

## CHAPTER 10

### MISCELLANEOUS ITEMS

#### Key Changes

Minor revision which incorporates the latest IACS UI's, and updated guidance for these miscellaneous items/equipment.

All amendments are highlighted in yellow.

<b>CHAPTER 10</b> .....	<b>1</b>
10.1 EXPLOSIONS, FIRES AND ACCIDENTS FROM LIQUEFIED PETROLEUM GAS (LPG) SYSTEMS .....	2
10.2 ACCIDENTS RESULTING FROM OIL FIRED APPLIANCES .....	2
10.3 FIRES INVOLVING ELECTRIC EQUIPMENT .....	2
10.4 MEASURES TO PREVENT FIRES CAUSED BY SPILLAGE OF FUEL, LUBRICATING AND HYDRAULIC OIL .....	3
10.4.1 Flexible pipework .....	3
10.4.2 Construction of pipes, filters, valves and cocks .....	4
10.4.3 Oil fuel units, pumps and fittings .....	5
10.4.4 Use of fuel oil having a flashpoint of 43°C or less and crude oil or slop for tanker boilers: .....	6
10.4.5 Vent and overflow arrangements .....	6
10.4.6 Sounding arrangements .....	8
10.4.7 Thermometer fitting .....	8
10.4.8 Heated surfaces .....	8
10.5 ARRANGEMENTS FOR OXYGEN/ACETYLENE EQUIPMENT .....	9
10.6 FIRE BLANKETS .....	10
10.7 SPECIAL REQUIREMENTS FOR BOILER AND MACHINERY SPACES .....	10
10.7.1 Roof-fired boilers .....	10
10.7.2 Coamings .....	10
10.7.3 Precautions against oil leakages .....	10
<i>Passenger ships on international voyages irrespective of size and cargo ships of 500 GT and over</i> .....	11
<i>EU Directive passenger vessels of classes B, C &amp; D</i> .....	11
<i>Passenger vessels operating solely on categorised waters</i> .....	11
<i>All other vessels</i> .....	12
10.7.4 Lubricating oil systems .....	13
10.8 MEANS FOR STOPPING MACHINERY, SHUTTING OFF OIL FUEL SUCTION PIPES, CLOSING OF OPENINGS AND SMOKE RELEASE ARRANGEMENTS .....	14
10.8.2 Closing of openings - fire integrity .....	14
10.8.3 Ventilation systems .....	14
10.8.4 Remote means of control .....	15
10.9 WASTE RECEPTACLES .....	16
10.10 PROTECTION OF VEHICLE, SPECIAL CATEGORY AND RO-RO SPACES .....	17

### 10.1 Explosions, fires and accidents from Liquefied Petroleum Gas (LPG) systems

10.1.1 Where LPG systems are used on smaller cargo ships, tugs, barges, launches and pleasure craft for cooking, water and space heating, refrigerators, etc., the standards in Annex 5 of the Harmonised Small Commercial Vessel Code (MGN 280) and the advice given in MGN 312 should be applied.

10.1.2 SOLAS II-2 Reg. 4.3 specifies that "Gaseous fuel systems used for domestic purposes shall be approved by the Administration. Storage of gas bottles shall be located on the open deck or in a well ventilated space which opens only to the open deck."

*Interpretation:*

*A portion of open deck, recessed into a deck structure, machinery casing, deck house, etc., utilized for the exclusive storage of gas bottles is considered acceptable for the purpose of reg. II-2/4.3 provided that:*

- (1) such a recess has an unobstructed opening, except for small appurtenant structures, such as opening corner radii, small sills, pillars, etc. The opening may be provided with grating walls and door;*
- (2) the depth of such a recess is not greater than 1 m. A portion of open deck meeting the above shall be considered as open deck in applying tables 9.1 to 9.8 of SOLAS Chapter II-2.*

*(IACS Unified Interpretation SC 214)*

10.1.3 The same will satisfy MSN 1699 Schedule 8 para 2.

## **10.2 Accidents resulting from oil fired appliances**

Many of the dangers from domestic LPG installations are common to oil fired devices. MSN 1136 gives guidance on minimising these hazards.

## **10.3 Fires involving electric equipment**

10.3.1 Chapter 9 of the Code of Safe Working Practices for Merchant Seamen draws attention to the fire hazards from electrical equipment, particularly from electric heaters.

