Revise the title of Chapter 4 to read as follows:
Chapter 4 General Requirements

Submitter Information Verification

Submitter Full Name: Kristin Bigda
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Street Address:
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Submital Date: Tue Jan 07 10:40:53 EST 2014

Committee Statement

Committee Statement: Proposed change reflects the scope of Chapter 4's requirements. Installation requirements for smoke door assemblies are covered in the proposed new Chapter 7. Proposed change is a result of the task group developed for the inspection, testing, and maintenance provisions for smoke doors.

Response Message:
Public Input No. 20-NFPA 105-2013 [Chapter 4 [Title Only]]
2.4 References for Extracts in Mandatory Sections.


Submitter Information Verification

Submitter Full Name: Kristin Bigda
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Submittal Date: Thu Nov 07 11:44:07 EST 2013

Committee Statement

Committee Statement: Reference update.
Response Message:
This chapter shall cover the requirements for testing and installation of smoke door assemblies.

Submitter Information Verification

Submitter Full Name: Kristin Bigda
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Street Address: 
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Submittal Date: Thu Nov 21 14:25:53 EST 2013

Committee Statement

Committee Statement: Proposed change reflects moving installation requirements to proposed new chapter 7 for swinging doors.

Response Message:

Public Input No. 21-NFPA 105-2013 [Section No. 4.1 [Excluding any Sub-Sections]]
4.1.1
Fire door assemblies that are intended for use as smoke door assemblies shall also comply with NFPA 80, Standard for Fire Doors and Other Opening Protectives.

4.1.2
Doors without fire protection ratings shall be permitted to be used as smoke doors in door openings not required to be protected by fire doors.

4.1.3
Doors without fire protection ratings shall comply with this standard.

Submitter Information Verification
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Submittal Date: Thu Nov 21 14:26:32 EST 2013

Committee Statement
Committee Statement: The requirements covered in 4.1.1, 4.1.2, and 4.1.3 have been moved to the proposed new Chapter 7 for swinging doors.

Response Message: 

Public Input No. 22-NFPA 105-2013 [Sections 4.1.1, 4.1.2, 4.1.3]
4.3.2*
Smoke door assemblies intended to be installed for installation where pressurization is provided to control smoke movement shall not have an artificial bottom seal installed during the test.

Supplemental Information

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Submitter Information Verification

Submitter Full Name: Kristin Bigda
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Submittal Date: Thu Nov 21 14:30:04 EST 2013

Committee Statement

Committee Statement: Proposed annex adds new annex comment that explains the use of an artificial door bottom during the UL 1784 air-leakage test.
Response Message: Public Input No. 23-NFPA 105-2013 [New Section after 4.3.2]
A.4.3.2

The artificial door bottom is used during the air-leakage tests of UL 1784, *Air Leakage Tests of Door Assemblies*, to better ascertain the amount of air leakage along the vertical edges and across the top edge(s) of the doors. An example of an artificial door bottom is duct tape used to seal the gap between the bottom of the door and the sill during the air-leakage test. The application of gasketing at the door bottom on installed smoke door assemblies is sometimes required in areas that are pressurized for smoke control. In the majority of cases, it is not necessary to seal the gap under the door.
4.4* Labeling.

Smoke door assemblies shall bear an “S” label indicating a maximum air leakage rate of 3 ft\(^3\)/min/ft\(^2\) (0.9 m\(^3\)/min/m\(^2\)) and the tested pressure differential of 0.1, 0.2, or 0.3 in. of water (25, 50, or 75 Pa).
A.4.4

Non-fire-rated smoke doors might not be marked with an "S" label or any other markings that indicate the maximum air leakage rate. Gasketing manufacturers might be able to provide anecdotal information based on the testing of their products. Due to the size, shape, material, and configuration of gasketing products, the label frequently is marked on the packaging of the gasketing material rather than on the product. Verifying the maximum air leakage rate of a smoke door without a fire protection rating might require additional research if the door does not carry an "S" label.
4.5.4
Fixed sealed transoms, side lights, side panels, or door vision lights shall be permitted in listed assemblies without additional testing.

4.5.5
Transoms, side lights, side panels, or door vision panels that are not fixed and sealed shall be installed in accordance with the smoke door listing.

Submitter Information Verification

Submitter Full Name: Kristin Bigda
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Submittal Date: Thu Nov 21 14:36:51 EST 2013

Committee Statement

Committee Statement: Proposed change reflects requirements that are found in the proposed new Chapter 7 for swinging doors.
Response Message:
Public Input No. 25-NFPA 105-2013 [Sections 4.5.4, 4.5.5]
Chapter 5 Maintenance

5.1 General.
This chapter shall cover the care, inspection, testing, and maintenance of smoke door assemblies.

5.1.1 The requirements of this chapter shall apply to new and existing installations.

5.1.2 Removal of Smoke Doors.
Where a smoke door or no longer functions as an opening, is no longer in use or is removed and not replaced, the opening shall be filled with construction equivalent to that to maintain the fire protection rating of the wall.

5.1.3* Operability.
Doors Smoke doors shall be operable at all times.

5.1.3.1 The doors Smoke doors shall be kept closed or arranged for automatic closing, unless otherwise permitted.

5.1.3.2 Where required, the doors shall be positively latched.

5.1.4 Replacement.
Where it is necessary to replace all or part of a smoke door assembly, replacement components shall be installed to meet the requirements of this standard and the manufacturer's instructions.

5.1.5 Repairs.
Damage and impairments to smoke door assemblies shall be corrected.

5.1.5.1 Damaged glazing material shall be replaced.

5.1.5.2 Replacement glazing material shall be installed in accordance with its individual listing, where required, and the manufacturer's listing.

5.1.5.3 When holes are left in a door or frame due to changes or removal of hardware or plant-ons, the holes shall be repaired by either of the following methods:

1. Installation of steel fasteners that completely fill the holes

2. Filling of the screw or bolt holes with the same material as the door or frame

5.1.5 Field Modifications.

5.1.5.1 Field modifications of fire-rated smoke door assemblies shall be made in accordance with NFPA 80.

5.1.5.2* Field modifications of smoke door assemblies without fire ratings shall be permitted to be made, provided the modifications are performed in accordance with the applicable requirements of this standard.

5.1.5.3 Upon completion of field modification work, smoke door assemblies shall be inspected in accordance with Section 5.4.

5.2 Specific Requirements

5.2.1 Inspections and Testing.
5.2.1.1 – Smoke door assemblies shall be inspected and tested in accordance with Chapter 5 of NFPA 80, Standard for Fire Doors and Other Opening Protectives.

5.2.1.2 – Hardware and gaskets shall be inspected annually, and any parts found to be damaged or inoperative shall be replaced.

5.2.1.3 – Tin clad and Kalamein doors shall be inspected regularly for dry rot.

5.2.1.4 – A written record shall be maintained and shall be made available to the AHJ.

5.2.1.5 – Records shall be maintained for not less than 3 years.

5.2.1 – Upon installation, smoke door assemblies shall be inspected and tested in accordance with the following:

1. Fire-rated smoke door assemblies shall be inspected and tested in accordance with this standard and also in accordance with Chapter 5 of NFPA 80.

2. Door assemblies without fire ratings shall be inspected in accordance with the requirements of this standard.

3. Inspections of smoke door assemblies without fire ratings shall be permitted to be performed at the same time as inspections for door assemblies subject to inspection under NFPA 80.

4. All functional tests shall be conducted after the building’s mechanical ventilation system has been balanced and is operating.

5. All functional tests shall be conducted after the closing mechanism has been adjusted for the applicable maximum allowable opening force.

5.2.2* – A record of all inspections and testing shall be signed by the inspector and kept for inspection by the AHJ.

5.2.2.1 – Records of the acceptance tests shall be retained for the life of the assembly.

