ANNEX 19

RESOLUTION MSC.512(105)
(adopted on 28 April 2022)

PERFORMANCE STANDARDS FOR SHIPBORNE MF AND MF/HF RADIO INSTALLATIONS CAPABLE OF VOICE COMMUNICATION, DIGITAL SELECTIVE CALLING AND RECEPTION OF MARITIME SAFETY INFORMATION AND SEARCH AND RESCUE RELATED INFORMATION

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO resolutions A.804(19) and A.806(19), by which the Assembly, at its nineteenth session, adopted the *Performance standards for shipborne MF radio installations capable of voice communication and digital selective calling* and the *Performance standards for shipborne MF/HF radio installations capable of voice communication, narrow-band direct-printing and digital selective calling*, respectively, which were subsequently amended by resolution MSC.68(68), annexes 2 and 3,

RECALLING FURTHER resolution A.886(21), by which the Assembly resolved that the functions of adopting performance standards for radio and navigational equipment, as well as amendments thereto, shall be performed by the Maritime Safety Committee on behalf of the Organization,

TAKING INTO ACCOUNT the amendments to the International Convention for the Safety of Life at Sea, 1974 ("the Convention") adopted by resolution MSC.496(105),

NOTING, in particular, regulations IV/9, 10 and 11 of the Convention, concerning radiocommunications for the Global Maritime Distress and Safety System (GMDSS), which require, respectively, that ships be provided with a MF or MF/HF radio installation capable of voice communication, digital selective calling and reception of maritime safety information and search and rescue related information,

RECOGNIZING the need to revise the performance standards for MF as well as MF/HF radio installations capable of voice communication, digital selective calling and reception of maritime safety information to be used in the GMDSS in order to ensure the operational reliability of such equipment and to avoid, as far as practicable, adverse interaction between such equipment and other communication and navigation equipment on board ship,

HAVING CONSIDERED, at its 105th session, the recommendation made by the Sub-Committee on Navigation, Communications and Search and Rescue at its eighth session,

1 ADOPTS the revised *Performance standards for shipborne MF and MF/HF radio installations capable of voice communication, digital selective calling and reception of maritime safety information and search and rescue related information*, set out in the annex to the present resolution;

2 RECOMMENDS Governments to ensure that shipborne MF and MF/HF radio installations capable of voice communication, digital selective calling and reception of maritime safety information which will form part of the GMDSS:

.1 if installed on or after 1 January 2024, conform to performance standards not inferior to those specified in the annex to the present resolution;

.2 if installed on or after 23 November 1996 but before 1 January 2024, conform to performance standards not inferior to those specified in the annex to resolutions A.804(19), as amended, and A.806(19), as amended, or conform to performance standard not inferior to those specified in the annex to this resolution; and

.3 if installed before 23 November 1996, conform to performance standards not inferior to those specified in annex to resolutions A.610(15) and A.613(15).

ANNEX

PERFORMANCE STANDARDS FOR SHIPBORNE MF AND MF/HF RADIO INSTALLATIONS CAPABLE OF VOICE COMMUNICATION, DIGITAL SELECTIVE CALLING AND RECEPTION OF MARITIME SAFETY INFORMATION AND SEARCH AND RESCUE RELATED INFORMATION

PART A – GENERAL

1 INTRODUCTION

The MF and MF/HF radiotelephone, digital selective calling (DSC) and reception of maritime safety information (MSI) and search and rescue (SAR) related information installation carried to meet any of the requirements of SOLAS regulations IV/9, 10 or 11, in addition to meeting the requirements of the Radio Regulations, the relevant ITU-R Recommendations and the general requirements set out in resolutions A.694(17) and MSC.191(79), as amended, should comply with the following minimum requirements.

2 GENERAL

2.1 The installation, which may consist of more than one piece of equipment, should be capable of operating on single-frequency channels or on single- and two-frequency channels.

2.2 The equipment should provide for the following categories of calling, using both voice and DSC:

.1 distress, urgency and safety;

.2 general radiocommunications; and

.3 ship operational requirements.

