
STATUTORY INSTRUMENTS

1998 No. 2514

**The Merchant Shipping (Passenger Ship Construction:
Ships of Classes I, II and II(A)) Regulations 1998**

PART VII

ELECTRICAL EQUIPMENT AND INSTALLATIONS

Application

52. Unless otherwise stated this Part applies to ships constructed on or after 25th May 1980, and regulations 53(1) and (3)(b), 54, 57, 58(1) and (2), 59(1), (2), (3), (4), (8), (9) and (10), 60 and 61 shall apply to ships constructed before 25th May 1980.

General

53.—(1) In every ship the electrical equipment and installations (including any electrical means of propulsion) shall be such that the ship and all persons on board are protected against electrical hazards.

- (i) In every ship constructed before 25th May 1980 where the power supply for an automatic sprinkler system is required to have not less than two sources of power supply for sea-water pumps, air compressors and automatic alarms, and that power is electrical, such supplies shall be taken from the main generating sets and from an emergency source of electric power.
 - (ii) One supply shall be taken from the main switchboard and another from the emergency switchboard, by separate feeders reserved solely for that purpose.
 - (iii) Such feeders shall be run to a change-over switch situated near to the sprinkler unit and the switch shall normally be kept closed to the feeder from the emergency switchboard.
 - (iv) The change-over switch shall be clearly labelled and no other switch shall be permitted in these feeders.
 - (v) For ships constructed on or after 25th May 1980 the electrical arrangements for any automatic sprinkler and fire alarm and fire detection system shall comply with the requirements specified in Schedule 1 of Merchant Shipping Notice MSN 1666 (M).
- (3) The electrical equipment and installations in every ship shall be such that—
- (a) all electrical auxiliary services essential for the propulsion and safety of the ship will be ensured without recourse to the emergency source of electrical power;
 - (b) the electrical services essential for safety will be ensured under emergency conditions; and
 - (c) for ships constructed on or after 1st September 1984, all electrical auxiliary services necessary for maintaining the ship in normal operational and habitable condition will be ensured without recourse to the emergency source of electrical power.

Main source of electrical power and main switchboards

54.—(1) In every ship a main source of electrical power shall be provided of sufficient capacity to supply all the services referred to in regulation 53(3). The main source of electrical power shall consist of at least two generating sets of such power, that services essential for the propulsion and safety of the ship can be operated when any one of the sets is out of service.

- (a) (2) (a) In any ship with only one main generating station, the main switchboard shall be located in the same space as the main generating sets;
- (b) Where there is more than one main generating station and only one main switchboard, that switchboard shall be located in the same space as one of the main generating stations;
- (c) Where other essential features of the ship render the application of these requirements impracticable, equivalent arrangements may be permitted;
- (d) For the purpose of this paragraph an environmental enclosure for the main switchboard, such as a machinery control room fitted within the boundary of the space, does not provide separation between the generating sets and switchboards.

Additional requirements for ships constructed on or after 1st September 1984

(3) The arrangement of the generating sets required by paragraph (1) shall be such that the services required by regulation 53(3) can be maintained regardless of the speed and direction of rotation of the propulsion machinery or shafting, and that with any one of the sets out of service—

- (a) normal operational conditions of propulsion and safety of the ship and minimum comfortable conditions of habitability including those for cooking, heating, domestic, refrigeration, mechanical ventilation, sanitary and fresh water can be maintained; and
- (b) from a dead ship condition, the remaining sets are capable of providing the electrical services necessary to start the main propulsion plant. The emergency source of electrical power may be used for this purpose if it is capable of simultaneously supplying the emergency supplies required by these Regulations or is capable of supplying such services when combined with any other source of electrical power.
- (a) (4) (a) Load shedding or other equivalent arrangements shall be provided to protect the generators required by paragraph (1) against sustained overload.
- (b) Where two or more generating sets may be in operation at the same time for maintaining the auxiliary services essential for the propulsion or safety of the ship, provision shall be made for the sets to operate in parallel.

(5) Any transforming equipment supplying an electrical system referred to in this regulation shall be arranged to ensure the same continuity of supply as that required for generating sets by this regulation.

(6) The main busbars shall be sub-divided in every ship which has a total installed electrical power of the main generating sets in excess of 3 megawatts. Each section of the busbars shall be interconnected by removable links or other suitable means such that the main generating sets and any supplies to duplicated services which are directly connected to the busbars are, so far as is practicable, equally divided between the sections. Other arrangements may be permitted if it can be shown that they can provide equivalent system redundancy.

