



RULES FOR
CLASSIFICATION OF
SHIPS

NEWBUILDINGS

SPECIAL SERVICE AND TYPE
ADDITIONAL CLASS

PART 5 CHAPTER 11

CARRIAGE OF DANGEROUS GOODS

JULY 2006

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DET NORSKE VERITAS

Veritasveien 1, NO-1322 Høvik, Norway Tel.: +47 67 57 99 00 Fax: +47 67 57 99 11

CHANGES IN THE RULES

General

The present edition of the rules includes additions and amendments decided by the Board in June 2006, and supersedes the January 2003 edition of the same chapter.

The changes come into force on 1 July 2006.

This chapter is valid until superseded by a revised chapter. Supplements will not be issued except for an updated list of minor amendments and corrections presented in Pt.0 Ch.1 Sec.3. Pt.0 Ch.1 is normally revised in January and July each year.

Revised chapters will be forwarded to all subscribers to the rules. Buyers of reprints are advised to check the updated list of rule chapters printed in Pt.0 Ch.1 Sec.1 to ensure that the chapter is current.

Main Changes

• Sec.1 General Requirements

- Under A200, items regarding issuance of statutory certificates have been added.
- Definition of classes of dangerous goods has been shortened, corresponding to the definitions in IMDG Code.
- Definitions of the terms “Hazardous area” and “Extended haz-

ardous area” have been added.

• Sec.2 Requirements for Carriage of Dangerous Goods in Various Types of Cargo Spaces

- B300 has been rewritten and updated to be in line with MSC/Circ. 1120, UISC79 and IEC60092-506.
- B500 has been restructured and aligned with MSC/Circ. 1120 and UISC89.
- B600 has been restructured to be more user friendly. No technical changes.
- Under B700, item covering medical oxygen has been added.
- B900 has been aligned with UISC103.
- In subsections B and C, the references in "tables of requirements" have been updated.

• Sec.3 Dangerous Goods Permitted in Passenger Ships, Including Car Ferries with more than 25 Passengers

This section has been deleted.

Corrections and Clarifications

In addition to the above stated rule requirements, a number of detected errors, corrections and clarifications have been made in the exist-

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Computer Typesetting (FM+SGML) by Det Norske Veritas

Printed in Norway

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SECTION 1 GENERAL REQUIREMENTS

A. Classification

A 100 Class notations

101 Ships complying with requirements of this chapter for the carriage of dangerous goods may be given one of the following class notations:

DG-P

denotes that the ship is found suitable for the carriage of dangerous goods in packaged form in enclosed or semi-enclosed cargo spaces.

DG-B

denotes that the ship is found suitable for the carriage of dangerous solid cargoes in bulk.

A 200 Scope

201 The rules in this section are considered to satisfy the requirements of SOLAS Chapter II-2, Regulation 19 in respect of carriage of dangerous goods in packaged form.

202 For potentially hazardous bulk cargoes not subject to the SOLAS requirements mentioned in 201 the rules are considered to meet the recommendation given in IMO's "Code of Safe Practice for Solid Bulk Cargoes", Res. A.434(XI) with respect to ships construction and equipment.

Guidance note:

When authorised by the government of the flag state, the Society can issue a Document of Compliance, certifying that the construction and equipment are in compliance with SOLAS II-2, Regulation 19 and or with the BC Code, as amended.

For such certification applicable parts of this chapter are used, also when class notations are not given.

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A 300 Assumption

301 It is assumed that the operational requirements of SOLAS Chapter VII, Part A as well as those of the International Maritime Dangerous Goods Code, IMDG Code (IMO Resolution A.81(IV)) or the "Code of Safe Practice for Solid Bulk Cargoes", as applicable, are complied with.

B. Documentation

B 100 Plans and particulars

101 In addition to documentation required for the main class the following documentation is to be submitted as applicable:

- Ventilation arrangements for cargo holds, cargo handling spaces and spaces having opening into those spaces.
- Arrangements for inerting of cargo holds.
- Arrangements for temperature detection in cargo holds.
- Drawings showing location of all electrical equipment in hazardous areas. The drawings are to include the location and extent of hazardous area.
- Single line diagram for intrinsically safe circuits and data for verification of the compatibility between the barrier and the field component.
- List of explosion protected equipment with reference to drawings.
- For fixed gas detection and alarm systems: Specification and location of detectors, alarm devices and call points, and cable routing layout drawing.
- For fixed fire detection and alarm systems: Specification

- and location of detectors, alarm devices and call points, and cable routing layout drawing.
- Arrangement of fire extinguishing system including water spray system, if fitted.
- Additional bilge pumping arrangements, if fitted.
- Information regarding fire integrity of bulkheads and decks separating cargo spaces from machinery spaces and accommodation.
- A specification of the bulk cargoes and or classes of packaged goods that are intended to be carried in each cargo space.

102 For general requirements for documentation of instrumentation and automation, including computer based control and monitoring, see Pt.4 Ch.9 Sec.1.

103 The following control and monitoring systems shall be approved by the Society:

- cargo and vapour temperature control and monitoring system (permanent system only)
- flammable gas detection system (permanent system only)
- oxygen indication equipment (permanent system only)
- TOX Toxic gas indication equipment (permanent system only).

For requirements to documentation, see Pt.4 Ch.9.

C. Definitions

C 100 Classes of dangerous goods

101 Classes of dangerous goods according to Chapter VII, Part A, of SOLAS, the BC-Code and the IMDG-Code, are as follows:

Class 1: Explosives

- Division 1.1: substances and articles which have a mass explosion hazard
- Division 1.2: substances and articles which have a projection hazard but not a mass explosion hazard
- Division 1.3: substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard
- Division 1.4: substances and articles which present no significant hazard

Guidance note:

Substances and articles in this division are in compatibility group S if they are so packaged or designed that any hazardous effects arising from the accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder fire-fighting or other emergency response efforts in the immediate vicinity of the package.