10.3.2 MGN 132 and MSN 1557 also highlight fire potential from poor installation and maintenance.

10.3.3 If essential electrical cables must be carried in trays, attached to the deckhead over the engines, because of limited headroom in the machinery spaces, it should be ensured that the materials of the protective sheath are compatible with the intended operating temperature of the environment. Cable runs should be so arranged as to prevent, as far as practical, the propagation of fire. The effect of any fire protection arrangements on cable ratings and heat dissipation requirements will have to be considered.

#### 10.3.4 Electric Radiators:

*Reference is made to IEC Publication 60092 - Electrical installations in ships.*

*(Unified Interpretation - MSC/Circ.1120)*

10.3.5 IACS Unified Requirement E12 gives standards for electrical equipment in paint lockers and their surrounds.

### **10.4 Measures to prevent fires caused by spillage of fuel, lubricating and hydraulic oil**

#### **10.4.1 Flexible pipework**

10.4.1.1 The following should be read in conjunction with Appendix 2 of MSC/Circ.647 "Guidelines to Minimise Leakages from Flammable Liquid Systems".

10.4.1.2 Main engines and auxiliary engines on vessels tend to be fitted with flexible mounts that require pipework to have a degree of flexibility. To avoid rigid pipework failing, short lengths of flexible pipework are introduced to permit flexibility between two rigid components. **Flexible hoses are not acceptable for use in high pressure fuel injection systems.** Flexible pipework on engines can carry **low pressure** fuel, lubricating oils and hydraulic oils. All these products, when released under pressure, can cause fire when coming into contact with a source of ignition.

10.4.1.3 The following guidance is for all passenger vessels, and all other vessels greater than 24m in length. It is recommended that these standards be also applied to code vessels of less than 24m in place of the current accepted ISO 7840 – **"Small craft – Fire-resistant fuel hoses"**.

10.4.1.4 Flexible pipework is to be of a type that has been approved by a recognised classification society or Nominated Body for the intended purpose. The pipework is to be constructed in accordance with the relevant **national and international** standards, taking into consideration the pressures in the system. The pipework approval is to incorporate fire testing to 800°C for 30 minutes, as per IACS Unified Requirement **F42**, which should be incorporated during class society approvals. Where sleeves are used in conjunction with the pipes, the sleeve requires a similar fire test approval as stated above. **Each flexible hose assembly should be provided with a certificate of hydrostatic pressure testing and conformity of production** to ensure the pipework complies with the relevant standards.

10.4.1.5 Where hoses do not meet the above fire testing requirements due to some constraints, MCA may consider granting approval on a case to case basis, provided appropriate fire detection/fighting arrangements are in place **and the equivalent level of safety is provided.**

10.4.1.6 Flexible pipework is to be installed in accordance with the manufacturer's instructions, and **be adequately supported and secured**. The pipework is to be provided with sufficient free movement to accommodate vibration and to avoid contact with any structure. Where sleeves are fitted, the sleeve needs to extend beyond the length of the pipe, with appropriate leak proof end connections.

*Hose clamps and similar types of attachments for flexible pipes should not be permitted.*

*(IACS Unified Requirement F 35)*

10.4.1.7 Flexible pipework tends to have a **fixed** service life and should be replaced in accordance with the manufacturer's **guidelines and instructions**. **If there are no records available for the dates of last renewal, these pipes shall be renewed immediately, and the new pipe or pipe/sleeve assembly shall meet the fire test requirements stated in paragraph 10.4.1.4.**

10.4.1.8 It is essential that flexible oil pipes should be able to withstand normal service conditions, e.g. vibration and/or pressure pulsing, **which must be taken into account when specifying the type of flexible pipe to be used**. When fitting a flexible pipe **due** care must always be taken to ensure that **the pipe** has sufficient free movement, and is not subject to any unnecessary initial stress whilst the engine is stopped. A common cause of pipe failure in service is the twisting of the pipe when tightening the end nut. Particular attention should be given to the manufacturer's installation instructions, and the recommendations about shelf and service life should be strictly observed.

## **10.4.2 Construction of pipes, filters, valves and cocks**

10.4.2.1 Reference should be made to the guidance contained in MSC/Circ.851 "Guidelines for Engine Room Oil Fuel Systems", which supplements MSC/Circ.647.

10.4.2.2 Whenever possible, pipes, filters, valves and cocks should be located well away from possible sources of ignition. It is recognised that the choice of location may often be limited, but it should often be possible to move small bore connections to a safer place.

