



# **Examination Standard for Hose Racks and Reels**

**Class Number 2141**

**September 2024**

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# 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 racks and reels designed to store fire hose in an occupancy.
- 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 sets performance requirements for the following product categories and associated class numbers:

Class Number	Product Category
2141	Hose Racks and Reels

- 1.2.2. This standard is applicable to racks and reels which provide readily accessible storage of fire hose. They are intended for use by building occupants in controlling incipient fires.
- 1.2.3. Requirements for the installation, use, inspection, service testing, and replacement for such fire hose storage devices are detailed in the following National Fire Protection Association standards:  
 NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*.  
 NFPA 1962, *Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances*.
- 1.2.4. Hose racks and reels of unusual design may be subjected to special tests to determine their suitability.

## 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 was also considered.
- 1.3.2. The requirements of this standard reflect tests and practices used to examine characteristics of hose racks and reels 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.

### 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 10, *American National Standard for Metric Practice*

ASTM B117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*

NFPA 1962, *Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances*

NFPA 1965, *Standard for Fire Hose Appliances*

### 1.9. Terms and Definitions

For purposes of this standard, the following terms apply:

*Angle Hose Valve* – A valve used to connect a fire hose or other device to the standpipe and water supply.

*Maximum Service Pressure* – The maximum static outlet pressure at the standpipe that a rack or reel is able to effectively operate at.

*Semi-Automatic Rack or Reel* – A rack or reel designed to automatically activate the hose and commence the flowing of water once it has been manually removed from the storage position. The semi-automatic operation is achieved by a water retention device near the standpipe connection which releases once the hose is deployed.

*Standpipe* – This term refers to the piping within a building that provides water supply to the hose connections and hose stations.

*Support Pins* – Metal pins on a rack used as a means for the hose to be looped over and supported to allow for storage in a folded, compact fashion.

## 2 GENERAL INFORMATION

### 2.1. Product Information

- 2.1.1. Hose racks and reels provide convenient and readily accessible storage of fire hose in an occupancy. Hoses can be deployed and operated manually or semi-automatically.
- 2.1.2. In order to meet the intent of this standard, racks and reels 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 racks or reels, selected in conformance to this criterion, shall satisfy all of the requirements of this standard.

### 2.2. Certification Application Requirements

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

- a complete list of all trade names or designations, and sizes for the products or services being submitted for certification consideration,
- general assembly drawings, complete set of manufacturing drawings, materials list, anticipated marking format, piping and electrical schematics, nameplate format, brochures, sales literature, spec. sheets, installation, operation and maintenance procedures, etc... ; and
- the number and location(s) of manufacturing facilities.

If the rack or reel is being submitted for certification as an assembly, the manufacturer shall specify the make and model of all components included in the assembly.

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

### 2.3. Requirements for Samples for Examination

- 2.3.1. Following authorization of a 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 rack or reel.

### 3 GENERAL REQUIREMENTS

#### 3.1. Review of Documentation

3.1.1. During the initial investigation and prior to physical testing, the manufacturer's specifications and details shall be reviewed to assess the ease and practicality of installation and use. The certification examination results may further define the limits of the final certification.

#### 3.2. Physical or Structural Features

##### 3.2.1. Racks and reels shall:

- have capacity for a maximum of 100 ft. of 1 ½" or 2 ½" nominal diameter fire hose.
- be designed such that a single operator can turn on the water and then lay out the preconnected hose. The action of the hose leaving the rack or reel shall be free and, as far as possible, progressive from the nozzle.
- be of sufficient durability to resist damage from normal wear and abuse.
- be constructed of corrosion resistant materials or be treated with protective coatings.
- be arranged to permit secure hose storage in the rack or reel. Hose shall be stored securely so as not to become dislodged until it is purposely removed.
- be designed so as not to damage the hose during loading, storing, or removal. The rack or reel shall be of sufficient manufacturing quality and free of rough or sharp edges or any projections that may potentially damage the hose or interfere with operation.
- be of sufficient manufacturing quality and free of rough or sharp edges.
- have means to be securely mounted to a building structure or standpipe.
- be provided with a means to secure the hose nozzle when not in use.
- provide accessibility to the hose valve.
- operate as intended at a maximum service pressure of 150 or 175 psi (10.3 or 12.1 bar).