5.2.2.2* – Unless a longer period is required by NFPA 80, records shall be retained for a period of at least 3 years.

5.2.2.3* – The records shall be on a medium that will survive the retention period. Paper or electronic media shall be permitted. [72: 14.6.2.3]
5.2.2.4 — A record of all inspections and testing shall be provided that includes, but is not limited to, the following information:

1. Date of inspection
2. Name of facility
3. Address of facility
4. Name of person(s) performing inspections and testing
5. Company name and address of inspecting company
6. Signature of inspector of record
7. Individual record of each inspected and tested smoke door assembly
8. Opening identifier and location of each inspected and tested smoke door assembly
9. Type and description of each inspected and tested smoke door assembly
10. Verification of visual inspection and functional operation
11. Listing of deficiencies in accordance with 5.2.4

5.2.3 — Maintenance Records.

Upon completion of maintenance, smoke door assemblies shall be inspected and tested in accordance with 5.2.4.

5.2.3.1 — A record of these inspections and testing shall be made in accordance with 5.2.2. A record of maintenance performed on existing smoke door assemblies shall be provided that includes, but is not limited to, the following information:

1. Date of maintenance
2. Name of facility
3. Address of facility
4. Name of person(s) performing maintenance
5. Company name and address of maintenance personnel
6. Signature of maintenance personnel performing the work
7. Individual listings of each maintained smoke door assembly
8. Opening identifier and location of each repaired smoke door assembly
9. Type and description of each repaired smoke door assembly
10. Description or listing of the work performed on each smoke door assembly

5.2.4* — Acceptance Testing.

Acceptance testing of smoke door assemblies shall be performed by a qualified person with knowledge and understanding of the operating components of the type of assembly subject to testing.

5.2.4.1* — Before testing, a visual inspection shall be performed to identify any damaged or missing parts that can create a hazard during testing or affect operation or resetting.

5.2.4.2* — Acceptance testing shall include the closing of the door by all means.

5.2.4.2.1* — Acceptance testing shall be conducted after the building's mechanical ventilation system has been balanced, in accordance with 5.2.1.

5.2.4.2.2* — Acceptance testing shall be conducted after the closing mechanism has been adjusted for the applicable maximum allowable opening force.
5.2.4.3 -
A record of these inspections and testing shall be made in accordance with 5.2.2.

5.2.4.4 - Swinging Smoke Door Assemblies.

5.2.4.4.1 -
Smoke door assemblies shall be visually inspected from both sides to assess the overall condition of the assembly.

5.2.4.4.2 -
As a minimum, the following items shall be verified:

1. Labels on fire-rated smoke door assemblies are clearly visible and legible and bear the "S" label marking.
2. Door leaves without fire protection ratings comply with 7.3.1.
3. Door frames comply with 7.3.2.
4. Gasketing along the vertical edges of the door and across the top of the door and, where required, at meeting edges of pairs of doors forms a continuous seal that is not cut, notched, or otherwise modified to accommodate other hardware items.
5. Gasketing materials, where required, are intact and close the gaps between the door and frame to seal the door opening against the passage of smoke.
6. Doors installed in pressurized applications have a bottom seal, where required.
7. Doors equipped with bottom seals that automatically project to fully seal the gap under the door in the closed position do not interfere with the swinging of the door when retracted or the closing of the door when projected.
8. No open holes or breaks exist in the surfaces of either the door or the frame.
9. Glazing, vision light frames, and glazing beads are intact and securely fastened in place, if so equipped.
10. Glazing materials and vision light kits comply with Sections 7.5 and 7.6.
11. Glazing materials, vision light kits, and glazing beads are continuously sealed.
12. The door, frame, hinges, and other hardware are secured, aligned, and in working order with no visible signs of damage.
13. No parts are missing or broken.
14. Door clearances do not exceed dimensions listed in 7.3.3 when measured on the pull side of the door(s).
15. The self-closing device is operational; that is, the active door completely closes when operated from the full open position.
16. If a coordinator is installed, the inactive leaf closes before the active leaf.
17. Where positive latching is required, latching hardware operates and secures the door when the door is in the closed position.
18. Where door leaves, other than doors arranged for automatic closing, are permitted to be held open with friction door holder devices, the door holder devices comply with 7.3.6.6.

5.2.4.5 - Horizontally Sliding, Vertically Sliding, and Rolling Doors.

5.2.4.5.1 -
Fire door assemblies shall be visually inspected from both sides to assess the overall condition of the door assembly.
5.2.4.5  The following items shall be verified:

1. Labels are clearly visible and legible.
2. No open holes or breaks exist in surfaces of either the door or the frame.
3. Slats, endlocks, bottom bar, guide assembly, curtain entry, hood, and flame baffle are correctly installed and intact for rolling steel fire doors.
4. Glazing, vision light frames, and glazing beads are intact and securely fastened in place, if so equipped.
5. Curtain, barrel, and guides are aligned, level, plumb, and true for rolling steel fire doors.
6. Expansion clearance is maintained in accordance with manufacturer’s listing.
7. Drop release arms and weights are not blocked or wedged.
8. Mounting and assembly bolts are intact and secured.
9. Attachments to jambs are with bolts, expansion anchors, or as otherwise required by the listing.
10. Smoke detectors, if equipped, are installed and operational.
11. No parts are missing or broken.
12. Fusible links, if so equipped, are in the location; chain/cable, s-hooks, eyes, and so forth, are in good condition; the cable or chain is not kinked, pinched, twisted, or inflexible; and links are not painted or coated with dust or grease.
13. Auxiliary hardware items that interfere or prohibit operation are not installed on the door or frame.
14. No field modifications to the door assembly that void the label have been performed.
15. Doors have an average closing speed of not less than 6 in/sec (152 mm/sec) or more than 24 in/sec (610 mm/sec).

5.2.5  Periodic Inspection and Testing.

5.2.5.1  Periodic inspection and testing shall be performed not less than annually.

5.2.5.2  As a minimum, the provisions of 5.2.4 shall be included in the periodic inspection and testing procedure.

5.2.5.3  Inspection shall include an operational test for automatic-closing doors to verify that the assembly will close under fire conditions.

5.2.5.4  The assembly shall be reset after each test.

5.2.5.5  Resetting of the release mechanism shall be done in accordance with the manufacturer’s instructions.

5.2.5.6  Hardware and gaskets shall be inspected annually, and any parts found to be damaged or inoperative shall be replaced without delay.

5.2.5.7  Tin-clad and Kalamein doors shall be inspected regularly for dry rot.

5.3  Performance-Based Option.

5.3.1  As an alternative means of compliance with 5.2.5, subject to the AHJ, smoke door assemblies shall be permitted to be inspected, tested, and maintained under a written performance-based program.

5.3.2  Goals established under a performance-based program shall provide assurance that the smoke door assembly will perform its intended function when exposed to fire conditions.
5.3.3
The technical justification for inspection, testing, and maintenance intervals shall be documented in writing.

5.3.4
The performance-based option shall include historical data acceptable to the AHJ.

5.4 Maintenance.

5.4.1 Repairs shall be made, and defects that could interfere with operation shall be corrected without delay.

5.4.2 Fire-rated smoke door assemblies shall also be maintained in accordance with NFPA 80.

5.4.3 Damaged glazing material shall be replaced in accordance with the applicable codes.

5.4.4 Replacement glazing material shall be installed in accordance with its individual listing, where required, and the manufacturer’s listing.

