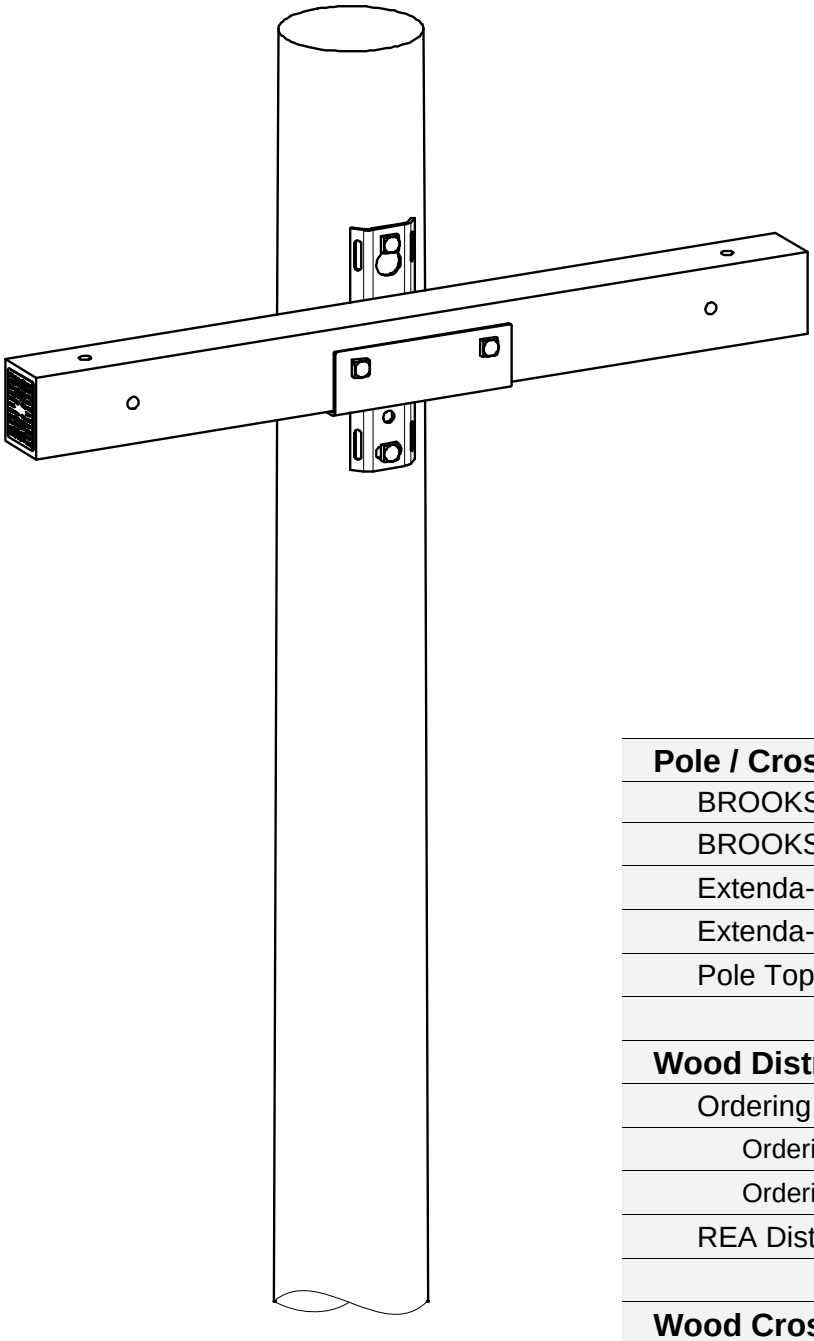
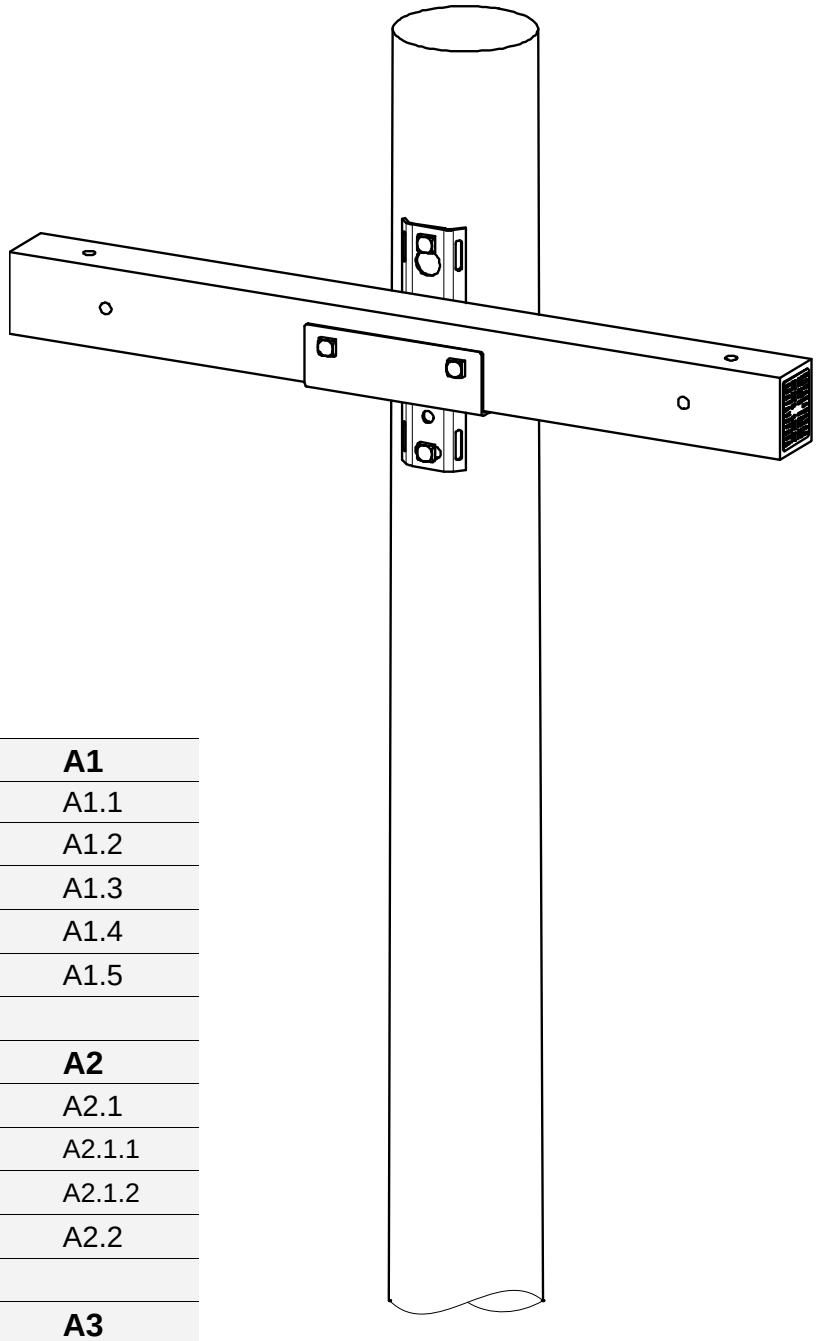
Distribution Products



Distribution Products



Distribution Products

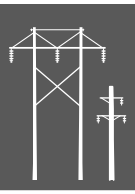
BROOKS is best known for producing the highest quality crossarms available in the industry. Our Douglas fir crossarms come from sustainable forests that are managed to meet the social, economic, and ecological needs of present and future generations. Treated Douglas fir wood remains the most cost effective material in terms of initial costs as well as total lifecycle costs.

In addition to visual inspection, before crossarms leave our facility every distribution crossarm is stress tested to simulate the typical working load of a distribution crossarm in the field. Refer to page A2 for more information regarding the BROOKS Machine Rated (BMR) standard.

BROOKS Manufacturing continually strives to innovate and also improve our existing products. We are able to stay ahead of the curve by developing new products that save the end user both time and money. New distribution products include the BROOKS Braceless Crossarm, BrooksWrapp™, Extenda-Life® Crossarms and BROOKS Pole Top Extension.

Many of our products can now be found in PLS. For engineering details and use within PLS-POLE™, please visit http://www.powline.com/files/pls_pole.html to download BROOKS Manufacturing's Crossarm & Brace Libraries.

BROOKS Manufacturing's single pole distribution and transmission crossarms are also available for new and existing pole designs within SPIDACalc Software. To request a copy of BROOKS Manufacturing's client file library, please contact support@spidasoftware.com.



Quality Standards and Specifications

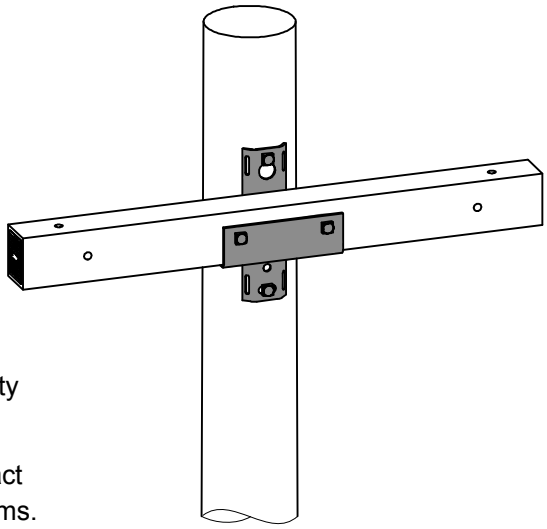
BROOKS is proud of the quality products we manufacture. Millions of our distribution crossarms and transmission framing components have been installed on utility poles in the United States and other parts of the world. Many of these have been in service for over 50 years. Our years of success are the result of following stringent specifications in purchasing, grading, production, treating and shipping. This attention to detail is your assurance that the finished product will fully meet your specified standards.

BROOKS Douglas fir Crossarms and Transmission Framing meet the latest revisions of the applicable product quality standards and specifications shown below. Most of these reference additional standards for method and quality.

WCLIB Rule No. 17	Sawmill standard for grading West Coast solid sawn timber. BROOKS purchases only the stock which meets this standard. Para. 169/169a (Transmission).
ANSI O5.2	Product standard for structural glued laminated timber for utility structures. References AITC 117 and ANSI/AITC A.
ANSI O5.3	Product standard for solid sawn wood crossarms and braces. This standard is to replace EEI TD-90, TD-92, and TD-93.
NRECA-WQC	The Wood Quality Control program administered by the National Rural Electric Cooperative Association sets stringent production and treatment standards which must be met in order to sell WQC approved wood products. BROOKS has met these standards and is an approved supplier under the NRECA-WQC program.
AWPA C-25 AWPA-C-28	Standard for pressure treating wood crossarms, by the American Wood Preservers Association. All BROOKS pentachlorophenol treated crossarms meet or exceed these specifications. C-25 (solid sawn). C-28 (laminated).

BROOKS Braceless Crossarm

When it comes to safe, fast installation and maintenance of distribution crossarms, the BROOKS Braceless Crossarm is the perfect way to ensure that you're getting the most out of your infrastructure.

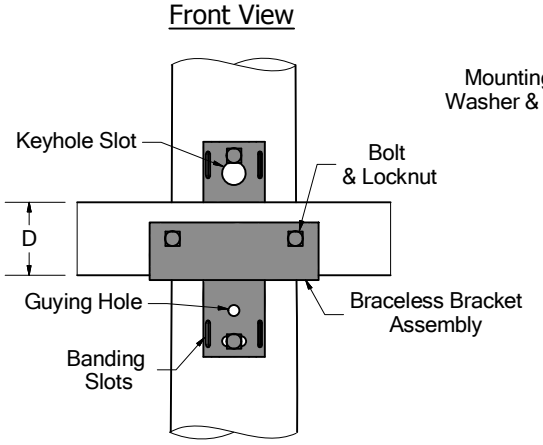


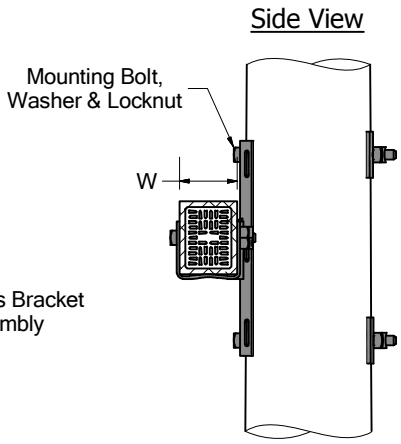
By eliminating the traditional, multiple mounting points for crossarms, the easily mounted braceless bracket installs in less time than traditional braces. Whether used in buck arm or traditional construction, the robotically-welded BROOKS Braceless Crossarm comes pre-assembled, eliminating the need to join the crossarm and bracket before lifting into position. Additionally, the bracket and crossarm can be installed on a variety of pole materials: concrete, steel, fiberglass, and wood.

With the BROOKS Dual Channel design, there is less water contact and greater support strength, providing longer life to your crossarms. Additionally, your line crews will appreciate the increased access and mobility created by the low profile installation. The ability to freely maneuver around the installed bracket reduces risk of injury and diminishes maintenance time.

The BROOKS Braceless Crossarm has been independently tested; contact BROOKS Engineering Department for test results and specifics, or visit our website.

Every crossarm assembled to the BROOKS Braceless Bracket will include the BROOKS Extenda-Life End Plates. See Page A1.3 for further details.





Available Crossarm Sizes

3½" x 4½"
3¾" x 4¾"
3¾" x 5¾"
4¾" x 5¾"
5¾" x 5¾"

To order your custom drilled crossarm assembled to BROOKS Braceless Bracket, add "-BBA" (to include pole mounting hardware) or "-BBA-NM" (less pole mounting hardware) to the end of the crossarm ordering code. Standard mounting bolt holes are ⅝" unless otherwise specified.

For assistance in identifying the BROOKS Braceless Crossarm best suited to your applications, contact BROOKS Engineering Department.

For more information, go to **www.brooksmfg.com/braceless**
or email us at **info@brooksmfg.com**

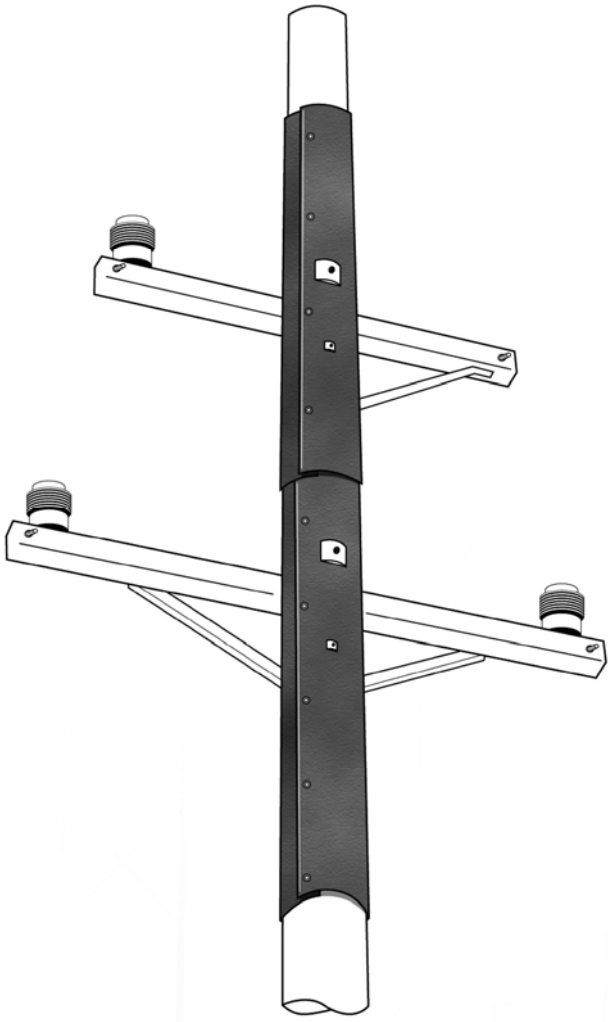
BROOKSWRAPP™

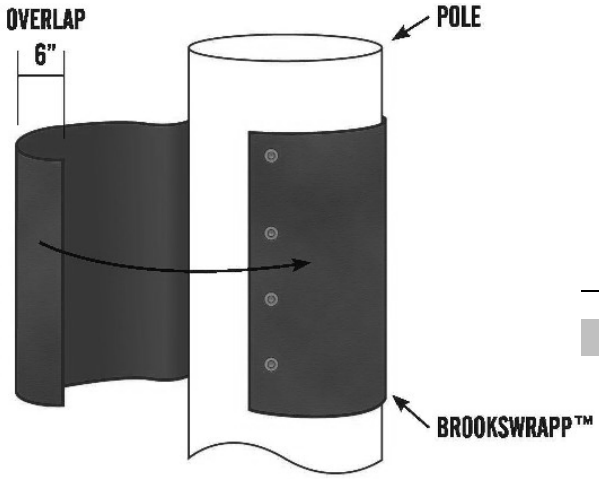
Designed to eliminate damage caused by woodpeckers, BrooksWrapp™ was developed out of a two part polyurea coating process. For some time, BROOKS Manufacturing has been using this specialized coating to protect against woodpecker damage to distribution crossarms. Now with a simple all-inclusive kit, line crews can feel comfortable that woodpeckers will not damage the pole itself.

Produced in 4’ x 8’ sheets, the BrooksWrapp™ product is easy to cut, requires no special handling and installs on the pole in minutes. It has been tested to withstand UV for over 80 years, has a UL® Class I fire rating, and is self extinguishing.

BrooksWrapp™ does not damage beaks or harm the woodpecker, it simply eliminates their ability to penetrate to the wood surface of the pole.

Simple and fast to install, BrooksWrapp™ can be applied at the first sign of woodpecker damage, saving valuable time and thousands of dollars.





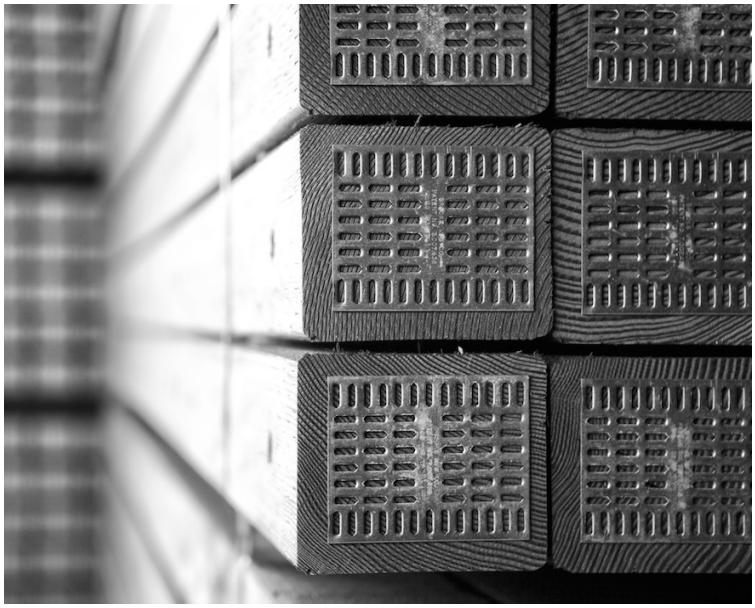
Catalog Number	Description
BPW-KIT	Two 4’x8’ BrooksWrapp™ Sheets & Cap Nails

Please contact BROOKS Sales Department to see how BrooksWrapp™ can work for your specific application.

For more information, go to **www.brooksmfg.com/brookswrapp**
or email us at **info@brooksmfg.com**

Extenda-Life® End Plated Crossarms

BROOKS Extenda-Life® End Plated Crossarms are the same superior quality crossarms that BROOKS has produced for decades, with the addition of a specially designed nail end plate hydraulically pressed into each end.



These patented, galvanized steel end plates extend the life of traditional Douglas fir crossarms by preventing end split. Extenda-Life® End Plated Crossarms significantly increase the life cycle of any distribution and transmission line. (Patent No.: 7,007,438 B1). Out of service crossarm research determined that replacement would not have been necessary, if Extenda-Life® End Plates had been installed.

Why Use Extenda-Life® End Plated Crossarm?

- Engineered to eliminate crossarm end split and the use of other anti-split devices
- More than a 50% increase in strength for longitudinal and transverse loading
- Factory installed
- Provides substantial long term cost savings by significantly extending the life of the crossarm
- Reduces expenditures for labor, equipment and materials
- ANSI and RUS approved
- Hardens the system while reducing labor cost

Available Wood Sizes for End Plates

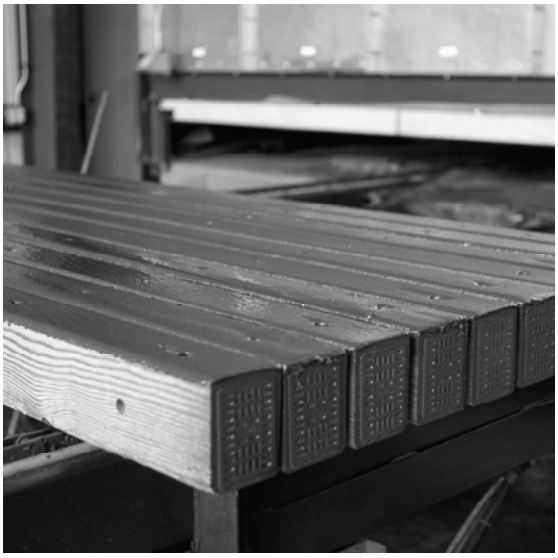
3½"	x	4½"
3¾"	x	4¾"
3¾"	x	5¾"
4¾"	x	5¾"
5¾"	x	5¾"
5⅝"	x	7½"
3⅜"	x	9½"

Additional sizes are available upon request

To order your custom drilled Extenda-Life® Crossarms, add “NP” to the end of the crossarm ordering code.

For more information, go to **www.brooksmfg.com/extenda-life**
or email us at **info@brooksmfg.com**

Extenda-Life® Coated Crossarms



BROOKS Extenda-Life® Coating is an ultra-strong protective barrier. The product successfully extends the life of wood crossarms. The formula coats the surface making the crossarm virtually impenetrable.

Why Use Extenda-Life® Coated Crossarms?

- Coating created after decades of research and development
- Shields against weather induced deterioration on the top of the crossarm
- Reduces contamination build-up, lessening the tracking potential
- Increases strength and improves reliability
- Class I fire retardant
- Compatible with all current pole line hardware
- Provides substantial long-term cost savings by extending the life of the crossarm and reducing expenditures for labor, equipment, and materials
- High tensile strength, pliable, tear resistant
- Protects crossarm from woodpecker damage (patent pending)

Extenda-Life® Coating can be applied to the top of a crossarm, bottom of a crossarm, or the entire crossarm depending on your application. Please speak with the BROOKS Sales Department to find out which coating suits your specific needs.

Top Coated Crossarms are perfect for shielding against weather induced deterioration on the top of the crossarm. To order your custom Top Coated Extenda-Life® Crossarm, add “RD-T” to the end of your crossarm ordering code.

Bottom Coated Crossarms prevent damage caused by Ladder-backed woodpeckers and eliminates retrofitting crossarms with inferior aftermarket products. To order your custom Bottom Coated Extenda-Life® Crossarm, add “RD-U” to the end of your crossarm ordering code.

Fully Encapsulated Crossarms are the ultimate protective barrier against all species of wood peckers. To order your custom Fully Encapsulated Extenda-Life® Crossarm, add “RD” to the end of your crossarm ordering code.

