

Pipe vs. Cable Sway Bracing

Application Comparisons Per NFPA 13

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This article is intended to discuss the physical and practical differences between pipe and cable sway bracing systems. Their impact on field installation procedures and design-strategies vary more than you may expect. We will not discuss the direct cost of labor or material as these are always debatable and are ultimately judged by the installing contractor anyway.

Brace assemblies using pipe can be developed into a systems approach, which allows for a uniform installation strategy on all but a negligible percentage of sway brace scenarios. It is applicable to all three brace orientations i.e. lateral, longitudinal and four way. The systems approach is very desirable because it imparts uniformity to installation technique which reduces mistakes and misapplication in the field. This explains why the vast majority of installing contractors choose this method.

Cable is a good product, but is more limited in scope. It is newer to the fire sprinkler market place and therefore, not as familiar to AHJ's.

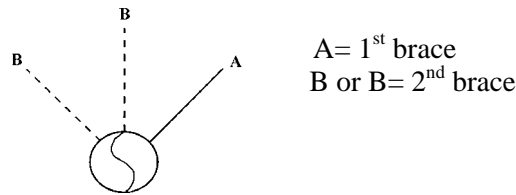
One of the first decisions to be made when addressing seismic protection is to select the type of sway brace systems to be used. The following outlines identify the advantages and disadvantages of both types of systems. For ease of comparison, topics are presented in the same basic order.

Advantages Pipe

- A. Pipe has strength in tension and compression which allows installation of one brace at each location.
- B. Industry standard method of choice by installing contractors for rigid brace elements.
 1. Fittings and attachments are all UL Listed and common to NFPA, AHJ's and contractors for more than 33 years.
 2. Strut, angle or flat lack UL listed accessories to compliment their use.
 3. Virtually every installation scenario has been used, recognized or accepted by contractors and AHJ's.
 4. There are many sway brace adapters which are targeted at specialized construction situations.

Advantages Pipe (cont.)

- C. Installation tools are standard to general installation.
- D. Pipe is common to inventory.
- E. Some installation strategies can eliminate rotating around the fastener (pivot dynamics) at building attachment
 - 1. Orientation
 - 2. Multiple fasteners
 - 3. Welding
- F. Can be used for all three required types of braces.
- G. For high horizontal or vertical acceleration:
 - 1. Optimum brace spacing is unchanged or not effected.
 - 2. A single brace is adequate when angle is sufficient
 - 3. When angle is not sufficient install one additional brace at adjacent location.
 - I. Orient at opposing equal angle or vertical. (see drawing)
 - II. Hanger layout, design or installation is unaffected and unchanged.



This option allows flexibility for adverse job conditions, obstructions or convenience.

- H. Brace length easily adjustable after installation.
 - 1. Helps to align pipe along its run.
 - 2. Easily re-used or re-located.
 - 3. Can eliminate cut to fit in the field.
 - I. Lends itself to pre-design and fabrication.
 - II. When in doubt simply size to next longer length.

Disadvantages Pipe

- A. Very long reaches may be problematic due to slenderness ratio.
- B. Greater bulk and weight.
- C. Multiple components.

Advantages Cable

- A. Not confined in ultimate length by slenderness ratio which helps with very long reaches.
- B. Less product bulk enhances storage and less weight enhances portability.
- C. Only three sizes for all possible combinations.

Disadvantages Cable

- A. Cable has strength in tension only, none in compression requiring two braces at each location.
- B. Must install two opposing adjacent braces either at equal angles or at reduced load rating based upon the most restrictive angle of the two.
 - 1. Therefore need building attachment access at two locations. This doubles the opportunity for location access obstruction.
 - 2. Opposing sway braces tend to fight each other during installation. You can't adjust sprinkler pipe alignment after installation without cutting one side out and replacing it. With pipe braces you simply loosen the sway brace and slide up or down the brace pipe as needed.
- C. Specialized tools required for installation.
- D. None of the components have other uses in a fire sprinkler system.
- E. Impact by brace type
 - 1. Not always possible to be used as a 4-Way brace at the top of a riser.
 - 2. Longitudinal braces are problematic because of restricted applications
 - I. Smooth pipe provides no point of attachment
 - II. Point of attachment exist at fittings or variations thereof which may not be at maximum spacing or optimum location
 - III. Can use listed sway brace clamps with no impact on spacing, but its another component
- F. Never possible to eliminate bending of cable (which produces pivot dynamics) at building attachment fastener, unless you involve an adjacent hanger.
 - 1. Cable lacks beam strength.
- G. For high horizontal or vertical acceleration:
 - 1. Cable has no ability in this orientation.
 - 2. Therefore you need the hanger to resist the resultant up force.
 - 3. Requires braces to be located at hanger spacing.
 - Therefore brace spacing could be restricted from maximum or optimum.
 - 4. Must reinforce hanger at brace locations.
 - Requires custom installation including rod size or rod stiffener and fastener.

With the increasing number of jurisdictions starting to require sway bracing, many are just starting to wrestle with this issue. The presented information, which is mostly known to experienced users, is intended to reduce the learning curve for those starting to address seismic protection.

Please call AFCON with any questions or comments to this article.