

ICC-ES Evaluation Report


ESR-4567-AU

Issued November 2024

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<p>DIVISION: 21 00 00— FIRE SUPPRESSION</p> <p>Section: 21 05 48— Vibration and Seismic Controls for Fire- suppression Piping and Equipment</p> <p>DIVISION: 22 00 00— PLUMBING</p> <p>Section: 22 05 48— Vibration and Seismic Controls for Plumbing Piping and Equipment</p> <p>DIVISION: 23 00 00— HEATING, VENTILATING, AND AIR- CONDITIONING (HVAC)</p> <p>Section: 23 05 48— Vibration and Seismic Controls for HVAC</p> <p>DIVISION: 26 00 00— ELECTRICAL</p> <p>Section: 26 05 48— Vibration and Seismic Controls for Electrical Systems</p> <p>DIVISION: 27 00 00— COMMUNICATIONS</p> <p>Section: 27 05 48— Vibration and Seismic Controls for Communications Systems</p>	<p>REPORT HOLDER:</p> <p>ERICO INTERNATIONAL CORPORATION, A DIVISION OF NVENT</p>	<p>EVALUATION SUBJECT:</p> <p>NVENT CADDY STEEL CABLE AND FITTING ASSEMBLIES FOR SEISMIC SWAY BRACING OF NONSTRUCTURAL COMPONENTS</p>	
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1.0 EVALUATION SCOPE

Compliance with the following codes:

- National Construction Code (NCC) 2022 Building Code of Australia (BCA) – Volume One

Compliance with the following NCC code provisions:

■ VOLUME 1: For Class 2 to 9 Buildings (Non-Residential)

B1P1(1), B1P1(2)(d): Structural Reliability

B1D3 (c)(iv): Determination of individual actions, earthquake.

2.0 USES

The nVent Caddy steel cable and fitting assemblies (SCFAs) are tension-only cable seismic sway braces used to resist seismic forces and control seismic force-induced sway (displacements) of non-structural MEP components such as HVAC, electrical, plumbing and fire sprinkler suspended systems.

3.0 DESCRIPTION

3.1 General: The nVent Caddy SCFAs consist of steel cables, attachment fittings, structural adapters and swaged oval sleeves. The ends of the cables are looped around the pipes, bar joists or fittings and secured with the swaged oval sleeves. The fittings are then anchored to structural wood, concrete or steel members with bolts or structural attachment adapters. The fittings come in three configurations: Universal Restraint Clips, Retrofit Universal Restraint Clips and No Pry Clips. See [Figure 1](#). Structural adapters are available to secure fittings to open web steel bar joists, I-beams or concrete, masonry, or wood members.

3.2 Materials:

3.2.1 Steel Cable: The steel wire rope cable is a pre-stretched cable complying with ASTM A1023, cut to length as needed and is available in sizes 12, 18 and 36. The cable is pre-galvanized. See [Table 1](#) for additional specifications.

3.3 Fittings: The fittings are electrogalvanized steel complying with ASTM A1011, Grade 50 with a specified yield strength of 345 MPa (50 ksi) and a specified tensile strength of 448 MPa (65 ksi).

3.3.1 Universal Restraint Clip (CSBURC): The universal restraint clips are 4.27 mm (0.168 in) thick and are to be used with steel cable sizes 12, 18 and 36 and fastener with diameters 6.35 mm (1/4 in), 9.53 mm (3/8 in), 12.7 mm (1/2 in), 15.88 mm (5/8 in), 19.05 mm (3/4 in) and 22.23 mm (7/8 in) or M6 (0.236 in), M10 (0.394 in), M12 (0.472 in), M16 (0.630 in) and M20 (0.787 in). See [Figure 1](#).

3.3.2 Universal Retrofit Restraint Clip (CSBURCR): The universal retrofit restraint clips are 4.27 mm (0.168 in) thick and are to be used with steel cable sizes 12 and 18 and fasteners with diameters 9.53 mm (3/8 in), 12.7 mm (1/2 in) and 15.88 mm (5/8 in) or M6 (0.236 in), M12 (0.472 in) and M16 (0.630 in). See [Figure 1](#).

3.3.3 No Pry Clip (CSBNPC): The no pry clips are 4.27 mm (0.168 in) thick and are to be used with steel cable sizes 12, 18 and 36 and fasteners with diameters 9.53 mm (3/8 in), 12.7 mm (1/2 in) and 15.88 mm (5/8 in) or M10 (0.394 in), M12 (0.472 in) and M16 (0.630 in). See [Figure 1](#).

3.3.4 Swaged Oval Sleeves: The oval sleeves are electrogalvanized Copper Alloy ASTM B75 and are to be used with steel cable sizes 12, 18 or 36. See [Figure 2](#).

3.4 Structural Adaptors: The structural adapters are electrogalvanized steel or ductile cast iron devices used connect cable end fittings for cable seismic sway braces to building structural elements. See [Figure 3](#).

3.4.1 Bar Joist Adapter (CSBBARJEG): The bar joist adapter is ductile cast iron clamp complying with ASTM A536 with a 12.7 mm (1/2 in) or M12 (0.472 in) diameter bolted connection for attachment of a CSBURC12 cable end fitting to the top chord of an open web steel bar joist.

3.4.2 I-Beam Adapter (CSBBC075EG): The I-Beam Adapter is a ductile cast iron clamp complying with ASTM A536 with a 12.7 mm (1/2 in) or M12 (0.472 in) diameter bolted connection for attachment of a CSBURC12 or CSBNPC12 cable end fitting to either the top or bottom flange of a structural steel I-Beam with a flange thickness between 6.35 to 19.05 mm (1/4 to 3/4 inches) and a flange width between 102 to 368 mm (4 to 14.5 inches).

3.4.3 Multi-Attachment Adapter (CSBMA0500XXEG): The Multi-Attachment Adapter is electrogalvanized 63.5 mm x 63.5 mm x 6.35 mm (2 1/2 in x 2 1/2 in x 1/4 in) structural steel angle complying with ASTM A36 with either two 12.7 mm (1/2 in) or two 19.05 mm (3/4 in), or two M12 (0.472 in) or two M20 (0.787 in) diameter bolt holes in one leg for anchorage to a structural element and one 12.7 mm (1/2 in) or M12 (0.472 in) diameter bolt hole for attachment of a CSBURC12 or CSBNPC12 cable end fitting.