For more information, go to **www.brooksmfg.com/extenda-life**
or email us at **info@brooksmfg.com**

Pole Top Extension

BROOKS Pole Top Extension bracket was designed to extend the length and lifespan of a pole. The FCC has mandated that the top of poles be made available for wireless carriers to attach cell phone antennas. The Pole Top Extension eliminates the need to replace poles in order to meet the requirement. The new extension can be used to mount telecom equipment without incurring major pole replacement costs.

Every BROOKS Pole Top Extension bracket is constructed of 3 interlocking, multipoint connections. The bracket is then hot dipped galvanized to meet ASTM A153 Steel Galvanization requirements. The actual wood extension is a BROOKS Manufacturing treated crossarm and meets ANSI O5.3 Specifications.

Built to last, and stronger than the elements that get thrown at it, BROOKS Pole Top Extension saves you both time and money. Additionally, it has been mechanically strength tested; contact BROOKS for test results and more specific information, or visit our website to download a PDF copy of the test report.

Catalog Number	Description
720-66-5	5¾" x 5¾" x 5'-0" Pole Top Extension
720-66-6	5¾" x 5¾" x 6'-0" Pole Top Extension
720-66-7	5¾" x 5¾" x 7'-0" Pole Top Extension

Available in 5, 6 or 7 foot lengths, each extension is sold pre-assembled, predrilled and ready to be installed, saving both time and money. Every Brooks Pole Top Extension comes standard with ⅞" x 16" mounting hardware.

For assistance in identifying the BROOKS Braceless Bracket best suited to your applications, contact BROOKS Engineering Department.

For more information, go to **www.brooksmfg.com/pole-extension**
or email us at **info@brooksmfg.com**

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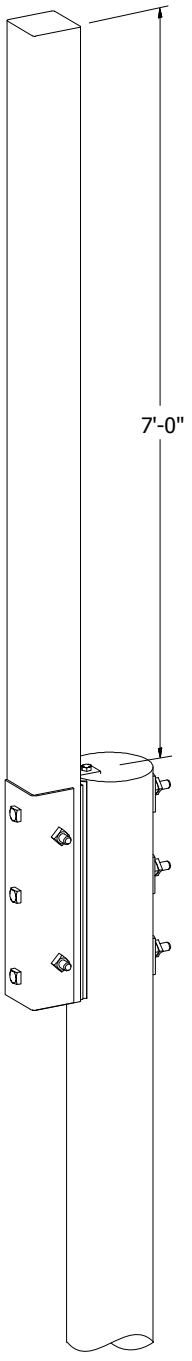
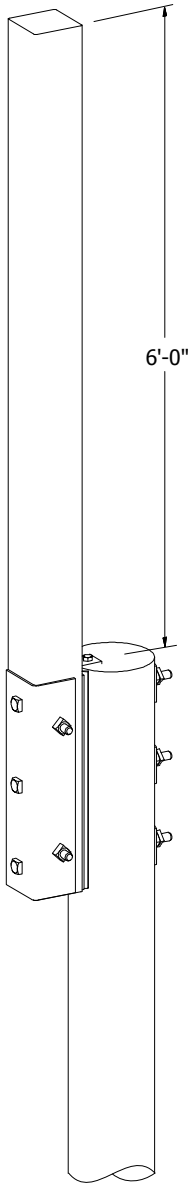
MANUFACTURING CO.

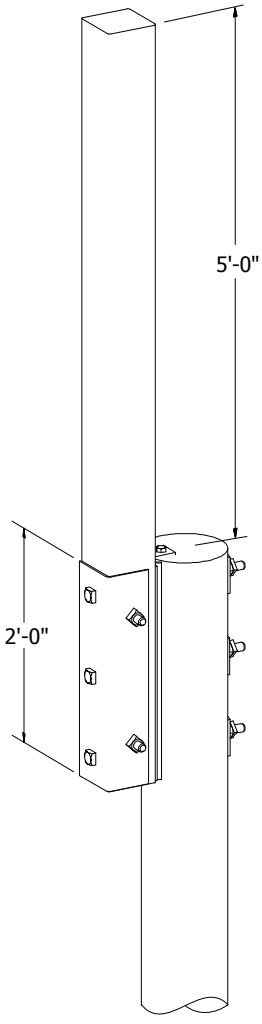
720-66-7



720-66-6



720-66-5



BROOKS Pole Top Extension

Douglas Fir Distribution Crossarms

BROOKS is committed to producing the highest quality crossarms available in the industry. Our products are available in a wide variety of sizes and applications and meet all industry standards. Our reputation for manufacturing quality crossarms has been earned through years of active involvement working with utilities and industry associations to develop standards which meet the critical demands of the electric utility industry.

Our fully integrated high efficiency manufacturing facility, located in the heart of the timber industry, provides total control of purchasing, grading, seasoning, boring, and treating operations. Our veteran lumber graders and skilled production staff understand timber characteristics and our multiple in-house inspections of every piece of lumber ensure our crossarms meet or exceed your specifications. When you purchase distribution crossarms from BROOKS, you also gain the confidence of knowing our products are backed by years of experience and our commitment to provide the best products available in the industry.

BROOKS Machine Rated (BMR)

At BROOKS Manufacturing, we're committed to producing the best products on the market. That is why we've introduced the BROOKS Machine Rated (BMR) standard.
To guarantee that every distribution crossarm meets our high standards, we've incorporated this test into our manufacturing process. As it passes through our automated drilling process, each crossarm gets stamped with an electric load cell, pre-programmed to apply stress to simulate the typical working load of a distribution crossarm in the field.

The durability of the crossarm is verified through this pre-stressing process. It also helps us determine if there are any defects that aren't visible in the product which may lead to breakage.

As the only wood crossarm manufacturer that performs this test, you can be assured that when you see the BMR stamp, you're getting the quality of BROOKS Manufacturing.

In addition, every crossarm has a warranty for one year from date of manufacture.

For more information, go to **www.brooksmfg.com/bmr**
or email us at **info@brooksmfg.com**

Ordering Considerations

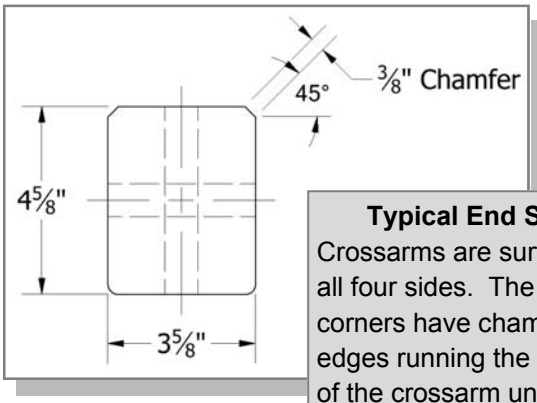
Listed below are the considerations and information typically requested when ordering distribution crossarms.

1. **Quantity**

2. **Cross Section and Length:** Common cross sections available for distribution crossarms after seasoning and surfacing are listed below. Many other sizes are available for special applications.

3¼" x 4¼"	3¾" x 5¾"
3½" x 4½"	4⅛" x 5⅛"
3⅝" x 4⅝"	4⅝" x 5⅝"
3¾" x 4¾"	4¾" x 5¾"

Note: BROOKS solid sawn crossarms are manufactured only after the rough cut stock has been kiln dried to industry accepted moisture levels. Only after the stock has become dimensionally stable, it is surfaced to a finished size and produced into crossarms. This is an essential step in producing quality crossarms which minimizes further dimensional change after installation.



Typical End Section
Crossarms are surfaced on all four sides. The top two corners have chamfered edges running the full length of the crossarm unless otherwise noted.

3. Solid Sawn or Glued Laminated: BROOKS manufactures distribution crossarms only from coast region Douglas fir in either traditional solid sawn or glued laminated stock. Douglas fir material from other regions does not treat properly to the required specification.

4. **Governing Specifications:** BROOKS will produce to any industry specification. Page A0.1 notes many of the industry accepted standards to which crossarms are often manufactured.

5. Treating Specifications: BROOKS state-of-the-art treating facility ensures proper penetration and retention to meet your specifications. Our laboratory is available to monitor treating charges and perform assays to guarantee retentions are maintained. Our advanced processes combined with treating only kiln dried stock, confirms a product free of excessive oil and contaminates.

6. Incising Requirements: BROOKS incises all treated crossarms unless specified otherwise.

7. Inspection Requirements: BROOKS distribution crossarms are inspected no less than five times throughout the production process. BROOKS welcomes utility representatives for independent inspections to verify our quality standards. BROOKS is an approved WQC facility as noted on page A0.1.

8. Boring Information: BROOKS high capacity precision boring machines can meet any boring requirements. Please refer to page A2.2 which outlines suggestions on how to specify boring instructions.

Douglas-fir Distribution Crossarms
Boring Specifications

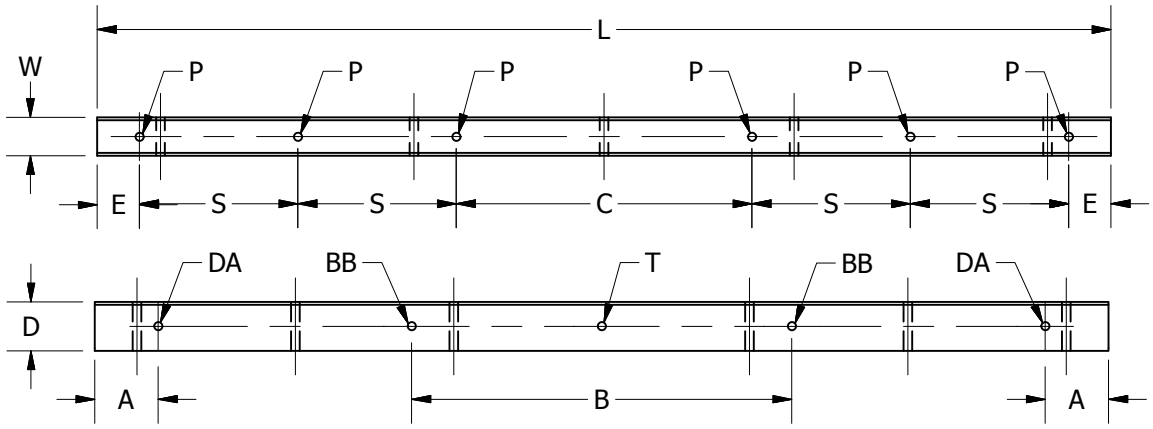
Important: When ordering crossarms, specify exactly what is required. If a verbal or written description is questionable, send a descriptive sketch or drawing which details the requirement. Orders for specially manufactured crossarms are not subject to cancellation if production has started, nor may they be returned if a mistake is made in ordering.

It is suggested that boring instructions be forwarded to us in the following manner:

1. Supply the applicable utility drawing or drawing number.
2. Reference BROOKS part number or previous production number.
3. Submit a sketch; preferably a completed copy of the ordering template below.
4. Use a verbal or written description that identifies the variables noted below.

Crossarm Ordering Template

Hole location, size, and orientation (vertical or horizontal) must be well specified. A template can assist in providing this data. The example template illustrated is for a 6-pin tangent crossarm with a symmetric pattern and horizontal brace bolt holes. This template can be adapted to other symmetrical configurations such as 2-pin and 4-pin. Please provide separate sketches for alley construction, unbalanced framing or offset patterns.



Arm Size ……..	**W**	=	_____	Width (top face)
	D	=	_____	Depth (side face)
	L	=	_____	Overall Length
Pin Holes ……..			_____	Number of Pin Holes
	P	=	_____	Pin Hole Diameter
	C	=	_____	Center Spacing
	E	=	_____	End Distance
	S	=	_____	Side Spacing
Brace Bolt Hole ……..	**BB**	=	_____	Brace Bolt Hole Diameter
	B	=	_____	MHC Brace Bolt Spacing
			_____	Specify Orientation: **V** (Vertical) **H** (Horizontal)
Pole Through Bolt …….	**T**	=	_____	Pole Through Bolt Hole Diameter
Double Arming Bolt …..			_____	Holes Required? **Y** (Yes) **N** (No)
	A	=	_____	End Distance
	DA	=	_____	Bolt Hole Diameter

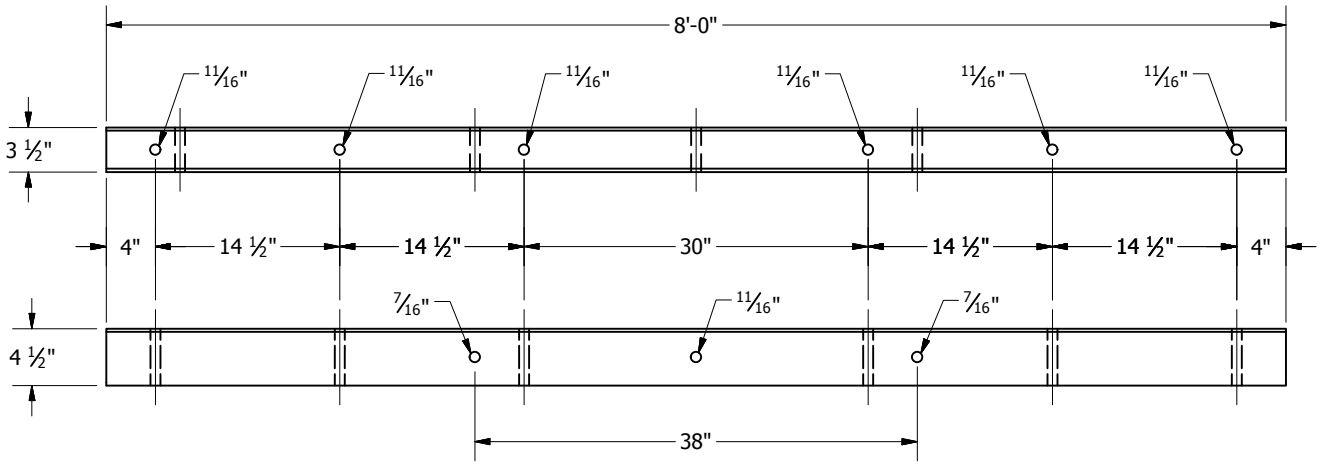
Please refer to the example for the Crossarm Ordering Template on next page.

Douglas-fir Distribution Crossarms
Boring Specifications

Example

For an ordering template completed in the following manner, crossarms would be manufactured as illustrated.

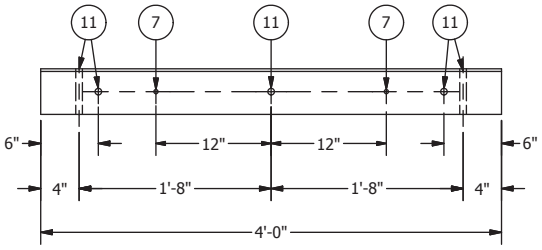
Arm Size ……..	**W**	=	3½"	Width (top face)
	D	=	4½"	Depth (side face)
	L	=	8'-0"	Overall Length
Pin Holes ……..			6	Number of Pin Holes
	P	=	11/16"	Pin Hole Diameter
	C	=	30"	Center Spacing
	E	=	4"	End Distance
	S	=	14½"	Side Spacing
Brace Bolt Hole …….	**BB**	=	7/16"	Brace Bolt Hole Diameter
	B	=	38"	MHC Brace Bolt Spacing
			H	Specify Orientation: **V** (Vertical) **H** (Horizontal)
Pole Through Bolt …….	**T**	=	11/16"	Pole Through Bolt Hole Diameter
Double Arming Bolt …..			N	Holes Required? **Y** (Yes) **N** (No)
	A	=	_____	End Distance
	DA	=	_____	Bolt Hole Diameter



REA Distribution Crossarms

Drilling guide M19 and cross section dimensions per REA specification 1728H-701

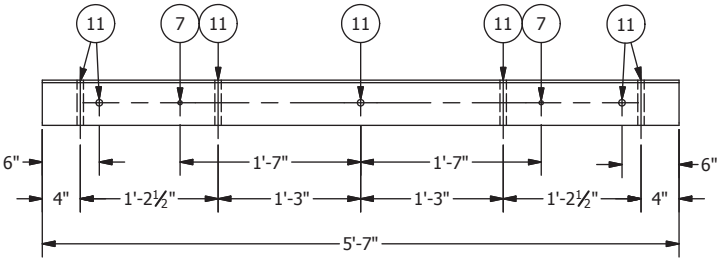
Type 01



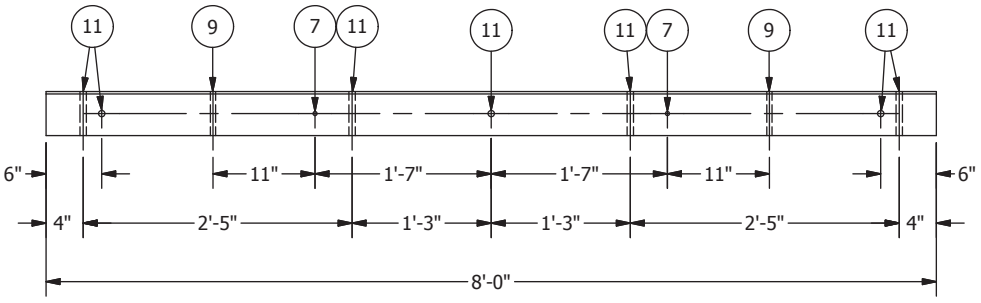
Hole Size Key

- (7) — 7/16" Diameter
- (9) — 9/16" Diameter
- (11) — 11/16" Diameter

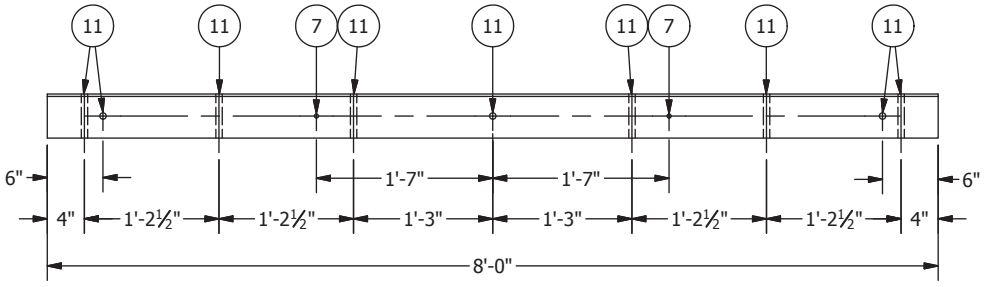
Type 02



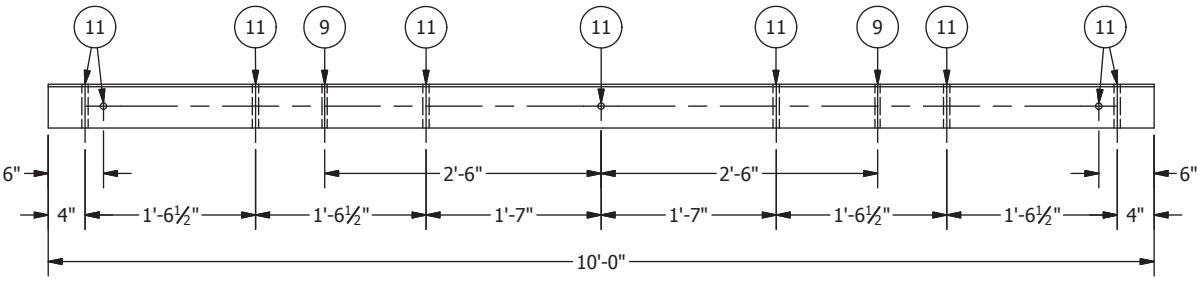
Type 03



Type 04

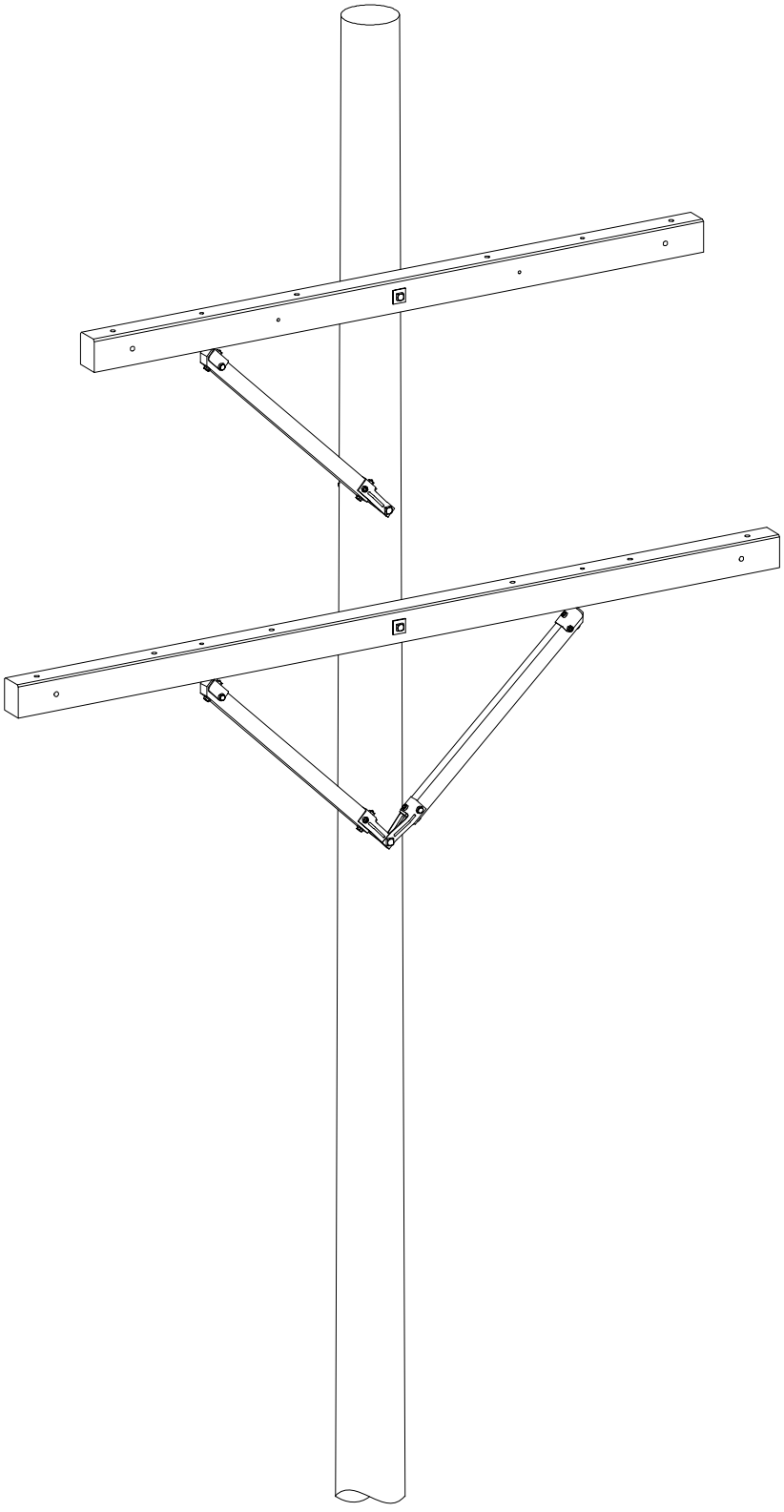


Type 05



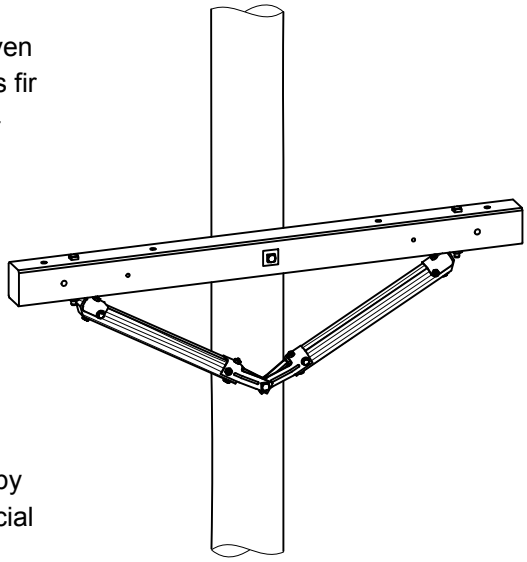
Please contact BROOKS for specific catalog numbers when ordering REA distribution crossarms.

