



Member of the FM Global Group

Examination Standard for Sight Drains for Automatic Sprinkler Systems

Class Number 1056

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.

Table of Contents

1. INTRODUCTION	1
1.1 PURPOSE	1
1.2 SCOPE	1
1.3 BASIS FOR REQUIREMENTS	1
1.4 BASIS FOR CERTIFICATION	1
1.5 BASIS FOR CONTINUED CERTIFICATION	1
1.6 EFFECTIVE DATE	2
1.7 SYSTEM OF UNITS	2
1.8 NORMATIVE REFERENCES	2
1.9 TERMS AND DEFINITIONS	2
2. GENERAL INFORMATION	4
2.1 PRODUCT INFORMATION	4
2.2 CERTIFICATION APPLICATION REQUIREMENTS	4
2.3 REQUIREMENTS FOR SAMPLES FOR EXAMINATION	4
3. GENERAL REQUIREMENTS	5
3.1 REVIEW OF DOCUMENTATION	5
3.2 PHYSICAL OR STRUCTURAL FEATURES	5
3.3 MATERIALS	5
3.4 MARKINGS	5
3.5 MANUFACTURER'S INSTALLATION AND OPERATION INSTRUCTIONS	6
3.6 CALIBRATION	6
3.7 TOLERANCES	6
4. PERFORMANCE REQUIREMENTS	7
4.1 EXAMINATION	7
4.2 HYDROSTATIC INTEGRITY	7
4.3 VISIBILITY	7
5. MANUFACTURER'S REQUIREMENTS	8
5.1 DEMONSTRATED QUALITY CONTROL PROGRAM	8
5.2 SURVEILLANCE AUDIT PROGRAM	9
5.3 PRODUCT MODIFICATION	9
5.4 MANUFACTURING AND PRODUCTION TESTS	9
6. BIBLIOGRAPHY	9
APPENDIX A: TOLERANCES	10
APPENDIX B: SAMPLE LISTING	11

1. INTRODUCTION

1.1 Purpose

- 1.1.1 This standard states testing and certification requirements for sight drains for use in automatic sprinkler systems. They are used to allow visual verification that water is flowing through a pipe. Typical installations include main drain lines and in close proximity to inspector's test devices when discharge flow is not readily visible.
- 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 sight drains. In cases where metric sized products are to be examined for certification, test criteria comparable to the equivalent or nearest nominal inch size shall be used.

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 sight drains 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; and as far as practical,
 - 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/ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*

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

BS 21, *Pipe Threads for Tubes and Fittings Where Pressure-Tight Joints Are Made On the Threads (Metric Dimensions)*

ISO 7-1, *Pipe Threads Where Pressure-Tight Joints are made on the Threads Part 1: Dimensions, Tolerances and Designation*

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.

Cut Groove

A groove that is machined in the outside diameter of a pipe, valve, or fitting near the end to allow joining by means of a gasketed grooved pipe coupling.

End Connections

The term "End Connections" refers to the method of connecting components of a fire protection system. Typical end connections in a fire protection service are grooved, threaded, plain end, flanged and welded end.

Flange Fittings

The term flanged fittings refers to any style of pipe fitting covered in the scope of this standard with integral flanged end connections.

Grooved Coupling, Flexible

A grooved coupling is an assembly that is used to join grooved ends together. The flexible grooved coupling is characterized by its ability to allow for angular or rotational differences between the components being joined after assembly. These products may provide greater system reliability in situations involving excessive vibration, difficult alignment, or seismic activity. They may also provide greater system flexibility than historic use of rigid systems of flanged pipe and fittings.

Grooved Coupling, Rigid

A rigid grooved coupling is an assembly that is used to join two grooved ends together. The rigid grooved coupling is characterized by its prevention of rotation of the joined ends, and reduced tolerances for angular variations after assembly.

Plain End Fittings

Pipe couplings or other devices that are designed to work with pipe ends that have been cut perpendicular to its axis and incorporating no grooves or threads. The fitting is typically fastened to the pipe by mechanical means, such as a fastener.

Rated Working Pressure

This is the maximum sustained pressure at or below which the device shall operate trouble free for its entire design life. This value sets the basis for the testing described in Section 4.

Threaded End

Pipe couplings, valves or fittings which have been furnished with their ends threaded with internal or external pipe threads conforming to national or international standards for pipe threads for the nation of intended use (i.e ANSI B1.20.1, ISO 7-1).

Welded End

Steel pipe furnished with ends which are characterized by having the ends cut perpendicular to its axis and finished with a pronounced bevel on each end to allow for butt welding. Valves and other devices found in piping systems can also be provided with welded end connections.

2. GENERAL INFORMATION

2.1 Product Information

- 2.1.1 The products outlined in Section 1.2 of this standard are for use in aboveground fire protection systems..
- 2.1.2 Sight drains show the operator that water is flowing to a drain when the outlet of the drain line is obscured from sight. They can also be used in and throughout a sprinkler system where visual verification of water flow is required.
- 2.1.3 In order to meet the intent of this standard, sight drains shall 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 using identical materials by different manufacturers, or even by different plants of the same manufacturer, have been seen to perform differently in testing. Sample drains, 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;
- 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 sight drain.

