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PEOPLE'S REPUBLIC OF CHINA**

GB 18428-2010

Glass bulbs used for automatic fire extinguishing systems

自动灭火系统用玻璃球

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1 Scope

GB 18428-2010 is the Chinese national standard on glass bulbs used for automatic fire extinguishing systems, in the field of environment and health protection, safety. It carries no /T suffix, which in the Chinese system means compliance is mandatory: a product or a practice within its scope has to meet it to be lawfully made, sold or carried out in China. It was issued on 10 January 2011 by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China; Standardization Administration of China, and has been in force since 1 June 2011. Classification: ICS 13.220.10, CCS C84. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This standard specifies the requirements, test methods, inspection rules, instruction manual, product data sheet, packaging, storage, transportation of glass bulbs used in automatic fire extinguishing systems. This standard applies to glass bulbs used in automatic fire extinguishing systems. The temperature-sensitive glass bulbs, which are used in other fire-fighting devices, can also use this standard as a reference.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard; however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 2828.1 Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection (GB/T 2828.1-2003, ISO 2859-1, 1999, IDT)

GB/T 2829 Sampling procedures and tables for periodic inspection by attributes (Apply to inspection of process stability)

3 Terms and definitions

The following terms and definitions apply to this standard.

3.1 Static operating temperature Under a certain heating rate, the temperature when the glass bulb cylinder is broken in the liquid bath, in Celsius (°C).

3.2 Response time index RTI An index for the sensitivity of a glass bulb, which is determined under standard conditions. Expression: Where: RTI - Response time index, in units of $(m - s)^{0.5}$; τ - Response time constant, in seconds (s); u - Gas velocity, in meters per second (m/s).

3.3 Fast response glass bulb Glass bulbs, which have a response time index (RTI) less than or equal to $50(m - s)^{0.5}$.

3.4 Special response glass bulb Glass bulbs, which have a response time index (RTI) greater than $50(m - s)^{0.5}$

0.5 and less than or equal to $80(m - s)^{0.5}$.

3.5 Standard response glass bulb Glass bulbs, which have a response time index (RTI) greater than $80(m - s)^{0.5}$

0.5 and less than or equal to $350(m - s)^{0.5}$.

4.1 Appearance and size

4.1.1 There shall be no damage on the outer surface of the glass bulb. There shall be no bubbles or other impurities inside the glass material. The size of the bubbles, in the working liquid of the glass bulb of the same specification, shall be uniform.

4.1.2 The deviation -- between the diameter of the glass bulb and the nominal diameter -- shall not exceed $\pm$

0.1 mm. The deviation -- between the assembly length of the glass average crushing load shall not be lower than the manufacturer's published value; the lower limit of the crushing load error (TL) shall not be lower than 50% of the average crushing load. The calculation of the crushing load error is carried out, according to the normal distribution. The confidence factor for the 99% normal-state distribution of all glass bulbs is 0.99.

4.6 Low-temperature storage performance Carry out the low-temperature storage test,

according to the regulations in 5.6; the glass bulb shall not be damaged. After the test, the static operating temperature of the glass bulb shall meet the requirements in 4.2.

4.7 Adaptability to ambient temperature Carry out the ambient temperature test, according to the provisions of 5.7. The glass bulb shall not be damaged in any way. After the test, the static operating temperature of the glass bulb shall meet the requirements in 4.2.

4.8 Dynamic response performance The response type of glass bulbs is provided by the manufacturer. Carry out the dynamic response test, according to the provisions of 5.8. All RTI values of the fast response glass bulbs shall be less than or equal to $50(m-s)^{0.5}$. All RTI values of the standard response glass bulbs shall be greater than $80(m-s)^{0.5}$.

0.5 and less than or equal to $350(m-s)^{0.5}$. The average RTI value of special response glass bulbs shall be between $50(m-s)^{0.5} \sim 80(m-s)^{0.5}$, meanwhile any value shall not be less than $40(m-s)^{0.5}$.

0.5 or greater than $100(m-s)^{0.5}$.

4.9 Functions Carry out the functional test, according to the provisions of 5.9. The glass bulb shall fracture within 120 s.

4.10 Light fading Carry out the light fading test, according to the provisions of 5.10. After the test, the color of the working fluid of the glass bulb shall not be the same or similar to the color of the working fluid of other glass bulbs, which have nominal operating temperature.

4.11 Volatility of working fluid Carry out the working fluid volatility test, according to the regulations in 5.11. The working fluid in the glass bulb shall change obviously.

5 Test method

5.1 Visual inspection Check the appearance, size, marks of the glass bulbs, against the technical documents; judge whether each sample meets the requirements of 4.1.

5.2 Static operating temperature test The ambient temperature of the test is $(20 \pm 5) ^\circ\text{C}$. The test is carried out in a liquid bath. Glass bulbs, which have a nominal operating temperature not higher than $79 ^\circ\text{C}$, shall use a water bath (distilled water should be used). The glass bulbs, which have a nominal operating temperature above $79 ^\circ\text{C}$, shall use an oil bath (an oil suitable for the nominal operating temperature). The temperature of the test liquid bath shall be uniform. The temperature deviation in the test area shall not exceed $0.5 ^\circ\text{C}$. The temperature measurement accuracy shall not be lower than $\pm 0.1 ^\circ\text{C}$. Put the glass bulb sample vertically in the liquid bath. The center of the glass bulb is not less than (40 ± 5) mm, from the liquid surface. Increase the temperature, from room temperature to $(20 \pm 2) ^\circ\text{C}$ below the nominal operating temperature, at a heating rate not exceeding $20 ^\circ\text{C}/\text{min}$. After maintaining for 10 min, increase the temperature at a velocity of $0.4 ^\circ\text{C}/\text{min} \sim 0.6 ^\circ\text{C}/\text{min}$, until the samples are all broken. Record the operating temperature of each sample. Judge whether the test results meet the requirements of 4.2.

5.3 Fatigue strength test The ambient temperature of the test shall be $(20 \pm 5) ^\circ\text{C}$. The test shall be carried out in a liquid bath. The glass bulb, whose nominal operating temperature is not higher than $79 ^\circ\text{C}$, shall be in a water bath (distilled water should be used). The glass bulb, which has a nominal operating temperature above $79 ^\circ\text{C}$, uses an oil bath (an oil suitable for the nominal operating temperature). Place the sample in the test container. Heat up from room temperature to $(20 \pm 2) ^\circ\text{C}$ below the nominal operating temperature, at a rate of no more than $20 ^\circ\text{C}/\text{min}$. Then heat up to the inside of the glass bulb, at a rate of $1 ^\circ\text{C}/\text{min}$, until the bubbles in the glass bulb disappear or the temperature is $5 ^\circ\text{C}$ lower than the nominal operating temperature. Take the sample out of the liquid bath immediately. Keep the sealing tip of the glass bulb facing down. Cool it naturally in the air, until the bubbles inside the glass bulb reappear. Repeat the above test 6 times for each sample, to judge whether the test results meet the requirements of 4.3. After the test, carry out the static operating temperature test, according to the provisions of 5.2.