Guideline No.: S-01(201510)

S-01 MARINE ELECTRIC LIGHTS

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Foreword:

This Guideline is a part of CCS Rules, which contains technical requirements, inspection and testing criteria related to classification and statutory survey of marine products.

This Guideline is published and updated by CCS and can be found through http://www.ccs.org.cn . Comments or suggestions can be sent by email to ps@ccs.org.cn .

Historical versions and release date :

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MARINE ELECTRIC LIGHTS

1 Application

1.1.1 This guideline applies to the approval and inspection of marine electric lights (masthead lights, sidelights, stern lights, all-round lights and flashing lights).

2 Basis for approval and inspection

2.1 International Regulations for Preventing Collisions at Sea, 1972;

2.2 Regulations for the Statutory Surveys of Ships and Offshore Installations by the Maritime Safety Administration of the People's Republic of China;

2.3 Chapter 3, PART ONE of CCS Rules for Classification of Sea-going Steel ships 2012 and its amendments;

2.4 CCS GD01-2006 Guidelines for Type Approval Test of Electric and Electronic Products.

3 Terms and definitions

3.1 "Masthead light" means a white light placed over the fore and aft centreline of the vessel showing an unbroken light over an arc of the horizon of 225 degrees and so fixed as to show the light from right ahead to 225 degrees abaft the beam on either side of the vessel.

3.2 "Side lights" means a green light on the starboard side and a red light on the port side each showing an unbroken light over an arc of the horizon of 112.5 degrees and so fixed as to show the light from right ahead to 22.5 degrees abaft the beam on its respective side.

3.3 "Stern light" means a white light placed as nearly as practicable at the stern showing an unbroken light over an arc of the horizon of 135 degrees and so fixed as to show the light 67.5 degrees from right aft on each side of the vessel.

3.4 "Towing light" means a yellow light having the same characteristics as the "stern light" defined in paragraph 1.3.3.

3.5 "All-round light" means a light showing an unbroken light over an arc of the horizon of 360 degrees.

3.6 "Flashing light" means a light flashing at regular intervals at a frequency of 120 flashes or more per minute.

4 Plans and documents

4.1 The following plans and documents are to be submitted to CCS for approval:
(1) Main performance specifications;
(2) Drawings of general assembly, figuration and installation;
(3) Drawings of parts of light body, light holder, lens and junction box;
(4) Type test program;

4.2 The following plans and documents are to be submitted to CCS for information:
(1) Installation and maintenance manual;
(2) Nameplate and manufacturer's quality certificate (specimen).

5 Design and technical requirements

The design and technical requirements for products are to comply with the International Regulations for Preventing Collisions at Sea, 1972 and Regulations for the Statutory Surveys of Ships and Offshore Installations by the Maritime Safety Administration of the People's Republic of China.

5.1 Ambient conditions

5.1.1 Ambient temperature
Lights are to be capable of operating correctly throughout an ambient temperature range of -30 ~ 50℃.

5.1.2 Lights are to be capable of operating correctly under vibration and shock likely to arise in normal service of the ship and under moisture, salt fog, oil vapor and mould.

5.2 Construction

5.2.1 Lights are to be capable of withstanding the vibration and shock likely to arise in normal service of ships.

5.2.2 Lights are to be constructed such that fitting and removal, and replacement of parts can be readily carried out. Provision is to be made to prevent bulbs from spontaneous uncoupling and loosening.

5.2.3 The frame and enclosure of lights are to be of sufficient strength and rigidity against improper operation likely to arise in intended fitting and usage.

5.2.4 Means are to be provided for maintenance of lights or replacement of their bulbs at sea. Such measures are to be simple so far as possible and keep lights waterproof, not impairing their visible sectors.

5.2.5 The degree of protective enclosure of lights is not to be less than IP55 and the enclosure may be fitted with drainage devices.

5.3 Bulbs and holders.

5.3.1 The bulbs used for lights are to be of the marine type approved by CCS.

5.3.2 The holders of lights are to be such that the filament of a replacing bulb will be kept at its intended position.

5.4 Wiring

5.4.1 Stranded marine wire cables are to be used for all internal wirings and the wires are not to be damaged. Internal wirings are to be run or secured such as to prevent interference with the optical performance of lights.

5.4.2 The nominal diameter of bolts at the end of cable conductors is not to be less than M3.

5.4.3 The temperature rise at the end of cable conductors is not to exceed 40℃.

5.5 Under normal test atmospheric conditions, lights are to operate reliably at the variations of supply voltage and frequency specified below:

(1) for a. c. power supply, the voltage varies between +6% ~ -10% and the frequency varies within ±5% of the rated value;

(2) for d. c. power supply, the voltage varies between +6% ~ -10% of the rated value.

