
# Examination Standard for Fire Door Assemblies

**Class Number 4100**

**January 2020**

# 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 certification of various types of products and services.

Examination in accordance with this standard shall demonstrate compliance and 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 the specific fire, hose stream and other performance test and certification requirements used in evaluating fire door assemblies.

1.1.2 The degree of fire protection measured provides a period of time in which a fire door assembly will remain in the opening and retard the passage of fire as measured in the form of flames, heat and hot gases.

## 1.2 Scope

1.2.1 This standard applies to fire door assemblies and to components used in fire door assemblies.

1.2.1.1 The fire exposure used in this standard is not representative of all fire conditions which may vary with changes in the fire loading, ventilation and configuration, compartment size and heat sink characteristics of the compartment which contains the fire.

1.2.1.2 Similarly, the hose stream exposure is not intended to be representative of actual hose streams used by fire fighters during suppression efforts as these too can vary.

1.2.2 The test methods in this standard shall not be used to provide the following:

a) Full information regarding the performance of specific fire door assemblies installed in fire resistive barriers constructed of materials other than those tested.

b) An evaluation of the degree to which the fire door assembly contributes to the hazards by the generation of smoke, toxic gases or other products of combustion.

c) Measurement of a fire door assembly's ability to control or limit the passage of smoke or similar products of combustion.

d) A temperature transmission limitation to the unexposed surface of the fire door assembly.

e) Measurement that determines a limit on the number and size of vision panels permitted or the number and size of lateral openings permitted between the door and any frame.

f) The degree or hourly rating of protection required to protect an opening.

g) Requirements for items attached to, or used in conjunction, with fire doors assemblies that serve the purpose, or act, as hold open or release devices.

h) Test requirements for other types of detection devices that can be used with various fire door assemblies or where such detection devices are to be located except as stated in this document.

1.2.3 This standard states performance requirements for fire door accessories that incorporate items that serve to function as self-closing, automatic closing or testing devices. This includes, but is not limited to, power operators, chain hoist assemblies and other testing devices that, when used in

conjunction with a fire door assembly, initiate automatic closing or cause or allow the fire door assembly to attain the fully closed position.

1.2.4 The performance requirements shown in this standard shall be considered to be the minimum requirements. Additional testing above and beyond what is stated in this standard shall be permitted in order to satisfy other national or international jurisdictional requirements.

### 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 and loss control specialists was also considered.

1.3.2 The requirements of this standard reflect tests and practices used to examine characteristics of fire door assemblies. Fire door assemblies having characteristics not anticipated by this standard may be permitted to be certified by an agency if performance equal, or superior, to that required by this standard is demonstrated.

### 1.4 Basis for Certification

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

- 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.

An examination of the manufacturing facilities and audit of quality control procedures may be made 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, but is not limited to, 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;
- satisfactory field experience;
- 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 agency’s product surveillance program.

### 1.6 Effective Date

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

The effective date of this standard is eighteen (18) months after 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 the 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. For undated references, the latest edition of the referenced document (including any amendments) apply.

**American Society for Testing and Materials (ASTM)**

E-119, Standard Test Method for Fire Tests of Building Construction and Materials

E-2226, Standard Practice for Application of Hose Stream

**Australian Standards**

AS 1530.4, Methods for Fire Tests on Building Materials, Components and Structures, Part 4: Fire Resistance Test of Elements of Construction

AS 1905.1, Components for the Protection of Openings in Fire Resistant Walls, Part 1: Fire Resistant Doorsets

**Canadian Standards**

CAN4-S104-10, Standard method for Tests of Door Assemblies

**European Standards**

EN 1363-1, Fire Resistance Tests Part 1: General Requirements

EN 1634-1, Fire Resistance and Smoke Control Tests for Door and Shutter Assemblies, Openable Windows and Elements of Building Hardware, Part 1: Fire Resistance Tests for Door and Shutter Assemblies and Openable Windows

EN 12605, Industrial, Commercial and Garage Doors and Sets – Mechanical Aspects – Test Methods

EN 13501-2, Fire Classification of Construction Products and Building Elements – Part 2 – Classification Using data From Fire Resistance Tests Excluding Ventilation Services

EN 16034, Pedestrian Doorsets, Industrial, Commercial, Garage Doors and Openable Windows – Product Standard, Performance Characteristics – Fire Resisting and/or Smoke Control Characteristics

**FM Approvals Standards**

FM 3010, Approval Standard for Fire Alarm Signaling Systems

**International Standards Organization**

ISO 834-1, Fire Resistance Tests – Elements of Building Construction, Part 1: General Requirements

ISO 3008, Fire Resistance Tests – Door and Shutter Assemblies

**National Fire Protection Association (NFPA)**

NFPA 72, National Fire Alarm Code

NFPA 80, Standard for Fire Doors and Other Opening Protectives

NFPA 252, Standard Methods of Fire Tests of Door Assemblies

NFPA 257, Standard on Fire Test for Window and Glass Block Assemblies

## 1.9 Definitions

For purposes of this standard, the following terms apply:

*Agency* – a certification agency or test agency

*Ambient* – the temperature of the room in which the test is being conducted.

*Astragal* – a horizontal or vertical molding attached to one leaf of a pair of doors.

*Authority Having Jurisdiction (AHJ)* – the organization, office, official or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation or a procedure.

*Automatic Closing Device* – a device that causes a door to close when activated by a fusible link, testing device or detector.

*Automatic Closing Door* –a door that normally is open but closes when an automatic closing device is activated.

*Binder* – a piece of hardware used to hold a sliding fire door to the wall, preventing lateral movement of the door from the wall.

*Bottom Bar* – a reinforcing member at the lower edge of the door curtain assembly.

*Builders Hardware* – metal hardware found on swinging type fire doors. Hardware includes items such as hinges, locks, latches, exit devices and door closers. Builders hardware is generally not supplied by the door manufacturer.

*Closed Position* – an arrangement of the fire door assembly such that all edges of the door are fully engaged into or against locks, latches, sills, jambs, stops, binders, guides or any other such device used to secure the door and protect the opening from the passage of flame. Allowance is made for designed clearances between items within the assembly.

*Closing Device* – a means of closing a door from the partially or fully opened position.

*Detector* – a device designed to detect the presence of a fire signature and to initiate action.

*Door Panel* – the panel portion of a swinging fire door assembly. Normally consists of stiles (vertical side pieces) and rails (horizontal pieces).

*Door Holder/Release Device* – a certified, fail safe device, controlled by a detection device, used on an automatic closing or self-closing door to release the door at the time of a fire.

