Guideline No.E-18 (201610)

E-18

GENERAL EMERGENCY ALARM SYSTEM

Issued date: October 28,2016

Foreword

CCS Product Inspection and Testing Guideline (hereinafter referred to as this Guideline) contains the technical requirements, inspection and testing criteria related to classification and statutory survey of marine products to be applied for CCS approval/inspection.

This Guideline frees the users to adopt other test methods and requirements which are equivalent to or are stricter than this Guideline.

This Guideline is published and updated by CCS, and is released at http://www.ccs.org.cn. Your comments or suggestions are welcomed and may be sent to our email addressed mp@ccs.org.cn.

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Main changes:

1. Guideline on Type Approval Test of Electrical and Electronic Products (GD01-2006) (2006)" is modified to "CCS GD 22-2015 <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version) ". "GD01-2006" appearing in this guideline is modified to <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version) , which is enter into force from Jan.1 2016.

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GENERAL EMERGENCY ALARM SYSTEM

1 Application

1.1 The Guideline applies to the approval and inspection on the general emergency alarm system installed and used on ships.

1.2 It does not involve the installation and arrangement of the general emergency alarm system on the ship.

2 Basis for approval and inspection

2.1 The approval and inspection bases adopted by the Guideline are as follows:

(1) Convention on the Safety of Life at Sea (SOLAS Convention) (1974) and its Amendment

(2) MSC. 48 (66) Resolution: Article 7.2.1 of Chapter Ⅶ of the International Life Saving Appliance Regulations

(3) MSC. 218(82) Resolution: Article 7.2.1 of Chapter Ⅶ of the Amendment of the International Life Saving Appliance Regulations

(4) Article 2.9.1, Section 9, Chapter 2, Part Four of Rules for Classification of Sea-going Steel Ships.

(5) IMO A.1021 (26) Resolution: Code on Alerts and Indicators, 2009

(6) IMO A.760(18) Resolution: Signs Related to the LSA and Arrangement

(7) MSC. 82(70) Resolution: Amendment of the Signs Related to the LSA and Arrangement

(8) International Regulations for Preventing Collisions at Sea (1972) and its Amendment

(9) IEC60092-504:2001:Electrical Installations in Ships –Part 504: Special Features – Control and Instrumentation

(10) CCS GD 22-2015 <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)

3 Definitions

3.1 The terms and definitions adopted in the Guideline are in line with those of SOLAS.

3.2 The terms and definitions adopted in the Guideline are in line with those of IEC60092-504.

3.3 The terms and definitions adopted in the Guideline are in line with those of IMO A. 1021(26).

3.4 General Emergency Alarm

The alarm used to call all passengers and crews to gather at the gathering station in case of any emergency.

3.5 General Emergency Alarm System

The system used to send out general emergency alarm. It is also called as the "general alarm or "gathering alarm".

4 Plans and documents

4.1 The following plans and documents should be submitted for approval:

4.1.1 General plan;

4.1.2 Enclosure plan (including front panel plan and bottom panel plan);

4.1.3 Front panel arrangement plan;

4.1.4 Label and sign graph;

4.1.5 Circuit (schematic) diagram;

4.1.6 List of components (including the name, model, specification, quantity, manufacturer or brand of the component, and its code in the circuit diagram);

4.1.7 Technical product condition or enterprise standard.

4.2 The following plans and documents should be submitted for information:

4.2.1 Product operation instructions (in both Chinese and English);

4.2.2 Process flow diagram marked with quality supervision point;

4.2.3 Model, specification and supplier list of main raw materials and parts (such as the integrated circuit chip, printed circuit board, semiconductor element, fuse, switch, power module, LED, printed matter, and insulation varnish);

4.2.4 External wiring diagram;

4.2.5 Software instructions (including programming platform, software type and version, which applies to products using programmable components);

4.2.6 Software flow chart/program block diagram (applicable to products using programmable components).

5 Technical requirement

5.1 System composition

5.1.1 The general emergency alarm system should consist of one or more control units, one or more driver elements, and multiple marine hornpipes, sirens, additional bell, small diaphragm electric siren, or other equivalent equipment.

5.1.2 If the emergency alarm system adopts the computer system consisting of CPU and memory unit as the control unit, the computerized emergency alarm system should not be provided with the equipment (such as the USB port, network connector, CD-ROM drive, or disc drive) used for inputting computer program and the expansion slot (except for the required output port and input port for maintenance).

