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ENCLOSED SPACE ENTRY

1. GENERAL

1.1. The objective of this chapter is to encourage the adoption of safety procedures aimed at preventing casualties to ships' personnel entering enclosed spaces. The atmosphere in any enclosed space may be oxygen-deficient or oxygen-enriched and/or contain flammable and/or toxic gases or vapours at varying levels within a space, all of which are hazardous to human health. Such unsafe atmospheres could also subsequently occur in a space previously found to be safe. Unsafe atmospheres may also be present in spaces adjacent to those spaces where a hazard is known to be present.

1.2. Investigations into the circumstances of casualties that have occurred have shown that accidents on board ships are caused by:

- Unrealistic time pressures
- Confusing Instruction
- Lack of Training
- Colleagues rushing in to help.
- Senior officers make up many of the fatalities reported.
- Insufficient knowledge
- Disregard for, the need to take precautions rather than a lack of guidance.

The company has introduced an Improved recognised training course, and this course is the core to mitigating casualties arising from Confined Space Entries.

1.3. The leading cause of fatalities in Enclosed Spaces is Asphyxiation from an oxygen deficiency or from exposure to toxic atmospheres.

- 83 deaths that occurred in enclosed spaces from 2015 to 2020
- 45 or 53% were due to oxygen depletion
- 50 or 60% of deaths were in the cargo holds.
- 89% of confined space fatalities occur on work authorized by a supervisor
- 80% of fatalities occur in locations once entered by the same person who later died.

1.4. Entry into enclosed spaces can lead to multiple fatalities and incidents due to seafarers who find a casualty in an enclosed space, enter that space to effect a rescue and then fall victim to the same hazard as evidenced by the industry record of fatalities and serious injuries.

1.5. Master shall ensure that ship staff are trained as appropriate in enclosed space safety, including familiarization with onboard procedures for recognizing, evaluating and controlling hazards associated with entry into enclosed spaces. Also, all officers shall be trained in the use of atmospheric testing equipment provided on board.

1.6. **If entry into an enclosed space can be avoided, it should be**. If entry is essential, compliance with this chapter will assist in the protection of those entering the space. As a general rule, enclosed spaces should not be entered unless it is absolutely necessary and when there

is no practicable alternative. No entry into an enclosed space should be permitted until competent persons are present. The implications of this should be considered in particular when the competent person are shore-based personnel. Any decision that entry is necessary should first be reviewed, by the Competent Person, against possible alternatives that remove the need for personnel to enter the space. If after this detailed review the entry is still necessary, no attempt should be made to enter the space, even under controlled conditions, until its atmosphere has been tested as safe.

1.7. Entry points to enclosed spaces shall so far as is reasonably practicable be labelled.

1.8. Compliance with these procedures shall be verified during internal audits/ship inspections. Company instruction is to carefully verify if an enclosed space entry is required. If entry to an enclosed space can be avoided, it should be the preferred option. Entry, for the sake of "having a look", should be avoided if possible.

2. DEFINITION

2.1 Enclosed space is defined as a space that has any of the following characteristics:

a. Limited openings for entry and exit; (Limited openings may increase the risk of a harmful atmosphere developing and may also create a hazard on entry whilst seafarers are wearing the appropriate personal protective equipment. It should be considered whether there is ease of access within the spaces and a potential route for casualty extraction if there was an emergency rescue situation.)

b. Inadequate ventilation: (An area with inadequate ventilation, which might not generally be considered an enclosed space, can still develop a harmful atmosphere under various conditions.)

c. Not designed for continuous worker occupancy.

Conditions such as poor ventilation and limited access to enter or exit a space heighten the risk of a hazardous environment, which can lead to asphyxiation or loss of consciousness in a matter of minutes.

2.2 Enclosed spaces include, but is not limited to:

1. Cargo Spaces – see table under Section 3 Risk Assessment
2. Double Bottoms
3. Fuel Tanks
4. Lube Oil Tanks
5. Ballast Tanks
6. Pump Rooms
7. Cargo Compressor Rooms

8. Freshwater Tanks
9. Cofferdams
10. Chain Lockers
11. Void Spaces
12. Duct Keels
13. Inter Barrier Spaces
14. Boilers
15. Engine Crank Cases
16. Engines Scavenge Air Receivers
17. Sewage Tanks and adjacent connected spaces

Enclosed Spaces that do not require and entry permit but do require ventilation prior to entry are as follows:

1. CO_2 Rooms
2. Battery Lockers
3. Emergency Generator Room
4. Enclosed Lifeboats
5. SOPEP Locker
6. Mast Houses
7. Chemical Lockers
8. Deck Stores
9. Forecastle Store
10. Crane Jibs
11. Crane Pedestal
12. Crane Cabin

The above spaces that do not require entry permits require a minimum of 15 minutes ventilation.

It also includes any other items of machinery or equipment, which are not routinely ventilated and entered.

2.1. An enclosed space may not necessarily be enclosed on all sides, e.g., a ship hold may have open tops, but the nature of the cargo and the makeup of the cargo hold makes the atmosphere in the ~~lower~~ entire hold toxic. Cargo holds whether empty or containing hazardous cargo, toxic cargo or oxygen depleting cargo are ~~also~~ considered to be enclosed spaces.

2.2. Adjacent connected space means a normally unventilated space which is not used for cargo, but which may share the same atmospheric characteristics with the enclosed space such as, but not limited to, a cargo space access way, forecastle spaces, windlass switch rooms and bosun's workshops / stores.

2.3. **Competent Person** (Operational Level) means a person with an operational level of competency to make an informed assessment of the likelihood of a dangerous atmosphere being present or subsequently arising in the space.

2.4. **Responsible Person** (Management Level) means a person at a management level on board a ship (i.e. Master, Chief Mate, Chief Engineer or Second Engineer) of competency and authorization by the shipping company to permit entry into an enclosed space.

2.5. **Attendant** (Ratings) maintains a watch over those entering the enclosed space, to maintain communications with those inside the space and to initiate the emergency procedures in the event of an incident occurring.

2.6. Under no circumstances is an EEBD to be utilised for any rescue attempts.

2.7. Crew working on deck and in the engine room should utilise the personal Oxygen meters during the normal course of their duties.

3. ASSESSMENT OF RISK

3.1. Enclosed spaces may be dangerous on account of a number of factors. A risk assessment should not be limited only to entry into the enclosed space but also consider the environment and activity as a whole and any other potential safety hazards, including but not limited to low lighting and reduced visibility, trip hazards, low ceilings and narrow walkways. Any activity which may cause a change in atmosphere such as hot work and use of paints, glues and coatings poses a particular risk. Consideration should be given to the ship design and layout as places frequently visited by seafarers can still develop a hazardous environment.

3.2. Spaces that are connected to or adjacent to enclosed spaces can become dangerous or cause the enclosed space to become dangerous, due to the migration of gases between the spaces. This is usually invisible to the human eye; therefore, it is important to maintain awareness of this risk, and the fact that atmospheres can change over time.