*Double Egress Doors* – a pair of swinging doors, each leaf of which swings in the opposite direction of the other.

*Fail Safe Device* – a device that will provide its intended function upon a loss of power.

*Fire Door* – the door component of a fire door assembly.

*Fire Door Assembly* – any combination of a fire door, frame, hardware and other accessories that together provide a specific degree of fire protection to an opening.

*Fire Door Frame* – A component forming the perimeter of an opening in a fire door assembly that is supplied welded or knocked down and anchored to the surrounding structure.

*Fire Door Hardware* – Door hardware furnished by the door manufacturer as a component of a labeled fire door assembly.

*Fire Door Testing Device-* a feature of a closing or release device that simplifies the testing of automatic or manual closing systems under simulated fire conditions.

*Fire Exit Hardware* – labeled devices for swinging fire doors installed to facilitate safe egress of people and generally consisting of a crossbar and various types of mechanisms that cannot hold the latch in a retracted locked position.

*Fire Protection Glazing* – glazing that has a fire protection rating.

*Fire Protection Rating* – the designation indicating the duration of the fire test exposure to which a fire door or glazing assembly was exposed and for which it successfully met all acceptance criteria as determined in accordance with NFPA 252 or NFPA 257.

*Fire Resistance Glazing* – glazing that has a fire resistance rating.

*Fire Resistance Rating* – the time, in minutes or hours, that materials or assemblies have withstood a fire exposure as established in accordance with the test procedures of ASTM E-119.

*Flame Baffle* – a hinged piece of sheet metal within the hood that, when released, closes the space between the top of the curtain and the hood of a rolling steel fire door.

*Fusible Link* – a labeled detection device consisting of two pieces of metal held together by a special solder that melts at a predetermined temperature allowing the pieces of metal to separate.

*Gasketing* – a piece of material that is used to make a tight seal between adjacent components. Normally used to prevent or limit the passage of smoke, flame or hot gases from passing through an assembly.

*Glazing* – the part of a window or wall made of glass or other transparent or translucent material.

*Governor* – a device that limits the rate of descent of the door during automatic closure.

*Guide* – a vertical assembly in which the curtain travels and that is fastened to the jamb, retaining the edges of the door curtain and closing the space between the curtain, edges and the jamb.

*Integrated Test Method*- a fire resistance test that combines the most critical attributes of the fire tests under consideration so that multiple jurisdictions can be satisfied using a single, worst case fire test.

*Label* – devices, equipment or materials to which has been attached a label, symbol or other identifying mark of an organization that is acceptable to the Authority Having Jurisdiction and concerned with product evaluation, that maintains periodic in-plant inspections and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

*Negative Pressure* – a situation in a fire test furnace that results in the neutral pressure plane being located at the top of the opening or top of the assembly.

*Neutral Pressure Plane* – the location in a fire test furnace where the pressure within the furnace during test conditions is zero. The location is usually stated as a distance above the sill.

*Oversize* – fire door assemblies for openings that are too large to be fire tested due to test facility limitations

*Positive Pressure* – a situation in a fire test furnace that results in the neutral pressure plane being located a distance of 40 in. (1016 mm) maximum above the sill.

*Power Operated Fire Door* – doors that are normally opened and closed electrically or mechanically.

*Retrofit Operator* – a product that incorporates any combination of operator, governor and/or automatic closing device that is installed on an existing fire door assembly in order to modernize, simplify or improve the performance of a fire door assembly.

*Rolling Steel Fire Door* – a fire door assembly consisting of a curtain, a bottom bar, a barrel, brackets, guides, a hood and an automatic releasing device.

*Sealant* – a substance used to seal a surface or adjacent surfaces so as to prevent or limit the passage of smoke, flames or hot gases through an assembly.

*Self-Closing Doors* – doors that, when opened and released, return to the closed position.

*Service (Counter) Fire Door Assembly* – a labeled assembly consisting of a rolling steel fire door used for the protection of openings in walls where the primary purpose of the opening is for non-pedestrian use such as conveyors. When in the closed position, the bottom bar of these units is generally above floor level.

*Sidelight* – an opening in a fire door frame alongside the fire door opening that is filled with a glazing material.

*Sill* – the bottom part of an opening onto which the door curtain and bottom bar come to rest in the closed position.

*Swinging Fire Door Assembly* – a fire door assembly that consists of a side hinged door panel, fire door frame and other builders hardware items such as locks, latches, hinges and door closers

*Sliding Fire Door Assembly* – a type of door that slides either horizontally or vertically across an opening. They normally consist of a door panel and fire door hardware such as tracks, hangers, binders, stay rollers and handles.

*Special Purpose Door* – a fire door assembly of special construction whose intended end use does not lend itself to be included in other door classifications. Generally these doors are not self-latching or provided with automatic closing devices. Examples would be acoustical, radiation shielding or blast resistance.

*Temperature Rise Rating* – the maximum temperature rise above the ambient temperature developed on the unexposed face of a door at 30 minutes of fire exposure.

*Transom* – an opening in a frame located above the door which contains fire rated glazing or a metal panel.

*Vision Panel* – a glazed opening contained within a fire door assembly.

# 2 GENERAL INFORMATION

## 2.1 Product Information

2.1.1 Fire door assemblies, door frames and other components can be manufactured by a variety of materials including steel, wood, glass or other materials.

2.1.2 Fire door assemblies and/or their component are supplied in a variety of ways depending on the type and complexity of the unit(s). In some cases, manufacturers may fabricate and provide the complete fire door assembly and all components needed for a proper installation. In other cases, manufacturers may provide only a portion or component of the assembly and depend on distributors and installers to provide the other components needed for a proper installation.

## 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, complete set of manufacturing drawings, materials list, anticipated marking format, installation and operating instructions, sales literature and any specification;
- The 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 documents shall be provided with English translation.
- Identification of other markets outside North America where the manufacturer seeks to sell into, whether they require an “integrated fire test method” and if so, which standards, as well as NFPA 252, they wish it to address.
- Written installation instructions for each fire door frame shall be submitted for review. The installation instructions shall provide clear guidance on the number, type, location and use of anchors used to secure the frame to the wall.

