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Code for Installation and Acceptance of Foam Extinguishing Systems

泡沫灭火系统施工及验收规范

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1 General Provisions

1.0.1 This specification has been established to ensure construction quality, normalize acceptance and maintenance for foam extinguishing system (or called System for short).

1.0.2 This code applies to construction, acceptance and maintenance of low, medium and high expansion foam extinguishing system mounted in newly-built, expanded and rebuilt project.

1.0.3 Requirement of project technical documents, contract documents as well as construction and acceptance adopted for foam extinguishing system construction shall be not below regulations of this code.

1.0.4 Besides this specification, construction, acceptance and maintenance of construction, acceptance and maintenance of shall comply with regulations of related compulsory standards and specifications at present.

2 Terms

2.0.1 Foam proportioner (device)

Equipment (relevant equipment and accessories) for proportioning mixing of water and foam to form foam mixed liquor.

2.0.2 Foam generating device

A general designation of devices to make foam mixed liquor generate foam.

2.0.3 Foam concentrate storage tank

Tankage able to provide foam liquor for foam extinguishing system.

2.0.4 Foam guiding cover

Device mounted on the top of outer floating roof tank wall to make foam flow downward along tank wall and prevent foam from running off.

2.0.5 Foam descending groove

Stepped device mounted in fixed roof tank to make water-resistant foam flow downward.

2.0.6 Foam flowing groove

Groove device mounted on inner wall of fixed roof tank to make water-resistant foam flow downward along inner wall.

3 Basic Regulations

3.0.1 Part project, subpart project and item project of foam extinguishing system shall be divided according to Appendix A of this code.

3.0.2 Construction of foam extinguishing system must be undertaken by construction unit with corresponding qualification grade.

3.0.3 Construction site of foam extinguishing system shall have corresponding construction technical standard, complete quality management system and construction quality examination system to achieve overall process quality control.

Quality management of construction site shall be checked and recorded according to requirements of Table B.0.1 in this Code.

3.0.4 Construction of foam extinguishing system shall be carried out according to approved design shop drawing, technical documents and regulations of relevant technical standards, and no arbitrary change is allowed. Necessary changes shall be conducted by its primary design unit.

3.0.5 The following technical materials shall be provided before construction of foam extinguishing system:

1 Approved design shop drawings and design specification;

2 Installation and operation instructions of main assemblies;

3 Effective certificates and product ex-works conformity certificates meeting requirements of the Market Access System shall be provided for assemblies and materials of the system, such as foam generation device, foam proportioner (device), foam liquid pressure tank, fire pump, foam hydrant, valves, pressure gage, piping filter, foam liquid, tubing and pipe fittings, etc..

3.0.6 The following conditions shall be provided for the construction of foam extinguishing system:

1 Technical disclosure with record shall be conducted by design unit to construction unit;

2 Specs and types of assemblies, tubing and pipe fittings of the system shall meet design requirements, and continuous construction shall be guaranteed;

3 Foundation, embedded parts and preserved hole relevant to construction shall comply with design requirements via examination;

4 Such makeshift facilities as field conditions, road, water and electricity shall satisfy construction requirements.

3.0.7 Quality control during construction of foam extinguishing system shall be conducted according to the following regulations:

4 Entrance Inspection

4.1 General Regulations

4.1.1 Audit trail records in construction process shall be filled according to Table B.0.2-1 in this code for entrance inspection of materials and systemic assemblies.

4.1.2 If one sample of materials and systemic assemblies is unqualified in entrance sampling inspection, double sampling inspection shall be conducted; if unqualified sample is still found, then this batch of products will be judged as unqualified.

4.2 Entrance Inspection of Materials

4.2.1 Entrance inspection of foam liquid shall be organized by supervision engineer, and onsite samples shall be stored.

Inspection amount: According to required amount for overall inspection.

Inspection method: Visual inspection and inspection of effective certificates and product ex-works conformity certificates required by the Market Access System

4.2.2 For foam liquid belonging to one of the following conditions, onsite sampling shall be organized by supervision engineer and obtained samples shall be sent to detection unit with corresponding qualification for detection, the results of which shall comply with relevant current national product standards and design requirements.