5.4.5 Where holes are left in a door or frame due to changes or removal of hardware or plant-ons, the holes shall be repaired by either of the following methods:

1. Installation of steel fasteners that completely cover the holes
2. Filling of the screw or bolt holes with the same material as the door or frame

5.4.6 Where a smoke door, frame, or any part of its appurtenances is damaged to the extent that it could impair the door assembly’s proper emergency function, the following actions shall be performed:

1. The door, frame, door assembly, or any parts of its appurtenances shall be replaced with parts obtained from the original manufacturer.
2. The door shall be tested to ensure emergency operation and closing upon completion of the repairs, in accordance with 5.2.3.

5.4.7 If repairs cannot be made with parts obtained from the original manufacturer or retrofitted, the door, the door assembly, or appurtenances shall be replaced.

5.5 Prevention of Door Blockage.

5.5.1 Door openings and the surrounding areas shall be kept clear of anything that could obstruct or interfere with the free operation of the door.

5.5.2 Blocking or wedging of doors in the open position shall be prohibited.

5.6 Maintenance of Closing Mechanisms.

5.6.1 Self-closing and automatic closing devices shall be kept in working condition at all times.

5.6.2 Care shall be taken to prevent paint accumulation on any movable parts such as, but not limited to, stay rolls, gears, and closing mechanisms, hinges, pivots, closer arms, and latching hardware.

Supplemental Information

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Submitter Information Verification

15 of 48
Committee Statement

The changes to Chapter 5 are the result of much work done by a task group since the last revision cycle, and further revised by the full Technical Committee. Proposed changes to Chapter 5 accomplish several objectives: First, the changes make NFPA 105 more consistent with the requirements in NFPA 80 regarding inspection, testing, and maintenance of fire doors (smoke doors for NFPA 105.) Secondly, the proposed changes expand the current requirements to address different types of smoke doors (swinging, rolling, sliding, etc) and fully address all three types of testing: operational, acceptance, and periodic.) It should be noted that proposed changes are still a work in progress. Additional work by the task group and the Technical Committee will be completed during the Second Draft phase. Additional input from the public is encouraged. Annex A.5.1.4 and A.5.2.1 should be deleted as part of this First Revision. New Annex Material has been developed for proposed new Chapter 5.

Response Message:

Public Input No. 1-NFPA 105-2013 [New Section after 5.2.1]
Public Input No. 3-NFPA 105-2013 [Chapter 5 [Title Only]]
Public Input No. 4-NFPA 105-2013 [Section No. 5.1 [Excluding any Sub-Sections]]
Public Input No. 5-NFPA 105-2013 [New Section after 5.1.1]
Public Input No. 6-NFPA 105-2013 [New Section after 5.1.2]
Public Input No. 7-NFPA 105-2013 [Section No. 5.1.2.2]
Public Input No. 8-NFPA 105-2013 [Section No. 5.1.1]
Public Input No. 9-NFPA 105-2013 [New Section after 5.1.4]
Public Input No. 10-NFPA 105-2013 [Section No. 5.1.4]
Public Input No. 11-NFPA 105-2013 [Section No. 5.2]
Public Input No. 12-NFPA 105-2013 [Section No. 5.2.3]
Public Input No. 13-NFPA 105-2013 [New Section after 5.2.3]
Public Input No. 14-NFPA 105-2013 [New Section after 5.2.3]
Public Input No. 15-NFPA 105-2013 [New Section after 5.2.3]
Public Input No. 16-NFPA 105-2013 [New Section after 5.2.3]
Public Input No. 17-NFPA 105-2013 [New Section after 5.2.3]
Public Input No. 18-NFPA 105-2013 [Section No. 5.2.2]
Public Input No. 19-NFPA 105-2013 [Section No. 5.2.3]
A.5.1.3 Smoke door assemblies, both fire-rated and non-fire-rated, should be operable under normal conditions. Operability includes closing easily and completely and, where required, positively latching in the closed position. Operability, in the case of smoke door assemblies, also includes the sealing of the door against the passage of smoke. Fire-rated doors are not required to be operable after exposure to a fire. Similarly, non-fire-rated doors should not be expected to be operable after exposure to a fire.

A.5.1.5.2 Generally, the replacement of hardware components on swinging doors (hinges, pivots, door closers, etc.) is not considered to be a field modification, provided that the replacement hardware does not require additional cutting, mortising, or boring into the doors and frames and the hardware meets the criteria specified elsewhere in the standard. Likewise, the installation of surface-mounted items like protection plates is not considered to be a field modification. Cutting doors for vision panels, enlarging existing cutouts for vision panels, and trimming doors in height or width are examples of field modifications, as is installing hardware components that require additional cutting and mortising of the doors or frames.

A.5.2.2 Newer technology includes use of bar codes and other electronic devices. This section recognizes that completed and filed bar code reports should be considered signed by the inspector.

A.5.2.2.2 In many cases, AHJs are not able to inspect every building in their jurisdiction each year. Inspection and testing records need to be retained during the intervening periods between the AHJ’s formal visits to provide evidence that the inspections and testing were performed as required by this standard. Additionally, maintenance records documenting that the necessary corrective actions have been made in accordance with this standard should be stored with the inspection and testing records for the same period of time. Retaining the records for 7 years allows the AHJ to look back over an extended period of time to verify that the smoke door assemblies are being properly maintained.

A.5.2.2.3 Installation of new smoke door assemblies should be documented in the same manner and level of detail as the periodic inspections and testing of smoke door assemblies required by 5.2.4 and 5.2.5. Records of new smoke door assemblies should be retained with the periodic inspections and testing records for the facility.

A.5.2.2.4(8) Each smoke door assembly in a facility should be assigned a unique identifier code (e.g., door number) that can be used to track the assembly's compliance and maintenance records throughout the lifetime of its installation. Identifier codes could be a door assembly number, bar code, or other code that is unique to each smoke door assembly in the facility.

A.5.2.2.4(9) To aid the AHJ during the review of the inspections and testing reports, the records should include a description of the smoke door assembly. The following door types are listed in NFPA 80 and could have application under this section:

1. Swinging Door with Builders Hardware
2. Swinging Fire Door with Fire Door Hardware
3. Horizontally Sliding Fire Door
4. Special Purpose Horizontally Accordion or Folding Door
5. Vertically Sliding Fire Door
6. Rolling Steel Door
7. Fire Shutter
8. Service Counter Fire Door
9. Hoistway Doors for Elevators and Dumbwaiter
10. Chute Door
11. Access Door
12. Fire Window
13. Fabric Fire Safety Curtain
A.5.2.2.4(10) Functional operation of smoke door assemblies should include testing of the closing device, complete closure of the door from the full-open position, and full engagement of latch(es) where required by door type. Functional testing of automatic-closing or power-operated smoke door assemblies and electrically controlled latching hardware might need to be coordinated with the facility during other electrically controlled system tests. Where required by other standards, the force to open a door should be recorded using a door pressure gauge.

A.5.2.3.1(8) See A.5.2.2.4.2(8).

A.5.2.3.1(9) See A.5.2.2.4.2(9).

A.5.2.3.1(10) When maintenance work on an existing smoke door assembly is required to correct deficiencies, as the result of a periodic inspections and testing report, the maintenance report should reference the inspections and testing report where the deficiencies where cited to show that the follow-up work was performed. Descriptions of the work performed on smoke door assemblies should document the nature of the work (e.g., replaced surface mounted door closer, installed new gasketing). Maintenance records should include digital photographs of the condition of the assembly before and after the maintenance work.

A.5.2.4 Visual inspection and functional testing of smoke door assemblies require the persons performing the inspections and testing to be thoroughly knowledgeable of the various components and systems that are used to create the assemblies. Inspectors of swinging doors need be able to recognize which components can or cannot be used on specific assemblies, which requires training and experience on the part of the persons performing the inspections. Additionally, AHJs need to be able to rely on the competency, expertise, experience, and knowledge of the smoke door inspectors in their jurisdiction.

A.5.2.4.1 Any smoke door assembly or component that has a history of recurring failures should be evaluated for possible replacement or other corrective measures.

