

Circular 109 / 2015

To: Vessel Owners, Managers, Masters, Officers, Deputy Registrars, Surveyors and Other Interested Parties

Subject: Paris, Tokyo MoU Concentrated Inspection Campaign – Enclosed Spaces

Date: 04 September 2015

Summary

Related circulars:

Circular 89 / 2014 - New SOLAS requirements for enclosed space entry and rescue drills, and draft requirements for portable atmosphere testing

Circular 108 / 2015 - Paris and Tokyo Joint Concentrated Inspection Campaign

It has come to our attention that there may be some lack of understanding of the requirements that are necessary to ensure that Cook Islands flagged vessels are compliant with the CIC goals. Enclosed Space Entry procedures are a critical safety item on **all vessels** where spaces may be closed and unventilated for prolonged periods. This CIC will therefore target ALL vessels and not just tankers.

Attached is the **PSC form “Crew Familiarization for Enclosed Space Entry”** which we will appreciate being completed and returned to your Deputy Registrar at the earliest possible opportunity. We are aware that your company may have carried out a self-assessment already in which case please forward the details of this assessment.

We have also attached **Guidance: Entering and Rescue from Enclosed Spaces** that detail examples/procedures that may be of use for personnel who may require additional examples of some standard industry procedures. **These examples are not to be taken as complete and can act as guidance only.** This guidance paper is for information only and is intended as information to be considered when implementing the procedures as contained in the vessels QMS.

MCI draws your attention to MCI Circular 89/2014 with detailed advice on the IMO Resolutions dealing with the subject on various vessel types that may also be of some benefit.

When conducting Flag State Inspections our surveyor will require you to provide a copy of the completed PSC form and witness a tank entry and rescue drill.

For further enquiries, please contact the Technical Department at df@maritimecookislands.com.

CIC on Crew Familiarization for Enclosed Space Entry

This CIC applies to all ships

| | | | |
|------------------------------|--|-------------------------|--|
| Inspection Authority: | | | |
| Ship Name: | | IMO Number: | |
| Date of Inspection | | Inspection Port: | |

| No. | Item | Yes | No | N/A |
|---------------|---|--------------------------|--------------------------|--------------------------|
| Q.1 Note 1 | Are there measures in place to test the atmosphere of an enclosed space to confirm it is safe to enter? | <input type="checkbox"/> | <input type="checkbox"/> | |
| Q.2 Note 1 | Are crew members responsible for testing the atmosphere in enclosed spaces trained in the use of the equipment referred to in Question 1? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| No. | Item | Yes | No | N/A |
|-------|---|--------------------------|--------------------------|--------------------------|
| Q.3 * | Are the crew members familiar with the arrangements of the ship, as well as the location and operation of any on-board safety systems or appliances that they may be called upon to use for enclosed space entry? | <input type="checkbox"/> | <input type="checkbox"/> | |
| Q.4 * | Are crew members responsible for enclosed space emergency duties, familiar with those duties? | <input type="checkbox"/> | <input type="checkbox"/> | |
| Q.5 * | Is the training manual available on board and its contents complete and customized to the ship? | <input type="checkbox"/> | <input type="checkbox"/> | |
| Q.6 * | Is there evidence on board that enclosed space entry and rescue drills are conducted in accordance with SOLAS Chapter III, Regulation 19? | <input type="checkbox"/> | <input type="checkbox"/> | |
| Q.7 * | Have the ship's crew participated in an enclosed space entry and rescue drill on board the ship at least once every two months in accordance with SOLAS Chapter III, Regulation 19.3.3? | <input type="checkbox"/> | <input type="checkbox"/> | |
| Q.8 * | Are crew members responsible for enclosed space entry aware of the associated risks? | <input type="checkbox"/> | <input type="checkbox"/> | |
| Q.9 * | During the CIC, the PSCO is to observe an enclosed space entry and rescue drill. Did the drill comply with the requirements of SOLAS Chapter III, Regulation 19.3.6? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q.10 | Is the ship detained as a result of a "NO" answer to any of the questions? | <input type="checkbox"/> | <input type="checkbox"/> | |

Note 1 For PMoU, questions 1 & 2 are for information purposes only.

Note 2 Each question should be answered and only one box ticked for that question.

Note 3 Questions with an asterisk indicate Code 30 may be issued.

The CIC on Crew Familiarization for Enclosed Space Entry was conducted during the period September – November 2015.