3.3. On any ship carrying goods or materials, the nature of these and their ability to decay and/or release chemicals into the atmosphere should be considered. Codes and guidance relevant to the cargo should be considered, such as the International Maritime Solid Bulk Cargoes (IMSBC) Code and International Maritime Dangerous Goods (IMDG) Code.

3.4. Fumigated cargo holds with cargo that have been ventilated and have obtained a chemist gas free certificate should still be considered as enclosed spaces and not be entered. Lethal doses of fumigant may remain in pockets or trapped within the cargo. A gas free certificate does not guarantee your safety.

3.5. The enclosed spaces on board the ships are identified as following based on the hazards they impose.

Spaces	**Possible Hazards**	**Safe Work Requirement**
Water Ballast Tanks / Double bottoms	Limited opening, lack of ventilation, oxygen deficient, flammable and toxic gases, lack of lighting, slippery surfaces, Weak metals/ sharp edges of rusted tank structures, Risk of physical harm due to difficult access and working conditions, Extreme temperature (hot or cold). By design deep framed tanks that appear to be gas free may have “dead pockets” where no circulation has occurred (Stool spaces, end of tank withing frames and webs)	Gas freeing, Risk Assessment, Permit to Work, Toolbox meeting
Cargo holds and access ways (hold cleaning purpose with hatch covers open)	Limited opening, lack of ventilation, oxygen deficient, flammable and toxic gases, lack of lighting, Engulfment hazard (such as grain, coal, sand, gypsum, or similar material)	Open hatch covers, ventilator flaps, booby hatch covers and ventilate for at least one hour. (Additional ventilation may be required considering the nature of previous cargo) Risk Assessment. Gas check prior entry. (Oxygen 20.9 % / LEL 0 %, CO 0%, H_2S 0% Toolbox meeting)
Cargo holds and access ways (hold cleaning purpose with hatch covers closed)	Limited opening, lack of ventilation, oxygen deficient, flammable and toxic gases, lack of lighting, Engulfment hazard (such as grain, coal, sand, gypsum, or similar material)	Open ventilator flaps, booby hatch covers and ventilate for at least one hour. (Additional ventilation may be required considering the nature of previous cargo) Risk Assessment. Ensure strict compliance with permit to work form
Cargo holds and access ways (Entering cargo hold in loaded condition)	Limited opening, lack of ventilation, oxygen deficient, flammable and toxic gases, lack of lighting, Engulfment hazard (such as grain, coal, sand, gypsum, or similar material)	Inform company stating the reason for entry. The DPA or ADPA must approve on a case by case-by-case basis after a detailed risk assessment considering the nature of cargo loads, reason for entry etc. The approval must be received in writing. Permit to work to be completed after Company approval is obtained

Spaces	Possible Hazards	Safe Work Requirement
Cargo holds and access ways (in port during cargo operations)	Limited opening, lack of ventilation, oxygen deficient, flammable and toxic gases, lack of lighting, Engulfment hazard (such as grain, coal, sand, gypsum, or similar material)	Open hatch covers, ventilator flaps, booby hatch covers and ventilate for at least one hour. (Additional ventilation may be required considering the nature of cargo) Risk Assessment. Gas check prior entry. (oxygen 20.9% / LEL 0%, CO 0%, H_2S 0%) Toolbox meeting
Cargo Hold Bilges	H_2S forming due to some cargo residue	Check the bilges separately for H_2S once cargo hold gas free
Void Spaces / cofferdams / inter-barrier spaces / chain lockers / duct keels	Limited opening, lack of ventilation, oxygen deficient, flammable and toxic gases, lack of lighting, slippery surfaces	Gas freeing, Risk Assessment, Permit to work, Toolbox meeting
Fuel Tanks	Limited opening, lack of ventilation, oxygen deficient, flammable and toxic gases, lack of lighting, slippery surfaces	Gas freeing, Risk Assessment, Permit to Work, Toolbox meeting
Fresh Water Tanks	Limited opening, poor natural ventilation, oxygen deficient, lack of lighting, slippery surfaces, Risk of physical harm due to difficult access and working conditions	Gas freeing, Risk Assessment, Permit to Work, Toolbox meeting
Lubricating oil tanks	Limited opening, poor natural ventilation, oxygen deficient, lack of lighting, slippery surfaces	Gas freeing, Risk Assessment, Permit to Work, Toolbox meeting
Waste oil tanks	Limited opening, poor natural ventilation, oxygen deficient, flammable and toxic gases, lack of lighting, slippery surfaces	Gas freeing, Risk Assessment, Permit to Work, Toolbox meeting
Sewage tank	Limited opening, poor natural ventilation, oxygen deficient, toxic gas, lack of lighting, slippery surfaces	Gas freeing, Risk Assessment, Permit to Work, Toolbox meeting
Engine crank cases	Limited opening, poor natural ventilation, oxygen deficiency, toxic gas, no lighting, slippery surfaces	Gas freeing, Risk Assessment, Permit to Work, Toolbox meeting

Spaces	Possible Hazards	Safe Work Requirement
Engine Scavenge Space	Limited opening, poor natural ventilation, oxygen deficiency, toxic gas, no lighting, slippery surfaces	Gas freeing, Risk Assessment, Permit to Work, Toolbox meeting
CO_2 Storage Room	Poor natural ventilation, O_2 deprivation due to leaking CO_2	Ensure proper ventilation prior entry
Flammable Storage Lockers like chemical storage rooms /Paint Rooms	Poor natural ventilation, oxygen deprivation, Flammability, Toxicity	Ensure proper ventilation prior entry
Battery Room	Poor natural ventilation, oxygen deprivation, Flammability, Toxicity	Ensure proper ventilation prior entry
Forecastle spaces, windlass switch rooms and bosun's workshops / stores	Poor natural ventilation, oxygen deprivation	Ensure proper ventilation prior entry
E/R Workshops	Toxicity from welding fumes, flammability, noise	Ensure proper ventilation prior entry
Provisions / Non-Flammable Storage	O_2 deprivation	Ensure proper ventilation prior entry
Enclosed Lifeboats / Emergency Generator Room	Poor natural ventilation, oxygen deprivation, Flammability, Toxic gas	Ensure proper ventilation prior entry
Boilers	Limited opening, poor natural ventilation, oxygen deficient, lack of lighting	Ensure proper ventilation prior entry

3.6. Every vessel should always have 4 personal oxygen meters onboard and available for use of all crew and 2 kept in the ships office under the Chief Officers care. Two will be kept in the Chief Engineers custody.

3.7. Personal oxygen meters provided onboard and are used as personal protective equipment (PPE) to detect unsafe oxygen deficient atmosphere They should be utilised in the breathing zone and keep the monitor visible and to allow alerts to be seen if hearing is impaired. These monitors should be worn by crew members when opening forecastle stores, crane mast pedestals, mast houses etc after prolonged closure.

