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**RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS****Part S SHIPS CARRYING DANGEROUS CHEMICALS IN BULK****Chapter 1 GENERAL****1.1 General****1.1.1 Application\***

1 The requirements of this Part apply to ships carrying dangerous chemicals in bulk intended to be registered and classed with the Society (hereinafter referred to as a “ship” in this Part). The term “dangerous chemicals” includes products shown below (1) and (2) and **Table S17.1** having an absolute vapour pressure not exceeding 0.28 MPa at a temperature of 37.8°C, except oil petroleum products or other similar flammable products.

- (1) Products having significant fire hazards in excess of those of petroleum products and similar flammable products.
- (2) Products having significant hazards in addition to or other than flammability.

2 For ships to be classed for restricted service and ships not provided with propulsive machinery, the requirements may be modified as appropriate.

3 Hull, machinery and equipment of a ship intended to carry dangerous chemicals are to comply with the followings in addition to those of this Part.

- (1) For ships having double hull structure and length of 150 m or above intended for the carrying a cargo or part cargo of oil in bulk: **Part CSR-B&T**

In this case, “length of ship” is as defined in **1.1.2-5(1), Part A**.

- (2) For ships intended for the carriage of liquid cargoes in tanks integrated to their hull structures, except ships defined in (1): **Part 2-7, Part C**
- (3) For ships intended for the carriage of flammable liquid: **2.1.1** and **14.2, Part 2-7, Part C** and **Chapter 14, Part D**

4 As for hull, machinery and equipment specified in this Part, the requirements in other Parts are not to apply.

5 Where a ship is intended to carry products covered by this Part and those covered by **Part N** simultaneously or alternately, the ship is to comply with requirements of both Parts as appropriate to the products carried, except where the requirements of this Part are to take precedence when a ship is designed and constructed to carry exclusively products to comply with the requirements of this Part, including those marked with an asterisk(\*) in column “a” of **Table N19.1, Chapter 19, Part N**.

**1.1.2 Equivalency**

The construction, equipment, etc. which do not fall under the provisions of this Part but is considered to be equivalent to those required in this Part will be accepted by the Society.

**1.2 Definition of Hazards****1.2.1 General**

Cargoes intended to be carried by a ship are to be clarified as to hazards specified in the following **1.2.2** to **1.2.5**.

**1.2.2 Health Hazard (With reference to IBC Code 1.2.2)**

The “health hazard” means the hazards defined by the one of the following (1) to (3).

- (1) corrosive effects on the skin in the liquid state;
- (2) acute toxic effect, taking into account values of;

LD50 oral: a dose which is lethal to 50% of the test subjects when administered orally;

*LD50* dermal: a dose which is lethal to 50% of the test subjects when administered to the skin;

*LC50* inhalation: the concentration which is lethal by inhalation to 50% of the test subjects.

- (3) other health effects such as carcinogenicity and sensitization.

### **1.2.3 Reactivity Hazard (With reference to IBC Code 1.2.3)**

The “reactivity hazard” means the hazards defined by reactivity with the following.

- (1) other products
- (2) water
- (3) air
- (4) the product itself (including polymerization)

### **1.2.4 Fire Hazard (With reference to IBC Code 1.2.1)**

The “fire hazard” means the hazard defined by flashpoint, explosive/flammability limits (range) and autoignition temperature of the chemical.

### **1.2.5 Marine Pollution Hazard (With reference to IBC Code 1.2.4)**

The “marine pollution hazard” means the hazards defined by the one of the following (1) to (6).

- (1) bioaccumulation;
- (2) lack of ready biodegradability;
- (3) acute toxicity to aquatic organisms;
- (4) chronic toxicity to aquatic organisms;
- (5) long term human health effects;
- (6) physical properties resulting in the product floating or sinking and so adversely affecting marine life.

## **1.3 Definitions**

### **1.3.1 Definitions (With reference to IBC Code 1.3)\***

The following definitions (1) to (33) in this part unless expressly provided otherwise.

- (1) “Accommodation spaces” mean those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, barber shops, pantries containing no cooking appliances and similar spaces. “Public spaces” are those portions of the accommodation spaces which are used for halls, dining rooms, lounges and similar permanently enclosed spaces.
- (2) “Administration” means the government of the state whose flag the ship is entitled to fly.
- (3) “Boiling point” means the temperature at which a product exhibits a vapour pressure equal to the atmospheric pressure.
- (4) “Breadth (*B*)” means the maximum breadth of the ship, measured amidships to the moulded line of the frame in a ship with a metal shell and to the outer surface of the hull in a ship with a shell of any other material. The breadth (*B*) is to be measured in metres (m).
- (5) “Cargo area” means that part of the ship which contains cargo tanks, slop tanks, cargo pump rooms including pump rooms, cofferdams, ballast or void spaces adjacent to tanks or slop tanks and also deck areas throughout the entire length and breadth of the part of the ship over the above-mentioned spaces. Where independent tanks are installed in hold spaces, cofferdams, ballast or void spaces at the after end of the aftermost hold space or at the forward end of the forwardmost hold space are excluded from the cargo area.
- (6) “Cargo pump room” means a space containing pumps and their accessories for the handling of products covered by this part.
- (7) “Cargo service spaces” means spaces within the cargo area used for workshops, lockers and store-rooms of more than 2 m<sup>2</sup> in area, used for the cargo handling equipment.
- (8) “Cargo tank” means the envelope designed to contain the cargo.
- (9) “Chemical tanker” means a ship constructed or adapted and used for the carriage in bulk of any liquid product listed in [Table S17.1](#).
- (10) “Cofferdam” means the isolating space between two adjacent steel bulkheads or decks. This space may be a void space or a ballast space.
- (11) “Control stations” means those spaces in which the ship’s radio or main navigating equipment or emergency source of power

is located or where the fire recording or fire control equipment is centralized. This does not include spaces containing special fire-control equipment which can be most practically located in the cargo area.

- (12) “Dangerous chemicals” means any liquid chemicals designated as presenting a safety hazard, based on the safety criteria for assigning products to **Chapter 17**.
- (13) “Density” means the ratio of the mass to the volume of a product, expressed in terms of kilograms per cubic metre (kg/m<sup>3</sup>). This applies to liquids, gases and vapours.
- (14) “Explosive/Flammability limits (range)” means the conditions defining the state of fuel-oxidant mixture at which application of an adequately strong external ignition source is only just capable of producing flammability in a given test apparatus.
- (15) “Flashpoint” means the temperature in degrees celsius (°C) at which a product will give off enough flammable vapour to be ignited. Values given in this part are “closed cup test” determined by an approved flashpoint apparatus.
- (16) “Gas-freeing” means the process where a portable or fixed ventilation system is used to introduce fresh air into a tank in order to reduce the concentration of hazardous gases or vapours to a level safe for tank entry.
- (17) “Hold space” means the space enclosed by the ship’s structure in which an independent cargo tank is situated.
- (18) “Independent” means that a piping or venting system, for example, is in no way connected to another system and that there are no provisions available for the potential connection to other systems.
- (19) *Length (L)* means 96 % of the total length on a waterline at 85 % of the least moulded depth measured from the top of the keel, or the length from the foreside of the stem to the axis of the rudder stock on that waterline, if that be greater. In ships designed with a rake of keel, the waterline on which this length is measured is to be parallel to the designed waterline. The length (*L*) is to be measured in metres (m).
- (20) “Machinery Spaces” means those spaces as defined **3.2.30, Part R of the Rules**.
- (21) “*MARPOL 73/78*” means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto and by the Protocol of 1997, as amended.
- (22) “Noxious liquid substance” means any substance indicated in the “Pollution Category” column of **Chapter 17** or **18** of this part, the current *MEPC.2/Circ.* or provisionally assessed under the provisions of regulation 6.3 of *MARPOL* Annex II as falling into categories X, Y or Z.
- (23) “Oil fuel unit” means the equipment as defined in **3.2.34, Part R of the Rules**.
- (24) “Permeability” of space means the ratio of the volume within that space which is assumed to be occupied by water to the total volume of that space.
- (25) “Port Administration” means the appropriate authority of the country in the port of which the ship is loading or unloading.
- (26) “Pump room” means a space, located in the cargo area, containing pumps and other accessories for the handling of ballast and oil fuel.
- (27) “Purging” means the introduction of inert gas into a tank which is already in an inert condition with the object of further reducing the oxygen content; and/or reducing the existing hydrocarbon or other flammable vapours content to a level below which combustion cannot be supported if air is subsequently introduced into the tank.
- (28) “Reference temperature” means the temperature at which the vapour pressure of the cargo corresponds to the set pressure of the pressure-relief valve.
- (29) “Separate” means that a cargo piping system or cargo vent system, for example, is not connected to another cargo piping or cargo vent system. This separation may be achieved by the use of design or operational methods. Operational methods are not to be used within a cargo tank and are to consist of one of the following types:
  - (a) removing spool pieces or valves and blanking the pipe end; or
  - (b) arrangement of two spectacle flanges in series with provisions for detecting leakage into the pipe between the two spectacle flanges.
- (30) “Service Spaces” means those spaces as defined **3.2.45, Part R of the Rules**.
- (31) “Vapour pressure” means the equilibrium pressure of the saturated vapour above the liquid expressed in *Pa* absolute at a specified temperature.
- (32) “Void space” means an enclosed space in the cargo area external to a cargo tank, other than a hold space, ballast space, oil fuel tank, cargo pump room, pump room, or any space in normal use by personal.
- (33) “*IBC Code*” means the “International Code for a Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk”.

## Chapter 2 SHIP SURVIVAL CAPABILITY AND LOCATION OF CARGO TANKS

### 2.1 General (*IBC Code 2.1*)

#### 2.1.1 General\*

Ships subject to this Part are to survive the normal effects of flooding following assumed hull damage caused by some external force. In addition, to safeguard the ship and the environment, the cargo tanks of certain types of ships are to be protected from penetration in the case of minor damage to the ship resulting, for example, from contact with a jetty or tug, and given a measure of protection from damage in the case of collision or stranding, by locating them at specified minimum distances inboard from the ship's shell plating. Both the damage to be assumed and the proximity of the cargo tanks to the ship's shell are to be dependent upon the degree of hazard presented by the products to be carried.

#### 2.1.2 Type of Ships

Ships are to be designed to one of the following standards:

- (1) A type I ship is a chemical tanker intended to transport products listed [Table S17.1](#) with very severe environmental and safety hazards which require maximum preventive measures to preclude an escape of such cargo.
- (2) A type II ship is a chemical tanker intended to transport products listed [Table S17.1](#) with appreciably severe environmental and safety hazards which require significant preventive measures to preclude an escape of such cargo.
- (3) A type III ship is a chemical tanker intended to transport products listed [Table S17.1](#) with sufficiently severe environmental and safety hazards which require a moderate degree of containment to increase survival capability in a damaged condition.

Thus a type I ship is a chemical tanker intended for the transportation of products considered to present the greatest overall hazard and type II and type III for products of progressively lesser hazards. Accordingly, a type I ship is to be designed to survive the most severe standard of damage and its cargo tanks are to be located at the maximum prescribed distance inboard from the shell plating.

#### 2.1.3 Ship Type Required for Individual Products

The ship type required for individual products is indicated in column "e" in [Table S17.1](#).

#### 2.1.4 Requirements for Ship Intended to Carry more than One Product

If a ship is intended to carry more than one product listed in [Table S17.1](#), the standard of damage is to correspond to that product having the most stringent ship type requirement. The requirements for the location of individual cargo tanks, however, are those for ship types related to the respective products intended to be carried.

### 2.2 Solid Ballast and Stability Information

#### 2.2.1 Solid Ballast (*IBC Code 2.2.4*)\*

Solid ballast is not normally to be used in double bottom spaces in the cargo area. Where, however, because of stability considerations, the fitting of solid ballast in such spaces becomes unavoidable, then its disposition is to be governed by the need to ensure that the impact loads resulting from bottom damage are not directly transmitted to the cargo tank structure.

#### 2.2.2 Stability Information (With reference to *IBC Code 2.2.5*)

The information booklet specified in [2.1.7-8, Part B](#) is to contain a summary of the ship's survival capabilities.

#### 2.2.3 Stability Instruments (With reference to *IBC Code 2.2.6 and 2.2.7*)\*

1 All ships subject to this Part are to be fitted with a stability instrument, capable of verifying compliance with intact and damage stability requirements, approved by the Administration having regard to the performance standards recommended by the *IMO*.

2 Notwithstanding the requirement in the preceding -1, a stability instrument installed on a ship at the beginning stage of construction before 1 January 2016 need not be replaced provided it is capable of verifying compliance with intact and damage stability to the satisfaction of the Administration.

3 In cases where the stability instrument is fitted in accordance with the requirements in the preceding -1 or -2, a document of approval for the stability instrument issued by the Administration is to be maintained on board.

4 The Administration may waive the requirements in the preceding -1 to -3 for the following ships, provided the procedures employed for intact and damage stability verification maintain the same degree of safety, as being loaded in accordance with the approved conditions:

- (1) Ships which are on a dedicated service, with a limited number of permutations of loading such that all anticipated conditions have been approved in the stability information provided in accordance with the requirements in 2.2.2;
- (2) Ships where stability verification is made remotely by a means approved by the Administration;
- (3) Ships which are loaded within an approved range of loading conditions; or
- (4) Ships at the beginning stage of construction before 1 January 2016 provided with approved limiting *KG/GM* curves covering all applicable intact and damage stability requirements.

## 2.3 Shiplside Discharges below the Freeboard Deck

### 2.3.1 Shiplside Discharges (IBC Code 2.3.1)\*

The provision and control of valves fitted to discharges led through the shell from spaces below the freeboard deck or from within the superstructures and deckhouses on the freeboard deck fitted with weathertight doors are to comply with the requirements of 13.4, Part D except that the choice of valves is to be limited to:

- (1) one automatic non-return valve with a positive means of closing from above the freeboard deck; or
- (2) where the vertical distance from the summer load waterline to the inboard end of the discharge pipe exceeds  $0.01L_f$ , two automatic non-return valves without positive means of closing, provided that the inboard valve is always accessible for examination under service conditions.

### 2.3.2 Non-return Valves (IBC Code 2.3.3)

The automatic non-return valves referred to in 2.3.1(1) and (2) are to be of a type acceptable to the Society and to be fully effective in preventing admission of water into the ship, taking into account the sinkage, trim and heel in survival requirements in 2.9.

## 2.4 Conditions of Loading (IBC Code 2.4)

### 2.4.1 Conditions of Loading

Damage survival capability are to be investigated for all anticipated conditions of loading and variations in draught and trim. The survival requirements need not be applied to the ship when in the ballast condition (the cargo content of small independent purge tanks on deck need not be taken into account when assessing the ballast condition.), provided that any cargo retained on board is solely used for cooling, circulation or fuelling purposes.

## 2.5 Damage Assumptions (IBC Code 2.5)

### 2.5.1 Assumed Maximum Extent of Damage\*

- 1 The assumed maximum extent of damage in the shiplside is to be in accordance with Table S2.1.
- 2 The assumed maximum extent of damage in the bottom is to be in accordance with Table S2.2.

Table S2.1 Side Damage

Direction	Extent of Damage
(1) Longitudinal extent:	$1/3L_f^{2/3}$ or 14.5 m, whichever is less
(2) Transverse extent:	B / 5 or 11.5 m, whichever is less (measured inboard from the ship's side at right angles to the centerline at the level of the summer load line)
(3) Vertical extent:	upwards without limit (from the moulded line of the bottom shell plating at centreline)



Table S2.2 Bottom Damage

Direction	Extent of Damage	
	For $0.3L_f$ from the forward perpendicular of the ship	Any other part of the ship
(1) Longitudinal extent:	$1/3L_f^{2/3}$ or 14.5 m, whichever is less	$1/3L_f^{2/3}$ or 5 m, whichever is less
(2) Transverse extent:	$B/6$ or 10 m, whichever is less	$B/6$ or 5 m, whichever is less
(3) Vertical extent:	$B/15$ or 6 m, whichever is less (measured from the moulded line of the bottom shell plating at centreline(see 2.6.2).)	$B/15$ or 6 m, whichever is less (measured from the moulded line of the bottom shell plating at centreline(see 2.6.2).)

### 2.5.2 Other Damage

If any damage of a lesser extent than the maximum damage specified in 2.5.1 would result in a more severe condition, such damage is to be considered.

## 2.6 Location of Cargo Tanks (IBC Code 2.6)

### 2.6.1 Location of Cargo Tanks\*

Cargo tanks are to be located at the following distances inboard:

- (1) Type I ships: from the side shell plating not less than the transverse extent of damage specified in Table S2.1 and from the moulded line of the bottom shell plating at centreline not less than the vertical extent of damage specified in Table S2.2 and nowhere less than 760 mm from the shell plating. This requirement does not apply to the tanks for diluted slops arising from tank washing.
- (2) Type II ships: from the moulded line of the bottom shell plating at centreline not less than the vertical extent of damage specified in Table S2.2 and nowhere less than 760 mm from the shell plating. This requirement does not apply to the tanks for diluted slops arising from tank washing.
- (3) Type III ships: no requirement.

### 2.6.2 Suction Well Installed in Cargo Tanks\*

Except for type I ships, suction wells installed in cargo tanks may protrude into the vertical extent of bottom damage specified in Table S2.2 provided that such wells are as small as practicable and the protrusion below the inner bottom plating does not exceed 25% of the depth of the double bottom or 350 mm, whichever is less. Where there is no double bottom, the protrusion of the suction well of independent tanks below the upper limit of bottom damage is not to exceed 350 mm. Suction wells installed in accordance with this paragraph may be ignored in determining the compartments affected by damage.

## 2.7 Flooding Assumptions (IBC Code 2.7)

### 2.7.1 General

The requirements of 2.9 are to be confirmed by calculations which take into consideration the design characteristics of the ship; the arrangements, configuration and contents of the damaged compartments; the distribution, relative densities and the free surface effects of liquids; and the draught and trim for all conditions of loading.

### 2.7.2 Permeability of Spaces

The permeability of spaces assumed to be damaged are to be in accordance with Table S2.3.

Table S2.3 Permeability

Space	Permeability
Appropriated to stores	0.60
Occupied by accommodation	0.95
Occupied by machinery	0.85
Voids	0.95
Intended for consumable liquids	0 to 0.95*
Intended for other liquids	0 to 0.95*

Note:

\* The permeability of partially filled compartments is to be consistent with the amount of liquid carried in compartment

### 2.7.3 Liquids Contained in Tank

Wherever damage penetrates a tank containing liquids it is to be assumed that the contents are completely lost from that compartment and replaced by salt water up to the level of the final plane of equilibrium.

### 2.7.4 Watertight Division within the Maximum Extent of Damage

Every watertight division within the maximum extent of damage defined in 2.5.1 and considered to have sustained damage in positions given in 2.8.1 is to be assumed to be penetrated. Where damage less than the maximum is being considered in accordance with 2.5.2, only watertight divisions or combinations of watertight divisions within the envelope of such lesser damage are to be assumed to be penetrated.

### 2.7.5 Unsymmetrical Flooding

The ship is to be so designed as to keep unsymmetrical flooding to the minimum consistent with efficient arrangements.

### 2.7.6 Equalization Arrangements\*

Equalization arrangements requiring mechanical aids such as valves or cross-leveling pipes, if fitted, are not to be considered for the purpose of reducing an angle of heel or attaining the minimum range of residual stability to meet the requirements of 2.9 and sufficient residual stability is to be maintained during all stages where equalization is used. Spaces which are linked by ducts of large cross-sectional area may be considered to be common.

### 2.7.7 Arrangement for Prevention of Progressive Flooding

If pipes, ducts, trunks or tunnels are situated within the assumed extent of damage penetration, as defined in 2.5, arrangements are to be such that progressive flooding cannot thereby extend to compartments other than those assumed to be flooded for each case of damage.

### 2.7.8 Buoyancy of Superstructure\*

The buoyancy of any superstructure directly above the side damage is to be disregarded. The unflooded parts of superstructures beyond the extent of damage, however, may be taken into consideration provided that:

- (1) they are separated from the damaged space by watertight divisions and the requirements of 2.9.2(1) in respect of these intact spaces are complied with; and
- (2) openings in such divisions are capable of being closed by remotely operated sliding watertight doors and unprotected openings are not immersed within the minimum range of residual stability required in 2.9.3(1), however the immersion of any other openings capable of being closed weathertight may be permitted.

## 2.8 Standard of Damage

### 2.8.1 Assumed Extent of Damage (IBC Code 2.8.1)\*

Ships are to be capable of surviving the damage indicated in 2.5 with the flooding assumptions in 2.7 to the extent determined by the ship's type according to the following standards:

- (1) A type I ship is to be assumed to sustain damage anywhere in its length;
- (2) A type II ship of more than 150 m in length is to be assumed to sustain damage anywhere in its length;
- (3) A type II ship of 150 m in length or less is to be assumed to sustain damage anywhere in its length except involving either of the bulkheads bounding a machinery space located aft;

- (4) A type III ship of more than 225 *m* in length is to be assumed to sustain damage anywhere in its length;
- (5) A type III ship of 125 *m* in length or more but not exceeding 225 *m* in length is to be assumed to sustain damage anywhere in its length except involving either of the bulkheads bounding a machinery space located aft;
- (6) A type III ship below 125 *m* in length is to be assumed to sustain damage anywhere in its length except involving damage to the machinery space when located aft. However, the ability to survive the flooding of the machinery space is to be considered by the Society.

#### **2.8.2 Alternative Measures (With reference to IBC Code 2.8.2)\***

In the case of small type II and type III ships which do not comply in all respects with the appropriate requirements of [2.8.1\(3\)](#) and [2.8.1\(6\)](#), special dispensations may only be considered by the Society provided that alternative measures can be taken which maintain the same degree of safety.

### **2.9 Survival Requirements (IBC Code 2.9)**

#### **2.9.1 General**

Ships are to be capable of surviving the assumed damage specified in [2.5](#) to the standard provided in [2.8](#) in a condition of stable equilibrium and are to satisfy [2.9.1](#) and [2.9.2](#).

#### **2.9.2 Stability Criteria at Any Stage of Flooding\***

In any stage of flooding, the requirements are to be according to followings.

- (1) the waterline, taking into account sinkage, heel and trim, are to be below the lower edge of any opening through which progressive flooding or downflooding may take place. Such openings are to include air pipes and openings which are closed by means of weathertight doors or hatch covers and may exclude those openings closed by means of watertight manhole covers and watertight flush scuttles, small watertight cargo tank hatch covers which maintain the high integrity of the deck, remotely operated watertight sliding doors, hinged watertight access doors with open/closed indication locally and at the navigation bridge of the quick-acting or single-action type that are normally closed at sea, hinged watertight doors that are permanently closed at sea, and sidescuttles of the non-opening type;
- (2) the maximum angle of heel due to unsymmetrical flooding is not to exceed 25 degrees, except that this angle may be increased up to 30 degrees if no deck immersion occurs;
- (3) the residual stability during intermediate stages of flooding is to be to the satisfaction of the Society. However, it is never to be significantly less than that required by [2.9.3](#).

#### **2.9.3 Stability Criteria at Final Equilibrium after Flooding\***

At final equilibrium after flooding, the requirements are to be according to followings.

- (1) the righting lever curve is to have a minimum range of 20 degrees beyond the position of equilibrium in association with a maximum residual righting lever of at least 0.1 *m* within the 20 degrees range; the area under the curve within this range is not to be less than 0.0175 *m·rad*. Unprotected openings are not to be immersed within this range unless the space concerned is assumed to be flooded. Within this range, the immersion of any of the openings listed in [2.9.2\(1\)](#) and other openings capable of being closed weathertight may be permitted; and
- (2) the emergency source of power is to be capable of operating.

## Chapter 3 SHIP ARRANGEMENTS

### 3.1 Cargo Segregation (*IBC Code 3.1*)

#### 3.1.1 Segregation of Tanks Containing Cargo or Residues of Cargo\*

Unless expressly provided otherwise, tanks containing cargo or residues of cargo subject to this Part are to be segregated from accommodation, service and machinery spaces and from drinking water and stores for human consumption by means of a cofferdam, void space, cargo pump room, pump room, empty tank, oil fuel tank or other similar space.

#### 3.1.2 Segregation of Cargoes which React with Other Cargoes\*

Cargoes, residues of cargoes or mixtures containing cargoes, which react in a hazardous manner with other cargoes, residues or mixtures, are to be in accordance with followings.

- (1) To be segregated from such other cargoes by means of a cofferdam, void space, cargo pump room, pump room, empty tank, or tank containing a mutually compatible cargo;
- (2) To have separate pumping and piping systems which should not pass through other cargo tanks containing such cargoes, unless encased in a tunnel; and
- (3) To have separate tank venting systems

#### 3.1.3 Cargo Piping\*

Cargo piping is not to pass through any accommodation, service or machinery space other than cargo pump rooms or pump rooms.

#### 3.1.4 Tanks for Loaded Cargoes

Cargoes subject to this Part are not to be carried in either the fore or aft peak tank.

#### 3.1.5 Location of Fuel Tanks\*

In cases where fuel tanks are located in the cargo area of ships carrying cargoes having a flashpoint not exceeding 60°C or ships carrying toxic cargoes, the following (1) to (5) are to apply. The “cargo tank block” referred to in the following (1) and (2) means the part of the ship extending from the aft bulkhead of the aft most cargo or slop tank to the forward bulkhead of the forward most cargo or slop tank, extending to the full depth and beam of the ship, but not including the area above the deck of the cargo or slop tank.

- (1) Fuel tanks located with a common boundary to cargo or slop tanks are not to be situated within nor extend partly into the cargo tank block.
- (2) Fuel tanks specified in (1) above may be situated aft and/or forward of the cargo tank block.
- (3) Fuel tanks may be accepted when located as independent tanks on open deck in the cargo area subject to spill and fire safety considerations.
- (4) The arrangement of independent fuel tanks and associated fuel piping systems, including the pumps, can be as for fuel tanks and associated fuel piping systems located in the machinery spaces.
- (5) For electrical equipment, the requirements to hazardous area classification specified in [Part H](#) are to be met.

### 3.2 Accommodation, Service and Machinery Spaces and Control Stations (*IBC Code 3.2*)

#### 3.2.1 Arrangement\*

No accommodation or service spaces or control stations are to be located within the cargo area except over a cargo pump room recess or pump room recess that complies with [4.5.1](#) and [4.5.2-1](#) through [-4](#), [Part R](#) and no cargo or slop tank is to be aft of the forward end of any accommodation.

#### 3.2.2 Location of Air Intakes and Openings\*

In order to guard against the danger of hazardous vapours, due consideration is to be given to the location of air intakes and openings into accommodation, service and machinery spaces and control stations in relation to cargo piping and cargo vent systems.

#### 3.2.3 Entrances, Air Inlets and Openings to Accommodation, Service and Machinery Spaces and Control Stations\*

Entrances, air inlets and openings to accommodation, service and machinery spaces and control stations are not to face the

cargo area. They are to be located on the end bulkhead not facing the cargo area and/or on the outboard side of the superstructure or deckhouse at a distance of at least 4% of the length ( $L$ ) of the ship but not less than 3m from the end of the superstructure or deckhouse facing the cargo area. This distance, however, need not exceed 5m. No doors are to be permitted within the limits mentioned above, except that doors to those spaces not having access to accommodation and service spaces and control stations, such as cargo control stations and store-rooms may be fitted. Where such doors are fitted, the boundaries of the space are to be insulated to “A-60” standard. Bolted plates for removal of machinery may be fitted within the limits specified above. Wheelhouse doors and wheelhouse windows may be located within the limits specified above so long as they are so designed that a rapid and efficient gas and vapour tightening of the wheelhouse can be ensured. Windows and sidescuttles facing the cargo area and on the sides of the superstructures and deckhouses within the limits specified above are to be of the fixed (non-opening) type. Such sidescuttles in the first tier on the main deck are to be fitted with inside covers of steel or equivalent material.

### **3.3 Cargo Pump Rooms (IBC Code 3.3)**

#### **3.3.1 Arrangement of Cargo Pump Rooms\***

Cargo pump rooms are to be so arranged as to ensure:

- (1) unrestricted passage at all times from any ladder platform and from the floor; and
- (2) unrestricted access to all valves necessary for cargo handling for a person wearing the required personnel protective equipment.

#### **3.3.2 Permanent Arrangement for Hoisting an Injured Person\***

Permanent arrangements are to be made for hoisting an injured person with a rescue line while avoiding any projecting obstacles.

#### **3.3.3 Installation of Guard Rails**

Guard railings are to be installed on all ladders and platforms.

#### **3.3.4 Access Ladders\***

Normal access ladders are not to be fitted vertical and should incorporate platforms at suitable intervals.

#### **3.3.5 Means for Discharging Cargoes and Bilges\***

Means are to be provided to deal with drainage and any possible leakage from cargo pumps and valves in cargo pump rooms. The bilge system serving the cargo pump room should be operable from outside the cargo pump room. One or more slop tanks for storage of contaminated bilge water or tank washings are to be provided. A shore connection with a standard coupling or other facilities are to be provided for transferring contaminated liquids to on-shore reception facilities.

#### **3.3.6 Pump Discharge Pressure Gauges\***

Pump discharge pressure gauges are to be provided outside the cargo pump room.

#### **3.3.7 Gas Tightness of Shafting Passing through Bulkhead or Deck\***

Where machinery is driven by shafting passing through a bulkhead or deck, gastight seals with efficient lubrication or other means of ensuring the permanence of the gas seal are to be fitted in way of the bulkhead or deck.

### **3.4 Access to Spaces in the Cargo Area (IBC Code 3.4)**

#### **3.4.1 General\***

Access to cofferdams, ballast tanks, cargo tanks and other spaces in the cargo area are to be direct from the open deck and such as to ensure their complete inspection. Access to double bottom spaces may be through a cargo pump room, pump room, deep cofferdam, pipe tunnel or similar compartments, subject to consideration of ventilation aspects.

#### **3.4.2 Minimum Clear Opening for Access through Horizontal Openings\***

For access through horizontal openings, hatches or manholes, the dimensions are to be sufficient to allow a person wearing a self-contained air breathing apparatus and protective equipment to ascend or descend any ladder without obstruction and also to provide a clear opening to facilitate the hoisting of an injured person from the bottom of the space. The minimum clear opening is to be not less than 600 mm by 600 mm.

#### **3.4.3 Minimum Clear Opening for Access through Vertical Openings and Arrangement of Vertical Openings\***

For access through vertical openings, or manholes providing passage through the length and breadth of the space, the minimum clear opening should be not less than 600 mm by 800 mm at a height of not more than 600 mm from the bottom shell plating unless

gratings or other footholds are provided.

#### **3.4.4 Smaller Dimensions of Opening\***

Smaller dimensions may be approved by the Society in special circumstances, if the ability to traverse such openings or to remove an injured person can be proved to the satisfaction of the Society.

### **3.5 Bilge and Ballast Arrangements (IBC Code 3.5)**

#### **3.5.1 General\***

Pumps, ballast lines, vent lines and other similar equipment serving permanent ballast tanks are to be independent of similar equipment serving cargo tanks and of cargo tanks themselves. Discharge arrangements for permanent ballast tanks sited immediately adjacent to cargo tanks are to be outside machinery spaces and accommodation spaces. Filling arrangements may be in the machinery spaces provided that such arrangements ensure filling from tank deck level and non-return valves are fitted.

#### **3.5.2 Filling of Ballast in Cargo Tanks\***

Filling of ballast in cargo tanks may be arranged from deck level by pumps serving permanent ballast tanks, provided that the filling line has no permanent connection to cargo tanks or piping and that non-return valves are fitted.

#### **3.5.3 Bilge Pumping Arrangements for Cargo Area\***

Bilge pumping arrangements for cargo pump rooms, pump rooms, void spaces, slop tanks, double bottom tanks and similar spaces are to be situated entirely within the cargo area except for void spaces, double bottom tanks and ballast tanks where such spaces are separated from tanks containing cargo or residues of cargo by a double bulkhead.

### **3.6 Pump and Pipeline Identification (IBC Code 3.6)**

#### **3.6.1 Pump and Pipeline Identification\***

Provisions are to be made for the distinctive marking of pumps, valves and pipelines to identify the service and tanks which they serve.

### **3.7 Bow or Stern Loading and Unloading Arrangements**

#### **3.7.1 General (IBC Code 3.7.1)\***

Cargo piping may be fitted to permit bow or stern loading and unloading. Portable arrangements are not to be permitted.

#### **3.7.2 Bow and Stern Loading and Unloading Arrangements (With reference to IBC Code 3.7.2)**

Bow or stern loading and unloading lines are not to be capable of being used for the transfer of products required to be carried in type I ships. Bow and stern loading and unloading lines are not to be capable of being used for the transfer of cargoes emitting toxic vapours required to comply with [15.12.1](#), unless specifically approved by the Society.

#### **3.7.3 Piping Requirements (IBC Code 3.7.3)**

In addition to [5.1](#), the following provisions apply:

- (1) The piping outside the cargo area is to be fitted at least 760mm inboard on the open deck. Such piping is to be clearly identified and fitted with a shutoff valve at its connection to the cargo piping system within the cargo area. At this location, it is also to be capable of being separated by means of a removable spool piece and blank flanges when not in use.
- (2) The shore connection is to be fitted with a shutoff valve and a blank flange.
- (3) The piping is to be full penetration butt welded, and fully radio-graphed. Flange connections in the piping are to only be permitted within the cargo area and at the shore connection.
- (4) Spray shields are to be provided at the connections specified in (1) as well as collecting trays of sufficient capacity with means for the disposal of drainage.
- (5) The piping is to be self-draining to the cargo area and preferably into a cargo tank. Alternative arrangements for draining the piping may be accepted by the Society.
- (6) Arrangements are to be made to allow such piping to be purged after use and maintained gas-safe when not in use. The vent pipes connected with the purge should be located in the cargo area. The relevant connections to the piping should be provided

with a shutoff valve and blank flange.

### **3.7.4 Entrances, Air Inlets and Openings to Accommodation, Service and Machinery Spaces and Control Stations (With reference to IBC Code 3.7.4)\***

Entrances, air inlets and openings to accommodation, service and machinery spaces and control stations are not to face the cargo shore connection location of bow or stern loading and unloading arrangements. They are to be located on the outboard side of the superstructure or deckhouse at a distance of at least 4% of the length of the ship but not less than 3 m from the end of the house facing the cargo shore connection location of the bow or stern loading and unloading arrangements. This distance, however, need not exceed 5 m. Sidescuttles facing the shore connection location and on the sides of the superstructure or deckhouse within the distance mentioned above are to be of the fixed (non-opening) type. In addition, during the use of the bow or stern loading and unloading arrangements, all doors, ports and other openings on the corresponding superstructure or deckhouse side are to be capable of being kept closed. Where, in the case of small ships, compliance with 3.2.3 and this paragraph is not possible, the Society may approve relaxations from the above requirements.

### **3.7.5 Shield of Air Pipes and Other Openings (IBC Code 3.7.5)**

Air pipes and other openings to enclosed spaces not listed in 3.7.4 are to be shielded from any spray which may come from a burst hose or connection.

### **3.7.6 Escape Routes (IBC Code 3.7.6)\***

Escape routes are not to terminate within the coamings required by 3.7.7 or within a distance of 3m beyond the coamings.

### **3.7.7 Coamings for Spills (IBC Code 3.7.7)\***

Continuous coamings of suitable height are to be fitted to keep any spills on deck and away from the accommodation and service areas.

### **3.7.8 Electrical Equipment within Coamings for Spills (IBC Code 3.7.8)**

Electrical equipment within the coamings required by 3.7.7 or within a distance of 3m beyond the coamings is to be in accordance with the requirements of Chapter 10.

### **3.7.9 Fire-fighting Arrangements (IBC Code 3.7.9)\***

Fire-fighting arrangements for the bow or stern loading and unloading areas are to be in accordance with 11.3.16.

### **3.7.10 Other Requirements for Cargo Shore Connection (IBC Code 3.7.10)**

Means of communication between the cargo control station and the cargo shore connection location are to be provided and certified safe, if necessary. Provision should be made for the remote shutdown of cargo pumps from the cargo shore connection location.

## **3.8 Operational Requirements**

### **3.8.1 Application**

The provisions in 3.8 are not the conditions for maintenance of classification for which examinations are required but the conditions to be observed by the ship owner, ship master or other persons who may concern with the ship's operation.

### **3.8.2 Cargo Piping for Bow or Stern Loading/Unloading (IBC Code 3.7.2)**

Bow or stern loading and unloading lines should not be used for the transfer of products required to be carried in type I ships. Bow and stern loading and unloading lines should not be used for the transfer of cargoes emitting toxic vapours required to comply with 15.12.1, unless specifically approved by the Administration.

### **3.8.3 Entrance, Air Inlets and Openings to Accommodation, Service and Machinery Spaces and Control Stations (With reference to IBC Code 3.7.4)**

During the use of the bow or stern loading and unloading arrangements, all doors, ports and other openings on the corresponding superstructure or deckhouse side should be kept closed.

## Chapter 4 CARGO CONTAINMENT

### 4.1 Definitions (*IBC Code 4.1*)

#### 4.1.1 Independent Tank

“Independent tank” means a cargo containment envelope which is not contiguous with, or part of, the hull structure. An independent tank is built and installed so as to eliminate whenever possible (or in any event to minimize) its stressing as a result of stressing or motion of the adjacent hull structure. An independent tank is not essential to the structural completeness of the ship’s hull.

#### 4.1.2 Integral Tank

“Integral tank” means a cargo containment envelope which forms part of the ship’s hull and which may be stressed in the same manner and by the same loads which stress the contiguous hull structure and which is normally essential to the structural completeness of the ship’s hull.

#### 4.1.3 Gravity Tank

“Gravity tank” means a tank having a design pressure not greater than 0.07 MPa gauge at the top of the tank. A gravity tank may be independent or integral. A gravity tank is to be constructed and tested according to the standards of the Society taking account of the temperature of carriage and relative density of the cargo.

#### 4.1.4 Pressure Tank

“Pressure tank” means a tank having a design pressure greater than 0.07 MPa gauge. A pressure tank is to be an independent tank and should be of a configuration permitting the application of pressure vessel design criteria according to the standards of the Society.

### 4.2 Design and Construction

#### 4.2.1 General\*

Design and construction of integral gravity tanks, independent prismatic gravity tanks and independent pressure tanks are to be in accordance with the following requirements (1) to (5). Tanks of other types are subject to the special approval by the Society.

- (1) As for the assumed loads and stress on a cargo tank, the load in (a) and the combined applicable loads and stress in (b) to (g) are to be considered:
  - (a) Loads which affect on a tank during tank testing;
  - (b) Static load by cargo;
  - (c) Dynamic load by ship motion at sea;
  - (d) Designed set pressure of tank relief valves, if necessary;
  - (e) Stress which is induced in the hull structure, if necessary;
  - (f) Thermal stress, if necessary;
  - (g) Tank weight, external pressure and external loads on a tank, if necessary.
- (2) For cargo tanks to be partially loaded, special consideration is to be made to the effect of dynamic pressure induced by partially loaded cargo.
- (3) For cargo tanks intended to be loaded with cargoes having temperatures greatly different from the atmospheric temperature, special consideration is to be made to provide suitable means for preventing rapid increase in thermal stress. This can be achieved by providing with the arrangements for pre-heating or pre-cooling cargo tanks and their fittings and equipments.
- (4) For ships having a cargo tank of excessively large length or width, suitable means are to be provided to reduce additional dynamic pressure of cargoes induced by ship motion at sea. This can be achieved by providing the swash bulkhead.
- (5) For a cargo tank provided with inside lining or insulations, the proof with respect to the various properties of materials used, work procedures and detailed construction is to be submitted to ensure that they will satisfy the design performance when completed.



**4.2.2 Gravity Tank**

**1** The scantlings of the members of cargo tank are, in general, to be in accordance with the applicable provisions of **Part 2-7** and **Part 2-9, Part C** prescribed for cargo tank construction of oil tanker, considering the loads and stress provided in **4.2.1(1)**.

**2** Weldings of gravity tanks are to be in accordance with provisions of **Chapter 12, Part 2-7, Part C** where  $F3$  in **Table 12.1.2-1, Part 2-7, Part C** to be altered as  $F2$ .

**3** Independent prismatic gravity tank is to be in accordance with the following requirements **(1)** to **(4)** as well as **-1** and **-2**.

- (1) Supporting structures of independent prismatic gravity tanks are to be so constructed, being strong enough to withstand the tank weight and the load induced by ship's motion, that any excessive concentrated load does not develop on the ship's hull and the tanks.
- (2) Supporting structures of independent prismatic gravity tanks loaded with cargoes having temperatures greatly different from the atmospheric temperature, are to be built so as not to restrain expansion or contraction of the tanks due to temperature changes.
- (3) Means are to be provided for the tanks to prevent them from being shifted by ship's motion or collision. In addition, means are also to be provided to prevent the tanks from floating up when the compartment surrounding the tanks are flooded with water.
- (4) An independent prismatic gravity tank is to be built and installed so as to eliminate the possibility of development of excessive concentrated stresses, and their comers are to be rounded, unless approved otherwise by the Society.

**4.2.3 Pressure Tank**

**1** Pressure tanks are to at least comply with the requirements for Group II pressure vessels specified in **Chapter 10, Part D**, using a design pressure of 1.5 or more times of the sum of the pressure generated by the load specified in **4.2.1(1)(b)** and the pressure specified in **4.2.1(1)(d)**. Where the procedure for transfer of cargo by gas pressurization is used, the design pressure of a pressure tank is not to be less than 0.3 MPa.

**4.3 Tank Type Requirements for Individual Products (IBC Code 4.2)****4.3.1 Tank Type Requirements for Individual Products**

Requirements for both installation and design of tank types for individual products are shown in column "f" in **Table S17.1**.

## Chapter 5 CARGO TRANSFER

### 5.1 Piping Scantlings (IBC Code 5.1)

#### 5.1.1 Wall Thickness of Pipes

Subject to the conditions stated in 5.1.4 the wall thickness ( $t$ ) of pipes are not to be less than:

$$t = \frac{t_0 + b + c}{1 - \frac{a}{100}} \quad (mm)$$

where:

$t_0$ : theoretical thickness

$t_0$ :  $PD / (2Ke + P)$  (mm)

with

$P$ : design pressure (MPa) referred to in 5.1.2

$D$ : outside diameter (mm)

$K$ : allowable stress (N/mm<sup>2</sup>) referred to in 5.1.5

$e$ : efficiency factor equal to 1.0 for seamless pipes and for longitudinally or spirally welded pipes, delivered by approved manufactures of welded pipes, which are considered equivalent to seamless pipes when non-destructive testing on welds is carried out in accordance with the Society. In other cases an efficiency factor of less than 1.0 may be determined by the Society depending on the manufacturing process.

$b$ : allowance for bending (mm). The value of  $b$  is to be chosen so that the calculated stress in the bend, due to internal pressure only, does not exceed the allowable stress. Where such justification is not given,  $b$  is to be not less than:

$$b = \frac{Dt_0}{2.5\gamma} \quad (mm)$$

with

$\gamma$ : mean radius of the bend (mm)

$c$ : corrosion allowance acceptable to the Society (mm)

$a$ : negative manufacturing tolerance for thickness (%)

#### 5.1.2 Design Pressure of Piping System

The design pressure  $P$  in the formula for  $t_0$  in 5.1.1 is the maximum gauge pressure to which the system may be subjected in service, taking into account the highest set pressure on any relief valve on the system.

#### 5.1.3 Design Pressure of Piping System Not Protected by a Relief Valve

Piping and piping system components which are not protected by a relief valve, or which may be isolated from their relief valve, are to be designed for at least the greatest of:

- (1) for piping systems or components which may contain some liquid, the saturated vapour pressure at 45°C;
- (2) the pressure setting of the associated pump discharge relief valve;
- (3) the maximum possible total pressure head at the outlet of the associated pumps when a pump discharge relief valve is not installed.

#### 5.1.4 Minimum Design Pressure

The design pressure should not be less than 1MPa gauge except for open-ended lines where it is to be not less than 0.5 MPa gauge.

#### 5.1.5 Allowable Stress for Pipes

For pipes, the allowable stress to be considered in the formula for  $t_0$  in 5.1.1 is the lower of the following values:

$$\frac{R_m}{A} \quad \text{OR} \quad \frac{R_e}{B}$$

where:

$R_m$ : specified minimum tensile strength at ambient temperature (N/mm<sup>2</sup>)

$R_e$ : specified minimum yield stress at ambient temperature (N/mm<sup>2</sup>). If the stress-strain curve does not show a defined yield

stress, the 0.2% proof stress applies.

*A and B are to have values of at least  $A = 2.7$  and  $B = 1.8$*

#### **5.1.6 Design Standard for Piping\***

**1** The minimum wall thickness should be in accordance with **Table D12.6, Part D**.

**2** Where necessary for mechanical strength to prevent damage, collapse, excessive sag or buckling of pipes due to weight of pipes and content and to super-imposed loads from supports, ship deflection or other causes, the wall thickness is to be increased over that required by **5.1.1** or, if this is impracticable or would cause excessive local stresses, these loads are to be reduced, protected against or eliminated by other design methods.

**3** Flanges, valves and other fittings are to be to a standard acceptable to the Society, taking into account the design pressure required under **5.1.2**.

### **5.2 Piping Fabrication and Joining Details**

#### **5.2.1 Application (IBC Code 5.1.2)**

The requirements of this section apply to piping inside and outside the cargo tanks. However, the Society may accept relaxations from these requirements for open-ended piping and for piping inside cargo tanks except for cargo piping serving other cargo tanks.

#### **5.2.2 Joint of Cargo Piping (IBC Code 5.2.2)\***

Cargo piping is to be joined by welding except:

- (1) for approved connections to shutoff valves and expansion joints; and
- (2) for other exceptional joints specifically approved by the Society.

#### **5.2.3 Direct Connection of Pipes without Flanges (IBC Code 5.2.3)\***

Connection of pipes without flanges is to be as follows:

- (1) Butt welded joints with complete penetration at the root may be used in all applications.
- (2) Slip-on welded joints with sleeves and related welding having dimensions satisfactory to the Society are only to be used for pipes with an external diameter of 50 mm or less. This type of joint is not to be used when crevice corrosion is expected to occur.
- (3) Screwed connections acceptable to the Society are to only be used for accessory lines and instrumentation lines with external diameters of 25 mm or less.

#### **5.2.4 Flange Connections (IBC Code 5.3.1)**

Flanges are to be of the welded neck, slip-on or socket welded type. However, socket welded type flanges are not to be used in nominal size above 50 mm.

#### **5.2.5 Standards for Flanges (IBC Code 5.3.2)\***

Flanges are to comply with standards acceptable to the Society to their type, manufacture and test.

#### **5.2.6 Expansion Joints (IBC Code 5.2.4)\***

Expansion joints used in piping system are to be as follows:

- (1) Expansion loops or bends are to be provided.
- (2) Bellows may be specially considered by the Society in each case.
- (3) Slip joints are not to be used.

### **5.3 Welding of Piping System (IBC Code 5.2.5)**

#### **5.3.1 Welding, Post Weld Heat Treatment and Non-destructive Testing**

Welding, post weld heat treatment and non-destructive testing are to be performed in accordance with standards acceptable to the Society.

### **5.4 Test Requirements for Piping (IBC Code 5.4)**

#### **5.4.1 Application\***

The test requirements of this section apply to piping inside and outside cargo tanks. However, the Society may accept relaxations

from these requirements for piping inside cargo tanks and open-ended piping.

#### **5.4.2 Hydrostatic Test**

After assembly, each cargo piping system is to be subject to a hydrostatic test to at least 1.5 *times* the design pressure. When piping systems or parts of systems are completely manufactured and equipped with all fittings, the hydrostatic test may be conducted prior to installation aboard the ship. Joints welded on board are to be hydrostatically tested to at least 1.5 *times* the design pressure.

#### **5.4.3 Leak Test**

After assembly on board, each cargo piping system is to be tested for leaks to a pressure depending on the method applied.

### **5.5 Piping Arrangements (IBC Code 5.5)**

#### **5.5.1 General**

Cargo piping is not to be installed under deck between the outboard side of the cargo containment spaces and the skin of the ship unless clearances required for damage protection (*see* 2.6) are maintained; but such distances may be reduced where damage to the pipe would not cause release of cargo provided that the clearance required for inspection purposes is maintained.

