



GOVERNMENT GAZETTE

OF THE

REPUBLIC OF NAMIBIA

N\$5.40

WINDHOEK - 18 May 2010

No. 4486

CONTENTS

Page

GOVERNMENT NOTICE

No. 105 Merchant Shipping (Radio Installations) Regulations: Merchant Shipping Act, 1951 1

Government Notice

MINISTRY OF WORKS AND TRANSPORT

No. 105 2010

MERCHANT SHIPPING (RADIO INSTALLATIONS) REGULATIONS: MERCHANT SHIPPING ACT, 1951

Under section 356 of the Merchant Shipping Act, 1951 (Act No. 57 of 1951), I -

- (a) make the regulations set out in the Schedule; and
- (b) repeal the Merchant Shipping (Radio Installations) Regulations published under Government Notice No. 60 of 19 April 2002.

E. NGHIMTINA

MINISTER OF WORKS AND TRANSPORT

Windhoek, 20 April 2010

SCHEDULE

ARRANGEMENT OF REGULATIONS

PART I

DEFINITIONS, INTERPRETATION AND APPLICATION OF REGULATIONS

1. Definitions
2. Application of regulations
3. Equivalents

4. Ships and persons in distress
5. Performance standards and satellite EPIRB registration

PART II GMDSS SHIP REQUIREMENTS

6. Definitions
7. Functional requirements
8. Radio installations
9. Radio equipment general requirements
10. Radio equipment requirements for sea area A1
11. Radio equipment requirements for sea areas A1 and A2
12. Radio equipment requirements for sea area A3
13. Radio equipment requirements for sea area A4
14. Radio watches
15. Source of energy
16. Maintenance requirements
17. Radio personnel
18. Radio records

PART III RADIO EQUIPMENT FOR LIFEBOATS AND SURVIVAL CRAFT

19. Radio equipment for lifeboats and survival craft

PART IV PENALTIES

20. Detention
 21. Penalties
- | | | |
|------------|---|---|
| Annexure 1 | - | Satellite (406 MHz) EPIRB registration |
| Annexure 2 | - | Equipment tests and reserve power checks: GMDSS ships |
| Annexure 3 | - | Radio log: GMDSS ships |
| Annexure 4 | - | Spare parts, tools and testing equipment |
| Annexure 5 | - | Documents and publications |
| Annexure 6 | - | VHF range |

PART I DEFINITIONS, INTERPRETATION AND APPLICATION OF REGULATIONS

Definitions

1. In these regulations a word or expression to which a meaning has been assigned in the Act has that meaning, and unless the context indicates otherwise -

“cargo ship” means any ship other than a passenger ship or a fishing vessel;

“Class A ship” means a class A fishing vessel, a cargo ship of 300 tons or more voyaging beyond the defined fishing zone, and a passenger ship voyaging beyond the defined fishing zone;

“Class B ship” means a class B fishing vessel or a cargo ship of less than 300 tons that undertakes regular voyages beyond the defined fishing zone;

“Class C ship” means a class C fishing vessel, an existing passenger ship of less than 300 tons other than a foreign-going passenger ship, a cargo ship of less than 300 tons or an existing cargo ship of

300 tons or more that operates beyond VHF range of a coast station but does not undertake voyages beyond the defined fishing zone;

“Class D ship” means a class D fishing vessel, an existing passenger ship of less than 300 tons, a cargo ship of less than 300 tons and an existing cargo ship of 300 tons or more that do not undertake voyages beyond VHF range of a coast station;

“coast” means the land and water landward of the baselines from which the breadth of territorial waters is measured;

“coast station” means a land station in the maritime mobile service approved by the Minister and which maintains a continuous watch;

“constructed”, in relation to a ship, means having her keel laid or being at a similar stage of construction;

“continuous radio watch” in respect of Convention ships means an uninterrupted radio watch except for brief intervals when the receiving capability of that radio watch is impaired or discontinued for repairs and in respect of non Convention ships means an uninterrupted radio watch but for brief intervals when the receiving capability of that radio watch is impaired or blocked by own communications or periodic maintenance or periodical maintenance checks;

“Convention ship” means a ship to which the 1974 SOLAS Convention and the 1978 Protocol or the 1993 SFV Protocol apply;

“defined fishing zone” means the exclusive economic zone of Namibia as defined in the Territorial Sea and Exclusive Economic Zone of Namibia Act, 1990 (Act No. 3 of 1990);

“Directorate” means the Directorate of Maritime Affairs in the Ministry of Works and Transport;

“EPIRB” means an emergency position-indicating radio beacon stationed in a mobile service, the emissions of which are intended to facilitate search and rescue operations;

“existing ship” means -

- (a) a ship with radio equipment fitted before the commencement of these regulations; or
- (b) a ship with radio equipment part of which was installed before the said commencement of these regulations and the rest of which consists of parts installed in replacement of identical parts or of parts that comply with the relevant provisions of these regulations;

“fishing vessel” means any of the following classes of vessels used for catching fish or other living resources of the sea for financial gain or reward:

Class A: a fishing vessel of 45M or more in length voyaging beyond the defined fishing zone;

Class B: a fishing vessel of less than 45M in length voyaging beyond the defined fishing zone;

Class C: a fishing vessel that operates beyond the VHF range of a Coast station but does not operate or undertake voyages outside the defined fishing zone;

Class D: a fishing vessel operating solely within VHF range of a coast station, whether or not such a coast station is a remote-controlled coast station;

“GMDSS” means the global maritime distress and safety system;

“GMDSS ship” means a ship required by these regulations to be fitted with a GMDSS installation in accordance with Part I and II;

“IMO” means the International Maritime Organization established by the Convention on the International Maritime Organization;

“ITU” means the International Telecommunications Union;

“length”, in relation to a ship, means the registered length which is recorded on the relevant international tonnage certificate or the Namibian tonnage certificate;

“maintenance”, in relation to a radio installation, means any activity intended to keep that installation in satisfactory working condition, and includes tests, measurements, replacements, adjustments and repairs;

“marine notice” means a notice issued by the Minister or the Permanent Secretary, containing standards adopted by IMO or ITU, and stated in the notice;

“maritime mobile service” means a mobile service between coast stations and ship stations, or between ship stations, or between associated on-board communication stations; survival craft stations and emergency position-indicating radio-beacon stations may also participate in this service;

“Ministry” means the Ministry responsible for works and transport;