3.8. Masters and Chief Engineers are to carry out an onboard risk assessment to identify other spaces which through lack of regular use or any other reason, may be considered potentially dangerous. Awareness of potential risks is necessary for all spaces on board ship. If in any

doubt, any such space should be regarded as enclosed and appropriate action taken. A detailed ship specific list of enclosed spaces shall be prepared by the Master and posted on the Notice board. All crew shall be briefed on the list of enclosed spaces onboard. Personnel should also exercise caution before entering any space on board a ship that has not been opened for some time

3.9. It is also important to consider that the atmosphere of spaces can change, and that any atmosphere can potentially become hazardous. Any spaces that are or may become connected to an enclosed (or previously enclosed) space, can cause that space to become unsafe too. As an example, when a tank is opened, the atmosphere in the space where the person opening the tank is standing could become unsafe. Breathing apparatus may be appropriate before opening an enclosed space, to protect against any potential gases that may migrate from the enclosed space. Work activity and leaks can also create harmful atmospheres. This includes leaks of refrigerant gas, water ingress, oxygen-depleting work (e.g. burning, welding), pressure and ventilation failure and vapours from cleaning chemicals and paints.

3.10. Opening an enclosed space creates the potential for inadvertent entry by others and even putting only your head in or near the space could have fatal consequences. There is also the potential for the dangerous atmosphere to migrate into adjacent spaces when a space is opened. When considering what constitutes an accessible enclosed space, risk assessments should consider whether there is potential for entry into such spaces. This would include, for example, where a tank hatch has been opened with the intention of conducting a visual inspection whilst remaining outside the space.

3.11. A person is considered to have entered a confined space just by putting his or her head across the plane of the opening. If the confined space contains toxic gases, workers who are simply near the opening may be at risk. Often the toxic gases are under pressure because of heat inside the confined space or when gases are generated inside the space. As a result, the concentration of toxic gases near the entrance to the confined space can be high enough to cause death. Precautions need to be taken during opening any confined space even if entry is not going to be done as in sewage tanks for maintenance of sensors etc.

3.12. A competent person should always make a preliminary assessment of any potential hazards in the space to be entered, taking into account previous cargo carried, ventilation of the space, coating of the space and other relevant factors. Based on the findings of the risk assessment appropriate control measures should be put in place to protect anyone who may enter an enclosed space. The competent person's preliminary assessment should determine the potential for the presence of an oxygen-deficient, oxygen-enriched, flammable or toxic atmosphere. The competent person should bear in mind that the ventilation procedures for an adjacent connected space may be different from the procedures for the ventilation of the enclosed space itself.

3.13. The procedures to be followed for testing the atmosphere in the space and for entry should be decided on the basis of the preliminary assessment. These will depend on whether the preliminary assessment shows that:

a. there is minimal risk to the health or life of personnel entering the space; or

b. there is no immediate risk to health or life but a risk could arise during the course of work in the space; or

c. a risk to health or life is identified.

3.14. Throughout the assessment process, there should be an assumption that the space to be entered is considered to be hazardous until positively proved to be safe for entry.

3.15. Potential Hazards

a. Oxygen depletion or enriched atmosphere.

b. Flammable atmosphere /Hydrocarbon vapours.

c. Toxic gases.

d. Products of inert gas.

e. Risk of physical harm due to difficult access and working conditions.

f. Weak metals/ sharp edges of rusted tank structures.

g. Slick / wet surfaces & tripping hazards.

h. Weak structures may cause personnel to trip and fall.

i. Extreme temperature (hot or cold).

j. Engulfment hazard (such as grain, coal, sand, gypsum, or similar material).

k. Extreme noise.

l. Falling objects.

m. Potential for rapidly changing atmosphere.

3.16. Oxygen Depleting Cargoes and Materials

3.16.1 A prominent risk with such cargoes is oxygen depletion due to the inherent form of the cargo, for example, self-heating, oxidation of metals and ores or decomposition of vegetable oils, fish oils, animal fats, grain and other organic materials or their residues. The materials listed below are known to be capable of causing oxygen depletion. However, the list is not exhaustive. Oxygen depletion may also be caused by other materials of vegetable or animal origin, by flammable or spontaneously combustible materials and by materials with a high metal content, including, but not limited to:

a. Grain, grain products and residues from grain processing (such as bran, crushed grain, crushed malt or meal), hops, malt husks and spent malt.

b. Oilseeds as well as products and residues from oilseeds (such as seed expellers, seed cake, oil cake and meal).

c. Copra.

d. Wood in such forms as packaged timber, round wood, logs, pulpwood, props (pit props and other prop wood), woodchips, wood shavings, wood pellets and sawdust.

e. Jute, hemp, flax, sisal, kapok, cotton and other vegetable fibres (such as esparto grass/Spanish grass, hay, straw), empty bags, cotton waste, animal fibres, animal and vegetable fabric, wool waste and rags.

f. Fish, fishmeal and fish scrap.

g. Guano.

h. Sulphidic ores and ore concentrates.

i. Charcoal, coal, lignite and coal products.

j. Direct reduced iron (DRI)

k. Dry ice.

l. Metal wastes and chips, iron swarf, steel and other turnings, borings, drillings, shavings, filings and cuttings; and

m. Scrap metal.

3.17 On ships carrying solid bulk cargoes, dangerous atmospheres may develop in cargo spaces and adjacent spaces. The dangers may include flammability, toxicity, oxygen depletion or self-heating, as identified in the shipper's declaration. For additional information, reference should be made to the International Maritime Solid Bulk Cargoes (IMSBC) Code.

3.18 On ships carrying solid bulk cargoes, dangerous atmospheres may develop in cargo spaces and adjacent spaces. The dangers may include flammability, toxicity, oxygen depletion or self-heating, as identified in the shipper's declaration. For additional information, reference should be made to the International Maritime Solid Bulk Cargoes (IMSBC) Code.

3.19 When a ship is fumigated, the detailed recommendations contained in recommendations on the safe use of pesticides in ships (MSC.1/Circ.1358) should be followed.

3.20 Spaces adjacent to fumigated spaces should be treated as if fumigated. Any entrances cargo holds within mast houses etc need to be checked to ensure they can be sealed to ensure mitigation of the fumigant to the area. Care should also be taken to ensure that piping leading from cargo spaces or adjacent connected spaces through the ship’s accommodation are properly sealed in accordance with Class requirements.

4 AUTHORISATION OF ENTRY

4.18 No person should open or enter an enclosed space unless duly authorized by the Master. The Chief Engineer can be nominated in exceptional circumstances,and unless the appropriate safety procedures as laid down in this section have been followed entry shall not be approved.

4.19 The entry permit should be restricted to a single compartment. Separate permit should be issued for each space to be entered.

4.20 Validity of the permit shall not exceed 8 hours.

4.21 A separate cold, hot work permit etc is required for any work planned in enclosed spaces.

4.22 Each Person entering the space shall have had the appropriate company approved training and shall complete and sign the permit along with responsible officer and ensure that above safeguards are put into effect prior entering the space.