10.4.2.3 If pipe failure, coupling or joint failure could result in fuel, lubricating or hydraulic oil spraying onto a hot surface, such as an engine exhaust system, suitable screening should be provided to deflect leaking oil to a safer area. Whenever possible, pressure pipes used for conveying heated oil should be placed above the platform in well **illuminated** and conspicuous, **readily accessible** positions.

10.4.2.4 Because of the number of fires caused by the inadvertent opening or failure of vent plugs and cocks, and failure of pressure gauge lines, the elimination of these items should be considered whenever possible. When installation cannot be avoided they should be positioned so that they are clear of **all potential** sources of ignition.

10.4.2.5 When avoidable, hydraulic power packs or other hydraulic machinery should not be located in spaces containing machinery, which has a hot exhaust system or other heated surfaces which might ignite hydraulic oil on contact.

### 10.4.3 Oil fuel units, pumps and fittings

10.4.3.1 An 'oil fuel unit' is:

*Oil fuel unit includes any equipment used for the preparation and delivery of oil fuel, heated or not, to boilers (including inert gas generators) and engines (including gas turbines) at a pressure of more than 0.18 N/mm<sup>2</sup>. Oil fuel transfer pumps are not considered as oil fuel units.*

*(Unified Interpretation - MSC/Circ.1203)*

10.4.3.2 Oil fuel units, pumps and fittings present the same hazards as pipes conveying oil and the following precautions should be taken:

- (a) suitable screens/shielding should be erected to prevent any oil which might escape from any oil pump, filter or heater from coming into contact with boilers or other heated surfaces;
- (b) save-alls or gutters should be provided under the oil pumps, heaters or strainers to catch any oil which may be spilled when any cover or door is removed. Similar arrangements should be made at boiler furnace fronts to intercept any oil which may escape from the burners. In the case of top fired boilers special care should be taken in arranging the save-alls and coamings to prevent the spread of any oil spillage;
- (c) any relief valve fitted to prevent overpressure in the oil fuel heater should be in a closed circuit;
- (d) master oil valves at boiler furnace fronts should be of the quick closing type, and fitted in conspicuous and readily accessible positions. It is recommended that they are painted bright red to aid identification in an emergency. Provision should be made to:
  - (i) prevent the supply of oil to any burner unless it has been correctly coupled to the oil supply line; and
  - (ii) prevent the removal of the burner before the oil supply is shut off.
- (e) a suitably mounted plan of the oil piping arrangements/system should be readily available in close proximity to the system to facilitate guidance of the ship's crew.

10.4.3.3 Change over cocks and their safety devices associated with duplex filters in oil systems, should be designed and maintained so as to ensure that the working filter cannot be opened up inadvertently.

10.4.3.4 Drain pipes fitted to oil tight flats should preferably be open pipes, but readily accessible cocks would be acceptable, and may be necessary, if inter-flooding of separate watertight compartments could occur through the drains. The heights of coamings around such flats should be arranged so that a small adverse list would not prevent effective drainage and cause an overflow.

#### **10.4.4 Use of oil fuel having a flashpoint of 43°C or less and crude oil or slop for tanker boilers:**

Interpretation of SOLAS II-2 Reg. 4.2.1.4:

*1 Machineries and piping systems for the usage of fuel oil having a flashpoint of 43°C or less should comply with the following:*

- .1 provisions for the measurement of oil temperature should be provided on the suction pipe of oil fuel pump;*
- .2 stop valves and/or cocks should be provided to the inlet side and outlet side of the oil fuel strainers; and*
- .3 pipe joints of welded construction or of circular cone type or spherical type union joint should be applied as much as possible.*

*2 Reference is made to IACS requirement M 24 - "Requirements concerning use of crude oil or slop as fuel for tanker boilers".*

*(Unified Interpretation - MSC/Circ.1120)*

#### **10.4.5 Vent and overflow arrangements**

10.4.5.1 The air vent and overflow pipes for all oil tanks should be arranged so that oil cannot overflow into a machinery space where there is a risk of fire. The overflow from one tank should be to another tank containing the same grade of oil, finally leading to an overflow tank. The air and overflow pipes from this tank should be led to the open deck and fitted with **corrosion resistant flame screens** at the **vent outlets**. The overflow tank should be fitted with a level alarm which operates when the tank is about one quarter full. Air pipes from oil tanks should also be led to the open deck and fitted with **corrosion resistant flame screens** at the **vent outlets**.