5.6 Insulation resistance

Under normal test atmospheric conditions, the insulation resistance between current-carrying parts and between current-carrying parts and light enclosure is not to be less than the values given in Table 5.6.

Insulation Resistance Table 5.6

Rated voltage (V)	Voltage measured by Megohmmeter (V)	Insulation resistance (MΩ)
≤ 60	250	10
> 60	500	100

5.7 High voltage test

Under normal test atmospheric conditions, an alternating voltage in approximate sinusoidal waveforms is to be applied between current-carrying parts and between current-carrying parts and light enclosure at the frequency of 50 Hz for l min, without any breakdown or flashover. Test voltage is given in Table 2.

Test Voltage Table 5.7

Rated voltage (V)	Test voltage (V)
≤ 60	1000
> 60	2000

5.8 Air clearances and creepage distances

There are to be sufficient air clearances and creepage distances between current-carrying parts and between current-carrying parts and metal enclosure or adjacent metal parts. The values are not to be less than those given in Table 5.8.

Air Clearances And Creepage Distances mm Table 5.8

Rated voltage (V)	Air clearance		Creepage distance	
	Between current-carrying parts with different polarities	Between current-carrying parts and adjacent metal parts	Between current-carrying parts with different polarities	Between current-carrying parts and adjacent metal parts
≤ 25	3	4	4	4
> 25 ~ 250	3	6	4	6

5.9 The optical performance of lights is shown in Table 5.9.

Optical Performance Of Lights Table 5.9

No.	Light	Color	Minimum visible distance (n mile)		Total angle		
			Ship length ≥ 50 m	50 m ≤ ship length < 20 m		Horizontal sector	Vertical sector
1	Masthead light	White	6	5	225°	From right ahead to 22.5° abaft the beam on either side	At all angles from 5° above to 5° below the horizontal
2	Side light, port	Red	3	2	112.5°	From right ahead to 22.5° abaft the beam on port side	At all angles from 5° above to 5° below the horizontal
3	Side light, starboard	Green	3	2	112.5°	From right ahead to 22.5° abaft the beam on starboard side	At all angles from 5° above to 5° below the horizontal
4	Stern light	White	3	2	135°	From right aft to 67.5° on each side	At all angles from 5° above to 5° below the horizontal
5	Towing light	Yellow	3	2	135°	From right aft to 67.5° on each side	At all angles from 5° above to 5° below the horizontal
6	Red all-round light	Red	3	2	360°	All round the horizon	At all angles from 5° above to 5° below the horizontal
7	White all-round light	White	3	2	360°	Ditto	At all angles from 5° above to 5° below the horizontal
8	Green all-round light	Green	3	2	360°	Ditto	At all angles from 5° above to 5° below the horizontal
9	Yellow all-round light	Yellow	3	2	360°	Ditto	At all angles from 5° above to 5° below the horizontal

5.9.1 Distribution of sectors

(1) In addition to complying with Table 5.9, the intensity of vertical sectors may decrease to 60% of the required minimum intensity at all angles from 5°~ 7.5°above to 5°~7.5°below the horizontal.

(2) In addition to complying with Table 5.9, horizontal sectors are to comply with the following:

① For sidelights, the minimum required intensities are to be maintained from right ahead to 17.5° abaft the beam on either side. From 17.5°~ 22.5°abaft the beam, the intensity may decrease by 50% and within the range of 22.5°~ 27.5°, it is to decrease steadily to reach practical cut-off; on the other side from right ahead, the intensity is to reach practical cut-off between 1°~ 3°;

② For masthead lights, the minimum required intensities are to be maintained from right ahead to 17.5° abaft the beam on each side. From 17.5°~ 22.5° abaft the beam on each side, the intensity may decrease by 50% and within the range of 22.5°~ 27.5°, it is to decrease steadily to reach practical cut-off;

③ For stern lights, the minimum required intensities are to be maintained from right aft to 67.5° on each side. From 62.5°~ 67.5°on each side, the intensity may decrease by 50% and within the range of 67.5°~ 72.5°, it is to decrease steadily to reach practical cut-off.

5.9.2 The chromaticity of all lights is to conform to the standards which lie within the boundaries of the area of the diagram specified for each colour by the International Commission on Illumination (CIE), see the following table.