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- Division 1.5: very insensitive substances which have a mass explosion hazard
- Division 1.6: extremely insensitive articles which do not have a mass explosion hazard

Class 2: Gases

- Class 2.1: flammable gases
- Class 2.2: non-flammable, non-toxic gases
- Class 2.3: toxic gases

Class 3: Flammable liquids

Class 4: Flammable solids; substances liable to spontaneous combustion; substances which, in contact with water, emit flammable gases

- Class 4.1: flammable solids, self-reactive substances and desensitized explosives
- Class 4.2: substances liable to spontaneous combustion
- Class 4.3: substances which, in contact with water, emit flammable gases

Class 5: Oxidizing substances and organic peroxides

- Class 5.1: oxidizing substances
- Class 5.2: organic peroxides

Class 6: Toxic and infectious substances

- Class 6.1: toxic substances
- Class 6.2: infectious substances

Class 7: Radioactive material

Class 8: Corrosive substances

Class 9: Miscellaneous dangerous substances and articles

Class MHB: Materials hazardous only in bulk.

Guidance note:

Class 6.2 and class 7 are neither covered by SOLAS reg. Ch. II-2/19 nor this chapter.

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C 200 Terms

201 *"A-60" class divisions* are smoke and fire resistant divisions formed by insulated steel bulkheads and decks complying with the SOLAS standard fire test criteria for 60 minutes exposure.

They shall be insulated with non-combustible materials such that the average temperature of the unexposed side will not rise more than 140°C above the original temperature, nor will the temperature, at any one point, including any joint, rise more than 180°C above the original temperature, within 60 minutes.

(SOLAS reg. Ch. II-2/3.2.3)

202 *Cargo spaces* are all spaces used for cargo and trunks to such spaces.

(SOLAS reg. Ch. II-2/3.8)

203 *Ro-ro cargo spaces* are spaces not normally subdivided in any way and extending to either a substantial length or the entire length of the ship in which goods (packaged or in bulk, in or on rail or road cars, vehicles, trailers, containers, pallets, demountable tanks or in or on similar stowage units or other receptacles) can be loaded and unloaded normally in a horizontal direction.

(SOLAS reg. Ch. II-2/3.41)

204 *Open ro-ro spaces* are ro-ro spaces either open at both ends or open at one end, and provided with adequate natural ventilation effective over their entire length through permanent openings distributed in the side plating or deckhead or from above, having a total area of at least 10% of the total area of the space sides.

(SOLAS reg. Ch. II-2/3.35)

205 *Closed ro-ro cargo spaces* are ro-ro cargo spaces which are neither open ro-ro cargo spaces nor weather decks.

(SOLAS reg. Ch. II-2/3.12)

206 *Weather deck* is a deck which is completely exposed to the weather from above and from at least two sides.

(SOLAS reg. Ch. II-2/3.50)

207 *An open deck extending into a ro-ro cargo space* not having sufficient openings to be considered "open" does not fall under the definition weather deck in the context of dangerous goods.

208 *Hazardous area* (comparable with zone 1 as defined in IEC 60092-502) is an area in which an explosive atmosphere is likely to occur in normal operation. The explosive atmosphere may exist due to gas and or dust.

(IEC 60092-506, 3.1)

209 *Extended hazardous area* (comparable with zone 2 as defined in IEC 60092-502) is an area in which an explosive atmosphere is not likely to occur in normal operation and, if it does occur, is likely to do so only infrequently and will exist for a short period only.

(IEC 60092-506, 3.2)

SECTION 2

REQUIREMENTS FOR CARRIAGE OF DANGEROUS GOODS IN VARIOUS TYPES OF CARGO SPACES

A. General

A 100 Application of requirements

101 Subsection B contains all requirements relevant for carriage of dangerous goods. Subsection C gives the requirements for packaged goods carried in various types of cargo spaces. Subsection D gives the application of the requirements for solid bulk cargoes.

B. Requirements applicable for various classes of dangerous goods

B 100 Fire water supply

101 Arrangements shall be made to ensure immediate availability of a supply of water from the fire main at the required pressure either by permanent pressurisation or by suitably placed remote starting arrangements for the fire pumps.

(SOLAS Ch. II-2/19 3.1.1)

The requirements also apply to pumps for water spray system for cargo spaces, if fitted.

If fire water supply pumps arranged for remote starting also serve other purposes, the arrangement must ensure that the pump selected is connected to the fire water system, e.g. by automatic change over of valves or visual signals for valves' correct positions at the remote starting position.

102 The capacity of the fire pumps shall be sufficient for supplying four (4) jets of water, and the number and position of hydrants shall be such that at least two (2) of the required four (4) jets of water, when supplied by single lengths of hose, may reach any part of the cargo space when empty; and all four (4) jets of water, each supplied by single lengths of hose may reach any part of ro-ro cargo spaces.

(SOLAS reg II-2/19 3.1.2 and UI SC 168.)

Guidance note:

The length of the water jet is generally not to be taken more than 7 m.

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103 Means of effectively cooling the designated under deck cargo space by copious quantities of water, either by a fixed arrangement of spraying nozzles, or flooding the cargo spaces with water are to be provided. If spray nozzles are used their capacity is to be sufficient for supplying not less than 5 litres/m²/min. of the horizontal projected area of the cargo hold.

Hoses may be used for this purpose in small cargo spaces and in small areas of larger cargo spaces at the discretion of the Ad-

ministration. However, the drainage and pumping arrangements shall be such as to prevent the build-up of free surfaces. The drainage system shall be sized to remove no less than 125% of the combined capacity of both the water spraying system pumps and required number of fire hose nozzles.

The drainage system valves shall be operated from outside the protected space at a position in the vicinity of the extinguishing system controls. Bilge wells shall be of sufficient holding capacity and shall be arranged at side shell of the ship at a distance from each other of not more than 40 m in each watertight compartment. If this is not possible, the adverse effect upon stability of the added weight and free surface of the water shall be taken into account to the extent deemed necessary by the Administration in its approval of the stability information.

(SOLAS reg II-2/19 3.1.3)

B 200 Fixed fire extinguishing

201 A ship engaged in the carriage of dangerous goods in any cargo spaces shall be provided with a fixed carbon dioxide or inert gas fire-extinguishing system complying with the provisions of the Fire Safety Systems Code or with a fire-extinguishing system which, in the opinion of the Administration, gives equivalent protection for the cargoes carried.

