



New SOLAS rule: Pre-entry measurement helps prevent accidents in enclosed spaces on board

Tanks, ship hulls and holds are so-called enclosed spaces which entail significant dangers for the crew: Toxic gases, lack of oxygen and risk of explosion. These dangers can be reduced through pre-entry measurement with multi-gas detectors according to the SOLAS amendment.

Pre-entry measurement of enclosed spaces on board is becoming mandatory

Holds, fuel or ballast tanks, ship hulls and other enclosed spaces can become deadly traps for the ship's crew—if pre-entry measurement isn't performed before entering these spaces. Life-threatening hazards such as toxic gases and vapours, lack of oxygen or risk of explosion can only be mitigated by analysing the situation beforehand with a portable multi-gas detector. On 1 July 2016, the IMO Maritime Safety Committee (MSC) will thus adopt a new SOLAS amendment: It will make pre-entry measurement of enclosed spaces on cargo ships above 500 GRT and passenger ships mandatory as of 1 July 2016. The multi-gas detectors are used to determine the concentration of oxygen (O₂), flammable gases and vapours, hydrogen sulphide (H₂S) and carbon monoxide (CO). The requirements also include providing suitable calibrating stations to perform function testing and calibration of the detectors—an important prerequisite for reliable and accurate measurement results. The main reason for this new rule is the large number of often deadly accidents while working in storerooms or other confined or enclosed spaces aboard ships.

Risks are often underestimated

It happens time and again despite all of the safety regulations in effect on board cargo and passenger ships: Crew members suffocate in cargo holds, for example because freight ripening, rotting, fermenting or oxidation processes have created a lack of oxygen. Or because toxic gases and vapours have developed as a result, leading to loss of consciousness, damage to health or even death—quickly and silently with no prior warning. Since many hazardous substances—as well as a lack of oxygen—cannot be perceived by the human senses and the emanating danger cannot be assessed quickly enough, pre-entry measurement of the atmosphere will be mandatory in the future. Multi-gas detectors, which can also be used to monitor gas concentrations while working in the enclosed spaces are used for this purpose.

WHAT IS AN "ENCLOSED SPACE"?

In the shipping industry, an enclosed space is distinguished in particular by restricted entry and exit opportunities, reduced headroom, reduced air exchange and by closed spaces created by bulkheads and partitions.¹ However, such spaces are always still large enough so that one can enter them to perform inspection, maintenance, cleaning and repair work. Typical examples include fuel tanks, ballast tanks, ship hulls, cargo holds, etc.

Recognising enclosed spaces—and securing them

In order to even be able to assess which area of a ship is a hazardous enclosed space, which requires carrying a gas detector, these spaces must be identified within the framework of a risk analysis. Furthermore, it is necessary to document and label these rooms, niches, tween decks, holds, containers, tanks, etc. A mechanical lock to prevent access should also be considered in order to keep unauthorised persons out and to warn authorised persons of the potential danger. Last but not least, gaining the necessary competency with regard to calibration and correct use of the gas detector is required, supported by additional training measures such as methods for rescuing accident victims from enclosed spaces. The safety officer on board is responsible for deciding who is even authorised to enter an enclosed space in the first place. Work in progress should always be monitored by another person stationed outside of the space for safety.



¹ <https://www.osha.gov/SLTC/etools/shipyard/shiprepair/confinedspace/definitionofspaces.html>; accessed June 11, 2015



Pre-entry measurement: Requirements for a portable multi-gas detector

That the gas detectors are sturdy, reliable and flexible is particularly important to ensure the safety and health of the ship's crew when it comes to entering enclosed spaces. In this regard, the devices should have the following attributes in order to withstand the particularly harsh conditions on board:

- **Explosion protection:** The device must meet the relevant explosion protection standards, so that it doesn't become an ignition source itself in potentially explosive areas (e.g. in case of a process-related risk of explosion or in case of leaks). Standards which are accepted around the world include ATEX, CSA, UL, GOST, etc.
- **Robustness:** A robust housing protects against blows, foreign bodies and water.

- **Quality of the measuring function:** The specified measuring quality must be complied with even under extreme conditions (high or low temperatures, pressure, moisture, vibration, etc.).
- **Electromagnetic compatibility:** The measurement signal of the gas detector must not be disrupted by using an electronic device in the immediate vicinity, and vice versa.

Depending on the number of gas detectors in use, it can make sense to have a fully automated calibration station in order to perform the required calibration and adjustments in an efficient manner. Additional equipment which is important for pre-entry measurement of enclosed spaces and tanks includes pumps, hoses and probes.



contained if necessary) at hand and to actually use it as well. Since January 2015, SOLAS recommends that both the personnel which is authorised to work in enclosed spaces and the on-board rescue officer participate in suitable training at least once every two months—and for good reason.² The IMO Resolution A.1050(27) Revised Recommendations for entering enclosed spaces aboard ships³ provides a guideline for designing these training sessions.

Education and acceptance are important

For the industry, the new SOLAS amendment may initially seem to be a costly additional requirement. However, the goal of the amendment is to effectively prevent accidents and deaths, which unfortunately still occur far too often in today's shipping industry. The use of portable multi-gas detectors can help the crew become aware of the dangers of enclosed spaces and make them more safety-conscious. It has to be clear that conditions involving a lack of oxygen or the presence of toxic substances can prevail in enclosed spaces such as tanks, containers and ship hulls, and may be deadly. This danger can be reduced significantly by pre-entry measurement and by carrying gas detectors while in the enclosed space. If the crew already understands the purpose of the new SOLAS rule within the context of the on-board safety training, then it doesn't take a dramatic accident to create a higher level of awareness and acceptance for the use of portable gas detectors.

No rescue attempt without self-protection!

On board and on land, first responders also suffer casualties time and again. They are often killed during a rescue attempt for the same reason as their colleague in distress—for example due to a lack of oxygen or toxic substances. This is why it is also important to measure the concentration of gases and vapours before attempting a rescue, and to keep the corresponding personal protective equipment such as breathing equipment (self-

² <http://www.imo.org/en/MediaCentre/PressBriefings/Pages/45-SOLAS-eif.aspx#.VdxWyEX0CGx>, accessed June 11, 2015

³ [http://www.imo.org/KnowledgeCentre/IndexofIMOResolutions/Documents/A%20-%20Assembly/1050\(27\).pdf](http://www.imo.org/KnowledgeCentre/IndexofIMOResolutions/Documents/A%20-%20Assembly/1050(27).pdf), accessed June 11, 2015

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