4.23 It is prohibited to enter a confined space compartment alone. All spaces must be entered with a minimum of 2 people.

5 VENTILATION

5.18 Any enclosed space should be properly ventilated before entry, by opening as many access points as possible. Natural ventilation may be acceptable in some circumstances, for example where a small space opens directly to fresh air. Natural ventilation - the space should be allowed to breath for at least 24 hours. In certain spaces, such as double bottom tanks, the most effective way of ensuring full ventilation may be to fill the compartment with clean seawater and then pump it out.

5.19 The minimum ventilation requirement varies depending on the specific hazards and the nature and size of the confined space.

5.20 Use the correct ventilation equipment, such as fans and blowers, to keep clean air flowing and remove polluted air.

5.21 Adequate and effective ventilation shall be maintained in the confined space for the purposes of entry into and work in the confined space.

5.22 The air supply for the ventilation shall be — from a source free from contaminants; and directed to the area where a person is or will be present in the confined space.

5.23 Check fans and blowers regularly.

5.24 Any gas testing should be carried out with ventilation to the enclosed space stopped, and after conditions have stabilized, in order to obtain accurate readings.

5.25 Ventilation should continue during the period that the space is occupied and during temporary breaks. Before re-entry after a break, the atmosphere should be re-tested. In the event of failure of the ventilation system, any persons in the space should leave immediately.

5.26 If multiple entry points / manholes should be kept open.

5.27 Natural ventilation in still air conditions may allow pockets of gas to appear.

6 GENERAL PRECAUTIONS

6.18 The master must ensure that all entrances (doors, manholes, hatches etc) to unattended enclosed spaces on the vessel are either kept closed or otherwise secured against entry, except when entry is necessary.

6.19 There should be safety signage advising of potential hazardous atmospheres, even in areas which are kept closed or locked and when procedures prohibit entry to the enclosed space.

6.20 A door or hatch cover which is opened to provide natural ventilation of an enclosed space may, wrongly be taken to be an indication of a safe atmosphere and therefore, an attendant may be stationed at the entrance or the use of a mechanical barrier, such as a rope or chain positioned across the opening with an attached warning sign, could prevent such accidental entry.

6.21 The master or the responsible person should determine that it is safe to enter an enclosed space by ensuring that:

a. potential hazards have been identified in the assessment and as far as possible isolated or made safe.

b. the space has been thoroughly ventilated by natural or mechanical means to remove any toxic or flammable gases and to ensure an adequate level of oxygen throughout the space.

c. the atmosphere of the space has been tested as appropriate with properly calibrated instruments to ascertain acceptable levels of oxygen and acceptable levels of flammable or toxic vapours.

d. the space has been secured for entry and properly illuminated.

e. a suitable system of communication between all parties for use during entry has been agreed and tested.

f. an agreed upon means of signalling during an emergency should the primary means of communication fail.

g. an attendant has been instructed to remain at the entrance to the space whilst it is occupied.

h. rescue and resuscitation equipment has been positioned ready for use at the entrance to the space and rescue arrangements have been agreed.

i. personnel are properly clothed and equipped for the entry and subsequent tasks; and

j. a permit has been issued, authorizing entry.

k. a tally system is established and used to maintain record of who has entered or exited the enclosed space and when.

l. tools are assembled at the entrance and correct for the job. (Recheck the tools on completion of the job and ensure all are removed from the enclosed space area).

m. Appropriate warning notices are placed on the relevant controls or equipment.

6.22 The precautions in subparagraphs .6 and .7 may not apply to every situation described in this section. The person authorizing entry should determine whether an attendant and the positioning of rescue equipment at the entrance to the space are necessary.

6.23 Training and Awareness

All seafarers should have had the appropriate company approved training and completed on-board training to help recognise the risks of enclosed spaces and to familiarise themselves with any applicable procedures.

Only trained personnel should be assigned the duties of entering, functioning as attendants or functioning as members of rescue teams. Ships' crews with rescue and first aid duties should be drilled periodically in rescue and first aid procedures. Training should include as a minimum:

a. recognition of the circumstances and activities likely to lead to the presence of a dangerous atmosphere

b. identification of the hazards likely to be faced during entry into enclosed spaces and the precautions to be taken.

c. recognition of the signs of adverse health effects caused by exposure to hazards during entry; and

d. the use and maintenance of equipment and clothing required for entry into enclosed spaces (knowledge of personal protective equipment required for entry)

e. instruction and drills in rescue from enclosed spaces

The Company shall ensure that all seafarers whose duties may involve entry into enclosed spaces attend a dedicated course for entry into enclosed spaces.

6.24 All equipment used in connection with entry should be in good working condition and inspected prior to use.

6.25 All entrances, which may be used as an emergency escape route from the space, must be open. As many other openings as practicable shall be removed to provide ventilation and light.

6.26 No two senior officers of the same department shall enter an enclosed space simultaneously.

7 TESTING THE ATMOSPHERE

7.18 No entry shall be permitted into any enclosed space unless the atmosphere inside has been tested with type approved, calibrated and tested equipment.

7.19 SOLAS Chapter XI - 1/7 makes it mandatory for all vessels to carry portable gas detectors. As a minimum, the portable gas detectors will need to be capable of testing for concentrations of oxygen, flammable gas, carbon monoxide, and hydrogen sulphide prior to entering enclosed spaces.

7.20 Appropriate testing of the atmosphere of a space should be carried out with properly calibrated equipment by persons trained in the use of the equipment. The manufacturers' instructions

should be strictly followed. Testing of the space should be carried out before any person enters the space and at regular intervals thereafter until all work is completed. Where appropriate, the testing of the space should be carried out at as many different levels as is necessary to obtain a representative sample of the atmosphere in the space. In some cases, it may be difficult to test the atmosphere throughout the enclosed space without entering the space (e.g. the bottom landing of a stairway) and this should be taken into account when assessing the risk to personnel entering the space. The use of flexible hoses or fixed sampling lines, which reach remote areas within the enclosed space, may allow for safe testing without having to enter the space.