#### **5.5.2 Cargo Piping under Deck\***

Cargo piping, located below the main deck, may run from the tank it serves and penetrate tank bulkheads or boundaries common to longitudinally or transversally adjacent cargo tanks, ballast tanks, empty tanks, pump rooms or cargo pump rooms provided that inside the tank it serves it is fitted with a stop valve operable from the weather deck and provided cargo compatibility is assured in the event of piping failure. As an exception, where a cargo tank is adjacent to a cargo pump room, the stop valve operable from the weather deck may be situated on the tank bulkhead on the cargo pump room side. As an exception, where a cargo tank is adjacent to a cargo pump room, the stop valve operable from the weather deck may be situated on the tank bulkhead on the cargo pump room side, provided an additional valve is fitted between the bulkhead valve and the cargo pump. The Society may, however, accept a totally enclosed hydraulically operated valve located outside the cargo tank, provided that the valve is:

- (1) designed to preclude the risk of leakage;
- (2) fitted on the bulkhead of the cargo tank which it serves;
- (3) suitably protected against mechanical damage;
- (4) fitted at a distance from the shell, as required for damage protection; and
- (5) operable from the weather deck.

#### **5.5.3 Stop Valve Installed in Cargo Piping**

In any cargo pump room where a pump serves more than one tank, a stop valve is to be fitted in the line to each tank.

#### **5.5.4 Pipe Tunnels**

Cargo piping installed in pipe tunnels is also to comply with the requirements of 5.5.1 and 5.5.2. Pipe tunnels are to satisfy all tank requirements for construction, location and ventilation and electrical hazard requirements. Cargo compatibility is to be assured in the event of a piping failure. The tunnel is not to have any other openings except to the weather deck and cargo pump room or pump room.

#### **5.5.5 Cargo Piping Passing through Bulkhead**

Cargo piping passing through bulkheads is to be so arranged as to preclude excessive stress at the bulkhead and is not to utilize flanges bolted through the bulkhead.

### **5.6 Cargo Transfer Control Systems (IBC Code 5.6)**

#### **5.6.1 General\***

For the purpose of adequately controlling the cargo, cargo transfer systems should be provided with:

- (1) one stop valve capable of being manually operated on each tank filling and discharge line, located near the tank penetration; if an individual deepwell pump is used to discharge the contents of a cargo tank, a stop valve is not required on the discharge line of that tank;
- (2) one stop valve at each cargo hose connection;
- (3) remote shutdown devices for all cargo pumps and similar equipment.

**5.6.2 Location of Controls**

The controls necessary during transfer or transport of cargoes covered by this Part other than in cargo pump rooms which have been dealt with elsewhere in this Part is not to be located below the weather deck.

**5.6.3 Additional Requirements**

For certain products additional cargo transfer control requirements are shown in column “o” in [Table S17.1](#).

**5.7 Ship's Cargo Hoses (IBC Code 5.7)****5.7.1 General\***

Liquid and vapour hoses used for cargo transfer are to be compatible with the cargo and suitable for the cargo temperature.

**5.7.2 Design Pressure**

Hoses subject to tank pressure or the discharge pressure of pumps are to be designed for a bursting pressure not less than 5 *times* the maximum pressure the hose will be subjected to during cargo transfer.

**5.7.3 Prototype Test**

Each new type of cargo hose, complete with end-fittings, is to be prototype-tested at a normal ambient temperature with 200 pressure cycles from zero to at least twice the specified maximum working pressure. After this cycle pressure test has been carried out, the prototype test is to demonstrate a bursting pressure of at least 5 *times* its specified maximum working pressure at the extreme service temperature. Hoses used for prototype testing are not to be used for cargo service. Thereafter, before being placed in service, each new length of cargo hose produced is to be hydrostatically tested at ambient temperature to a pressure not less than 1.5 *times* its specified maximum working pressure but not more than two-fifths of its bursting pressure. The hose is to be stencilled or otherwise marked with the date of testing, its specified maximum working pressure and, if used in services other than the ambient temperature services, its maximum and minimum service temperature, as applicable. The specified maximum working pressure is not to be less than 1 MPa gauge.

## **Chapter 6 MATERIALS OF CONSTRUCTION**

### **6.1 General**

#### **6.1.1 Structural Materials Used for Tank, Pipings and etc. (IBC Code 6.1)**

Structural materials used for tank construction, together with associated piping, pumps valves, vents and their jointing materials, are to be suitable at the temperature and pressure for the cargo to be carried to the satisfaction of the Society. Steel is assumed to be the normal material of construction.

#### **6.1.2 Considerations in Selecting the Material of Construction (IBC Code 6.2)**

Where applicable the following is to be taken into account in selecting the material of construction:

- (1) notch ductility at the operating temperature;
- (2) corrosive effect of the cargo; and
- (3) possibility of hazardous reactions between the cargo and the material of construction.

#### **6.1.3 Information for Materials of Construction (IBC Code 6.2)\***

Compatibility information for materials of construction is to be provided and available to the ship operator and/or master.

### **6.2 Operational Requirements**

#### **6.2.1 Application**

The provisions in this section are not the conditions for maintenance of classification for which examinations are required but the conditions to be observed by the ship owner, ship master or other persons who may concern with the ship's operation.

#### **6.2.2 Provision of Cargo Information (IBC Code 6.4)**

The shipper of the cargo is responsible for providing compatibility information to the ship operator and/or master. This must be done in a timely manner before transportation of the product. The cargo should be compatible with all materials of construction such that no damage to the integrity of the materials of construction is incurred and/or, no hazardous or potentially hazardous reaction is created.

## Chapter 7 CARGO TEMPERATURE CONTROL (IBC Code Chapter 7)

### 7.1 General

#### 7.1.1 General\*

When provided, any cargo heating or cooling systems are to be constructed, fitted and tested to the satisfaction of the Society. Materials used in the construction of temperature control systems are to be suitable for use with the product intended to be carried.

#### 7.1.2 Cargo Heating or Cooling Media

Heating or cooling media are to be of a type approved for use with the specific cargo. Consideration is to be given to the surface temperature of heating coils or ducts to avoid dangerous reactions from localized overheating or overcooling of cargo. (See also [15.13.6.](#))

#### 7.1.3 Valves for Heating or Cooling System\*

Heating or cooling systems are to be provided with valves to isolate the system for each tank and to allow manual regulation of flow.

#### 7.1.4 Maintenance of Pressure within Heating or Cooling System\*

In any heating or cooling system, means are to be provided to ensure that, when in any condition other than empty, a higher pressure can be maintained within the system than the maximum pressure head that could be exerted by the cargo tank contents on the system.

#### 7.1.5 Means for Measuring the Cargo Temperature\*

Means are to be provided for measuring the cargo temperature.

- (1) The means for measuring the cargo temperature are to be of restricted or closed type, respectively, when a restricted or closed gauging device is required for individual substances as shown in column “j” in [Table S17.1](#).
- (2) A restricted temperature measuring device is subject to the definition for a restricted gauging device in [13.1.1\(2\)](#), e.g. a portable thermometer lowered inside a gauge tube of the restricted type.
- (3) A closed temperature measuring device is subject to the definition for closed gauging device in [13.1.1\(3\)](#), e.g. a remote-reading thermometer of which the sensor is installed in the tank.
- (4) When overheating or overcooling could result in a dangerous condition, an alarm system which monitors the cargo temperature is to be provided. (See also operational requirements in [16.2.7.](#))

#### 7.1.6 Circuit Operated with Heating or Cooling Medium\*

When products for which [15.12](#), [15.12.1](#) or [15.12.3](#) are listed in column “o” in [Table S17.1](#) are being heated or cooled, the heating or cooling medium is to operate in a circuit:

- (1) which is independent of other ship’s services, except for another cargo heating or cooling system, and which does not enter the machinery space; or
- (2) which is external to the tank carrying toxic products; or
- (3) where the medium is sampled to check for the presence of cargo before it is recirculated to other services of the ship or into the machinery space. The sampling equipment is to be located within the cargo area and be capable of detecting the presence of any toxic cargo being heated or cooled. Where this method is used, the coil return is to be tested not only at the commencement of heating or cooling of a toxic product, but also on the first occasion the coil is used subsequent to having carried an unheated or uncooled toxic cargo.

### 7.2 Additional Requirements

#### 7.2.1 Additional Requirements

For certain products, additional requirements contained in [Chapter 15](#) are shown in column “o” in [Table S17.1](#).

## Chapter 8 CARGO TANK VENTING AND GAS-FREEING ARRANGEMENTS

### 8.1 Cargo Tank Venting (*IBC Code 8.2*)

#### 8.1.1 Venting Systems (*IBC Code 8.2.1*)\*

All cargo tanks are to be provided with a venting system appropriate to the cargo being carried and these systems are to be independent of the air pipes and venting systems of all other compartments of the ship. Tank venting systems are to be designed so as to minimize the possibility of cargo vapour accumulating about the decks, entering accommodation, service and machinery spaces and control stations and in the case of flammable vapours entering or collecting in spaces or areas containing sources of ignition. Tank venting systems are to be arranged to prevent entrance of water into the cargo tanks and at the same time, vent outlets are to direct the vapour discharge upwards in the form of unimpeded jets.

#### 8.1.2 Provision for Drainage of Vent Lines (*IBC Code 8.2.2*)\*

The venting systems are to be connected to the top of each cargo tank and as far as practicable the cargo vent lines are to be self-draining back to the cargo tanks under all normal operational conditions of list and trim. Where it is necessary to drain venting systems above the level of any pressure/vacuum valve, capped or plugged drain cocks are to be provided.

#### 8.1.3 Provision to Protect Liquid Head Exceeding Design Head (*IBC Code 8.2.3*)\*

Provision is to be made to ensure that the liquid head in any tank does not exceed the design head of the tank. Suitable high-level alarms, overflow control systems or spill valves, together with gauging and tank filling procedures may be accepted for this purpose. Where the means of limiting cargo tank overpressure includes an automatic closing valve, the valve is to comply with the appropriate provisions of [15.19](#).

#### 8.1.4 Design Parameter of Venting Systems (*IBC Code 8.2.4*)\*

Tank venting systems are to be designed so as to ensure that neither pressure nor vacuum created in the cargo tanks during loading or unloading exceeds tank design parameters. The main factors to be considered in the sizing of a tank venting system are as follows:

- (1) design loading and unloading rate;
- (2) gas evolution during loading: this is to be taken account of by multiplying the maximum loading rate by a factor of at least 1.25;
- (3) density of the cargo vapour mixture;
- (4) pressure loss in vent piping and across valves and fittings;
- (5) pressure/vacuum settings of relief devices.

#### 8.1.5 Materials of Vent Piping (*IBC Code 8.2.5*)

Tank vent piping connected to cargo tanks of corrosion resistant material, or to tanks which are lined or coated to handle special cargoes as required by the Rules, is to be similarly lined or coated or constructed of corrosion resistant material.

#### 8.1.6 Information for the Master (*IBC Code 8.2.6*)

Information related to the maximum permissible loading and unloading rates for each tank or group of tanks consistent with design of the venting systems is to be provided to the ship's master.

### 8.2 Types of Tank Venting Systems (*IBC Code 8.3*)

#### 8.2.1 Open Tank Venting System (*IBC Code 8.3.1*)\*

An open tank venting system is a system which offers no restriction except for friction losses to the free flow of cargo vapours to and from the cargo tanks during normal operations. An open venting system may consist of individual vents from each tank, or such individual vents may be combined into a common header or headers, with due regard to cargo segregation. In no case shut-off valves are to be fitted either to the individual vents or to the header.

#### 8.2.2 Controlled Tank Venting System (*IBC Code 8.3.2*)\*

A controlled tank venting system is a system in which pressure and vacuum relief valves or pressure/vacuum valves are fitted to each tank to limit the pressure or vacuum in the tank. A controlled venting system may consist of individual vents from each tank or



such individual vents on the pressure side only as may be combined into a common header or headers with due regard to cargo segregation. In no case shut-off valves are to be fitted either above or below pressure or vacuum relief valves or pressure/vacuum valves. Provision may be made for bypassing a pressure or vacuum or pressure/vacuum valve under certain operating conditions provided that the requirement of 8.2.6 is maintained and that there is suitable indication to show whether or not the valve is bypassed.

### **8.2.3 Secondary Means for Controlled Tank Venting Systems (IBC Code 8.3.3)\***

Controlled tank venting systems are to consist of a primary and a secondary means of allowing full flow relief of vapour to prevent over-pressure or under-pressure in the event of failure of one means. Alternatively, the secondary means may consist of pressure sensors fitted in each tank with a monitoring system in the ship's cargo control room or position from which cargo operations are normally carried out. Such monitoring equipment is to also provide an alarm facility which is activated by detection of over-pressure or under-pressure conditions within a tank.

### **8.2.4 Position of Vent Outlet of a Controlled Venting System (IBC Code 8.3.4)\***

The position of vent outlets of a controlled tank venting system is to be arranged:

- (1) at a height of not less than 6 m above the weather deck or above a raised walkway if fitted within 4m of the raised walkway;
- (2) at a distance of at least 10 m measured horizontally from the nearest air intake or opening to accommodation, service and machinery spaces and ignition sources.

### **8.2.5 Height of Vent Outlet Fitted with High Velocity Venting Valves (IBC Code 8.3.5)**

The vent outlet height referred to in 8.2.4(1) may be reduced to 3 m above the deck or a raised walkway, as applicable, provided that high velocity venting valves of a type approved by the Society directing the vapour/air mixture upwards in an unimpeded jets with an exit velocity of at least 30 m/s are fitted.

### **8.2.6 Devices to Prevent the Passage of Flame (IBC Code 8.3.6)\***

Controlled tank venting systems fitted to tanks to be used for cargoes having a flashpoint not exceeding 60°C are to be provided with devices to prevent the passage of flame into the cargo tanks. The design, testing and locating of the devices are to comply with the requirements specified in 14.4, Part D of the Rules.

### **8.2.7 Blockage of Venting Systems (IBC Code 8.3.7)\***

In designing venting systems and in the selection of devices to prevent the passage of flame for incorporation into the tank venting system, due attention is to be paid to the possibility of the blockage of these systems and fittings by, for example, the freezing of cargo vapour, polymer build up, atmospheric dust or icing up in adverse weather conditions. In this context it is to be noted that flame arresters and flame screens are more susceptible to blockage. Provisions are to be made such that the system and fittings may be inspected, operationally checked, cleaned and renewed as applicable.

### **8.2.8 Means of Stoppage in Vent Lines (IBC Code 8.3.8)**

Requirements in 8.2.1 and 8.2.2 to the use of shut-off valves in the venting lines are to be applied to all other means of stoppage including spectacle blanks and blank flanges.

## **8.3 Venting Requirements for Individual Products (IBC Code 8.4)**

### **8.3.1 Venting Requirements for Individual Products (IBC Code 8.4)**

Venting requirements for individual products are shown in column "g" and additional requirements in column "o" in the table of Chapter 17.

## **8.4 Cargo Tank Purging (IBC Code 8.5)**

### **8.4.1 Cargo Tank Purging**

When the application of inert gas is required by 11.1.1, before gas-freeing, the cargo tanks are to be purged with inert gas through outlet pipes with cross-sectional area such that an exit velocity of at least 20 m/s can be maintained when any three tanks are being simultaneously supplied with inert gas. The outlets are to extend not less than 2 m above the deck level. Purging is to continue until the concentration of hydrocarbon or other flammable vapours in the cargo tanks has been reduced to less than 2% by volume.

## **8.5 Cargo Tank Gas-freeing (IBC Code 8.6)**

### **8.5.1 The Arrangements for Gas-freeing (IBC Code 8.6.1)**

The arrangements for gas-freeing cargo tanks used for cargoes other than those for which open venting is permitted are to be such as to minimize the hazards due to the dispersal of flammable or toxic vapours in the atmosphere and to flammable or toxic vapour mixtures in a cargo tank. Accordingly, the gas-freeing system is to be such as to ensure that vapour is initially discharged:

- (1) through the vent outlets specified in 8.2.4 and 8.2.5; or
- (2) through outlets at least 2 m above the cargo tank deck level with a vertical efflux velocity of at least 30 m/s maintained during the gas-freeing operation; or
- (3) through outlets at least 2 m above the cargo tank deck level with a vertical efflux velocity of at least 20 m/s which are protected by suitable devices to prevent the passage of flame.

When the flammable vapour concentration at the outlets has been reduced to 30% of the lower flammable limit and in the case of a toxic product the vapour concentration does not present a significant health hazard, gas-freeing may thereafter be continued at cargo tank deck level.

### **8.5.2 The Outlets in the Gas-freeing System (IBC Code 8.6.2)**

The outlets referred to in 8.5.1(2) and 8.5.1(3) may be fixed or portable pipes.

### **8.5.3 Design of Gas-freeing System (IBC Code 8.6.3)\***

In designing a gas-freeing system in conformity with 8.5.1 particularly in order to achieve the required exit velocities of 8.5.1(2) and 8.5.1(3), due consideration is to be given to the following:

- (1) materials of construction of system;
- (2) time to gas-free;
- (3) flow characteristics of fans to be used;
- (4) the pressure losses created by ducting, piping, cargo tank inlets and outlets;
- (5) the pressure achievable in the fan driving medium (e.g. water or compressed air);
- (6) the densities of the cargo vapour/air mixtures for the range of cargoes to be carried.

## Chapter 9 ENVIRONMENTAL CONTROL (*IBC Code Chapter 9*)

### 9.1 General

#### 9.1.1 General

Vapour spaces within cargo tanks and, in some cases, spaces surrounding cargo tanks may require to have specially controlled atmospheres.

#### 9.1.2 Types of Environmental Control

There are four different types of control for cargo tanks, as follows:

- (1) Inerting - by filling the cargo tank and associated piping systems and, where specified in [Chapter 15](#), the spaces surrounding the cargo tanks, with a gas or vapour which will not support combustion and which will not react with the cargo, and maintaining that condition.
- (2) Padding - by filling the cargo tank and associated piping systems with a liquid, gas or vapour which separates the cargo from the air, and maintaining that condition.
- (3) Drying - by filling the cargo tank and associated piping system with moisture-free gas or vapour with a dewpoint of  $-40^{\circ}\text{C}$  or below at atmospheric pressure, and maintaining that condition.
- (4) Ventilation - forced or natural.

#### 9.1.3 Inerting or Padding of Cargo Tanks\*

Where inerting or padding of cargo tanks is required by column “h” of [Chapter 17](#) in this Part:

- (1) An adequate supply of inert gas for use in filling and discharging the cargo tanks is to be carried or is to be manufactured on board unless a shore supply is available. In addition, sufficient inert gas is to be available on the ship to compensate for normal losses during transportation.
- (2) The inert gas system on board the ship is to be able to maintain a pressure of at least  $0.007\text{ MPa}$  gauge within the containment system at all times. In addition, the inert gas system is not to raise the cargo tank pressure to more than the tank’s relief valve setting.
- (3) Where padding is used, similar arrangements for supply of the padding medium are to be made as required for inert gas in (1) and (2).
- (4) Means are to be provided for monitoring ullage spaces containing a gas blanket to ensure that the correct atmosphere is being maintained.
- (5) Inerting or padding arrangements or both, where used with flammable cargoes, are to be such as to minimize the creation of static electricity during the admission of the inerting medium.

#### 9.1.4 Drying

Where drying is used and dry nitrogen is used as the medium, similar arrangements for supply of the drying agent are to be made to those required in [9.1.3](#). Where drying agents are used as the drying medium on all air inlets to the tank, sufficient medium is to be carried for the duration of the voyage, taking into consideration the diurnal temperature range and the expected humidity.

### 9.2 Environmental Control Requirements for Individual Products

#### 9.2.1 Environmental Control Requirements for Individual Products

The required types of environmental control for certain products are shown in column “h” in [Table S17.1](#).

## Chapter 10 ELECTRICAL INSTALLATIONS

### 10.1 General

#### 10.1.1 Application (With reference to *IBC Code 10.1.1*)

The provisions of this chapter are applicable to ships carrying cargoes which are inherently, or due to their reaction with other substances, flammable or corrosive to the electrical equipment.

#### 10.1.2 Risk of Fire and Explosion from Flammable Product (*IBC Code 10.1.2.1*)

Electrical installations are to be such as to minimize the risk of fire and explosion from flammable products.

#### 10.1.3 Particular Characteristics of the Materials (*IBC Code 10.1.2.2*)

Where the specific cargo is liable to damage the materials normally used in electrical apparatus, due consideration are to be given to the particular characteristics of the materials chosen for conductors, insulation, metal parts, etc. as far as necessary, these components are to be protected to prevent contact with gases or vapours liable to be encountered.

#### 10.1.4 Restriction of Electrical Equipment in Hazardous Areas (*IBC Code 10.1.4*)

Electrical equipment and cables are not to be installed in the hazardous areas specified in [4.2.3-2](#), [-4](#) and [-5](#), [Part H](#), unless it conforms to the requirements in [4.2.4](#), [Part H](#).

#### 10.1.5 Certified Safe Type Equipment (*IBC Code 10.1.5*)\*

Where electrical equipment is installed in hazardous areas as provided in [10.1.4](#), it is to be to the satisfaction of the Society, for operation in the flammable atmosphere concerned and to be approved one as the certified safe type.

#### 10.1.6 Substances Having a Flashpoint Exceeding 60°C (*IBC Code 10.1.6*)

For guidance, indication is given in column “*I*” in the [Table S17.1](#) whether the flashpoint of substance is excess of 60°C. In case of carrying heated cargo, carriage conditions might need to be established and requirements of [4.4.1](#) and [4.5.1](#), [Part H](#) are applied.

### 10.2 Bonding (Related to *IBC Code 10.2*)

#### 10.2.1 Bonding\*

**1** Independent cargo tanks are to be electrically bonded to the hull. All gasketed cargo pipe joints and hose connections are to be electrically bonded.

**2** In addition to [-1](#) above, cargo tanks and cargo piping systems are to comply with the requirements specified in [14.2.2-7](#), [Part D of the Rules](#) (in this case the term “cargo oil” is to be read as “cargo”).

### 10.3 Electrical Requirements for Individual Products (*IBC Code 10.3*)

#### 10.3.1 Electrical Requirements for Individual Products

Electrical requirements for individual products are to be in accordance with the requirement in column “*I*” in the [Table S17.1](#).

## Chapter 11 FIRE PROTECTION AND FIRE EXTINCTION

### 11.1 General (With reference to *IBC Code 11.1*)

#### 11.1.1 Application\*

1 The requirements for tankers in **Part R** and corresponding requirements in **Part D** are to apply to ships covered by this Part, irrespective of tonnage including ships of less than 500 *gross tonnes*, except those specified in (1) to (8) below.

- (1) **1.1.1** (except **1.1.1-2**), **10.8**, **10.9** and **Chapter 21, Part R** and **14.4, Part D** are not to apply; (2) **4.5.1-2, Part R** i.e. the requirements for location of the main cargo control station need not apply;
- (3) **10.2**, **10.4** and **10.5** (except **10.5.5**), **Part R** are to apply, as they would apply to cargo ships of 2,000 *gross tonnage* and over;
- (4) **10.5.5, Part R** is to apply to ships of 2,000 *gross tonnage* and over;
- (5) **11.3** is to apply in lieu of **10.8, Part R**;
- (6) **11.2** is to apply in lieu of **10.9, Part R**;
- (7) **4.5.10, Part R** is to apply to ships of 500 *gross tonnage* and over, replacing “hydrocarbon gases” by “flammable vapours” in **4.5.10, Part R**; and
- (8) **4.2.2(8)**, **13.3.3** and **13.4.7, Part R** are to apply to ships of 500 *gross tonnage* and over.

2 Where alternative and supplementary arrangements are provided to the satisfaction of the Society, the requirements in **Part R** need not apply to ships covered by this Part.

#### 11.1.2 Exemption from the Application of the Requirements

Notwithstanding the provisions of **11.1.1**, ships engaged solely in the carriage of products which are non-flammable (with entry *NF* in column “*i*” of the table of minimum requirements) are to comply with the requirements for fire protection and fire extinction specified in **Part R** (except **10.7**), except additional requirements for tankers, and need not comply with **11.2** and **11.3** in this chapter.

#### 11.1.3 Requirements for Ship Engaged Solely In the Carriage of Products with Flashpoint above 60°C

Ships engaged solely in the carriage of products with flashpoint above 60°C (entry “yes” in column “*i*” of the table of minimum requirements) may comply with **1.2.3-2, Part R** in lieu of the provisions of this chapter.

### 11.2 Cargo Pump Rooms (With reference to *IBC Code 11.2*)

#### 11.2.1 Fixed Fire-extinguishing System

The cargo pump room of any ship is to be provided with a carbon dioxide system as specified in **25.2.1** and **25.2.2, Part R**. A notice is to be exhibited at the controls stating that the system is only to be used for fire extinguishing and not for inerting purposes, due to the electrostatic ignition hazard. The alarms referred to in **25.2.1-3(2), Part R** are to be safe for use in a flammable cargo vapour/air mixture. For the purpose of this requirement, an extinguishing system is to be provided which would be suitable for machinery spaces. However, the amount of gas carried is to be sufficient to provide a quantity of free gas equal to 45% of the gross volume of the cargo pump room in all cases.

#### 11.2.2 Fire-extinguishing System for the Ships Dedicated to the Carriage of a Restricted Number of Cargoes\*

Cargo pump rooms of ships which are dedicated to the carriage of a restricted number of cargoes are to be protected by an appropriate fire-extinguishing system approved by the Society.

#### 11.2.3 Other Fixed Fire-extinguishing System

A fire-extinguishing system consisting of either a fixed pressure water-spray system or a high-expansion foam system could be provided for a cargo pump room if cargoes will be carried which are not suited to extinguishment by carbon dioxide. The International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk should reflect this conditional requirement.

**11.3 Cargo Area (IBC Code 11.3)****11.3.1 Fixed Deck Foam System**

Every ship is to be provided with a fixed deck foam system in accordance with the requirements of 11.3.2 to 11.3.12.

**11.3.2 Type of Foam Concentrate\***

Only one type of foam concentrate is to be supplied, and it is to be effective for the maximum possible number of cargoes intended to be carried. For other cargoes for which foam is not effective or is incompatible, additional arrangements to the satisfaction of the Society are to be provided. Regular protein foams are not to be used.

**11.3.3 Arrangements for Providing Foam\***

The arrangements for providing foam are to be capable of delivering foam to the entire cargo tanks deck area as well as into any cargo tank, the deck of which is assumed to be ruptured.

**11.3.4 Capability of Fixed Deck Foam System**

The deck foam system is to be capable of simple and rapid operation. The main control station for the system is to be suitably located outside of the cargo area, adjacent to the accommodation spaces and readily accessible and operable in the event of fires in the areas protected.

**11.3.5 Rate of Supply of Foam Solution\***

The rate of supply of foam solution is not to be less than the greatest of the following:

- (1) 2 *l/min* per *square metre* of the cargo tanks deck area, where cargo tanks deck area means the maximum breadth of the ship times the total longitudinal extent of the cargo tank spaces;
- (2) 20 *l/min* per *square metre* of the horizontal sectional area of the single tank having the largest such area;
- (3) 10 *l/min* per *square metre* of the area protected by the largest monitor, such area being entirely forward of the monitor, but not less than 1,250 *l/min*. For ships of less than 4,000 *tonnes* deadweight, the minimum capacity of the monitor should be to the satisfaction of the Society.

**11.3.6 Volume of Foam Concentrate**

Sufficient foam concentrate is to be supplied to ensure at least 30 *min* of foam generation when using the highest of the solution rates stipulated in 11.3.5.

**11.3.7 Monitor and Foam Applicator\***

Foam from the fixed foam system should be supplied by means of monitors and foam applicators. At least 50% of the foam rate required in 11.3.5(1) or (2) should be delivered from each monitor. The capacity of any monitor is to be at least 10 *l/min* of foam solution per square metre of deck area protected by that monitor, such area being entirely forward of the monitor. Such capacity is not to be less than 1,250 *l/min*. For ships of less than 4,000 *tonnes* deadweight, the minimum capacity of the monitor is to be to the satisfaction of the Society.

**11.3.8 Covered Area by Monitor**

The distance from the monitor to the farthest extremity of the protected area forward of that monitor is not to be more than 75% of the monitor throw in still air conditions.

**11.3.9 Arrangement of Monitor and Foam Applicator**

A monitor and hose connection for a foam applicator is to be situated both port and starboard at the poop front or accommodation spaces facing the cargo area.

**11.3.10 Foam Applicator**

Applicators are to be provided for flexibility of action during fire-fighting operations and to cover areas screened from the monitors. The capacity of any applicator is not to be less than 400 *l/min* and the applicator throw in still air conditions is not to be less than 15 *m*. The number of foam applicators provided is not to be less than four. The number and disposition of foam main outlets are to be such that foam from at least two applicators can be directed to any part of the cargo tanks deck area.

**11.3.11 Foam Main and Valves for Isolation from Damaged Sections**

Valves are to be provided in the foam main, and in the fire main where this is an integral part of the deck foam system, immediately forward of any monitor position to isolate damaged sections of those mains.

**11.3.12 Fire Main\***

Operation of a deck foam system at its required output is to permit the simultaneous use of the minimum required number of

jets of water at the required pressure from the fire main.

### **11.3.13 Alternative Provisions Installed in Ships Dedicated to the Carriage of a Restricted Number of Cargoes\***

Ships which are dedicated to the carriage of a restricted number of cargoes are to be protected by alternative provisions to the satisfaction of the Society when they are just as effective for the products concerned as the deck foam system required for the generality of flammable cargoes.

### **11.3.14 Portable Fire-extinguishing Equipment\***

Suitable portable fire-extinguishing equipment for the products to be carried is to be provided and kept in good operating order.

### **11.3.15 Exclusion of Sources of Ignition\***

Where flammable cargoes are to be carried, all sources of ignition are to be excluded from hazardous locations referred to in [4.2.3-2, -4](#) and [-5, Part H](#).

### **11.3.16 Additional Requirements for Ships Fitted with Bow or Stern Loading and Unloading Arrangements**

Ships fitted with bow or stern loading and unloading arrangements are to be provided with one additional foam monitor meeting the requirements of [11.3.7](#) and one additional applicator meeting the requirements of [11.3.10](#). The additional monitor is to be located to protect the bow or stern loading and unloading arrangements. The area of the cargo line forward or aft of the cargo area is to be protected by the above-mentioned applicator.

## **11.4 Special Requirements**

### **11.4.1 Special Requirements (*IBC Code 11.4*)\***

Fire-extinguishing media determined to be effective for certain products are listed for information in column “*I*” in the [Table S17.1](#).

## Chapter 12 MECHANICAL VENTILATION IN THE CARGO AREA

### 12.1 General

#### 12.1.1 Application

To ships intended to carry products addressed under paragraphs 11.1.2 and 11.1.3, except acids and products for which paragraph 15.17 apply, 4.5.2-6 and 4.5.4 (except -1(2)), Part R may apply in lieu of provisions of this chapter.

### 12.2 Spaces Normally Entered during Cargo Handling Operations

#### 12.2.1 General (IBC Code 12.1.1)

Cargo pump rooms and other enclosed spaces which contain cargo handling equipment and similar spaces in which work is performed on the cargo are to be fitted with mechanical ventilation systems, capable of being controlled from outside such spaces.

#### 12.2.2 Ventilation prior to Entering the Compartment (IBC Code 12.1.2)\*

Provision is to be made to ventilate such spaces prior to entering the compartment and operating the equipment and a warning notice requiring the use of such ventilation is to be placed outside the compartment.

#### 12.2.3 Arrangement and Capacity of Ventilation System (IBC Code 12.1.3)

Mechanical ventilation inlets and outlets are to be arranged to ensure sufficient air movement through the space to avoid the accumulation of toxic or flammable vapours or both (taking into account their vapour densities) and to ensure sufficient oxygen to provide a safe working environment, but in no case the ventilation system is to have a capacity of less than 30 changes of air per hour based upon the total volume of the space. For certain products, increased ventilation rates for cargo pump-rooms are prescribed in 15.17.

#### 12.2.4 Type of Ventilation Systems (IBC Code 12.1.4)\*

Ventilation systems are to be permanent and are normally to be of the extraction type. Extraction from above and below the floor plates are to be possible. In rooms housing motors driving cargo pumps, the ventilation is to be of the positive pressure type.

#### 12.2.5 Ventilation Exhaust Ducts from Cargo Area Spaces (IBC Code 12.1.5)

Ventilation exhaust ducts from spaces within the cargo area are to discharge upwards in locations at least 10 m in the horizontal direction from ventilation intakes and openings to accommodation, service and machinery spaces and control stations and other spaces outside the cargo area.

#### 12.2.6 Arrangement of Ventilation Intakes (IBC Code 12.1.6)\*

Ventilation intakes are to be so arranged as to minimize the possibility of recycling hazardous vapours from any ventilation discharge opening.

#### 12.2.7 Arrangement of Ventilation Ducts (IBC Code 12.1.7)\*

Ventilation ducts are not to be led through accommodation, service and machinery spaces or other similar spaces.

#### 12.2.8 Electric Motors Driving Fans (IBC Code 12.1.8)\*

Electric motors driving fans are to be placed outside the ventilation ducts if the carriage of flammable products is intended. Ventilation fans and fan ducts, in way of fans only, for hazardous locations referred to in Chapter 10 are to be of nonsparking construction defined as follows (1) through (4), but any combination of an aluminium or magnesium alloy fixed or rotating component and a ferrous fixed or rotating component, regardless of tip clearance, is considered a sparking hazard and is not to be used in these places:

- (1) impellers or housing or nonmetallic construction, due regard being paid to the elimination of static electricity;
- (2) impellers and housing of nonferrous materials;
- (3) impellers and housing of austenitic stainless steel; and
- (4) ferrous impellers and housing with not less than 13 mm design tip clearance.

#### 12.2.9 Spare Parts for Fan (IBC Code 12.1.9)\*

Sufficient spare parts are to be carried for each type of fan on board, required by this Chapter.



**12.2.10 Protection Screens Fitted in the Opening of Ventilation Ducts (IBC Code 12.1.10)\***

Protection screens of not more than 13 mm square mesh are to be fitted in outside openings of ventilation ducts.

**12.3 Pump Rooms and Other Enclosed Spaces Normally Entered (IBC Code 12.2)****12.3.1 Pump Rooms and Other Enclosed Spaces Normally Entered\***

Pump rooms and other enclosed spaces normally entered, which are not covered by 12.2.1, are to be fitted with mechanical ventilation systems, capable of being controlled from outside such spaces and complying with the requirements of 12.2.3, except that the capacity is not to be less than 20 changes of air per hour, based upon the total volume of the space. Provision is to be made to ventilate such spaces prior to entering.

**12.4 Spaces Not Normally Entered (IBC Code 12.3)****12.4.1 Spaces Not Normally Entered\***

Double bottoms, cofferdams, duct keels, pipe tunnels, hold spaces and other spaces where cargo may accumulate, are to be capable of being ventilated to ensure a safe environment when entry into spaces is necessary. Where a permanent ventilation system is not provided for such spaces, approved means of portable mechanical ventilation is to be provided. Where necessary owing to the arrangement of spaces, for instance hold spaces, essential ducting for such ventilation is to be permanently installed. For permanent installations, the capacity of eight air changes per hour is to be provided and for portable systems the capacity of 16 air changes per hour. Fans or blowers are to be clear of personnel access openings, and should comply with 12.2.8.

**12.5 Operational Requirements (With reference to IBC Code 12.1.2)****12.5.1 Application**

The provisions in this section are not the conditions for maintenance of classification for which examinations are required but the conditions to be observed by the ship owner, ship master or other persons who may concern with the ship's operation.

**12.5.2 Ventilation prior to Entering the Compartment (With reference to IBC Code 12.1.2)**

The compartment specified in 12.2.1 should be ventilated prior to entering such places.

## Chapter 13 INSTRUMENTATION (*IBC Code Chapter 13*)

### 13.1 Gauging

#### 13.1.1 Types of Gauging Devices\*

Cargo tanks are to be fitted with one of the following kinds of gauging devices. The gauging device is to be of type approved by the Society:

- (1) Open device-which makes use of an opening in the tanks and may expose the gauger to the cargo or its vapour. An example of this is the ullage opening.
- (2) Restricted device-which penetrates the tank and which, when in use, permits a small quantity of cargo vapour or liquid to be exposed to the atmosphere. When not in use, the device is completely closed. The design is to ensure that no dangerous escape of tank contents (liquid or spray) can take place in opening the device.
- (3) Closed device-which penetrates the tank, but which is part of a closed system and keeps tank contents from being released. Examples are the float-type systems, electronic probe, magnetic probe and protected sight glass. Alternatively an indirect device which does not penetrate the tank shell and which is independent of the tank may be used. Examples are weighing of cargo, pipe flow meter.

#### 13.1.2 Gauging Devices being Independent of the Equipment Required under 15.19

Gauging devices are to be independent of the equipment required under [15.19](#).

#### 13.1.3 Open Gauging and Restricted Gauging

Open gauging and restricted gauging are to be allowed only where:

- (1) open venting is allowed by the Rule; or
- (2) means are provided for relieving tank pressure before the gauge is operated.

#### 13.1.4 Types of Gauging for Individual Product

Types of gauging for individual products are shown in column “j” in the [Table S17.1](#).

### 13.2 Vapour Detection

#### 13.2.1 General\*

Ships carrying toxic or flammable products or both are to be equipped with at least two instruments, which are as deemed appropriate by the Society, designed and calibrated for testing for the specific vapours in question. If such instruments are not capable of testing for both toxic concentrations and flammable concentrations, then two separate sets of instruments are to be provided.

#### 13.2.2 Types of Vapour Detection

Vapour detection instruments may be portable or fixed. If a fixed system is installed, at least one portable instrument is to be provided.

#### 13.2.3 Requirement for Some Products which is Not Available with Toxic Vapour Detection\*

When toxic vapour detection equipment is not available for some products which require such detection, as indicated in column “k” in the [Table S17.1](#). The Society may exempt the ship from the requirement. When granting such an exemption, the Society is to recognize the necessity for additional breathing air supply to the provisions of [14.2.4](#).

#### 13.2.4 Vapour Detection Requirements for Individual Products

Vapour detection requirements for individual products are shown in column “k” in the [Table S17.1](#).

### 13.3 Additional Requirements

#### 13.3.1 Installation of Gas Detection Equipment\*

Installation of gas detection equipment of the sampling type located outside gas dangerous zones is to conform to the requirements otherwise specified in addition to those specified in this Part.

## Chapter 14 PERSONNEL PROTECTION EQUIPMENT

### 14.1 Protective Equipment (*IBC Code 14.1*)

#### 14.1.1 Protective Equipment\*

For the protection of crew members who are engaged in loading and discharging operations, the ship should have on board suitable protective equipment consisting of large aprons, special gloves with long sleeves, suitable footwear, coveralls of chemical-resistant material, and tight-fitting goggles or face shields or both. The protective clothing and equipment should cover all skin so that no part of the body is unprotected.

#### 14.1.2 Storage Room\*

Work clothes and protective equipment should be kept in easily accessible places and in special lockers. Such equipment should not be kept within accommodation spaces, with the exception of new, unused equipment and equipment which has not been used since undergoing a through cleaning process. The Society may, however, approve storage rooms for such equipment within accommodation spaces if adequately segregated from living spaces such as cabins, passageways, dining rooms, bathrooms, etc.

### 14.2 Safety Equipment (*IBC Code 14.2*)

#### 14.2.1 Number of Safety Equipment\*

Ships carrying cargoes for which [15.12](#), [15.12.1](#) or [15.12.3](#) is listed in column “o” in the [Table S17.1](#) should have on board sufficient but not less than three complete sets of safety equipment each permitting personnel to enter a gas-filled compartment and perform work there for at least 20 *min*. Such equipment should be in addition to that required by [10.10, Part R of the Rules](#).

#### 14.2.2 Composition of Safety Equipment\*

One complete set of safety equipment should consist of:

- (1) one self-contained air-breathing apparatus (not using stored oxygen);
- (2) protective clothing, boots, gloves and tight fitting goggles;
- (3) fireproof lifeline with belt resistant to the cargoes carried; and
- (4) explosion-proof lamp.

#### 14.2.3 Supply of Spare Compressed Air\*

An adequate supply of compressed air is to be provided and is to consist either of:

- (1) the equipment consisting of:
  - (a) one set of fully charged spare air bottles for each breathing apparatus;
  - (b) a special air compressor suitable for the supply of high pressure air of the required purity; and
  - (c) a charging manifold capable of dealing with sufficient spare breathing apparatus air bottles for the breathing apparatus required by (b); or
- (2) fully charged spare air bottles with a total free air capacity of at least 6,000 l for each breathing apparatus on board in excess of the air bottles for firemen’s equipment required by [10.10, Part R of the Rules](#).

#### 14.2.4 Additional Air Supply System\*

A cargo pump room of ships carrying cargoes which are subject to the requirements of [15.18](#) or cargoes for which in column “k” in the [Table S17.1](#) toxic vapour detection equipment is required but is not available should have either:

- (1) a low-pressure line system with hose connections suitable for use with the breathing apparatus required by [14.2.1](#). This system should provide sufficient high-pressure air capacity to supply, through pressure reduction devices, enough low-pressure air to enable two men to work in a gas-dangerous space for at least 1 *hour* without using the air bottles of the breathing apparatus. Means should be provided for recharging the fixed air bottles and breathing apparatus air bottles from a special air compressor suitable for the supply of high-pressure air of the required purity; or
- (2) an equivalent quantity of space bottled air in lieu of the low-pressure air line.

**14.2.5 Storage Room**

At least one set of safety equipment as required by 14.2.2 should be kept in a suitable clearly marked locker in a readily accessible place near the cargo pump room. The other sets of safety equipment should also be kept in suitable, clearly marked, easily accessible places.

**14.2.6 Maintenance of Compressed Air Equipment**

The maintenance of compressed air equipment is to be in accordance with 14.3.

**14.2.7 Stretcher**

A stretcher which is suitable for hoisting an injured person up from spaces such as the cargo pump room should be placed in a readily accessible location.

**14.2.8 Respiratory for Emergency Escape Purpose etc.**

Ships carrying cargoes for which “Yes” is listed in column “n” in the Table S17.1 should be provided with suitable respiratory and eye protection sufficient for every person on board for emergency escape purposes, subject to the following (1) and (2).

- (1) Respiratory protection is subject to the followings:
  - (a) filter type respiratory protection is unacceptable; and
  - (b) self-contained breathing apparatus have normally at least a duration of service of 15 min;
- (2) Emergency escape respiratory protection is not to be used for firefighting or cargo handling purposes and should be marked to that effect.

**14.2.9 Medical First-aid Equipment\***

The ship is to have on board medical first-aid equipment, including oxygen resuscitation equipment and antidotes for cargoes to be carried, as deemed appropriate by the Society.

**14.2.10 Decontamination Shower and Eyewash\***

Suitably marked decontamination showers and eyewash should be available on deck in convenient locations. The showers and eyewash should be operable in all ambient condition.

**14.3 Operating Requirements****14.3.1 Application**

The provision in 14.3 are not the conditions for maintenance of classification for which examinations are required but the conditions to be observed by the ship owner, ship master or other persons who may concern with the ship's operation.

**14.3.2 Use of Protective Equipment (IBC Code 14.1.3)**

Protective equipment should be used in any operation which may entail danger to personnel.

**14.3.3 Maintenance of Air Compressed Equipment (IBC Code 14.2.6)**

The compressed air equipment required by 14.2.2 should be inspected at least once a month by a responsible officer, and the inspection recorded in the ship's log-book. The equipment should be inspected and tested by an expert at least once a year.

## Chapter 15 SPECIAL REQUIREMENTS

### 15.1 General (*IBC Code 15.1*)

The provisions of this chapter are applicable where specific reference is made in column “o” in the [Table S17.1](#). These requirements are additional to the general requirements of this part.

### 15.2 Ammonium Nitrate Solution, 93% or Less

#### 15.2.1 Ammonium Nitrate Solution (*IBC Code 15.2.1*)

The provisions of [15.2](#) have been made under the following conditions:

- (1) The ammonium nitrate solution is to contain at least 7% by weight of water.
- (2) The acidity (*pH*) of the cargo when diluted with ten parts of water to one part cargo by weight is to be between 5.0 and 7.0.
- (3) The solution is not to contain more than 10 *ppm* chloride ions, 10 *ppm* ferric ions, and is to be free of other contaminations.

#### 15.2.2 Tank and Equipment (With reference to *IBC Code 15.2.2*)

Tanks and equipment for ammonium nitrate solution are to be independent of tanks and equipment containing other cargoes or combustible products.

#### 15.2.3 Provisions for Cleaning of Tanks and Associated Equipment (With reference to *IBC Code 15.2.3*)

Tanks and associated equipments used for carrying ammonium nitrate solution are to be provided with cleaning arrangements approved by the Society.

#### 15.2.4 Temperature of the Heat Exchanging Medium in the Tank Heating System (*IBC Code 15.2.4*)\*

The temperature of the heat exchanging medium in the tank heating system is not to exceed 160°C. The heating system is to be provided with a control system to keep the cargo at a bulk mean temperature of 140°C. High-temperature alarms at 145°C and 150°C and a low-temperature alarm at 125°C are to be provided. Where the temperature of the heat exchanging medium exceeds 160°C an alarm is also to be given. Temperature alarms and controls are to be located on the navigating bridge.

#### 15.2.5 Ammonia Gas Injection System (With reference to *IBC Code 15.2.5*)

A fix installation is to be provided to inject ammonia gas into the cargo.

#### 15.2.6 Controls for Ammonia Gas Injection System (With reference to *IBC Code 15.2.6*)\*

Controls for the system specified in [15.2.5](#) are to be located on the navigating bridge. For the purpose, a storage tank for 300 *kg* of ammonia per 1,000 *tonnes* of ammonia nitrate solution is to be provided on board.

#### 15.2.7 Type of Cargo Pump (*IBC Code 15.2.7*)\*

Cargo pumps are to be of the centrifugal deepwell type or of the centrifugal type with water flushed seals.

#### 15.2.8 Weatherhoods for Prevention of Clogging of Vent Piping (*IBC Code 15.2.8*)

Vent piping is to be fitted with approved weatherhoods to prevent clogging. Such weatherhoods are to be constructed and arranged to easily remove for inspection and cleaning.

### 15.3 Carbon Disulphide

Carbon disulphide may be carried either under a water pad or under a suitable inert gas pad as specified in the following paragraphs.

#### 15.3.1 Carriage under Water Pad

##### 1 (*IBC Code 15.3.1*)

Provision are to be made to maintain a water pad in the cargo tank during loading, unloading and transit. In addition, equipment to maintain a suitable inert gas pad in the ullage space of cargo tanks during transit is to be provided.

##### 2 (*IBC Code 15.3.2*)

All openings are to be in the top of the tank, above the deck.

##### 3 (*IBC Code 15.3.3*)

Loading lines are to terminate near the bottom of the tank.

**4** (IBC Code 15.3.4)

A standard ullage opening is to be provided for emergency sounding.

**5** (IBC Code 15.3.5)

Cargo piping and vent lines are to be independent of piping and vent lines used for other cargo.

**6** (IBC Code 15.3.6)

Pumps may be used for discharging cargo, provided they are of the deepwell or hydraulically driven submersible types. The means of driving a deepwell pump are not to present a source of ignition for carbon disulphide and are not to employ equipment that may exceed a temperature of 80°C.

**7** (with reference to IBC Code 15.3.7)

If a cargo discharge pump is used, it is to be inserted through a cylindrical well extending from the tank top to a point near the tank bottom.

**8** (IBC Code 15.3.8)

Water or inert gas displacement may be used for discharging cargo, provided the cargo system is designed for the expected pressure and temperature.

**9** (IBC Code 15.3.9)

Safety relief valves are to be of stainless steel construction.

**10** (IBC Code 15.3.10)

Because of its low ignition temperature and close clearances required to arrest its flame propagation, only intrinsically safe systems and circuits are to be permitted in the hazardous locations described in [4.2.3-2, -4](#) and [-5, Part H](#).

**15.3.2 Carriage under Suitable Inert Gas Pad**

**1** (IBC Code 15.3.11)

Cargo tanks for carriage of carbon disulphide are to be independent tanks with a design pressure more than 0.06 MPa gauge.

**2** (IBC Code 15.3.12)

All openings are to be located on the top of the tank, above the deck.