(SOLAS reg II-2/10.7.2)

202 Each open ro-ro cargo space having a deck above it and each space deemed to be a closed ro-ro cargo space not capable of being sealed, is to be fitted with an approved fixed pressure water-spray system for manual operation which is to protect all parts of any deck and vehicle platform in such space. The capacity of the system is to be sufficiently for providing at least 5 litres/m²/min. of the horizontal area of decks and platforms. The use of any other fixed fire-extinguishing system that has been shown by full-scale test to be no less effective, may be permitted.

(SOLAS reg II-2/19.3.9)

B 300 Electrical installations

301 Electrical equipment and wiring shall not be fitted in hazardous areas and in areas where explosives are stored unless it is essential for the safety and operation of the ship.

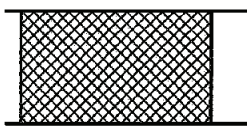
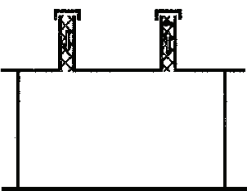
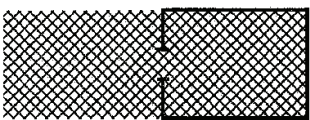
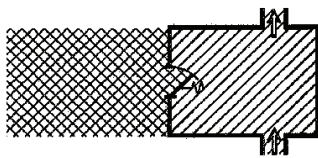

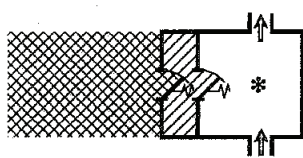
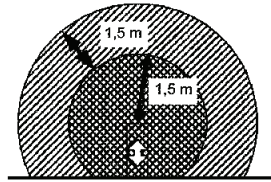




(IEC 60092-506, 5.1)

302 The hazardous area shall be categorised in accordance with IEC 60092-506 Annex B, see Fig.1:

Guidance note:

The spaces are categorised as hazardous only when dangerous goods are carried.

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<i>Cargo classes</i>	<i>Typical example</i>	<i>Description</i>
Bulk: 4.1, 4.2, 4.3, 9, MHB Packaged: 1, 2.1, 3, 6.1, 8		— Closed cargo spaces — Permanently fixed magazines
Bulk: 4.1, 4.2, 4.3, 9, MHB Packaged: 2.1, 3, 6.1, 8		— Pipes having open ends (e.g., ventilation and bilge pipes, etc.) in a hazardous area.
Bulk: 4.3 Packaged: 2.1, 3, 6.1, 8		— Enclosed or semi-enclosed space with direct opening to closed cargo space
Bulk: 4.3 Packaged: 2.1, 3, 6.1, 8		— Enclosed or semi-enclosed space with direct opening to closed cargo space with gastight door and natural ventilation.
		— Space protected by overpressure in accordance with 303.
Bulk: 4.3 Packaged: 2.1, 3, 6.1, 8		— Space with direct opening to closed cargo space with air lock and natural ventilation.
Bulk: 4.3 Packaged: 2.1, 3, 6.1, 8		— Areas on open deck, or semi-enclosed spaces on open deck, in the indicated distance from ventilation outlets of hazardous areas
 Hazardous area  Extended hazardous area  Non-hazardous space  Substantially gas-tight self-closing door Fig. 1		

303 Where a space has an opening into an adjacent hazardous space or area, it may be made into a non-hazardous space in accordance with the following requirements:

- A minimum overpressure of 25 Pa (0.25mPa) with respect to the adjacent hazardous space or area is provided at all points inside the space and its associated ducts at which leaks are liable to occur, all doors and windows being closed.
- Visual and acoustic alarm is provided at a manned position in case of loss of pressure.

304 The requirements for electrical equipment in hazardous areas are specified in Table B1 for packaged goods and Table D1 for bulk cargoes. The requirements are additional to those given in Pt.4 Ch.8.

Guidance note:

Reefer containers shall be regarded as electrical equipment.

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305 The electrical equipment in extended hazardous areas shall either:

- be appropriate for use in the adjacent space in accordance with Table B1 or Table D1, or
- have Ex-protection Ex-n and appropriate temperature class, gas group and ingress protection in accordance with Table B1 or Table D1.

306 Portable electrical equipment shall have its own self-contained electrical source of energy, except for intrinsically safe

circuits, and shall comply with the requirements of 303 and 304.

307 If electrical equipment which is not approved for the use in hazardous areas as specified in 303 or 304 is installed, it must be possible to isolate the equipment completely, and to protect it against unauthorised reconnection. Disconnection shall be made outside the hazardous areas and shall be effected with isolating links or lockable switches. Equipment essential either for the safety of the ship or crew must be approved for the installation in hazardous area and shall not be disconnected.

308 Cables shall be either

- a) protected by electrically continuous metal sheathing or metallic wire armour braid or tape, or
- b) enclosed in screwed heavy gauge steel drawn or seam-welded and galvanized conduit.

309 All metallic protective coverings of power and lighting cables passing through a hazardous area or connected to equipment in such an area, shall be earthed at least at each end. The metallic covering of all other cables shall be earthed at least at one end.

310 Cable penetrations of decks and bulkheads are to be gas tight, and of a recognised make.

311 Cable joints in cargo spaces shall be avoided where possible. Where joints are unavoidable, they shall be enclosed in metal-clad or impact strength plastic junction boxes of certified safe type, or heat shrink or encapsulated crimp sleeve cable joints.

Table B1 Requirements for electrical equipment for packaged goods				
Classes or types of dangerous goods	Temperature class	Gas group	Ingress protection	Ex-protection
Explosives, Class 1 except Class 1.4 S	T 5		IP 64	
Liquids with flashpoint below 23°C (Class 3.1, 3.2, 6.1 & 8), flammable gases (Class 2.1)	T 3	II B		Ex-i, Ex-d, Ex-e, Ex-p, Ex-m or Ex-s

B 400 Fire detection system

401 Ro-ro cargo spaces are to be fitted with a fixed fire detection and fire alarm system complying with the requirements of Pt.4 Ch.10. All other types of cargo spaces except spaces certified for solid bulk cargoes only, are to be fitted with either a fixed fire detection and fire alarm system complying with the requirements of Pt.4 Ch.10 or a sample extraction smoke detection system complying with the requirements of Pt.4 Ch.10. If a sample extraction smoke detection system is fitted, particular attention is to be made to Pt.4 Ch.10 in order to prevent the leakage of toxic fumes into occupied areas.

