An Exploration of Regulatory Compliance

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Presentation Overview

- Codes, codes, codes
- Where to start? What do I need to know?
- Major healthcare code considerations
- Common issues
Learning Objectives

- Understand the application of NFPA 101 for CMS participating facilities
- Review occupancy classifications of a hospital
- Obtain a fundamental understanding of major healthcare code considerations
- Recognize commonly cited findings
Applicable Codes

  - With exception to Chapters 7, 8, 12*, and 13* (*May be applied to DNV facilities)


- State Building and Fire Codes
  - Referenced Standards:
    - NFPA 13
    - NFPA 72
LSC Application

JULY 5, 2016 – Effective Regulation Date

Prior

May be evaluated as “existing construction” (LSC Existing Occupancy, i.e. Chapter 19)

Chapter 43

After

Buildings, additions, renovations, or changes (LSC New Occupancy, i.e. Chapter 18)
<table>
<thead>
<tr>
<th>Work Category</th>
<th>Section</th>
<th>Occupancy Chapter</th>
<th>Additional (Unplanned) Work Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repair</td>
<td>43.3</td>
<td>Existing (features repaired)</td>
<td>No</td>
</tr>
<tr>
<td>Renovation</td>
<td>43.4</td>
<td>Existing</td>
<td>No</td>
</tr>
<tr>
<td>Modification</td>
<td>43.5</td>
<td>New</td>
<td>No</td>
</tr>
<tr>
<td>Reconstruction</td>
<td>43.6</td>
<td>New</td>
<td>Yes</td>
</tr>
</tbody>
</table>

- Change of Use
- Change of Occupancy Classification
- Addition
Existing Reduction Allowance

May Be Reduced (4.6.7.4)

New Compliance – No Further Reduction (4.6.7.5)

Minimum Existing Compliance
LSC Occupancy Classifications

- Assembly (NFPA 101 Chapter 12 / 13)
- Business (NFPA 101 Chapter 38 / 39)
- Ambulatory Health Care (NFPA 101 Chapter 20 / 21)
  - An occupancy that provides outpatient services for four (4) or more patients incapable of self-preservation
  - Ambulatory Surgical Centers (ASCs) - regardless of number of patients
  - Hospital Outpatient Surgical Departments - regardless of number of patients
- Healthcare (NFPA 101 Chapter 18 / 19)
  - An occupancy that provides inpatient services for four (4) or more patients that are mostly incapable of self-preservation due to age, physical or mental disability, or because of security measures not under the occupants control
The hospital designs and manages the physical environment to comply with the Life Safety Code

- LS.01.01.01, EP 3 - Hospital maintains current and accurate drawings
  - Sprinkler protection
  - Locations of all hazardous areas
  - Locations of all fire-rated barriers
  - Locations of all smoke-rated barriers
  - Sleeping and non-sleeping suite boundaries, including the size of the identified suites
  - Locations of designated smoke compartments
  - Locations of chutes and shafts
  - Any approved equivalencies or waivers
Healthcare Considerations - Smoke Barriers

18.3.7.1 Buildings containing health care facilities shall be subdivided by smoke barriers (see 18.2.4.3), unless otherwise permitted by 18.3.7.2, as follows:

1. To divide every story used by inpatients for sleeping or treatment into not less than two smoke compartments
2. To divide every story having an occupant load of 50 or more persons, regardless of use, into not less than two smoke compartments
3. To limit the size of each smoke compartment required by 18.3.7.1(1) and (2) to an area not exceeding 22,500 ft$^2$ (2100 m$^2$), unless the area is an atrium separated in accordance with 8.6.7, in which case no limitation in size is required
4. To limit the travel distance from any point to reach a door in the required smoke barrier to a distance not exceeding 200 ft (61 m)

19.3.7.1 Smoke barriers shall be provided to divide every story used for sleeping rooms for more than 30 patients into not less than two smoke compartments (see 19.2.4.4), and the following also shall apply:

(1) The size of any such smoke compartment shall not exceed 22,500 ft$^2$ (2100 m$^2$), and the travel distance from any point to reach a door in the required smoke barrier shall not exceed 200 ft (61 m).
(2) Where neither the length nor width of the smoke compartment exceeds 150 ft (46 m), the travel distance to reach the smoke barrier door shall not be limited.
(3) The area of an atrium separated in accordance with 8.6.7 shall not be limited in size.
Healthcare Considerations - How Suite it is!