Lighting systems *Requirements for ships constructed on or after 1st September 1984*

55.—(1) The main source of electrical power shall be capable of illuminating any part of the ship normally accessible to and used by the passengers or the crew.

(2) Emergency electrical lighting provided in accordance with these Regulations shall be arranged so that a fire or other casualty in spaces containing the emergency source of electrical power, the

associated transforming equipment, if any, the emergency switchboard and the emergency lighting switchboard will not render inoperative the main electrical lighting system required by paragraph (1).

(3) Lighting fittings shall be arranged to prevent rises in temperature which would be injurious to the fitting or the electric wiring or which would result in a risk of fire.

Emergency and transitional sources of electrical power

56.—(1) In every ship, there shall be provided a self-contained emergency source of electrical power which shall be so designed and arranged that it will operate at full rated power when the ship is listed 22.5 degrees and when the trim of the ship is 10 degrees from an even keel or any combination of heel and trim within these limits.

(2) The emergency and transitional sources of electrical power and the associated equipment shall be in accordance with the conditions and specifications set out in Schedule 7 in Merchant Shipping Notice MSN 1698 (M).

Distribution systems

57. In every ship, distribution systems shall be so arranged that a fire in any main fire zone will not interfere with essential services in any other main fire zone. Main and emergency feeders passing through any main fire zone shall be separated as widely as is practicable both horizontally and vertically.

Location and construction of electric cable

58.—(1) All electric cables external to equipment shall be flame retardant and shall be installed so that their flame retarding or equivalent properties are not impaired. Installation of cables which do not comply with the foregoing for particular purposes, such as radio frequency cables, may be permitted if it can be shown that compliance would be impracticable.

(2) Cables shall be installed and supported in such a manner as to avoid chafing and other damage. All metal sheaths and metal armour of cables shall be electrically continuous and shall be earthed except that such earthing may be omitted for particular purposes.

(3) Cables serving emergency services shall not so far as is practicable be routed through galleys, laundries, machinery spaces of Category A and their casings or other high risk areas except insofar as it is necessary to provide emergency services in such areas. Cables connecting fire pumps to the emergency switchboard shall be of a fire resistant type where they pass through high fire risk areas.

(4) Cabling for emergency alarms and public address systems fitted in ro-ro passenger ships on or after 1st July 1998 shall be approved by a Certifying Authority.

(5) Cables serving emergency services shall where practicable be installed in such a manner as to preclude them being rendered unserviceable by the effect of a fire in an adjacent space and subsequent heating of the dividing bulkhead.

(6) The electrical, mechanical, flame retarding and, where applicable, fire resisting properties of the terminations and joints in any conductor shall be at least equivalent to those of the conductor.

General precautions against shock, fire and other hazards

59.—(1) All electrical equipment shall be so constructed and installed that there will be no danger or injury to any person handling it in a proper manner. Exposed metal parts of electrical equipment which are not intended to have a voltage above that of earth, but which may have such a voltage under fault conditions, shall be earthed unless such equipment is—