## 2.3 Installation and Maintenance

2.3.1 All fire door assemblies shall be installed and maintained in accordance with NFPA 80.

2.3.2 Written installation instructions and reset instructions, if applicable, shall be provided for each closing device, testing device, rolling steel, sliding or special purpose door submitted for certification. The installation instructions shall clearly state the proper installation sequence for each item in the assembly as well as a field testing procedure to ensure that the door assembly functions properly once it is installed. The reset instructions shall detail the steps required to reset the door properly after it has been activated. Guidance of door maintenance shall also be included. These instructions shall be provided with each door order when shipped from the manufacturer’s facility.

## 2.4 Design Reviews

2.4.1 Fire doors shall be designed for automatic closing.

2.4.2 Each swinging door and frame shall be suitably reinforced where necessary in accordance with the Steel Door Institute and/or Builders Hardware Manufacturers Association guidelines to permit the attachment of hardware and automatic closing devices.

2.4.3 The method of door operation for other than fire or alarm conditions shall not be limited provided that such operation does not interfere with the automatic closing capability of the door under fire or alarm conditions.

2.4.4 The manufacturer shall assign specific and unique model names and/or numbers to each product certified to this standard for purposes of identification.

**2.5 Requirements for Samples for Examination**

2.5.1 Following authorization of a certification examination, the project engineer shall inform the manufacturer of the number and type of samples that shall be submitted for examination and testing.

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

2.5.3 The manufacturer shall submit samples representative of production. Any decision to use data generated using prototypes is at the discretion of the agency.

2.5.4 When an integrated fire test method has been requested, and includes the requirements of EN 16034, sample selection shall be the sole responsibility of, and can only be performed by, a European Union notified product certification body against the Construction Products Regulation (CPR).

# 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 Markings

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

On the fire door:

The words “fire door”
Manufacturer’s name or a code that can be traced back to the manufacturer
The certification agency mark. See exception for oversize doors.
The fire protection rating
A serial number
The test standard designation of the fire test
Temperature rise rating (if applicable)
Minimum latch throw (swinging doors with builders hardware)

On the fire door frame:

The words “fire door frame”
Manufacturer’s name or a code that can be traced back to the manufacturer
The certification agency mark. See exception for oversize doors.
The fire protection rating
A serial number
The test standard designation of the fire test

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

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

3.2.3 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. The manufacturer shall apply such markings to eligible products only within, and on the premises, of the manufacturing facility to which the certification is granted.

3.2.4 In lieu of a label as described above, a fire door frame may contain an embossment. The embossment shall contain the words “fire door frame”, the certification agency mark and either the manufacturer’s name or a code that can be traced back to the manufacturer.

3.2.5 The fire protection rating may be omitted when the frame is fabricated from minimum 16-gauge steel and is rated for three (3) hours when installed in masonry walls or for 1-1/2 hours when installed in drywall.

3.2.6 Labels shall be permitted to be fabricated from metal (steel, brass or aluminum), plastic (mylar or equivalent) or embossed. The label should be approximately 7/8 in. x 3-1/2 in (22 mm x 89 mm) to

1-1/4 in. x 5-1/4 in (32 mm x 133 mm). Lettering on the metal labels shall be either raised lettering using either an embossing or etching method.

3.2.7 Metal labels shall be permanently attached by welding, non-removable metal fasteners/rivets or by other means deemed acceptable by the certification agency.

3.2.8 Plastic labels shall be self-adhering with the adhesive being compatible with proposed substrates such that any attempts to remove it shall result in at least a partial destruction of the label.

3.2.9 The manufacturer shall keep a label usage log. The log shall contain the serial number assigned to the order number or block of serial numbers assigned to an order.

3.2.10 Other products and accessory items such as door holder and release devices, automatic closing devices, testing devices, detectors and power operators that obtain a separate listing shall contain a separate label from the above. This label shall include the manufacturer's name and the certification agency mark

3.2.11 Labels for doors that are considered to be "Oversize" shall contain the manufacturers name and address, a unique serialized number and the words "This door conforms to a ___ hour rated construction but is OVERSIZE." The label that is attached to an oversized fire door assembly shall not contain the certification agency mark.

3.2.12 Fire doors furnished with, or prepared for, fire exit hardware shall bear a label stating "Fire Door to be Equipped with Fire Exit Hardware".

3.2.13 When an integrated fire test has been performed, labelling shall also satisfy any relevant standard requirements (example: labels for use in the European Union shall also meet the requirements of EN 16034).

### 3.3 Manufacturer's Installation and Operation Instructions

3.3.1 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 products of such nature that it would not be reasonable to expect the average user to be able to provide such installation, inspection, or maintenance.

### 3.4 Calibration

3.4.1 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.

3.4.2 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 thus equipment.

# 4 PERFORMANCE REQUIREMENTS

## 4.1 Fire Endurance Test

4.1.1 All fire door assemblies shall meet a minimum 20 minute rating when fire tested in accordance with NFPA 252. Other test methods deemed equivalent solely at the discretion of the certification agency shall be permitted.

Fire testing for all swinging fire door assemblies (side hinged or pivoted swinging) shall be tested using positive pressure where, beginning no later than five (5) minutes into the fire test, the neutral pressure plane in the furnace shall be established at forty (40) inches (1016 mm) or less above the sill.

All other types of fire door assemblies, including swinging elevator fire door assemblies, shall be permitted to be tested using negative pressure where the pressure in the furnace shall be maintained as nearly equal to atmospheric pressure as possible with the neutral pressure plane established at the top of the assembly. Once established, the pressure shall be maintained during the entire test period.

4.1.2 Fire door assemblies shall be permitted to be tested using an integrated fire test as described below. An integrated fire test uses the most critical requirements from NFPA 252 and other fire door test methods typically required by other countries.

Items to be considered when conducting an integrated test shall include, but not be limited to, conditioning of the test specimen, time/temperature curve, location of thermocouples and/or plate thermometers, the location of the neutral pressure plane within the furnace, mounting and installation of the test specimen, clearances, movement and deflection and conditions of acceptance. Other items shall be considered as applicable.

When a fire door assembly is tested using the integrated method, the assembly shall be subjected to a hose stream test immediately upon completion of the fire test.

The integrated fire test procedure combines one or more additional test methods so as to assist manufacturers to qualify for jurisdictions located in other countries at the same time that they are qualifying for certification utilizing this standard. Test methods or product standards that shall be permitted for consideration as an integrated test method with this standard are:

- AS 1530.4
- AS 1905.1
- CAN4-S104-10
- EN 16034
- EN 1634-1
- EN 1363-1
- ISO 834-1
- ISO 3008
- Other test methods deemed to be equivalent to the above may be utilized.

