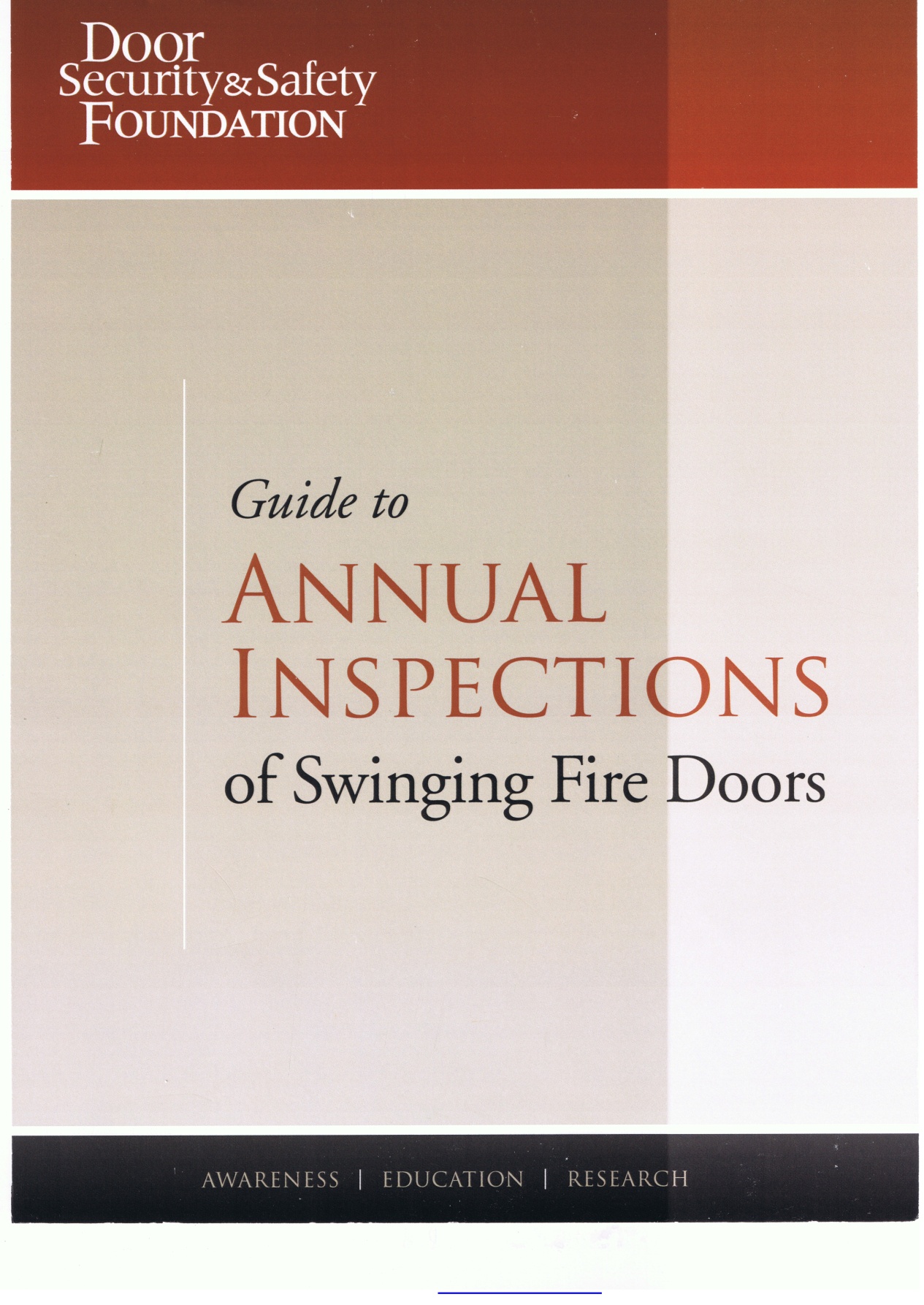
**Guide to Annual Inspections of Swinging**

**Fire Doors with Builders Hardware**

**Published by   
The Door Security and Safety Foundation**

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**Foreword**

Providing life safety and security for occupants in today's buildings is the overarching purpose that drives the development of our ever-evolving building, fire, and life safety codes and standards. The National Fire Protection Association's (NFPA) publication NFPA 80, *Standard for Fire Doors and Other Opening Protectives,* is among the most important standards referenced by all of the model building, fire, and life safety codes. NFPA 80 has been the *de facto* standard for fire doors and fire windows since the late 1950s and likely will continue to be so for many years to come.

Prior to the 2007 edition, NFPA 80's title was the *Standard for Fire Doors and Fire Windows;* it established the requirements for the installation and maintenance of fire door and fire window assemblies. Additionally, NFPA 80 required fire doors and fire windows to be maintained in operating condition throughout the life of their installations. However, the language in these earlier editions of NFPA 80 was vague and ambiguous, which made it difficult for AHJs and building owners to understand, apply, and follow.

One of the most important changes that appeared in the 2007 edition of NFPA 80 was the requirement for formal safety inspections of fire door assemblies, which mandates that safety inspections be performed on an annual basis. Both the 2010 and 2013 editions of NFPA 80 contain additional requirements for safety inspections of fire door and fire window assemblies.

Another important code that requires safety inspections of swinging door assemblies is NFPA 101, *Life Safety CodeTM.* The 2009 edition of NFPA 101 was the first edition to include provisions and requirements for door assembly inspections—for both fire-rated and non-fire-rated egress door assemblies. And, as with NFPA 80's continued development, NFPA 101's door assembly inspection requirements have continued to evolve with the 2012 edition.

Inspecting, testing, and maintenance of swinging fire doors with builders hardware require an immense level of knowledge and expertise. The information contained in this publication is intended to provide guidance to code enforcement officers, and other Authorities Having Jurisdiction (and other AHJs), building owners, and property management personnel to aid them in maintaining swinging egress and fire door assemblies in accordance with the requirements of NFPA 80 and NFPA 101.

**Section 1: Introduction Why Life Safety Is Important**

Whether your job title is building inspector, code enforcement officer, fire marshal, or some variant of those, you represent the Authority Having Jurisdiction (AHJ). In any jurisdiction, the AHJ's office is responsible for determining which materials, products, installations, and construction techniques are acceptable for the buildings in that area. AHJs bear the responsibility for ensuring that the buildings and structures in their jurisdiction are built and maintained in accordance with the building, fire, and life safety codes that they have adopted.

Building owners and property managers are responsible for adequately maintaining their buildings and facilities in accordance with applicable fire, life safety, and accessibility codes on a daily basis. One of the most common requirements with which building owners and property managers need to comply is the requirement to ensure that the means of egress within their buildings and facilities are maintained and free of obstructions. Swinging fire and egress door assemblies are major components of the means of egress that need to function reliably throughout the life of their installation.

Both AHJs and building owners are acutely aware of the need to protect occupants from devastating and tragic incidents such as fires and other panic-inducing emergencies that require people to hurriedly evacuate a building, space, or structure. Building elements such as an accessible means of egress and areas of refuge within buildings, spaces, and structures need to be continuously protected with fire-resistant construction, which requires ongoing maintenance and periodic inspections throughout the life of the buildings, spaces, or structures. Building, fire, and life safety codes contain stringent requirements for the construction and maintenance of these all-important elements.

Perhaps the paramount concern in our society today is that for the safety of friends, family, and self. Our children's protection in school is likely the number-one concern of all—protection not just from criminal and violent acts, but also from catastrophic incidents such as fires, floods, and other natural disasters. As individuals, we are all part of the general public, and in a very real sense, our personal safety depends on countless others. We might never meet those who perform the jobs and provide the services that contribute to our collective safety, but their importance to our daily lives is priceless nonetheless.

The people who serve as firefighters, paramedics, doctors, nurses, and police officers are the most obvious people who help to protect us. Not so obvious are the people who work in construction-related fields, many of whom have contributed their knowledge and expertise toward creating the building, fire, and life safety codes that govern the design, construction, and maintenance of the buildings we inhabit.

Regrettably, significant changes in our codes most times occur after tragic incidents claim the lives of people who were merely going about their normal routines. We learn from each incident, and we improve our buildings to prevent their reoccurrence. New materials, products, and construction techniques are invented to enhance our safety as a result of these lessons.

This guide is designed to help you understand your role in maintaining critical fire and life safety features within the building(s) you inspect, own, or are responsible for maintaining, specifically, swinging fire and egress door assemblies. Fire door assemblies are installed at strategic locations within a building, forming compartments designed to contain fire and restrict the passage of deadly smoke and gases.

In a perfect world, fire door assemblies contain fires and provide time for sprinkler systems to

extinguish the flames. Sprinkler systems remain idle, waiting for that moment in time when they are called on to perform their function. Most times the sprinkler systems work well. However, sometimes they fail or are insufficient and cannot contain the flames or prevent the spread of smoke and gases; their success depends heavily on the containment of flames that is provided by fire-resistant construction in ceilings, floors, partitions, walls, and of course, the fire door assemblies and other opening protectives that are installed within them.

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Unfortunately, the world is far from perfect. Door leaves are one of the few moving elements of a building that we routinely touch; they are susceptible to wear and tear over time and require ongoing maintenance to keep them working properly. When door leaves are working properly, we might never be consciously aware of them. On the other hand, we become aware of them when they are difficult to open or close and as they become an obstacle we need to overcome.

In addition to the fire protection properties of door assemblies, swinging door assemblies must provide occupants with access to a clear, unobstructed path of egress through the building, s2pace, or structure to the public way (the street or other safe area outside the building) in panic-inducing situations. At the same time, the door assemblies are expected to provide a level of physical security from unauthorized entry, theft, and other acts. Occupants need to be able to evacuate a building, space, or structure safely and quickly at a moment's notice, which is why the NFPA 101 door assembly inspection requirements are necessary.

Door assemblies that are equipped with special locking arrangements (these arrangements are explained later), electrically controlled egress doors, and door leaves that are equipped with panic hardware or fire exit hardware devices are used in applications that might have serious consequences if they fail to provide a safe path of egress during emergency conditions.

For example, imagine what might happen in a building where the swinging fire door assemblies in the stair towers are properly installed, inspected, and maintained in accordance with NFPA 80's requirements, but the exterior swinging door (non-fire-rated) at the level of discharge is not properly maintained or inspected. In an emergency situation, the exterior door might not allow the occupants to leave the stair tower, causing more panic and leading to potentially fatal consequences. When NFPA 101's inspection requirements for door assemblies are implemented and enforced, they most likely will prevent that situation from occurring.

Readers of this guide will begin to understand the necessity of properly maintaining fire-rated and egress door assemblies. Naturally, regular inspections need to take place to ensure that these critical elements are ready to perform their potentially lifesaving task when the time comes. When preparing for these safety inspections, please keep in mind that there is an entire industry of knowledgeable and capable people who stand ready to perform the inspections.

**Using This Guide**

You will find it helpful to have a copy of the 2013 edition of NFPA 80, *Standard for Fire Doors and Other 0\_peningProtectives,* and the 2012 edition of NFPA 101, *Life Safety Code,* close at hand to refer to as you progress through this guide. Where appropriate, excerpted language from NFPA 80 and NFPA 101 is included for emphasis and is explained. However, these excerpts should not be construed to contain all of NFPA's requirements; this guide is designed to explain a technical subject to a non-technical audience—specifically those individuals charged with overseeing or performing routine maintenance on fire door assemblies. You can obtain a copy of NFPA 80 and NFPA 101 directly from NFPA at [www.nfpa.org](http://www.nfpa.org) or any number of other publication resellers.

It is not possible to list all of the potential door leaf, door frame, and builders hardware applications that are used on swinging fire and egress door assemblies. Consequently, the examples

cited in this guide are focused on the most commonly observed problems and situations. In many cases, it might be necessary to rely on the expertise and skills of experienced industry professionals to perform the safety inspections and the subsequent maintenance of fire door assemblies.

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**Section 2: General Information Function of Fire Door Assemblies**

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Fire door assemblies are primarily designed to provide time for occupants to safely escape a burning building or to create an area of refuge within the building where the occupants can wait safely for help to arrive. Secondarily, they are designed to protect the structural integrity of the building long enough to give firefighters time to extinguish the flames.

Few people fully comprehend the tremendous forces and stresses that fire door assemblies are subjected to under fire conditions until they witness the effect fire has on those door assemblies.   
Perhaps the most common misconception regarding fire door assemblies is that they will maintain their appearance, albeit a bit scorched and covered with soot, and be fully functional after being exposed to a fire. Nothing could be further from the truth.

During the first few minutes of fire exposure, a metal fire door leaf expands very rapidly on the fire-side of the assembly. This expansion causes the door leaf to deform as it deflects, twists, and warps toward the heat of the fire. When the fire is on the pull-side of the assembly, enormous stress is exerted on the hinges and the latching hardware; the door leaf must stay closed and latched.

As the intensity of the fire increases, the door leaf deflects farther, exerting more stress on the hinges and latching hardware. Fluid in the hydraulic door closer will eventually reach its boiling point and begin to leak. At this stage, the door closer has performed its intended task, and the door leaf is closed. Likewise, door knobs, levers, and fire exit hardware devices are designed to become inoperable when the temperature reaches a certain point, ensuring they do not inadvertently release the latching hardware and cause the assembly to fail.

Latching hardware and hinges are designed to bear an enormous amount of stress during a fire, but they also need to be able to handle additional stresses when the superheated assembly is exposed to the water temperature and pressure from fire hoses as firefighters extinguish the flames. Cold water causes metals to contract almost as rapidly as they expanded, exerting more force and stress on the hinges and latching hardware.

No matter what else happens to the assembly, the latching hardware and hinges must keep the door leaf closed and latched in place.

In the aftermath of a fire, the assembly barely retains any of its original characteristics. The door leaf has become a fixed part of the assembly. Its paint, or veneer in the case of wood fire doors, has been consumed. Its builders hardware has melted, warped, or otherwise has been destroyed by the fire. All that is left is a shell, warped and misshapen, serving as a testament to the ingenuity, engineering, and manufacturing processes that produce products able to withstand fire and provide protection for human lives.

Consider the consequences of failing to properly maintain fire door assemblies. A seemingly minor defect could potentially result in serious injuries and the deaths of occupants if a fire were to occur. Neglecting to take corrective actions when problems are discovered is unacceptable and is sufficient cause for the Authority Having Jurisdiction (AHJ) to issue citations and fines for allowing those conditions to continue unabated.

**Understanding How Codes and Standards Affect Buildings**

Building, fire, and life safety codes are documents designed to ensure that buildings are constructed and properly maintained to protect the lives and property of occupants within all types of residential, commercial, industrial, institutional, and recreational buildings and facilities. These documents are created by organizations focused on ensuring that **today's buildings are built to an**

acceptable minimum level of standard and quality. This includes developing stringent requirements for certain elements within buildings, such as an accessible means of egress; protection from fire, smoke, and gases; and security from intrusion and violent crimes. Building, fire, and life safety codes become legally enforceable only after a jurisdiction has adopted them, many times with specific addendums relevant to the adopting region.

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In the United States, there are two major model building codes that are in effect in regions throughout the country. They are the *International Building Code* (IBC), published by the International Code Council (ICC), and NFPA 5000, *Building Construction and Safety Code* (BCSC), published by the National Fire Protection Association (NFPA). Of the two nationally recognized building codes, the IBC has become the predominant building code and has been adopted (in one version or another) in every state.

Prior to the creation of the IBC and NFPA 5000 building codes, other building codes were used throughout the country. In the northeast region of the country, the *National Building Code* (NBC), published by Building Officials and Code Administrators (BOCA), was the primary building code. In southern region of the country, the *Standard Building Code* (SBC), published by Southern Building Code Congress International (SBCCI), was the primary building code. And the building code that was primarily used in the western regions of the country was the *Uniform Building Code* (UBC), published by the International Conference of Building Officials (ICBO).

In the late 1990s, BOCA, ICBO, and SBCCI merged to form the ICC and ceased publication of their respective building codes in favor of creating a new model building code to be used uniformly throughout the country: the *International Building Code* (IBC). Concurrent with the development of the IBC, NFPA developed the *Building Construction and Safety Code* (NFPA 5000) as an alternative code that would similarly be used throughout the country. While publication of the legacy codes (e.g., NBC, SBC, and UBC) has ceased, they will remain in effect in certain areas until their respective jurisdictions adopt the IBC (and/or the *International Fire Code)* or NFPA 5000 as their next building and fire codes.

In addition to the above-mentioned building codes, which are designed to govern new construction, there are two other codes that are used to ensure that occupied structures are satisfactorily maintained. The first is published by the ICC and is titled the *International Fire Code* (IFC); the second is published by NFPA and is titled NFPA 1, *Fire CodeTM* (FC). A supplementary code that has limited application as a building and fire code is NFPA 101, *Life S afe0 CodeTM* (LSC).

Unlike codes, standards are documents that are designed to establish an acceptable minimum level of quality to ensure that products (as in the case of fire and smoke door assemblies) meet the requirements of the applicable building, fire, or life safety codes. Standards are not viewed as legally enforceable documents until they are incorporated into a building, fire, or life safety code by

reference, extraction, or excerpted language. For many years, NFPA 80, the standard that establishes requirements for fire door assemblies and their installation, has been referenced by all of the previously mentioned model codes and is recognized as the *de facto* standard for fire door assemblies.

**NFPA 80 and Its Effect on Buildings**

NFPA 80, *Standard for Fire Doors and Other Opening Protectives,* contains specific requirements for the formal inspection of fire door assemblies to ensure that they are properly maintained throughout the life of their installation and will function properly under fire conditions. Under the provisions of NFPA 80, fire door assemblies are required to be inspected on an annual cycle, and written documentation of these safety inspections is required to be kept on site for review by the AHJ.

Previous editions of NFPA 80, up to and including the 1999 edition, contained requirements for the ongoing maintenance and care of fire door assemblies, but the language in these earlier editions did not contain specific direction as to what items were required to be inspected or the frequency of inspections. Nor was there a requirement to maintain records of these inspections. Consequently, many fire door assemblies have fallen into varying states of disrepair and are not able to provide their intended protection.

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As of the writing of this guide, there are three editions of NFPA 80 that require formal safety inspections of fire door assemblies: 2007, 2010, and 2013. The latter editions contain additional inspection requirements that do not appear in the preceding editions. Understanding which edition of NFPA 80 is applicable for a specific building, space, or structure requires knowing the prevailing building, fire, or life safety code for the building.

The 2016 edition of NFPA 80 is scheduled to be published by the end of 2015, but its requirements will not be enforceable until it is referenced by a future building, fire, or life safety code. Even so, knowing that NFPA 80's requirements for safety inspections continue to evolve, it is wise to stay abreast of its changes, as they will become enforceable at some point in time.

**NFPA 80 Types of Fire Door Assemblies**

NFPA 80 includes specific requirements for the following types of fire door assemblies:

* Swinging Doors with Builders Hardware
* Swinging Doors with Fire Door Hardware
* Horizontally Sliding Fire Doors
* Special-Purpose Horizontally Sliding Accordion or Folding Doors
* Vertically Sliding Fire Doors
* Rolling Steel Fire Doors
* Fire Shutters
* Service Counter Fire Doors
* Hoistway Doors for Elevators and Dumbwaiters
* Chute Doors
* Access Doors

It is important to understand that NFPA 80 requires all of these types of fire door assemblies to be inspected, tested, and maintained throughout the life of their installation. As previously stated, this guide concentrates on swinging fire doors with builders hardware. You will need to seek guidance for inspecting and maintaining the other types of fire door assemblies from their

respective industries.