“mobile service” means a radio-communication service between mobile and land stations, or between mobile stations;

“new ship” means a ship that is not an existing ship;

“non-Convention ship” means a ship to which the 1974 SOLAS Convention and the 1978 Protocol or the 1993 SFV Protocol do not apply;

“operator” means an operator operating radio stations, INMARSAT stations, and GMDSS facilities on board a ship;

“radio installation” in relation to a ship, means any radio installation provided on board a ship, including its associated antennae, inter-connecting circuits and, where appropriate, sources of energy;

“radio log” means the diary of the radio service;

“radio operator” means a person holding a valid appropriate certificate issued or recognised by the relevant authority authorised to issue or recognise that certificate;

“Radio Regulations” means the ITU Radio Regulations annexed to the International Telecommunication Union Convention;

“satellite EPIRB” means an earth station in the mobile-satellite service, the emissions of which are intended to facilitate search and rescue operations;

“ship station” means a mobile station, other than a survival craft station, in the maritime mobile service located on board a ship that is not permanently moored;

“survival craft station” means a mobile station in the maritime mobile service intended solely for survival purposes and located on any lifeboat, life-raft, or other survival equipment;

“the Act” means the Merchant Shipping Act, 1951 (Act No. 57 of 1951);

“tons”, in relation to a ship, means the gross tonnage units which is recorded on the relevant International Tonnage Certificate or the Namibian Tonnage Certificate;

“VHF range” means the range calculated in accordance with Annexure 6;

“1974 SOLAS Convention” means International Convention for the Safety of Life at Sea, 1974, referred to in the Second Schedule of the Act, and the 1978 Protocol;

“1978 Protocol” means the Protocol to the 1974 SOLAS Convention, acceded to by Namibia on 27 November 2000;

“1993 SFV Protocol” means the 1993 Torremolinos Protocol done in Torremolinos from 22 March to 2 April 1993.

Application of regulations

2. (1) Subject to subregulation (8), these regulations apply to Namibian ships, referred to in subregulation (2), (3), (4), (5) and (6).

(2) Every Class A ship and every new ship must comply with Part I and Part II.

(3) Every Class B ship must comply with Part I and Part II.

(4) Every Class C fishing vessel and every other Class C ship must comply with Part I and Part II.

(5) Every Class D ship and every Class D fishing vessel must comply with the requirements for Sea Area A1.

(6) Every Class A and Class B ship must be provided with the documents and publications in accordance with Annexure 5.

(7) Every Class C and every Class D ship must be provided with a list of local coast stations and their facilities as well as a list of Namibian ship station identities.

(8) These regulations do not apply to:

(a) a ship to which the 1974 SOLAS Convention or the 1993 SFV Protocol do not apply, if the ship is in Namibia or its territorial sea as defined in section 2 of the Territorial Sea and Exclusive Economic Zone of Namibia Act, 1990 (Act No. 3 of 1990), because of stress of weather or any circumstances that the owner, master or charterer could not have prevented;

(b) a ship when it is securely ashore or moored in a safe berth; and

(c) small vessels which are subject to the Merchant Shipping (Small Vessel Safety) Regulations published under Government Notice No. 39 of 17 March 2009.

(9) A safety certificate or the renewal of that certificate may not be issued to a ship that does not comply with a provision of these regulations that is applicable to the ship, but a safety certificate issued under the Merchant Shipping (Radio Installations) Regulations published under Government Notice No. 60 of 19 April 2002 remains valid until its expiry.

Equivalents

3. Where these regulations require that -
- (a) a particular performance standard, fitting, material, appliance, apparatus, item of equipment or type of it be fitted or carried in a ship; or
 - (b) any particular provision be made or any procedure or arrangement be complied with;

the Minister or the Permanent Secretary as the case may be, may in writing permit any other performance standard, fitting, material, appliance, apparatus, item of equipment or type of it to be fitted or carried, or any other provision, procedure or arrangement to be made in that ship, if the Minister or Permanent Secretary is satisfied by trial of it or otherwise that such performance standard, fitting, material, appliance, apparatus, item of equipment or type of it, or that any particular provision, procedure or arrangement is at least as effective as that which is required by these regulations.

Ships and persons in distress

4. Nothing in these regulations prevents the use by any ship, survival craft or persons in distress of any means at their disposal to attract attention, make known their position and obtain help.

Performance standards and satellite EPIRB registration

5. (1) Subject to subregulation (2), radio equipment required by these regulations must -

- (a) in the case of Convention ships, comply with performance standards not inferior to the relevant performance standards adopted by the IMO and stated in a marine notice;
- (b) in the case of non-Convention ships, comply with the performance standards adopted by the IMO and ITU and stated in a marine notice; and
- (c) in respect of subregulation (1)(a) and (b), be of a type approved in a marine notice.

(2) In respect of a ship entitled to fly the flag of a Convention State, subregulation (1)(c) does not apply to equipment of a type approved by or on behalf of the competent maritime authority of that State.

(3) A specification under subregulation (1)(b) or an approval under subregulation (1)(c) may, after reasonable notice, be altered or cancelled by the Minister or the Permanent Secretary, as the case may be.

(4) The owner of a ship, contemplated in regulation 2(1) -

- (a) that is required by these regulations to carry a satellite EPIRB; or
- (b) that is not required to carry a satellite EPIRB, but on which a satellite EPIRB is carried;

must register the particulars of that satellite EPIRB with the Ministry in the form prescribed in Annexure 1 and also inform the Ministry in writing of any change in the information provided in the form as well as the disposal of that EPIRB.