10.4.5.2 Position of air pipe outlets (SOLAS II-2 Regs. 4.2.2.4 and 4.2.3.1)

*Air pipes from oil fuel tanks or heated lubricating oil tanks should be led to a safe position on the open deck. They should not terminate in any place where a risk of ignition is present. Air pipes from unheated lubricating oil (including hydraulic oil) tanks may terminate in the machinery space, provided that the open ends are so situated that*

*issuing oil cannot come into contact with electrical equipment or heated surfaces.*

*(Unified Interpretation - MSC/Circ.1120)*

*Air pipes from oil fuel tanks should be led to a safe position on the open deck.*

*Air pipes from lubricating oil storage tanks may terminate in the machinery space, provided that the open ends are so situated that issuing oil cannot come into contact with electrical equipment or heated surfaces.*

*Any overflow pipe should have a sectional area of at least 1,25 times that of the filling pipe and should be led to an overflow tank of adequate capacity or to a storage tank having space reserved for overflow purposes.*

*An alarm device should be provided to give warning when the oil reaches a predetermined level in the tank, or alternatively, a sight glass should be provided in the overflow pipe to indicate when any tank is overflowing. Such sight glasses should be placed on vertical pipes only and in readily visible positions.*

*(IACS Unified Requirement F 35)*

#### 10.4.5.3 Interpretation of SOLAS II-2 Regs. 4.2.2 and 4.2.5.2

*Oil fuel in storage tanks should not to be heated to temperatures within 10°C below the flash point of the fuel oil, except that where oil fuel in service tanks, settling tanks and any other tanks in supply system is heated the following arrangements should be provided:*

- the length of the vent pipes from such tanks and/or a cooling device is sufficient for cooling the vapours to below 60°C, or the outlet of the vent pipes is located 3m away from a source of ignition;*
- the vent pipes are fitted with flame screens;*
- there are no openings from the vapour space of the fuel tanks into machinery spaces (bolted manholes are acceptable) ;*
- enclosed spaces are not located directly over such fuel tanks, except for vented cofferdams ;*
- electrical equipment is not fitted in the vapour space of the tanks, unless it is certified to be intrinsically safe.*

*(IACS Unified Requirement F 35)*

#### **10.4.6 Sounding arrangements**

10.4.6.1 Sounding arrangements and oil level indicators should be of types which will not permit the escape of oil if they are damaged, nor should oil escape if the tank is overfilled. The use of gauges, which require the lower

part of the tank to be pierced, is not allowed in passenger vessels, and it is preferred that their use is also avoided on cargo ships.

#### 10.4.6.2 Interpretation of SOLAS II-2 Reg. 4.2.2.3.5.1

*Short sounding pipes may be used for tanks other than double bottom tanks without the additional closed level gauge provided an overflow system is fitted.*

*(IACS Unified Requirement F 35)*

#### 10.4.6.3 Interpretation of SOLAS II-2 Reg. 4.2.2.3

*Level switches may be used below the tank top provided they are contained in a steel enclosure or other enclosures not capable of being destroyed by fire.*

*(IACS Unified Requirement F 35)*

### 10.4.7 Thermometer fitting

Where thermometers are required to measure the temperature in oil pipes, etc., they should be placed in suitable permanent pockets so that damage to the thermometer, or its removal, does not allow oil to escape.

### 10.4.8 Heated surfaces

10.4.8.1 Interpretation of SOLAS II-2 Reg. 4.2.2.5.3 and MSN 1699 Sch 8 para. 14:

*Spray shields should be fitted around flanged joints, flanged bonnets and any other flanged or threaded connections in fuel oil piping systems under pressure exceeding 0.18 N/mm<sup>2</sup> which are located above or near units of high temperature, including boilers, steam pipes, exhaust manifolds, silencers or other equipment required to be insulated by SOLAS regulation II-2/4.2.2.6.1.*

*(Unified Interpretation - MSC/Circ.1083)*

10.4.8.2 Interpretation of SOLAS II-2 Reg. 4.4.3 - Surface protection of insulation

*The fire insulation in such spaces can be covered by metal sheets (not perforated) or by vapour barrier glass cloth accurately sealed at the joint.*

*(Unified Interpretation - MSC/Circ.1120)*

10.4.8.3 The effective insulation of heated surfaces, particularly the exhaust systems and exposed indicator cocks of main and auxiliary diesel engines, is required by SOLAS II-2 Reg. 4.2.2.6.1, so that the surface temperature is below 220°C, the auto-ignition temperature of any oil which might come into contact with them. This insulation should be provided with readily removable sections around joints, flanges, etc., to allow access for normal maintenance.

