

## **MERCHANT SHIPPING (RADIO DIRECTION FINDERS) RULES, 1968**

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## **MERCHANT SHIPPING (RADIO DIRECTION FINDERS) RULES, 1968**

MERCHANT SHIPPING (RADIO DIRECTION FINDERS) RULES, 1968

### **1. Short title, application and commencement :-**

(1) These rules may be called the Merchant Shipping (Radio Direction Finders) Rules, 1968.

(2) They shall apply to

(a) Indian ships of sixteen hundred tons gross or more and

(b) ships other than Indian ships, of sixteen hundred tons gross or more while they are at any port or place in India or within the territorial waters of India.

(3) They shall come into force at once.

## **2. Definitions :-**

In these rules

(1) "Act" means the Merchant Shipping Act, 1958 (44 of 1958);

(2) "existing installation" means

(a) an installation wholly installed on board a ship before the 26th May, 1965; and

(b) an installation part of which was installed on board a ship before the 26th May 1965 and the rest of which consists either of parts installed in replacement of identical part or parts which comply with the requirements of these rules;

(3) "interference" means any radiation or any induction which endangers the functioning of a radio navigation service or obstructs, or repeatedly interrupts radio service operating in accordance with these rules;

(4) "new installation" means any installation which is not an existing installation;

(5) "radio inspector" means a person appointed as such under Sec. 10 of the Act;

(6) "Schedule" means a Schedule to these rules;

(7) in relation to classes of emission "Class A-1" means telegraphy by on-off keying without the use of a modulating audio frequency; "Class A-2" means telegraphy by the on-off keying of an amplitude-modulating audio frequency or audio frequencies, or by the on-off keying of the modulated emission; "Class B" means damped waves.

## **3. Provision of radio direction-finders :-**

Every ship shall be provided with a radio direction-finder complying with the requirements specified in the First Schedule.

## **4. Climatic and durability tests :-**

(1) The radio direction-finder required to be provided by these rules shall be such that it will be free from mechanical defects, and, shall comply with the following tests, namely

(a) while undergoing the vibration dry heat and low temperature

tests specified in the Second Schedule

(b) when subjected to the damp heat, tests specified in paragraph 3 (4) of the said Schedule and

(c) the other tests specified in the said Schedule.

(2) The radio direction-finder aerial system referred to in the First Schedule shall be such that after undergoing the mould growth tests required by the Second Schedule no mould growth will be present on it.

#### **5. Interference with reception :-**

(1) At no time when a ship is at sea interference or mechanical noise produced by a radio direction-finder required by these rules or by other equipment in the ship shall be of such intensity as to prevent the efficient determination of radio bearings by means of the radio direction-finder.

(2) Any ship which is provided with a radio direction-finder not being an existing installation shall also be provided with a communal aerial system for all broadcast receivers in respect of which it is impracticable to erect efficient and properly installed aerials which

(a) are outside a radius of 15.2 metres from the radio direction finder aerial or

(b) do not rise above the base of the radio direction-finder or

(c) can be lowered quickly and stowed easily when the radio directionfinder is in use.

#### **6. High voltage parts :-**

(1) All parts and wirings of the equipment specified in these rules in which the direct and alternating voltage (other than radio frequency voltages) combine at any time to give an instantaneous voltage greater than fifty volts shall be protected from accidental access.

(2) All parts and wirings of an equipment specified in these rules (other than the parts and wiring of a rotating machine) in which the direct and alternating voltages (other than radio frequency voltages) combine at any time to give an instantaneous voltage greater than two hundred and fifty volts shall be isolated

automatically from all sources of electrical energy when the means of protection are removed.

### **7. Supply of electrical energy :-**

There shall be available in every ship while it is at sea and at all reasonable times when it is not in port, a supply of electrical energy sufficient for the operation of the radio direction finder in accordance with these rules, and for testing purposes, and for the charging of any batteries which are a source of electrical energy for the radio direction-finder.

### **8. Charging of batteries :-**

(1) If batteries are provided as a source of electrical energy for the radio direction-finder, means shall be provided on every ship for the charging of such batteries from the ship's main source of electrical energy. The master of the ship shall cause such batteries to be tested once a day by Voltmeter and once a month by Hydrometer, and shall cause any battery which is found not to be fully charged to be brought up to that condition as soon as possible.

