

Guideline No.: E-09(201510)



# E-09 EXPLOSION-PROOF LUMINAIRES

Issued date: October 20,2015

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Foreword:

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

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Historical versions and release date :

Main changes and effective date:

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## 1 General provisions

### 1.1 Application

This Chapter applies to explosion-proof luminaires with operating voltage not exceeding 1000 V, installed in spaces of ships and offshore installations where explosive gas mixtures may be present or accumulate (excluding explosion-proof emergency luminaires).

### 1.2 Normative references

1.2.1 The following standards, rules and guidelines are the basis for approval and inspection of the above luminaires by CCS.

1.2.2 The paragraphs of the following standards, rules and guidelines referred to in this Chapter are to be deemed as part of this Chapter. Where such documents are dated, any subsequent amendments (excluding corrections) or revisions do not apply to this Chapter. However, users of this Chapter are encouraged to study the use of latest versions of these standards, rules and guidelines.

- (1) CCS Rules for Classification of Sea-going Steel Ships;
- (2) CCS Guidelines for Approval Inspection of Luminaires;
- (3) GB 3836.1-2000 Electrical apparatus for explosive gas atmospheres – Part 1: General requirements;
- (4) GB 3836.2-2000 Electrical apparatus for explosive gas atmospheres – Part 2: Flameproof enclosure “d”;
- (5) GB 3836.3-2000 Electrical apparatus for explosive gas atmospheres – Part 3: Increased safety “e”.

### 1.3 Terms and definitions

1.3.1 For definitions of terms such as products inspection, approval, type test, sample and unit/batch inspection, see 3.1.2 of Chapter 3, PART ONE of CCS Rules for Classification of Sea-going Steel Ships.

1.3.2 Explosive gas atmosphere means mixture with air, under atmospheric conditions, of flammable substances in the form of gas or vapour, in which after ignition, combustion spreads throughout the unconsumed mixture.

1.3.3 Explosion-proof type means specific measures taken to avoid ignition by electrical apparatus of surrounding explosive gas atmosphere.

1.3.4 Increased safety type means a type of protection applied to electrical apparatus in which additional measures are applied so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks in normal service.

1.3.5 Flameproof enclosure means a type of protection whereby the parts which can ignite an explosive atmosphere are placed in an enclosure which can withstand the pressure developed during an internal explosion of an explosive mixture penetrating through any joint or structural gap of the enclosure and which prevents the transmission of the explosion to the explosive atmosphere surrounding the enclosure and consisting of one or more explosive gases or vapours

## **2 Plans and documents**

2.1 General requirements for plans and documents to be submitted to CCS for examination and approval are specified in PART ONE of the Guidelines.

2.2 When applying for approval by CCS, the following plans and documents are to be submitted.

2.2.1 The following plans and documents are to be submitted to CCS for approval:

- (1) General plan of explosion-proof luminaires and detailed drawings of main parts (approved by an appropriate explosion-proof products certification organization authorized by the State and accepted by CCS);
- (2) Technical specifications of explosion-proof luminaires (approved by an appropriate explosion-proof products certification organization authorized by the State and accepted by CCS);
- (3) Type test programme of explosion-proof luminaires.

2.2.2 The following plans and documents are to be submitted to CCS for information:

- (1) Particulars of the manufacturer (including history and current situation) and description of main manufacturing equipment and test equipment;
- (2) Documents of the manufacturer's technical management and quality management systems, such as product quality management system (including management of raw materials, semi-products and finished products), test equipment management system and general introduction of testing and inspection personnel;

- (3) Explosion-proof certificate issued by an appropriate explosion-proof products certification organization authorized by the State in which the manufacturer is based;
- (4) Explosion-proof test report issued by an appropriate explosion-proof products test organization authorized by the State in which the manufacturer is based;
- (5) Documents of manufacturing processes;
- (6) Specifications of associated electrical products;
- (7) Operation instructions for the products.

