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**GUIDELINES ON THE CONFIGURATION OF THE RESERVE SOURCE  
OR SOURCES OF ENERGY USED TO SUPPLY RADIO  
INSTALLATIONS ON GMDSS SHIPS**

1 With a view to provide recommendations on the configuration of possible reserve source or sources of energy to be used for supplying radio equipment on GMDSS ships, the Sub-Committee on Radiocommunications and Search and Rescue (COMSAR), at its third session (23 to 27 February 1998), prepared the annexed Guidelines.

2 Member Governments are invited to bring the annexed Guidelines to the attention of classification societies, shipbuilders, shipowners, ship operators, shipping companies, manufacturers and shipmasters.

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**ANNEX****GUIDELINES ON THE CONFIGURATION OF THE RESERVE SOURCE OR SOURCES OF ENERGY USED TO SUPPLY RADIO INSTALLATIONS ON GMDSS SHIPS****1 INTRODUCTION**

1.1 The radio reserve source or sources of energy should meet the requirements set out in regulation IV/13 of SOLAS 1974, as amended, and in IMO resolutions A.694(17) and A.702(17), as applicable, and should also comply with the following requirements.

1.2 The configuration of such reserve sources of energy could comply with recommendations of annexes 1, 2 and 3 of these guidelines, as applicable.

**2 GENERAL**

2.1 Where the reserve source or sources of energy consists of rechargeable accumulator batteries, the arrangement may consist either of batteries used solely in the absence of ships supply of electrical energy (see paragraph 3) or of batteries used in an uninterruptable power supply (UPS) configuration (see paragraph 4).

2.2 Only equipment specified in regulation IV/13 of SOLAS 1974, as amended, and paragraphs 2.1.1 and 2.1.2 of the annex to resolution A.702(17) may be connected to the reserve source or sources of energy.

2.3 Any ship's navigational or other equipment providing to the radio installation an input of information, which is needed to ensure its proper performance, should be connected to the ship's main and emergency supply and to the reserve source of energy to ensure an uninterruptable input of information.

2.4 To determine the electrical load to be supplied by the reserve source of energy for each radio installation required for distress conditions, the following formula should be applied:

½ of the current consumption necessary for transmission  
+ the current consumption for reception  
+ the current consumption of any additional loads.

2.5 If a manual change-over switch is provided in the configuration, this switch should be clearly marked and readily accessible to the operator.

### **3 BATTERIES USED SOLELY IN THE ABSENCE OF SHIP'S SUPPLY**

3.1 A single battery may be provided for the radio installation specified in regulations IV/13.2, 13.4, 13.5, and 13.8 of SOLAS 1974, as amended. The capacity of the battery should be sufficient for the load determined in paragraph 2.4 in compliance with the requirements of regulations IV/13.2 and 13.4 of SOLAS 1974, as amended, taking in consideration duplication equipment when provided.

3.2 The charging current of the automatic battery charger should be sufficient to comply with regulation IV/13.6.1 for the load determined in paragraph 2.4 (see annex 2, paragraph 2.1).

3.3 The supply lines from the battery distribution panel to each radio installation of both the basic and the duplication equipment should be independent and fused separately.

3.4 In case of interruption of the ship's supply, as well as upon its recovery, the change-over between the radio reserve source of energy and the ship's supply may be manual or automatic.

3.5 The change-over between the ship's supply and the radio reserve source of energy should not require any of the equipment connected to it to be re-initialized manually and should not result in the loss of data stored in memory.

3.6 Any fault in the battery or battery charger should not impair or reduce the functional availability of any GMDSS equipment while energised from the ship's supply.

### **4 BATTERIES USED IN AN UNINTERRUPTABLE POWER SUPPLY (UPS) CONFIGURATION**

4.1 A single UPS may be provided for the radio installation specified in regulations IV/13.2, 13.4, 13.5 and 13.8 of SOLAS 1974, as amended. The UPS should comply with the load determined in paragraph 2.4 and the requirements of regulations IV/13.2, 13.4 and 13.6 of SOLAS 1974, as amended, taking into consideration duplication equipment when provided.

