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**Fire emergency lighting
and evacuate indicating system**

消防应急照明和疏散指示系统

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Fire emergency lighting and evacuate indicating system

1 Scope

This Standard specifies terms and definitions, classification, protection degree, general requirements, test, inspection rules, marking and operation instruction of fire emergency lighting and evacuate indicating system.

This Standard is applicable to fire emergency lighting and evacuate indicating system (hereinafter referred to as "system") installed and used in general industrial and civil buildings and to the system installed in other environment and with specific requirements (except unless otherwise specified by relevant standard).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. For dated reference, subsequent amendments to (excluding correction to), or revisions of, any of these publications do not apply. However, all parties coming to an agreement according to this standard are encouraged to study whether the latest edition of these documents is applicable. For undated references, the latest edition of the normative document is applicable to this standard.

GB 4208-2008 Degrees of protection provided by enclosure (IP code) (IEC 60529:2001, IDT)

GB 7000.1-2007 Luminaires - Part 1: General requirements and tests (IE C 60598-1:2003, IDT)

GB/T 9969 General principles for preparation of instructions for use of industrial products"

GB 12978 Rules for test of fire electronic products

GB 13495 Fire safety signs (GB 13495-1992, neq ISO 6309:1987)

GB 16838 Environmental test methods and severities for fire electronic products

3.3

fire emergency lighting & indicating luminaire

Fire emergency luminaire which has the function of fire emergency lighting luminaire and fire emergency indicating luminaire simultaneously.

3.4

fire emergency luminaire powered by self-contained battery

Fire emergency luminaire of which the battery, light source and associated circuits are assembled in the luminaire.

3.5

emergency power supply cell for fire emergency luminaire

Component of battery and associated circuits which are not in the same luminaire as light source in fire emergency luminaire powered by self-contained battery.

3.6

son & mother type fire emergency luminaire(s)

A group of fire emergency luminaires that the son fire emergency luminaire has no independent battery and is powered by the associated mother fire emergency luminaire, and its working state is controlled by the mother luminaire.

3.7

fire emergency luminaire powered by centralized batteries

Fire emergency luminaire that has no independent battery therein and is powered by centralizing power supply for fire emergency luminaries.

3.8

centralizing power supply for fire emergency luminaries

Power supply which powers for fire emergency luminaire powered by centralized batteries if fire occurs and takes battery as the energy source.

3.9

fire emergency luminaire controlled by central control panel

Fire emergency luminaire of which the working state is controlled by central

luminaires powered by centralized battery

Fire emergency lighting and evacuate indicating system composed of fire emergency luminaire controlled by central control panel, central control panel for fire emergency luminaire, centralizing power supply for fire emergency luminaries, distribution and switch equipment for fire emergency lighting and associated accessories.

3.16

non-central controlled fire emergency lighting system for fire emergency luminaires powered by centralized battery

Fire emergency lighting and evacuate indicating system composed of fire emergency luminaire powered by centralized batteries, centralizing power supply for fire emergency luminaries, distribution and switch equipment for fire emergency lighting, associated accessories, etc.

3.17

switch board for fire emergency lighting

The Distribution and switch equipment which is powered by fire emergency luminaire powered by self-contained battery.

3.18

distribution and switch equipment for fire emergency lighting

Distribution and switch equipment which distributes power for emergency output of centralizing power supply for fire emergency luminaries.

3.19

exhausted voltage

Terminal voltage of battery that the fire emergency luminaire does not have emergency action any more when the overdischarge protection part starts.

4 Classification

4.1 System classification

Classified according to system type:

- a) Central controlled system for fire emergency luminaires powered by self-contained battery;

specified in GB 4208-2008; that of the luminaires installed outdoors shall not be less than IP67 specified in GB 4208-2008 and shall meet the nominal protection degree.

5.3 The installing surface of the luminaires on floor shall be capable of withstanding exoteric mechanical shock and grinding.

6 Requirements

6.1 General provisions

Fire emergency lighting and evacuate indicating system and its all parts shall first meet the requirements of this Clause if it is intended to comply with this standard, and then shall be subjected to tests according to the relevant requirements of Clause 7 and meet the test requirements. The system and its composition may refer to the description of Annex A.