**Swinging Doors with Builders Hardware**

Of the types of fire door assemblies covered in NFPA 80, swinging doors with builders hardware (the door assemblies covered in Chapter 6 of NFPA 80) are the most common; these types of fire door assemblies are used to protect the means of egress within a building (e.g., corridors, stair towers, etc.), as well as to separate rooms containing hazardous materials and equipment (e.g., boiler, electrical, mechanical, and storage rooms) to protect occupants and property. In addition to providing fire protection, swinging door assemblies installed in corridors and stair towers often provide accessibility, life safety, and security functions, which increase the complexity of these door assemblies.

Typically, swinging doors with builders hardware are comprised of components produced from

more than one manufacturer. For example, the steel door frame might come from one manufacturer, and the wood fire door might come from another manufacturer. Additionally, many of the individual builders hardware components (e.g., hinges, locks, door closers, etc.) are usually produced by a variety of manufacturers. Key to understanding swinging doors with builders hardware is knowing that all of the products used on these fire door assemblies are required to be labeled for use on fire door assemblies. Many builders hardware products used on fire door assemblies are referred to as being *listed* rather than as being *labeled.* However, as is the case with fire exit hardware, some builders hardware products are both *listed* and *labeled* for use on fire doors.

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Unlike swinging fire doors with builders hardware, all of the other types of fire door assemblies covered in NFPA 80 are labeled, furnished, and installed as complete units rather than as individual components. In other words, there is only one label on the entire door assembly, whereas each component that is installed on a swinging door with a builders hardware assembly is required to have its own label or be listed for use on fire door assemblies.

Due to the myriad components that are permitted to be used on swinging fire door assemblies, properly maintaining these assemblies requires special attention, especially when there are limitations and restrictions to the types of modifications that can be made to them after installation. Many swinging fire door assemblies have unintentionally been ruined by field modifications that have compromised their fire-protection properties and that thereby void the labeling requirements of the openings.

NFPA 80 defines these assemblies as such: *"Swinging fire doors shall be permitted to be furnished separately from labeled door frames and builders hardware if the complete fire door assembly, including the door, frame, and builders hardware, comprises a labeled fire door assembly"* (NFPA 80, 4.3.2). And paragraph 4.2.5.2 states, *"Except where restricted by individual published listings, a fire door assembly shall be permitted to consist of the labeled, listed, or classified components of different organkations that are acceptable to the AHJ."*

The latter statement acknowledges that products listed and/or labeled by different testing organizations and laboratories are commonly used as components of a fire door assembly (except when specifically restricted by the respective testing organization). In the case of swinging doors with builders hardware, there are three national testing organizations that list and/or label doors, frames, and hardware products for use on fire door assemblies. They are Underwriters Laboratories (UL); Intertek, which provides testing under its Warnock Hersey Mark (WHM); and Factory Mutual (FM). The labels attached to fire door assemblies identify which organization the respective manufacturers submitted their products to for testing and labeling.

**Building Owners' Responsibilities under NFPA 80**

Chapter 5 of NFPA 80, titled "Care and Maintenance," establishes the requirements for the

safety inspections of fire door assemblies. In addition to the safety inspection requirements, Chapter 5 includes instructions and requirements for the removal, replacement, and repair of fire door assemblies.

Paragraph 5.5.1 states, *"Repairs shall be made, and defects that could interfere with operation shall be corrected without delay."* The intent of this statement is to require maintenance personnel to immediately take steps to remedy broken or malfunctioning fire door assemblies when they are discovered. For example, bent, broken, or missing closer arms prevent door closers from being able to close the door leaves, rendering the assemblies useless for their intended purpose. Likewise, a broken or missing latch bolt requires immediate corrective action since swinging fire door assemblies are required to latch positively when they close at the time of fire.

Other defects and problems require corrective action, but if they do not interfere with the

operation of the opening (e.g., dented metal doors), immediate action is not required. In some cases, lead times for ordering and installing replacement items (e.g., locks, fire exit hardware, door closers, etc.) might take four weeks or more; failure to begin the replacement process further exacerbates the problems.

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In addition to being responsible for ongoing maintenance of fire door assemblies, building owners and property management personnel are responsible for making sure that formal safety inspections take place on an annual basis. Section 5.2 of NFPA 80, titled "Inspection and Testing," lists requirements for periodic inspection and operational testing of fire door assemblies, as well as the documentation necessary for safety inspection records. Further explanation of this requirement is included in paragraph A.5.2 of annex A, which states, *"Doors, shutters, and windows are of no value unless they are properly maintained and closed or are able to close at the time of fire. A periodic inspection and maintenance program is generally the responsibility of the building owner."*

Section 5.2.3, "Acceptance Testing," establishes the minimum inspection requirements for fire door assemblies. Paragraph 5.2.3.1 states, *'Acceptance testing of fire door and window assemblies shall be performed by a qualified person with knowledge and understanding of the operating components of the op of assembly being subject to testing. "Key* to understanding this requirement is that the persons performing the operational testing are required to meet the standard for a *qualified person* as defined by NFPA.

NFPA defines a qualified person as 'A *person who, by possession of a recogn4d degree, certificate, professional standing, or skill, and who, by knowledge, training, and experience, has demonstrated the abilio to deal with the subject matter, the work, or the project."*

Each type of fire door assembly has its particular means of operation and requirements. Rolling steel fire doors, for example, require a functional test that is referred to as a drop test. During the drop test, the curtain is required to close within a certain range of speed, not less than 6 inches per second or not faster than 24 inches per second. A second drop test is required to confirm that the automatic-closing device was properly reset after the first drop test. Once the operational testing is completed, rolling steel fire doors are required be properly reset to their ready position.

Similarly, swinging fire doors are required to: (1) swing freely, (2) be self-closing, automatic-closing, or power-operated, and (3) be positively latch in the closed position. While these requirements might seem simple and easily ascertained, it requires a trained eye to identify products that are not listed for use on fire doors and that therefore violate the labeling requirements of the door assembly. For instance, NFPA 80 requires that conventional hinges used on swinging fire doors have a steel base material or be stainless steel. It is difficult to visually distinguish brass-plated steel hinges from solid brass hinges, since they are aesthetically identical. Solid brass hinges or plated hinges with a brass or bronze base metal are not permitted on fire door assemblies due to their lower melting temperatures.

To further complicate matters, there are builders hardware products that have very specific and limited applications on swinging fire doors. Depending on the door leaf material or construction (and sometimes on the door frame material) or the level of fire-protection rating (e.g., 1/3-hour versus 3-hour fire ratings), a product might be permitted on one application and prohibited on another.

Building owners and property management personnel are responsible for ensuring that the persons inspecting their fire door assemblies have the requisite knowledge and training to properly perform the evaluations. Depending on the quantity and complexity of the swinging fire doors in your building(s), you might need to seek specific training for your maintenance personnel or hire third-party inspectors to perform these safety inspections.

**AHJs' Responsibilities for Inspecting Fire Door Assemblies**

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It is important to note that NFPA 80's safety inspection and testing requirements are primarily addressed to building owners and property management personnel. AHJs are responsible for ensuring that building owners and property management personnel are aware of their responsibility to maintain the fire door assemblies in working condition. In situations in which there is sufficient cause, an AHJ might compel them into compliance through citations, fines, and other appropriately punitive measures.

AHJs are responsible for ensuring that the entire structure meets the intent of the applicable code(s). Rarely will an individual code enforcement officer have the depth of knowledge, expertise, or time necessary to perform detailed system inspections of building elements like fire and egress door assemblies. Instead, AHJs rely on industry professionals to perform thoroughly detailed inspections like those required for fire and egress door assemblies.

Safety inspections of building systems (e.g., sprinklers, elevators, fire/building alarms, fire extinguishers, standpipes, etc.) are performed and documented by professionals working in the respective industry. Records of those inspections are retained on site and are presented to the AHJ during its periodic building inspection visits. Frequently, the AHJ will take time to spot-check the systems to verify that the information recorded in the documentation is accurate. When deficiencies are discovered, the AHJ can require corrections to be made within a certain numbers of days, issue citations for noncompliance, and assess monetary fines. The AHJ has the authority to temporarily close a building until corrective actions have been completed. In extreme circumstances, the AHJ can permanently close a building.

**Section 3: Inspection Cycles Annual Inspection Cycle**

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Section 5.2.4, "Periodic Inspection and Testing," requires fire door assemblies to be inspected and tested *"...not less than annually"* (NFPA 80, 5.2.4.1). Further, annex A, paragraph A.5.2.4.1 states: *`Doors subject to high-volume use and abuse might warrant an increased frequency of inspection. Components including, but not limited to, hinges, catches, closers, latches, and stay rollers are especially subject to wear."* The intent of the annex comment is to alert building owners, property managers, and AHJs that high­frequency-use door assemblies tend to require more ongoing maintenance and a higher level of attention than fire door assemblies that have ordinary- or low-frequency usage. For example, some cross-corridor pairs of doors in hospitals are normally closed to create separation between adjacent spaces; they might be opened and closed hundreds of times a day. It is common for door assemblies such as these to develop deficiencies from the constant usage to which they are subjected. Maintenance personnel are generally aware of which door assemblies in their facilities require a higher degree of attention. In these cases, NFPA 80's safety inspections can be used to ensure that the door assemblies are maintained and functioning properly.

The intent of 5.2.4.1 is to ensure that each fire door assembly is inspected and tested for operation on at least an annual basis. In other words, the functional test verifies that each fire door will move to the closed position and remain closed (e.g., latched), as it is required to under fire conditions.

Annual inspection of fire door assemblies in the majority of small buildings is relatively straightforward and is not inordinately time-consuming. However, inspecting and testing fire door assemblies in large buildings and facilities could become a seemingly never-ending process. Accordingly, NFPA 80 has established an alternative inspection cycle program for these situations: the performance-based option.

**Understanding NFPA 80's Performance-Based Option**

Owners and property managers of large buildings and facilities that have established maintenance programs for fire door assemblies might qualify to convert to the *performance-based option* for the inspection and testing of their fire door assemblies, provided they can document sustained levels of acceptable performance and demonstrate compliance to the AHJ.

Section 5.4 of NFPA 80, titled "Performance-Based Option," describes the basic requirements of the program. The following text is excerpted from NFPA 80:

*5.4 Performance-Based Option*

*5.4.1 As an alternate means of compliance with 5.2.4, subject to the AHJ, fire door assemblies shall be permitted to be inspected, tested, and maintained under a written performance-based \_program.*

*5.4.2 Goals established under a performance-based program shall provide assurance that the fire door assembly will perform its intended function when exposed to fire conditions.*

*5.43 Technical justification for inspection, testing, and maintenance intervals shall be documented in writing. 5.4.4 The performance-based option shall include historical data acceptable to the AHJ.*

First and foremost, only the AHJ can grant approval to extend the inspection cycle beyond one year. Before granting approval, the AHJ needs to establish an acceptable level of compliance (e.g., 5% maximum failure rate or 95% acceptable performance rate, etc.), which might vary depending upon the building occupancy and function. Next, the AHJ needs to review the owner's technical

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justification documenting the existing maintenance program, including operational testing of fire door assemblies. Finally, the AHJ might require statistical and historical documentation detailing the total number of fire doors inspected over a rolling period of time (e.g., the five years preceding the application for extension and/or subsequent inspections), the number of documented failures within that time period, the causes or reasons for failures, and the corrective actions taken to repair them.

To fully comprehend the level of documentation required by the performance-based option, read annex J, "Performance-Based Option for the Inspection, Testing, and Maintenance of Fire Door Assemblies." Technically speaking, the information contained in the annex sections of NFPA 80 is intended to provide additional explanation and guidance, rather than being formal requirements of the standard. Such information is necessary to help users of the standard understand the complexities of the performance-based option.

AHJs need to be able to explain and defend their rationale for extending or reducing the inspection cycle. Their position needs to be based on technical and historical documentation provided by the owner to justify their decision. After all, the purpose for inspecting and testing fire door assemblies is to ensure that they are ready and able to provide the protection for which they were designed. Assurance that the fire doors are performing reliably during safety inspections and testing should indicate that they would perform as intended under fire conditions. In cases in which the owner can satisfactorily document an acceptable and sustained level of compliance, the AHJ can be reasonably confident that the fire door assemblies will continue to be well-maintained over an extended period of time. In other cases in which the documentation indicates an unacceptable level of performance, the AHJ is justified in reducing the inspection cycle to less than one year. In other words, the AHD's decision to extend or reduce the time period of the inspections is based on factual data and is not made arbitrarily.

Performance-based inspection programs should be comprised of the following elements: (1) an acceptable level of sustained performance (established by the AHJ), which can be addressed as maximum failure rate or minimum performance rate, (2) a formally documented maintenance program for fire door assemblies, (3) an estimate of the frequency of use for each fire door assembly, (4) documented maintenance history, (5) continuous monitoring of the failure rate between formal inspections, (6) overall building condition, (7) consequences of failure, (8) review of failure or compliance rates, and (9) a plan for the incremental increase or reduction of the inspection cycle.

**Acceptable Level of Performance**

In order to ensure that the intent of the inspection requirements is being met, the AHJ needs to establish an acceptable level of sustained performance for a particular building or facility. Paragraphs J.5 and J.6 in annex J of NFPA 80 present an equation for determining the maximum failure rate over an extended period of time. The equation can be illustrated as:

FDFR(t) = NF (NC x t)

Here, **FDFR** represents the **Fire Door Failure Rate** over a specific period of time, which is represented by the letter **t. NF** represents the total number of documented failures in the same time period, which is divided by **NC,** the total number of inspected fire door assemblies within that period of time.

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In the scenario listed in paragraph J.6, the figures used result in the following equation:

.020 = 5 ± (50 x 5)

In other words, over a five-year period, a total of 250 fire door assemblies were inspected—the same 50 fire door assemblies were inspected in each of the five years. Of those 250 fire door assembly safety inspections, five door assemblies were determined to be failures. Translated, the example building has a failure rate of 2% per year. Conversely, the result could be referred to as an acceptable level of performance rating of 98% per year.

**Documented Maintenance Program**

Owners and property management personnel need to establish a formal ongoing maintenance plan for ensuring that fire door assemblies are in satisfactory condition and are fully operational. One aspect of this program should be documentation of the specific training that personnel have completed in preparation for properly maintaining fire door assemblies. Another aspect of this program should be the collection and retention of historical data documenting the ongoing maintenance program (including deficiencies and corrections). The level of detail captured in this history needs to be sufficient to repeat the formula for determining an acceptable level of compliance over the interim period between formal inspection cycles.

**Frequency of Door Usage**

Door assemblies within any given structure have varying degrees of daily usage. Consider the main entrance to an office suite that has 100 employees in a high-rise building. Each business day the main suite entrance door is opened and closed approximately 200 times when employees arrive and depart. Add to this usage an allowance for visitors and vendors, plus comings and goings of the employees during the course of business, and the daily usage of that one opening might well be upwards of 350 cycles per business day. By extrapolation, we can estimate that this opening will cycle approximately 87,000 times in a 12-month period. Since most fire-rated door, door frame, and builders hardware products are engineered to last a minimum of 1,000,000 cycles, our example door assembly would have an approximate lifespan of 11 to 12 years—during which time, of course, it would require a certain amount of care and maintenance to keep it working properly.

Other door assemblies within a structure might have a low frequency of use due to their location. For instance, a door assembly in an electrical service closet might be opened as little as once or twice per month and is less susceptible to the rigors of wear and tear. Similarly, swinging fire door assemblies installed across a corridor that are normally held open electrically might be cycled only during inspections of the fire alarm system and door assemblies. Door assemblies like these might never wear out and are less likely to require significant care and maintenance over time.

Door assemblies that are most susceptible to frequent and rigorous usage are located in high-traffic areas such as main entrances, public restrooms, and at the level of discharge from stair towers. Generally speaking, door assemblies in junior and senior high schools are subjected to significantly more abusive usage than door assemblies in office buildings.

Frequency-of-use estimates need to be based on the nature of the building(s), the placement of fire door assemblies within the building(s), and the occupancy group(s) within them.

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**Building Condition**

When considering an extension of the inspection cycle for a building, the AHJ needs to assess the condition of the entire building. For example, fire door assemblies in buildings that were constructed in the preceding five years are more likely to be in good condition and operating reliably. On the other hand, fire door assemblies in buildings that were constructed 10, 15, or more years ago are more likely in need of repair—at least until such time as the safety inspection records document an acceptable level of performance.

**Consequences of Failure**

Without a doubt, determining the consequences of a fire door assembly failing to perform its intended function is the most difficult dynamic the AHJ needs to consider when applying the performance-based option. As we are keenly aware, if a tragic incident were to occur after the AHJ approved an extension of the inspection cycle, the AHJ's decision would be scrutinized, and there might be legal consequences if the decision was made improperly.

Fire door assemblies that are required to swing in the direction of egress typically serve an occupant load of 50 or more persons. They are also installed in rooms with hazardous equipment or materials. Failure of these fire doors could potentially result in a large number of fatalities—either by failing to block smoke, gases, and flames from spreading to other parts of the structure or by impeding the egress of the occupants to the point of preventing them from reaching safety.

The consequences of failures for fire doors that do not protect the means of egress might be less severe (at least in terms of injuries and loss of life). For example, fire door assemblies protecting a file storage room or an electrical closet within other rooms would likely not impede egress, and their failure might have less severe consequences.

The other element that should be considered in this decision is the nature of the building or facility requesting the extension of the inspection cycle. Healthcare facilities, progressive care facilities for senior citizens, and our schools (for children in grades K through 12) are examples of buildings where the occupants are less able to protect themselves during emergency situations, whereas occupants in office buildings, manufacturing plants, and other such buildings are typically better able to protect themselves during emergencies.

AHJs, building owners, and property managers need to be aware of the possible consequences of extending the inspection cycle. They need to weigh the potentially fatal consequences against the time and effort it takes annually to ensure that the fire door assemblies are in operating condition.

**Planning for Extended Inspection Cycles**

A critical element of the performance-based inspection cycle is the development of a plan for the incremental increase of the inspection cycle based on documentation accrued over time. Changes in the inspection cycle should be made incrementally while continuously monitoring the performance level of the maintenance program. Paragraph J.10 of NFPA 80 recommends changes to the inspection cycle to be no more than six months at a time and to not exceed a total period of 36 months, *"...regardless of \_peg`ormance."*

When permission is granted to increase the inspection cycle, the owner agrees to maintain the fire door assemblies at an acceptable level of sustained performance. In cases in which the AHJ determines that a building has an unacceptable level of performance, the AHJ needs to reduce the

time period of the inspections accordingly. Buildings with high percentages of failures might have their inspection cycle reduced to every six months until such time as the owner can document that corrections have been made and can demonstrate that the maintenance program is sustaining an acceptable level of performance.

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It is important to understand that the AHJ will establish the increments for increasing or decreasing the inspection cycle within its jurisdiction. Changes in ownership, facilities management, building use, and occupancy might be sufficient cause for the AHJ to make reductions in the inspection cycle or revoke permission for the performance-based inspection cycle.

**Transitioning to the Performance-Based Inspection Cycle**

Before seeking the approval from the AHJ to transition to the performance-based inspection cycle, building owners and property managers need to determine if the increased burden of record keeping and the continuous scrutiny of its maintenance program is offset by the benefit of extending the time between the annual inspections. It should be understood that the AHJ's decision to permit an extension of the inspection cycle is in recognition of the building owner's or property manager's established maintenance program. This program includes periodic testing and proper maintenance of fire door assemblies, as well as keeping accurate records documenting the work performed on the door assemblies. The AHJ might require historical information spanning five or more years in order to fully assess the effectiveness of the owner's maintenance program and accurately gauge its level of performance before granting an extension of the inspection cycle.