(SOLAS reg II-2/19 3.3)

B 500 Ventilation of cargo spaces

501 Depending on the type of cargo spaces and the cargoes intended, requirements for ventilation in 502 to 507 apply, as given in Table C2 to Table C4 and in Table D1.

502 Mechanical ventilation

The fan(s) are to be permanently fitted or of a portable type adapted for being permanently fitted prior to loading and during voyage.

The height of ventilation inlets and outlets must satisfy the requirements of the Load Line Convention for openings fitted with closing appliances. The means of closure for fire protection must be fitted in accordance with Pt.4 Ch.10.

503 Continuous ventilation

The fan(s) are to be permanently fitted or of a portable type adapted for being permanently fitted prior to loading and during voyage.

Holds intended for the carriage of cargoes for which continu-

ous ventilation is required, shall be provided with ventilation openings which may be kept opened when required. Such openings shall comply with the requirements of the Load Line Convention as amended for openings not fitted with means of closure. The means of closure for fire protection must be fitted in accordance with Pt.4 Ch.10.

504 Fan capacity

- a) Cargo holds are to be provided with a minimum of two ventilation fans, giving a minimum of 6 air changes per hour, based on the volume of the empty hold.
- b) Cargo holds are to be provided with a minimum of one ventilation fan, giving a minimum of 6 air changes per hour, based on the volume of the empty hold.
- c) Cargo holds are to be provided with a minimum of one ventilation fan, giving a minimum of 2 air changes per hour, based on the volume of the empty hold.

505 Natural ventilation

Natural ventilation with closing appliances to be provided in enclosed cargo spaces, where there is no provision for mechanical ventilation.

(SOLAS reg. II-2/19 3.4.3)

506 Ventilation outlets

Ventilation outlets shall be located at a minimum of 3 m away from openings into machinery and or accommodation spaces.

507 Fans

The fans shall be of a type that prevents the possibility of the ignition of flammable gas air mixtures, and shall comply with Pt.5 Ch.3 Sec.6 A200.

The exhaust fans shall be fitted with suitable wire mesh guards (maximum 13x13 mm mesh).

(SOLAS reg. II-2/19 3.4.2 and UI SC 52.)

508 Spark arresting screens

The inlet and outlet ventilation openings shall be fitted with spark-arresting screens (one screen with 30 x 30 threads per square inch or two screens with 20 x 20 threads per square inch fitted in series)

B 600 Separate bilge pumping system and drainage arrangements for cargo spaces

601 The capacity and arrangement of the bilge system are to meet the requirements in Pt.4 Ch.6 Sec.4.

602 Bilge pumping and drainage system for cargo spaces is to be arranged outside machinery spaces. If bilge ejectors are used driving water may be taken from a pump in the engine room provided a non-return valve is fitted in the supply line.

(SOLAS reg. II-2/19.3.5.1)

603 If the bilge drainage system for cargo space is additional to the system served by pumps in the machinery space, the capacity of the system is to be not less than 10 m³/h per cargo space served. If the additional system is a common system, the capacity need not exceed 25 m³/h. The additional bilge system need not be arranged with redundancy.

(SOLAS reg. II-2/19.3.5.2)

604 Whenever flammable or toxic liquids are carried, the bilge line into the machinery space shall be isolated either by fitting a blank flange or by a closed lockable valve to be located in a readily accessible space outside cargo holds, e.g. in the engine room.

(SOLAS reg. II-2/19.3.5.3)

605 Enclosed spaces outside machinery spaces containing bilge pumps serving cargo spaces intended for carriage of flammable or toxic liquids shall be fitted with separate mechanical ventilation giving at least 6 air changes per hour. If the space has access from another enclosed space, the door shall be self-closing.

(SOLAS reg. II-2/19 3.5.4)

606 If gravity drainage is applied the discharges to be lead directly overboard, alternatively to a closed collecting tank, located outside the machinery spaces, having a minimum volume sufficient to accumulate 1/3 of the drainage capacity per hour of the largest cargo space. The tank shall be provided with vent pipe to a safe location on the open deck.

Drainage from a cargo space to wells in a lower cargo space is only permitted if the lower cargo space satisfies the same requirements as the cargo space above.

(SOLAS reg. II-2/19.3.5.5)

Guidance note:

For the purpose of cargo segregation according to the International Maritime Dangerous Goods Code, the two spaces are considered as one cargo space.

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B 700 Personnel protection and medical equipment

701 Four sets of protective clothing according to the Emergency Procedures (Ems) as given in the IMDG-code for packaged goods or BC Code for bulk cargoes shall be provided in addition to the firefighter's outfits required by Pt.4 Ch.10.

(SOLAS reg II-2 .19 3.6.1)

702 At least two self-contained breathing apparatuses additional to those required by Pt.4 Ch.10, are to be provided.

Two spare charges suitable for use with the breathing apparatus shall be provided for each required apparatus. Passenger

ships carrying not more than 36 passengers and cargo ships that are equipped with suitable located means for fully recharging the air cylinders free from contamination need carry only one spare charge for each required apparatus.

(SOLAS reg II-2/19 3.6.2)

703 The ship's hospital shall have a 40 litre/200 bar medical oxygen cylinder, assembled for direct use, equipped with one flow-meter unit for supplying oxygen for two persons simultaneously, and a complete portable set, ready for use, with a 2 litre/200 bar medical oxygen cylinder and a spare cylinder (also 2 litre/200 bar).

The 40 litre/200 bar cylinders shall be stored in fixed supports connected directly to vessels steel structure within the ship's hospital. The cylinders shall be stored within a steel cabinet with natural ventilation to free air. Signboard warning of possible ignition caused by static electricity from clothing or open flame when medical oxygen is used (released) shall be posted on the cabinet.

