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Examination Standard for Water Motor Gongs

Class Number 1055

May 2024

Foreword

This standard is intended to verify that the products and services described will meet stated conditions of performance, safety and quality useful to the ends of property conservation. The purpose of this standard is to present the criteria for examination of various types of products and services.

Examination in accordance with this standard shall demonstrate compliance and verify that quality control in manufacturing shall ensure a consistent and reliable product.

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1 INTRODUCTION

1.1 Purpose

1.1.1 This standard states testing and certification requirements for water motor gongs for use in sprinkler system piping. They are used to give an audible alarm signal when a fire protection system operates.

1.1.2 Testing and certification criteria may include performance requirements, marking requirements, examination of manufacturing facility(ies), audit of quality assurance procedures, and a surveillance program.

1.2 Scope

1.2.1 This standard encompasses the design and performance requirements for water motor gongs.

1.3 Basis for Requirements

1.3.1 The requirements of this standard are based on experience, research and testing, and/or the standards of other organizations. The advice of manufacturers, users, trade associations, jurisdictions and/or loss control specialists may also be considered.

1.3.2 The requirements of this standard reflect tests and practices used to examine characteristics of water motor gongs for the purpose of obtaining certification.

1.4 Basis for Certification

Certification is based upon satisfactory evaluation of the product and the manufacturer in the following major areas:

1.4.1 Examination and tests on production samples shall be performed to evaluate:

- the suitability of the product;
- the performance of the product as specified by the manufacturer and required for certification;
- the durability and reliability of the product.

1.4.2 An examination of the manufacturing facilities and audit of quality control procedures may be conducted to evaluate the manufacturer's ability to consistently produce the product, which is examined and tested, and the marking procedures used to identify the product. Subsequent surveillance may be required by the certification agency in accordance with the certification scheme to ensure ongoing compliance.

1.5 Basis for Continued Certification

The basis for continual certification may include the following based upon the certification scheme and requirements of the certification agency:

- production or availability of the product as currently certified;
- the continued use of acceptable quality assurance procedures;
- compliance with the terms stipulated by the certification;
- satisfactory re-examination of production samples for continued conformity to requirements; and;

- satisfactory surveillance audits conducted as part of the certification agency's product surveillance program.

1.6 Effective Date

The effective date of this examination standard mandates that all products tested for certification after the effective date shall satisfy the requirements of this standard.

The effective date of this standard is eighteen (18) months after the publication date of the standard for compliance with all requirements.

1.7 System of Units

Units of measurement used in this standard are United States (U.S.) customary units. These are followed by their arithmetic equivalents in International System (SI) units, enclosed in parentheses. The first value stated shall be regarded as the requirement. The converted equivalent value may be approximate. Conversion of U.S. customary units is in accordance with ANSI/IEEE/ASTM SI 10.

Two units (liter and bar), outside of but recognized by SI, are commonly used in international fire protection and are used in this standard.

1.8 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the cited edition applies:

ANSI/IEEE/ASTM SI, American National Standard for Metric Practice

1.9 Terms and Definitions

For purposes of this standard, the following terms apply:

Accepted

This term refers to installations acceptable to the authority enforcing the applicable installation rules. Acceptance is based upon an overall evaluation of the installation. Acceptance is not a characteristic of a product. It is installation specific. A product accepted for one installation may not be acceptable elsewhere.

End Connections

The means by which components of a sprinkler system are connected to the sprinkler fitting or piping. The typical end connection used for water motor gongs is a threaded connection.

Rated Working Pressure

This is the maximum sustained pressure at or below which the water motor gong shall operate trouble free. This also sets the basis for the testing described in Section 4, Performance Requirements. The minimum pressure rating considered for certification is 175 psi (1205 kPa).

2. GENERAL INFORMATION

2.1 Product Information

2.1.1 Water motor gongs produce an audible alarm signal sufficient to alert nearby personnel that a fire protection sprinkler system is experiencing a water flow condition, and needs to be investigated.

2.1.2 In order to meet the intent of this standard, water motor gongs must be examined on a model-by-model, type-by-type, manufacturer-by-manufacturer, and plant-by-plant basis. This is predicated on the basis that identical designs, fabricated in identical materials by different manufacturers or, even by different plants of the same manufacturer, have been seen to perform differently in testing. Sample water motor gongs, selected in conformance to this criterion, shall satisfy all of the requirements of this standard.