2.3 The equipment should provide capabilities for the reception and processing of MSI and SAR related information.

2.4 The equipment should comprise at least:

.1 a transmitter/receiver, including antenna(e);

.2 an integral main control unit and/or one or more separate control units, or control functions in an integrated communication system, with the possibility of separate slave control units;

.3 a microphone with a press-to-transmit switch, which may be combined with a telephone in a handset;

.4 an internal or external loudspeaker;

.5 an integral or separate capability for reception and presentation of MSI and SAR related information;

.6 an integral or separate DSC facility;

.7 a dedicated DSC watchkeeping facility to maintain a continuous watch on distress channels. Where a scanning receiver is employed to watch more than one DSC channel, all selected channels should be scanned within two seconds and the dwell time on each channel should be adequate to allow detection of the dot pattern which precedes each DSC call. The scan should only stop on detection of a 100 baud dot pattern; and

.8 an integral or separate facility to establish a connection between stations of the maritime mobile service by simple means using DSC.[1]

2.5 A distress alert should be activated only by means of a dedicated distress button. This button should not be any key of an ITU-T digital input panel or an ISO keyboard provided on the equipment and should be physically separated from functional buttons/keys used for normal operation. This button should be a single button for no other purpose than to initiate a distress alert.

2.6 The dedicated distress button should:

.1 be clearly identified, red in colour and marked "DISTRESS". Where a non-transparent protective lid or cover is used, it should also be marked "DISTRESS"; and

.2 be protected against inadvertent operation. The required protection of the distress button should consist of a spring-loaded lid or cover permanently attached to the equipment by, for example, hinges. It should not be necessary for the user to remove additional seals or to break the lid or cover in order to operate the distress button. The operation of the distress button should generate a visible and audible indication. The distress button should initiate a distress alert when kept pressed for at least three seconds. A flashing light and an intermittent acoustic signal should start immediately. After the three seconds the transmission of the distress alert is initiated and the indication should become steady and the acoustic signal should stop. If the distress button is released before a distress alert is initiated, the light should go out and the acoustic signal should stop.

2.7 The distress alert initiation should require at least two independent actions. The lifting of the protective lid or cover is considered as the first action. Pressing the distress button as specified above is considered as the second independent action.

2.8 The equipment should indicate the status of the distress alert transmission.

2.9 It should be possible to interrupt and initiate distress alerts at any time and to interrupt repetitive transmissions of distress messages. Such operation should not interrupt the transmission of a distress alert or distress message in progress but should prevent repetitive transmissions of a distress message.

2.10 Valid GNSS position and timing data from either an internal or external source should be available to the equipment at all times. The loss of position information should generate a visible or audible indication.

[1] Conforming to Recommendation ITU-R M.493.

3 POWER SUPPLY

3.1 The MF and MF/HF radio installation should be powered from the ship's main source of electrical energy. In addition, it should be possible to operate the installation from an alternative source of electrical energy including a reserve source of energy.

3.2 If it is necessary to delay the application of voltage to any part of the transmitter after switching on, this delay should be provided automatically.

3.3 If the transmitter or receiver or both include parts which are required to be heated in order to operate correctly, for example crystal ovens, the power supplies to the heating circuits should be so arranged that they can remain operative when other supplies to or within the equipment are switched off. If a special switch for the heating circuits is provided, its functions should be clearly indicated; it should normally be in the "on" position and be protected against inadvertent operation. The correct operating temperature should be reached within a period of five minutes after the application of power.

4 CONTROL AND INDICATORS

4.1 Operational controls

4.1.1 It should be possible to initiate distress alerts and conduct distress and safety communications from the position, or in the vicinity of the position, from which the ship is normally navigated.

4.1.2 The equipment should provide a standard interface to enable the selections of frequencies and setting of MMSI to be called from a remote control unit (e.g. INS) by using standardized interfaces.[2]

4.1.3 The equipment should provide functionality to establish connection with other stations of the mobile maritime service by simple means using the DSC "Automatic Connection System".[3]

4.1.4 The equipment should provide visual and audible indication of any distress alert or alerts received on board at the position from which the ship is normally navigated, which may be different from the position of the primary control of the equipment.

4.2 Transmitter controls

4.2.1 Provision should be made for indicating the antenna current or power delivered to the antenna. Failure of the indicating system should not interrupt the antenna circuit.