(2) The master of every ship shall maintain or cause to be maintained a separate record and whenever any batteries providing source of electrical energy for radio direction-finder are charged or when such batteries are tested daily by a Voltmeter, or when such batteries are tested monthly by a Hydrometer, as required by sub-rule (1), he shall make or cause to be made appropriate entries in the said records in regard to such charging or testing of batteries. The said record shall be placed on board together with records of calibration maintained under rule 13 and shall be made available to the radio inspector for inspection at any reasonable time.

### **9. Installation of radio direction-finder :-**

(1) The radio direction-finder shall be installed in such a position that efficient determination of radio bearings by means of the radio direction-finder will not be hindered by extraneous noises.

(2)

(a) The radio direction-finder aerial system referred to in the First Schedule shall be mounted in such a manner that the efficient determination of radio bearings by means of the radio direction-finder is hindered as little as possible by the proximity of aerials,

derricks, wire halyards, or other large metal objects.

(b) Unless the feeder cables connecting the radio direction-finder aerial system with the receiver forming part of the radio direction-finder consist of solid electric screened cable, they shall be protected by metal tubes which are bonded to earth. The joints of the feeder cables shall be watertight.

**10. Means of communication :-**

(1) In every ship, an efficient two-way means of calling and voice communication shall be provided between the receiver of the radio direction-finder and the bridge from which the ship is normally navigated.

(2) In every such ship, an efficient means of signalling shall be provided between the receiver of the radio direction-finder and the ship's standard compass or gyro compass repeater, if any.

**11. Restriction on use of the radio direction-finder :-**

The radio direction-finder shall not be used,

(a) for any purpose other than the business of the ship or

(b) for keeping the radio watch required by the rules framed under Sec. 296 of the Act.

**12. Calibration :-**

(1) The Master of every ship shall cause the radio directionfinder to be calibrated in accordance with this rule as soon as practicable after it has been installed in the ship and whenever any change is made in the position of the radio-direction-finder aerial system.

(2) The radio direction-finder shall be calibrated by two persons the one being experienced in the taking of radio bearings and the other experienced in the taking of visual bearings. The calibration shall be carried out by taking simultaneous radio and visual bearings of a calibrating transmitter, and such bearings shall be taken at intervals of not greater than 5 degrees throughout 360 degrees on a frequency between 285 Kc/s and 315 Kc/s.

(3) Calibration tables and curves shall be prepared on the basis of the bearings taken in accordance with sub-rule (2).

(4) The Master of every ship shall cause the calibration tables and curves prepared in accordance with the foregoing provisions of this

rule to be verified by means of check-bearings

(a) at intervals not exceeding twelve months; and

(b) whenever any change is made in any structure or fitting on deck which is likely to affect the accuracy of the radio direction-finder. If such verification shows that the calibration tables or curves are materially inaccurate, the Master of the ship shall cause the radio direction-finder to be recalibrated as soon as practicable in the manner specified in sub-rules (2) and (3).

**13. Records of calibration and verification :-**

The Master of every ship shall cause the following records to be kept on board in a place accessible to any person operating the radio direction-finder, and to be available for inspection at any reasonable time by a radio inspector, namely

(a) a list or diagram indicating the condition and position, on the most recent occasion on which the radio direction-finder was calibrated, of

(i) the aerials, and

(ii) all moveable structures on board the ship which might affect the accuracy of the radio direction-finder;

(b) the calibration tables and curves which were prepared on the most recent occasion on which the radio direction-finder was calibrated;

(c) a Certificate of Calibration in the form specified in the Third Schedule, relating to the most recent occasion on which the radio direction-finder was calibrated and signed by the persons making the calibration; and

(d) a record, in the form specified in the Fourth Schedule of check-bearings taken for the verification of calibration, the bearings being numbered in the order in which they were taken.

**14. Wiring, diagram and instructions :-**

A schematic wiring diagram of the radio direction-finder and a book containing adequate instructions as to the use of the radio direction-finder shall be available at all times on board for use by any person operating or testing the radio direction-finder.

