

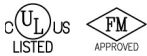
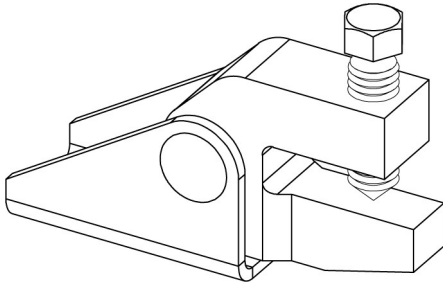


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# SEISMIC BRACING

## FIG. 030

## C-CLAMP STRUCTURAL ATTACHMENT



**Function:** Designed for bracing pipe against sway and seismic disturbances. Universal swivel design allows for attachment at any surface angle combined with concentric loading. Structure attachment fitting designed to use 1" thru 2" SCH 40 pipe, structural steel, and PHD 12 gauge strut channel (1001 & 1201) as sway bracing elements. No bracing member thicker than  $\frac{3}{8}$ " can be used in conjunction with this product. Utilize the Fig. 030 with a PHD Manufacturing pipe attachment fitting and a bracing element to form a complete sway brace assembly. Sway brace assemblies are intended to be installed in accordance with NFPA 13 and the manufacturer's installation instructions.

**Size:**  $\frac{1}{2}$ " mounting hole. Braces up to 8" Pipe MAX

**Material:** Ductile iron and carbon steel

**Finish:** Electro-galvanized

**Install:** Mount device to structure then insert brace element into fitting against back of jaw. Tighten set screw finger tight, then tighten until hex head breaks off. Adjust attachment to proper brace angle.

**Approvals:** Underwriters Laboratories listed for US and Canada and Factory Mutual approved. Listed for use with NFPA fastener tables and PHD sway brace components only.

**Ordering:** Specify figure number.

UL Maximum Design Loads (Up to 8" Pipe) - Lateral & Longitudinal Assemblies						
Brace Member	Member Thickness	Member Length	lbs.	kN	Wt. Each	
					lbs.	kg
1" Thru 2" Pipe	SCH 40	Refer to NFPA13	1370	(6.09)	1.23	(0.56)
Structural Steel	$\frac{3}{8}$ " thick MAX	Refer to NFPA13	1370	(6.09)	1.23	(0.56)
1001 Series Strut	12 Ga.	See Chart Below	1370	(6.09)	1.23	(0.56)
1201 Series Strut	12 Ga.	See Chart Below	1370	(6.09)	1.23	(0.56)

UL's current Listings, shown above, are predicated on installation in accordance with the latest edition of NFPA 13. The 2016 and earlier editions of NFPA 13 referenced a minimum safety of 1.5 for the load rating as compared to 2.2 for the current edition.

The load ratings noted in table below, Previously Listed Loads, are consistent with the historical cULus Listings that were evaluated to the requirements of UL 203A, Outline of Investigation for Sway Brace Devices for Fire Sprinkler System Piping, based upon a minimum safety factor of 1.5 in accordance with the earlier editions of NFPA 13. The load ratings based upon the 2016 or earlier editions of NFPA 13 should only be used where approved by the Authority Having Jurisdiction (AHJ).

Previously Listed UL Loads (Up to 8" Pipe) - Lateral & Longitudinal Assemblies						
Brace Member	Member Thickness	Member Length	lbs.	kN	Wt. Each	
					lbs.	kg
1" Thru 2" Pipe	SCH 40	Refer to NFPA13	*2015	*(8.96)	1.23	(0.56)
Structural Steel	$\frac{3}{8}$ " thick MAX	Refer to NFPA13	*2015	*(8.96)	1.23	(0.56)
1001 Series Strut	12 Ga.	See Chart Below	*2015	*(8.96)	1.23	(0.56)
1201 Series Strut	12 Ga.	See Chart Below	*2015	*(8.96)	1.23	(0.56)

\*Load ratings are based on a minimum safety factor of 1.5 in accordance with NFPA 13-2016 Section A.9.3.5.2.3.

FM Maximum Design Load				
For Bracing SCH 10, 40 & Flow Pipe				
Brace Member		Brace Angle From Vertical (Degrees)	lbs.	kN
1" Thru 2" SCH 40 Pipe	(GB/T3091, EN10255H, or JISG3454)	30°-44°	1270	(5.64)
		45°-59°	2040	(9.07)
		60°-74°	2450	(10.89)
		75°-90°	2740	(12.18)
$\frac{1}{4}$ " Thru $\frac{3}{8}$ " Thick Structural Steel		30°-44°	900	(4.00)
		45°-59°	1280	(5.69)
		60°-74°	1570	(6.98)
PHD 12 Gauge Strut Channel 1001 & 1201		30°-44°	1070	(4.75)
		45°-59°	1440	(6.40)
		60°-74°	1740	(7.73)
		75°-90°	1940	(8.62)

When governed by NFPA13 2019 or later, multiply FM approved loads by 0.682.