2.2 Certification Application Requirements

The manufacturer shall provide the following preliminary information with any request for certification consideration:

- a complete list of all models, types, sizes, and options for the products or services being submitted for certification consideration,
- general assembly drawings, one complete set of manufacturing drawings, materials list(s), anticipated marking format, brochures, sales literature, specification sheets, installation, operation and maintenance procedures, and
- number and location of manufacturing facilities.

All documents shall identify the manufacturer's name, document number or other form of reference, title, date of last revision, and revision level. All foreign language documents shall be provided with English translation.

2.3 Requirements for Samples for Examination

2.3.1 Following authorization of certification examination, the manufacturer shall submit samples for examination and testing based on the following:

Sample requirements to be determined by the certification agency.

2.3.2 Requirements for samples may vary depending on design features, results of prior or similar testing, and results of any foregoing tests.

2.3.3 The manufacturer shall submit samples representative of production.

2.3.4 It is the manufacturer’s responsibility to provide any necessary test fixtures, such as those which may be required to evaluate the water motor gongs.

3. GENERAL REQUIREMENTS

3.1 Review of Documentation

3.1.1 During the initial investigation and prior to physical testing, the manufacturer's specifications, technical data sheets, and design details shall be reviewed to assess the ease and practicality of installation and use. The product shall be capable of being used within the limits of the certification investigation.

3.1.2 The manufacturer's dimensional specifications and/or dimensional drawings shall fully describe the product. All critical dimensions shall be indicated with the allowed upper and lower tolerance limits clearly shown.

3.2 Physical or Structural Features

3.2.1 Water motor gongs submitted for testing shall be true production samples and shall be free of sharp edges, burrs, or other imperfections which might injure the installer or interfere with proper assembly of the unit**.**

3.2.2 The design shall permit disassembly for inspection, lubrication, adjustment, or repair without removal from the supporting wall or structure. Suitable means shall be provided so that nozzle and strainer can be readily cleaned.

3.2.3 An outer shield or cover shall be provided to protect the gong from effects of rain and snow, or to prevent nesting of birds, vermin, etc.

3.2.4 Nominal size of inlet threads shall be 3/4 inch NPT or equal. Other threaded connections, conforming to recognized international standards, are acceptable on a case by case basis.

3.2.5 Nominal size of outlet shall be between 1 and 1-1/2 inch NPT to facilitate the removal of waste water.

3.2.6 Shafts and other moving parts shall be designed to prevent binding, and to be protected against mechanical injury.

3.2.7 Bearings shall be either self-lubricating, or have means for lubrication as part of normal maintenance. The lubricant must be suitable for use over a range of temperatures from between -40°F (-40°C) and 120°F (49°C).

3.2.8 Double water motor gongs are permitted, where one unit sounds inside a building, and one unit sounds outside the building. Both gongs are driven by one drive section, and are connected by a shaft turning inside a pipe spacer or nipple.

3.2.9 Operating ports such as nozzles shall have a diameter of not less than 1/8 inch (3.2 mm), and shall be protected by a suitable strainer of corrosion-resistant material. The total area of all openings in the strainer screen shall be at least ten times the port area. The strainer, which shall be supplied by the gong manufacturer, may be located at the water flow detecting device.

3.3 Materials

All materials used in these water motor gongs shall be suitable for the intended application. Parts exposed to water shall be constructed of corrosion resistant materials. Materials shall be compatible with other sprinkler system components. When unusual materials are used, special tests may be necessary to verify their suitability. All components shall withstand the normal abuse of shipping, handling, and installation.

3.4 Markings

3.4.1 Marking on the product or, if not possible due to size, on its packaging or label accompanying the product, shall include the following information:

- name and address of the manufacturer or marking traceable to the manufacturer;
- date of manufacture or code traceable to date of manufacture or lot identification;
- the words “Sprinkler Alarm” on the shield or cover;
- model number.

When hazard warnings are needed, the markings should be universally recognizable.

3.4.2 Any additional pertinent marking information required by a national or international standard to which the product is manufactured shall be permanently marked on the outside surface of each assembly.

3.4.3 Each required marking listed in Section 3.4.1 shall be legible and durable and applied in any of, or any combination of casting, die stamping, forging, roller embossing or electro-etching.

3.4.4 The model or type identification shall correspond with the manufacturer's catalog designation and shall uniquely identify the certification agency’s mark of conformity.

3.4.5 The certification agency’s mark of conformity shall be displayed visibly and permanently on the product and/or packaging as appropriate and in accordance with the requirements of the certification agency. The manufacturer shall exercise control of this mark as specified by the certification agency and the certification scheme.

