



# RUSSIAN MARITIME REGISTER OF SHIPPING

**CIRCULAR LETTER**

**No. 315-22-1442c**

dated 28.09.2020

Re:

amendments to the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships, 2020, ND No.2-020101-130-E

Item(s) of supervision:  
products

Entry-into-force date:  
**01.11.2020**

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Appendices:

Appendix 1: information on amendments introduced by the Circular Letter

Appendix 2: text of amendments to Part IV "Technical Supervision during Manufacture of Products"

Director General

Konstantin G. Palnikov

Text of CL:

We hereby inform that the Rules for Technical Supervision During Construction of Ships and Manufacture of Materials and Products for Ships shall be amended as specified in the Appendices to the Circular Letter.

It is necessary to do the following:

1. Bring the content of the Circular Letter to the notice of the RS surveyors, interested organizations and persons in the area of the RS Branch Offices' activity.
2. Apply the provisions of the Circular Letter to the products installed on board the ships contracted for construction on or after 01.11.2020.

List of the amended and/or introduced paras/chapters/sections:

Sections 15 and 16

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**Information on amendments introduced by the Circular Letter  
(for inclusion in the Revision History to the RS Publication)**

No.	Amended paras/chapters/sections	Information on amendments	No. and date of the Circular Letter introducing the amendments	Entry-into-force date
1	Section 15	<p>The requirements to carry out the RS technical supervision considering the amendments introduced into Part IV "Radio Equipment" of the Rules for Equipment of Sea-Going Ships and Part I "General Regulations for Technical Supervision of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships have been specified.</p> <p>The requirements for the survey of radio and navigational equipment have been unified.</p> <p>Editorial amendments of technical nature to the equipment modernization have been made</p>	315-22-1442c of 28.09.2020	01.11.2020
2	Section 16	<p>The requirements to carry out the RS technical supervision considering the amendments introduced into Part V "Navigational Equipment" of the Rules for Equipment of Sea-Going Ships and Part I "General Regulations for Technical Supervision of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships have been specified.</p> <p>The requirements for the survey of radio and navigational equipment have been unified.</p> <p>Editorial amendments of technical nature to the equipment modernization have been made</p>	315-22-1442c of 28.09.2020	01.11.2020

**RULES FOR TECHNICAL SUPERVISION DURING CONSTRUCTION OF SHIPS AND  
MANUFACTURE OF MATERIALS AND PRODUCTS FOR SHIPS, 2020,**

**ND No. 2-020101-130-E**

**PART IV. TECHNICAL SUPERVISION DURING MANUFACTURE OF PRODUCTS**

1 **Section 15** is replaced by the following text:

**"15 RADIO EQUIPMENT**

**15.1 GENERAL**

**15.1.1** The provisions of this Section apply in technical supervision of the radio equipment specified in the RS Nomenclature.

**15.1.2** The Section establishes the procedure, scope and methods of the Register supervision during manufacture of radio equipment at the firm (manufacturer).

**15.1.3** General provisions on the arrangement of technical supervision during manufacture of radio equipment for ships are set forth in Part I "General Regulations for Technical Supervision", on technical documentation - in Part II "Technical Documentation".

**15.1.4** Radio equipment shall be supplied for the ship together with the documents in accordance with the RS Nomenclature.

**15.2 TECHNICAL SUPERVISION FOR TYPE APPROVAL OF THE PRODUCT**

**15.2.1** The following stages of technical supervision shall be provided for type approval of the products:

**.1** review and approval of technical documentation for the product specified in 1.3.4, Part IV "Radio Equipment" of the Rules for the Equipment of Sea-Going Ships;

**.2** review and approval of test program;

**.3** performance of surveys and tests;

**.4** drawing up of technical supervision results (Form 6.3.18) and issuing the RS Type Approval Certificate (CTO) for the product (Form 6.8.3).

**15.2.2** Review of technical documentation shall be carried out for check of the product compliance with the applicable requirements of the RS rules, appropriate IMO resolutions, other ND to be specified in the RS Type Approval Certificate (CTO).

The product shall be subjected to the full list of tests resulting from the requirements of RS rules, IMO resolutions, other ND. Types, test procedures and required results are given in the appropriate IEC and ISO standards. The results of previous tests may be taken into account. Test program specified in 15.2.1.2 determines the types and methods of tests to be carried out in the presence of the RS surveyor. Test program may include both bench tests and full scale or shipboard tests of the product.

Survey of the product shall be conducted for determining its compliance with the approved technical documentation, applicable RS rules, appropriate IMO resolutions, other ND to be specified in the RS Type Approval Certificate (CTO).

**15.2.3** When required by the Register, the radio equipment pilot specimens may be subjected to operational tests on board a ship, if they are of radically new design and were not previously used on board a ship, or cannot be adequately checked on the test bed.

### **15.3 SCOPE OF SURVEYS OF SERIAL PRODUCTS AT ESTABLISHED PRODUCTION**

**15.3.1** Technical supervision during manufacture of radio equipment items at a manufacturer's with established production shall be carried out by surveying each finished product providing for:

- .1 checking the product compliance with the data specified in the RS Type Approval Certificate (CTO), checking the documents of the competent bodies confirming the product conformity with the special requirements (intrinsic safety, etc.);
- .2 checking the completeness of the product and technical documentation;
- .3 external inspection;
- .4 checking product functioning;
- .5 checking and testing the product to determine its performance and parameters, when the survey of equipment is carried out at production site;
- .6 testing in the scope specified in effective documents on the product;
- .7 checking spare parts (where applicable);
- .8 issuing for products the Register documents prescribed by the technical supervision type established.

**15.3.2** To surveying, shall be submitted the final products that have passed all the checks and tests conducted by the technical control body of the firm (manufacturer).

### **15.4 GENERAL INSTRUCTIONS ON SURVEYING OF SERIAL PRODUCTS AT ESTABLISHED PRODUCTION**

**15.4.1** Depending on the production process used at the firm (manufacturer), to be submitted for surveying are individual specimens of fully completed products or of their batch.