PART II
GMDSS SHIP REQUIREMENTS

Definitions

6. In this Part, unless the context otherwise indicates -

“bridge-to-bridge communications” means safety communications between ships from the position from which the ships are normally navigated;

“DSC” means a digital selective calling technique using digital codes that enables a radio station to establish contact with and transfer information to another radio station or group of radio stations;

“direct-printing telegraphy” means automated telegraphy techniques;

“enhanced group calling” means a system providing a simple and automated means of receiving marine safety information on board a ship at sea and in coastal waters;

“general radio communications” means operational and public correspondence traffic, other than distress, urgency and safety messages, conducted by radio;

“GMDSS general operator’s certificate” means the GMDSS general operator’s certificate issued or recognised by the authority empowered to issue or recognise those certificates;

“GMDSS restricted operator’s certificate” means the GMDSS restricted operator’s certificate issued or recognised by the authority empowered to issue or recognise those certificates;

“HF” means the frequency spectrum between 3 000 kHz and 30 MHz;

“INMARSAT” means the International Maritime Organization established by the Convention on the International Maritime Satellite Organization;

“international NAVTEX service” means the co-ordinated broadcast and automatic reception on 518 kHz of maritime safety information by means of narrow-band direct-printing telegraphy using the English language;

“locating” in relation to ships, aircraft, or persons in distress, means the finding of those ships, aircraft, or persons;

“maritime safety information” means navigational warnings, meteorological forecasts or reports and other urgent safety-related messages broadcast to ships;

“MF” means the frequency spectrum between 300 kHz and 3 000 kHz;

“polar orbiting satellite service” means a service that is based on polar orbiting satellites that receive and relay distress alerts from satellite EPIRBs;

“SART” means a survival craft search and rescue radar transponder for search and rescue between ships or aircraft and survival craft;

“sea area A1” means an area within the radiotelephone coverage of at least one VHF coast station in which continuous DSC alerting is available;

“sea area A2” means an area, excluding sea area A1, within the radiotelephone coverage of at least one MF coast station in which continuous DSC alerting is available;

“sea area A3” means an area, excluding sea areas A1 and A2, within the coverage of an INMARSAT geostationary satellite in which continuous alerting is available;

“sea area A4” means an area outside sea areas A1, A2 and A3;

“ship earth station” means a mobile earth station in the maritime mobile-satellite service located on board a ship;

“VHF” means the frequency spectrum between 30 MHz and 300 MHz.

Functional requirements

7. While at sea, a ship must have the capacity -
 - (a) subject to regulations 10(1)(a) and 12(2)(d)(iii), of transmitting ship-to-shore distress alerts by at least two separate and independent means, each using a different radio communication service;
 - (b) of receiving shore-to-ship distress alerts;
 - (c) of transmitting and receiving ship-to-ship distress alerts;
 - (d) of transmitting and receiving search and rescue co-ordinating communications;
 - (e) of transmitting and receiving on-scene communications;
 - (f) of transmitting and receiving signals for locating;
 - (g) of transmitting and receiving maritime safety information;
 - (h) subject to regulation 16(14), of transmitting and receiving general radio communications to and from shore-based radio systems or networks; and
 - (i) of transmitting and receiving bridge-to-bridge communications.

Radio installations

8. (1) Every radio installation referred to in regulation 9, 10, 11 and 12 must -
 - (a) be installed in such a way that harmful interference of mechanical, electrical or other origin does not affect its proper use, and to ensure electromagnetic compatibility and avoidance of harmful interaction with other equipment and systems and the greatest possible degree of safety and operational availability;
 - (b) be protected against the harmful effects of water, extremes of temperature and other adverse environmental conditions;
 - (c) be provided with reliable, permanently-arranged electrical lighting, independent of the main and emergency sources of electrical energy, for the adequate illumination of the radio controls for operating that radio installation; and
 - (d) be clearly marked with the call sign, the ship station identity and such other codes as are applicable for the use of that radio installation.
- (2) Control of the VHF radiotelephone channels required for navigational safety must be immediately available on the navigating bridge, convenient to the conning position and

where necessary facilities including portable VHF equipment must be available to permit radio communications from the wings of the navigating bridge.

(3) Every transmitter and receiver fitted in accordance with this Part must be provided with a suitable antenna, so constructed and sited to enable each item of radio equipment to perform its intended communication function effectively.

(4) Where wire transmitting antennae are provided as part of the radio installation -

(a) it must be fitted with suitable insulators which are suspended between supports liable to whipping;

(b) the antennae must be protected against breakage; and

(c) a spare antenna, completely assembled for rapid placement, must be carried.

(5) Where MF and MF/HF radio installations are provided with a transmitting antenna that is not a supported wire antenna, a spare antenna of similar electrical characteristics must be carried.

(6) The normal range of a radiotelephone transmitter must not be less than 150 nautical miles on either 2182, 4125, 6215 or 8291 kHz from ship to ship or ship to shore at any time of the day or night under normal propagation conditions.

(7) Subject to subregulation (6), the range of a radiotelephone transmitter referred to in that subregulation must be determined by calculating the metre-amperes, which is the product of the maximum height of the antenna in metres, measured from the lead-out insulator and the current in amperes, measured at the base of the antenna.

(8) A radiotelephone transmitter must comply with subregulation (6), if the product calculated in accordance with paragraph (a) is not less than -

(a) 7.5 metre-amperes, in the case of an antenna which has a horizontal top-length of not less than 50 per cent of its maximum height, measured from the lead-out insulator; or

(b) 12.8 metre-amperes, in the case of any other antenna.

(9) If an antenna arrangement causes difficulties in determining the range of the radiotelephone transmitter by calculation, its range must be determined by trial or by means of a radio frequency wattmeter.

(10) A radiotelephone transmitter referred to in subregulation (6), must have a minimum rated power output of not less than 100 watts peak envelope power (PEP) measured between the transmitter final stage and the antenna tuning unit (ATU) on either 2182, 4125, 6215 or 8291 kHz.

Radio equipment general requirements

9. A ship must be fitted with -

(a) a VHF radio installation capable of transmitting and receiving -

(i) DSC on 156.525 MHz, channel 70, to enable it to initiate the transmission of distress alerts on that channel from the position from which the ship is normally navigated; and