1 Design dosage of 6% type low expansion foam liquid shall be no less than 7.0t;

2 Design dosage of 3% type low expansion foam liquid shall be no less than 3.5t;

3 Minimum reserve of 6% protein type medium expansion foam liquid shall be no less than 2.5t;

4 Minimum reserve of 6% synthetic type medium expansion foam liquid shall be no less than 2.0t;

5 Minimum reserve of high expansion foam liquid shall be no less than 1.0t;

6 Foam liquid sent for detection with onsite sample regulated in contract document.

Inspection amount: According to required amount for detection.

Inspection method: Inspection of onsite sampling, inspection report on blowing characteristics (blowing ratio, drainage time) and extinguishment characteristics (fire- extinguishing time, burn-back time) according to regulations of current national standard “General Specification for Foam Extinguishing Agents” (GB 15308).

4.2.3 Materials, specs, types and quality of tubing and pipe fittings shall comply with relevant current national product standard and design requirements.

Inspection amount: Total inspection.

Inspection method: inspection of ex-works test report and conformity certificates.

4.2.4 Besides regulations of its product standards, appearance quality of tubing and pipe fittings shall comply with the following requirements:

1 The surface shall be free of defects, such as crack, shrinkage cavity, slag inclusion, folding, cold laps, and rust or fossa not exceeding negative deviation of wall thickness;

2 The surface of screw thread shall be contact and free of damage, and flange sealing surface shall be flat, smooth, free of burr and radial groove;

3 Spacer shall be free of aging deterioration or layering phenomenon, and its surface shall be free of such defects as pincher.

Inspection amount: Total inspection.

Inspection method: Visual inspection.

4.2.5 Size and wall thickness as well as permissible variation of tubing and pipe fittings shall comply with its product standards and design requirements.

Inspection amount: 20% sampling inspection based on product pieces for product of the same specs and type, and no less than 1.

Inspection method: Measured by steel ruler and vernier caliper.

4.2.6 For tubing and pipe fittings belonging to one of the following conditions, samples shall be taken by supervision engineer and rechecked by detection unit with corresponding qualification, the recheck results of which shall comply with relevant current national product standards and design requirements:

1 For those with recheck requirements in design.

2 For those with doubtful points in quality.

Inspection amount: According to required amount of design or detection.

Inspection method: Inspect recheck report.

4.3 Entrance Inspection of Systemic Assemblies

4.3.1 Appearance quality of systemic assemblies, such as foam generation device, foam proportioner (device), foam liquid tank, fire pump, foam hydrant, valves, pressure gage, piping filter and metal hose, shall comply with the following requirements:

1 Free of deformation and other mechanical damage;

2 Intact protective coat on exposed non-machined surface;

3 Machined surface without protective coat shall be free of rust;

4 All exposed joints shall be free of damage and well enveloped by protector, such as block, cover, etc.;

5 System Construction

5.1 General Regulations

5.1.1 Besides regulations in this code, installation of fire pump shall also comply with relevant regulations in current national standard “Code for Construction and Acceptance of Compressor, Fan and Pump Installation Engineering” (GB 50275).

5.1.2 Besides regulations in this code, the following construction of foaming extinguishing system shall also comply with relevant regulations in current national standard “Code for Construction and Acceptance of Industrial Metallic Piping” (GB 50235), “Code for Construction and Acceptance of Field Equipment Industrial Pipe Welding Engineering” (GB 50236) and Steel Welded Atmospheric Pressure Vessel (JB/T 4735).

1 Field fabrication, welding and corrosion protection of atmospheric pressure steel tank for foam liquid.

2 Processing, welding and installation of pipe.

3 Test, pressure test, rinsing and corrosion protection of pipe.

4 Welding and installation of bracket and hanger.

5 Installation of valve.

5.1.3 Besides regulations in this code, installation of foaming sprinkler system shall also comply with relevant regulations in current national standard “Code for Installation and Acceptance of Automatic Water-Based Extinguishing System” (GB 50261).