**15.4.2** The presence of metrological documents for devices, apparatus, testing equipment, and the like intended for checking and testing products during the survey shall be ascertained.

**15.4.3** For two-way VHF radiotelephone apparatus, as well as for radar transponders, AIS-transmitters of life-saving appliances and radio beacons, the presence of instructions for their activating by untrained personnel on the case of each kind of the equipment shall be checked.

**15.4.4** The completeness shall be checked for compliance with data specified in the RS CTO.

In visual examination, the product conformity with the requirements of the Rules for the Equipment of Sea-Going Ships shall be verified. Presence of marking that indicates the manufacturer, type, serial number, safe distance of magnetic compass installation (where applicable) and other data pertinent for the particular kind of equipment.

### **15.5 SURVEYING SINGLE KINDS OF SERIAL PRODUCTS OF RADIO EQUIPMENT AT ESTABLISHED PRODUCTION**

**15.5.1** In addition to general inspections, checks, tests and measurements of radio equipment, the following checks of single kinds of radio equipment devices and systems given below can be carried out.

**15.5.2** In the survey of transmitters being separate or combined radio transmitting devices or a part of radio stations, depending on their purpose, the following can be checked:

- .1 operation on fixed frequencies, over separate bands;
- .2 operation using different classes of emission;
- .3 operation for the standard artificial aerial;
- .4 operation of tuners over the given range of aerial parameters and the power delivered to a standard artificial aerial. The transmitter shall be readily tuned over all bands to all the aerials having specified parameters; in this case, the power values shall be within the limits specified in the technical documentation;
- .5 operability of transmitters in simulating the open-circuiting of an aerial or its fault to frame.

**15.5.3** In the survey of receivers being separate ones or a part of radio stations, depending

on their purpose, the following can be checked:

- .1 correspondence of a frequency range;
- .2 accuracy of frequency setting;
- .3 sensitivity in the modes of receiving H3E, J3E, F1B or J2B (G3E, G2B for VHF) emissions, specified in the technical documentation over all bands;
- .4 attenuation of sensitivity of the adjacent channel, intermediate frequency, image channel and other parameters;
- .5 bandwidth of audio frequencies in all the modes of radiotelephone transmissions reception;
- .6 presence and values of clipping in radiotelephone modes of operation.

**15.5.4** In the survey of automatic matching aerial devices integrated in transmitters or fitted as separate units, the following can be checked and tested:

- .1 functioning of the matching device over all the transmitter bands specified and on all the aerials specified. Such checks may be carried out using an artificial aerial;
- .2 measurement of time to tune and retune of the matching device, when shifting to another frequency of a transmitter;
- .3 presence and functioning of indication of transmitter availability for operation, wrong tuning, etc.;
- .4 availability in the matching device of an opportunity to connect a transmitting aerial, an aerial commutator, a receiving aerial; their earthing and isolation;
- .5 the minimum value of aerial insulation resistance wherein the matching device automatically prevents transmitter tuning and which shall not exceed 1 MOhm.

**15.5.5** In the survey of supply devices making parts of radio equipment products, both integrated in the common structure of the product or being separate units of those products, the following can be checked:

- .1 presence of electric protection devices and their conformity with rated values of voltage and current;
- .2 functioning of commutators of supply switching on and off;
- .3 functioning of the visual indication of "ON – OFF" positions;
- .4 presence of devices for measuring voltage and current, and their functioning on measuring (continuously, casually, selectively) the parameters under control;
- .5 temperature of the most heated parts after lengthy functioning under load;
- .6 power demanded from an electric power source;
- .7 insulation resistance of input circuits, and protective and switching devices fitted therein;
- .8 insulating strength of supply sources of up to 24, 220 and 380 V when tested at a voltage of 500, 1000 and 1500 V respectively, and absence therewith of breakdowns, new formations and discharges;
- .9 operability of the radio equipment with the variation of a supply voltage by  $\pm 10\%$  and a current frequency by  $\pm 5\%$  from rated values;  
absence of self excitation and generation of parasitic oscillations;  
absence of ac potential components at the rectifiers output;
- .10 operability of the radio equipment designed for battery supply at a voltage reduced by 10 % and increased by 30 % of the rated one respectively.

**15.5.6** In the survey of transmitters, receivers, supply devices, automatic devices for generating alarm signals, automatic matching aerial devices, remote control panels and other units being part of the radio station set, in addition to the checks specified in 15.5.2 to 15.5.5, the following can be checked:

- .1 presence of an opportunity to control radio stations both directly and using a remote control panel, if available;
- .2 communication both from the radio station location and via a remote control panel, if available;
- .3 presence of a device for earthing and isolating of aerials connected to the radio station;
- .4 radio station functioning on simplex and duplex channels.

**15.5.7** In the survey of command broadcasting equipment, the following can be checked:

- .1 priority of loudspeaking and command broadcasting in transmitting general radio broadcasting;
- .2 remote start system;
- .3 operability when supplied from a transitional emergency source of electrical power, if any.

**15.5.8** In the survey of the GMDSS VHF radio installation, the following can be checked:

.1 categories of calls using both telephony and digital selective calling (DSC), as well as the availability of communication in the telephony mode for the purposes of:

distress, urgency and safety;  
ship operational requirements;  
public correspondence;

.2 in the survey of the radiotelephone station of the VHF radio installation, the following can be checked and tested:

.2.1 operability:

in the band 156 to 174 MHz using G3E (radiotelephone channels) and G2B (DSC channel 70) type emissions;

within the frequency range 156.3 to 156.875 MHz on simplex channels;

within the frequency range 156.025 to 156.875 MHz for transmission and within the frequency range 160.625 – 162.025 MHz for reception on duplex channels;

.2.2 the maximum deviation of frequency not exceeding  $\pm 5$  kHz at a depth of modulation 100 %;

.2.3 frequency modulation precorrection of 6 dB per octave;