3.4.4 Single and Double Side Flange Adapter (CSBS1, CSBS2, CSBS3, CSBS4, CSBS5, CSBIB075XXXEG): The CSBS1 and CSBS2 are single side stamped steel flange attachment clamps

complying with ASTM A1018 with 12.7 mm ($\frac{1}{2}$ in) or M12 (0.472 in) diameter bolted connection for attachment of a CSBURC12 cable end fitting to either the top or bottom flange of a structural steel I-Beam with a flange thickness of 6 to 19 mm ($\frac{1}{4}$ to $\frac{3}{4}$ inch) and 19 to 31 mm ($\frac{3}{4}$ to 1 $\frac{1}{4}$ inch), respectively.

The CSBS3, CSBS4 and CSBS5 are double-side cast ductile iron flange attachment clamps complying with ASTM A1018 with 12.7 mm ($\frac{1}{2}$ in) or M12 (0.472 in) diameter bolted connection for attachment of a CSBURC12 cable end fitting to the bottom flange of a structural steel I-Beam with a flange thickness of 6 to 31 mm ($\frac{1}{4}$ to 1 $\frac{1}{4}$ inch) and flange width of 100 to 455 mm (4 to 18 inch).

The CSBIB075XXX is a double-side cast ductile iron clamp complying with ASTM A536 with a 12.7 mm ($\frac{1}{2}$ in) or M12 (0.472 in) diameter bolted connection for attachment of a CSBURC12 cable end fitting to the bottom flange of a structural steel I-Beam.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: The design load must be determined from Section 8.0 of *Structural design actions Part 4: Earthquake actions in Australia* (AS 1170.4 – 2007 (R2018)), and must be less than the corresponding tabulated SCFA values determined in accordance with [Tables 3](#) to [5](#), as applicable.

The non-structural components (i.e. architectural, mechanical and electrical components) to be braced with the SCFAs are outside the scope of this report must be designed by a registered design professional in accordance with Section 8.0 of AS 1170.4 – 2007 (R2018), as applicable.

The anchor bolts and mechanical fasteners used to attach SCFAs to their structural supports are outside the scope of this report and must be designed by a registered design professional in accordance with Section 8.0 of AS 1170.4 – 2007 (R2018). Consideration must be given to prying effects resulting from fitting geometry.

4.2 Additional Connection Configurations: The cables can be secured or spliced in accordance with this section, with design strengths to be determined from [Table 4](#). See [Figure 4](#) for various configurations.

4.2.1 Cable Wrap Pipe: Size 12, 18 and 36 cables can be wrapped 1 $\frac{1}{2}$ times around pipe and secured with oval sleeve.

4.2.2 Bar Joist Cable Loop: Size 12, 18 and 36 cables can be looped around the top chord of a bar joist at a panel point and secured with an oval sleeve.

4.2.3 Cable Lap Splice: Size 12 and 18 cables can be lap spliced with two oval sleeves.

4.3 Durability: nVent Caddy steel cable and fitting assemblies are pre-galvanized and electro-galvanized, respectively, and for use in corrosive environments must be justified to the satisfaction of the code official.

4.4 Installation:

Installation of the nVent Caddy steel cable and fitting assemblies must be in accordance with this report, the approved plans and the manufacturer's printed installation instructions. Dead load of the nonstructural components must be supported independently of the SCFAs. The SCFAs must only be hand-tightened sufficiently to remove slack. Any penetrations of walls, floors and ceilings by pipes, wires or cables must comply with the requirements of Specification 13 of the 2022 BCA Volume 1.

See [Figures 6](#) through [10](#) for examples of brace assembly details for various non-structural elements.

5.0 CONDITIONS OF USE:

The nVent Caddy steel cable and fitting assemblies described in this report comply with, or are a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

1. Installation of the nVent Caddy steel cable and fitting assemblies must be in accordance with this report, approved plans, and the manufacturer's printed installation instructions. In event of a conflict between this report and the manufacturer's printed installation instructions, the more restrictive requirement governs.
2. SCFAs are limited to resisting seismic forces and controlling seismic force-induced sway (displacements) of nonstructural components only. The registered design professional may need to consider other load requirements as set forth in the applicable codes.
3. When used as tension-only sway bracing for fire protection automatic sprinkler system, SCFAs must be installed in accordance with Section E1D4 of the 2022 BCA Volume 1.
4. The following items are beyond the scope of the evaluation report:

- (1) Attachments of the non-structural component to the seismic force-resisting system, such as anchor bolts and mechanical fasteners, with the exception of end loops or wrapping of the SCFAs, and structural support members;
 - (2) The effects of elevated temperatures on the performance of SCFAs;
 - (3) The effects of fatigue on the performance of SCFAs;
 - (4) Use with vibrating equipment unless dynamic loading on calculated stresses, fatigue, and deflections of the SCFAs are considered by the registered design professional for the specific applications;
 - (5) Protection against sharp resonant motions of nonstructural components, or shock loading;
 - (6) Outdoor applications and necessary corrosion protections;
 - (7) Use as rigid seismic sway bracings resisting tension and compression forces;
 - (8) Replaceability of cables;
 - (9) Post-construction considerations and inspection requirements;
 - (10) Pipe clamps, grooved couplings, or other similar hanger devices that are installed for the purpose of attaching SCFAs to sprinkler pipes;
 - (11) Rod stiffeners, when required, used to resist upward vertical movement.
5. nVent Caddy steel cable and fitting assemblies are manufactured under an approved quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the [ICC-ES Acceptance Criteria for Steel Cable and Fitting Assemblies \(SCFAs\) for Seismic Sway Bracing of Nonstructural Components \(AC413\)](#), dated August 2020, editorially revised September 2022.