5.1.4 Besides regulations in this code, construction of linkage part between automatic fire alarm system and foaming extinguishing system shall be executed according to current national standard “Code for Installation and Acceptance of Automatic Fire Alarm System (GB 50166).

5.1.5 Construction of foaming extinguishing system shall be recorded according to Table B.0.2-3~Table B.0.2-6 and Table B.0.3 in this code.

5.2 Installation of Fire Pump

5.2.1 Fire pump shall be integrally installed on foundation, and arbitrary disassembly of assemblies during installation shall be forbidden. Necessary disassembly can only be conducted by manufactory.

Inspection amount: Total inspection.

Inspection method: Visual inspection.

5.2.2 Fire pump shall be made level and straight with base level as benchmark.

Inspection amount: Total inspection.

Inspection method: Visual inspection.

5.2.3 When connected with relevant pipes, fire pump shall be measured and installed with flange end face of fire pump as benchmark.

Inspection amount: Total inspection.

Inspection method: Ruler measurement and visual inspection.

5.2.4 When filter screen is set at blast hole of inlet pipe of fire pump, the installation of screen frame shall be firm; screen shall be convenient to clean.

Inspection amount: Total inspection.

Inspection method: Visual inspection.

5.2.5 When fire pump is driven by internal-combustion engine, drain pipe of cooler for internal-combustion engine shall be connected with drainage facilities.

Inspection amount: Total inspection.

Inspection method: Visual inspection.

5.2.6 For fire pump driven by internal-combustion engine, the installation of its exhaust pipe for internal-combustion engine shall comply with design requirements, and steel pipe of the same diameter shall be adopted and open to outdoor after connection under the condition without design regulations.

Inspection amount: Total inspection.

Inspection method: Visual inspection.

5.3 Installation of Foam Liquid Tank

5.3.1 Installation position and height of foam liquid tank shall comply with design requirements. Under the condition without design requirements, passage meet maintenance requirements shall be left around foam liquid tank, the width and operation surface of which shall be no less than 0.7m and 1.5m, respectively. When height of control valve on foam liquid tank from ground is more than 1.8m, operation platform or operation stool shall be set at operation face.

Inspection amount: Total inspection.

Inspection method: Ruler measurement.

5.3.2 Field fabrication, installation and corrosion protection of atmospheric pressure foam liquid tank shall comply with the following regulations:

1 For field fabricated atmospheric pressure steel tank for foam liquid, the height between outlet of foam liquid pipe and minimum liquid level of foam liquid tank shall be no more than 1m, and the distance between blast hole of foam liquid pipe and bottom surface of foam liquid tank shall be no less than 0.15m. The blast hole shall be fabricated in bell-mouthed shape.

Inspection amount: Total inspection.

Inspection amount: Total inspection.

Inspection method: Visual inspection.

5.4 Installation of Foam Proportioner (Device)

5.4.1 Installation of foam proportioner (device) shall comply with the following regulations:

1 Label direction of foam proportioner (device) shall be consistent with flow direction.

Inspection amount: Total inspection.

Inspection method: Visual inspection.

2 Installation of connections between foam proportioner (device) and pipe shall be tight.

Inspection amount: Total inspection.

Inspection method: Visual inspection during debugging.

5.4.2 Installation of round-the-pump foam proportioner shall comply with the following regulations:

1 Permissible deviation of installation height of round-the-pump foam proportioner shall be ±10mm.

Inspection amount: Total inspection.

Inspection method: Inspect by line or ruler measurement.

2 Spare round-the-pump foam proportioner shall be parallel connected on system and marked obviously.

Inspection amount: Total inspection.

Inspection method: Visual inspection.

5.4.3 Pressure type foam proportioning device shall be integrally installed and firmly fixed with foundation.

Inspection amount: Total inspection.

Inspection method: Visual inspection.