Cook Islands

An example of a detailed industry procedure for Entering and Resucue from Enclosed Spaces

Precautions When Entering Spaces

1. Entry Into Enclosed Spaces

Many spaces on the ship may be dangerous to enter.

This is because they -

- Have contained flammable mixtures;
- Have contained toxic gas;
- Are adjacent to spaces containing dangerous cargoes, which may have leaked into them in either liquid or gaseous form;
- May have insufficient oxygen available, in the air in the space, to support life. This includes ballast tanks, void spaces, cargo holds and any space that may have been closed and unventilated for an extended period

Before entering any enclosed space -

1. Follow all procedures as per the tank/enclosed space entry guidelines;
2. Do not take any shortcuts;
3. Make sure tank entry permits are completed

Always be familiar with the type and location of the safety equipment.

If you are watching over someone who is in an enclosed space and you see him/her experiencing difficulty –

- **Do not go immediately to the assistance of the person in trouble;**
- **This way you are more likely to avoid two casualties instead of a possible one casualty;**
- **Raise the alarm. This you may be able to do by, for instance, actuating a pump room alarm, informing the officer in charge, or informing the bridge;**
- **Wait for help;**
- **Do not enter the space unless you are wearing breathing apparatus;**
- **Do not enter the space unless you have another person available to take your place at the entrance to the space, and to watch over you;**
- **Think!**

Do not become the next casualty yourself

There is much more detailed information about safe operations available on your ship; Ask the Chief Officer. They can help you with information and advice. They will make themselves freely available and will answer any of your questions. If you want to read more for yourself they will be able to recommend books.

2. Tank/enclosed space entry guidelines

2.1 Purpose

The purpose of this section is to describe the procedure and minimum precautions, which are to be followed when personnel intend to enter a tank or other enclosed spaces.

These guidelines will reduce the risk of accidents and poisoning by toxic gases and vapours that may be present.

Additional precautions should be taken when other hazards may be present due to the nature of repairs e.g. breaking of pipelines, opening of valve chests, heating coil repairs etc.

The pump room should also be treated as a confined space.

2.2 Preplanning

Prior to entering a tank, all persons who are to be involved in the task must meet to -

- Define the purpose of entering the tank;
- Identify the steps to be taken to achieve the purpose;
- Develop a plan of action;
- Assign responsibilities

The meeting should address -

- Scheduling of manpower;
- Tank washing (where applicable);
- Gas freeing and tank ventilation;
- Testing of the tank atmosphere;
- Identifying and minimising physical hazards;
- Listing equipment needed. I.e. Safety, fire fighting, communication, tools, escape and Rescue;
- Advising non-vessel personnel of the hazards associated with the operation;
- Maintaining safe conditions in the tank;
- Reviewing procedures for rescue

The Master should chair the meeting; they must ensure that a complete plan has been prepared and responsibilities have been assigned. In most cases the Chief Officer will be responsible to the Master for the safety of the operation.

The emergency procedures in the event of fire fighting, rescue and tank evacuation are to be clearly discussed and understood by all persons involved.

2.3 Prior To Entry - Initial Preparation

After a tank has been cleaned (where applicable) and ventilated, the following steps should be taken -

- Ensure the tank to be entered has been segregated from all other spaces, which contain or may contain a non-gas free or oxygen deficient atmosphere. All valves must be lashed in the closed position and labelled.
- Check that all cargo pipes (where applicable) in the tank being entered have been washed and drained.
- In addition to the safety equipment used for tank entry, the following rescue and resuscitation and fire fighting equipment must be available, inspected and in proper working order -
- The equipment must be immediately available on deck. The equipment should be located at the tank entrance.
- The following equipment should be on available-
 - Rescue hoist equipment to enable an injured person to be removed from the tank;
 - Escape respirators;
 - C.A.B.A. sets;
 - Oxygen meter;
 - Gas meter (where applicable);
 - Toxic gas detector (where applicable);
- Equipment carried on the ship is readily available. This includes -
 - Stretchers;
 - Resuscitator;
 - First aid kit;
 - Fire hose with spray nozzle;
 - Dry chemical and foam fire extinguishers
- Equipment carried by each member of the tank entry party. This is to include -
 - Flashlight;
 - Protective clothing;
- Equipment carried by at least one member of the tank entry team -
- Hand held VHF set;
- Additional equipment immediately available on deck during hot work operations -
 - Fire hose with open spray nozzle rigged to spray water on the exit ladder when the hydrant valve is opened. The stand-by watch in the event of fire will open the hydrant. This hose is to be securely lashed in a proper manner.