### **3 Design and technical requirements**

#### **3.1 Explosion-proof performance requirements**

The relevant standards for explosion-proof performance adopted by the State, in which the manufacturer is based, are to be complied with. The explosion-proof luminaires produced by manufacturers in the People's Republic of China are to comply with the following standards:

- (1) GB3836.1-2000 Electrical apparatus for explosive gas atmospheres – Part1: General requirements.
- (2) The explosion-proof performance standards relating to the type of protection of luminaires against explosion. For example, flameproof luminaires are to comply with GB3836.2-2000 Electrical apparatus for explosive gas atmospheres – Part 2: Flameproof enclosure “d”, Increased safety luminaires are to comply with GB3836.3-2000 Electrical apparatus for explosive gas atmospheres – Part 3: Increased safety “e”.

#### **3.2 Requirements for marine luminaires**

The requirements as specified in 8.3, Chapter 8 of this PART are to be complied with.

### **4 Selection of typical samples**

4.1 Explosion-proof luminaires to be tested are to be selected by CCS Surveyor on site or under his supervision.

#### **4.2 Selection of samples**

Explosion-proof luminaires to be tested are to represent or cover, in terms of characteristics, features and manufacturing quality, the products or product series for which approval is sought

and are to be manufactured by the required manufacturing methods and means. Three type test samples are to be taken randomly for each type of finished explosion-proof luminaires satisfactorily inspected by the manufacturer.

## **5 Type test**

### 5.1 Test locations

5.1.1 For initial type approval, samples are to be submitted to a verification organization designated or recognized by CCS for type test. Explosion-proof performance tests are to be carried out by an appropriate explosion-proof products test organization authorized by the State in which the manufacturer is based.

5.1.2 For renewal of the type approval certificate, explosion-proof performance tests are to be carried out by an appropriate explosion-proof products test organization authorized by the State in which the manufacturer is based. The tests for other items may be carried out at the manufacturer's laboratory in the presence of CCS Surveyor, subject to agreement of CCS and provided that the manufacturer has required test environment and equipment as well as competent inspection and test personnel.

### 5.2 Test environment

Unless otherwise specified, all tests are to be carried out under the following atmospheric conditions:

- (1) ambient temperature: 15°C to 35°C;
- (2) relative humidity: 30%RH to 90%RH;
- (3) pressure: 86 to 106 kPa.

### 5.3 Exemption from test items

Any exemption requested by the manufacturer from type test items will be addressed by the related CCS inspection organization, taking into consideration the significance of products, their mature manufacturing procedures and history of use as well as the availability of appropriate test reports issued by any IACS member or verification test organization. If the manufacturer declares that there is no any substantial change in design, construction and materials of the products, of which the type approval certificate is to be renewed, consideration may be given to an appropriate exemption from type test items.

## 5.4 Type test items

### 5.4.1 Test items for explosion-proof performance

The test items are to be confirmed by an appropriate explosion-proof products certification organization authorized by the State in which the manufacturer is based.

### 5.4.2 Test items for non-explosion-proof performance

The requirements as specified in 8.5.4, Chapter 8 of this PART are to be complied with.

## 6 Unit/batch inspection

Items and sampling number of explosion-proof luminaires for unit/batch inspection are specified in Table 9.6. Additional items may be added, as appropriate. If any sample is found unsatisfactory for any listed test item, such samples are to be doubled for re-inspection. If any unsatisfactory sample is found again, the inspection is to be stopped and the manufacturer is to be required to remove the defects for further inspection.

**Items and Sampling Number of Explosion-Proof Luminaires for Unit/Batch Inspection**

**Table 6**

No.	Test item	Technical requirements	Test method	Sampling number by manufacturer	Sampling number by Surveyor
1.	External appearance, marking, construction and material	9.3 of this Chapter	As per type test sample and approved technical documents	1%, not less than 3	1%, not less than 3
2.	Pressure test of empty enclosure (for explosion-proof luminaires only)	GB 3836.2-2000 para. 16	GB 3836.2-2000 para. 16	100%	1%, not less than 3
3.	Other routine test items confirmed by explosion-proof products certification organization (if applicable)	GB 3836 series standards	GB 3836 series standards	Confirmed by explosion-proof products certification organization	1%, not less than 3

4.	Functional testing				
5.	Reliability of earthing	IEC 60598-1:2003	IEC 60598-1:2003	100%	
6.	Dielectric strength and insulation resistance	Annex Q	Annex Q		