

6" Rod Hangers Are Not Sway Braces

Exempting Sway Braces Is Problematic

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10-4-07

I believe the 6" rod hanger exception allowed by section 9.3.5.3.8 is questionable because it is not consistent with Chapter 9 sway brace theory. Seismic performance by these hangers is not precisely known and is not thoroughly predictable. Instructing the omission of a lateral sway brace of known ability in lieu of any hanger of unknown ability constitutes best guess engineering policy and protocol of questionable methodology and logic. Adhering to the chapter 9 definition of fire the sprinkler as an emergency system, durability is required to enhance permanence, which insures future system performance. The methodology of section 9.3.5.3.8 conflicts with 2007 NFPA 13 Chapter 9 sway brace theory relied upon by FEMA, NEHRP, ASCE 7 and many others. Accordingly, section 9.3.5.3.8 should be eliminated to conform to the seismic philosophy promoted in 2007 NFPA 13 by the rigorous sway brace protocol in Chapter 9.

Allowing a 6" rod hanger to exempt the installation of a lateral sway brace on an emergency system is dismissive of potential detrimental consequences. There are many contributing factors to be recognized during a seismic event. Examples include the importance of specific piping to the systems function, such as a large feed main. System piping deflection by pipe type and diameter should not be ignored. Also, seismic force specific to each building location is important but is not being addressed. It sets a questionable seismic engineering precedent to assume all these variables can be addressed during a seismic event without installing lateral sway braces.

Hangers are the wrong product to resist seismic force. Horizontal seismic force is contrary to their design and this additional load exposes them to potential damage. The combination of the constant hanger load plus additional horizontal seismic load may exceed the ability of the hanger assembly. Further, section 9.3.5.3.8 assumes that the hanger will pivot to provide a dampening effect, but some hanger assemblies resist pivoting. When the upper hanger attachment component like TBC, ceiling plate or post-installed insert resists pivoting it induces a non-axial load on that component plus a non-axial load on the hanger rod.

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It is important to note that the geometry of each hanger assembly will influence its ability to provide any desired dampening effect. Adjacent hangers may have different components. Adjacent hangers may have different lengths. Differential movement between hangers may result due to these differences which include varying component pivot resistance.

The dampening effect may not be uniform because each hanger may be subject to a different load due to varying piping system geometry. The horizontal load can vary between adjacent hangers, because the zone of influence on each may be different. Variations such as pipe diameter transition between hangers; differences in adjacent line spacing, line size or line length can exacerbate desired uniformity of dampening and amplify differential movement.

Following this line of reasoning, it's conservative to assume that the ability of the fastener supporting the hanger assembly could be compromised by the addition of this horizontal seismic load. When subjected to additive horizontal force the varying geometry of the hanger attachment components can further default this fasteners ability. Concrete hanger fasteners are problematic when evaluating their type, variations in load rating between tension and shear or potential prying effect. Wood hanger fasteners lack the through bolt requirement of sway brace fasteners.

In closing, I don't think Chapter 9 should allow any seismic event to damage the fire sprinkler system hangers because lateral sway braces were not required. Section 9.3.5.3.8 extends too much benefit of the doubt that is dismissive of and conflicts with the conservative engineering typical to an emergency system. It is questionable reasoning to allow a hanger that lacks any of the necessary characteristics of a sway brace to exempt the installation of a sway brace. Exceptions should always be avoided whenever possible and the 6" rod hanger exception in section 9.3.5.3.8 is a perfect example of potential unintended consequences.