- Equipment in each hot work area within the tank -
 - Fire hose with spray nozzle - provided with butterworth hose saddle at point of tank entry;
 - Dry chemical fire extinguisher;
- Arrange for qualified person to stand by the tank entrance while people are in the tank. In addition, sufficient people to form a rescue team are to be identified and readily available.
- Establish a means of communication and emergency signals between the persons on deck and the persons in the tank. Ensure everybody understands these signals before tank entry.
- Intrinsically safe (where applicable) walkie-talkies are to be available in the tank and at the tank entrance.
- Make sure the form/permits are completed.

2.4 Minimum Atmosphere Test Equipment Requirements

The minimum numbers for atmosphere test equipment to be carried on board is as follows -

| Type | Quantity |
|---|------------------|
| a) Portable oxygen analyser | Two (2) pieces |
| b) Combustible gas indicator (<i>portable</i>) | Two (2) pieces |
| c) Toxic gas tester (<i>only required on chemical tankers</i>) | Two (2) pieces |
| d) Personal gas detector | Three (3) pieces |
| e) Tank scope (<i>for ships with inert gas system or ships which use Nitrogen Blanketing</i>) | Two (2) pieces |

There are some instruments in the market, which can test both oxygen and gas at the same time, in which case; only two (2) pieces are required to be carried on board.

The Chief Officer is to ensure that all measuring instruments in use have been properly calibrated and are maintained in accordance with the respective manufacturers instructions.

Testing The Atmosphere In The Tank

After a tank has been cleaned, ventilated and prepared for entry it should be tested for oxygen content, and finally for toxic gases at various levels from top to bottom.

The atmosphere can only be accepted as suitable for entry when all the relevant hazards have been identified and removed.

Measurement of the tank atmosphere through the tank cleaning openings is not considered adequate where work is to be done in areas away from these openings. If work is to be carried out in an area of the tank where the atmosphere cannot be checked from outside the tank, then a responsible officer should first check the tank as far as possible, enter the tank with a self contained breathing apparatus and check the areas using a suitable direct reading meter.

All ventilation must be stopped prior to and during the atmosphere tests and resumed prior any person entering the tank.

2.5 Criteria For Tank Entry

The following conditions must be met before allowing tank entry -

1. Oxygen

- Tank entry is only allowed, without the use of breathing apparatus, if the oxygen content is above 20.8%.
- Normally the oxygen level should be 20.8% if gas freeing to less than 1% lel has been achieved. However. If gas free enclosed spaces have been closed for long periods or inert, they will be oxygen deficient and air blowing will be necessary even though there may be no gas present.

2. Hydrocarbon

- 1% lel or less: entry permitted without respiratory protection.

3. Benzene (where applicable)

- Tanks which have carried benzene or products containing benzene such as gasoline, reformat, light cracked naphthas etc. as a last cargo.
- Entry permitted without respiratory protection only when the tank has been cleaned to -
- A reading one part of benzene per million parts of air by volume (1 ppm) which is the threshold limit value time - weighted average (tlv-twa) over an eight hour period, which covers the time a person is assumed to work in any 24 hour period and,

4. Alkyl lead (where applicable) tanks, which have carried, leaded products as last cargo.

- Precautions may need to be taken due to residual lead alkyl vapour present in the atmosphere, even after gas freeing to less than 1 % lel. This will be especially significant in uncoated tanks or in tanks with a lot of coating damage, or where any sludge or other sediment has built up on the bottom of the tank.

2.6 Identifying Physical Hazards

Prior to the tank atmosphere testing described above, the officer making this inspection shall familiarise himself with the construction of the tank.

Before the initial entry, lighting is to be rigged as required inside the tank.