4.2.2 Manually tuned equipment should be fitted with a sufficient number of indicators to permit accurate and rapid tuning.

4.2.3 Operation of the transmit/receive control should not cause unwanted emissions.

4.2.4 All adjustment and controls necessary for switching the transmitter to operate on 2 182 kHz and 2 187.5 kHz should be clearly marked, in order that these operations may be performed readily.

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2 Refer to IEC 61162.

3 Conforming to Recommendation ITU-R M.493.

4.3 Receiver controls

The receiver should be provided with automatic gain control.

4.4 DSC controls and indicators

4.4.1 It should be possible to initiate and make distress and safety calls from the position from which the ship is normally navigated. The means for initiating a distress call should be as prescribed in 2.5 to 2.9 of part A.

4.4.2 Initiation of DSC distress calls should take precedence over any other operation of the facility.

4.4.3 Self-identification data should be stored in the DSC unit. It should not be possible for the user to easily change these data.

4.4.4 Means should be provided to enable routine testing of the DSC facilities without radiation of RF signals.

4.4.5 Provision should be made for alerts with specific audible signals and visual indications to indicate receipt of a distress or urgency call or a call having a distress category.[4] It should not be possible to disable this alert. Provision should be made to ensure that it can be reset only manually.

5 INTERFACES

5.1 Where the equipment is part of an integrated communication system (ICS), integrated navigation system (INS), integrated bridge system (IBS) or connected to a navigation system, this should not impair any of the GMDSS functions of the system or the equipment itself.

5.2 Equipment should provide an interface for bridge alert management (BAM) in accordance with resolution MSC.302(87) on *Performance standards for bridge alert management*.

5.3 The equipment should provide an interface to report a ship identifier and location data from a received distress alert, MSI or SAR related information to a navigation display system in order to enable a graphical display and possible linking to available target information.

5.4 All interfaces provided for communication with other navigation and communication equipment should comply with the relevant international standards.[5]

6 HUMAN-MACHINE INTERFACE

6.1 The human-machine interface (HMI) should provide all functions necessary to carry out all communication procedures including those required by the GMDSS.

6.2 Visual indications and visual presentations of text and graphics of the system should conform to resolution MSC.191(79), as amended.

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4 Recommendation ITU-R M.493.

5 Refer to IEC 61162.

PART B – TRANSMITTER

1 FREQUENCIES AND CLASSES OF EMISSION

1.1 For MF only equipment, the radiotelephone and DSC transmitter should be capable of transmitting on all frequencies allocated in the bands between 1 605 kHz and 4 000 kHz, but at least the frequency 2 182 kHz for voice and the DSC frequency 2 187.5 kHz, as well as the DSC frequency 2 177 kHz used for routine calls should be readily accessible to the operator.

1.2 For MF/HF equipment the transmitter should be capable of transmitting on all frequencies allocated to the maritime mobile service in the frequency band 1 605 kHz to 27 500 kHz. As a minimum, the following frequencies should be readily accessible to the operator: the voice frequencies 2 182, 4 125, 6 215, 8 291, 12 290 and 16 420 kHz; and the DSC frequencies 2 187.5, 4 207.5, 6 312, 8 414.5, 12 577 and 16 804.5 kHz and the DSC routine calling frequencies in the 2 MHz, 4 MHz, 6 MHz, 8 MHz, 12 MHz and 16 MHz bands.[6]

1.3 Radiotelephone frequencies are designated in terms of the carrier frequency; DSC frequencies are designated in terms of the assigned (centre) frequency. When DSC signals are transmitted using a transmitter in the J2B mode the (suppressed) carrier frequency should be adjusted so as to have the DSC signal transmitted on the assigned frequency. The selected transmitter frequency should be clearly identifiable on the control panel of the equipment.

1.4 The transmitter should be capable of transmitting upper side band using classes of emission J3E and either J2B or F1B. The modulation should change automatically according to the designation of the frequency selected.

1.4.1 When switching to the preset distress frequencies 2 182, 4 125, 6 215, 8 291, 12 290 and 16 420 kHz, the appropriate class of emission in accordance with the Radio Regulations should be selected automatically.[7]

1.4.2 When switching to the assigned (centre) frequencies for DSC specified in paragraphs 1.1 and 1.2 above, classes of emission F1B or J2B should be selected automatically.