7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number ICC-ES ESR-4567 along with the name, registered trademark, or registered logo of the report holder, must be included in the product label.
- 7.2 In addition, product labeling shall include the company name, and the cables coated with permanent color cable coding (Size 12 – RED, Size 18 – WHITE and Size 36- BLUE).
- 7.3 The report holder's contact information is the following:

**ERICO INTERNATIONAL CORPORATION,
A DIVISION OF NVENT
31700 SOLON ROAD
SOLON, OHIO 44139
(440) 248 - 0100
www.erico.com**



FIGURE 1: ATTACHMENT FITTINGS (XX = Bolt hole size)

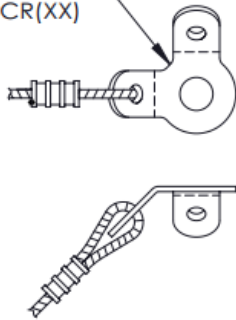


FIGURE 2: OVAL SLEEVES

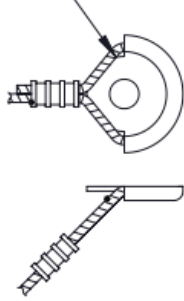
 <p>BAR JOIST ADAPTER CSBBARJEG</p>	 <p>I-BEAM ADAPTER CSBBC075EG</p>	 <p>MULTI-ATTACHMENT ADAPTER CSBMA050050EG CSBMA050075EG</p>
 <p>SINGLE SIDE FLANGE ADAPTER CSBS1 CSBS2</p>	 <p>DOUBLE SIDE FLANGE ADAPTER CSBS3 CSBS4 CSBS5</p>	 <p>DOUBLE SIDE FLANGE ADAPTER CSBIB075085EG CSBIB075145EG</p>

FIGURE 3: STRUCTURAL ADAPTERS

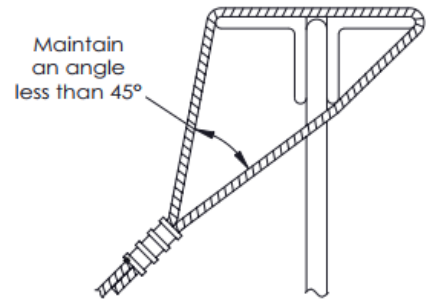
Part Number
CSBURC(XX)
CSBURCR(XX)



Part Number
CSBNPC(XX)

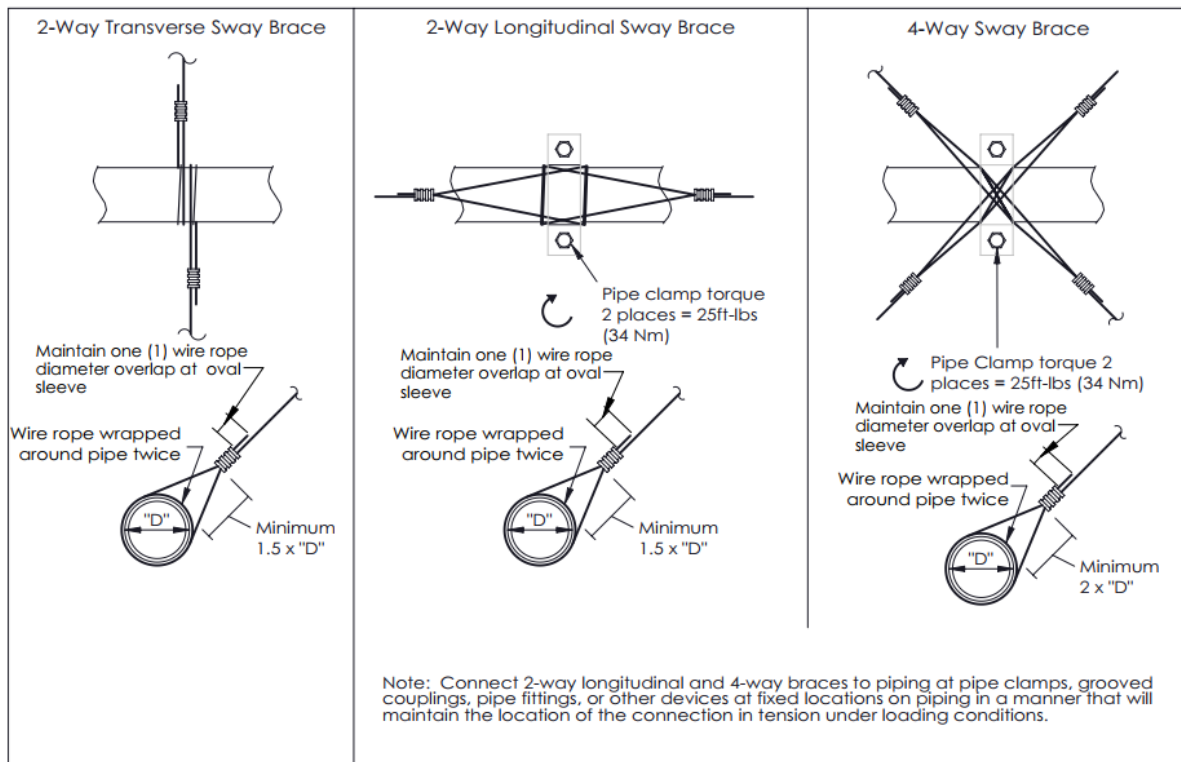


Looped Connection
Wire rope can be looped around the top
cord of a bar joist at the "A" panel point

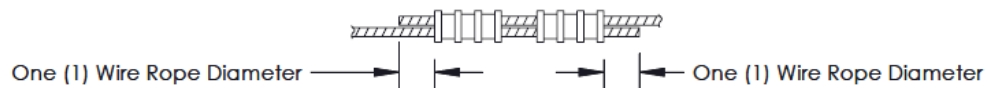


CSBURC AND CSBURCR CONNECTIONS TO STRUCTURE OR COMPONENT

BAR JOIST CABLE LOOP



CABLE WRAPPED PIPE, TUBE OR CONDUIT CONNECTIONS



Step 1 - Slide two sleeves (ferrules) onto overlapping wire ropes.