All fire door assemblies shall be assigned a fire protection rating expressed in hours, or fractions thereof or shown in minutes. Allowable fire protection ratings shall be twenty (20) minutes, forty-five (45) minutes, one (1) hour, one and one-half (1-1/2) hours, two (2 hours), three (3) hours and four (4) hours.

When an integrated fire test is conducted as the qualifying fire test, the ratings customarily obtained by the relevant test method shall also be determined. When the integrated fire test includes the

requirements of EN 16034, a test report in accordance with EN 1634-1 and an associated classification report in accordance with EN 13501-2 shall be produced.

The fire protection rating of the entire fire door assembly shall default to the minimum fire protection rating of any component of the assembly.

The temperature rise rating on the unexposed surface of the fire door assembly shall be determined during the fire test. The rating shall be stated as the temperature rise above ambient on the unexposed surface of the fire door assembly at the end of thirty (30) minutes of standard fire exposure. Available temperature rise ratings available shall be 250ºF (139ºC), 450ºF (250ºC), 650ºF (361ºC) or greater than 650ºF (361ºC).

These ratings shall be permitted to be shown on the label indicating certification. When no rating is shown on the label denoting certification, the default rating of the assembly shall be assumed to be greater than 650ºF (361ºC).

When an integrated fire test has been conducted, the temperature ratings customarily obtained by the test method shall also be determined and permitted to be shown on the label indicating certification.

### 4.2 Hose Stream Test

All fire door assemblies, except for those rated for 20 minutes, shall be subjected to the standard controlled time-temperature exposure per NFPA 252 for a specified time period followed by the application of a hose stream test to determine the fire protection rating of the assembly. The hose stream test shall be conducted in accordance with ASTM E-2226.

The assembly shall be considered as having successfully passed the fire endurance and hose stream test for the desired exposure period if it has met all the conditions of acceptance as stated in the NFPA 252.

The water pressure at the base of the nozzle and the duration of the hose stream test shall be as shown below. The exposed area shall be calculated using the outside dimensions of the test specimen, including a frame, hangers, tracks or other parts of the assembly when provided, and normally does not include the wall into which the specimen is mounted. Where multiple test specimens are mounted in the same wall, the rectangular or square wall area encompassing all of the specimens is identified as the exposed area since the hose stream must traverse this area during its application.

| Specified Rating | Water Pressure (at the base of the nozzle)<br><br>psi<br>(kPa) | Duration of Application of Exposed Area<br><br>$s/ft^2$<br>($s/m^2$) |
|---|---|---|
| 3 hr and over | 45<br>(310) | 3.0<br>(32) |
| 1-1/2 hr and over and less than 3 hr | 30<br>(207) | 1.5<br>(16) |
| 1 hr and over and less than 1-1/2 hr | 30<br>(207) | 0.9<br>(10) |
| Less than 1 hr | 30<br>(207) | 0.6<br>(6) |

When an integrated test procedure has been conducted, the test assembly shall meet the most critical acceptance criteria, as determined by the certification agency, of all the tests being considered.

### 4.3 Durability Test

All fire door assemblies, except as noted below, shall be subjected to a durability test in order to ensure that the assemblies are durable when subjected to ordinary, everyday usage.

The types of fire door assemblies that are exempt from this test are side hinged swinging and pivoting type fire doors that use builder's hardware or fire door hardware, fire door assemblies where normal opening and closing use manual methods of operation and fire door assemblies that are opened or closed using chain hoists, counterweights, cranks and other similar pieces of equipment.

All assemblies that open and close under electrical or pneumatic power shall be tested.

All fire door assemblies shall be operated through a minimum 7500 repetitions of the open/close cycle. The test shall be considered to meet the test requirements if the unit completes the specified number of repetitions of the fully opened and fully closed cycle without failure or replacement of any component that would prevent the assembly from performing its intended function.

The opening for the test will be nominally 12 ft wide x 10 ft high (3.6 m x 3.0 m). In cases where the door assembly is normally not provided for such a size opening, the unit shall be tested at the largest height and width for which it will be certified.

For rolling steel fire doors:

4.3.1 At the start of the test, the door shall be in the open position. One complete open and close cycle shall have a duration of 1 minute ± 5 seconds.

4.3.1.1 Some motor operators are not designed for continuous operation. In these cases, at the sole discretion of the agency, the unit shall be allowed to be set on a cycle time greater than 1 minute by increasing the time the door spends in either or both the open or closed position.

4.3.2 The timing device shall be activated causing the curtain to close.

4.3.3 The door shall be allowed to rest in the closed position before it receives a signal from the timing device causing the curtain to open.

4.3.4 The door shall be allowed to rest in the open position before it receives a signal from the timing device causing the curtain to close.

4.3.5 Steps 4.3.1 to 4.3.4 shall be repeated a total of 7500 times. Additional cycles can be conducted in order to meet requirements of other jurisdictions or test methods.

4.3.6 The assembly shall operate continuously between the open and closed positions except for the temporary rest periods allowed when in the open or closed position. When the operator has not been designed for continuous operation, the test shall be allowed to be interrupted to allow the motor to cool off.

4.3.7 At the sole discretion of the agency, the unit shall be permitted to be stopped overnight and/or week-ends.

4.3.8 At the discretion of the agency, the test shall be permitted to be interrupted, either at the start, during or end of the test, to conduct all or part of the automatic closing test.

4.3.9 The operator shall be permitted to stop if caused by the activation of a thermal overload feature inherent to the operator. If this occurs, a single automatic closing test shall be conducted in accordance with the automatic closing procedure. This is done to verify that the door can close automatically in the open or partially open position even when the thermal overload has been activated.

Horizontally or vertically sliding doors:

4.3.10 At the start of the test, the door shall be in the open position. One complete open and close cycle shall have a duration of 1 minute ± 5 seconds.

4.3.10.1 Some motor operators are not designed for continuous operation. In these cases, at the sole discretion of the agency, the unit shall be allowed to be set on a cycle time greater than 1 minute by increasing the time the door spends in either or both the open or closed position.

4.3.11 The timing device shall be activated causing the door to close.

4.3.12 The door shall be allowed to rest in the closed position before it receives a signal from the timing device causing the door to open.

4.3.13 The door shall be allowed to rest in the open position before it receives a signal from the timing device causing the door to close.

4.3.14 Steps 4.3.10 to 4.3.13 shall be repeated a total of 7500. Additional cycles can be conducted in order to meet the requirements of other jurisdictions or test methods.