BROOKS
MANUFACTURING CO.



Wood Crossarm Braces

BROOKS engineered Wood Crossarm Brace designs utilize the proven dependability and reliability of select straight grained coastal Douglas fir combined with tested steel fittings. The fittings are hot dipped galvanized after fabrication. The tapped fitting designs ensure that the assembly hardware remains permanently tight and secure.



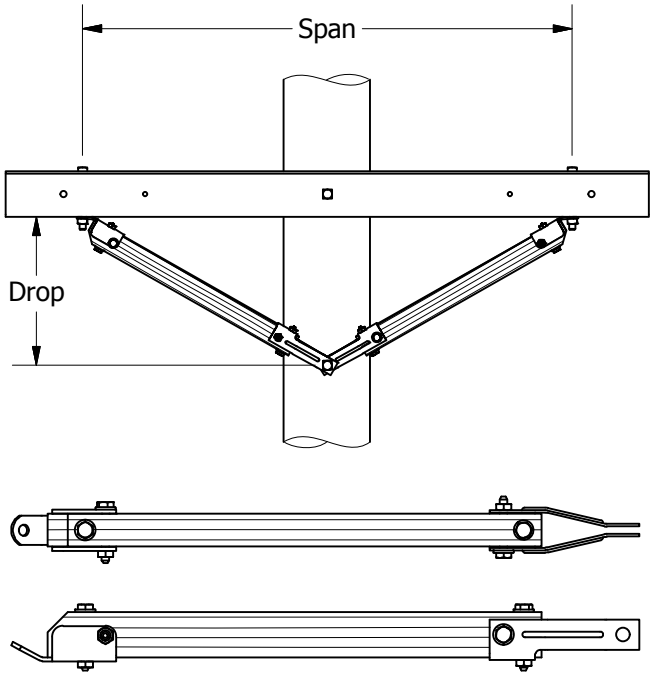
With over a half-century of providing quality products to the electric utility industry, BROOKS understands the strength and electrical qualities demanded by today's distribution systems. BROOKS braces are designed, tested, and manufactured to meet those requirements.

Catalog numbers listed in the product tables are for standard spans, drops, and mounting holes. For other applications, please describe by span, drop, and mounting hole size. Catalog numbers for these special applications are available on request.

446 Series Reversible Crossarm Braces

BROOKS 446 Series Reversible Braces combine all the benefits required of a distribution brace and will satisfy most distribution applications. It is strong, lightweight and can be furnished in a wide variety of spans and drops. The listed catalog numbers indicate pairs and standard hole sizes. The reversible feature allows for either the left or right hand installations.

Wood Section - $1\frac{5}{8}$"x $2\frac{1}{4}$" Standard Holes - $\frac{9}{16}$" arm, $\frac{11}{16}$" pole. Specify hole sizes if other than standard.



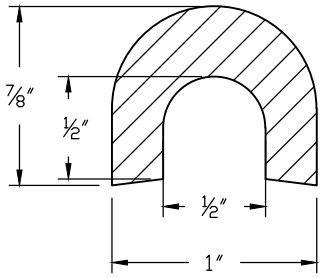
Catalog Number	Span	Drop	Approx. Wt. Lbs. Per Pair
446-37-12	37"	12"	7.0
446-37-184	37"	$18\frac{1}{2}$"	7.8
446-42-12	42"	12"	7.4
446-42-21	42"	21"	8.1
446-48-14	48"	14"	8.1
446-48-18	48"	18"	9.0
446-48-24	48"	24"	9.2
♦ **446-60-18**	60"	18"	7.7
♦ **446-60-30**	60"	30"	8.8
446-72-22	72"	22"	10.2
446-72-36	72"	36"	10.2
446-86-33	86"	$33\frac{5}{8}$"	13.5

♦ REA Accepted

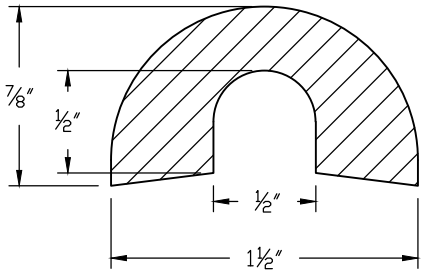
BROOKS Braces are not limited to those noted above. We will furnish any practical span and drop with mounting hole sizes of $\frac{9}{16}$", $\frac{11}{16}$", or $\frac{13}{16}$". We welcome the opportunity to review your special requirements.

Ground Wire Moulding

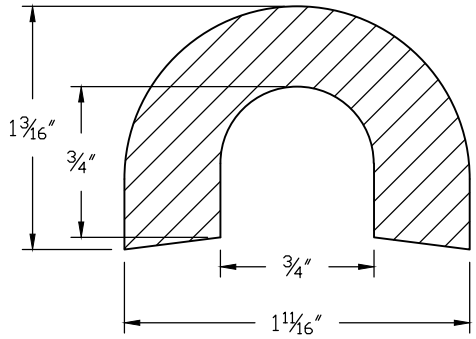
BROOKS Ground Wire Mouldings are furnished standard in 8’ lengths and treated with pentachlorophenal.



Type 100



Type 200



Type 300

Catalog Number	Type	Species	Length	Standard Package Qty.	Approx. Wt. Lbs. Each
BR100-08-GWM	100	Douglas fir	8’-0”	50 pcs./400 lft.	1.0
BR200-08-GWM	200	Douglas fir	8’-0”	42 pcs./336 lft.	1.4
BR300-08-GWM	300	Douglas fir	8’-0”	25 pcs./200 lft.	2.4

Also available in Oak. To order Oak Ground Wire Moulding, add “OAK” before the length.
Ordering Example: BR100-OAK-08-GWM.

Wood Double Arm Dead End Assemblies

Complete Factory Assembled Units

BROOKS Dead End Assemblies ship complete with crossarms, braces, mounting bolts and washers ready for immediate field installation.

Why Use a Factory Assembled Dead End

- **Only one unit to order**
- **Only one unit to inventory**
- **Only one unit to install**

Strength

Dead ends are critical components of powerline systems, subjected to heavy longitudinal conductor tension loads much greater than the vertical loads. BROOKS Dead Ends are designed to handle these loads safely and efficiently. Most conventional dead ends, such as “buck-arm” construction, orient the crossarms to carry heavy vertical loads. BROOKS Dead Ends position the arms to provide greater longitudinal strength with less wood.

Tested

Test results verify the greater strength of BROOKS Dead Ends vs. conventional dead ends.

Reversible Braces

All BROOKS Dead Ends include BROOKS 446 Series Reversible Braces.

Static Proof Design

BROOKS Dead End fittings are designed for a tight static proof fit.

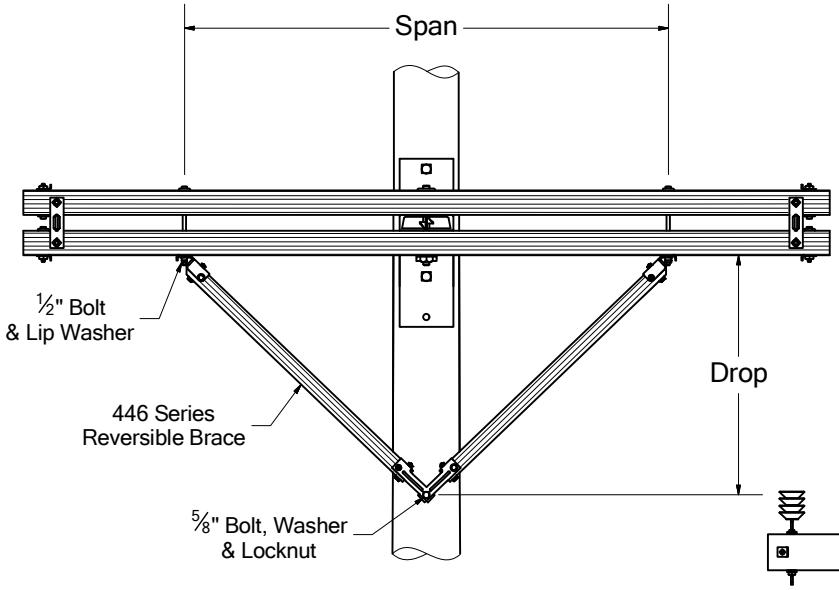
Adaptable

By drilling a hole in the center of the top arm of a BROOKS Dead End Assembly you can easily add jumper pins without reducing the strength of the unit.

Special Orders

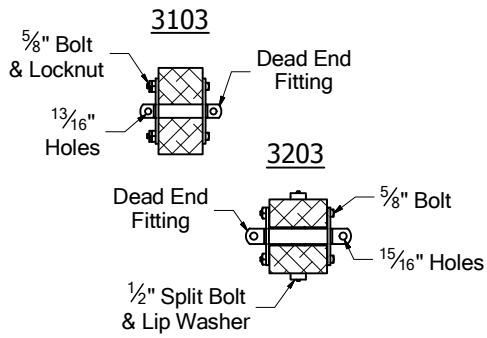
BROOKS welcomes the opportunity to work with you on special dead end applications. Just send a sketch of your requirements to our Engineering Department and we will assist you in solving your special dead end needs.

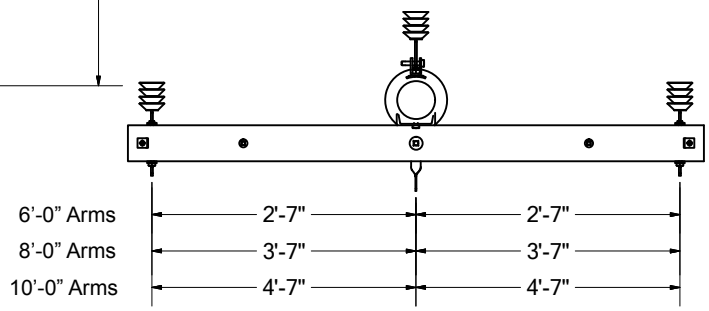
3-Wire Dead Ends



3200 Series Illustrated

Dead End Fitting Details

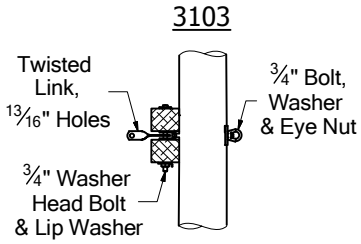


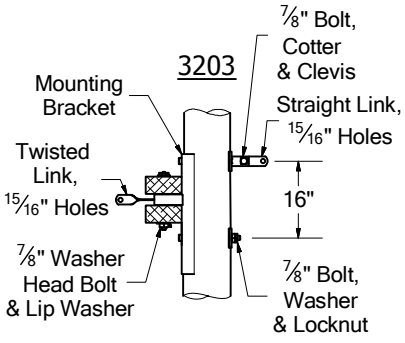


Ordering And Strength Chart

Catalog Number	T3 Calculated* Ultimate Strength Per Attachment (Lbs.)	Arm Size	Brace Span	Brace Drop	Approx. Wt. Lbs. Each
♦ **3103-A6**	5,800	3½" x 4½" x 6'-0"	37"	18½"	83
3103-B6	7,000	3¾" x 4¾" x 6'-0"	37"	18½"	90
3103-C6	10,000	3¾" x 5¾" x 6'-0"	37"	18½"	103
3103-D6	13,000	4¾" x 5¾" x 6'-0"	37"	18½"	122
♦ **3103-A8**	4,300	3½" x 4½" x 8'-0"	60"	30"	103
3103-B8	5,000	3¾" x 4¾" x 8'-0"	60"	30"	112
♦ **3103-C8**	7,500	3¾" x 5¾" x 8'-0"	60"	30"	129
3103-D8	9,500	4¾" x 5¾" x 8'-0"	60"	30"	154
♦ **3203-A8**	12,200	3⅝" x 7½" x 8'-0"	60"	30"	196
3203-B8	15,000	3⅝" x 8½" x 8'-0"	60"	30"	213
3103-B10	4,000	3¾" x 4¾" x 10'-0"	72"	36"	133
3103-C10	6,000	3¾" x 5¾" x 10'-0"	72"	36"	154
3103-D10	7,400	4¾" x 5¾" x 10'-0"	72"	36"	185
♦ **3203-A10**	9,500	3⅝" x 7½" x 10'-0"	72"	36"	227
3203-B10	11,800	3⅝" x 8½" x 10'-0"	72"	36"	247
3203-C10	14,600	3⅝" x 9½" x 10'-0"	72"	36"	268

Pole Mounting Details





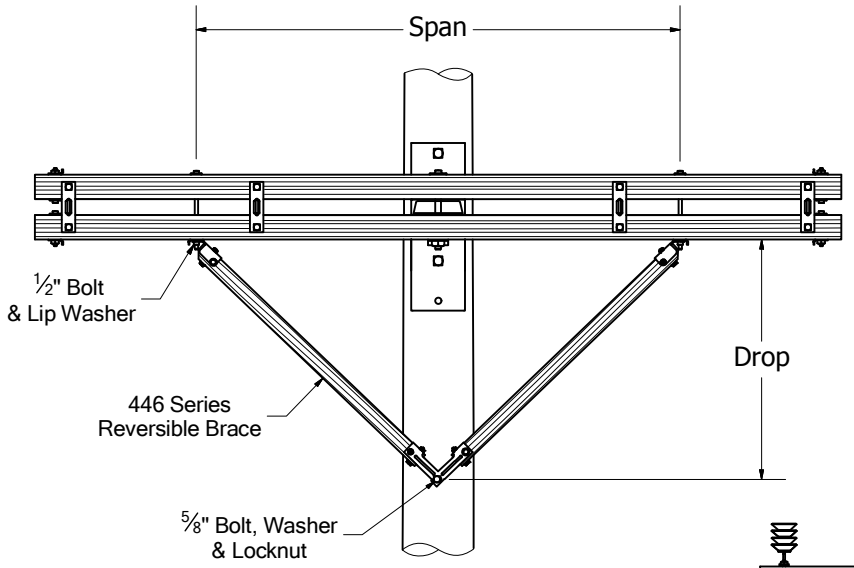
Ordering Note: To order glued laminated dead ends, add a "LAM" at the end of the catalog number, **Example:** 3103-B6LAM

*** Note:** These calculated ultimate strengths should meet or exceed both of the following criteria:

1. The maximum design tension of the wire multiplied by an overload capacity factor of 2.0.
2. The wire tension at 60°F, no ice multiplied by an overload capacity factor of 4.0.

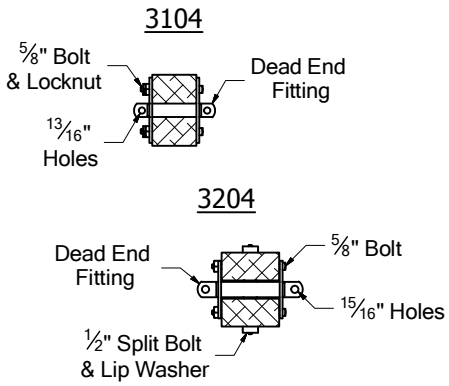
♦ REA accepted (gj)

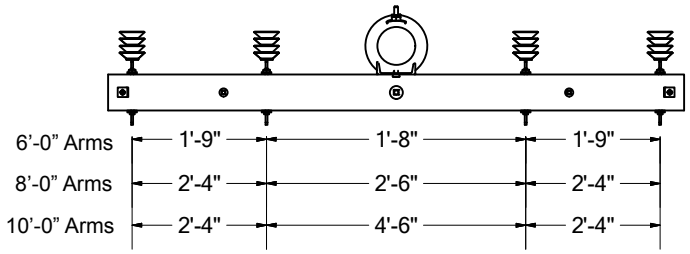
4-Wire Dead Ends



3200 Series Illustrated

Dead End Fitting Details

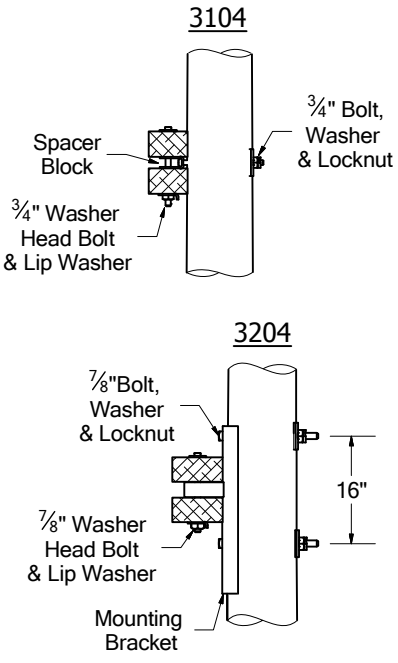




Ordering And Strength Chart

Catalog Number	T4 Calculated* Ultimate Strength Per Attachment (Lbs.)	Arm Size	Brace Span	Brace Drop	Approx. Wt. Lbs. Each
3104-A6	4,400	3½" x 4½" x 6'-0"	37"	18½"	92
3104-B6	5,300	3¾" x 4¾" x 6'-0"	37"	18½"	100
3104-C6	7,800	3¾" x 5¾" x 6'-0"	37"	18½"	113
3104-D6	9,900	4¾" x 5¾" x 6'-0"	37"	18½"	132
3104-A8	3,000	3½" x 4½" x 8'-0"	60"	30"	112
3104-B8	3,600	3¾" x 4¾" x 8'-0"	60"	30"	122
3104-C8	5,500	3¾" x 5¾" x 8'-0"	60"	30"	139
3104-D8	7,000	4¾" x 5¾" x 8'-0"	60"	30"	164
3204-A8	8,600	3⅝" x 7½" x 8'-0"	60"	30"	205
3104-B10	2,600	3¾" x 4¾" x 10'-0"	72"	36"	143
3104-C10	3,900	3¾" x 5¾" x 10'-0"	72"	36"	164
3104-D10	5,000	4¾" x 5¾" x 10'-0"	72"	36"	195
3204-A10	6,000	3⅝" x 7½" x 10'-0"	72"	36"	236
3204-B10	7,800	3⅝" x 8½" x 10'-0"	72"	36"	256
3204-C10	9,800	3⅝" x 9½" x 10'-0"	72"	36"	278

Pole Mounting Details



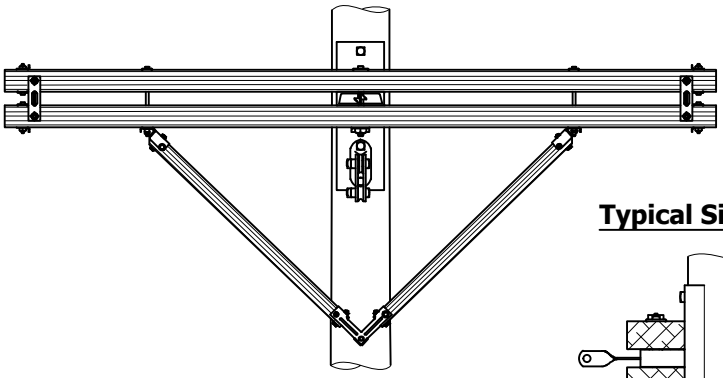
Ordering Note: To order glued laminated dead ends, add a "LAM" at the end of the catalog number, **Example:** 3104-B6LAM

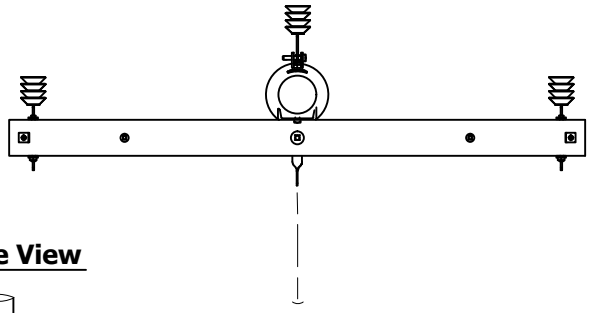
*** Note:** These calculated ultimate strengths should meet or exceed both of the following criteria:

1. The maximum design tension of the wire multiplied by an overload capacity factor of 2.0.
2. The wire tension at 60°F, no ice multiplied by an overload capacity factor of 4.0.