- Patient Care Suites
  - Sleeping
    - > 1,000 sq ft - at least two, remotely located exit access doors
    - Maximum 10,000 sq ft size with full smoke detection and direct supervision
    - ≤ 100-ft travel distance to exit access door from any point in suite
  - Non-Sleeping
    - > 2,500 sq ft - at least two, remotely located exit access doors
    - Maximum 10,000-sq ft size
    - Travel Distance
      - 100-ft travel distance to exit access door from any point in suite with 1 intervening room
      - 200-ft travel distance to an exit from any point in suite

- Non Patient Care Suites
Healthcare Considerations - Passive Fire Protection

- Rated Assemblies (Smoke Partitions, Smoke Barriers, Fire Barriers, Fire Walls, Horizontal Assemblies)

- Penetrations
  - F, T, & L UL Ratings
    - F is a fire rating and hose test
    - T is a fire and temperature rise rating
    - L is an air leakage rating

- Opening Protection

- Duct and Air Transfer Openings
  - Dampers
    - Fully ducted HVAC systems penetrating smoke barriers walls are no longer required to have smoke dampers by the International Building Code (2015 edition and beyond) for Healthcare only
Annual Inspection and Testing


- The total area of all attached signs shall not exceed five percent of the area of the face of the fire door to which they are attached
Healthcare Considerations - Corridor Doors

13. In existing buildings, all corridor doors are constructed to resist the passage of smoke and constructed of 1¾-inch or thicker solid bonded wood core or constructed of material that resists fire for not less than 20 minutes, and the doors do not have ventilating louvers or transfer grills (with the exception of bathrooms, toilets, and sink closets that do not contain flammable or combustible materials). Positive latching hardware is required. Roller latches are prohibited. (For full text, refer to NFPA 101-2012: 19.3.6.3.1; 19.3.6.3.2; 19.3.6.3.5)

Note 1: For hospitals that use Joint Commission accreditation for deemed status purposes: Powered corridor doors are equipped with positive latching hardware unless the organization can verify that this equipment is not an option provided by the door manufacturer. In instances where positive latching hardware is not an available option provided by the manufacturer, the device used must be capable of keeping the door fully closed when a force of 5 lbf is applied at the latch edge and in any direction to a sliding or folding door, whether or not power is applied in accordance with NFPA 101-2012: 19.3.6.3.7.

Note 2: For hospitals that use Joint Commission accreditation for deemed status purposes: Doors to toilet rooms, bathrooms, shower rooms, sink closets, and similar auxiliary spaces that do not contain flammable or combustible materials are not required to have a device capable of keeping the door fully closed if a force of 5 lbf is applied at the latch edge. In these cases, roller latches are permissible.
Doors within a required means of egress shall not be equipped with a latch or lock that requires the use of a tool or key from the egress side, unless otherwise permitted by one of the following (NFPA 101 §18.2.2.2.4 / §19.2.2.2.4):

- Door locking for clinical needs or where patient special needs require specialized protective measures
- Delayed-egress locks complying with NFPA 101 §7.2.1.6.1
- Access-controlled egress doors complying with NFPA 101 §7.2.1.6.2
- Elevator lobby exit access door locking in accordance with NFPA 101 §7.2.1.6.3
- Existing Only - Approved existing door locking arrangements shall be permitted (NFPA 101 §19.2.2.2.4)
The 2010 edition of NFPA 13 §8.15.5 provides the following:

- **Bottom of Hoistway** - Sidewall spray sprinklers to be installed at the bottom of the elevator hoistways with exception that such sprinklers are not required for enclosed, noncombustible elevator shafts that do not contain combustible hydraulic fluids (NFPA 13 §8.15.5.1 & §8.15.5.2)

- **Top of Hoistway and Machine Room** - Upright, pendent, or sidewall sprinklers of ordinary or intermediate temperature rating are required in elevator machine rooms and at the top of the elevator hoistway with exception that the sprinkler at the top of the hoistway is not required where the hoistway for passenger elevators is noncombustible or limited-combustible and the car enclosure materials meet the requirements of ASME A.17.1, *Safety Code for Elevators and Escalators* (NFPA 13 §8.15.5.4 & §8.15.5.5)

- Sprinklers shall be installed at the top and bottom of elevator hoistways where elevators utilize polyurethane-coated steel belts or other similar combustible belt material (NFPA 13 §8.15.5.6)
The requirements within the “Elevator Hoistway and Machine Rooms” section of NFPA 13 were updated in the 2013 edition, as follows:

8.15.5.3 Automatic fire sprinklers shall not be required in elevator machine rooms, elevator machinery spaces, control spaces, or hoistways of traction elevators installed in accordance with the applicable provisions in NFPA 101, or the applicable building code, where all of the following conditions are met:

1. The elevator machine room, machinery space, control room, control space, or hoistway of traction elevator is dedicated to elevator equipment only.
2. The elevator machine room, machine room, machinery space, control room, control space, or hoistway of traction elevators are protected by smoke detectors, or other automatic fire detection, installed in accordance with NFPA 72.
3. The elevator machinery space, control room, control space, or hoistway of traction elevators is separated from the remainder of the building by walls and floor/ceiling or roof/ceiling assemblies having a fire resistance rating of not less than that specified by the applicable building code.
4. No materials unrelated to elevator equipment are permitted to be stored in elevator machine rooms, machinery spaces, control rooms, control spaces, or hoistways of traction elevators.
5. The elevator machinery is not of the hydraulic type.
Accrediting Organizations (AO’s) with CMS approved program enforce CMS provisions to participating facilities

The Joint Commission
EC.02.03.05 - The hospital maintains fire safety equipment and fire safety building features

EP 6 - EP 12

- **NFPA 25 §5.3.1.1.1.3** requires Quick Response (QR) sprinklers to be replaced or have a sample size tested, 20 years after installation.
  - Sample Size = Minimum of 4 or 1% of individual sprinkler sample installed, whichever is greater.

*Note: Manufacturer’s literature may state that a QR sprinkler head becomes a Standard Response head due to the presence of the gasket.*

*FIGURE A.5.3.1.1 Sprinkler Operating Element Identification.*
Fire Alarm - Occupant Notification

- NFPA 101 Section 18.3.4.3.1 / 19.3.4.3.1 - Occupant notification is provided automatically

- Public Mode Typical System Operation:
  - Sounds in all occupied areas
  - Visual alarms in all occupied areas
  - At least 15 dB above ambient noise or voice signal
  - Evacuation begins

**FIGURE 18.4.2.1** Temporal Pattern Parameters.
NFPA 101 Section 9.6.3.6.3 allows private mode when occupants are incapable of self preservation

“9.6.3.6.3 Where occupants are incapable of evacuating themselves because of age, physical or mental disabilities, or physical restraint, the private operating mode, as described in NFPA 72, National Fire Alarm and Signaling Code, shall be permitted to be used. Only the attendants and other personnel required to evacuate occupants from a zone, area, floor, or building shall be required to be notified. The notification shall include means to readily identify the zone, area, floor, or building in need of evacuation.”