4.3.15 The assembly shall operate continuously between the open and closed positions except for the temporary rest periods allowed when in the open or closed position. The unit shall also be permitted to be stopped overnight. When the operator has not been designed for continuous operation (see 4.3.10.1), the test shall be allowed to be interrupted to allow the motor to cool off.

4.3.16 At the sole discretion of the agency, the unit shall be permitted to be stopped overnight and/or week-ends.

4.3.17 The test shall be permitted to be interrupted, either at the start, during or end of the test, to conduct all or part of the automatic closing test.

4.3.18 The operator shall be permitted to stop if caused by the activation of a thermal overload feature inherent to the operator. If this occurs, a single automatic closing test shall be conducted in accordance with the automatic closing procedure. This is done to verify that the door can close automatically in the open or partially open position even when the thermal overload has been activated

4.3.19 In Europe, the number of cycles required to prove adequate durability is dependent upon the required use category as shown below (Table 1 from EN 16034). At the request of the manufacturer, an "integrated durability test" identifying the most critical elements from the Durability Test procedure and the test method of EN 12605, as specified by EN 16034, shall be performed.

| Use Category | Cycles |
|---|---|
| 5 | ≥200,000 |
| 4 | ≥100,000 |
| 3 | ≥50,000 |
| 2 | ≥10,000 |
| 1 | ≥500 |
| 0 | 1-499 |

4.4 **Automatic Closing Test**

4.4.1 All fire door assemblies shall be self-closing or automatic closing. Self-closing, swinging type fire doors shall swing easily and freely and shall be equipped with a device which causes the door to close and latch each time it is opened.

4.4.2 Automatic closing doors shall be permitted to close automatically by means of a closing device and one of the following:

- A separate, labeled fail-safe fire door holder/release device or a hold open mechanism that is an integral part of the basic closing device.
- An integral closing device that allows the door to close automatically during an alarm condition provided the hold open mechanisms are release by one or more detectors acceptable to the Authority Having Jurisdiction.

4.4.3 Power operators that are not fail-safe shall incorporate features that allow the drive train of the operator to disconnect from the power operator upon receipt of a signal from a detector. Such doors shall be provided with a separate closing device which causes the door to attain the closed position.

4.4.4 Power operators that are fail-safe are not required to incorporate features that cause the drive train of the operator to disconnect from the power operator upon receipt of a signal from a detector. Such doors shall be allowed to close by gravity or to be closed under power in alarm conditions.

4.4.5 Fail-safe power operators shall be permitted to close the door by gravity or to be closed under power in alarm conditions. When closed under power, the automatic closing device shall be equipped with an entrapment device that allows the door to open and then reclose a maximum of three times when an obstruction has been encountered. After the 3rd attempt at closing, the door shall automatically come to rest on the obstruction.

4.4.6 The closing speeds of fire door assemblies shall be in accordance with NFPA 80.

4.4.7 Automatic closing devices shall be permitted to incorporate detectors. When present, the detector shall be examined in accordance with an applicable standard. Automatic closing devices shall be permitted to be provided with, or connected to, a battery back-up device.

4.4.8 All fire door assemblies that use or incorporate an automatic closing device, except for side hinged swinging and pivoting type fire doors that use builder's hardware, shall be subjected to a test for automatic closing in order to ensure that the assembly will reliably attain the fully closed position during situations that require automatic closing. When an automatic closing device can be activated by more than one method, each feature shall be tested.

4.4.9 When applicable, the automatic closing test shall be conducted on the same test sample and upon completion of the Durability Test. No maintenance or replacement of components shall be permitted between the completion of the Durability Test and the start of the Automatic Closing Test conducted on the primary automatic closing method. Minor adjustments shall be permitted to any limit switches

or devices that return the door panel or door curtain to its original opened or closed position if these have drifted during the Durability Test.

4.4.10 Once the Automatic Closure Test has started, no maintenance or adjustments shall be permitted on any part of the door assembly. Activities that are part of the resetting or reopening process after automatic closing shall not be considered as maintenance or adjustments.

4.4.11 Upon completion of the primary set of twenty-five (25) automatic closing tests, other components of the assembly that are not part of the automatic closing device shall be permitted to be adjusted or maintained at the discretion of the door manufacturer.

4.4.12 Prior to the start of each subsequent set of twenty-five (25) activations of other methods of automatic closure, the fire door assembly, including the automatic closing device, or any of the individual components that are part of the fire door assembly shall be permitted to be maintained or adjusted at the discretion of the door manufacturer.

4.4.13 Once a subsequent set of automatic closing activations has started, no part of the fire door assembly, including the automatic closing device, or any of the individual components that are part of the fire door assembly shall be permitted to be replaced, maintained or adjusted until the entire set of twenty-five (25) closing tests have been completed.

4.4.14 If any of the subsequent sets of tests for automatic closing do not attain the fully closed position, the Durability Test noted above shall not be required to be rerun.

4.4.15 Automatic closing devices that incorporate a power operator that does not disconnect from the drive train shall be fail-safe.

4.4.16 When power operators disconnect from the drive train, other methods of operation (such as hand chain, crank or manual) do not need to be tested for automatic closure provided that they use the same type of disconnect device as was used with the power operator.

4.4.17 Each automatic closing feature, except as shown below, shall be subjected to twenty-five (25) activations of the automatic closing mechanism.

4.4.18 The test shall be considered to meet the test requirements if the unit completes the specified number of consecutive repetitions and comes to rest in the fully closed position without failure or replacement of any component that would prevent the assembly from performing its intended function.

4.4.19 During automatic closure, the door shall close unimpeded at a controlled rate of descent having an average velocity not greater than 2 ft/sec (0.61 m/sec) or less than 6 in/sec (0.15 m/sec) until coming to rest in the closed position. In some cases, depending on the size and weight of the unit and the automatic closing device, a slower closing speed shall be permitted at the discretion of the certification agency.

4.4.20 The closing speed shall be determined from the time the door panel or door curtain starts to move and does not include the time of any initial delay caused by either a time delay device or otherwise.

4.4.21 The assembly shall be reset after each closure in accordance with the manufacturer’s written reset instructions.

4.4.22 Prior to the start of the Automatic Closure Test, minor adjustments shall be allowed to any limit switches or devices that return the door panel or curtain to its original open or closed position if these limits have drifted during the Durability Test.

4.4.23 If any of the subsequent tests for automatic closing do not attain the fully closed position, the Durability Test noted above shall not be required to be rerun.

4.4.24 When a fusible link is incorporated into the automatic closing system and used as a detector, the fusing of the link shall be required for only one of the individual automatic closing cycles. Subsequent tests shall be permitted to be done by simulating the fusing of the link disconnecting the cable assembly at the fusible link.