Paragraph J.4 of NFPA 80 lists three critical factors that building owners should consider before switching to the performance-based inspection program. These factors are: (1) past door reliability, (2) resource expenditures, and (3) administrative burden.

1. **Past Door Reliability**

The first factor owners and property managers should consider in making the decision to request an extended inspection cycle is the current and historical condition of the fire door assemblies in the building(s). The AHJ is not likely to approve extending the inspection cycle for buildings with a history of poor maintenance and code violations—especially for fire door violations. In cases like this, it might take years for the owner to improve the maintenance program such that the AHJ might consider granting an extension.

1. **Resource Expenditures**

The next factor the owner needs to consider in this decision is the costs associated with performing the inspections on an annual basis, as prescribed in Section 5.2 of NFPA 80, against the costs of developing internal systems to provide statistical information and documentation that monitors the effectiveness of the ongoing maintenance program.

1. **Administrative Burden**

Finally, building owners need to determine if the increase in the administration and monitoring of the maintenance program is an acceptable tradeoff in return for the extended inspection cycle.

Large facilities with hundreds or even thousands of fire door assemblies are the most likely candidates for using the performance-based inspection cycle. Typically, they have an established maintenance program staffed with personnel who are capable of successfully administering performance-based inspections. On the other hand, owners of buildings with comparatively few fire door assemblies might decide that the cost of administering and monitoring a performance-based inspection program is greater than the cost of performing the inspections on an annual basis.

**Developing a Written Performance-Based Program**

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Once permission for converting to a performance-based inspection program has been approved by the AHJ, the program itself needs to be documented in writing so that future facility and AHJ personnel understand the requirements. A copy of the approved performance-based program should be on file with the AHJ and filed with the owner's maintenance records. The written program should specify the following requirements:

* Minimum acceptable level of compliance or maximum failure rate as determined by the AHJ
* Maximum time interval between formally documented inspections
* Documentation of the level of compliance (number of failures divided by total number of fire door assemblies)
* Documentation proving that inspectors have sufficient knowledge to perform inspections
* Maintenance history for corrective actions needed to repair failures
* Level-of-compliance rating for preceding inspection cycles

**Section 4: Safety Inspections of Swinging Fire Door Assemblies New and Existing Installations**

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Generally, the requirements of product standards like NFPA 80 are not retroactively applied to products or their installations that were made in compliance with earlier editions of the same standards. However, NFPA 80 contains requirements that are applicable to existing fire door assemblies, regardless of when they were installed. Chapter 5, "Care and Maintenance," specifically gives direction to the ongoing maintenance of fire doors, as well as the requirements for formally inspecting and testing them. Paragraph 5.1.1.2 states, *'The requirements of this chapter shall apply to new and existing installations."*

**Performing Visual Inspections**

Requirements for the visual inspections of swinging fire door assemblies are listed in Section 5.2.3.5, "Swinging Doors with Builders Hardware or Fire Door Hardware." Paragraph 5.2.3.5.1 states, *'Fire door assemblies shall be visually inspected from both sides to assess the overall condition of the door assembly."* Additionally, paragraph 5.2.3.2 states, *'Before testing, a visual inspection shall be performed to identift any damaged or missing parts that can create a haard during testing or affect operation or resetting."*

**Checklist for Visual Inspection of Swinging Fire Doors**

Fire door assemblies are not required to be maintained in like-new condition, but they do need to be in proper operating condition in order to perform as intended. After all, a certain amount of wear and tear is to be expected over the life of their installation, provided that such wear and tear does not prevent the assemblies from containing a fire. For example, cosmetic damage such as minor scratches, scrapes, and dents that do not penetrate the face of the doors and door frames should not detrimentally affect their performance under fire conditions.

The following checklist of items is found in paragraph 5.2.3.5 of NFPA 80 and has been expanded upon here to better explain its requirements.

**A. Labels Are Clearly Visible and Legible**

The labels that are applied to door leaves, door frames, and builders hardware components need to be visible and legible. Some of the most frequently cited deficiencies on swinging fire door assemblies are labels that have been painted over, labels that have been removed, or labels that show signs of tampering.

NFPA 80 paragraph 4.2.2 states, *'Labels shall be applied in locations that are readily visible and convenient for identification by the AHJ after installation of the assembly."*

Physical labels on door leaves might be made from metal or Mylar and are attached by rivets or adhesives in a manner that will cause the labels to be deformed or destroyed when removed. Metal door frames might have embossed (stamped) or attached physical labels indicating a maximum level of fire-protection rating for a particular application.

Generally, labels are located on the hinge edge of the door and in the hinge rabbet of the frame at about 60 inches above the floor. Labels are sometimes located on the top edge of the door and in the door rabbet of the head of the frame when hardware items (e.g., concealed leaf continuous hinges) would otherwise cover them if the labels were placed in their typical locations.

Labels contain valuable information concerning the construction of the door, including the name of the manufacturer, the testing laboratory, and the maximum level of fire-protection rating. Many labels have serial numbers, which can be used to access historical information. The ability to track

this information is useful following incidents in which damages have resulted due to failure of the door's performance under fire conditions. If owners have concerns regarding a labeled fire door leaf or door frame, they should contact the manufacturer or testing organization and provide them with the serial number.

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Painters are notorious for painting over or removing and reattaching the metal labels attached to fire doors and frames. It cannot be overstated that painting over these labels is a serious matter, as it obscures the information contained on the labels. In most cases, the information is irretrievably concealed beneath layers of paint. Labels that have been removed and replaced are easily distinguishable from labels that have not been removed. Labels that have been painted or tampered with should be brought to the attention of the AHJ to determine how the situation should be remedied.

Generally, fire-rated hardware components are marked with embossed symbols from one of the nationally recognized testing labs, like Underwriters Laboratories or Intertek, which serve as their labels. Some hardware products like conventional five-knuckle hinges are not marked in any manner but are listed with the testing labs by their manufacturer.

**Temperature-Rise Labels**

Depending on the age of the building and the applicable building, fire, and life safety codes at the time the fire door assemblies were installed, the door leaves protecting stair towers might be required to have an increased level of protection. In addition to having a fire-protection rating of 1- 1/2 hours, these door assemblies are required to limit the transmission of heat from the fire-exposed side of the assembly during the first 30 minutes of exposure to fire. These types of fire doors are referred to as *temperature-rise fire doors.*

There are three levels of temperature-rise protection: 650, 450, and 250 degrees Fahrenheit; the lower the temperature, the better the protection. When no degree of temperature rise is listed on

the label, the door leaf permits the heat transfer to exceed 650 degrees during the first 30 minutes of a fire.

The degree of temperature rise is measured from the increase above the ambient temperature at the door assembly. For instance, when the ambient temperature in a stair tower is 80 degrees Fahrenheit and a fire occurs in a corridor, a 250-degree temperature-rise door limits the transmission of heat to 330 degrees in the stair tower for the first 30 minutes of exposure, providing time for the occupants to descend through the stair tower and past the level of the fire.

1. **No Open Holes or Breaks**

Fire door assemblies are intended to form an impenetrable barrier during fire conditions. Unused fastener holes resulting from the removal and/or replacement of hardware items on the door or door frame accelerate the deterioration of the door and door frame materials during a fire and permit the flames, smoke, and gases to spread to the non-fire side of the assembly. Significant dents, penetrations (e.g., rust through, punctures from equipment, etc.), or delamination of the door or door frame surfaces have similar detrimental consequences to the assembly's performance in a fire.

1. **Glass and Glazing**

Fire-rated door leaves, side lights, and transom-light frames are permitted to have integral vision lights. In order for the vision lights and panels to prevent the spread of flames, smoke, and gases, the frames (light kits and/or glazing beads) around the vision panels need to be intact and securely fastened to the door or frame. Glazing panels cannot be cracked or damaged.

Choices for the glass and glazing materials used to form these lights are limited to products that

have passed fire testing, including hose stream tests. At one point in time, the most commonly used glazing material in fire door assemblies was 1/4-inch-thick clear wired glass.

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Concern for reducing injuries caused by shattering glass has led to the development of glazing materials that provide physical safety from accidental impacts. These glazing materials also provide fire-protection or fire-resistant properties in fire door assemblies. Typically, these products do not have the familiar wire glass pattern (diamond or square). Instead, they have an etched label or listing marked on one corner of the exposed area. Inspectors need to look closely at non-wire glazing panels to verify that they are appropriately labeled for use in fire assemblies.

The requirements for glass and glazing that is permitted to be used in fire door assemblies have evolved significantly over the past 15 years. When performing safety inspections of fire door assemblies, it is important to be aware of the glass and glazing requirements that were applicable at the time of installation. For example, 1/4-inch wire glass vision panels and lights that were installed prior to the mid-1990s were not required to be individually labeled, whereas every piece of glass or glazing material that is installed today is required to be individually labeled.

In cases in which the glass or glazing materials become damaged and require replacement, the replacement glass and glazing materials must meet NFPA 80's requirements at the time of replacement, regardless of when the original materials were installed. In other words, when a piece of 1/4-inch clear wired glass becomes damaged, the replacement glazing material is required to comply with today's standard, which most likely will be one of the non-wire glass glazing materials that meets safety standards.

1. **Alignment**

Door leaves and door frames that are not properly aligned are not able to form a suitable barrier during a fire. For example, the meeting stiles of a pair of door leaves installed in a frame that is not properly aligned will create the illusion of the door leaves being warped. This misalignment might prevent positive latching when the door leaves are completely closed if the door frame is too far out of alignment. Misalignment might be the result of poor installation or excessive usage that caused the vertical jambs of the door frame to shift. Fire door leaves, their door frames, and builders hardware components need to be securely fastened in place and properly aligned to withstand the extreme forces and stresses exerted on them in a fire.

1. **Missing or Broken Parts**

As simple as it might sound, the necessary components installed on fire door assemblies need to be complete. A missing strike plate for latching hardware, for instance, prevents the door from being positively latched during a fire. Door closers, closer arms, mounting brackets, latch bolts, and many other component parts have an important role in the performance of fire door assemblies. When any one of these items is missing from the assembly, the entire assembly is in jeopardy of failing in a fire.

Fasteners are perhaps one of the most overlooked elements of fire door assemblies. At best, missing fasteners (e.g., hinge screws, lock face and strike screws, etc.) are indicative of poor installation and maintenance practices. Worse, missing fasteners might indicate that hardware items that were not part of the original assembly and are not listed for use on fire door assemblies were installed. Incorrect fasteners might fail when exposed to fire conditions, causing failure of the entire assembly. Inspectors need to verify that no exposed fasteners are missing and that they are fully secured in place. Inspectors might need to verify the presence of concealed fasteners in cases in which hardware items (e.g., surface door closers, fire exit hardware devices, etc.) are obviously loose. Verification of concealed fasteners requires the partial disassembly of hardware items (e.g.,

removing cover plates), which should be performed by the owner's personnel in the presence of the inspector, especially when third-party inspectors are performing the safety inspections.

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1. **Clearances**

In addition to alignment, NFPA 80 4.8.4 and 6.3.1.7 also list the maximum clearance dimensions permitted between the edges of the door and the door frame, as well as between the bottom of the door and the finished floor or threshold. It is possible to have doors and door frames aligned within acceptable tolerances and excessive clearance around the perimeter of the door leaves.

When the top corner of the door at the lock edge has dropped significantly lower than the opposite top corner at the hinge edge, the door is referred to as *sagging.* Door sag can be indicative of a worn-out top hinge, which is easily corrected, or it can be indicative of a broken hinge reinforcement plate in a hollow metal door or door frame, which is a much more significant problem to correct.

1. **Closing Devices**

One of the most critical elements of a fire door assembly is the closing device. Without a properly working closing device, the fire door assembly is rendered useless. Hydraulic closers can develop leaks over time, which reduces (or eliminates) their ability to control the opening and closing speeds of the door leaves. Technically, as long as the door closer is able to move the door leaf to the completely closed position—even if it is slamming the door—it meets the intent of NFPA 80. However, over time the stress created by repeatedly slamming the door leaves closed accelerates wear and tear on the assembly and will damage the assembly eventually.

As a cautionary side note, the number-one cause of personal injury lawsuits (as they relate to the door industry) is doors that close too fast and knock down occupants or catch hands and fingers between the door and door frame. The closing and latching speeds of door closers should be properly adjusted to overcome resistance of the latching hardware and pressure from HVAC systems without creating a hazard for building occupants.

1. **Coordinators**

Door coordinators are used on pairs of swinging fire doors to control the closing sequence of the door leaves and to ensure that both leaves return to the completely closed position. Typically, these devices are used on fire door assemblies that are required to swing in the direction of egress when the active leaf is arranged to latch into the edge of the inactive leaf. Soffit-mounted door coordinators require the use of auxiliary mounting brackets to accommodate other soffit-mounted hardware items such as parallel arm door closers and strikes for surface-mounted vertical rod fire exit hardware devices.

1. **Latching Hardware**

Latching hardware is equally as critical as the closing device on fire door assemblies. The door leaves are required to positively latch under fire conditions and to remain latched for the duration of their fire-protection rating. Depending on the type of locking or latching hardware (e.g., bored or mortise locks, flush bolts, fire exit hardware devices, etc.) and the configuration of the door leaves, the latch bolts have specific requirements that they are required to meet in order to be used on fire door assemblies. For example, single door leaf openings generally require latches to have a projection of 1/2 inch to ensure that they positively engage the strike plates mounted in the door frames. However, the projection of the same latching hardware device used on a pair of door leaves might be required to project 5/8 inch or 3/4 inch, depending on the information on the label of the

fire-rated door leaf.

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To further complicate the matter, there are non-listed latches and locks that might appear to be suitable for use on fire door assemblies but that technically violate the labeling requirements since they have not passed stringent fire testing.

**Fire Exit Hardware**

Fire exit hardware is a type of exit device that is limited to being installed on fire-rated door leaves that bear a physical label that states: *'Tire Door to Be Equipped with Fire Exit Hardware."* These special labels indicate that the internal construction of the door leaf is designed to support the application of fire exit hardware. When fire exit hardware devices are installed on fire doors that do not bear the required label, or when fire doors are discovered that are labeled for fire exit hardware but have latching hardware devices other than fire exit hardware devices, immediate corrective action is required.

**Less Bottom Rod/Bolt Option**

Certain applications of pairs of swinging fire doors are permitted to be used without an active latching device installed on the bottom of one or both of the door leaves. This option is commonly referred to as *less bottom rod / bolt.* The less bottom rod/bolt option is restricted to specific fire-rated door leaves that have been tested and listed for that application.

In this scenario, an auxiliary device referred to as a *fire pin* is installed into the edge or bottom of the door leaves. Under normal operating conditions, the pin is held in the retracted position by a fusible covering, which is designed to release the pin when exposed to the extreme temperatures of a fire. Once released, the pin is projected under spring tension into the opposing door leaf or the floor, which fixes the door leaf in place.

To clarify this situation, fire pins are not released until the temperature at the core of the door is sustained above 400 degrees Fahrenheit (approximately)—which requires the temperature on the fire side of the assembly to be well above 400 degrees Fahrenheit—at which point the assembly is no longer meant for ingress or egress. Rather, it becomes a rigidly fixed barrier that is designed to protect the structural integrity of the building from further damage.

1. **Auxiliary Hardware**

Auxiliary hardware items that interfere with or prohibit the operation of the door leaf need to be removed immediately. Perhaps the most frequently misused item of hardware is the ubiquitous kick-down door holder, which is used to hold open self-closing doors; these types of door holders are relatively inexpensive and readily available, which increases the likelihood of their misuse on fire door assemblies.

Hardware items such as overlapping astragals are sometimes used on pairs of doors to close the gap between the meeting edges of the door leaves. However, overlapping astragals require the active door leaf to be opened before the inactive door leaf, which is why they are specifically prohibited in paragraph 6.4.7.1 of NFPA 80.

1. **Field Modifications**

The term field *modification* refers to work that involves cutting, welding, planing, trimming, and otherwise modifying fire-rated door leaves and door frames that is performed on-site, rather than in a shop that is properly authorized by a testing agency, licensed by the manufacturer(s) of the component(s), and staffed with personnel who are trained to perform such work.

Many fire door assemblies have been ruined in the field by improper modifications that destroyed

the integrity of their fire-protection properties. Section 4.1.3 of NFPA 80, "Appurtenances," describes the type of modifications that are required to *"...be\_peormed in accordance with the manufacturer's inspection service procedure and under label service"* (paragraph 4.1.3.1) and those modifications that can be performed at the job site (paragraphs 4.1.3.2, 4.1.3.3, and 4.1.3.4) as part of the typical installation process.

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Significant modifications made to a fire door assembly more than likely violate the labeling requirements of the assembly. In some cases, it might be possible to repair the assemblies, but replacing the door leaves might be the best, most expedient, and least expensive solution for restoring a fire door assembly to its original condition.

In cases in which the modification work was performed well, it might be difficult for an inspector to determine that a modification was made to the assembly. However, certain types of modifications are blatantly obvious and need to be corrected upon discovery. For example, door leaves that have been poorly trimmed in height often exhibit rough, uneven, or jagged edges and are telltale signs of improper field modifications. Frequently, installers of access-control devices and systems make cutouts in door frames to receive electric strikes. These cutouts are sometimes oversized, uneven, or are otherwise poor-fitting, which are telltale signs of field modifications. Similarly, installing door position switches that are not designed for use on fire door assemblies violates the labeling requirements of the assemblies.

In the course of performing routine maintenance on door assemblies, untrained personnel can inadvertently violate the labeling requirements of the assemblies. Work such as removing locks and replacing them with fire exit hardware devices (or vice versa) might solve the functional needs of the occupants, but it also might destroy the integrity of the door assemblies.

A good rule of thumb for determining when a modification is in danger of violating the labeling requirements of an assembly is when it requires drilling new holes, removing sections of material (e.g., pockets for mortise locks or through-holes for bored locks, cutting in vision lights, etc.), or trimming doors in height or width. In these cases, the modification(s) should not be made to the assembly unless formal approval of the work is granted in accordance with NFPA 80's provisions for field modifications (see Section 5.1.4).

**L. Gasketing and Edge Seals**

Many wood fire doors installed in compliance with the 1997 edition of the *Uniform Building Code,* or any edition of the *International Building Code,* are required to have intumescent seals when they are placed in assemblies that are protecting the path of egress (e.g., corridors, stair towers, etc.). The intumescent materials might be built into the door leaves or surface-applied to the door frame, depending on the components used in the assemblies. Additionally, gasketing might be required by the applicable building, fire, or life safety code to retard the spread of smoke and gases during a fire. NFPA 80 requires these gaskets and seals to be inspected to verify that they are intact and in good condition.

Soffit-applied smoke gasketing and seals are intended to continuously close the gap between the door and door frame along the full height of the door and across the top of the door. Installers frequently cut and notch the gasketing and seals to accommodate soffit-applied hardware items, such as strikes for rim and surface vertical rod fire exit hardware and brackets for parallel arm door closers. When the gasketing material, or its attaching channel, is cut or notched to accommodate other hardware items, it cannot be expected to perform its intended function under fire conditions. In this case, the gasketing needs to be removed and replaced, which might also require the removal, reinstallation, or replacement of other hardware items.

**M. Signage**

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Large institutions and facilities often use signage to identify room usage within the structures. Section 4.1.4 of NFPA 80, "Signage," lists requirements for applying signage to fire door assemblies. Care should be exercised during the visual inspections to confirm that existing signage is installed in compliance with these requirements.

Signage is not permitted to be attached to fire door leaves with screws or nails or any other means of fastening that penetrates the surfaces of the doors unless the screws or nails are included in the published listing of the signage. Additionally, the physical size of signage applied to the fire door leaf is restricted to being no larger than 5% of the total surface area of the door leaf; this restriction is for the total area of the door leaf, which might be covered by one or more signs. Signage is prohibited from being attached to glazing materials (NFPA 80, 4.1.4.3).