.2.4 audio frequency bandwidth not exceeding 3000 Hz;

.2.5 operation on a vertically polarized aerial;

.2.6 rated power of a transmitter not less than 6 W and not more than 25 W;

.2.7 the mean power of any spurious emission due to modulation products at any other channel of the International Maritime Mobile Service not exceeding a limit of 10  $\mu$ W, and the mean power of any other spurious emission at any discrete frequency of the International Maritime Mobile Service band not exceeding the limit of 2,5  $\mu$ W;

.2.8 sensitivity of the receiver for a signal-to-noise ratio of 20 dB, which shall be equal to or better than 2  $\mu$ V EMF;

.2.9 automatic switching off the loudspeaker during duplex operation;

.2.10 change of channels within 5 s, and change from transmission to reception and vice versa within 0,3 s;

.2.11 manual volume control of the receiver;

.2.12 sufficiency of the receiver bandwidth for receiving a signal with the maximum frequency deviation of +5 kHz in the high (intermediate) frequency at a level of 6 dB;

.2.13 non-linear distortion factor of the receiver which shall not exceed 7 %;

.2.14 adjacent channel selectivity of the receiver which shall be at least 75 dB;

.2.15 intermodulation selectivity of the receiver which shall be at least 70 dB;

.2.16 automatic transition from simplex to duplex operation and vice versa in the transition to the corresponding channels;

.3 in the survey of the radiotelephone station having multichannel watch (scanning) facilities, the following can be checked:

scanning characteristics:

scanning the priority channel with a frequency of not less than once per 2 s;

holding the receiver on the priority channel during all the time of signal duration;

interrupting the signal reception on the additional channel for not longer than 150 ms while continuing the scan on the priority channel;

duration of each listening period on the additional channel which shall be at least 850 ms in the case when a signal is not received on the priority channel, but is received on the additional one;

indicating the channel on which a signal is being received.

**15.5.9** In the survey of the GMDSS MF radio installation, the following can be checked:

.1 categories of calls using both radiotelephony and digital selective calling, as well as the availability of communication in the radiotelephony mode for the purposes of:

distress, urgency and safety;

ship operational requirements;

public correspondence;

.2 operability of the transmitter within the frequency range of 1605 – 4000 kHz with at least two operating frequencies: 2182 and 2187.5 kHz;

.3 transmitter operation with emission classes J3E, H3E and J2B or F1B;

.4 stability of a frequency within 10 Hz of the set one after the transmitter warm up;

.5 peak envelope power with normal modulation and emission class J3E, or the mean

power with emission class J2B or F1B which shall be at least 60 W;

.6 operability on the frequencies 2182 and 2187.5 kHz within a minute after switching on the radio installation;

.7 continuity of the transmitter operation at the rated power;

.8 discrete or continuous tuning of the receiver in the frequency range of 1605 – 4000 kHz;

.9 receiver operation with emission classes J3E, H3H, J2B and F1B;

.10 frequency deviation of the receiver within 10 Hz of the frequency required;

.11 sensitivity of the receiver for emission classes J3E and F1B which shall be at least 6 mV at the receiver input for a signal-to-noise ratio of 20 dB;

.12 receiver power which shall be at least 2 W to a loudspeaker and at least 1 mW to a handset;

.13 adjacent channel selectivity of the receiver which shall be at least 60 dB when tuning away an interference by +6 kHz;

selectivity on spurious channels which shall be at least 80 dB;

intermodulation selectivity relative to 1 µV which shall be at least 70 dB;

non-linear distortion factor of the receiver which shall not exceed 7 per cent;

.14 decoding and encoding DSC formats and their composing, automatic erasing of those messages in 48 h after their reception;

.15 sufficiency of memory capacity for storage in the DSC facility of at least 20 distress alerts received when these are not immediately printed out, automatic erasing of those alerts in 48 h after their reception;

.16 opportunity to control the radio installation from an integral or remote control panel(s) (priority shall be given to the control panel at the conning position);

.17 opportunity to prepare and transmit distress alerts and safety calls, and to provide communications related to distress and safety from the conning position;

.18 immunity to inadvertent use of the means for transmitting distress alerts;

.19 operation of the radio installation control system:

switching on the DSC distress alert (prioritized regarding other kinds of operations);

acknowledgement of DSC distress alert reception;

DSC distress alert relay;

switching on the frequencies 2182 and 2187.5 kHz;

automatic selection of the emission class J3E when switching to the frequency 2182 kHz;

automatic selection of the emission class J2B or F1B when switching to the frequency 2187,5 kHz;

.20 changing emission classes with one control;

.21 independence of receiver and transmitter frequency setting;

.22 opportunity to manually input the ship's position and the time of its determination;

.23 absence of unwanted emissions in use of controls;

.24 presence of indication in clear for understanding form for the DSC formats received and being entered;

.25 presence of the fixed manually-acknowledged audible and visual alarm indicating the receipt of a distress alert or an urgency call. Opportunity of checking the alarm;

.26 indication of transmission and reception frequencies;

.27 storage in the DSC facility memory of self-identification data, and lack of an opportunity to readily change them;

.28 availability of means for checking the DSC facility without signal emission;

**15.5.10** In the survey of the GMDSS MF/HF radio installation, the following can be checked:

.1 categories of calls using both radiotelephony and digital selective calling, as well as provision of radiocommunications in the mode of radiotelephony and NBDP for the purposes of:

distress, urgency and safety;

ship operational requirements;

public correspondence;

.2 operation of the transmitter within the frequency range of 1605 kHz to 27,5 MHz;

availability of at least 18 operating frequencies:

for radiotelephony – 2182; 4125; 6215; 8291; 12290 and 16420 kHz;

for NBDP – 2174.5; 4177.5; 6268; 8376.5; 12520 and 16695 kHz;

for DSC – 2187.5; 4207.5; 6312; 8414.5; 12577 and 16804.5 kHz;

.3 transmitter operation with emission classes J3E, H3H, J2B and F1B;