4.4.25 Automatic closing devices that incorporate detection devices that can receive signals from various types of signaling devices needs only to be tested for a single signal.

## 4.5 Electrical Evaluation for Fail-Safe Power Operators, Automatic Closing Devices and Other Testing Devices

All fail-safe power-operators, automatic closing devices and other testing devices that do not disconnect from the door assembly during automatic closure, fail-safe or otherwise, and can affect the door's ability to attain the closed position or remain in the closed position, shall be subjected to an electrical evaluation.

4.5.1 Normal Operation Test

Representative samples of the equipment (system or modules) shall be powered according to the manufacturer's written instructions and programmed (if applicable) for proper operation and application. Re-wiring, re-configuring or programming to satisfy different types of applications is often required. Demonstrations or simulations at maximum rated loads of power supplies, initiating device circuits (IDC), notification appliance circuits (NAC) and signaling device circuits (SLC) will be required.

Basic operation to NFPA 72 will be verified and documented as specified in the manufacturer's instructional manual.

4.5.2 Environmental Conditioning Test

It shall be verified that the automatic closing device is designed so that it is capable of performing its intended normal operational capability and functionality throughout temperature extremes and high humidity conditions that are typical of equipment intended for indoor applications. If the manufacturer specifies a temperature range beyond those typical for indoor/dry locations, the equipment will be tested using the values specified by the manufacturer.

At a minimum, the test sample(s) shall be subjected to the following environmental extremes. If rated for extremes beyond these values, the equipment shall be tested using those values specified by the manufacturer.

a) Conditioned for a period of four (4) hours at 32°F (0°C) and 120°F (49°C).

b) Conditioned for a period of twenty-four (24) hours at a relative humidity of 90% and an ambient temperature of 100°F (37.8°C).

The equipment shall operate as intended and show no signs of instability or false alarms during these exposures.

4.5.3 Vibration Test

The line connected power supply equipment (enclosure and assemblies) shall be tested to verify its mechanical strength and ability to withstand the vibration. As a result of this testing, there shall be no loosening of parts or visible signs of permanent deformation.

With the equipment powered and installed in accordance with the manufacturer's instructions, the equipment shall be subjected to a vertical movement as described below:

| | |
|---|---|
| Duration | 4 hours |
| Displacement | 0.02 in (0.5 mm) |
| Sweep Frequency Range | 10 Hz-30 Hz-10 Hz |
| Sweep Rate | 2 cycles/minute |

Following the exposure, the equipment shall:

- not have any loose parts;
- not have any visible of permanent deformation that would compromise the electrical safety of the equipment;
- operate as intended.

4.5.4 Dielectric Test

The equipment shall withstand the application of approximately 60 Hz AC voltage or a DC voltage for a period of at least one (1) minute. The voltage shall be applied between live parts and the enclosure and dead metal parts in which it might come in contact with and live parts of circuits operating at different voltages. The test voltages are described below:

| Circuit Ratings | Dielectric Test Voltage |
|---|---|
| < 30 Vac (60 Vdc) | 500 Vac (707 Vdc) |
| ≥ 30 Vac (60 Vdc) | 1000 Vac + 2 x rating (1414 Vdc) |

Upon completion of the test, there shall be no indication of a dielectric breakdown or leakage current greater than 10 mA during the one (1) minute test exposure.

4.5.5 Endurance Test

With the product supply circuit at rated voltage and frequency and with rated devices or equivalent loads connected to the output circuits, a product shall not show a manifestation of a fire or risk of electrical shock and shall be capable of operating in the intended manner after being subjected to repetitive signal operation. In addition, there shall be no electrical or mechanical failure or evidence of approaching failure of the product components.

Based upon the frequency of expected use, each circuit of the product shall be tested for the number of cycles and at the rate indicated in table below.

Exception: When circuits are not capable of the rate indicated in the table, the test cycle rate shall be the maximum rate permitted by the design of the product.

| Frequency of Use | Total Number of Operations | Operations per Minute |
|---|---|---|
| Daily | 30,000 | 5 |
| Occasional | 6,000 | 5 |

The loads or equivalent loads specified above shall conform to the power factor loading indicated in the table below:

| Type of the Device Tested | Required Power Factor |
|---|---|
| Electromagnetic | 0.6 |
| Electromechanical | 0.4 |

4.5.6 Equipment Load Rating Test

The standby or alarm current necessary to power the equipment shall not exceed 110% of the rated value over the entire voltage range that the equipment is rated or intended. The test(s) shall be conducted in accordance with FM 3010.

With the equipment configured for maximum rated current draw (outputs at full rated load), the input voltage shall be varied over the extremes as determined by the Voltage Variation Test. At no time shall the current value measured exceed 110% of that rated on the nameplate or the manufacturer's installation instructions.

4.5.7 Protective Grounding Test

Any equipment that contains or connects to a high voltage circuit shall provide a positive grounding system for all exposed dead metal parts to reduce the risk of electrical shock. The test(s) shall be conducted in accordance with FM 3010.

The grounding system shall consist of a dedicated (green head) screw or terminal clearly marked (G, GR, GND, Ground, International Ground Symbol or the like), or dedicated, flexible green (or green and yellow) bonding conductors.

- The bonding resistance shall be measured at ≤ 1.0 ohm
- All bonding conductors shall be 14 AWG minimum

*Exception: Metal-foil markings, screws, handles, etc. which are located on the outside of the enclosure and isolated from electrical components or wiring by grounded metal parts so that they are not liable to become energized or those which are positively separated from wiring and un-insulated live parts.*

4.5.8 Voltage Variation Test

It shall be verified that the device will maintain the normal operational capability and functionality throughout typical voltage extremes of both the primary and secondary power supplies from which they are powered. The test(s) shall be conducted in accordance with FM 3010.

As a minimum, the normal operation of the equipment shall be verified at 85% to 110% of the rated primary (AC) and secondary (DC) power sources. If the manufacturer specifies a voltage range beyond these extremes, the equipment will be tested using those values specified by the manufacturer. The typical voltage ranges are defined as shown below:

| **Nominal** | **+10%** | **-15%** |
|---|---|---|
| 120 Vac | 132 Vac | 102 Vac |
| 240 Vac | 264 Vac | 204 Vac |
| 12 Vdc | 13.2 Vdc | 10.2 Vdc |
| 24 Vdc | 26.4 Vdc | 20.4 Vdc |

4.5.9 Surge Line Transient Test

Protection against surge line transients shall be a requirement for any low voltage circuit (power, inputs, IDC, SLC or NAC). The test(s) shall be conducted in accordance with FM 3010.