5.1.3 The general emergency alarm system should be supplemented with public address system meeting the requirements in Article 7.2.2 of the LSA regulations, Article 2.9.2 in Section 9 of Chapter 2 in Part Four of the *CCS Rules for Classification of Sea-going Steel Ships*, and Chapter X of the Guideline, or other proper communication facilities (for example, the alarm indicator). If the general emergency alarm system is started up, all the entertainment sound systems should be stopped automatically.

5.2 System power supply

5.2.1 The power of the general emergency alarm system should be supplied by the main power supply of the ship and the emergency power supply required in Article Ⅱ-1/42 of Ⅱ-1/43 of SOLAS. The power of the general emergency alarm system of the passenger ship should also be supplied by the temporary emergency power supply.

5.2.2 The power of the general emergency alarm system should be supplied by the main power supply of the ship, and the conversion device should be provided for automatic switchover to the emergency power supply in case of any main power supply failure of the ship. During power supply conversion, the general emergency alarm system should not send out any false alarm.

5.2.3 The general emergency alarm system should send out sound and light alarm signal in case of normal power supply (namely, the main power supply) interruption. Such sound alarm should persist till it is responded; such light alarm signal should flash in red, and become normal (normally on) after being responded till the power supply is resumed. The sound, light alarm indicator and “Response” button should be set at the position that is as close as possible to the main controller and easy to be found and accessed. If the light alarm is installed on the bridge, a device should be provided to adjust the brightness of the alarm light to a low level but not turn off the lamp, so as not to affect the night vision of the driver.

5.2.4 The general emergency alarm system should work continuously for 18 h at the designed full load. If available for the passenger ship, it should work continuously for 36 h at the designed full load.

5.3 Label

5.3.1 The main power supply and emergency power supply should be indicated on the control unit panel. During normal operation of the main power supply and emergency power supply of the ship, relevant indicating lamp should stay on; in case of any power supply interruption, relevant indicating lamp should be off. The indicating lamp can be white or green, and the brightness can be minimized, so as not to affect the night vision of the ship. However, such indicating lamp cannot be turned off.

5.3.2 Firm and durable marks should be provided on or around the button used to send out the general emergency alarm. The mark patterns are shown in Fig. 1 and 2. If the general emergency alarm signal persists, the indicating lamp on or near the button used to start the signal should flash (or be on).

5.3.3 Firm and durable marks should be provided on the alarm or indicator. The mark patterns are shown in Fig. 5.3.3(1) and 5.3.3(2). Such alarm and indicator involve the alarm indicator column installed at such places as the engine room and the alarm indicator panel (or screen) installed at such places as the engine control console).

5.3.4 The bottom of the pattern should be in green with white graph, and the color and plan scale should meet the requirement of IMO A.760(18) and MSC. 82(70) resolutions.

Fig. 5.3.3(1) Crew boat station

Fig. 5.3.3(2) Passenger gathering station

5.4 Audible signal

5.4.1 Unless otherwise specified in the ship gathering allocation table, the general emergency signal should consist of 7 or more short sounds followed by 1 long sound, and the audio waveform should be as shown in Fig. 3.

5.4.2 For the waveforms shown in Fig. 5.4.2, the "short sound" lasts for about 1 s, "long sound" for about 4~6 s, and the interval between the sounds is about 1 s.

5.4.3 The signal frequency of the sound alarm should be 200 Hz-2500 Hz.

5.4.4 Generally, the sound pressure level of such alarm devices as the bell and small diaphragm electric siren installed at the sleep position and washroom measured at the position 1 m away should not be less than 75dB(A), and should be 10dB(A) higher than the environmental noise pressure level generated by common equipment on the ship during sailing at common meterological conditions, but not higher than 120dB(A). The sound pressure level should be within 1/3 band around the fundamental frequency.

5.4.5 Apart from the positions specified above, the sound pressure level of such alarm devices as the siren, bell and small diaphragm electric siren installed inside and outside of the ship measured at its frontal position 1 m away should not be less than 80dB(A), and should be 10dB(A) higher than the environmental noise pressure level generated by common equipment on the ship during sailing at moderate meterological conditions, but not higher than 120dB(A). The sound pressure level should be within 1/3 band around the fundamental frequency.

5.4.6 The device used to adjust the sound pressure level of such sound alarms as the siren, bell and mall diaphragm electric siren should not be provided.