**3** (IBC Code 15.3.13)

Gaskets used in the containment system are to be of a material which does not react with, or dissolve in, carbon disulphide.

**4** (IBC Code 15.3.14)

Threaded joints are not to be permitted in the cargo containment system, including the vapour lines.

**5** (IBC Code 15.3.15)

Prior to loading, the tank(s) are to be inerted with suitable inert gas until the oxygen level is 2% by volume or lower. Means are to be provided to automatically maintain a positive pressure in the tank using suitable inert gas during loading, transport and discharge. The system are to be able to maintain this positive pressure between 0.01 and 0.02 MPa gauge, and are to be remotely monitored and fitted with over/under pressure alarms.

**6** (IBC Code 15.3.16)

Hold spaces surrounding an independent tank carrying carbon disulphide are to be inerted by a suitable inert gas until the oxygen level is 2% or less. Means are to be provided to monitor and maintain this condition throughout the voyage. Means are also to be provided to sample these spaces for carbon disulphide vapour.

**7** (IBC Code 15.3.17)

Carbon disulphide is to be loaded, transported and discharged in such a manner that venting to the atmosphere does not occur. If carbon disulphide vapour is returned to shore during loading or to the ship during discharge, the vapour return system is to be independent of all other containment systems.

**8** (IBC Code 15.3.18)

Carbon disulphide is to be discharged only by submerged deepwell pumps or by a suitable inert gas displacement. The submerged deepwell pumps are to be operated in a way that prevents heat build-up in the pump. The pump is also to be equipped with a temperature sensor in the pump housing with remote readout and alarm in the cargo control room. The alarm is to be set at 80°C. The pump is also to be fitted with an automatic shut-down device, if the tank pressure falls below atmospheric pressure during the discharge.

**9** (with reference to IBC Code 15.3.21)

A water spray system of sufficient capacity is to be provided to blanket effectively the area surrounding the loading manifold, the exposed deck piping associated with product handling and the tank domes. The arrangement of piping and nozzles is to be such as to give a uniform distribution rate of  $10 \text{ l/m}^2/\text{min}$ . Remote manual operation is to be arranged such that remote starting of pumps supplying the water-spray system and remote operation of any normally closed valves in the system can be carried out from a suitable location outside the cargo area adjacent to the accommodation spaces and readily accessible and operable in the event of fire in the areas protected. The water-spray system is to be capable of both local and remote manual operation, and the arrangement is to ensure that any spilled cargo is washed away.

**10 (IBC Code 15.3.22)**

No cargo tanks are to be more than 98% liquid-full at the reference temperature.

**11 (IBC Code 15.3.23)**

The maximum volume ( $V_L$ ) of cargo to be loaded in a tank is to be:

$$V_L = 0.98V \frac{\rho_R}{\rho_L}$$

$V$ : volume of the tank

$\rho_R$ : relative density of cargo at the reference temperature

$\rho_L$ : relative density of cargo at the loading temperature

$R$ : reference temperature, i.e. the temperature at which the vapour pressure of the cargo corresponds to the set pressure of the pressure-relief valve

**12 (IBC Code 15.3.24)**

The maximum allowable tank filling limits for each cargo tank are to be indicated for each loading temperature which may be applied, and for the applicable maximum reference temperature, on a list approved by the Society.

**13 (IBC Code 15.3.25)**

Zones on open deck, or semi-enclosed spaces on open deck within 3 metres of a tank outlet, gas or vapour outlet, cargo pipe flange or cargo valve of a tank certified to carry carbon disulphide, are to comply with the electrical equipment requirements specified for carbon disulphide in column "I", [Chapter 17](#). Also, within the specified zone, no other heat sources, like steam piping with surface temperatures in excess of  $80^\circ\text{C}$  are to be allowed.

**14 (IBC Code 15.3.26)**

Means are to be provided to ullage and sample the cargo without opening the tank or disturbing the positive suitable inert gas blanket.

**15 (with reference to IBC Code 15.3.27)**

The product is to be transported only in accordance with a cargo handling plan that has been approved by the Society. Cargo handling plans are to show the entire cargo piping system.

**15.4 Diethyl Ether (IBC Code 15.4)**

**15.4.1 Environmental Control for Void Space Surrounding the Cargo Tanks\***

Unless inerted, natural ventilation is to be provided for the voids around the cargo tanks while the vessel is under way. If a mechanical ventilation system is installed, all blowers are to be of nonsparking construction. Mechanical ventilation equipment is not to be located in the void spaces surrounding the cargo tanks.

**15.4.2 Pressure Relief Valves Installed in Gravity Tank**

Pressure relief valve settings are not to be less than  $0.02 \text{ MPa}$  gauge for gravity tanks.

**15.4.3 Inert Gas Displacement for Discharging Cargo**

Inert gas displacement may be used for discharging cargo from pressure tanks provided the cargo system is designed for the expected pressure.

**15.4.4 Avoidance of Ignition Source or Heat Generation in the Cargo Area**

In view of the fire hazard, provision is to be made to avoid any ignition source or heat generation or both in the cargo area.

**15.4.5 Cargo Pumps for Discharging**

Pumps may be used for discharging cargo, provided that they are of a type designed to avoid liquid pressure against the shaft gland or are of a hydraulically operated submerged type and are suitable for use with the cargo.

**15.4.6 Inert Gas Systems**

Provision is to be made to maintain the inert gas pad in the cargo tank during loading, unloading and transit.

**15.5 Hydrogen Peroxide Solutions****15.5.1 Hydrogen Peroxide Solutions over 60% but Not over 70% by Mass\*****1** (*IBC Code 15.5.1*)

Hydrogen peroxide over 60% but not over 70% solutions by weight is to be carried in dedicated ships only and no other cargoes are to be carried.

**2** (*IBC Code 15.5.1.2*)

Cargo tanks and associated equipment are to be either pure aluminium (99.5%) or solid stainless steel (304L, 316, 316L or 316Ti), and passivated in accordance with approved procedures. Aluminium is not to be used for piping on deck. All nonmetallic materials of construction for the containment system are neither to be attacked by hydrogen peroxide nor contribute to its decomposition.

**3** (with reference to *IBC Code 15.5.1.3*)

Appropriate means such as notice requiring not to use during cargo transfer operation are to be provided to the pump rooms.

**4** (*IBC Code 15.5.1.4*)

Cargo tanks are to be separated by cofferdams from oil fuel tanks or any other space containing flammable or combustible materials.

**5** (*IBC Code 15.5.1.5*)

Cargo tanks intended for the carriage of hydrogen peroxide are not to be capable of use for seawater ballast.

**6** (*IBC Code 15.5.1.6*)

Temperature sensors are to be installed at the top and bottom of the tank. Remote temperature readouts and continuous monitoring are to be located on the navigating bridge. Visible and audible alarms activating when the temperature in the cargo tanks rises above 35°C are to be provided on the navigating bridge.

**7** (*IBC Code 15.5.1.7*)

Fixed oxygen monitors (or gas sampling lines) are to be provided in void spaces adjacent to tanks to detect leakage of the cargo into these spaces. Remote readouts, continuous monitoring (if gas sampling lines are used, intermittent sampling is satisfactory) and visible and audible alarms similar to those for the temperature sensors are also to be located on the navigating bridge. Visible and audible alarms activating when the oxygen concentration in these void spaces exceeds 30% by volume are to be provided on the navigating bridge. Two portable oxygen monitors are also to be available as back-up systems.

**8** (with reference to *IBC Code 15.5.1.8*)

As a safeguard against uncontrolled decomposition, a cargo jettisoning system is to be installed to discharge the cargo overboard.

**9** (*IBC Code 15.5.1.9*)

Cargo tank venting systems are to have pressure/vacuum relief valves for normal controlled venting, and are to have rupture discs or a similar device for emergency venting, should tank pressure rise rapidly as a result of uncontrolled decomposition. Rupture discs are to be sized on the basis of tank design pressure, tank size and anticipated decomposition rate.

**10** (*IBC Code 15.5.1.10*)

A fixed water-spray system is to be provided for diluting and washing away any concentrated hydrogen peroxide solution spilled on deck. The areas covered by the water-spray are to include the manifold/hose connections and the tank tops of those tanks designated for carrying hydrogen peroxide solutions. The minimum application rate is to satisfy the following criteria:

- (1) The product is to be diluted from the original concentration to 35% by weight within 5 min of the spill.
- (2) The rate and estimated size of the spill are to be based upon maximum anticipated loading and discharge rates, the time required to stop flow of cargo in the event of tank overfill or a piping/hose failure, and the time necessary to begin application of dilution water with actuation at the cargo control location or on the navigating bridge.

**11** Protective equipment (*IBC Code 15.5.1.12*)

For the protection of crew members who are engaged in loading and discharging operations, the ship should have on board protective equipment that is resistant to hydrogen peroxide. Protective equipment should include coveralls that are nonflammable, suitable gloves, boots and eye protection.



**15.5.2 Hydrogen Peroxide Solutions over 8% but Not over 60% by Weight\*****1** (IBC Code 15.5.2.1)

The ship's shell plating is not to form any boundaries of tanks containing this product.

**2** (IBC Code 15.5.2.3)

Cargo tanks and associated equipment are to be either pure aluminium (99.5%) or solid stainless steel of types suitable for use with hydrogen peroxide (e.g. 304, 304L, 316, 316L, 316Ti). Aluminium is not to be used for piping on deck. All nonmetallic materials of construction for the containment system are neither to be attacked by hydrogen peroxide nor contribute to its decomposition.

**3** (IBC Code 15.5.2.4)

Cargo tanks are to be separated by a cofferdam from fuel oil tanks or any other space containing materials incompatible with hydrogen peroxide.

**4** (IBC Code 15.5.2.5)

Temperature sensors are to be installed at the top and bottom of the tank. Remote temperature readouts and continuous monitoring are to be located on the navigating bridge. Visible and audible alarms activating when the temperature in the cargo tanks rises above 35°C are to be provided on the navigating bridge.

**5** (IBC Code 15.5.2.6)

Fixed oxygen monitors (or gas sampling lines) are to be provided in void spaces adjacent to tanks to detect leakage of the cargo into these spaces. The enhancement of flammability by oxygen enrichments is to be recognized. Remote readouts, continuous monitoring (if gas sampling lines are used, intermittent sampling is satisfactory) and visible and audible alarms similar to those for the temperature sensors are also to be located on the navigating bridge. Visible and audible alarms activating when the oxygen concentration in the void spaces exceeds 30% by volume are to be provided on the navigating bridge. Two portable oxygen monitors are also to be available as back-up systems.

**6** (with reference to IBC Code 15.5.2.7)

As a safeguard against uncontrolled decomposition, a cargo jettisoning system is to be installed to discharge the cargo overboard.

**7** (IBC Code 15.5.2.8)

Cargo tank venting systems with filtration are to have pressure vacuum relief valves for normal controlled venting, and are to have a device for emergency venting, should tank pressure rise rapidly as a result of an uncontrolled decomposition rate, as stipulated in [15.5.1-9](#). These venting systems are to be designed in such a manner that there is no introduction of seawater into the cargo tank even under heavy sea conditions. Emergency venting is to be sized on the basis of tank design pressure and tank size.

**8** (IBC Code 15.5.2.9)

A fixed water-spray system is to be provided for diluting and washing away any concentrated solution spilled on deck. The areas covered by the water-spray are to include the manifold/hose connections and the tank tops of those tanks designated for the carriage of hydrogen peroxide solutions. The minimum application rate is to satisfy the following criteria:

- (1) The product is to be diluted from the original concentration to 35% by weight within 5 minutes of the spill.
- (2) The rate and estimated size of the spill are to be based upon maximum anticipated loading and discharge rates, the time required to stop flow of the cargo in the event of tank overfill or a piping/hose failure, and the time necessary to begin application of dilution water with actuation at the cargo control location or on the navigating bridge.

**9** Protective equipment (IBC Code 15.5.2.11)

For the protection of crew members who are engaged in loading and discharging operations, the ship should have on board protective equipment that is resistant to hydrogen peroxide. Protective equipment should include coveralls that are nonflammable, suitable gloves, boots and eye protection.

**10** (IBC Code 15.5.2.12)

During transfer of hydrogen peroxide the related piping system is to be separated from all other systems. Cargo hoses used for transfer of hydrogen peroxide are to be marked "FOR HYDROGEN PEROXIDE TRANSFER ONLY".

**15.6 Motor Fuel Anti-knock Compounds (Containing lead alkyls)****15.6.1 Restricted Use of the Cargo Tank (IBC Code 15.6.1)**

Tanks used for these cargoes are not to be used for the transportation of any other cargo except those commodities to be used

in the manufacture of motor fuel anti-knock compounds containing lead alkyls.

#### **15.6.2 Ventilation System for Cargo Pump Room (*IBC Code 15.6.2*)**

If a cargo pump-room is located on deck level according to [15.18](#), the ventilation arrangements are to be in compliance with [15.17](#).

#### **15.6.3 No Entry into Cargo Tanks (With reference to *IBC Code 15.6.3*)**

Appropriate means such as notice requiring not to enter in cargo tank to be used for these products are to be provided.

#### **15.6.4 Air Analysis (*IBC Code 15.6.4*)**

Air analysis is to be made for lead content to determine if the atmosphere is satisfactory prior to allowing personnel to enter the cargo pump room or void spaces surrounding the cargo tank.

### **15.7 Phosphorus, Yellow or White**

#### **15.7.1 Construction and Equipment of Ships for Carriage of Phosphorus (With reference to *IBC Code 15.7.1*)**

Ships intended for carriage of phosphorus are to have arrangements capable of loading, carrying and discharging under a water pad of 760 mm minimum depth at all time, and of returning water discharged from a phosphorus tank to a shore installation only.

#### **15.7.2 Design and Test on Cargo Tanks (*IBC Code 15.7.2*)**

Tanks are to be designed and tested to a minimum equivalent water head of 2.4 m above the top of the tank, under designed loading conditions, taking into account the depth, relative density and method of loading and discharge of the phosphorus.

#### **15.7.3 Interfacial Area between the Liquid Phosphorus and Its Water Pad (*IBC Code 15.7.3*)**

Tanks are to be so designed as to minimize the interfacial area between the liquid phosphorus and its water pad.

#### **15.7.4 Ullage Space above the Water Pad (*IBC Code 15.7.4*)**

A minimum ullage space of 1% is to be maintained above the water pad. The ullage space is to be filled with inert gas or naturally ventilated by two cowled standpipes terminating at different heights but at least 6m above the deck and at least 2m above the pump house top.

#### **15.7.5 Openings of Cargo Tanks (*IBC Code 15.7.5*)**

All openings are to be at the top of cargo tanks, and fittings and joints attached thereto are to be of materials resistant to phosphorus pentoxide.

#### **15.7.6 Loading Arrangements (*IBC Code 15.7.6*)**

The loading arrangements are to be of the type capable of loading at a temperature not exceeding 60°C.

#### **15.7.7 Tank Heating Arrangements and High-temperature Alarm for the Cargo Tanks (*IBC Code 15.7.7*)**

Tank heating arrangements are to be external to tanks and have a suitable method of temperature control to ensure that the temperature of the phosphorus does not exceed 60°C. A high-temperature alarm activating in case of exceeding 60°C is to be fitted.

#### **15.7.8 Water Drench System for Void Space (*IBC Code 15.7.8*)**

A water drench system acceptable to the Society is to be installed in all void spaces surrounding the tanks. This water drench system is to be of the type capable of operating automatically in the event of an escape of phosphorus.

#### **15.7.9 Mechanical Ventilation System for Void Space (*IBC Code 15.7.9*)**

Void spaces referred to in [15.7.8](#) are to be provided with effective means of mechanical ventilation which are to be capable of being sealed off quickly in an emergency.

#### **15.7.10 Loading and Discharging System for Phosphorus (*IBC Code 15.7.10*)**

Loading and discharge of phosphorus are to be governed by a central system on the ship which, in addition to incorporating high-level alarms, is to ensure that no overflow of tanks is possible and that such operations can be stopped quickly in an emergency from either ship or shore.

#### **15.7.11 Deck Washing System (With reference to *IBC Code 15.7.11*)**

Deck washing system is to be provided to wash down any spillage of phosphorus with water immediately.

#### **15.7.12 Ship-to-shore Loading and Discharge Connections (*IBC Code 15.7.12*)**

Ship-to-shore loading and discharge connections are to be of a type approved by the Society.

**15.8 Propylene Oxide or Ethylene Oxide/Propylene Oxide Mixtures with an Ethylene Oxide Content of not more than 30% by Mass****15.8.1 General (IBC Code 15.8.1)**

The provisions of 15.8 have been made under the condition of transportation of products being free of acetylene.

**15.8.2 Tanks for Propylene Oxide or Ethylene Oxide/Propylene Oxide Mixtures with an Ethylene Oxide Content of not more than 30% by Mass (With reference to IBC Code 15.8.2)**

The cargo tanks intended for carriage of these products are to be provided with facilities for cleaning the cargo tanks which have contained as one of three previous cargoes any products known to catalyse polymerization, such as:

- (1) mineral acids (e.g. sulphuric, hydrochloric, nitric);
- (2) carboxylic acids and anhydrides (e.g. formic, acetic);
- (3) halogenated carboxylic acids (e.g. chloroacetic);
- (4) sulphonics acids (e.g. benzene sulphonic);
- (5) caustic alkalis (e.g. sodium hydroxide, potassium hydroxide);
- (6) ammonia and ammonia solutions;
- (7) amines and amine solutions;
- (8) oxidizing substances.

**15.8.3 Cleaning System for Cargo Tanks and Associated Pipework (With reference to IBC Code 15.8.3)**

Cleaning system is to be provided on board to remove all traces of previous cargoes from cargo tanks and associated pipework.

**15.8.4 Provision for Checking of Effectiveness of Cleaning (With reference to IBC Code 15.8.4)**

Provision for suitable checking or testing on effectiveness of cleaning for tanks and associated pipework is to be provided to ascertain that acidic or alkaline materials remain that might create a hazardous situation in the presence of these products.

**15.8.5 Construction of Cargo Tank (With reference to IBC Code 15.8.5)**

Cargo tanks are to be the one capable of entering and inspecting prior to each initial loading of these products to ensure freedom from contamination, heavy rust and visible structural defects.

**15.8.6 Construction Materials of Cargo Tanks (IBC Code 15.8.6)**

Tanks for the carriage of these products are to be of steel or stainless steel construction.

**15.8.7 Tank Cleaning System (With reference to IBC Code 15.8.7)**

Tanks for the carriage of these products are to be provided with cleaning system for tanks and associated pipework.

**15.8.8 Type and Material of Valves, Flanges, Fittings and Accessory Equipment (IBC Code 15.8.8)**

All valves, flanges, fittings and accessory equipment are to be of a type suitable for use with the products and are to be constructed of steel or stainless steel acceptable to the Society. Discs or disc faces, seats and other wearing parts of valves are to be made of stainless steel containing not less than 11% chromium.

**15.8.9 Materials of Gasket (IBC Code 15.8.9)**

Gaskets are to be constructed of materials which do not react with, dissolve in, or lower the autoignition temperature of, these products and which are fire-resistant and possess adequate mechanical behaviour. The surface presented to the cargo is to be polytetrafluorethylene (PTFE), or materials giving a similar degree of safety by their inertness. Spirally-wound stainless steel, with a filler of PTFE or similar fluorinated polymer, may be accepted.

**15.8.10 Insulation and Packing (IBC Code 15.8.10)**

Insulation and packing, if used, are to be of a material which does not react with, dissolve in, or lower the autoignition temperature of, these products.

**15.8.11 Special Requirements on Materials of Gaskets and Packing (IBC Code 15.8.11)**

The following materials are generally found unsatisfactory for gaskets, packing and similar uses in containment systems for these products and would require testing before being approved by the Society:

- (1) Neoprene or natural rubber, if it comes into contact with the products.
- (2) Asbestos, or binders used with asbestos.
- (3) Materials containing oxides of magnesium, such as mineral wools.

**15.8.12 Threaded Joint (IBC Code 15.8.12)**

Threaded joints are not to be permitted in the cargo liquid and vapour lines.

**15.8.13 Filling and Discharge Piping (IBC Code 15.8.13)**

Filling and discharge piping are to extend to within 100 mm of the bottom of the tank or any sump pit.

**15.8.14 Vapour Return Connection (IBC Code 15.8.14.1)**

The containment system for a tank containing these products is to have a valved vapour return connection.

**15.8.15 Independent Vapour Return System (With reference to IBC Code 15.8.14.2)**

In case where vapour return to shore is used during tank loading, the vapour return system connected to a containment system for the product is to be independent of all other containment systems.

**15.8.16 Control of Tank Pressure (IBC Code 15.8.14.3)**

The cargo tank is to be provided with the system to maintain the pressure in the cargo tanks above 0.007 MPa gauge during discharging operation.

**15.8.17 Independent Discharging (IBC Code 15.8.16)**

Tanks carrying these products are to be vented independently of tanks carrying other products. Facilities are to be provided for sampling the tank contents without opening the tank to atmosphere.

**15.8.18 Cargo Discharging (IBC Code 15.8.15)**

The cargo is to be discharged only by deepwell pumps, hydraulically operated submerged pumps, or inert gas displacement. Each cargo pump is to be arranged to ensure that the product does not heat significantly if the discharge line from the pump is shut off or otherwise blocked.

**15.8.19 Marking on Cargo Hoses (IBC Code 15.8.17)**

Cargo hoses used for transfer of these products are to be marked "FOR ALKYLENE OXIDE TRANSFER ONLY".

**15.8.20 Environmental Control of Spaces adjacent to Cargo Tank (With reference to IBC Code 15.8.18)**

Inert gas system is to be provided to inert cargo tanks, void spaces and other enclosed spaces adjacent to an integral gravity cargo tank for carriage of these products. The inert gas system is to be of the type capable of maintaining oxygen content of these spaces below 2%. The monitoring system for these products and oxygen is to be provided in these inerted spaces and tanks.

**15.8.21 No Air Entry into Cargo Pump or Piping (IBC Code 15.8.19)**

The cargo pump and piping system is to be constructed not to allow any air entry into the system while these products are contained within the system.

**15.8.22 Relief of Pressure in Liquid and Vapour Lines (IBC Code 15.8.20)**

Prior to disconnecting shore-lines, the pressure in liquid and vapour lines is to be relieved through suitable valves installed at the loading header. Liquid and vapour from these lines are not to be discharged to atmosphere.

**15.8.23 Design of Cargo Tank (IBC Code 15.8.21)**

Cargo tanks for carriage of propylene oxide are to be pressure tanks or independent or integral gravity tanks. Cargo tanks for carriage of ethylene oxide/propylene oxide mixtures are to be independent gravity tanks or pressure tanks. Tanks are to be designed for the maximum pressure expected to be encountered during loading, conveying and discharging cargo.

**15.8.24 Cooling System (IBC Code 15.8.22.1)**

Tanks for the carriage of propylene oxide with a design pressure less than 0.06 MPa gauge and tanks for the carriage of ethylene oxide/propylene oxide mixtures with a design pressure less than 0.12 MPa gauge are to have a cooling system to maintain the cargo below the reference temperature. Reference temperature means the temperature corresponding to the vapour pressure of the cargo at the set pressure of the pressure relief valve.

**15.8.25 Exemption from the Refrigeration Requirement (With reference to IBC Code 15.8.22.2)**

The refrigeration requirement for tanks with a design pressure less than 0.06 MPa gauge may be waived by the Society for ships operating in restricted areas or on voyages of restricted duration, and account may be taken in such cases of any insulation of the tanks.

**15.8.26 Temperature Control of Cooling System (IBC Code 15.8.23.1)**

Any cooling system is to be the type capable of maintaining the liquid temperature below the boiling temperature at the containment pressure. At least two complete cooling plants automatically regulated by variations within the tanks are to be provided. Each cooling plant is to be complete with the necessary auxiliaries for proper operation. The control system is also to be capable of

being manually operated. An alarm is to be provided to indicate malfunctioning of the temperature controls. The capacity of each cooling system is to be sufficient to maintain the temperature of the liquid cargo below the reference temperature (*See 15.8.24*) of the system.

#### **15.8.27 Capacity of Cooling System (IBC Code 15.8.23.2)**

An alternative arrangement may consist of three cooling plants, any two of which are to be sufficient to maintain the liquid temperatures below the reference temperature.

#### **15.8.28 Cooling Media (IBC Code 15.8.23.3)**

Cooling media which are separated from the products by a single wall only are to be nonreactive with the products.

#### **15.8.29 Type of Cooling System (IBC Code 15.8.23.4)**

Cooling systems not requiring compression of these products are to be provided. Remote manual operation is to be arranged such that remote starting of pumps supplying the water spray system and remote operation of any normally closed valves in the system can be carried out from a suitable location outside the cargo area, adjacent to the accommodation spaces and readily accessible and operable in the event of fire in the areas protected.

#### **15.8.30 Pressure Relief Valve Setting (IBC Code 15.8.24)**

Pressure relief valve settings are not to be less than 0.02 MPa gauge and for pressure tanks not greater than 0.7 MPa gauge for the carriage of propylene oxide and not greater than 0.53 MPa gauge for the carriage of propylene oxide/ethylene oxide mixtures.

#### **15.8.31 Piping System for Tanks (IBC Code 15.8.25.1)**

The piping system for tanks to be loaded with these products is to be separated from piping systems for all other tanks, including empty tanks. If the piping system for the tanks to be loaded is not independent, the required piping separation is to be accomplished by the removal of spool pieces, valves, or other pipe section, and the installation of blank flanges at these locations. The required separation applies to all liquid and vapour piping, liquid and vapour vent lines and any other possible connections, such as common inert gas supply lines.

#### **15.8.32 Cargo Handling Plans (With reference to IBC Code 15.8.25.2)**

Ships for carriage of these products are to be provided with cargo handling plans approved by the Society. Each intended loading arrangement is to be shown on a separate cargo handling plan. Cargo handling plans are to show the entire cargo piping system and the locations for installation of blank flanges needed to meet the above piping separation requirements.

#### **15.8.33 Maximum Allowable Tank Filling Limits**

##### **1 (IBC Code 15.8.26.1)**

No cargo tanks are to be more than 98% liquid full at the reference temperature.

##### **2 (IBC Code 15.8.26.2)**

The maximum volume to which a cargo tank is to be loaded is:

$$V_L = 0.98V \frac{\rho_R}{\rho_L}$$

where

$V_L$ : maximum volume to which the tank may be loaded

$V$ : volume of the tank

$\rho_R$ : relative density of cargo at the reference temperature

$\rho_L$ : relative density of cargo at the loading temperature and pressure.

##### **3 (with reference to IBC Code 15.8.26.3)**

The maximum allowable tank filling limits for each cargo tank are to be indicated for each loading temperature which may be applied, and for the applicable maximum reference temperature, on a list to be approved by the Society.

#### **15.8.34 Conditions of Carriage (IBC Code 15.8.27)\***

Cargo tanks are to be the type capable of carrying the cargo under a suitable protective padding of nitrogen gas. An automatic nitrogen make-up system is to be installed to prevent the tank pressure falling below 0.007 MPa gauge in the event of product temperature fall due to ambient conditions or maloperation of refrigeration systems. Sufficient nitrogen is to be available on board to satisfy the demand of the automatic pressure control. Nitrogen of commercially pure quality (99.9% by volume) is to be used for padding. A battery of nitrogen bottles connected to the cargo tanks through a pressure reduction valve satisfies the intention of the expression “automatic” in this context.

**15.8.35 Oxygen Content Meter (With reference to IBC Code 15.8.28)**

Oxygen content meter is to be provided to ensure that the oxygen content is 2% by volume or less.

**15.8.36 Water Spray System (With reference to IBC Code 15.8.29)**

A water-spray system of sufficient capacity is to be provided to blanket effectively the area surrounding the loading manifold, the exposed deck piping associated with product handling, and the tank domes. The arrangement of piping and nozzles is to be such as to give a uniform distribution rate of  $10\text{ l/m}^2\text{/min}$ . The water-spray system is to be capable of both local and remote manual operation, and the arrangement is to ensure that any spilled cargo is washed away.

**15.8.37 Requirement for Cargo Hose Connection (IBC Code 15.8.30)**

A remotely operated, controlled closing-rate, shutoff valve is to be provided at each cargo hose connection used during cargo transfer.

**15.9 Sodium Chlorate Solution, 50% or Less by Mass (With reference to IBC Code 15.9)****15.9.1 Cleaning of Cargo Tanks and Associated Equipment**

Tanks and associated equipment for carriage of this product are to be provided with cleaning system in order to load other cargoes.

**15.9.2 Washing System for Spilled Liquid**

Washing system is to be provided for spilled liquid.

**15.10 Sulphur (molten) (IBC Code 15.10)****15.10.1 Cargo Tank Ventilation System**

Cargo tank ventilation is to be provided to maintain the concentration of hydrogen sulphide below one half of its lower explosive limit throughout the cargo tank vapour space for all conditions of carriage, i.e. below 1.85% by volume.

**15.10.2 Alarm System for Mechanical Ventilation System**

Where mechanical ventilation systems are used for maintaining low gas concentrations in cargo tanks, an alarm system is to be provided to give warning if the system fails.

**15.10.3 Precleaning of Sulphur Depositing**

Ventilation systems are to be so designed and arranged as to preclude depositing of sulphur within the system.

**15.10.4 Openings to Void Space**

Openings to void spaces adjacent to cargo tanks are to be so designed and fitted as to prevent the entry of water, sulphur or cargo vapour.

**15.10.5 Connection for Sampling**

Connections are to be provided to permit sampling and analysing of vapour in void spaces.

**15.10.6 Cargo Temperature Controls\***

Cargo temperature controls are to be provided to ensure that the temperature of the sulphur does not exceed 155°C.

**15.10.7 Electrical Equipment**

Sulphur (molten) has a flashpoint above 60°C; however, electrical equipment is to be certified safe for gases evolved.

**15.11 Acids****15.11.1 Boundaries of Cargo Tank**

The ship's shell plating is not to form any boundaries of tanks containing mineral acids.

**15.11.2 Lining with Corrosion-resistant Materials\***

Proposals for lining steel tanks and related piping systems with corrosion-resistant materials may be considered by the Society. The elasticity of the lining is not to be less than that of the supporting boundary plating.

**15.11.3 Consideration of Corrosivity**

Unless constructed wholly of corrosion-resistant materials or fitted with an approved lining, the plating thickness is to take into

account the corrosivity of the cargo.

#### **15.11.4 Means of Guard against the Danger of Cargo being Sprayed and Leakage\***

Flanges of the loading and discharge manifold connections are to be provided with shields, which may be portable, to guard against the danger of the cargo being sprayed; and, in addition, drip trays are also to be provided to guard against leakage on to the deck.

#### **15.11.5 Electrical Arrangements**

Because of the danger of evolution of hydrogen when these substances are being carried, the electrical arrangements are to comply with [10.1.4](#). The certified safe type equipment is to be suitable for use in hydrogen-air mixtures. Other sources of ignition are not to be permitted in such spaces.

#### **15.11.6 Segregation of Cargo from Oil Fuel Tanks\***

Substances subjected to the requirements of this section are to be segregated from oil fuel tanks, in addition to the segregation requirements in [3.1.1](#).

#### **15.11.7 Apparatus for Detection of Leakage of Cargo\***

Provision is to be made for suitable apparatus to detect leakage of cargo into adjacent spaces.

#### **15.11.8 Materials of Bilge Pumping and Drainage Arrangements in Cargo Pump Room\***

The cargo pump room bilge pumping and drainage arrangements are to be of corrosion-resistant materials.

### **15.12 Toxic Products (*IBC Code 15.12*)**

#### **15.12.1 Exhaust Openings of Cargo Tank Vent Systems**

Exhaust openings of tank vent systems are to be located:

- (1) at a height of  $B/3$  or 6 m, whichever is greater, above the weather deck or, in the case of a deck tank, the access gangway;
- (2) not less than 6 m above the fore and aft gangway, if fitted within 6 m of the gangway; and
- (3) 15 m from any opening or air intake to any accommodation and service spaces;
- (4) the vent height may be reduced to 3 m above the deck or fore and aft gangway, as applicable, provided high-velocity vent valves of a type approved by the Society, directing the vapour-air mixture upwards in an unimpeded jet with an exit velocity of at least 30 m/s, are fitted.

#### **15.12.2 Connection for Return Line**

Tank venting systems are to be provided with a connection for a vapour return line to the shore installation.

#### **15.12.3 Requirements for Ships Intended to Carry Products**

Ships for carriage of these products are to be so arranged that the products:

- (1) are not stowed adjacent to oil fuel tanks;
- (2) have separate piping systems; and
- (3) have tank vent systems separate from tanks containing nontoxic products. (*See also 3.7.2*)

#### **15.12.4 Cargo Tank Relief Valve Setting Pressure**

Cargo tank relief valve settings are to be a minimum of 0.02 MPa gauge.

### **15.13 Cargoes Protected by Additives\***

#### **15.13.1 Environmental Control**

Certain cargoes with a reference in column “o” in the table of [Chapter 17](#) by the nature of their chemical make-up tend, under certain conditions of temperature, exposure to air or contact with a catalyst, to undergo polymerization, decomposition, oxidation or other chemical changes. Mitigation of this tendency is to be carried out by introducing small amounts of chemical additives into the liquid cargo or by controlling the cargo tank environment.

#### **15.13.2 Material of Construction**

Ships carrying these cargoes are to be so designed as to eliminate from the cargo tanks and cargo handling system any material of construction or contaminants which could act as a catalyst or destroy the inhibitor.

**15.13.3 Chemical Inhibition\***

Care is to be taken to ensure that these cargoes are sufficiently protected to prevent deleterious chemical change at all times during the voyage. Ships carrying such cargoes are to be provided with a certificate of protection from the manufacturer and kept during the voyage specifying:

- (1) name and amount of inhibitor added;
- (2) whether the additive is oxygen dependent;
- (3) date inhibitor was added and duration of effectiveness;
- (4) any temperature limitations qualifying the inhibitor's effective lifetime;
- (5) the action to be taken should the length of voyage exceed the effective lifetime of the inhibitor.

**15.13.4 Exclusion of Air as the Method of Preventing Self-reaction**

Ships using the exclusion of air as the method of preventing oxidation of the cargo are to comply with [9.1.3](#).

**15.13.5 A Product Containing an Oxygen Dependent Additive\***

When a product containing an oxygen-dependent inhibitor is to be carried,

- (1) in a ship for which inerting is required under the requirements of [4.5.5, Part R](#), the application of inert gas is not to take place before loading or during the voyage, but is to be applied before commencement of unloading.
- (2) in a ship to which the requirements of [4.5.5, Part R](#) does not apply, the product may be carried without inertion (in tanks of a size not greater than 3,000 m<sup>3</sup>). If inertion is to be applied on such a ship, then the application of inert gas is not to take place before loading or during the voyage, but is to be applied before commencement of unloading.

**15.13.6 Venting System**

Venting systems are to be of a design that eliminates blockage from polymer build-up. Venting equipment is to be of a type that can be checked periodically for adequacy of operation.

**15.13.7 Prevention of Crystallization or Solidification**

Crystallization or solidification of cargoes normally carried in the molten state can lead to depletion of inhibitor in parts of the tanks contents. Subsequent remelting can thus yield pockets of uninhibited liquid, with the accompanying risk of dangerous polymerization. To prevent this, care is to be taken to ensure that at no time are such cargoes allowed to crystallize or solidify, either wholly or partially, in any part of the tank. Any required heating arrangements are to be such as to ensure that in no part of the tank does cargo become overheated to such an extent that any dangerous polymerization can be initiated. If the temperature from steam coils would induce overheating, an indirect low-temperature heating system is to be used.

**15.14 Cargoes with a Vapour Pressure Greater than 0.1013 MPa Absolute at 37.8°C****15.14.1 Cargo System (With reference to IBC Code 15.14.1)**

For a cargo referenced in column "o" in the [Table S17.1](#) to this section, a mechanical refrigeration system is to be provided unless the cargo system is designed to withstand the vapour pressure of the cargo at 45°C.

**15.14.2 Mechanical Refrigeration System (IBC Code 15.14.2)**

A mechanical refrigeration system is to be of the type capable of maintaining the liquid temperature below the boiling temperature at the cargo tank design pressure.

**15.14.3 Refrigeration System for Ships Intend to Operate in Restricted Areas (With reference to IBC Code 15.14)**

When ships operate in restricted areas and at restricted times of the year, or on voyages of limited duration, the Society may agree to waive requirements for a refrigeration system.

**15.14.4 Connection for Returning Expelled Gases (IBC Code 15.14.4)**

Connections are to be provided for returning expelled gases to shore during loading.

**15.14.5 Pressure Gauge**

Each tank is to be provided with a pressure gauge which indicates the pressure in the vapour space above the cargo.

**15.14.6 Thermometer**

Where the cargo needs to be cooled, thermometers are to be provided at the top and bottom of each tank.

**15.14.7 Maximum Allowable Tank Filling Limits****1 (IBC Code 15.14.7.1)**



Cargo tanks are to be designed not to be loaded more than 98% liquid full at the reference temperature ( $R$ ).

## 2 (IBC Code 15.14.7.2)

The maximum volume ( $V_L$ ) of cargo to be loaded in a tank is to be:

$$V_L = 0.98V \frac{\rho_R}{\rho_L}$$

where

$V$ : volume of the tank

$\rho_R$ : relative density of cargo at the reference temperature ( $R$ )

$\rho_L$ : relative density of cargo at the loading temperature

$R$ : reference temperature is the temperature at which the vapour pressure of the cargo corresponds to the set pressure of the pressure relief valve.

## 3 (with reference to IBC Code 15.14.7.3)

The maximum allowable tank filling limits for each cargo tank are to be indicated for each loading temperature which may be applied, and for the applicable maximum reference temperature, on a list approved by the Society.

# 15.15 Hydrogen Sulphide( $H_2S$ ) Detection Equipment for Bulk Liquids (IBC Code 15.15)

## 15.15.1 Hydrogen Sulphide( $H_2S$ ) Detection Equipment for Bulk Liquids

Hydrogen sulphide ( $H_2S$ ) detection equipment is to be provided on board ships carrying bulk liquids prone to  $H_2S$  formation. It is to be noted that scavengers and biocides, when used, may not be 100 % effective in controlling the formation of  $H_2S$ . Toxic vapour detection instruments complying with the requirement in [13.2.1](#) for testing for  $H_2S$  may be used to satisfy this requirement.

# 15.16 Cargo Contamination (IBC Code 15.16)

## 15.16.1 (Deleted)

## 15.16.2 No Contamination with Water\*

Where column “o” in the [Table S17.1](#) refers to this section, water is not to be allowed to contaminate this cargo. In addition, the following provisions apply.

- (1) Air inlets to pressure/vacuum relief valves of tanks containing the cargo are to be situated at least 2  $m$  above the weather deck.
- (2) Water or steam is not to be used as the heat transfer media in a cargo temperature control system required by [Chapter 7](#).
- (3) The cargo is not to be carried in tanks adjacent to slop tanks or cargo tanks containing ballast or slops or other cargoes containing water which may react in a dangerous manner. Pumps, pipes or vent lines serving such tanks are to be separate from similar equipment serving tanks containing the cargo. Pipelines from slop tanks or ballast lines are not to pass through tanks containing the cargo unless encased in a tunnel.

# 15.17 Increased Ventilation Requirements (IBC Code 15.17)

## 15.17.1 Increased Ventilation Requirements\*

For certain products, the ventilation system as described in [12.2.3](#) is to have a minimum capacity of at least 45 changes of air per hour based upon the total volume of space. The ventilation system exhaust ducts are to discharge at least 10  $m$  away from openings into accommodation spaces, work areas or other similar spaces, and intakes to ventilation systems, and at least 4  $m$  above the tank deck.

# 15.18 Special Cargo Pump Room Requirements

## 15.18.1 Special Cargo Pump Room Requirements\*

For certain products, the cargo pump room is to be located on the deck level or cargo pumps are to be located in the cargo tank.

**15.19 Overflow Control****15.19.1 Application (IBC Code 15.19.1)**

The provisions of this section are applicable where specific reference is made in column “o” in the [Table S17.1](#), and are in addition to the requirements for gauging devices.

**15.19.2 Power Failure Alarm (IBC Code 15.19.2)**

In the event of a power failure on any system essential for safe loading, an alarm is to be given to the operators concerned.

**15.19.3 System for Termination of Loading Operation (IBC Code 15.19.3)**

A system is to be provided to terminate loading operation immediately, in the event of any system essential for safe loading becoming inoperative.

**15.19.4 Test of Level Alarm (IBC Code 15.19.4)\***

Level alarms are to be capable of being tested prior to loading.

**15.19.5 Independence of High Level Alarm (IBC Code 15.19.5) \***

The high-level alarm system required under [15.19.6](#) is to be independent of the overflow control system required by [15.19.7](#) and is to be independent of the equipment required by [13.1](#).

**15.19.6 Installation of High Level Alarm (IBC Code 15.19.6)\***

Cargo tanks are to be fitted with a visual and audible high-level alarm which complies with [15.19.1](#) to [15.19.5](#) and which indicates when the liquid level in the cargo tank approaches the normal full condition.

The level detecting device for the high level alarm is to be of type approved by the Society.

**15.19.7 Requirements for Tank Overflow Control System (IBC Code 15.19.7)**

A tank overflow control system required by this section is to:

- (1) come into operation when the normal tank loading procedures fail to stop the tank liquid level exceeding the normal full condition;
- (2) give a visual and audible tank overflow alarm to the ship's operator; and
- (3) provide an agreed signal for sequential shutdown of onshore pumps or valves or both and of the ship's valves. The signal, as well as the pump and valve shutdown, may be dependent on operator's intervention.
- (4) The level detecting devices used for overflow control systems are to be of type approved by the Society.

**15.19.8 The Loading Rate of the Tank (IBC Code 15.19.8)**

The tank overflow control system is to be designed considering the loading rate of the tank estimated by the following formula and is also take into account the pipeline system design pressure.

$$LR = \frac{3600U}{t} (\text{m}^3/\text{h})$$

where

*U*: ullage volume (m<sup>3</sup>) at operating signal level;

*t*: time(s) needed from the initiating signal to fully stopping the cargo flow into the tank, being the sum of times needed for each step in sequential operations such as operator's responses to signals, stopping pumps and closing valves;

**15.20 Alkyl (C7-C9) Nitrates, All Isomers (IBC Code 15.20)****15.20.1 The Carriage Temperature of the Cargo**

The carriage temperature of the cargo is to be maintained below 100°C to prevent the occurrence of a self-sustaining, exothermic decomposition reaction.

**15.20.2 Requirements for Independent Pressure Vessels**

The cargo may not be carried in independent pressure vessels permanently affixed to the vessel's deck unless:

- (1) The tanks are sufficiently insulated from fire.
- (2) The vessels has a water deluge system for the tanks such that the cargo temperature is maintained below 100°C and the temperature rise in the tanks dose not exceed 1.5°C/hour for a fire of 650°C.

**15.21 Temperature Sensors\***

Temperature sensors are to be used to monitor the cargo pump temperature detect overheating due to pump failures.

**15.22 Operational Requirements****15.22.1 Application**

The provisions in this section are not the conditions for maintenance of classification for which examinations are required but the conditions to be observed by the ship owner, ship master or other persons who may concern with the ship's operation.

**15.22.2 Ammonium Nitrate Solution, 93% or Less****1** (IBC Code 15.2.2)

Tanks and equipment for ammonium nitrate solution should be independent of tanks and equipment containing other cargoes or combustible products. Equipment which may in service, or when defective, release combustible products into the cargo, e.g. lubricants, should not be used. Tanks should not be used for seawater ballast.

**2** (IBC Code 15.2.3)

Except where expressly approved by the Administration, ammonium nitrate solutions should not be transported in tanks which have previously contained other cargoes unless tanks and associated equipment have been cleaned to the satisfaction of the Administration.

**3** (IBC Code 15.2.4)

The temperature of the heat-exchanging medium in the tank heating system should not exceed 160°C. The heating system should be provided with a control system to keep the cargo at a bulk mean temperature of 140°C. High-temperature alarms at 145°C and 150°C and a low-temperature alarm at 125°C should be provided. Where the temperature of the heatexchanging medium exceeds 160°C, an alarm should also be given. Temperature alarms and controls should be located on the navigating bridge.

**4** (IBC Code 15.2.5)

If the bulk mean cargo temperature reaches 145°C, a cargo sample should be diluted with ten parts of distilled or demineralized water to one part of cargo by weight and the acidity (*pH*) should be determined by means of a narrow range indicator paper or stick. Acidity (*pH*) measurements should then be taken every 24 hours. If the acidity (*pH*) is found to be below 4.2, ammonia gas should be injected into the cargo until the acidity (*pH*) of 5.0 is reached.

**5** (IBC Code 15.2.6)

A fixed installation should be provided to inject ammonia gas into the cargo. Controls for this system should be located on the navigation bridge. For this purpose, 300 kg of ammonia per 1,000 tonnes of ammonium nitrate solution should be available on board.

**6** (IBC Code 15.2.9)

Hot work on tanks, piping and equipment which have been in contact with ammonium nitrate solution should only be done after all traces of ammonium nitrate have been removed, inside as well as outside.

**15.22.3 Carbon Disulphide****1** Carriage under water pad (with reference to IBC Code 15.3.7)

A water pad is to be formed in this well before attempting pump removal unless the tank has been certified as gas-free.

**2** Carriage under suitable inert gas pad**(1)** (IBC Code 15.3.19)

Air is not to be allowed to enter the cargo tank, cargo pump or lines while carbon disulphide is contained in the system.

**(2)** (IBC Code 15.3.20)

No other cargo handling, tank cleaning or deballasting is to take place concurrent with loading or discharge of carbon disulphide.

**(3)** (with reference to IBC Code 15.3.21)

A water hose with pressure to the nozzle when atmospheric temperature permits, is to be connected ready for immediate use during loading and unloading operations.

**15.22.4 Hydrogen Peroxide over 60% but Not over 70% by Mass****1** (IBC Code 15.5.1.3)

Pump rooms should not be used for cargo transfer operations.

**2** (IBC Code 15.5.1.8)

The cargo should be jettisoned if the temperature rise of the cargo exceeds a rate of 2°C per hour over a 5 hour period or when the temperature in the tank exceeds 40°C.

**3** (with reference to *IBC Code 15.5.1.11*)

Only those hydrogen peroxide solutions which have a maximum decomposition rate of 1% per year at 25°C should be carried. Certification from the shipper that the product meets this standard should be presented to the master and kept on board. A technical representative of the manufacturer should be on board to monitor the transfer operations and have the capability to test the stability of the hydrogen peroxide. He should certify to the master that the cargo has been loaded in a stable condition.

**15.22.5 Hydrogen Peroxide over 8% but Not over 60% by Mass**

**1** (*IBC Code 15.5.2.2*)

Hydrogen peroxide should be carried in tanks thoroughly and effectively cleaned of all traces of previous cargoes and their vapours or ballast. Procedures for inspection, cleaning, passivation and loading of tanks should be in accordance with *MSC/Circ. 394*. A certificate should be on board the vessel indicating that the procedures in the circular have been followed. The passivation requirement may be waived by an Administration for domestic shipments of short duration. Particular care in this respect is essential to ensure the safe carriage of hydrogen peroxide.

- (1) When hydrogen peroxide is carried no other cargoes should be carried simultaneously.
- (2) Tanks which have contained hydrogen peroxide may be used for other cargoes after cleaning in accordance with the procedures outlined in *MSC/Circ. 394*.
- (3) Consideration in design should provide minimum internal tank structure, free draining, no entrapment and ease of visual inspection.

**2** (*IBC Code 15.5.2.7*)

The cargo should be jettisoned if the temperature rise of the cargo exceeds a rate of 2°C per hour over a 5 hour period or when the temperature in the tank exceeds 40°C.

**3** (with reference to *IBC Code 15.5.2.10*)

Only those hydrogen peroxide solutions which have a maximum decomposition rate of 1% per year at 25°C should be carried. Certification from the shipper that the product meets this standard should be presented to the master and kept on board. A technical representative of the manufacturer should be on board to monitor the transfer operations and have the capability to test the stability of the hydrogen peroxide. He should certify to the master that the cargo has been loaded in a stable condition.

**4** (with reference to *IBC Code 15.5.2.12*)

The piping system for loading and unloading hydrogen peroxide is to be separated from other piping system while transferring this product.