All field wiring terminals that have a possibility of being subjected to line-induced voltage (i.e., initiating device circuits, power circuits and remote/auxiliary connections shall be subjected to this test. One (1) powered sample of the control equipment shall be subjected to transient waveforms having peak values of:

- 100 Vdc
- 500 Vdc
- 1000 Vdc
- 2400 Vdc

The units shall produce:

- No false alarm signals or non-self-restoring trouble signals;
- No evidence of instability during or at the end of the test, and;
- The unit shall operate normally following the test.

*Exception: Any circuit specified to remain in the same room or 20 ft (6 m) or less in length and in conduit.*

4.5.10 RFI Immunity Test

No false signal will be generated when the equipment is subjected to extraneous transients from sources which are described below. The test(s) shall be conducted in accordance with FM 3010.

One powered sample of the control equipment shall be subjected to extraneous transients described below at distances as close as 24 inches (0.6 m) to the device under test.

Radio frequency transmissions with radiation power levels equivalent to 5 watts in the 27 MHz, 150-174 MHz, 450-467 MHz, 850-870 MHz and 900-920 MHz bands.

The unit shall produce:

- No false signals (alarm or trouble) and
- No evidence of instability during or at the end of the test.
- The unit shall operate normally following this test.

**4.6 Classification and Requirements for Fire Door Assemblies**

All fire doors shall be self-closing or automatic closing except as noted elsewhere in this standard.

4.6.1 Fire doors that are not self-closing or automatic closing shall be considered to be special purpose fire doors. Acceptance of special purpose fire doors shall be the prerogative of the Authority Having Jurisdiction. Examples of special purpose fire doors would be radiation shielding doors, acoustical

doors, pressure resistant (blast) doors, security doors, accordion folding doors and any other door assembly that is not considered to be one of the other types of doors addressed in this standard.

4.6.2 Rolling steel, service (counter), horizontally and vertically sliding, accordion folding, hoistway and elevator fire door assemblies shall be furnished as a complete fire door assembly.

4.6.3 Fire door assemblies installed above floor level shall be provided with a non-combustible sill which extends past each door jamb as necessary a minimum of 4 in. (102 mm) on each side.

4.6.4 When fire tested, all fire door assemblies shall be installed such that the assembly is attached to the fire side of the test assembly.

4.6.5 When fire tested, swinging fire doors and pairs of doors swinging in the same direction shall be installed in the test wall such that they open into the furnace.

4.6.6 When integrated fire testing is conducted, it may be necessary to conduct additional fire tests with the doors installed as required by the individual test method being used.

4.6.7 Fire door assemblies shall be certified only for wall constructions on which they have been fire tested.

**4.7 Fire Door Frames**

4.7.1 Fire door frames shall include suitable hardware reinforcements, door stops and provisions for anchoring to walls and/or floors.

4.7.2 Fire door frames, provided that they conform to generic industry standards, shall be permitted to be provided by a manufacturer other than the door panel manufacturer provided it is compatible with the door design and fire protection rating.

**4.8 Double egress fire door frames shall be used only with double egress door designs with which it has been specifically fire tested.**

4.8.1 Frames with inoperable transoms, sidelights or side panels shall be permitted.

**4.9 Hardware**

4.9.1 All hardware shall be certified to the appropriate performance requirements of NFPA 80.

4.9.2 Hardware for fire door assemblies shall be referred to as builder’s hardware or fire door hardware.

**4.10 Fire exit hardware shall be considered to be builder’s hardware.**

4.10.1 Builders hardware shall be applied only to swinging fire door assemblies. Such hardware shall include, but not be limited to, hinges, single-, two- or three-point locks and latches, top and bottom bolts and door closers.

4.10.2 Certification of swinging type fire doors shall be granted based upon test results that utilize a specific combination of builder’s hardware. Other builder’s hardware shall be permitted to be installed provided that it is compatible to the door design and its fire protection rating.

**4.11 Latch throws and the size and quantity of hinges shall, at a minimum, be as was used in the fire and hose stream tests used to qualify the assembly.**

4.11.1 Builders hardware shall not be required to be shipped from the factory with the fire doors.

4.11.2 Fire door hardware shall be shipped from the factory with the fire door assembly.

4.11.3 For an integrated fire test method that includes the provisions of EN 16034, all building hardware shall meet the requirements of EN 16034.

**4.12 Detectors**

4.12.1 All detectors shall be certified in accordance with the appropriate standard and installed in accordance with the manufacturer's instructions.

4.12.2 Detectors shall be located in accordance with NFPA 80 and shall be permitted to be part of an overall system that detects and releases the door for automatic closing.

4.12.3 Detectors, including fusible links, shall be installed on both sides of the opening and interconnected such that the activation of any single detector allows doors on both sides of the opening to close.

4.12.4 When a system or arrangement of detectors for an opening is not considered fail-safe, fusible links shall be used to ensure the automatic closing of the door in the event of a power failure.

4.12.5 When fusible links are used, one fusible link shall be located near the top of the opening and additional links shall be located at or near the ceiling on each side of the opening.

4.12.6 The maximum temperature rating of any fusible link used to activate the closing of fire doors shall be 165ºF (74ºC) unless a higher rating is required by the Authority Having Jurisdiction.

**4.13 Door Holders and Releases**

4.13.1 All door holders and release devices shall be certified in accordance with the appropriate standard and installed in accordance with the manufacturer's instructions.

4.13.2 When doors are kept in the open position, door holders and release devices must be used. The units are connected to detectors so that when a detector is activated and sends a signal that an alarm condition exists, the door holder and release device perform their function by automatically disconnecting the door. With the door holder and release device no longer keeping the door in the open position, the door is allowed to close due to the presence of an automatic closing or self-closing device.

4.13.3 Door holder and release devices shall be permitted to incorporate detectors. When present, the detector shall be examined in accordance with the applicable standard.

4.13.4 Door holder and release devices shall be permitted to incorporate a time delay device in order to avoid nuisance closures and false alarms. The time delay device shall be permitted to be adjustable by the end user or the Authority Having Jurisdiction can determine how long of a delay is needed. If the time delay device is not adjustable, it shall release after a maximum ten (10) seconds after receipt of a signal or loss of power. The units shall be permitted to be provided with a battery back-up device to extend the time period where the door holder and/or release device will not release as a result of a loss of power.