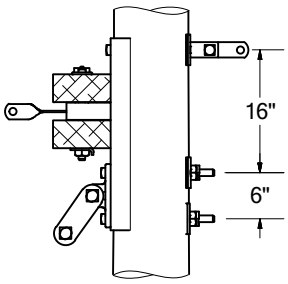
Guyed 3-Wire Dead Ends

Complete with Guy Attachment Hardware & Long Bracket
42,000 Pound Ultimate Guy Attachment Rating

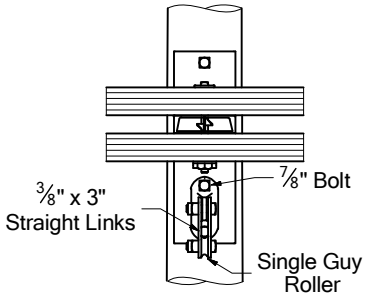




Typical Side View



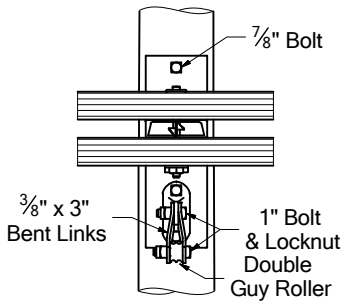
"GS" Single Guy



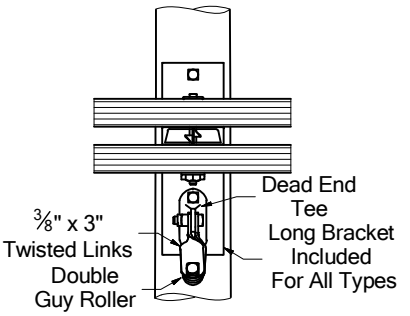
Ordering And Strength Chart

Catalog Number	Double Guy - Vertical Catalog Number	Double Guy - Horizontal Catalog Number	Arm Size
3103-A6-GS	3103-A6-GDV	3103-A6-GDH	3½" x 4½" x 6'-0"
3103-B6-GS	3103-B6-GDV	3103-B6-GDH	3¾" x 4¾" x 6'-0"
3103-C6-GS	3103-C6-GDV	3103-C6-GDH	3¾" x 5¾" x 6'-0"
3103-D6-GS	3103-D6-GDV	3103-D6-GDH	4¾" x 5¾" x 6'-0"
3103-A8-GS	3103-A8-GDV	3103-A8-GDH	3½" x 4½" x 8'-0"
3103-B8-GS	3103-B8-GDV	3103-B8-GDH	3¾" x 4¾" x 8'-0"
3103-C8-GS	3103-C8-GDV	3103-C8-GDH	3¾" x 5¾" x 8'-0"
3103-D8-GS	3103-D8-GDV	3103-D8-GDH	4¾" x 5¾" x 8'-0"
3203-A8-GS	3203-A8-GDV	3203-A8-GDH	3⅝" x 7½" x 8'-0"
3203-B8-GS	3203-B8-GDV	3203-B8-GDH	3⅝" x 8½" x 8'-0"
3103-B10-GS	3103-B10-GDV	3103-B10-GDH	3¾" x 4¾" x 10'-0"
3103-C10-GS	3103-C10-GDV	3103-C10-GDH	3¾" x 5¾" x 10'-0"
3103-D10-GS	3103-D10-GDV	3103-D10-GDH	4¾" x 5¾" x 10'-0"
3203-A10-GS	3203-A10-GDV	3203-A10-GDH	3⅝" x 7½" x 10'-0"
3203-B10-GS	3203-B10-GDV	3203-B10-GDH	3⅝" x 8½" x 10'-0"
3203-C10-GS	3203-C10-GDV	3203-C10-GDH	3⅝" x 9½" x 10'-0"

"GDV" Double Guy Vertical



"GDH" Double Guy Horizontal



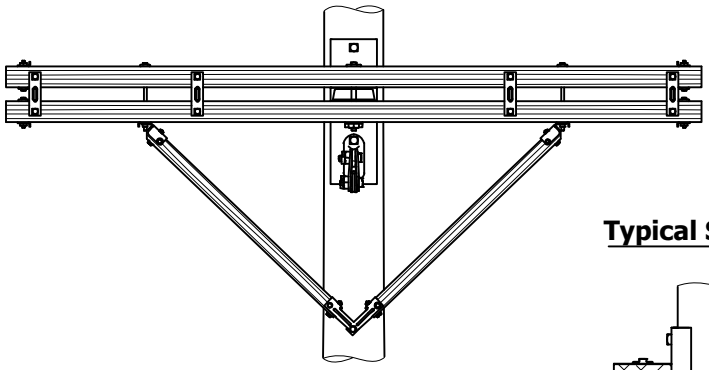
To determine shipping weight in pounds, add these amounts to page A5.1 unguyed weights.

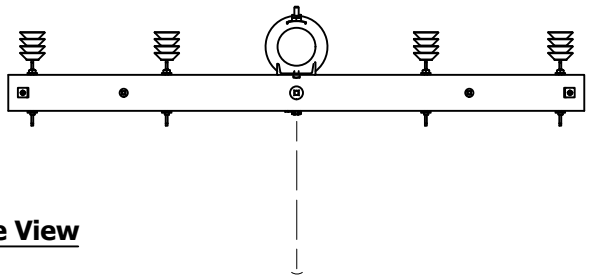
Series	GS	GDV	GDH
3103	60	61	65
3203	24	25	29

Note: Reference page A5.1 for the calculated ultimate strengths of the dead end assemblies.

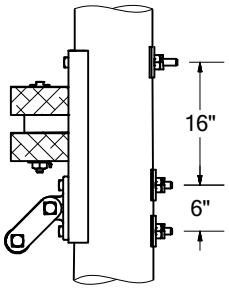
Guyed 4-Wire Dead Ends

Complete with Guy Attachment Hardware & Long Bracket
42,000 Pound Ultimate Guy Attachment Rating

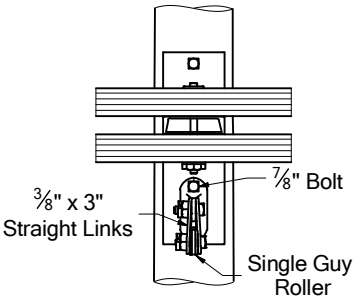




Typical Side View



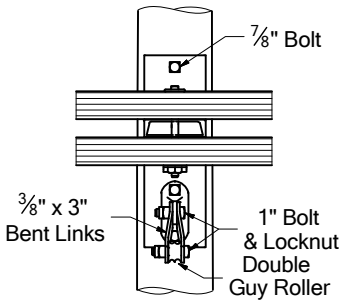
"GS" Single Guy



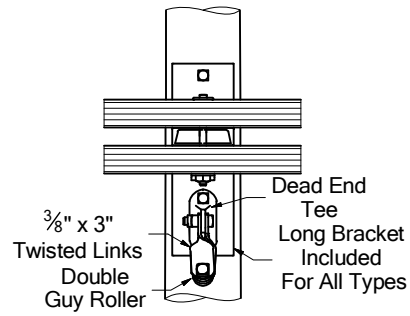
Ordering And Strength Chart

Catalog Number	Double Guy - Vertical Catalog Number	Double Guy - Horizontal Catalog Number	Arm Size
3104-A6-GS	3104-A6-GDV	3104-A6-GDH	3½" x 4½" x 6'-0"
3104-B6-GS	3104-B6-GDV	3104-B6-GDH	3¾" x 4¾" x 6'-0"
3104-C6-GS	3104-C6-GDV	3104-C6-GDH	3¾" x 5¾" x 6'-0"
3104-D6-GS	3104-D6-GDV	3104-D6-GDH	4¾" x 5¾" x 6'-0"
3104-A8-GS	3104-A8-GDV	3104-A8-GDH	3½" x 4½" x 8'-0"
3104-B8-GS	3104-B8-GDV	3104-B8-GDH	3¾" x 4¾" x 8'-0"
3104-C8-GS	3104-C8-GDV	3104-C8-GDH	3¾" x 5¾" x 8'-0"
3104-D8-GS	3104-D8-GDV	3104-D8-GDH	4¾" x 5¾" x 8'-0"
3204-A8-GS	3204-A8-GDV	3204-A8-GDH	3⅝" x 7½" x 8'-0"
3104-B10-GS	3104-B10-GDV	3104-B10-GDH	3¾" x 4¾" x 10'-0"
3104-C10-GS	3104-C10-GDV	3104-C10-GDH	3¾" x 5¾" x 10'-0"
3104-D10-GS	3104-D10-GDV	3104-D10-GDH	4¾" x 5¾" x 10'-0"
3204-A10-GS	3204-A10-GDV	3204-A10-GDH	3⅝" x 7½" x 10'-0"
3204-B10-GS	3204-B10-GDV	3204-B10-GDH	3⅝" x 8½" x 10'-0"
3204-C10-GS	3204-C10-GDV	3204-C10-GDH	3⅝" x 9½" x 10'-0"

"GDV" Double Guy Vertical



"GDH" Double Guy Horizontal



To determine shipping weight in pounds, add these amounts to page A5.2 unguyed weights.

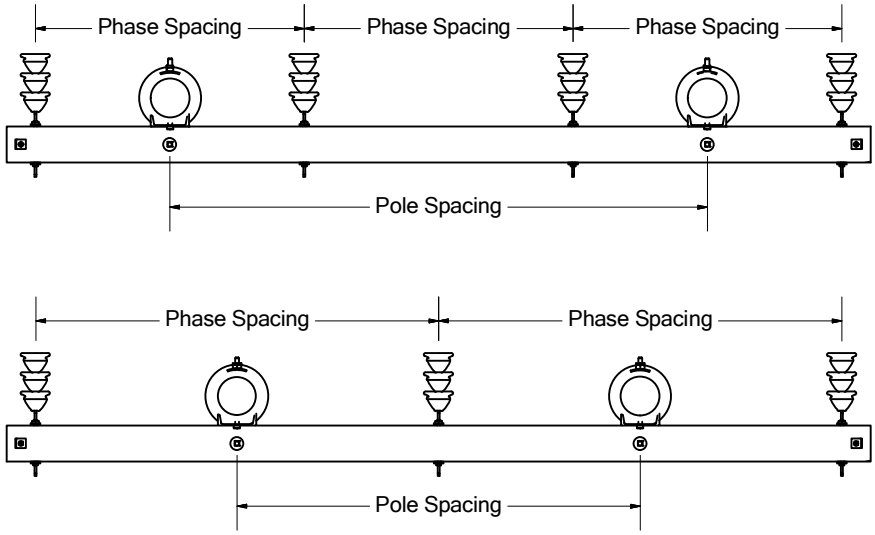
Series	GS	GDV	GDH
3104	55	56	60
3204	24	25	29

Note: Reference page A5.2 for the calculated ultimate strengths of the dead end assemblies.

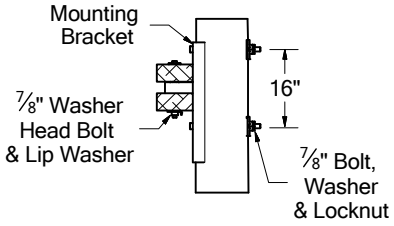
H-Frame Dead Ends

Engineering concepts for single pole dead ending applications are equally effective for use in H-frame applications.

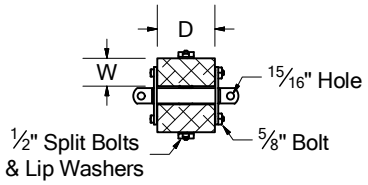
The BROOKS H-frame Dead End crossarms are shipped factory assembled and furnished standard with all mounting hardware packaged separately. The 3300 Series is furnished standard with the extended pole mounting brackets to accommodate easy installation of the 3400-GS, 3400-GDH or 3400-GDV guying assemblies, which are to be ordered separately.



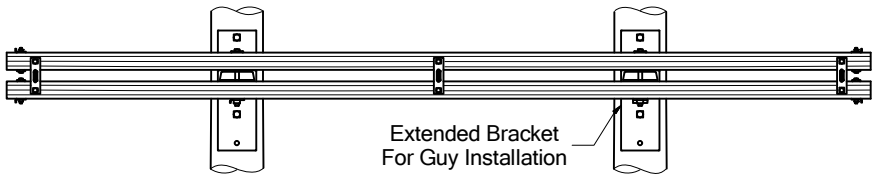
Pole Mounting Detail



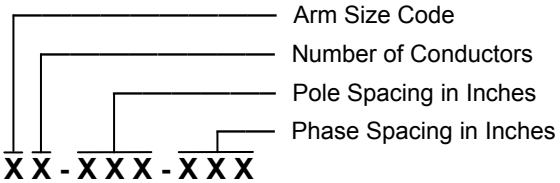
End Detail



Line View



Ordering Information:



Arm Size

Code	W	D
A	3 5/8"	7 1/2"
B	3 5/8"	8 1/2"
C	3 5/8"	9 1/2"
D	5 5/8"	7 1/2"

Example: 3300-C3-126-126, 3300 Series H-Frame Dead End Assembly for three wire construction, 10'-6" pole spacing and 10'-6" phase spacing, 3 5/8" x 9 1/2" x 22'-0" crossarms.

Bracing and guying hardware are not included as part of the assembly and should be ordered separately. 14" arm mounting bolts are furnished standard unless specified otherwise.

For assistance in determining the appropriate wood section best suited for your loading requirements, contact BROOKS Engineering Department.

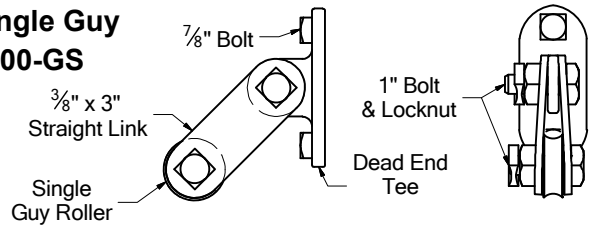
Guy Attachment Packages

For 3100, 3200 & 3300 Series Dead End Assemblies

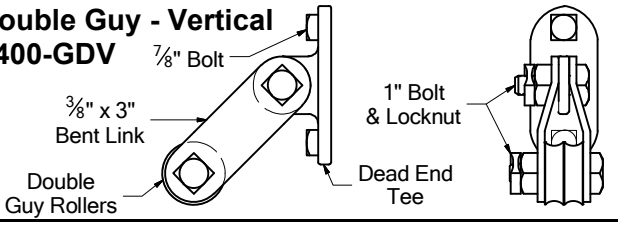
Each of the guying packages 3400-GS, 3400-GDV and 3400-GDH can be installed on any of the three Dead End Series, 3100, 3200 or 3300. Typical installations are shown below.

42,000 Pounds Ultimate Guy Rating

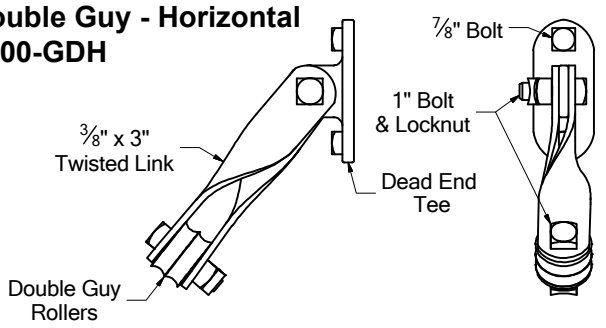
Single Guy
3400-GS



Double Guy - Vertical
3400-GDV

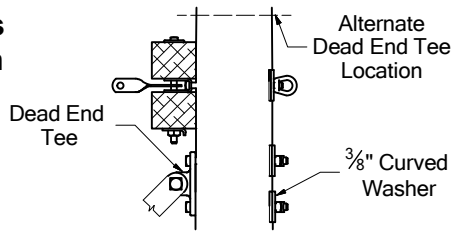


Double Guy - Horizontal
3400-GDH

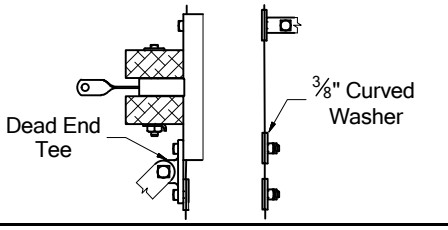


Typical Applications

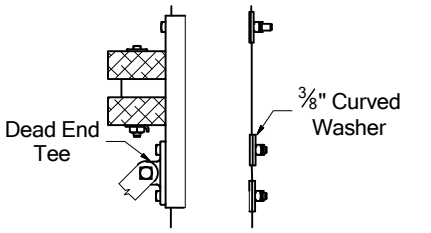
3100 Series Application



3200 Series Application



3300 Series Application



Description	Catalog Number 3400-GS Quantity Per Package	Catalog Number 3400-GDV Quantity Per Package	Catalog Number 3400-GDH Quantity Per Package
Dead End Tee	1	1	1
Pieces (1 Pair) Straight Links	2		
Pieces (1 Pair) Bent Links		2	
Pieces (1 Pair) Twisted Links			2
Guy Roller	1	2	2
1" x 3½" Machine Bolt, Nut	2	1	1
1" x 5" Machine Bolt, Nut		1	1
7/8" x 14" Machine Bolt, Nut	2	2	2
Curved Washer, 3/8" Thick	2	2	2
7/8" Locknut	2	2	2
1" Locknut	2	2	2
Approx. Wt. Lbs. Per Package	**26**	**29**	**37**

Note: Assemblies are furnished standard with 14" bolts. To order other bolt lengths, specify length as a suffix to the catalog number. **Example:** 3400-GS-12, furnished with 7/8" x 12" bolts.

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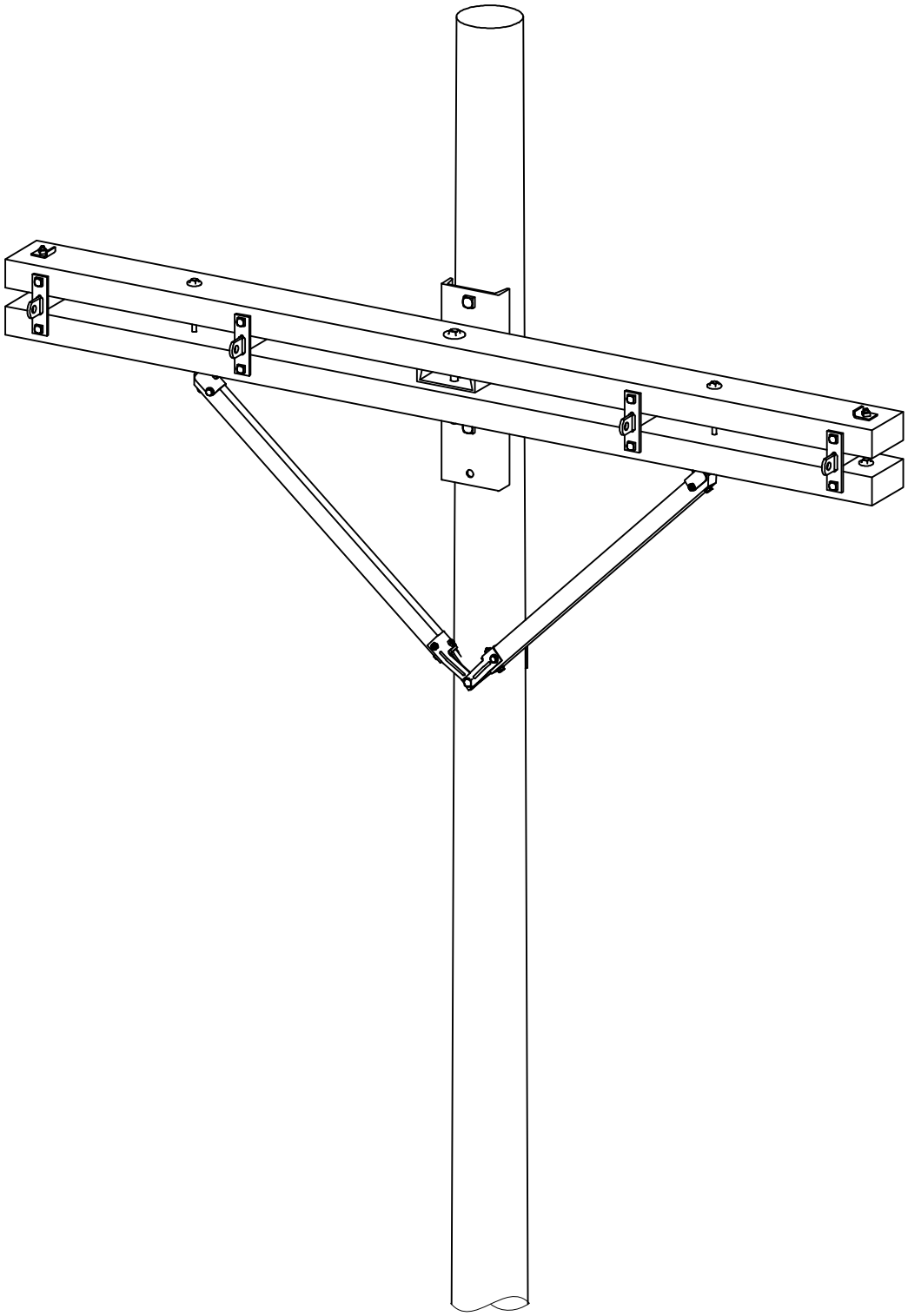
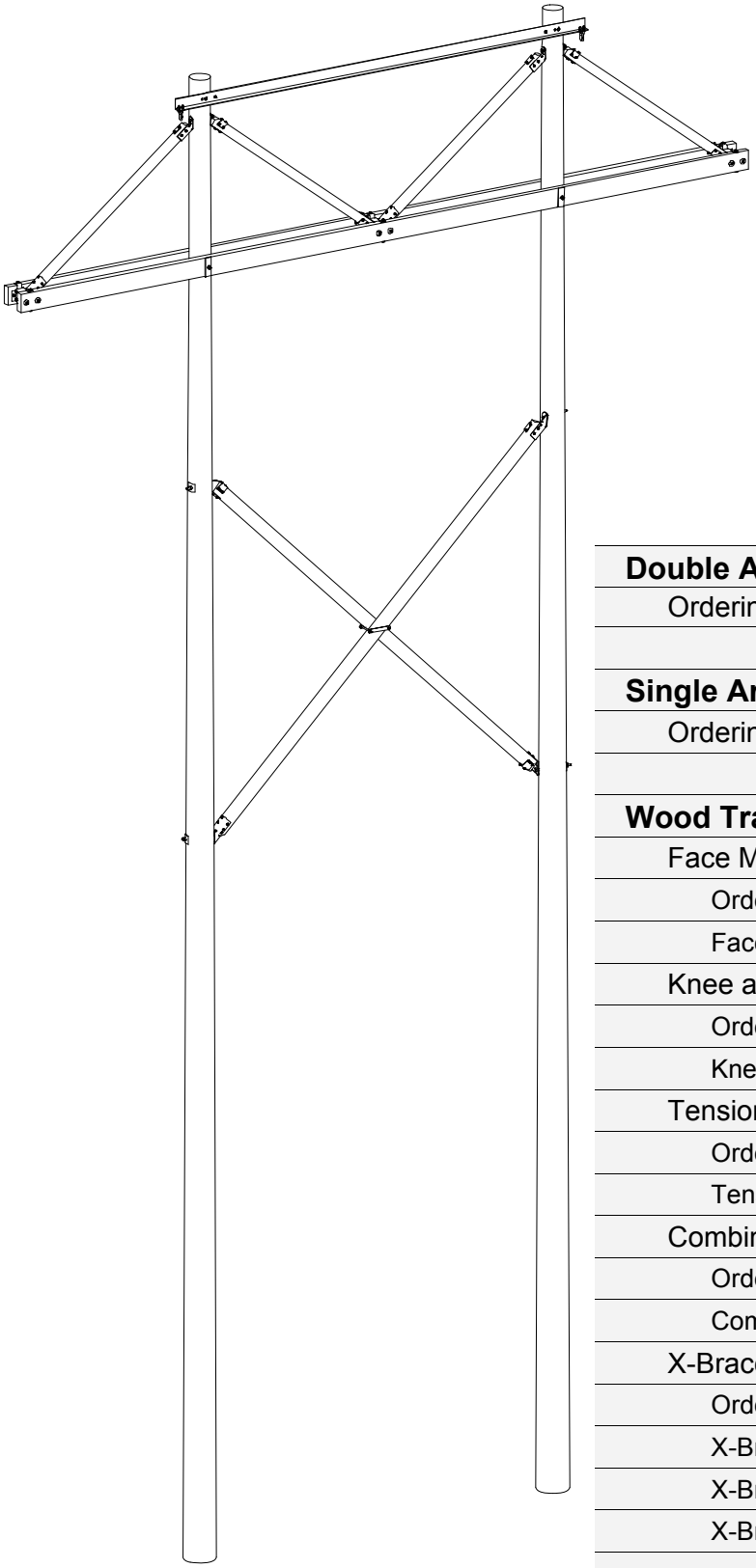
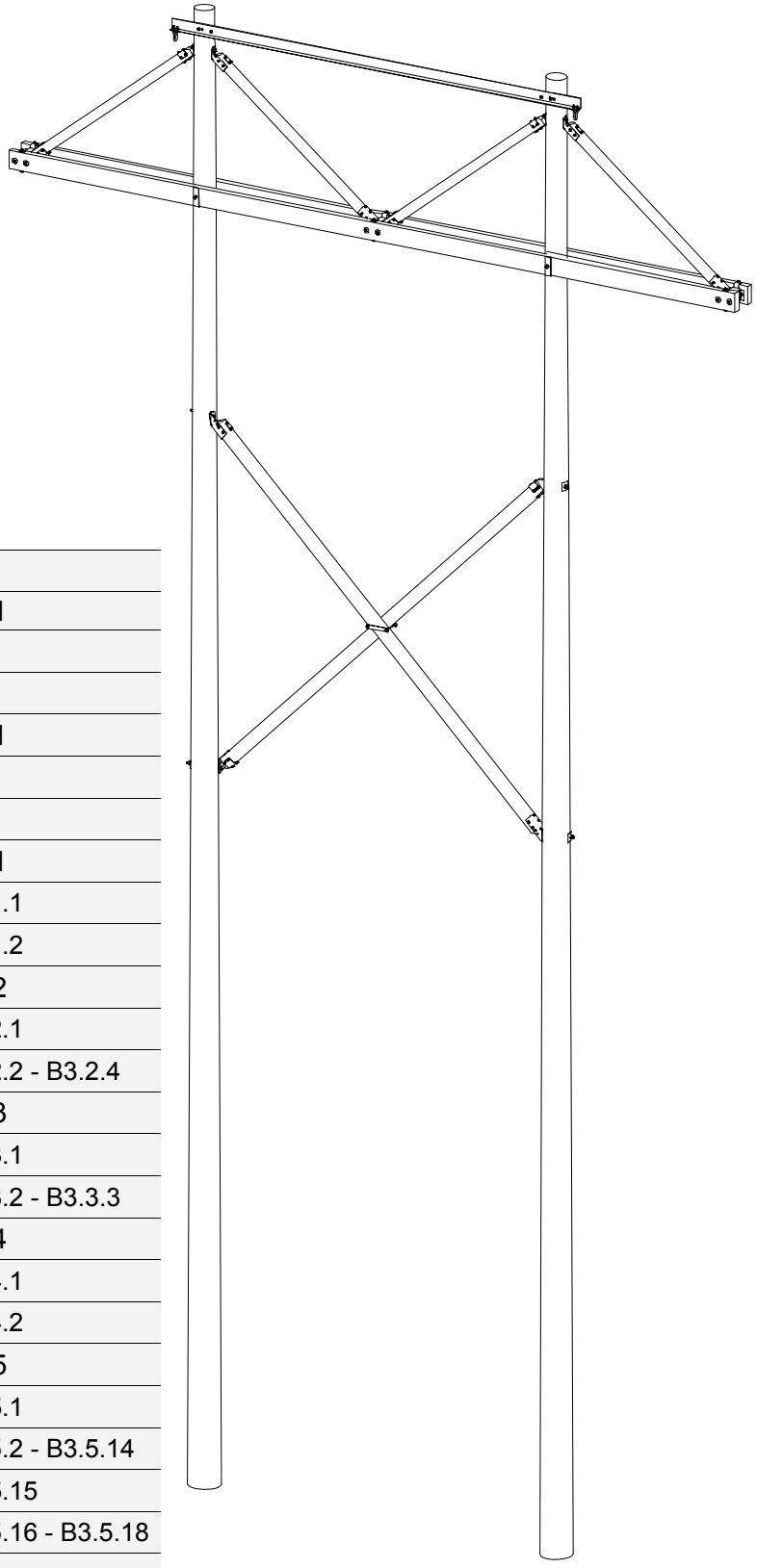