A.5.2.4.2(12) Fusible links should not be coated with any materials such as fireproofing, drywall compound, or spray texturing.

A.5.3 See Annex J for information regarding performance-based inspection, testing, and maintenance options for smoke door assemblies.

A.5.4.1 The determination of the time required for corrective action should be based on a risk analysis and the availability of replacement materials.
6.5  Acceptance Testing.
6.5.1  Acceptance testing of smoke dampers shall be performed by a qualified person with knowledge and understanding of the operating components of the type of assembly to be tested.
6.5.2  Before testing, a visual inspection shall be performed to identify any damaged or missing parts that could create a hazard during testing or affect operation or resetting.
6.5.3  Acceptance testing shall include the closing of the damper by every means.
6.5.4  Acceptance testing shall be conducted after the building mechanical ventilation system has been balanced, and in operation under maximum air flow, if equipped with a variable air volume system in accordance with 5.2.1.
6.5.5  A record of these inspections and testing shall be made in accordance with 5.2.2.

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Submitter Information Verification

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Submittal Date: Mon Nov 25 10:45:45 EST 2013

Committee Statement and Meeting Notes

Committee Statement: Currently, NFPA 105 does not address acceptance testing for smoke dampers. Other inspection, testing, and maintenance documents cover three types of testing: operational, acceptance, and periodic. Acceptance testing provisions should be included in NFPA 105. Similar provisions are being proposed for fire dampers in NFPA 80. Annex A material is being added to further clarify what is intended by the requirement for the damper to be closed by all means during the test.

Response Message:

Committee Notes:

Date  Submitted By
Jan 6, 2014  6.5.3 - changed 'all' to every
A.6.5.3 If the damper is equipped with a fusible link, it is not required to activate the link by heat to test the damper. Visual inspection should be made after the fusible link has been reinstalled to ensure it will not impede closing of the damper.
6.6 Periodic Inspection and Testing.

6.6.1 Smoke dampers for dedicated and nondedicated smoke control systems shall be inspected and tested in accordance with NFPA 92, *Standard for Smoke Control Systems*.

6.6.2 Each damper shall be tested and inspected 1 year after installation.

6.6.2.1 In buildings not containing a hospital, each damper shall be tested and inspected every 4 years thereafter.

6.6.2.2 In buildings containing a hospital, each damper shall be tested and inspected every 6 years thereafter.

6.6.3 Care shall be exercised that all tests are completed in a safe manner by personnel wearing the appropriate personal protective equipment.

6.6.4 Full unobstructed access to the damper shall be verified and corrected as required.

6.6.5 Where a fusible link is installed on a combination fire/smoke damper, the fusible link shall be removed for testing the damper for full closure simulating a fire condition per the requirements and frequencies of 19.5.4 of NFPA 80, *Standard for Fire Doors and Other Opening Protectives*.

6.6.6 The test shall be conducted with normal HVAC airflow.

6.6.7 The operation of the damper shall verify that there is no damper interference due to rust or bent, misaligned, or damaged frame or blades; and no defective hinges or other moving parts.

6.6.8 The damper frame shall not be penetrated by any foreign objects that would affect proper fire damper operations.

6.6.9 The damper shall be verified to not be blocked from closure in any way.

6.6.10 The fusible link shall be reinstalled after testing is complete. If the link is damaged or painted, it shall be replaced with a link of the same size, temperature rating, and load rating.

6.6.5 Periodic Testing for Fusible Link–Operated Dampers.

Testing of fusible link–operated dampers shall comply with the following procedures:

1. For safety considerations, the fan shall be off.

2. The fusible link shall be removed with the damper in the full-open position. Before the fusible link is removed, it shall be verified that all obstructions, including hands, are out of the path of the damper blades.

3. The damper shall close completely without assistance once the fusible link is removed. If the damper is designed with a latch to hold the damper in the full-closed position, the damper shall latch properly.

4. The damper shall be returned to the full-open position and the fusible link shall be replaced. If the link appears damaged, it shall be replaced with a functionally equivalent link.

6.6.6 Periodic Testing for Dampers That Do Not Use a Fusible Link to Operate.
6.6.6.1
Testing of dampers with position indication wired to indication lights, control panels, or BAS Building Alarm System (BAS) shall comply with the following procedure:

(1) The signal from the damper’s position indicator device shall be used to confirm that the damper is in the full-open position.
(2) The damper shall be commanded to the closed position.
(3) The signal from the damper’s position indicator device shall be used to confirm that the damper reaches its full-closed position.
(4) The damper shall be commanded to the open position.
(5) The signal from the damper’s position indicator device shall be used to confirm that the damper reaches its full-open position.

6.6.6.2
Testing of dampers without position indicators shall comply with the following procedure:

(1) It shall be visually confirmed that the damper is in the full-open position.
(2) It shall be verified that all obstructions, including hands, are out of the path of the damper blades, and then electrical power or air pressure shall be removed from the actuator to allow the actuator’s spring return feature to close the damper.
(3) It shall be visually confirmed that the damper closes completely.
(4) Electrical power or air pressure shall be reapplied to reopen the damper.
(5) It shall be visually confirmed that the damper is in the full-open position.

6.6.7
All inspections and testing shall be documented indicating the location of the damper, date of inspection, name of inspector, and deficiencies discovered. The documentation shall have a space to indicate when and how the deficiencies were corrected.

6.6.8
All documentation shall be maintained by the property owner and available for review by the AHJ.

Supplemental Information

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Submitter Information Verification

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Submittal Date: Mon Nov 25 09:09:14 EST 2013

Committee Statement

Committee Statement: Proposed changes to Section 6.5 clarifies the specific procedures intended by NFPA 105 when smoke dampers are tested. The current language in the standard isn’t clear with regards to the specific steps that must be taken for dampers that use a fusible link to operate versus those that do not use a fusible link to operate. NFPA staff receive many questions from users of this section.
Proposed changes hope to clarify damper testing requirements. A.6.5.2 Annex material is also being modified. It is outside the scope of this document to require testing of the detector along with the smoke damper. If testing of such an integrated system is required, it is within the scope of NFPA 4.

Response
Message:
Public Input No. 27-NFPA 105-2013 [Section No. A.6.5.2]
A.6.5.2

If the damper is arranged to be activated automatically, such as by a smoke detector or other device or system, the periodic test required by 6.5.2 should involve need not involve initiation of the detector or other device or system. The damper can also be actuated and cycled as part of the associated smoke detector testing in accordance with NFPA 72. However, such testing does not meet all the testing and inspection requirements of NFPA 105. The NFPA 72 testing could be combined with the inspection and testing requirements of NFPA 105, provided that all testing requirements of NFPA 105 are met. If operational issues are discovered during NFPA 72 testing, they should be reported to the building owner for corrective measures, as required by NFPA 105. For additional information, refer to NFPA 4.
Chapter 7  Swinging Doors

7.1*  General.
This chapter covers the installation of side-hinged and pivoted swinging smoke door assemblies.

7.2  Swinging Doors with Fire Protection Ratings.
Fire door assemblies that are intended for use as smoke door assemblies shall also comply with NFPA 80.

7.3*  Swinging Doors Without Fire Protection Ratings.
Doors without fire protection ratings shall be permitted to be used as smoke door assemblies in door openings not required to be protected by fire doors.

7.3.1*  Doors.
Non-fire-rated door leaves shall not be less than 1 ¾ in. (44 mm) thick, solid-bonded wood core or of equivalent design that resists fire for a minimum of 20 minutes.

7.3.1.1*  Vertical edges of new composite and wood door leaves shall be square edged or beveled.