Step 2 - The sleeve (ferrule) has to be swaged by using a swaging tool (CSB3346SB, CSB13SBHS, CSB48 or CSBHS02). Refer to the manufacturers instructions for the number of swages needed per wire rope size.

CABLE SPLICE

FIGURE 4: ADDITIONAL CONNECTION CONFIGURATIONS

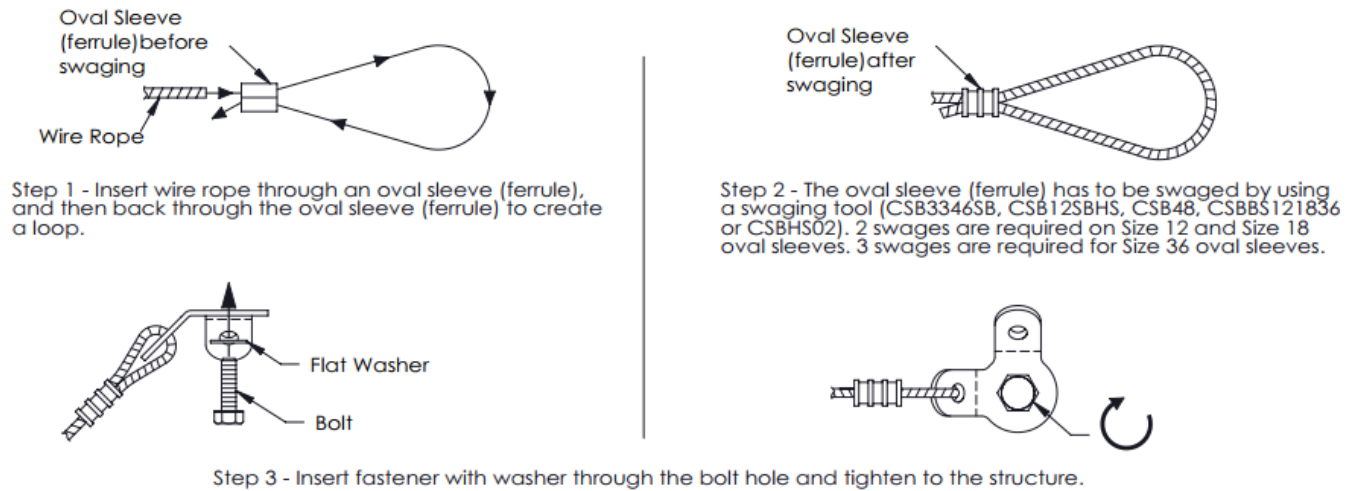


FIGURE 5: TYPICAL INSTALLATION INSTRUCTIONS

TABLE 1: nVent CADDY SEISMIC CABLE SPECIFICATIONS

Model	CSB12CBL	CSB18CBL	CSB36CBL
Size	12	18	36
Nominal Diameter mm(in)	2.4 (3/32)	3.2 (1/8)	4.76 (3/16)
Color Code	Red	White	Blue
Material Specification	ASTM A1023 Gr. IPS	ASTM A1023 Gr. IPS	ASTM A1023 Gr. IPS
Classification	Commercial	Commercial	Commercial
Construction	7x7	7x7	7x19
Wire Finishes	Drawn Galvanized	Drawn Galvanized	Drawn Galvanized
Core Type	Wire Strand Core	Wire Strand Core	Wire Strand Core
Direction and Type of Rope Lay	Right Hand Regular Lay	Right Hand Regular Lay	Right Hand Regular Lay
Specified Nominal Cable Strength ¹ N(lbs)	4.1 (920)	7.6 (1700)	18.7 (4200)
Minimum Specified Prestretching Force ²	60%	60%	60%
Minimum Specified modulus of Elasticity kPa(psi)	1.2 x 10 ⁵ (17.5 x 10 ⁶)	1.2 x 10 ⁵ (17.5 x 10 ⁶)	1.2 x 10 ⁵ (17.5 x 10 ⁶)

For SI: 1 inch = 25.4 mm; 1 psi = 6895 MPa; 1 lb = 4.45 N.

¹Minimum Breaking Force per ASTM A1023 Table 7

²Approximate percentage of minimum breaking force as basis for ASCE/SEI 19 E7.3.1 MOE test method.

TABLE 2: nVent CADDY SEISMIC CABLE LOADS

Model	Cable Size	Color Code	Description	Specified Breaking Force ¹ N (lbs.)
CSB12CBL	12	RED	7 x 7 Drawn Galvanized Cable	4092 (920)
CSB18CBL	18	WHITE	7 x 7 Drawn Galvanized Cable	7561 (1700)
CSB36CBL	36	BLUE	7 x 19 Drawn Galvanized Cable	18681 (4200)

¹ Specified Breaking Force of the cable from ASTM A1023-15 Table 7.