- (ii) radiotelephony on 156.300 MHz, channel 6, 156.650 MHz, channel 13, and 156.800 MHz, channel 16;
- (b) a radio installation capable of maintaining a continuous DSC watch on VHF channel 70, which may be separate from or combined with the radio installation referred to in paragraph (a)(i);
- (c) two SARTs, capable of operating in the 9 GHz band, carried on both sides, one on each side, of the bridge and stowed inside the wheelhouse near the exit doors from the bridge so as to enable rapid placement in a survival craft in respect of Class A cargo ships of 500 tons and more, Class A fishing vessels and Class A passenger ships;
- (d) one SART, capable of operating in the 9 GHz band, carried inside the wheelhouse near the most convenient exit door and stowed so as to enable rapid placement in a survival craft in respect of Class A cargo ships under 500 tons, Class B ships and Class C ships;
- (e) a receiver capable of receiving international NAVTEX service broadcasts, if the ship is engaged on voyages in any area in which an international NAVTEX service is provided;
- (f) a radio facility for the reception of maritime safety information by the INMARSAT enhanced group calling system, if the ship is engaged on voyages in any area of INMARSAT coverage but in which an international NAVTEX service is not provided or unreliable, but this provision does not apply to a ship engaged on a voyage in an area where an HF direct-printing telegraphy maritime safety information service is provided and that ship is fitted with equipment capable of receiving that service;
- (g) subject to regulation 10(3), a satellite EPIRB that is -
 - (i) capable of transmitting a distress alert through either the polar orbiting satellite service operating in the 406 MHz band or if the ship is engaged only on voyages within areas of INMARSAT coverage, the INMARSAT geo-stationary satellite service operating in the 1.6 GHz band;
 - (ii) installed in an easily accessible position;
 - (iii) capable of being manually released and carried by one person into a survival craft;
 - (iv) capable of floating free if the ship sinks, and of being automatically activated when afloat; and
 - (v) capable of being activated manually;
- (h) at least three portable two-way VHF radiotelephone transceivers in respect of Class A cargo ships of 500 tons or more, Class A fishing vessels and Class A passenger ships, at least two portable two-way VHF radiotelephone transceivers in respect of Class A cargo ships of 300 tons or more, but less than 500 tons, Class B and C fishing vessels of 24 meters or more in length, and Class C and D passenger ships of 25 tons or more;
- (i) at least one portable two-way VHF radiotelephone transceiver in respect of Class B, Class C and Class D fishing vessels of less than 24 metres in length and other class B, C and D ships of less than 300 tons; and

- (j) in respect of the portable VHF transceivers provided on Convention ships, sealed lithium batteries with valid expiry dates.

Radio equipment requirements for sea area A1

10. (1) In addition to meeting the requirements of regulation 9, a ship engaged on voyages exclusively in sea area A1 must be fitted with a radio installation capable of initiating the transmission of ship-to-shore distress alerts from the position from which the ship is normally navigated, operating -

- (a) on VHF using DSC, which requirement may be met by the EPIRB specified in subregulation (3), by installing the EPIRB close to the position from which the ship is normally navigated or by remote activation of the EPIRB from that position;
- (b) through the polar orbiting satellite service on 406 MHz, which requirement may be met by the satellite EPIRB referred to in regulation 9(g), by installing the satellite EPIRB close to the position from which the ship is normally navigated or by remote activation of the satellite EPIRB from that position;
- (c) if the ship is engaged on voyages within areas of coverage of MF coast stations fitted with DSC, on MF using DSC;
- (d) on HF using DSC;
- (e) through the INMARSAT geostationary satellite service, which requirement may be met by -
 - (i) an INMARSAT ship earth station, which requirement may be met by such stations capable of two-way communications, such as standard B or C ship earth stations; or
 - (ii) the satellite EPIRB referred to in regulation 9(g), by installing the satellite EPIRB close to the position from which the ship is normally navigated or by remote activation of the satellite EPIRB from that position.

(2) The VHF radio installation required by regulation 9(a) must have the capacity of also transmitting and receiving general radio communications using radiotelephony.

(3) Ships engaged on voyages exclusively in sea area A1 may carry, in the place of the satellite EPIRB required by regulation 9(g), an EPIRB that is -

- (a) capable of transmitting a distress alert using DSC on VHF channel 70 and providing locating by means of a SART operating in the 9 GHz band;
- (b) installed in an easily accessible position;
- (c) capable of being manually released and carried by one person into a survival craft;
- (d) capable of floating free if the ship sinks, and of being automatically activated when afloat; and
- (e) capable of being activated manually.

Radio equipment requirements for sea areas A1 and A2

11. (1) In addition to meeting the requirements of regulation 9, a ship engaged on voyages beyond sea area A1 but remaining within sea area A2, must be fitted with -

- (a) a MF radio installation capable of transmitting and receiving, for distress and safety purposes, on -
 - (i) 2 187.5 kHz using DSC; and
 - (ii) 2 182 kHz using radiotelephony;
- (b) a radio installation capable of maintaining a continuous DSC watch on 2 187.5 kHz, which may be separate from or combined with the radio installation referred to in paragraph (a)(i); and
- (c) means of initiating the transmission of ship-to-shore distress alerts by a radio service, other than MF, operating -
 - (i) through the polar orbiting satellite service on 406 MHz, which requirement may be met by the satellite EPIRB referred to in regulation 9(g), by installing the satellite EPIRB close to the position from which the ship is normally navigated or by remote activation of the satellite EPIRB from that position;
 - (ii) on HF using DSC; or
 - (iii) through the INMARSAT geostationary satellite service, which requirement may be met by -
 - (aa) the equipment referred to in subregulation (3)(b); or
 - (bb) the satellite EPIRB referred to in regulation 9(g), by installing the satellite EPIRB close to the position from which the ship is normally navigated or by remote activation of the satellite EPIRB from that position.

(2) The radio installations referred to in subregulation (1)(a) and (c) must have the capability of transmitting distress alerts from the position from which the ship is normally navigated.

(3) A ship referred to in subregulation (1) must be capable of transmitting and receiving general radio communications using radiotelephony or direct-printing telegraphy by -

- (a) radio installation operating on frequencies between 1 605 kHz and 4 000 kHz or between 2 000 kHz and 27 500 kHz, which requirement may be met by the equipment referred to in subregulation (1)(a); or
- (b) an INMARSAT ship earth station.

Radio equipment requirements for sea area A3

12. (1) In addition to regulation 9, a ship engaged on voyages beyond sea areas A1 and A2, but remaining within sea area A3, must comply with subregulation (2) or (3).