7.3.1.2  Doors installed in pairs shall be beveled or have astragals or rabbets at meeting edges.

7.3.1.3  Doors shall be flush mounted in door frames.

7.3.1.4  Dutch doors shall be permitted to be used, provided they comply with the following:

(1) Both the upper leaf and the lower leaf are equipped with a latching device.
(2) The meeting edges of the upper and lower leaves are equipped with an astragal or a rabbet.

7.3.1.5  Louvers and transfer grilles shall not be permitted in doors.

7.3.2  Door Frames.
Door frames shall be labeled or comply with 7.3.2.1.

7.3.2.1  Where permitted by other standards, door frames shall be of steel construction or shall be of other designs that have been tested and reported by a nationally recognized testing agency in accordance with NFPA 252; ANSI/UL 10B, Standard for Fire Tests of Door Assemblies; and ANSI/UL 10C, Standard for Positive Pressure Fire Tests of Door Assemblies.

7.3.2.2*  Door frames with terminated stops shall be permitted, provided that the lowest portion of the terminated stops is not greater than 6 in. (152 mm) above the bottom of the frame.

7.3.2.3  Supporting Construction.
Wall openings shall be constructed to readily accept the door frames.

7.3.2.4  The door frames shall be considered to be non–load bearing.

7.3.2.5  Frames shall be securely anchored to the wall construction.

7.3.3*  Clearances.
Doors in smoke partitions shall have clearances in accordance with NFPA 80.

7.3.3.1*  Doors in smoke barriers shall close the opening, leaving only the minimum clearance necessary for proper operation. The clearance under the bottom of a new door shall be a maximum of ¾ in. (19 mm).
7.3.2
The maximum clearance between the bottom of side-hinged or -pivoted smoke doors and the finished floor shall be not greater than \( \frac{3}{4} \) in. (19 mm), unless otherwise permitted.

7.3.3
Where the bottom of the door is more than 38 in. (965 mm) above the finished floor, the maximum clearance under the door shall not exceed \( \frac{3}{8} \) in. (9.5 mm).

7.3.4* Latching Hardware.
Where required, smoke doors without fire protection rating shall be provided with hardware that provides positive latching.

7.3.5 Operation of Doors.
Doors shall be arranged to be either self-closing or automatic closing, where required, unless otherwise exempted.

7.3.5.1* Self-Closing.
Self-closing doors shall swing easily and freely and shall be equipped with a closing device that closes and latches the door each time it is opened.

7.3.5.2
The closing mechanism shall not have a hold-open feature.

7.3.5.3 Automatic Closing.
Automatic-closing doors shall be permitted to close automatically by means of the installation of a closing device and one of the following:

1. A separate, labeled, fail-safe door holder/release device(s) or a hold-open mechanism that shall be permitted to be an integral part of the basic closing device and a door holder device that manually releases the door when pulled or pushed.

2. An integral closing device that allows the doors to swing freely and that automatically closes the doors during an alarm condition, provided the hold-open mechanisms are released by one or a combination of automatic fire detectors acceptable to the AHJ, and a hold-open mechanism that manually releases the door when pulled or pushed.

7.3.5.4 Power-Operated Doors.
Power-operated doors shall be equipped with a releasing device that automatically disconnects the power operator at the time of fire, allowing a self-closing or automatic device to close the door regardless of power failure or manual operation, provided the following criteria are met:

1. The door is equipped with a means for keeping the door closed that is acceptable to the AHJ.

2. The device used is capable of keeping the door fully closed if a force of 5 lbf (22 N) is applied to the latch edge of swinging doors, whether or not power is applied.

7.3.6* Builders Hardware
7.3.6.1 Conventional Hinges
Conventional hinges used on doors with closing devices shall have ball bearings or anti-friction bearings and meet the requirements of ANSI/BHMA A156.1, Standard for Butts and Hinges.

7.3.6.1.1 Hinges shall be sized in thickness, height, and width in accordance with the hinge manufacturer's recommended guidelines. Hinges shall have brass/bronze or steel base materials or be stainless steel.

7.3.6.1.2 Doors up to 60 in. (1.52 m) in height shall be provided with two hinges and an additional hinge for each additional 30 in. (0.76 m) of door height or fraction thereof.

7.3.6.1.3 The distance between hinges shall be permitted to exceed 30 in. (0.76 m).

7.3.6.1.4 Where spring hinges are used, at least two shall be provided.

7.3.6.2 Pivots
Pivots shall be in compliance with NFPA 80.

7.3.6.3 Continuous Hinges
Continuous hinges shall be in compliance with NFPA 80.

7.3.6.4* Locks and Latches
Locking and latching shall comply with NFPA 80.

7.3.6.4.1 Panic Hardware
Where panic hardware is utilized, the latching device shall not be permitted to be held in the retracted position.

7.3.6.4.2* Roller Latches
Where permitted, roller latches that are capable of keeping the doors closed when a force of 5 lbf (22 N) is applied to the latch edge of the door shall be permitted to be used.

7.3.6.4.3 Strike plates for locks and latches on pairs of doors shall not have extended lips that prevent astragals from sealing the gap at the meeting edges of the doors.

7.3.6.5 Door-Closing Devices
Door-closing devices, other than spring hinges, shall meet the requirements of ANSI/BHMA A156.4, Door Controls — Closers, Grade 1.

7.3.6.5.1 Where non-fire-rated doors are permitted to be held open, the door closing device shall be permitted to have an integral friction hold-open feature that permits the door to be closed when pulled or pushed.

7.3.6.5.2 Doors arranged for automatic closing shall have a closing device that meets the requirements of 7.3.5.3.

7.3.6.6 Door Holder/Release Devices
7.3.6.6.1 Door holder/release devices for automatic-closing doors shall be installed in accordance with the manufacturer's instructions and in conformance with the individual manufacturer's published listings.

7.3.6.6.2* Where required for non-fire-rated smoke doors without door closers, only door holder devices that release when pushed or pulled shall be permitted.

7.3.6.7* Protection Plates.
Doors without fire protection rating are permitted to have non-rated, factory- or field-applied protection plates of unlimited size, unless otherwise restricted by the door or protection plate manufacturers' specifications.

7.3.6.8* Attaching Hardware to Doors and Frames.
Hardware items shall be attached to doors and frames in accordance with NFPA 80.

7.4 Vision Panels in Doors.
7.4.1 The perimeter of the glazing material and vision panel frames shall be sealed to resist the passage of smoke.

7.4.2 Vision panels in smoke doors required to have a fire protection rating shall comply with NFPA 80 and shall not exceed the sizes tested in accordance with the door manufacturer's published listings.

7.5 Glazing in Sidelight and Transom Light Frames.

7.5.1* The perimeter of the glazing material shall be sealed to resist the passage of smoke.

7.5.2 Glazing in sidelight and transom light frames shall comply with NFPA 80 and shall not exceed the sizes tested in accordance with the door manufacturer's published listings.

7.6 Side Panel and Transom Panel Frames.

7.6.1 The perimeter of fixed solid panels used in side panel and transom panel frames shall be sealed to resist the passage of smoke.

7.6.2 Removable panels shall be permitted, provided they are gasketed in compliance with Section 7.7.

7.7* Gasketing and Astragals.

7.7.1 Gasketing.
The gaps between the top and vertical edges of the door and frame and between the meeting edges of pairs of doors shall be closed with labeled gasketing material in accordance with the gasketing manufacturer's published listings.

7.7.1.1* Gasketing material shall form a continuous seal along the top and vertical edges of the doors and at meeting edges of pairs of doors.

7.7.1.2* Where mortising of doors to receive hardware items creates a void along the vertical or top edges of doors, soffit-mounted gasketing shall be required.

7.7.2* Where required, gaps between the bottom of the doors and the floor shall be closed with labeled gasketing in accordance with the gasketing manufacturer's published listing.