5.4.7 Facilities used to adjust the sound alarm frequency in the range specified in the Guideline can be provided, so as to get the optimal performance at the environmental condition. After adjustment, the adjustment device should be sealed in a way to the satisfaction of CCS.

5.4.8 The ship hornpipe should meet relevant requirement of the *International Regulations for Preventing Collisions at Sea* (1972) and Annex III of its Amendment.

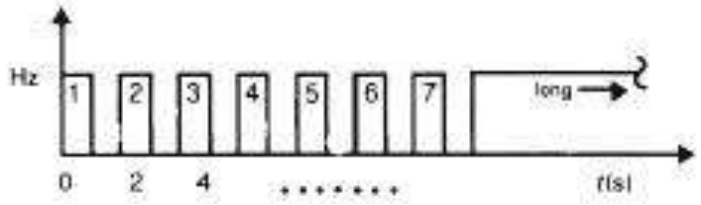

Fig. 5.4.2 Alarm sound waveform

5.5 Performance and functions

5.5.1 The general emergency alarm system should be an independent one, which should be functionally independent of and arranged away (as far as possible) from other control system and equipment. If not practical, metal enclosure should be used for protection. Its power supply, control unit, drive unit and sound generating mechanism should not be shared with other equipment.

5.5.2 If the general emergency alarm system adopts the computer system consisting of CPU and memory unit as the control unit, the program should not disappear or be changed permanently in case of any power supply interruption or fluctuation, and measures should be taken to avoid any unexpected or unauthorized change to the computer program or preset parameters. Except for the software necessary for the normal operation of the computer, no software irrelevant to the general emergency alarm system can be installed. During system startup, the normal operating interface should be displayed directly and automatically after self-inspection and initialization. The operating interface cannot be exited or the operating system of the computer entered without permission.

5.5.3 The general emergency alarm system should be operated at the navigation bridge or other key position of the ship to send out or stop the general emergency alarm signal.

5.5.4 The general emergency alarm system, after being started, should send out continuously and automatically the general emergency alarm signal featuring 7 short sounds and 1 long sound, till it is stopped manually or interrupted by the information of certain wired broadcast system.

5.5.5 Once the general emergency alarm signal is sent out, it cannot be stopped or interrupted for a long time by any equipment or device except the control unit installed in the ship navigation bridge or the control device installed at other key positions of the ship.

5.5.6 The general emergency alarm signal, after being sent out, can be interrupted temporarily by the information of certain wired broadcast system. Such wired broadcast system should meet the requirements of Article 2.9.2.1 in Section 9 of Chapter 2 in the *CCS Rules for Classification of Sea-going Steel Ships* and relevant Guidelines; for passenger ships, such wired broadcast system should meet the requirements of Article 2.9.2.2 in Section 9 of Chapter 2 in the *CCS Rules for Classification of Sea-going Steel Ships* and Chapter X of the Guideline.

5.5.7 The general emergency alarm system, after sending out the general emergency alarm and being interrupted temporarily by the information of certain wired broadcast system, should be restored automatically to the status of sending general emergency alarm signal continuously, so as to prevent it from being interrupted permanently by such wired broadcast system.

6 Type test

The general emergency alarm system should be subject to type test as required. The specific test requirements are as follows:

6.1 All the system units should be connected by simulating the actual situation with actual or simulated load as per the max. capacity of the system. All the tests should be conducted under the following atmospheric conditions:

6.1.1 Ambient temperature：15℃~35℃;

6.1.2 Relative humidity: 30％RH~90％RH;

6.1.3 Air pressure: 86~106 kPa.

6.2 The general emergency alarm system should be subject to type test required in Table 6.2 at least;

List of type test items **Table 6.2**

No.	Test items	Technical requirement	Test method	Remark
1	Appearance, structure, and label inspection	Articles 5.3, 5.4.6, 5.4.7, 5.5.1, and 5.5.2 of the Guideline	Visual inspection, using RHS Color Chart and gauge if necessary. Inspection result: The appearance, structure, and label should comply with the approved plans; assembling and wiring process should comply with the requirement of the process documents of the factory.	
2	Dielectric strength verification	Article 2.14 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 2.14 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Between single circuits; To the ground after connecting all circuits in series; The contact element is in the normally-open status; The printed circuit with electronic components that may be damaged can be removed.

