Deficiencies and Impairments of Sprinkler Systems

By Jonathan Hart
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NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems* provides the criteria for the routine activities that must be conducted to ensure that water-based fire protection systems, such as automatic sprinklers systems, can be relied upon in the event of a fire. These activities range from simple visual confirmation of some things such as valve position or water tank temperature, on a more frequent basis; to performance of much more complex activities such as full flow tests and internal assessments at longer intervals.

There is a very large number of observations or findings during inspection or testing of a sprinkler system that can be out of compliance with the standard. With that said, there is a difference between issues that mean the system will not function in a fire event as opposed to those that do not have much, if any, of an effect on the ability of the system to function in a fire event. While each needs to be corrected, the urgency and priority of the former is clearly ahead of the latter. Here we will discuss how NFPA 25 classifies conditions of noncompliance.

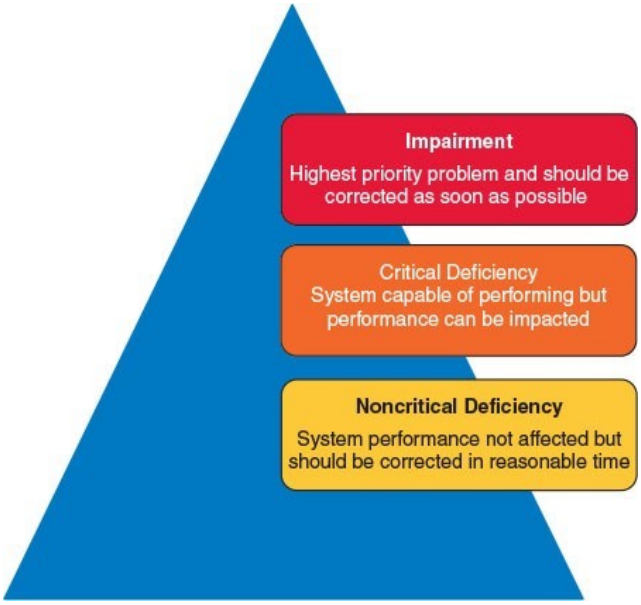
Noncritical deficiency, critical deficiency, impairment

Editions prior to the 2011 edition of NFPA 25 presented ITM requirements as pass/fail because no other options for identifying system status was presented in the standard. Since that edition additional definitions have been added and the standard is continuously being refined to clarify these differences with each new revision. The following are definitions form NFPA 25 (2020 edition) related to noncompliant conditions. These conditions can be classified as an impairment or a deficiency with there two subsets of deficiency.

Noncritical Deficiency: A deficiency that does not have a material effect on the ability of the fire protection system or unit to function in a fire event, but correction is needed to meet the requirements of NFPA 25 or for the proper inspection, testing, and maintenance of the system or unit.

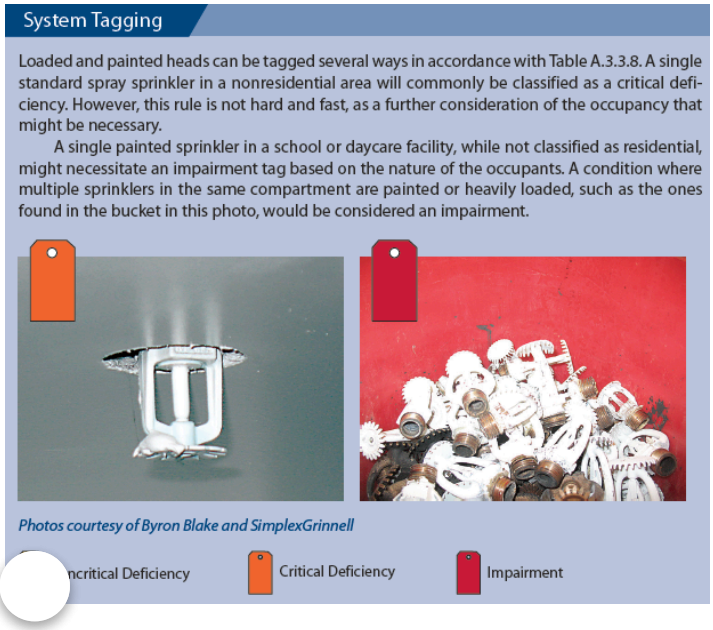
Critical Deficiency: A deficiency that, if not corrected, can have a material effect on the ability of the fire protection system or unit to function as intended in a fire event.