4.2 To provide for a failure of the single UPS, a second UPS or means for direct supplying the radio installation from ship's main or emergency supply should be installed and be available permanently.

4.3 The change-over to the second UPS or to the ship's supplies may be manual or automatic.

4.4 This change-over should not require any of the equipment connected to it to be re-initialized manually and should not result in the loss of data stored in memory.

4.5 The capacity of the battery charger or chargers used in the UPS configuration should be sufficient to comply with regulation IV/13.6.1 for the load determined in paragraph 2.4 and that all equipment connected can be operated.

For guidance, the following may be used for determining the nominal current of the charger:

- 1/10 of the current consumption necessary for transmission
- + the current consumption for reception
- + the current consumption of any additional loads
- + the nominal charging current of the battery.

4.6 The supply lines from the UPS output to each radio installation of both the basic and the duplication equipment should be independent and fused separately.

## **5 ALARMS AND INDICATORS**

Provision should be made for an aural alarm and visual indication at the position from which the ship is normally navigated, indicating an interruption of the ship's supply. It should not be possible to disable this alarm and indication. It should only be possible to acknowledge and silence the alarm manually. Both the alarm condition and indication should reset automatically when the ship's supply has been restored.

## ANNEX 1

### RECHARGEABLE ACCUMULATOR BATTERIES

#### 1 INTRODUCTION

Rechargeable accumulator batteries as installed should meet the general requirements set out in regulation IV/13 of SOLAS 1974, as amended, and in resolution A.694(17), as applicable and should also comply with the following requirements.

#### 2 GENERAL

2.1 Any type or construction of batteries (e.g. lead acid, alkaline, maintenance free, traction, semi-traction, etc.) may be used as reserve source or sources of energy, taking into consideration the environmental conditions of the location where they are installed.

2.2 The capacity of the battery should be sufficient for the load determined in accordance with the annex, paragraph 2.4.

For guidance, the nominal battery capacity to comply with the minimum capacity requirements at all times is 1.4 times the load determined in paragraph 2.4 multiplied by the intended period of operation (1 hour or 6 hours in accordance with SOLAS IV/13.2).

2.3 The battery should maintain its rated capacity when inclined at any angle up to 22½° in any orientation.

#### 3 INSTRUCTIONS FOR RECHARGEABLE BATTERIES

3.1 An instruction manual which contains all necessary specifications of the batteries should be available on board. The information should include at least:

- .1 capacity and temperature range within which the stated capacity is maintained for the specified operation period i.e. 1 hour or 6 hours;
- .2 charging voltage and current limits in order to keep batteries fully charged while preventing overcharging;
- .3 actual specific gravity of the electrolyte and/or cell voltages or the voltage of the fully charged battery;
- .4 guidelines on how to carry out a controlled discharge test;
- .5 methods of determining the condition of charge of the battery, e.g. check of specific gravity of electrolyte (acid density) or check of battery cell voltages/battery voltages by using an accurate measuring instrument in accordance with the battery manufacturer's specifications;
- .6 requirement for ventilation; and
- .7 requirements for maintenance.

## **4 MARKINGS**

4.1 The batteries should be properly marked with type or construction, rated capacity (capacity for 1 hour discharge  $C_1$  and capacity for 5 hours discharge  $C_5$ ), and installation date. The marking must be visible after the batteries have been installed and during their lifetime.

4.2 A label warning of explosion danger should be displayed near the installed batteries.

## **5 INSTALLATION**

5.1 When defining the minimum required battery capacity, consideration should be given to the expected extreme temperatures for the location of the battery and reduction of its capacity during its lifetime in addition to the loads which are to be connected to it.

5.2 The temperature range of the battery should be wider than the expected temperature range of the location where the battery is to be installed.

5.3 Equipment requiring lower voltage than the total voltage of the battery bank should not be connected to a part of the battery bank.

5.4 The batteries should be installed in an elevated position in the ship and as close to the radio equipment as possible.

