The Hanger Exceptions are Problematic

They lack features required of sway braces

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The NFPA 13 Chapter 9 hanger assemblies referenced below are not sway braces. For the purpose of this opinion, I will identify two paragraphs in 2010 NFPA 13 Chapter 9 as the **hanger exceptions.** The paragraphs referencing the subject hangers are:

9.3.5.3.9 "…. Rods less than 6in. long…."
9.3.5.3.10 "….U-type hooks."

With the elimination of sway braces, I believe the additional seismic forces that the hangers in the above two paragraphs must resist is very problematic and potentially catastrophic. The potential additional seismic load on the hanger is indefinable, unknown and absolutely contrary to the precise structural definition of a sway braces performance, function and ability. The hanger exceptions are dismissive of the conservative tenets of Chapter 9 that require sway braces to limit stress on system piping and limit additional non-axial load on hangers.

NFPA 13 Chapter 9 is the standard of reference for I-Codes. Since 2007 NFPA 13, sway bracing of the fire sprinkler system is relative to the structural characteristics of its piping with respects to seismic force per SEI/ASCE 7 and specific to the USGS. The hanger exceptions ignore the above requirements and therefore have no basis in fact. They ignore the tenet of restraining the force on system pipe in relation to the zone of influence, Ss, Cp, pipe material and pipe size. In contradiction to the SEI/ASCE 7 standards referenced above, the hanger exceptions conflict technically with the I-Codes and are not appropriate within their jurisdiction.

I believe co-mingling of the vertical performance of hangers with the horizontal performance of sway braces is not prudent and invites interpretation over clarity. The hanger exceptions assume a defined benefit of unknown ability with no known basis of comparison. The conservatively defined mechanics of the pipe hanger may be breached, causing failure that is detrimental to an emergency systems performance. Using a strict definition of the hanger exceptions, it will be possible to install a fire sprinkler system in a seismic zone without quantifying the seismic force and analyzing its effects on the system piping material. This is exactly the problem that existed in NFPA 13 Chapter 9 prior to 2007. Surely, this is not the intent of the NFPA 13 Technical Committee on Hanging and Bracing.

The hanger exceptions directly conflict with the required sway brace features specified in the following Chapter 9 paragraphs:

9.3.5.2.3 "…weakest component … with safety factors."
9.3.5.3.2 "… based on the piping material of the sprinkler system."
9.3.5.3.2.3 "The maximum permissible load… of a sway brace …"
9.3.5.6 Horizontal Seismic Loads
9.3.5.7 "…arranged to resist…"
9.3.5.8.1 "Sway bracing shall be tight"
9.3.5.8.4 "…avoid eccentric loading on fittings and fasteners."
9.3.5.9.2 "The type of fasteners … shall be limited…"
9.3.5.9.7.1 "Concrete anchors shall be prequalified for seismic applications…"
9.3.5.10.1 "…listed for maximum load rating…"
9.3.5.10.2.1 "… shall be listed."
9.3.5.11.1 "…directly attached…"
A.9.1.2.3 "Limit horizontal loads on hanger rod"

In NFPA 13, hangers and sway braces are two separate structures which focus the function of each, simplify their definition and enhance their reliability. The Chapter 9 texts must be concise, logical and uniform to enhance clarity, importance, application and performance.

Further, reference and comparison of the hanging and bracing of fire sprinklers to other mechanical (non-life safety) piping systems and their standards is irrelevant. NFPA 13 defines an emergency system which remedies comparison to other piping systems as inappropriate and lacking in basis and fact. The hanger exceptions are conservative theory for restraint **but not sway bracing**. In view of these stated intellectual inconsistencies, I believe it is prudent to remove the hanger exceptions for lateral sway bracing from the 2013 NFPA 13 standard text of Chapter 9.

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