**Additional Inspection Items**

In addition to the checklist of inspection items outlined in Section 5.2.3.5, there are several other items that need to be verified during the visual inspections.

1. **Protection Plates**

Auxiliary hardware items like armor, kick, mop, and stretcher plates and edge guards are often installed long after fire door assemblies have been in place. They are frequently used to conceal damage to the surface or edges of fire doors. Section 6.4.5, "Protection Plates," describes the requirements for installing protection plates on fire doors. Unless the protection plates are specifically labeled or were installed by the door manufacturer, installation of protection plates is restricted to *"...not more than* 16 *inches (406 mm) above the bottom of the door"* (NFPA 6.4.5.3). To clarify this point, a 16-inch-high kick plate that is not installed flush with the bottom of the door technically does not comply with NFPA 80's requirement since a portion, or all, of the kick plate is installed more than 16 inches from the bottom of the door.

1. **Plant-Ons and Laminated Overlays**

Plant-ons and laminated overlays are moldings or materials that are attached to the faces of the door leaves to enhance the appearance of the doors. Paragraph 4.1.3.1 requires the installation of plant-ons and laminated overlays to *"...bepeormed in accordance with the manufacturer's inspection service procedure and under label service."*

Materials attached to the face of fire door leaves affect their performance under fire conditions; some materials have an extremely detrimental effect. For example, laminating wood materials to a fire door leaf increases the fuel load of the door since flames will consume the wood materials. Likewise, adding large armor plates to wood fire doors might cause the door leaves to fail due to the increased stresses that are exerted on them by the heat-induced expansion of the metal plates.

Another area of concern regarding plant-ons and overlays is their means of attachment. Materials attached with adhesives might fall away from the door when exposed to intense heat, which alleviates the concern for increased fuel load. However, screws, nails, and other means of fastening that penetrate the surface of the door leaf might compromise the fire-protection properties of the door leaf. Consequently, the door manufacturer needs to be consulted to determine whether the integrity of the door leaf has been compromised by the application of plant-ons.

1. **Shimming**

Shimming is a common technique of adjusting the clearances between the top and vertical edges of the door and door frame by inserting thin sheets of material behind the hinge leaves. Paragraph

6.4.3.4, "Shimming," states, *'When required to meet the clearances stated in 6.3.1.7, the shimming of hinges using steel shims shall be permitted."*

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During the visual inspection of fire doors, hinges that have been shimmed improperly are usually readily visible and might require corrective action to replace the shim material with steel, as required. Other materials such as pressed cardboard and aluminum flashing are sometimes used as shim material but will not withstand sustained exposure to the extreme heat of a fire, causing the door assembly to fail prematurely.

1. **Prevention of Door Blockage**

One of the most frequently cited violations issued for swinging fire doors is for blocked door leaves, especially those door leaves that are required to swing in the direction of egress. Boxes, equipment, furniture, and other items are sometimes stacked near or in front of fire door assemblies, blocking the occupants' approach. Worse, materials piled against the pull-side of egress door leaves restrict or prevent the movement of the door leaves, which could result in serious injuries and fatalities.

In the 2010 edition (and earlier editions) of NFPA 80, Section 5.2.13, "Prevention of Door Blockage," requires the areas around the door openings to be kept clear of materials, equipment, furniture, or any other items that interfere with or block the travel of the door leaves. In buildings where there is the likelihood of interference with the operation of the door travel, NFPA 80 requires a barrier to be constructed to protect the immediate area around the door.

Blocking the door leaf in the open position is specifically prohibited. Door chocks, wedges, and kick-down door holders provide convenience to the occupants by holding the door leaves open. However, the occupants typically are unaware that they have completely defeated the assembly's ability to protect them in a fire.

Note: The "Prevention of Door Blockage" section of NFPA 80 does not appear in the 2013 edition. It is unclear as to why it was removed; it might have been due to an oversight that occurred during the reorganization of Chapter 5 for the 2013 edition. Regardless of the reason why this section does not appear in the 2013 edition of NFPA 80, the model building, fire, and life safety codes require the areas on either side of door assemblies to be kept free of obstructions. Most likely, the "Prevention of Door Blockage" section will reappear in the 2016 edition of NFPA 80.

1. **Painted Doors, Frames, and Hardware**

Over time, layers of paint can accumulate to the point at which it interferes with or even prohibits the function of moving parts such as hinges and door closer arms. NFPA 80 paragraph 5.2.3.8 states, *'Fusible links, release devices, and any other moveable parts shall not be painted or coated with other materials that could interfere with the operation of the assembly."* Hardware items with excessive paint build­up need to be cleaned or replaced.

**Operational Requirements for Swinging Doors with Builders Hardware**

Regardless of when swinging doors with builders hardware were installed, there are three main operational requirements that the majority of assemblies are required to meet under fire conditions. They are required to: (1) swing freely, (2) be self- or automatic-closing or power-operated, and (3) positively latch when in the closed position. In certain applications approved by the AHJ, the closing device can be omitted (see NFPA 80, paragraph A.6.4.1.1).

**Acceptance Testing of Fire Door Assemblies**

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As discussed previously, NFPA 80 requires safety inspections of fire door assemblies to "... *be performed by a qualified person with knowledge and understanding of the operational components of the type of door being subjected to testing"* (NFPA 80, 5.2.3.1). Acceptance testing of fire door assemblies includes operational testing and visual inspection upon completion of installation or maintenance work. On new construction projects, acceptance testing of the fire door assemblies should be completed before the certificate of occupancy is issued and the owner takes possession of the building, space, or structure. In existing buildings, acceptance testing is required upon completion of maintenance work.

Prior to performing the operational testing, the door assemblies are required to be visually inspected for deficiencies that might create a hazard during the testing. Any such deficiencies should be corrected before performing the operational testing.

Paragraph 5.2.3.3 states, *"Acceptance testing shall include closing of the door by all means of activation."* In other words, acceptance testing of fire door leaves that are arranged for automatic closing or that are power-operated require the inspectors to verify that the doors close completely under all conditions, which means that some of the operational testing needs to be coordinated with the periodic testing of other systems (e.g., the fire alarm system).

Each iteration of acceptance testing is required to be fully documented in accordance with Section 5.2.2. Acceptance testing records are required to be maintained for the life of the assembly (see paragraph 5.2.2.1).

**Acceptance Testing of Self-Closing Doors**

The majority of swinging fire doors are designed to be self-closing. Generally, they are comprised of mechanical hardware and have a hydraulic door closer, whether surface-mounted or concealed, that controls the opening and closing speeds of the door leaves. Some single-leaf swinging fire doors have labeled spring hinges that close the door leaf. In both cases, the door leaf normally rests in the closed position.

Operational testing of self-closing door assemblies is straightforward; the door leaves are required to move to the completely closed position when operated from the full open position. Item 6 under Section 5.2.3.5.2 states, *"...the active door completely closes when operated from the full open position."* In the context of this requirement, the term full *open* is intended to require the door leaves to be

opened as far as possible, which might be only 90 degrees (approximately) for door leaves that open against a wall or partition, or as far as the installed hardware permits (e.g., 110, 140, or up to 180 degrees).

Assuming the operational test is successful, the inspectors need to open the door several more times to witness the closing device's ability to reliably close the door leaf every time the door is opened.

**Acceptance Testing of Automatic-Closing Swinging Doors**

As stated previously, acceptance testing of automatic-closing swinging door leaves *"...shall include closing of the door by all means of activation"* (NFPA 80, 5.2.3.3). Swinging fire doors installed in cross-corridor applications are often electrically held in the open position for the majority of their lifespan; they are designed to automatically close under fire conditions. Magnetic door releases mounted to the walls or floors are commonly used to hold the door leaves in the open position. Electromechanical controlled door clOsers are also used to hold open the door leaves. Both of these types of hold-open devices are required to be tied into the fire alarm system—including other

systems such as water flow alarms and carbon dioxide release systems. The door leaves are immediately released when the alarm system is actuated by fire, heat, or smoke detectors at the door assemblies or upon loss of power to the hold-open devices. Once released, the door leaves become self-closing and move to the completely closed position.

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Acceptance testing of automatic-closing doors includes the following tests:

* Activation by the fire alarm system\*
* Activation by the fire, heat, and/or smoke detector(s)\*
* Simulation of loss of power to the hold-open device
* Manually pulling the door leaves from the hold-open device
* Opening the doors from the closed position to the full-open position

\*Requires coordination with the testing of these other systems

Section 5.2.4, "Periodic Inspection and Testing," requires the automatic-closing devices to be reset in accordance with the manufacturer's instructions.

**Acceptance Testing of Power-Operated Swinging Doors**

Operational requirements for power-operated doors are found in paragraph 6.1.3.4 of NFPA 80, "Power-Operated Fire Doors," which states, *Tower-operated fire doors shall be equipped with a releasing device that shall automatically disconnect the power operator at the time of fire, allowing a self-closing or automatic device to close and latch the door regardless of power failure or manual operation."*

Acceptance testing of power-operated swinging door leaves is similar to the testing of automatic-closing door leaves in that the inspectors need to witness the closing of the door by all means of actuation.

Acceptance testing of power-operated swinging doors includes the following tests:

* Activation of the fire alarm system interrupts power to the automatic door operator(s)\*
* Activation of the fire, heat, and/or smoke detector(s), where applicable, interrupts power to the automatic door operator(s)\*
* Simulation of loss of power to the automatic door operator(s)
* Manually opening the doors from the closed position to the full open position when there is no power to the automatic door operators

\*Requires coordination with the testing of these other systems

The door leaves of power-operated door assemblies are required to become self-closing when power to the automatic door operators is interrupted. Latching hardware—mechanical or electrically controlled—is required to positively latch when the door leaves close during the acceptance testing, simulating their function under fire conditions.

**Latching of Swinging Fire Doors**

The most critical aspect of the acceptance testing for swinging fire doors is to ensure that they positively latch in the closed position, just as they are required to do under fire conditions. Section 6.4.4 of NFPA 80, "Locks or Latches," includes two seemingly opposing requirements that directly affect how the acceptance testing should be administered.

First, paragraph 6.4.4.3 states, *"All single doors and active leaves of pairs of doors shall be provided with an active latch bolt that cannot be held in a retracted position as specified in the individual manufacturer's \_published listings."* Subsequent to that requirement, paragraph 6.4.4.3.3 states, *'Latching arrangements that do not*

*provide positive latching in the normal mode shall be permitted to be used provided that, in a fire emergency, the door becomes \_positively latched by means of an automatic fail-safe device that is activated by an automatic fire detector."*

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The first requirement is specifically designed for fire door assemblies with mechanically operated latching or locking hardware devices. These products are required to positively latch each time the door leaf returns to the completely closed position—no exceptions.

The latter requirement applies to many of today's modern fire door assemblies that are automated with electrically controlled latching or locking hardware and automatic door operators. The requirements listed in 6.4.4.3.3 are designed to accommodate these modern door assemblies.

During normal (non-fire) conditions, the latching mechanisms are held in the retracted position, allowing the door leaves to be opened and closed by the automatic door operators. However, the power to the system that controls the latching hardware is required to be interrupted when the fire alarm (or other building alarm) system is actuated; latching mechanisms immediately return to the active state and positively latch the door leaves in the closed position.

**Fire-Protection versus Accessibility**

Since the enactment of the Americans with Disabilities Act (ADA) in 1990, building owners, property managers, and AHJs have struggled with balancing the need for fire door assemblies to completely close and latch with the requirements of the ADA. More specifically, the *Americans with Disabilities Act Accessibility Guidelines* (ADAAG) and ANSI/ICC A117.1, *Accessible and Usable Buildings and Facilities,* comprise the two main standards for accessibility requirements that restrict the opening force of accessible door assemblies to no more than 5 pounds of force. In many cases, hydraulic door closers with reduced opening forces do not have adequate closing power to reliably close fire doors. Both ADAAG and A117.1 specifically exclude the reduced opening force requirements for fire door assemblies in deference to their fire-protection requirements.

**Section 5: Inspection Reports and Records Keeping Documenting Safety Inspections**

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One of the most important aspects of the safety inspections of fire door assemblies is how the acceptance testing and periodic safety inspection and testing reports are documented and maintained. NFPA 80 contains a list of information that is required to be recorded on the inspection reports, as well the retention periods for the records. Section 5.2, "Inspection and Testing," requires inspection records to be signed by the inspector(s) and kept on-site for the AHJ's review as part of the AHJ's routine inspections for the buildings in its jurisdiction.

**Retention of Inspection Records**

Acceptance testing records—the safety inspections and operational testing required following installation and maintenance work—are required to be retained for the life of the respective door assemblies. Newly installed fire door assemblies, whether installed during the construction of a new building, structure, or space or those that are replacing original door assemblies, are required to be inspected and operationally tested following installation to confirm that they comply with NFPA 80 and function correctly.

Acceptance testing is also required following the completion of maintenance work, which might be as simple as painting the doors and frames or as significant as replacing or installing major hardware components (e.g., hinges, latching hardware, and closing devices).

According to paragraph 5.2.2.2, records of periodic safety inspections and testing are required to be *"...retained for a period of at least 3 \_years."* One of the reasons for requiring the inspection records to be retained for a minimum period of time is that the AHJ is not usually able to visit each building in its jurisdiction each year. It is important to understand that building owners and property managers need to retain the inspection records for each of the intervening years between the AHJ's official visits. In other words, while NFPA 80 might recommend a minimum period of three years for retaining the inspection records, owners and property managers need to be able show that the inspections occurred on schedule in each of the years between the AHJ's visits, which might be once every five or more years.

The annex comment (see paragraph A.5.2.2.2 in annex A) refers to a retention period of seven years for inspection records to allow the AHJ to assess the maintenance history of the door assemblies in a building. This type of history might be needed if the owner desires to transition into a performance-based inspection program at some future point in time.

**Inspection Record Medium**

Acceptance testing records and periodic safety inspection and testing records are permitted to be recorded on paper or in a digital format that is acceptable to the AHJ. Whichever medium is selected for recording the inspections, the records need to be stored in a manner that "...will *survive the retention period."* As of the writing of this guide, there are several computer-based software programs that are designed to document the safety inspections of fire and egress door assemblies. One of the important features that should be considered when looking at software programs is the ability to prevent the inspection records from being altered after they have been verified and completed.

A main advantage of door assembly inspection software programs is that they have the ability to collate all of the information and create lists of corrective actions that need to be performed to bring the door assemblies into compliance.

**Data for Inspection Reports**

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Paragraph 5.2.2.4 in NFPA 80 contains a list of information that is required to be recorded for the acceptance testing and the periodic inspection and testing reports. Some of the information is basic in nature, like the date that the walk-through inspection(s) occurred, the name and address of the building/facility, the name of the inspector, and the name of the inspector's company. In addition, the inspection reports are required to include the following information:

* A door number (or other identifier) that is unique to each door assembly
* The location of the door assembly in the building, structure, or space
* A description of each door assembly (e.g., swinging, sliding, overhead, access, or other type of assembly)
* An individual record for each inspected door assembly
* Verification of the visual inspection and operational testing of each assembly
* A list of deficiencies that require corrective action

**Maintenance Reports**

Although NFPA 80 does not list requirements for maintenance records at the present time, a paperwork trail that documents when and how the deficiencies that were recorded in the inspection reports were corrected will be immensely helpful when assessing the effectiveness of the building's maintenance program over an extended period of time. The maintenance reports should include the following information:

* Date the corrective actions were made
* Name of the person(s) performing the work
* Door number of the assembly that was repaired
* Reference to the inspection report(s) that documented the deficiencies

**Additional Information for Inspection Reports**

One of the most valuable tools that can be used to document the safety inspections is a digital camera. Pictures that show certain types of deficiencies can be extremely helpful, especially when compared to pictures of the assemblies after the corrective actions have been completed. As the old saying goes, "a *picture is worth a thousand words."*

**Section 6: NFPA 101, *Life Safety Code,* Inspection of Door Openings Overview**

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It is important to understand that NFPA 101's inspection requirements are designed to complement the inspection requirements of NFPA 80, *Standard for Fire Doors and Other Opening Protectives.* As we will discuss in more detail later, NFPA 101 directly incorporates NFPA 80's inspection requirements for fire door assemblies into its requirements. After all, it makes sense to verify that the fire door assemblies are functioning properly while at the same time ensuring that their life safety functions are not compromised.

Many non-fire-rated egress doors provide equally important life safety functions that serve to protect the occupants. For example, consider the door assemblies that are installed in stair towers of high-rise office, apartment, or hotel buildings. The door assemblies leading into the stair towers (above and below the level of discharge) most likely are fire door assemblies, which are subject to NFPA 80's safety inspection requirements. In many cases, the exterior door assemblies at the level of discharge from the stair towers are not fire-rated and therefore are not subject to NFPA 80's inspections. Consider the consequences that might arise in situations in which the building's occupants are not able to leave the stair towers due to malfunctioning or non-functioning door assemblies at the level of discharge, especially in panic situations.

NFPA 101, *Life Safety Code,* might not be the prevailing model code that is enforced by the applicable AHJs in many cities, counties, and states. However, NFPA 101 is frequently used as a fire-prevention code; its requirements are applied to buildings of specific occupancy types like schools, hospitals, and other healthcare facilities. In some cases, school districts have adopted portions of NFPA 101 for the inspection and maintenance of the means of egress and periodic fire drills.

Inspection requirements for door assemblies first appeared in the 2009 edition of NFPA 101 and were updated in the 2012 edition. The discussion that follows is based on the requirements of the 2012 edition as they clarify the types of door assemblies that are subject to periodic safety inspections.

Note: It is recommended that you refer to your copy of the 2012 edition of NFPA 101 as you progress through this section of the guide.

**Occupancies that**. **Require NFPA 101's Safety Inspections of Door Openings**

In order to understand the full scope of NFPA 101's requirements for safety inspections of door assemblies, it is necessary to discuss how NFPA 101's requirements are intended to be applied. Chapter 7, "Means of Egress," contains baseline requirements for the design, construction, protection, and maintenance of the means of egress in all types of buildings, spaces, and structures. Protecting the life safety of occupants during normal operating (non-emergency) conditions and providing for their safe evacuation during a fire, flood, earthquake, or other panic-inducing incident is the main focus of NFPA 101. At the same time, NFPA 101's requirements are designed with the occupants' need to maintain security from unauthorized ingress and intrusion in mind, while making ingress and egress accessible to persons with physical disabilities.

Unlike other model building and fire codes, NFPA 101 is comprised of four main parts: Part 1, the base chapters (Chapters 1 through 4, Chapters 6 through 11, and Chapter 43); Part 2, Chapter 5, "Performance-Based Option"; Part 3, the occupancy chapters (Chapters 12 through 42); and Part 4, Annexes A and B. The provisions and requirements of Part 1 are subject to application in the

occupancy types in Part 2. For example, Section 7.2.1.6, "Special Locking Arrangements," contains requirements for door assemblies that are equipped with delayed-egress locking systems (Section 7.2.1.6.1), but these types of door assemblies are only allowed in the occupancies that explicitly permit their use.

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There are two phrases used in Part 1 that indicate how specific provisions and requirements are applied elsewhere in NFPA 101. The first phrase, *"...where permitted in Chapters 11 through 43,"is* used in instances where the requirements are only allowed to be used in the occupancy types that explicitly permit those applications. The second phrase, *"...unless prohibited by Chapters 11 through 43,"* is used where the requirements are intended to be applied to every type of occupancy except those occupancies that explicitly disallow the application.