7.21 Multi-gas detector tubing shall be long enough to reach all areas of the space to be entered.

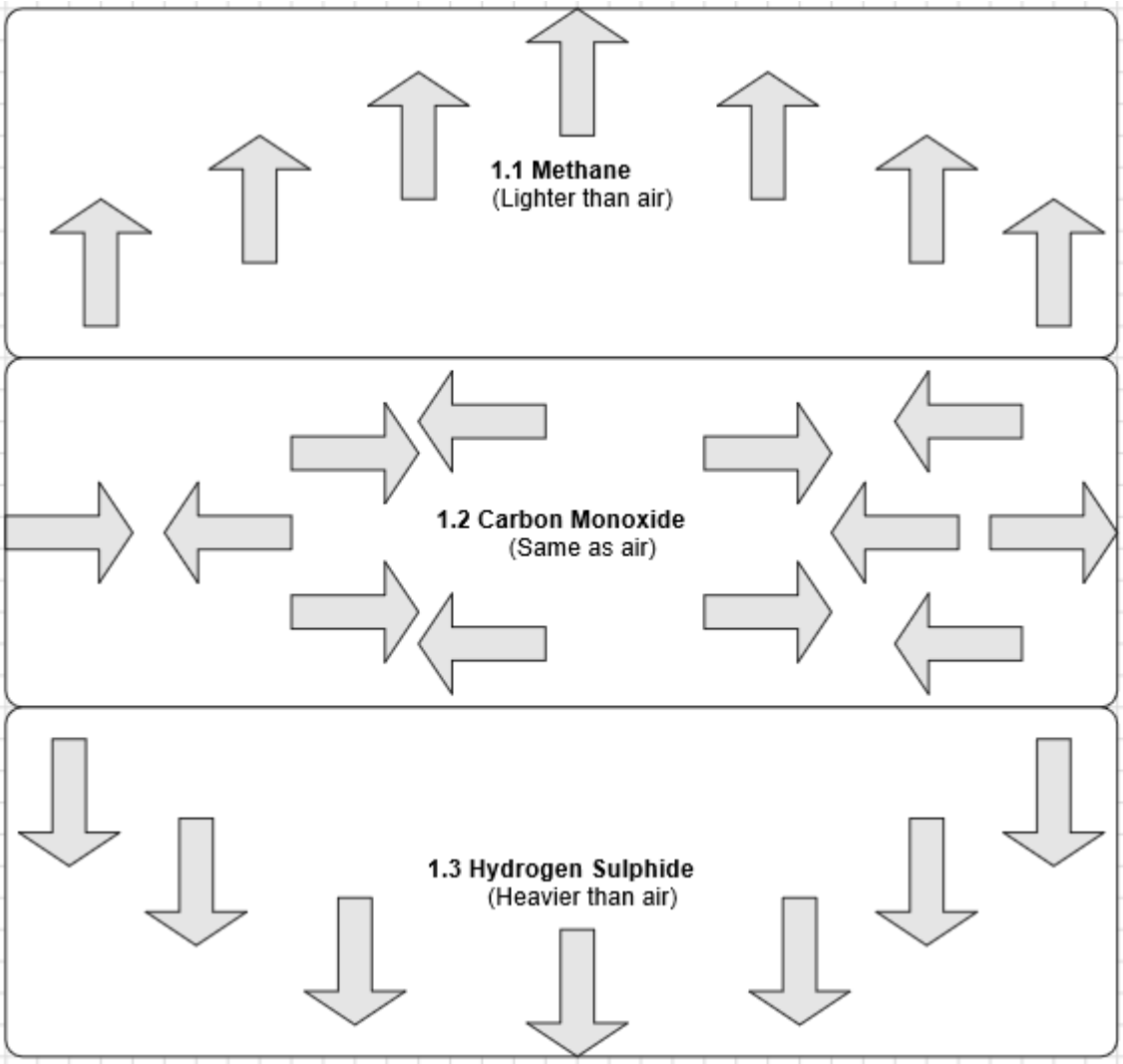
7.22 For entry purposes, steady readings of all of the following should be obtained:

- Oxygen content 20.9% by volume.
- Combustible Vapour Lower Flammability Limit (LFL): <1%
- No toxic or other contaminants are present.
- If these conditions cannot be met, additional ventilation should be applied to the space and re-testing should be conducted after a suitable interval.
- Any gas testing should be carried out with ventilation to the enclosed space stopped, and after conditions have stabilized, in order to obtain accurate readings.

7.23 If these conditions cannot be met, additional ventilation should be applied to the space and re-testing should be conducted after a suitable interval.

7.24 It should be noted that testing for flammability or oxygen content does not provide a suitable means of measuring for toxicity, nor vice versa.

7.25 It is important to understand that some gases or vapours are heavier than air and will settle to the bottom of an enclosed space. Also, some gases are lighter than air and will be found around the top of the enclosed space. Therefore, it is necessary to test all areas (top, middle, bottom) of an enclosed space with properly calibrated testing instruments to determine what gases are present.



Note: Tests should be carried out at various depths and through as many deck openings as practicable taking care to sample at various depths so as to detect any pockets of gas that may exist. Ventilation should be stopped for at least 10 minutes before tests are carried out for conditions to stabilize and to obtain accurate readings. Sufficient samples should be drawn to ensure that the resulting readings are representative of the condition of the entire space.

It should be emphasized that the internal structure of the space, cargo, cargo residues and tank coatings may also present situations where oxygen-deficient areas may exist, and should always be suspected, even when an enclosed space has been satisfactorily tested as being suitable for entry. This is particularly the case for spaces where the path of the supply and outlet ventilation is obstructed by structural members or cargo.

Oxygen (O_2) Oxygen depletion can occur in confined spaces due to chemical reactions, bacterial action, or work such as cutting, welding, or brazing. Other causes include air displaced by cargo vapors, fire extinguishing systems, corrosion or oxidization. Oxygen depletion can be dangerous, and there are no warning signs that one is breathing oxygen-deficient air. Inhaling

oxygen-depleted air can cause impaired cognition and coordination, rapid breathing, and in extreme cases, loss of consciousness or death. Entry only permitted with a stable reading of 20.9%.

% Oxygen Content	Effect
>23.5	Disorientation, breathing / vision difficulties.
19.5	Absolute minimum O_2 level.
15–19	Impaired co-ordination, decreased ability to work effectively.
10–14	Respiration increases, poor judgement, lips become blue.
8–10	Mental failure, fainting, nausea, vomiting, unconsciousness.
6–8	Eight minutes of exposure is fatal, up to four minutes of exposure means recovery is possible.
4–6	Coma within 40 seconds, death within three minutes.

Hydrogen Sulfide (H_2S) is heavier than air and may travel along the ground. It collects in low-lying and enclosed, poorly ventilated areas such as bilges, manholes, sewer lines etc. H_2S can collect in 'pockets' and can be unexpectedly encountered, leading to acute exposure. Concentrations over 1000 ppm cause immediate collapse with loss of breathing, even after inhalation of a single breath - death can occur within one to four hours of exposure.

Carbon Monoxide (CO) is an odorless, colorless and tasteless but dangerous gas. Carbon monoxide is produced when fuels such as gasoline, natural gas, oil, kerosene, wood or charcoal are burned. Breathing CO reduces the blood's ability to carry oxygen. It can reach dangerous levels indoors or outdoors.