Alternative arrangements, which in the opinion of the Administration are equivalent, may be accepted.

B 800 Portable fire extinguishers

801 At least two (2) portable fire extinguishers with a total capacity of at least 12 kg of dry powder or equivalent are to be provided per cargo space. These extinguishers are additional to any portable fire extinguishers required elsewhere in the rules.

(SOLAS reg II-2/19 3.7)

B 900 Insulation of machinery space boundaries and separation of cargo spaces

901 Bulkheads forming boundaries between cargo spaces and machinery spaces of category A are to be insulated to "A-60" standard, unless the dangerous goods are stowed at least 3 m horizontally away from such bulkheads.

(SOLAS reg II-2/19 3.8)

Guidance note:

Machinery spaces of category A are those spaces and trunks to such spaces which contain:

- 1) internal combustion machinery used for main propulsion; or
- 2) internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of no less than 375 kW; or
- 3) any oil-fired boiler or oil fuel unit.

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902 Decks between cargo spaces and machinery spaces of category A are to be of "A-60" standard.

In the case that a closed or semi-closed cargo space is located partly above a machinery space of category A and the deck is not insulated to "A-60" standard, dangerous goods are prohibited in the whole of that cargo space. If the un-insulated deck above such machinery space is a weather deck, dangerous goods are prohibited only for the portion of the deck located above the machinery space.

903 In ship having ro-ro cargo spaces, a separation shall be provided between a closed ro-ro cargo space and an adjacent open ro-ro cargo space. The separation to be such as to minimize the passage of dangerous vapours and liquids between such spaces. Alternatively, such separation need not be provided if the ro-ro cargo space is considered to be a closed cargo space over its entire length and shall fully comply with the relevant special requirements of the regulation.

(SOLAS Ch. II-2/19.3.10.1)

904 In ship having ro-ro cargo spaces, a separation to be provided between a closed ro-ro cargo space and the adjacent weather deck. The separation to be such as to minimize the

passage of dangerous vapours and liquids between such spaces.

Alternatively, a separation need not be provided if the arrangement of the closed ro-ro cargo spaces is in accordance with those required for the dangerous goods carried on the adjacent weather deck.

(SOLAS Ch. II-2/19.3.10.2)

B 1000 Self unloading systems for solid bulk cargoes

1001 Types of self unloading systems:

Closed: The part of the system located outside the cargo hold is fully enclosed, e.g. pneumatic systems or fully enclosed chain conveyors.

Open: Open type systems, e.g. belt conveyors and bucket conveyors.

1002 For some cargoes the use of self unloading systems are not permitted due to hazards involved. For other cargoes only closed systems are permitted. Restrictions on use of self unloading systems are shown in Table D1.

1003 Enclosed spaces containing self unloading systems are to be provided with a water flushing system enabling easy cleaning/removal of dust deposits.

1004 Self unloading systems of the open type are to be arranged for emergency stop from convenient locations within the cargo handling spaces and on open deck.

1005 Spaces outside cargo holds containing self unloading systems are to be fitted with mechanical ventilation giving at least 6 airchanges per hour.

1006 Conveyor belts are to be made from materials not liable to accumulate static electricity.

B 1100 Special requirements

1101 Gas measuring instruments

When transporting a bulk cargo which is liable to emit a toxic or flammable gas, or cause oxygen depletion in the cargo space, the ship is to be provided with gas measuring instruments as follows:

- Instruments for measuring hydrogen gas or methane gas (0-100% LEL).
- Instruments for measuring toxic gases that may be given off from the particular cargo.
- Instruments for measuring oxygen concentration (0-21% by volume).

(SOLAS Ch. VI/3.1)

The instruments may be portable or fixed.

In case portable gas measuring instruments are provided, suitable sampling connections enabling the checking of atmosphere in holds and cargo handling spaces without need of entry, are to be arranged.

(BC-Code Appendix 6)

Guidance note:

Sampling points for cargo holds should be located as high as possible, e.g. upper part of hatch coaming. In order to ensure safe access in adverse weather conditions, two sampling points per hold should be provided, preferably one on each side. Fore and aft lo-

cation may also be accepted if this is deemed more advantageous.

Sampling openings must be fitted with means of closure, e.g. threaded plug or cap, ball valve or similar. Appendix 6 of the BC Code gives guidance on arrangements and procedures for gas sampling.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

1102 Temperature detection in cargo holds

Cargo holds are to be fitted with arrangements for detecting temperatures in the cargo.

The temperature sensors shall be either permanently fitted or of portable type. If portable sensors are used the arrangement shall enable measurement of the temperature of the cargo without entry of the hold being necessary.

1103 Inerting of cargo holds

Cargo holds are to be provided with arrangements for maintaining an inert atmosphere in the loaded hold. Oxygen content is not to exceed 5 percent by volume. The arrangement is to enable purging of the space above the cargo with inert gas.

1104 Separation of cargo spaces from oil tanks

Cargo holds are not to have fuel oil tanks and lubricating oil tanks located adjacently.

1105 Separation of cargo from heated surfaces

Heated fuel tanks adjacent to cargo holds shall be fitted with permanent temperature indicators or provided with suitable arrangement for using portable indicators. Such fuel tanks are not to be heated above 45°C. However, if high temperature alarm(s) is provided an alarm limit of 50°C may be accepted.

1106 Tightness testing of fuel oil tanks prior to loading

Before loading fuel tanks adjacent to the cargo hold are to be hydrostatically tested for tightness.

1107 Acidity of bilge water

Means for testing acidity of water in bilge wells of cargo holds are to be provided.

1108 Procedures for gas monitoring of coal cargoes

Sampling points for gas monitoring of coal cargoes are to be arranged in the hatch comings. See BC Code Appendix 6.

C. Minimum Requirements for Cargo Spaces Intended for Packaged Goods

C 100 General

101 The minimum requirements are given in Tables C1 to C5, which give reference to the relevant paragraphs in sub-section B.

102 In the case of ships dedicated to transport of goods in special packaging, e.g. shipborne barges, carriage requirements may be specified upon special considerations in particular cases.

103 For packaged goods in classes 6.2 and 7 there are no specific requirements to ships' design or equipment in SOLAS Ch.19. Refer to SOLAS VII, IMDG-code and the INF-code when applicable.