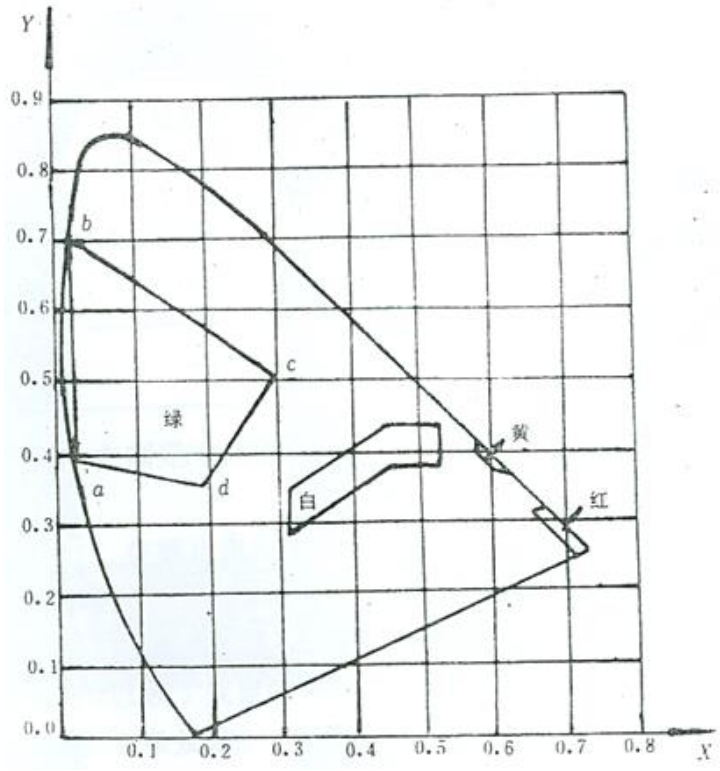

Figure 4 Coordinates for Chromaticity of Lights and Boundaries of the Area for Each Colour

Corner Co-ordinates of Boundaries of the Area for Each Colour Table 5.9.2

Light colour	Co-ordinate	Corner					
		1	2	3	4	5	6
White	X	0.525	0.525	0.453	0.310	0.310	0.443
	Y	0.382	0.440	0.440	0.348	0.283	0.382
Green	X	0.028	0.009	0.300	0.203		
	Y	0.385	0.723	0.511	0.356		
Red	X	0.680	0.660	0.735	0.721		
	Y	0.320	0.320	0.265	0.259		
Yellow	X	0.612	0.618	0.575	0.575		
	Y	0.382	0.382	0.425	0.406		

6 Selection of typical samples

Samples are to be taken from qualified lights provided by the manufacturer, covering various types and voltage grades. At least 3 samples are to be selected for each type/voltage, sealed and sent to a test organization approved by CCS.

7 Type test

7.1 The type test items, methods and criteria are to comply with:

(1) International Regulations for Preventing Collisions at Sea, 1972;

(2) Regulations for the Statutory Surveys of Ships and Offshore Installations by the Maritime Safety Administration of the People's Republic of China;
(3) CCS GD-01 2006 Guidelines for Type Approval Test of Electric and Electronic Products.

7.2 Test samples are to include masthead lights, sidelights, stern lights, all-round lights and flashing lights.

7.3 Test equipment
(1) Dark room having a length sufficient for measuring between photometer and lights under test, with its walls and ceiling reflecting no light.
(2) Test bed on which lights are to be fitted, capable of turning within the range of 360 ° and facing to an angle of 7.5 ° above or below the horizontal, and having a goniometer graduated not more than 0.5 °.
(3) Photometer.
(4) Indicating instruments, e.g. radiometer, voltmeter or other instruments used to indicate measured luminance, the accuracy of which is not to be less than 5%.
(5) Standard light source.

7.4 Type test items

7.4.1 Examination of construction, bulbs and wiring;

7.4.2 Examination of materials, delivery and air clearances;

7.4.3 Light intensity test;

7.4.4 Light sector test;

7.4.5 Chromaticity test;

7.4.6 Insulation resistance measurement;

7.4.7 High voltage test;

7.4.8 Power supply variation test;

7.4.9 Test of temperature rise of ends of cable conductors;

7.4.10 Test of optical parts for withstanding sudden change in temperature;

7.4.11 High temperature test;

7.4.12 Low temperature test;

7.4.13 Humidity test;

7.4.14 Salt fog test;

7.4.15 Vibration test;

7.4.16 Protective enclosure test.

7.5 Test organization
Samples are to be sent to a test organization approved by CCS for the type test prescribed in 1.7.4.

8 Unit/batch inspection

8.1 Application for unit/batch inspection of marine electric lights may be received only after type approval.

8.2 Unit/batch inspection of products of manufacturers with CCS type approval B
The inspection is to be carried out according to the approved inspection plan, including at least the following items:
(1) examination of construction, bulbs and wiring (bulbs to be approved by CCS);
(2) examination of materials, delivery and air clearances;
(3) light intensity test;
(4) light sector test;
(5) chromaticity test;
(6) insulation resistance measurement;
(7) high voltage test.

8.3 At least 5% or 2 units are to be selected randomly by the Surveyor from each batch of products for above test items.