3.5 Manufacturer's Installation and Operation Instructions

3.5.1 The manufacturer shall:

- prepare instructions for the installation, maintenance, and operation of the product;
- provide facilities for repair of the product and supply replacement parts; and
- provide services to ensure proper installation, inspection, or maintenance for products where it is not reasonable to expect the average user to be able to provide the installation, inspection, or maintenance.

3.6 Calibration

3.6.1 Each piece of equipment used to verify the test parameters shall be calibrated within an interval determined on the basis of stability, purpose, and usage. A copy of the calibration certificate for each piece of test equipment is required. The certificate shall indicate that the calibration was performed against working standards whose calibration is certified and traceable to an acceptable reference standard and certified by an ISO/IEC 17025 accredited calibration laboratory. The test equipment shall be clearly identified by label or sticker showing the last date of the calibration and the next due date. A copy of the service provider’s accreditation certificate as an ISO/IEC 17025 accredited calibration laboratory should be available.

3.6.2 When the inspection equipment and/or environment is not suitable for labels or stickers, other methods such as etching of control numbers on the measuring device are allowed, provided documentation is maintained on the calibration status of the equipment.

3.7 Tolerances

Tolerances on units of measure shall be as described in Appendix A, unless otherwise specified in this standard.

4. PERFORMANCE REQUIREMENTS

4.1 Examination

4.1.1 Requirement

The water motor gongs shall conform to the manufacturer's drawings and specifications and to certification requirements.

4.1.2 Test/Verification

A sample water motor gong shall be examined and compared to drawings and specifications. It shall be verified that the sample conforms to the physical and structural requirements described in Section 3, General Requirements.

4.2 Audibility

4.2.1 Requirement

The water motor gong shall produce an audible signal sufficient to alert nearby personnel that a fire protection sprinkler system is experiencing a water flow condition.

4.2.2 Test/Verification

The water motor gong shall generate sound waves having a minimum sound-pressure level of 90 decibels (referred to a 0.0002 microbar base) using the "C" weighting, when testing in a room having a background noise level within the approximate range of 50 to 55 decibels. The operating pressure at the inlet to the water motor gong shall be 30 psi (205 kPa). Sound pressure level measurements will be made at a point of 10 feet (3 m) in front of the gong with the shield or protective cover in place.

4.3 Durability

4.3.1 Requirement

A water motor gong shall be designed to operate reliably without excessive maintenance. It will be subjected to a 60 hour continuous endurance run with an average full flow operating water pressure of 50 psi (345 kPa) at the inlet to the device. No lubrication or adjustment will be made during the endurance test.

4.3.2 Test/Verification

Operate one sample of each style water motor gong for 60 hours continuously, with an inlet water supply set at 50 psi (345 kPa). The gong shall be capable of generating sound waves having a minimum sound-pressure level of 80 decibels (referred to a 0.0002 microbar base) using the "C" weighting, when testing in a room having a background noise level within the approximate range of 50 to 55 decibels at the conclusion of the test period, and there shall be no evidence of excessive wear of any component at the conclusion of the test.

4.4 Sensitivity

4.4.1 Requirement

The water motor gong shall sound an audible alarm when subjected to a minimum operating water supply pressure of 5 psi (35 kPa).

4.4.2 Test/Verification

Starting from zero water pressure, increase the water supply to the inlet of the water motor gong, until a pressure of 5 psi +/- 0.2 psi (35 kPa +/- 1.4 kPa) is measured. The sound pressure level at this minimum water supply should be clearly audible. The gong shall be capable of generating sound waves having a minimum sound-pressure level of 70 decibels (referred to a 0.0002 microbar base) using the "C" weighting, when testing in a room having a background noise level within the approximate range of 50 to 55 decibels.

4.5 Hydrostatic Strength

4.5.1 Requirement

The water motor gong housing shall withstand hydrostatic strength testing without sustaining cracking or permanent deformation.

4.5.2 Test/Verification

The water motor gong housing shall be able to withstand a hydrostatic pressure of 175 psi (1205 kPa) or the rated working pressure, whichever is greater, for 5 minutes.

4.6 Protective Cover

4.6.1 Requirement

A water motor gong cover or shield shall be able to withstand 6 impacts from a 10.5 lb (4.8 kg) weight, swinging along a 10.5 foot (3.2 m) long pendulum from a height of 5 feet (1.5 m).

4.6.2 Test/ Verification

The water motor gong cover shall withstand six impacts from a 10.5 foot (3.2 m) long pendulum supporting a 10.5 lb. (4.8 kg) circular weight hung directly above the cover such that the weight will strike the cover at a 90° angle. The weight shall be raised to a distance of 5 feet (1.5 m) above the point of impact along the trajectory of the pendulum. The point of impact between the circular weight and gong cover will be halfway between the center of the cover and its periphery in a horizontal plane. After the 6 impacts, the water motor gong shall still provide an audible signal in accordance with Section 4.2.