3.2.2. Any moving parts shall remain attached to the rack or reel when the hose is withdrawn and shall have sufficient clearance to avoid any binding.

3.2.3. The fire hose, when installed in the rack or reel, shall be able to lie or hang in natural folds or be coiled on a spool.

3.2.4. Hose racks shall incorporate a means for semi-automatic operation via a water retention device.

#### 3.3. Materials

All materials shall be suitable for the intended application. Any materials used in these products shall have physical properties necessary to render them suitable for their intended use. When unusual materials are used, special tests may be necessary to verify their suitability.

#### 3.4. Assemblies

Racks or reels may be certified as a stand-alone device or as an assembly including an angle hose valve, fire hose, and hose nozzle. The manufacturer shall be able to supply the components included in the assembly. All components must be certified for the assembly to be eligible for certification. The manufacturer must specify the make and model of all components and the certification agency must be notified of any changes.



### 3.5. Markings

- 3.5.1. Each rack or reel shall be permanently marked on its external surface with the following information:
- manufacturer's name or identifying symbol;
  - trade name or model designation;
  - operating instructions for the device;
  - the maximum rated service pressure;
  - if provided without a hose, length and nominal diameter of the appropriate hose to be installed, and
  - the certification agency's mark of conformity.
- 3.5.2. The trade name or designation shall correspond with the manufacturer's catalog designation and shall uniquely identify the product as certified. The manufacturer shall not place this model or type identification on any other product unless covered by a separate agreement.
- 3.5.3. The certification agency's mark of conformity shall be displayed visibly and permanently on the product. The manufacturer shall not use this Mark on any other product unless such product is covered by separate agreement with the certification agency.
- 3.5.4. All markings shall be legible and durable.

### 3.6. Manufacturer's Installation and Operation Instructions

- 3.6.1. 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, if applicable; and
  - provide services to ensure proper installation, inspection, or maintenance for the product where it is not reasonable to expect the average user to be able to provide the installation, inspection, or maintenance.

### 3.7. Calibration

- 3.7.1. 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.
- 3.7.2. 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 this equipment.

### 3.8. Tolerances

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

## 4 PERFORMANCE REQUIREMENTS

### 4.1. Examination

#### 4.1.1. Requirements

The rack or reel shall conform to the manufacturer's specifications and to the certification requirements.

#### 4.1.2. Test/Verification

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

### 4.2. Loading and Removal

#### 4.2.1. Requirements

It shall be possible for a single operator to effectively lay out the hose and activate water spray at service pressures of 30 psi (2.1 bar) and the maximum specified service pressure. There shall be no damage to the rack or reel and no kinking, binding, or tangling of the hose. If the rack or reel is of semi-automatic type, the water retention device shall not permit water to fill the hose beyond the third fold from the standpipe end until released. Additionally, the force to release the water retention device and activate the hose shall not exceed 25 lb<sub>f</sub> (111 N). The water retention device shall not show any evidence of wear after operation.

#### 4.2.2. Test/Verification

A rack or reel equipped with the maximum specified length of hose shall be tested. A means to supply a constant water pressure of 30 psi (2.1 bar) to the hose valve under static and flowing conditions shall be established. Once the required pressure is obtained, the valve shall be opened. If the rack or reel is of semi-automatic type, the pressure shall be applied to the water retention device for a period of 2 minutes and observations of any filling past the water retention device shall be made. A single operator shall lay out the full length of hose. Upon deployment, the force to release the water retention device shall be measured on semi-automatic type racks or reels. After the full length of hose is deployed, the water shall be turned off and the hose reloaded onto the rack. The removal process shall then be repeated at the maximum specified service pressure. Observations of any damage to the rack or reel or any kinking, binding, or tangling of the hose during the loading and removal process shall be made.