Transmission Framing



Transmission Framing



Transmission Framing

For over 60 years, BROOKS Manufacturing Co. has been designing and manufacturing quality wood transmission products for the electric utility industry. Our products for applications through 345kV meet many inventory and system standard specifications. They are available as individual components or as complete structure kits including all field installation hardware.

Your requirements ranging from single pole applications through the most complex structure configurations are satisfied by our product diversity. We optimize the economic advantages of wood framing for your benefit, while meeting your strength application requirements. Full scale product testing is used to verify the reliability of the applications.

The BROOKS Engineering Department has the necessary knowledge in structure analysis and wood design, and the years of experience, to assist you with your product applications and designs.

Many of our Transmission products can now be found in PLS. For engineering details and use within PLS-POLE™, please visit http://www.powline.com/files/pls_pole.html to download BROOKS Manufacturing's Crossarm & Brace Libraries.

BROOKS Manufacturing's single pole distribution and transmission crossarms are also now available for new and existing pole designs within SPIDACalc Software. Please contact support@spidasoftware.com to request a copy of the BROOKS Manufacturing's client file library.

Wood Transmission Products

The reputation for quality that BROOKS is known for has been earned by long term commitment to three key areas.

Market Awareness

BROOKS is sensitive to the needs of the industry. Our approach to the market is based on designing and manufacturing products that fill a niche within the utility sector. While we manufacture many items which are recognized as industry standards, we also custom design applications for your specific and unique requirements. Since we manufacture products only for the electric utility industry, our interest is totally vested in responding with creative solutions to your unique challenges.

Engineering

Proper application of sound engineering analytic and design principles is the cornerstone of our quality product designs. Full scale product testing is used to verify the reliability of the applications. Years of successful field installations through 345kV confirm that experienced engineering is a key to long term economical service from wood structures.

The BROOKS Engineering Department has the necessary knowledge in structure analysis and wood design, and the years of experience, to assist you with your product applications and designs.

Many of our Transmission products can now be found in PLS. For engineering details and use within PLS-POLE™, please visit http://www.powline.com/files/pls_pole.html to download BROOKS Manufacturing's Crossarm & Brace Libraries.

BROOKS Manufacturing's single pole distribution and transmission crossarms are also now available for new and existing pole designs within SPIDACalc Software. Please contact support@spidasoftware.com to request a copy of the BROOKS Manufacturing's client file library.

Quality Materials

BROOKS manufactures wood products only from coastal region Douglas fir. When properly kiln-dried, it has the best strength-to-weight ratio and dimensional stability of any species used in crossarm and transmission framing. When properly manufactured and treated, Douglas fir will provide a service life of over 50 years in most environments.

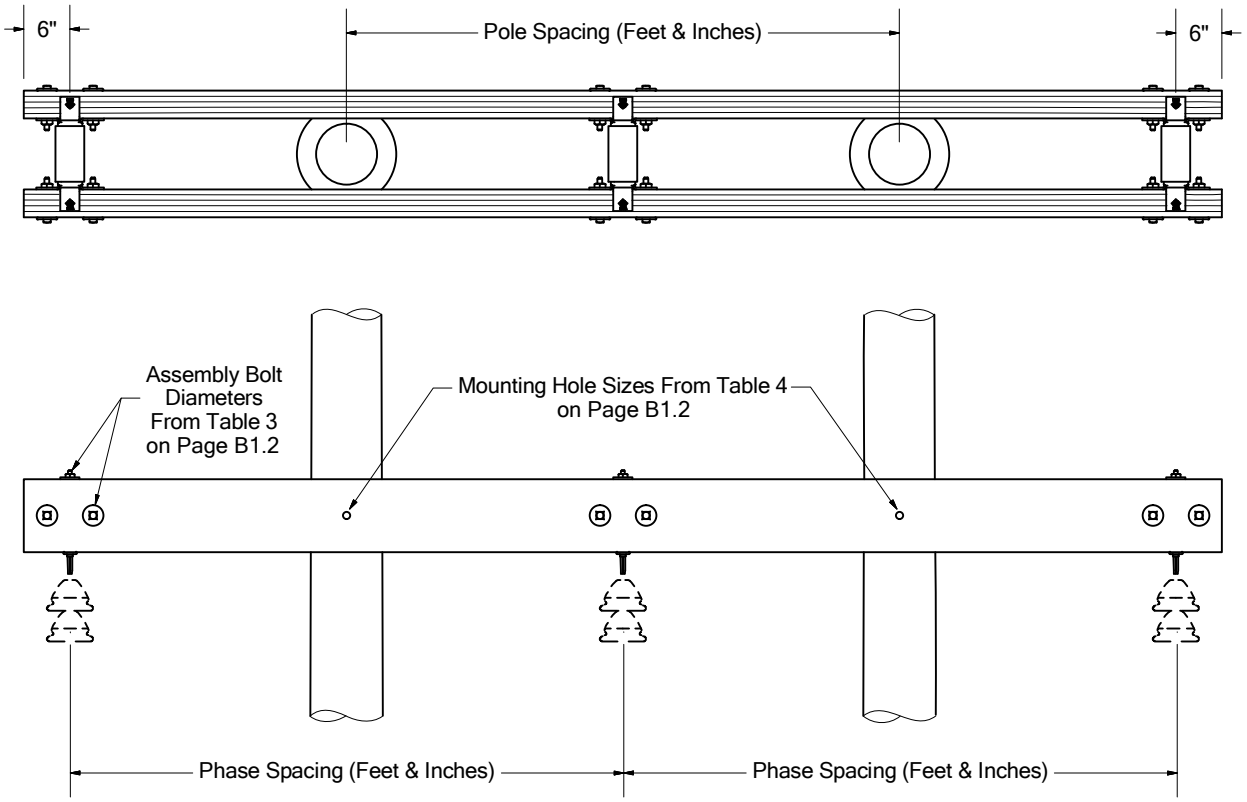
Our full service facility is located in the heart of Douglas fir country in the coastal region of the Pacific Northwest. Our designs utilize both solid sawn and conventional glued laminated stock. We have ready access to many quality mills producing solid sawn stock and laminated billets to our standards.

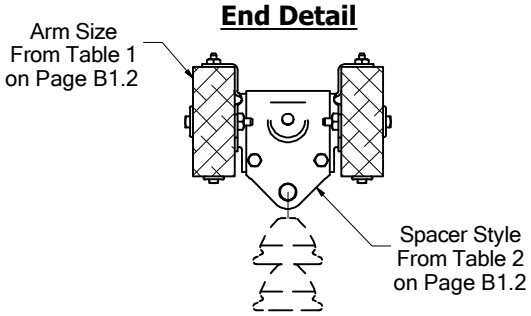
Our assembled products use a multitude of dependable galvanized fittings securely bolted to the wood components. Fitting designs are tapped for the assembly bolts to ensure that hardware connections remain permanently tight. We design our own hardware, and have it manufactured to industry standard by select custom manufacturers who have decades of experience in production of sophisticated hardware.

Sound market awareness, responsive and innovative engineering, and quality materials all manufactured in a high efficiency production environment — that's the heart of BROOKS Manufacturing Company's commitment. Our commitment is built into every product we make. When you need the best, specify BROOKS.

Double Arm Tangent Crossarm Assemblies

The drawings shown below are intended to assist in or dering a variety of tangent crossarm assemblies, utilizing many common crossarm sizes and hardware components, shown in tables on the next page. BROOKS is not limited by the sizes or styles noted. For additional information regarding designs, strengths, applications, etc., please contact the BROOKS Engineering Department.





Ordering Codes for Double Arm Tangent Crossarm Assemblies

Ordering Information:

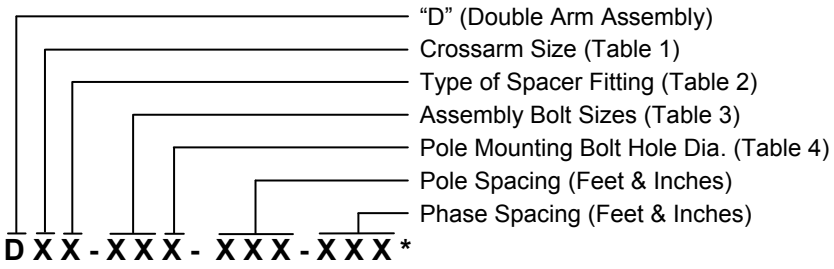


Table 1

Common Sizes for Solid Sawn and/or Laminated Crossarms

Solid Sawn Code	Size	Laminated Code	Size
A	2⅝" x 9½"	J	2⅝" x 9½"
B	3⅝" x 7½"	K	3⅛" x 7½"
C	3⅝" x 8½"	L	3⅛" x 9"
D	3⅝" x 9½"	M	3⅛" x 10½"
E	3⅝" x 11½"	N	3⅝" x 7½"
F	5½" x 7½"	O	3⅝" x 8½"
G	5⅝" x 7½"	P	3⅝" x 9½"
		Q	3⅝" x 11½"
		R	5⅛" x 7½"
		S	5⅛" x 9"
		T	5⅛" x 10½"
		U	5½" x 7½"
		V	5⅝" x 7½"
		W	6¾" x 7½"

Table 2

Spacer Fittings

Code	Spacer Style	Adjustments
1	5860	8¾" to 12¾"
2	5861	10¾" to 14¾"
3	5862	12¾" to 16¾"
4	5870	8¾" to 12¾"
5	5871	10¾" to 14¾"
6	5872	12¾" to 16¾"
7	5840	8¾" to 12¾"
8	5841	10¾" to 14¾"
9	5842	12¾" to 16¾"

Table 3

Spacer Fitting Mounting Bolts

Code	Vertical	Horizontal
45	½"	⅝"
46	½"	¾"
55	⅝"	⅝"
56	⅝"	¾"
66	¾"	¾"

Table 4

Mounting Bolt Size

Code	Bolt	Hole
6	¾"	13/16"
7	⅞"	15/16"
8	1"	1 1/16"

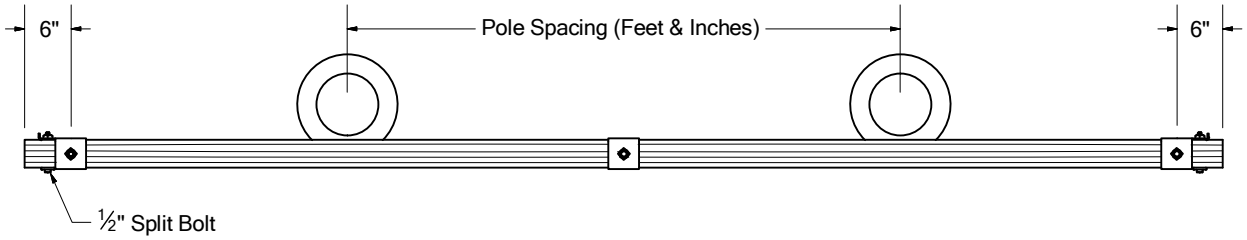
Example: DD1-457-156-156. Double Crossarm Assembly, 3⅝" x 9½" x 32'-0" solid sawn crossarms, 15'-6" C/C pole spacing, 15'-6" phase spacing. Assembled with (3) 5860 Series Spacer Fittings (8¾" to 12¾" adjustment) using ½" vertical and ⅝" horizontal mounting bolts. Drilled for ⅞" arm mounting bolts.

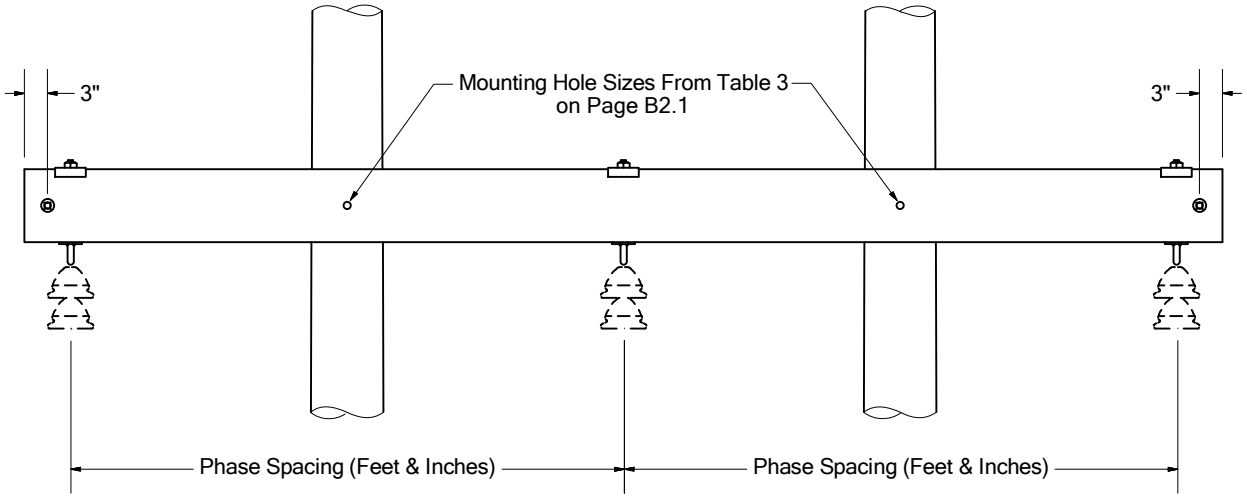
*To purchase a side arm, bored but less the assembly hardware, add a "W" to the assembly number ordering code.

Pole mounting hardware is not furnished standard as part of the assembly and should be ordered separately.

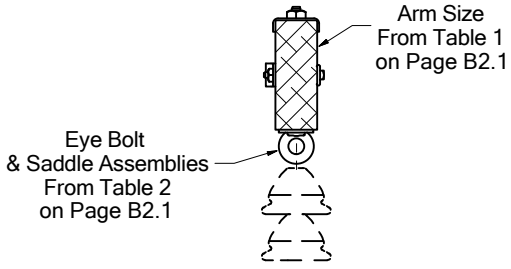
Single Arm Tangent Crossarm Assemblies

The drawings shown below are intended to assist in ordering a variety of tangent crossarm assemblies, utilizing many common crossarm sizes and hardware components, shown in tables on the next page. BROOKS is not limited by the sizes or styles noted. For additional information regarding designs, strengths, applications, etc., or for assistance in ordering crossarm assemblies not addressed in this format, please contact the BROOKS Engineering Department.





End Detail



Ordering Codes for Single Arm Tangent Crossarm Assemblies

Ordering Information:

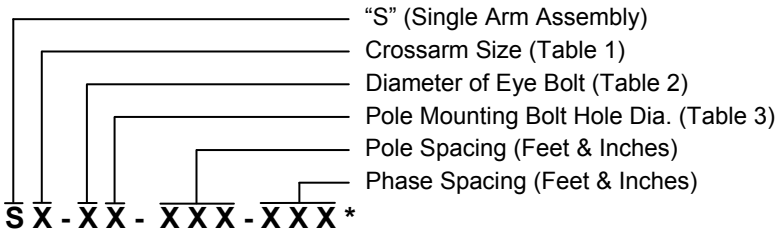


Table 1

Common Sizes for Solid Sawn and/or Laminated Crossarms

Solid Sawn Code	Size	Laminated Code	Size
A	$2\frac{5}{8}$" x $9\frac{1}{2}$"	J	$2\frac{5}{8}$" x $9\frac{1}{2}$"
B	$3\frac{5}{8}$" x $7\frac{1}{2}$"	K	$3\frac{1}{8}$" x $7\frac{1}{2}$"
C	$3\frac{5}{8}$" x $8\frac{1}{2}$"	L	$3\frac{1}{8}$" x 9"
D	$3\frac{5}{8}$" x $9\frac{1}{2}$"	N	$3\frac{5}{8}$" x $7\frac{1}{2}$"
E	$3\frac{5}{8}$" x $11\frac{1}{2}$"	O	$3\frac{5}{8}$" x $8\frac{1}{2}$"
F	$5\frac{1}{2}$" x $7\frac{1}{2}$"	P	$3\frac{5}{8}$" x $9\frac{1}{2}$"
G	$5\frac{5}{8}$" x $7\frac{1}{2}$"	Q	$3\frac{5}{8}$" x $11\frac{1}{2}$"
		R	$5\frac{1}{8}$" x $7\frac{1}{2}$"
		S	$5\frac{1}{8}$" x 9"
		T	$5\frac{1}{8}$" x $10\frac{1}{2}$"
		U	$5\frac{1}{2}$" x $7\frac{1}{2}$"
		V	$5\frac{5}{8}$" x $7\frac{1}{2}$"
		W	$6\frac{3}{4}$" x $7\frac{1}{2}$"
		X	$5\frac{3}{4}$" x $7\frac{3}{4}$"
		Y	6" x 8"

Table 2

Eye Bolt and Saddle Assemblies

Code	Bolt
5	$\frac{5}{8}$"
6	$\frac{3}{4}$"
7	$\frac{7}{8}$"

Table 3

Mounting Bolt Size

Code	Bolt	Hole
6	$\frac{3}{4}$"	$\frac{13}{16}$"
7	$\frac{7}{8}$"	$\frac{15}{16}$"
8	1"	$1\frac{1}{16}$"

Example: SN-67-126-126. Single Crossarm Assembly, $3\frac{5}{8}$" x $7\frac{1}{2}$" x 26'-0" glued laminated crossarm, 12'-6" C/C pole spacing, 12'-6" phase spacing. Assembled with (3) $\frac{3}{4}$" eye bolt and saddle assemblies. Drilled for $\frac{7}{8}$" arm mounting bolts.

*To purchase a single arm, bored but less the assembly hardware, add a "W" to the assembly number ordering code.

Pole mounting hardware is not furnished standard as part of the assembly and should be ordered separately.