**15. Fees :-**

Fees shall be levied under these rules at the rates and for the

purposes specified in the Fifth Schedule.

**16. Penalty :-**

Any person who commits a breach of these rules shall be punishable with fine which may extend to one thousand rupees and if the breach is a continuing one, with a further fine which may extend to fifty rupees for every day after the first during which the breach continues.

SCHEDULE 1

SCHEDULE

FIRST SCHEDULE

(See rule 3)

1. The direction finder shall consist of a radio receiver, an associated direction finder aerial system and Goniometry suitable for the determination of both bearing and sense by aural-null method.

2. (a) The mechanical parts of the direction-finder aerial system other than ball bearings, hose clips, set screws and other similar small parts shall consist of non-magnetic material.

(b) In all respects the mechanical and electrical construction and the finish of the equipment shall conform to good standards of engineering practice.

3. No vibrators or primary cells shall be employed. The equipment shall operate from the ship's mains and shall not cause any of the supply leads to be earthed.



4. The equipment shall be suitable for use with held. Hones.

5. Technical characteristics of the receiver shall comply with the following:

(a) Frequency Range 225 Kc/s to 525 Kc/s.

(b) Types of reception A1 and A2.

(c) Sensitivity (for loop aerial system) : Field strength required for 20 decibel Signal/Noise ratio :

Frequency	A, (Microvolts per metre)	Wide band A2 30% mod at 400 Cycles (Microvolts per metre)	
500 Kc/s	10	45	
350 Kc/s	12	55	
260 Kc/s	15	67	
(d) Selectionity			
Attention		Band width	
		Wide	Narrow
6 decibels at frequencies plus or minus 29 decibels at frequencies plus or minus 40 decibels at frequencies plus or minus 60 decibels at frequencies		2.5 Kc/s 4.5 Kc/s 7.5 Kc/s	1.5 Kc/s 3.5 Kc/s 6.0 Kc/s 9.0 Kc/s

(e) The protection against second channel or image frequency shall be over 90 decibels at 500 Kc/s.

(f) The protection against I.F. break-through shall be over 90 decibels at 500 Kc/s.

(g) The overall gain of the receiver shall be such that the first circuit noise may be amplified to load the headphones output to one mill watt on "wide" bandwidth in both A1 and A2 positions of reception.

6. The receiver shall not produce a field exceeding 0.1 micro volt per meter at a distance of one nautical mile from the receiver.

7. Fluctuations of plus or minus 10 per cent in the supply voltages shall not produce perceptible change in output.

8. (a) After the receiver has been switched on for 5 minutes, the tune frequency shall not change by more than one part in one thousand in any further period of 5 minutes;

(b) a change of 5 per cent in any one of the supply voltages to the receiver or to a power unit associated therewith shall not cause the tune frequency to change by more than three parts in ten thousand.

(c) a change of ambient temperature of 4 degrees centigrade within the range of Zero degree centigrade to

50 degree centigrade applied after the receiver has been switched on for one hour shall not cause the tune frequency to change by more than one part in one thousand.

9. The tuning scale shall be calibrated directly in frequency.

10. The Goniometry shall be provided with a circular bearing indicator scale with marking at each one degree interval. Degree markings shall be distinctive at each fifth degree marking and more distinctive at each tenth degree marking with numerical indication.

11. After due allowance has been made for any site

errors the bearing as indicated by the scale of the Goniometry shall be within one degree of the correct bearing. This requirement shall be met at all frequencies in the range of frequencies specified in paragraph 5 of this Schedule and throughout the 360 degrees of azimuth regardless of the previous setting of the bearing indicator.

12. Changes in the setting of the bearing indicator from the position or positions of minimum output of 5 degrees and 90 degrees in either direction shall cause the audio-frequency output to increase by not less than 18 decibels and not less than 35 decibels respectively.

SCHEDULE 2  
SCHEDULE

SECOND SCHEDULE

[See rule 4(1)]

**Climatic and Durability Tests**

1. In this Schedule:

(a) References to Class X equipment shall be construed as references to the direction-finder aerial system;

(b) References to Class B equipment shall be construed as references to each part of the direction-finder other than the direction-finder aerial system.