**15.22.6 Motor Fuel Anti-knock Compounds Containing Lead Alkyls**

**1** (*IBC Code 15.6.3*)

Entry into cargo tanks used for the transportation of these cargoes is not permitted unless approved by the Administration.

**2** (*IBC Code 15.6.4*)

Air analysis should be made for lead content to determine if the atmosphere is satisfactory prior to allowing personnel to enter the cargo pump room or void spaces surrounding the cargo tank.

**15.22.7 Phosphorus, Yellow or White**

**1** (*IBC Code 15.7.1*)

Phosphorus should, at all times, be loaded, carried and discharged under a water pad of 760 mm minimum depth. During discharge operations, arrangements should be made to ensure that water occupies the volume of phosphorus discharged. Any water discharged from a phosphorus tank should be returned only to a shore installation.

**2** (*IBC Code 15.7.6*)

Phosphorus should be loaded at a temperature not exceeding 60°C.

**3** (*IBC Code 15.7.11*)

During cargo transfer, a water hose on deck should be connected to a water supply and kept flowing throughout the operation so that any spillage of phosphorus may be washed down with water immediately.

**15.22.8 Propylene Oxide or Ethylene Oxide/Propylene Oxide Mixtures with an Ethylene Oxide Content of not more than 30% by Mass****1** (IBC Code 15.8.2)

Unless cargo tanks are properly cleaned, these products should not be carried in tanks which have contained as one of the three previous cargoes any products known to catalyse polymerization, such as:

- (1) mineral acids (e.g. sulphuric, hydrochloric, nitric);
- (2) carboxylic acids and anhydrides (e.g. formic, acetic);
- (3) halogenated carboxylic acids (e.g. chloracetic);
- (4) sulphonic acids (e.g. benzene sulphonic);
- (5) caustic alkalis (e.g. sodium hydroxide, potassium hydroxide);
- (6) ammonia and ammonia solutions;
- (7) amines and amine solutions;
- (8) oxidizing substances.

**2** (IBC Code 15.8.3)

Before loading, tanks should be thoroughly and effectively cleaned, to remove all traces of previous cargoes from tanks and associated pipework, except where the immediately prior cargo has been propylene oxide or ethylene oxide/propylene oxide mixtures. Particular care should be taken in the case of ammonia in tanks made of steel other than stainless steel.

**3** (IBC Code 15.8.4)

In all cases, the effectiveness of cleaning procedures for tanks and associated pipework should be checked by suitable testing or inspection, to ascertain that no traces of acidic or alkaline materials remain that might create a hazardous situation in the presence of these products.

**4** (IBC Code 15.8.5)

Tanks should be entered and inspected prior to each initial loading of these products to ensure freedom from contamination, heavy rust deposits and visible structural defects. When cargo tanks are in continuous service for these products, such inspections should be performed at intervals of not more than two years.

**5** (IBC Code 15.8.7)

Tanks for the carriage of these products may be used for other cargoes after thorough cleaning of tanks and associated pipework systems by washing or purging.

**6** (with reference to IBC Code 15.8.14.2)

The products should be loaded and discharged in such a manner that venting of the tanks to atmosphere does not occur.

**7** (IBC Code 15.8.14.3)

During discharge operations, the pressure in the cargo tank must be maintained above 0.007 MPa gauge.

**8** (with reference to IBC Code 15.8.18)

The oxygen content of these spaces should be maintained below 2%.

**9** (IBC Code 15.8.19)

In no case should air be allowed to enter the cargo pump or piping system while these products are contained within the system.

**10** (IBC Code 15.8.22.2)

The refrigeration requirement for tanks with a design pressure less than 0.06 MPa gauge may be waived by the Administration for ships operating in restricted areas or on voyages of restricted duration, and account may be taken in such cases of any insulation of the tanks. The area and times of year for which such carriage would be permitted should be included in the conditions of carriage of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk.

**11** (IBC Code 15.8.23.4)

Cooling systems requiring compression of the products should not be used.

**12** (with reference to IBC Code 15.8.25.2)

These products may be transported only in accordance with cargo handling plans that have been approved by the Administration. Each intended loading arrangement should be shown on a separate cargo handling plan. Cargo handling plans should show the entire cargo piping system and the locations for installation of blank flanges needed to meet the above piping separation requirements. A copy of each approved cargo handling plan should be maintained on board the ship.

**13** (with reference to *IBC Code 15.8.25.2*)

These products may be transported only in accordance with cargo-handling plans that have been approved by the Administration. Each intended loading arrangement should be shown on a separate cargo-handling plan. Cargo-handling plans should show the entire cargo piping system and the locations for installation of blank flanges needed to meet the above piping separation requirements. A copy of each approved cargo-handling plan should be maintained on board the ship. The International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk should be endorsed to include reference to the approved cargo-handling plans.

**14** (*IBC Code 15.8.25.3*)

Before each initial loading of these products and before every subsequent return to such service, certification verifying that the required piping separation has been achieved should be obtained from a responsible person acceptable to the Port Administration and carried on board the ship. Each connection between a blank flange and a pipeline flange should be fitted with a wire and seal by the responsible person to ensure that inadvertent removal of the blank flange is impossible.

**15** (*IBC Code 15.8.26.1*)

No cargo tanks should be more than 98% liquid full at the reference temperature (See [15.8.24](#)).

**16** (*IBC Code 15.8.26.3*)

The maximum allowable tank filling limits for each cargo tank should be indicated for each loading temperature which may be applied, and for the applicable maximum reference temperature, on a list to be approved by the Administration. A copy of the list should be permanently kept on board by the master.

**17** (*IBC Code 15.8.28*)

The cargo tank vapour space should be tested prior to and after loading to ensure that the oxygen content is 2% by volume or less.

**18** (with reference to *IBC Code 15.8.29*)

A water hose with pressure to the nozzle, when atmospheric temperatures permit, should be connected ready for immediate use during loading and unloading operations.

**15.22.9 Sodium Chlorate Solution, 50% or Less by Mass (*IBC Code 15.9*)**

**1** Tanks and associated equipment which have contained this product may be used for other cargoes after thorough cleaning by washing or purging.

**2** In the event of spillage of this product, all spilled liquid should be thoroughly washed away without delay. To minimize fire risk, spillage should not be allowed to dry out.

**15.22.10 Cargoes with a Vapour Pressure Greater than 0.1013 MPa Absolute at 37.8°C****1** (with reference to *IBC Code 15.14.1*)

Where the cargo system is designed to withstand the vapour pressure of the cargo at 45°C, and no refrigeration system is provided, a notation should be made in the conditions of carriage on the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk to indicate the required relief valve setting for the tanks.

**2** (*IBC Code 15.14.3*)

When ships operate in restricted areas and at restricted times of the year, or on voyages of limited duration, the Administration involved may agree to waive requirements for a refrigeration system. A notation of any such agreement, listing geographic area restrictions and times of the year, or voyage duration limitations, should be included in the conditions of carriage on the International Certificate for the Carriage of Dangerous Chemicals in Bulk.

**3** (*IBC Code 15.14.7.1*)

No cargo tanks should be more than 98% liquid full at the reference temperature (*R*).

**4** (*IBC Code 15.14.7.3*)

The maximum allowable tank filling limits for each cargo tank should be indicated for each loading temperature which may be applied, and for the applicable maximum reference temperature, on a list approved by the Administration. A copy of the list should be permanently kept on board by the master.

**15.22.11 Cargo Contamination****1** (with reference to *IBC Code 15.16.2*)

Where column “o” in the [Table S17.1](#) refers to this sub-paragraph, water should not be allowed to contaminate this cargo. In addition, the cargo should not be carried in cargo tanks adjacent to permanent ballast or water tanks unless the tanks are empty and dry.

**15.22.12 Overflow Control****1** (IBC Code 15.19.3)

Loading operations should be terminated at once in the event of any system essential for safe loading becoming inoperative.

**2** (IBC Code 15.19.8)

The loading rate ( $L_R$ ) of the tank should not exceed:

$$LR = \frac{3600U}{t} (\text{m}^3/\text{h})$$

where

$U$ : ullage volume (m<sup>3</sup>) at operating signal level;

$t$ : time (s) needed from the initiating signal to fully stopping the cargo flow into the tank, being the sum of times needed for each step in sequential operations such as operator's responses to signals, stop ping pumps and closing valves;

and should also take into account the pipeline system design pressure.

**15.22.13 Procedures for Inspection, Cleaning, Passivation and Loading of Tanks for the Carriage of Hydrogen Peroxide Solutions 8-60%, which Have Contained Other Cargoes, or for the Carriage of Other Cargoes after the Carriage of Hydrogen Peroxide****1** (IBC Code 15.5.3.1)

Tanks having contained cargoes other than hydrogen peroxide should be inspected, cleaned and passivated before re-use for the transport of hydrogen peroxide solutions. The procedures for inspection and cleaning, as given in -2 to -8 below, apply to both stainless steel and pure aluminium tanks (see 15.22.5-1). Procedures for passivation are given in -9 for stainless steel and -10 for aluminium. Unless otherwise specified, all steps apply to the tanks and to all associated equipment having been in contact with the other cargo.

**2** (IBC Code 15.5.3.2)

After unloading the previous cargo the tank should be rendered safe and inspected for any residues, scale and rust.

**3** (IBC Code 15.5.3.3)

Tanks and associated equipment should be washed with clean filtered water. The water to be used should at least have the quality of potable water with a low chlorine content.

**4** (IBC Code 15.5.3.4)

Trace residues and vapours of the previous cargo should be removed by steaming of tank and equipment.

**5** (IBC Code 15.5.3.5)

Tank and equipment are washed again with clean water (quality as above) and dried, using filtered, oil-free air.

**6** (IBC Code 15.5.3.6)

The atmosphere in the tank should be sampled and investigated for the presence of organic vapours and oxygen concentration.

**7** (IBC Code 15.5.3.7)

The tank should be checked again by visual inspection for residues of the previous cargo, scale and rust as well as for any smell of the previous cargo.

**8** (IBC Code 15.5.3.8)

If inspection or measurements indicate the presence of residues of the previous cargo or its vapours, actions described in -3 to -5 should be repeated.

**9** (IBC Code 15.5.3.9)

Tank and equipment made from stainless steel which have contained other cargoes than hydrogen peroxide or which have been under repair should be cleaned and passivated, regardless of any previous passivation, according to the following procedure:

- (1) New welds and other repaired parts should be cleaned and finished using stainless steel wire brush, chisel, sandpaper or buff. Rough surfaces should be given a smooth finish. A final polishing is necessary.
- (2) Fatty and oily residues should be removed by the use of appropriate organic solvents or detergent solutions in water. The use of chlorine-containing compounds should be avoided as they can seriously interfere with passivation.
- (3) The residues of the degreasing agent should be removed, followed by a washing with water.
- (4) In the next step, scale and rust should be removed by the application of acid (e.g. a mixture of nitric and hydrofluoric acids), followed again by a washing with clean water.
- (5) All the metal surfaces which can come into contact with hydrogen peroxide should be passivated by the application of nitric

acid of a concentration between 10 and 35% by mass. The nitric acid must be free from heavy metals, other oxidizing agents or hydrogen fluoride. The passivation process should continue for 8 to 24 *hours*, depending upon the concentration of acid, the ambient temperature and other factors. During this time a continuous contact between the surfaces to be passivated and the nitric acid should be ensured. In the case of large surfaces this may be achieved by recirculating the acid. Hydrogen gas may be evolved in the passivation process, leading to the presence of an explosive atmosphere in the tanks. Therefore, appropriate measures must be taken to avoid the build-up or the ignition of such an atmosphere.

- (6) After passivation the surfaces should be thoroughly washed with clean filtered water. The washing process should be repeated until the effluent water has the same *pH* value as the incoming water.
- (7) Surfaces treated according to the above steps may cause some decomposition when coming into contact with hydrogen peroxide for the first time. This decomposition will cease after a short time (usually within two or three days). Therefore an additional flushing with hydrogen peroxide for a period of at least two days is recommended.
- (8) Only degreasing agents and acid cleaning agents which have been recommended for this purpose by the manufacturer of the hydrogen peroxide should be used in the process.

#### **10 (IBC Code 15.5.3.10)**

Tanks and equipment made from aluminium and which have contained cargoes other than hydrogen peroxide, or which have been under repair, should be cleaned and passivated. The following is an example of a recommended procedure:

- (1) The tank should be washed with a solution of a sulphonated detergent in hot water, followed by a washing with water.
- (2) The surface should then be treated for 15 to 20 *min* with a solution of sodium hydroxide of a concentration of 7% by mass or treated for a longer period with a less concentrated solution (e.g. for 12 h with 0.4 to 0.5% sodium hydroxide). To prevent excessive corrosion at the bottom of the tank when treating with more concentrated solutions of sodium hydroxide, water should be added continuously to dilute the sodium hydroxide solution which collects there.
- (3) The tank should be thoroughly washed with clean, filtered water. As soon as possible after washing, the surface should be passivated by the application of nitric acid of a concentration between 30 and 35% by mass. The passivation process should continue for 16 to 24 *hours*. During this time a continuous contact between the surfaces to be passivated and the nitric acid should be ensured.
- (4) After passivation the surfaces should be thoroughly washed with clean, filtered water. The washing process should be repeated until the effluent water has the same *pH* value as the incoming water.
- (5) A visual inspection should be made to ensure that all surfaces have been treated. It is recommended that an additional flushing is carried out for a minimum of 24 *hours* with dilute hydrogen peroxide solution of a concentration approximately 3% by mass.

#### **11 (IBC Code 15.5.3.11)**

The concentration and stability of the hydrogen peroxide solution to be loaded should be determined.

#### **12 (IBC Code 15.5.3.12)**

The hydrogen peroxide is loaded under intermittent visual supervision of the interior of the tank from an appropriate opening.

#### **13 (IBC Code 15.5.3.13)**

If substantial bubbling is observed which does not disappear within 15 *min* after the completion of loading, the contents of the tank should be unloaded and disposed of in an environmentally safe manner. The tank and equipment should then be repassivated as described above.

#### **14 (IBC Code 15.5.3.14)**

The concentration and stability of the hydrogen peroxide solution should be determined again. If the same values are obtained within the limits of error as in -10, the tank is considered to be properly passivated and the cargo ready for shipment.

#### **15 (IBC Code 15.5.3.15)**

Actions described in paragraphs -2 to -8 should be carried out under the supervision of the master or shipper. Actions described in paragraphs -9 to -14 should be carried out under the on-site supervision and responsibility of a representative of the hydrogen peroxide manufacturer or under supervision and responsibility of another person familiar with the safety-relevant properties of hydrogen peroxide.

#### **16 (IBC Code 15.5.3.16)**

The following procedure should be applied when tanks having contained hydrogen peroxide solution are to be used for other products (unless otherwise specified, all steps apply to the tanks and to all associated equipment having been in contact with hydrogen peroxide):



- (1) Hydrogen peroxide cargo residue should be drained as completely as possible from tanks and equipment.
- (2) Tanks and equipment should be rinsed with clean water, and subsequently thoroughly washed with clean water.
- (3) The interior of the tank should be dried and inspected for any residues.

Steps (1) to (3), in this sub-paragraph, should be carried out under the supervision of the master or the shipper.

Step (3), in this sub-paragraph, should be carried out by a person familiar with the safety-relevant properties of the chemical to be transported and of hydrogen peroxide.

#### **17 Special Cautions**

- (1) Hydrogen peroxide decomposition may enrich the atmosphere with oxygen and appropriate precautions should be observed.
- (2) Hydrogen gas may be evolved in the passivation processes described in paragraphs -9(5), -10(2) and -10(4), leading to the presence of an explosive atmosphere in the tank. Therefore, appropriate measures must be taken to avoid the build-up or the ignition of such an atmosphere.

## Chapter 16 OPERATIONAL REQUIREMENTS

### 16.1 (Deleted)

### 16.2 Operational Requirements

#### 16.2.1 Application

The provisions in this section are not the conditions for maintenance of classification for which examinations are required but the conditions to be observed by the ship owner, ship master or other persons who may concern with the ship's operation.

#### 16.2.2 Maximum Allowable Quantity of Cargo per Tank (*IBC Code 16.1*)\*

- 1 The quantity of a cargo required to be carried in a type I ship should not exceed 1,250  $m^3$  in any one tank.
- 2 The quantity of a cargo required to be carried in a type II ship should not exceed 3,000  $m^3$  in any one tank.
- 3 Tanks carrying liquids at ambient temperatures should be so loaded as to avoid the tank becoming liquid-full during the voyage, having due regard to the highest temperature which the cargo may reach.

#### 16.2.3 Cargo Information (*IBC Code 16.2*)\*

1 A Copy of *IBC Code*, or national regulations incorporating the provisions of *IBC Code* should be on board every ship covered by *IBC Code*.

2 Any cargo offered for bulk shipment should be indicated in the shipping documents by the correct technical name. Where the cargo is a mixture, an analysis indicating the dangerous components contributing significantly to the total hazard of the product should be provided, or a complete analysis if this is available. Such an analysis should be certified by the manufacturer or by an independent expert acceptable to the Administration.

3 Information should be on board, and available to all concerned, giving the necessary data for the safe carriage of the cargo. Such information should include a cargo stowage plan to be kept in an accessible place, indicating all cargo on board, including each dangerous chemical carried:

- (1) a full description of the physical and chemical properties, including reactivity necessary for the safe containment of the cargo;
- (2) action to be taken in the event of spills or leaks;
- (3) counter-measures against accidental personal contact;
- (4) fire-fighting procedures and fire-fighting media;
- (5) procedures for cargo transfer, tank cleaning, gas-freeing and ballasting;
- (6) for those cargoes required to be stabilized or inhibited in accordance with [15.13.3](#), the cargo should be refused if the certificate required by [15.13.3](#) is not supplied.

4 If sufficient information necessary for the safe transportation of the cargo is not available, the cargo should be refused.

5 Cargoes which evolve highly toxic imperceptible vapours should not be transported unless perceptible additives are introduced into the cargo.

6 Where column “o” in the [Table S17.1](#) refers to this paragraph, the cargo's viscosity at 20°C should be specified on a shipping document and if the cargo's viscosity exceeds 50  $mPa \cdot s$  at 20°C, the temperature at which the cargo has a viscosity of 50  $mPa \cdot s$  should be specified in the shipping document.

7 Where column “o” in the [Table S17.1](#) refers to this paragraph, the cargo's melting point should be indicated in the shipping document.

8 Where column “o” in the [Table S17.1](#) refers to this paragraph, the cargo is subject to the prewash requirements in regulation 13.7.1.4 of Annex II of *MARPOL 73/78*.

#### 16.2.4 Personnel Training (*IBC Code 16.3*)

1 Reference is made to the provisions of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, and in particular to the “Mandatory minimum requirements for the training and qualifications of masters, officers and ratings of chemical tankers”-regulation V/2, chapter V of the Annex to that Convention and to resolution 11 of the International

Conference on Training and Certification of Seafarers, 1978.

2 All personnel should be adequately trained in the use of protective equipment and have basic training in the procedures appropriate to their duties, necessary under emergency conditions.

3 Personnel involved in cargo operations should be adequately trained in handling procedures.

4 Officers are to be trained in emergency procedures to deal with conditions of leakage, spillage or fire involving the cargo, based on the *MEDICAL FIRST AID GUIDE FOR USE IN ACCIDENTS INVOLVING DANGEROUS GOODS (MFAG)* and to the relevant provisions of the *STCW Code*, parts A and B, and a sufficient number of them is to be instructed and trained in essential first aid for cargoes carried.

#### **16.2.5 Opening of and Entry into Cargo Tank (IBC Code 16.4)\***

1 During handling and carriage of cargoes producing flammable or toxic vapours, or both, or when ballasting after the discharge of such cargo, or when loading or unloading cargo, cargo tank lids should always be kept closed. With any hazardous cargo, cargo tank lids, ullage and sighting ports and tank washing access covers should be open only when necessary.

2 Personnel should not enter cargo tanks, void spaces around such tanks, cargo handling spaces or other enclosed spaces unless:

- (1) the compartment is free of toxic vapours and not deficient in oxygen; or
- (2) personnel wear breathing apparatus and other necessary protective equipment, and the entire operation is under the close supervision of a responsible officer.

3 Personnel should not enter such spaces when the only hazard is of a purely flammable nature, except under the close supervision of a responsible officer.

#### **16.2.6 Stowage of Cargo Samples (IBC Code 16.5)\***

1 Samples which have to be kept on board should be stowed in a designated space situated in the cargo area or, exceptionally, elsewhere, subject to the approval of the Administration.

2 The stowage space should be:

- (1) cell-divided in order to avoid shifting of the bottles at sea;
- (2) made of material fully resistant to the different liquids intended to be stowed; and
- (3) equipped with adequate ventilation arrangements.

3 Samples which react with each other dangerously should not be stowed close to each other.

4 Samples should not be retained on board longer than necessary.

#### **16.2.7 Cargoes Not to be Exposed to Excessive Heat (IBC Code 16.6)\***

1 Where the possibility exists of a dangerous reaction of a cargo such as polymerization, decomposition, thermal instability or evolution of gas, resulting from local overheating of the cargo in either the tank or associated pipelines, such cargo should be loaded and carried adequately segregated from other products whose temperature is sufficiently high to initiate a reaction of such cargo (*See 7.1.5(4)*).

2 Heating coils in tanks carrying this product should be blanked off or secured by equivalent means.

3 Heat-sensitive products should not be carried in deck tanks which are not insulated.

4 In order to avoid elevated temperatures, this cargo should not be carried in deck tanks.

#### **16.2.8 (Deleted)**

(Deleted)

#### **16.3 (Deleted)**

(Deleted)

#### **16.4 (Deleted)**

(Deleted)

## Chapter 17 SUMMARY OF MINIMUM REQUIREMENTS (with reference to *IBC Code* Chapter 17)

### 17.1 General

#### 17.1.1 Application\*

The requirements for each product mentioned in column “e” to “o” in the [Table S17.1](#) apply to the ship in accordance with the provisions in which refer to the table. The contents of each column in the [Table S17.1](#) are as follows. Further, Minimum requirements to ships intended to carry mixtures of noxious liquid substances presenting pollution hazards only and which are provisionally assessed under regulation 6.3 of Annex II of *MARPOL 73/78*, are to be to the satisfaction of the Society.

(1) Product name (column **a**)

Product names are to be used in the shipping document for any cargo offered for bulk shipments. In some cases, the product names are not identical with the names given in previous issues of the *Code*, or the *BCH Code* for explanation see index of chemicals.

(2) Pollution category (column **c**)

The letter *X*, *Y* or *Z* means the pollution category assigned to each product under Annex II of *MARPOL 73/78*.

(3) Hazards (column **d**)

“**S**” means that the product is included in this Part because of its safety hazards;

“**P**” means that the product is included in this Part because of its pollution hazards; and

“**S/P**” means that the product is included in this Part because of both its safety and pollution hazards.

(4) Ship type (column **e**)

1 = ship type I (See [2.1.2](#))

2 = ship type II (See [2.1.2](#))

3 = ship type III (See [2.1.2](#))

(5) Tank type (column **f**)

1 = independent tank (See [4.1.1](#))

2 = integral tank (See [4.1.2](#))

**G** = gravity tank (See [4.1.3](#))

**P** = pressure tank (See [4.1.4](#))

(6) Tank vents (column **g**)

*Open*: open venting

*Cont*: controlled venting

(7) Tank environmental control (column **h**)

*Inert*: inerting (See [9.1.2\(1\)](#))

*Pad*: liquid or gas padding (See [9.1.2\(2\)](#))

*Dry*: drying (See [9.1.2\(3\)](#))

*Vent*: natural or force ventilation (See [9.1.2\(4\)](#))

*No*: no special requirements under this Part

(Inerting may be required under the requirements of [Part R](#))

(8) Electrical equipment

(column **i'**) temperature classes **T1** to **T6**

“-” indicates no requirements.

Blank indicates no information.

(column **i''**) apparatus groups **IIA**, **IIB** or **IIC**

“-” indicates no requirements.

Blank indicates no information.

(column i”)

*Yes*: flashpoint exceeding 60°C (closed cup test) (See 10.1.6.)

*No*: flashing point not exceeding 60°C (closed cup test) (See 10.1.6)

*NF*: none-flammable product (See 10.1.6)

(9) Gauging (column j)

*O*: open gauging (13.1.1(1))

*R*: restricted gauging (13.1.1(2))

*C*: closed gauging (13.1.1(3))

(10) Vapour detection (column k)

*F*: flammable vapours

*T*: toxic vapours

“*No*” indicates nil requirements.

(11) Fire extinguishing (column l)

*A*: alcohol-resistant foam or multi-purpose foam

*B*: regular foam, encompasses all foams that are not of an alcohol-resistant type, including fluoroprotein and aqueous-film-forming foam (*AFFF*)

*C*: water-spray

*D*: dry chemical powder systems when used may require an additional water system for boundary cooling. This is normally provided in sufficient quantities by standard fire main system as specified in 10.2, Part R. (regulation II-2/10 of the 1974 *SOLAS* Convention as amended.)

*No*: no special requirements under this Part.

Combination of symbol of fire extinguishing system are follows:

*A, D*: “*A*” is to be provided, “*D*” may be provided as optional system.

*B, D*: “*B*” is to be provided, “*D*” may be provided as optional system.

*A, C / D*: “*A*” is to be provided, “*C*” and “*D*”, or “*C*” or “*D*” may be provided as optional system.

*B, C*: “*B*” is to be provided, “*C*” may be provided as optional system.

*C, D*: “*C*” or “*D*” is to be provided. However, if ships mainly carry only one product, a fire extinguishing system has no objection to provided for system indicated column “l” in the Table S17.1.

(12) Respiratory and eye protection (column n)

*Yes*: See 14.2.8

*No*: no special requirements under this part.

(13) Special requirements (column o)

Paragraphs in brackets indicates paragraphs of *IBC Code*.

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Acetic acid	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>No</i>	<i>C</i>	<i>F</i>	<i>AC</i>	<i>Yes</i>	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.17, 15.19, 16.2.3-7 (16.2.9)
Acetic anhydride	<i>Z</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.12.4, 15.19.6
Acetochlor	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-6. (16.2.6), 16.2.3-7 (16.2.9)
Acetone cyanohydrin	<i>Y</i>	<i>S/P</i>	1	1G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.13, 15.17, 15.19 & 15.22.12 (15.19), 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2), 16.2.7-3 (16.6.3)
Acetonitrile	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Acetonitrile (Low purity grade)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Acid oil mixture from soya bean, corn (maize) and sunflower oil refining	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6(16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Acrylamide solution (50 % or less)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>No</i>	15.12, 15.13, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9), 16.2.7-1 (16.6.1)
Acrylic acid	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.12.4, 15.13, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9), 16.2.7-1(16.6.1)
Acrylic acid/ethenesulphonic acid copolymer with phosphonate groups,	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
sodium salt solution														
Acrylonitrile	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>II B</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.13, 15.17, 15.19 & 15.22.12 (15.19)
Acrylonitrile-Styrene copolymer dispersion in polyether polyol	<i>Y</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Adiponitrile	<i>Z</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Alachlor technical (90 % or more)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6, 16.2.3-7 (16.2.9)
Alcohol (C9– C11) poly (2.5– 9) ethoxylate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Alcohol (C6-C17) (secondary) poly(3-6)ethoxylates	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Alcohol (C6– C17) (secondary) poly (7– 12) ethoxylates	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Alcohol (C10 – C18) poly (7) ethoxylate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> (16.2.6), <a href="#">16.2.3-7</a> (16.2.9)
Alcohol (C12 – C16) poly (1 – 6) ethoxylates	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-7</a> (16.2.9)
Alcohol (C12 – C16) poly (20+) ethoxylates	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-7</a> (16.2.9)
Alcohol (C12 – C16) poly (7– 19) ethoxylates	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> (15.19), <a href="#">16.2.3-7</a> (16.2.9)
Alcohols (C13+)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-7</a> (16.2.9)
Alcohols (C12+), primary, linear	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> (16.2.6), <a href="#">16.2.3-7</a> (16.2.9)



Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Alcohols (C8 – C11), primary, linear and essentially linear	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Alcohols (C12 – C13), primary, linear and essentially linear	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Alcohols (C14 – C18), primary, linear and essentially linear	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Alkanes (C6 – C9)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6
Iso-and cyclo-alkanes (C10 – C11)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Iso-and cyclo-alkanes (C12+)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
n-Alkanes (C9 – C11)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
n-Alkanes (C10 – C20)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Alkaryl polyethers (C9 – C20)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6)
Alkenoic acid, polyhydroxy ester borated	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6)
Alkenyl (C11+) amide	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Alkenyl (C16– C20) succinic anhydride	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> )
Alkyl acrylate/vinylpyridine copolymer in toluene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
Alkylaryl phosphate mixtures (more than 40 % Diphenyl tolyl phosphate, less than 0.02 % ortho-isomers)	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a>
Alkylated (C4 – C9) hindered phenols	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
Alkylbenzene, alkylindane, alkylindene mixture (each C12 – C17)	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Alkyl benzene distillation bottoms	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> )
Alkylbenzene mixtures (containing at least 50 % of toluene)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19.6</a>
Alkylbenzenes mixtures (containing naphthalene)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19.6</a>
Alkyl (C3 – C4) benzenes	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a>
Alkyl (C5 – C8) benzenes	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a>
Alkyl( C9+)benzenes	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a>

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Alkyl (C11 – C17) benzene sulphonic acid	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6)
Alkylbenzene sulphonic acid, sodium salt solution	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Alkyl/cyclo (C4 – C5) alcohols	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Alkyl (C10 – C15, C12 rich) phenol poly (4 – 12) ethoxylate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6)
Alkyl (C12+) dimethylamine	<i>X</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Alkyl dithiocarbamate (C19 – C35)	<i>Y</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Alkyldithiothiadiazole (C6 – C24)	<i>Y</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Alkyl ester copolymer (C4 – C20)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Alkyl (C7– C9) nitrates	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.17, 15.19.6 & 15.22.12 (15.19), 15.20, 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2), 16.2.7-3 (16.6.3)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Alkyl (C8 – C10)/(C12 – C14): (40 % or less/60 % or more) polyglucoside solution (55 % or less)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> ), <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
Alkyl (C8 – C10)/(C12 – C14): (60 % or more/40 % or less) polyglucoside solution(55 % or less)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
Alkyl (C7 – C11) phenol poly (4 – 12) ethoxylate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a>
Alkyl (C8 – C40) phenol sulphide	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	
Alkyl (C8 – C9) phenylamine in aromatic solvents	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a>
Alkyl (C9 – C15) phenyl propoxylate	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a>
Alkyl (C8 – C10) polyglucoside solution (65 % or less)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> )
Alkyl (C8 – C10)/(C12-C14): (50 %/50 %) polyglucoside solution (55 % or less)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> ), <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Alkyl (C12 – C14) polyglucoside solution (55 % or less)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Alkyl (C12 – C16) propoxyamine ethoxylate	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6(16.2.6)
Alkyl (C10 – C20, saturated and unsaturated) phosphite	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Alkyl sulphonic acid ester of phenol	<i>Y</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Alkyl (C18+) toluenes	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Alkyl (C18 – C28)toluenesulphonic acid	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12, 15.17, 15.19&15.22.12(15.19), 16.2.3-6(16.2.6), 16.2.3-7 (16.2.9)
Alkyl (C18 – C28)toluenesulphonic acid, calcium salts, borated	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Alkyl (C18 – C28)toluenesulphonic acid, calcium salts, low overbase	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6(16.2.6)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Alkyl (C18 – C28)toluenesulphonic acid, calcium salts, high overbase	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Allyl alcohol	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Allyl chloride	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Aluminium chloride/Hydrogen chloride solution	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.11, 15.12, 15.17, 15.19&15.22.12(15.19)
Aluminium hydroxide, sodium hydroxide, sodium carbonate solution (40 % or less)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Aluminium sulphate solution	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
2-(2-Aminoethoxy) ethanol	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AD</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Aminoethyldiethanolamine/Aminoethyle thanolamine solution	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Aminoethyl ethanolamine	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
N-Aminoethylpiperazine	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
2-Amino-2-methyl-1-propanol	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Ammonia aqueous (28 % or less)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Ammonium chloride solution (less than 25 %)	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Ammonium hydrogen phosphate solution	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Ammonium lignosulphonate solutions	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.3-7 (16.2.9)
Ammonium nitrate solution (93 % or less)	Z	S/P	2	1G	Cont	No			NF	R	T	No	No	15.2 & 15.22.2 (15.2), 15.11.4, 15.11.6, 15.12.3, 15.12.4, 15.18, 15.19.6, 16.2.3-7 (16.2.9)
Ammonium polyphosphate solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Ammonium sulphate solution	Z	P	3	2G	Open	No			NF	O	No	No	No	
Ammonium sulphide solution (45 % or less)	Y	S/P	2	2G	Cont	Inert	T4	IIB	No	C	F-T	AC	No	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2), 16.2.7-3 (16.6.3)
Ammonium thiosulphate solution (60 % or less)	Z	S/P	3	2G	Open	No			NF	O	No	No	No	
Amyl acetate (all isomers)	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	15.19.6
n-Amyl alcohol	Z	S/P	2	2G	Cont	No	T2	IIA	No	C	F-T	ABC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Amyl alcohol, primary	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F-T	ABC	No	15.12.3, 15.12.4, 15.19.6
sec-Amyl alcohol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F-T	ABC	No	15.12.3, 15.12.4, 15.19.6
tert-Amyl alcohol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
tert-Amyl ethyl ether	Z	P	3	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.19.6
tert-Amyl methyl ether	X	S/P	2	2G	Cont	No	T2	IIB	No	R	F-T	AC	No	15.12.3, 15.12.4, 15.19.6
Aniline	Y	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	AC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Aryl polyolefins (C11 – C50)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Aviation alkylates (C8 paraffins and iso-paraffins BPT 95 – 120 °C)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
Barium long chain (C11 – C50) alkaryl sulphonate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Benzene and mixtures having 10 benzene or more (i)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12, 15.17, 15.19.6, 16.2.3-7 (16.2.9)
Benzene sulphonyl chloride	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Benzenetricarboxylic acid, trioctyl ester	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6(16.2.6)
Benzyl acetate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Benzyl alcohol	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Benzyl chloride	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.13, 15.17, 15.19 & 15.22.12 (15.19)
Bio-fuel blends of diesel/gas oil and FAME (>25 % but < 99 % by volume)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12, 15.17, 15.19.6
Bio-fuel blends of diesel/gas oil and vegetable oil (>25% but < 99 % by volume)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12, 15.17, 15.19.6
Bio-fuel blends of gasoline and ethyl alcohol(>25 % but <99 % by volume)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6
Bis (2-ethylhexyl) terephthalate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Brake fluid base mix: Poly (2 – 8) alkylene (C2 – C3) glycols/Polyalkylene (C2 – C10) glycols monoalkyl (C1 – C4)	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	



Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
ethers and their borate esters														
Bromochloromethane	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	
Butene oligomer	<i>X</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T4</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
2-Butoxyethanol (58 %)/Hyperbranched polyesteramide (42 %) (mixture)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19)
Butyl acetate (all isomers)	<i>Y</i>	<i>P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Butyl acrylate (all isomers)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.13, 15.19.6, 16.2.7-1 (16.6.1), 16.2.7-2(16.6.2)
tert-Butyl alcohol	<i>Z</i>	<i>P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Butylamine (all isomers)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Butylbenzene (all isomers)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Butyl benzyl phthalate	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6
Butyl butyrate (all isomers)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
Butyl/Decyl/Cetyl/ Eicosyl methacrylate mixture	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.13, 15.19.6, 16.2.7-1 (16.6.1), 16.2.7-2(16.6.2)
Butylene glycol	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
1,2-Butylene oxide	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>Inert</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.8.1~15.8.7 & 15.22.8-1~15.22.8-5 (15.8.1~15.8.7), 15.8.12, 15.8.13, 15.8.17 (15.8.16), 15.8.19 (15.8.17), 15.8.20 & 15.22.8-8 (15.8.18), 15.8.21 & 15.22.8-9 (15.8.19), 15.8.23 (15.8.21), 15.8.31~15.8.33 &

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
														15.22.8-12~15.22.8-14 (15.8.25), 15.8.35 (15.8.35), 15.8.37 & 15.22.8-18 (15.8.29), 15.12, 15.17, 15.19.6
n-Butyl ether	Y	S/P	3	2G	Cont	Inert	T4	IIB	No	R	F	AC	No	15.4.6, 15.19 & 15.22.12 (15.19)
Butyl methacrylate	Z	S/P	3	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.13, 15.19.6, 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
n-Butyl propionate	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	15.19.6
Butyraldehyde (all isomers)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6
Butyric acid	Y	S/P	3	2G	Cont	No			Yes	O	No	AC	No	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.19.6
gamma-Butyrolactone	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19.6
Calcium alkaryl sulphonate(C11 – C50)	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
Calcium alkyl (C10 – C28) salicylate	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Calcium hydroxide slurry	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Calcium hypochlorite solution (15 % or less)	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 15.19.6
Calcium hypochlorite solution (more than 15 %)	X	S/P	1	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19)
Calcium lignosulphonate solutions	Z	P	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.3-7 (16.2.9)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Calcium long-chain alkyl (C5 – C10) phenate	<i>Y</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6
Calcium long-chain alkyl (C11 – C40) phenate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Calcium long-chain alkyl phenate sulphide (C8– C40)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Calcium long-chain alkyl salicylate (C13+)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Calcium long-chain alkyl (C18– C28) salicylate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Calcium nitrate/Magnesium nitrate/Potassium chloride solution	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	16.2.3-7 (16.2.9)
Calcium nitrate solution (50 % or less)	<i>Z</i>	<i>S</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	16.2.3-7 (16.2.9)
Camelina oil	<i>Y</i>	<i>S/P</i>	2(k)	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-8 (16.2.7)
epsilon-Caprolactam (molten or aqueous solutions)	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Carbolic oil	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Carbon disulphide	<i>Y</i>	<i>S/P</i>	1	1G	<i>Cont</i>	<i>Pad+inert</i>	<i>T6</i>	<i>IIC</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>C</i>	<i>Yes</i>	15.3 & 15.22.3 (15.3), 15.12, 15.17, 15.18,

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
														<a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> )
Carbon tetrachloride	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>No</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19.6</a>
Cashew nut shell oil (untreated)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> ), <a href="#">16.2.3-8</a> ( <a href="#">16.2.7</a> )
Castor oil	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> ), <a href="#">16.2.3-8</a> ( <a href="#">16.2.7</a> )
Cesium formate solution	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	<a href="#">15.19.6</a>
Cetyl/Eicosyl methacrylate mixture	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.13</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> ), <a href="#">16.2.7-1</a> ( <a href="#">16.6.1</a> ), <a href="#">16.2.7-2</a> ( <a href="#">16.6.2</a> )
Chlorinated paraffins (C10 – C13)	<i>X</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>No</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> ), <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> )
Chlorinated paraffins (C14 – C17) (with 50 % chlorine or more, and less than 1 % C13 or shorter chains)	<i>X</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> )
Chloroacetic acid (80 % or less)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	<a href="#">15.11.2</a> , <a href="#">15.11.3</a> , <a href="#">15.11.4</a> , <a href="#">15.11.6</a> , <a href="#">15.11.7</a> , <a href="#">15.11.8</a> , <a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.18</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Chlorobenzene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a>
Chloroform	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>No</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19.6</a>
Chlorohydrins (crude)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> )
4-Chloro-2-methylphenoxyacetic acid, dimethylamine salt solution	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>R</i>	<i>T</i>	<i>No</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
o-Chloronitrobenzene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> ), <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
1-(4-Chlorophenyl)-4,4-dimethyl-pentan-3- one	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABD</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
2-or 3-Chloropropionic acid	<i>Z</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.11.2</a> , <a href="#">15.11.3</a> , <a href="#">15.11.4</a> , <a href="#">15.11.6</a> , <a href="#">15.11.7</a> , <a href="#">15.11.8</a> , <a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
Chlorosulphonic acid	<i>Y</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	<a href="#">15.11.2</a> , <a href="#">15.11.3</a> , <a href="#">15.11.4</a> , <a href="#">15.11.5</a> , <a href="#">15.11.6</a> , <a href="#">15.11.7</a> , <a href="#">15.11.8</a> , <a href="#">15.12</a> , <a href="#">15.16.2</a> & <a href="#">15.22.11</a> ( <a href="#">15.16.2</a> ), <a href="#">15.17</a> , <a href="#">15.18</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> )
m-Chlorotoluene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T4</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> )
o-Chlorotoluene	<i>Y</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a>
p-Chlorotoluene	<i>Y</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
Chlorotoluenes (mixed isomers)	<i>Y</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T4</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a>

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Choline chloride solutions	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Citric acid (70 % or less)	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Coal tar	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>BD</i>	<i>No</i>	15.12, 15.17, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Coal tar naphtha solvent	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12, 15.17, 15.19.6, 16.2.3-7 (16.2.9)
Coal tar pitch (molten)	<i>X</i>	<i>S/P</i>	2	1G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC D</i>	<i>No</i>	15.12, 15.17, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Cocoa butter	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Coconut oil	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Coconut oil fatty acid	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Coconut oil fatty acid methyl ester	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
Copper salt of long chain (C17+) alkanolic acid	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Corn oil	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Cotton seed oil	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Creosote (coal tar)	<i>X</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AD</i>	<i>No</i>	15.12, 15.17,

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
														15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Cresols (all isomers)	Y	S/P	1	2G	Cont	No	T1	IIA	Yes	C	T	ABC	Yes	15.12, 15.18, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Cresol/Phenol/Xylenol mixture	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Cresylic acid, dephenolized	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Cresylic acid, sodium salt solution	Y	S/P	2	2G	Cont	No	T4	IIB	No	C	F-T	AC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Crotonaldehyde	X	S/P	1	1G	Cont	No	T3	IIB	No	C	F-T	AC	Yes	15.12, 15.17, 15.18, 15.19 & 15.22.12 (15.19)
1,5,9- Cyclododecatriene	X	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.13, 15.19.6, 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
Cycloheptane	X	S/P	2	2G	Cont	No	T4	IIA	No	R	F	AC	No	15.19.6
Cyclohexane	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6, 16.2.3-7 (16.2.9)
Cyclohexane-1, 2-dicarboxylic acid, diisononyl ester	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.3-6 (16.2.6)
Cyclohexane oxidation products, sodium salts solution	Z	P	3	2G	Open	No			NF	O	No	No	No	
Cyclohexanol	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.3-7 (16.2.9)
Cyclohexanone	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
Cyclohexanone, Cyclohexanol mixture	Y	S/P	3	2G	Cont	No			Yes	R	F	AC	No	15.19.6
Cyclohexyl acetate	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	F-T	AC	No	15.12.3, 15.12.4, 15.19.6
Cyclohexylamine	Y	S/P	3	2G	Cont	No	T3	IIA	No	C	F-T	AC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
1,3-Cyclopentadiene dimer (molten)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Cyclopentane	<i>Y</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Cyclopentene	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
p-Cymene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Decahydronaphthalene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Decanoic acid	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Decene	<i>X</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Decyl acrylate	<i>X</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.13, 15.19 & 15.22.12 (15.19), 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
Decyl alcohol (all isomers)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9) (e)
Decyl/Dodecyl/Tetradecyl alcohol mixture	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Decyloxytetrahydrothiophene dioxide	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Diacetone alcohol	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Dialkyl (C8 – C9) diphenylamines	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	
Dialkyl (C7 – C13) phthalates	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12, 15.17, 15.19.6, 16.2.3-6 (16.2.6)



Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Dialkyl (C9 – C10) phthalates	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Dialkyl thiophosphates sodium salts solution	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
2, 6-Diaminohexanoic acid phosphonate mixed salts solution	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>R</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.11, 15.17, 15.19.6
Dibromomethane	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19.6
Dibutylamine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Dibutyl hydrogen phosphonate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
2,6- Di-tert-butylphenol	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Dibutyl phthalate	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6
Dibutyl terephthalate	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Dichlorobenzene (all isomers)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABD</i>	<i>No</i>	15.12, 15.17, 15.19.6
3,4-Dichloro-1-butene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
1,1-Dichloroethane	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Dichloroethyl ether	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.18, 15.19 & 15.22.12 (15.19)
1,6-Dichlorohexane	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
2,2'-Dichloroisopropyl ether	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19)
Dichloromethane	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12, 15.17, 15.19.6
2,4-Dichlorophenol	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>Dry</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AD</i>	<i>Yes</i>	15.12, 15.16.2 & 15.22.11 (15.16.2), 15.17, 15.19 &

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
														15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
2,4-Dichlorophenoxyacetic acid, diethanolamine salt solution	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
2,4-Dichlorophenoxyacetic acid, dimethylamine salt solution (70 % or less)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
2,4-Dichlorophenoxyacetic acid, triisopropanolamine salt solution	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
1,1-Dichloropropane	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
1,2-Dichloropropane	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
1,3-Dichloropropene	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Dichloropropene/ Dichloropropane mixtures	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABD</i>	<i>No</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
2,2-Dichloropropionic acid	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>Dry</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AD</i>	<i>Yes</i>	15.11.2, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12, 15.16.2 & 15.22.11 (15.16.2), 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Dicyclopentadiene, Resin Grade, 81–89 %	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>Inert</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.13, 15.17, 15.19 & 15.22.12 (15.19)
Diethanolamine	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6, 16.2.3-6 (16.2.6),

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
														16.2.3-7 (16.2.9)
Diethylamine	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	F-T	AC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Diethylaminoethanol	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	F-T	AC	No	15.12.3, 15.12.4, 15.19.6
2,6-Diethylaniline	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Diethylbenzene	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	F-T	AC	No	15.12.3, 15.12.4, 15.19.6
Diethylene glycol	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Diethylene glycol dibutyl ether	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Diethylene glycol diethyl ether	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Diethylene glycol phthalate	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6)
Diethylenetriamine	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Diethylenetriaminepentaacetic acid, pentasodium salt solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Diethyl ether	Z	S/P	2	1G	Cont	Inert	T4	IIB	No	R	F	AC	No	15.4, 15.14 & 15.22.10 (15.14), 15.19 & 15.22.12 (15.19)
Di-(2-ethylhexyl) adipate	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 15.17, 15.19.6
Di-(2-ethylhexyl) phosphoric acid	Y	S/P	2	2G	Cont	No			Yes	R	T	AD	No	15.12.3, 15.12.4, 15.19.6
Diethyl phthalate	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6
Diethyl sulphate	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Diglycidyl ether of bisphenol A	X	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Diglycidyl ether of bisphenol F	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6, 16.2.3-6 (16.2.6)
Diheptyl phthalate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
Di-n-hexyl adipate	<i>X</i>	<i>S/P</i>	1	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19 & 15.22.12 (15.19)
Dihexyl phthalate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12, 15.17, 15.19.6
Diisobutylamine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T4</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19)
Diisobutylene	<i>Y</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Diisobutyl ketone	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Diisobutyl phthalate	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6
Diisononyl adipate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6
Diisooctyl phthalate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Diisopropanolamine	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	16.2.3-7 (16.2.9)
Diisopropylamine	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.17, 15.19.6
Diisopropylbenzene (all isomers)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Diisopropyl-naphthalene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6
N,N- Dimethylacetamide	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
N,N- Dimethylacetamide solution (40 % or less)	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>R</i>	<i>T</i>	<i>No</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Dimethyl adipate	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Dimethylamine solution (45 % or less)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19)
Dimethylamine solution (greater than 45 % but not greater than 55 %)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19)
Dimethylamine solution (greater than 55 %)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.14 & 15.19.6