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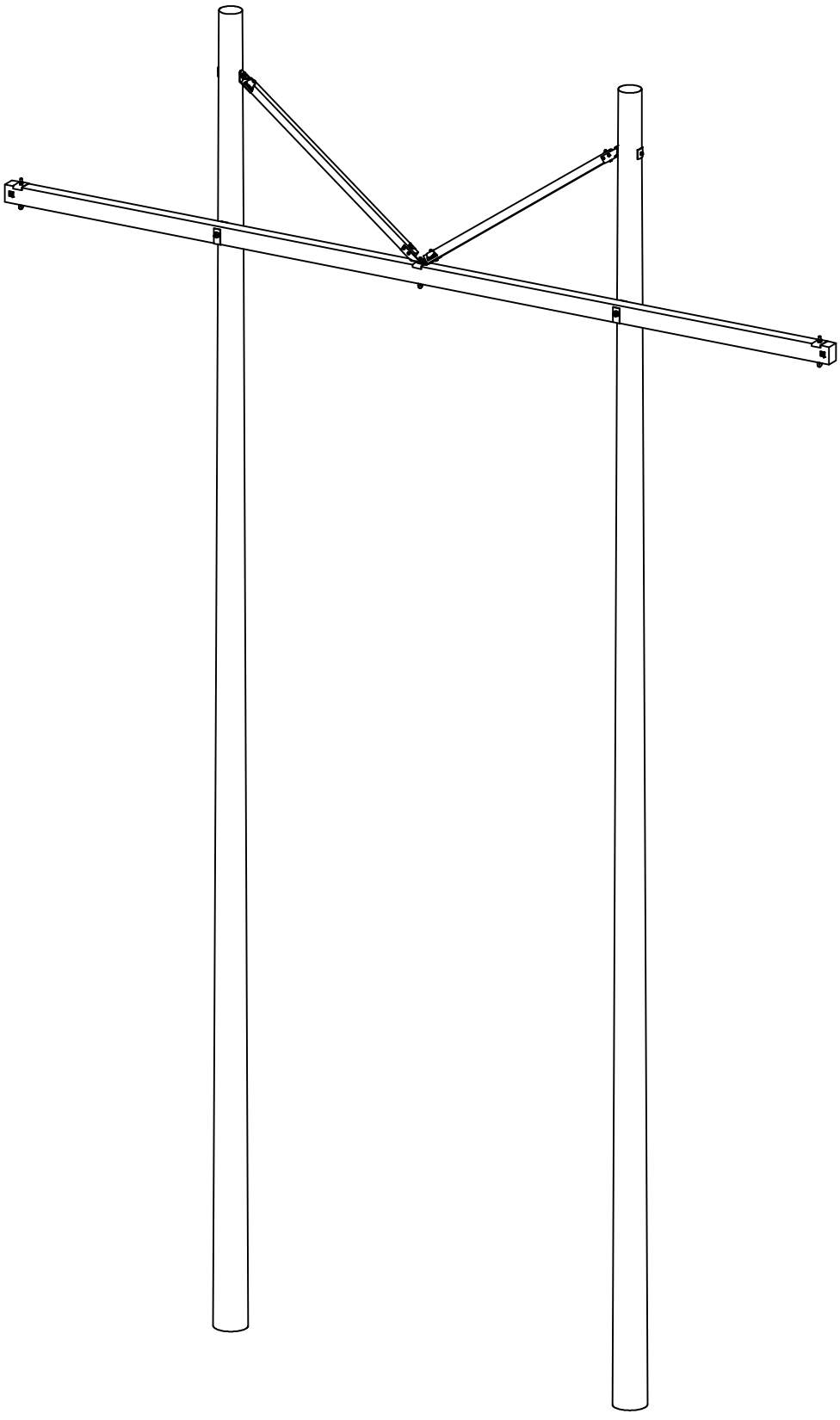
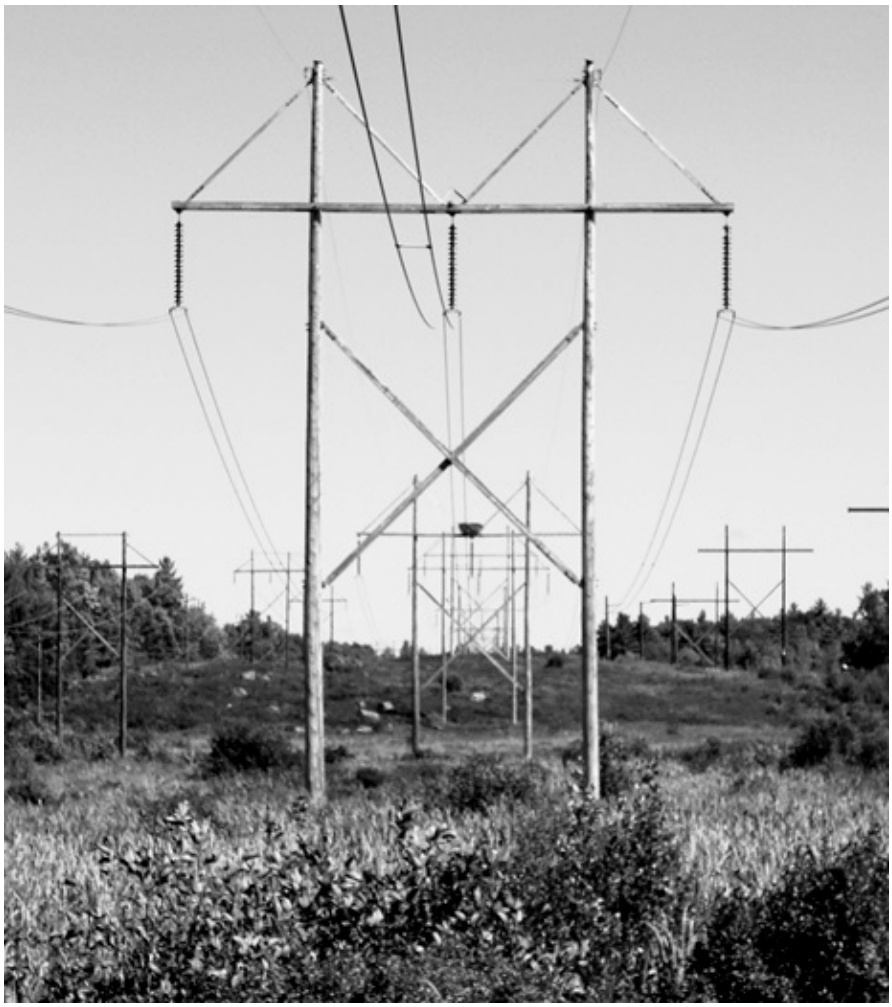


Wood Transmission Braces



BROOKS Manufacturing has a complete line of engineered and history tested transmission braces. Our diversity in design and manufacturing facilities ensures that we can furnish the proper brace to interchange with your existing systems and inventory, or meet your new framing requirements.

A variety of standard design types and sizes of braces are available to meet the unique applications of individual utility power transmission systems. Brace types include face mounted, knee, vee, tension, combination tension vee, and X-brace.

Designs other than those shown in the catalog are available for specific applications. We welcome the opportunity to review your bracing requirements.

All BROOKS Wood Transmission Braces are manufactured from select coast region Douglas fir. The braces are pressure treated after fabrication with pentachlorophenol unless otherwise specified. End fittings are made from steel which equals or exceeds the strength ratings of ASTM A-36, are tapped to secure a tight fit, and are hot dipped galvanized. Assembly bolts meet the requirements of ANSI C135.1.

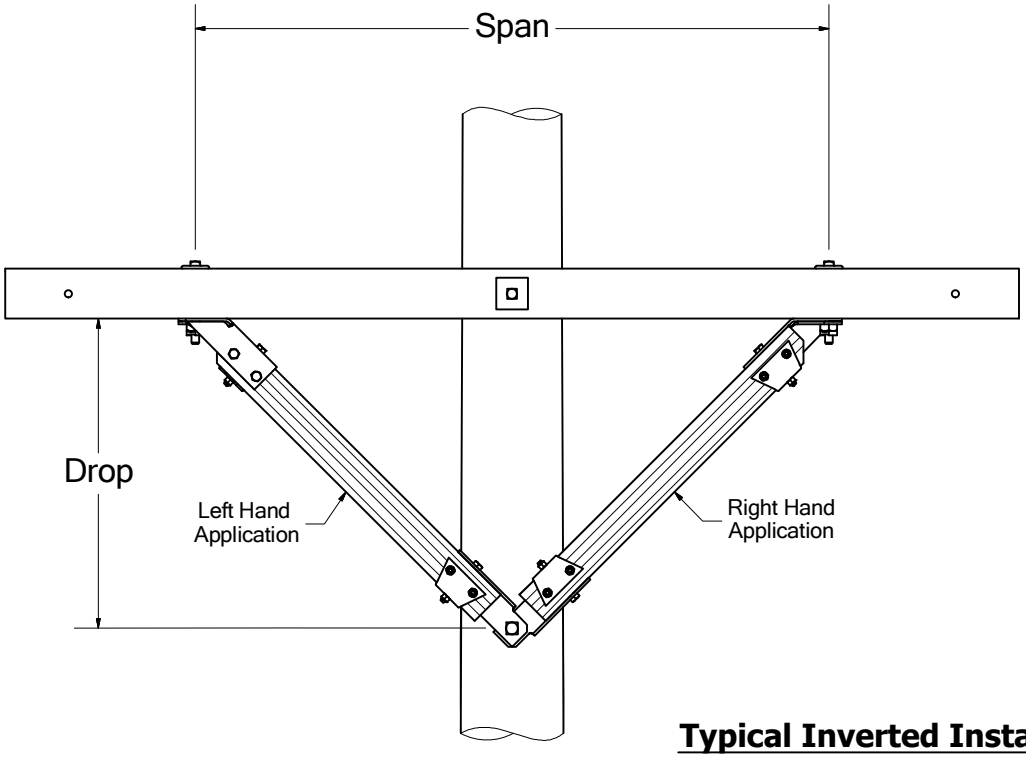
Catalog numbers are developed from codes which indicate the variables for specific applications. These codes are shown for each brace group along with examples of developed catalog numbers. Braces may be ordered by catalog number, or by indicating the brace type and series number along with appropriate descriptive information such as span or spacing, drop, MHC (C/C holes), end fitting angles, and mounting hole sizes.

Face Mounted Braces

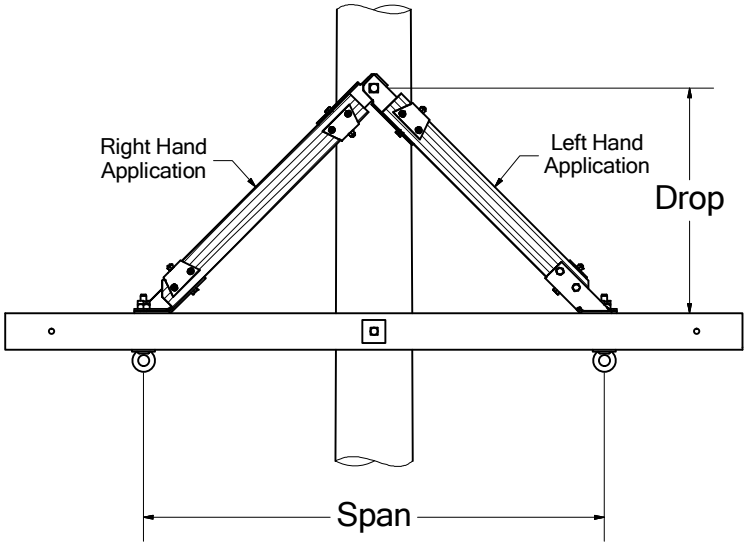
BROOKS Face Mounted Braces are typically furnished in pairs. Individual left or right hand units may be ordered as indicated by the examples on the next page.

Face mounted braces are equally suited for installation under or above the crossarm for both single pole and H-frame applications. When positioned below the crossarm, the orientation of left or right hand assembly appears normal. In the inverted application, the orientation related to right and left hand is reversed.

Typical Underarm Installation



Typical Inverted Installation



Face Mounted Brace Ordering Codes

For 411 and 412 Series Braces

Ordering Information:

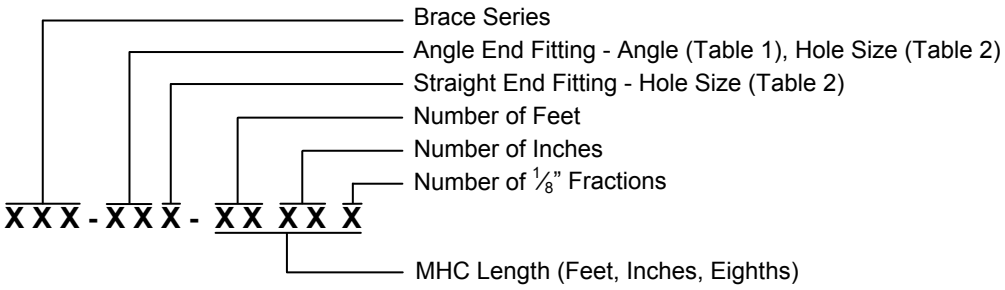


Table 1

End Fitting Angle

Bend Code	Degree
C	30°
F	37½°
J	45°
L	50°
M	52½°

Additional angles are available.

Table 2

Mounting Hole Size

Hole Code	Size
5	11/16"
6	13/16"
7	15/16"

Ordering Example for Pairs: 412-F67-07043 = 1 pair Face Mounted Braces, 3⅜" x 4⅜" wood, angle fitting 37½° (degree) and 13/16" hole, straight fitting 15/16" hole, MHC = 7'- 4⅜". Approximate shipping weight = 43 lbs. per piece, or 86 lbs. per pair.

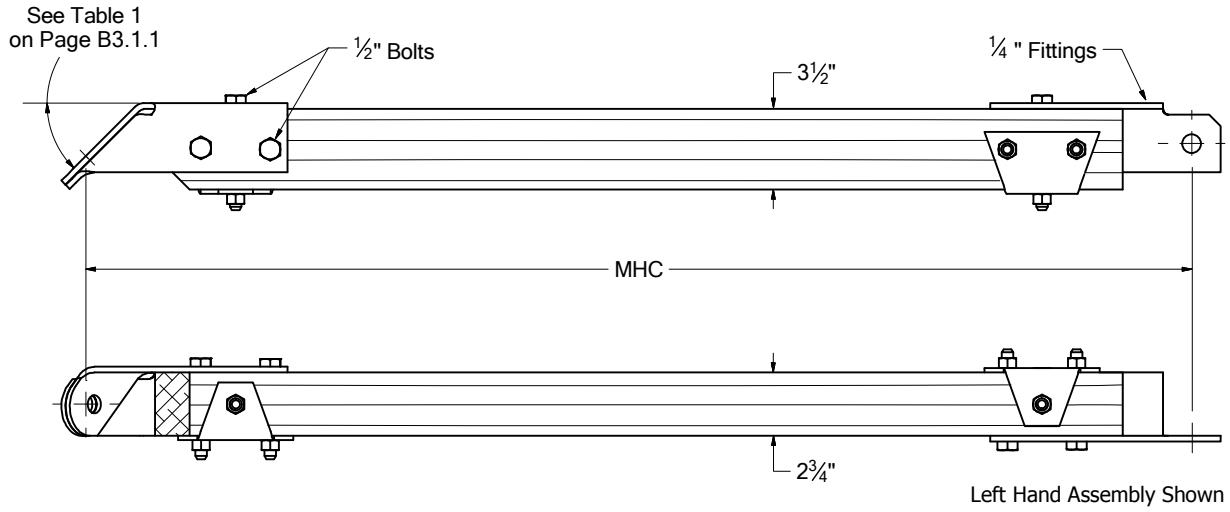
For applications which require individual left or right hand pieces, use the same format illustrated above, except add the code letter "L" (left hand) or "R" (right hand) immediately following the brace series number.

Ordering Example for Pieces: 411L-F77-09 = Left hand Face Mounted Brace, 2¾" x 3½" wood, angle fitting 37½° (degree), 15/16" holes, MHC = 9'-0". Approximate shipping weight = 57 lbs. per piece.

411 Series Face Mounted Braces

15,000 Lbs. Ultimate Tensile Capacity
Wood Section - 2¾" x 3½". Standard Holes - 13/16". 11/16" holes are also available for this series.

To estimate shipping weight per piece, multiply MHC in feet equivalent by 2.4, then add 12 pounds.

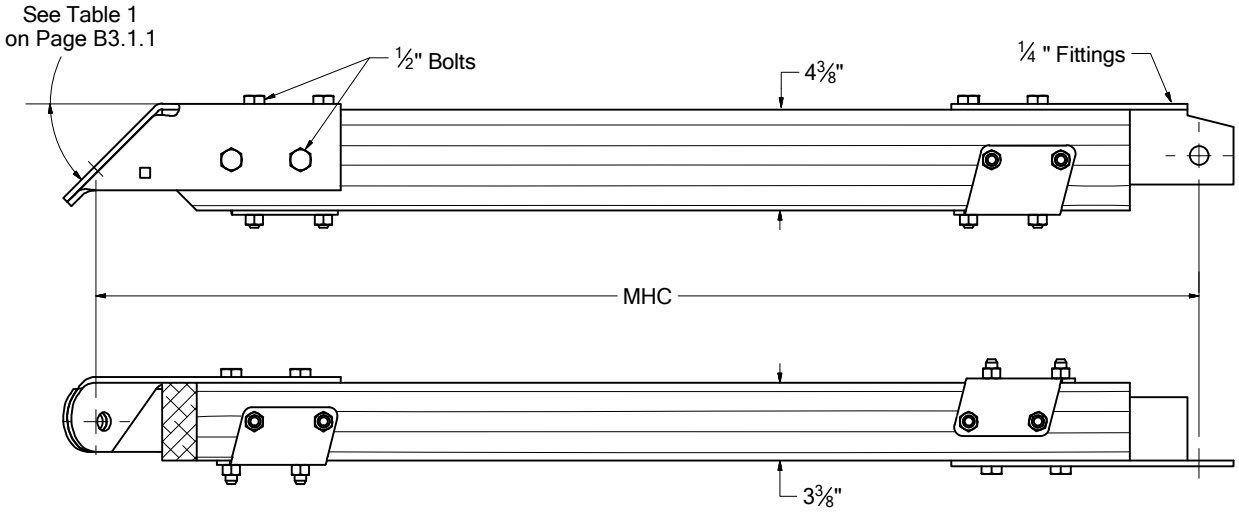


Left Hand Assembly Shown

412 Series Face Mounted Braces

20,000 Lbs. Ultimate Tensile Capacity
Wood Section - 3⅜" x 4⅜". Standard Holes - 15/16". 13/16" holes are also available for this series.

To estimate shipping weight per piece, multiply MHC in feet equivalent by 3.8, then add 15 pounds.



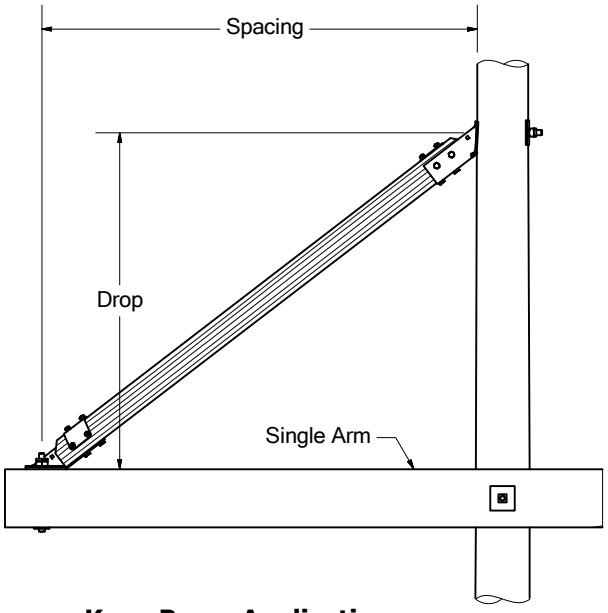
Left Hand Assembly Shown

Knee and Vee Braces

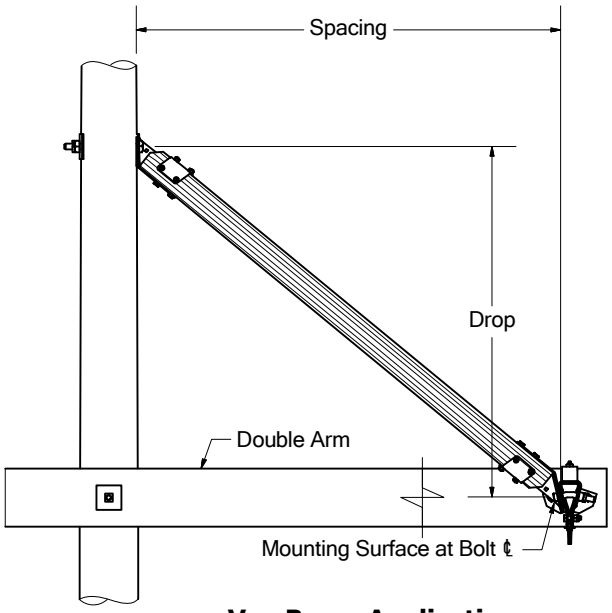
The following examples illustrate typical installations for Knee and Vee Brace applications. Knee Bracing is generally used with single arm construction, having one end attached to the side of the pole, and the other end to the top or bottom face of the single crossarm.

Vee Bracing, by comparison, is generally used with double arm construction, with one end attached to the side of the pole, and the other end to the side of a spacer fitting. Because of the variance in slope of the brace mounting plane on the spacer fitting body, care must be exercised when selecting the end fitting angle for the spacer fitting end.

Knee and Vee Braces may be ordered by the catalog number developed from codes on page B2.2.2, or by brace type and series along with complete descriptive data. A catalog number indicates “each” units, meaning a single piece of wood with end fittings.



Knee Brace Application



Vee Brace Application

Knee and vee braces may also be installed under the arm, as the need dictates. Please contact the BROOKS Engineering Department for assistance in determining which application best meets your design criteria.

Knee and Vee Brace Ordering Codes

For 414, 415, 416, 429 and 430 Knee Brace Series
For 417, 418, 419, 425, 426 and 450 Vee Brace Series

Ordering Information:

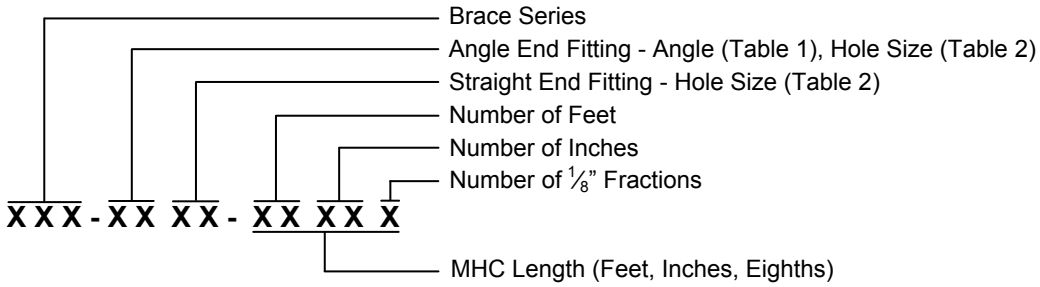


Table 1

End Fitting Angle

Bend Code	Degree
C	30°
F	37½°
J	45°
L	50°
M	52½°

Additional angles are available

Table 2

Mounting Hole Size

Hole Code	Size
5	11/16"
6	13/16"
7	15/16"
8	1 1/16"

Ordering Example: 415-F6M6-07014 = 1 Knee Brace, 3⅜" x 4⅜" wood, angle fitting 37½° (degree) with 13/16" hole, and 52½° (degree) with 13/16" hole, MHC = 7'-1½". Approximate shipping weight = 43 lbs. per piece.

Ordering Example: 419-J6J7-1006 = 1 Vee Brace, 3⅜" x 5⅜" wood, angle fitting 45° (degree) with 15/16" hole, and 45° (degree) with 13/16" hole, MHC = 10'-6". Approximate shipping weight = 65 lbs. per piece.

BROOKS has a wide variety of additional brace sizes to meet your specific requirements that are not illustrated in this general catalog. For assistance in identifying the brace best suited to your applications, contact BROOKS Engineering Department.

414 Series Knee Braces

15,000 Lbs. Ultimate Tensile Capacity

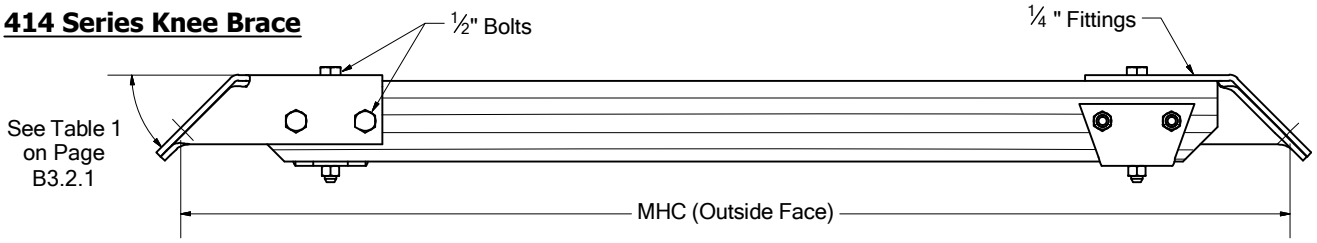
417 Series Vee Braces

15,000 Lbs. Ultimate Tensile Capacity

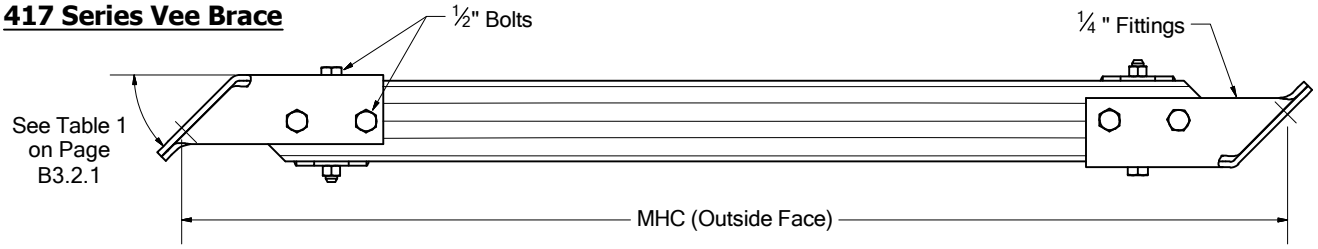
Wood Section - $2\frac{3}{4}$" x $3\frac{1}{2}$". Standard Holes - $\frac{13}{16}$". $\frac{11}{16}$" holes are also available for this series.