2. (1) Class X equipment shall be subjected to all the tests given in the following Table, and Class B equipment shall be subjected to the test named opposite the letter B thereof:

Provided that Class X equipment shall not be subjected to the Immersion test if it is subjected to the Rain test at a static pressure of not less than 3.164 or more than 3.867 kg. per square centimetre.

## TABLE

### Nature of Test

(a)	Vibration Test		B
(b)	Bump Test		B
(c)	Dry Heat Test		B
(d)	Damp Heat Test		B
(e)	Low Temperature Test		B
(f)	Rain Test		
(g)	Immersion Test		
(h)	Corrosion Test Salt Water		B
(i)	Corrosion Test Acid Fumes (if a battery	is included in the equipment)	B
(j)	Mould Growth Test		

(2) All tests shall be conducted in the order in which they appear in the Table.

(3) At any time when the equipment is required by paragraph 3 below to be kept working for the purposes of such tests, power shall be supplied thereto at the voltage at which such equipment is intended to be operated.

3. The tests referred to in paragraph 2 above, shall be conducted in the manner specified below:

(a) Vibration Test. The equipment, complete with its chassis covers and shock absorbers (if any) shall in its normal operating position be clamped to a vibration Table. The Table shall be vibrated at all frequencies between 0 and 12 cycles per second at an amplitude of plus or minus 0.16 cm. during which period the equipment shall be kept working continuously. The Table shall be so vibrated for three periods each of which shall be of eight minutes duration. Throughout each such period, the direction of the vibrations shall be perpendicular to the direction of the vibration during the other two periods,

(b) Bump Test. The equipment shall be subjected to not less than 500 bumps at a constant rate of between one and four bumps per second with a free drop of at least 2.5 cm.

(c) Dry Heat Test.(1) Class X equipments shall be placed in a chamber which is maintained for a period of ten hours at a constant temperature of 70 1C during which period the equipment shall not be worked or tested. The said chamber shall then be cooled to a constant temperature of 55 1C and the equipment shall be kept working continuously at that temperature for a period of two hours.

(ii) Class B equipment shall be placed in a chamber which is maintained for a period of two hours at a constant temperature of 55 1C during which period the equipment shall be kept working continuously.

(d) Damp Heat Test.(1) The equipment shall be prepared for the damp heat test in the following manner:

(i) The equipment shall be placed in a chamber which within a period not exceeding two hours shall be heated from room temperature to 40C, and shall be brought to a relative humidity of not less than 95 per cent.

(ii) The chamber shall be kept at a temperature of 40' 1C for a period of 12 hours, and at a relative humidity of not less than 95 per cent.

(iii) At the beginning of the last 60 minutes of such period all accessible surfaces and components shall be wiped dry and any fans or drying lamps provided in the equipment shall be switched on.

After the fans or drying lamps have been in operation for 30 minutes and while the temperature of the chamber is still 40C subject to the aforesaid tolerance the equipment shall be tested.

(2) After the equipment has been tested, the chamber shall be prepared for the low temperature test, by allowing the temperature to fall below 25C, the equipment remaining in the chamber.

(e) Low Temperature Test.(1) Class X equipment shall be exposed to a temperature of minus 25 1C at normal atmospheric pressure for a period of not less than twelve hours.

(2) Class B equipment shall be exposed to a temperature of minus 15 1C at normal atmospheric pressure for a period of not less than twelve hours.

(f) Rain Test.-(1) The equipment shall be placed in a chamber fitted with eight shower heads, the discharge end of each of which shall consist of a flat, non-rustable metal plate, 0.16 cm. thick, having thirty-six holes each of 0.1 cm. diameter evenly spaced in concentric circles in the following manner:

16 holes on the periphery of a circle of 5.1 cm. diameter.

8 holes on the periphery of a circle of 3.8 cm. diameter.

8 holes on the periphery of a circle of 2.5 cm. diameter.

4 holes on the periphery of a circle of 1.3 cm. diameter.