Methane (CH_4) comes from both natural sources and human activities. Exposure to high levels of methane can cause a range of health issues, including headaches, dizziness, nausea, unconsciousness, and even death. Inhaling methane can also cause rapid breathing, rapid heart rate, clumsiness, emotional upsets, and fatigue. Methane is extremely flammable and can cause an explosion when its concentration reaches 5% to 15% in air. Methane is often found in confined spaces, such as sewers, where explosions can be especially dangerous.
Methane combustion is possible when the gas level is at or above 5%, but below 15%.
This means that if the concentration of methane in the air is less than 4.4%, the gas mixture is too lean to burn, and an explosion cannot occur.

The primary cause of deaths in confined spaces on ships is asphyxiation, typically due to oxygen depletion or exposure to toxic gases. Oxygen deficiency can arise from various factors, including corrosion of steel structures and anchor chains, as well as the oxygen-consuming nature of some cargo. Furthermore, the presence of toxic or flammable gases in confined spaces can also lead to asphyxiation.

8 PRECAUTIONS DURING ENTRY

8.18 The atmosphere should be tested frequently by a person who has received the company approved Confined Space Entry training whilst the space is occupied, and persons inside should be instructed to leave the space should there be a deterioration in the conditions.

8.19 Persons entering enclosed spaces should be provided with a Calibrated and tested multi-gas detectors that monitor the levels of oxygen, carbon monoxide and other gases as appropriate. (IMO requirement Resolution A.1050(27) 8.2/9.3)

8.20 Ventilation should continue during the period that the space is occupied and during temporary breaks. Before re-entry after a break, the atmosphere should be re-tested. In the event of failure of the ventilation system, any persons in the space should leave immediately.

8.21 Particular care should be exhibited when working on pipelines and valves within the space. Pipes and valves can cause the release of toxic gases and under such circumstances breathing apparatus should be worn until it can be conclusively established that no threat to the atmosphere exits. If conditions change during the work, increased frequency of testing of the atmosphere should be performed. Changing conditions that may occur include increasing ambient temperatures, the use of oxygen-fuel torches, mobile plant, work activities in the enclosed space that could evolve vapours, work breaks, or if the ship is ballasted or trimmed during the work.

8.22 In the event of an emergency, under no circumstances should the attending crew member enter the space before help has arrived and the situation has been evaluated to ensure the safety of those entering the space to undertake rescue operations. Only properly trained and equipped personnel should perform rescue operations in enclosed spaces as per the company contingency plan – Rescue from Enclosed Space.

8.23 Persons entering an enclosed space should consider the carriage of EEBD to facilitate escape if required.

8.24 Any lock out tag out of tank valve etc. to be carried out prior to entry and form part of the permit to Work

9 ENTRY INTO ENCLOSED SPACES WITH ATMOSPHERES KNOWN OR SUSPECTED TO BE UNSAFE FOR ENTRY

9.18 As per company policy, entry into non-gas free space or space suspected unsafe is generally prohibited.

9.19 If the atmosphere in an enclosed space is suspected or known to be unsafe, the space should only be entered when no practical alternative exists. Entry should only be made for further testing, essential operation, safety of life or safety of a ship. The number of persons entering the space should be the minimum compatible with the work to be performed.

9.20 Company approval is to be obtained for entry into enclosed spaces with atmospheres known or suspected to be unsafe for entry.

9.21 An Enclosed Space Entry Permit shall be issued and signed by the Master.

9.22 Risk assessment shall be prepared prior entry.

9.23 SCBA shall be used and only personnel trained in its use should be allowed to enter the space. Spare sets of breathing apparatus, a resuscitator and rescue equipment shall be available outside the space and a standby party, with breathing apparatus and personal protective equipment donned, is to be in attendance in case of an emergency.

9.24 Additional ventilation shall be provided where possible.

9.25 Means of communication shall be provided and a system of signals is to be agreed and understood by the personnel involved.

9.26 Persons entering enclosed spaces should be provided with calibrated and tested multi-gas detectors that monitor the levels of oxygen, carbon monoxide and other gases as appropriate.

9.27 Rescue harnesses should be worn prior to entry and, unless impractical, lifelines should be used.

9.28 Appropriate protective clothing should be worn, particularly where there is any risk of toxic substances or chemicals coming into contact with the skin or eyes of those entering the space.

9.29 Persons entering into enclosed spaces should consider taking EEBD's with them in order to facilitate an emergency escape in the case of oxygen depletion within the area, or the person feels unwell and needs to leave the enclosed space, the have the option to utilse the EEBD for this purpose.

10 EVACUATION FROM ENCLOSED SPACES

10.18 If any of the conditions that are stated on the permit for entering the space change, or the conditions in the space are suspected of becoming unsafe after personnel have entered the space, they should be ordered to leave the space immediately and not be permitted to re-enter until the situation has been re-evaluated and the safe conditions stated on the permit have been restored.

10.19 Uncontaminated air with a lower oxygen concentration can be breathed for some minutes before the effects become apparent. If the oxygen supply to the brain is depleted, victims will feel dizzy and have headaches before losing consciousness. This is particularly dangerous because they may not recognize that they are in danger or be capable of finding the way out of the space.

They therefore become a risk to themselves and others. There is a danger of permanent brain damage after only four minutes in a very oxygen deficient space. A successful rescue depends upon the victim being resuscitated in the shortest possible time.

IMMEDIATELY LEAVE ANY CONFINED SPACE IF:

- A personal monitor alarms.
- You feel dizzy or lightheaded.
- The forced air ventilation stops or is apparently ineffective; or
- If you sense any unexpected chemical through smell or dermal sensation that concerns you. This is a judgment call; however, you should depart any time there is a burning sensation in your lungs or you experience a shortness of breath. Any of these sensations may indicate a life-threatening situation and you must react promptly to avoid injury.

10.20 When an accident involving injury to personnel occurs in an enclosed space, the first action must be to raise the alarm. Although speed is vital, a rescue attempt must not be made until all necessary equipment and personnel are ready.

10.21 The rapid rescue of personnel who have collapsed in an enclosed space presents particular risk. It is a human reaction to go to the aid of a colleague in difficulties, but far too many additional and unnecessary casualties have occurred from impulsive and ill-prepared rescue attempts.

10.22 If you are watching over someone who is in an enclosed space, and you see him getting into difficulties:

- Do not go immediately to the assistance of the man in trouble. This way there are likely to be two casualties instead of a possible one casualty.
- Raise the alarm. This you may be able to do by, for instance, informing the officer in charge, or informing the bridge.
- Wait for help.
- Evaluate the situation to ensure safety of those entering the space to undergo rescue operations.
- Take gas measurements.
- Whenever it is suspected that an unsafe atmosphere has been a contributory factor to the accident, breathing apparatus and, where practicable, lifelines/ harness should be used by person entering the space (Refer section 9). It is important to note that an Emergency Escape Breathing Device (EEBD is for escape purposes only and should NEVER be used as a substitute for Breathing Apparatus to enter an enclosed space.
- The person in charge of a rescue team should remain outside the space, from where the most effective control can be exercised.

In the event of an emergency, under no circumstances should the attending crew member enter the space before help has arrived and the situation has been evaluated to ensure the safety of those entering the space to undertake rescue operations. Only properly trained and equipped personnel should perform rescue operations in enclosed spaces.