Strut Fig. #	PHD Strut Channel Maximum Horizontal Load 90° From Vertical													
	r		l/r =		100			200			300			
					Max	lbs.	kN	Max	lbs.	kN	Max	lbs.	kN	
1001	0.580	(14.73)	58"	(1473.2)	4670	(20.77)	116"	(2946.4)	1165	(5.18)	174"	(4419.6)	518	(2.30)
1201	0.297	(7.54)	29"	(736.6)	3260	(14.50)	59"	(1498.6)	785	(3.49)	89"	(2260.6)	345	(1.53)

FIG. 031 Horizontal Prying Factors Per NFPA 13										
Brace Orientation*	A	B	C	D	E	F	G	H	I	
Brace Angle**	30° - 44°	45° - 59°	60° - 90°	30° - 44°	45° - 59°	60° - 90°	30° - 44°	45° - 59°	60° - 90°	
Prying Factor (Pr)	2.396 (60.85)	1.098 (27.90)	1.285 (32.64)	1.677 (42.60)	1.353 (34.36)	2.125 (53.98)	2.570 (65.28)	1.817 (46.16)	1.484 (37.69)	

\* Brace Orientation per NFPA 13.

\*\* Brace Pipe Angles are determined from vertical.

Unless otherwise specified, all dimensions on drawings and in charts are in inches and dimensions shown in parentheses are in millimeters.



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**FIG. 030 C-CLAMP STRUCTURAL ATTACHMENT**

- Pipe Braced:** 8" Pipe MAX  
**Bracing:** 1" thru 2" SCH 40 pipe, structural steel, and PHD 12 gauge strut channel (1001 & 1201)  
**Function:** Designed for bracing pipe against sway and seismic disturbances. Universal swivel design allows for attachment at any surface angle combined with concentric loading. Structure attachment fitting designed to use 1" thru 2" SCH 40 pipe, structural steel, and PHD 12 gauge strut channel (1001 & 1201) as sway bracing elements. No bracing member thicker than 3/8" can be used in conjunction with this product. Utilize the Fig. 030 with a PHD Manufacturing pipe attachment fitting and a bracing element to form a complete sway brace assembly. Sway brace assemblies are intended to be installed in accordance with NFPA 13 and the manufacturer's installation instructions.  
**Approvals:** Underwriters Laboratories listed for US and Canada  
 Factory Mutual approved  
 Listed for use with NFPA13 fastener tables and PHD sway brace components only  
**Material:** Ductile Iron and Low Carbon Steel  
**Installation:** Mount device to structure then insert brace element into fitting against back of jaw. Tighten set screw finger tight, then tighten until hex head breaks off. Adjust attachment to proper brace angle.

FM Maximum Design Load For Bracing SCH 10, 40 & Flow Pipe		
Brace Member	Brace Angle From Vertical (Degrees)	lbs.
1" Thru 2" SCH 40 Pipe (GB/T3091, EN10255H, or JISG3454)	30°-44°	1270
	45°-59°	2040
	60°-74°	2450
	75°-90°	2740
1/4" Thru 3/8" Thick Structural Steel	30°-44°	900
	45°-59°	1280
	60°-74°	1570
	75°-90°	1750
PHD 12 Gauge Strut Channel 1001 & 1201	30°-44°	1070
	45°-59°	1440
	60°-74°	1740
	75°-90°	1940
When governed by NFPA13 2019 or later, multiply FM approved loads by 0.682.		

UL Maximum Design Loads (Up to 8" Pipe)			
Brace Member	Member Thickness	Member Length	lbs.
1" Thru 2" Pipe	SCH 40	Refer to NFPA13	1370
NFPA13 Structural Steel	3/8" thick MAX	Refer to NFPA13	1370
1001 Series Strut	12 Ga.	See Chart Below	1370
1201 Series Strut	12 Ga.	See Chart Below	1370

Strut Fig. #	Max. Horizontal Load (lbs.) 90° From Vertical	r			l/r =		
		100	200	300	58"	116"	174"
1001	0.580	58"	4670	116"	1165	174"	518
1201	0.297	29"	3260	59"	785	89"	345

NOTE: Use NFPA13 table "Allowable Horizontal Load on Brace Assemblies Based on the Weakest Component of the Brace Assembly" reduction factors for maximum loads at varying angles.

Refer to [www.phd-mfg.com](http://www.phd-mfg.com) regarding further strut channel details

FIG. 031 Horizontal Prying Factors Per NFPA 13										
Brace Orientation*	A		B		C		D		E	
Brace Angle**	30° - 44°		45° - 59°		60° - 90°		30° - 44°		45° - 59°	
Prying Factor (Pr)	2.396	(60.85)	1.098	(27.90)	1.285	(32.64)	1.677	(42.60)	1.353	(34.36)

\* Brace Orientation per NFPA 13.

\*\* Brace Pipe Angles are determined from vertical.

FIG. 031 Horizontal Prying Factors Per NFPA 13								
Brace Orientation*	F		G		H		I	
Brace Angle**	60° - 90°		30° - 44°		45° - 59°		60° - 90°	
Prying Factor (Pr)	2.125	(53.98)	2.570	(65.28)	1.817	(46.16)	1.484	(37.69)

\* Brace Orientation per NFPA 13.

\*\* Brace Pipe Angles are determined from vertical.