Impairment: A condition where a fire protection system or unit or portion thereof is out of order, and the condition can result in the fire protection system or unit not functioning in a fire event.



Simple but not easy

While in theory the definitions allow for easy classification of issues not in compliance with the standard into one of the three levels it is often not cut--and-dried. Where the water supply is not available or has been significantly compromised it can be clearly labeled as an impairment. Where a general information sign is missing it can clearly be classified as a noncritical deficiency. Most things fall somewhere in between these two extremes and requires more of a judgement call. The image below shows a "System Tagging" feature from the NFPA 25, ITM of Water-Based Fire Protection Systems Handbook in which different conditions are evaluated along with key considerations and a tag is applied. This feature demonstrates the variables that come into making a determination. This particular example speaks to painted sprinklers. Check out this blog more information on the specific sprinkler inspection items.


System Tagging

Loaded and painted heads can be tagged several ways in accordance with Table A.3.3.8. A single standard spray sprinkler in a nonresidential area will commonly be classified as a critical deficiency. However, this rule is not hard and fast, as a further consideration of the occupancy that might be necessary.

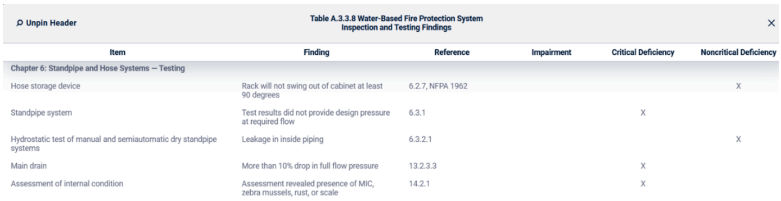
A single painted sprinkler in a school or daycare facility, while not classified as residential, might necessitate an impairment tag based on the nature of the occupants. A condition where multiple sprinklers in the same compartment are painted or heavily loaded, such as the ones found in the bucket in this photo, would be considered an impairment.

Photos courtesy of Byron Blake and SimplexGrinnell

ncritical Deficiency Critical Deficiency Impairment

There's a Table to Help

While each situation and condition still needs to be evaluated individually there is a table provided in the annex of NFPA 25 that provides a good starting place for considering how to classify a noncompliant condition. While annex material of NFPA codes and standards is not considered part of the requirements of the document it is included for informational purposes as explanatory material. With that caveat understood it is still an output of the standards development process that is voted on and passed by a consensus of the technical committee responsible for the standard. The image below provides a snapshot of a small portion of the table. It is informational because the specifics of each situation and condition must be considered for the individual situation.



Unpin Header

Table A.3.3.8 Water-Based Fire Protection System Inspection and Testing Findings

Item	Finding	Reference	Impairment	Critical Deficiency	Noncritical Deficiency
Chapter 6: Standpipe and Hose Systems — Testing					
Hose storage device	Rack will not swing out of cabinet at least 90 degrees	6.2.7, NFPA 1962			X
Standpipe system	Test results did not provide design pressure at required flow	6.3.1		X	
Hydrostatic test of manual and semiautomatic dry standpipe systems	Leakage in inside piping	6.3.2.1			X
Main drain	More than 10% drop in full flow pressure	13.2.3.3		X	
Assessment of internal condition	Assessment revealed presence of MIC, zebra mussels, rust, or scale	14.2.1		X	

View larger

Tagging the System

While NFPA 25 does not specifically define a "tagging structure" for identifying levels of deficiencies or impairments, many states have developed a series of color-coded tags that are placed on a system or component to identify the significance of the condition identified. Annex G of NFPA 25 providesauthorities having jurisdiction (AHJs) with some basic guidance regarding a system status tagging program. Readers should check the requirements for tagging in the jurisdiction they are working. The NFPA 25 guidance suggest four tags to identify the condition.