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
55 % but not greater than 65 %)														15.22.10 (15.14), 15.19 & 15.22.12 (15.19)
N,N-Dimethylcyclohexylamine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Dimethyl disulphide	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
N,N-Dimethyldodecylamine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Dimethylethanolamine	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Dimethylformamide	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6
Dimethyl glutarate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Dimethyl hydrogen phosphite	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T4</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Dimethyl octanoic acid	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Dimethyl phthalate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Dimethylpolysiloxane	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
2,2-Dimethylpropane-1,3-diol (molten or solution)	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	16.2.3-7 (16.2.9)
Dimethyl succinate	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Dinitrotoluene (molten)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 15.21, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.7-4 (16.6.4)
Dinonyl phthalate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6
Diocetyl phthalate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
1,4-Dioxane	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6, 16.2.3-7 (16.2.9)
Dipentene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Diphenyl	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Diphenylamine (molten)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Diphenylamine, reaction product with 2,2,4-Trimethylpentene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6)
Diphenylamines, alkylated	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Diphenyl/Diphenyl ether mixtures	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Diphenyl ether	<i>X</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Diphenyl ether/Diphenyl phenyl ether mixture	<i>X</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Diphenylmethane diisocyanate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>Dry</i>	-	-	<i>Yes(a)</i>	<i>C</i>	<i>T(a)</i>	<i>AB(b)D</i>	<i>Yes</i>	15.12, 15.16.2 & 15.22.11 (15.16.2), 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Diphenylol propane-epichlorohydrin resins	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Di-n-propylamine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12.3, 15.12.4, 15.17, 15.19.6
Dipropylene glycol	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Dithiocarbamate ester (C7–C35)	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
Ditridecyl adipate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6)
Ditridecyl phthalate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6
Diundecyl phthalate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Dodecane (all isomers)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
tert-Dodecanethiol	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
1-Dodecene	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
Dodecene (all isomers)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Dodecyl alcohol	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
n-Dodecyl mercaptan	<i>X</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Dodecylamine/Tetradecylamine mixture	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Dodecylbenzene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Dodecyl diphenyl ether disulphonate solution	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6)
Dodecyl hydroxypropyl sulphide	<i>X</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6
Dodecyl methacrylate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.13, 15.19.6
Dodecyl/Octadecyl methacrylate mixture	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.13, 15.19.6, 16.2.3-6 (16.2.6), 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
Dodecyl/Pentadecyl methacrylate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.13, 15.19.6,

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
mixture														16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
Dodecyl phenol	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6)
Dodecyl Xylene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Drilling brines (containing zinc chloride)	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>Yes</i>	15.19.6
Drilling brines(containing calcium bromide)	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19.6
Epichlorohydrin	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19&15.22.12(15.19)
Ethanolamine	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>Yes</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
2-Ethoxyethyl acetate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6
Ethoxylated long chain (C16+) alkyloxyalkylamine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Ethoxylated tallow amine (>95 %)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>Inert</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Ethyl acetate	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
Ethyl acetoacetate	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Ethyl acrylate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12, 15.13, 15.17, 15.19 & 15.22.12 (15.19), 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)



Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Ethylamine	<i>Y</i>	<i>S/P</i>	2	1G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>C</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.12.3(2) (15.12.3.2), 15.14 & 15.22.10 (15.14), 15.19 & 15.22.12 (15.19)
Ethylamine solutions (72 % or less)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>C</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.12.3(2) (15.12.3.2), 15.14 & 15.22.10 (15.14), 15.19 & 15.22.12 (15.19)
Ethyl amyl ketone	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Ethylbenzene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6
Ethyl tert-butyl ether	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIB	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Ethyl butyrate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Ethylcyclohexane	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
N- Ethylcyclohexylamine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	IIB	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19)
S-Ethyl dipropylthiocarbamate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6, 16.2.3-7 (16.2.9)
Ethylene carbonate	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Ethylene chlorohydrin	<i>Y</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.18, 15.19 & 15.22.12 (15.19)
Ethylene cyanohydrin	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>		IIB	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Ethylenediamine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Ethylenediaminetetraacetic acid, tetrasodium salt solution	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Ethylene dibromide	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>No</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Ethylene dichloride	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12, 15.17, 15.19 &

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
														15.22.12 (15.19)
Ethylene glycol	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	15.19.6
Ethylene glycol acetate	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Ethylene glycol butyl ether acetate	Y	S/P	3	2G	Open	No			Yes	O	No	AC	No	15.19.6
Ethylene glycol diacetate	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6
Ethylene glycol methyl ether acetate	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6
Ethylene glycol monoalkyl ethers	Y	S/P	3	2G	Cont	No	T2	IIB	No	C	F-T	AC	No	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Ethylene glycol phenyl ether	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.3-7 (16.2.9)
Ethylene glycol phenyl ether/Diethylene glycol phenyl ether mixture	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Ethylene glycol (>75 %)/sodium alkyl carboxylates/borax mixture	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 15.17, 15.19.6
Ethylene glycol (>85 %)/sodium alkyl carboxylates mixture	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	15.19.6
Ethylene oxide/Propylene oxide mixture with an ethylene oxide content of not more than 30% by mass	Y	S/P	2	1G	Cont	Inert	T2	IIB	No	C	F-T	AC	Yes	15.8 & 15.22.8 (15.8), 15.12, 15.14 & 15.22.10 (15.14), 15.17, 15.19 & 15.22.12 (15.19)
Ethylene-vinyl acetate copolymer (emulsion)	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Ethyl-3- ethoxypropionate	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6
2-Ethylhexanoic acid	Y	S/P	3	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
2-Ethylhexyl acrylate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.13</a> , <a href="#">15.19.6</a> , <a href="#">16.2.7-1</a> ( <a href="#">16.6.1</a> ), <a href="#">16.2.7-2</a> ( <a href="#">16.6.2</a> )
2-Ethylhexylamine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19.6</a>
2-Ethyl-2- (hydroxymethyl) propane-1,3-diol (C8–C10) ester	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
Ethylidene norbornene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a>
Ethyl methacrylate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.13</a> , <a href="#">15.19.6</a> , <a href="#">16.2.7-1</a> ( <a href="#">16.6.1</a> ), <a href="#">16.2.7-2</a> ( <a href="#">16.6.2</a> )
N- Ethylmethylallylamine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> )
Ethyl propionate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a>
2-Ethyl-3- propylacrolein	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
Ethyl toluene	<i>Y</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a>
Fatty acid (saturated C13+)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
Fatty acid methyl esters (m)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
Fatty acids, (C8–C10)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> ), <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
Fatty acids, (C12+)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> . ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> ), <a href="#">16.2.3-8</a> ( <a href="#">16.2.7</a> )
Fatty acids, (C16+)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> )
Fatty acids, essentially linear (C6–C18) 2-ethylhexyl ester	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a>

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Ferric chloride solutions	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.11, 15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Ferric nitrate/Nitric acid solution	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.11, 15.12, 15.17, 15.19 & 15.22.12 (15.19)
Fish oil	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Fish silage protein concentrate (containing 4 % or less formic acid)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Fish protein concentrate (containing 4 % or less formic acid)	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	
Fluorosilicic acid solution (20–30 %)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.11, 15.12, 15.17, 15.19 & 15.22.12 (15.19)
Formaldehyde solutions (45 % or less)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Formamide	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6, 16.2.3-7 (16.2.9)
Formic acid (85 % or less acid)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T(g)</i>	<i>AC</i>	<i>Yes</i>	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.12.4, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Formic acid (over 85 %)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T (g)</i>	<i>AC</i>	<i>Yes</i>	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7,

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
														15.11.8, 15.12.3, 15.12.4, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Formic acid mixture (containing up to 18 % propionic acid and up to 25 % sodium formate)	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T(g)</i>	<i>AC</i>	<i>No</i>	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.12.4, 15.19.6
Furfural	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Furfuryl alcohol	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Glucitol/glycerol blend propoxylated (containing less than 10 % amines)	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Glucitol/glycerol blend propoxylated (containing 10 % or more amines)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6)
Glutaraldehyde solutions (50 % or less)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Glycerine	<i>Z</i>	<i>S</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	16.2.3-7 (16.2.9)
Glycerol monooleate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-6(16.2.6), 16.2.3-7 (16.2.9)
Glycerol propoxylated	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Glycerol, propoxylated and ethoxylated	Z	P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
Glycerol/sucrose blend propoxylated and ethoxylated	Z	P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
Glyceryl triacetate	Z	S/P	3	2G	Open	No			Yes	O	No	ABC	No	15.19.6
Glycidyl ester of C10 trialkylacetic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Glycine, sodium salt solution	Z	S/P	3	2G	Open	No			NF	O	No	No	No	
Glycolic acid solution (70 % or less)	Z	S/P	3	2G	Cont	No	-	-	NF	C	T	No	Yes	15.12.3, 15.12.4, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Glyoxal solution (40 % or less)	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Glyoxylic acid solution (50 % or less)	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	ACD	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9), 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2), 16.2.7-3 (16.6.3)
Glyphosate solution (not containing surfactant)	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Grape seed oil	Y	S/P	2 (k)	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-8 (16.2.7)
Groundnut oil	Y	P	2 (k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Heptane (all isomers)	X	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
n-Heptanoic acid	Z	S/P	3	2G	Cont	No			Yes	R	No	ABC	No	15.19.6, 15.17
Heptanol (all isomers) (d)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F-T	ABC	No	15.12.3, 15.12.4, 15.19.6
Heptene (all isomers)	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.19.6
Heptyl acetate	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
1-Hexadecylnaphthalene / 1,4-bis(hexadecyl)naphthalene mixture	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.3-6 (16.2.6)
Hexamethylenediamine (molten)	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Hexamethylenediamine adipate (50 % in water)	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Hexamethylenediamine solution	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Hexamethylene diisocyanate	Y	S/P	2	2G	Cont	Dry	T1	IIB	Yes	C	T	AC( b) D	Yes	15.12, 15.16.2 & 15.22.11 (15.16.2), 15.17, 15.18, 15.19 & 15.22.12 (15.19)
Hexamethylene glycol	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	
Hexamethyleneimine	Y	S/P	2	2G	Cont	No	T2	IIB	No	R	F-T	AC	No	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19)
Hexamethylenetetramine solutions	Z	S	3	2G	Open	No			Yes	O	No	AC	No	15.19.6
Hexane (all isomers)	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	F-T	AC	No	15.12, 15.17, 15.19.6
1,6-Hexanediol, distillation overheads	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Hexanoic acid	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Hexanol	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.17, 15.19 & 15.22.12 (15.19)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Hexene (all isomers)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Hexyl acetate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Hexylene glycol	<i>Z</i>	<i>S</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Hydrocarbon wax	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12, 15.17, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Hydrochloric acid	<i>Z</i>	<i>S/P</i>	3	1G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.11, 15.12, 15.17, 15.19 & 15.22.12 (15.19)
Hydrogen peroxide solutions (over 60 % but not over 70 % by mass)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>R</i>	<i>T</i>	<i>No</i>	<i>No</i>	15.5.1 & 15.22.4 (15.5.1), 15.12.3, 15.12.4, 15.19.6
Hydrogen peroxide solutions (over 8 % but not over 60 % by mass)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>R</i>	<i>T</i>	<i>No</i>	<i>No</i>	15.5.2 & 15.22.5 (15.5.2), 15.12.3, 15.12.4, 15.18, 15.19.6
2-Hydroxyethyl acrylate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.13, 15.17, 15.19 & 15.22.12 (15.19), 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
N-(Hydroxyethyl)ethylenediaminetri-acetic acid, trisodium salt solution	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19.6
2-Hydroxy-4-(methylthio)butanoic acid	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19)
Illipe oil	<i>Y</i>	<i>P</i>	2(k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6(16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Isoamyl alcohol	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Isobutyl alcohol	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
Isobutyl formate	<i>Z</i>	<i>P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6



Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Isobutyl methacrylate	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.13</a> , <a href="#">15.19.6</a> , <a href="#">16.2.7-1 (16.6.1)</a> , <a href="#">16.2.7-2 (16.6.2)</a>
Isophorone	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a>
Isophoronediamine	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19</a> & <a href="#">15.22.12 (15.19)</a> , <a href="#">16.2.3-7 (16.2.9)</a>
Isophorone diisocyanate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>Dry</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABD</i>	<i>Yes</i>	<a href="#">15.12</a> , <a href="#">15.16.2</a> & <a href="#">15.22.11 (15.16.2)</a> , <a href="#">15.17</a> , <a href="#">15.19</a> & <a href="#">15.22.12 (15.19)</a>
Isoprene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12</a> , <a href="#">15.13</a> , <a href="#">15.14</a> & <a href="#">15.22.10 (15.14)</a> , <a href="#">15.17</a> , <a href="#">15.19.6</a> , <a href="#">16.2.7-1 (16.6.1)</a> , <a href="#">16.2.7-2 (16.6.2)</a>
Isopropanolamine	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>Yes</i>	<i>R</i>	<i>No</i>	<i>AC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6 (16.2.6)</a> , <a href="#">16.2.3-7 (16.2.9)</a>
Isopropyl acetate	<i>Z</i>	<i>P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a>
Isopropylamine	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3(2) (15.12.3.2)</a> , <a href="#">15.14</a> & <a href="#">15.22.10 (15.14)</a> , <a href="#">15.19</a> & <a href="#">15.22.12 (15.19)</a>
Isopropylamine (70 % or less) solution	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3(2) (15.12.3.2)</a> , <a href="#">15.19</a> & <a href="#">15.22.12 (15.19)</a>
Isopropylcyclohexane	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-7 (16.2.9)</a>
Isopropyl ether	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>Inert</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	<a href="#">15.4.6</a> , <a href="#">15.13</a> , <a href="#">15.19.6</a> , <a href="#">16.2.7-1 (16.6.1)</a> , <a href="#">16.2.7-2 (16.6.2)</a>
Jatropha oil	<i>Y</i>	<i>P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6 (16.2.6)</a> , <a href="#">16.2.3-8 (16.2.7)</a>
Lactic acid	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	<a href="#">15.12</a> , <a href="#">15.17</a> , <a href="#">15.19</a> & <a href="#">15.22.12 (15.19)</a>

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Lactonitrile solution (80 % or less)	<i>Y</i>	<i>S/P</i>	1	1G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12, 15.13, 15.17, 15.18, 15.19 & 15.22.12 (15.19), 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2), 16.2.7-3 (16.6.3)
Lard	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Latex, ammonia (1 % or less)-inhibited	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Latex: Carboxylated styrene-Butadiene copolymer; Styrene- Butadiene rubber	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	16.2.3-7 (16.2.9)
Lauric acid	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Ligninsulphonic acid, magnesium salt solution	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Ligninsulphonic acid, sodium salt solution	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	16.2.3-7 (16.2.9)
Linseed oil	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Liquid chemical wastes	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), (20.5.1), (20.7)
Long-chain alkaryl polyether (C11–C20)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Long-chain alkaryl sulphonic acid (C16–C60)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Long-chain alkylphenate/Phenol sulphide mixture	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Long-chain alkylphenol (C14–C18)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6)
Long-chain alkylphenol (C18–C30)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6)
L-Lysine solution (60 % or less)	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Magnesium chloride solution	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Magnesium hydroxide slurry	<i>Z</i>	<i>S</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	16.2.3-7 (16.2.9)
Magnesium long-chain alkaryl sulphonate (C11–C50)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Magnesium long-chain alkyl salicylate (C11+)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Maleic anhydride	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC(f)</i>	<i>Yes</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Maleic anhydride-sodium allylsulphonate copolymer solution	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	
Mango kernel oil	<i>Y</i>	<i>P</i>	2(k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Mercaptobenzothiazol, sodium salt solution	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Mesityl oxide	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>II B</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Metam sodium solution	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>No</i>	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19)
Methacrylic acid	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.13, 15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9), 16.2.7-1 (16.6.1)
Methacrylic acid - alkoxypoly (alkylene oxide) methacrylate copolymer, sodium salt aqueous solution (45 % or less)	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	16.2.3-7 (16.2.9)
Methacrylic resin in Ethylene dichloride	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12, 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Methacrylonitrile	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12, 15.13, 15.17, 15.19 & 15.22.12 (15.19)
3-Methoxy-1-butanol	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
3-Methoxybutyl acetate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
N-(2-Methoxy-1- methyl ethyl)-2-ethyl -6-methyl chloroacetanilide	<i>X</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6)
Methyl acetate	<i>Z</i>	<i>P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Methyl acetoacetate	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Methyl acrylate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12, 15.17, 15.13, 15.19 & 15.22.12 (15.19)
Methyl alcohol	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.1, 15.12.2, 15.12.3(2) (15.12.3.2), 15.12.3(3) (15.12.3.3), 15.12.4, 15.17, 15.19 & 15.22.12 (15.19)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Methylamine solutions (42 % or less)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19)
Methylamyl acetate	<i>Y</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
Methylamyl alcohol	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Methyl amyl ketone	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
N-Methylaniline	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
alpha-Methylbenzyl alcohol with acetophenone (15 % or less)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Methylbutenol	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T4</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Methyl tert-butyl ether	<i>Z</i>	<i>P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
Methyl butyl ketone	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.15.17, 15.19.6
Methylbutynol	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T4</i>	IIB	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Methyl butyrate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T4</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Methylcyclohexane	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Methylcyclopentadiene dimer	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T4</i>	IIB	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Methylcyclopentadienyl manganese tricarbonyl	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12.15.17, 15.18, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Methyl diethanolamine	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6)
2-Methyl-6-ethyl aniline	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Methyl ethyl ketone	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
2-Methyl-5-ethyl pyridine	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12.15.17, 15.19 & 15.22.12 (15.19)
Methyl formate	Z	S/P	2	2G	Cont	No	T1	IIA	No	R	F-T	AC	No	15.12.3, 15.12.4, 15.14 & 15.22.10 (15.14), 15.19.6
2-Methylglutaronitrile with 2-Ethylsuccinonitrile (12 % or less)	Z	S/P	3	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12.15.17, 15.19 & 15.22.12 (15.19)
2-Methyl-2-hydroxy-3-butyne	Z	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.19.6, 16.2.3-7 (16.2.9)
Methyl isobutyl ketone	Z	S/P	3	2G	Cont	No	T1	IIA	No	R	F-T	ABC	No	15.12.3, 15.12.4, 15.19.6
Methyl methacrylate	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.13, 15.19.6
3-Methyl-3-methoxybutanol	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Methyl naphthalene (molten)	X	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
N-Methylglucamine solution (70 % or less)	Z	S	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
2-Methyl-1,3-propanediol	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
2-Methylpyridine	Z	S/P	3	2G	Cont	No	T1	IIA	No	C	F	AC	No	15.12.3(2) (15.12.3.2), 15.19 & 15.22.12 (15.19)
3-Methylpyridine	Z	S/P	3	2G	Cont	No	T1	IIA	No	C	F-T	AC	No	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19)
4-Methylpyridine	Z	S/P	3	2G	Cont	No	T1	IIA	No	C	F-T	AC	No	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
N-Methyl-2-pyrrolidone	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12.15.17, 15.19.6
Methyl propyl ketone	Z	S	3	2G	Cont	No	T1	IIA	No	R	F-T	ABC	No	15.12.3, 15.12.4, 15.19.6
Methyl salicylate	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12.15.17, 15.19.6
alpha-Methylstyrene	Y	S/P	2	2G	Cont	No	T1	IIB	No	C	F-T	AD	No	15.12.15.13, 15.17,

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
												(j)		15.19.6, 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
3-(methylthio)propionaldehyde	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F-T	ABC	No	15.12.15.17, 15.19.6
Molybdenum polysulphide Long chain alkyl dithiocarbamide complex	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Morpholine	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	F-T	AC	No	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19)
Motor fuel anti-knock compound (containing lead alkyls)	X	S/P	1	1G	Cont	Inert	T4	IIA	No	C	F-T	AC	Yes	15.6 & 15.22.6 (15.6), 15.12.15.17, 15.18, 15.19 & 15.22.12 (15.19)
Myrcene	X	S/P	2	2G	Cont	No	T3	IIA	No	R	F-T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Naphthalene (molten)	X	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	ABC	No	15.12.15.17, 15.19.6, 16.2.3-7 (16.2.9)
Naphthalene crude (molten)	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12.15.17, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Naphthalenesulphonic acid-Formaldehyde copolymer, sodium salt solution	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.3-7 (16.2.9)
Neodecanoic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6
Nitrating acid (mixture of sulphuric and nitric acids)	Y	S/P	1	1G	Cont	No			NF	C	T	No	Yes	15.11, 15.12.15.16.2 & 15.22.11 (15.16.2), 15.17, 15.18, 15.19 & 15.22.12 (15.19)
Nitric acid (70 % and over)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12.15.16.2 & 15.22.11 (15.16.2), 15.17, 15.19 & 15.22.12 (15.19)
Nitric acid (less than 70 %)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12.15.17,

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
														<b>15.19 &amp; 15.22.12 (15.19)</b>
Nitrilotriacetic acid, trisodium salt solution	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>No</i>	<b>15.12.15.17, 15.19.6</b>
Nitrobenzene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	<b>15.12.15.17, 15.19 &amp; 15.22.12 (15.19), 16.2.3-7 (16.2.9)</b>
Nitroethane	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC (f)</i>	<i>No</i>	<b>15.12.3, 15.12.4, 15.19.6, 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2), 16.2.7-4 (16.6.4)</b>
Nitroethane (80 %)/ Nitropropane (20 %)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC (f)</i>	<i>No</i>	<b>15.12.3, 15.12.4, 15.19.6, 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2), 16.2.7-3 (16.6.3)</b>
Nitroethane, 1-Nitropropane (each 15 % or more) mixture	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC (f)</i>	<i>No</i>	<b>15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2), 16.2.7-3 (16.6.3)</b>
o-Nitrophenol (molten)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T4</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	<b>15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)</b>
1-or 2-Nitropropane	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	<b>15.12.15.17, 15.19 &amp; 15.22.12 (15.19)</b>
Nitropropane(60 %)/ Nitroethane (40 %) mixture	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC (f)</i>	<i>No</i>	<b>15.12.15.17, 15.19.6</b>
o-or p-Nitrotoluenes	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>		<i>IIB</i>	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	<b>15.12.15.17, 15.19.6</b>
Nonane (all isomers)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IILA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	<b>15.19.6</b>
Nonanoic acid (all isomers)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	<b>15.12.15.17, 15.19 &amp; 15.22.12 (15.19), 16.2.3-7 (16.2.9)</b>



Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Non-edible industrial grade palm oil	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> ), <a href="#">16.2.3-8</a> ( <a href="#">16.2.7</a> )
Nonene (all isomers)	<i>Y</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	<a href="#">15.19.6</a>
Nonyl alcohol (all isomers)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a>
Nonyl methacrylate monomer	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
Nonylphenol	<i>X</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	<a href="#">15.12.15.17</a> , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> ), <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )
Nonylphenol poly (4+) ethoxylate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> )
Noxious liquid, NF, (1) n.o.s. (trade name ....., contains ....) ST1, Cat. X	<i>X</i>	<i>P</i>	1	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	<a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> ), <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> )
Noxious liquid, F, (2) n.o.s. (trade name ....., contains ....) ST1, Cat. X	<i>X</i>	<i>P</i>	1	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	<a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> ), <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> )
Noxious liquid, NF, (3) n.o.s. (trade name ....., contains ....) ST2, Cat. X	<i>X</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-		<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	<a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> ), <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> )
Noxious liquid, F, (4) n.o.s. (trade name ....., contains ....) ST2, Cat. X	<i>X</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	<a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> ), <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> )
Noxious liquid, NF, (5) n.o.s. (trade name ....., contains ....) ST2, Cat. Y	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-		<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	<a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> ), <a href="#">16.2.3-6</a> ( <a href="#">16.2.6</a> ), <a href="#">16.2.3-7</a> ( <a href="#">16.2.9</a> )(1)
Noxious liquid, F, (6) n.o.s. (trade	<i>Y</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	<a href="#">15.19</a> & <a href="#">15.22.12</a>

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
name ....., contains ....) ST2, Cat. Y														(15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)(l)
Noxious liquid, NF, (7) n.o.s. (trade name ....., contains ....) ST3, Cat. Y	<i>Y</i>	<i>P</i>	3	2 <i>G</i>	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)(l)
Noxious liquid, F, (8) n.o.s. (trade name ....., contains ....) ST3, Cat. Y	<i>Y</i>	<i>P</i>	3	2 <i>G</i>	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)(l)
Noxious liquid, NF, (9) n.o.s. (trade name ....., contains ....) ST3, Cat. Z	<i>Z</i>	<i>P</i>	3	2 <i>G</i>	<i>Open</i>	<i>No</i>	-		<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Noxious liquid, F, (10) n.o.s. (trade name ....., contains ....) ST3, Cat. Z	<i>Z</i>	<i>P</i>	3	2 <i>G</i>	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Octamethylcyclotetrasiloxane	<i>Y</i>	<i>P</i>	2	2 <i>G</i>	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Octane (all isomers)	<i>X</i>	<i>P</i>	2	2 <i>G</i>	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Octanoic acid (all isomers)	<i>Y</i>	<i>S/P</i>	2	2 <i>G</i>	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19)
Octanol (all isomers)	<i>Y</i>	<i>S/P</i>	2	2 <i>G</i>	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Octene (all isomers)	<i>Y</i>	<i>P</i>	2	2 <i>G</i>	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
n-Octyl acetate	<i>Y</i>	<i>S/P</i>	3	2 <i>G</i>	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Octyl aldehydes	<i>Y</i>	<i>S/P</i>	2	2 <i>G</i>	<i>Cont</i>	<i>No</i>	<i>T4</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Octyl decyl adipate	<i>Y</i>	<i>S/P</i>	2	2 <i>G</i>	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
n-Octyl mercaptan	<i>X</i>	<i>S/P</i>	1	2 <i>G</i>	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19 & 15.22.12 (15.19)
Offshore contaminated bulk liquid P (o)	<i>X</i>	<i>P</i>	2	2 <i>G</i>	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6
Offshore contaminated bulk liquid S (o)	<i>X</i>	<i>S/P</i>	2	2 <i>G</i>	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.15, 15.17, 15.19 & 15.22.12 (15.19)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Olefin-Alkyl ester copolymer (molecular weight 2000+)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Olefin Mixture (C7–C9) C8 rich, stabilized	<i>X</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.13, 15.19.6
Olefin mixtures (C5–C7)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Olefin mixtures (C5–C15)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Olefins (C13+, all isomers)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
alpha-Olefins (C6–C18) mixtures	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T4</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Oleic acid	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Oleum	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>Dry</i>	-	-	<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.11.2~15.11.8, 15.12, 15.16.2 & 15.22.11 (15.16.2), 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6)
Oleylamine	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Olive oil	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Oxygenated aliphatic hydrocarbon mixture	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	
Palm acid oil	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Palm fatty acid distillate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6(16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Palm kernel acid oil	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Palm kernel fatty acid distillate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Palm kernel oil	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Palm kernel olein	<i>Y</i>	<i>P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Palm kernel stearin	<i>Y</i>	<i>P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Palm mid-fraction	<i>Y</i>	<i>P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6(16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Palm oil	<i>Y</i>	<i>P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Palm oil fatty acid methyl ester	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Palm olein	<i>Y</i>	<i>P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Palm stearin	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6),

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
			(k)											16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Paraffin wax, highly-refined	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Paraffin wax, semi-refined	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.15.17, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Paraldehyde	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Paraldehyde-ammonia reaction product	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19)
Pentachloroethane	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>No</i>	15.12.15.17, 15.19.6
1,3-Pentadiene	<i>Y</i>	<i>P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.13, 15.19.6, 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2), 16.2.7-3 (16.6.3)
1,3-Pentadiene(greater than 50 %), cyclopentene and isomers, mixtures	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>Inert</i>	<i>T3</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>Yes</i>	15.12.15.13, 15.17, 15.19 & 15.22.12 (15.19)
Pentaethylenhexamine	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19)
Pentane (all isomers)	<i>Y</i>	<i>P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.14 & 15.22.10 (15.14), 15.19.6
Pentanoic acid	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19)
n-Pentanoic acid (64 %)/2-Methyl butyric acid (36 %) mixture	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.15.17, 15.19 & 15.22.12 (15.19)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Pentene (all isomers)	<i>Y</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.14 & 15.22.10 (15.14), 15.19.6
n-Pentyl propionate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Perchloroethylene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>No</i>	15.12.15.17, 15.19.6
Phenol	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
1-Phenyl-1-xylyl ethane	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
Phosphate esters, alkyl (C12–C14) amine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T4</i>	IIB	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Phosphoric acid	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.11.1, 15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Phosphorus (yellow or white)	<i>X</i>	<i>S/P</i>	1	1G	<i>Cont</i>	<i>Pad+(vent or inert)</i>			<i>No(c)</i>	<i>C</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.7 & 15.22.7 (15.7), 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Phthalic anhydride (molten)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
alpha-Pinene	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
beta-Pinene	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIB	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
Pine oil	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6(16.2.6), 16.2.3-7 (16.2.9)
Piperazine, 68 % solution	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Polyacrylic acid solution (40 % or less)	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Polyalkyl (C18–C22) acrylate in xylene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>II B</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Polyalkylalkenaminesuccinimide, molybdenum oxysulphide	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Poly (2-8) alkylene glycol monoalkyl (C1–C6) ether	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Poly (2-8) alkylene glycol monoalkyl (C1–C6) ether acetate	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
Polyalkyl (C10–C20) methacrylate	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Polyalkyl (C10–C18) methacrylate/ethylene-propylene copolymer mixture	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Polyaluminium chloride solution	<i>Z</i>	<i>S</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	
Polybutene	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Polybutenyl succinimide	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Poly(2+)cyclic aromatics	<i>X</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Polyether (molecular weight 1350+)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Polyethylene glycol	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Polyethylene glycol dimethyl ether	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Poly(ethylene glycol) methylbutenyl ether (MW>1000)	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	16.2.3-7 (16.2.9)
Polyethylene polyamines	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Polyethylene polyamines (more than 50 % C5–C20 paraffin oil)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Polyferric sulphate solution	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19)
Poly (iminoethylene) -graft-N-poly (ethyleneoxy) solution (90 % or less)	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	16.2.3-7 (16.2.9)
Polyisobutenamine in aliphatic (C10–C14) solvent	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
(Polyisobutene) amino products in aliphatic hydrocarbons	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Polyisobutenyl anhydride adduct	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	
Poly(4+)isobutylene (MW>224)	<i>X</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)



Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Polyisobutylene (MW≤224)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Polyglycerin, sodium salt solution (containing less than 3 % sodium hydroxide)	<i>Z</i>	<i>S</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Polymethylene polyphenyl isocyanate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>Dry</i>			<i>Yes(a)</i>	<i>C</i>	<i>T(a)</i>	<i>AD</i>	<i>Yes</i>	15.12.15.16.2 & 15.22.11 (15.16.2), 15.17, 15.19.6, 16.2.3-7 (16.2.9)
Polyolefin (molecular weight 300+)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Polyolefin amide alkeneamine (C17+)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Polyolefin amide alkeneamine borate (C28–C250)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Polyolefin amide alkeneamine polyol	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Polyolefinamine (C28–C250)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Polyolefinamine in alkyl (C2–C4) benzenes	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Polyolefinamine in aromatic solvent	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> (16.2.6), <a href="#">16.2.3-7</a> (16.2.9)
Polyolefin aminoester salts (molecular weight 2000+)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> (16.2.6), <a href="#">16.2.3-7</a> (16.2.9)
Polyolefin anhydride	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> (16.2.6), <a href="#">16.2.3-7</a> (16.2.9)
Polyolefin ester (C28–C250)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> (16.2.6), <a href="#">16.2.3-7</a> (16.2.9)
Polyolefin phenolic amine (C28–C250)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> (16.2.6), <a href="#">16.2.3-7</a> (16.2.9)
Polyolefin phosphorosulphide, barium derivative (C28–C250)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> (16.2.6), <a href="#">16.2.3-7</a> (16.2.9)
Poly(20)oxyethylene sorbitan monooleate	<i>Y</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> (16.2.6), <a href="#">16.2.3-7</a> (16.2.9)
Poly(5+)propylene	<i>Y</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-7</a> (16.2.9)
Polypropylene glycol	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	<a href="#">15.19.6</a>
Polysiloxane	<i>Y</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-7</a> (16.2.9)
Potassium chloride solution	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	<a href="#">16.2.3-7</a> (16.2.9)
Potassium hydroxide solution	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>No</i>	<i>No</i>	<i>No</i>	<a href="#">15.12.3(2)</a> ( <a href="#">15.12.3.2</a> ) , <a href="#">15.19</a> & <a href="#">15.22.12</a> ( <a href="#">15.19</a> )
Potassium formate solutions	<i>Z</i>	<i>S</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>R</i>	<i>No</i>	<i>No</i>	<i>No</i>	<a href="#">15.19.6</a>
Potassium oleate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	<a href="#">15.19.6</a> , <a href="#">16.2.3-6</a> (16.2.6), <a href="#">16.2.3-7</a> (16.2.9)
Potassium thiosulphate (50 % or less)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>R</i>	<i>T</i>	<i>No</i>	<i>No</i>	<a href="#">15.12.3</a> , <a href="#">15.12.4</a> , <a href="#">15.19.6</a> , <a href="#">16.2.3-7</a> (16.2.9)
n-Propanolamine	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	<a href="#">15.12.15.17</a> , <a href="#">15.19</a> &

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
														15.22.12 (15.19), 16.2.3-7 (16.2.9)
2-Propene-1-aminium,N,N-dimethyl-N-2-propenyl-,chloride, homopolymer solution	<i>Y</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19.6
beta-Propiolactone	<i>Y</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>		IIA	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.18, 15.19 & 15.22.12 (15.19)
Propionaldehyde	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>Inert</i>	<i>T4</i>	IIB	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Propionic acid	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.15.17, 15.19 & 15.22.12 (15.19)
Propionic anhydride	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19)
Propionitrile	<i>Y</i>	<i>S/P</i>	1	1G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIB	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.18, 15.19 & 15.22.12 (15.19)
n-Propyl acetate	<i>Y</i>	<i>P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
n-propyl alcohol	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.15.17, 15.19.6
n-Propylamine	<i>Z</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>Inert</i>	<i>T2</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19)
Propylbenzene (all isomers)	<i>Y</i>	<i>P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
Propylene carbonate	<i>Z</i>	<i>S</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19)
Propylene glycol methyl ether acetate	<i>Z</i>	<i>P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	
Propylene glycol monoalkyl ether	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Propylene glycol phenyl ether	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	
Propylene oxide	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>Inert</i>	<i>T2</i>	IIB	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.8 & 15.22.8 (15.8), 15.12.15.14 & 15.22.10

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
														(15.14), 15.17, 15.19 & 15.22.12 (15.19)
Propylene tetramer	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
Propylene trimer	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
Pyridine	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Pyrolysis gasoline (containing benzene)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.15.17, 15.19.6
Rapeseed oil	<i>Y</i>	<i>P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8(16.2.7)
Rapeseed oil (low erucic acid containing less than 4 % free fatty acids)	<i>Y</i>	<i>P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8(16.2.7)
Rape seed oil fatty acid methyl esters	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
Resin oil, distilled	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.15.17, 15.19.6
Rice bran oil	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8(16.2.7)
Rosin	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Safflower oil	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8(16.2.7)
Shea butter	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8(16.2.7)
Sodium alkyl (C14–C17) sulphonates (60 – 65 % solution)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>R</i>	<i>T</i>	<i>No</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Sodium aluminosilicate slurry	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	16.2.3-7 (16.2.9)
Sodium benzoate	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	16.2.3-7 (16.2.9)
Sodium borohydride (15 % or less)/Sodium hydroxide solution	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Sodium bromide solution (less than 50 %)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>NF</i>	<i>R</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19.6
Sodium carbonate solution	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>R</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19.6
Sodium chlorate solution (50 % or less)	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>R</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.9 & 15.22.9 (15.9), 15.12.15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Sodium dichromate solution (70 % or less)	<i>Y</i>	<i>S/P</i>	1	1G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12.15.17, 15.18, 15.19 & 15.22.12 (15.19)
Sodium hydrogen sulphide (6 % or less)/Sodium carbonate (3 % or less) solution	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Sodium hydrogen sulphite solution (45 % or less)	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	16.2.3-7 (16.2.9)
Sodium hydrosulphide/Ammonium sulphide solution	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T4</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.15, 15.17, 15.19 & 15.22.12 (15.19), 16.2.7-1 (16.6.1), 16.2.7-2

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
														(16.6.2), 16.2.7-3 (16.6.3)
Sodium hydrosulphide solution (45 % or less)	<i>Z</i>	<i>S/P</i>	3	2 <i>G</i>	<i>Cont</i>	<i>Vent or pad(gas)</i>			<i>NF</i>	<i>R</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12.15.15, 15.19.6, 16.2.3-7 (16.2.9)
Sodium hydroxide solution	<i>Y</i>	<i>S/P</i>	3	2 <i>G</i>	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Sodium hypochlorite solution (15 % or less)	<i>Y</i>	<i>S/P</i>	2	2 <i>G</i>	<i>Cont</i>	<i>No</i>	-	-	<i>NF</i>	<i>R</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.17, 15.19.6
Sodium methylate 21–30 % in methyl alcohol	<i>Y</i>	<i>S/P</i>	2	2 <i>G</i>	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6) (only if >28%), 16.2.3-7 (16.2.9)
Sodium nitrite solution	<i>Y</i>	<i>S/P</i>	3	2 <i>G</i>	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>No</i>	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Sodium petroleum sulphonate	<i>Y</i>	<i>S/P</i>	2	2 <i>G</i>	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6)
Sodium poly (4+) acrylate solutions	<i>Z</i>	<i>S/P</i>	3	2 <i>G</i>	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	16.2.3-7 (16.2.9)
Sodium silicate solution	<i>Y</i>	<i>S/P</i>	3	2 <i>G</i>	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Sodium sulphate solutions	<i>Z</i>	<i>S</i>	3	2 <i>G</i>	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	16.2.3-7 (16.2.9)
Sodium sulphide solution (15 % or less)	<i>Y</i>	<i>S/P</i>	3	2 <i>G</i>	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Sodium sulphite solution (25 % or less)	<i>Y</i>	<i>S/P</i>	3	2 <i>G</i>	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Sodium thiocyanate solution (56 % or less)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Soyabean oil	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Soybean oil fatty acid methyl ester	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Styrene monomer	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.15.13, 15.17, 15.19.6, 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
Sulphohydrocarbon (C3–C88)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Sulpholane	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Sulphur (molten)	<i>Z</i>	<i>S</i>	3	1G	<i>Open</i>	<i>Vent or pad(gas)</i>	<i>T3</i>		<i>Yes</i>	<i>O</i>	<i>F-T</i>	<i>No</i>	<i>No</i>	15.10, 16.2.3-7 (16.2.9)
Sulphuric acid	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.11, 15.12.15.16.2 & 15.22.11 (15.16.2), 15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Sulphuric acid, spent	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>Yes</i>	15.11, 15.12.15.16.2 & 15.22.11 (15.16.2), 15.17, 15.19 & 15.22.12 (15.19)
Sulphurized fat (C14–C20)	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	
Sulphurized polyolefinamide alkene (C28–C250) amine	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Sunflower seed oil	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Tall oil, crude	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
Tall oil, distilled	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Tall oil fatty acid (resin acids less than 20 %)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
Tall oil pitch	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Tall oil soap, crude	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6)
Tallow	<i>Y</i>	<i>P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Tallow fatty acid	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Tetrachloroethane	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>NF</i>	<i>R</i>	<i>T</i>	<i>No</i>	<i>No</i>	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19)
Tetraethylene glycol	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Tetraethylene pentamine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19)
Tetrahydrofuran	<i>Z</i>	<i>S</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>AC</i>	<i>No</i>	15.19.6
Tetrahydronaphthalene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Tetramethylbenzene (all isomers)	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Titanium dioxide slurry	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	
Toluene	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.15.17, 15.19.6
Toluenediamine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12.15.17, 15.18, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)



Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Toluene diisocyanate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>Dry</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC (b)D</i>	<i>Yes</i>	15.12.15.16.2 & 15.22.11 (15.16.2), 15.17, 15.18, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
o-Toluidine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.15.17, 15.19 & 15.22.12 (15.19)
Tributyl phosphate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
1,2,3-Trichlorobenzene (molten)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
1,2,4-Trichlorobenzene	<i>X</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
1,1,1-Trichloroethane	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
1,1,2-Trichloroethane	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19.6
Trichloroethylene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>NF</i>	<i>C</i>	<i>T</i>	<i>No</i>	<i>No</i>	15.12.15.17, 15.19.6
1,2,3-Trichloropropane	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.15.17, 15.19 & 15.22.12 (15.19)
1,1,2-Trichloro-1,2,2-Trifluoroethane	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19.6
Tricresyl phosphate (containing 1 % or more ortho-isomer)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-6 (16.2.6)
Tricresyl phosphate (containing less than 1 % ortho-isomer)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.15.17, 15.19.6, 16.2.3-6 (16.2.6)
Tridecane	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
Tridecanoic acid	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Tridecyl acetate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
Triethanolamine	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Triethylamine	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIA</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19 & 15.22.12 (15.19)
Triethylbenzene	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Triethylenetetramine	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	-	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>AC</i>	<i>Yes</i>	15.12.15.17, 15.19 & 15.22.12 (15.19), 16.2.3-7 (16.2.9)
Triethyl phosphate	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6
Triethyl phosphite	<i>Z</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Triisopropanolamine	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9)
Triisopropylated phenyl phosphates	<i>X</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	15.19.6, 16.2.3-6(16.2.6)
Trimethylacetic acid	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.11, 15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Trimethylamine solution (30 % or less)	<i>Z</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.14 & 15.22.10 (15.14), 15.19.6
Trimethylbenzene (all isomers)	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6
Trimethylol propane propoxylated	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	
2,2,4-Trimethyl-1,3-pentanediol diisobutyrate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
2,2,4-Trimethyl-1,3-pentanediol-1-isobutyrate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
1,3,5-Trioxane	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	<i>IIB</i>	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.12.15.17, 15.19.6, 16.2.3-7 (16.2.9)
Tripropylene glycol	<i>Z</i>	<i>P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	
Trixylyl phosphate	<i>X</i>	<i>S/P</i>	1	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.15.17, 15.19.6,

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
														16.2.3-6 (16.2.6)
Tung oil	<i>Y</i>	<i>S/P</i>	2 (k)	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Turpentine	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	<i>IIA</i>	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>AC</i>	<i>No</i>	15.19.6
Undecanoic acid	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
1-Undecene	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6
Undecyl alcohol	<i>X</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Urea/Ammonium nitrate solution	<i>Y</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	15.19.6
Urea/Ammonium phosphate solution	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>R</i>	<i>T</i>	<i>AC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Urea solution	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>AC</i>	<i>No</i>	16.2.3-7 (16.2.9)
Used cooking oil (m)	<i>X</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Used cooking oil (Triglycerides, C16–C18 and C18 unsaturated) (m) (n)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Valeraldehyde (all isomers)	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>Inert</i>	<i>T3</i>	<i>IIB</i>	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.4.6, 15.13, 15.19.6, 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
Vegetable acid oils (m)	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Vegetable fatty acid distillates (m)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>	-	-	<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9), 16.2.3-8 (16.2.7)
Vegetable oil mixtures, containing less	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9),

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt; 60 °C</i>					
than 15 % free fatty acid (m)														16.2.3-8 (16.2.7)
Vinyl acetate	<i>Y</i>	<i>S/P</i>	3	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.15.13, 15.17, 15.19.6, 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
Vinyl ethyl ether	<i>Z</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>Inert</i>	<i>T3</i>	IIB	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.4, 15.13, 15.14 & 15.22.10 (15.14), 15.19.6, 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
Vinylidene chloride	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>Inert</i>	<i>T2</i>	IIA	<i>No</i>	<i>C</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.15.13, 15.14 & 15.22.10 (15.14), 15.17, 15.19 & 15.22.12 (15.19), 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
Vinyl neodecanoate	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>			<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12.15.13, 15.17, 15.19 & 15.22.12 (15.19), 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
Vinyltoluene	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>No</i>	<i>C</i>	<i>FT</i>	<i>ABC</i>	<i>No</i>	15.12.15.13, 15.17, 15.19.6, 16.2.7-1 (16.6.1), 16.2.7-2 (16.6.2)
White spirit, low (15.20 %) aromatic	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T3</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6, 16.2.3-7 (16.2.9)
Wood lignin with sodium acetate/oxalate	<i>Z</i>	<i>S/P</i>	3	2G	<i>Open</i>	<i>No</i>	-	-	<i>NF</i>	<i>O</i>	<i>No</i>	<i>No</i>	<i>No</i>	
Xylenes	<i>Y</i>	<i>P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T1</i>	IIA	<i>No</i>	<i>R</i>	<i>F</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-7 (16.2.9) (h)
Xylenes/ethylbenzene (10 % or more) mixture	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	<i>T2</i>	IIA	<i>No</i>	<i>R</i>	<i>F-T</i>	<i>ABC</i>	<i>No</i>	15.12.3, 15.12.4, 15.19.6
Xylenol	<i>Y</i>	<i>S/P</i>	2	2G	<i>Cont</i>	<i>No</i>	-	IIA	<i>Yes</i>	<i>C</i>	<i>T</i>	<i>ABC</i>	<i>Yes</i>	15.12.15.17, 15.19 &

Table S17.1 Summary of Minimum Requirements

<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i'</i>	<i>i''</i>	<i>i'''</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>n</i>	<i>o</i>
<i>Product Name</i>	<i>Pollution Category</i>	<i>Hazards</i>	<i>Ship Type</i>	<i>Tank Type</i>	<i>Tank Vents</i>	<i>Tank Environmental Control</i>	<i>Electrical Equipment</i>			<i>Gauging</i>	<i>Vapour</i>	<i>Fire Extinguishing</i>	<i>Respiratory and Eye Protection</i>	<i>Special Requirements</i>
							<i>Class</i>	<i>Group</i>	<i>Flashpoint &gt;60 °C</i>					
														15.22.12 (15.19), 16.2.3-7 (16.2.9)
Zinc alkaryl dithiophosphate (C7–C16)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6), 16.2.3-7 (16.2.9)
Zinc alkenyl carboxamide	<i>Y</i>	<i>S/P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)
Zinc alkyl dithiophosphate (C3–C14)	<i>Y</i>	<i>P</i>	2	2G	<i>Open</i>	<i>No</i>			<i>Yes</i>	<i>O</i>	<i>No</i>	<i>ABC</i>	<i>No</i>	15.19.6, 16.2.3-6 (16.2.6)

(Notes)

- (a): If the product to be carried contains flammable solvents such that the flashpoint does not exceed 60°C, then special electrical systems and a flammable-vapour detector are to be provided.
- (b): Although water is suitable for extinguishing open-air fires involving chemicals to which this footnote applies, water is not to be allowed to contaminate closed tanks containing these chemicals because of the risk of hazardous gas generation.
- (c): Phosphorus, (yellow or white) is carried above its auto-ignition temperature and therefore flashpoint is not appropriate. Electrical equipment requirements may be similar to those for substances with a flashpoint above 60°C.
- (d): Requirements are based on those isomers having a flashpoint of 60°C, or less; some isomers have a flashpoint greater than 60°C, and therefore the requirements based on flammability would not apply to such isomers.
- (e): Applies to n-decyl alcohol only.
- (f): Dry chemical is not to be used as fire extinguishing media.
- (g): Confined spaces are to be tested for both formic acid vapour and carbon monoxide gas, a decomposition product.
- (h): Applies to p-xylene only.
- (i): For mixtures containing no other components with safety hazards and where the pollution category is Y or less.
- (j): Only certain alcohol-resistant foams are effective.
- (k): Requirements for Ship Type identified in column *e* might be subject to regulation 4.1.3 of *ANNEX II* of *MARPOL 73/78*.
- (l): Applicable when the melting point is equal to or greater than 0°C.
- (m): From vegetable oils, animal fats and fish oils specified in this chapter.
- (n): Confirmation that the product is composed of triglycerides, C16–C18 and C18 unsaturated is to be required in order for the entry to be used. Otherwise, the more generic entry “Used cooking oil (m)” is to be used.
- (o): Indicates that the entries are to be used solely for backloading of contaminated bulk liquids from offshore installations used in the search and exploitation of seabed mineral resources.

## Chapter 18 LIST OF CHEMICALS TO WHICH THIS PART DOES NOT APPLY (With reference to *IBC Code* Chapter 18)

### 18.1 General

#### 18.1.1 Application\*

1 Although the products listed in the [Table S18.1](#) fall outside the scope of this part, the attention of Society is drawn to the fact that some safety precautions may be needed for their safe transportation. Accordingly Society is to prescribe appropriate safety requirements.

