

TOLCO™ Branch line restraints
for fire protection systems
per NFPA 13 (2010-2013)



TOLCO Branch Line Restraints for Fire Protection Systems

TOLCO seismic bracing for branch line restraints

Rely on us for all your seismic and engineering needs

TOLCO™ Seismic Bracing products are manufactured in California, which is located on the “Ring of Fire” - locations that experience multiple earthquakes a year. Most are small, but some are significant and the potential for a major catastrophic earthquake is always present.

Being located in a virtual “living laboratory of seismic activity” has driven our team of engineers to develop some of the best seismic bracing product designs in the industry. Our products are known

and respected by installers, designers, and fire protection authorities worldwide.

For over 45 years, TOLCO Seismic Bracing products have been installed around the world where earthquakes are prevalent. Our UL Listed and FM approved quality seismic bracing products are confidently relied upon to help protect lives and property, from these devastating forces.

TOLCO Seismic Bracing products are specified worldwide for bracing fire

sprinkler systems against damage from earthquakes. Installing our UL Listed and FM approved bracing products helps to ensure compliance with the National Fire Protection Association Standard for the installation of fire sprinkler systems (NFPA 13).

This brochure is intended to show examples of how TOLCO Seismic Bracing can help you meet the NFPA 13 Guidelines for Branch Line Restraints.

NFPA 13 GUIDELINES FOR BRANCH LINE RESTRAINTS*

The National Fire Protection Association Pamphlet 13 (2010-2013) as part of a complete seismic bracing system, requires that sprinkler mains and cross mains be braced and that branch lines 2 inches and smaller be restrained.

How branch lines are to be restrained is defined in Section 9.3.6.1; also see Annex Section A.9.3.6.1(5) and Annex Figures A.9.3.6.1(5)(a)&(b). NFPA 13 (2010-2013 in Section 9.3.6.1) for additional information.

Per these guidelines, restraints are considered a lesser degree of resisting loads than bracing and shall be provided by use of one of the following*:

1. Listed Sway Brace
2. Wrap-around U-Hook satisfying the requirements of 9.3.5.5.11
3. No. 12, 440 lb. (200 kg) wire installed at least 45 degrees from the vertical plane and anchored on both sides of the pipe
4. CPVC hangers utilizing two points of attachment
5. Hanger not less than 45 degrees from vertical installed within 6 inches (152 mm) of the vertical hanger arranged for restraint against upward movement, provided it is utilized such that l/r does not exceed 400, where the rod shall extend to the pipe or have a surge clip installed
6. Other approved means

It should be noted that devices that are listed by UL as seismic restraint devices, as tested and defined by UL 203A, only meet the criteria of option 6 noted above. As such it is appropriate for the area authority to require test results or structural calculations for the specific installation under review.

* For the most up-to-date and full details on the NFPA guidelines, please refer to the NFPA website: www.nfpa.org

A listed sway brace device used as a branch line restraint

Satisfies requirements of NFPA 13 2010 & 2013 section 9.3.6.1(1)



This option while providing some of the best resistance to horizontal loads should be considered carefully. Seismic brace components have published maximum loads and when submitted for review, should be accompanied with zone of influence (ZOI) calculations per NFPA 13; 10 & 13 Section 9.3.5.6 that take into consideration the orientation of the fastener and the brace angle so as not to exceed these loads. An area authority should request these calculations for branch line restraints as well to verify they have the capacity to restrain the required loads.

It should be noted that devices that are listed by UL as seismic restraint devices, as tested and defined by UL 203A, only meet the criteria of option 6, other approved means, noted on previous page. As such it is appropriate for the area authority to require test results or structural calculations for the specific installation under review.

Sway Brace Assembly Example

- TOLCO Fig. 980 Universal Swivel Sway Brace Attachment
- TOLCO Fig. 1001 Sway Brace Attachment
- 1" Brace Pipe

Wrap-around U-hook

Satisfies requirements of NFPA 13 (2010; section 9.3.6.1(2) "other approved means"; section 9.3.5.3.10) (2013; section 9.3.5.5.11)

This option is clearly defined and requires no additional calculations to prove its performance.

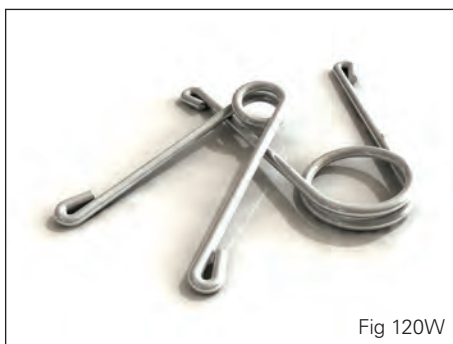


Fig 120W

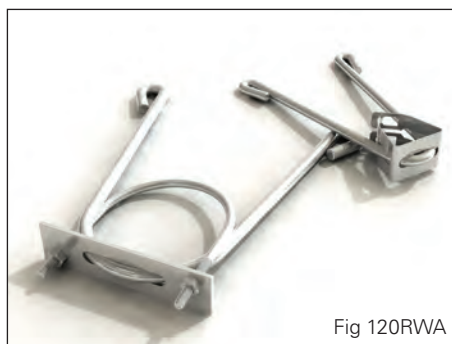


Fig 120RWA

No. 12, 440 lb. (200 kg) wire installed at least 45 degrees from the vertical plane and anchored on both sides of the pipe

Satisfies requirements of NFPA 13 2010 & 2013 section 9.3.6.1(3)

While this option can be more difficult to install, the process is clearly defined and details are provided by NFPA to make inspection by area authorities easier. No additional calculations are required. However, please note that two points of contact are required, which can increase the installation time and cost.



