Technical Publication

DROMON
CLASS

Frequently Asked Questions (FAQ) /

Confined Space Safe Entry

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It is our policy that our Surveyors only enter a confined space when a permit has been issued and after careful consideration that it is safe to do so. Our Surveyors have been advised to remain inside a confined space for as long as it is necessary to carry out the work.

It is the full responsibility of the Owner of the confined space (i.e. ship, shipyard etc.) to ensure that it is safe.

Our Surveyors have the right to refuse to enter an unsafe and/or unknown space and have clear instructions in case they are not confident that the space about to enter is safe to report these concerns and not enter until all safety measures are met.

This publication includes Frequently Asked Questions (FAQs) concerning confined space entry aiming to keep our Surveyors safe as well as inform interest parties on their obligations. FAQs have been categorized as follow:

- General
- For Owners
- For Surveyors

We trust that this publication will be used by all parties' concern to keep informed on the procedures to be followed and other activities that could impact the safety of those in a confined space.

FAQ general /

1. What is a confined space?

Confined space means a space that has any of the following characteristics:

- Limited openings for entry and exit
- Unfavorable natural ventilation
- Not intended for continuous worker occupancy

It may include, but is not limited to: boilers, pressure vessels, cargo spaces (cargo holds, or cargo tanks), cargo space stairways, ballast tanks, double bottoms, double hull spaces, fuel oil tanks, lube oil tanks, sewage-tanks, pump-rooms, compressor rooms, cofferdams, void spaces, duct keels, inter-barrier spaces, engine crankcases, excavations and pits.

2. What is a confined space entry?

A confined space entry is the process of entering, working in and exiting a confined space.

3. What is a Permit to Enter/Permit to Work?

A Permit to Enter or Permit to Work is a documented authorization that has been signed and dated, including time of issue by the Responsible Person, which states that the space has been tested by a Competent Person and that the space is safe for entry; what precautions, equipment etc. are required and what works is to be done.

4. What work is usually being performed in a confined space?

Examples of work being performed in a confined space include welding, cutting, brazing, painting, scraping, sand blasting and degreasing. Toxic atmospheres are generated in various processes. For example, cleaning solvents are used in many industries for cleaning/degreasing. The vapours from these solvents are very toxic in a confined space. It is also important to be aware that hot work carried out consumes oxygen.

Welding: hot work on all surfaces with coating will create several gases which may be very toxic. This gas may come from hot work being carried out in a tank adjacent to the space being surveyed.

Coating: special attention should be paid when spray coating is carried out in the area of the

survey. Spray coating where small size particles are mixed with air will lead to high toxic exposure if inhaled.

Grinding: may cause miscellaneous compositions of dust. Absorption of metal dust into the body through inhalation is dependent on the physical and chemical properties and the size of the particles. Dust like this may cause metal fume fever and bronchitis.

Sandblasting: the dangers connected to sandblasting very much depend on the object's substance and the size and containment of grit. Several grits used for sandblasting contain carcinogenic substances like quartz, nickel, lead and lead compound. During sandblasting the containment of carcinogenic chemicals may increase depending on the surface of the sandblasted area.

Hydro blasting: may create aerosols. Aerosols are dispersion of solid or liquid particles in air which are small enough to stay in the air for a long period of time. Aerosols may transport reactive chemicals deep into the lungs in a way that causes very high exposure. Aerosols may be produced from dust, dirt and cleaning chemicals in the process of high-pressure cleaning of miscellaneous surfaces.

NDT operations: chemicals from NDT operations may also be dangerous. Most ultrasonic thickness measuring equipment is not intrinsically safe.

5. What general hazards can be caused working in a confined space?

Work in confined space has a greater likelihood of causing fatalities, severe injuries and illness than any other type of shipyard work or onboard ships. The key hazards associated with confined spaces are:

- serious risk of fire or explosion;
- loss of consciousness from asphyxiation arising from gas, fumes, vapour or lack of oxygen;
- drowning arising from increased water level;
- loss of consciousness arising from an increase in body temperature;
- asphyxiation/suffocation arising from free flowing solid (engulfment) or the inability to reach a breathable atmosphere due to entrapment

Surveyors routinely enter confined spaces that are difficult to access due to small and/or narrow openings. There may be physical constraints within the space which need to be considered, and the space itself may be cramped permitting only restricted mobility.

Given the usual enclosed and darkened nature of a confined space this activity ideally should not be carried out by personnel suffering from phobias (e.g. claustrophobia) or who are susceptible to panic or anxiety attacks.