Table C1 Weather deck cargo spaces

Class of dangerous goods ----- Applicable requirement	1.1- 1.6	1.4S	2.1	2.2	2.3	3.1 Liquids f.p. ≤ 23°C	3.1 Liquids f.p. > 23°C ≤ 61°C	4.1	4.2	4.3	5.1	5.2	6.1 Liquids	6.1 Liquids f.p. ≤ 23°C	6.1 Liquids f.p. > 23°C ≤ 61°C	6.1 Solids	8 Liquids	8 Liquids f.p. ≤ 23°C	8 Liquids f.p. > 23°C ≤ 61°C	8 Solids	9
Fire water supplies	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101
Fire extinguishing						B800	B800	B800	B800	B800	B800			B800	B800	B800		B800	B800		
Personal protection	B703	B703	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700 ¹⁾
Insulation of boundaries	B900 ³⁾	-	B900	B900	B900	B900	B900	B900	B900	B900	B900 ²⁾			B900	B900	B900		B900	B900		

1) As appropriate to the goods being carried.

2) Refer to the International Maritime Dangerous Goods Code.

3) Stow 3 m horizontally away from the machinery space boundaries in all cases.

Table C2 General cargo spaces																				
Class of dan- gerous goods ----- Applicable requirement	1.1- 1.6	1.4S	2.1	2.2	2.3	3.1 Liquids f.p. ≤ 23°C	3.1 Liquids f.p. > 23°C ≤ 61°C	4.1	4.2	4.3	5.1	6.1 Liquids	6.1 Liquids f.p. ≤ 23°C	6.1 Liquids f.p. > 23°C ≤ 61°C	6.1 Solids	8 Liquids	8 Liquids f.p. ≤ 23°C	8 Liquids f.p. > 23°C ≤ 61°C	8 Solids	9
Fire water supplies	B101 B102 B103	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101
Fire extin- guishing	B201	B201	B201	B201	B201	B201 B800	B201 B800	B201 B800	B201 B800	B201 B800	B201 B800	B201	B201 B800	B201 B800	B201	B201	B201 B800	B201 B800	B201	B201
Electrical installations	B300	-	B300	-	-	B300	-	-	-	-	-	-	B300	-	-	-	B300	-	-	-
Fire detection	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	-
Ventilation	-	-	B502 B504b) B506 B507	-	B502 B504b)	B502 B504b) B506 B507	-	B502 ⁴⁾ B504b)	B502 ⁴⁾ B504b)	B502 B504b) B504b)	B502 ⁴⁾ B504b)	-	B502 B504b) B506 B507	B502 B504b) B507	B502 ⁴⁾ B504b)	-	B502 B504b) B506 B507	B502 B504b) B507	-	B502 ⁴⁾ B504b)
Separate bilge drainage	-	-	-	-	-	B600	-	-	-	-	-	B600	B600	B600	-	-	B600	-	-	-
Personal protection	B703	B703	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700 ¹⁾
Insulation of boundaries	B900 ³⁾	-	B900	B900	B900	B900	B900	B900	B900	B900	B900 ²⁾	-	B900	B900	-	-	B900	B900	-	-

1) As appropriate to the goods being carried.

2) Refer to the International Maritime Dangerous Goods Code.

3) Stow 3 m horizontally away from the machinery space boundaries in all cases.

4) When "mechanically ventilated spaces" are required by the International Maritime Dangerous Goods Code, as amended.

1) As appropriate to the goods being carried.

2) Refer to the International Maritime Dangerous Goods Code.

3) Stow 3 m horizontally away from the machinery space boundaries in all cases.

4) When "mechanically ventilated spaces" are required by the International Maritime Dangerous Goods Code, as amended.

Table C3 Container cargo spaces

<i>Class of dangerous goods</i> ----- <i>Applicable requirement</i>	<i>1.1-1.6</i>	<i>1.4S</i>	<i>2.1</i>	<i>2.2</i>	<i>2.3</i>	<i>3.1 Liquids f.p. ≤ 23°C</i>	<i>3.1 Liquids f.p. > 23°C ≤ 61°C</i>	<i>4.1</i>	<i>4.2</i>	<i>4.3</i>	<i>5.1</i>	<i>6.1 Liquids</i>	<i>6.1 Liquids f.p. ≤ 23°C</i>	<i>6.1 Liquids f.p. > 23°C ≤ 61°C</i>	<i>6.1 Solids</i>	<i>8 Liquids f.p. ≤ 23°C</i>	<i>8 Liquids f.p. > 23°C ≤ 61°C</i>	<i>8 Solids</i>	<i>9</i>
Fire water supplies	B101 B102 B103	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101
Fire extinguishing	B201	B201	B201	B201	B201	B201	B201	B201	B201	B201	B201	B201	B201	B201	B201	B201	B201	B201	B201
Electrical installations	B300		B300	-	-	B300	-	-	-	-	-	-	B300	-	-	-	-	-	-
Fire detection	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	-
Ventilation	-	-	B502 B504b) ⁽⁶⁾ B506 B507	-	B502 B504 b) ⁽⁶⁾	B502 B504b) ⁽⁶⁾ B506 B507	-	B502 ⁽⁴⁾ B504b) ⁽⁵⁾)	B502 ⁽⁴⁾ B504 b) ⁽⁵⁾ b) ⁽⁵⁾	B502 B504 b) ⁽⁵⁾ b) ⁽⁵⁾	B502 ⁽⁴⁾ B504b) ⁽⁵⁾)	-	B502 B504b) ⁽⁶⁾ B506 B507	B502 B504b) ⁽⁶⁾ B507	B502 ⁽⁴⁾ B504b) ⁽⁶⁾)	-	B502 B504b) ⁽⁶⁾ B506 B507	-	B502 ⁽⁴⁾ B504b) B504b)
Separate bilge drainage	-	-	-	-	-	B600	-	-	-	-	-	B600	B600	B600	-	-	-	-	-
Personal protection	B703	B703	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700 ⁽¹⁾
Insulation of boundaries	B902 ⁽³⁾	-	B902	B902	B902	B902	B902	B902	B902	B902	B902 ⁽²⁾	-	B902	B902	-	B902	B902	-	-

1) As appropriate to the goods being carried.