TABLE 3: nVent CADDY SEISMIC WIRE ROPE/CABLE FITTINGS AND CONNECTIONS

Model	For Cable Size	Description	Tested Breaking Force N (lbs.)	Ultimate Strength Load ¹ N (lbs.)
UNIVERSAL RESTRAINT CLIP (CSBURC)				
CSBURC14	12, 18, 36	CSBURC w/ ¼ in or M6 diameter fastener	18681 (4200)	11887 (2673)
CSBURC38	12, 18, 36	CSBURC w/ 3/8 in or M10 diameter fastener	18681 (4200)	11887 (2673)
CSBURC12	12, 18, 36	CSBURC w/ ½ in or M12 diameter fastener	18681 (4200)	11887 (2673)
CSBURC58	12, 18, 36	CSBURC w/ 5/8 in or M16 diameter fastener	18681 (4200)	11887 (2673)
CSBURC34	12, 18, 36	CSBURC w/ ¾ in or M20 diameter fastener	18681 (4200)	11887 (2673)
CSBURC78	12, 18, 36	CSBURC w/ 7/8 in or M22 diameter fastener	18681 (4200)	11887 (2673)
UNIVERSAL RETROFIT RESTRAINT CLIP (CSBURCR)				
CSBURCR38	12, 18	CSBURCR w/ 3/8 in or M10 diameter fastener	7561 (1700)	4806 (1081)
CSBURCR12	12, 18	CSBURCR w/ ½ in or M12 diameter fastener	7561 (1700)	4806 (1081)
CSBURCR58	12, 18	CSBURCR w/ 5/8 in or M16 diameter fastener	7561 (1700)	4806 (1081)
NO PRY CLIP (CSBNPC)				
CSBNPC38	12, 18, 36	CSBNPC w/ 3/8 in or M10 diameter fastener	18681 (4200)	11887 (2673)
CSBNPC12	12, 18, 36	CSBNPC w/ ½ in or M12 diameter fastener	18681 (4200)	11887 (2673)
CSBNPC58	12, 18, 36	CSBNPC w/ 5/8 in or M16 diameter fastener	18681 (4200)	11887 (2673)
OVAL SLEEVE				
CSB12SLVB	12	For swaged cable termination fittings on Size 12 Cable	4092 (920)	2603 (585)
CSB18SLVB	18	For swaged cable termination fittings on Size 18 Cable	7561 (1700)	4806 (1081)
CSB36SLVB	36	For swaged cable termination fittings on Size 36 Cable	18681 (4200)	11887 (2673)

For SI: 1 inch = 25.4 mm

¹ Tabulated strength values are determined by dividing the tested breaking force by a factor of 1.54.

TABLE 4: ADDITIONAL ATTACHMENT CONFIGURATIONS

Model	For Cable Size	Description	Tested Breaking Force N (lbs.)	Ultimate Strength Load ¹ N (lbs.)
Cable Wrap Pipe Conn.	12	Size 12 cable wrapped 1 1/2 times around pipe and secured with oval sleeve	4092 (920)	2603 (585)
Cable Wrap Pipe Conn.	18	Size 18 cable wrapped 1 1/2 times around pipe and secured with oval sleeve	7561 (1700)	4806 (1081)
Cable Wrap Pipe Conn.	36	Size 36 cable wrapped 1 1/2 times around pipe and secured with oval sleeve	18681 (4200)	11887 (2673)
Bar Joist Cable Loop	12	Size 12 cable loop secured to top chord of bar joist at "A" panel point	4092 (920)	2603 (585)
Bar Joist Cable Loop	18	Size 18 cable loop secured to top chord of bar joist at "A" panel point	7561 (1700)	4806 (1081)
Bar Joist Cable Loop	36	Size 36 cable loop secured to top chord of bar joist at "A" panel point	13699 (3080)	8718 (1960)
Cable Lap Splice	12	Size 12 cable lap splice secured with two oval sleeves	4092 (920)	2603 (585)
Cable Lap Splice	18	Size 18 cable lap splice secured with two oval sleeves	7561 (1700)	4806 (1081)

For SI: 1 inch = 25.4 mm

¹ Tabulated strength values are determined by dividing the tested breaking force by a factor of 1.54.

TABLE 5: nVent CADDY STRUCTURAL ADAPTERS

Model	For Cable Size	Description	Tested Breaking Force lbs. N (lbs.)	Ultimate Strength Load ¹ N (lbs.)
CSBBARJEG w/ URC	12, 18, 36	Bar Joist Adapter with CSBURC12	10764 (2420)	6849 (1540)
CSBBC075EG w/ URC	12, 18, 36	I-Beam Adapter with CSBURC12	7828 (1760)	4981 (1120)
CSBBC075EG w/ NPC	12, 18, 36	I-Beam Adapter with CSBNPC12	7828 (1760)	4981 (1120)
CSBIB075085EG w/ URC	12, 18, 36	Double Side Flange Adapter with CSBURC12	10764 (2420)	6849 (1540)
CSBIB075085EG w/ NPC	12, 18, 36	Double Side Flange Adapter with CSBNPC12	13699 (3080)	8718 (1960)
CSBIB075145EG w/ URC	12, 18, 36	Double Side Flange Adapter with CSBURC12	10764 (2420)	6849 (1540)
CSBIB075145EG w/ NPC	12, 18, 36	Double Side Flange Adapter with CSBNPC12	13699 (3080)	8718 (1960)
CSBMA050050EG w/ NPC	12, 18, 36	Multi-Attachment Adapter - (2) 1/2" or (2) M12 diameter fasteners for structure anchorage and (1) 1/2" or M12 diameter fastener for CSBNPC12	12721 (2860)	8095 (1820)
CSBMA050075EG w/NPC	12, 18, 36	Multi-Attachment Adapter - (2) 3/4" or (2) M20 diameter fasteners for structure attachment and (1) 1/2" or M12 diameter fastener for CSBNPC12	12721 (2860)	8095 (1820)
CSBMA050050EG w/ URC	12, 18, 36	Multi-Attachment Adapter - (2) 1/2" or (2) M12 diameter fasteners for structure attachment and (1) 1/2" or M12 diameter fastener for CSBURC12	10764 (2420)	6849 (1540)
CSBMA050075EG w/ URC	12, 18, 36	Multi-Attachment Adapter - (2) 3/4" or M20 diameter fastener for structure attachment and (1) 1/2" or M12 diameter fastener CSBURC12	10764 (2420)	6849 (1540)
CSBS1 w/ URC	12, 18, 36	Single Side Flange Adapter with CSBURC12	10764 (2420)	6849 (1540)
CSBS2 w/ URC	12, 18, 36	Single Side Flange Adapter with CSBURC12	10764 (2420)	6849 (1540)
CSBS3 w/ URC	12, 18, 36	Double Side Flange Adapter with CSBURC12	10764 (2420)	6849 (1540)
CSBS4 w/ URC	12, 18, 36	Double Side Flange Adapter with CSBURC12	10764 (2420)	6849 (1540)
CSBS5 w/ URC	12, 18, 36	Double Side Flange Adapter with CSBURC12	10764 (2420)	6849 (1540)

For SI: 1 inch = 25.4 mm

¹ Tabulated strength values are determined by dividing the tested breaking force by a factor of 1.54.