(2) Subject to subregulation (1), a ship referred to in that subregulation must be fitted with -

- (a) an INMARSAT ship earth station capable of -
 - (i) transmitting and receiving distress and safety communications using direct-printing telegraphy;
 - (ii) initiating and receiving priority distress calls;
 - (iii) maintaining watch for shore-to-ship distress alerts, including alerts transmitted to specifically defined geographical areas; and
 - (iv) transmitting and receiving general radio communication, using radiotelephony or direct-printing telegraphy;
 - (b) an MF radio installation capable of transmitting and receiving, for distress and safety purposes, on -
 - (i) 2 187,5 kHz using DSC; and
 - (ii) 2 182 kHz using radiotelephony;
 - (c) a radio installation capable of maintaining a continuous DSC watch on 2 187.5 kHz, which may be separate from or combined with the radio installation referred to in paragraph (b)(i); and
 - (d) means of initiating the transmission of ship-to-shore distress alerts by a radio service operating -
 - (i) through the polar orbiting satellite service on 406 MHz, which requirement may be met by the satellite EPIRB referred to in regulation 9(g), by installing the satellite EPIRB close to the position from which the ship is normally navigated or by remote activation of the satellite EPIRB from that position;
 - (ii) on HF using DSC; or
 - (iii) through the INMARSAT geostationary satellite service, by an additional ship earth station or by the satellite EPIRB referred to in regulation 9(g), by installing the satellite EPIRB close to the position from which the ship is normally navigated or by remote activation of the satellite EPIRB from that position.
- with -
- (3) Subject to subregulation (1), a ship referred to in that subregulation must be fitted
 - (a) an MF/HF radio installation capable of transmitting and receiving, for distress and safety purposes, on all distress and safety frequencies in the bands between 1 605 kHz and 4 000 kHz and between 4 000 kHz and 27 500 kHz using -
 - (i) DSC;
 - (ii) radiotelephony; and
 - (iii) in the case of a Convention ship, direct-printing telegraphy;
 - (b) equipment, which may be separate from or combined with the radio installation referred to in paragraph (a), capable of maintaining DSC watch on 2 187.5 kHz, 8

414.5 kHz and on at least one of the distress and safety DSC frequencies 4 207.5 kHz, 6 312 kHz, 12 577 kHz or 16 804.5 kHz, frequencies that are possible to select at any time; and

- (c) means of initiating the transmission of ship-to-shore distress alerts by a radio communication service other than HF operating -
 - (i) through the polar orbiting satellite service on 406 MHz, which requirement may be met by the satellite EPIRB referred to in regulation 9(g), by installing the satellite EPIRB close to the position from which the ship is normally navigated or by remote activation of the satellite EPIRB from that position; or
 - (ii) through the INMARSAT geostationary satellite service, which requirement may be met by -
 - (aa) an INMARSAT ship earth station; or
 - (bb) the satellite EPIRB referred to in regulation 9(g), by installing the satellite EPIRB close to the position from which the ship is normally navigated or by remote activation of the satellite EPIRB from that position; and
- (d) equipment capable of transmitting and receiving general radio communications using radiotelephony or direct-printing telegraphy by an MF/HF radio installation operating on working frequencies in the bands between 1 605 kHz and 4 000 kHz and between 4 000 kHz and 27 500 kHz, which requirement may be met by equipment required by paragraph (a).

(4) The radio installations referred to in subregulation (2)(a), (b) and (d) and subregulation (3)(a) and (c) must have the capacity to be able to initiate the transmission of distress alerts from the position from which the ship is normally navigated.

Radio equipment requirements for sea area 4

- 13.** Ships engaged on voyages in sea area A4 must -
- (a) be provided with equipment and radio installations referred to in regulation 12(3)(a), (b), (c)(i) and (d); and
 - (b) comply with regulation 12(4).

Radio watches

- 14.** (1) A ship, while at sea, must maintain a continuous radio watch -
- (a) on VHF DSC channel 70, if the ship is fitted with a VHF radio installation in accordance with regulation 9(b);
 - (b) on the distress and safety DSC frequency 2 187.5 kHz, if the ship is fitted with an MF radio installation as required by regulation 11(1)(b) or 12(2)(c);
 - (c) on the distress and safety DSC frequencies 2 187.5 kHz and 8 414.5 kHz and also on at least one of the distress and safety DSC frequencies 4 207.5 kHz, 6 312 kHz, 12 577 kHz or 16 804.5 kHz, appropriate to the time of day and the geographical position of the ship, if the ship is fitted with an MF/HF radio installation in accordance with regulation 12(3)(b) or regulation 13, which watch may be kept by means of a scanning receiver; and

- (d) for satellite shore-to-ship distress alerts, if the ship is fitted with an INMARSAT ship earth station in accordance with regulation 12(2)(a).

(2) A ship, while at sea, must maintain a radio watch for broadcasting maritime safety information on the appropriate frequency on which the information is broadcasted for the area in which the ship is navigating.

(3) A ship, while at sea and from the position from which the ship is normally navigated must maintain, when practicable, a continuous watch on VHF channel 16.

Source of energy

15. (1) A source of energy sufficient to operate the radio installations required by this Part and to charge any batteries used as part of a reserve source of energy for such installations must be available at all times while the ship is at sea, and at all reasonable times the ship is in port.

(2) On -

(a) a class A passenger ship or cargo ship whose keel was laid after 31 January 1995; and

(b) a Class A fishing vessel whose keel was laid after 1 March 1998,

an emergency source of energy complying with regulation II 1/42 or II 1/43 of the 1974 SOLAS Convention or regulation IV 17 (1) and (2) of the 1993 SFV Protocol, respectively, must be available at all times while the ship is at sea, and at all reasonable times the ship is in port.

(3) A ship must, if there is a failure of the main and emergency sources of electrical power, be fitted with a reserve source of energy to supply radio installations referred to in subregulation (4) with energy to conduct distress and safety radio communications.

(4) A reserve source of energy contemplated in subregulation (3) must be capable of simultaneously operating the VHF radio installation required by regulation 9(a) and, as appropriate for the sea area or sea areas for which the ship is fitted, the MF radio installation required by regulation 11(1)(a), the MF/HF radio installation required by regulation 12(3)(a) or regulation 13 or the INMARSAT ship earth station required by regulation 12(2)(a), and any of the additional requirements specified in subregulations (6), (7) and (10) of this regulation -

(a) on a class A passenger ship or cargo ship whose keel was laid after 31 January 1995, for a period of at least one hour;

(b) on a class A fishing vessel whose keel was laid after 1 March 1998, for a period of at least 3 hours, or 1 hour if the emergency source of electrical power complies with the requirements to supply the radio installations and is capable of serving for a period of at least 6 hours;

(c) on a passenger ship or cargo ship whose keel was laid before 1 February 1995 and a fishing vessel whose keel was laid before 2 March 1998 -

(i) if the emergency source of electrical energy complies with the relevant provisions of regulation 11-1/42 or 43 of the 1974 SOLAS Convention, including the supply of such energy to the radio installations, for a period of at least one hour;

(ii) on a fishing vessel, if the emergency source of electrical energy complies with all relevant requirements of regulation IV 17 (1) and (2) of the 1993 SFV Protocol, including the requirements to supply the radio installations,

for a period of at least 3 hours or at least 1 hour if the emergency source of electrical power complies with the requirements to supply the radio installations and is capable of serving for a period of at least 6 hours; or

(iii) if the reserve source of energy is not provided or does not comply with this regulation, for a period of at least six hours.