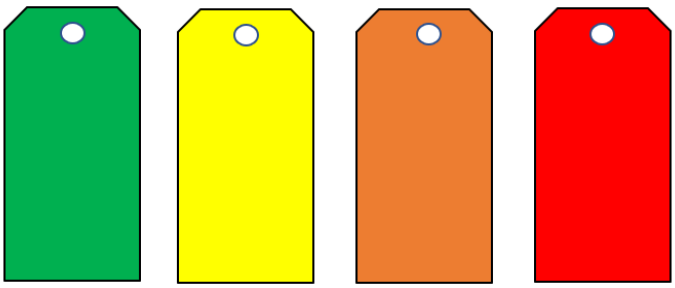
A color-coded tagging system that mirrors the standard would include the following tags:

Green tag — No deficiencies or impairments found when inspections and tests performed at the required frequency were completed as indicated on the ITM report provided to the owner

Yellow tag — Noncritical deficiencies found and recorded on the ITM report

Orange tag — Critical deficiencies found and recorded on the ITM report

Red tag — Impairments found and recorded on the ITM report (The color-coded tagging program should be kept separate from the impairment tag and other requirements outlined in Chapter 15.)



Additional information to be included on the tag is detailed in Annex G.

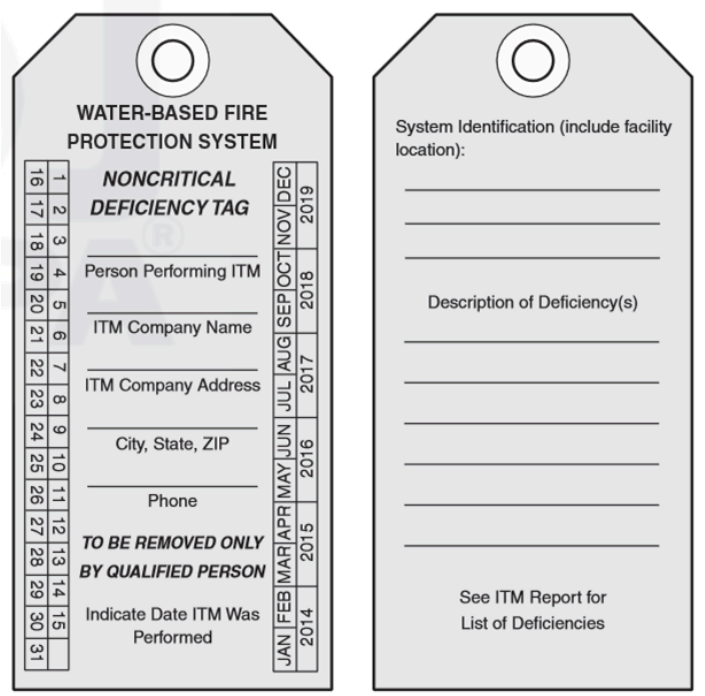


FIGURE G.2(b) Sample Noncritical Deficiency Tag (Yellow Tag).

Mind the Edition

As mentioned earlier, the standard is being continuously refined around this topic. The examples and information provided here are based on the 2020 edition of NFPA 25. While it is not likely that the overall approach outlined here will change small tweaks can certainly be expected from edition to edition. The 2023 edition of the standard will be released later this year and is proposed to have significant revisions to the annex tables and the classification of certain findings as deficiencies or impairments.

Correction or Repair of Deficiencies and Impairments

The correction or repair of deficiencies or impairments are one of the responsibilities of the building owner or designated representative. The property owner is responsible for ensuring that deficiencies or impairments are corrected or repaired. Corrective action to remediate deficiencies and impairments must be done in accordance with the applicable design and installation standard. Impairments must be corrected within 10 hours or the building either needs to be evacuates, an approved fire watch established, a temporary water supply be established, or an approved program be established and implemented to eliminate potential sources and limit the amount of potential fuel. A number of other steps and policies on dealing with impairments is detailed in Chapter 15 of NFPA 25. Understanding the differences between impairments, critical deficiencies, and noncritical deficiencies is necessary for properly prioritizing corrective actions.

Jonathan Hart

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2 Comments 1 ONLINE LOGIN

Jason 1 year ago

What if multiple flow switches and control valves are not wired and monitored. Is that considered a critical condition

0 0 Reply

Oyuna 2 years ago

Hello dear,

I have a question about valve locking. Is there a code or standard for locking valves? What kind of chain and lock should be used?

0 0 Reply