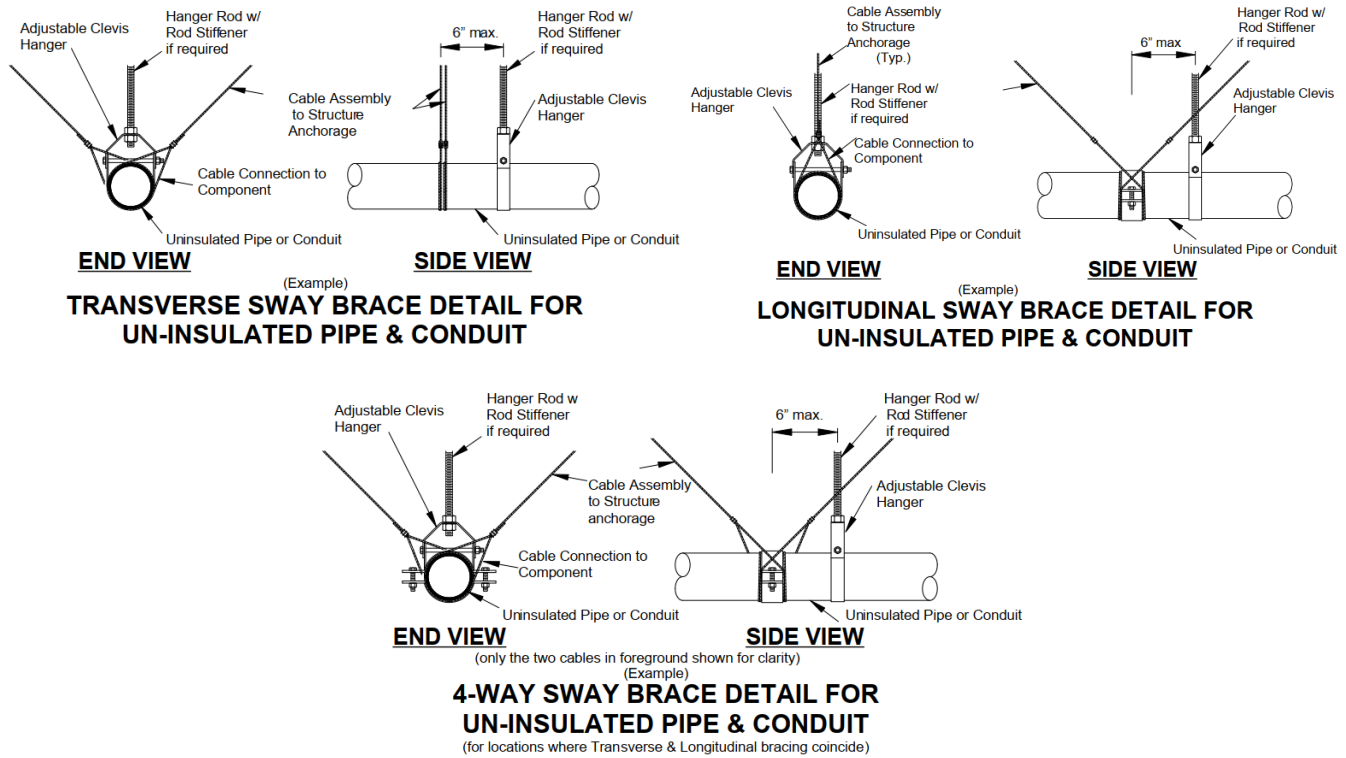


FIGURE 6: SWAY BRACE DETAILS FOR UN-INSULATED PIPE AND CONDUIT

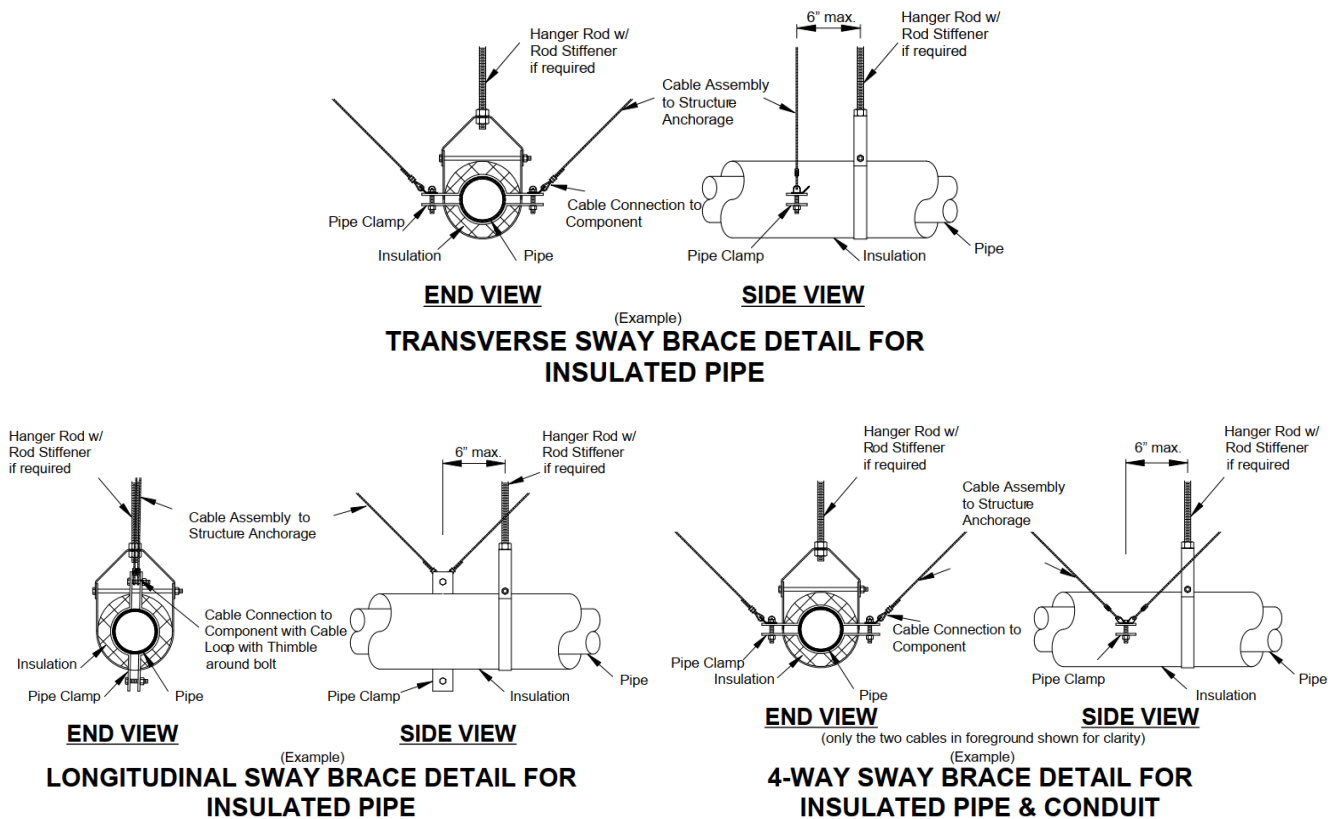