1.5 It should be possible for the user to select transmission frequencies independent of any receiver setting. This does not preclude the use of transceivers.

1.6 It should be possible to change the transmitter quickly from operation on any frequency to operation on any other frequency, and in any event within a period not exceeding five seconds. The equipment should not be able to transmit during channel switching operations.

1.7 Means should be provided to automatically control the modulation level to prevent over modulation.

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6 As defined by the ITU-R Radio Regulations.

7 For existing transmitters, during the transition and amortization period, classes of emission may be selected manually.

2 FREQUENCY ACCURACY AND TOLERANCE

The transmitter frequency should be provided with a frequency tolerance (+/- 10 Hz) which ensures reception of the voice and DSC signal.

3 OUTPUT POWER

3.1 During normal modulation, the peak envelope power in the case of J3E emissions, or the mean power in the case of J2B or F1B emissions, should be at least 60 W[8] at any frequency within the specified frequency range.

3.2 If the rated output power exceeds 400 W[9] in the MF band, provision should be made for reducing the output to 400 W or less.

4 PERMISSIBLE WARMING-UP PERIOD

The equipment should be capable of operation within one minute after switching on.

5 CONTINUOUS OPERATION

5.1 The transmitter should be capable of continuous voice operation at rated power without causing any reduction in performance or damage to the equipment.

5.2 The transmitter should have a visual indication that the transmitter is activated and should provide a facility integrated in the power amplifier to limit the continuous transmission time to a maximum of five minutes.

6 CONTROLS AND INDICATORS

See Part A 4.2.

7 SAFETY PRECAUTIONS

7.1 The equipment should be so designed and constructed that, when the transmitter is providing power to the antenna, the transmitter is protected against damage resulting from disconnection of the antenna or short-circuiting of antenna terminals. If this protection is provided by means of a safety device, that device should automatically be reset following removal of the antenna open-circuit or short-circuit conditions.

7.2 In case the standing wave ratio (SWR) becomes too high, the power of the transmitter can be automatically reduced without stopping the transmission and an appropriate alert should be initiated.

PART C – RECEIVERS

1 FREQUENCIES AND CLASSES OF EMISSION

1.1 For MF equipment only, the receiver should be capable of being tuned throughout the bands between 1 605 kHz and 4 000 kHz. The frequency for 2 182 kHz for voice and the DSC frequency 2 187.5 kHz as well as the DSC routine frequency 2 177 kHz should be readily accessible to the operator.

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8 Note should be taken that in some areas of the world a 60 W value may not be adequate to ensure reliable communications. A value greater than 60 W may be required in these areas.

9 The Radio Regulations No.52.127 specify a 400 W maximum power for equipment operating in the MF band in region 1.

1.2 For MF/HF the receiver should be capable of being tuned throughout the bands between 1 605 kHz and 27 500 kHz. As a minimum, the following frequencies should be readily accessible to the operator: the carrier frequencies 2 182, 4 125, 6 215, 8 291, 12 290 and 16 420 kHz for radiotelephony; and the DSC frequencies 2 187.5, 4 207.5, 6 312, 8 414.5, 12 577 and 16 804.5 kHz and the DSC routine frequencies in the 2 MHz, 4 MHz, 6 MHz, 8 MHz, 12 MHz and 16 MHz bands.[10]

1.3 Radiotelephone frequencies should be designated in terms of the carrier frequency and DSC frequencies should be designated in terms of the assigned (centre) frequency. The selected receiver frequency should be clearly identifiable on the control panel of the equipment.

1.4 The receiver should be capable of receiving upper sideband signals as appropriate for classes of emission J3E, J2B and F1B.

1.5 The class of emission should be selectable by not more than one control.

1.6 It should be possible for the user to select reception frequencies independent of any transmitter setting. This does not preclude the use of transceivers.

1.7 The receiver should be capable of being tuned to different frequencies quickly and in any event within a period not exceeding five seconds.