In the case of safety inspections of door assemblies, paragraph 7.2.1.15.1 states, *`Where required by Chapters 11 through 43, the following door assemblies shall be inspected and tested not less than annually in accordance with 7.2.1.15.2 through 7.2.1.1 5.8."* A quick study of NFPA 101's index reveals that the following occupancy chapters require safety inspections of door assemblies:

* Chapters 12 (New) and 13 (Existing) Assembly Occupancies
* Chapters 14 (New) and 15 (Existing) Educational Occupancies
* Chapters 16 (New) and 17 (Existing) Day-Care Occupancies
* Chapters 32 (New) and 33 (Existing) Residential Board and Care Occupancies

Assembly occupancies are incorporated into many different types of buildings, structures, and spaces. In most cases, the requirements for assembly occupancies become applicable when the occupant load for a room or space is designed for 50 or more persons. For example, the large meeting rooms and ballrooms in hotels are classified as assembly occupancies, even though the primary occupancy type of the building is classified as a hotel. Likewise, restaurants with maximum occupant loads of 50 or more persons are also classified as assembly occupancies. Similarly, recreational rooms and spaces in dormitory and apartment buildings are classified as assembly occupancies when the occupant load accommodates 50 or more persons.

Schools for children in Kindergarten through the twelfth grade (sometimes referred to as K-12 schools) are classified as educational occupancies. School cafeterias, auditoriums, gymnasiums, natatoriums, and other large rooms are classified as assembly occupancies when the occupant load is 50 or more persons. A common misconception is that university buildings and classrooms are subject to the requirements of educational occupancies. Generally, individual university classrooms are classified as business occupancies when the occupant load is less than 50 persons and are classified as assembly occupancies when the occupant load is designed for 50 or more persons.

Places used for child daycare, nursery schools, and adult daycare are subject to the requirements for daycare occupancies.

Residential board and care occupancies are generally buildings that are used for housing elderly persons; buildings that house persons rehabilitating from alcoholism, drug abuse, or mental health problems; assisted living facilities; and buildings for physically and mentally handicapped persons who require personal but not medical care. Dining rooms, cafeterias, and recreational rooms in these types of buildings are usually considered to be assembly occupancies when the occupant load is designed for 50 or more persons.

Accordingly, NFPA 101's safety inspections of door assemblies become applicable to many different types of buildings where the above-mentioned occupancies are located and NFPA 101's requirements are enforced.

Note: For a more complete description of these and other occupancy types, refer to annex A in NFPA 101, starting with paragraph A.6.1.2.1.

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**New or Existing Construction**

One of the differences between the inspection requirements of NFPA 101 versus those of NFPA 80 is that some of NFPA 101's requirements for existing construction vary from the requirements for new construction; there are chapters dedicated to new and existing construction. Door assembly inspectors need to be aware of these differences and understand when one set requirements takes precedence over the other.

As with NFPA 80's safety inspections, door assembly inspectors need to bear in mind the code requirements that were applicable at the time of installation when applying NFPA 101's requirements. In cases in which the original door assemblies are maintained in working condition, they should be inspected to the code requirements that were in effect at the time of installation. Door assemblies that have been replaced or that have required significant repair (e.g., replacing door leaves or replacing glazing materials) should be inspected in accordance with the code requirements that were in effect at the time of the replacement or repair work.

**Fire-Rated Swinging Door Assemblies**

It is important to be aware that NFPA 101 requires fire door assemblies, including swinging fire doors with builders hardware, to be installed in accordance with NFPA 80, *Standards for Fire Doors and Other Opening Protectives* (see paragraph 8.3.3.1).

As might be expected, NFPA 101's requirements for safety inspections of door assemblies are directly applicable to swinging fire door assemblies that are also subject to the safety inspections of NFPA 80. Accordingly, NFPA 101's safety inspections are permitted to be performed concurrently with NFPA 80's inspections. In fact, it makes a great deal of sense to perform NFPA 80's and NFPA 101's inspections at the same time. Dual inspections save time, reduce records keeping (and other administration duties/costs), increase consistency, and reduce the costs of the inspection and testing surveys.

**Smoke Door Assemblies**

Many of the 1/3-hour fire-rated door assemblies are also classified as smoke door assemblies; the labels on the door leaves include the S mark to indicate that they were tested for use in smoke door assemblies. In order for the S mark to be valid, supplemental gasketing products (not intumescent gasketing) are typically required to be installed on the door frame. Higher rated fire door assemblies are frequently used in locations that require them to also be classified as smoke door assemblies.

Section 7.2.1.15, "Inspection of Door Openings," requires smoke door assemblies to be inspected in accordance with NFPA 105, *Standard for Smoke Door Assemblies and Other Opening Protectives.* (Note: The 2010 and 2013 editions of NFPA 105 do not contain specific inspection requirements for smoke door assemblies. However, the soon-to-be-released 2016 edition of NFPA 105 most likely will contain formal inspection requirements for smoke door assemblies.)

Typically, door assemblies that are installed at fire separations are required to be smoke leakage-rated, in addition to being fire-rated. For example, door assemblies installed in horizontal exits that are in fire barriers that are also smoke barriers are required to be smoke leakage-rated. Likewise, door assemblies that protect an area of refuge are required to be smoke leakage-rated (see paragraph 7.2.12.3.4.1).

Interestingly, door assemblies that are installed in smoke barriers are not required to be fire-rated unless the occupancy type requires the smoke barrier to be of fire-rated construction (in other words, a fire barrier that is also used as a smoke barrier). Since these types of door assemblies are not fire-rated, they are not subject to the requirements of NFPA 80. Technically speaking, when the occupancy type does not require the door assemblies to be smoke leakage-rated, they are not subject to the requirements of NFPA 105.

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In cases in which the smoke door assemblies are not required to be fire-rated, the door leaves will not bear any type of physical label. Such door assemblies are usually not referred to as being smoke leakage-rated (a term that triggers the requirements of NFPA 105), but rather as *smoke-resistant doors—door* assemblies that resist the passage of smoke and that are not fire-rated. This is a subtle but important distinction that door assembly inspectors need to bear in mind, as only the smoke barrier doors that are required to be smoke leakage-rated are subject to NFPA 101's inspection requirements.

In order for smoke door assemblies to be effective and perform their intended function, the door leaves need to be closed at the time of fire. Accordingly, NFPA 101 requires doors that are installed in smoke barriers to be either self-closing or automatic-closing (see paragraph 8.5.4.4). In most cases, latching door hardware is required on smoke barrier door assemblies, which is consistent with NFPA 80's requirements for fire-rated door assemblies; non-fire-rated smoke door assemblies might not be required to have latching hardware. **(Remember, NFPA 80's requirements for fire-rated door assemblies take precedence over all other requirements—even the requirements of NFPA 101 and NFPA 105.)**

Regardless of fire rating, smoke leakage-rated door assemblies are required to be tight-fitting in their frames. Paragraph 8.5.4.1 states, *'Doors in smoke barriers shall close the opening, leaving only the minimum clearance necessary for proper operation, and shall be without louvers or grilles. The clearance under the bottom of a new door shall be a maximum of 3 / 4-in. (19 mm)."*

Neither NFPA 101 nor NFPA 105 provides specific criteria that can be used to determine when a door leaf is considered to have *"...only the minimum clearance necessary for \_proper operation,"* which makes this requirement subjective to interpretation in the field. Depending on the construction (e.g., hollow metal, flush wood, etc.) and configuration (e.g., beveled or square vertical stiles) of the door leaf, the minimum clearances needed for the door leaves to open and close without interference with the door frames varies. For instance, squared-edged hollow metal door leaves usually require an operating clearance of nearly 1/8 inch (3.18 mm) at the vertical stiles, whereas flush wood doors with beveled vertical stiles typically require operating clearances of approximately 1/16 inch (1.59 mm).

In the absence of any minimal operating clearance specifications in NFPA 101 or NFPA 105, it seems reasonable to apply the clearance requirements from NFPA 80 to smoke leakage-rated door assemblies.

Generally, smoke leakage-rated door assemblies are required in the following locations:

* Areas of refuge
* Elevator lobbies
* Fire barriers that are also smoke barriers
* Fire separations
* Horizontal exits

**Functional Testing of Door Assemblies**

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Individuals performing NFPA 101's safety inspections of fire and egress door assemblies are required to be able to demonstrate their *"...knowledge and understanding of the operating components of the type of door being subjected to testing"* (see paragraph 7.2.1.15.5). This language is vague and therefore ambiguous as to what levels of credentials, if any, the persons performing NFPA 101's safety inspections are required to provide to building owners and AHJs.

Even though NFPA 101's current requirements do not specifically mandate that the safety inspections be performed by a qualified person, NFPA 80's do. (Refer to Section 2, "General Information," of this guide for more information regarding the term *qualified person.)* Accordingly, it stands to reason that the qualified persons who are performing the NFPA 80 safety inspections should also be able to perform the NFPA 101 safety inspections.

**Inspection of Door Openings**

Section 7.2.1.15 of Chapter 7, "Means of Egress," tided "Inspection of Door Openings," lists four types of door assemblies that are required to be inspected on an annual basis (paragraph, 7.2.1.15.1). They are:

* Door leaves equipped with panic hardware or fire exit hardware in accordance with 7.2.1.7
* Door assemblies in exit enclosures
* Electrically controlled egress doors
* Door assemblies with special locking arrangements subject to 7.2.1.6

**Doors with Panic Hardware or Fire Exit Hardware**

Generally, panic hardware and fire exit hardware devices are only required by NFPA 101 to be used on door assemblies serving assembly occupancies that have occupant loads of 100 or more persons, door assemblies for educational occupancies, and door assemblies serving high-hazard contents areas (including electrical vault room door assemblies). Consequently, doors equipped with panic hardware or fire exit hardware, whether required by occupancy or used as a matter of preference, are subject to NFPA 101's safety inspections.

Paragraph 7.2.1.7.2 requires panic hardware devices to be installed on non-fire-rated door leaves, and fire exit hardware devices to be installed only on fire-rated door leaves. Remember, NFPA 101 requires fire door assemblies to installed in accordance with NFPA 80, which restricts the installation of fire exit hardware devices to door leaves that bear a label that states: *'Fire Door to Be Equipped with Fire Exit Hardware";* the requirements work together. Accordingly, fire exit hardware devices are only permitted to be installed on fire doors that are appropriately labeled.

**Door Assemblies in Exit Enclosures**

NFPA 101 describes exit enclosures as providing *"...a continuous protected path of travel to an exit discharge"* (paragraph 7.1.3.2.2). Door assemblies installed in exit enclosures are used to protect the path of egress through a portion of a building, structure, or space.

Stair towers are a type of exit enclosure. Their construction (e.g., walls, stairs, railings, etc.) is designed to provide time for occupants to safely evacuate during fires or other emergencies. The door assemblies (both fire-rated and non-fire-rated) are critical to the occupants' safe evacuation. Corridors that connect multiple stair towers or that extend from an internal stair tower to the outside are other types of exit enclosures; only door assemblies from normally occupied spaces and corridors and door assemblies that lead to the outside (public way) are permitted. Spaces that are designated as areas of refuge are located in exit enclosures.

Exit enclosures are not permitted to contain equipment (other than equipment that is needed in areas of refuge) or to be used for storage of any type. Generally, exit enclosures are intended to be free of combustible materials and contents.

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In the case of door assemblies that are installed in stair towers, Section 7.2.1.5.8 and paragraph 7.2.1.5.9 contain requirements for locking the stair side of the door assemblies and providing for re­entry into the interior of the building. (Note: There are significant differences between NFPA 101's provisions for locking stair tower doors and those in the *International Building Code* and the *International Fire Code.* Door assembly inspectors need to be aware of these differences in cases in which NFPA 101's inspections are applied to buildings and structures that were constructed under the IBC.)

**Electrically Controlled Egress Doors**

Electrically controlled egress doors are door assemblies that are equipped with mechanical and electrified hardware devices. Electrified hardware devices might be as simple as electric strikes that are connected to key pads or card readers or as complex as fully automated door operation that is integrated with electrically controlled latching hardware (e.g., electric latch retraction panic hardware or fire exit hardware).

In all cases, electrically controlled egress doors include some form of hardware device that is mounted directly to the door leaves that interrupts power to the locking device when used by the occupants to exit through the door opening. This is an important point to remember when determining when a door assembly should be classified as an electrically controlled egress door assembly or as an access-controlled egress door assembly. Access-controlled egress door assemblies are subject to the provisions and requirements of "Special Locking Arrangements" (Section 7.2.1.6.2) and usually are locked by a magnetic lock or a fail-safe electric/pneumatic bolt; no interconnected hardware device is mounted on the door leaves that causes the locking device to unlock.

Many electrically controlled egress door assemblies include some form of credential reader (e.g., key pad, card, proximity, or biometric) on the non-egress side of the assembly, which leads some AHJs to mistakenly apply the requirements for access-controlled egress door assemblies to these assemblies. Section 7.2.1.5.6, "Electrically Controlled Egress Door Assemblies," contains a list of mandatory requirements for these systems. Of particular note, paragraph 7.2.1.6.1.2 explicitly excludes electrically controlled egress door assemblies from the requirements for access-controlled egress door assemblies.

Another important point to remember regarding electrically controlled egress door assemblies is that they are permitted to be used in all of the occupancy types—their use is not qualified by the typical *"where permitted... "* or *"unless prohibited . . ."* statements. In addition, these types of door assemblies might be fire-rated, which requires compliance with NFPA 80's safety inspections.

**Door Assemblies with Special Locking Arrangements**

The term *special locking arrangements* refers to electrified hardware applications that intentionally delay (e.g., delayed-egress locking systems) the egress of occupants under normal (non-emergency) conditions or that might prevent the occupants' egress under emergency conditions (e.g., access-controlled egress door assemblies). These systems are required to permit free egress under emergency conditions or loss of power to the locking devices. In each case, these types of door assemblies are only used in occupancy groups that explicitly permit special locking arrangement applications.

Section 7.2.6.1, "Special Locking Arrangements," is comprised of three subsections, each containing provisions and requirements that pertain to a specific type of special locking arrangement. The three subsections are:

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* Delayed-Egress Locking Systems (Section 7.2.1.6.1)
* Access-Controlled Egress Door Assemblies (Section 7.2.6.1.2)
* Elevator Lobby Exit Access Door Assemblies Locking (Section 7.2.6.1.3)

**Delayed-Egress Locking Systems**

As the title indicates, delayed-egress locking systems are designed to delay the egress of the occupants during normal (non-emergency) conditions. Typically, delayed-egress locking systems are permitted to prevent the door leaves from opening for a period of 15 seconds. In rare cases, where approved by the AHJ, the delay period is permitted to be 30 seconds.

Under fire-alarm conditions and upon loss of power, doors that are equipped with delayed-egress locking systems are required to unlock in the direction of egress travel, allowing the occupants to open the doors immediately.

Delayed egress locking systems might be comprised of delayed-egress magnetic locks or delayed-egress panic hardware/fire exit hardware devices. The required function of delayed-egress locking systems is the same, regardless of the components that comprise the systems. Paragraph 7.2.1.6.1.1(3) describes the function of delayed-egress locking systems. It states:

*An irreversible process shall release the lock in the direction of egress within 15 seconds, or 30 seconds where approved by the authority having jurisdiction, upon application of a force to the release device required in 7.2.1.3.10 under all of the following conditions:*

1. *The force shall not be required to exceed 15 lbf (67 N).*
2. *The force shall not be required to be continuously applied for more than 3 seconds.*
3. *The initiation of the release process shall activate an audible signal in the vicinity of the door opening.*
4. *Once the lock has released by the application of force to the releasing device, relocking shall be by manual means only.*

Delayed-egress locking systems are only permitted to be used in occupancies of low or ordinary hazards contents, where they are explicitly permitted by the occupancy types. Additionally, the buildings are required to be protected by automatic sprinkler systems or fire detection systems throughout.

There a several other requirements listed in Section 7.2.1.6.1 that are critical to the function and operation of delayed-egress locking systems that are too detailed to include in this guide. Please refer to NFPA 101 for the complete list of requirements for delayed-egress locking systems.

**Access-Controlled Egress Door Assemblies**

The term *access-controlled egress door assemblies* brings to mind visions of door assemblies that are equipped with sophisticated electrified hardware devices, state-of-the-art credential readers, and even fully automated door operation. Persons seeking to gain entry into the building, structure, or space need to present authorized credentials (e.g., enter a PIN, swipe cards, submit fingerprints or handprints, etc.) in order to unlock and open the door. While access-controlled egress door assemblies include some form of authorized credentials for people to gain entry, the locking portion of the system is usually accomplished by a magnetic lock or by fail-safe electrified/pneumatic bolts. Locking-latched hardware or other devices that interrupt power to the locking hardware are not

installed on the door leaves.

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NFPA 101 Section 7.2.1.6.2, "Access-Controlled Egress Door Assemblies," defines the function and establishes the requirements that such door assemblies must provide and meet. Of paramount concern is the occupants' ability to safely and immediately egress through the door openings under normal (non-emergency) conditions, as well as in emergency situations.

Requirements for access-controlled egress doors appeared in the building, fire, and life safety codes as far back as the 1970s. At that time, the term *access-controlled* had a much different connotation than it does today. Key pads and magnetic stripe/Wiegand cards (circa 1980) were primarily used to unlock magnetic locks to allow entry. Many of today's electrified hardware functions and devices did not exist when the requirements for access-controlled egress doors first appeared in the codes. Consequently, when a card reader (or other authorized credential reader) is installed on a door assembly, some people assume that the door assembly is subject to the requirements for access-controlled egress door assemblies when it is not.

**Remember, the absence of door leaf-mounted devices that interrupt power to the locking devices is the key factor in identifying access-controlled egress door assemblies, not the presence of credential readers on the entry side of the door assemblies.**

Magnetic locks are a type of fail-safe locking device that requires electrical power to maintain the locked condition. When magnetic locks are used to secure an access-controlled door assembly, provisions for the occupants' unimpeded egress (under normal conditions) need to be met. To accomplish this function, a motion detector is required to be installed on the egress side of the assembly that detects occupants as they approach the door, interrupting power to the locking device and allowing the door to be opened. A secondary, redundant, manual release device (e.g., push button) is required to be installed adjacent to the door assembly that allows the occupants to unlock the door in cases in which the detector malfunctions or otherwise fails to unlock the door.

NFPA 101 requires the locking devices installed on access-controlled egress door assemblies to unlock upon loss of power to the motion detector and/or locking device. And as with the other types of door assemblies that have electrified hardware devices, access-controlled egress door assemblies are required to be connected to the fire alarm system; activation of the automatic sprinkler system also causes the doors to unlock.

Please refer to Section 7.2.1.6.2 in NFPA 101 for the complete list of provisions and requirements for access-controlled egress door assemblies.

**Elevator Lobby Exit Access Door Assemblies Locking**

*Elevator lobby exit access door assemblies locking* is another classification of special locking arrangements that appears in Section 7.2.1.6.3 of NFPA 101. The purpose of an elevator lobby exit access door assembly locking system is to prevent unauthorized access to the floor, while at the same time preventing occupants from being trapped in the elevator lobby under fire conditions.

Most of the provisions and requirements for these types of door assemblies pertain to building systems such as the fire alarm and sprinkler systems rather than the function of the hardware devices. The main distinction in this case is that the door assemblies are fire-rated, which requires the doors to have positive latching hardware in accordance with NFPA 80.

The locking hardware device might be a magnetic lock (with a passage latchset) or a fail-safe electrified locking device (e.g., mortise or cylindrical lock) that remains latched in the unlocked condition. Typically, a credential reader of some form (e.g., key pad, card, proximity, or biometric reader) is installed on the elevator side of the door assembly to allow authorized entry to the tenant space on the floor.