.4 stability of a frequency within 10 Hz of the set one after the transmitter warm up;

- .5 peak envelope power with normal modulation and emission class J3E, or the mean power with emission class J2B or F1B which shall be at least 60 W;
- .6 opportunity to reduce the output power down to 400 W or less if the mean output power exceeds 400 W;
- .7 operability on the frequencies 2182 and 2187.5 kHz within a minute after switching on the radio installation;
- .8 continuity of the transmitter operation at the rated power;
- .9 discrete or continuous tuning of the receiver in the frequency range of 1605 kHz — 27.5 MHz, or the combination of these, or use of the receiver tuned to the fixed frequencies numbered at least 18;
- .10 receiver operation with emission classes J3E, H3H, J2B and F1B;
- .11 stability of a frequency within 10 Hz of the set one after the transmitter warm up;
- .12 sensitivity of the receiver for emission classes J3E and F1B which shall be at least 6 mV at the receiver input for a signal-to-noise ratio of 20 dB;
- .13 receiver power which shall be at least 2 W to a loudspeaker and at least 1 mW to a handset;
- .14 adjacent channel selectivity of the receiver which shall be at least 60 dB when tuning away interference by +6 kHz;
  - selectivity on spurious channels which shall be at least 80 dB;
  - intermodulation selectivity relative to 1  $\mu$ V which shall be at least 70 dB;
  - non-linear distortion factor of the receiver which shall not exceed 7 %;
- .15 decoding and encoding DSC formats and their composing;
- .16 sufficiency of memory capacity for storage in the DSC facility of at least 20 distress alerts received when these are not immediately printed out;
- .17 scanning all the DSC distress channels selected within not more than 2 s with the time of watching on each channel sufficient for detecting a sequence of dots preceding each DSC. End of scanning when dots transmitted at a speed of 100 Baud are detected;
- .18 operation of the radio installation control system:
  - switching on the DSC distress alert (prioritized regarding other kinds of operations);
  - acknowledgement of DSC distress alert reception;
  - switching on the frequencies 2182 and 2187.5 kHz;
  - automatic selection of the emission class J3E when switching to the frequency 2182 kHz;
  - DSC distress alert relay;
  - automatic selection of the emission class J2B or F1B when switching to the DSC and NBDP distress and safety frequencies;
  - changing emission classes with not more than one control;
  - opportunity to independently set receiver and transmitter frequencies;
  - manual input of the ship's position and the time of its determination;
- .19 absence of unwanted emissions in use of controls;
- .20 presence of an audible and visual alarm activating after the receipt of a distress alert or an urgency call, or the call of a distress category; possibility to manually acknowledge the alarm;
- .21 indication of transmission and reception frequencies;
- .22 storage in the DSC facility memory of self-identification data, and lack of an opportunity to readily change them;
- .23 means for periodical checking the DSC facilities without signal emission;

**15.5.11** In the survey of the DSC INMARSAT ship earth station, the following can be checked:

- .1 call categories;
- .2 transmission and reception of distress priority calls;
- .3 watching shore-to-ship distress alerts including those addressed to certain geographical areas;
- .4 transmission and reception of general radiocommunications (in the mode of direct-printing telegraphy or telephony);
- .5 an opportunity to transmit the distress alert from the conning position, as well as from any other place allocated for that purpose; protection against the inadvertent use of means for transmitting the distress alert;
- .6 absence of a need to repeatedly manually force the equipment into the operating mode, of a loss of messages received and being stored in the memory in the case of the transition from one power supply to another or of any break in electric power supply within up to 60 s;



- .7 availability of a self-checking system, and automatic activating an audible and/or visual alarms in the case of:
- satellite tracking loss by an aerial;
  - failure of ship earth station operability;
  - loss of power supply or starting a stand-by source of power.
- 15.5.12** In the survey of the NAVTEX service receiver, the following can be checked:
- .1 operability on the frequency 518 kHz and additional frequencies of the national NAVTEX service (490 kHz, 4209.5kHz);
  - .2 operability of the receiver, signal processing device, output device of the information received;
  - .3 storage of at least 200 message identities. Automatic erasing the message identity from the memory of the equipment on expiry between the 60th and 72nd h. Automatic erasing the oldest message when the number of received messages exceeds the memory capacity.
  - .4 storage of correctly received messages only (i.e. the error ratio per character is lower than 4 %);
  - .5 activating an alarm when receiving search and rescue messages;
  - .6 keeping the information on the areas covered by the service and on the types of messages stored in the equipment memory within 6 h after the supply voltage failure;
- 15.5.13** In the survey of the COSPAS-SARSAT satellite Emergency Position-Indicating Radio Beacon (EPIRB), the following can be checked:
- .1 EPIRB operation on the frequency 406 MHz using G1B class of emission without using the satellite system;
  - .2 EPIRB operation on the frequency 121.5 MHz (for homing);
  - .3 operation of the light beacon;
  - .4 availability of documents confirming the check of a releasing arrangement.
- 15.5.14** In the survey of the search and rescue locating device, the following can be checked and tested:
- .1 device operation;
  - .2 presence of means to prevent inadvertent activation;
  - .3 manual activation and deactivation;
  - .4 indication of a stand-by condition;
- 15.5.15** In the survey of the two-way VHF radiotelephone apparatus, the following can be checked and tested:
- .1 operation on the frequency 156,800 MHz (channel 16) and at least on one additional channel (channel 6 (156.3 MHz); channel 13 (156,65 MHz);
  - .2 emission class G3E;
  - .3 determining channel 16 selection in all ambient light conditions;
  - .4 minimum output power of a transmitter 0,25 W;
  - .5 device for reducing power down to 1 W or less if the output power of the transmitter exceeds 1 W;
  - .6 sensitivity of a receiver which shall be equal to or better than 2  $\mu$ V EMF for a SINAD ratio of 12 dB;
  - .7 availability of a brief operating instruction and an expiry date for the primary battery;
  - .8 availability for service in 5 s after switching on.
- 15.5.16** Additional checks and tests of radio equipment of other kinds excepting those listed in 15.5.2 – 15.5.15 are specified during the review of technical documentation including test programs. In all cases, their scope shall be sufficient for assessing its fitness for use according to its purpose.