6.2 General requirements

6.2.1 The main power supply shall adopt 220 V (centralizing power supply for fire emergency luminaries may adopt 380 V), 50 Hz AC power supply; the dropping equipment of the main power supply shall not adopt resistance-capacitance voltage-reducing mode; the main power supply of luminaires on floor shall adopt safety voltage.

6.2.2 The system that its enclosure adopts non-insulating material shall be equipped with earthing protection; the earthing terminal shall meet the requirements of GB 7000.1-2007 and shall be provided with definite marking.

6.2.3 The marking of fire emergency indicating luminaires shall meet the relevant requirements of Annex B; the evacuate indicating luminaires shall use Figure B.1, Figure B.2 or Figure B.3 as the main marking information; the storey indicating luminaires shall use Arabic numerals and letter "F" as the main marking information.

6.2.4 The fire emergency luminaire with inversion output and output voltage exceeding 36 V shall be capable of stopping battery discharge within 20 s after disconnecting light source for 5 s during the period of emergency working state.

6.2.5 The luminaire using fluorescent lamp as the light source shall not access a starter into emergency circuit and shall not use the light source with built-in starter.

6.2.6 The maximum rated power of single-phase output of centralizing power supply for fire emergency luminaries shall not be larger than 30 kW·A, and the maximum rated power of three-phase output shall not be larger than 90 kW·A;

6.2.8 The model preparation method of each part of the system shall meet the requirements of Annex C.

6.3 System and complete performance

6.3.1 General requirements

6.3.1.1 The emergency switching time of the system shall not be larger than 5 s, and that of the system used in high hazardous area shall not be larger than 0.25 s.

6.3.1.2 The emergency working time of the system shall not be less than 90 min and shall not be less than the nominal emergency working time of the luminaire itself.

6.3.1.3 The surface brightness of fire emergency indicating luminaire shall meet the following requirements:

- a) For the marker light consisting of marking only with green or red figures, the minimum brightness of the marking surface shall not be less than 50 cd/m², and the maximum brightness shall not be larger than 300 cd/m²;
- b) For the marker light consisting of marking with white and green combination or white and red combination figures, the minimum brightness of the surface shall not be less than 5 cd/m², and the maximum brightness shall not be larger than 300 cd/m²; the ratio of maximum brightness and minimum brightness of white, green or red itself shall not be larger than 10. The brightness ratio of corresponding points at both sides of white and adjacent green or red boundary shall not be less than 5 and shall not be larger than 15.

6.3.1.4 The luminous flux of fire emergency lighting luminaire in emergency state shall not be less than the nominal luminous flux and shall not be less than 50 lm. The luminous color temperature of flashlight for evacuation shall be 2500 K ~ 2700 K.

6.3.1.5 Fire emergency lighting & indicating luminaire shall meet the requirements of 6.3.1.3 and 6.3.1.4 simultaneously.

6.3.1.6 Where the luminaires are in abnormal conditions that the light source is not connected, cannot normally operate or its specification does not meet the requirements, etc., the maximum temperature of the internal component surface shall not exceed 90 °C and shall not affect the normal charging of battery. After the light source is recovered, the luminaires shall be capable of normal operation.

6.3.1.7 For luminaires with voice prompt, the voice should use "Here is the

luminaires combined herewith; the state indicator lamp may adopt one tricolored indicator lamp, indicating green when the luminaire is in the main power supply working state, red when in charging state and yellow when in fault state or failing to complete the self-checking function.

6.3.2.5 Floor-installed and seal-installed luminaires in other locations shall also meet the following requirements:

- a) The state indicator lamp and the nonlocking button (switch) for controlling emergency work output shutoff shall be arranged in the luminaires and shall be clearly visible after uncovering; non-central controlled luminaires shall be arranged with nonlocking test button (switch) or remote control device for remotely simulating main power supply fault;
- b) For non-glisten maintained or guiding light stream type indicating luminaire, state indicator lamp may not be arranged on the surface, but the light source shall glisten when the luminaire is out of service or fails to complete self-checking, and the glisten frequency shall not be less than 1Hz; the glisten frequency of guiding light stream type luminaire, in fault, shall have obvious difference with the normal glisten frequency;
- c) The state indicator lamp of lighting luminaire shall be arranged at the position which is obviously observed from the exposed or transparent surface of the luminaire; the state indicator lamp may adopt one tricolored indicator lamp, indicating red when the luminaire is in charging state, green in full charging, and yellow when in fault state or failing to complete the self-checking function.