## 10.5 Arrangements for oxygen/acetylene equipment

10.5.1 Reference should be made to Chapter 23 of the Code of Safe Working Practices for Merchant Seamen with regard to hot work and the use of oxygen/acetylene equipment, and to Chapter 16 with regard to permit to work (PTW) systems. Operational dangers are highlighted in MSN 957 and MGN 310.

10.5.2 Permanent piping systems for oxygen/acetylene may be accepted, subject to them being designed by competent suppliers, having regard to agreed codes of practice and to the following requirements:

- .1 acetylene pipes should be adequately constructed of steel. It should be noted that when acetylene comes into contact with copper, or copper alloys with more than 70% Cu – it forms an explosive compound called Copper Acetylide. Oxygen pipes should be constructed of suitable material having regard to the gas velocity and pressure envisaged;
- .2 if two or more cylinders of each gas are carried, then separate storage rooms should be provided;
- .3 storage rooms should be constructed of steel, be well ventilated and open on to the open deck;
- .4 cylinder securing devices should be capable of quick and easy release, so that in the event of fire the cylinders can be removed quickly;
- .5 suitable pressure gauges and regulators should be fitted;
- .6 prominent and permanent "NO SMOKING - DANGER GAS CYLINDERS" signs should be displayed at gas storage rooms.

10.5.3 Where possible, no electrical equipment should be installed in acetylene stores however, when unavoidable, SOLAS II-1 Reg. 45.10 allows equipment certified safe for acetylene atmospheres.

## 10.6 Fire blankets

10.6.1 Unless other standards are specifically required, fire blankets supplied to meet regulations or the recommendations of the Code of Safe Working Practices, may be of light duty type and meet the requirements of BS EN 1869: 1997. The minimum size should be 1.8 m x 1.2 metres. Smaller blankets may be accepted when additional to regulation requirements.

## 10.7 Special requirements for boiler and machinery spaces

### 10.7.1 Roof-fired boilers

10.7.1.1 As roof-fired boilers present particular fire hazards, the surveyor conducting the first and subsequent surveys should be satisfied that:

- (a) there are adequate coamings and, where necessary, screens around the oil burners to prevent the spread of oil;
- (b) the space surrounded by the coamings is adequately drained;
- (c) the oil burner platform and surrounds are painted a light colour;
- (d) the oil burner platform is adequately lit;
- (e) there are sufficient fire appliances ready to hand to tackle a fire on the burner platform; and
- (f) there is a means of quickly shutting off the supply of fuel to the oil burners from a position not likely to be cut off by a fire near the burners.

### 10.7.2 Coamings

10.7.2.1 Coamings are necessary in the machinery spaces to prevent the spread of oil should there be a leak. The coamings should be not less than 150 mm in height where the breadth of the area over which the oil fuel may spread is not more than 3 m, and not less than 300 mm in height where the breadth is 3 m and over.

10.7.2.3 Where drains are fitted from boiler flats they should be led to an oily bilge at a lower level, but due regard should be paid to the possibility of the spread of fire through such a drain. A suitable trap may be desirable in certain cases.

### 10.7.3 Precautions against oil leakages

10.7.3.1 The requirements for jacketed high-pressure fuel delivery piping between the high-pressure fuel pumps and fuel injectors for various vessel classes are given below.

10.7.3.2 Surveyors should note that MSC Resolution 201(81) revised the application of SOLAS II-2 Reg. 15, so that "Paragraphs 2.9 to 2.12 of this regulation apply to ships constructed on or after 01 February 1992, except that the references to paragraphs 2.10 and 2.11 in paragraphs 3 and 4 apply to ships constructed on or after 01 July 1998". Similar relaxations can be accepted for non SOLAS ships. It is expected that all ships which originally complied with the requirements, will continue to maintain this higher standard of safety, however, ships constructed before 01 February 1992, which are found not to comply with those requirements, may be considered to be in compliance with SOLAS. Operators of such ships can be recommended to consider the benefits of complying with the fitting of suitable sheathed fuel lines, as far as reasonably practicable.

10.7.3.3 Under the Merchant Shipping and Fishing Vessels (Health & Safety at Work) Regulations, employers have duties to ensure the health and safety of seafarers. Therefore, it is recommended that a risk assessment should be carried out and, where practicable, measures should be taken to control any risk of fire from all fuel lines.