To estimate shipping weight per piece, multiply MHC in feet equivalent by 2.5, then add 13 pounds.

414 Series Knee Brace



417 Series Vee Brace



415 Series Knee Braces

20,000 Lbs. Ultimate Tensile Capacity

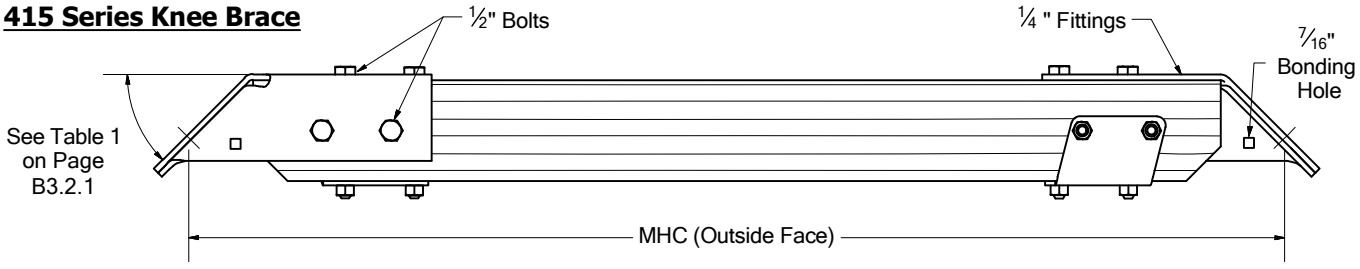
418 Series Vee Braces

20,000 Lbs. Ultimate Tensile Capacity

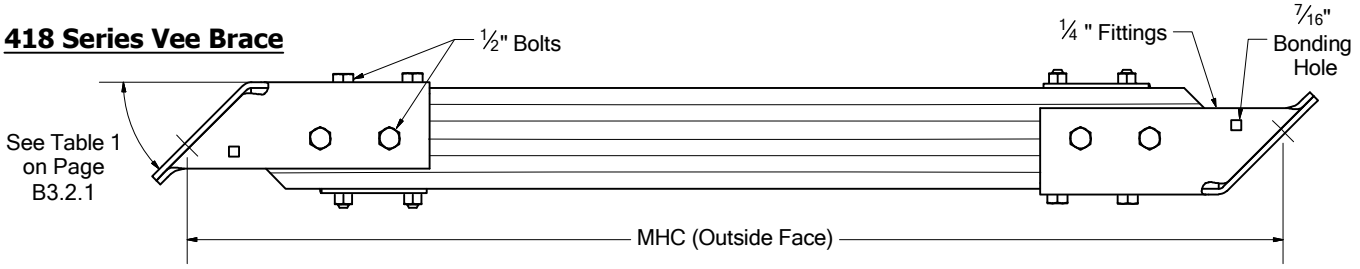
Wood Section - $3\frac{3}{8}$" x $4\frac{3}{8}$". Standard Holes - $\frac{15}{16}$". $\frac{13}{16}$" holes are also available for this series.

To estimate shipping weight per piece, multiply MHC in feet equivalent by 3.8, then add 16 pounds.

415 Series Knee Brace



418 Series Vee Brace



416 Series Knee Braces

20,000 Lbs. Ultimate Tensile Capacity

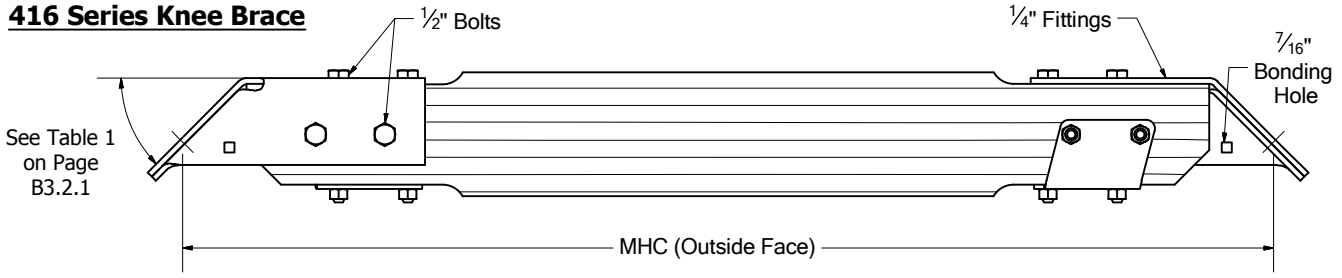
419 Series Vee Braces

20,000 Lbs. Ultimate Tensile Capacity

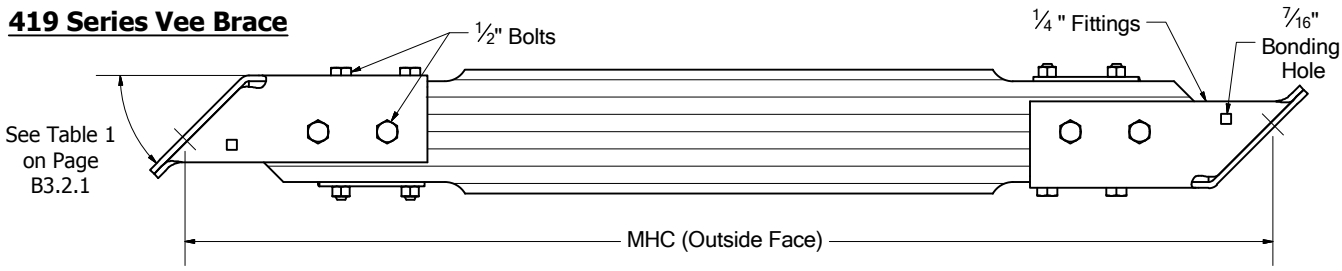
Wood Section - $3\frac{3}{8}$" x $5\frac{3}{8}$". Standard Holes - $\frac{15}{16}$". $\frac{13}{16}$" holes are also available for this series.

To estimate shipping weight per piece, multiply MHC in feet equivalent by 4.7, then add 16 pounds.

416 Series Knee Brace



419 Series Vee Brace



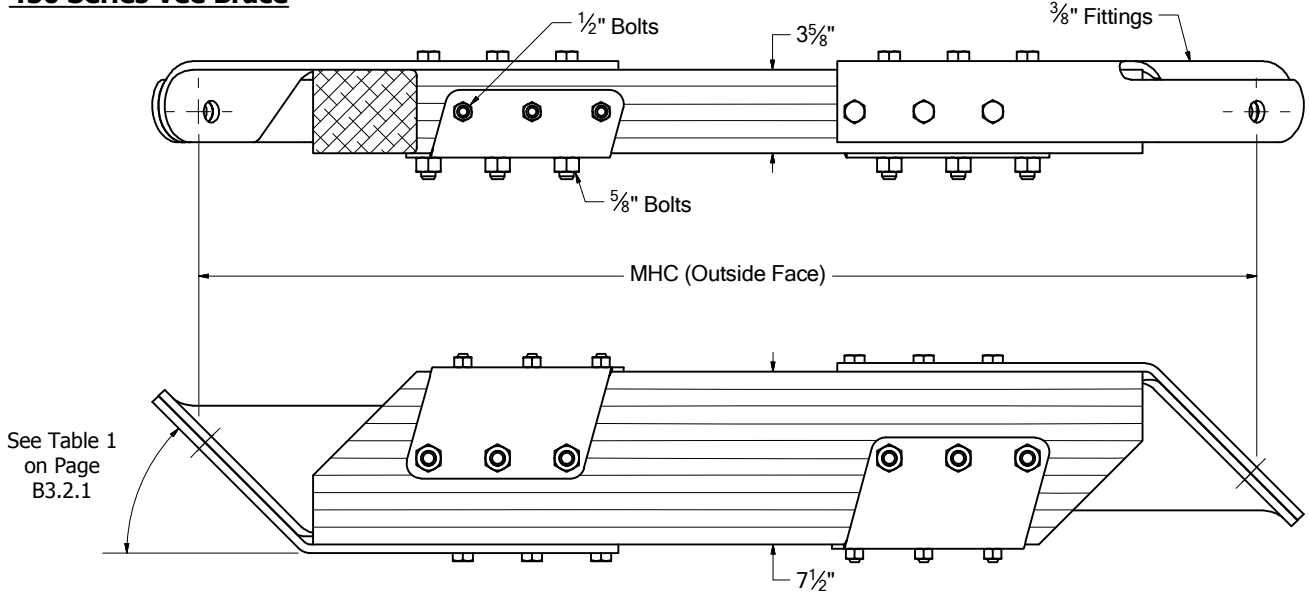
450 Series Vee Braces

30,000 Lbs. Ultimate Tensile Capacity

Wood Section - $3\frac{5}{8}$" x $7\frac{1}{2}$". Standard Holes - $\frac{15}{16}$". $1\frac{1}{16}$" holes are also available for this series.

To estimate shipping weight per piece, multiply MHC in feet equivalent by 7.0, then add 39 pounds.

450 Series Vee Brace



429 Series Knee Braces

35,000 Lbs. Ultimate Tensile Capacity

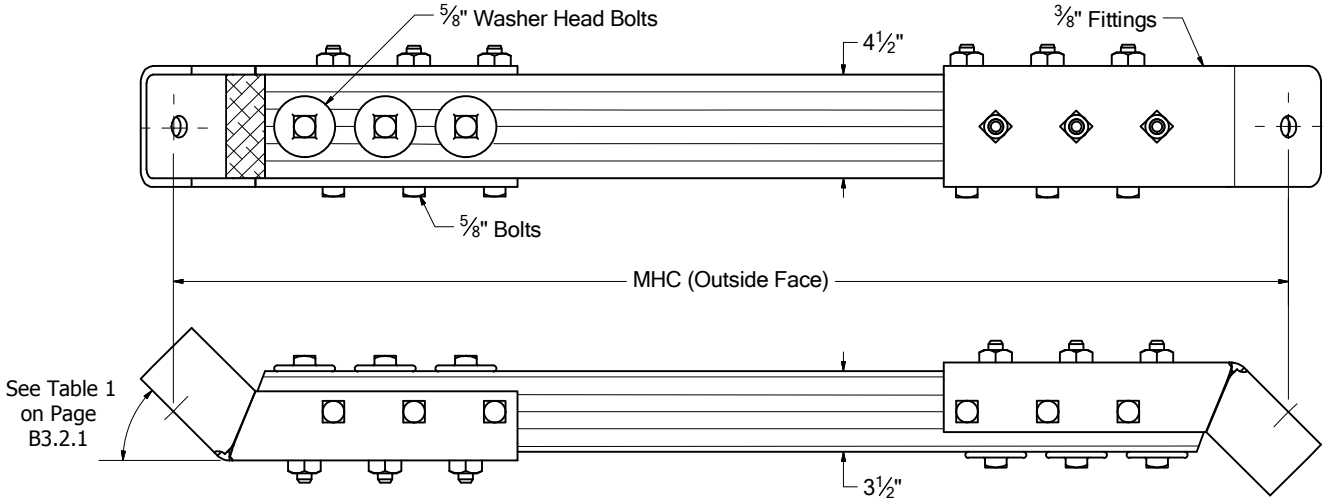
425 Series Vee Braces

35,000 Lbs. Ultimate Tensile Capacity

Wood Section - 3½" x 4½". Standard Holes - 15/16". 1 1/16" holes are also available for this series.

To estimate shipping weight per piece, multiply MHC in feet equivalent by 4.1, then add 42 pounds.

425 Series Vee Brace



430 Series Knee Braces

35,000 Lbs. Ultimate Tensile Capacity

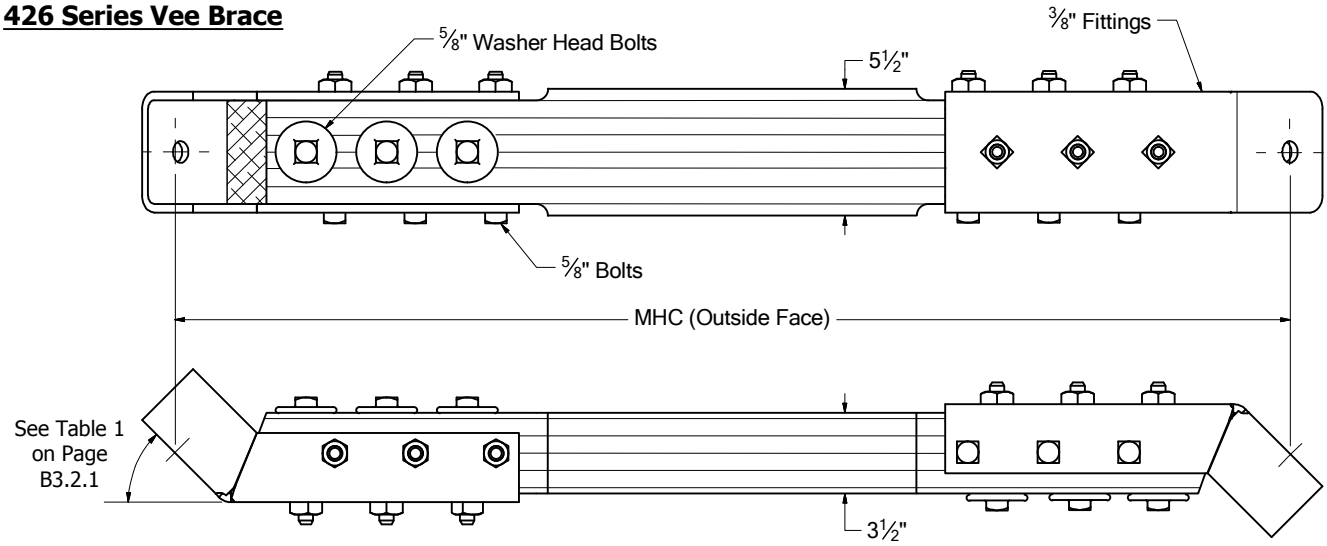
426 Series Vee Braces

35,000 Lbs. Ultimate Tensile Capacity

Wood Section - 3½" x 5½". Standard Holes - 15/16". 1 1/16" holes are also available for this series.

To estimate shipping weight per piece, multiply MHC in feet equivalent by 5.0, then add 42 pounds.

426 Series Vee Brace



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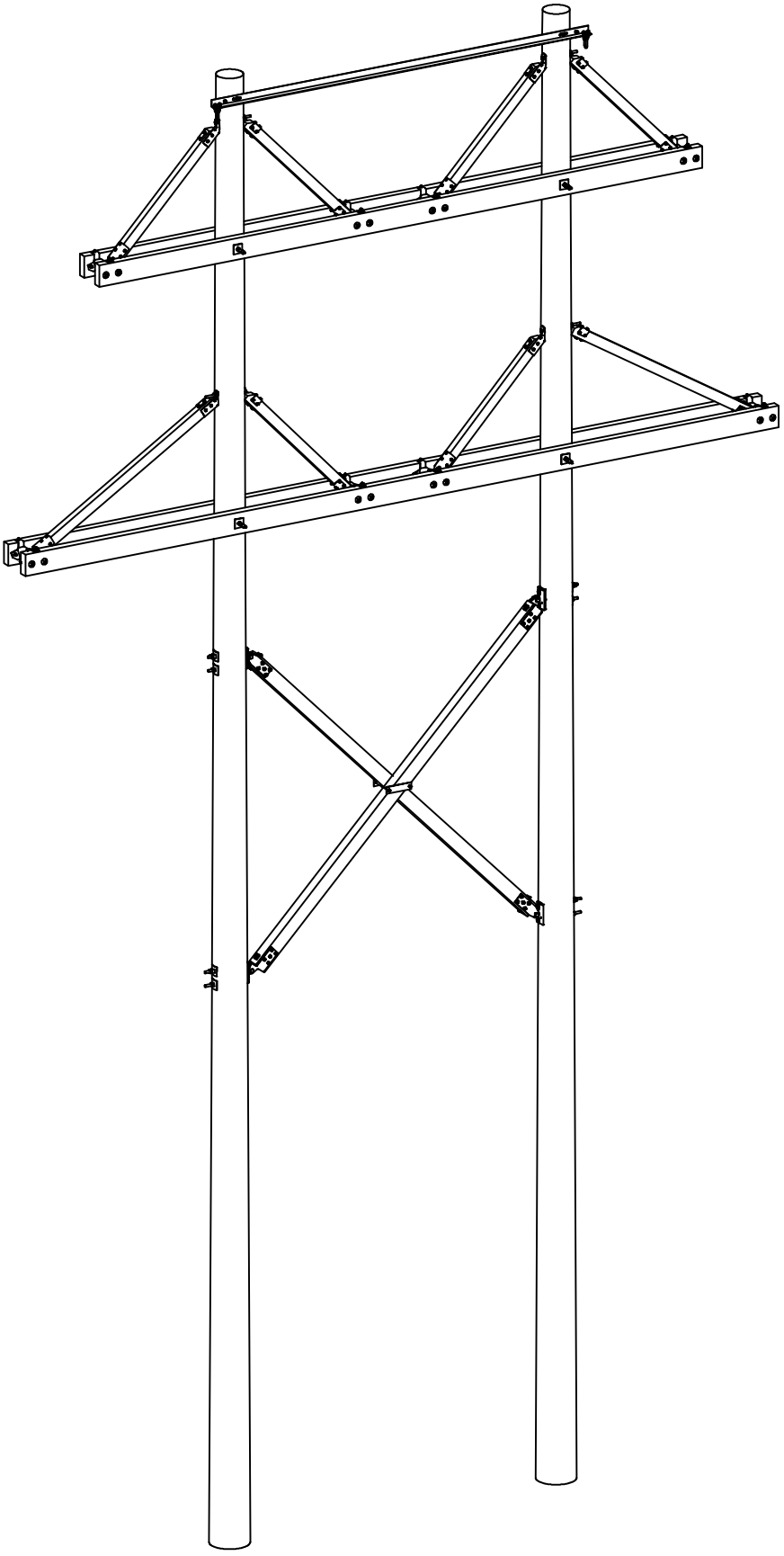
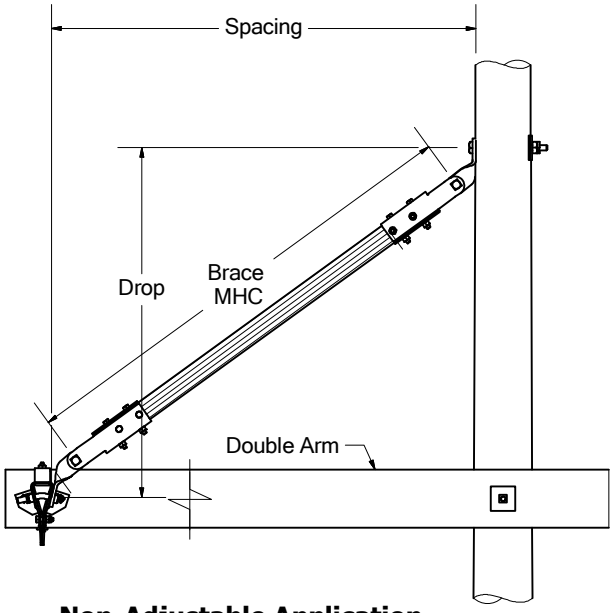


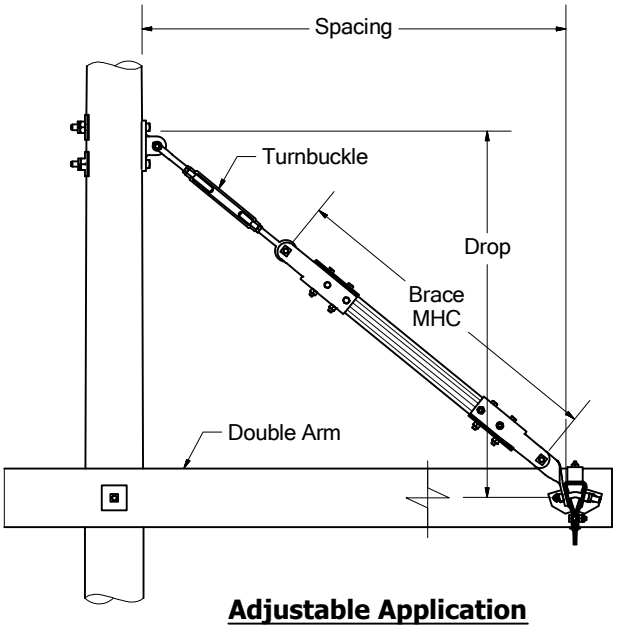
Tension Braces

BROOKS Tension Braces are typically used to support the outside phase positions on H-frame structures carrying heavy loads associated with bundled conductors on long vertical spans. These braces use pinned-end clevis type fittings which can efficiently transfer the high tensile loads into adjacent structure components without developing connection fatigue problems which can occur with other semi-fixed connections.

BROOKS Tension Braces may be combined with compatible sized turnbuckles to develop an adjustable length brace. BROOKS can supply the turnbuckles along with your Tension Brace order. Tension Braces may be ordered by the catalog number developed from the codes shown below, or by brace series along with complete descriptive data. A catalog number indicated “each” units, meaning a single piece of wood assembled to end fittings.



Non-Adjustable Application



Adjustable Application

Contact the BROOKS Engineering Department for assistance in determining the application to best meet your design criteria.

Tension Brace Ordering Code

For 424, 431 & 436 Series Braces

Ordering Information:

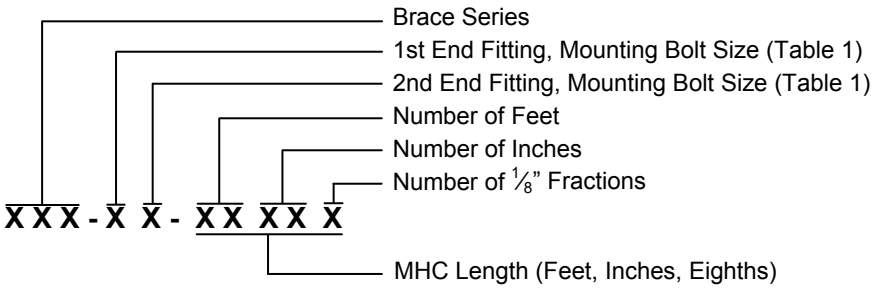


Table 1

Bolt Size

Bolt Code	Size
6	3/4" x 2 1/2"
7	7/8" x 3"
8	1" x 3 1/2"

Ordering Example: 424-88-1210 = 1 Tension Brace, 3 1/2" x 4 1/2" wood, 1" mounting bolts at each end, MHC = 12'-10". Approximate shipping weight = 104 lbs. per piece.