Table S18.1 List of Chemicals to which this Part Does Not Apply

Product name	Pollution Category
Acetone	Z
Alcoholic beverages, n.o.s.	Z
Apple juice	OS
n-Butyl alcohol	Z
sec-Butyl alcohol	Z
Calcium carbonate slurry	OS
Clay slurry	OS
Coal slurry	OS
Ethyl alcohol	Z
Glucose solution	OS
Glycerol ethoxylated	OS
Hydrogenated starch hydrolysate	OS
Isopropyl alcohol	Z
Kaolin slurry	OS
Lecithin	OS
Maltitol solution	OS
Microsilica slurry	OS
Molasses	OS
Noxious liquid, (11) n.o.s. (trade name ....., contains .....) Cat. Z	Z
Non-noxious liquid, (12) n.o.s. (trade name ....., contains .....) Cat. OS	OS
Orange juice (concentrated)	OS
Orange juice (not concentrated)	OS
Potassium chloride solution (less than 26%)	OS
Propylene glycol	OS
Sodium acetate solutions	Z
Sodium bicarbonate solution (less than 10%)	OS
Sorbitol solution	OS
Sulphonated polyacrylate solution	Z
Tetraethyl silicate monomer/oligomer (20% in ethanol)	Z
Triethylene glycol	OS
Vegetable protein solution (hydrolysed)	OS
Water	OS

(note)

Product name: The product name is to be used in the shipping document for any cargo offered for bulk shipments. In some cases, the product names may not be identical with the names given in previous issues of the *IBC Code*.

Pollution category: The letter “Z” means the pollution category assigned to each product under Annex II of *MARPOL 73/78*. “OS” means the product was evaluated and found to fall outside the categories X, Y or Z.

**2** Some liquid substances are identified as falling into Pollution Category *Z* and, therefore, subject to certain requirements of *MARPOL 73/78* Annex II.

**3** Liquid mixtures which are assessed or provisionally assessed under regulation 6.3 of *MARPOL 73/78* Annex II as falling into Pollution Category *Z* or *OS*, and which do not present safety hazards, may be carried under the appropriate entry in this chapter for “Noxious or Non-Noxious Liquid Substances, not otherwise specified (n.o.s.)”.



## **Chapter 19      (Deleted)**

(Deleted)

## Chapter 20 TRANSPORT OF LIQUID CHEMICAL WASTES

### 20.1 General

#### 20.1.1 Application

1 The requirements of this chapter are to apply to the transboundary movement of liquid chemical waste in bulk by seagoing ships and are to be considered in conjunction with all other requirements of this Part.

2 The requirements of this chapter are not to apply to:

- (1) wastes derived from shipboard operations which are covered by the requirements of *MARPOL 73/78*;
- (2) substances, solutions or mixtures containing or contaminated with radioactive materials which are subject to the applicable requirements for radioactive materials.

#### 20.1.2 Definitions

For the purpose of this chapter:

- (1) “Liquid chemical wastes” are substances, solutions or mixtures, offered for shipment, containing or contaminated with one or more constituents which are subject to the requirements of this Code and for which no direct use is envisaged but which are carried for dumping, incineration or other methods of disposal other than at sea.
- (2) “Transboundary movement” means maritime transport of wastes from an area under the national jurisdiction of one country to or through an area under the national jurisdiction of another country, or to or through an area not under the national jurisdiction of any country, provided at least two countries are concerned by the movement.

### 20.2 Documentation

#### 20.2.1 Documentation to be On Board

In addition to the documentation specified in [16.2](#) of this Part ships engaged in transboundary movement of liquid chemical wastes are to carry on board a waste movement document issued by the competent authority of the country of origin.

### 20.3 Classification of Liquid Chemical Wastes

#### 20.3.1 Classification of Liquid Chemical Wastes

For the purpose of the protection of the marine environment all liquid chemical wastes transported in bulk are to be treated as Category *X* noxious liquid substances, irrespective of the actual evaluated category.

### 20.4 Carriage and Handling of Liquid Chemical Wastes

#### 20.4.1 Minimum Requirements for the Carriage by Ships

Liquid chemical wastes are to be carried in ships and cargo tanks in accordance with the minimum requirements for liquid chemical wastes specified in [Chapter 17](#), unless there are clear grounds indicating that the hazards of the wastes would warrant:

- (1) carriage in accordance with the ship type 1 requirements; or
- (2) any additional requirements of this Part applicable to the substance or, in case of a mixture, its constituent presenting the predominant hazard.

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# GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

## Part S SHIPS CARRYING DANGEROUS CHEMICALS IN BULK

### S1 GENERAL

#### S1.1 General

##### S1.1.1 Application

1 Where the products specified in [Table S17.1, Part S of the Rules](#) are added to the cargo carried in bulk to maintain the properties of the cargo, the requirements in [Part S of the Rules](#) may not apply to such additive cargoes. However, in consideration of the properties and quantity of such additive cargoes, additional requirements for tank vent system, electrical installations, instrumentation, safety equipment, etc. may be applied.

2 The equipment and construction of ships for products not specified in [Chapter 17](#) and [Chapter 18, Part S of the Rules](#) but are considered necessary to apply the requirements of the *IBC Code* are acceptable to the Administration.

#### S1.3 Definitions

##### S1.3.1 Definitions

1 For the purpose of [Part S of the Rules](#) and the Guidance, the term “adjacent” means all cases of facial contact, linear contact and point contact unless otherwise specified.

2 The term “cargo area” referred to [1.3.1\(5\), Part S of the Rules](#) is to be as follows.

- (1) The area excludes the fuel oil tanks adjacent to the cargo tanks or slop tanks of the arrangement as given in [Fig. S1.3.1-1](#). However, the requirements specified in [3.4, Part S of the Rules](#) apply.
- (2) A non-hazardous area in the forecastle space which is protected from cargo tanks by cofferdams, etc. is not to be defined as part of the cargo area. However, compartments located above cofferdams, etc. protecting non-hazardous areas are to be defined as part of the cargo area (refer to [Fig. S1.3.1-3](#)).

3 The piping system “separated” from each other as referred to in [1.3.1\(29\), Part S of the Rules](#) mean either of the following (1) or (2):

- (1) Piping system completely independent from each other.
- (2) The piping system that come through with the tank carrying other cargo, but can be separated by the means as exemplified in (Acceptable) in [Fig. S1.3.1-2](#) when cargoes likely to cause dangerous reaction with each other are carried may be regarded as those completely independent from each other. In case where separation can be achieved by this method, operational precautions are to be noted in the Operation Manual.

Fig. S1.3.1-1

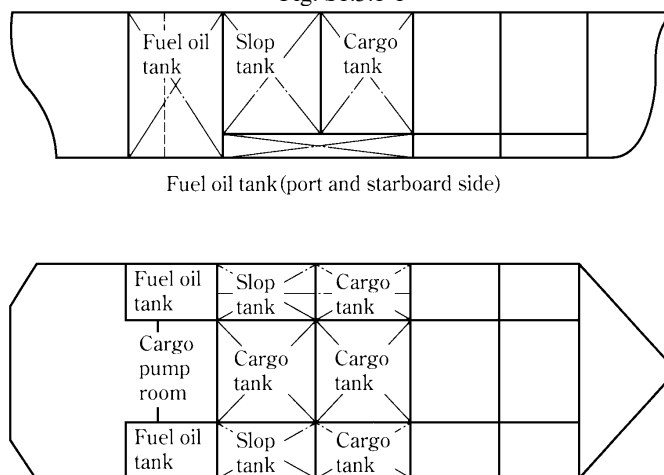
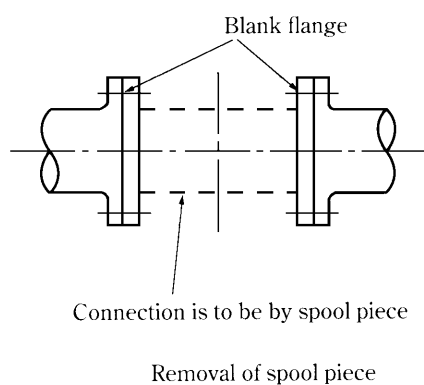


Fig. S1.3.1-2

Example for "Acceptable"



Example for "Unacceptable"

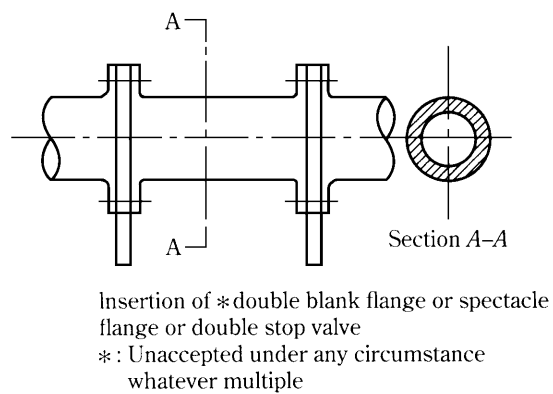
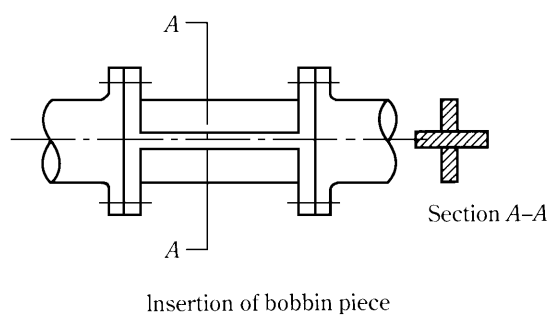
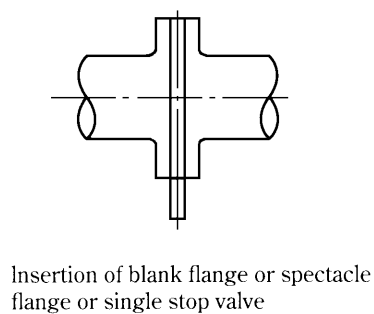
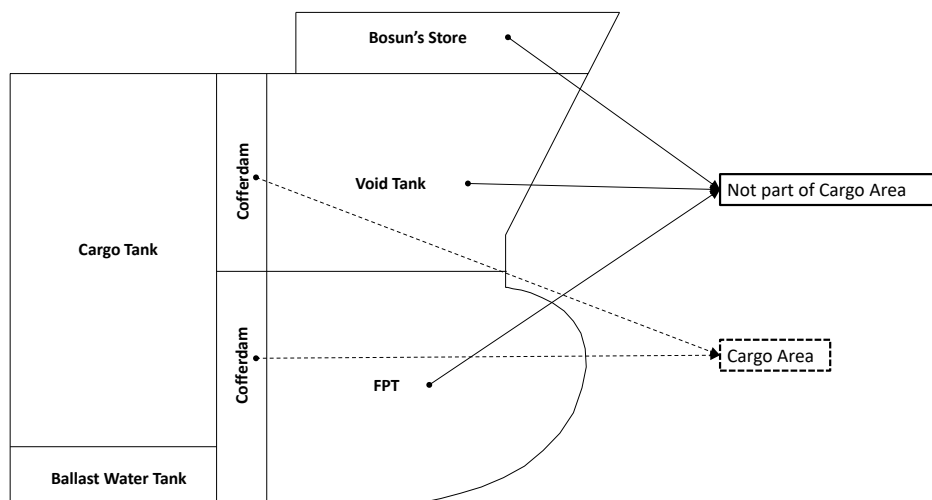
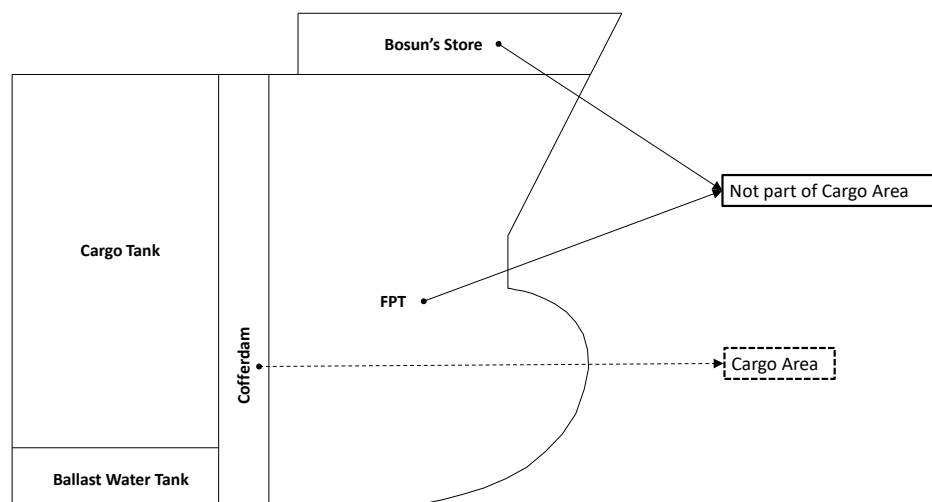


Fig. S1.3.1-3

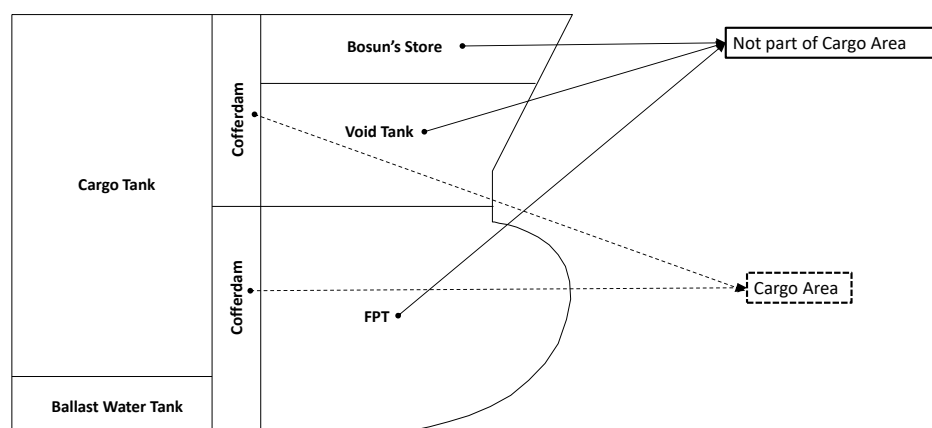
(Sample 1) Applicable



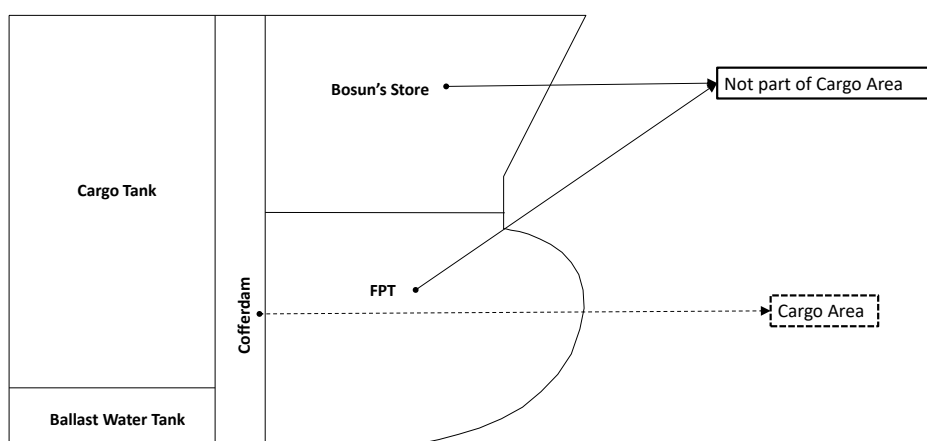
(Sample 2) Applicable



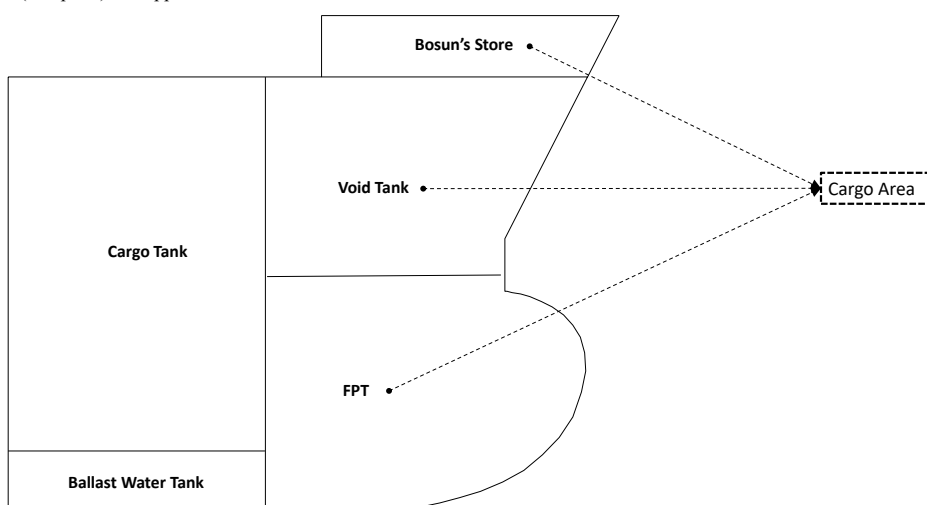
(Sample 3) Applicable



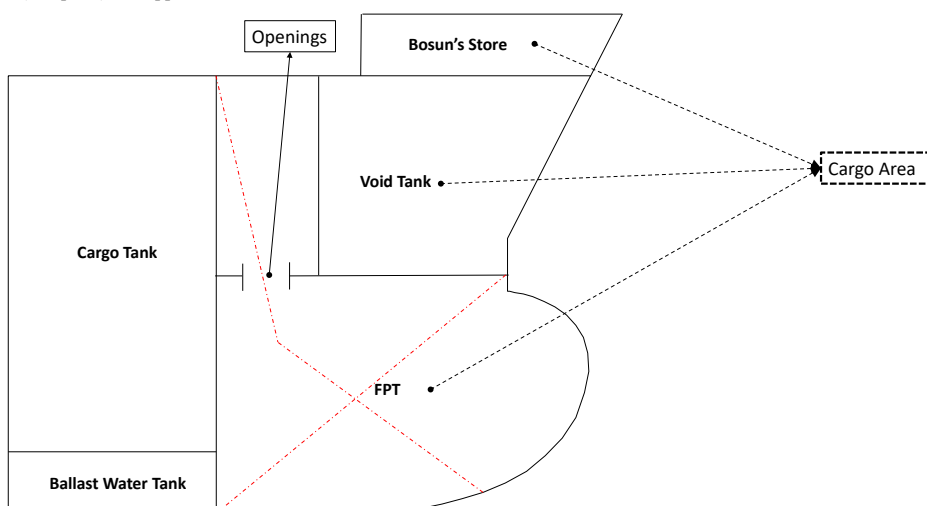
(Sample 4) Applicable



(Sample 5) Not applicable



(Sample 6) Not applicable





## S2 SHIP SURVIVAL CAPABILITY AND LOCATION OF CARGO TANKS

### S2.1 General

#### S2.1.1 General

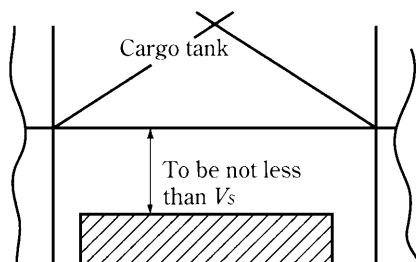
Calculation method of damage stability is to be in accordance with the “Guidelines for the Uniform Application of the Survival Requirements (MSC/Circ.286)” approved by the *Maritime Safety Committee* at its forty second session, 1980.

### S2.2 Solid Ballast and Stability Information

#### S2.2.1 Solid Ballast

Where the requirements for the initial stability are not satisfied, use of solid ballast may be approved. When solid ballast is provided directly below the tank, the distance between the top of solid ballast and cargo tank bottom is to be not less than the vertical extent of damage  $V_s$  as given in [Fig. S2.2.1-1](#)

Fig. S2.2.1-1



Notes:

Shaded Section: Solid ballast

$V_s$ : Vertical extent of damage given in [Table S2.2, Part S of the Rules](#)

#### S2.2.3 Stability Instruments

1 The wording “performance standards recommended by the *IMO*” specified in [2.2.3-1, Part S of the Rules](#) refers to the following (1) to (3):

- (1) Chapter 4, Part B of *IMO resolution MSC.267(85) “International Code on Intact Stability, 2008 (2008 IS Code)”*
- (2) Section 4, Annex to “*Guidelines for the Approval of Stability Instruments*” (MSC.1/Circ.1229)
- (3) The technical standards provided in Part 1 of “*Guidelines for Verification of Damage Stability Requirements for Tankers*” (MSC.1/Circ.1461)

2 In applying the requirements in [2.2.3-4, Part S of the Rules](#), reference is to be made to the operational guidance provided in Part 2 of “*Guidelines for Verification of Damage Stability Requirements for Tankers*” (MSC.1/Circ.1461).

### S2.3 Shipline Discharges below the Freeboard Deck

#### S2.3.1 Shipline Discharges

1 The requirements of [2.3.1, Part S of the Rules](#) don’t apply to the overboard discharges led through the shell from the superstructure and deckhouse located on or above the second deck on freeboard deck.

2 For the purpose of the requirements in [2.3.1, Part S of the Rules](#), the following requirements (1) and (2) are to be complied with.

- (1) The scupper pipes within the superstructure are to be in accordance with the requirements in [D13.4.1-1](#).
- (2) The inboard open ends of scupper pipes are to be in accordance with the requirements in [D13.4.1-2](#).

**S2.5 Damage Assumptions****S2.5.1 Assumed Maximum Extent of Damage**

When extent of bottom damage is assumed in **2.5.1-2, Part S of the Rules** where the damage is within  $0.3L_f$  from the forward perpendicular of the ship, the requirements for the extent of damage specified in **Table S2.2, Part S of the Rules** “other parts of the ship” apply.

**S2.6 Location of Cargo Tanks****S2.6.1 Location of Cargo Tanks**

Notwithstanding the requirements for the location of cargo tanks in **2.6, Part S of the Rules**, cargo pump room bilges or tank washings may be thrown into any cargo tanks.

**S2.6.2 Suction Well Installed in Cargo Tanks**

**1** It is desirable that the area of suction well is not larger than the area necessary for the installation of cargo pumps, suction pipes, valves, heating coils, etc. added with the area necessary for sufficient suction, cleaning and maintenance.

Note: Regulation 12 in *Annex II to MARPOL 73/78* is also to be taken into consideration.

**2** For Type II ships, the suction wells which comply with requirement in **2.6.2, Part S of the Rules** are not to be installed less than 760 mm from the shell plating.

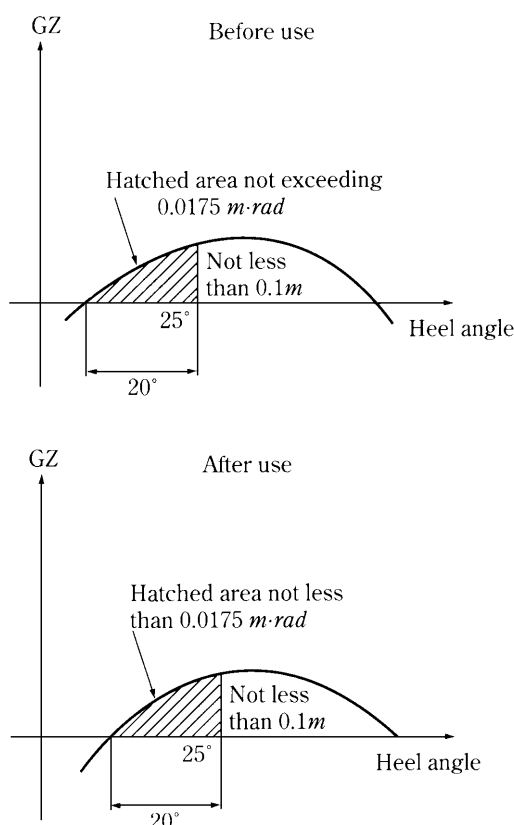
**S2.7 Flooding Assumptions****S2.7.6 Equalization Arrangements**

The “cross-levelling pipes” specified in **2.7.6, Part S of the Rules** are to comply with the following requirements:

- (1) Use of this equalization arrangement is to be accepted only for obtaining the  $GZ$  area of  $0.0175 \text{ m-rad}$  for the righting lever of  $0.1 \text{ m}$  and the range between the state of equilibrium and 20 degrees. Without the use of this equalization arrangement, the requirements for heel angle and positive stability range are to be satisfied. (See **Fig. S2.7.6-1**)

Fig. S2.7.6-1

(Example)



- (2) When righting lever curves before use of this equalization arrangements are to be determined, the following assumptions are to be made:
- (a) The cargo or consumable liquid in the damaged space has completely spilled out.
  - (b) The damaged space is filled with sea water to the water level outside the ship.
  - (c) The cross-levelling pipes are closed.
- (3) The time required for horizontal adjustment is to be not more than 15 *minutes*.
- (4) The cross sectional area  $A$  of piping used for horizontal adjustment is to be as follows:

$$A \geq 7.5 \frac{V}{\sqrt{H}} (\text{cm}^2)$$

where:

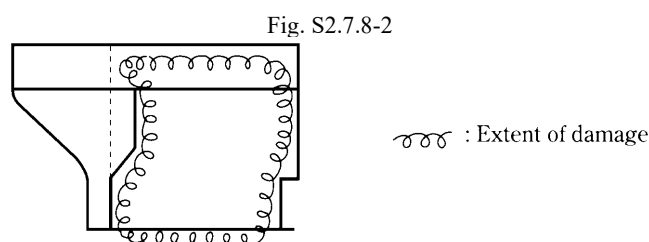
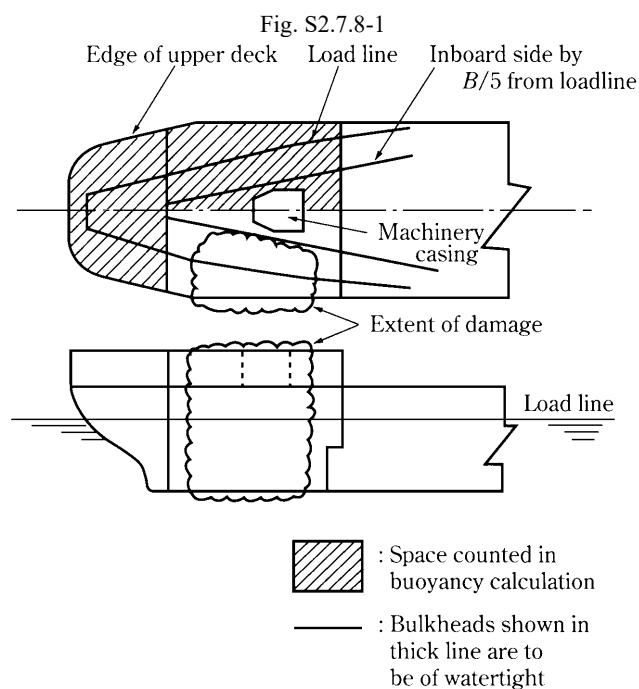
$V$ : Quantity of water expected to enter the flooded space ( $\text{m}^3$ )

$H$ : Height from the draught line before flooding to the centre line of the pipe ( $\text{m}$ )

- (5) It is not desirable to connect spaces on both sides of the ship with a large diameter duct to ensure the same rate of flooding as this aggravates the heeling moment of the ship in turning motion.

### S2.7.8 Buoyancy of Superstructure

1 In the case of the side damage where the machinery space is regarded as one-space flooding in [2.7.8, Part S of the Rules](#), damage extent applicable to spaces other than the machinery space is applied to poop. With this reason, therefore, the space within poop surrounding the machinery space and enveloped by watertight bulkheads can not be treated as a reserve buoyancy unless watertight bulkheads are arranged as given in [Fig. S2.7.8-1](#). However, in case where such treatment is accepted under the special requirements for small ships in accordance with [2.8.2, Part S of the Rules](#) as a special relaxation by the Administration, the above requirements may not be applied. Where the engine room bulkhead is knuckled, the [Fig. S2.7.8-2](#), and the space between the foremost end and the aftermost end is to be taken as the damaged space of the superstructure.



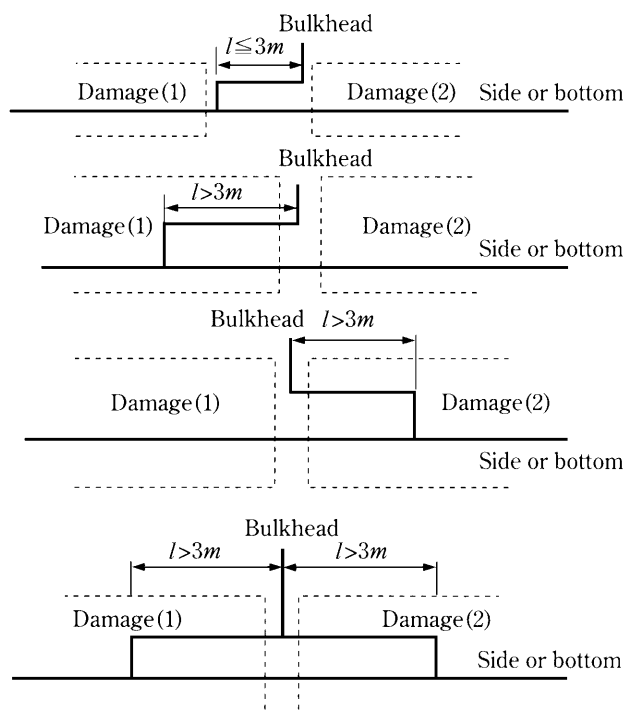
2 In 2.7.8(2), **Part S of the Rules**, the remotely operated sliding watertight doors are to satisfy the requirements of 2.2.2, **Part 1, Part C of the Rules**, unless otherwise specified in this chapter and to be capable of being controlled from a safe and readily accessible place. Weathertight openings submerge in water under the minimum range of residual stability are to be capable of closing securely in a state of equilibrium.

## S2.8 Standard of Damage

### S2.8.1 Assumed Extent of Damage

1 In 2.8.1(3) and (5), **Part S of the Rules**, the treatment of the stairway cases located forward or aft end bulkheads of the machinery space is to be in accordance with Fig. S2.8.1-1.

Fig. S2.8.1-1



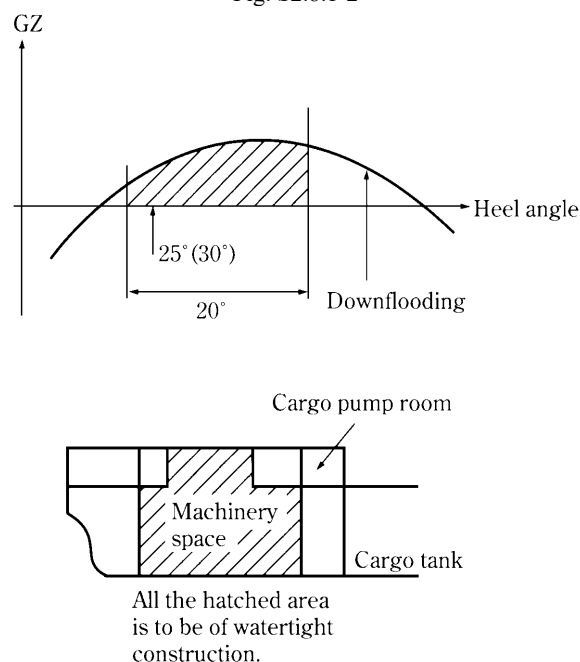
2 In 2.8.1(6), Part S of the Rules, the expression “should be considered by the Society” means that the survival requirements specified in 2.9, Part S of the Rules under a condition of flooding only in the machinery space are satisfied, or the following requirements are satisfied:

- (1) The area with positive sign of the righting lever curve within the range from an arbitrary point between the final state of equilibrium after flooding and 25 degrees (or 30 degrees when the deck side line is not submerged) to 20 degrees is to be:
  - (a) 0.017 *m-rad* or more for  $70m \leq L_f < 125m$
  - (b) 0.0088 *m-rad* or more for  $L_f < 70m$
- (2) The position of downflooding is to be in accordance with 2.9.3(1), Part S of the Rules.
- (3) The angle of heel is to be in accordance with 2.9.2(2), Part S of the Rules.

Where the machinery casing is of the watertight construction, the space in poop surrounding the machinery space may be treated as a reserve buoyancy. When a door is provided, it is to be of the watertight sliding door remotely operated from the poop deck.

(See Fig. S2.8.1-2)

Fig. S2.8.1-2

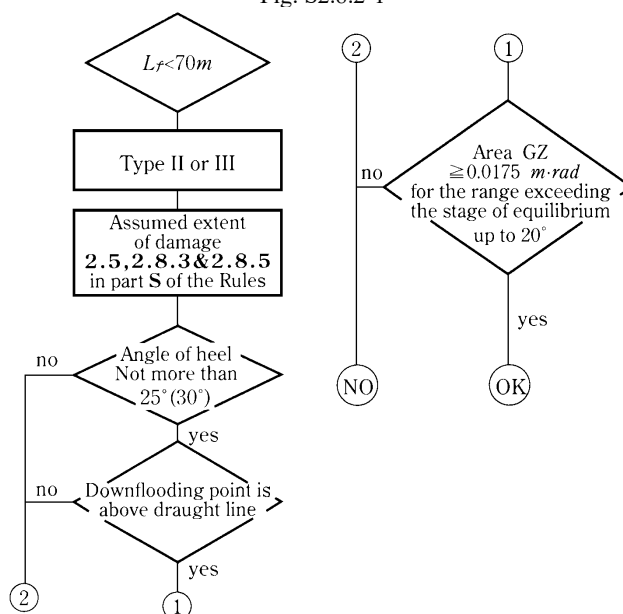


## S2.8.2 Alternative Measures

The “special dispensations” in **2.8.2, Part S of the Rules** are to be in accordance with the following (See Fig. S2.8.2-1).

- (1) No dispensations are to be accepted for Type I ships.
- (2) Small ships mean as those whose  $L_f < 70m$ .
- (3) Except for the case of flooding of machinery space of Type III ships (**2.8.1(6), Part S of the Rules**), to be in accordance with the following:
  - (a) Assumed extent of damage is to be in accordance with **2.5, 2.8.1(3)** and **2.8.1(6), Part S of the Rules**.
  - (b) Downflooding point and angle of heel are to be in accordance with **2.9.2** and **2.9.3, Part S of the Rules**.
  - (c) The area with positive sign of the righting lever curve within the range from an arbitrary point between the final stage of equilibrium after flooding and 25 degrees (or 30 degrees when the deck side line is not submerged) to 20 degrees is to be: 0.0175 *m-rad* or more.
  - (d) The maximum value of *GZ* is not specified.

Fig. S2.8.2-1



## S2.9 Survival Requirements

### S2.9.2 Stability Criteria at Any Stage of Flooding

1 The “watertight sliding doors” referred to in **2.9.2(1), Part S of the Rules** means such doors satisfying the requirements of **2.2.2, Part 1, Part C of the Rules**, unless otherwise specified in this chapter.

2 The words “to the satisfaction of the Society” in **2.9.2(3) in Part S of the Rules** mean as follows:

In ordinary cases, the final stage of flooding is considered most severe, but the most severe condition may be encountered during intermediate stages of flooding involving replacement of sea water in the damaged space. In this connection, stability during such intermediate stages of flooding are to be considered when specifically requested by the Society.

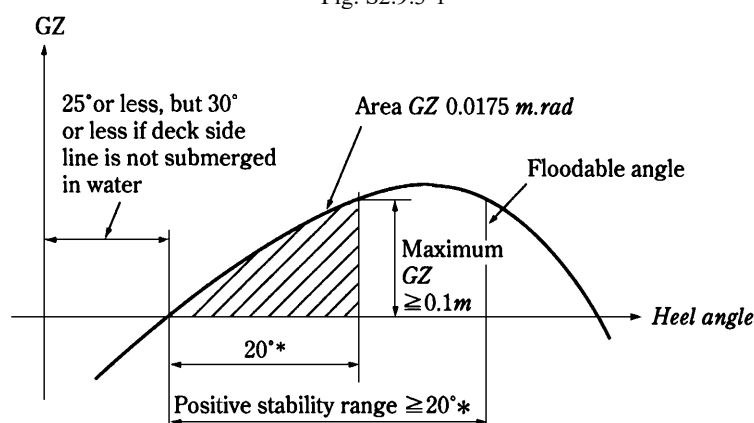
### S2.9.3 Stability Criteria at Final Equilibrium after Flooding

1 In **2.9.3(1), Part S of the Rules**, floodable weathertight openings within the minimum stability range (20 degrees) are to be capable of being securely closed at the final stage of equilibrium after flooding. Where safe access thereto is impracticable due to submersion of deck or large angle of heel, such weathertight openings may not be accepted. However, air pipes of float type, etc. having self-closing mechanism in case of submersion in water may be accepted.

2 The survival requirements at the final stage of equilibrium after flooding are to be in accordance with **Fig. S2.9.3-1**.

3 In applying the requirements of **2.9.3(1), Part S of the Rules**, “other openings capable of being closed weathertight” do not include ventilators provided with weathertight closing appliances in accordance with the requirements of **14.12.3.1-3, Part 1, Part C of the Rules** or **21.6.5-2, Part CS of the Rules** that for operational reasons have to remain open to supply air to the engine room or emergency generator room (if the same is considered buoyant in the stability calculation or protecting openings leading below) for the effective operation of the ship.

Fig. S2.9.3-1



Note \* :

The initial point of calculation of the stability range at an angle of heel of  $20^\circ$  may be taken arbitrarily at any intermediate point between the angle of heel at the final stage of equilibrium and the maximum angle of heel.

## S3 SHIP ARRANGEMENTS

### S3.1 Cargo Segregation

#### S3.1.1 Segregation of Tanks Containing Cargo or Residues of Cargo

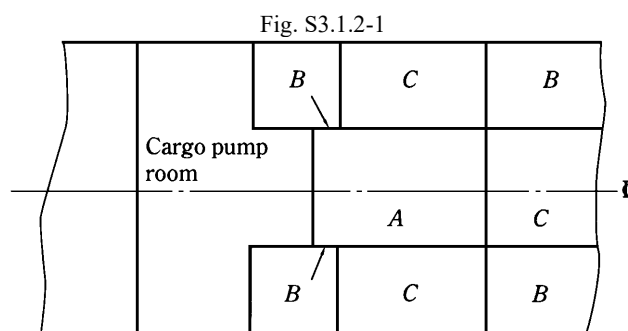
For cargo tanks and slop tanks, neither linear contacts nor point contacts with accommodation spaces, service spaces, machinery space, etc. are to be accepted. Further, no segregation of spaces in contact by means of slanting plates is to be accepted.

#### S3.1.2 Segregation of Cargoes which React with Other Cargoes

Where cargoes which react with other cargoes in a hazardous manner are loaded simultaneously, the ship arrangement as given in [Fig. S3.1.2-1](#) is not to be accepted.

Only in the requirements for segregation of cargoes which react with each other, the linear contacts and point contacts as given in [Fig. S3.1.2-2](#) may be accepted.

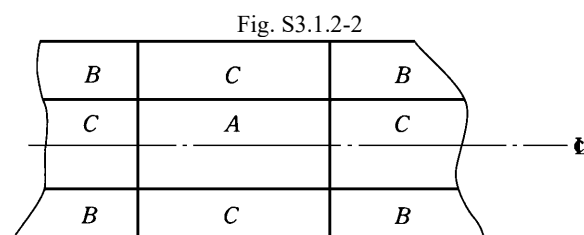
Where the cargo pipes are of common pipes, they are not to pass through cargo tanks carrying cargoes which react with each other in a hazardous manner except for the cases where pipe arrangement is provided a tunnel or made as given in [Fig. S3.1.2-3](#).



Notes:

*A* and *B* react with each other in a hazardous manner. (Arrowhead indicates linear contacts.)

*A*, *B* and *C* do not react with each other in a hazardous manner.



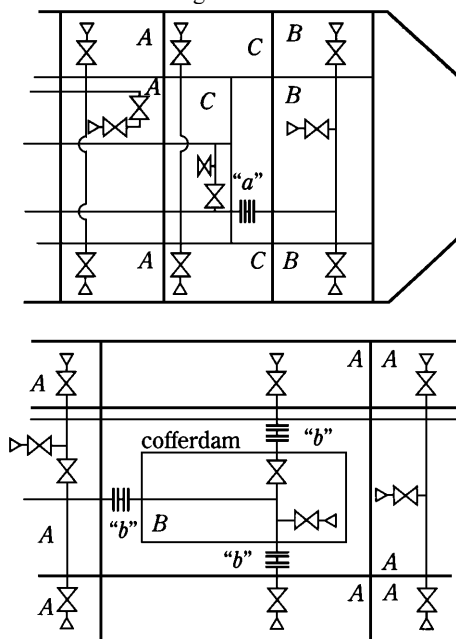
Notes:

*A* and *B* react with each other in a hazardous manner.

*A* and *C*, and *B* and *C* do not react with each other in a hazardous manner.



Fig. S3.1.2-3



Notes:

1. “a” and “b” are to be segregated within cofferdams or void spaces in the method specified in **1.3, Part S of the Rules**.  
No segregation in tanks is to be accepted.
2. A and B are cargoes which react with other in a hazardous manner.
3. A and C, and B and C are safe cargoes which do not react with each other in a hazardous manner. In this case, however, cargo operation of cargo B by connecting the spool pieces of “a” and “b” after discharging cargo A is unacceptable, and therefore provisions of independent cargo pumps may be required for cargo operation on tanks segregated under the method given above.

### S3.1.3 Cargo Piping

- 1 Cargo piping is not to pass through the spaces specified in **3.1.3, Part S of the Rules**, in addition, spaces such as fuel oil tanks, freshwater tanks and control stations.
- 2 Gas-freeing piping systems and blowers may be arranged outside cargo areas in accordance with **R4.5.6-2** to **R4.5.6-10**.

### S3.1.5 Location of Fuel Tanks

- 1 The requirements specified in **3.1.5, Part S of the Rules** do not permit the placing of fuel tanks adjacent to cargo tanks intended to carry cargoes which are prohibited to be loaded adjacent to fuel tanks by requirements elsewhere in this Part.
- 2 The “toxic cargoes” referred to in **3.1.5, Part S of the Rules** include those for which toxic vapour detection is specified in column “k” of **Table S17.1, Part S of the Rules**.
- 3 An example of the “cargo tank block” defined in **3.1.5, Part S of the Rules** is shown in **Fig. S3.1.5-1**.

## S3.2 Accommodation, Service and Machinery Spaces and Control Stations

### S3.2.1 Arrangement

- 1 With respect to the requirements specified in **3.2.1, Part S of the Rules**, paint lockers, regardless of their use, are not to be located within the cargo area.
- 2 When segregated by a gastight deck and well ventilated, such a space is not electrically hazardous space, and in this case, arrangement of accommodation spaces, service spaces or control stations above fuel oil tanks adjacent to cargo tanks in the poop as given in **Fig. S3.2.1-1** may be accepted.

Fig. S3.1.5-1 Example of Cargo Tank Block

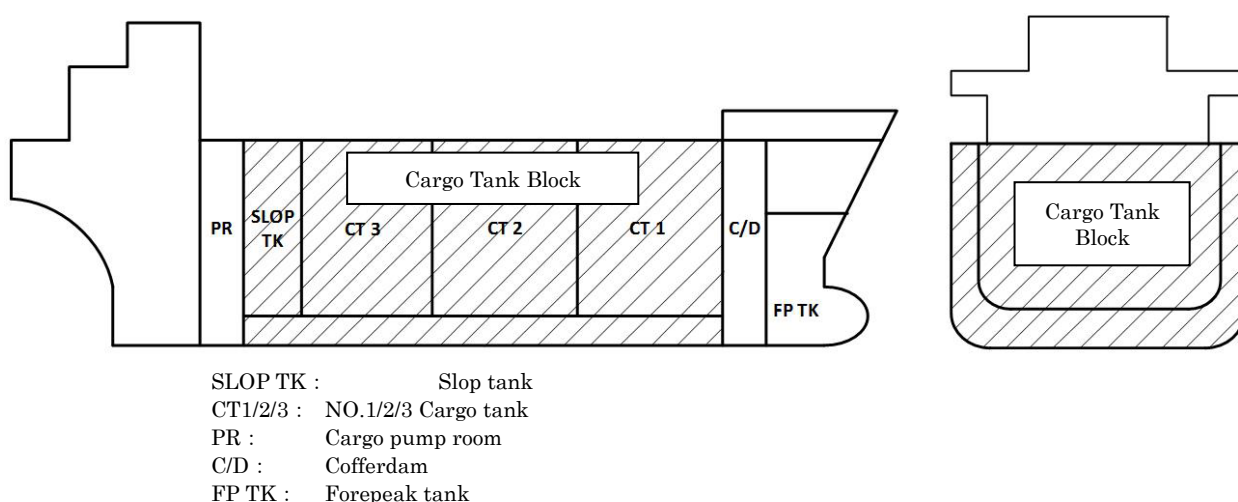
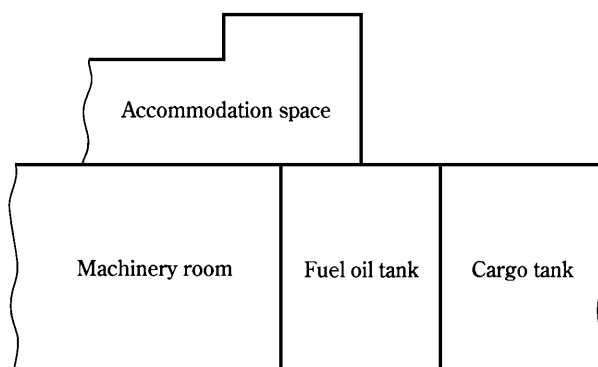


Fig. S3.2.1-1



### S3.2.2 Location of Air Intakes and Openings

The locations of air intakes and openings are to comply with the requirements in 3.2.3, 3.7, 3.8.3, 8.2.2, 12.2.5 and 15.12, Part S of the Rules.

### S3.2.3 Entrances, Air Inlets and Openings to Accommodation, Service and Machinery Spaces and Control Stations

1 For exhaust air outlets of the mechanical ventilation system of accommodation, service and machinery spaces, the requirements in this Part also apply. (The requirements in 3.2.3 also apply to exhaust air outlets specified in 3.2.2, 3.7.4, 8.2.4 and 15.12.1, Part S of the Rules.)

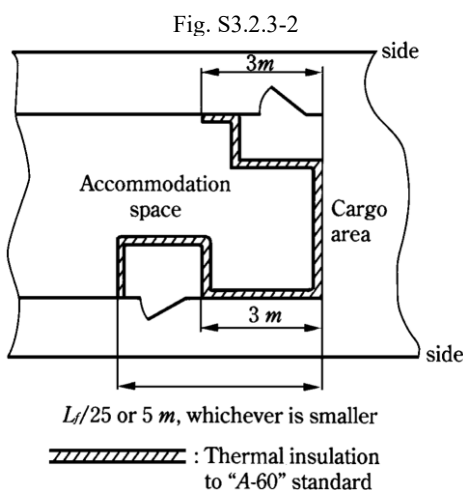
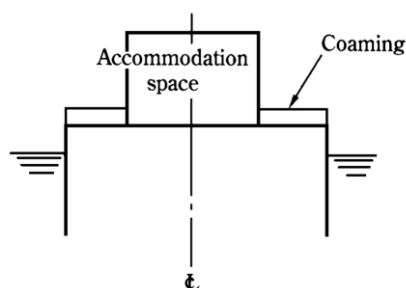
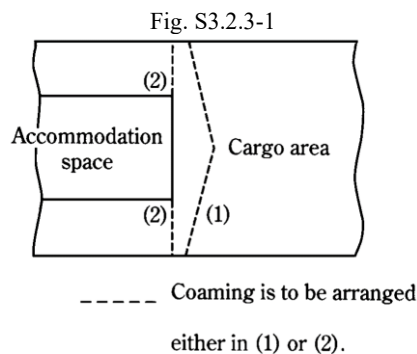
2 Spaces where doors can be provided are to be restricted to lockers containing cargo gears and safety equipment, cargo control room and decontamination shower room. As given in Fig. S3.2.3-1, these spaces are not provided with passageways led to accommodation space and service spaces and control station, and the casings, floors and ceilings adjacent to the accommodation spaces are to be insulated to “A-60” standard.

3 The gastight wheelhouse doors and windows are to be fitted with packing and dog bolts. These windows, doors and clear view screen are to be hose tested at a pressure of  $2.0 \text{ kg/cm}^2$ . To ensure gastightness of the clear view screen, an additional window fitted with dog bolts or other means of gastight capable of tightening the window pane when the screen is not rotating are to be provided.