The provisions for the other types of special locking arrangements addressed in Section 7.2.1.6 are expressly prohibited from being applied to elevator lobby exit access door assemblies. Please refer to Section 7.2.1.6.3 of NFPA 101 for the complete list of provisions and requirements for elevator lobby exit access door assemblies locking.

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**Inspecting Door Assemblies Equipped with Special Locking Arrangements**

The persons performing NFPA 101 (and NFPA 80) safety inspections on door assemblies that are equipped with special locking arrangements need to be able to witness all of the applicable functions that are required by NFPA 101. For instance, where the systems are required to be tied into the fire alarm (or other building system), the safety inspections need to include simulating alarm conditions to verify that the door assemblies function as required. This level of functional testing needs to be coordinated and completed during other system-wide testing to minimize disruption to the routine daily use of the buildings, structures, and spaces.

**Checklist of Inspection Items**

Section 7.2.1.15.7 lists the minimum conditions and items that are required to be verified during the safety inspections.

*As a minimum, the following items shall be verified:*

1. *Floor space on both sides of the openings is clear of obstructions, and the door leaves open fully and close freely.*
2. *Forces required to set the door leaves in motion and move to the fully open position do not exceed the requirements of 7.2.1.4.5.*
3. *Latching and locking devices comply with 7.2.1.5.*
4. *Releasing hardware devices are installed in accordance with 7.2.1.5.10.1.*
5. *Door leaves of paired openings are installed in accordance with 7.2.1.5.11.*
6. *Door closers are adjusted \_properly to control the closing speed of door leaves in accordance with accessibility requirements.*
7. *Projection of door leaves into the path of egress does not exceed the encroachment permitted by 7.2.1.4.3.*
8. *Powered door openings operate in accordance with 7.2.1.9.*
9. *Signage required by 7.2.1.4.1(3, 7.2.1.5.5, 7.2.1.6, and 7.2.1.9 is intact and legible.*
10. *Door openings with special locking arrangements function in accordance with 7.2.1.6.*
11. *Security devices that impede egress are not installed on openings, as required by 7.2.1.5.12.*

Each of these inspection points requires the persons performing the safety inspections to be extremely knowledgeable of the myriad requirements that affect egress door assemblies. Due to the immense number of components that can be installed on egress (fire-rated and non-fire-rated) door assemblies, it is not possible to fully describe each application in this guide. Suffice it to say that in addition to knowing the code and standard requirements for egress door assemblies, the persons inspecting them need to have acquired a great deal of product application knowledge. For example, while the functional requirements for delayed-egress locking systems are the same regardless of whether the systems are comprised of delayed-egress magnetic locks or delayed-egress panic hardware/fire exit hardware, the inspection and testing of the system is determined by the specific components that are installed on the assembly.

**Additional Inspection Items**

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In addition to the previously mentioned list of inspection items, there are a few other items that should be included in the safety inspections, the most important of which are the glass and glazing materials that are installed in the door leaves or in sidelight or transom-light door frames.

**Glass and Glazing in Door Assemblies**

Glass and glazing materials installed in door leaves or in sidelight door frames are susceptible to damage caused by accidental impact by occupants. Occupants have been injured (sometimes seriously) when they have put their hands, forearms, feet, and legs through glass vision panels in doors, which is why the modern building and life safety codes require the use of glass and glazing materials that meet or exceed the requirements for safety materials. Tempered glass, laminated glass, and ceramic/composite glazing materials are usually acceptable for use in door assemblies with large vision panels and sidelight panels.

Another type of glass that once was widely used in door assemblies is wired glass. Since 1977, wired glass has been prohibited from being used in non-fire-rated door assemblies (and other areas) where the building and life safety codes required glass and glazing materials to comply with the Consumer Product Safety Commission's 16 CFR 1201 standard. However, clear wired glass was the predominant glazing material used in fire-rated door assemblies until recent years, when its use was severely restricted by the building, fire, and life safety codes. Consequently, clear wired glass is installed in many older door assemblies.

As far as NFPA 101's safety inspection requirements of door assemblies are concerned, **door assembly inspectors need to bear in mind the codes and standards that were applicable at the time of installation.** In instances in which door assembly inspectors witness wired glass installed in non-fire-rated door assemblies, the inspectors need to cite its presence as a deficiency that requires corrective action, meaning replacement. Tempered and laminated glass panels are generally acceptable for use in non-fire-rated door assemblies.

Glass and glazing materials installed in fire-rated doors are required to be individually marked in accordance with paragraph 8.3.4.2 and Table 8.3.4.2 in NFPA 101. The requirement for individually marked panels of glass and glazing is dependent on the code requirements that were applicable at the time of installation. Generally, glass and glazing in door assemblies that were installed in accordance with the 2006 edition of NFPA 101 were required to be individually marked. (Note: NFPA 80 contains separate marking requirements for glass and glazing materials that are installed in fire-rated door assemblies; its requirements date back to the 1990s.)

In cases in which the existing glass and glazing materials need to be replaced, the replacement materials are required to comply with the current code and standard requirements. In other words, even when the original building code requirements permitted the use of clear wired glass in fire-rated door assemblies, replacement glass and glazing needs to comply with the codes and standards that are in effect at the time of replacement. Wired glass might need to be replaced with glazing materials that are labeled for use in fire-rated doors and that meet requirements for safety glazing materials.

Door assembly inspectors should include a note or comment on their inspection reports when they witness large sections of wired glass panels installed in older fire door assemblies. Technically speaking, undamaged wire glass panels that were permitted under the original building code are not considered to be deficiencies. Even so, owners and property managers need to be made aware of wired glass in their door assemblies, as they are a potential hazard to the occupants.

**Changes in Use or Occupancy**

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Additional inspection items that should be considered part of the NFPA 101 safety inspections include recognizing changes in the building's use or occupancy over its lifetime. Some of the points that door assembly inspectors need to be aware of are:

* Minimum clear opening width
* Egress capacity
* Direction of door swing
* Panic hardware and fire exit hardware

In most cases, door assembly inspectors should not be tasked with determining that the clear width of a particular door assembly complies with NFPA 101's requirements. However, in older existing buildings where the occupancy use has changed (sometimes more than once), door assembly inspectors need to be able to recognize situations in which the existing door assembly does not meet the **minimum clear width** for the space that it serves (see Section 7.2.1.2.1, "Measurement of Clear Width").

Additionally, changes in the building's use and occupancy (especially changes that increase the occupant load of a room or space) might require new door assemblies that provide adequate **egress capacity** for the room or space that they serve (see Section 7.3.3, "Egress Capacity").

Generally, building renovations that included merging two or more rooms in order to create meeting rooms or other large spaces are considered to be assembly occupancies when the occupant load is designed for 50 or more persons. NFPA 101 requires doors that serve rooms or spaces with 50 or more persons to swing in the direction of egress travel (see Section 7.2.1.4.2, "Door Leaf Swing Direction"). When the occupant load is designed for 100 or more persons, panic hardware or fire exit hardware devices are required to be installed on the doors (see Section 7.2.1.7, "Panic Hardware and Fire Exit Hardware").

**NFPA 101's Inspection Reports and Records Keeping**

Similar to NFPA 80, safety inspections and testing performed in accordance with NFPA 101's requirements are required to be documented in writing, signed by the inspector, and kept on-site for periodic review by the AHJ. However, NFPA 101 does not contain requirements as to the level of information that is required to be captured on the inspection reports. Nor does NFPA 101 specify a minimum period of time for the retention of the inspection records. In the absence of such requirements, and considering that NFPA 101's inspections are tied to the inspections of NFPA 80, it makes sense to apply NFPA 80's inspection report and record-retention requirements as guidelines for NFPA 101's inspections.

Comprehensive inspection reports can be designed to accommodate both NFPA 101's and NFPA 80's safety inspections, reducing redundancy that would occur if the inspections were recorded separately. Acceptance testing (upon installation and following maintenance) inspections, periodic safety inspections, and ongoing maintenance records of non-fire-rated egress doors should be modeled after NFPA 80's reports for fire door assemblies.

**Section 7: Inspector Qualifications, Responsibilities, and Training Inspector Qualifications**

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NFPA 80 and NFPA 101 do not require the safety inspections to be performed by third parties, but they do require the individuals performing the inspections to have an acceptable level of knowledge and expertise. As mentioned previously, NFPA 80 requires the safety inspections of fire door assemblies to *"...be\_peormed by a qualified person with knowledge and understanding of the operating components of the type of door being subject to testing"* (paragraph 5.2.3.1).

AHJ personnel need to have confidence in the individuals who are performing the safety inspections of fire door assemblies. While NFPA 80 does not explicitly require the inspections to be performed by third-party inspectors, maintenance personnel for a building or facility might not have the necessary experience and training to accurately inspect the door assemblies.

Building owners and property management personnel need to be prepared to provide assurance to the AHJ that the persons performing the safety inspections of their fire and egress door assemblies have the requisite level of knowledge and expertise to fully evaluate the condition of the door assemblies in accordance with NFPA 80's and NFPA 101's requirements. Depending on the types of fire and egress door assemblies in the buildings, owners might decide to rely on third-party inspectors to perform these safety inspections. On the other hand, in cases in which owners have experienced maintenance personnel who are capable of performing these safety inspections, training is available from a number of sources.

**Third-Party Inspectors**

Performing the safety inspections and functional testing is a daunting task for AHJs to add to their already-burgeoning responsibilities. When one considers all of the other critical building systems that are equally important to sustaining life safety, this is especially true. Inspections of small buildings and facilities with only a few fire and egress door assemblies might take so little time that an AHJ might choose to perform these inspections. On the other hand, inspections of larger buildings and facilities require a great deal more time to perform—time that AHJs are not able to dedicate due to their other responsibilities.

Fortunately, there is a group of qualified people ready to perform safety inspections of fire and egress door assemblies. To access a directory of individuals who are certified to perform inspections of swinging fire and egress door assemblies, contact Intertek ([www.whmark.com/dhi),](http://www.whmark.com/dhi),) the Door and Hardware Institute ([www.dhi.org](http://www.dhi.org)), or the Door Security and Safety Foundation ([www.DoorSecuritySafety.org](http://www.DoorSecuritySafety.org)).

When considering using third-party fire door assembly inspectors, seek out the individuals with the specific skills and expertise necessary to inspect the types of fire door assemblies that are installed in the buildings and facilities. After identifying the types of fire and egress door assemblies in the buildings, a series of questions can be developed to help select appropriate inspectors. Likely questions might include the following:

* Which type(s) of fire and egress door assemblies are you qualified to inspect and test?
* How many fire door assembly safety inspections have you performed?
* What type of door assembly inspection training have you completed?
* Are you certified to perform safety inspections of fire door assemblies? If so, do you have documentation of your certification?
* Are you affiliated with any professional organizations that pertain to fire door assemblies? If

so, which professional organizations?

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* Does your company offer corrective action services? If not, which companies do you recommend to perform the corrective actions?
* Do you carry liability insurance?
* Are you bonded and/or licensed?

Another good practice to employ when selecting third-party inspectors is to request a list of references from clients of the prospective inspectors. Take time to thoroughly research prospective inspectors before hiring them to perform the safety inspections of fire and egress door assemblies.

**Inspector Responsibilities**

Inspectors of fire and egress door assemblies are responsible for performing the safety inspections and operational testing correctly and reporting their findings accurately to the building owner or property manager. They are simply recording and reporting the conditions of the fire and egress door assemblies as of the date and time of the inspections, nothing more. Inspectors are not imbued with the authority to force owners to bring their buildings into compliance, nor are they required to act as agents of the AHJ by reporting noncompliant assemblies directly to the AHJ's office. Only the AHJ has the authority to enforce building, fire, and life safety code-compliance.

Remember, under the requirements of NFPA 80 and NFPA 101, building owners and property managers are the parties responsible for making sure that the safety inspections and testing of fire and egress door assemblies take place as prescribed, as well as the subsequent maintenance.

**Certification for Inspectors of Swinging Fire and Egress Door Assemblies**

Intertek, who provides the recognized Warnock Hersey Mark (WHM) for building products, offers professional certification for individuals performing inspections of swinging fire and egress door assemblies with builders hardware through their Intertek Qualified Personnel (IQP) Fire Door Inspector program. In order for fire door inspectors to be eligible to enroll in the IQP program, candidates are required to successfully complete a prescribed series of courses in the Annual Fire and Egress Door Assembly Inspection Program (FDAI) presented by the Door and Hardware Institute (DHI) and pass their 4-hour proctored exam, upon which they receive the credentials FDAI.

Once enrolled in the IQP program, FDAI inspectors subscribe to periodic audits of their inspection records and are required to maintain their certification through continuing education every three years. IQP Fire Door Inspectors are issued photo-badge credentials as evidence that they have completed the required training and passed the proctored exam.

DHI's courses focus on swinging doors with builders hardware, giving the inspectors a working knowledge of numerous door, door frame, and hardware products used on these types of fire door assemblies, as well as the codes and standards that affect them. Interested parties are encouraged to contact Intertek or DHI for more information.

Intertek Testing Services, NA, Inc.

8431 Murphy Drive

Middleton, WI 53562

telephone: 608/836-4400

fax: 608/831-9279

website: [www.whmark.com/Pages/DHI/Education.aspx](http://www.whmark.com/Pages/DHI/Education.aspx)

Door and Hardware Institute 14150 Newbrook Drive, Suite 200 Chantilly, VA 20151-2232

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telephone: 703/222-2010

website: [www.dhi.org](http://www.dhi.org)

**Fire Door Assembly Inspector (FDAI) Credential**

Only individuals who complete the DHI training program that leads to the Intertek IQP certification earn the DHI Fire Door Assembly Inspector (FDAI) credential.

DHI also offers an extensive education program and four levels of professional certification for individuals working in the architectural openings industry. DHI's Architectural Hardware Consultant (AHC) professional certification began under the former American Society of Architectural Hardware Consultants (ASAHC) (circa 1940) and is the most established level of certification within its membership. DHI's other professional certifications include the Certified Door Consultant (CDC), Electrified Hardware Consultant (EHC), and Architectural Openings Consultant (AOC). The people who hold these certifications have completed hundreds of hours of educational training, accumulated significant on-the-job-training experience, and passed rigorous written examinations.

Each of DHI's certification disciplines requires candidates to complete a prescribed series of classes before they are eligible to sit for their respective certification exams. The core curriculum provides these individuals with detailed training and technical information regarding the myriad of door, frame, and builders hardware products, as well as their applications that comprise swinging fire and egress door assemblies.

DHI's educational courses are available to all interested parties. For additional information, please contact DHI or visit their website and click on the Education link.

**Locating Third-Party Inspectors**

The Door and Hardware Institute offers an online directory of individuals who have completed the DHI FDAI door assembly inspection training courses on its website ([www.dhi.org](http://www.dhi.org)) that is free of charge to all interested parties. Similarly, Intertek offers an online directory of companies and individuals who have enrolled in their IQP- Fire Door Inspection program on their website ([www.whmark.com/Pages/DHI/Education.aspx).](http://www.whmark.com/Pages/DHI/Education.aspx).)

**Section 8: Performing Safety Inspections Preparing for the Initial Inspection**

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Building owners and property managers need to gather significant information concerning the fire door assemblies within their buildings and facilities before the initial inspection can take place. Facilities with established maintenance programs will already have collected most, if not all, of the necessary information.

**Identifying Fire and Egress Door Assemblies**

Ideally, maintenance personnel have access to the as-built floor plans from when the building was constructed or last renovated, which illustrate where the fire-rated partitions and walls are located and include door opening schedules. Many healthcare facilities are required to maintain a detailed set of life safety drawings that include the locations and ratings of fire door assemblies. Armed with this level of information, locating and cataloging the fire and egress door assemblies is relatively straightforward.

Owners of older buildings might not have access to the original floor plans and door opening schedules, making locating the fire door assemblies more difficult. In some cases, the AHD's office or the office that issued the building permit (if they are not the same entity) might have archived copies of the floor plans, which could be copied and used for these safety inspections.

Worst-case scenario, the floor plans are permanently misplaced for these buildings. In these cases, the best method for identifying the fire door assemblies is to physically check each door assembly and look for the labels attached to the door leaves. Be sure to catalog them as you go to create an updated record of the building's fire door assemblies.

**Locating Fire Door Assemblies**

Interior door assemblies that open into or out of corridors and stair towers are likely to be fire-rated. Likewise, door assemblies placed across corridors typically are fire-rated. Door assemblies placed at building separations (e.g., in walls between existing construction and new construction, etc.) most likely are fire-rated.

Fire doors to rooms within other rooms are more difficult to locate. Janitorial, storage, and electrical service closets and mechanical and file storage rooms can be scattered throughout a building. Finding and cataloging all of the fire door assemblies might be a time-consuming process, but it is a worthwhile investment in improving safety for the building's occupants.

**Physical Labels Attached to Fire Door Assemblies**

Generally, labels that are attached to fire-rated door leaves are located on the hinge edge of the door and in the hinge rabbet of the door frame at approximately 60 inches above the floor. Labels are sometimes located on the top edge of the door and/or in the door rabbet of the head of the door frame when hardware items (e.g., concealed leaf continuous hinges) would otherwise cover them if they were placed in their typical locations.

Physical labels on door leaves might be made from metal or Mylar and are attached by rivets or adhesives; they are approximately an inch in height and three inches in length. Most metal fire door labels are black, but they might also be other colors, depending on the issuing laboratory and the manufacturer.

Locating and reading the information contained on the labels is necessary to fully evaluate the condition of the door assemblies. When the labels are painted over, it is not possible to read the

information printed on them, but at least you will have identified the door leaves and door frames as being fire-rated.

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Many labeled hollow metal door frames are marked with embossed (stamped) labels rather than physical labels. In most cases, the embossed markings are obscured by layers of paint that have accumulated over time. In order to read the embossments, it is necessary to remove some (or all) of the paint.

**Cataloging Fire and Egress Door Assemblies**

Once all of the fire and door assemblies have been located, an index of these door assemblies should be created so that it can be used for generating inspection, testing, and maintenance records. Each assembly should be assigned a permanent code, number, or symbol that is unique to the assembly. The following information should be the minimum information listed with each assembly.

1. **Door Number (Code or Symbol)**

Assigning individual door numbers can easily be accomplished. Depending on the building, the numbering sequence might be as simple as 1, 2, and 3. In multiple-story buildings, a prefix number or letter (e.g., 1-1, Al, B-1, etc.) might be added to the number to identify the floor where the door assembly is installed. Alternatively, other coding schemes can be devised to create identification codes for the door assemblies. The point of the door number is to be able to consistently track each assembly's performance through the inspection, testing, and maintenance programs.

In addition to assigning door numbers to the assemblies, barcodes can be used to create a unique code for each assembly. Generic barcodes of various designs can quickly be scanned by handheld devices (e.g., PDAs, smart phones, tablets, and handheld PCs) into inspection-based software (or apps) to enter or recall detailed information concerning specific door assemblies.

1. **Location of the Assembly in the Building**

The description of the location of the assemblies within the structure should be purposefully simple. For example, "Door Al first-floor stair tower" indicates where the door assembly is   
located.

1. **Type of Door Assembly**

The type of door assembly should indicate whether the assembly is a swinging door with builders hardware or any of the other assembly types addressed in NFPA 80 that are subject to the inspection, testing, and maintenance requirements therein.

1. **Fire-Protection Rating of the Assembly**

Fire-protection rating is typically expressed in hourly ratings (see annex D of NFPA 80 for a complete explanation). Door assemblies are rated for 1/3-hour (20 minutes), 1/2-hour (30 minutes), 3/4-hour (45 minutes), 1-hour (60 minutes), 1-1/2-hour (90 minutes), and 3-hour (180 minutes) durations.