(2) The shower heads shall be kept at a distance of not less than 50 cm. and not more than 80 cm. from the equipment in such manner that spray from four of such shower heads is directed downwards at an angle of 45 at each of the four uppermost corners of the equipment, and the spray from the other four shower heads is directed horizontally at the centre of each area of the four sides of the



equipment. Fresh water at room temperature and at static pressure in accordance with the following Table shall be sprayed on the equipment from the shower heads for a period of one hour with the equipment in a position in which it is normally operated :

	Minimum pressure (Kg./sq.cm.)	Maximum pressure (Kg./sq.cm.)
If the equipment is to be subjected to the immersion test	1.055	1.758
If the equipment is not to be subjected to the immersion test	3.164	3.867

(3) Throughout the test, the equipment shall be rotated at between 12 and 22/3 revolutions per minute about a vertical axis passing through the centre of the equipment.

(g) Immersion Test. The equipment, in the position in which it will normally be kept on board ship, shall be immersed in water the surface of which is at least 10 cm. above the highest point of the equipment. The equipment shall be kept in the water for a period of one hour. Thereafter it shall be removed from the water and the water drained off.

(h) Corrosion Test (Salt Water). (1) The equipment shall be placed in a chamber fitted with an apparatus capable of spraying in the form of a fine mist, either natural sea water or tap water containing the following salts in the quantities shown below in solution:

	Per cent
Sodium Chloride	2.7
Magnesium Chloride Calcium Chloride	0.6 0.1
Potassium Chloride	0.07

(2) The quantity of each salt shall be subject to a tolerance of plus or minus 10 per cent. The spraying apparatus shall be such that the products of corrosion cannot mix with the sea water or solution contained in the spray reservoir. The solution shall be sprayed simultaneously on all the external surfaces of the equipment for a period of one hour. The equipment shall be kept working continuously for the last 30 minutes of the period. Immediately thereafter the equipment shall be stored for a period of seven days at a temperature of 40 1C at a relative humidity of not less than 60 per cent and not more than 80 per cent. Such spraying and storing shall be carried out on four separate occasions.

(i) Corrosion Test (Acid Fumes). If the arrangements in the equipment are such that the battery can be charged without being removed from the equipment the battery shall be charged continuously for a period of twenty-four hours at the maximum rate appropriate to it. Otherwise, before the test is carried out, the battery shall be fully charged and then fitted into the equipment, which shall immediately thereafter be stored for a period of four weeks at a temperature 40 1C at a relative humidity of not less than 60 per cent and not more than 80 per cent.

(j) Mould Growth Test. The equipment shall be inoculated by spraying with an

aqueous suspension of mould spores containing all the cultures named in Column A or all the cultures named in Column B of the following Table:

A	B
Aspergillus niger Aspergillus Amstelodami Paecilomyces varioti Stachybotrys atra Penicillium brevi-compactum Penicillium cyclopium Chaetomium globosum	Aspergillus niger Aspergillus Amstelodami Aspergillus versicolor. Stachybotrys atra Penicillium brevi-compactum Cladosporum herbasum.

Immediately after it has been so sprayed, the equipment shall be placed in a chamber, the temperature of which shall be maintained at any fixed value within the

range 31°C at 33°C (both inclusive) and controlled within a tolerance of plus or minus 1°C at a relative humidity of not less than 95 per cent. The equipment shall remain in the said chamber for a period of twenty-eight days.

### SCHEDULE 3

#### SCHEDULE

### **THIRD SCHEDULE**

**[See rule 13 (c)]**

## **Certificate of Calibration of Direction Finder**

We the undersigned, hereby certify that we have this day

(a) Calibrated in accordance with the Merchant Shipping (Radio Direction Finders) Rules, 1968 the direction-finder installed on the s.s./m.v.

(b) Handed to the Master of the aforesaid ship, tables of calibration corrections;

(c) Adjusted the said direction finder so that the readings taken thereby, when corrected with such tables differed from the correct bearings by no more than plus or minus two degrees.

We hereby further certify that the Master of the said ship has been furnished with a list/diagram indicating the condition and positions, at the time of such calibration, of the aerials and all moveable structures on board the ship, which might affect the accuracy of the direction finder.

Radio Observer.

Visual Observer.

(Date)