4 For ships carrying dangerous chemicals in bulk, irrespective of the kind of cargo, coaming is to be provided at the forward end of the deckhouse to prevent the ingress of the cargo overflow on the deck into the deckhouse including the accommodation and service spaces and control stations as given in Fig. S3.2.3-2. The height of coaming is to be 150 mm from the deck, 50 mm above the upper edge of the sheer strake or 50 mm above the upper face of the deck longitudinals, whichever is the greatest.

5 In cases where it is impossible or impractical to satisfy the requirements specified in 3.2.3, Part S of the Rules, entrances, air

inlets and openings facing cargo areas may be provided subject to no sources of ignition in a hazardous area as defined in 4.2.3-2, -4 and -5, Part H of the Rules. In such cases, explosion-protected electrical equipment complying with IEC 60092-502 is not regarded as a source of ignition.



### S3.3 Cargo Pump Rooms

#### S3.3.1 Arrangement of Cargo Pump Rooms

Where cargo pump rooms are normally manned, and in case where cargo pump rooms are specially large, an additional escape trunk is to be provided. In this case, it is desirable that two escape routes led to the weather deck are available.

#### S3.3.2 Permanent Arrangement for Hoisting an Injured Person

The permanent arrangement for hoisting an injured person from cargo pump room is to be in accordance with the following requirements:

- (1) To be capable of being one-man-operated from the weather deck.
- (2) To be capable of lifting an injured person up to the place on the weather deck.
- (3) To be capable of lifting a weight of not less than 255 kg.

#### S3.3.4 Access Ladders

The angle of normal access ladders provided in cargo pump room to a horizontal plane is to be not more than 60 degrees.

### S3.3.5 Means for Discharging Cargoes and Bilges

1 For pumps and valves dealing with cargoes likely to cause corrosions of structural members or contamination with other bilges within the cargo pump room due to leakage of corrosive cargoes, interactive cargoes or water prohibitive cargoes, proper bilge processing systems are to be provided according to degree of hazard. For instance, as the bilge processing systems for pumps dealing with interactive cargoes, provisions of independent bilge processing systems may be considered. In case where interactive cargoes are handled in the same cargo pump room, simultaneous cargo operations are to be avoided whereby the next cargo operation is to be carried out after complete bilge processing for the first cargo.

2 Slop tanks specified in **3.3.5, Part S of the Rules** are to comply with the following requirements (1) through (4):

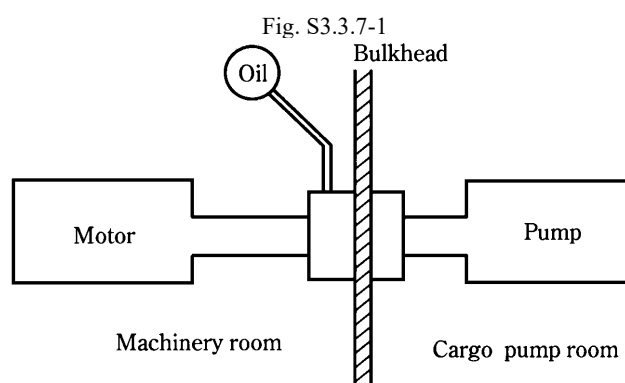
- (1) In case of using the tank both as cargo tank and slop tank, the same requirements applicable to cargo tanks apply.
- (2) Where no cargo is carried and only bilges or tank washings are contained, no requirements for ship type (only concerning the cargo tank arrangement) apply, notwithstanding kind of cargoes contained in bilges or tank washings. However, for the minimum requirements other than ship type, the following (a), (b) and (c) are to be complied with:
  - (a) For ventilation system, electrical installation and instrumentation, the severest of the requirements applicable to the cargoes contained in the slops is to apply.
  - (b) For tank environmental control and its special requirements, all the requirements for all cargoes contained in the slops are to be satisfied.
  - (c) For tank type, the requirements for the cargo contained in the slops are to be satisfied.
- (3) For tank washings of tanks that carried the dangerous cargoes subjected to **15.12, Part S of the Rules**, slop tanks containing bilges of the cargo pump room used for the cargo operation of these cargoes and pipes serving them, the requirements of **15.12, Part S of the Rules** apply without exceptions.
- (4) In case where two or more cargoes which react in a hazardous manner are carried, the tank washings and bilges containing these cargoes are not to be contained in the same slop tank. Therefore, slop tanks equal in number to that of cargoes which react in a hazardous manner carried at the same time are to be provided. In this case, when cargo tanks are used as slop tanks, these cargo tanks are to be provided with the pumps and pipelines to serve as the slop tanks.

### S3.3.6 Pump Discharge Pressure Gauges

“Cargo pumps” specified in **3.3.6, Part S of the Rules** are the cargo pumps, tank cleaning pumps, bilge pumps, etc. used for handling cargoes and liquids containing cargoes in general.

### S3.3.7 Gas Tightness of Shafting Passing through Bulkhead or Deck

Where gastight seals are maintained with efficient lubrication, shaft seals of a type for periodical feeding of grease are not to be accepted, but continuous gastight sealing is to be ensured. These shaft seals are to be provided outside the cargo pump room. Given in **Fig. S3.3.7-1** in an example.



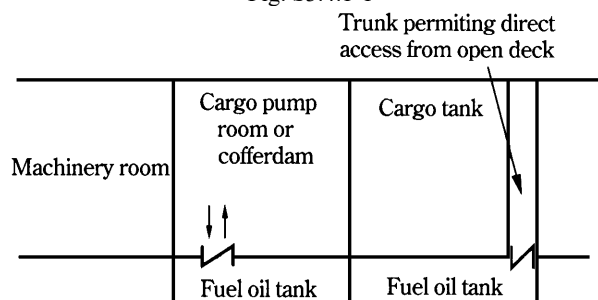
**S3.4 Access to Spaces in the Cargo Area****S3.4.1 General**

1 Spaces having direct openings to hold spaces containing independent tanks are to be to the requirements in **3.4, Part S of the Rules** irrespective of the definition of the cargo area. Fuel oil tanks which have face contacts, linear contacts or point contacts with cargo tanks and those arranged directly below cargo pump room are not included in the cargo area, but subject to the requirements of this Paragraph.

- (1) Fuel oil tank adjacent to cargo tank or in linear or point contact therewith. (See **Fig. S3.4.1-1**)

Access holes are to be to the requirements in this Paragraph, and access is to be from the cargo area.

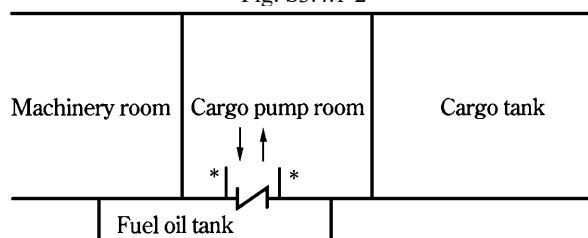
Fig. S3.4.1-1



- (2) Fuel oil tank directly below cargo pump room (See **Fig. S3.4.1-2**)

Access holes are to be to the requirements in this Paragraph, and in consideration of possible cargo leakage, access is to be from the cargo area.

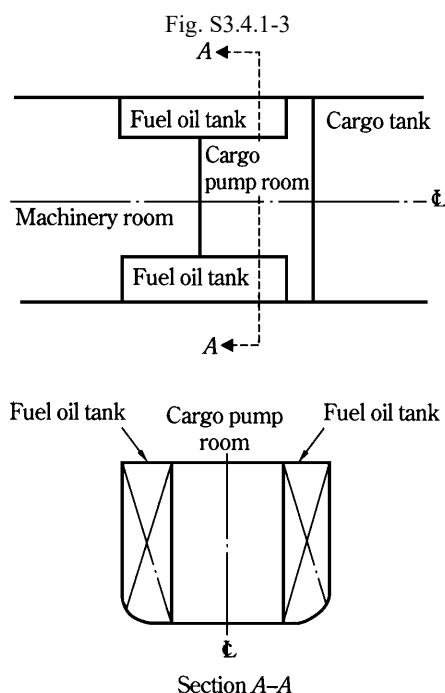
Fig. S3.4.1-2



Note:

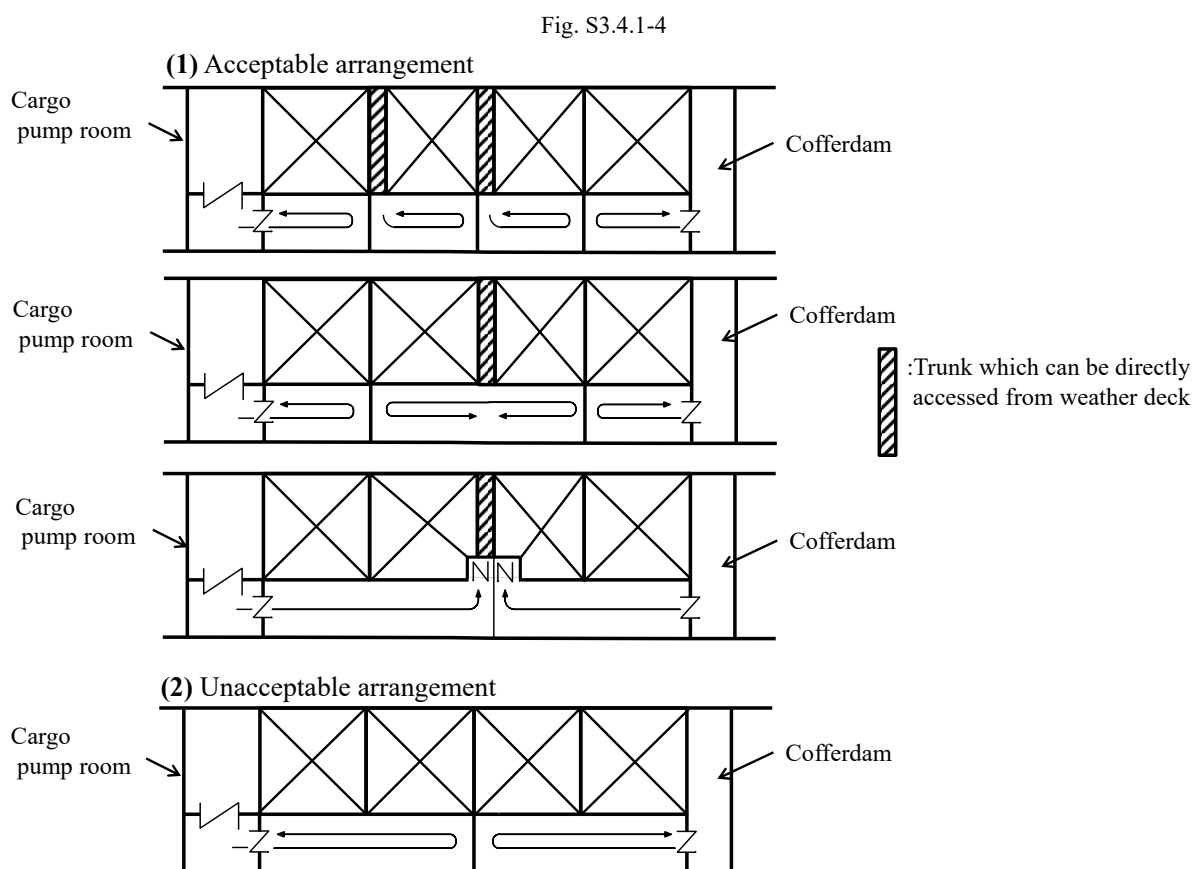
\* : Coaming of a suitable height

- (3) For fuel oil tanks given in **Fig. S3.4.1-3**, the requirements in this Paragraph do not apply. Access from the cargo area is desirable.



2 For access openings of double bottom, etc., the following requirements are to be complied with:

Two access routes are, as a rule, necessary for double bottom or similar other spaces. However, on the condition that easy access is provided and an unconscious injured person can be rescued, only one access route may be accepted for a relatively small space (see Fig. S3.4.1-4). On duct keel, access openings are to be provided at both ends, and an opening led to weather deck is to be provided at intervals not exceeding 60 m.



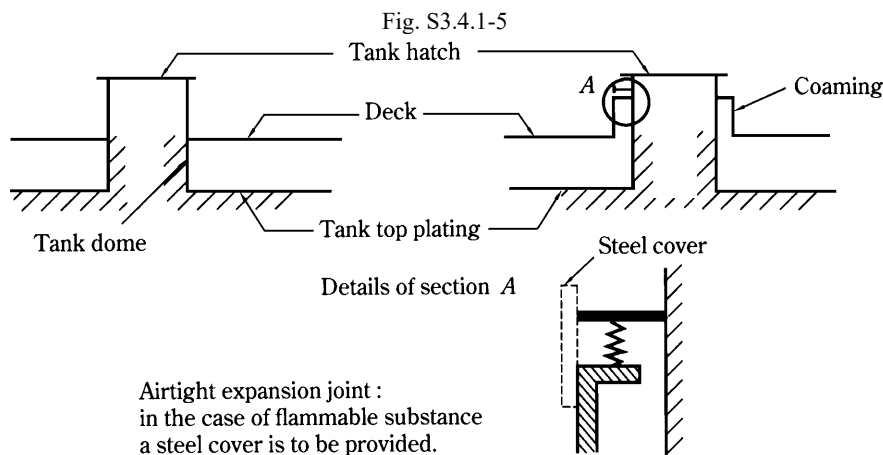
Note:

In the case of double bottoms under cargo tanks, the round-trip distance from any access opening is to be no more than twice

the length of the cargo tank as indicated in (1).

**3** Access openings to independent cargo tanks are to be in accordance with the following requirements:

Independent cargo tanks are to be provided with trunks or domes protruding beyond the weather deck as given in Fig. S3.4.1-5 and cargo tank hatches are to be provided the top of these trunks or domes. No opening of any construction is to be provided on the cargo tank wall below the weather deck.



**S3.4.2 Minimum Clear Opening for Access through Horizontal Openings**

The minimum opening dimensions are to be  $600\text{ mm} \times 600\text{ mm}$  with rounded corners.

**S3.4.3 Minimum Clear Opening for Access through Vertical Openings and Arrangement of Vertical Openings**

Access openings are to comply with the following requirements:

- (1) Opening of  $600\text{ mm} \times 800\text{ mm}$  is to be so oriented that the major axis is taken in the vertical direction. However, where the major axis is difficult to be taken in the vertical direction under the structural reason, horizontal direction may be taken.
- (2) At access openings and in the vicinity, no pipes or equipment that interfere with the assurance of access route are to be arranged.

**S3.4.4 Smaller Dimensions of Opening**

For ships which have been approved for a limited service area (for example “Coasting Service”, “Smooth Water Service”, etc.), the dimensions of their opening are to be complied with the following (1) to (3):

- (1) The dimensions of horizontal opening (H) are not to be less than  $600\text{ mm} \times 600\text{ mm}$ .
- (2) The dimensions of vertical opening (V) are not to be less than  $600\text{ mm} \times 800\text{ mm}$ .
- (3) Regardless of the preceding (1) or (2), for small ships whose length is less than 70 m and which does not engage in international voyage, the dimensions of opening are to be according to Table S3.4.4.

Table S3.4.4 Dimensions of Opening for Small Ship

	Area	Minimum dimension of opening (mm)
Ships having Integral tanks	Cargo tank	H;600 × 600, V;600 × 800
	Void space adjacent to cargo tank*	H;500 × 500, V;500 × 650
	<i>WBT</i> adjacent to a tank where the cargoes referred to the requirements in <b>15.12, Part S of the Rules</b> or the cargo requiring toxic gas detection is loaded**	H;500 × 500, V;500 × 650
	<i>WBT</i> adjacent to cargo tank (except the areas mentioned in the upper column)	H;450 × 450, V;450 × 550
	<i>FOT</i> adjacent to cargo tank or right under cargo pump room	H;450 × 450, V;450 × 550
	Cargo pump room	H;600 × 600, V;600 × 800
Ships having Independent Tanks	Cargo tank	H;600 × 600, V;600 × 800
	Space adjacent to cargo tank and accessible to inspect	H;500 × 500, V;500 × 650 Clearance: 600 at bottom, 450 at side
	Space adjacent to cargo tank and to be inspected by a lifting the cargo tank	The minimum dimensions are not required.
	Void space, <i>WBT</i> or <i>FOT</i> adjacent to cargo hold* , <i>WBT</i> , <i>FOT</i>	H;450 × 450, V;450 × 550
	Cargo pump room	H;600 × 600, V;600 × 800

## Notes

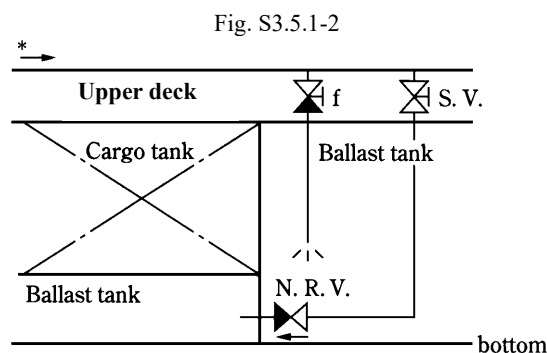
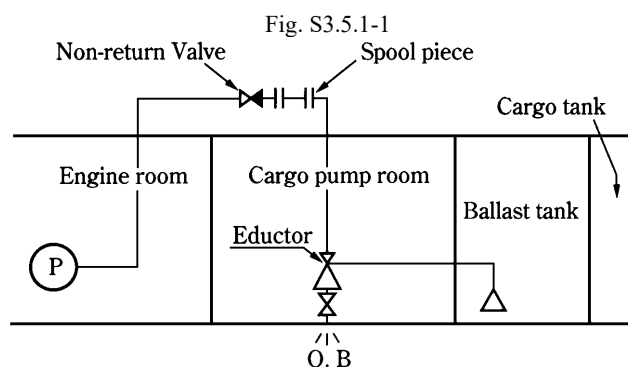
- \* Void space includes cofferdam, void tank, trunk for passage, pipe tunnel and pump room except cargo pump room.
- \* \* *WBT*, which is an only passage to the relevant *WBT*, is also included in the relevant *WBT*.

**S3.5 Bilge and Ballast Arrangements****S3.5.1 General**

1 The discharge arrangements of permanent ballast tanks adjacent to cargo tanks may be such that ballast pumps in the machinery space are used as given as **Fig. S3.5.1-1** and ballast or bilges are discharged overboard through the eductor in the cargo pump room. In this case, non-return valve is to be provided between the ballast pump and eductor and spool piece is to be provided on the weather deck within the cargo area.

2 The words “ensure filling from tank deck level and non-return valves are fitted” referred to in **3.5.1, Part S of the Rules** mean that exclusively used for filling from the weather deck but can not be used for discharging fitted with stop valves on the weather deck or stop valves operable from the weather deck and additionally non-return valves are provided as given in **Fig. S3.5.1-2**. Further, sufficient consideration is to be taken so as not to cause non-compliance with the damage stability requirements due to damage to pipelines or spillage of dangerous ballast or cargo into other compartments.





Remarks:

\*: A line to ensure filling only from the pump in machinery room

N.R.V.: Non-return valve

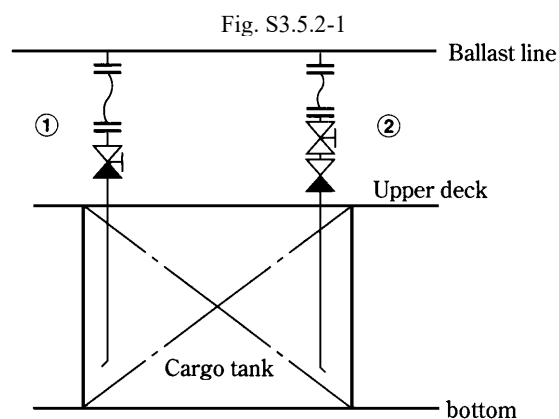
S.V.: Stop valve

f: Stop valve + Non-return valve or Screw-down non-return valve

### S3.5.2 Filling of Ballast in Cargo Tanks

1 The case referred to in **3.5.2, Part S of the Rules** as “the filling line has no permanent connection to cargo tanks or piping and that non-return valves are fitted” is to be as given in **Fig. S3.5.2-1**. In this case, filling is to be limited to that from the open deck where spool pieces, hoses, stop valves and non-return valves are required.

2 When filling is made from the open deck according to the preceding -1, the piping arrangement in cargo tanks is to be such that the filling pipe is extended as close to the bottom as practicable to minimize generation of static electricity.



- ① Hose (spool piece) +  
Screw-down non-return valve
- ② Hose (spool piece) + Stop valve  
+ Non-return valve

### S3.5.3 Bilge Pumping Arrangements for Cargo Area

Pipes dealing with cargo or cargo residues passing through void spaces, double bottom and ballast tank spaces are to be treated within the bilge cargo spaces of the compartments even when they are segregated from tanks containing cargo or cargo residues by double bulkheads.

## S3.6 Pump and Pipeline Identification

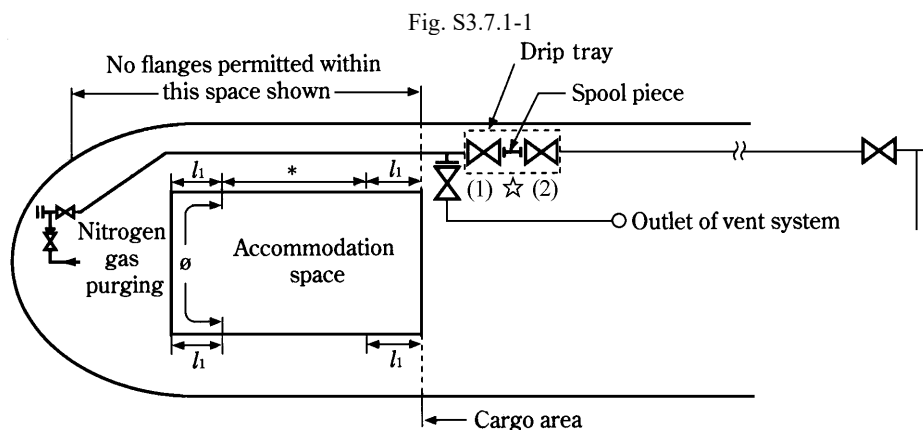
### S3.6.1 Pump and Pipeline Identification

“Marking” referred to in 3.6, Part S of the Rules is to be made by peel-resisting tapes or paint coat to clearly identify respective pipes.

## S3.7 Bow or Stern Loading and Unloading Arrangements

### S3.7.1 General

The bow or stern loading and unloading arrangements are to be given in Fig. S3.7.1-1, as a standard.



Remarks:

$l_1$ :  $L_f/25$  or 3 m, whichever is the greater, but need not exceed 5 m

$*$ : Where inlets, air intakes, openings, etc. are permitted to be provided

$\phi$ : Where inlets, air intakes, openings, etc. are not permitted to be provided

Valve(1): The stop valve required in 3.7.3(1), Part S of the Rules

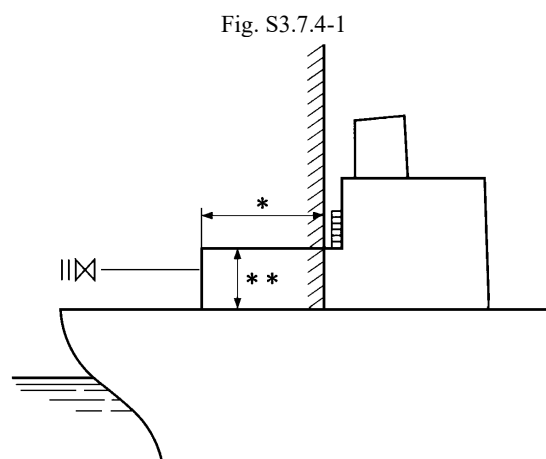
Valve(2): The stop valve necessary for fitting/removal of the spool piece

☆: Spray shield is to be provided for valves and spool pieces (portable one may be accepted)

### S3.7.4 Entrances, Air Inlets and Openings to Accommodation, Service and Machinery Spaces and Control Stations

All openings such as entrances, to accommodation, service and machinery spaces and control stations, air inlets rope hatches, openings to machinery casing and openings in escape routes, etc. are to be arranged in areas outside the shaded sections given in Fig. S3.7.4-1.

The standard height of superstructure is to be as given in Table S3.7.4-1. The standard heights at intermediate lengths of the ship are to be obtained by linear interpolation.



Remark:

\*:  $L_f/25$  or 3 m, whichever is the greater, but need not exceed 5 m.

\* \*: To be the standard height of superstructure prescribed in the 1966 International Load Line Convention or more.

Table S3.7.4-1

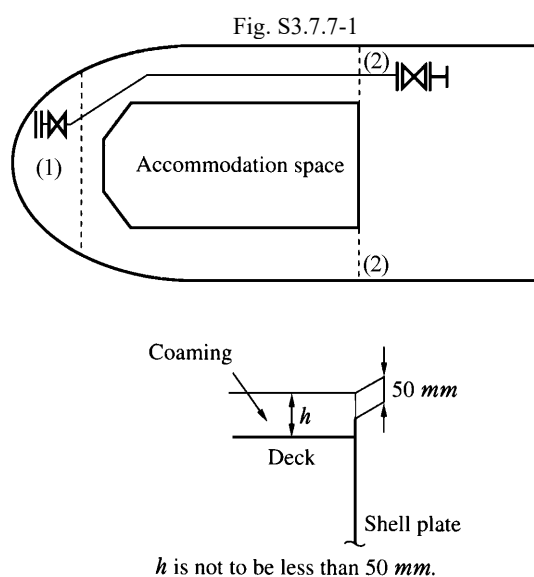
$L_f (m)$	Low poop	Other poop
Not more than 30	0.90	1.80
75	1.20	1.80
Not less than 125	1.80	2.30

### S3.7.6 Escape Routes

The “escape routes” referred to in [3.7.6, Part S of the Rules](#) means the escape route from machinery space.

### S3.7.7 Coaming for Spills

The “continuous coamings of suitable height” referred to in [3.7.7, Part S of the Rules](#) are the coamings provided on the cargo handling machinery and gear with a height above deck of 150 mm or 50 mm above the upperedge of the sheer strake as given [Fig. S3.7.7-1](#), whichever is the greater, and are to be arranged in direction of breadth of ships continuously.



Note:

Coaming (1) is required by this Paragraph, and coaming (2) is the one required under [S3.2.3](#).

### S3.7.9 Fire-extinguishing Arrangements

One each monitor for foam fire-extinguishing system and portable foam applicator unit required in the cargo area are to be

provided. The hydrant connected with the portable foam applicator unit is to be arranged within the range effective for discharging the fire-extinguishing medium and the portable foam applicator unit is to be stowed in a space ready for immediate use.

## **S4 CARGO CONTAINMENT**

### **S4.2 Design and Construction**

#### **S4.2.1 General**

In applying **4.2.1(2), Part S of the Rules**, the following are to be satisfied.

- (1) For ships subject to **Part C of the Rules, 10.9, Part 1, Part C of the Rules** is to be satisfied.
- (2) For ships subject to **Part CS of the Rules**, when cargo is half loaded in a range from 20 to 80% of loading ratio in cargo tanks, the structural strength is to be determined in consideration of the effects of sloshing. However, in case where the length of tanks is not more than 10 *m* or 10% of the ship's length for freeboard ( $L_f$ ), whichever is the greater, no consideration may be taken for sloshing effects.

## S5 CARGO TRANSFER

### S5.1 Piping Scantlings

#### S5.1.6 Design Standard for Piping

**1** In **5.1.6-1, Part S of the Rules**, the minimum thickness of stainless steel pipes is, in general, to be in accordance with the following requirements:

Cargo pipes passing through ballast tanks: Schedule 40

Other cargo pipes: Schedule 20S

However, the minimum thickness is to satisfy the requirements for thickness of pipes subjected to internal pressure specified in **5.1.1, Part S of the Rules**.

**2** The protection for cases “Where necessary for mechanical strength” referred to in **5.1.6-2, Part S of the Rules** is to be provided as follows:

- (1) No protection is required for steel pipes used for ordinary applications.
- (2) Where aluminium pipes, stainless steel pipes of which thickness is reduced according to their tensile strength, etc. considered vulnerable to impact loads are used, suitable protection is to be provided.
- (3) It is desirable that manifolds are to be made of steel.
- (4) Pipes passing through bulkheads or decks, those arranged an elevated space above upper deck, those subjected to load of the loading arms at the manifold may be required to have increased thickness.

**3** In “Flanges, valves and other fittings” referred to in **5.1.6-3, Part S of the Rules**, the use of gate valves and expansion joints is to be in accordance with the following requirements:

- (1) To comply with the requirements in **Part D of the Rules** (for both Type 1 and Type 2 pipes).
- (2) Since use of expansion joints is not allowed for the cargo pipes within tanks containing the cargo for which special means for the maintenance of product quality are required, expansion of the pipes is to be absorbed by U-bends, etc.
- (3) The materials of valves, seals, etc. are not to be of the ones of which use is prohibited.

### S5.2 Piping Fabrication and Joining Details

#### S5.2.2 Joint of Cargo Piping

Cargo pipes are to be joined by welded joints except for the flange joints for shut-off valves and expansion joints, spool pieces and equivalent fittings approved in **5.2.2(1)** and **(2) in Part S of the Rules** and flange joints necessary for painting, lining, assembly, inspection or maintenance.

#### S5.2.3 Direct Connection of Pipes without Flanges

Where Type 1 pipes or Type 2 pipes are required under **S5.4** in **5.2.3(1), Part S of the Rules**, the requirements in **12.4, Part D of the Rules** are to be complied with. The butt welding procedure for cargo pipes (including liquid cargo and vapour cargo) where use of Type 3 pipes are permitted is to be the same as in Type 2 pipes. However, nondestructive testing may not be carried out.

#### S5.2.5 Standards for Flanges

The “standard approved by the Society” referred to in **5.2.5, Part S of the Rules** means the requirements in **12.4, Part D of the Rules**.

Note: For the purpose of **Table D12.10, Part D of the Rules**, the requirements given in dealing with fuel oil, lubricating oil and operating oil apply to the types of joints. Flanges used for Type 3 pipes are to be of joints *A*, *B*, *C* or *E* specified in **Fig. D12.2, Part D of the Rules**.

#### S5.2.6 Expansion Joints

The “bellows” referred to in **5.2.6(2), Part S of the Rules** are not to be used for cargoes having corrosive or polymerizing nature unless consideration is taken for the cargo drains trapped in the corrugated parts of the joints.

**S5.4 Tests Requirements for Piping****S5.4.1 Application**

The classification standard and test requirements for cargo piping are to be in accordance with [Table S5.4.1-1](#) and [Table S5.4.1-2](#).

Table S5.4.1-1 Classification Standard for Cargo Piping

Ship type requirements	Classification of applicable cargo piping (See <a href="#">Table S5.4.1-2</a> )	Remark
Type 1	Category I	Irrespective of the design pressure and temperature, the requirements in the left-hand column apply, as a standard.
Type 2	Category II	
Type 3	Category III	For compatibility between cargo and cargo piping materials, separate investigation is to be made.

Note:

- (1) Cargo piping means the piping to transfer liquid cargo and vapour cargo.
- (2) Cargo piping for slop tanks arranged in accordance with the requirements of Ship Type 3 is to be classified into Category III irrespective of the ship type requirements for cargo contained in slop tanks.
- (3) Cargo piping passing through the tanks cargo with higher ship type requirements is to comply with the requirements of the piping specified for such cargo.

Table S5.4.1-2 Test Requirements for Piping

	1. Materials of pipe	2. Materials of valves, cocks and pipe fittings	3. Shop tests for piping fabrication			4. Shop tests for valves, cocks and pipe fittings	5. Shipboard tests for piping
			Welding procedure test	Non-destructive tests	Hydraulic tests		
Category I	Materials complying, as a rule, with the requirements in <b>Part K of the Rules</b> .	Materials complying, as a rule, with the requirements in <b>Part K of the Rules</b> . However, materials complying with the requirements of <i>JIS</i> or equivalent may be accepted. <sup>(1)</sup>	To be carried out on piping of Category I or Category II where the following (1) to (3) are relevant: (1) Joinings between pipes, pipes and valves (or cocks) and, pipes and fittings are being welded for the first time. (2) When a new welding method is employed. (3) When the base material, type of welding material, or type of joint is changed.	(1) Radiographic testing for the entire length of butt welded joints between pipes, pipes and valves (or cocks), and pipes and fittings with nominal diameters exceeding 65 mm. (2) Radiographic testing for the sampled butt welded joints between pipes, pipes and valves (or cocks), and pipes and fittings with nominal diameters not more than 65 mm. (3) In place of radiographic testing, suitable other nondestructive testing may be accepted. (4) Magnetic particle testing or suitable other testing for fillet welds between pipes, pipes and valves (or cocks), and pipes and fittings.	(1) All piping of Category I, Category II and Category III are to be subjected to hydraulic tests with fittings attached after fabrication at a test pressure 1.5 times the design pressure. (2) The test pressure for hydraulic test for pipes with design temperature exceeding 300°C is to be specified separately. (3) The hydraulic test for welded joints between pipes or pipe and valves (or cocks) of piping arranged on board the ship is to be specified separately.	Valves, cocks and fittings for piping of Category I or Category II are to be subjected to hydraulic tests at a pressure of 1.5 times the design pressure.	(1) All piping is to be subjected to leak tests in their service condition. (2) All piping is to be subjected to preliminary tests together with the equipment they serve. (3) All cargo piping is to be subjected to hydraulic tests at a pressure of 1.5 times the design pressure.
Category II				(1) Radiographic testing or suitable other testing for the sampled butt welded pipe joints between pipes, pipes and valves (or cocks), and pipes and fittings with nominal diameters exceeding 80 mm. (2) Magnetic particle testing or suitable other testing for fillet welds between pipes, pipes and valves (or cocks), and pipes and fittings.			
Category III	Materials complying with the requirements of <i>JIS</i> or equivalent.	Materials complying with the requirements of <i>JIS</i> or equivalent.					



Note:

- (1) Materials complying with international or national standards such as *ISO*, *JIS*, etc. may be used for pipe joints of butt welded type and pipe joints of a slip-on sleeve welded type (such as elbows, reducers, tees, bends and sockets, etc.) for which hot forming or heat treatment is carried out during their manufacturing process in accordance with the requirements of **D12.6.1-1(1)(a)ii** on the condition that they receive approval of use from the Society in accordance with **Chapter 12, Part 6 of the Guidance for the Approval of Materials and Equipment for Marine Use**.

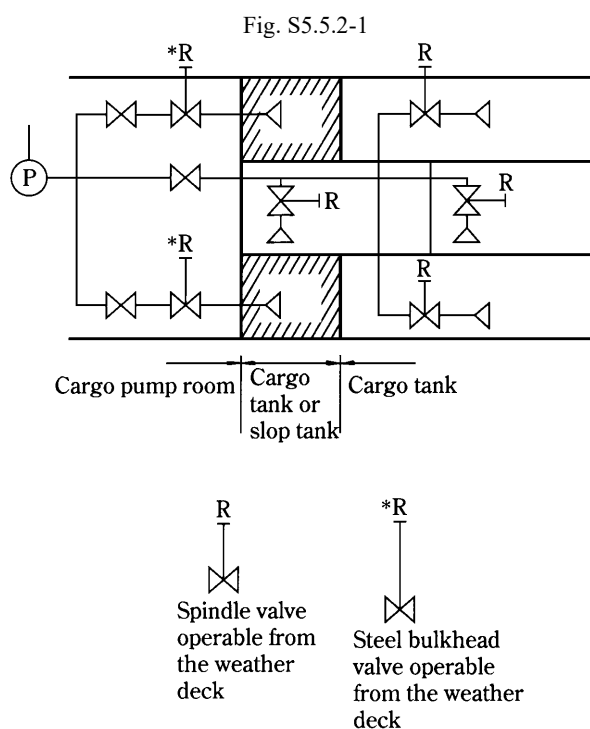
## S5.5 Piping Arrangements

### S5.5.2 Cargo Piping under Deck

1 “the stop valve operable from the weather deck” referred to in 5.5.2, Part S of the Rules is to be located in the vicinity of each open end within each tank.

2 The wording in the requirements in 5.5.2, Part S of the Rules following “As an exception” is applicable only to the cargo piping arranged in one cargo tank or slop tank adjacent to the cargo pump room as given in the shaded section of Fig. S5.5.2-1. In this case, an additional stopvalve is to be provided between the bulkhead valve and cargo pump.

3 The word “leakage” referred to in 5.5.2(1), Part S of the Rules includes the leakage through packing.

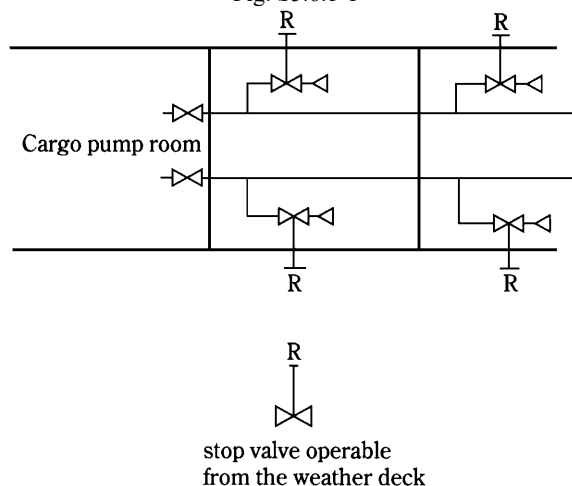


## S5.6 Cargo Transfer Control Systems

### S5.6.1 General

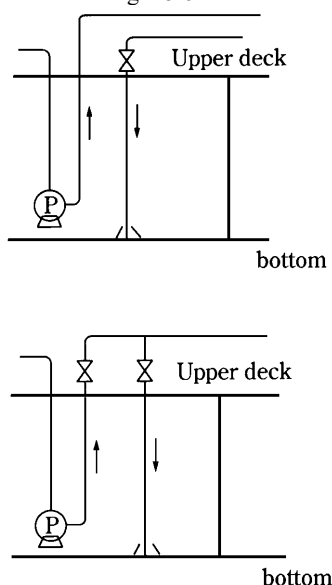
1 The “one stop valve capable of being manually operated on each tank filling and discharge line, located near the tank penetration” referred to in 5.6.1(1), Part S of the Rules, cargo pipes provided in cargo tanks as given in Fig. S5.6.1-1 may be omitted if there are stop valve specified in 5.5.2, Part S of the Rules (stop valve located near the open end and operable from the weather deck) and bulkhead valve provided in the cargo pump room specified in 5.5.3, Part S of the Rules.

Fig. S5.6.1-1



2 Stop valve is not required at the deck penetration of the discharge piping of deep well pump or submerged pump provided independently in each tank, but a stop valve is to be provided near at each penetration of weather deck as given in Fig. S5.6.1-2 for the direct cargo filling line (piping capable of filling cargo without being led through the cargo pump).

Fig. S5.6.1-2



3 When the “direct cargo filling line” specified in the preceding -2 is provided, the open end of such direct cargo filling line for highly flammable and/or toxic chemicals is to be extended to not more than 10 cm above the tank top or sump surface or the filling pipe radius, whichever is the greater.

4 The “one stop valve” referred to in 5.6.1(2), Part S of the Rules is also required for the hose used for the transfer of cargo vapour.

5 In addition to the preceding -4, a stop valve is required for the hose connection to the shore vapour circulation. When the stop valve is of the portable type for fitting as necessary, stop valves equal to or greater, in number, than the maximum number of tanks scheduled for simultaneous loading of the cargo requiring shore circulation are to be provided at shore for the ship. The restriction to the number of loaded cargo tanks according to the number of these stop valves is to be provided to the ship’s master.

6 It is desirable that the “remote shut-down devices” referred to in 5.6.1(3), Part S of the Rules can be centrally controlled from a place manned at all times during the cargo operation (e.g. cargo control station).

**S5.7 Ship's Cargo Hoses****S5.7.1 General**

**1** The “hoses” referred to in **5.7.1, Part S of the Rules** are to comply with the following requirements **(1)** and **(2)**:

- (1) When come in contact with the cargo, hoses are not to be mechanically damaged or caused extreme degrading in their function.
- (2) The materials of cargo hoses are not to give hazardous effects on the cargo.

**2** In the preceding **-1**, if cargo hoses are integral with the emergency cargo pump or they are submerged in the tank connected to the pump, the requirements in the preceding **-1** are to be considered for both the inside and outside surfaces of hoses.

## **S6 MATERIALS OF CONSTRUCTION**

### **S6.1 General**

#### **S6.1.3 Information for Materials of Construction**

The “Compatibility information for materials of construction” referred to in [6.1.3, Part S of the Rules](#) is to be involved in information for all compatibility between intended loading cargo and materials of construction.

## **S7 CARGO TEMPERATURE CONTROL**

### **S7.1 General**

#### **S7.1.1 General**

The “cargo heating or cooling system” referred to in **7.1.1, Part S of the Rules** is to comply with the following requirements (1) to (3):

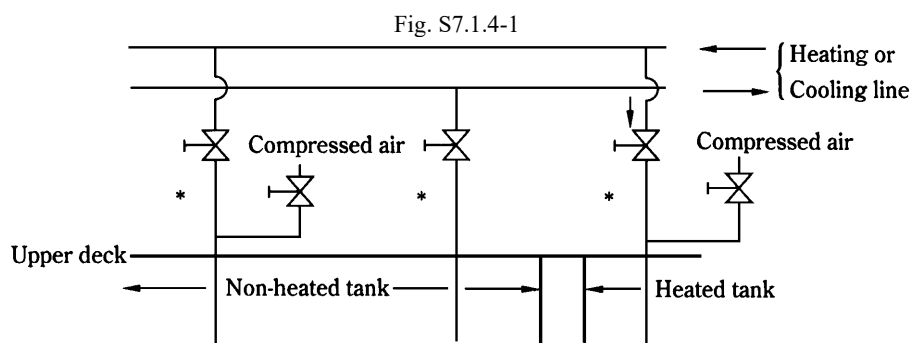
- (1) For possible failure of any component or the whole system serving as a source of heating in ships carrying the cargo requiring heating and to which the requirements in this Part apply, means are to be provided so as not to disable cargo heating, cargo operation or not to endanger the safety of the ship.
- (2) For the refrigerating installations and insulation materials of ships carrying the cargo requiring cooling to which the requirements in this Part apply, the requirements in **Chapter 4** to **Chapter 7, Part N of the Rules** and those specified in the Rules for the Construction and Survey of Cargo Refrigerating Installations of Ships apply correspondingly. Particular attention is to be paid to the cargo since propylene oxide for the refrigerating installation of which detailed requirements are specified.
- (3) Cargo requiring heating means the dangerous chemicals with a melting point not less than 15°C, as a standard. In this case, the temperature measuring equipment specified in **7.1.5, Part S of the Rules** is to be of the fixed type.

#### **S7.1.3 Valves for Heating or Cooling System**

The “valves to isolate the system for each tank and to allow manual regulation of flow” referred to in **7.1.3, Part S of the Rules** means the valves provided between the main vapour line and each tank and are capable of regulating flow rate. This also applies to the case of the refrigerating installations. In **Table S17.1, Part S of the Rules** where carriage of the water prohibiting cargoes to which the requirements of **15.16.2, Part S of the Rules** apply is intended, spool pieces are to be provided in addition to these valves.

#### **S7.1.4 Maintenance of Pressure within Heating or Cooling System**

As the provision for the maintenance of the pressure specified in **7.1.4, Part S of the Rules**, compressed air may be supplied from the deck general service air line fed from the air reservoirs and air compressors in the machinery space to the heating (cooling) piping. When it is solely planned to carry the heated (cooled) cargo in all tanks, compressed air may be fed from the compressed air main, but if it is intended to carry the heated (cooled) cargo in part of tanks with the rest of tanks used for the carriage of non-heated (non-cooled) cargo, compressed air is to be supplied from the connection on the tank side of the stop valve of the compressed air branch line as given in **Fig. S7.1.4-1**. In case where carriage of the cargo not requiring heating (or cooling) but requiring to inert the tanks and cofferdams adjacent thereto, no air is to be sealed in the line but inert gas is to be filled in. Consideration is to be given so as not to cause dangerous mutual reaction between the sealing medium and the cargo. Where other means are employed for the maintenance of line pressure, the same requirements apply.



Remark:

- \* For the heating (cooling) lines led to tanks where water prohibiting cargoes are carried, spool pieces are to be provided on the tank side of the stop valve. Where the cargo causing harmful reaction with the thermal medium is carried, the heating (cooling) lines are to be emptied, dried and gases are to be filled before cargo loading.

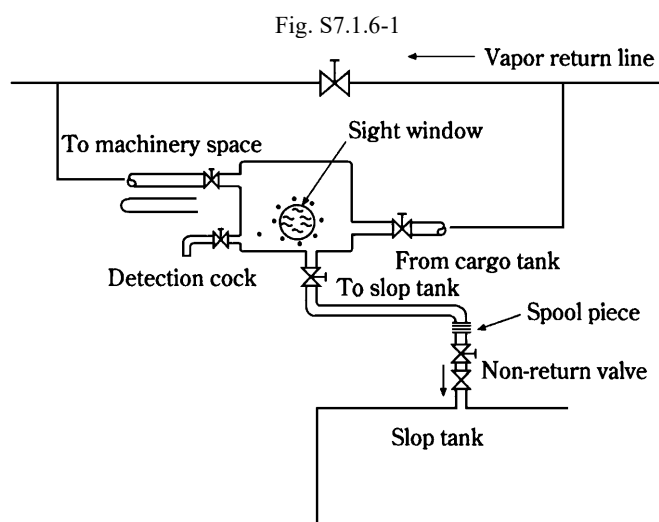
### S7.1.5 Means for Measuring the Cargo Temperature

“When overheating or overcooling could result in a dangerous condition” referred to in [7.1.5\(4\), Part S of the Rules](#) means such a case where the adjacent cargo tanks or fuel oil tanks are heated or cooled to the extent that they suffer from thermal effects. In this case, the temperature sensing ends are to be provided at least at two locations on the liquid surface and bottom of the tank.

### S7.1.6 Circuit Operated with Heating or Cooling Medium

1 The cargoes falling under the requirements in [7.1.6, Part S of the Rules](#) are to be those to which application of the requirements of either [15.12](#), [15.12.1](#) or [15.12.3, Part S of the Rules](#) specified in [Table S17.1, Part S of the Rules](#) is required, but they also apply to the cargo with a notation of “T” in vapour detection of the Table.

2 “where the medium is sampled to check for the presence of cargo” referred to in [7.1.6\(3\), Part S of the Rules](#) is to be of the detection tank fitted with a detection cock as given in [Fig. S7.1.6-1](#), as a standard. Although provision of a water observation tank in the machinery space is required for ordinary tankers according to the requirements in [14.2.9, Part D of the Rules](#), in the case of carriers carrying dangerous chemicals in bulk, provision in the machinery space is not permitted and such means is to be provided on the weather deck within the cargo area without exception. Means of detection is to be by an effective toxic gas-detecting tube or suitable testing agent. The suitable testing agent is to have been procured from the manufacturer.



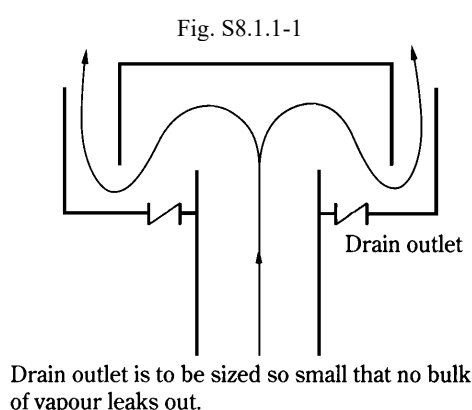
## S8 CARGO TANK VENTING AND GAS-FREEING ARRANGEMENTS

### S8.1 Cargo Tank Venting

#### S8.1.1 Venting Systems

1 The Venting systems of ships carrying petroleum products having a flashpoint of 60°C or less with a Reid vapour pressure below atmospheric pressure and other products having a similar fire hazard, are, in addition, to be in accordance with the requirements in **14.4, Part D of the Rules**.

2 “Tank venting systems are to be arranged to prevent entrance of water into the cargo tanks and at the same time, vent outlet are to direct the vapour discharge upwards in the form of unimpeded jets” referred to in **8.1.1, Part S of the Rules** mean the outlet as given in **Fig. S8.1.1-1**.



#### S8.1.2 Provision for Drainage of Vent Lines

The “cargo vent lines are to be self-draining back to the cargo tanks” referred to in **8.1.2, Part S of the Rules** is to be so arranged that drains of the vent lines will flow into cargo tanks by natural gravitation by heels and trims of the ship. In case where such piping arrangement is impracticable, drain cocks are to be fitted at the location of *PV* valves and other places where drains tend to accumulate. For drain cocks which are capable of returning drains to the slop tanks when large volume of drains are accumulated, hose connections are to be provided.