(5) The reserve source or sources of energy referred to in subregulation (3) -

(a) need not supply independent HF and MF radio installations simultaneously; and

(b) must be independent of the ship's propelling power and main electrical system.

(6) Where, in addition to the VHF radio installation, two or more of the other radio installations specified in subregulation (4) can be connected to the reserve source of energy referred to in that subregulation, it must be capable of simultaneously supplying, for the period specified in paragraph (a) or (b) of that subregulation, as the case may be, the VHF radio installation and -

(a) all other radio installations that can be connected to the reserve source of energy at the same time; or

(b) if only one of such other radio installations can be connected to the reserve source of energy at the same time as the VHF radio installation, whichever of the other radio installations that consumes the most power.

(7) The reserve source of energy referred to in subregulation (3) may be used to supply the electrical lighting required by regulation 8(1)(c).

(8) Where a reserve source of energy consists of rechargeable accumulator batteries -

(a) a means of automatically charging such batteries, capable of recharging them to minimum capacity requirements within 10 hours, must be provided; and

(b) the capacity of the battery or batteries must be checked when the ship is not at sea, using an appropriate method, at intervals not exceeding 12 months.

(9) The site and installation of accumulator batteries that provide a reserve source of energy must be located above the uppermost continuous deck and must be readily accessible from the open deck, and in such installation it must be ensured that -

(a) the degree of service specified by the manufacturer is not impaired;

(b) the lifetime specified by the manufacturer is not negatively affected;

(c) reasonable safety is provided;

(d) battery temperatures remain within the manufacturer's specifications, whether under charge or idle; and

(e) when fully charged, the batteries provide at least the minimum number of hours of operation specified by the manufacturer, under all weather conditions.

(10) If an uninterrupted source of electrical energy is needed to ensure the performance of any emergency communication equipment not referred to in this regulation, a reserve source of electrical energy must be provided to ensure a supply of such energy for a period of not less than 18 hours in respect of a passenger ship and not less than six hours in respect of any other ship.

(11) For the purpose of calculating the required ampere-hour capacity of the reserve source of energy, the total current used in the calculation must be equal to the sum of the average current consumption of all the radio installations that can be connected simultaneously to the source of energy, calculated by adding -

- (a) the current consumption of the VHF receiver;
- (b) one half of the current consumption of the VHF transmitter;
- (c) the current consumption of an MF/HF receiver and of the transmitter when operation of the “press to transmit” switch makes it ready for immediate transmission;
- (d) one half of the current that may be drawn by an MF/HF transmitter for speech transmission on the frequency at which the current consumption of the transmitter is at its maximum;
- (e) the current consumption of an INMARSAT ship earth station when it is receiving transmissions;
- (f) one half of the current that may be drawn by an INMARSAT ship earth station when it is transmitting in the mode in which the current consumption is at its maximum; and
- (g) the total current consumption of all additional loads to which the reserve source may supply energy in times of distress or emergency.

(12) For the purpose of calculating the peak current requirements of the reserve source of energy, the total current used in the calculation must be equal to the sum of the peak current consumption of all the radio installations that can be connected simultaneously to the source of energy, calculated by adding -

- (a) the peak current consumption of the VHF transmitter;
- (b) the peak current that may be drawn by an MF/HF transmitter for transmission on the frequency at which the current consumption of the transmitter is at its maximum;
- (c) the peak current that may be drawn by an INMARSAT ship earth station when it is transmitting in the mode in which the current consumption is at its maximum; and
- (d) the total peak current consumption of all additional loads to which the reserve source may supply energy in times of distress or emergency.

Maintenance requirements

16. (1) For the purposes of this regulation “equipment” means all radio equipment necessary for providing general radio communications as required by this Part.

(2) Equipment must be designed in such a way that the main units can be replaced readily, without elaborate recalibration or readjustment.

(3) Where applicable, equipment must be constructed and installed in such a way so as to be readily accessible for inspection and on-board maintenance purposes.

(4) Adequate information must be readily available to properly operate and maintain equipment.

- (5) Adequate tools and spare parts in accordance with Annexure 4 must be provided by the owner to maintain equipment.
- (6) On ships engaged on voyages in sea area A1, availability must be ensured by duplication of VHF equipment or a single VHF transceiver with a separate dedicated VHF Ch70 receiver and DSC decoder.
- (7) On ships engaged on voyages in sea area A2, availability must be ensured by using such methods as duplication of equipment and shore-based maintenance, or at-sea electronic maintenance capability.
- (8) Non-Convention vessels provided with a complete Inmarsat C SES or mini C SES or a class A or class E MF/HF station with class A or E MF/HF DSC watchkeeping facilities and class A or E MF/HF DSC calling facilities in addition to the other equipment prescribed in these regulations are regarded to have complied with the duplication required by this subregulation.
- (9) Evidence of shore-based maintenance contracts must be displayed or available for inspection at all reasonable times.
- (10) On vessels engaged on voyages in sea area A3, availability of radio and Inmarsat communications must be ensured by using a combination of at least two methods such as duplication of equipment, shore-based maintenance or at-sea electronic maintenance capability.
- (11) Class B and C vessels provided with an approved Maritime Inmarsat C SES or mini C SES as well as a class A or class E MF/HF station with class A or class E MF/HF DSC watchkeeping facilities and class A or class E MF/HF DSC calling facilities in addition to the other equipment prescribed in these regulations are regarded to have complied with the duplication required by this subregulation.
- (12) On Convention ships engaged on voyages in sea areas A4, availability of radio communications must be ensured by using a combination of at least two methods such as duplication of equipment, shore-based maintenance or at-sea electronic maintenance capability.
- (13) Non-Convention vessels provided with two class A or class E MF/HF stations with class A or class E MF/HF DSC watchkeeping facilities and class A or class E MF/HF DSC calling facilities as well as two class A or class D VHF stations with class A or class D DSC watchkeeping facilities and class A or class D DSC calling facilities in addition to the other equipment prescribed in these regulations are regarded to have complied with the duplication referred to in this subregulation.
- (14) A ship is not unseaworthy by reason of a malfunction of the equipment for providing general radio communications as referred to in regulation 7(h), and this must not be a reason for delaying a ship in a port where repair facilities are not readily available, but the ship must be capable of performing all distress and safety radio communication functions.
- (15) While a ship is at sea, the master of such ship must designate a person to carry out the appropriate tests and checks specified in Annexure 2 and, if any radio installation is not in working order, that person must inform the master thereof and enter the relevant details in the radio log.
- (16) Satellite EPIRBs must be tested at intervals not exceeding 12 months for all aspects of operational efficiency, including frequency stability, signal strength and coding.
- (17) In cases where it is proper and reasonable, the Minister or the Permanent Secretary, as the case may be, may extend the period referred to in subregulation (16) to 17 months.