1. **Comments and/or Remarks**

Be sure to record details of fire and egress door assemblies that might appear atypical. For example, oversized fire door assemblies might have a special type of label that is referred to as a *construction label,* or there might be a *certificate of construction* on file with the AHJ for that specific door assembly. It is beneficial to research and document these unique openings during the initial

inspection so that time will not be spent reconfirming the same details during subsequent inspections.

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**Documenting Approved Exceptions**

Occasionally, custom or specially engineered fire door assemblies are created to suit conditions that are unique to a specific building or structure. These assemblies are constructed using the same materials and techniques as the standard units but are not technically classified as fire door assemblies since they have not been formally subjected to fire door tests. Prior to these custom assemblies being installed, the AHJ will require documentation attesting to the construction of the assembly.

When the AHJ approves a custom fire door assembly, a formal letter of approval is issued recording the specifics of the approval. Be sure to retain a copy of this approval with the index of door assemblies for future inspection cycles.

**Performing the Inspections**

A final step in preparing to conduct inspections is to consult with the AHJ's office to confirm its expectations for the safety inspections and how it intends to enforce compliance with the requirements of NFPA 80 and NFPA 101. In most cases, the local AHJ office will have requirements that are specific to its jurisdiction that need to be incorporated into the inspection and testing process. Likely areas of concern are:

* Clearances between the perimeter of the door and the door frame
* Painted, removed, or reinstalled labels
* Blocking fire doors in the open position
* Plant-ons and laminated overlays
* Significantly damaged or inoperable fire door assemblies

Once all of the initial preparation work has been completed, the next step is to perform the inspection and testing of the fire and egress door assemblies. Regardless of whether the inspections are performed by third-party inspectors or the owner's maintenance personnel, the inspectors should be provided with the index of fire and egress door assemblies to help with accurate identification and inspection. Ideally, the owner's maintenance personnel should accompany third-party inspector(s) and be equipped to make minor adjustments during the operational tests; adjusting door closers and latching devices during the walk-through inspections increases the number of compliant openings recorded in the inspections.

Inspectors need to conduct these inspections with the following key points in mind:

* Presumption of correct applications
* Original building, fire, and life safety code requirements at the time of installation
* Practical application of inspection criteria

**Presumption of Correct Applications**

It needs to be stressed that the inspectors should perform these inspections with the fundamental presumption that the correct door, door frame, and builders hardware products were originally installed as a fire door assembly and that the assembly provides the appropriate level of fire protection for the area of the building it serves. Inspectors should not be burdened with determining the correct level of fire-protection rating for each fire door assembly or locating and verifying fire barriers within the buildings.

However, inspectors need to be capable of recognizing incorrect applications when they are discovered during the inspections. For instance, a 3/4-hour fire door leaf installed in a stair tower fire door assembly most likely is an erroneous application. (Stair towers typically require 1-hour or 1-1/2-hour fire-protection-rated door assemblies.) Likewise, a stair tower door assembly with large vision panels might be indicative of an incorrect application and requires closer inspection to verify its compliance with NFPA 80.

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**Original Building, Fire, and Life Safety Code Requirements**

In addition to presuming that the correct doors, door frames, and builders hardware components were installed, inspectors need to be aware of the building, fire, and life safety codes that were applicable at the time of installation—the importance of this point cannot be overstated. In other words, inspectors should not apply the capabilities, limitations, and requirements for modern products to assemblies that were installed many years ago. For example, certain fire doors are listed for less bottom rod/bolt applications using modern products. However, very few (if any) of the older existing fire doors were designed or tested for this particular application. Therefore, these older fire door leaves cannot be permitted to be equipped with the less bottom rod/bolt application without consulting the manufacturers, the testing laboratory, and the AHJ.

**Practical Application of Inspection Criteria**

Inspectors and AHJs need to apply the inspection criteria of NFPA 80 pragmatically. For example, NFPA 80 Sections 4.8.4 and 6.3.1.7 are both tided "Clearances." Each section lists specific maximum clearance dimensions permitted around the perimeter of the door leaf when it is closed and latched into the door frame.

Many people are of the opinion that it is unrealistic to expect fire door assemblies to be installed within the specified clearance requirements of NFPA 80. In fact, when the door frames are properly installed (e.g., level, square, plumb, and true), the clearance dimensions between the perimeter of the door(s) and the door frames are usually within NFPA 80's requirements. Poor door frame installation techniques and practices are the most frequent causes of noncompliant clearances on fire doors assemblies, as well as the causes of other deficiencies—installation of the door frames is the single most important factor

Recently, new door frame and builders hardware products have been developed to help mitigate the excessive clearance dimensions. AHJs need to determine the acceptable maximum clearance dimensions permitted within their jurisdictions before requiring corrective actions to be taken, which might include allowing new products to be used or requiring the door leaves to be replaced.

**After the Inspections**

Upon completion of the visual inspections and operational testing of the fire door assemblies, inspectors might need to spend additional time verifying technical conditions they witnessed during the inspections before they are able to submit their reports to the owner. The language used in NFPA 80 frequently includes statements such as *"...as specified in the individual manufacturer's published listings."* Statements like these are designed to accommodate the varying capabilities and limitations of the products produced by the manufacturers.

NFPA 80 recognizes that manufacturers are constantly developing new products and continuously subjecting them to fire testing. For example, the maximum size and configuration of vision lights installed in fire door leaves varies from manufacturer to manufacturer. In fact, the dimensions might vary within a particular manufacturer's product line, depending on the internal

construction of the door leaves. What might seem to be unacceptable at first might turn out to be acceptable after the research has been completed.

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Once all of the necessary research has been completed and the reports are finalized, the inspectors will present their reports to the owners and property managers. In turn, the owners and property managers need to decide how to proceed with the information documented in the inspection reports. Certain corrections might be as simple as adjusting hardware items (e.g., door closers, etc.) or removing kick-down door holders. Other corrective actions might be more complicated and require replacing major components or entire assemblies. All corrective actions made to fire door assemblies need to be fully documented, correlated to the inspection reports, and presented to the AHJ with the inspection reports.

It is important to point out that the fact that fire door assemblies develop deficiencies is not a violation of the building, fire, or life safety code; they are mechanical equipment that is subject to wear over time. Failure to maintain fire door assemblies in proper operating condition is the action (or inaction, as the case may be) that violates the building, fire, and life safety codes. Once deficiencies have been discovered, owners or property management personnel are on notice that they need to take immediate corrective action. That action might require ordering replacement parts that takes weeks to fulfill, during which time the assembly might need to be temporarily fixed in the closed position—provided that the means of egress is not compromised, that is. As long as the AHJ is confident that corrective actions have been made or are in the process of being made, the building owner is in compliance with the intent of NFPA 80, as well as the other applicable codes.

**Summary Report**

Inspectors should summarize their findings as of the date of the visual inspections and operational testing. The summary should include documentation supporting special applications and/or significant areas of concern observed during the inspections.

Thorough summaries will cover: (1) the general condition of the fire door assemblies, (2) the total number of inspected assemblies, (3) the number of assemblies with deficiencies, (4) the nature of the deficiencies (e.g., nuisance level: those requiring minor adjustments to operating hardware; critical-level: those with significant deficiencies—missing door leaves or broken glass, etc.), and (5) emphasis on the need to maintain fire door assemblies in proper working order.

Summary reports should include:

* Date and time of inspection and testing
* Name and physical address of building or facility
* Name and credentials of inspector
* Inspector contact information
* Summary statements
* Signature of inspector
* Signature of building owner or property management

**Detailed Report**

An inspection record of each fire door assembly needs to be included with the summary report to help the AHJ determine the overall condition of the fire and egress door assemblies within the building, structure, or space. This detailed information will guide the AHJ during the review of the inspection documentation. AHJs might spot-check the fire and egress door assemblies to verify the accuracy of the inspection reports before issuing their approval.

Detailed reports should include the following information for each assembly:

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* Door number or other unique identifier
* Type of fire door assembly
* Fire-protection rating
* Remarks and/or comments (including documentation of special conditions affecting the assembly)
* List of deficiencies
* Recommended corrective actions

**Maintenance Report**

A maintenance report for each fire and egress door assembly should be available for the AHJ's review in order to confirm that the necessary corrective actions have been completed or are in the process of being completed.

Maintenance reports should include the following information for each assembly:

* Door number or other unique identifier
* Date of corrective action
* Description of corrective action
* Date of operational test following repair or replacement
* Name (and company information, when applicable) of the person(s) performing the work

**Repairing and Replacing Fire Door Assemblies**

Before making repairs to fire door assemblies, owners and property managers need to confirm that the necessary work is permitted to be performed and will not further compromise the fire door assemblies. Section 5.5, "Maintenance," gives direction for the repair and testing of fire door assemblies. Paragraph 5.5.1 states, *"Repairs shall be made, and defects that could intefere with operation shall be corrected without delay."*

Repairs to fire door assemblies also need to be performed in compliance with the requirements of Section 4.1.3, "Appurtenances," paragraph 5.1.3, "Replacement," and Section 5.1.4, "Field Modifications."

**Record Keeping**

In most jurisdictions, the AHJs are not able to physically inspect each building and structure in their jurisdictions every year. However, an AHJ's inability to reach each building in a year is not sufficient reason for postponing safety inspections of fire and egress door assemblies and does not alleviate owners or property managers from complying with the requirements of NFPA 80 or NFPA 101.

During the AHJ's building inspections, owners and property managers need to be able provide evidence that the fire and egress door assembly safety inspections have taken place since the AHJ's last visit. As previously mentioned, Section 5.2, "Inspection and Testing," requires the **periodic safety inspection records to be retained for a minimum of three years** (see paragraph 5.2.2.2). In cases in which the owner or property manager might seek to transition to a performance-based inspection program, the inspection records might need to be retained for five or more years in order to document the effectiveness of the door maintenance program.

**Section 9: Sample Forms**

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**Inspection Summary Report Form**

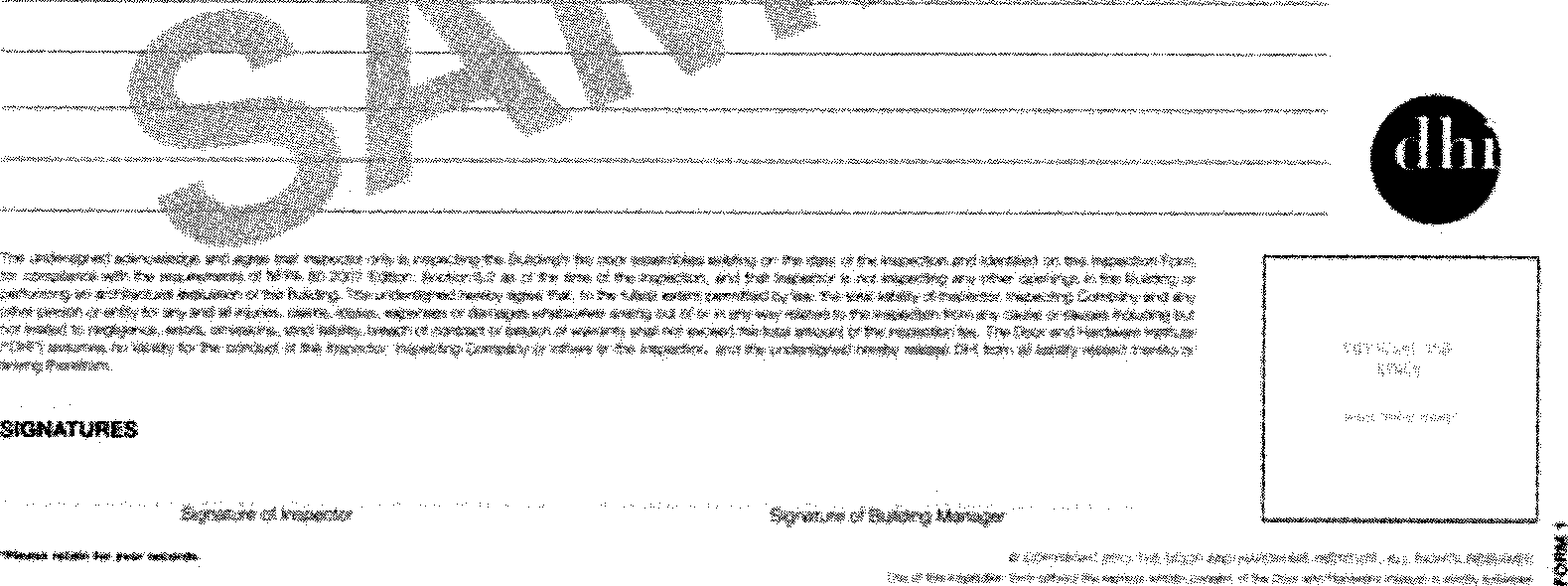
INSPECTION SUMMARY REPORT \*WM

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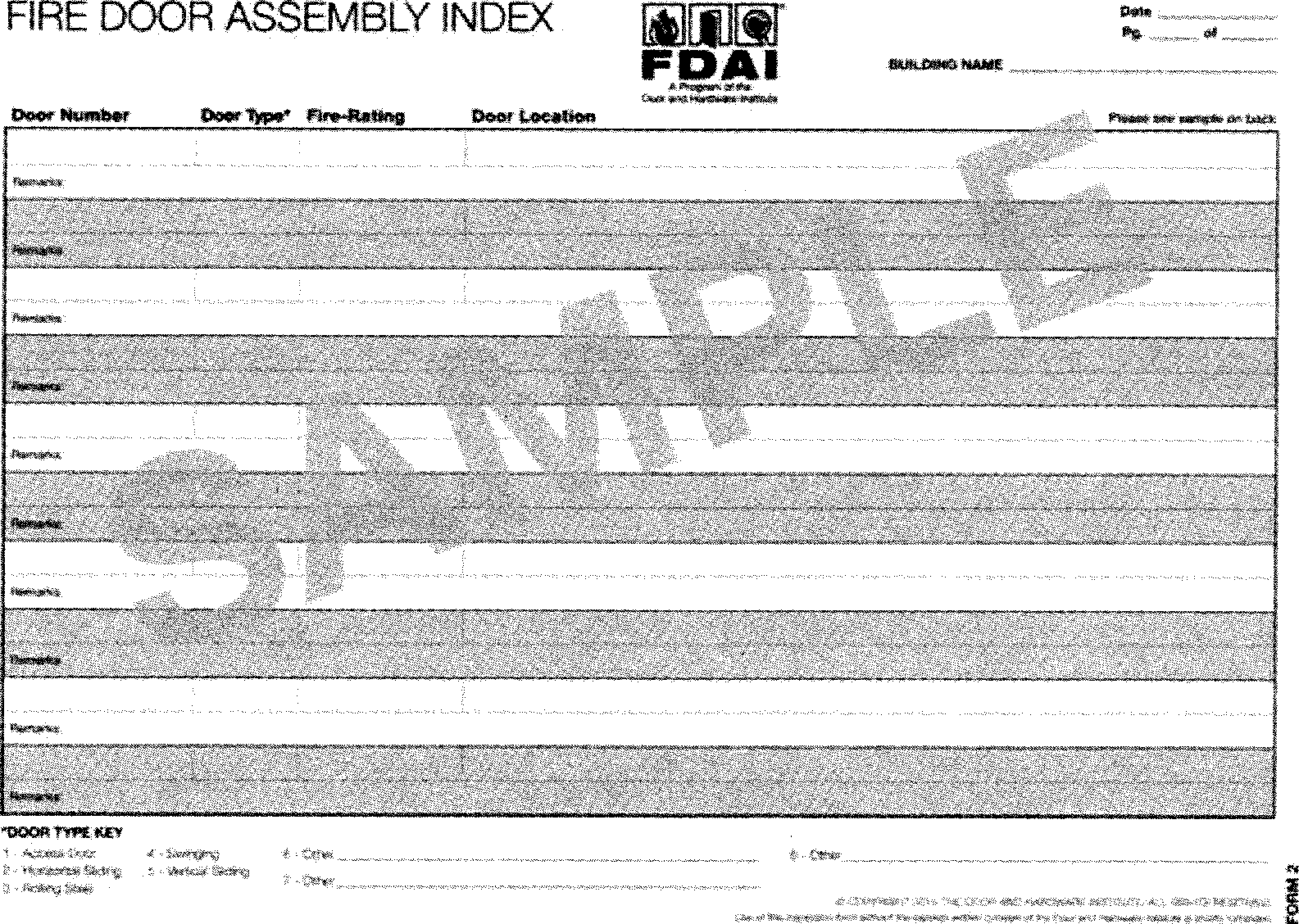
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**ADDRESS**

**SUMMARY**



**Fire Door Assembly Index**



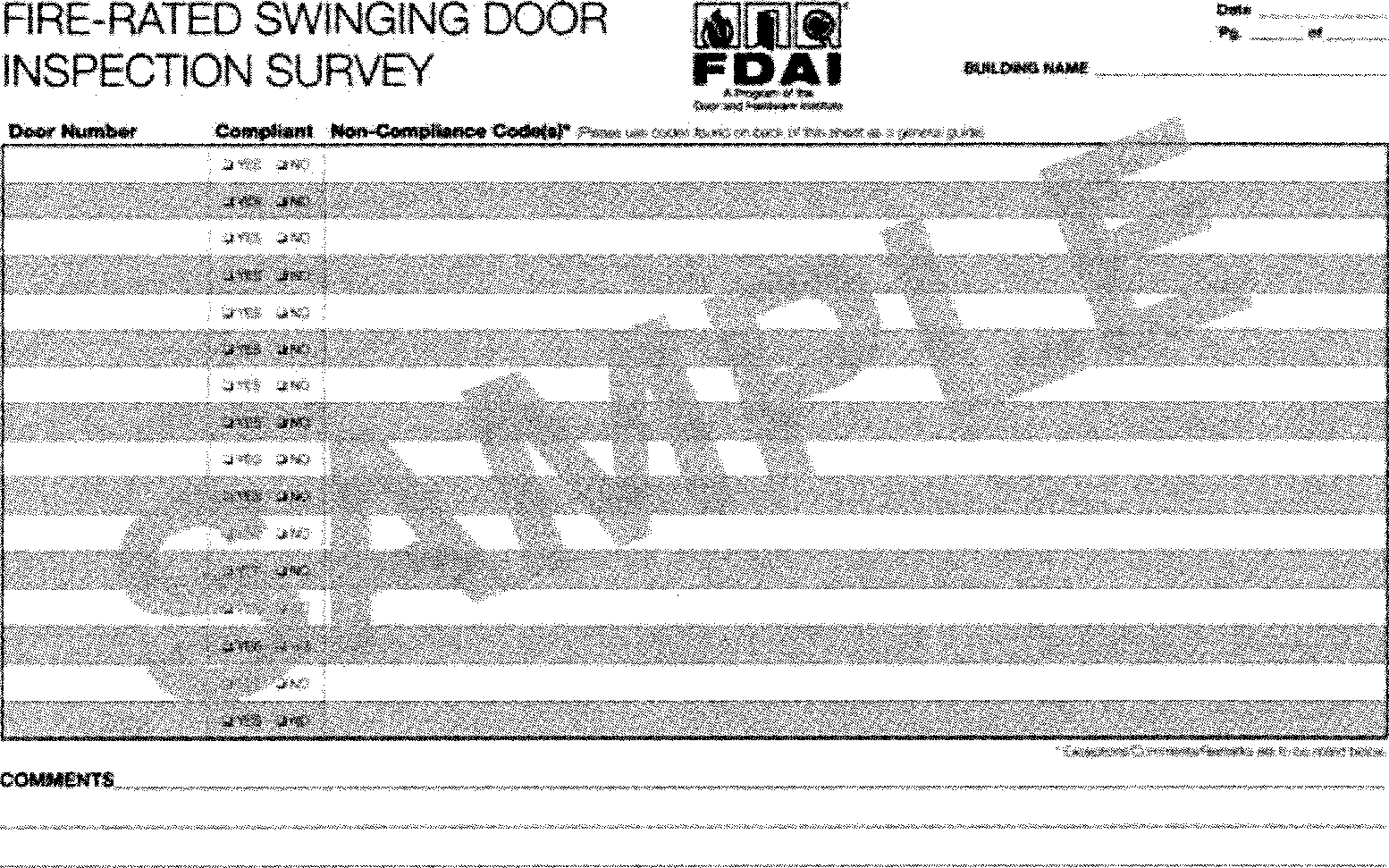
FIRE DOOR ASSEMBLY INDEX

**Fire Door Assembly Inspection Survey Form**

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This form is intended to be used to list detailed information (codes) for each fire door assembly during the inspections and testing.