Continued Table 6.2

3	Insulation resistance verification	Article 2.3 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 2.3 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Between all circuits and the ground, at the power source end (if applicable); Measurement should be conducted before and after such tests as the dielectric strength test, damp heat test, low temperature test and salt mist test.
4	Power steady-state fluctuation test	Article 2.4 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 2.4 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	
5	Power transient fluctuation test	Article 2.4 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 2.4 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	
6	Power failure test	Article 2.5 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 2.5 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	To confirm: a) The specific actions of the equipment during power supply failure and recovery; b) The program and data of the programmable electronic system are not damaged (if applicable).

Continued Table 6.2

7	Vibration test	Article 2.7 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version) [when the frequency is 2^{+3}_{-0}~13.2 Hz, the amplitude is ±1.0 mm; when the frequency is 13.2~100, the acceleration is ±6.9 m/s^2 (including all samples)]	Article 2.7 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	a) During the vibration test, the equipment should be running; b) The test should be conducted on 3 mutually-perpendicular axes; c) Q should be the value recommended by the Guideline, but not more than 5; d) If the measurements of several resonance points are almost the same, the frequency scanning test should last for 120 min.
8	Enclosure protection level test	Article 2.15 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 2.15 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	

Continued Table 6.2

9	Dry heat test	Article 2.8 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version) [+55℃±2℃，16 h (excluding the equipment installed on the open deck); +70℃±2℃，2 h (applicable to the equipment installed on the open deck)]	Article 2.8 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Equipment without cooling device: a) Power on for operation in high temperature environment; b) Conduct function test in the last 1 h at the test temperature; c) Conduct function test after restoration. Equipment with cooling device: a) Power on for operation in high temperature environment and start the cooling system; b) Conduct function test in the last 1 h at the test temperature; c) Conduct function test after restoration.

Continued Table 6.2

10	Low-temperature test	Article 2.9 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version) [+5℃±3℃，2 h (excluding the equipment installed on the open deck); -25℃±3℃，2 h (applicable to the equipment installed on the open deck)]	Article 2.9 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	a) Initial insulation resistance measurement; b) The equipment will not be powered on for operation during the whole test temperature condition except for the function test in the last 1 h at the low temperature; c) Conduct function test in the last 1 h at the low temperature; d) Conduct insulation resistance measurement and function test after restoration.
11	Cyclic damp heat test	Article 8 in Table 1 of IEC60092-504:2001 Article 2.10 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version) [55℃, relative humidity of 95%，2×(12+12 hours)]	Article 2.10 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	a) Measure the insulation resistance during the test; b) The equipment operates in the 1st cycle and stops in the 2nd cycle except for the function test; c) Conduct function test within the first 2 h in the 1st cycle and in the last 2 h in the 2nd cycle at the test temperature; d) Restore it at standard environmental condition; Insulation resistance measurement and performance test.

Continued Table 6.2

12	Salt mist test (K_b) (applicable to the equipment installed on the open deck)	Article 2.12 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 2.12 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	
13	Load test	Article 5.2.4 of the Guideline	Connect all system equipment according to the actual system operating status (analog load can be used) to make the system in the full load status.	
			After startup of the general emergency alarm, the system should be capable of continuous operation for the specified duration.	
14	Performance and function verification			
14.1	Verification of indicating lamp brightness adjustment function	Article 5.3.1 of the Guideline	After adjustment of the Dimmer knob or button, the brightness of the indicating lamp should be changed accordingly. When the brightness is adjusted to the lowest, it should not offend the eyes at night.	
14.2	Verification on automatic power supply changeover and power loss alarm function	Article 5.2 of the Guideline	Visual inspection	

Continued Table 6.2

14.3	Signal sending function verification	Article 5.5.4 of the Guideline	After relevant functional button of the system control unit is pressed down, the signal (with 7 short sounds and 1 long sound) should be sent out.	
14.4	Safety verification on starting, stopping, and interruption	Articles 5.5.5, 5.5.6, and 5.5.7 of the Guideline	Check the each unit and port of the system to confirm that there is no equipment, device or input port to start, stop or terminate the general emergency alarm signal except for the specific control unit. After the general emergency alarm signal is sent out, the alarm signal should be interrupted temporally after certain public broadcasting information is entered. Regardless of the fact that such public broadcasting information is closed deliberately, the general emergency alarm signal should be restored to the continuous alarm status after the specified time delay.	
14.5	Alarm signal waveform verification	Articles 5.4.1 and 5.4.2 of the Guideline	Measure the sound time of the signal with 7 short sounds and 1 long sound with oscilloscope or second chronograph, and the result should meet the requirement.	