6.3.2.6 The line voltage drop of connecting line between son & mother luminaires for the son & mother type luminaire shall not exceed 3 % of output terminal voltage of mother luminaire.

6.3.2.7 Non-maintained fire emergency luminaire powered by self-contained battery and son & mother type fire emergency luminaire shall lighten the fault state indicator lamp under light source fault condition and shall be capable of recovering to the normal working state after normal light source connected.

6.3.2.8 For the fire emergency luminaire with remote control device, the distance between the remote controller and the receiving device shall not be less than 3m and shall not be larger than 15 m.

6.3.3 Performance of luminaire powered by centralized battery

Luminaire powered by centralized battery (except floor-installed luminaire and central controlled luminaire) shall be arranged with main power supply and emergency power supply state indicator lamp, green for main power supply

fault sound and light signal and indicate the fault type under the following conditions; the fault sound signal shall be capable of being manually eliminated; if there is any new fault signal, the fault sound signal shall be restarted; the fault light signal shall be maintained before fault removal. The fault conditions are as follows:

- a) Open circuit of connecting line between charger and battery;
- b) Open circuit of emergency output circuit;
- c) Battery voltage is less than overdischarge protection voltage in emergency state.

6.3.5 Performance of switch board for fire emergency lighting

6.3.5.1 Dual-input switch board for fire emergency lighting shall be capable of automatically launching into standby power supply when the normal power supply is in fault, and of automatically recovering to normal power supply after the normal power supply recovers; the normal power supply and standby power supply shall be free from simultaneous output, equipped with manual test switching device, and shall be capable of automatically recovering to the normal power supply after the manual test switching completes.

6.3.5.2 The switch board for fire emergency lighting shall be capable of receiving emergency switching interlocking control signal, cutting off power supply, and making connected luminaire switch into emergency state and send feedback signal.

6.3.5.3 Each output distribution circuit of the switch board for fire emergency lighting shall be arranged with protective electrical device and shall meet the relevant requirements of GB 50054.

6.3.5.4 Each power supply of the switch board for fire emergency lighting shall be equipped with green power supply state indicator lamp to indicate the power supply state of normal power supply and standby power supply.

6.3.5.5 In emergency switching, the switch board for fire emergency lighting shall guarantee luminaire to switch into the emergency working state within 5s, and the emergency switching time in high hazardous area shall not be larger than 0.25 s.

6.3.6 Performance of distribution and switch equipment for fire emergency lighting

6.3.6.1 It shall be capable of completing the switching from main power supply working state to emergency working state.

- a) Undervoltage main power supply of central control panel for fire emergency luminaire;
- b) Open circuit and short circuit of connecting line between the charger of standby power supply of central control panel for fire emergency luminaire and the standby power supply;
- c) Open circuit and short circuit of connecting line between the central control panel for fire emergency luminaire and the standby power supply powered for it.

6.3.7.7 Central control panel for fire emergency luminaire shall be capable of conducting function check for the body and all indicator lamps, displayers and acoustic devices on panels.

6.3.7.8 Central control panel for fire emergency luminaire shall be capable of making all the connected luminaires switching into the emergency state with manual and automatic mode; the button forcing all the luminaires to switch into the emergency state shall be arranged.

6.3.7.9 Where the connecting line between the luminaire of a certain branch and the central control panel for fire emergency luminaire occurs to open circuit, short circuit or earthing, the working of luminaires of other branches or emergency power supply cell shall not be influenced.

6.3.7.10 Where central control panel for fire emergency luminaire controls the luminaire powered by self-contained battery, it shall maintain the emergency working state when the connecting line between the luminaire in emergency working state and the central control panel for fire emergency luminaire occurs to open circuit and short circuit.

6.3.7.11 Where central control panel for fire emergency luminaire controls the luminaire powered by self-contained battery, it shall be capable of indicating the working state of the switch board for fire emergency lighting.