After the tank has been found safe for entry, an inspection is to be made to identify any physical hazards and corrective actions are to be considered. These are to include -

- Handrails, ladders and walkways -
 - Access ladders and surfaces in the space may become slippery and should be cleaned to prevent accidents;

- Handrails and ladders must be checked to ensure that they are safe for use;
- Any unsafe areas are to be roped off and warning signs rigged;
- Structure and fittings -
 - Some parts of the structure may have suffered corrosion to the extent where a hazard may exist (e.g., thin plating, detached stiffeners or even missing sections). Such areas must be identified and warning signs rigged.
- Lightening holes
 - All lightening holes along the access route and in work areas must be roped off to prevent persons from falling through them.
- Lighting
 - Adequate lighting is to be provided in the access and working areas.
- Access
 - Staging should be rigged as required to provide safe access to the work area;
 - Safety harnesses should be worn when working at heights inside the tank.
- Remotely controlled valves and equipment
 - Remotely controlled valves and equipment which, if operated could pose a hazard to persons in the tank must be secured and warning signs placed at all operating positions.
- Sediment
 - When sediment, scale or sludge is being removed the atmosphere must be monitored continuously to ensure that safe limits are not exceeded;
 - If the tanks have carried leaded cargoes, the sediment removal procedures must be in accordance with the current guidelines of lead regulations;
 - Persons must wear full respiratory protection.
- Tools
 - Before any hammering, chipping, welding, cutting or grit is undertaken, or any power tool is used outside the machinery space, the responsible officer is to ensure;
 - That the area is gas free and maintains that status throughout the period and that hot work procedures are being followed.
 - In addition, due to the hazards being presented by falling tools, all tools must be carefully lowered into the space inside a bag or a bucket. When working at height, tools should be tied to the user with a lanyard to prevent them from being dropped.

2.7 Final Preparation

For final preparation, the following must be done -

- Review with the work group the final plan of action.
- Ensure that all persons entering the tank have been given instructions.
- The person in charge of the tank must be aware of the location of every man in the tank at all times. The entry team should stay together whenever possible.
- Ventilation must be provided during the entire period of the operation. Where necessary, portable ducting must be provided to ensure a good supply of air to the actual working area inside the space.
- The Officer in Charge should check that each person entering the space is correctly dressed in the proper protective clothing and provided with the correct safety equipment.

2.8 Tank Entry

After the tank entry requirements have been met, the work group may enter the tank.

While persons are working in the space, safe-working conditions must be maintained.

Particular attention should be given to the following -

- The Chief Officer is to ensure that the atmosphere is continuously monitored and shall order the evacuation of the space if the safe limits are exceeded or if there is any doubt about it at any stage of the operation. Ventilation is to be effective at all times.
- The Chief Officer is to ensure that all safety hazard corrective measures are being enforced.
- The standby watch shall be in continuous attendance at the entrance to the space.
- Rescue equipment is to be rigged and ready for use throughout the operation and persons assigned to the rescue detail are to be constantly in attendance.
- Tools and equipment for use in the space are to be lowered to the work area in a bag or bucket; they are not to be carried.
- If pipes or fittings are to be opened, they shall have been flushed with water prior to the entry of the work team. They are to monitor for gas during the work period.
- Access openings are to be kept open and clear for emergency exit at all times.

2.9 Leaving the Space

Whenever the space is vacated for a long period of time, such as a meal break or other interruption, ventilation is to continue during the break and all tests are to be retaken prior to re-entry.

When finally leaving the tank, the officer in charge must ensure that all persons in the entry team are accounted for and that all tools, rags and equipment have been removed from the space.

2.9 Tank Rescue

At the preplanning meeting, prior to tank entry, the rescue party organisation will establish communications and procedures, which will be understood by all persons.

The following points should be noted-

- The person in charge of the rescue party is not to enter the space. He is to co-ordinate the rescue operation from the tank access.
- In the event that a casualty must be removed from the space, sufficient persons must be on deck and available to effect proper use of the rescue equipment.
- Sufficient persons are to be assigned to the rescue party. They are to be familiar with the space and qualified in the use of the equipment and able to deliver first aid.
- The decision to remove an injured person from the space must be based on the relative danger of his location and extent of his injuries, versus the danger of increasing his injuries by movement prior to effecting first aid.

Pumproom Entry (where applicable)

Cargo and ballast pumprooms are considered as enclosed spaces, however due their location design and the operational need for the space to be routinely entered by personnel pumproom present a particular hazard and necessitate special precautions.

Ventilation -

- Throughout cargo handling operation the pumproom ventilation must be in continuous operation.
- The gas detection system if fitted must be functioning correctly. The audio and visual alarm for the fixed gas detection system should be set to not more than 10 % l_{el}.
- In case of cargo pumproom the ventilation must be in extraction mode.