5.5 An outdoor located battery case should be avoided due to considerable temperature variations.

5.6 Batteries of different types, different cell constructions, different capacities or different manufacturers should not be mixed in a battery bank.

5.7 Batteries of different types and different cell construction should not be installed in the same location if they can affect each other.

5.8 Sufficient ventilation for the battery should be provided, as required by the battery manufacturer.

5.9 Electrical installations including battery chargers, located in the battery room should be intrinsically safe.

5.10 Sufficient space between batteries and battery banks should be provided for carrying out inspections and maintenance. The batteries should be well braced to remain firmly fixed under all sea conditions.

5.11 The cabling from the batteries should be protected against earth- and short-circuits and be appropriately fused and installed according to recognized international standards\*. Battery cables should have sufficient dimensions to prevent voltage reduction at peak current consumption.

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\* IEC 92-101 and IEC 533.

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## ANNEX 2

### **AUTOMATIC BATTERY CHARGERS**

#### **1 INTRODUCTION**

Automatic battery chargers should meet the general requirements set out in regulation IV/13 of SOLAS 1974, as amended, and in resolution A.694(17), as applicable and should also comply with the following requirements.

#### **2 GENERAL**

2.1 The charger should be capable of recharging the completely discharged accumulator batteries to the minimum required capacity within 10 hours.

2.2 The charger should be capable of keeping the batteries appropriately charged as prescribed by the battery manufacturer for permanent automatic charging.

2.3 The supplied voltage and current should always be within the tolerance limits prescribed by the battery manufacturer, taking into account the environmental temperature of the battery, likely to be experienced in ship. A protection should be provided against over charging or discharging of batteries from a possible fault in the charger.

#### **3 CONTROL AND INDICATORS**

3.1 The automatic charger should be provided with a visual indication that it is switched on.

3.2 Provision should be made for an aural alarm and visual indication at the position from which the ship is normally navigated, indicating when the charging voltage or current is outside the limits given by the battery manufacturer for automatic charging conditions. It should not be possible to disable this alarm and indication and it should only be possible to acknowledge and silence the alarm manually. Both the alarm condition and indication should reset automatically when normal charging condition has been restored. Failure of the alarm system should not interrupt the charging or discharging of batteries.

#### **4 READINESS**

The automatic charger should be operational within five seconds of switching on or after a power supply interruption.

#### **5 SAFETY PRECAUTIONS**

The automatic charger should be so designed and constructed that it is protected against damage resulting from disconnecting the batteries or, with the battery disconnected, short-circuiting the battery connections. If this protection is provided by electronic means it should automatically reset following removal of the open or short-circuit conditions.



## ANNEX 3

### UNINTERRUPTABLE POWER SUPPLIES (UPS)

#### 1 INTRODUCTION

The UPS should meet the general requirements set out in regulation IV/13 of SOLAS 1974, as amended, and in resolution A.694(17), as applicable, and should also comply with the following requirements.

#### 2 GENERAL

2.1 An uninterruptable power supply system (UPS) is defined as a device which for a specific period of time supplies continuous power to radio equipment independent of any power failures in the ship's main or emergency source of electric energy.

2.2 The UPS should comprise at least:

- .1 an automatic charger, complying with the requirements of paragraph 4.5 of these guidelines and of annex 2; and
- .2 rechargeable accumulator batteries, complying with the requirements of annex 1.

#### 3 CONTROLS AND INDICATORS

Provisions should be made for an aural alarm and visual indication at the position from which the ship is normally navigated, indicating any failure in the UPS which is not already monitored by the alarm and indicators required by paragraph 5 of these guidelines and by annex 2.

#### 4 READINESS

The UPS should be operational within 5 s of switching on.

#### 5 SAFETY PRECAUTIONS

The UPS should be so designed and constructed that it is protected against damage resulting from disconnecting the batteries or, with the battery disconnected, short-circuiting the UPS battery connections. If this protection is provided by electronic means it should automatically reset following removal of the open or short-circuit conditions.