient airflow

It is recommended to ventilate **7.5 times** the volume of the confined space before entering.

Examples:

If the volume is 50 m^3 then it is necessary to ventilate the equivalent of **375 m^3** (7.5×50).

If the device has airflow of:

$1\,000 \text{ m}^3/\text{h}$: $(375 / 1000) \times 60 = 22.5$ minutes ventilation time

$3\,000 \text{ m}^3/\text{h}$: $(375 / 3000) \times 60 = 7.5$ minutes ventilation time

The bigger the airflow of the device, the less time is needed to “secure” the confined space before entering in it.

It is recommended to have a ventilator that is able to ventilate **20 times** the volume of the confined space per hour.

Examples:

- $50 \text{ m}^3 \times 20 = 1000 \text{ m}^3 / \text{Hour}$.
- $100 \text{ m}^3 \times 20 = 2000 \text{ m}^3 / \text{Hour}$.
- $150 \text{ m}^3 \times 20 = 3000 \text{ m}^3 / \text{Hour}$.

Confined Space Volume	Recommended Air Mover
Up to 50 m^3	SAF35/110-30
$50 \text{ m}^3 - 150 \text{ m}^3$	SAF35/110-30
$150 \text{ m}^3 - 250 \text{ m}^3$	SAF35/110-40

The compact design and versatile construction of the **SA CYCLONE EX Air Mover** provides increased mobility and performance in the most demanding environments. With maximum airflow of $5179 \text{ m}^3/\text{hr}$, our EX air mover safeguards you when it matters most.



3. To reach the entire confined space

It is generally more effective to ventilate a confined space by pushing fresh air into it than extracting because:-

- The pushed air is going 30 times further than if it was exhausted.
- You are creating a real air stream inside the whole confined space. If you are exhausting there are some places in the confined space where the polluted air could remain.

Portable Ventilation equipment is particularly essential where portable gas cylinders and diesel-fuelled equipment are used inside the space because of the dangers from build-up of engine exhaust. **Warning: carbon monoxide in the exhaust from petrol-fuelled engines is so dangerous that use of such equipment in confined spaces should be prohibited.**

Over 50% of the workers who die in confined spaces are attempting to rescue other workers.

Rescuers must be trained in and follow established emergency procedures and use appropriate equipment and techniques (lifelines, respiratory protection, standby persons, etc.). Steps for safe rescue should be included in all confined space entry procedures. Rescue should be well planned and drills should be frequently conducted on emergency procedures. Unplanned rescue, such as when someone instinctively rushes in to help a downed co-worker, can easily result in a double fatality or even multiple fatalities if there is more than one would-be rescuer.

Review - Checkpoints for effective Ventilation in confined spaces

- Check wind direction will take expelled air away from the confined space, and not back through the ventilator
- Ensure 7.5 complete air exchanges before entry
- Ensure ventilator is able to ventilate 20 times the volume of the confined space per hour.