6.3.7.12 Where central control panel for fire emergency luminaire controls the centralizing power supply for fire emergency luminaires, the central control panel for fire emergency luminaire shall also meet the following requirements:

- a) Indicate the position of each emergency power supply, main power supply working state, charging state, fault state, battery voltage, output voltage and output current;
- b) Indicate the working state of distribution and switch equipment for fire emergency lighting;
- c) Control each emergency power supply switching into the emergency

C₂₀A.

6.5 Battery performance

The system shall select cadmium-nickel, nickel-hydrogen and maintenance-free lead acid battery. Cadmium-nickel and nickel-hydrogen battery shall meet the requirements of Annex D; maintenance-free lead acid battery shall meet the requirements of Annex E; if other battery is adopted, the battery itself shall be provided with self-recovery short circuit protection device based on meeting the requirements of Annex D.

6.6 Repeat switching performance

The system shall be capable of continuously completing at least 50 working state cycles of "main power supply state for 1 min → emergency state for 20 s → main power supply state for 1 min".

6.7 Voltage fluctuation performance

The system shall not switch into the emergency state within the range of 85 % ~ 110 % of the main power supply voltage.

6.8 Switching voltage performance (except central controlled system)

The main power supply voltage, when the system is switched into the emergency state from the main power supply state, shall be within the range of 60 % ~ 85 % of the main power supply voltage. The main power supply voltage recovering to the main power supply state from the emergency state shall not be larger than 85 % of the main power supply voltage; if the system voltage is any voltage within the range of 60 % ~ 85 % of the main power supply voltage, the system shall be free from such switching phenomena as state indicator lamp and relay fluctuation for several times; non-glisten light source shall be free from light source flicker state.

6.9 Charge and discharge durability

The system shall complete the charge and discharge process with 10 cycles of "fully charged → discharge off → fully charged". The last discharge time shall not be less than 85% of the first discharge time and shall meet the requirements of 6.3.2.

6.10 Insulating property

The insulation resistance between the main power supply input terminal of the equipment in the system and the enclosure shall not be less than 50 MΩ; the insulation resistance between the external live terminal with insulation requirements and the enclosure shall not be less than 20 MΩ.

Creepage distance and clearance of the equipment in the system shall meet the requirements of Clause 11 of GB 7000.1-2007.

6.17 Performance of main components

6.17.1 The main components of the system shall adopt the approved product meeting the relevant standards of the nation.

6.17.2 The charge-discharge performance of the system battery shall meet the requirements of 6.5.

6.17.3 The system shall add fuse or other protective device between battery and charge and discharge circuit and between main power supply input circuits, and the current value indication of the fuse shall be distinct; direct current and alternating current fuse shall be indicated by model (direct current is DC and alternating current is AC); the indicated font height shall not be less than 2 mm, and the font shall be visible.

6.17.4 The earthing terminal of the equipment in the system shall be indicated distinctly.

6.17.5 The enclosure of the equipment of the system shall be made of incombustible material or nonflammable material (oxygen index ≥ 28); internal wiring and external wiring shall meet the requirements of Clause 5 of GB 7000.1-2007.

6.17.6 Under the environment temperature of $(25 \pm 3) ^\circ\text{C}$, the maximum surface temperature of heating elements and components such as built-in transformer and ballast shall not exceed $90 ^\circ\text{C}$. The environment temperature around (not touching) the battery shall not exceed $50 ^\circ\text{C}$.

6.17.7 The indicator lamp shall be marked with function; under the condition not larger than 500 lx ambient light, within the range of right ahead 22.5° visual angle, the indicator lamp shall be distinct and visible at 3 m.

6.17.8 Under the normal working conditions, the sound pressure level (A-weighted) of acoustic devices at 1 m right ahead shall be larger than 65 dB and less than 115 dB.

7 Tests

7.1 General provisions

7.1.1 Atmospheric conditions of test

Unless otherwise specified in the relevant clauses, each test shall be carried

emergency working time.

7.2.2.3 Immediately measure the surface brightness of different marker lights (including the marking part of the lighting marker lights) respectively according to the following procedure when the main power supply state is switched into the emergency state; after discharge for 80 min, immediately measure the surface brightness of different marker lights (including the marking part of the lighting marker lights) respectively according to the following procedure.