## **15.6 RS DOCUMENTATION**

**15.6.1** With the positive results of radio equipment product prototypes surveys, as specified in 15.2, and the tests (if planned) on board the ship carried out, CTO shall be issued for products according to Section 6, Part I "General Regulations for Technical Supervision".

**15.6.2** With the positive results of radio equipment serial products surveys at steady production, as specified in 15.3 – 15.5, for each product (or batch) the documents shall be issued according to Section 7, Part I "General Regulations for Technical Supervision".

2      **Section 16** is replaced by the following text:

## **"16 NAVIGATIONAL EQUIPMENT**

### **16.1 GENERAL**

**16.1.1** The provisions of this Section apply in technical supervision of the navigational equipment specified in the RS Nomenclature.

**16.1.2** The Section establishes the procedure, scope and methods of the Register supervision during manufacture of navigational equipment at the firm (manufacturer).

**16.1.3** General provisions on the arrangement of technical supervision during manufacture of navigational equipment for ships are set forth in Part I "General Regulations for Technical Supervision", on technical documentation - in Part II "Technical Documentation".

**16.1.4** Navigational equipment shall be supplied to the ship together with the documents in accordance with the RS Nomenclature.

### **16.2 TECHNICAL SUPERVISION FOR TYPE APPROVAL OF THE PRODUCT**

**16.2.1** The following stages of technical supervision shall be provided for type approval of the products:

.1 review and approval of technical documentation for the product specified in 1.3.4, Part V "Navigational Equipment" of the Rules for the Equipment of Sea-Going Ships;

.2 review and approval of test program;

.3 surveys and tests;

.4 drawing up of technical supervision results (Form 6.3.18) and issuing the RS Type Approval Certificate (CTO) for the product (Form 6.8.3).

**16.2.2** Review of technical documentation shall be carried out to determine the product compliance with the applicable requirements of the RS rules, appropriate IMO resolutions, other ND to be specified in Type Approval Certificate (CTO).

The product shall be subjected to the full list of tests resulting from the requirements of the RS rules, IMO resolutions, other ND. Test types, test procedures and required results are given in the appropriate IEC and ISO standards. The results of previous tests may be taken into account. Test program specified in 16.2.1.2 determines the types and methods of tests to be carried out in the presence of the RS surveyor. Test program may include both bench tests and full scale or shipboard tests of the product.

Survey of the product shall be conducted for determining its compliance with the approved technical documentation, applicable RS rules, appropriate IMO resolutions, other ND to be specified in the RS Type Approval Certificate (CTO).

**16.2.3** When required by the Register, the navigational equipment pilot specimens may be subjected to operational tests on board a ship, if they are of radically new design and were not previously used on board a ship, or cannot be adequately checked on the test bed.

### **16.3 SCOPE OF SURVEYS OF SERIAL PRODUCTS AT ESTABLISHED PRODUCTION**

**16.3.1** Technical supervision for manufacture of navigational equipment items at a manufacturer's during stable production shall be carried out by surveying each finished product providing for:

.1 checking the product compliance with the data specified in the RS Type Approval Certificate (CTO), checking the documents of the competent bodies confirming the product conformity with the special requirements (intrinsic safety, etc.);

.2 checking the completeness of the product and technical documentation;

.3 external inspection;

.4 checking product functioning;

.5 checking and testing the product to determine its performance and parameters, when the survey of equipment is carried out at production site;

- .6 testing in the scope specified in effective documents on the product;
- .7 checking spare parts (where applicable);
- .8 issuing for products the Register documents prescribed by the technical supervision type established.

**16.3.2** To surveying, shall be submitted the final products that have passed all the checks and tests conducted by the technical control body of the firm (manufacturer).

#### **16.4 GENERAL INSTRUCTIONS ON SURVEYING OF SERIAL PRODUCTS AT ESTABLISHED PRODUCTION**

**16.4.1** Depending on the production process used at the firm (manufacturer), to be submitted for surveying are individual specimens of fully completed products or of their batch.

**16.4.2** The presence of metrological documents for devices, apparatus, testing equipment, and the like intended for checking and testing products during the survey shall be ascertained.

**16.4.3** The completeness shall be checked for compliance with data specified in the RS Type Approval Certificate (CTO).

In visual examination, the product conformity with the requirements of the Rules for the Equipment of Sea-Going Ships shall be verified. Presence of marking that indicates the manufacturer, type, serial number, safe distance of magnetic compass installation (where applicable) and other data pertinent for the particular kind of equipment.

#### **16.5 SURVEYING SINGLE KINDS OF SERIAL PRODUCTS OF NAVIGATIONAL EQUIPMENT AT ESTABLISHED PRODUCTION**

**16.5.1** In addition to general inspections, checks, tests and measurements of navigational equipment, the following checks of single kinds of navigational equipment devices and systems given below can be carried out.

**16.5.2** Radars and radar plotting aids (EPA, ATA or ARPA).

During survey of the radars and automatic radar plotting aids (ARPA) on the firm's (manufacturer's) bench, the following can be checked:

- .1 starting period from the time the power is turned on;
- .2 operation of the control and checking devices;
- .3 the transmitter peak power for different range scales;
- .4 the receiver sensitivity;
- .5 the characteristics:
  - temporary gain control;
  - duration of the transmitted pulses on different range scales;
  - transmitted pulse recurrence rate;
- .6 compliance of the range scales with the requirements of the documents;
- .7 agreement between the zero reading of the digital range counter and the zero radius of the range ring;
- .8 time required to read out the bearing and range with the use of the electronic bearing line and variable range marker;
- .9 clear display of the course mark, range rings and possibility of varying the brilliance;
- .10 readout of the radar information to other navigational aids and systems;
- .11 maximum and minimum target detection range;
- .12 range and bearing resolution of the radar;
- .13 operation of the facilities for target acquisition and cancellation (EPA, ATA or ARPA);
- .14 operation of the visual and audible signaling (EPA, ATA or ARPA);
- .15 period of time during which full plotting information is displayed after changing range scales on which the EPA, ATA or ARPA facilities are available or resetting the display;
- .16 test checking of the performance of the EPA, ATA or ARPA facilities with the use of the radar signal simulators and all necessary sensors including evaluation of the accuracy characteristics of the target's motion parameters according to test scenarios.