### 4.3. Rough Usage Tests

#### 4.3.1. Requirements

- A. A rack or reel shall withstand an applied static load of 150 lbs. (68 kg) without any damage or distortion.
- B. A rack or reel shall withstand damage that would impede its proper function after impact from a 5 lb. (2.3 kg) weight.

#### 4.3.2. Test/Verification

- A. A rack shall be mounted as intended and swung out to the position considered most severe with respect to maintaining support. A static load of 150 lbs. (68 kg) shall be applied for 5 minutes vertically downward at the furthest point from the connection/mounting end. Observations of any damage or distortion to the rack including its supporting means and any other components shall be made.
- B. A 5 lb. weight shall be dropped from a height of 3 ft. onto the rack or reel at the locations determined to be the most prone to impact damage. The locations shall include, at minimum, the

mounting components and the point furthest from the connection/mounting end. For reels equipped with a hand crank, impacts shall also be performed on the moving components. The weight shall be dropped a total of 3 times onto each location. Observations of any damage that would impede proper function of the rack or reel shall be made.

#### 4.4. Accelerated Air-Oven Aging Test

##### 4.4.1. Requirements

The requirements of Sections 4.2.1 and 4.3.1 shall be met after accelerated aging of the rack or reel.

##### 4.4.2. Test/Verification

The rack or reel shall be conditioned at 150°F (66°C) for 180 days. After the conditioning period, the rack or reel shall be subjected to the loading and removal and rough usage tests described under Sections 4.2.2 and 4.3.2.

#### 4.5. Corrosion – Salt Spray

##### 4.5.1. Requirements

Rack or reel construction materials shall withstand a 240 hour exposure to the processes described in 4.5.2 without incurring excessive corrosion damage that would impair function.

##### 4.5.2. Tests/Verification

Racks or reels shall be exposed to salt spray (fog) as specified in the latest version of ASTM B 117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*. The salt solution shall consist of 20 percent (by weight) of common salt (NaCl) dissolved in deionized water with a pH between 6.5 and 7.2 and a specific gravity between 1.126 and 1.157.

Following the exposure period, the rack or reel shall be inspected for corrosion damage that would impair proper function. If deemed necessary, the sample shall be subjected to the loading and removal test described in 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 may be 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

To assure adequate traceability of materials and products, the manufacturer shall maintain a record of all quality assurance tests performed, for a minimum period of two years from the date of manufacture.

### 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**

- 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 Modifications**

- 5.3.1.** 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.

**6 BIBLIOGRAPHY**

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

## APPENDIX A: Tolerances

Unless otherwise stated, the following tolerances shall apply:

<b>Angle:</b>	$\pm 2^\circ$
<b>Flow:</b>	$\pm 3\%$ of value
<b>Frequency (Hz):</b>	$\pm 5\%$ of value
<b>Length:</b>	$\pm 2\%$ of value
<b>Volume:</b>	$\pm 5\%$ of value
<b>Force:</b>	$\pm 2\%$ of value
<b>Torque:</b>	$\pm 2\%$ of value
<b>Rotation:</b>	$\pm 1$ RPM
<b>Pressure:</b>	$\pm 5\%$ of value
<b>Temperature:</b>	$\pm 5\%$ of value
<b>Time:</b>	+ 5/-0 seconds + 0.1/-0 minutes + 0.1/-0 hours + 0.25/-0 days

Unless stated otherwise, all tests shall be carried out at a room (ambient) temperature of  $68^\circ\text{F} \pm 18^\circ\text{F}$  ( $20^\circ\text{C} \pm 10^\circ\text{C}$ ).