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 Sight drains shall be designed for a minimum rated working pressure of 175 psi (1205 kPa). Sight drains with higher rated working pressures may be evaluated on a case-by-case basis.
- 3.2.2 Installation is limited to use in automatic sprinkler systems.
- 3.2.3 Nominal sizes of threads shall be between 1/2 and 2 inch NPT or equivalent. Threaded connections shall be in accordance with ANSI B1.20.1, BS21, ISO 7-1, or other recognized international standard.
- 3.2.4 Other types and sizes of end connection may be evaluated on a case by case basis, provided such ends are compatible with the requirements of FM Global Loss Prevention Data Sheets.
- 3.2.5 Sight drains 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.
- 3.2.6 Sight drains shall be designed with transparent windows to allow for the viewing of water flow through the drain. Other means of observing water flow will be evaluated on a case-by-case basis.

3.3 Materials

All materials used in these sight drains 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;
 - model number, size, rating, etc., as appropriate;
- 3.4.3 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.

- 3.4.4 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.
- 3.4.5 The model or type identification shall correspond with the manufacturer's catalog designation and shall uniquely identify the certification agency's mark of conformity.
- 3.4.6 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.

4. PERFORMANCE REQUIREMENTS

4.1 Examination

4.1.1 Requirement

The sight drains shall conform to the manufacturer's drawings and specifications and to certification requirements.

4.1.2 Test/Verification

A sample of each model sight drain 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 Hydrostatic Integrity

4.2.1 Requirement

All sight drains shall withstand exposure to hydrostatic pressure of two times the rated working pressure of the product. During and at the conclusion of the test, no fracture, permanent distortion, or functional impairment, including leakage, shall occur.

4.2.2 Test/Verification

Each size sight drain shall be subjected to a hydrostatic pressure test at 350 psi (2415 kPa) or two times its rated working pressure, whichever is higher, for five minutes. No failure, as described above, is allowed.

4.3 Visibility

4.3.1 Requirement

The sight drain shall clearly show water flow from a distance of 2 ft. (0.6 m) for all size sight drains, when viewed by an informed observer.

4.3.2 Test/Verification

A sample sight drain shall be placed indoors under a light source generating approximately 50 lumen/ft.² (538 lux). The sight drain shall be installed in a piping system and a turbulent water flow established through the device. At least four observers who have 20/20 vision (normal or corrected) shall stand 2 ft. (0.6 m) from the sight drain, and shall be able to observe water flow through the sight.

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 Manufacturing and Production Tests

The manufacturer shall test 100 percent of production sight drains hydrostatically for body leakage and integrity to the rated working pressure. The pressure shall be held for a minimum of 5 seconds with no evidence of body leakage, cracking or distortion.

6. BIBLIOGRAPHY

ANSI/AWWA C606, *Grooved and Shouldered Joints*

BS EN 10226-1, *Pipe Threads Where Pressure Tight Joints Are Made on the Threads - Part 1: Taper External Threads and Parallel Internal Threads - Dimensions, Tolerances and Designation*

BS EN 10226-2, *Pipe Threads Where Pressure-Tight Joints are Made on the Threads - Part 2: Taper External Threads and Taper Internal Threads - Dimensions, Tolerances and Designation*

BS EN 10226-3, *Pipe Threads Where Pressure-Tight Joints are Made on the Threads - Part 3: Verification By Means Of Limit Gauges*

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

FM Global Property Loss Prevention Data Sheet 3-7, *Fire Protection Pumps*

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

ISO 65, *Carbon Steel Tube Suitable for Screwing in Accordance with ISO 7-1*

JIS G3454, *Carbon Steel Pipes for Pressure Service*

APPENDIX A: Tolerances

Unless otherwise stated, the following tolerances shall apply:

Angle: $\pm 2^\circ$

Frequency (Hz): ± 5 percent of value

Length: ± 2 percent of value

Volume: ± 5 percent of value

Pressure: ± 5 psi (35 kPa)

Time: $+ 5/-0$ seconds

$+0.1/-0$ minutes

Unless stated otherwise, all tests shall be carried out at a room (ambient) temperature of $68 \pm 9^\circ\text{F}$ ($20 \pm 5^\circ\text{C}$).

APPENDIX B: Sample Listing

Sight Drains

A sight drain is designed to visually show that water is flowing in the drain piping of an automatic sprinkler system. They can be used in other applications in an automatic sprinkler system where visual verification of water flow is required. Unless otherwise noted in the listing, these sight drains have 175 psi (1205 kPa) rated working pressure.

Product CPH

<i>Product Designation</i>	<i>Connection Size, NPT inches</i>
CPH 33	1/2
CPH 34	3/4
CPH 35	1
CPH 36	1-1/4
CPH 37	1-1/2