*Passenger ships on international voyages irrespective of size and cargo ships of 500 GT and over*

10.7.3.4 Ships constructed on or after 01 February 1992, (also see [10.7.3.2](#)): Must comply in accordance with SOLAS 1994 Amendments, II-2 Regs. 15, 2.9 to 2.12 for main engines, auxiliary engines and emergency generators, except diesel fire pumps or lifeboat engines. For this application (requiring sheathing, leak tank and alarms), a high-pressure fuel line is intended to mean where dynamic working pressures are of 20 bar (290 psi) or greater.

10.7.3.5 Ships constructed on or after 01 July 2002: Must comply in accordance with SOLAS 2000 Amendments, II-2 Regs. 4.2.2.5.2, 4.2.2.5.3 and 4.2.2.6.1.

*EU Directive passenger vessels of classes B, C & D*

10.7.3.6 New ships constructed on or after 01 July 1998: All main engines, auxiliary engines and emergency generators, except diesel fire pumps or lifeboat engines must comply in accordance with Directive 2010/36/EC, Annex I, Chapter II-2, Part A, paragraphs 10.9 to 10.11. For existing class B ships having engines of 375 kW (500 hp) or less, where an engine manufacturer is unable to supply a jacketed high-pressure fuel piping system, paragraph [10.7.3.9](#) below may be applied to attending MCA surveyors' satisfaction.

*Passenger vessels operating solely on categorised waters*

10.7.3.7 For existing vessels built under MSN 1699 (M), all main engines, auxiliary engines and emergency generators, except diesel fire pumps or lifeboat engines, having a power output of 375 kW (500 hp) and over must comply with Schedule 8, paragraphs 11-14.

10.7.3.8 For new vessels built under MSN 1823, all main engines, auxiliary engines and emergency generators, except diesel fire pumps or lifeboat engines, having an output of 375 kW (500 hp) or above must comply with paragraph 7.5.3.2, i.e. a jacketed piping system is required for the high-pressure fuel lines.

10.7.3.9 For new and existing vessels built under MSN 1699 or MSN 1823 all main engines, auxiliary engines and emergency generators, except diesel fire pumps or lifeboat engines, having a power output of 375kW (500 hp) or less must comply with the requirements for engines of 375 kW (500 hp) and over. In exceptional cases, e.g. where an engine manufacturer is unable to supply a jacketed high-pressure fuel piping system, an equivalent level of safety, such as IACS Unified Interpretation SC 189 - see [10.7.3.11](#) below, may be accepted to the attending MCA surveyor's satisfaction, taking into account the following:-

- If an engine under 375 kW (500 hp) is designed so that there are no surfaces having a temperature exceeding 220°C, and this can be verified by acceptable evidence/inspection, then an enclosure to prevent spray from a damaged high-pressure fuel line is not necessarily required. When approving such an installation, care should also be taken to ensure that there is no other equipment in the machinery space that may be a source of ignition if impinged by a fuel spray, e.g. electric motors, switches, etc.
- It should be documented in the ship's CM file number 21\_12 the measures taken to prevent a fuel spray impinging on a hot surface.

#### *All other vessels*

10.7.3.10 It is recommended these vessels comply, as far as reasonably practicable.

10.7.3.11 For new ships with high pressure oil fuel delivery lines on small engines:

#### *1. Application*

*1.1 This interpretation applies to ships constructed before 1 July 1998.*

*1.2 The requirements of SOLAS regulation II-2/15.2.9 and 15.2.12 are applicable to internal combustion engines installed in any area on board ships irrespective of service and location. These requirements do not apply to gas turbines.*

*1.3 Engines having a single cylinder, multi-cylinder engines having separate fuel pumps and those having multiple fuel injection pump units are included.*

1.4 For the purpose of these regulations lifeboat engines are excluded.

2. Suitable enclosure

2.1 For engines of less than 375 kW where an enclosure is fitted, the enclosure is to have a similar function to jacketed pipes i.e., prevent spray from a damaged injector pipe impinging on a hot surface.

2.2 The enclosure is to completely surround the injection pipes except that existing "cold" engine surfaces may be considered as part of the enclosure.

2.3 All engine parts within the enclosure are to have a surface temperature not exceeding 220°C when the engine is running at its maximum rating.

