

automatically charged, relay operated accumulator lamps; and

(ii) all services required by sub-clauses (5)(d)(i), (5)(d)(iii) and (5)(d)(iv) of this clause unless such services have an independent supply for the period specified, from an accumulator battery suitably located for use in an emergency.

(8) The emergency switchboard shall be installed as near as is practicable to the emergency source of electrical power.

(9) Where the emergency source of electrical power is a generator, the emergency switchboard shall be located in the same space unless the operation of the emergency switchboard would thereby be impaired.

(10) No accumulator battery fitted in accordance with this regulation shall be installed in the same space as the emergency switchboard. An indicator shall be mounted in a suitable place on the main switchboard or in the machinery control room to indicate when the batteries constituting either the emergency source of electrical power or the transitional source of electrical power referred to in sub-clauses (6)(b) or (7) of this clause are being discharged.

(11) The emergency switchboard shall be supplied during normal operation from the main switchboard by an interconnector feeder which is to be adequately protected at the main switchboard against overload and short circuit and which is to be disconnected automatically at the emergency switchboard upon failure of the main source of electrical power. Where the system is arranged for feedback operation, the interconnector feeder is also to be protected at the emergency switchboard at least against short circuit.

(12) In order to ensure ready availability of the emergency source of electrical power, arrangements shall be made where necessary to disconnect automatically non-emergency circuits from the emergency switchboard to ensure that electrical power shall be available automatically to the emergency circuits.

(13) The emergency generator and its prime mover and any emergency accumulator battery shall be so designed and arranged as to ensure that they will function at full rated power when the ship is upright and when inclined at any angle of list up to 22.5° or when inclined up to 10° either in the fore or aft direction, or when in any combination of angles within those limits.

(14) Provision shall be made for the periodic testing of the complete emergency system and shall include the testing of automatic starting arrangements.

65. Starting Arrangements for Emergency Generating Sets—(1) Emergency generating sets shall be capable of being readily started in their cold condition at a temperature of 0°C. If this is impracticable, or if lower temperatures are likely to be encountered, provision acceptable to the Chief Surveyor shall be made for the maintenance of heating arrangements, to ensure ready starting of the generating sets.

(2) Each emergency generating set arranged to be automatically started shall be equipped with starting devices approved by the Chief Surveyor with a stored energy capability of at least three consecutive starts. A second source of energy shall be provided for an additional three starts within 30 minutes unless manual starting can be demonstrated to be effective.

(3) The stored energy shall be maintained at all times, as follows:

(a) electrical and hydraulic starting systems shall be maintained from the emergency switchboard.

(b) compressed air starting systems may be maintained by the main or auxiliary compressed air receivers through a suitable nonreturn valve or by an emergency air compressor which, if electrically driven, is supplied from the emergency switchboard;

(c) all of these starting, charging and energy storing devices shall be located in the emergency generator space; these devices are not to be used for any purpose other than the operation of the emergency generating set. This does not preclude the supply to the air receiver of the emergency generating set from the main or auxiliary emergency generator space.

(4) Where automatic starting is not required, manual starting is permissible, such as manual cranking, inertia starters, manually charged hydraulic accumulators, or powder charge cartridges, where they can be demonstrated as being effective.

(5) When manual starting is not practicable, the requirements of sub-clauses (2) and (3) of this clause shall be complied with except that starting may be manually initiated.

66. Precautions Against Shock, Fire and Other Hazards of Electrical Origin—(1) Exposed metal parts of electrical machines or equipment which are not intended to be live but which are liable under fault conditions to become live shall be earthed unless the machines or equipment are:

(a) supplied at a voltage not exceeding 55V direct current or 55V, root mean square between conductors; auto-transformers shall not be used for the purpose of achieving this voltage; or

(b) supplied at a voltage not exceeding 250V by safety isolating transformers supplying only one consuming device; or

(c) constructed in accordance with the principle of double insulation.

(2) The Chief Surveyor may require additional precautions for portable electrical equipment for use in confined or exceptionally damp spaces where particular risks due to conductivity may exist.

(3) All electrical apparatus shall be so constructed and so installed as not to cause injury when handled or touched in the normal manner.

(4) Main and emergency switchboards shall be so arranged as to give easy access as may be needed to apparatus and equipment, without danger to personnel. The sides and the rear and, where necessary, the front of switchboards shall be suitably guarded. Exposed live parts having a voltage between conductors to earth exceeding 55V direct current or 55V root mean square shall not be installed on the front of such switchboards. Where necessary, nonconducting mats or gratings shall be provided at the front and rear of the switchboard.

(5) The hull return system of distribution shall not be used for any purpose in a tanker, or for power, heating, or lighting in any other ship of 1,600 gross tonnage and upwards.

(6) The requirement of sub-clause (5) of this clause does not preclude under conditions approved by the Chief Surveyor the use of:

(a) impressed current cathodic protective systems;

(b) limited and locally earthed systems; or

(c) insulation level monitoring devices provided the circulation current does not exceed 30mA under the most unfavourable conditions.

(7) Where the hull return system is used, all final subcircuits, i.e. all circuits fitted after the last protective device, shall be two-wire and special precautions shall be taken to the satisfaction of the Chief Surveyor.

(8) Earthed distribution systems shall not be used in a tanker. The Chief Surveyor may exceptionally permit in a tanker the earthing of the neutral for alternating current power networks of 3,000V (line to line) and over, provided that any possible resulting current does not flow directly through any of the dangerous spaces.

(9) When a distribution system, whether primary or secondary, for power, heating or lighting, with no connection to earth is used, a device capable of continuously monitoring the