

**PART II RULES FOR THE CONSTRUCTION
AND CLASSIFICATION OF VESSELS
IDENTIFIED BY THEIR MISSIONS**

**TITLE 26 ROLL ON - ROLL OFF PASSENGER
SHIP**

SECTION 7 ELECTRICITY

CHAPTERS

- A APPROACH
- B TECHNICAL DOCUMENTATION
- C MATERIALS AND MANLABOUR
 See Part II, Title 11, Section 7
- D CONSTRUCTION PRINCIPLES
- E BASIC PRINCIPLES FOR DIMENSIONING
 See Part II, Title 11, Section 7
- F DESIGN AND CONSTRUCTION OF THE ELEC-
 TRICAL POWER GENERATING SYSTEM
 See Part II, Title 11, Section 7
- G DESIGN AND CONSTRUCTION OF THE ELEC-
 TRIC POWER DISTRIBUTION SYSTEM
 See Part II, Title 11, Section 7
- H DESIGN AND CONSTRUCTION OF ELECTRI-
 CAL INTALATIONS
- T INSPECTONS AND TESTS
 See Part II, Title 11, Section 7

CONTENTS

| | |
|---|----------|
| CHAPTER A | 5 |
| SCOPE | 5 |
| A1. APPLICATION | 5 |
| 100. Additional requirements for roll on / roll off vessels | 5 |
| A2. DEFINITIONS | 5 |
| 100. Terms employed in this Section..... | 5 |
| CHAPTER B..... | 6 |
| TECHNICAL DOCUMENTATION | 6 |
| B1. DOCUMENTATION TO THE RBNA | 6 |
| CHAPTER D | 7 |
| CONSTRUCTION PRINCIPLES | 7 |
| D2. INSTALLATIONS | 7 |
| 100. Degrees of protection | 7 |
| 200. Electrical equipment and wiring | 7 |
| 300. Electrical equipment and wiring in exhaust ventilation ducts | 7 |
| 400. Intallation of electric equipment in special category spaces above the bulkhead deck..... | 7 |
| 500. Installation of electrical equipment in exhaust ventilation ducts and of exhaust fans | 7 |
| 600. Summary table of electrical equipment and wiring permitted in closed Ro-Ro- cargo spaces | 7 |
| CHAPTER H | 9 |
| DESIGN AND CONSTRUCTION OF ELECTRICAL CONSUMERS - LIGHTS AND MOTORS | 9 |
| H1. SUPPLEMENTARY EMERGENCY LIGHT FOR RO-RO PASSENGER SHIPS [SOLAS II-1/D/REGULATION 42-1] | 9 |
| 100. Passenger public spaces and crew space..... | 9 |

CHAPTER A SCOPE

A1. APPLICATION

A1. APPLICATION

100. Additional requirements for roll on / roll off vessels

101. In addition to the requirements of Part II, Title 11, Section 7, of Part II, Title 21 Section 7 and those in the present Title 26, the electrical installations in spaces intended for the carriage of motor vehicles with fuel in their tanks are to comply with those of Part II, Title 11, Section 3, Chapter E, Subchapter E14.

A2. DEFINITIONS

100. Terms employed in this Section

101. **Artificial ventilation:** movement of air and its replacement with fresh air by artificial means (for example fans) and applied to a general area.

102. **Enclosed space:** any space within which, in the absence of artificial ventilation, the ventilation will be limited and any explosive atmosphere will not be dispersed naturally

103. EPL – Equipment Protection Level

- a. **EPL a** – with very high level of protection and thus a very high degree of safety
- b. **EPL b** – with high level of protection and therefore a high degree of safety
- c. **EPL c** – with normal level of protection and therefore a conventional degree of safety

104. **Explosive gas atmosphere:** mixture with air, under atmospheric conditions, of flammable substances in the form of gas, vapour or mist, in which, after ignition, combustion spreads throughout the unconsumed mixture

105. **Hazardous area:** area in which an explosive gas atmosphere is or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of electrical apparatus.

