

Through-Bolts in the Top Chord of Steel Joists

A Problem Sway Brace Attachment

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Through the years many sway brace connections to open web steel joists have been accomplished by bolting through the gap at the top chord of a joist, which exists between the parallel angle iron elements. Some contractors have used a **fender washer assembly** consisting of a 1/2" threaded stud assembled with two fender washers and nuts to provide engagement, see **Figure #1**. This practice became common in the fire sprinkler industry because joist manufacturers discourage welding to or drilling through the top chord elements, due to concern about reduced load capacity. Despite the use of the fender washer assembly being common practice, it is not structurally adequate nor does it meet the requirements of NFPA-13 for sway bracing. The following text supports this position.

1999 NFPA dictates bore-fit for bolts per section 6-1.5.3 "Holes for bolts shall not exceed 1/16" greater than the diameter of the bolt." Even though this criterion is not explicitly in section 6-4 on Seismic requirements, it still applies as a general hanging and bracing requirement. The top chord gap is not a hole or bore. It is a slot that has a minimum 3/4" width and an indeterminate length. As such, the subject through bolt ALWAYS violates 6-1.5.3 along the top chord.

A second violated requirement is NFPA13: 6-4.5.10 that requires the brace fittings and connections shall be listed. This is also covered by 6-1.1.1 that states "The components of hanger assemblies that directly attach to the pipe or to the building structure shall be listed." The fender washer assembly is NOT listed. It in fact failed UL sway brace test criteria performed in AFCON's laboratory.

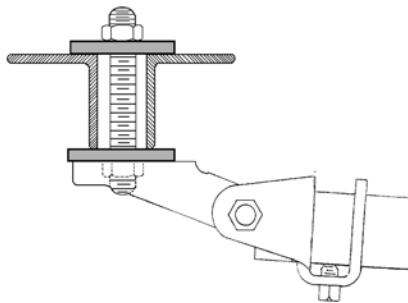


Figure #1
Incorrect Joist Connector

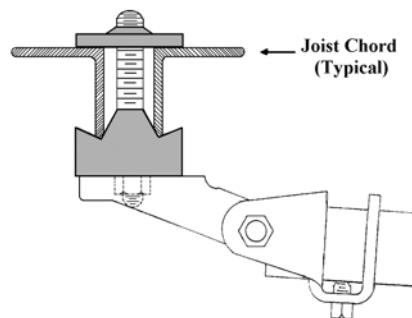


Figure #2
AFCON #085

The fender washer assembly does NOT meet fastener bore criteria or the sway brace listing criteria. If you are using it, I advise you to cease because it's only a matter of time before AHJ's perceive this deficiency. Do it correctly using listed product or drill/weld as approved by the joist manufacturer. AFCON #085 is a listed direct replacement for the fender washer assembly, see **Figure #2**. The geometry of this adapter, though similar to the fender washer assembly regarding bore hole, is different and was driven by the demands associated with it passing the listing test criteria. Its' listing verifies that it is not only structurally adequate but also capable of withstanding the dynamic forces created by an earthquake. Other manufacturers have listed sway brace adapters to provide a connection at different orientations. We hope these facts help to provide a correct solution to your installation strategy.