2) Refer to the International Maritime Dangerous Goods Code.

3) Stow 3 m horizontally away from the machinery space boundaries in all cases.

4) When "mechanically ventilated spaces" are required by the International Maritime Dangerous Goods Code, as amended.

5) No ventilation required when stowed in closed freight containers.

6) A ventilation rate of not less than 2 air changes per hour is sufficient when stowed in closed freight containers.

Table C4 Closed ro-ro cargo spaces																			
Class of dan- gerous goods ----- Applicable requirement	1.1- 1.6	1.4S	2.1	2.2	2.3	3.1 Liquids f.p. ≤ 23°C	3.1 Liquids f.p. > 23°C ≤ 61°C	4.1	4.2	4.3	5.1	6.1 Liquids	6.1 Liquids f.p. ≤ 23°C	6.1 Liquids f.p. > 23°C ≤ 61°C	6.1 Solids	8 Liquids f.p. ≤ 23°C	8 Liquids f.p. > 23°C ≤ 61°C	8 Solids	9
Fire water supplies	B101 B102 B103	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101
Fire extin- guishing	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾	B201 ⁵⁾
Electrical installations	B300	-	B300	-	-	B300	-	-	-	-	-	-	B300	-	-	B300	-	-	-
Fire detection	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	B400	-
Ventilation	-	-	B502 B504b) B506 B507	-	B502 B504b) B506 B507	B502 B504b) B506 B507	-	B502 ⁴⁾ B504b)	B502 ⁴⁾ B504b)	B502 B504b)	B502 ⁴⁾ B504b)	-	B502 B504b) B506 B507	B502 B504b) B506 B507	B502 ⁴⁾ B504b)	B502 B504b) B506 B507	B502 B504b) B506 B507	-	B502 ⁴⁾ B504b)
Separate bilge drainage	-	-	-	-	-	B600	-	-	-	-	-	B600	B600	B600	-	B600	-	-	-
Personal protection	B703	B703	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700 ¹⁾
Insulation of boundaries	B900 ³⁾	-	B900	B900	B900	B900	B900	B900	B900	B900	B900 ²⁾	-	B900	B900	-	B900	B900	-	-

1) As appropriate to the goods being carried.

2) Refer to the International Maritime Dangerous Goods Code.

3) Stow 3 m horizontally away from the machinery space boundaries in all cases.

4) When "mechanically ventilated spaces" are required by the International Maritime Dangerous Goods Code, as amended.

5) For closed ro-ro spaces not capable of being sealed, B202 applies in lieu of B201.

1) As appropriate to the goods being carried.

2) Refer to the International Maritime Dangerous Goods Code.

3) Stow 3 m horizontally away from the machinery space boundaries in all cases.

4) When "mechanically ventilated spaces" are required by the International Maritime Dangerous Goods Code, as amended.

5) For closed ro-ro spaces not capable of being sealed, B202 applies in lieu of B201.

Table C.5 Open (semi enclosed) ro-ro cargo spaces

Class of dangerous goods ----- Applicable requirement	1.1-1.6	1.4S	2.1	2.2	2.3	3.1 Liquids f.p. ≤23°C	3.1 Liquids f.p. > 23°C ≤ 61°C	4.1	4.2	4.3	5.1	5.2	6.1 Liquids	6.1 Liquids f.p. ≤23°C	6.1 Liquids f.p. > 23°C ≤ 61°C	6.1 Solids	8 Liquids	8 Liquids f.p. ≤23°C	8 Liquids f.p. > 23°C ≤ 61°C	8 Solids	9
Fire water supplies	B101 B102 B103	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101 B102	B101
	B202	B202	B202	B202	B202	B202	B202	B202	B202	B202	B202	B202	B202	B202	B202	B202	B202	B202	B202	B202	B202
Electrical installations	B300	-	B300	-	-	B300	-	-	-	-	-	-	-	B300	-	-	-	B300	-	-	-
Personal protection	B703	B703	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700	B700 ¹⁾
Insulation of boundaries	B900 ³⁾	-	B900	B900	B900	B900	B900	B900	B900	B900	B900 ²⁾	-	-	B900	B900	-	-	B900	B900	-	-

1) As appropriate to the goods being carried.

2) Refer to the International Maritime Dangerous Goods Code.

3) Stow 3 m horizontally away from machinery space boundaries in all cases.

D. Minimum Requirements for Cargo Spaces Intended for Solid Bulk Cargoes

D 100 General

101 The minimum requirements are given in Table D1 that

gives reference to the relevant paragraphs of subsection B.

102 For solid bulk cargoes of hazard class “MHB” the requirements are not mandatory for statutory certification purposes.

Table D1 Requirements for solid bulk cargoes

Cargo	UN no	IMO class	Fire water supply	Fire ext. in cargo spaces	Ingress protection	Temp. class	Gas group	Ex-protection Ex-	Vent. of cargo spaces	Seperate bilge system	Personnel protection	Insulation of boundaries	Gas measuring equipment B1101	Self unloading system	Fire ext. in self unloading systems	Special requirements
Aluminium ferrosilicon powder	1395	4.3				T2	IIC	i, d, e, p, m or s	B503 B504a) B506 B507		B702 B703	B900	Hydrogen Phosphine Arsine			
Aluminium nitrate	1438	5.1	B101 B102						B505		B700					
Aluminium silicon powder, uncoated	1398	4.3				T2	IIC	i, d, e, p, m or s	B503 B504a) B506 B507		B702 B703	B900	Hydrogen Phosphine Arsine Silane			
Aluminium smelting by-products	3170	4.3				T2	IIC	i, d, e, p, m or s	B502 B504a) B506 B507	B600	B702 B703	B900	Hydrogen Ammonia Acetylene			
Ammonium nitrate	1942	5.1	B101 B102		Electrical installations to be disconnected in accordance with B306				B505 B507		B700	B900		Not permitted		B1104 or B1106
Ammonium nitrate based fertilizers, Type A	2067	5.1	B101 B102		Electrical installations to be disconnected in accordance with B306				B505 B507		B700	B900		Not permitted		B1104 or B1106 B1105
Ammonium nitrate based fertilizers, Type B	2071	9	B101 B102		Electrical installations to be disconnected in accordance with B306				B505 B507		B700	B900		Not permitted		B1105
Barium nitrate	1446	5.1	B101 B102						B505		B700					
Brown coal (lignite) briquettes		MHB			IP54	T4	IIA	i, d, e, p, m or s			B703		Oxygen Methane CO		B201 or B202	B1102 B1105 B1107 B1108
Calcium nitrate	1454	5.1	B101 B102						B505		B700					
Castor beans	2969	9	B101 B102	B201					B505		B700			Closed	B201 or B202	
Charcoal		MHB		B201							B703		Oxygen		B201 or B202	
Coal		MHB			IP54	T4	IIA	i, d, e, p, m or s	B505 B506		B703		Oxygen Methane CO		B201 or B202	B1102 B1105 B1107 B1108
Copra (dry)	1363	4.2	B101 B102	B201					B505		B703	B900	Oxygen		B201 or B202	B1105
Direct reduced iron, (A) (briquettes, hot moulded)		MHB				T2	IIC	i, d, e, p, m or s	B505 B506		B703		Hydrogen Oxygen			