5.4.4 Installation of balanced foam proportioning device shall comply with the following regulations:

1 Integral balanced foam proportioning device shall be vertically installed on horizontal pipe of pressure water, and pressure gages shall be respectively installed on horizontal inlet pipes for water and foam liquid inlet. The distance between pressure gage and inlet position of balanced proportioner (device) shall be no more than 0.3m.

Inspection amount: Total inspection.

Inspection method: Ruler measurement and visual inspection.

2 Balance pressure flow control valve for separate-type balanced foam proportioning device shall be vertically installed.

Inspection amount: Total inspection.

Inspection method: Visual inspection.

3 Foam pump for hydraulic driving balanced proportioning device shall be horizontally installed, and installation dimensions and connection way of pipe shall comply with design requirements.

Inspection amount: Total inspection.

Inspection method: Ruler measurement and visual inspection.

5.4.5 In line foam proportioner shall be installed on horizontal pipe of pressure water or connected on fire hose in series, and adjacent to tank or protective area. The height between its blast hole and minimum level of foam liquid tank or foam barrel shall be no more than 1.0m.

Inspection amount: Total inspection.

Inspection method: Ruler measurement and visual inspection.

5.5 Installation of Pipe, Valve and Foam Hydrant

5.5.1 Installation of pipe shall comply with the following regulations:

1 During the installation of horizontal pipe, its slope and exposure shall comply with design requirements, and the slope shall be no less than design value. Blow-down measures shall be taken for U-type pipe.

Inspection amount: 1 for selective examination of main pipe; 2 for selective examination of lateral pipe; 10% for selective examination of sublateral pipe, and no less than 1; 5% for selective examination of sublateral pipe for foam spraying, and no less than 1.

Inspection method: Checked by level-gauge.

2 Vertical pipes shall be fixed on bracket by pipe clamp, and their distance shall be no more than design value.

Inspection amount: Total inspection.

Inspection method: Ruler measurement and visual inspection.

3 Installation of underground pipe shall comply with the following regulations:

1) Foundation of underground pipe shall comply with design requirements;

2) Corrosion protection measures shall be taken before installation of underground pipe, and anti-corrosion coatings shall be kept from damage during installation;

between it and other across pipes.

5 Installation of bracket and hanger shall be firm and even, and laying of pipe pier shall be clear and neat. The distance between pipe piers shall comply with design requirements.

Inspection amount: 5% of overall installation shall be selected for examination, and inspection amount shall be no less than 5.

Inspection method: Visual and ruler measurement inspection.

6 Casing pipe shall be installed when pipe penetrates through fire bund, fire wall and floor-slab. The length of casing pipe for pipe penetrating through fire bund and fire wall shall be no less than their thickness, and the length of casing pipe through floor-slab shall be 50mm higher than the floor-slab with bottom even with floor-slab bottom surface; fire resistive materials shall be adopted to calk spacing between pipe and casing pipe; protection measures shall be taken for pipe penetrating through deformation joint of buildings.

Inspection amount: Total inspection.

Inspection method: Visual and ruler measurement inspection.

7 Hydrostatic test shall be conducted for pipe after completion of installation, and comply with the following regulations:

1) Test shall be conducted in clean water, and environmental temperature for test shall be not below 5°C; antifreezing measures shall be taken when environmental temperature is below 5°C.

2) Test pressure shall be 1.5 times of design pressure;

3) Foam generation device and foam proportioner (device) shall be separated before test;

4) After tested pipe passes, results shall be recorded according to Table B.0.2-4 in this code.

Inspection amount: Total inspection.

Inspection method: Fill the pipe with water to empty air, then slow increase pressure by pressure test device, and stabilize for 10min when pressure reaches test pressure. If the pipe is free of damage and deformation, decrease the pressure from test pressure to design pressure and stabilize for 30min, and those pipes without pressure decrease and leakage are qualified.

8 Pipes shall be rinsed by clean water after passing pressure test, and other constructions influencing cleanliness of internal pipe shall be avoid. Records shall be taken according to Table B.0.2-5 in this code.

Inspection amount: Total inspection.

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