2 FREQUENCY TOLERANCE AND ACCURACY

The receiver frequency should be provided with a frequency tolerance (+/- 10 Hz) which ensures reception of the voice and DSC signal.

3 USABLE SENSITIVITY

For classes of emission J3E and F1B the sensitivity of the receiver should be equal to or better than 6 μV e.m.f. at the receiver input for a signal-to-noise and distortion (SINAD) ratio of 20 dB. For DSC an output character error rate of 10^{-2} or less should be obtained for a signal-to-noise ratio of 12 dB.

4 RECEIVER OUTPUT

4.1 For the reception of voice signals, the receiver should be suitable for use with a loudspeaker and a telephone handset and should be capable of providing power of at least 2 W to loudspeaker and at least 1 mW to the handset.

4.2 An output should be provided for DSC signals if the corresponding facility is not integrated.

5 PERMISSIBLE WARMING-UP PERIOD

The equipment should be capable of operating within one minute after switching on.

6 CONTROLS AND INDICATORS

See part A 4.3.

[10] As defined by the ITU-R Radio Regulations.

7 IMMUNITY TO INTERFERENCE

The immunity to interference of the receiver should be such that the wanted signal is not seriously affected by unwanted signals.

PART D – DIGITAL SELECTIVE CALLING FACILITY

1 DSC CAPABILITIES

1.1 The facility should conform to the provisions of the relevant ITU-R Recommendations pertaining to the DSC system.[11]

1.2 The DSC facility should comprise:

.1 means to decode and encode DSC messages;

.2 means necessary for composing the DSC message;

.3 means to verify the prepared message before it is transmitted;

.4 means to display the information contained in a received call in plain language;

.5 facilities to automatically update the ship's position and the time at which the position was determined from a suitable electronic position-fixing aid which may be an integral part of the equipment. For equipment which does not have an integral position-fixing aid, such facilities should include a suitable interface conforming to the appropriate international standards;[12]

.6 means for the manual entry of position and the time at which the position information was determined should be provided; and

.7 means to activate an alert when:

.1 no position data is received from the electronic position-fixing aid; or

.2 in the case of manual input, the position information is over four hours old.

Any position information not updated for more than 23.5 hours should be erased.

2 DISTRESS MESSAGE STORAGE

2.1 Sufficient capacity should be provided to enable at least 20 received distress messages to be stored in the DSC facility.

2.2 These calls should be marked as read when they are printed or displayed.

[11] DSC equipment conforming to Recommendations ITU-R M.493 and ITU-R M.541 should be used to meet this requirement.

[12] Refer to IEC 61162.

PART E – FACILITY FOR THE RECEPTION OF MSI

The facility can be an integral part or a separate part of the MF/HF-Radio. It should conform to the *Performance standards for the reception of maritime safety information and search and rescue related information by MF (NAVTEX) and HF* (resolution MSC.508(105).

PART F – AUTOMATIC CONNECTION SYSTEM

The function for automatic connection system may be an integral part or a separate unit of the MF/HF station.

1 THE TRANSMITTER

The system should be able to send a DSC call[13] on DSC routine calling frequencies[14] in all or selected bands either by the user or by a predefined automatic algorithm. The call sent out should provide a provisional transmit frequency.[14]

2 THE RECEIVER

2.1 A dedicated receiver which may be the same receiver as that used as DSC watch receiver to monitor the DSC distress frequencies or an additional receiver should scan the DSC routine calling frequencies.[14]

2.2 The scanning process should only stop when a scanning receiver is employed to watch more than one DSC channel, in which case all selected channels should be scanned within two seconds and the dwell time on each channel should be adequate to allow detection of the dot pattern which precedes each DSC call. The scan should only stop on detection of a 100 baud dot pattern.

2.3 The system should be able when receiving a DSC call[13] requesting a connection to confirm if the proposed frequency/channel is available. In case the proposed frequency/channel is not available, or the noise level is not adequate, the system should propose an appropriate frequency/channel in the band with the lowest noise by using a defined DSC call and using the transmitter defined in part F, section 1.

2.4 If the requested frequency is confirmed the system should switch automatically to the confirmed frequency.

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[13] In accordance with ITU-R M.493 and ITU-R M.541.

[14] As defined by the ITU-R Radio Regulations.