106. **Lower explosive limit (LEL):** concentration of flammable gas, vapour or mist in air, below which an explosive gas atmosphere will not be formed

107. **Natural ventilation:** movement of air and its replacement with fresh air due to the effects of wind and/or temperature gradients

108. **Open space:** space in an open air situation without stagnant areas where vapours are rapidly dispersed by wind and natural convection. Typical air velocities should rarely be less than 0.5 m/s and should frequently be above 2 m/s

109. **Upper explosive limit (UEL):** concentration of flammable gas, vapour or mist in air, above which an explosive gas atmosphere will not be formed

110. **Zone 0:** area in which an explosive gas atmosphere is present continuously or is present for long periods

111. **Zone 1:** area in which an explosive gas atmosphere is likely to occur in normal operation

112. **Zone 2:** area in which an explosive gas 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

113. Types of protection for electrical apparatuses

- a. **Flameproof enclosure “d”:** Type of protection of electrical apparatus in which the enclosure will withstand an internal explosion of a flammable mixture which has penetrated into the interior, without suffering damage and without causing ignition, through any joints or structural openings in the enclosure, of an external explosive atmosphere consisting of one or more of the gases or vapours for which it is designed
- b. **Increased safety “e”:** Type of protection applied to electrical apparatus that does not produce arcs or sparks in normal service, in which additional measures are applied so as to give increased security against the possibility of excessive temperatures and the occurrence of arcs and sparks
- c. **Intrinsically-safe circuit “i”:** Circuit in which no spark or any thermal effect produced in the test conditions prescribed (which include normal operation and specified fault conditions) is capable of causing ignition of a given explosive gas atmosphere. The coding ‘ia’ denotes that the unit will not cause ignition of explosive atmosphere under normal operation and with two faults present in the circuitry. The coding ‘ib’ denotes that the unit will not cause ignition of explosive atmosphere under normal operation and with one fault present in the circuitry. You should note that this method does not protect entirely against the local over-heating of damaged connections or conductors and these should be kept sound and suitably protected against damage
- d. **Encapsulation “m”:** A type of protection in which the parts which could ignite an explosive atmosphere by either sparking or heating are enclosed in a compound in such a way that this explosive atmosphere cannot be ignited

- e. **Protection “n”**: Type of protection applied to electrical apparatus such that, in normal operation, it is not capable of igniting a surrounding explosive gas atmosphere and a fault capable of causing ignition is not likely to occur.
- f. **Oil immersion “o”**: Type of protection in which the electrical apparatus or parts of the electrical apparatus are immersed in a protective liquid in such a way that an explosive atmosphere, which may be above the liquid or outside the enclosure, cannot be ignited
- g. **Pressurisation “p”**: Technique of guarding against the ingress of the external atmosphere, which may be explosive, into an enclosure by maintaining a protective gas therein at a pressure above that of the external atmosphere
- h. **Sand/Powder/Quartz Filled “q”**: Equipment components are completely covered with a layer of Sand, powder or quartz.
- i. **Ex s** is a coding referenced in IEC 60079-0. The use of EPL and ATEX Category directly is an alternative for “s” marking. The IEC standard EN 60079-33 is made public and is expected to become effective soon, so that the normal Ex certification will also be possible for Ex-s
- j. **Ro-Ro spaces** are spaces not normally subdivided in any way and normally extending to either a substantial length or the entire length of the ship in which motor vehicles with fuel in their tanks for their own propulsion and/or goods (packaged or in bulk, in or on rail or road cars, vehicles (including road or rail tankers), 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.
- k. **Special category spaces** are those enclosed vehicle spaces above and below the bulkhead deck, into and from which vehicles can be driven and to which passengers have access. Special category spaces may be accommodated on more than one deck provided that the total overall clear height for vehicles does not exceed 10 m.
- l. **Vehicle spaces** are cargo spaces intended for carriage of motor vehicles with fuel in their tanks for their own propulsion

CHAPTER B TECHNICAL DOCUMENTATION

CHAPTER CONTENTS

- B1. DOCUMENTATION TO THE RBNA
- B2. REGULATIONS – See Part II, Title 11, Section 7
- B3. STANDARDS AND UNITS
– See Part II, Title 11, Section 7