7.7.2.1* Where required, automatic door bottoms that close the gap between the bottom of the door and the floor or threshold shall be permitted to be installed.

7.7.3 Astragals.
Doors swinging in pairs, where located with a means of egress, shall not be equipped with astragals that inhibit the free use of either leaf.
Supplemental Information

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Committee Statement

Committee Statement: Proposed Chapter 7 is a new chapter for inclusion in NFPA 105 specifically for the installation of swinging smoke door assemblies. This chapter is also the result of task group work that has been ongoing since the last revision cycle. Currently, little guidance is provided in NFPA 105 to address the installation of smoke door assemblies. In addition, the current installation requirements provide minimal differences between the types of smoke doors that are present in the field. Chapter 7 introduces NFPA 105 to providing door specific installation criteria, consistent in format to what is found in NFPA 80 in the door specific chapters. One unique aspect of smoke doors that is addressed in the proposed language is that smoke doors may or may not have been tested to be fire-rated. The proposed text addressed both types of smoke door assemblies: fire-rated and non-fire rated. The text is not complete at this time. The task group and Technical Committee will continue to work on the language during the Second Draft phase of the revisions process. Additional input from the public is encouraged. Annex A Material is also being added.

Response Message:
Public Input No. 26-NFPA 105-2013 [New Section after 6.6.6]
A.7.1

Swinging smoke door assemblies fall into two categories, fire rated and non–fire rated. Fire-rated smoke door assemblies are also required to comply with NFPA 80. Where there are conflicting requirements for fire-rated doors, NFPA 80's requirements take precedence over all other requirements. Additionally, building, fire, and life safety codes contain specific requirements that affect the design and installation of swinging smoke door assemblies. Some of the requirements of Chapter 7 have been adapted from the requirements found in Chapter 8 of NFPA 101.

Generally, swinging smoke door assemblies without fire protection rating comprise many of the same components that are used on swinging fire door assemblies. In many cases, the internal construction of the door leaves is the main difference between the two categories of smoke door assemblies. Each type of swinging smoke door assembly utilizes the same types of frames, doors, and builders hardware (hinges, latching hardware, closing devices, etc.) and are virtually identical except for the labels that indicate the door is fire rated. For that reason, many of the requirements of Chapter 7 refer directly to NFPA 80 or otherwise adapt applicable NFPA 80 requirements for use on non-fire-rated swinging smoke door assemblies.

Many of the components used in non-fire-rated smoke door assemblies are not specifically tested or listed by nationally recognized testing laboratories for use on smoke door assemblies, with the exception of gasketing materials and products that have been subjected to testing in accordance with UL1784, *Air Leakage Tests of Door Assemblies*.

Users of this standard are encouraged to review related codes and standards to determine the applicable requirements for a specific smoke door assembly. When competing requirements are found in the related codes and standards, the AHJ should be consulted to determine which requirements take precedence.

A.7.3
Non-fire-rated doors used as smoke doors in door openings that are not required to be protected by fire doors might be constructed of aluminum, fiberglass, hollow metal, steel, wood, or other suitable materials. Generally, non-fire-rated smoke door assemblies are required to be self-closing or automatic closing and swing easily and freely, which requires ball bearing or anti-friction bearing hinges or pivots. Smoke door assemblies are required to have positive latching hardware, unless otherwise specifically exempted by the applicable building, fire, or life safety code.

**A.7.3.1**

Door leaves used in smoke door assemblies without fire protection rating should be constructed of a design that resists fire for a minimum of 20 minutes. Doors that are 1 3/4 in. (44 mm) thick solid-bonded wood core doors include, but are not limited to, particleboard, agrifiber, structural composite lumber (SCL), and stave core doors. ANSI/WDMA I.S. 1A, *Industry Standard for Interior Architectural Wood Flush Doors*, and ANSI/WDMA I.S. 6A, *Industry Standard for Architectural Stile and Rail Doors*, give specifications governing the construction of solid-bonded wood core doors. Door leaves constructed of aluminum, fiberglass reinforced polymer (FRP), hollow metal, and steel might also be acceptable for use in smoke door assemblies without fire protection ratings; manufacturers' technical data should be consulted to confirm the use of such door leaves in smoke door assemblies.

**A.7.3.1.1**

Beveling the vertical edges of composite and wood door leaves permits the door leaves to be undersized in width, from the nominal width of the door opening. This is less than doors that have squared vertical edges, thus reducing the clearance dimension between the vertical edges of the doors and the rabbets of the door frames. Industry practice is to bevel the vertical edges of doors 1/8 in.:2 in. (3 mm:51 mm), which results in a bevel of 3 degrees.

**A.7.3.2.2**
Door stops in the door frames are necessary elements that provide support for the installation of gasketing materials.

A.7.3.3
Additional information regarding clearances for doors can be found in ANSI/WDMA I.S. 1A, *Industry Standard for Interior Architectural Wood Flush Doors*. Clearances for stile and rail wood doors should be in accordance with ANSI/WDMA I.S. 6A, *Industry Standard for Architectural Stile and Rail Doors*. Clearances for standard hollow metal doors should be in accordance with SDI A250.8, <<full title needed>>. Clearances for custom hollow metal doors should be in accordance with HMMA 840-07, <<full title needed>>.

A.7.3.3.1
In some occupancy groups, the clearance between the bottom horizontal edge of the door and the floor covering is permitted to be a maximum of 1 in. on doors without fire protection ratings.

A.7.3.4
In most cases, doors are required to be equipped with positive-latching hardware. In some occupancy groups, building, fire, and life safety codes permit positive-latching hardware to be omitted on doors in smoke partitions to rooms such as toilet rooms, bathrooms, shower rooms, sink closets, and similar auxiliary spaces that do not contain flammable or combustible materials.

A.7.3.5.1
Typically, non-fire-rated interior side-hinged and pivoted doors with door closers, including smoke doors without fire protection rating, are required to have a reduced opening force of a maximum of 5 lbf (22 N) once the door leaves are set in motion, to meet accessibility standards such as A117.1, *Accessible and Usable Buildings and Facilities*, or the *Americans with Disabilities Act Accessibility Guidelines (ADAAG)*. In some cases, a door closer with a reduced opening force might not be able to completely close a fully gasketed smoke door reliably, due to the additional pressure applied to the door when the face of the door contacts the perimeter.
gasketing during closing. Additionally, when positive-latching hardware is required, the door closer needs to overcome the friction of the latching hardware at the end of the closing cycle to completely close the door and cause it to latch.

Fire-rated doors are exempt from the 5 lbf (22 N) reduced opening force due to the recognized need for fire doors to reliably close and latch every time. Similarly, smoke doors without fire protection rating should be exempt from the reduced opening force requirement since their ability to resist the passage smoke is compromised when the doors fail to close. The AHJ should be consulted for guidance when smoke doors without fire protection rating are not able to close reliably because they are equipped with reduced opening force door closers.

A.7.3.6

Builders hardware products... << need to write this content >>

A.7.3.6.4

In general, NFPA 80's requirements for locks and latches are commensurate with industry practices for the installation of positive-latching hardware in smoke doors without fire protection rating and should be applied uniformly, where applicable, to smoke door assemblies.

Latching hardware devices include, but are not limited, to the following:

(1) Bored, mortise, and interconnected locks and latches

(2) Panic hardware

(3) Fire exit hardware

(4) Automatic flush bolts

A.7.3.6.4.2

Roller latches are designed to hold the door leaves closed by friction between the spring-loaded roller and the surface of the strike plate; they do not provide positive latching. In new health care occupancy groups, roller latches are permitted to be used only in acute psychiatric settings where patient special clinical needs require specialized protective measures for their safety. Roller latches are also permitted to be used in existing health care occupancies, provided their
use is permitted by the AHJ and the building is protected throughout by an approved automatic sprinkler system. In both cases, roller latches are required to be capable of holding the door leaves closed when a force of 5 lbf (22 N) is applied to the latch edge of the door.