Continued Table 6.2

14.6	Alarm audio frequency verification	Article 5.4.3 of the Guideline	In the laboratory with low environmental noise pressure level, put the zeroed audio meter transducer to a place 1 m right ahead of the system sound equipment. Then, the sound frequencies measured within 1/3 band around the fundamental frequency should meet the requirement.	
14.7	Alarm sound pressure level verification	Articles 5.4.4 and 5.4.5 of the Guideline	In the laboratory with low and stable environmental noise pressure level, put the zeroed audio meter transducer to a place 1 m right ahead of the system sound equipment.	
			Then, the sound frequencies measured within 1/3 band around the fundamental frequency should meet the requirement.	
15	Electromagnetic compatibility test			

Continued Table 6.2

15.1	Electrostatic discharge immunity test	Article 13 in Table 1 of IEC60092-504:2001 Article 3.4 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 3.4 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	a) Electrostatic discharge may occur when the human body touches the equipment; b) The test is conducted at the point or on the surface that may be touched usually by operators; c) Performance criteria B
15.2	Radio-frequency electromagnetic field radiated immunity test	Article 14 in Table 1 of IEC60092-504:2001 Article 3.5 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 3.5 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	a) The radio frequency electromagnetic field radiation derives from different transmitters; b) To test the equipment with modulation frequency of 1000 Hz input signal, select the modulation frequency of 400 Hz; c) Performance criteria A
15.3	Low frequency conduction immunity test	Article 15 in Table 1 of IEC60092-504:2001 Article 3.8 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 3.8 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	a) Simulate the distortion of the power supply system of the electronic load and coupling harmonic products; b) For test method, see IEC60945:2002. c) Performance criteria A

Continued Table 6.2

15.4	Radio-frequency field conducted disturbance immunity test	Article 16 in Table 1 of IEC60092-504:2001 Article 3.9 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 3.9 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	a) The electromagnetic induction frequency modulation enters the test sample via the power line; b) To test the equipment with modulation frequency of 1000 Hz input signal, select the modulation frequency of 400 Hz; c) Performance criteria A
15.5	Electrical fast transient burst immunity test	Article 17 of Table 1 of IEC60092-504:2001; Article 3.6 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 3.6 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	a) Arc due to electric contact; b) The interference effect may occur at the power supply or the external terminal of the equipment; c) Performance criteria B
15.6	Surge immunity test	Article 18 in Table 1 of IEC60092-504:2001	Article 3.7 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	a) Simulate the interference occurred at the time of connection or disconnection of the

Continued Table 6.2

		Article 3.7 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)		high-power inductive load products; b) The interference effect may occur at the power supply or the external terminal of the equipment; c) Performance criteria B
15.7	Radiation emission measurement at the enclosure port	Article 19 of Table 1 of IEC60092-504:2001; Article 3.3 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 3.3 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Keep the antenna at a distance 3 m away from the equipment, and conduct the test according to the standard procedure.
15.8	Conduction emission measurement	Article 20 of Table 1 of IEC60092-504:2001; Article 3.2 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	Article 3.2 of <Guidelines for Type Approval Test of Electric and Electronic Products> (current valid version)	

6.3 Selection of Typical Sample

6.3.1 The sample used for type test should be selected from the qualified finished products by the CCS Surveyor at the factory.

6.3.2 The test sample of the general emergency alarm system should be 1 set at least in quantity (which can be increased if necessary), and should include all system units.

6.3.3 The max. design load should be connected during the load test. Generally, such actual loads as the hornpipe, electric whistle, bell and small diaphragm electric siren should be connected.

6.4 Test agency

6.4.1 For initial type approval, the agency to conduct the test should be the proper testing organization with relevant Recognized Certificate of Product Inspection and Test Agency issued by CCS.

6.4.2 For renewal of the type approval certificate, after being approved, the type test can be carried out in the manufacturer's laboratory with the witness of the CCS Surveyor provided that the

manufacturer has the test environment and equipment with competent inspection and test personnel required by the standards.

7 Unit/batch inspection

7.1 The general emergency alarm system should be subject to the following verification items one by one in the factory:

7.1.1 Appearance and label inspection;

7.1.2 Dielectric strength verification;

7.1.3 Insulation resistance verification;

7.1.4 Performance and function verification.

7.2 Simulated load can be connected during unit/batch inspection; such sound devices as the hornpipe, electric whistle, bell and small diaphragm electric siren should be verified as per the *Product Verification Plan*.