(18) Whenever practical, the test referred to in subregulation 16 must be carried out at the same time as the annual radio survey.

(19) The test referred to subregulation (16) may be conducted on board the ship or at an approved testing or servicing station and a certified copy of the test certificate must be available on board.

Radio personnel

17. A GMDSS ship must carry the number of GMDSS operators required by the Radio Regulations.

Radio records

18. The master must keep a radio log or cause a radio log to be kept by a radio operator, setting out the particulars prescribed by Annexure 3 of all incidents connected with the radio communication service that appear to be of importance to the safety of life at sea.

PART III

RADIO EQUIPMENTS FOR LIFEBOATS AND SURVIVAL CRAFT

Radio equipment for lifeboats and survival craft

19. (1) The portable radio equipment for survival craft, the two-way VHF radiotelephone apparatus for survival craft, the survival craft EPIRBs and SARTs required by the Act must comply with the appropriate performance standards as referred to in regulation 5(1).

(2) The battery included in motor lifeboat fixed radio equipment must be used only for the operation of such equipment and searchlight.

PART IV

PENALTIES

Detention

20. A ship that does not comply with these regulations may be detained in terms of section 243 of the Act.

Penalties

21. (1) The master or owner of a ship to which these regulations apply and who fails to comply with or contravenes regulation 2(2),(3), (4), or (5), regulation 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16(2), (3), (4), (5), (6), (7), (8), (9), (10) (11), (12), (13), (14), (15) or (16), regulation 17 or 18 commits an offence, and is on conviction liable to a fine not exceeding N\$ 400 or to imprisonment for a period not exceeding one year, or to both such fine and such imprisonment.

(2) An operator who contravenes regulation 18 commits an offence, and is on conviction be liable to a fine not exceeding N\$400 or to imprisonment for a period not exceeding one year, or to both such fine and such imprisonment.

(3) A person charged under this regulation may, as defence, show that he or she took all reasonable precautions to avoid the commission of the offence.

- 4.3 Communication equipment: Mark with tick or quantity ①② or ③ if more than one of each item.
- VHF with DSC VHF without DSC Portable VHF
- MFwith DSC MF without DSC MF with NBDP
- HF with DSC HF without DSC. HF with NBDP
- Inmarsat C Inmarsat No.
- Other Inmarsat Inmarsat No.
- Iridium: Iridium No. SART Satrac
- Other:
- 5.1.1 Name and address of owners:
- 5.1.2 Telephone No. Country code:Area code: Telephone No.....
- 5.1.3 FaxNo. Country code:Area code: FaxNo.....
- 5.1.4 emailaddress:
- 5.2.1 Name of primary 24-hour Emergency contact:
- 5.2.2 Office Telephone number of primary contact: Country code: Area code: No.
- 5.2.3 Cellphonenumberofprimarycontact:Countrycode:.....No.....
- 5.2.4 Residential telephone number of primary contact: Country code: Area code: No.
- 5.2.5 emailaddressofprimarycontact:
- 5.3.1 Name of alternate 24-hour Emergency contact:
- 5.3.2 Office Telephone number of alternate contact: Country code: Area code: No.
- 5.3.3 Cellphonenumberofalternatecontact:Countrycode:.....No.....
- 5.3.4 Residential telephone number of alternate contact: Country code: Area code: No.
- 5.3.5 email address of alternate contact:
- 5.4.1 Name of alternate 24-hour Emergency contact:
- 5.4.2 Office Telephone number of alternate contact: Country code: Area code: No.
- 5.4.3 Cellphone number of alternate contact: Country code:No.....
- 5.4.4 Residential telephone number of alternate contact: Country code: Area code: No.
- 5.4.5 emailaddressofalternatecontact:
6. Other information:

Annexure 2**Equipment tests and reserve power checks: GMDSS ships****(Regulation 16(15))****1. Daily**

- (a) The proper functioning of the DSC facilities must be tested at least once each day, without radiation of signals, by use of the means provided on the equipment.
- (b) Batteries providing a source of energy for any part of the radio installations must be tested daily and, where necessary, brought to a fully charged condition.

2. Weekly

- (a) The proper operation of the DSC facilities must be tested at least once a week by means of a test call, when within communication range of a coast station fitted with DSC equipment, but where a ship has been out of communication range of a coast station fitted with DSC equipment for a period longer than one week, a test call must be made at the first opportunity once the ship is within communication range of such a coast station.
- (b) Where the reserve source of energy is not a battery, the reserve source of energy must be tested weekly.

3. Monthly

- (a) Each EPIRB and satellite EPIRB must be tested at least once a month to determine its capability to operate properly using the means provided on the device and without using the satellite system and have their source of energy and hydrostatic release units replaced not later than their expiry dates.
- (b) Each SART must be checked at least once a month for security and signs of damage and have its source or energy replaced not later than its expiry date.
- (c) A test must be performed at least once a month on the security and condition of the battery connections, the battery compartment and all batteries providing a source of energy for any part of a radio installation.

Annexure 3**Radio log: GMDSS ships****(Regulation 18)**

In accordance with regulation 18, the following must be entered in the radio log:

- (a) particulars of communications relating to distress, urgency and safety traffic, and the time of occurrence;
- (b) particulars of important service incidents, and the time of occurrence;
- (c) particulars of maintenance checks required by regulation 16(12), and the time of occurrence;
- (d) the position of the ship at least once a day;
- (e) particulars of the ship, including call sign, ship station identity numbers, gross tonnage, registered length, official number, owner's name and address;
- (f) particulars of the primary operator, including his or her name, certificate number and category and period employed as the primary operator; and
- (g) particulars of watchkeeping in compliance with regulation 14.