FIGURE 7: SWAY BRACE DETAILS FOR INSULATED PIPE AND CONDUIT

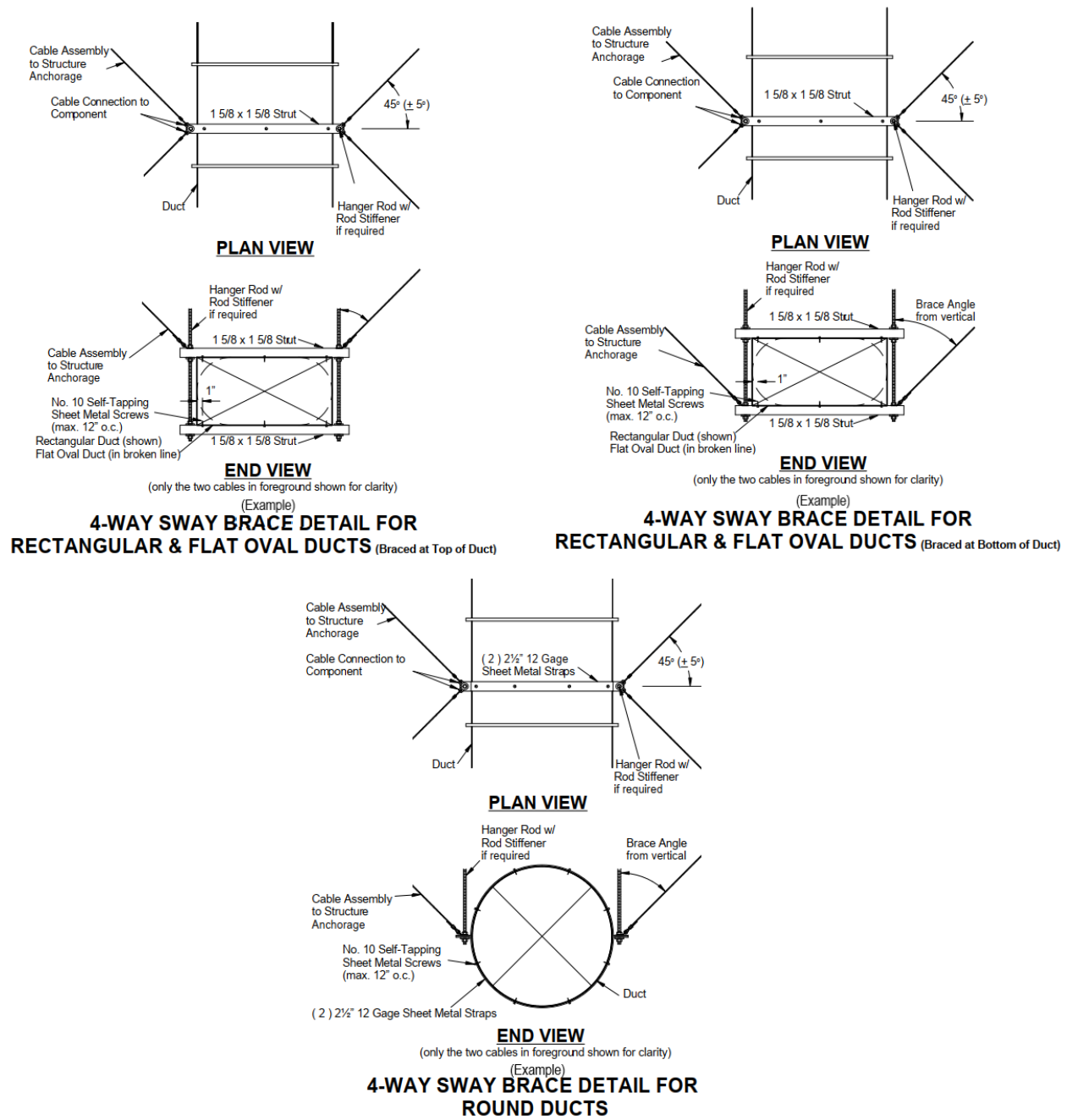
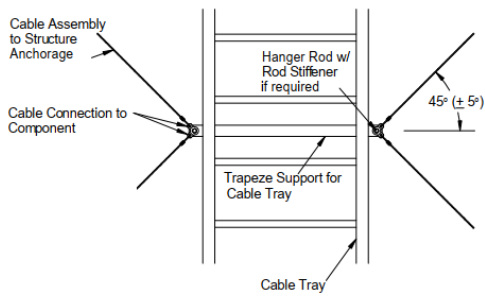
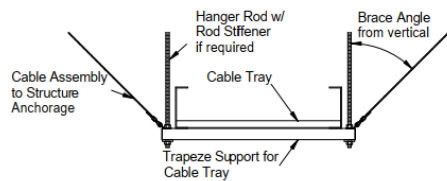