2.4 The enclosure is to have sufficient strength and cover area to resist the effects of high pressure spray from a failed fuel pipe in service, prevent hot parts from being sprayed and restrict the area that can be reached by leaked fuel. Where the enclosure is not of metallic construction, it is to be made of non-combustible, non oil-absorbing material.

2.5 Screening by the use of reinforced tapes is not acceptable as a suitable enclosure.

2.6 Where leaked oil can reach hot surfaces, suitable drainage arrangements are to be fitted to enable rapid passage of leaked oil to a safe location which may be a drain tank. Leaked fuel flow onto "cold" engine surfaces can be accepted, provided that it is prevented from leaking onto hot surfaces by means of screens or other arrangements.

2.7 Where the enclosure has penetrations to accommodate high pressure fittings, the penetrations are to be a close fit to prevent leakage.

(IACS Unified Interpretation SC 189)

#### **10.7.4 Lubricating oil systems**

10.7.4.1 Lubricating oil and other flammable oil system arrangements —  
Retroactive application of SOLAS II-2 Reg. 4.2.3 and 4.2.4 (II-2 Regs. 15.3 and 15.4 of SOLAS 2001 Edition)

SOLAS regulations II-2/15.2.10 and 15.2.11 (SOLAS 2001 Edition) are not intended to apply to lubricating oil and other flammable oil system arrangements on ships constructed before 1 July 1998.

(IACS Unified Interpretation SC 177)

## **10.8 Means for stopping machinery, shutting off oil fuel suction pipes, closing of openings and smoke release arrangements**

10.8.1 SI 1998 No. 1012 (Fire Protection: Large Ships) Regulation 47, SI 1998 No. 1011 (Fire Protection: Small Ships) Regulation 38 and SOLAS II-2 Regs. 4 & 5 contain the requirements for the means of stopping machinery, shutting off oil fuel suction pipes, closing of openings and smoke release arrangements.

### **10.8.2 Closing of openings - fire integrity**

In respect of closing of openings to the machinery spaces, it is assumed that both the boundaries of the spaces and the means for closing any opening in them are of steel. Where this is not so, or alternative proposals are made, details should be referred to Headquarters.

### **10.8.3 Ventilation systems**

10.8.3.1 The inlets and exhausts of every mechanical and natural ventilation system should have readily accessible means by which they can be closed in the event of fire within the space.

*In machinery spaces of category A, controls to close off ventilation ducts and pipes should be installed with due regard to the hot gases produced by a fire in the space concerned.*

*(Unified Interpretations - MSC/Circ.1120)*

10.8.3.2 Ventilation by fan coil units (SOLAS II-2 Regs. 5.2.1.3 and II-2/7.9.3)

*Interpretations:*

*The fan in a cabin HVAC temperature control unit is not considered to be a ventilation fan as addressed in Reg.II-2/5.2.1.3 and Reg.II-2/7.9.3, if it is not capable of supplying outside air to the cabin when the power ventilation is shut down.*

*(IACS Unified Interpretation SC 148)*

10.8.3.3 Surveyors should ensure that accesses to cargo spaces are capable of being individually and effectively closed.

10.8.3.4 Arrangement of exhaust fans for smoke extraction systems for passenger ship atriums (SOLAS II-2 Reg. 8.5):

*The application of this regulation does not imply the arrangement of additional exhaust fans other than those normally dedicated to the space considered, if these latter fans are of sufficient size to meet the required capacity.*

*(Unified Interpretations - MSC/Circ.1120)*

10.8.3.5 Interpretation of closing device for ventilation of battery rooms (SOLAS II-2 Reg. 5.2.1.1)

*Battery room ventilators are to be fitted with a means of closing whenever:*

- i) The battery room does not open directly onto an exposed deck.*
- ii) The ventilation opening for the battery room is required to be fitted with a closing device according to the Load Line Convention (i.e. the height of the opening does not extend to more than 4.5 m (14.8 feet) above the deck for position 1 or to more than 2.3 m (7.5 feet) above the deck in position 2; or*
- iii) The battery room is fitted with a fixed gas fire extinguishing system.*

*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", is to be provided at the closing device to mitigate the possibility of inadvertent closing (IACS Unified Interpretation SC 240)*

#### 10.8.4 Remote means of control

10.8.4.1 Controls required for the closure of certain oil fuel suction valves, closing of openings, stopping of ventilation and forced draft fans, etc., should be centralised as far as is reasonable and practicable. The controls for oil fuel suction valves should not be grouped together in an arrangement whereby testing the operation of the valves will 'shut-down' the entire ships machinery.