Annexure 4**Spare parts, tools and testing equipment****(Regulation 16(5))****GMDSS ship provided with radio electronics officer****Tools**

- 1 15 cm smooth file
- 1 jointing knife
- 1 pair 18 cm wireman's insulated pliers
- 1 pair 15 cm insulated long-nose pliers
- 1 pair 15 cm insulated side cutters
- 1 set each insulated flat-head and cross-head screwdrivers
- 1 set watchmaker's screwdrivers
- 1 set each of spanners (flat and box) (suitable for use on the equipment)
- 1 adjustable spanner with 25 mm gap
- 1 hand drill with 8 mm chuck
- 1 set high-speed twist drill bits to suit hand drill
- 1 clamp vice
- 1 electric soldering iron (to suit ship's voltage) with a power consumption of not less than 75 watts or more than 125 watts
- 1 electric soldering iron (to suit ship's voltage) with a power consumption of not more than 30 watts
- 1 dusting brush
- 1 300 g ball-pane hammer
- 1 hacksaw and spare blades to suit
- 1 lockable tool-box or compartment (for containing the above-mentioned tools)

Measuring instruments

- 1 hydrometer or load-tester
- 2 An analogue or digital multimeter capable of measuring direct current from 1 to 500 milliamperes, AC and DC voltage from 1 to 1 000 volts, and resistance from 10 to 20 000 ohms.

Spare parts

- 5 fuses for each type and rating of fuse in use
- 1 safety loop (if main or reserve antenna is a supported wire type and fitted with safety loops)
- 12 bulldog grips to suit the antenna wire
- 1 telephone handset with leads, and plugs if used, for each type of handset in use
- 1 emergency lamp with spare bulb
- 1 spare bulb for the emergency light
- 50 per cent of the number of insulators in use (excluding lead-out insulators)
- 100 per cent of the number of shackles and thimbles in use

Miscellaneous items

- 1 pack carborandum paper (assorted grades)
- 1 large roll of insulating tape

- 1 can general purpose lubricating oil
- 2 rolls of NAVTEX paper
- ½ litre lubricating oil (if a machine lubricated with oil forms part of the installation)
- 10 M of flexible wire (5 amp rating) for adjustable connections
- 10 M of PVC wire of 10 mm thickness
- 250 g petroleum jelly
- 500 g general purpose grease
- 500 g resin-cored solder
- 5 litres distilled water

GMDSS ships not provided with radio electronics officers

Tools

- 1 15 cm smooth file
- 1 jointing knife
- 1 pair 18 cm insulated wireman's pliers with side cutters
- 1 set each insulated flat-head and cross-head screwdrivers (suitable for use on radiotelephone equipment)
- 1 adjustable spanner with 25 mm gap
- 1 hacksaw and spare blades to suit
- 1 lockable tool box or compartment (for containing the above-mentioned tools)

Measuring instruments

- 1 hydrometer or compatible load tester
- 5 fuses for each type and rating of fuse in use
- 1 spare bulb for the emergency light required by regulation
- 2 rolls of NAVTEX paper
- 250 g petroleum jelly or general purpose grease
- 5 litres distilled water

On all ships where special nuts and/or screws are used for fastening, suitable tools must be provided in addition to those specified in (A) and (B) above.

Annexure 5**Documents and Publications****(Regulation 2(6))**

GMDSS ships must be provided with –

- (a) the ship station licence and current receipt for the annual renewal thereof;
- (b) the certificate of the radio operator or operators referred to in the Radio Regulations;
- (c) GMDSS logbook;
- (d) an Alphabetical List of Call Signs and Numerical Table of Identities of Stations used by the Maritime Mobile and Maritime Mobile-Satellite service, e.g. ITU List VII A, current edition, required by class A and B ships, or local list for class C and D ships;
- (e) a list of coast stations and coast earth stations with which communications are likely to be conducted, showing watchkeeping hours and frequencies, particulars of the coast stations and coast earth stations participating in the GMDSS, e.g. ITU List of Coast stations, List IV, current edition, required by class A and B ships, or local list for class C and D ships;
- (f) a list of coast stations and coast earth stations providing navigational and meteorological warnings and other urgent information for ships, e.g. ITU List of Radiodetermination and Special Service Stations, List VI, current edition, for class A and class B ships, or local list for class C and D ships;
- (g) list of Ship Stations, e.g. ITU List of Ship Stations, List V, current edition for class A and B ships;
- (h) ITU Manual for use by the Maritime Mobile and Maritime Mobile-Satellite services, current edition, or an equivalent publication thereof applicable to the facilities on board;
- (i) the full International Code of Signals;
- (j) Local General Safety certificate, or Fishing Vessel Safety certificate, including Endorsements or, in the case of other ships, Safety Radio certificate;
- (k) a Tonnage certificate;
- (l) a Registration certificate;
- (m) an Antenna Rigging Plan, indicating the height of the MF/HF antenna above the lead-out insulator and the height of the VHF antennae above sea level.

Annexure 6**VHF range****(Regulation 1)**

Theoretical VHF range to be used for determining the maximum range of class D ships limited to sea area A1.

The maximum range of a class D ship limited to sea area A1 expressed in nautical miles must be based on the formula $R_{NM} = 2.2 \times (\sqrt{h_{SS}} + \sqrt{h_{CRS}}) \times P/25$

where R_{NM} stands for range in nautical miles

h_{SS} stands for height of ship station VHF antenna in metres above sea level

h_{CRS} stands for height of Coast station VHF Receiver antenna in metres above sea level

P stands for the VHF Transmitter RF output power expressed in Watts.

h_{SS}	h_{CRS}	Watts	R_{NM}
4	4	25	8.8
4	9	25	11
4	16	25	13.2
4	25	25	15.4
4	36	25	17.6
4	49	25	19.8
4	64	25	22
4	81	25	24.2
4	100	25	26.4
9	9	25	13.2
9	16	25	15.4
9	25	25	17.6
9	36	25	19.8
9	49	25	22
9	64	25	24.2
9	81	25	26.4
9	100	25	28.6
16	16	25	17.6
16	25	25	19.8
16	36	25	22
16	49	25	24.2
16	64	25	26.4
16	81	25	28.6
16	100	25	30.8
25	25	25	22
25	36	25	24.2
25	49	25	26.4
25	64	25	28.6
25	81	25	30.8
25	100	25	33
36	36	25	26.4
36	49	25	28.6
36	64	25	30.8
36	81	25	33
36	100	25	35.2
49	49	25	30.8
49	64	25	33
49	81	25	35.2
49	100	25	37.4