- a) For the marker light consisting of marking information only with green or red figures and characters, 10 points shall be selected from the figures and characters for measurement;
- b) For the marker light consisting of marking information with combined color figures and characters, 10 points shall be selected uniformly from the figures and characters according to the point selection mode of Annex B for measurement, and then 10 points shall be selected correspondingly from another color adjacent to each point for measurement.
- c) For the marker light with double-side indication, the surface brightness of two surfaces shall be measured respectively according to a) or b).

7.2.2.4 Immediately measure the luminous flux of lighting lamp (including the lighting part of the lighting marker light) when the main power supply state is switched into the emergency state; after discharge for 80 min, immediately measure the luminous flux of the lighting lamp (including the lighting part of the lighting marker light) in the emergency state and the luminous color temperature of the flashlight for evacuation.

7.2.2.5 Cut off the main power supply of fire emergency luminaire powered by self-contained battery or son & mother type fire emergency luminaire, make it in the emergency state, respectively make the main power supply line short circuit and earthing, and inspect the working condition of luminaire.

7.2.2.6 Start the test button (switch or remote receiving launching unit) of the luminaire for simulating AC power supply fault, inspect the switching condition of the working state; inspect whether the main power supply supplies power to light source and charging circuit and whether to influence the switch with emergency function; test the remote control function and remote control distance of the luminaire in different distances.

7.2.2.7 Make the luminaire in the main power supply working state, check the manual self-checking function, and then make the luminaire in the emergency working state, and check the function controlling emergency working shutoff.

7.2.2.8 Respectively disconnect the battery and light source of fire emergency

7.2.3.3 Respectively make centralizing power supply for fire emergency luminaries in the main power supply and emergency working state, make any output branch short circuit, and check the working condition of another branch of the centralizing power supply for fire emergency luminaries.

7.2.3.4 Respectively make centralizing power supply for fire emergency luminaries in no-load, full-load 10 %, full-load and overload 20 % state, and check the working condition.

7.2.3.5 Check the rated voltage and segment protection condition of the battery, and then respectively measure the voltage of each segment under fully charged condition.

7.2.3.6 Respectively make the connecting line between charger and battery of centralizing power supply for fire emergency luminaries open circuit and short circuit, and check the fault condition.

7.2.3.7 Respectively make the connecting line of output branch lines of centralizing power supply for fire emergency luminaries open circuit, and check the fault condition.

7.2.3.8 Respectively make the connecting line between charger and battery of centralizing power supply for fire emergency luminaries and the emergency output circuit open circuit, and check the fault condition.

7.2.3.9 Check the protection condition of forced emergency start button, and then start the forced emergency start button, make centralizing power supply for fire emergency luminaries switch into the emergency state until discharge off, check the overdischarge protection condition and the fault condition when the battery voltage is less than the overdischarge protection voltage.

7.2.4 Basic function test procedure of central control panel for fire emergency luminaire

7.2.4.1 Connect central control panel for fire emergency luminaire with such accessories as fire emergency luminaire and switch board for fire emergency lighting, power on, and make them in the normal working state.

7.2.4.2 Operate the control mechanism of central control panel for fire emergency luminaire, respectively make the controlled luminaire in main power supply state, emergency state, charging state and fault state, observe the indication condition of central control panel for fire emergency luminaire, meanwhile, check whether the central control panel for fire emergency luminaire has the measures for preventing non-professionals operation.

7.2.4.3 Make the connecting line between central control panel for fire

7.2.4.8 Operate the central control panel for fire emergency luminaire, respectively automatically and manually switch the controlled luminaire into the emergency state, check the working condition of the controlled luminaire and of main and standby power supply of the emergency power supply; start the forced button to make all the controlled luminaires switch into the emergency state until discharge off, and check the overdischarge protection condition of the emergency power supply.

Respectively make the connecting line between any branch luminaire and central control panel for fire emergency luminaire open circuit, short circuit and earthing, and check the working condition of other luminaire and the emergency power supply.

7.2.5 Basic function test procedure of switch board for fire emergency lighting

7.2.5.1 Cut off normal power supply of dual-input switch board for fire emergency lighting, and then return to the normal power supply, check the power supply indication condition, the working condition of automatic input to the standby power supply as well as the power supply condition automatically recovering to the normal power supply for the switch board for fire emergency lighting, and record the switching time; and then check the output condition of normal power supply and standby power supply; manually operate the switching device, and check the manual test switching function.