10.8.4.2 Interpretation of SOLAS II-2 Reg. 5.2.2.3 in respect of oil fuel or lubricating oil tank valves:

*Controls required by this regulation should also be provided from the compartment itself.*

*(IACS Unified Requirement F 35)*

10.8.4.3 In respect of oil fuel suction valves, means should preferably be provided at the remote station to show when the closure of the valve has been initiated. Where the means for the remote closing of oil valves is by extended spindle, no special fire protection need be fitted, provided no low melting point (< 800°C) materials are used. Otherwise, and where the means of closing is electric, pneumatic or hydraulic, the operating system should be capable of withstanding the appropriate fire test. The source of power to affect the closure of such power operated systems should be located outside the space in which the valves are situated. Where hydraulic or pneumatic operated valves are fitted, the capacity of any reservoir should be sufficient to ensure it is capable of closing all remotely operated valves in the system without the need for 'topping-up' the reservoir.

10.8.4.4 SOLAS II-2 Reg. 4.2.2.3.4 does not require quick closing valves on tanks under 500 litres. On non-SOLAS ships quick closing valves are to be fitted on oil fuel tanks of any size.

#### 10.8.4.5 Material of oil fuel pipe valves:

*For valves, fitted to oil fuel tanks and which are under static pressure, steel or modular cast iron may be accepted. However, ordinary cast iron valves may be used in piping systems where the design pressure is lower than 7 bar and the design temperature is below 60°C.*

*(Unified Interpretation - MSC/Circ. 847)*

#### 10.8.4.6 Controls for remote operation of the valve for emergency generator fuel tank

*The wording "separate location" does not mean separate spaces.*

*(Unified Interpretations - MSC/Circular.1120)*

10.8.4.7 **It should be** ensured that the emergency generator fuel valve is not accidentally tripped **when** operating the engine room **remote closing oil valves**. The same principle would apply if a quick closing valve is fitted to the emergency fire pump.

#### 10.8.4.8 Arrangements for other flammable oils (SOLAS II-2 Reg. 4.2.4)

*The second sentence of regulation 4.2.4 is not applicable to hydraulic valves and cylinders located on weather decks, in tanks, cofferdams, or void spaces.*

*(Unified Interpretations - MSC/Circular.1120)*

10.8.4.9 Pull wire arrangements for closing oil fuel suction valves are not recommended, and should not be fitted in new ships because the wire may stretch unduly in a fire. However, arrangements incorporating only a short length of wire may be considered on their merits. Where permitted, the wire should be of steel without a fibre core.

10.8.4.10 Power operated means for the closure of openings should, if they are the only means, be treated in a similar manner to power operated means provided for the closure of oil fuel valves (paragraph [10.8.4.3](#) refers).

10.8.4.11 The remote controls for stopping ventilation fans, serving accommodation spaces, should be extended to include remote stops for fans used in conjunction with air conditioning units, and any controls for operating the re-circulation of air should be capable of being rapidly put into the non-recirculation mode. This is to enable the units to be rapidly stopped from the centralised position to prevent circulation of smoke throughout the accommodation.

## **10.9 Waste receptacles**

Interpretation of SOLAS II-2 Reg. 4.4.2:

*This regulation is not intended to preclude the use of containers constructed of combustible materials in galleys, pantries, bars, garbage*

*handling or storage spaces and incinerator rooms provided they are intended purely for the carriage of wet waste, glass bottles and metal cans and are suitably marked.*

*(Unified Interpretation - MSC/Circ.1120)*

## **10.10 Protection of Vehicle, Special Category and Ro-Ro Spaces**

Information regarding the carriage of gas cylinders in motor vehicles, boats, caravans and other vehicles where the gas is used solely in connection with its operation or business can be found in MGN 340 (M) - International Maritime Dangerous Goods (IMDG) Code and Cargoes Carried in Cargo Transport Units and MGN 341 (M) - Ro-Ro Ships Vehicle Decks - Accidents to Personnel, Passenger Access and the Carriage of Motor Vehicles.

<b>Author</b>	Allan Greenland	<b>Branch</b>	Marine Technology
<b>Approved by</b>	Katy Ware	<b>Branch</b>	Marine Technology
<b>Authorised by</b>	Paul Coley	<b>Branch</b>	DMS Seafarers & Ships