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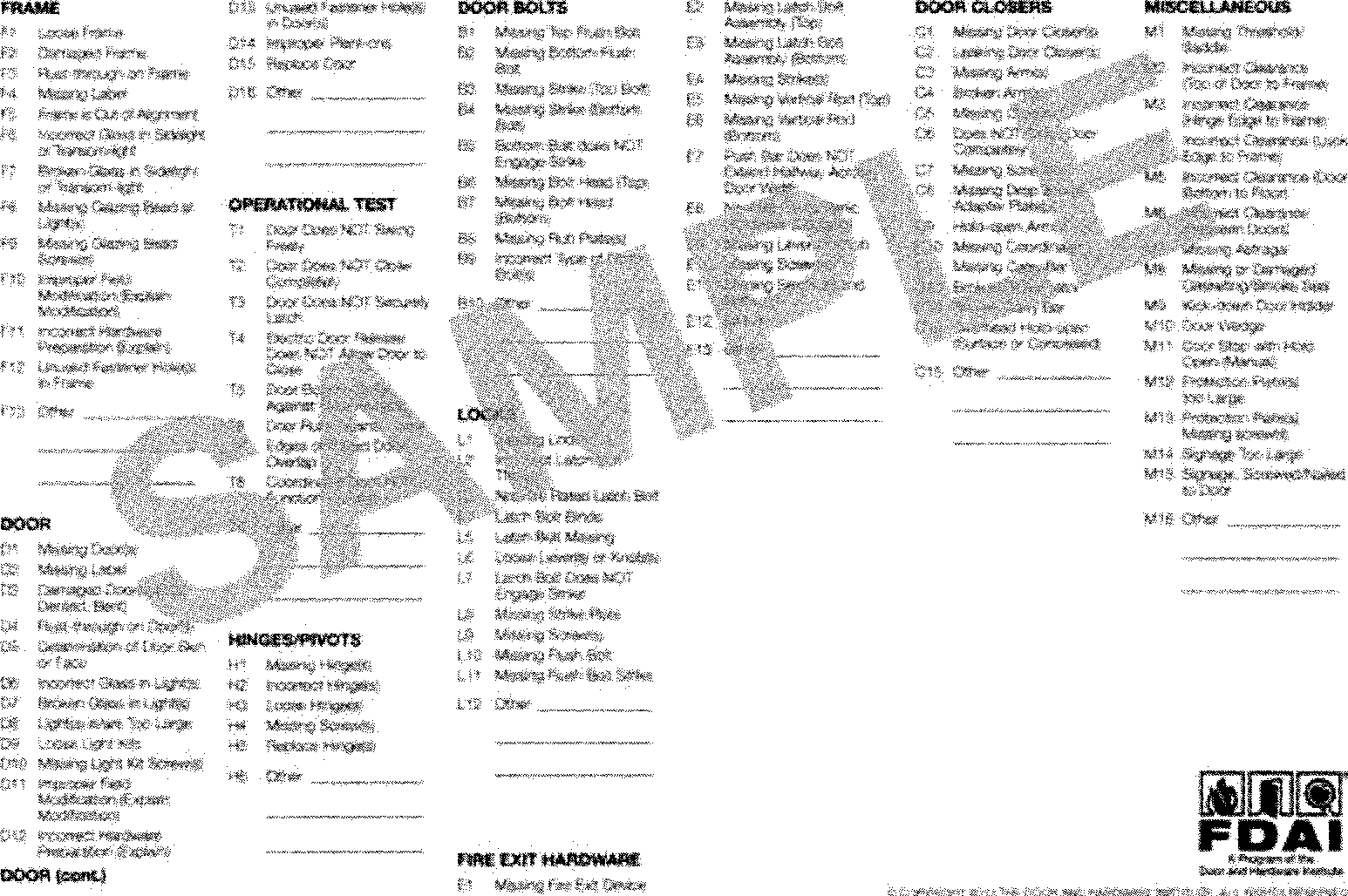


FIRE-RAI ED SWINGING DOOR

INSPECTION SURVEY

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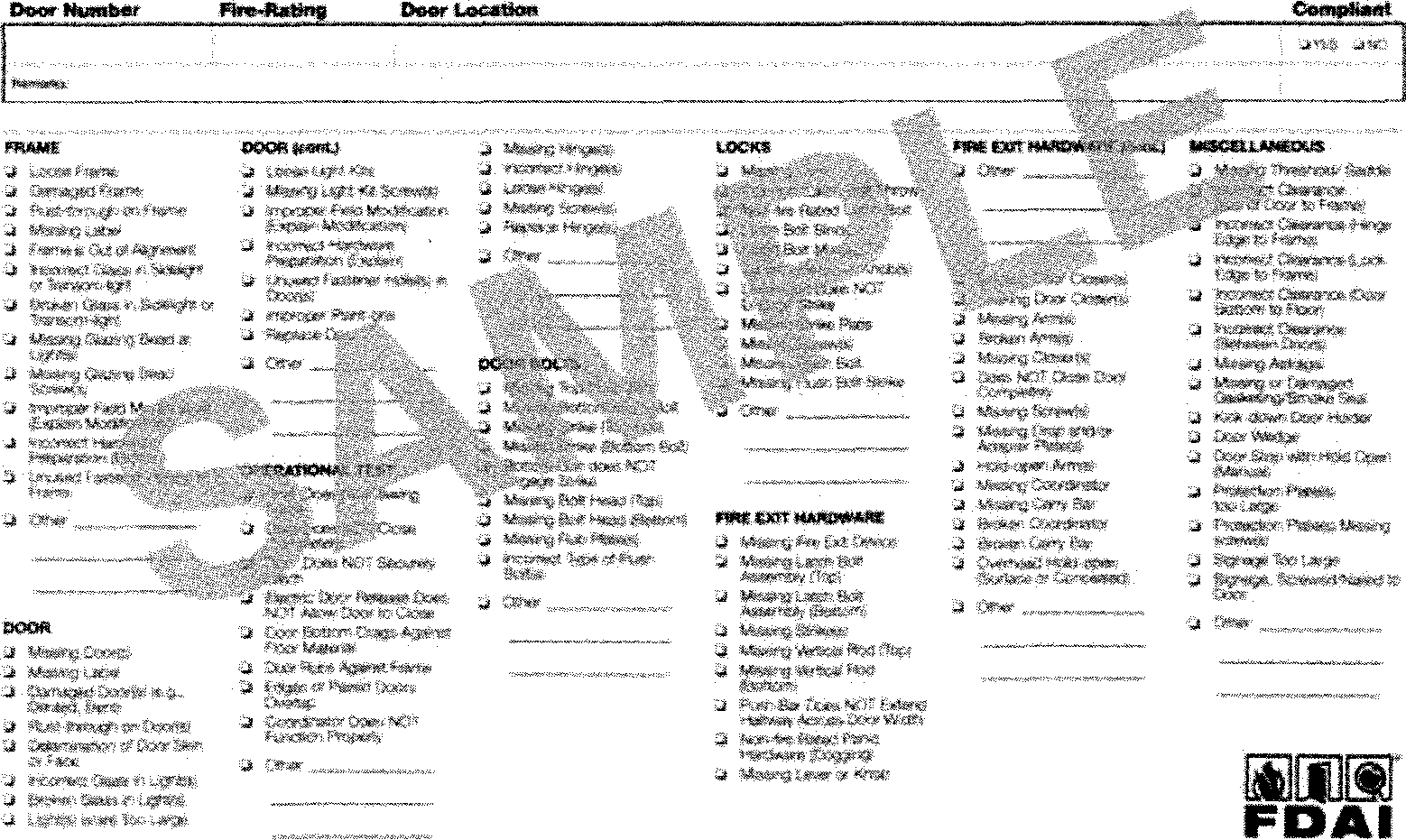
DOOM law.,

**Fire Door Inspection Checklist**

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INSPECTION CHECKLIST

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**Section 10: Other Types of Fire Door Assemblies**

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Typically, modern buildings have other types of fire door assemblies that are equally important to successfully protecting the lives and property of the occupants. These other types of fire door assemblies range from access doors, which are the least complicated, to large sliding or rolling fire doors that require specialized knowledge to accurately perform inspection, testing, and maintenance services.

Contact professionals from the respective industries to locate qualified persons to perform safety inspections for these types of fire door assemblies.

**Section 11: New Construction**

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The majority of this manual is dedicated to the necessity of maintaining fire and egress door assemblies in existing buildings. However, AHJs need to consider how they might address the installation and testing of fire and egress door assemblies in new construction and renovation projects once annual inspections become mandatory in their jurisdictions.

At first glance, one might wonder why inspections of fire and egress door assemblies in new buildings are necessary. However, when you consider the overwhelming numbers of deficiencies (found on swinging fire doors with builders hardware) that stem directly from incomplete or poor installation, you begin to understand the necessity for inspections at this early stage in the building's lifespan.

Your office might decide to require full inspection and functional testing of fire and egress door assemblies on or before the date of substantial completion of new buildings to ensure that they are properly installed *before* the certificate of occupancy is issued. At this point in a construction project, the owner, architect, contractor, and material supplier(s) have complete sets of door and hardware schedules and can easily document that their installation and function meet the requirements of NFPA 80 and NFPA 101. Corrective actions, when required, can be readily completed, ensuring that the fire and egress door assemblies in new buildings have been installed correctly and are functioning as intended.

Another advantage of requiring formal safety inspections of fire and egress door assemblies before the issuance of the certificate of occupancy is that it determines the future inspection cycles for the building once it is occupied.

Design officials and facility maintenance staff should collaborate in the design phase to locate

the high frequency usage and high abuse door assemblies in the facilities. Together they can provide the most efficient assembly design both in function and ease of maintenance over the lifetime of the buildings.

To ensure the fire and egress doors are 100% compliant with NFPA 80 inspection requirements, design officials should incorporate into the construction documents, the requirement of a fire door assembly inspection prior to issuing the certificate of occupancy. The initial fire door assembly inspection will provide the starting point for facility managers to build in the annual fire door and egress door inspections to ensure the safety of occupants, firefighters and first responders in the event of fire or emergency.

From the building owners' and facility managers' perspective, ensuring that fire and egress door assemblies are compliant with all of the codes and standards on the first day of occupancy reduces premature maintenance costs and provides a baseline for all future inspection cycles. Theoretically, routine inspection, testing, and maintenance of door assemblies that are correctly installed and that are functioning in accordance with code requirements will be less costly over the lifetime of the

building.

**Section 12: Summary**

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Fire door assemblies are designed to withstand tremendous pressures and stresses under fire conditions. Metals rapidly expand, wood is consumed, but the door leaves must remain within the opening *and* form impenetrable barriers for their rated duration (which might be up to three hours). Their fire protection provides occupants time to escape to the outside or to reach an area of refuge within the building where they can wait to be rescued.

Many swinging fire door assemblies have complicated and sophisticated hardware products that provide convenience and security under normal conditions. These assemblies require an immense level of expertise to coordinate their functions with their fire-protection properties.

The information presented in this guide is intended to provide guidance to building owners and property managers who are responsible for maintaining the fire and egress door assemblies in their buildings and facilities. Each building or maintenance department should have a copy of NFPA 80 and NFPA 101 available for reference during inspections (and when performing maintenance on fire and egress door assemblies).

NFPA makes many of its publications available for reading online through its website at no charge. Users are required to establish an account on the website, which typically includes setting up their name and email address. To view the current edition of NFPA 80 or NFPA 101, simply go to [www.nfpa.org/80](http://www.nfpa.org/80) or [www.nfpa.org/101](http://www.nfpa.org/101) respectively, and follow the on-screen instructions.

We strongly urge you to proceed with these inspections cautiously. Seek out qualified individuals or training that will aide you and your staff in fulfilling your obligations under NFPA 80 and NFPA 101. Building owners and property managers are encouraged to contact their local AHJ's office and discuss the method in which these inspections will be enforced in their communities.

**Section 13: Glossary**

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The following list of terms is provided to establish a consistent level of understanding when reading this document. Italicized terms are excerpted from Chapter 3 of NFPA 80.

*Active Leaf. The first operating door of a pair, which is usually the door in which a lock is installed Approved. Acceptable to the authority having jurisdiction*

Architectural Hardware Consultant (AHC). An industry professional, certified by the Door and Hardware Institute (DHI), with specialized knowledge of the specification and installation of builders hardware products applied to architectural openings

Architectural Openings Consultant (AOC). An industry professional, certified by the Door and

Hardware Institute (DHI), who has attained AHC, CDC, and EHC professional certifications *Astragal (Overlapping). A horkontal or vertical molding attached to one leaf of a pair of doors*

*Astragal (Split). A horkontal or vertical molding attached to both leaves of a pair of doors*

*Authority Having Jurisdiction (AHJ). An organkation, office 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 the door or window to close when activated by a fusible link*

*or detector*

*Automatic-Closing* ***Door.*** *A door that normally is open but that closes when the automatic-closing device is activated*

Certified Door Consultant (CDC). An industry professional, certified by the Door and Hardware Institute (DHI), with specialized knowledge of the specification, fabrication, and installation of architectural doors and frames

*Closing Device. A means of closing a door from the \_partially or fully opened position*

*Coordinator. A device used on pairs of swinging doors that prevents the active leaf from closing before the inactive leaf closes*

*Door and Hardware Institute (DHI). The Door and Hardware Institute is a professional organkation dedicated to promoting life safety in public buildings through the development of codes and standards affecting the built environment. DHI provides training and is the certification body for AHC, CDC, EHC, and AOC professional certifications.*

*Door Closer (Swinging). A labeled device that, where applied to a door and frame, causes an open door to close by mechanical force. The closing speed can be regulated by this device.*

*Door Protection Plate. Protective material applied to the face of a door and generally made of approximately 0.05 in. (1 .2 mm) thick brass, broRe, aluminum, or stainless steel or 1 /8 in. (3.2 mm) thick laminated plastic Egress Side. The side of an opening from which traffic exits*

Electrified Hardware Consultant (EHC). An industry professional, certified by the Door and Hardware Institute (DHI), with specialized knowledge of architectural door openings operated by electrified architectural hardware and access-control systems

*Fail-Safe Device. A device that will provide its intended function upon loss of \_power*

*FDFR. Fire door failure rate measured averaged over a \_period of time*

*Fire Door. The door component of a fire door assembly*

*Fire Door Assembly. Any combination of a fire door, a frame, hardware, and other accessories that together provide a specific degree of fire protection to the 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 for swinging and sliding fire doors by the door manufacturer as a component \_part of the listed door assembly*

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*Fire Exit Hardware. Labeled devices for swinging fire doors installed to facilitate safe egress of \_persons and generally consisting of a cross bar and various types of latch mechanisms that cannot hold the latch in a retracted locked position*

*Fire Protection Rating. For the purposes of this standard* [NFPA 80], *the designation indicating the duration of the fire test exposure to which a fire door assembly or fire window assembly was exposed and for which it successfully met all acceptance criteria as determined in accordance with NFPA 252,* Standard Methods of Fire Tests of Door Assemblies, *or NFPA 257,* Standard on Fire Test for Window and Glass Block Assemblies, *respectively*

*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*

*Flush Bolts (Automatic). A mortised bolt installed near the top or bottom of the inactive leaf of a pair of doors that holds the inactive leaf in a closed position until the active leaf is opened*

*Flush Bolts (Manual). A mortised bolt installed near the top or bottom of the inactive leaf of a pair of doors in which the bolts are manually extended or retracted into or out of the header or sill by means of a lever*

*Inactive Leaf. One door of a pair of doors that ordinarily is latched closed; the second operating door of a pair*

*Labeled. Equipment or materials to which has been attached a label, symbol, or other identifting mark of an organkation that is acceptable to the authority havingjurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or\_peiformance in a specified manner*

*Latching Device. A spring-loaded latch bolt or a gravity-operated steel bar that, after release by physical action, returns to its operating position and automatically engages the strike plate when it is returned to the closed position*

*Listed. Equipment, materials, or services included in a list published by an organkation that is acceptable to the authority havingjurisdiction and concerned with evaluation of \_products or services, that maintains periodic inspection of \_production of listed equipment or materials or \_periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose*

*Minimum Level of Quality. An established level of \_peormance for products, systems, installations, and construction that is the minimum acceptable under a building code or standard; not intended to exclude or prohibit products, systems, installations ,or construction that provides increased levels of performance*

*Mullion. A fixed or removable vertical member set in a double door opening that allows both leaves to be active or set between a door and a side light or a separate, framed, glaed area*

*NC. Number of fire door assemblies inspected and tested in a period of time*

*NF. Number of failures of fire door assemblies identified during inspections and testing over a period of time Plant-On. A decorative trim applied to the surface of a door*

*Qualified Person. A person who, by possession of a recognked degree, certificate, professional standing, or skill, and who, by knowledge, training and experience, has demonstrated the ability to deal with the subject matter, the work, or the project*

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

*Self-Latching Bolt. An automatic-latching device that engages in a keeper to hold a door leaf in a closed position and that can only be released manually*

*Shall. Indicates a mandatory requirement*

*Should. Indicates a recommendation or that which is advised but not required*

*Side Light. An opening in a fire door frame alongside the fire door opening that is filled with glaing material Side Panel Frame. A door frame prepared for the installation of a fixed solid metal or wood panel alongside the door opening*

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*Sidelight Frame. A fire door frame prepared for the application of a glaing material alongside the door opening Spring Hinge. A closing device in the form of a hinge with a built-in spring used to hang and close the door Standard. A document, the main text of which contains only mandatory provisions using the word `shall" to*

*indicate requirements and which is in a form generally suitable for mandatory reference by another standard or*

*code or for adoption into law. Non-mandatog provisions shall be located in an appendix or annex, footnote, or*

*fine printnote and are not to be considered a part of the requirements of a standard.*

*Strike Plate. A wear plate for projecting hardware or a wear plate and keeper for a latch bolt*

*Transom. An opening in a fire door frame above the door opening that is filled by a solid panel or with glc4ng material*

*Transom Light Frame. A fire door frame prepared for the application of a glo4ng material above and alongside the door opening*

*Transom Panel Frame. A fire door frame prepared for the application of solid metal or wood panels above and alongside the door opening*

*Wired Glass. A glaing material with embedded wire mesh*

**Section 14: About the Door Security and Safety Foundation**

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The Door Security and Safety Foundation (DSSF) is dedicated to promoting secure and safe openings that enhance life safety, through outreach efforts that include awareness and education within the building design, code authority, and facility management communities.

Funding for the DSSF's programs and services is provided by donations from manufacturers, sales agencies, and distributors of architectural door and hardware products, as well as contributions from private individuals.

For more information, please visit the Foundation's website at [www.doorsecuritysafety.org](http://www.doorsecuritysafety.org)