NFPA 72, National Fire Alarm and Signaling Code, 2010 edition

3.3.169.1 Private Operating Mode. Audible or visible signaling only to those persons directly concerned with the implementation and direction of emergency action initiation and procedure in the area protected by the fire alarm system.
Fire Alarm - Private Mode Notification

- Alerts *only* responding staff
- Audible and Visual alarms in staff areas (coded chime systems)
- Systems often have a *general alarm* feature
- Sound pressure levels 10 dB above ambient with option for AHJ approval of reduction or elimination
- Fire emergency response begins
Fire Alarm - Areas for Private Mode Notification

- Patient sleeping rooms / patient care areas
  - Staff is present at all times
  - Notification of the staff from the public areas is possible
  - Patient room fire alarm tone or visuals are not required to alert the staff
  - Guests are best instructed by the staff

- Operating Rooms
Accrediting Organizations (AO’s) with CMS approved program enforce CMS provisions to participating facilities

The Joint Commission

EC.02.03.05 - The hospital maintains fire safety equipment and fire safety building features

EP 3 - (D) Every 12 months, the hospital tests duct detectors, heat detectors, manual fire alarm boxes, and smoke detectors on the inventory. The results and completion dates are documented. Note: For additional guidance on performing tests, see NFPA 72-2010: NFPA Table 14.4.5.
## Visual Inspections

### Table 14.3.1 Visual Inspection Frequencies

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial/Reacceptance</th>
<th>Monthly</th>
<th>Quarterly</th>
<th>Semiannually</th>
<th>Annually</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Air sampling</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>X</td>
<td>—</td>
</tr>
<tr>
<td>(b) Duct detectors</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>X</td>
</tr>
<tr>
<td>(c) Electromechanical releasing devices</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>X</td>
</tr>
<tr>
<td>(d) Fire extinguishing system(s) or suppression system(s) switches</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>X</td>
</tr>
<tr>
<td>(e) Manual fire alarm boxes</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>X</td>
</tr>
<tr>
<td>(f) Heat detectors</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>X</td>
</tr>
<tr>
<td>(g) Radiant energy fire detectors</td>
<td>X</td>
<td>—</td>
<td>X</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>(h) Smoke detectors (excluding one- and two-family dwellings)</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>X</td>
<td>—</td>
</tr>
<tr>
<td>(i) Supervisory signal devices</td>
<td>X</td>
<td>—</td>
<td>X</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>(j) Waterflow devices</td>
<td>X</td>
<td>—</td>
<td>X</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
## NFPA 72 - TESTING

- Test Frequencies

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial/Reacceptance</th>
<th>Monthly</th>
<th>Quarterly</th>
<th>Semiannually</th>
<th>Annually</th>
<th>Table 14.4.2.2 Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Duct detectors</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>X</td>
<td>14</td>
</tr>
<tr>
<td>(h) System smoke detectors — functional test</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>X</td>
<td>—</td>
</tr>
<tr>
<td>(i) Smoke detectors — sensitivity testing in other than one- and two-family dwellings (The requirements of 14.4.5.5 shall apply.)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
Section 14.4.2.2, the method to conduct testing of fire alarm systems must comply with Table 14.4.2.2, including the following:

14(g)(6) Duct Detectors

In addition to the testing required in Table 14.4.2.2(g)(1), duct smoke detectors utilizing sampling tubes shall be tested by verifying the correct pressure differential (within the manufacturer’s published ranges) between the inlet and exhaust tubes using a method acceptable to the manufacturer to ensure that the device will properly sample the airstream. These tests shall be made in accordance with the manufacturer’s published instructions for the device installed.

Air pressure differential: 0.005 to 1.00 inches of water
Section 14.4.2.2, the method to conduct testing of fire alarm systems must comply with Table 14.4.2.2, including the following:

14(g)(1) Smoke Detectors. In other than one- and two-family dwellings, system detectors and single- or multiple-station smoke alarms

Smoke detectors/smoke alarms shall be tested in place to ensure smoke entry into the sensing chamber and an alarm response. Testing with smoke or listed aerosol, acceptable to the manufacturer of the aerosol or the manufacturer of the smoke detector/smoke alarm and identified in their published instructions, shall be permitted as acceptable test methods. Other methods listed in the manufacturer’s published instructions that ensure smoke entry from the protected area, through the vents, into the sensing chamber shall be permitted.