Roller latches are not permitted to be used on doors that have fire protection ratings.

A.7.3.6.6.2

In some occupancy groups, door-closing devices are not required to be installed on smoke door assemblies without fire protection ratings. In the absence of a means of holding doors open, occupants might block door open with chocks, furniture, tie-downs, drop-down/plunger-type devices or other means. Examples of permitted door holder devices include friction catches (e.g., wall mounted, floor mounted, or overhead mounted) and magnetic catches.

Door holder/release devices for swinging doors should, wherever possible, be installed at the top of the door as close as possible to the lock edge and should be located to avoid interference with any other hardware. If necessary, the holder/release device can be located at the bottom of the door as close as possible to the lock edge, with the device installed on the wall or floor.

A.7.3.6.7

Armor, kick, mop, stretcher, and edge guards are types of protection plates. Protection plates should not be permitted to be used to conceal damage that compromises the structural integrity of the doors (i.e., split or delaminating vertical edges) or to conceal cutouts resulting from the removal of hardware items.

A.7.3.6.8

In most cases, the means of fastening for builders hardware products installed on non-fire-rated door assemblies is the same as the means of fastening for builders hardware products installed on fire-rated door assemblies. Installation practices such as drilling pilot holes or tapping holes in steel doors and frames are the same for fire-rated and non-fire-rated doors.

Some fasteners for builders hardware products have specially designed or undercut heads that are necessary to allow the fasteners to seat properly when installed. Use of fasteners from
sources other than the respective hardware manufacturers should not be permitted to be used, since their use might affect door operation and might void the warranties of the affected hardware items.

A.7.7

Gasketing for smoke door assemblies is available in a wide variety of sizes, shapes, materials, colors, and configurations. Some gasketing products are designed to be installed between the rabbet and door stops of the door frames and the doors with adhesive. Other gasketing products include aluminum or stainless steel channels of various profiles that are surface-mounted to the soffit of the door frame by means of mechanical fasteners such as sheet metal screws or self-drilling/self-tapping screws. Gasketing materials in soffit-mounted products include materials such as silicone and neoprene bulbs and sponges and nylon brushes.

A.7.7.1.1

Regardless of the design of gasketing applied to smoke door assemblies, the gasketing is of little value if it is not installed properly. The gasketing material should form an unbroken seal along the full height of the side jambs and across the head jambs and the full height of meeting edges of pairs of doors. Gasketing materials should not be permitted to be cut or notched to fit around other soffit-mounted hardware items such as door closer brackets (e.g., parallel arm brackets) or strikers for panic hardware and fire exit hardware devices. Similarly, astragals applied to the face of doors should not be permitted to be cut out or notched around protruding strike plate lips. Gasketing products should be installed in accordance with the gasketing manufacturer's installation instructions.

When properly installed, gasketing should contact the surface of the door, whether the gasketing is applied to the rabbets and stops or to the soffit area of the frame. A bright concentrated beam of light can be used to verify that the gasketing material blocks the light from passing through to the ungasketed side of the door, which should be indicative of the gasketing's ability to block the passage of smoke and gases.
A.7.7.1.2

Voids created in the door leaves such as mortising the top rail of doors for overhead stops or concealed overhead door closers require soffit-mounted gasketing to seal the top edge of the door.

A.7.7.2

Complete sealing of doors is not always desirable. A disadvantage of complete sealing is the difficulty of opening or closing doors because of the pressure differential. Some smoke management designs call for some areas to be pressurized. A small pressure acting across the full area of the door can exert sufficient force to make opening the door difficult. A seal must be first broken to equalize the pressure on both sides of the door before the door can be opened easily.
A.1.3
While the use of smoke door assemblies will be helpful in reducing the flow of airborne gases, it is not assumed that using this standard obviates the concern over toxic combustion products.

NFPA 101, Life Safety Code, and building codes include specific requirements for smoke door assemblies and should be consulted in every instance. NFPA 80, Standard for Fire Doors and Other Opening Protectives, should be followed when fire door assemblies are used as smoke door assemblies.

Consideration should be given to the leakage characteristics of adjacent wall, ceiling, and floor assemblies. It is generally considered to be of marginal benefit to install smoke door assemblies in locations where adjacent walls, ceilings, or floors do not effectively resist the passage of smoke. (For additional information, see ASHRAE/SEPE, Principles of Smoke Management, ASHRAE/ICC/SFPE/NFPA Handbook of Smoke Control Engineering.)

When protecting against smoke migration into spaces of large volume, a reasonably tight-fitting door can be considered adequate because of the relatively long time it would take for such a space to become untenable due to smoke. Conversely, the average 8 ft (2.4 m) high by 4 ft to 6 ft (1.2 m to 1.8 m) wide corridor can become untenable in less than 2 minutes, as shown in a test conducted in California and documented in Operation School Burning, where the fire room door was open.

Tests indicate that listed gaskets, if properly installed and maintained in accordance with manufacturer's instructions, do a good job of reducing the smoke infiltration to a sufficient level to provide protection against smoke infiltration through the door assembly. In a fire condition, there would normally be a room of fire origin, and temperatures would be high in this area. Immediately outside the room of origin there might be warm smoke.
A.4.3.4

Pressure differentials of at least 0.04 in. of water (10 Pa) are developed in the upper parts of rooms that are involved in fire. Considerably higher pressure differentials can exist in rooms, corridors, and stair enclosures due to the action of air-handling systems, stack effect, and wind.

In sprinklered buildings where the fire will be controlled, it is anticipated that the maximum pressure differential generated should not exceed 0.05 in. of water (12.5 Pa). See pressure differences discussed in NFPA 92, Standard for Smoke Control Systems, and Principles of Smoke Management, and ASHRAE/ICC/SFPE/NFPA Handbook of Smoke Control Engineering.

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Committee Statement

Committee Statement: Reference update.
Response Message:
Annex B  Performance-Based Option for the Inspection, Testing, and Maintenance of Smoke Door Assemblies

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1
This annex provides the option to adopt a performance-based method as an alternative means of compliance with Section 5.2. Equivalent levels of performance can be demonstrated through quantitative performance-based analyses. This annex provides a basis for implementing a performance-based program acceptable under this option, provided that approval is obtained from the AHJ.

B.2
The concept of a performance-based program is to establish the type and frequency of inspection to demonstrate that the assembly is operational. The goal is to balance the inspection frequency with the proven reliability of the assembly. The goal of a performance-based inspection program is also to adjust test and inspection frequencies commensurate with documented historical equipment performance and desired reliability. Frequencies of tests and inspections under a performance-based program can be extended or reduced from the once-per-year test requirement in 5.2.5 when continued testing of door assemblies in 5.2.4, 5.2.4.4, or 5.2.4.5, as applicable, has been documented indicating a higher or lower degree of reliability compared with the AHJ's and the owner's expectations of performance. Additional program attributes that should be considered in the adjustment of test and inspection frequencies include the following:

1. Door maintenance programs
2. Door usage frequencies
3. History of door repairs
4. Building condition
5. Consequence of failure

B.3
Fundamental to implementing a performance-based program is that adjusted test and inspection frequencies should be technically defensible to the AHJ and supported by evidence of higher or lower reliability. Data collection and retention should be established so that the data utilized to alter frequencies are representative, statistically valid, and evaluated against firm criteria. Frequencies cannot be arbitrarily extended or reduced without suitable rationale.