#### S8.1.3 Provision to Protect Liquid Head Exceeding Design Head

1 Except for the case specified in **15.19, Part S of the Rules**, no independency is required among liquid level gauges, high liquid level alarm system and overflow control system. The high level alarm system or overflow control system required in **15.19, Part S of the Rules** may be used for the prevention of cargo tank overpressure. When the cargo having a larger specific gravity than the design specific gravity is carried in partial loading, the cargo tank is to be provided with the measuring systems required in **13.1, Part S of the Rules**, and additionally, high liquid level alarm system capable of being set at arbitrary levels is to be provided for the protection of the cargo tank.

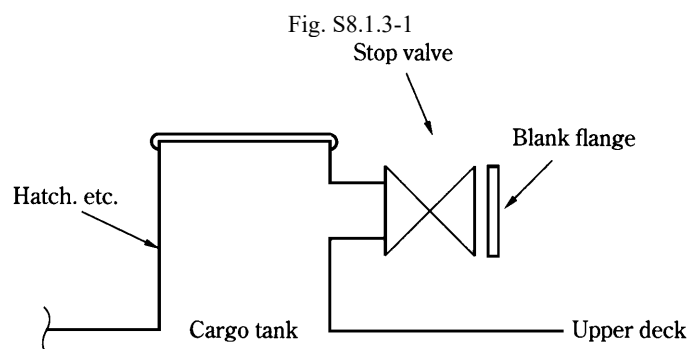
2 The system fitted with valves and flanges for connecting cargo hoses at hatches on the top of cargo tank for preventing cargo tank overpressure as given in **Fig. S8.1.3-1** may be accepted only when either of the following (1) or (2) is relevant:

- (1) Cargo loading is carried out only at ports fully equipped with circulating systems
- (2) Where method of cargo transfer to other cargo tanks has been established.

In this case, however, cargo loading may be restricted under the requirements for mutual reaction with each other.

In either case of (1) or (2), much difficulty is involved in observing the operational restrictions and hence it is desirable to install the high level alarm or overflow control system specified in **15.19, Part S of the Rules**. For tanks carrying the cargo with a flashpoint of not more than 60°C, provision of the high level alarm system or overflow control system conforming to **11.6.3-1, Part R of the Rules** is required where spill valves are not to be used. (Spill valves are not deemed equivalent.)





#### S8.1.4 Design Parameter of Venting Systems

1 The size of vent system specified in **8.1.4, Part S of the Rules** is to be given consideration so that the back pressure produced during the cargo operation at the maximum design loading rate does not exceed either of the following allowable pressures (1) or (2):

- (1) Where no special consideration is taken for the strength of tank, the tank design pressure, or
- (2) Where cargo tank is suitably strengthened and the tank has been tested in the presence of the Surveyor of the Society, such tank test head.

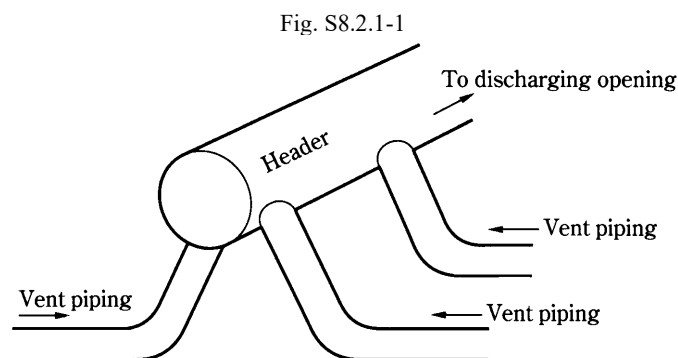
2 In a cargo with a boiling point not more than 45°C having a high vapour pressure, the factor exceeding 1.25 may be required in connection to the gas evolution during loading specified in **8.1.4(2), Part S of the Rules**. In addition to parameters specified in **8.1.4, Part S of the Rules**, following (1) and (2) are to be considered in sizing of a tank venting system. For the calculation formula of back pressure, reference is to be made to *JSDS-23 "Guidance for Vent Piping System Design"* (Shipbuilding Equipment Design Standard).

- (1) Ballasting/deballasting ratio: in the case of cargo tanks intended to load ballast water
- (2) Number of air changes when fixed ventilating system is used: in the case that gas-freeing is carried out through the venting system

### S8.2 Types of Tank Venting Systems

#### S8.2.1 Open Tank Venting System

The term "with due regard to cargo segregation" referred to in **8.2.1, Part S of the Rules** means the design that restricts the ingress of the cargo of a cargo tank into other cargo tanks through vent lines even at times of heavy weather as given in **Fig. S8.2.1-1**. In consideration of possible degrading of product quality due to coming to contact with different other dangerous chemicals or their vapours, however, it is desirable that even the open type vent system be of independent design as far as practicable.



**S8.2.2 Controlled Tank Venting System**

1 The words “such individual vents may be combined into a common header or headers, with due regard to cargo segregation” referred to in **8.2.2, Part S of the Rules** mean as follows:

- (1) In case where the controlled vent systems of the cargo tanks carrying the cargoes different from each other or the same cargoes are led to a common pipe header, the pressure relief valves and vacuum regulating valves are to be separate from each other, and any other arrangement than that given in **Fig. S8.2.2-1** is unacceptable. This requirement does not apply to tanks where cargoes which react in a dangerous manner are carried.
- (2) When PV valves whose pressure side and vacuum side are led to the common pipe for the vent system of the cargo tank intended to carry cargoes different from each other or the same cargoes are used, any arrangement other than the vent system independent for each tank is unacceptable. Accordingly, both the arrangements given in **Fig. S8.2.2-2** and **Fig. S8.2.2-3** are unacceptable.

Fig. S8.2.2-1

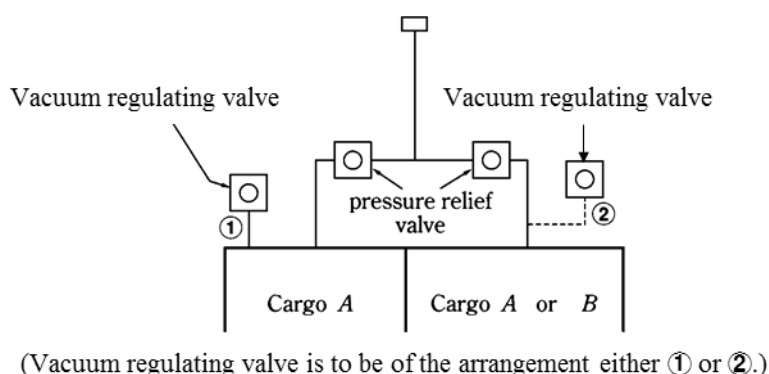


Fig. S8.2.2-2

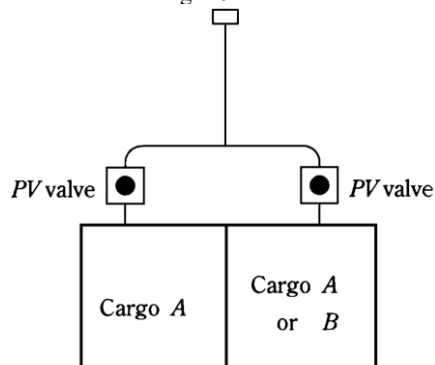
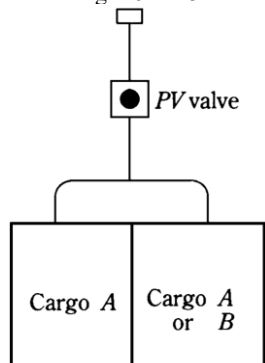


Fig. S8.2.2-3



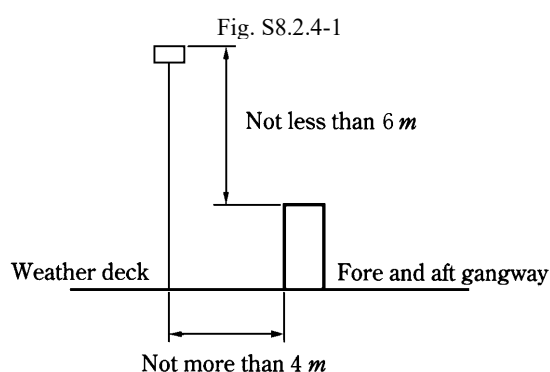
2 The wording “certain operating conditions”, which may be allowed bypassing a pressure/vacuum valve, referred to in **8.2.2, Part S of the Rules** means the cargo operating conditions which the cargo is not required a vapour return system during cargo operation in **Chapter 15, Part S of the Rules**, provided that the vent-line outlet is complied with the requirements specified in **8.2.4** and **8.2.6, Part S of the Rules**. However bypassing of high-velocity valves is not permitted, and the bypassing a pressure/vacuum valves is not permitted during cargo operations for cargoes requiring vapour return systems in accordance with **Chapter 15, Part S of the Rules**.

### S8.2.3 Secondary Means for Controlled Tank Venting Systems

“Secondary means” specified in **8.2.3, Part S of the Rules**, means the equipment which comply with the requirements specified in **11.6.3-2, Part R of the Rules**.

### S8.2.4 Position of Vent Outlet of a Controlled Venting System

The measurement of the height of vent outlet “not less than 6 m above the weather deck” specified in **8.2.4, Part S of the Rules** is to be taken as given in **Fig. S8.2.4-1**. As for the height of the opening of the vacuum beaker valve, it is to be not less than 760 mm above the freeboard deck for the cargo to which application of **15.16.2, Part S of the Rules** is not required.



### S8.2.6 Devices to Prevent the Passage of Flame

The design, testing and locating of devices to prevent the passage of flame are to comply with relevant requirements in **R4.5.3-3**.

### S8.2.7 Blockage of Venting Systems

As the countermeasures against the “freezing of cargo vapour or by icing up in adverse weather conditions” referred to in **8.2.6, Part S of the Rules**, ships operated in cold zone are to be provided with heating systems, etc. for the prevention thereof. In ships not provided with special heating systems, proper maintenance and inspection work procedures are to have been established.

## S8.5 Cargo Tank Gas-freeing

### S8.5.3 Design of Gas-freeing System

In designing the gas-freeing system, it is to be taken account for the relevant requirements in **S8.1.4**.

## **S9 ENVIRONMENTAL CONTROL**

### **S9.1 General**

#### **S9.1.3 Inerting or Padding of Cargo Tanks**

**1** The inert gas systems for use in filling and discharging the cargo tanks specified in **9.1.3(1), Part S of the Rules** are to comply with the following requirements, except where the installation of inert gas system is required by **4.5.5, Part R of the Rules**.

- (1) Inert gas systems using oil fired inert gas generators are to comply with the requirements of **R4.5.5-4(3)**
- (2) Inert gas systems using nitrogen generators are to comply with the requirements of **R4.5.5-4(2)**.
- (3) Inert gas systems using boiler flue gases are to comply with the requirements of **R4.5.5-4(4), Part R of the Guidance**.

**2** Except where the installation of inert gas system is required by **4.5.5, Part R of the Rules**, the inert gas system for ensuring “sufficient inert gas available on the ship to compensate for normal losses during transportation” referred to in **9.1.3(1), Part S of the Rules** is to be as following **(1), (2)** and **R4.5.5-4**.

- (1) The nitrogen generator that separates nitrogen from the air may be used in combination of the inert gas contained in a pressure vessel as a make-up system at sea.
- (2) The required quantity of inert gas to be carried on board the ship is to be determined for each ship in consideration of the construction and equipment of the ship, but it, as a rule, is to be not less than 5% of the total volume of cargo spaces to be inerted.

**3** The “means to be provided for monitoring” referred to in **9.1.3(4), Part S of the Rules** are to be as follows:

- (1) Continuous monitoring system
  - (a) Continuous monitoring by fixed oxygen content meter, or
  - (b) Combined use of continuous pressure measurement of tank atmosphere and portable oxygen content meter.
- (2) In the case of the cargo where the “closed type” is required for measurement instruments and inerted method is applied, the measurements by a portable oxygen content meter are to be taken at such measuring line from which no cargo is leaked onto the deck during and after the measurements, and means are provided to lead the exhaust gas to the cargo vent lines. In the case of the cargo where the “restricted type” is required, means are to be provided so that the opening for measurement are automatically closed.

## **S10 ELECTRICAL INSTALLATIONS**

### **S10.1 General**

#### **S10.1.5 Certified Safe Type Equipment**

**1** The wording “the satisfaction of the Society” in **10.1.5, Part S of the Rules** mean that the explosion-protected electrical equipment complying with the requirements in **2.16, Part H of the Rules** and grouped into appropriate Apparatus Group and Temperature Class according to the column “7” of **Table S17.1 Part S of the Rules** or equivalent thereto for an environmental gas or vapours condition.

**2** The wording “approved one as the certified safe type” in **10.1.5, Part S of the Rules** mean that the explosion-protected electrical equipment approved by the Society in accordance with the requirements in **1.2.1-4, Part H of the Rules** or the equipment of a type which may not cause ignition of gases or vapours of the cargoes.

### **S10.2 Bonding**

#### **S10.2.1 Bonding**

For the purpose of the requirements in **10.2.1, Part S of the Rules**, electrical bonding is to be in accordance with the requirements in **N5.7.4** in practicable.

## S11 FIRE PROTECTION AND FIRE EXTINCTION

### S11.1 General

#### S11.1.1 Application

1 Even in cases where the “alternative and supplementary arrangements” referred to in **11.1.1-2, Part S of the Rules** are provided, **4.5.1-8, Part R of the Rules** applies to the oil tankers defined in **2.1.1(6), Part 1 of the Rules for Marine Pollution Prevention Systems**.

2 The ships, which are other than ships exclusively engaged in the carriage of the cargo exempted the application of the requirements for tankers in **Part R** of the Rules (except **10.2.1-4(4)** and **10.10.2-2**) and **Chapter 14, Part D** of the Rules in according to **11.1.2, Part S of the Rules**, are to be comply with the requirements for tankers in **Part R of the Rules** (except **4.5.1-2**) and **Chapter 14, Part D of the Rules**.

### S11.2 Cargo Pump Rooms

#### S11.2.2 Fire-extinguishing System for the Ships Dedicated to the Carriage of a Restricted Number of Cargoes

As “an appropriate fire-extinguishing system approved by the Society” referred to in **11.2.2, Part S of the Rules**, the requirements in **10.9.1, Part R of the Rules** apply correspondingly and it is desirable to provide fixed carbon dioxide fire extinguishing system. The fire extinguishing system for ships carrying only the restricted number of cargoes as defined “No-nil requirements” in column *I* of **Table S17.1, Part S of the Rules** is left to the discretion of the Society.

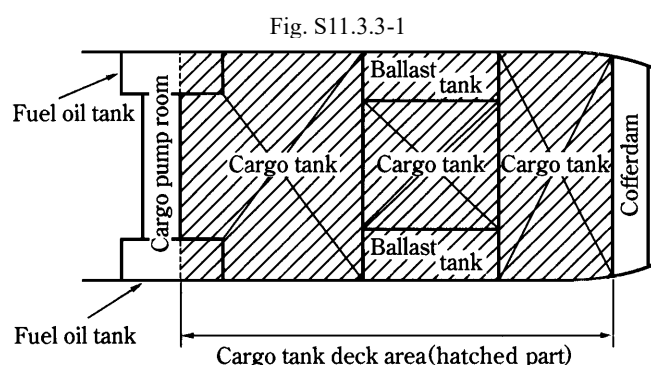
### S11.3 Cargo Area

#### S11.3.2 Type of Foam Concentrate

Where plural fire extinguishing agents including foam are defined effective in column *I* of **Table S17.1, Part S of the Rules**, foam fire extinguishing system is to be provided.

#### S11.3.3 Arrangements for Providing Foam

- 1 For the deck area of cargo tanks, reference is to be made to **Fig. S11.3.3-1**.
- 2 In supplying foams to inside the cargo tanks, access hatches, etc. may be used.



#### S11.3.5 Rate of Supply of Foam Solution

The minimum capacity of the monitor for ships not exceeding 4,000 tons deadweight is to be 1,000 l/min and the rate of spray may be set at 10 l/m<sup>2</sup>/min.

#### S11.3.7 Monitor and Foam Applicator

For the monitor and foam applicator, the requirements in **S11.3.5** are to apply correspondingly.

**S11.3.12 Fire Main**

The fire main is to be capable of discharging at least two lines of water jet on deck, accommodation space, control rooms and machinery space during the fire-fighting operation by foam.

**S11.3.13 Alternative Provisions Installed in Ships Dedicated to the Carriage of a Restricted Number of Cargoes**

The fire extinguishing systems for ships carrying the cargoes defined “No-nil requirements” in column *I* in **Table S17.1, Part S of the Rules** are left to the discretion of the Administration.

**S11.3.14 Portable Fire-extinguishing Equipment**

As portable fire-extinguishing equipment, two fire extinguishers with a capacity of 9 *l* to 13.5 *l* using the fire-extinguishing agents suitable for the type of cargo carried are to be provided at each manifold. These fire extinguishers are to be stored at suitable places except for the time of cargo operation.

**S11.3.15 Exclusion of Sources of Ignition**

The windlasses and chain lockers are to be regarded as sources of ignition and are not to be provided in the dangerous compartments given in **4.2.3-2, -4 and -5, Part H of the Rules**. The requirements in **4.5.3-4(1)(c) and (d), Part R of the Rules** are also to be complied with.

**S11.4 Special Requirements****S11.4.1 Special Requirements**

**1** For ships dedicated to exclusive carriage of one type of cargo relating to the fire extinguishing installation given in column *I* in **Table S17.1, Part S of the Rules**, either one of the alternative fire extinguishing equipment specified therein may be selected and provided notwithstanding the requirements in column *I*. Further, the fire extinguishing arrangements in ships carrying only the cargo defined “NF” in column *i* and “No-nil requirements” in column *I*, in **Table S17.1, Part S of the Rules** are to be such that any places on deck within the cargo area can be covered by water spray from at least two lines of fire nozzles discharged from separate fire hydrants.

**2** The capacity of fire extinguishing agent of dry chemical fire extinguishers is to be the greater or more of the following capacities:

- (1) The capacity required in *MSC.1/Circ.1315/Rev.1* referred to in **N11.4.1**
- (2) 1.5  $\text{kg/m}^2$  of the total deck area of the cargo tanks which are expected to carry simultaneously the cargo for which the fire extinguishing equipment is required. For other requirements for installations, the requirements in **11.4, Part N of the Rules** apply correspondingly.

**3** The “C-water spray” required in column *I* in **Table S17.1, Part S of the Rules** as the fire extinguishing equipment of “ammonium solution of 28% or less” may be replaced with the water spray from the fixed type on-deck foam extinguishing system.

## S12 MECHANICAL VENTILATION IN THE CARGO AREA

### S12.2 Spaces Normally Entered during Cargo Handling Operations

#### S12.2.2 Ventilation prior to Entering the Compartment

The ventilating period before the entrance of person in the compartments is to be 15 *minutes* as standard.

#### S12.2.4 Type of Ventilation Systems

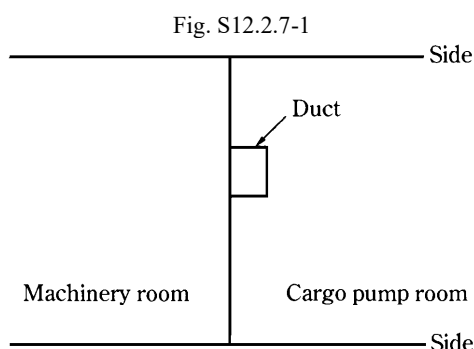
The ventilation ducts in cargo pump room are to be provided at the upper part of cargo pump room, and in addition, to be arranged in compliance with the requirements in **R4.5.4-1(1), Part R of the Guidance**. Further, the suction openings are to be arranged as far apart as practicable from each other, for instance on a diagonal line of cargo pump room, in consideration of the vapour density of the cargo and air intaking efficiency.

#### S12.2.6 Arrangement of Ventilation Intakes

The ventilation intakes are to be so arranged as to minimize the possibility of recycling hazardous vapours.

#### S12.2.7 Arrangement of Ventilation Ducts

In view of the difficulties involved in the maintenance when protection against the approved type of cargo to be carried is required, the location of ventilation ducts on the bulkhead bounding the cargo pump room and machinery room as given in **Fig. S12.2.7-1** is not allowed.



#### S12.2.8 Electric Motors Driving Fans

With respect to the requirements specified in **12.2.8, Part S of the Rules**, the ventilation fans are to comply with the requirements of **12.2.8, Part S of the Rules** and to be of non-sparking type complying with the requirements of **R4.5.4-1(2)**.

#### S12.2.9 Spare Parts for Fan

One spare impeller is to be provided for each type of fan.

#### S12.2.10 Protection Screens Fitted in the Opening of Ventilation Ducts

The protection screens may be of not more than 13 *mm* square mesh without having the function of flame screen. However, the protection screens are to have suitable strength against the falling impact of foreign objects.

### S12.3 Pump Rooms and Other Enclosed Spaces Normally Entered

#### S12.3.1 Pump Rooms and Other Enclosed Spaces Normally Entered

**1** The requirements in **12.3, Part S of the Rules** apply irrespective whether the control system of the pumps and valves in the pump room is provided outside the pump room or not.

**2** The pump room and other enclosed spaces normally entered are to have 20 air changes per hour and, in addition, the requirements in **12.2, Part S of the Rules** are to be complied with. In enclosed spaces normally entered, the special lockers and storage rooms specified in **14.1.2, Part S of the Rules** and suitable clearly marked locker specified in **14.2.5, Part S of the Rules** which are readily accessible for persons are to be included.



**3** The ballast pump room where no cargo piping whatsoever penetrates therethrough but cargo pipings are connected thereto, or where cargo pipings without having flange joints and valves penetrate therethrough is to be dealt with in accordance with the following requirements:

- (1) The exhaust outlet of the mechanical ventilation fans of the ballast pump room may not undergo the restriction to its location specified in **12.2.5, Part S of the Rules**.
- (2) The exhaust outlet of the mechanical ventilation fans serving the ballast pump room is to be provided with a protection screen of not more than 13 *mm* square mesh. However, no flame screens may be provided.
- (3) For the exhaust ventilation fans of the ballast pump room, spare parts as required for the ventilation fans of cargo pump room are to be provided for each type.
- (4) The fire extinguishing arrangement of the ballast pump room is to be such that fire hydrants are provided on the fire main, but no fixed gas fire extinguishing system is required.

#### **S12.4 Spaces Not Normally Entered**

##### **S12.4.1 Spaces Not Normally Entered**

The ventilation system provided in spaces not normally entered is not allowed to be the natural ventilation alone. Where a fan is provided in the permanent duct, eight air changes per hour, where no permanent duct is provided, sixteen air changes per hour are to be provided.

## S13 INSTRUMENTATION

### S13.1 Gauging

#### S13.1.1 Types of Gauging Devices

1 The openings for the restricted device and closed device of the types of gauging devices referred to in **13.1.1, Part S of the Rules** are to comply with the following requirements:

(1) Restricted device

The inside diameter of the opening is to be not more than 200 mm for both sounding pipe and ullage hatch and to be provided with self-closing type pipe head fitting. For cargo tank sounding/ullage measuring, the device is to be of the gas seal valve capable of being fitted with a measuring device of the construction restricting a massive leakage of cargo vapour. Glazed peeping window is to be provided separately as necessary.

(2) Closed device

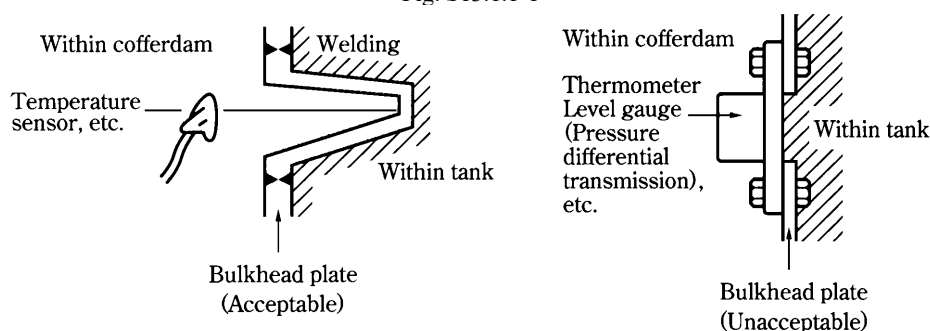
The closed construction is to be of all welded construction, as a rule, but flange construction for periodic inspection which is normally not open may be accepted as the closed device.

2 In types referred to in **13.1.1(1), (2) and (3), Part S of the Rules**, the closed type may serve commonly with open type and restricted type, and the restricted type, with open type respectively. Namely, the degree of safety is highest in the closed type followed by the restricted type and then open type, thus it descends in the order of description. In the cargo tank where loading of the cargo required to be provided with the closed devices is expected, restricted devices may be provided in addition to closed devices. In more specific terms, in case where carriage is made of the cargo for which the use of closed devices is required, only the closed devices are to be used, but when carriage is made of the cargo in this tank for which the use of restricted devices is required, either of the closed devices and/or restricted devices may be used. However, for tanks where use of either the closed device or restricted devices is required, open devices are not to be provided from the safety point of view.

3 Where peeping windows are provided as a means of gauging device, their construction, liquid and gas sealing performance are to be equivalent to that of tank top, and are to be fitted with protective covers of sufficient strength.

4 The fitting of a gauging device on the bulkhead of tank with a flange is not allowed under any circumstances. Namely, the gauging device is to be housed in a recessed pipe as shown in **Fig. S13.1.1-1**.

Fig. S13.1.1-1



5 The performance and construction of liquid level indicator are to have been approved in accordance with the **Guidance for the Approval of Materials and Equipment for Marine Use**.

6 The tests (pressure, temperature, etc.) and inspection for other gauging devices are to be complied with the following requirements (1) and (2). However, the performance test does not necessarily require a test using the real cargo if as the effect of the device can be verified.

(1) Testing procedure at time of manufacture

Performance tests are to be conducted using the real cargo according to the test plan prepared by the manufacturer. However, in the case of devices which are of the same type previously approved, the performance test using the real cargo may be omitted

on approval by the Society. In the case of fixed type device, tests and inspection are to be arranged in accordance with the shipboard test plan approved by the Society.

(2) Reinspection and retesting procedures on board.

For the gauging devices and equipment fitted on board the ship, the data specifying the following items (the data is to have been approved by the Society) are to be placed aboard the ship.

- (a) Check procedure before use (including the testing procedure)
- (b) Check procedure during use (including the test procedure)
- (c) The periodical check procedure established by the manufacturer and service frequency
- (d) Service life
- (e) Tests and inspection procedures at periodical inspection
- (f) Other precautions

## **S13.2 Vapour Detection**

### **S13.2.1 General**

The wording “as deemed appropriate by the Society” in **13.2.1, Part S of the Rules** means to be approved by the Society in accordance with **Chapter 7, Part 7 of Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use** or to pass the test of the official organization deemed appropriate by the Society.

### **S13.2.3 Requirement for Some Products Which is Not Available with Toxic Vapour Detection**

In case where a suitable vapour detection instrument for a specific cargoes is not available, approval from the Society is to be obtained. However, it is desirable that fixed type vapour detection instruments are installed as far as such are available. At least against carbon disulfide and chlorsulfonic acid, fixed type vapour detection instruments are to be provided.

## **S13.3 Additional Requirements**

### **S13.3.1 Installation of Gas Detection Equipment**

The wording “the requirements otherwise specified” in **13.3.1, Part S of the Rules** means those specified in **R4.5.10-2(1)**.

## S14 PERSONNEL PROTECTION EQUIPMENT

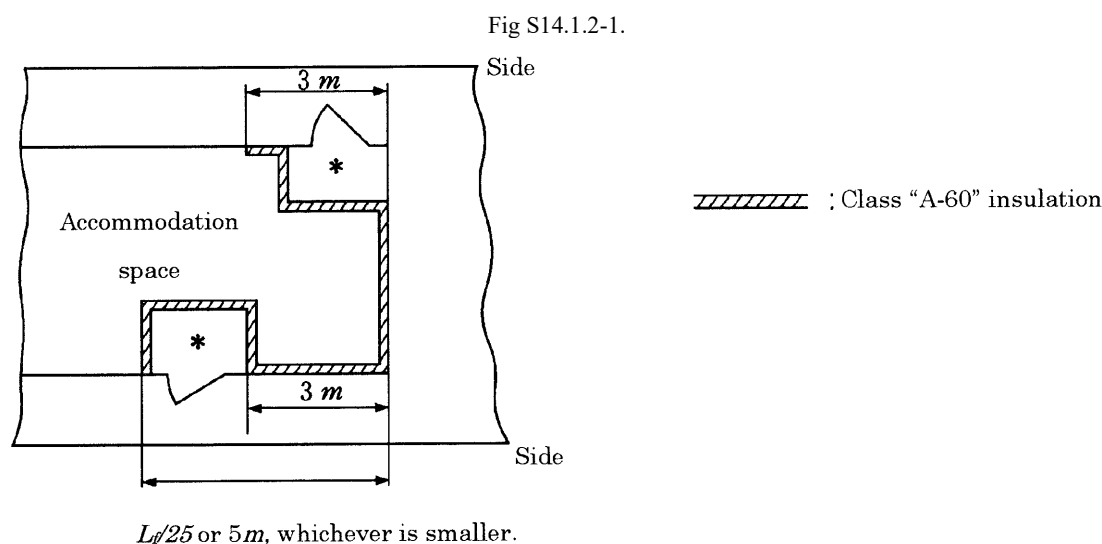
### S14.1 Protective Equipment

#### S14.1.1 Protective Equipment

Work clothes and protective equipment specified in the requirements in [14.1.1, Part S of the Rules](#) are to be capable of protecting the entire body of the wear against cargo splashes in all directions, and the number of sets necessary for those working on deck and in cargo pump room are to be provided. Where one type of work clothes or protective types of cargo of the ship, necessary number of sets for respective types of cargo is to be provided.

#### S14.1.2 Storage Room

The protective equipment used to handle the cargo to which the requirements in this Part apply for once or more are, as a rule, to be stored in the lockers provided within the cargo area. One set of these is , to be stored in the locker near the cargo pump room at all times. The construction of the special locker for the storage of protective equipment provided in the cargo area is to comply with the requirement in [11.3.3, Part 1, Part C of the Rules](#). When this can not be complied with under avoidable reasons, protective equipment may be stored in the store or locker having no openings to accommodation space and service space and located outside the cargo area as shown in [Fig. S14.1.2-1](#). This requirement does not apply to brand new protective equipment, unused equipment, or equipment which has not been used since undergoing a through cleaning process.



Note:

When the storage place of protective equipment is provided within the accommodation space or service space, such is only allowed at areas with openings as specified in [3.2.3, Part S of the Rules](#). In this case, it is desirable to provide showers, etc. within the room. The location of the store room of cargo specimens referred to in [16.2.6-3, Part S of the Rules](#) is to be dealt with in the same manner as above.

### S14.2 Safety Equipment

#### S14.2.1 Number of Safety Equipment

The number of safety equipment is to be determined after carefully studying the arrangement and scheme of shipboard working persons.

#### S14.2.2 Composition of Safety Equipment

The safety equipment specified in [14.2.2, Part S of the Rules](#) is to comply with the following requirements:

- (1) The term “platform work for at least 20 min” means a capacity in terms of the open air volume at atmosphere pressure is 800 l

or more.

- (2) Work clothes and protective equipment of excellent acid-resisting, alkali-resisting and antitoxic features against the types of prospective cargo are to be used. No duplicated use of work clothes and protective equipment with those required under **14.1.1, Part S of the Rules**, in number, is permitted.
- (3) The length of the fire-resisting life line is to be 30 *m* or more so that it can be used also for signaling between the person who enters the enclosed compartment and the other person outside the compartment
- (4) The explosion-proof light is to be capable of lighting for a period not less than 3 *hours*.

#### **S14.2.3 Supply of Spare Compressed Air**

The air compressor referred to in **14.2.3(1)(b), Part S of the Rules** is to be capable of charging the air bottles placed on board to their maximum working pressure.

#### **S14.2.4 Additional Air Supply System**

The additional requirements for “the cargo pump room of ships carrying cargo for which no effective vapour detection instruments” referred to in **14.2.4, Part S of the Rules**, are provided are to be as given in the following **(1)** and **(2)**.

- (1) The additional air bottles for the work in the cargo pump room of ships carrying toxic cargo without being provided with effective vapour toxicity detection instruments are to be provided in addition to the number of spare air bottles specified in **14.2.3, Part S of the Rules**.
- (2) The capacity of the equivalent air bottle in replacement with the low pressure air piping as an addition to air breathing apparatus is to be not less than 4,800*l* under the atmosphere pressure.

#### **S14.2.9 Medical First-aid Equipment**

With respect to the wording “Medical first-aid equipment as deemed appropriate by the Society” specified in **14.2.9, Part S of the Rules**, reference is made to “*MEDICAL FIRST AID GUIDE FOR USE IN ACCIDENTS INVOLVING DANGEROUS GOODS(MFAG)*”.

#### **S14.2.10 Decontamination Shower and Eyewash**

Decontamination showers and eyewash are to be located in the vicinity of cargo manifolds, cargo pump room, etc. which are vulnerable to cargo splashes, and shielding walls are to be provided to prevent crew members from being sprayed by any additional cargo splashes during eye washing. The construction of a special locker for the storage of protective equipment provided in the cargo area is to comply with the requirement in **11.3.3, Part 1, Part C of the Rules**. The piping for decontamination showers and eyewash is to be permanent metal piping complying with the requirements in **Chapter 6, Part S of the Rules**, and it is to be provided with thermal insulation or drain connections at suitable locations to prevent freeze damage.

## S15 SPECIAL REQUIREMENTS

### S15.2 Ammonium Nitrate Solution, 93% or Less

#### S15.2.4 Temperature of the Heat Exchanging Medium in the Tank Heating System

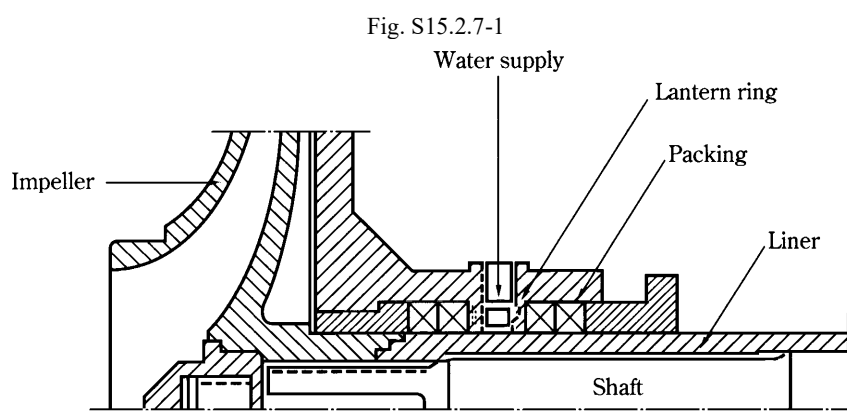
The temperature alarm is to be of visible and audible alarm. The detecting temperature is to be the mean temperature within the tank, but the heating system is to be so arranged to avoid uneven heating.

#### S15.2.6 Controls for Ammonia Gas Injection System

Where ammonia gas is injected into cargo, the cargo is to be circulated during the injection is being made.

#### S15.2.7 Type of Cargo Pump

The sealing system of centrifugal pump is to be of the stuffing box provided with lantern rings as shown in [Fig. S15.2.7-1](#). Pressurized fresh or of the stuffing box.



### S15.3 Carbon Disulphide

#### S15.3.1 Carriage under Water Pad

When the requirements in [15.3.1-4, Part S of the Rules](#) are applied, the opening for emergency sounding is to be provided with sluice valve and cock fitted with automatic closing devices. Further, warning signs banning their use other than in emergency cases are to be fitted.

### S15.4 Diethyl Ether (*IBC Code 15.4*)

#### S15.4.1 Environmental Control for Void Space Surrounding the Cargo Tanks

With respect to the requirements specified in [15.4.1, Part S of the Rules](#), the ventilation fans are to comply with the requirements of [15.4.1, Part S of the Rules](#) and to be of non-sparking type complying with the requirements of [R4.5.4-1\(2\)](#). For the purpose of this requirement, protection screens of not more than 13 mm square mesh are to be fitted in the inlet and outlet ventilation openings of the ducts fitted with such fans on the open deck.

### S15.5 Hydrogen Peroxide Solutions

#### S15.5.1 Hydrogen Peroxide Solutions over 60% but Not over 70% by Weight

When the rate and estimated size of the spill referred to in [15.5.1-10\(2\), Part S of the Rules](#) are calculated, the piping and hoses are to be considered to have undergone total loss.

**S15.5.2 Hydrogen Peroxide Solutions over 8% but Not over 60% by Weight**

When the rate and estimated size of the spill referred to in **15.5.2-8(2), Part S of the Rules** are calculated, the piping and hoses are to be considered to have undergone total loss.

**S15.8 Propylene Oxide or Ethylene Oxide/Propylene Oxide Mixtures with an Ethylene Oxide Content of not more than 30 % by Mass****S15.8.34 Conditions of Carriage**

The nitrogen gas produced by the membrane type nitrogen gas generator capable of ensuring a purity of 99% or more by volume may be used as the nitrogen gas to be sealed.

**S15.10 Sulphur (Molten)****S15.10.6 Cargo Temperature Controls**

The cargo temperature control system may employ manual temperature control trip, etc. provided that the cargo tanks are equipped with cargo temperature indicators and high/low temperature alarms. In this case, tank temperatures are to be so monitored and controlled as not to allow them to exceed 155°C at any points of measurement. In case where the heating medium does not exceed 155°C, the requirements here may be reduced to the temperature indicator only.

**S15.11 Acids****S15.11.2 Lining with Corrosion-resistant Materials**

- 1 “Lining” is an acid-resistant material that is applied to the tank or piping system in a solid state (i.e. not sprayed on).
- 2 The wording “elasticity of the lining is not to be less than that of the supporting boundary plating” in **15.11.2, Part S of the Rules**, means to the prevention of debonding at the interfaces between linings and lined surfaces.
- 3 The use of lining with corrosion-resistant materials is to be applied also to the casing walls of cargo pump room (the bottom and casings to a height of 1 *m* from the bottom).

**S15.11.4 Means of Guard against the Danger of Cargo Being Sprayed and Leakage**

The shields to guard against the danger of cargo being sprayed and leakage are to be of acid-resistant materials.

**S15.11.6 Segregation of Cargo from Oil Fuel Tanks**

In segregating cargo tanks carrying cargoes or cargo residues from oil fuel tanks, none of facial contacts, linear contacts and point contacts are accepted.

**S15.11.7 Apparatus for Detection of Leakage of Cargo**

The apparatus for detection of leakage of cargo is to be of the *pH* meter and hydrogen detector. These apparatuses may be of portable ones. Further, auxiliary means such as litmus papers may also be used.

**S15.11.8 Material of Bilge Pumping and Drainage Arrangements in Cargo Pump Room**

Underneath the cargo pumps and associated flange joints, drain pans are to be provided and the collected drains are to be led to bilge wells through the drain lines. These drain lines are to be formed by corrosion-resistant materials or to be applied with effective coatings. Where the bottom of the cargo pump room and its casing walls to a height of 1 *m* from the bottom are made corrosion-resistant, the requirements may be dispensed with.

**S15.13 Cargoes Protected by Additives****S15.13.3 Chemical Inhibition**

With respect to the requirements specified in **15.13.3(2), Part S of the Rules**, in case where additives have oxygen-dependent inhibitor, *MSC-MEPC.2/Circ.14*, as amended, is to be applied.

**S15.13.5 A Product Containing an Oxygen Dependent Additive**

- 1 Where the requirements of the following (1) to (3) are satisfied according to the requirements of **1.1.2, Part S of the Rules**

regardless of **15.13.5, Part S of the Rules**, styrene monomer may be transported in chemical tankers with cargo tanks over 3000  $m^3$  fitted with an inert gas system required in the requirement of **4.5.5, Part R of the Rules**.

- (1) An inert gas system which is capable of keeping oxygen content in cargo tanks between 2% and 8% is to be fitted.
- (2) Equipment which is capable of keeping from the inert gas leakage when vapor space oxygen content is measured with a portable oxygen content meter is to be fitted.
- (3) The following (a) to (c) are not the conditions for maintenance of classification for which examinations are required but the conditions to be observed by the ship owner, ship master or other persons who may be concerned with the ship's operation.
  - (a) Upon completion of loading and taking of product samples, the vapor space is checked to ensure that the oxygen level is within acceptable limits (2% to 8%). Although levels as low as 2% are adequate, level of the oxygen between 6% and 8% are preferred.
  - (b) During the voyage, the vapor space oxygen content is monitored and recorded at least twice per day, at least 8 hours apart ; and
  - (c) temperature and pressure readings of the cargo tanks are monitored and recorded at least twice per day, at least 8 hours apart.

2 With respect to the requirements specified in **15.13.5, Part S of the Rules**, in case where additives have oxygen-dependent inhibitor, *MSC-MEPC.2/Circ.14*, as amended, is to be applied.

3 With respect to the requirements specified in **15.13.5, Part S of the Rules**, in case a product containing an oxygen dependent inhibitor is carried, *MSC-MEPC.5/Circ.10*, as amended, is to be applied.

## **S15.16 Cargo Contamination**

### **S15.16.2 No Contamination with Water**

1 The “permanent ballast or water tanks unless the tanks are empty or dry” referred to in **15.16.2(3), Part S of the Rules** means that the tank casings, frames, etc. are free from attachments of water droplets or from moistened condition. In the cargo tanks adjacent to permanent ballast or water tanks not maintained in dry condition, no cargo to which the requirements in **15.16.2, Part S of the Rules** apply is to be carried. In this case, none of linear contacts and point contacts are accepted.

2 Where cargo that reacts dangerously with water is carried in the cargo tank adjacent to ballast tanks, the ballast tank is to be fitted with detachable spool pieces (at outside the tank, e.g. pump room, etc.), the said detachable spool pieces are to be removed after discharging the ballast, and then the open ends are to be blanked off. In this case, the ballast tanks are to be made in dry condition and, at the same time, it is to be ensured that there is no possibility of introducing ballast water thereto by erroneous operation. With permanent ballast tanks not in dry condition or cargo tanks adjacent to water tanks, the carriage of cargo to which the requirements in **15.16.2, Part S of the Rules** apply is not allowed. In this case, both linear contacts and point contacts may be accepted.

## **S15.17 Increased Ventilation Requirements**

### **S15.17.1 Increased Ventilation Requirements**

The “work areas or other similar spaces” referred to in **15.17.1, Part S of the Rules** are the service spaces, cargo control rooms and other similar spaces but not include cargo manifolds where cargo operation is carried out.

## **S15.18 Special Cargo Pump Room Requirements**

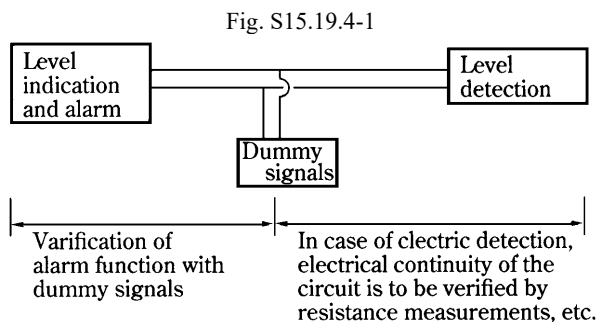
### **S15.18.1 Special Cargo Pump Room Requirements**

Under any circumstances, no cargo pump room is arranged directly below open deck. Namely, for tanks carrying the cargo to which the requirements in **15.18, Part S of the Rules** apply, either submerged type cargo pump is to be provided therein or cargo pump room is to be provided on open deck.



**S15.19 Overflow Control****S15.19.4 Test of Level Alarm**

In the test of alarms carried out prior to loading, their functions are to be capable of being tested by actual operation of level gauges. When verification by actual operation is impracticable, suitable means to verify that the alarm circuit is in normal condition as shown in **Fig. S15.19.4-1** is to be provided.

**S15.19.5 Independence of High Level Alarm**

For cargoes required to have high level alarm system and overflow control system in the requirements, the provisions of closed type instruments are required in many cases. For such tanks, the following detecting ends are required:

- (a) Gauging devices (**13.1, Part S of the Rules**)
- (b) High level alarm (**15.19.6, Part S of the Rules**)
- (c) Overflow controls (**15.19.7, Part S of the Rules**)

The above detecting ends (a), (b) and (c) are to be separate from each other. However, only for pipes to which the detecting ends of (b) and (c) (lead switch, float, electric device, etc.) are fitted, they may serve commonly. The electric, pneumatic or hydraulic circuits required for the detecting ends of (a), (b) and (c) are to be independent so that defect in one circuit may not cause functional disability in other circuits. In case where process units are provided on bridge, etc. for the purpose of visual display, the electric circuits concerned are to be independent at least up to the point of display. Power is to be supplied from distribution box.

**S15.19.6 Installation of High Level Alarm**

The level detecting devices used for high level alarm system and overflow control system are to be of type approved in accordance with the requirements of **Chapter 4, Part 7 of the Guidance for the Approval of Materials and Equipment for Marine Use**. When modular units are provided in the control room or on bridge, level indicators and visible alarms independent from those (a), (b) and (c) given in the preceding **S15.19.5** are to be provided. Such audible alarms are not intended to identify alarms and thus they may not necessarily be independent. Visible and audible alarms are to be provided also in the cargo areas. Visible alarms are to be provided at such locations readily recognizable also from shore side. In case where no control room is provided, audible and visible alarms are to be provided in the cargo control room. Except for entering the cargo tanks which have thoroughly been washed clean, the testing device for detecting ends is to be provided outside the tank. Simulation test of electric circuit or self-monitoring circuit may be accepted.

**S15.21 Temperature Sensors**

Temperature sensors are to be fitted to the casing and the shaft bearing. The use of portable devices are unacceptable.

## **S16 OPERATIONAL REQUIREMENTS**

### **S16.2 Operational Requirements**

#### **S16.2.2 Maximum Allowable Quantity of Cargo per Tank**

The maximum allowable quantity of cargo specified in **16.2.2-3, Part S of the Rules** is to be determined in consideration of the thermal expansion of the cargo at temperature of 45°C. Care is to be taken so as to ensure that the open ends of the venting system in the tank may not submerge in the cargo but in the gaseous phase under any trim condition of the ship at sea. Further, the maximum allowable quantity of cargo in cases where the tank temperature will possibly exceed 45°C being affected by tank heating is to be determined on the basis of such a temperature.

#### **S16.2.5 Opening of and Entry into Cargo Tank**

Covers of the cargo tank specified in **16.2.5-1, Part S of the Rules**, ullage hole covers and peeping hole covers or tank cleaning hatch covers are not to be opened except for cases where air is intaken in gas free operation, tank washing operation, gauging is taken of the tanks requiring the open devices and restricted devices and during gas detection and when samples are being taken.

#### **S16.2.6 Stowage of Cargo Samples**

When the stowage of cargo samples is made outside the cargo area, such stowage compartment is to be only accessible directly from the exposed areas of the ship provided with exhaust type independent mechanical ventilating fan capable of ensuring twenty air changes or more per hour.

#### **S16.2.7 Cargoes Not to be Exposed to Excessive Heat**

In case where the tank carrying the cargo which is not to be exposed to excessive heat is subjected to tank heating or where the tank is adjacent to other tanks (cargo tanks, oil fuel tanks, etc.) which are heated, fixed type thermometers and temperature alarms are to be provided.

## **S17 SUMMARY OF MINIMUM REQUIREMENTS**

### **S17.1 General**

#### **S17.1.1 Application**

The requirements for each product of provisional assessment except the products shown in [Table S17.1, Part S of the Rules](#), and the modified requirements of the products shown in [Table S17.1, Part S of the Rules](#), refer to the latest version of *IMO MEPC.2/Circ.*

## **S18 LIST OF CHEMICALS TO WHICH THIS PART DOES NOT APPLY**

### **S18.1 General**

#### **S18.1.1 Application**

The chemicals of provisional assessment to which this Part does not apply and that are not shown in [Table S18.1, Part S of the Rules](#), refer to the latest version of *IMO MEPC.2/Circ.*