7.2.5.2 Input emergency switching interlocking control signal for the switch board for fire emergency lighting, check the condition cutting off power supply, and making the connected luminaire switch into the emergency state as well as sending feedback signal.

7.2.5.3 Check the protective electrical device of each output distribution circuit of switch board for fire emergency lighting according to the relevant requirements of GB 50054.

7.2.6 Basic function test procedure of distribution and switch equipment for fire emergency lighting

7.2.6.1 Connect distribution and switch equipment for fire emergency lighting and centralizing power supply for fire emergency luminaries, fire emergency luminaire and equivalent load, and power on the main power supply of centralizing power supply for fire emergency luminaries.

7.2.6.2 Respectively make centralizing power supply for fire emergency luminaries in main power supply and emergency working state, check the working state switching condition of distribution and switch equipment for fire emergency lighting, and measure the output voltage and other output

- a) Test voltage: 500 V $\pm$ 50 V, DC;
- b) Measuring range: 0 M Ω ~ 500 M Ω ;
- c) Timing: 60 s $\pm$ 5 s.

7.8.3 Test procedure

Apply 500 V $\pm$ 50 V DC voltage between the external live terminal with insulation requirement for sample (including central control panel for fire emergency luminaire of central controlled system) and the enclosure and between the main power supply input terminal and the enclosure (power plug is not connected into the power grid) respectively through the insulation resistance test device and maintain for 60 s $\pm$ 5 s, and then measure the insulation resistance value. In the test, the contact point shall be provided with reliable contact, and the insulation resistance between lead wires shall be large enough to guarantee correct reading.

7.8.4 Test result

The insulating property of the sample shall meet the requirements of 6.10.

7.9 Earthing resistance test

7.9.1 Purpose

Inspect the earthing performance of the system and the equipment therein.

7.9.2 Test equipment

Test equipment shall meet the following conditions:

- a) Adjustable DC power supply;
- b) Where no-load voltage does not exceed 12 V, at least 10 A of current shall be generated.

7.9.3 Test procedure

7.9.3.1 Connect the at least 10 A of current produced by no-load voltage not exceeding 12 V respectively to earthing terminal or between earthing contact and each touchable metal component, and maintain for at least 1min.

7.9.3.2 Measure voltage drop between earthing terminal or earthing contact and touchable metal component, and work out the resistance by voltaic voltage drop.

7.9.4 Test result

for the system and the equipment therein.

7.11.2 Test equipment

Test equipment shall meet the requirements of GB 16838.

7.11.3 Test procedure

7.11.3.1 Place the sample for 2 h ~ 4 h under normal atmospheric condition, then put it into high temperature test chamber, power on to let it in the main power supply working state.

7.11.3.2 Raise temperature in average heating rate less than or equal to 1 °C/min to 55 °C ± 2 °C and maintain for 16 h.

7.11.3.3 Carry out test according to the requirements of 7.2.

7.11.4 Test result

Performance of the sample under high temperature environment shall meet the requirements of 6.3 and 6.12.

7.12 Low temperature test

7.12.1 Purpose

Inspect the capability of normal working under low temperature environment for the system and the equipment therein.

7.12.2 Test equipment

Test equipment shall meet the requirements of GB 16838.

7.12.3 Test procedure

7.12.3.1 Place the sample for 2 h ~ 4 h under normal atmospheric condition, then put it into low temperature test chamber, power on to let it in the main power supply working state.

7.12.3.2 Drop temperature in average drop rate less than or equal to 1 °C/min to 0 °C ± 1 °C and maintain for 24 h.

7.12.3.3 Carry out test according to the requirements of 7.2.

7.12.4 Test result

Performance of the sample under low temperature environment shall meet the requirements of 6.3 and 6.12.

7.14.3.2 Start up the vibration table and keep it in the frequency range of 10 Hz ~ 55 Hz, and then sweep frequency repeatedly at 0.5 g acceleration, 1 frequency interval/min rate on X, Y and Z axis respectively for 20 times.

7.14.3.3 Inspect appearance and fastening position condition.

7.14.3.4 Carry out test according to the requirements of 7.2.

7.14.4 Test result

Anti-vibration performance of the sample shall meet the requirements of 6.3 and 6.13.