Table D1 Requirements for solid bulk cargoes (Continued)

Cargo	UN no	IMO class	Fire water supply	Fire ext. in cargo spaces	Ingress protection	Temp. class	Gas group	Ex- protection Ex-	Vent. of cargo spaces	Sepa- rate bilge system	Personnel protection	Insulation of boundaries	Gas measuring equipment B1101	Self-un- loading system	Fire ext. in self-un- loading systems	Special require- ments
Direct reduced iron, (B) (lumps, pellets, cold moulded bri- quettes)		MHB		B201		T2	IIC	i, d, e, p, m or s			B703		Hydrogen Oxygen			B1103
Ferro phosphorus		MHB				T1	IIC	i, d, e, p, m or s	B502 B504b) B506 B507		B702 B703		Hydrogen Phosphine			
Ferrosilicon, 30% - 90%	1408	4.3				T1	IIC	i, d, e, p, m or s	B503 B504a) B506 B507	B600	B702 B703	B900	Hydrogen Phosphine Arsine	Closed		
Ferrosilicon, 25-30% or >90%		MHB				T1	IIC	i, d, e, p, m or s	B503 B504a) B506 B507	B600	B702 B703		Hydrogen Phosphine Arsine	Closed		
Ferrous metal borings, shavings, turnings or cuttings	2793	4.2	B101 B102	B201					B505		B702 B703	B900	Oxygen			B1102
Fishmeal (fish scrap), stabilized	2216	9	B101 B102	B201					B505		B702 B703		Oxygen		B201 or B202	B1102 B11051)
Fluorspar		MHB									B703			Closed		
Iron oxide, spent	1376	4.2	B101 B102	B201	IP54	T2	IIA	i, d, e, p, m or s	B505 B506		B700	B900	Oxygen Hydrogen sulphide Sulphur dioxide Hydrogen cyanide Hydrogen			
Lead nitrate	1469	5.1	B101 B102						B505		B700			Closed		
Lime (unslaked)		MHB									B703			Closed		
Magnesia (unslaked)		MHB									B703			Closed		
Magnesium nitrate	1474	5.1	B101 B102						B505		B700					
Metal sulphide con- centrates		MHB		B201							B702 B703		Oxygen Hydrogen sulphide	Closed		
Peat moss		MHB							B505		B703		Oxygen			
Petroleum coke, cal- cined or uncalcined		MHB									B700					
Pitch prill		MHB							B505		B700			Closed		

Table D1 Requirements for solid bulk cargoes (Continued)

Cargo	UN no	IMO class	Fire water supply	Fire ext. in cargo spaces	Ingress protection	Temp. class	Gas group	Ex-protection Ex-	Vent. of cargo spaces	Sepa-rate bilge system	Personnel protection	Insulation of boundaries	Gas measuring equipment B1101	Self-un-loading system	Fire ext. in spaces for self-un-loading systems	Special require-ments
Potassium nitrate	1486	5.1	B101 B102						B505		B700					
Pyrites (calcined)		MHB									B703					
Radioactive material, LSA-I	2912	7									B700			Closed		
Radioactive material, SCO-I	2913	7									B700			Closed		
Sawdust		MHB		B201					B505		B703		Oxygen		B201	
Seed cake, cont. vegetable oils (a), mechanically expelled seeds	1386	4.2	B101 B102	B201					B505		B702 B703	B900	Oxygen		B201	B1102 B1105
Seed cake, cont. vegetable oils (b), solvent extraction and expelled seeds	1386	4.2	B101 B102	B201		T3	IIA	i, d, e, p, m or s	B503 B504a) B506 B508		B702 B703	B900	Oxygen		B201	B1102 B1105
Seed cake, cont. vegetable oils (c), solvent extraction	2217	4.2	B101 B102	B201		T3	IIA	i, d, e, p, m or s	B503 B504a) B506 B508		B702 B703	B900	Oxygen		B201	B1102 B1105
Silicomanganese		MHB				T1	IIC	i, d, e, p, m or s	B503 B504b) B506 B507		B702 B703		Hydrogen Phosphine Arsine			
Sodium nitrate	1498	5.1	B101 B102						B505		B700					
Sodium nitrate and Potassium nitrate mixture	1499	5.1	B101 B102						B505		B700					
Sulphur	1350	4.1	B101 B102		IP54	T4			B505 B508		B702 B703	B900		Not permitted		
Tankage		MHB		B201							B702 B703				B201	B1102
Vanadium ore		MHB									B702 B703			Closed		
Woodchips		MHB									B703		Oxygen			
Wood pellets		MHB		B201							B703		Oxygen			
Wood pulp pellets		MHB									B703		Oxygen			
Zinc ashes	1435	4.3				T2	IIC	i, d, e, p, m or s	B503 B504a) B506 B507		B700	B900	Hydrogen			

1) Maximum temperature to be 30 °Celsius.