FAQ for Owners /

1. What procedures must be implemented in the Safety Management System (SMS) concerning confined space safe entry?

The ISM code requires the Company to establish safe practices in ship operation and a safe working environment. This is commonly provided for by a permit-to-work system that is drawn up to provide a formal written safety control system. MOU and FPSO units not covered by ISM code have a similar permit-to-work system.

A permit-to-work shall:

- set out the work to be done, the location and the precautions to be taken;
- predetermine safe methods of work;
- provide a clear record that all foreseeable risks have been considered;
- define the precautions to be taken and their sequence;
- provide written authority for the confined space to be entered and the work to start and the time when the work must cease.

Entry into a confined space should only be allowed when a separate permit-to-enter has been issued. This permit should only be issued after tests have taken place to ensure that the atmosphere is safe to breathe.

In addition risk assessment shall be completed for mitigating the associated risks and all identified controls are confirmed in place prior to confined space entry.

2. What are Owner's responsibilities for confined space safe entry?

It is the Owner’s responsibility to provide the following information:

- Evaluate ventilation of the space: Check that the tank or enclosed space is empty, cleaned and ventilated. The Owner is obliged to document that this is carried out.
- Evaluate need for isolation of the space.
- Ensure that a standby and/or rescue team is in place.
- Check and evaluate gas measurements taken. For testing and limit values:
    - as a minimum, oxygen measurements should be carried out before entry into the enclosed space. When found necessary the measurements should be taken under the supervision of the surveyor.
    - in addition a set of additional control measures should be evaluated depending on what kind of tank is to be surveyed.

3. How should crew members prepare a confined space for safe entry?

Tanks and spaces to be surveyed must be sufficiently clean and free from water, scale, dirt and oil residues to reveal excessive corrosion, significant deformation, fractures, damage and other structural deterioration. There is no point in entering a tank if the bottom of the tank is not visible and the intention of the survey is to survey those areas. Tank cleaning can be performed with an existing fixed tank cleaning system. However, in shadow areas portable washing machines may have to be used in order to achieve sufficient degree of cleanliness.

Generally, tank surveys should be avoided in tanks in which de-sludging operations are taking place since these operations can potentially raise gas levels.

When entering into a HFO, lube oil or diesel fuel tank, extra care should be taken when considering cleanliness and atmosphere. Long term effects of exposure to substances found in these tanks are not well documented.

Whenever possible, natural lighting should be provided in the tank during inspection by opening all tank hatches. In general a pocket size backup light should always be carried when working in confined spaces in case of loss of light. Lighting in confined spaces may not be good and will normally be temporary arrangements cabled into the space or by torchlight.

FAQ for Surveyors /

1. What PPE must Surveyors carry?

The following minimum set of Personal Protective Equipment (PPE) shall be carried by surveyors for conducting a Confined Space Entry:

- Protective clothing
- Safety shoes/boots
- Hard hat
- Work gloves
- Protective glasses and/or goggles
- Ear defenders and/or ear plugs
- An individual multi gas meter, in good working order, serviced and calibrated as per the manufacturer's instructions
- A flashlight, appropriate to the nature of the confined space to be entered, and in good working order

The surveyor must always use the necessary personal protective equipment according to the specific conditions and the survey being carried out. Refer to Dromon QSP 2.2-16 concerning the requirements for Personal Protective Equipment.

2. What Surveyors must request prior entering a confined space?

Prior to entry into a confined space or tank the following procedure should be applied:

- A Safety meeting should be held prior to the survey to discuss all aspects of safety measures.
- Entry Permit should be obtained for the space to be entered.
- Identify the hazards and assess the risks. Refer to Dromon QSM 6.2 with the Risk Assessment Manual for Ship Inspectors.
- In order to be able to identify the hazards in the space to be surveyed and assess the risks, the following information should be available:
    - Latest content of the spaces to be surveyed should be identified and the content in spaces adjacent to them.
    - For Gas Carriers: a data sheet for the last cargo should be presented.
    - For Chemical Tankers: a data sheet for the previous three cargoes should be presented.

Ventilation should be continuous where possible because in many confined spaces the hazardous atmosphere will form again when the flow of air is stopped. All openings are to be opened for ventilation including emergency exit.

De-ballasting a tank does not guarantee a safe atmosphere. Testing of the atmosphere is still required.

The inert gas fans should not be used to provide fresh air ventilation because contaminants from the inert gas lines could be introduced into the tanks.

The surveyor should evaluate the need for isolation of the confined space from service before entering the space.

The surveyor should not enter or remain in any ballast or cargo tank if ballast is transferred into or out of any tank, if not agreed beforehand.