Check specified in 16.5.2.11 — 16.5.2.13 can be carried out in the process of operational tests on a special site or on board ship.

### **16.5.3 Radionavigation system receivers.**

.1 during the survey of the receivers of the land-based radionavigation systems operating on the principle of measuring the time and phase difference, the following can be checked and tested:

- .1.1 facility sensitivity;
- .1.2 operation of the facility on the stipulated spacing frequencies;
- .1.3 general gain control;
- .1.4 determination of the root-mean-square error in measurement of the time interval on the signals of the system;
- .1.5 limiting sensitivity in different modes;
- .1.6 instrumental accuracy in the phase difference measurement;
- .1.7 allowable lag error of the readout devices;
- .1.8 root-mean-square error in correlation of the coarse display scale rotation;
- .1.9 sufficiency of the indicator scale illumination.

.2 When surveying the receivers of the Global Navigational Satellite System (GNSS) the following checks and tests can be carried out:

- .2.1 built-in performance test system;
- .2.2 sensitivity of the radio receiving device;
- .2.3 frequency selectivity characteristics of the radio receiving device;
- .2.4 dynamic range;
- .2.5 systems of co-ordinates used and means provided to transform the computed position base upon WGS-84 into another reference system of co-ordinates;
- .2.6 output for transmitting data to other radio and navigational facilities;
- .2.7 susceptibility level of the radio receiving device on the side receiving channels;
- .2.8 interference immunity of the radio receiving device to the effects of interferences in the passband;
- .2.9 interference immunity of the radio receiving device to the pulse interference;
- .2.10 software and information support;
- .2.11 time of receiving the navigational parameters;
- .2.12 accuracy in determination of the navigational parameters.

### **16.5.4 Standard and spare magnetic compasses, transmitting heading device.**

The following can be checked:

- .1 accuracy in indicating course on a stationary base and under motions in all directions;
- .2 steps in the card dial graduation and marking;
- .3 total error in positioning of the card in any direction (heading) due to inaccuracy in the dial graduation, eccentricity of the card on the pin and inaccuracy in orientation in relation to the magnetic system;
- .4 distance at which the card readings may be readily taken with the naked eye;
- .5 the extent of the card observation sector transmitted to the conning station from the position where the standard compass is installed with the use of geometric or light-fibre optics;
- .6 card stagnation (friction error);
- .7 deflection of the card from the magnetic meridian when the compass rotates in the horizontal plane;
- .8 semi-period of oscillation and time during which the card is brought in alignment with the magnetic meridian in case of forced deflection;
- .9 compass bowl inclination angle at which the card retains horizontal position;
- .10 free inclination angle of the bowl in gimbal suspension;
- .11 limiting values and accuracy in compensation of semicircular, intercardinal, inclination and latitude deviation;
- .12 transparency of liquid and absence of air in the bowl;
- .13 reading accuracy of bearing finder;
- .14 agreement in readings of the repeaters and main sensitive element in case of electric remote transmission of dial readings;
- .15 error of the device for remote transmission of course when magnetic course is converted in the true course and the latter is transmitted to other navigational equipment (if any);
- .16 operability of the signaling system to indicate error in the electric system for remote transmission of course (if any);
- .17 hardware and software support to the protection of the device for the compensation of deviation due to unauthorized access;

.18 main, emergency (supplied from accumulator battery) and independent lighting of the card, sufficient to make the dial divisions of the compass card distinctly visible;

.19 provision of an alarm to indicate a failure of the power supply to the compass system and the device for remote transmission of course.

#### **16.5.5 Gyrocompasses.**

The following special checks and tests can be carried out:

.1 time period during which the gyrocompass is brought into alignment with meridian in latitudes up to 60°;

.2 steady state error at any course;

.3 permissible error from one run-up to another;

.4 errors in readings due to rolling up to 20° with a period of 10 s, pitching up to 10° with a period of 6 s and yawing up to 5° with a period of 15 s and the maximum horizontal accelerations not more than 1 m/s<sup>2</sup>.

.5 follow-up system performance speed;

.6 divergence in readings between the master compass and repeaters;

.7 possibility of correcting the compass readings in respect to ship speed and latitude;

.8 operability of an alarm to indicate the main faults of the gyrocompass;

.9 possibility of transmitting the information on course to other navigational equipment.

#### **16.5.6 Logs for measuring speed made good through the water and over the ground.**

The following can be checked:

.1 unambiguity of displaying the operation mode and measured parameters by the indicators of the log units when several primary transducers are installed on board ship;

.2 minimum depth of functioning;

.3 range of the speeds to be measured;

.4 initial sensitivity;

.5 error in measuring the ship speed;

.6 error in measuring the distance run through the water;

.7 steps of the readings of the digital displays and electromagnetic distance displays, scale graduation of the analogue speed displays (if any);

.8 the effect of rolling and pitching on the accuracy characteristics of the log;

.9 functioning in the automatic and forced modes of measuring speed through the water and over the ground (if provided);

.10 maximum operating depth;.11 structural measures to ensure tightness of the equipment penetrating the hull and signalling system to indicate position of the primary log transducer protruding from the hull;

.11 functioning of an alarm and indication to notify of the faults and operating status of the log;

.12 availability and operability of the arrangements for connecting with other ship equipment;

.13 functioning of an alarm and indication to notify of the faults and operating status of the log (fidelity of readings);

.14 possibility and ease of the log calibrating and making corrections.

