

**Port State Control guidance for examination of fixed CO2 firefighting systems and  
conducting fire drills onboard Cruise Ships during scheduled examinations.  
(CG-CVC-2 / July 2013)**

**1. General**

These guidelines are intended to assist Port State Control Officers (PSCOs) when examining fixed CO2 firefighting systems and conducting fire drills during scheduled passenger vessel examinations. Although this guidance focuses on Cruise Ships, the methodology may be applied to all ships, and is intended to assist in determining that the CO2 system is kept in good working order (SOLAS 74 (09 Cons) regulation II-2/14.2.1.2; crew members are trained and familiar with ship arrangements (SOLAS 74 (09 Cons) regulation II-2/15); and that the crew competencies comply with the intent of SOLAS III, Regulation 19.3.1 and 19.3.4.

Note: These Guidelines are intended to supplement existing guidance<sup>1</sup> and should not be considered all inclusive, nor is it expected that the PSCO verify/complete every item herein in order to determine vessel compliance.

**2. Background**

It has been more than two years since the Assistant Commandant for Marine Safety issued two Marine Safety Alerts that addressed critical concerns related to the fixed CO2 system noted during the investigation of the engine room fire on the CARNIVAL SPLENDOR; Alert 10(a)-10 and 10(b)-10 dated December 21, 2010. Since the CARNIVAL SPLENDOR engine room fire, two more major fires have occurred on cruise ships operating out of U.S. Ports: CARNIVAL TRIUMPH and GRANDEUR OF THE SEAS. These casualties highlight the importance of shipboard firefighting equipment maintenance and proper crew training to ensure their readiness to combat a shipboard fire.

**3. Safety**

- a. General: Whenever an examination of a fixed carbon dioxide fire-extinguishing system is taking place, strict safety precautions should be followed to avoid accidental discharges and to reduce the risk to individuals performing or witnessing the activities from the hazards associated with CO2. Prior to the examination of any fixed CO2 firefighting system, the PSCO should ensure that Coast Guard personnel are familiar with NVIC 09-00, and utilize the appropriate CG issued Personal Protective Equipment (PPE) in accordance with existing policy and verify that:
  - i. ship board personnel demonstrate compliance and/or knowledge of the fixed CO2 firefighting system;

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<sup>1</sup> MSC.1/Circ.1318 - Guidelines for the Maintenance and Inspections of Fixed Carbon Dioxide Fire-Extinguishing Systems; MSC.1/Circ.1432 - Revised Guidelines for the Maintenance and Inspection of Fire Protection Systems and Appliances; and NVIC 06-91

- ii. that the crew acknowledges all CO2 discharging functions shall be simulated and no activation or disassembling of any system components shall be performed (i.e. opening/closing of valves, activation of remotes, disconnecting linkage, etc.);
  - iii. the CO2 room ventilation shall be turned on and operating properly for at least 15 minutes before inspection of the CO2 room;
  - iv. the CO2 room vent outlet(s) are examined to ensure they are opened and in serviceable condition;
  - v. all means of egress are clear and that adequate lighting is available. The CO2 room door must be secured in the open position. PSCOs should not enter the CO2 room without a crewmember responsible for CO2 system maintenance (Chief Engineer, Chief Officer or other responsible person – this person may or may not be assigned the duties of activating the system during the fire drill).
- b. Inspection or Maintenance: Maintenance and inspections should be carried out in accordance with the ship's maintenance plan having due regard to ensuring the reliability of the system. The onboard maintenance plan should be included in the ship's safety management system and should be based on the system manufacturer's recommendations. Certain maintenance procedures and inspections may be performed by competent crew members while others are required to be performed by persons specially trained in the maintenance of such systems (servicing technicians). The onboard maintenance plan should indicate which inspections and what system maintenance procedures can be completed by the crew (or servicing technician) and which items must be completed by a servicing technician. At times PSCOs may witness an inspection or maintenance of a fixed CO2 firefighting system in order to clear a deficiency. In these cases, the PSCO should be aware of additional safeguards necessary to avoid accidental discharges such as locking or removing the operating arms from directional valves, or shutting and locking the system block valve, evacuating the space protected, etc. PSCOs should interview the servicing personnel to verify they are an authorized servicing agency for the installed equipment and are familiar with the operation of the system. PSCOs should review the safety procedures with the servicing personnel before witnessing repairs/maintenance. Personnel which are not engaged in the repairs, maintenance or testing but may be performing work activities in the immediate or surrounding areas (i.e. engine room crewmembers, cadets, etc.) should be notified of the impending activities before work is begun.