4.13.5 Units shall be permitted to be provided with manual release or testing devices so that units can be manually disconnected or tested from the door or floor level.

### 4.14 Oversize Door Assemblies

4.14.1 The maximum size door that can bear a label denoting certification shall be the largest size door.

4.14.2 Due to test facility limitations, fire door assemblies that are provided with fire door hardware and exceed the maximum size tested shall be permitted to bear a special serialized label stating that the assembly is "OVERSIZE".

4.14.3 The construction of the oversized assembly shall conform in all respects with an extrapolation of the certified door construction and rating, except for size.

4.14.4 The certification agency shall have drawings, tables and other information on file showing the various size components for which the maximum combinations of widths, heights and areas for which oversize openings shall be labeled by the manufacturer.

4.14.5 The certification report shall state the maximum width, height and area of the opening which is permitted to bear the special oversize label.

4.14.6 Assemblies exceeding the maximum opening size referenced in the certification report shall not be labeled as oversize without written authorization from the certification agency. These assemblies shall be reviewed on a case-by-case basis and may require additional testing as deemed necessary.

### 4.15 Special Provisions

4.15.1 Glazing

4.15.1.1 Only labeled fire protection rated or fire resistive rated glazing material shall be used in fire door assemblies and/or their components. The label shall be visible after installation.

4.15.1.2 All fire protection rated glazing shall meet all acceptance criteria when tested in accordance with NFPA 257.

4.15.1.3 All fire resistive rated glazing shall meet all acceptance criteria when tested in accordance with ASTM E-119.

4.15.1.4 Fire protection rated glazing and fire resistance rated glazing shall meet all applicable impact safety standards.

4.15.1.5 Glazing materials in vision panels shall be installed in labeled glass light kits or in accordance with the manufacturer's installation instructions.

4.15.1.6 Fire protection rated glazing shall be limited to the maximum areas shown below:

| Maximum Fire Protection Rating | Maximum Exposed Glass Vision Panel Area |
|---|---|
| 3 or 4 hours | None |
| 1-1/2 hours | 100 in.$^2$ (0.065 m$^2$)<br>with no dimension exceeding<br>33 in. (0.84 m) |
| ¾ hour | 296 in.$^2$ (0.84 m$^2$)<br>with no dimension exceeding<br>54 in. (1.37 m) |

4.15.1.7 Fire protection rated glazing shall be limited to 100 in.$^2$ (0.065 m$^2$) per door leaf with no dimension exceeding 33 in. (0.84 m) in temperature rise rated fire door assemblies unless substantiated by test data.

4.15.1.8 Fire resistance rated glazing shall be permitted to the maximum size opening for which it has been successfully fire tested. Fire resistance rated glazing shall not be permitted in fire door assemblies rated for 3 or 4 hours.

4.15.1.9 Fire door frames with glazed transoms and/or side lights shall have a maximum fire protection rating of ¾ hour.

4.15.1.10 Fire door assemblies rated for 3 or 4 hours and supplied with fire door hardware shall be permitted to incorporate small openings that are filled with fire protection rated glazing when substantiated by test data. The size of the individual openings shall not exceed 1 in. x 4 in. (25 mm x 102 mm). A maximum of two such glazed openings shall be permitted to be installed in each door assembly.

4.15.2 Louvers

4.15.2.1 Louvers shall not be permitted in fire door assemblies certified by this standard.

4.15.3 Astragals

4.15.3.1 An astragal shall be provided on one leaf of all swing fire doors used in pairs and horizontally or vertically bi-parting sliding doors.

4.15.3.2 As an alternative, astragals shall be permitted to be omitted when the opening has been qualified using gasketing and/or sealants.

4.15.4 Flame baffles

4.15.4.1 A flame baffle shall be required in the hood of all rolling steel type fire door assemblies.

### 4.16 Retrofit Operators

4.16.1 Operators shall be permitted to be certified for retrofit use onto existing fire door assemblies for each manufacturer's product with which they have been tested and are to be certified. A representative of the certification agency shall witness the testing.

4.16.2 The retrofit operator assembly shall be permitted to be provided by a manufacturer that was not the original door or operator manufacturer.

4.16.3 The retrofit operator shall meet all the applicable test criteria.

4.16.4 Retrofit operators shall be provided with written retrofit installations and test/reset instructions.

4.16.5 If the retrofit operator manufacturer has completed all the applicable test criteria for use on their own fire door assemblies, the certification examination for retrofit use shall consist of a set of Automatic Closing Tests.

4.16.6 At the discretion of the agency, only a single automatic closing feature needs to be tested.

# 5 OPERATIONS REQUIREMENTS

A quality assurance program is required to assure that subsequent fire doors produced by the manufacturer at an authorized location shall present the same quality and reliability as the specific fire doors 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 covered in the examination report. Conformance to design is verified by control of quality and is covered in the certification agency's surveillance program. Quality of performance is determined by field performances and by periodic re-examination and testing.

## 5.1 Demonstrated Quality Control Program

5.1.1 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;
- Handling and disposition of non-conformance materials; and,
- In order to assure adequate traceability of materials and products, the manufacturer shall maintain records of all quality control tests performed, for a minimum period of two years from the date of manufacture.

5.1.2 Documentation/Manual

There should be an authoritative collection of procedures and policies. Such documentation shall 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.

5.1.3 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 examination report, must be reported to, and authorized by, the certification agency prior to implementation for production. The manufacturer shall assign an appropriate person or group to be responsible for reporting proposed changes to the product to the certification agency before implementation. In situations involving significant modifications to a certified product, the notification shall be in the form of a formal request for an examination. For modifications of a more common nature, the manufacturer shall notify the certification agency of changes in the product or of persons responsible

for keeping the certification agency advised. 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. An audit of the manufacturing facility may be part of the certification investigation to verify implementation of the quality control program. Its purpose is to determine that the manufacturer's equipment, procedures, and quality program are maintained to insure a consistently uniform and reliable product. Initial inspections of facilities already producing similar products may be waived at the discretion of the certification agency.

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. Unannounced surveillance audits shall be conducted at least annually by the certification agency, or its designate, to determine continued compliance. More frequent audits may be required.

5.2.3 The manufacturer shall manufacture the product or service only at the location(s) audited by the certification agency and as specified in the examination report. Certification agencies do not permit manufacture of products bearing the certification mark at any other locations without prior written authorization by the certification agency. A separate audit and product examination shall be required at each location.

### 5.3 Manufacturer's Responsibilities

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