#### **16.5.7 Echo sounders.**

The following can be checked:

.1 the minimum depth to be measured by echo sounder (in acoustic basin);

.2 compliance of the main performance of the echo sounder with the requirement for measuring the maximum depth (a quantitative integral evaluation of the system indicator of the equipment purpose meeting the requirement for measuring the maximum depth at maximum ship speed and in rolling and pitching can be made in laboratory conditions);

.3 availability of graphical and digital indication of the depth;

.4 scale ranges;

.5 scale of displaying depths in graphical form (resolution of the graphic display);

.6 intervals between the digital depth indicator readings and agreement thereof with the graphic display;

.7 presentation of servicing information (time marks and their intervals, depth scale graduation marks and their intervals, warning of the termination of the paper tape, if used);

.8 immediate and long-term data record;

.9 instrumental tolerance of the indicated depths on the shallow and deep range scales in digital and graphical indication;

**.10** accuracy of operation of the dangerous/preset depth alarm, limits and discreteness of its setting;

**.11** recurrence frequency of the transmissions;

**.12** availability and operability of arrangements for connecting with other ship equipment;

**.13** design of the echo sounder transducers with respect to protections (IP);

**.14** starting period.

**16.5.8** Heading control systems/Ship's track control systems.

**.1** The following can be checked:

**.1.1** stability of keeping the ship on a preset heading and/or on a preset course line (on special bench with simulators);

**.1.2** adjustment of the sensitivity of the system performance in actuation of the rudder;

**.1.3** limits of the rudder shifting and availability of the rudder stops;

**.1.4** time of changing-over from "automatic" and/or "track" mode and back;

**.1.5** indication of the system operation mode used;

**.1.6** an alarm both audible with mute function and visual to indicate when the actual heading and/or track line deviates from the preset heading and/or track beyond a permissible limit as well as to warn about a failure of any information sensor, reduction in the ship speed below the limit necessary for steering the ship;

**.1.7** manual adjustment of the system in case of absence or failure of the automatic adaptation to the sailing conditions;

**.1.8** functioning of the remote steering stations (where provided);

**.1.9** output of the data on the operation mode and performance of the system for automatic recording;

**.2** moreover, the following can be checked during the tests of the ship's track control system:

**.2.1** information displayed in the analogue and digital form on the system control panel;

**.2.2** monitoring the ship position by another independent positioning system;

**.2.3** actuation of an alarm when approaching the wheel-over and at the moment of manoeuvre starting;

**.2.4** possibility of modifying a waypoint when the track was changed or a new track was plotted;

**.2.5** possibility of sailing from one point to another at the preset turn radius and at the design radius basing on a preset ship turning motion pattern (if any).

**16.5.9** Bridge navigational watch alarm system (BNWAS).

The following can be checked:

**.1** operability of the system in all designated functioning modes;

**.2** sequence of visual and audible alarms;

**.3** the reset of the BNWAS to the initial state;

**.4** operation of the device for alarm (visual and audible) acknowledgement;

**.5** the indication of the operational mode of the BNWAS.

**16.5.10** Long-range identification and tracking (LRIT) system equipment.

The following can be checked:

**.1** automatic transmitting the ship's LRIT information to a LRIT Data Centre;

**.2** format and completeness of the transmitting information;

**.3** transmitting information on the LRIT Data Centre demand;

**.4** changing intervals of the transmitting information based on the remote control commands from the LRIT Data Centre;

**.5** operation of the system in the check mode without transmitting information to the LRIT Data Centre.

**16.5.11** Electronic chart display and information system (ECDIS).

The following can be checked during the bench tests:

**.1** recording of the route data and impossibility of changing them;

**.2** connection with the receiver of the Global Navigational Satellite System, gyrocompass, log, radar, etc.;

**.3** capability of displaying information contained in the electronic navigational chart and all updates without any quantitative or qualitative degradation of their information content;

**.4** agreement between the accuracy of measurements and accuracy of computations in performing the following tasks:

establishment of the position by bearing and of the distance from the known position;

- conversion of the co-ordinates from local system into WGS-84 and back;
- .5** capability of scaling up and down the chart displaying. Whilst so doing, the size of symbols, letters and figures shall remain unchanged;
- .6** capability of displaying the ship position either in true scale or as a symbol;
- .7** display of:
  - co-ordinates in degrees, minutes and parts thereof; depths in meters and decimeters; heights in meters;
  - distances in miles and decimal parts thereof or meters;
  - speed in knots and parts thereof; time in hours, minutes and seconds; direction in degrees and parts thereof;
- .8** amount of information on the chart objects including: units of depth; units of height; scale of displaying; zero reading of heights and depths; name of the geographic co-ordinate system; dangerous depth value; dangerous isobath value; edition number and edition date of the electronic navigational chart; date and number of the last updates made;
- .9** colour of the chart display;
- .10** resolution and size of the display;
- .11** capability of displaying notes of the navigator in text and graphic form;
- .12** capability of changing orientation of the chart display and the true or relative motion modes (chart display is stationary, ship mark moves and vice versa);
- .13** actuation of an alarm in case of:
  - availability of a chart at a larger scale than provided by the display;
  - limit for deviation from the planned route, set by the operator, is exceeded;
  - ship enters the areas for which special conditions exist;
  - input from the position fixing system is lost;
  - approach to planned point;
  - use of reference system of the chart other than that used in position fixing system;
  - failure of ECDIS;
  - situation when the planned route crosses the selected safety contour
- .14** capability of using at least one electronic sighting device and movable range marker;
- .15** capability and correctness of deriving co-ordinates from the automatic positioning system;
- .16** capability, if envisaged, of overlaying the electronic chart by radar image;
- .17** acceptance of the updates from an information carrier. Confirmation of the fidelity of the updates and compilation of the update list. Capability of manual entering the updates;
- .18** automatic testing the performance of the major functions;
- .19** ability of reproducing the information sufficient to reconstruct the operator's actions and verify the official database within the previous 12 h. Impossibility of changing the recorded information;
- .20** retention of the operability in case of interruption of power supply within 45 s.