5. MANUFACTURER'S REQUIREMENTS

5.1 Demonstrated Quality Control Program

5.1.1 A quality assurance program is required to assure that subsequent products produced by the manufacturer shall present the same quality and reliability as the specific products examined. Design quality, conformance to design, and performance are the areas of primary concern.

- Design quality is determined during the examination and tests, and is documented in the certification report.
- Continued conformance to this standard is verified by the certifier's surveillance program.
- Quality of performance is determined by field performance and by periodic re-examination and testing.

5.1.2 The manufacturer shall demonstrate a quality assurance program which specifies controls for at least the following areas:

- existence of corporate quality assurance guidelines;
- incoming quality assurance, including testing;
- in-process quality assurance, including testing;
- final inspection and tests;
- equipment calibration;
- drawing and change control;
- packaging and shipping; and
- handling and disposition of non-conforming materials.

5.1.3 Documentation/Manual

There should be an authoritative collection of procedures/policies. It should provide an accurate description of the quality management system while serving as a permanent reference for implementation and maintenance of that system. The system should require that sufficient records are maintained to demonstrate achievement of the required quality and verify operation of the quality system.

5.1.4 Records

There should be an authoritative collection of procedures/policies. It should provide an accurate description of the quality management system while serving as a permanent reference for implementation and maintenance of that system. The system should require that sufficient records are maintained to demonstrate achievement of the required quality and verify operation of the quality system.

5.1.5 Drawing and Change Control

The manufacturer shall establish a system of product configuration control that shall allow no unauthorized changes to the product. Changes to critical documents, identified in the certification

report, may be required to be reported to, and authorized by the certification agency prior to implementation for production.

Records of all revisions to all certified products shall be maintained.

5.2 Surveillance Audit Program

5.2.1 An audit of the manufacturing facility may be part of the certification agency's surveillance requirements to verify implementation of the quality assurance program. Its purpose is to determine that the manufacturer's equipment, procedures, and quality program are maintained to ensure a uniform product consistent with that which was tested and certified.

5.2.2 Certified products or services shall be produced or provided at, or provided from, location(s) disclosed as part of the certification examination. Manufacture of products bearing a certification mark is not permitted at any other location prior to disclosure to the certification agency.

5.3 Product Modification

The manufacturer shall notify the certification agency of changes in product construction, components, raw materials, physical characteristics, coatings, component formulation or quality assurance procedures prior to implementation.

5.4 Installation Inspections

Field inspections may be conducted to review an installation. The inspections are conducted to assess ease of application, and conformance to written specifications. When more than one application technique is used, one or all may be inspected at the discretion of FM Approvals.

5.5 Manufacturing and Production Tests

5.5.1 Test Requirement No. 1 – *Durability Test*

The manufacturer shall test 100 percent of production water motor gongs hydrostatically for body and joint integrity during operation. The flow shall be held for a minimum of 10 seconds with no evidence of body leakage, cracking or distortion. There will be an audible sound produced, and the mechanism will run freely.

6. BIBLIOGRAPHY

ANSI/ASME B1.20.1, Pipe Threads, General Purpose (Inch) and Redesignation of ASME/ANSI B2.1

ANSI/ ASA S1.4A, Specification for Sound Level Meters

ISO 17025, *General Requirements for the Competence of Testing and Calibration Laboratories*

FM Global Property Loss Prevention Data Sheet 2-0, *Installation Guidelines for Automatic Sprinklers*

APPENDIX A: TOLERANCES

Unless otherwise stated, the following tolerances shall apply:

Mass	± 2 percent of value
Length	± 2 percent of value
Pressure	± 2 psi (14 kPa)
Temperature	± 4°F (2°C)
Time	+ 5/–0 seconds
	+0.1/–0 minutes

Unless stated otherwise, all tests shall be carried out at a room (ambient) temperature of 68 ± 9°F (20 ± 5°C).

APPENDIX B: SAMPLE LISTING

Water Motor Gongs

Water motor gongs give a locally audible alarm signal when the automatic sprinkler system operates. They may be used with water flow alarm, dry pipe, or automatic water control valves. Unless otherwise specified in the listing, all water motor gongs have a rated working pressure of 175 psi (1205 kPa).

Model TAC

Product Designation	Inlet Connection	Outlet Connection	Remarks
Model TAC	3/4 inch NPT	1-1/2 inch NPT	