B1. DOCUMENTATION TO THE RBNA

100. Additional documents

101. In addition to the documentation listed in Part II, Title 11, Section 7, Chapter B, Subchapter B1 the following plans shall be required for roll on - roll off ships with cargo spaces intended for the carriage of motor vehicles with fuel in their tanks and / or dangerous goods:

- a. General arrangement of the ship showing the gauge, type, insulation and cable penetrations in bulkheads and decks, location and type of safety of electrical equipment in hazardous zones and special category spaces;
- b. Diagram of distribution of the systems of side doors identification, cargo doors and closing devices, TV surveillance or detection of flooding and visual alarm showing the segregation of indication circuits, operation and locking in ro-ro cargo spaces and special category spaces;
- c. Diagram of distribution systems and electrical energy monitoring for additional emergency lighting showing the lanterns and connection device for continuous charging batteries;
- d. Diagram of distribution systems, control, monitoring showing the type of electric equipment safety, type, gauge and insulation of cables, automatic devices of closing of the flaps and stopping of the forced ventilation in main vertical zones and special category spaces; and
- e. Diagram of distribution systems, control, monitoring and high water level alarms in cargo spaces and special category spaces

Guidance

Area classification shall be carried out at an early stage of planning, before any construction work starts and the results documented in drawings showing the different zones.

End of guidance

CHAPTER D CONSTRUCTION PRINCIPLES

CHAPTER CONTENTS

D1. SHIP CONSTRUCTION

– See Part II, Title 11, Section 7

D2. INSTALATIONS

D2. INSTALLATIONS

100. Degrees of protection

101. The present requirements are additional to those of Part II, Title 11, Section 7, Subchapter D2. The requirements are based upon IEC Standard 60079-14, Section 5.

102. For electrical equipment installed in closed ro-ro cargo spaces, only the types described in the topics below are permitted.

200. Electrical equipment and wiring

201. Except as provided in paragraph D2.202, electrical equipment and wiring shall be of a type suitable for use in an explosive petrol and air mixture.

Note: Refer to the recommendations of the International Electrotechnical Commission, in particular publication 60079.

202. In case of other than special category spaces below the bulkhead deck, notwithstanding the provisions in paragraph D2.201, above a height of 450 mm from the deck and from each platform for vehicles, if fitted, except platforms with openings of sufficient size permitting penetration of petrol gases downwards, electrical equipment of a type so enclosed and protected as to prevent the escape of sparks shall be permitted as an alternative on condition that the ventilation system is so designed and operated as to provide continuous ventilation of the cargo spaces at the rate of at least ten air changes per hour whenever vehicles are on board.

300. Electrical equipment and wiring in exhaust ventilation ducts

301. Electrical equipment and wiring, if installed in an exhaust ventilation duct, shall be of a type approved for use in explosive petrol and air mixtures and the outlet from any

exhaust duct shall be sited in a safe position, having regard to other possible sources of ignition.

400. Intallation of electric equipment in special category spaces above the bulkhead deck

401. For equipment above a height of 450 mm above deck the degree of protection of electrical equipment required by this regulation will be realized:

- a. by an enclosure of at least IP 55 as defined in IEC Publication 60529 - Classification of Degree of Protection Provided by Enclosures; or
- b. by apparatus for use in zone 2 areas as defined in Publication 60079 - Electrical Apparatus for Explosive Gas Atmospheres (Temperature class T3).

500. Installation of electrical equipment in exhaust ventilation ducts and of exhaust fans

501. The electrical equipment referred to in these regulations should be of certified safe type and wiring, if fitted, and should be suitable for use in zone 1 areas as defined in IEC Publication 60079 - Electrical Apparatus for Explosive Gas Atmospheres (Gas group II A and temperature class T3).

502. Exhaust fans should be of non-sparking type in accordance with IACS Requirement F 29, as revised.

600. Summary table of electrical equipment and wiring permitted in closed Ro-Ro- cargo spaces

601. Table 1 T.D2.601.1 presents a summary of the requirements for electrical equipment in ro-ro and special cargo spaces.