A standby person should be assigned to remain on the outside of the confined space and be in constant contact (visual or two-way voice communication e.g. walkie-talkie) with the survey team inside. Routines for communication intervals with the survey team should be established.

The standby person:

- should not have any other duties than to serve as standby and know who should be notified in case of emergency;
- should never leave his post even after help has arrived and is a key communication link to others onboard;
- should be able to communicate sufficiently in a relevant common language.

Communication between watch personnel (Bridge, Cargo Control Room or Engine Control Room) and standby person should be established.

Rescuers must be trained in and follow established emergency procedures and use appropriate equipment and techniques (such as lifelines, respiratory protection, standby persons).

Emergency and evacuation procedures should be agreed and understood by all parties involved in a potential rescue operation.

Steps for safe rescue should be included in all confined space entry procedures. Rescue should be well planned and evidence should be made available that indicates drills have been frequently conducted on emergency procedures.

3. What is the procedure for entering a confined space?

Safe entry procedures (such as entry permit, “safe for workers” certificate, “safe for hot work” certificate, etc.) must be in place, current and are being followed. Note that:

- The Responsible and Competent Persons are identified.
- The access and exit arrangements to and within the confined space are considered safe. Where available, multiple entry and exit ways shall be opened.
- Communications arrangements are adequate.
- The confined space is adequately clean to allow safe working.
- The confined space lighting is adequate for entry/exit and to allow safe working in a confined space.
- The atmosphere has been demonstrated as being safe (safe limits are: atmospheric oxygen the range of 20.6% to 22% by volume, combustible gases less than 5% of lower explosive limit, toxics within acceptable limits).
- Adequate ventilation arrangements are in place and functioning.
- Isolation of the confined space, as applicable, from other tanks, cargo spaces, pipes, etc. and of machinery in the space, is confirmed.
- Extreme temperature effects are adequately considered.
- Electrical equipment in the confined space is suitable and in acceptable condition.
- A dedicated Attendant is provided by the vessel’s management or the management of the facility where the surveyor’s activities are carried out for the complete duration of the time spent working in the confined space and the Attendant has suitable means of initiating emergency response.
- Adequate emergency response arrangements are in place.
- No surveyor shall be the first to enter a confined space, and they shall be accompanied at all times where the size of the space permits.

Surveyors shall not enter the confined space if they are required to wear breathing apparatus.

Surveyor shall not enter the confined space if the surrounding noise can adversely impact effective communication.

Surveyor shall not enter the confined space if a toxic product is contained in an adjacent space, until the following is carried out:

- A risk assessment is completed by the vessel’s Management Company and the risk is mitigated.
- All identified controls are confirmed in place prior to tank entry.

No surveyor shall be part of a rescue team.

Surveyors shall immediately leave a confined space, by the nearest safe exit, if any alarms sound, or any physical impairment or distress is experienced by the surveyor.

The surveyor should always use his personal gas measuring equipment during the survey to:

- evaluate need for precaution against extreme temperature;
- evaluate the lighting arrangement; and
- evaluate if special clothing and/or equipment are required.

A checklist with the items above must be used for evaluation if the space is safe to enter. Surveyors must refer to Dromon QSP 2.2-22/Form 01 for the Checklist for Entry into Confined Spaces.

If extensive work is to be carried out within a large space, such as a cargo tank, it is recommended that a full assessment of the tank atmosphere is undertaken after the initial tests have been satisfactorily carried out and recorded. The tank atmosphere should be checked frequently during this entry, with particular attention being placed on testing the work location(s) and places that are inaccessible for testing from the deck. On satisfactory completion of this additional atmosphere test, the results should be recorded.

4. What additional requirements apply for entering confined spaces adjacent to loaded tanks on double hull tankers?

The compartmentalized structure in double hull and double bottom tanks makes them more difficult to gas free than conventional tanks and particular care should be taken to monitor the tank atmosphere.

Although entry into double hull or double bottom tanks with adjacent tanks loaded should be kept to a minimum, tank entry will on occasion be required for such purpose as tank inspections.

In relation to the entry procedure above, the following additional recommendations should be strictly enforced. Once the tank atmosphere meets the entry criteria at each sampling point, actual entry by personnel should be undertaken in two stages.

The first stage should be for the purpose of atmosphere verification and a general safety review. The surveyor making the entry should be equipped with:

- an emergency escape breathing set;
- personal gas detector capable of monitoring at least hydrocarbon and oxygen;
- portable radio;
- emergency light source;
- a retrieval harness; and
- an alternative means of attracting attention, e.g. a whistle.

Only after the first stage has verified that the atmosphere throughout the tanks is safe for the intended task should entry for other purpose be permitted.

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