FIGURE 8: SWAY BRACE DETAILS FOR INSULATED PIPE AND CONDUIT



PLAN VIEW

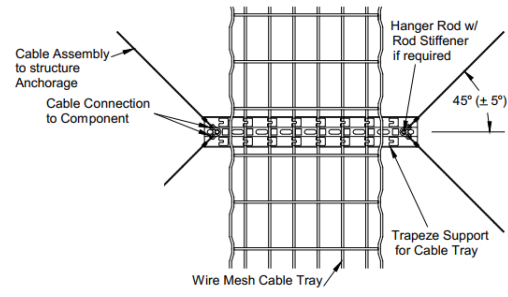


END VIEW

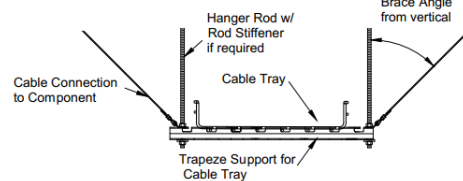
(only the two cables in foreground shown for clarity)

(Example)

4-WAY SWAY BRACE DETAIL FOR CABLE TRAY



PLAN VIEW



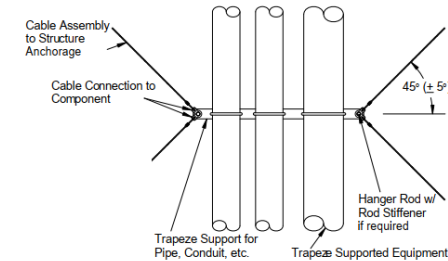
END VIEW

(only the two cables in foreground shown for clarity)

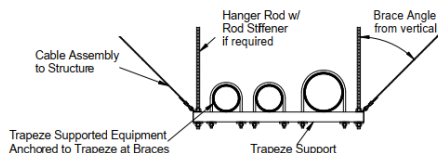
(Example)

4-WAY SWAY BRACE DETAIL FOR WIRE MESH CABLE TRAY

(for locations where Transverse & Longitudinal bracing coincide)



PLAN VIEW



END VIEW

(only the two cables in foreground shown for clarity)

(Example)

4-WAY SWAY BRACE DETAIL FOR TRAPEZE SUPPORTED EQUIPMENT

FIGURE 9: SWAY BRACE DETAILS FOR INSULATED PIPE AND CONDUIT

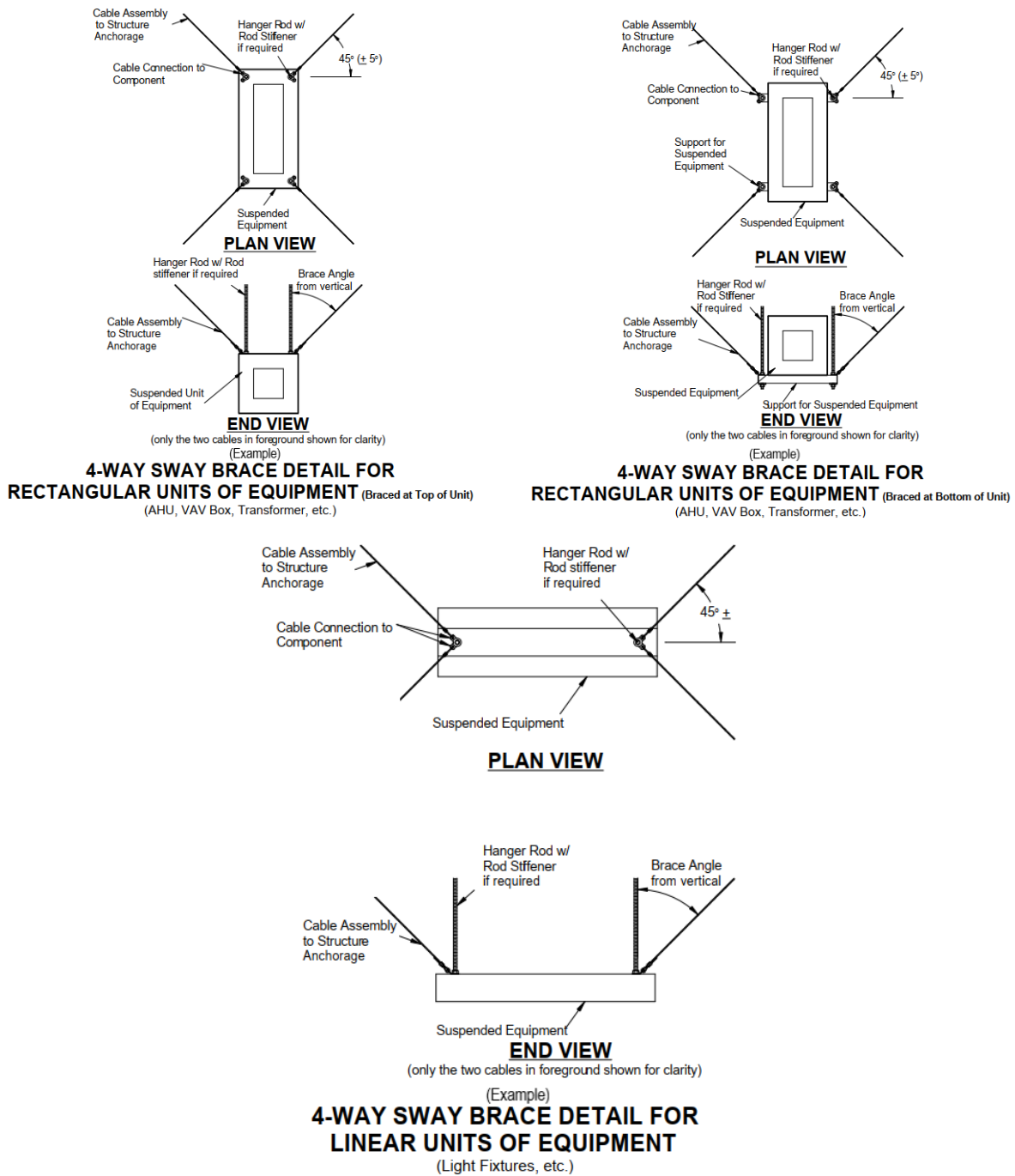


FIGURE 10: SWAY BRACE DETAILS FOR INSULATED PIPE AND CONDUIT