THINK!

Do not become the next casualty yourself.

11 RESCUE FROM ENCLOSED SPACES:

11.1 Prior entry into any enclosed space, a detailed task-based risk assessment should be prepared as explained in Section 3 of this Chapter. Prior to issuing an enclosed space permit, a detailed plan for rescue operations and the correct rescue equipment shall be kept in readiness at the compartment entrance.

11.2 The responsible officer shall analyse what could go wrong and formulate a rescue plan at the planning stage. It would be too late to start making a plan, cluttering the rescue area with equipment which is not required and planning to send in a rescue team that is not equipped with the correct skills or PPE, when the general alarm has already sounded.

11.3 When determining the rescue equipment to be used, the following factors shall be considered:

- The shape of the enclosed space.
- The size of lightning holes and size of the stretcher to be used.
- Whether lateral rescue would be required or rescue from height would be required.
- Obstacles in the space that would have to be considered when attempting a rescue (pipelines, hydraulic pipes, valves etc).
- Access available to most difficult part of the space.
- Whether the space danger is possibly a lack of oxygen, toxic fumes, or whether crew injury is the most likely scenario. Response methods may be different in each case.

11.4 Examples of rescue equipment to be used:

- When entering a freshwater tank which has minimal to no obstructions, equipment like BA Sets, stretcher shall be kept in readiness. This space has little chance of oxygen deficiency or toxic vapours but has a possibility of the crew slipping and medical injury.
- When entering a side ballast tank (lack of oxygen in the different bays, slippery surfaces, working at height, rescue though multilevel and though lightning holes). Rescue equipment like tripod, stretcher, resuscitator etc and a plan to get the crew out from the most difficult spot in the space shall be in readiness.
- When entering a double bottom, the crew shall have a recovery strategy from the flat low height area as there could be multiple obstacles such as pipes, lightning holes, frames, mud. Rescue equipment such as a stretcher that can be manoeuvred in tight spots and strong crew members to physically man handle through the frames and webs may be required. These operations will increase the use of oxygen bottles, spares are to be made available for quick change out, or change out of tired personnel.

- Fuel tanks may contain toxic vapours, and the recovery may need to consider fuel contamination of the person, ingested fuel, intoxication from fumes and nausea. BA Sets, resuscitator, stretcher, Tripod, gas equipment, ventilation equipment etc shall be kept in readiness.

11.5 The rescue equipment to be kept in readiness at the entrance shall be clearly specified in the permit.

Examples of rescue from enclosed spaces:

Case 1: Evacuating crew when atmosphere is safe (example injured crew inside the cargo hold)

- Certified Tripod equipment with stretcher shall be used for rescue
- Casualty shall be carefully laid in a stretcher with his head protected and supported. Lifting using a Robinson type stretcher would allow the head to be clear and the airway kept unobstructed . Under no circumstances a crew must be lifted on the safety harness alone as it could cause body/neck injury and breathing difficulties
- Proper communication shall be established between the crew involved in rescue operations
- Guide ropes to be connected to the stretcher to guide the path and control the movement when lifting. The operating crew shall ensure that the casualty does not make contact with any tank/ hold structures while being lifted.
- The winch shall be used in manual / hand cranking mode in a controlled manner by trained crew.
- No crew must ever be lifted on the wire alone. A16mm rope must be attached to the stretcher harness, kept taut and manned with turns so that the tension is always kept on the rope for the entire lifting process. This allows for single point failure of the tripod, winch and wire.

Case 2: Evacuating crew considering an unsafe atmosphere (example crew unconscious inside cargo hold due to fumigation, toxic or hydrocarbon gas)

- Additional ventilation shall be provided using blowers / ducts etc
- Rescue team shall don breathing apparatus sets and carry oxygen resuscitator into the cargo hold.
- Oxygen resuscitator shall be connected to the casualty
- Comply with procedures as mentioned for case 1

12 SHIPYARD – ENCLOSED SPACE ENTRY

12.1 Contractors usually perform a large volume of work when a vessel dry docks or refits at a shipyard, this includes a lot of hot work and enclosed space entry, which creates special circumstances for Enclosed Space Entry Procedures.

12.2 When a vessel is in dry dock or under refit at a shipyard the following special requirements apply.

12.3 All cargo spaces, void spaces, pipe tunnels, cofferdams, empty fuel or lube oil tanks and ballast tanks where appropriate must be in a clean and gas free “Safe for Entry Condition” on the vessel’s arrival at the shipyard.

12.4 Enclosed spaces must be maintained in a gas free “Safe for Entry Condition;”

12.5 An independent qualified chemist shall inspect and certify the vessel to be gas free and safe for hot work on a daily basis. All tanks and machinery spaces, regardless of whether or not work is being carried out in them, shall be monitored at least once per day for oxygen content, hydrocarbon gas and any toxic gases which might be present, including those generated by the work in hand i.e. welding.

12.6 Ship’s staff must be alert for changes such as opening of pipelines, valves or pumps, introduction of chemicals or paints, leaking fuel, leaking gas or oxygen hoses, etc. which could make the atmosphere of a tank or confined space hazardous or unhealthy to work in and thus invalidate the entry/work permit.

12.7 The chemist shall re-inspect if any of the conditions on the entry or hot work permit change.

12.8 The status, i.e. safe for entry, safe for hot work, do not enter, etc., of the spaces referred to above must be clearly displayed at each entrance and on the central status board; and

12.9 The shipyard’s responsibilities regarding safety and entry, hot work permits must clearly be established.

13 ENTRY PROCEDURES FOR CARGO HOLDS DURING CARGO OPERATION

Personal protective equipment: All crew shall wear appropriate personal protective equipment as per company PPE matrix during cargo operations.

13.1 Safety Meeting

Prior starting cargo operations, a safety meeting should be held between ship and terminal representative and ship shore safety checklist completed. Any hazards involved in cargo operations shall be discussed and necessary precautions shall be taken.

If other operations like bunkering, receiving stores etc are planned concurrently during cargo operations, same to be discussed with terminal representative and permission obtained.

Ships staff also to maintain Proper communication with terminal representative during vessels stay in port

13.2 Crew Safety During Cargo Operations

At all times during cargo operation, duty officer to ensure that appropriate safety precautions are taken to prevent injury to vessel crew, visitors and shore employees. Duty officer should contact chief officer / Master if he has any doubt regarding safety aspects.

Hold entry during cargo operations:

a. No ship staff or shore crew to enter the hold during bulk cargo operations.

b. A notice must be displayed at all cargo hold entrances prohibiting entry without permission. (Signs and means of barring entry need to be promulgated)

c. If entry into cargo holds is to be made for any reason during cargo operations (example unexpected emergency, to retrieve objects fallen in cargo hold etc) then the following to be complied.