CPVC Hangers utilizing two points of attachment

Satisfies Requirements of NFPA 13 2013 Section 9.3.6.1(4)

Typical CPVC hangers utilize two #10 x 1" screws and attach the sprinkler pipe directly to the structure. Similar to the wrap-around u-hanger option this sufficiently restrains the pipe and requires no additional calculations. Please note to be careful when selecting this option as not all CPVC hangers are UL Listed as both hangers and restrainers.

TOLCO CPVC Hanger Options



Hanger not less than 45 degrees from vertical

Installed within 6 inches (152 mm) of the vertical hanger arranged for restraint against upward movement, provided it is utilized such that L/r does not exceed 400, where the rod shall extend to the pipe or have a surge clip installed.

Satisfies Requirements of NFPA 13 2010 & 2013 Section 9.3.6.1(5) see also NFPA 13 2013 Annex A.9.3.6.1(5) and Figures 9.3.6.1(5)(a)&(b)

This option is clearly defined by NFPA 13 and if UL Listed hanger components are used then no additional calculations or test data is required for use.

- Use of all thread rod or machine threaded rod should comply with the requirements of NFPA 13 2010 Section 9.3.5.8.7(a,b&c) and NFPA 13 2013 Section 9.3.5.11.8(a,b&c)
- L/R should not exceed 400
- If two opposing rod assemblies are installed at a location then the limitations of the table below regarding all thread rod length do not apply, subject to the approval of the area authority having jurisdiction

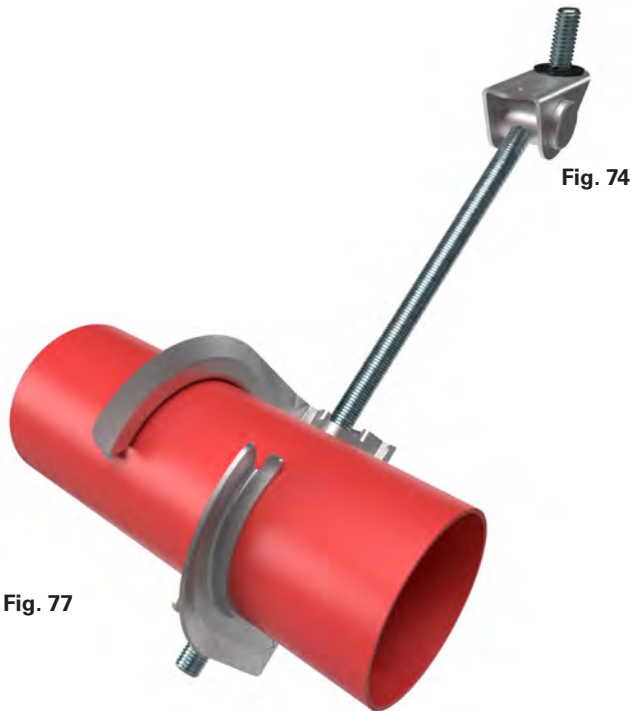
Allowable Rod Lengths per NFPA 13 (2010 & 2013)

Rod Size (in)	Area (sq. in)	Least Radius of Gyration (in)	L/R=100 (max length)	L/R=200 (max length)	L/R=300 (max length)	L/R=400 (max length)
3/8"	.07	.075	0'-7"	1'-2"	1'-10"	2'-6"
1/2"	.129	.101	0'-10"	1'-8"	2'-6"	3'-4"

Other approved means

Satisfies Requirements of NFPA 13 2010 Section 9.3.6.1(5) and 2013 Section 9.3.6.1(6)

This option gives the area authority latitude to approve other methods in the case where none of the other methods can be applied. Not defined at all, when used it would most likely require supporting structural calculations or test data. To help meet this option, TOLCO offers the services of our Seismic Engineering Department with a professional Structural Engineer on staff to supply wet-stamped structural calculations as required.



Other Approved Means Example

TOLCO Fig. 74 Structural BLR Attachment, is designed to use both 3/8" and 1/2" rod, and multiple types of fasteners for various structure types. Fig. 77 System BLR Attachment is designed to use both 3/8" and 1/2" rod and easily snaps on to either side of plastic pipe.

Create a complete submittal package with TOLBrace software

Designed for ease of use, the TOLBrace™ software steps the user through a series of questions to determine the scope of the project. It helps the user create detailed reports of the appropriate seismic bracing components and TIFF files for CAD use. It calculates the correct bracing loads per NFPA 13 guidelines, Uniform Building Code (UBC) and International Building Code (IBC). Also, to help ensure users are following the latest codes, standards, and product requirements, TOLBrace software also includes an automatic update feature.

TOLBrace software assists fire sprinkler system designers in:

- Seismic force factor calculations (Fp)
- Zone of influence calculations
- Sway brace orientation and angle selection
- Structural attachment of sway braces
- Brace material selection
- Appropriate selection of UL Listed and FM approved sway brace components
- Creating a submittal sheet with all relevant information with the click of a mouse
- Selection of Branch Line Restraint details from NFPA 13 approved methods
- Available in English & Spanish

TOLBrace follows the requirements of:

- NFPA 13, 1999, 2002, 2007, 2010 & 2013
- Factory Mutual
- International Building Code (IBC)

For additional support, contact your TOLCO Seismic Bracing Specialist at:
Phone: 909-427-9773

Email: SeismicQuotes@Eaton.com

Email: TolcoSupport@Eaton.com

To learn more, visit Eaton.com/fireprotection.



For more information, visit
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