Entry procedure -

Before entry the pumproom must be thoroughly ventilated and checked for oxygen 21 pct, hydrocarbons less than 1 pct l_{el} and no toxic gases as applicable.

- The pumproom entry must be controlled by the entry permit form and the entry into the space are recorded
- Proper and effective communication must be provided and tested between persons inside the pumproom and those outside. Regular communication checks should be made at pre agreed intervals and failure to respond should be a cause to raise the alarm.
- In case if there are difficulties in communications then a person must be standby on the pumproom top and a visual and remote communication procedure put in place
- Notices should be displayed at the pumproom entrance prohibiting entry without formal permission.

3. Precautions For Rescue

Rescue From Enclosed Space

During work in any cargo tank, bunker tank, ballast tank, or void space - peak tank etc., the safety trolley is to be in attendance as per the company's standard laid down procedures for entry permits, and entry into enclosed spaces. As a minimum, the safety trolley contents must be -

- Two fully charged SCBA sets plus spare bottles;
- Stretcher;
- Two rescue harnesses and lifelines;
- Two fully charged torches;
- Two gantlines or messengers, capable of reaching the tank bottom;
- Resuscitator

If there are indications through the agreed system of communications that the person or persons down the compartment are being either affected by the atmosphere, or are in trouble of any description, (injury etc.), then the alarm should be raised immediately. This is to be via the general alarm, and supplemented by a public address announcement.

On no account should the standby man at the top of the tank attempt a rescue, or enter the compartment on his own. He should prepare breathing apparatus but must wait for assistance. He should have the facemask on, but the demand valve removed, ready to go

Tank Rescue

As soon as fire parties are mustering, the local control will immediately dispatch personnel with breathing apparatus to the scene. Back up personnel will be dispatched to bring additional breathing apparatus sets and spare bottles to the scene.

Unless it can be established beyond any doubt that the nature of the emergency does not involve the atmosphere of the compartment, then SCBA must be utilised for entry.

Every effort must be made to establish the last known area in the tank that the casualty was known to be located as this will save valuable time. Note that the sight and sound equipment should be utilised for prolonged tank entry and this should assist in locating the casualty.

Local BA control will be established on scene, and using the equipment stationed at the entry to the compartment from the safety trolley, two personnel will enter the space in SCBA. The stretcher and resuscitator will be attached to the gantline and lowered to the bottom of the compartment. Radio communications should be maintained with the rescue party at all times to monitor progress.

It should be stressed to the rescue party that the priority is to get the resuscitator upon the casualty in order to get air supplied as soon as possible. The rescue party should also be aware of the possibility of the casualty struggling as he revives, and should act accordingly.

When back up personnel arrives, they should be readied in SCBA as a second rescue party. Do not let them use the masks at this time, as it will waste valuable air.

Should it become necessary for the second team to enter, then they should be on their way down the tank and in situ as the first teams whistles are going off. Again this will save valuable time.

Hospital and medical equipment should be prepared in readiness to accept the casualty.

Once the casualty has been secured in the stretcher, the gantline should be attached, and the casualty raised to deck level via the tank lid.

Depending upon the circumstances medical advice may be required.

Pumproom rescue (where applicable)

The ballast pump room rescue bears many similarities to a tank rescue, and indeed for entry into the compartment where it known to contain toxic vapours the procedure is identical. However, the following points should be borne in mind.

The pump room has major advantages over a tank -

- It is mechanically ventilated
- If fitted with a gas detection alarm system - in an emergency situation this should give an indication as to whether the emergency requires use of BA.
- The pump room is lit
- The pump room has lifting appliances permanently in situ - the rescue line.

Since the pump room has fixed mechanical ventilation, it is not necessary to have the safety trolley in attendance for routine entry. However, the regular checking and standard company procedures for enclosed space entry, plus entry permits still apply.

In the event of it being necessary to affect a rescue from the pump room, then the equipment listed on page one of this procedure, will need to be collected, although the pump room will have its own safety line in readiness with a safety harness. It cannot be stressed enough how importance speed is in getting the rescue team mustered and into SCBA ready for entry.

The same principles apply to a pump room rescue as to a tank rescue.

The cause of the change in atmosphere to a hazardous condition should indicate that either known and/or planned work was taking place, which went wrong, or equipment failure. In the former case this would be an indication as to the exact location of the casualty. In either case the chief officer should ensure that all valves are closed in the pump room, and that any operations underway, are suspended immediately.