Footnote e - Note, it is customary for the manufacturer of the smoke detector / smoke alarm to test a particular product from an aerosol provider to determine acceptability for use in smoke entry testing of their smoke detector / smoke alarm.

ADDED TO 2013 EDITION OF NFPA 72: “MAGNETS ARE NOT ACCEPTABLE FOR SMOKE ENTRY TESTS”
Duct Smoke Detector Testing Functions

1. Control Equipment - Verify correct receipt of signals, functions, circuit supervision, and power supply supervision.

2. Test smoke entry into the detector by introducing a smoke or aerosol acceptable to the manufacturer. The use of a magnet or remote test switch does not meet the intent of NFPA 72 for either initial or annual testing requirements.

3. Differential Pressure - Ensure proper air movement from the duct to the detector through the sampling tubes. For example, a manometer can be used to measure the differential pressure between the inlet and outlet sampling tubes and verify compliant ranges.

4. Control Function - Function shall be operated and receipt of correct visual and audible signals at control units shall be verified.
<table>
<thead>
<tr>
<th>Rank</th>
<th>Joint Commission Standard</th>
<th>% Noncompliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LS.02.01.35: The hospital provides and maintains systems for extinguishing fires.</td>
<td>89%</td>
</tr>
<tr>
<td>2</td>
<td>EC.02.05.01: The hospital manages risks associated with its utility systems.</td>
<td>79%</td>
</tr>
<tr>
<td>3</td>
<td>EC.02.06.01: The hospital establishes a safe, functional environment.</td>
<td>74%</td>
</tr>
<tr>
<td>4</td>
<td>LS.02.01.30: The hospital provides and maintains building features to protect individuals from the hazards of fire and smoke.</td>
<td>73%</td>
</tr>
<tr>
<td>5</td>
<td>LS.02.01.10: Building and fire protection features are designed and maintained to minimize the effects of fire, smoke, and heat.</td>
<td>71%</td>
</tr>
<tr>
<td>6</td>
<td>IC.02.02.01: The hospital reduces the risk of infections associated with medical equipment, devices, and supplies.</td>
<td>71%</td>
</tr>
<tr>
<td>7</td>
<td>LS.02.01.20: The hospital maintains the integrity of the means of egress.</td>
<td>67%</td>
</tr>
<tr>
<td>8</td>
<td>EC.02.08.08: The hospital inspects, tests, and maintains utility systems.</td>
<td>65%</td>
</tr>
<tr>
<td>9</td>
<td>EC.02.01.01: The hospital manages risks related to hazardous materials and waste.</td>
<td>62%</td>
</tr>
<tr>
<td>10</td>
<td>EC.02.05.09: The hospital inspects, tests, and maintains medical gas and vacuum systems.</td>
<td>62%</td>
</tr>
</tbody>
</table>
The Joint Commission Top Cited - Jan. 1 - June 30, 2019

Note: The data included for the hospital program were derived from 688 applicable surveys.
## Our Top Cited LS Items - 2018