TABLE T.D2.601.1 – ELECTRICAL EQUIPMENT AND WIRING PERMITTED IN CLOSED RO-RO- CARGO SPACES

| Zone | Description of spaces | EPL | Degree of protection | Code |
|------|--|--|---|--------------------|
| 1 | Areas at less than 450 mm above the deck or platforms for vehicles, if fitted, without openings of sufficient size permitting penetration of petro gases downward | - | Any type that may be considered for Zone 0 | |
| | | | Through runs of cable | |
| | | Ga | Intrinsically safe | Ex(ia) |
| | | | Encapsulated | Ex(ma) |
| | | Gb | Flame proof | Ex(d) |
| | | | Increased safety | Ex(e) |
| | | | Intrinsically safe | Ex(ib) |
| | | | Encapsulated | Ex(m) Ex(mb) |
| | | | Pressurized | Ex(p) |
| | Sand filled | Ex(q) | | |
| 1 | Electrical equipment and wiring in exhaust ventilation ducts Electrical equipment and wiring, if installed in an exhaust ventilation duct, shall be of a type approved for use in explosive petrol and air mixtures and the outlet from any exhaust duct shall be sited in a safe position, having regard to other possible sources of ignition. | | As per item for “Zone 1” above | |
| 2 | [SOLAS II-2/G/20/3.2] On condition that the ventilation system is so designed and operated as to provide continuous ventilation of the cargo spaces at the rate of at least ten air changes per hour whenever vehicles are on board, in case of other than special category spaces below the bulkhead deck, notwithstanding the provisions in item above: a. a height of 450 mm from the deck; b. areas above a height of 450 mm from each platform for vehicles, if fitted, without openings of sufficient size permitting penetration of petrol gases downward; c. areas above platforms with openings of sufficient size permitting penetration of petrol gases downwards; Electrical equipment of a type so enclosed and protected as to prevent the escape of sparks shall be permitted as an alternative | - | Any type that may be considered for Zone 1 | |
| | | | Gc | Intrinsically safe |
| | | Encapsulated | | Ex(mc) |
| | | Not ignited | | Ex(n) Ex nA |
| | | Restricted “breathing” | | Ex(nR) |
| | | Energy restriction | | Ex(nL) |
| | | Sparking apparatus in which the contacts are protected in a suitable way | | Ex(nC) |
| | | Pressurized | | Ex(pZ) |
| | | | FISCO – Fieldbus intrinsically safe concept | |

CHAPTER H DESIGN AND CONSTRUCTION OF ELECTRICAL CONSUMERS - LIGHTS AND MOTORS

CHAPTER CONTENTS

H1. SUPPLEMENTARY EMERGENCY LIGHT FOR RO-RO PASSENGER SHIPS

H1. SUPPLEMENTARY EMERGENCY LIGHT FOR RO-RO PASSENGER SHIPS [SOLAS II- 1/D/REGULATION 42-1]

100. Passenger public spaces and crew space

101. In addition to the emergency lighting required by Part II, Title 21, Section 7, on every passenger ship with ro-ro cargo spaces or special category spaces:

- a. all passenger public spaces and alleyways shall be provided with supplementary electric lighting that can operate for at least three hours when all other sources of electric power have failed and under any condition of heel. The illumination provided shall be such that

the approach to the means of escape can be readily seen. The source of power for the supplementary lighting shall consist of accumulator batteries located within the lighting units that are continuously charged, where practicable, from the emergency switchboard. Alternatively, any other means of lighting which is at least as effective may be accepted by the Administration. The supplementary lighting shall be such that any failure of the lamp will be immediately apparent. Any accumulator battery provided shall be replaced at intervals having regard to the specified service life in the ambient conditions that they are subject to in service; and

- b. a portable rechargeable battery operated lamp shall be provided in every crew space alleyway, recreational space and every working space which is normally occupied unless supplementary emergency lighting, as required by H1.101.a, is provided.

Rgmm14en-PIIT26S7-abdh-00