- (a) supplied at a voltage not exceeding 50 volts direct current or 50 volts root mean square alternating current between conductors, hereinafter referred to as “RMS ac”, from a source other than an auto-transformer;
 - (b) supplied at a voltage not exceeding 250 volts RMS ac by safety isolating transformers supplying only one consuming device; or
 - (c) of double insulation construction.
- (2) All electrical apparatus shall be constructed and installed so that it will not cause injury when handled or touched in the normal manner. In particular when electrical lamps, welding equipment, tools or other apparatus are used in confined or damp spaces or spaces with large exposed conductive surfaces, special provision shall be made so far as is practicable, to ensure that the danger of electric shock is reduced to a minimum. Such spaces shall at least include open decks and machinery spaces.
- (3) Every main and emergency switchboard shall be so arranged as to give easy access for operation and sufficient access for maintenance without danger to any person. Every such switchboard shall be suitably guarded and a non-conducting mat or grating shall be provided at the back and front where necessary. No exposed parts which may have a voltage between conductors or to earth exceeding 250 volts direct current or 50 volts RMS ac shall be installed on the face of any switchboard or control panel.
- (4) The hull return system shall not be used in any such ship for the power, heat and light distribution systems thereof.
- (5) The final sub-circuits of any hull return system of distribution shall be two wire.
- (6) The requirements of paragraphs (4) and (5) do not preclude the use of—
- (a) impressed current cathodic protection systems;
 - (b) limited and locally earthed systems; and
 - (c) insulation monitoring devices with a maximum circulation current of 30 milliamperes.
- (7) The insulation of any distribution system that is not earthed shall be continuously monitored by a system capable of giving audible and visual indication of abnormally low insulation values.
- (8) For ships constructed on or after 1st October 1994, [the requirement of] paragraph (4) does not preclude the use of limited and locally earthed systems, provided that any possible resulting current does not flow directly through any dangerous spaces.
- (9) Every separate electrical circuit shall be protected against short circuits.
- (10) Each separate electrical circuit, other than a circuit which operates the ship’s steering gear shall, unless it is permitted otherwise, be protected against overload. There shall be clearly and permanently indicated on or near each overload protective device the current carrying capacity of the circuit which it protects and the rating or setting of the device.
- (11) All lighting and power circuits terminating in a cargo space shall be provided with a multiple pole switch outside the space for disconnecting all such circuits.
- (12) Accumulator batteries shall be housed in boxes or compartments which are constructed to protect the batteries from damage and are so ventilated as to minimise the accumulation of explosive gas. Subject to regulation 60(1), electrical or other equipment which may constitute a source of ignition of flammable vapours shall not be installed in any compartment assigned to accumulator batteries. Accumulator batteries shall not be installed in sleeping accommodation spaces.
- (13) Every electrical space-heater forming part of the equipment of a ship shall be fixed in position and shall be so constructed as to reduce the risk of fire to a minimum. No such heater shall be constructed with an element so exposed that clothing, curtains or other material can be scorched or set on fire by heat from the element.

Additional requirements for ships constructed on or after 1st September 1984

(14) The insulation of any distribution system that is not earthed shall be continuously monitored by a system capable of giving audible and visual indication of abnormally low insulation values.

Electrical equipment in hazardous areas and spaces

60.—(1) Electrical equipment shall not be installed in any hazardous area unless such equipment is—

- (a) essential for operational or safety purposes;
- (b) of a type that is certified for use in the flammable dusts, gases or vapours to which it may be subjected; and
- (c) appropriate to the space concerned.

Additional requirements for ships constructed on or after 1st September 1984

(2) Cables passing through any hazardous areas or serving electrical equipment in such areas shall—

- (a) be appropriate having regard to the dusts, gases or vapours to which they may be subjected; and
- (b) unless they form part of intrinsically safe circuits be enclosed in a gas-tight steel conduit or include a metallic sheath braid or wire armour for earth leakage detection or be protected in some other satisfactory manner. Additional protection against mechanical damage shall be provided in locations where such damage may occur.

(3) In special category spaces the electrical equipment shall be certified for use in explosive petrol and air mixtures and the cables shall be appropriate for use in such mixtures; except that in such spaces above the bulkhead deck, electrical equipment that is enclosed and protected to prevent discharge of sparks may be used if installed more than 450 millimetres above any deck on which vapours may accumulate.

(4) In cargo spaces, other than special category spaces, intended for the carriage of motor vehicles with fuel in their tanks for their propulsion the electrical equipment shall be certified for use in explosive petrol and air mixtures and the cables shall be appropriate for use in such mixtures.

(5) In any ventilation trunk connected to any enclosed space for the carriage of motor vehicles with fuel in their tanks for their propulsion, including a special category space, electrical equipment shall be certified for use in explosive petrol and air mixtures and the cables shall be appropriate for use in such mixtures.

- (i) Electrical equipment and cables shall not be installed in enclosed cargo spaces, special category spaces or open ro-ro cargo spaces intended for the carriage of dangerous goods which are flammable liquids with a flash point below 23°C (Closed Cup Test) or flammable gases unless the Secretary of State considers the location therein essential.
- (ii) If permitted, any electrical equipment installed in such spaces shall be certified for, and cables shall be appropriate for, use with the flammable dusts, gases or vapours to which it may be exposed.
- (iii) Cable penetrations of the decks and bulkheads of such spaces shall be sealed against the passage of gas or vapour.
- (iv) Electrical equipment and cables which do not comply with the foregoing for particular applications may be installed, provided such equipment and cables are capable of being electrically isolated by the removal of links or the operation of lockable switches.

Spare parts and tools

61. Every ship shall be provided with an adequate quantity of replacements for those parts of the ship's electrical equipment and installations which, having regard to the intended service of the ship, it would be essential for the safety of the ship and of persons on board to replace in the event of failure while the ship is at sea, together with such tools as are necessary for the fitting of these replacements.