7.15 Impact test

7.15.1 Purpose

Inspect impact resistance of the equipment in the system.

7.15.2 Test equipment

Test equipment shall meet the requirements of GB 16838.

7.15.3 Test procedure

7.15.3.1 Fix the sample (including central controlled fire emergency lighting system for fire emergency luminaires and central control panel for fire emergency luminaire) by its normal operation position to the impact table, and keep it in a non-working state.

7.15.3.2 Start up the impact table, continuously impact in half sine pulse for 3 times (9 times in total) to the sample (mass = m (kg)) at peak acceleration (100 - 20 m)g, pulse duration 11 ms $\pm$ 1 ms, to every direction of three mutually perpendicular axes.

7.15.3.3 Inspect appearance and fastening position condition.

7.15.3.4 Carry out test according to the requirements of 7.2.

7.15.4 Test result

Impact resistance of the sample shall meet the requirements of 6.3 and 6.13.

7.16 Electrostatic discharge immunity test

7.16.1 Purpose

Inspect the adaptability of centralizing power supply for fire emergency

Inspect the interference immunity of centralizing power supply for fire emergency luminaries and central control panel for fire emergency luminaire, under the condition of voltage dip, short interruption and voltage variation (like due to actions of load switching and protecting component in the main distribution network).

7.19.2 Test equipment

Test equipment shall meet the requirements of GB 16838.

7.19.3 Test procedure

7.19.3.1 Connect the sample with equivalent load according to the requirements of normal monitoring state; connect the sample to the test device of principal voltage gliding and interrupting, and keep the sample in a normal monitoring state.

7.19.3.2 Make the principal voltage glide 60 %, and maintain for 20 ms; repeat 10 times; then make the principal voltage glide 100 %, maintain for 10 ms and repeat 10 times. During the test, observe and record the sample's working state; after the test, carry out test according to the requirements of 7.2.

7.19.4 Test result

During the test, the sample shall maintain a normal monitoring state; after the test, basic function of the sample shall stay the same.

7.20 Radio-frequency electromagnetic field radiation immunity test

7.20.1 Purpose

Inspect the adaptability of central control panel for fire emergency luminaire working under the radiation environment in radio-frequency electromagnetic fields.

7.20.2 Test equipment

Test equipment shall meet the requirements of GB 16838.

7.20.3 Test procedure

7.20.3.1 Carry out test arrangements to the sample according to the requirements of GB 16838; power on, and keep the sample in a normal monitoring state for 20min.

7.20.3.2 Apply interference test under conditions shown in Table 8 to the sample according to test procedure specified in GB 16838; observe and record the sample's state during the period. After the test, carry out test according to the

Test equipment shall meet the following requirements:

- a) Taber model or identical abrasion tester;
- b) Grinding miller fabricated according to Annex F.

7.24.3 Test procedure

Fabricate grinding miller according to Annex F; stick No. 3 abrasive cloth with corundum particle size of 180 to it and place it under environment condition of temperature $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, relative humidity $65\% \pm 5\%$ for over 24 h. Wipe up the sample surface with defatting gauze; install the sample on the abrasion tester with surface upwards; install the grinding miller on the support and grind 9000 turns under the condition of applying $4.9\text{ N} \pm 0.2\text{ N}$ external force; the grinding miller shall be replaced once every 500 turns' abrasion. After the test, carry out test according to the requirements of 7.2.

7.24.4 Test result

After the test, the sample's watch glass shall be free from breaking phenomenon; the basic function shall stay the same.

7.25 Impact resistance test

7.25.1 Purpose

Inspect impact resistance of watch glass of floor-installed model luminaries.

7.25.2 Test procedure

Install the sample to normal operation position according to the manufacturer's requirements; the surface shall be horizontal. Then place a ganoid iron shot with diameter of 63.5 mm (mass approximately 1040 g) above 1000 mm from the sample and let it free fall. The impact point shall be in the range of 25 mm to the frame of four corners of the sample; every corner impact once; observe and record the sample's state. After the test, carry out test according to the requirements of 7.2.

7.25.3 Test result

After the test, the sample's watch glass shall be free from breaking phenomenon; the basic function shall stay the same.