B.4
It must be noted that transitioning to a performance-based program requires an expenditure of resources in order to collect and analyze failure data, coordinate review efforts, change program documents, and seek approval from the AHJ. The following factors should be considered in determining whether a transition to a performance-based test program as permitted in Section 5.3 is warranted:

1. Past door reliability. Have problems routinely been identified during the prescriptive test requirements of Section 5.2, or have doors consistently performed with minimal discrepancies noted?
2. Resource expenditures. Do the recurring resource expenditures necessary to implement the prescriptive test requirements in Section 5.2 justify the consideration of conducting the detailed analyses needed to support a performance-based testing program?
3. Administrative burden. Is there an increase to the administrative burden for implementing, documenting, and monitoring a performance-based program?
A performance-based program requires that a maximum allowable failure rate be established and approved by the AHJ in advance of implementation. The use of historic documented smoke door inspection records can be utilized to determine failure rates. One method of calculating the failure rate of smoke door assemblies is based on the following equation:

\[
SDFR(t) = \frac{\text{NF}}{\text{NC} \times t}
\]  

where:
- \( SDFR(t) \) = smoke door failure rate (failures per year)
- \( NF \) = number of failures
- \( NC \) = total number of smoke door assemblies inspected or tested
- \( t \) = time interval of review (years)

Example.
Data are collected for 50 smoke doors over a 5-year period. The testing is conducted annually as described in 5.2.5. A review of the data identifies five failures: total components, 50; data collection period, 5 years; total failures, 5.

\[
SDFR = \frac{5}{50 \times 5} = 0.020 \text{ per year}
\]

A fundamental requirement of a performance-based program is the continual monitoring of the door component failure rates and determining if they exceed the maximum allowable failure rates as agreed on with the AHJ. The process used to complete this review should be documented and repeatable.

Coupled with the ongoing review is a requirement for a formalized method of increasing or decreasing the frequency of testing and inspection when the door assemblies exhibit either a higher than expected failure rate or an increase in reliability as a result of a decrease in failures.

A formal process for reviewing the failure rates and increasing or decreasing the frequency of testing should be well documented. The frequency required for future tests can be reduced to the next inspection frequency and maintained there for a period equaling the initial data review or until the ongoing review indicates that the failure rate is no longer being exceeded.

Increases and decreases in inspection frequency should be initiated on a step approach such that increments do not exceed 50 percent of the required frequency in 5.2.4, that is, 6 months for any given period under consideration. An example would be going from annual to semi-annual testing when the failure rate exceeds the AHJ's expectations or from annual testing to testing every 18 months when the failure trend indicates an increase in reliability. The maximum time period between inspections regardless of performance should not exceed 36 months. Changes in occupancy, facility management, or ownership that could result in changes in performance should be reassessed by the AHJ to determine if continued acceptability of a performance-based inspection program is warranted.

Supplemental Information

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Committee Statement

Committee Statement: Performance based inspection and testing options for smoke door assemblies are being added to proposed new Chapter 5. This Annex is found in NFPA 80 and should be located in 105 as well to assist with the application of performance based options.

Response Message:
Annex B  Performance-Based Option for the Inspection, Testing, and Maintenance of Smoke
Door Assemblies

This annex is not a part of the requirements of this NFPA document but is included for
informational purposes only.

B.1

This annex provides the option to adopt a performance-based method as an alternative means
of compliance with Section 5.2. Equivalent levels of performance can be demonstrated through
quantitative performance-based analyses. This annex provides a basis for implementing a
performance-based program acceptable under this option, provided that approval is obtained
from the AHJ.

B.2

The concept of a performance-based program is to establish the type and frequency of
inspection to demonstrate that the assembly is operational. The goal is to balance the
inspection frequency with the proven reliability of the assembly. The goal of a performance-
based inspection program is also to adjust test and inspection frequencies commensurate with
documented historical equipment performance and desired reliability. Frequencies of tests and
inspections under a performance-based program can be extended or reduced from the once-
per-year test requirement in 5.2.5 when continued testing of door assemblies in 5.2.4, 5.2.4.4,
or 5.2.4.5, as applicable, has been documented indicating a higher or lower degree of reliability
compared with the AHJ's and the owner's expectations of performance. Additional program
attributes that should be considered in the adjustment of test and inspection frequencies include the following:

(1) Door maintenance programs
(2) Door usage frequencies
(3) History of door repairs
(4) Building condition
(5) Consequence of failure

B.3

Fundamental to implementing a performance-based program is that adjusted test and inspection frequencies should be technically defensible to the AHJ and supported by evidence of higher or lower reliability. Data collection and retention should be established so that the data utilized to alter frequencies are representative, statistically valid, and evaluated against firm criteria. Frequencies cannot be arbitrarily extended or reduced without suitable rationale.

B.4

It must be noted that transitioning to a performance-based program requires an expenditure of resources in order to collect and analyze failure data, coordinate review efforts, change program documents, and seek approval from the AHJ. The following factors should be considered in determining whether a transition to a performance-based test program as permitted in Section 5.3 is warranted:
(1) *Past door reliability.* Have problems routinely been identified during the prescriptive test requirements of Section 5.2, or have doors consistently performed with minimal discrepancies noted?

(2) *Resource expenditures.* Do the recurring resource expenditures necessary to implement the prescriptive test requirements in Section 5.2 justify the consideration of conducting the detailed analyses needed to support a performance-based testing program?

(3) *Administrative burden.* Is there an increase to the administrative burden for implementing, documenting, and monitoring a performance-based program?

**B.5**

A performance-based program requires that a maximum allowable failure rate be established and approved by the AHJ in advance of implementation. The use of historic documented smoke door inspection records can be utilized to determine failure rates. One method of calculating the failure rate of smoke door assemblies is based on the following equation:

\[
SDFR(t) = \frac{NF}{NC \cdot t}
\]

where:

\(SDFR(t) = \text{smoke door failure rate (failures per year)}\)

\(NF = \text{number of failures}\)
\( NC = \) total number of smoke door assemblies inspected or tested

\( t = \) time interval of review (years)

**B.6 Example.**

Data are collected for 50 smoke doors over a 5-year period. The testing is conducted annually as described in 5.2.5. A review of the data identifies five failures: total components, 50; data collection period, 5 years; total failures, 5.

\[
FDFR = \frac{5}{50 \times 5} = 0.020 \text{ per year}
\]

**B.7**

A fundamental requirement of a performance-based program is the continual monitoring of the door component failure rates and determining if they exceed the maximum allowable failure rates as agreed on with the AHJ. The process used to complete this review should be documented and repeatable.

**B.8**

Coupled with the ongoing review is a requirement for a formalized method of increasing or decreasing the frequency of testing and inspection when the door assemblies exhibit either a higher than expected failure rate or an increase in reliability as a result of a decrease in failures.

**B.9**

A formal process for reviewing the failure rates and increasing or decreasing the frequency of testing should be well documented. The frequency required for future tests can be reduced to
the next inspection frequency and maintained there for a period equaling the initial data review or until the ongoing review indicates that the failure rate is no longer being exceeded.

B.10

Increases and decreases in inspection frequency should be initiated on a step approach such that increments do not exceed 50 percent of the required frequency in 5.2.4, that is, 6 months for any given period under consideration. An example would be going from annual to semi-annual testing when the failure rate exceeds the AHJ's expectations or from annual testing to testing every 18 months when the failure trend indicates an increase in reliability. The maximum time period between inspections regardless of performance should not exceed 36 months. Changes in occupancy, facility management, or ownership that could result in changes in performance should be reassessed by the AHJ to determine if continued acceptability of a performance-based inspection program is warranted.
First Revision No. 3-NFPA 105-2013 [ Section No. B.1.2.1 ]

C.1.2.2 ASHRAE Publications.
ASHRAE, Inc., 1791 Tullie Circle, N.E., Atlanta, GA 30329-2305.


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Committee Statement

Committee Statement: Reference update.
Response Message:
C.3 References for Extracts in Informational Sections.

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