#### **16.5.12** Rate-of-turn indicators.

The following can be checked and tested during the survey of the rate-of-turn indicators:

- .1** operation independently of gyrocompass and radar operation with indication of the direction and angular speed of the ship turn;
- .2** accuracy of the rate-of-turn determination with due regard for the influence of the Earth's revolution at ship's speed up to 10 knots;
- .3** time of readiness of the indicator for operation;
- .4** capability of using the indicator both with the automatic and manual ship steering;
- .5** capability of transmitting the information on the rate-of-turn to other navigational instruments and systems.

#### **16.5.13** Shipborne automatic identification (information) system (AIS).

The following can be checked during the bench tests of AIS together with connected aids and systems or simulators thereof:

- .1** functioning of the built-in integrity test equipment including automatic record of all periods when the AIS installation is non-functioning in a non-volatile memory;
- .2** automatic switching-on of the AIS equipment when the power is turned on and readiness of the equipment for operation within 2 min of switching-on (this requirement does not apply to the time of putting the receiver of the global navigation satellite system on the operational mode);
- .3** capability of operating in an "autonomous mode" and capability of being switched to other modes ("assigned mode" and "polling mode") and back to the "autonomous mode";

.4 content of the information transmitted by AIS:

.4.1 static:

IMO number assigned to the ship;

call sign and name;

length and beam;

type of ship;

location of position-fixing antenna on the ship (aft or bow and port or starboard of centerline);

.4.2 dynamic:

ship's position with accuracy indication and integrity status);

time in UTC; course over ground;

speed over ground; true course;

navigational status: underway, at anchor, etc. – manual input;

rate-of-turn (where the rate-of-turn indicator is available);

.4.3 voyage related: ship's draught;

hazardous cargo and its type (as required by competent authority);

destination and estimated time of arrival (at Master's discretion);

.4.4 safety related messages;

.5 capability of transmitting information with the prescribed time intervals:

static information – every 6 min and at request; dynamic information – depending on the navigational status of the ship, change in its speed and course; voyage-related information – every 6 min, when data have been amended and on request;

.6 ability to transmit at least 2,000 reports per minute;

.7 capability of operating in assigned mode;

.8 capability of operating in polling mode;

.9 responding to the calls on the same channel;

.10 automatic switching-on of the Global Navigational Satellite System receiver in the event of failure of the main source of ship's positional information as well as an appropriate built-in integrity test indication;

.11 possibility of receiving differential corrections;

.12 availability and proper operation of two high-speed in-put/output ports (for interfacing the graphic display systems and additional equipment);

.13 availability and proper operation of ports for interfacing the dynamic information sensors;

.14 availability and proper operation of a port for interfacing the long-range communication facilities;

.15 protection of the input and transmitted data against unauthorized alteration;

.16 actuation of an alarm and indication when the status of the dynamic information sensor is changed;

.17 ability of ensuring the required priority in selecting the source of ship's positional information and automatic switching to the source of higher priority within 30 s of switching-on;

.18 capability of displaying the following information using the minimum keyboard and display of the AIS:

bearing, range and ship's name; alarm information and indications as a result of built-in integrity test;

input of voyage-related information and safety-related messages;

received safety-related messages;

received requests from the long-range communication facilities.

**16.5.14 Voyage Data Recorder (VDR).**

The following can be checked during the bench tests with the interfaced instruments, systems or simulators thereof connected:

.1 automatic switching-on of the recorder when the power from ship's sources is applied thereto as well as transfer to power supply from an emergency ship's source in the event of failure of the main source;

.2 operation of the recorder supplied from its own reserve power source within 2 h with automatic switching-off;

.3 manual switching-off of the recorder on prolonged stay of the ship in port and under repair;

.4 capability of recording, on the end information carrier, the initial ratings and list of the sensors in use with indication of their type for permanent storage;



- .5 protection of the capsule with the end information carrier against unauthorized access and capability of extracting the recorded information without opening of the protective capsule;
- .6 availability of documents confirming special tests of the protective capsule for deep-water immersion, high temperature and impact;
- .7 design of the end information carrier with protective capsule which makes it possible to record data during accident; availability of devices to aid search and location of the capsule as well as a mechanism to release the capsule during immersion of the ship (emerging version);
- .8 check of capability of continuous recording and storing of the data in the fixed and float-free recording media for at least 48 h;
- .9 the relation between different events in time and capability of determining the date and time from the records;
- .10 the volume of the compulsory information to be recorded and stored;
- .11 capability of interpreting and documenting the information recorded on the end carrier with the use of special land-based facilities;
- .12 capability of recording attempts of an authorized intervention in the recorder operation;
- .13 integrity of the recorded data and actuation of an alarm when a non-correctable error is detected during recording;
- .14 recording the bridge audio if the ship's source of electric power supply fails for a period of 2 h with subsequent automatic switching-off of the recorder;
- .15 absence of the recorder's impact on the operation of the information sensors in the event of failure of the recorder or individual communication channels.

**16.5.15 Sound reception system.**

The following can be checked:

- .1 range and direction of receiving outside sound signals (by comparison with the operator's perception);
- .2 the audio band for reception of the sound signals;
- .3 provision and possibility of adjusting the volume of outside sound signals reproduced in the wheelhouse;
- .4 time of determination of the direction of the received sound signal.

## **16.6 RS DOCUMENTATION**

**16.6.1** With the satisfactory results of surveying prototype specimen of navigational equipment products specified in 16.2 and shipboard tests (where assigned), the RS Type Approval Certificate (CTO) shall be issued in accordance with Section 6, Part I "General Regulations for Technical Supervision".

**16.6.2** With the positive results of surveying serial specimens of navigational equipment products at stable production as specified in 16.3 – 16.5, for each product (or batch) the documents shall be issued in accordance with Section 7, Part I "General Regulations for Technical Supervision".