### 2018 Top 10 Deficiencies (National)

<table>
<thead>
<tr>
<th>Indicator Text</th>
<th>Percentage of Finding</th>
<th>Total Times Cited</th>
<th>Total Facilities Cited</th>
<th>Total Number of Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penetrations in smoke barrier not properly sealed.</td>
<td>45%</td>
<td>1864</td>
<td>95</td>
<td>211</td>
</tr>
<tr>
<td>Door separating room or suite from corridor does not properly latch.</td>
<td>44%</td>
<td>936</td>
<td>92</td>
<td>211</td>
</tr>
<tr>
<td>Penetration in fire rated barrier not properly sealed.</td>
<td>41%</td>
<td>1427</td>
<td>87</td>
<td>211</td>
</tr>
<tr>
<td>Projections/objects reduce required clear width of corridor.</td>
<td>41%</td>
<td>578</td>
<td>87</td>
<td>211</td>
</tr>
<tr>
<td>Non-rated hazardous area door does not properly self- or automatically close.</td>
<td>41%</td>
<td>384</td>
<td>87</td>
<td>211</td>
</tr>
<tr>
<td>Proper cover not provided for electrical switch / outlet or junction box.</td>
<td>39%</td>
<td>663</td>
<td>83</td>
<td>211</td>
</tr>
<tr>
<td>Sprinkler piping and / or hanger used to support non-system component.</td>
<td>39%</td>
<td>1265</td>
<td>82</td>
<td>211</td>
</tr>
<tr>
<td>Hazardous area not properly enclosed.</td>
<td>37%</td>
<td>485</td>
<td>79</td>
<td>211</td>
</tr>
<tr>
<td>Smoke detector located so smoke could be diluted by supply / return diffuser.</td>
<td>36%</td>
<td>712</td>
<td>77</td>
<td>211</td>
</tr>
<tr>
<td>Corridor door not arranged to restrict the passage of smoke.</td>
<td>35%</td>
<td>479</td>
<td>73</td>
<td>211</td>
</tr>
</tbody>
</table>
### 2019 Top 10 Deficiencies (National)

<table>
<thead>
<tr>
<th>Indicator Text</th>
<th>Percentage of Finding</th>
<th>Total Times Cited</th>
<th>Total Facilities Cited</th>
<th>Total Number of Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door separating room or suite from corridor does not properly latch.</td>
<td>48%</td>
<td>705</td>
<td>79</td>
<td>163</td>
</tr>
<tr>
<td>Penetrations in smoke barrier not properly sealed.</td>
<td>42%</td>
<td>1398</td>
<td>69</td>
<td>163</td>
</tr>
<tr>
<td>Penetration in fire rated barrier not properly sealed.</td>
<td>42%</td>
<td>1401</td>
<td>68</td>
<td>163</td>
</tr>
<tr>
<td>Projections/objects reduce required clear width of corridor.</td>
<td>42%</td>
<td>387</td>
<td>68</td>
<td>163</td>
</tr>
<tr>
<td>Smoke detector located so smoke could be diluted by supply / return diffuser.</td>
<td>39%</td>
<td>508</td>
<td>64</td>
<td>163</td>
</tr>
<tr>
<td>Automatic sprinkler protection has not been provided where required.</td>
<td>38%</td>
<td>338</td>
<td>62</td>
<td>163</td>
</tr>
<tr>
<td>Non-rated hazardous area door does not properly self- or automatically close.</td>
<td>36%</td>
<td>278</td>
<td>59</td>
<td>163</td>
</tr>
<tr>
<td>Sprinkler piping and / or hanger used to support non-system component.</td>
<td>36%</td>
<td>1045</td>
<td>58</td>
<td>163</td>
</tr>
<tr>
<td>Proper cover not provided for electrical switch / outlet or junction box.</td>
<td>34%</td>
<td>537</td>
<td>56</td>
<td>163</td>
</tr>
<tr>
<td>Corridor door not arranged to restrict the passage of smoke.</td>
<td>34%</td>
<td>356</td>
<td>55</td>
<td>163</td>
</tr>
</tbody>
</table>
Top Cited Conclusion

- Top Items are Maintenance Related
  - Can be handled procedurally
  - How are you evaluating your facilities?
- Sprinkler Throughout
- Utilize Suiting Where Appropriate
- Be Proactive!

Top reasons for LS.02.01.10 and LS.02.01.30 door failures

- Latch failure: 860
- Rating/label: 343
- Closer missing: 342
- Gap/undercut: 336
- Hardware: 304
- Blocked: 137
- Damaged: 112
- Jerry-rigged: 49
- Door missing: 12
- Louvre: 11
- Roller latch: 8

Joint Commission findings related to fire-door maintenance.

Graphic courtesy of the American Society for Health Care Engineering
https://www.hfmmagazine.com/articles/3577-understanding-recent-door-inspection-and-maintenance-codes