- Terminal to be informed and specific agreement to be made for entry into holds. Hold entry to be made only after permission is obtained from the terminal or relevant authorities. Cargo operations may also be temporarily stopped for this purpose.
- Toolbox meeting / Risk assessment to be completed prior entry.
- The enclosed space entry procedures to be strictly complied and permit to be completed prior entry. Hold entry must be supervised by a responsible officer and must be authorized by the Master.
- A designated person should be stationed on deck to watch the safety of persons working in the hold.
- The designated person should ensure that the ship loader is not positioned in the hold.
- Hold entry checklist considering below points to be prepared prior entry and same to be signed by Master and terminal representative.
- Terminal / Foreman informed regarding hold entry.
- Specific agreement made and permission obtained from terminal prior hold entry.
- Crew wearing PPE as per company matrix.
- Cargo operations stopped prior entry.
- Permit to work for enclosed space completed prior entry.
- Hold entry supervised by responsible officer.
- Designated person stationed on deck to monitor safety of persons in the hold.

- Ship loader not positioned in the hold.
- Proper communication established between crew in hold and designated person on deck.
- Designated person on deck not allotted any other duty while crew are working inside hold
- Crew entering hold briefed and are aware of all dangers which may exist in the hold.
- Name of crew and shore staff entering / leaving hold recorded.
- All access points to cargo hold opened and are unobstructed for crew to come out in case of emergency.

Training: Master shall provide training to all ship's staff regarding above mentioned hold entry procedures and same to be recorded.

Reporting requirements for vessels calling PWCS terminal:

Vessels to submit the following to coalloadingplans@pwcs.com.au :

- Copy of above procedure identifying action to be taken by vessel crew when entering a hold during cargo operations.
- Evidence of recent training in the above procedure.
- Hold entry checklist.

One person should be wearing a multi gas meter prior to any entry after ventilation completed.

14 BATTERY ROOM

The battery room is an explosion risk as batteries release hydrogen gas during charging. Hydrogen is a highly explosive gas and it is therefore important to keep the room ventilated at all times. The ISPS code and the ship security plans require the battery rooms to be locked or tagged shut. It poses an additional risk of accumulation of hydrogen gas inside the room as door is rarely opened for ventilation other than routine maintenance. The door should be left open for some time before entering the room.

Where a battery room ventilator is fitted with a closing device, then a warning notice stating, for example "This closing device is to be kept open and only closed in the event of fire or other emergency – Explosive gas", should be provided at the closing device to mitigate the possibility of inadvertent closing. (MSC.1/Circ.1434 - Unified Interpretations of SOLAS Chapter II-2)

Equipment that is not certified 'explosion proof' must not be used within the battery room compartment. Portable electric lamps and tools, and other portable power tools that might give rise to sparks, should not be used in battery compartments.

Smoking and any type of open flame is prohibited in a battery compartment. A conspicuous notice to this effect should be displayed at the entrance to the compartment.

Good housekeeping requires the battery room to be maintained in a clean condition. The battery compartment should not be used as a store for any materials or gear not associated.

Goggles/face shield, rubber gloves and a protective apron should be worn when electrolyte is handled. An eyewash bottle should be available in the compartment for immediate use on the eyes in case of accident.

No metal container should be used when filling distilled water inside the batteries. The tools used for maintenance should be rubberized coating to prevent any chance of short circuit resulting in a spark. The coating would also prevent any kind of spark generation when the tool falls on the floor.
One person should be wearing personal oxygen meter prior to any entry after ventilation completed.

15 CO_2 ROOM

CO_2 gas is non-toxic but inhaling the gas, as 3-5 per cent concentrations of CO_2 may cause difficulty in breathing, nausea and palpitations of the heart, depending on the person's health and the time exposed to the gas. Inhaling gas of concentrations above 6 per cent may lead to increased blood pressure and unconsciousness. Very high concentrations will paralyze the respiratory system and may cause serious injury and death.

Being heavier than air, the leaking CO_2 gas accumulates in lower level within the CO_2 room and becomes the danger to the persons entering the room for routine checks and maintenance. For the safety of the persons entering the room, the natural and mechanical air ventilators' flaps are to be always kept open except in emergency. Where the CO_2 room is provided with mechanical exhaust fan, the CO_2 room should be ventilated mechanically prior to entering the room and the fan should be kept running during the period person is inside the CO_2 room. The warning notice ''Ventilate prior to entry'' is to be posted at the entrance of the CO_2 room.
One person should be wearing personal oxygen meter prior to any entry after ventilation completed.

16 PAINT AND CHEMICAL STORES

Vapours from paint, thinners and chemicals are considered toxic and flammable (refer MSDS). The in-use paint, thinner and chemical drums should never be left in the store uncovered for toxic and flammable vapours to evolve. These spaces should be considered dangerous. Gases produced within the space may displace or lower the oxygen level in addition to the presence of toxic gases. For the safety of the persons entering the store, the natural ventilator should be kept open except in emergency. The warning notice ''Ventilate prior to entry'' is to be posted at the entrances of the paint and chemical stores.
One person should be wearing personal oxygen meter prior to any entry after ventilation completed.

17 ENCLOSED LIFEBOAT AND EMERGENCY GENERATOR ROOM

The spaces of both enclosed lifeboat and emergency generator contain fuel and batteries. Batteries release hydrogen during charging. The natural ventilator of emergency generator room should be kept open except in emergency. The doors of both enclosed lifeboat and emergency generator should be left open before entering the space. The warning notice ''Ventilate prior to entry'' is to be posted at the entrances. Explosion and fire hazard sign should be posted near to the battery.
One person should be wearing personal oxygen meter prior to any entry after ventilation completed.

18 MASTHOUSES, BOATSWAIN STORE, CRANE JIBS, CRANE PEDSTALS ETC.

These areas can be considered an enclosed space due to their limited access points and potential for hazardous atmospheres. Due to the nature of these areas if not properly ventilated, oxygen levels can drop, leading to asphyxiation, a condition where the body is deprived of oxygen.
This can happen quickly, especially in confined spaces where oxygen consumption is high. The doors to these areas need to be left open before entering the space.
One person should be wearing personal oxygen meter prior to any entry after ventilation completed.

19 OPENING AND CLOSURE OF ENCLOSED SPACES

Once Confined Spaces are opened the area needs to be protected from accidental entry (Stanchions or Roped off warning note posted)
When the Confined Space is completed, it must be closed correctly and signed off in the Permit to Work before closing the permit.

20 REFERENCE

i. IMO Resolution A.1050(27) - Revised recommendations for entering enclosed spaces aboard ships.
ii. SOLAS Chapter III, Regulation 19 3.3
iii. SOLAS Chapter III Regulation 19. 3.6.2. Emergency training and drills.
iv. SOLAS Chapter XI 1, Regulation 7, Atmosphere testing instrument for enclosed spaces.
v. International Safety Management (ISM) Code Part A, Section 7
vi. Code of Safe Working Practices for Merchant Seafarers (COSWP)