#### **4. Fixed CO2 firefighting system examination guidance (SOLAS II-2, Reg. 14.2.2) during scheduled PSC exams**

- a. PSCOs should review Marine Safety Alerts 10(a) – 10 and 10(b) – 10 to familiarize themselves with examples of discrepancies pertaining to fixed CO2 firefighting systems.

- b. Examine the ship's maintenance plan required by SOLAS II-2/14 and the Firefighting Instruction Manual (FIM) for maintenance, testing and inspections required. Compare the maintenance plan and FIM with posted instruction for operating the installed CO2 system, test procedures and images referenced for verification to ensure these items agree with the CO2 system arrangements as installed. PSCOs should question crewmembers (i.e. Chief Engineer or Chief Officer) assigned responsibility for the CO2 system maintenance to gauge their familiarity with the FIM and installed system.
- c. Visually examine the individual lines connecting the CO2 bottles to the CO2 distribution piping system paying particular attention to their tightness. Visually check for the use of hemp or other types of sealant (extruding from the connection per the photo in MSA 10(b)-10 (pg 2) as most high pressure systems utilize a mechanical connection which does not require the use of sealant. At no time should components be disassembled for the PSCO's examination.
- d. Using care to not actuate the system, visually examine the CO2 actuator arms, valves, associated hardware and other piping connections for proper assembly and tightness (loose bolts, unions, control heads, missing gaskets, loose disconnected hoses).
- e. Pay particular attention to proper installation of control valves (i.e. directional flow check valves, handles provided, etc.) Verify that control valves and release stations are correctly labeled as to the spaces served by that section of the system.
- f. Check the maintenance plan (SOLAS II-2/14.2.2.2 & SMS) indicating the results of previous maintenance record and inspections performed either by ship's crew or specially trained personnel (certified technician). Confirm that inspections check for proper operation of pressure switches for control of ventilation fans and fuel shut-offs for the protected space.
- g. Any concerns noted during the visual exam should be brought to the attention of the Master or Chief Engineer.

Note: Other fire protection systems, fire fighting systems and appliances are just as important as the fixed CO2 system and may even be integral to the fixed CO2 system's ability to extinguish a fire. PSCOs should be cognizant of other equipment and design factors, such as ventilation shutdowns, remote fuel quick closing valves, hatches, scuttles, doors and fire boundaries/insulation (i.e. A-60 bulkheads) when performing the PSC exam.

## **5. Fire Drills (SOLAS Ch. II-2, Reg. 15 & Ch. III, Reg. 19 & NVIC 06 – 91)**

- a. When witnessing fire drills during each annual and semi-annual COC examination it is important to ensure that the fire location selected will properly evaluate the crew's response to a high consequence fire. As such, during the next

Cruise Ship scheduled exam the PSCO shall select an engine room for the fire drill location. Once a vessel has completed this initial fire drill of an engine room, other locations may be selected during subsequent PSC exams, however a fire drill will be conducted in the engine room at least once during the vessel's COC annual cycle. The location in which the fire drill was held shall be recorded in the remarks section of the COC.