8 Inspection rules

8.1 Delivery inspection

D.3.1.2.1 Check whether battery's overall dimension meets nominal dimension of the battery with Vernier caliper.

D.3.1.2.2 Inspect battery's appearance and marks.

D.3.1.3 Test results

D.3.1.3.1 Overall dimension meets the nominal requirements.

D.3.1.3.2 Battery appearance shall be regular without damage, deformation and corrosion etc.

D.3.1.3.3 Battery marks shall be distinct, including manufacturer's name, type, model, rated capacity, nominal voltage and manufacturing date.

D.3.2 Actual capacity test of battery

D.3.2.1 Purpose

Inspect whether battery capacity is consistent with nominal capacity.

D.3.2.2 Test procedure

Discharge eight 1[#] ~ 8[#] batteries to 80 % of nominal voltage with 0.2 C₅A constant current at 20 °C ± 5 °C temperature conditions, then charge for 16 h at 0.1 C₅A constant current, keep for 1 h, discharge again to 80 % of nominal voltage at 0.2 C₅A constant current and then inspect discharge time. If the first results for this test show that the discharge time is less than 4 h 45 min, three cycles may be carried out continuously and the discharge time after cycle shall not be less than 4 h 45 min.

D.3.2.3 Test results

D.3.2.3.1 Actual capacity of the battery shall not be less than 95 % of nominal capacity at normal environment.

D.3.2.3.2 Battery shall be free from alkali climbing, leakage, severe distortion and bursting etc.

D.3.3 Overcharge performance test

D.3.3.1 Purpose

Check normal operations capacity of battery under long-term float charging condition.

D.3.3.2 Test procedure

E.3 Test

E.3.1 Battery appearance and structure test

E.3.1.1 Purpose

Inspect whether appearance and internal structure of battery meet the requirements.

E.3.1.2 Test procedure

E.3.1.2.1 Check whether the overall dimension and the terminal overall dimension of battery meet the nominal dimension provided by the manufacturer with a Vernier caliper.

E.3.1.2.2 Measure the battery poles with a voltmeter, and check whether the polarity is consistent with the polarity mark.

E.3.1.2.3 Inspect the battery appearance.

E.3.1.3 Test results

E.3.1.3.1 The overall dimension and the terminal overall dimension meet the nominal dimension provided by the manufacturer;

E.3.1.3.2 The battery poles shall be consistent with the polarity and the positive and negative pole terminals are convenient for bolt connection.

E.3.1.3.3 The battery appearance shall be regular, and free of crack, deformation, alkali sink, or leakage.

E.3.2 Voltage uniformity test

E.3.2.1 Purpose

Inspect the battery voltage uniformity after the battery is charged fully.

E.3.2.2 Test procedure

Connect batteries 1[#] ~ 6[#] in serial to a battery, charge the batteries on the manufacturer-specified charging condition for 48 h, open the circuit, keep for 24 h, and measure the open-circuit voltage of each battery.

E.3.2.3 Test results

The difference between the maximum and minimum open-circuit voltages of the battery shall not be greater than the value specified in Table E.2.

battery appearance has crack, and whether the terminal has acidation-mark.

E.3.9.3 Test result

The battery shall not have fracture phenomena and the terminal has no acidation-mark.

E.3.10 Antifoam performance test

E.3.10.1 Purpose

Inspect the antifoam performance of the battery.

E.3.10.2 Test procedure

Charge battery 3[#] for 48 h on the manufacturer-specified charging condition, and charge it with constant current ($0.05 C_{20}A$) for 4 h; keep the charging state, place a sodden pH paper over the battery vent port, and observe the change condition of the test paper.

E.3.10.3 Test result

The test paper shall not have acidation reaction.

E.3.11 Impact resistance test

E.3.11.1 Purpose

Inspect the impact resistance of the battery.

E.3.11.2 Test procedure

Charge battery 4[#] for 48 h on the manufacturer-specified charging condition, and measure the open circuit voltage and internal resistance of the battery; fall the battery at the height of 20 cm for 3 times, observe the appearance change of the battery, and measure the open circuit voltage and internal resistance hereof.

E.3.11.3 Test results

The battery shall not leak liquid, and the pole shall be free from rupture; the variance in off state voltage and internal resistance of the sample shall not be greater than 10 %.

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