- b. Examine the ship's instructions related to onboard training and drills required by SOLAS II-2/15. In addition to the normal observations associated with a fire drill (i.e. proper muster, appropriate gear/donning of gear, passenger instructions, etc.) the PSCO should pay particular attention to the competency of crewmembers assigned to operating fire fighting systems. The following questions may assist in evaluating their knowledge and experience with their assigned duties related to the CO2 system:
  - i. How does the crewmember receive training and familiarization with the operational requirements of the system or equipment for which they are assigned responsibility?
  - ii. Where does activation of the system take place (remote/bridge) and who is responsible for authorizing activation (master/fire team leader);
  - iii. Can the crewmember explain how to operate the system or appliance; confirm their explanation corresponds to the written/posted instructions;
  - iv. What other actions are required prior to activating the system (i.e. ventilation & power secured, engine room evacuation, etc.). Note: This may be part of the Master's responsibility prior to giving permission to activate the system.
  - v. How is permission passed to activate the CO2 system?
  - vi. How does the crewmember verify the system has activated and what are some indicators available to the crewmember that the system did or did not function properly?
  - vii. If presented with the scenario that the fixed CO2 system did not activate properly, what actions are taken? Is there a secondary means to activate? Does the crewmember need permission to activate by the secondary means & does this align with the shipboard firefighting instructions/procedures/training?
  - viii. Does their explanation correspond to posted instructions? Are there any other system functions required to direct the discharge of CO2 to the space intended? (i.e. bypass valves, manually opening of control valves, etc.);
  - ix. What actions must be taken before the space can be re-entered after the CO2 system is discharged? How are temperatures monitored to verify the fire is extinguished? How much time must elapse before the space can be ventilated? (at least 1 hour is recommended)

## **6. Discrepancies identified**

- a. The Master shall immediately be notified of any discrepancy (i.e. issues with components of the fixed CO2 firefighting system affecting the proper operation; written or posted operational procedure; or crew knowledge of assigned duties).
- b. Not all discrepancies or concerns discovered will prevent the CO2 system from discharging as designed (i.e. hemp packing discovered in mechanical seal fittings), however based on the critical concerns identified in the MSA's, PSCOs should provide copies of the MSAs to the Master if similar discrepancies are noted. The PSCO should also review the Coast Guard's recommendations as outlined in the MSAs with the Master.

Note: Maintenance, inspections and service performed on a fixed CO2 firefighting system shall be in accordance with the vessels maintenance plan and/or the Manufacturer's FIM.

- c. Deficiencies that are corrected-on-the-spot, or, in other words, deficiencies corrected before the PSCO completes his or her visit to the vessel shall be documented as follows:
  - i. Detainable deficiencies corrected-on-the-spot must always be documented on the form B and entered into MISLE as corrected;
  - ii. Serious deficiencies corrected-on-the-spot should be documented on the form B and entered into MISLE as corrected (example - anything that would qualify as a code 17 deficiency should be documented in this way);
  - iii. Lesser deficiencies corrected on the spot need not be documented on the form B and entered into MISLE unless the deficiencies are attributed to a systemic failure of the maintenance program contained in the vessel's safety management system. If this is the case, an expanded ISM exam should also be conducted.
  - iv. With the exception of initial COC exams on passenger ships, for multiple-day PSC exams, the PSCO should provide the master with a form A/B at the end of each day. Lesser deficiencies documented on an earlier days form B and corrected by the end of the PSC exam need not be entered into MISLE as a deficiency unless it meets the criterion discussed above (iii.).
  - v. As a point of reference, current policy for U.S. inspected vessels does not require inspectors to document deficiencies corrected on the spot with an 835 or MISLE deficiency (but the situation may merit a narrative entry to discuss how an issue was handled). Keep this in mind when writing form B's and making MISLE entries for PSC exam lesser deficiencies.
- d. The following examples are provided to assist the PSCO in determining the appropriate course of action for discrepancies identified:
  - i. Crew knowledge of assigned duties or conflicts with posted vs. Manufacturer's instructions should be documented on the Form B. This may

be remedied by the Master as follows: providing additional training, re-assigning of duties or by amending the posted instructions and ensuring all crewmembers assigned with duties affected by the changes are aware of the amendments. For deficiencies other than failure of two consecutive fire drills (detainable), the PSCO should issue a code 17.

- ii. Loose fittings discovered on flex (or hard pipe) connections, connecting the CO2 bottles to the servicing branch line should be documented on the Form B as a code 17.

Note: The OCMI maintains discretion for allowing a vessel to sail with outstanding deficiencies provided in his/her opinion safe alternative arrangements have been made.