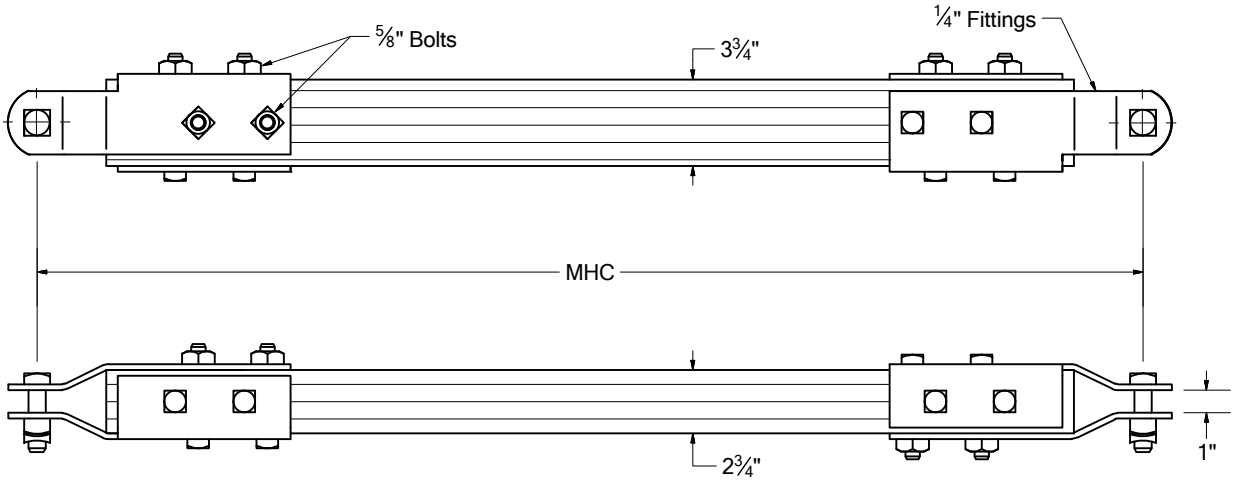
Ordering Example: 436-77-09032 = 1 Tension Brace, 3 3/8" x 4 3/8" wood, 7/8" mounting bolts at each end, MHC = 9'-1/4". Approximate shipping weight = 62 lbs. per piece.

431 Series Tension Braces

25,000 Lbs. Ultimate Tensile Capacity
Wood Section - 2¾" x 3¾". Standard Holes - 13/16".

The 431 Series Tension Brace is furnished standard with (2) ¾" x 2¾" machine bolts with nuts and locknuts factory assembled.

To estimate shipping weight per piece, multiply MHC in feet equivalent by 2.5, then add 20 pounds.

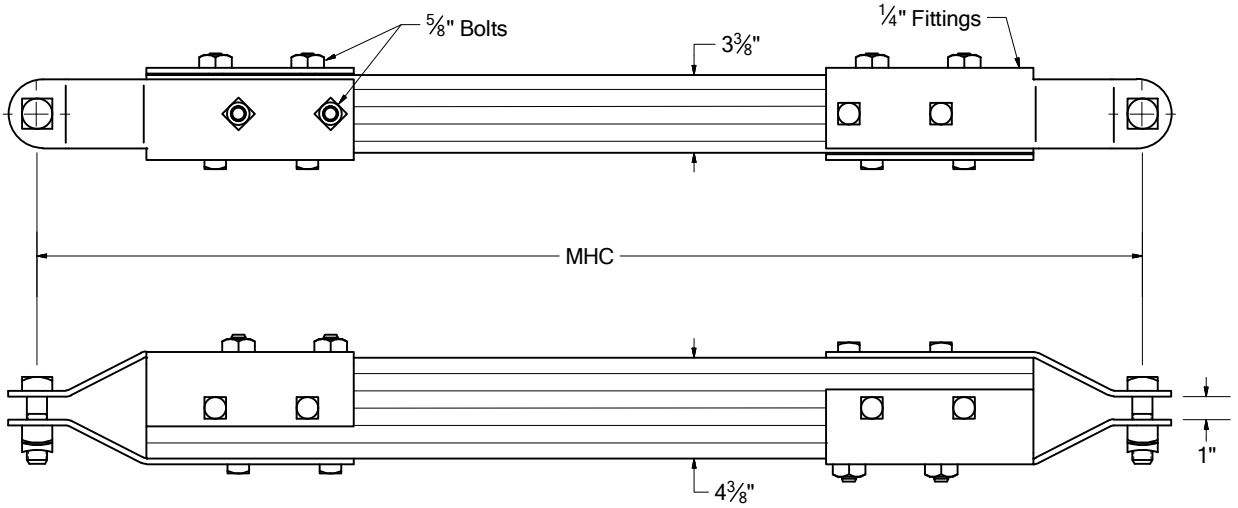


436 Series Tension Braces

30,000 Lbs. Ultimate Tensile Capacity
Wood Section - 3⅜" x 4⅜". Standard Holes - 15/16".

The 436 Series Tension Brace is furnished standard with (2) ⅞" x 3" machine bolts with nuts and locknuts factory assembled.

To estimate shipping weight per piece, multiply MHC in feet equivalent by 3.8, then add 27 pounds.



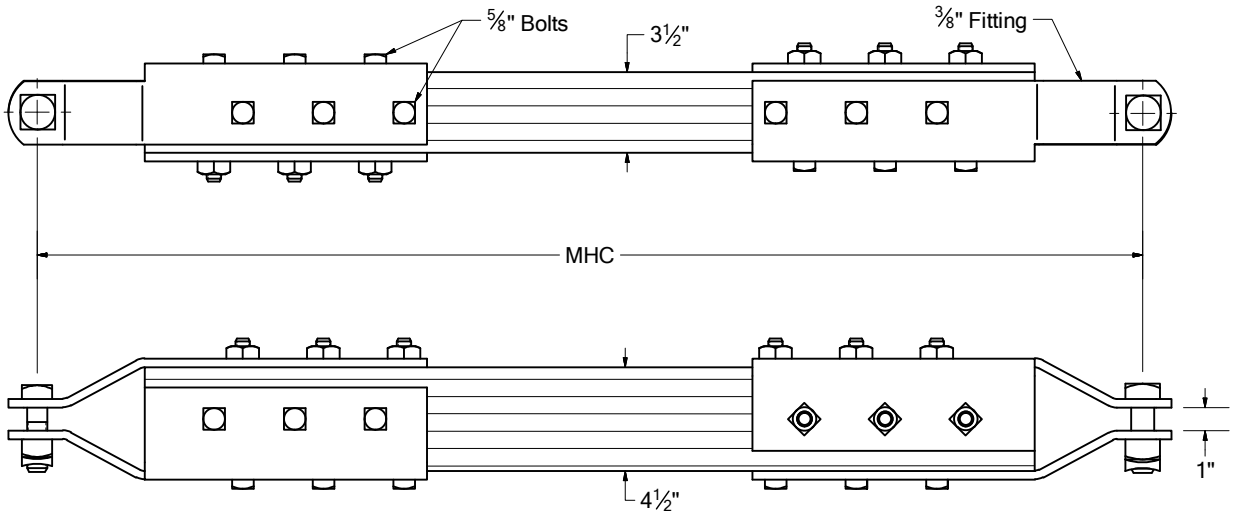
424 Series Tension Braces

35,000 Lbs. Ultimate Tensile Capacity (⅞" Bolts)
40,000 Lbs. Ultimate Tensile Capacity (1" Bolts)

Wood Section - 3½" x 4½". Standard Holes - 15/16". 1⅛" holes are also available for this series.

The 424 Series Tension Brace is furnished standard with (2) ⅞" x 3" machine bolts with nuts and locknuts factory assembled. 1" connection bolts are furnished for this series, when specified with the ordering code noted on page B3.3.1.

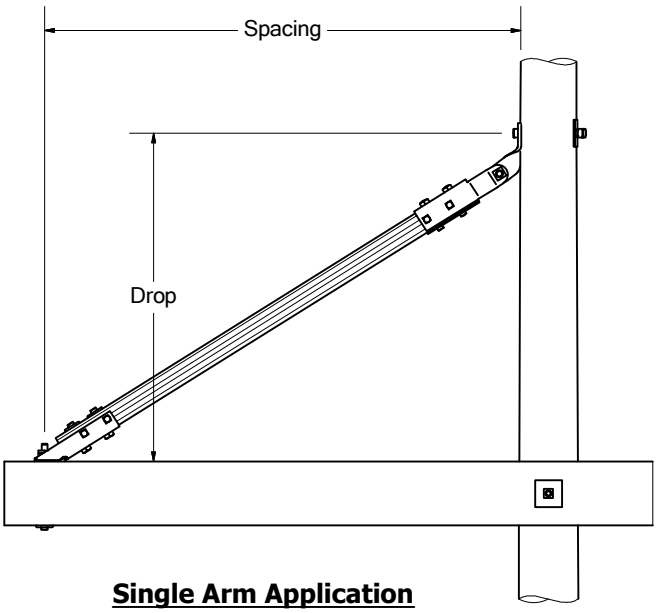
To estimate shipping weight per piece, multiply MHC in feet equivalent by 4.1, then add 51 pounds.



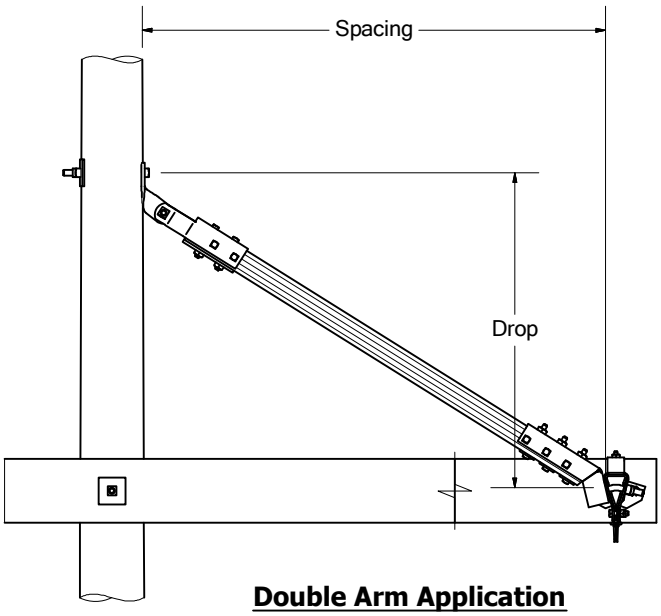
Combination Tension Vee Braces

BROOKS Combination Tension Vee Braces combine end fitting features of tension braces and knee or vee braces. Combination braces are used for applications where it is advantageous for one end of the brace to connect to a tee while the other end attaches to the side of a spacer fitting, or to other similar structure components.

Combination braces may be combined with compatible sized turnbuckles available from BROOKS, for critical length adjustment. Combination braces may be ordered by the catalog number developed from the codes on the next page, or by the brace series along with descriptive data. The catalog number indicates “each” units, meaning a single piece of wood assembled to end fittings.



Single Arm Application



Double Arm Application

Combination Tension Vee Brace Ordering Code

For 423 and 435 Series Braces

Ordering Information:

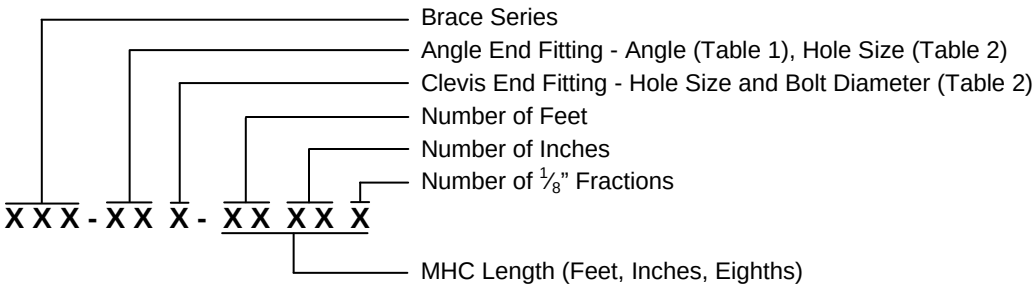


Table 1

End Fitting Angle

Bend Code	Degree
C	30
F	37½"
J	45
L	50"
M	52½"

Additional angles are available

Table 2

Mounting Hole Size

Hole	Size	Bolt Diameter
7	15/16"	7/8"
8	1 1/8"	1"

Ordering Example: 423-F77-09043 = 1 Combination Tension Vee Brace, 3⅜" x 4⅜" wood, angle fitting 37½° (degree) with 15/16" hole, ⅞" bolt in clevis fitting, MHC = 9'-4⅜". Approximate shipping weight = 62 lbs. per piece.

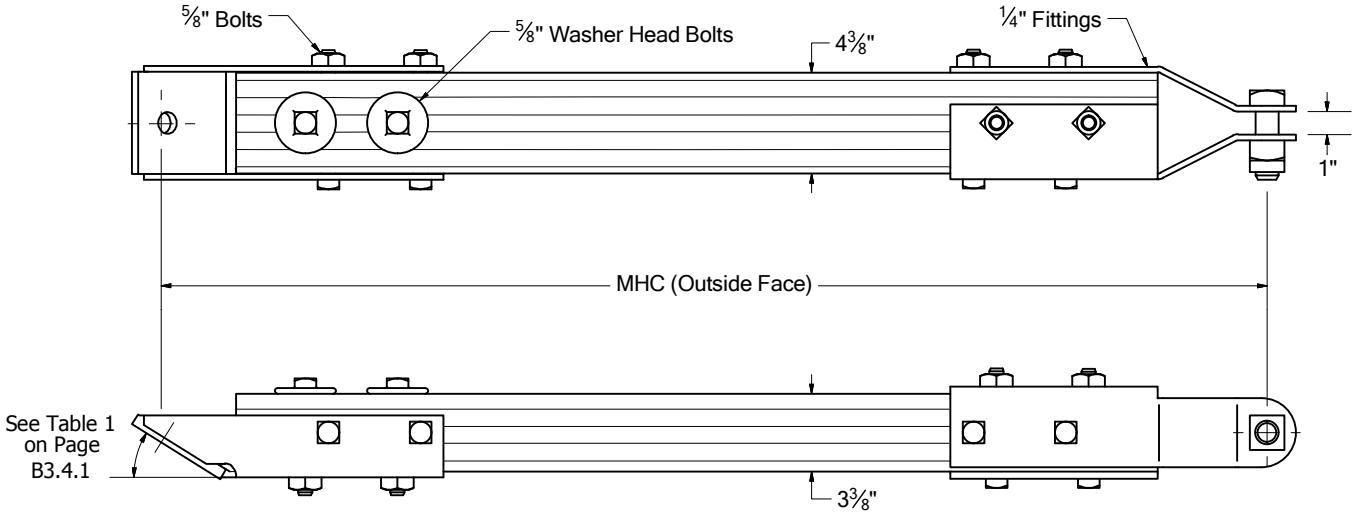
Ordering Example: 435-J87-1110 = 1 Combination Tension Vee Brace, 3½" x 4½" wood, angle fitting 45° (degree) with 1⅛" hole, ⅞" bolt in clevis fitting, MHC = 11'-10". Approximate shipping weight = 95 lbs. per piece.

423 Series Combination Tension Vee Braces

25,000 Lbs. Ultimate Tensile Capacity
Wood Section - 3⅜" x 4⅜". Standard Holes - 15/16". 13/16" holes are also available for this series.

The 423 Series Combination Tension Vee Braces are furnished standard with 1 clevis pin bolt with nut and locknut factory assembled.

To estimate shipping weight per piece, multiply MHC in feet equivalent by 3.8, then add 26 pounds.

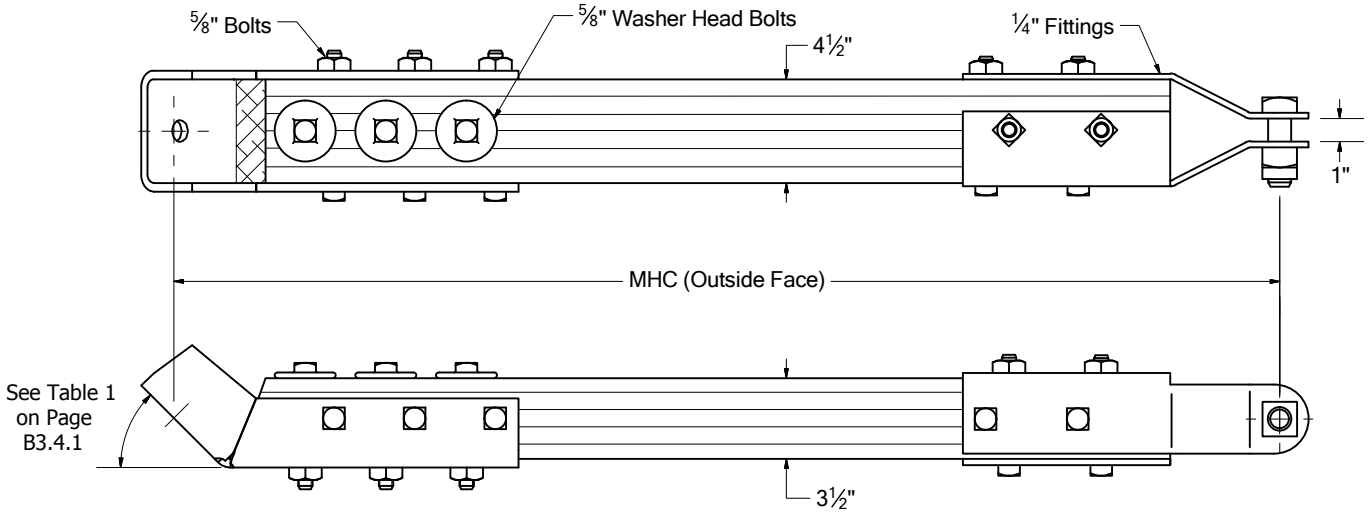


435 Series Combination Tension Vee Braces

35,000 Lbs. Ultimate Tensile Capacity
Wood Section - 3½" x 4½". Standard Holes - 15/16". 1⅛" holes are also available for this series.

The 435 Series Combination Tension Vee Braces are furnished standard with 1 clevis pin bolt with nut and locknut factory assembled.

To estimate shipping weight per piece, multiply MHC in feet equivalent by 4.1, then add 36 pounds.



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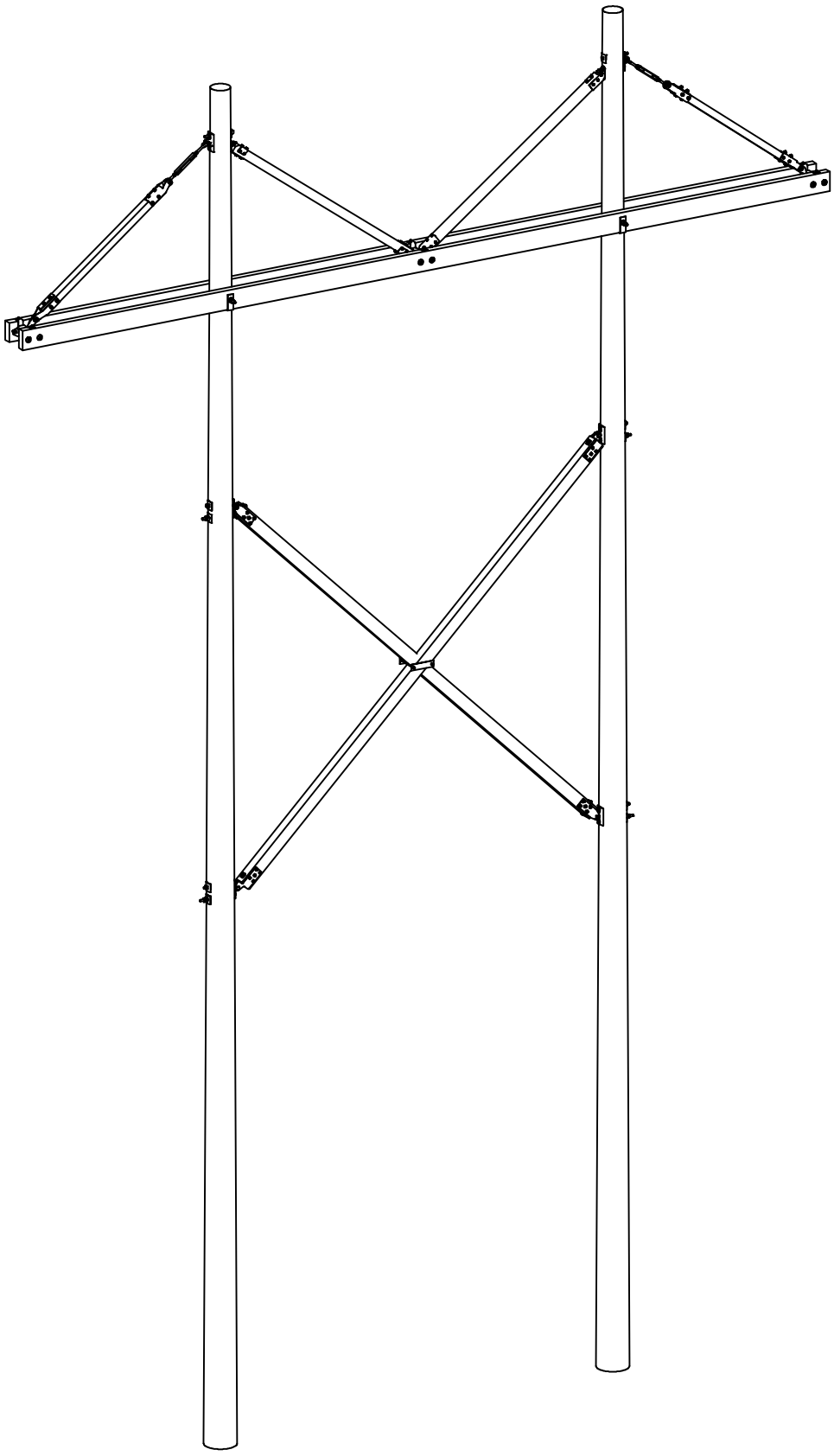


X-Braces

BROOKS tradition of producing dependable engineered products is vividly evident in our diverse line of wood X-braces. Our solid engineering commitment and decades of wood structure design and testing provide the experience and knowledge necessary to select the proper bracing to meet both your strength and budget requirements.

A set of wood X-Braces is the most economical method of fully developing the transverse capacity of the H-frame structure. Wood members provide the required tensile and compressive strengths without sacrificing the “BIL” levels associated with wood construction. The wide range of BROOKS X-Brace styles provides the transmission designer an optimum match for the given pole spacing and pole class required for the specific job through 345kV construction. BROOKS Engineering Department will work with you on applications of these standard X-Braces or a custom designed X-Brace to meet your individual needs.

Our ready access to both solid sawn and reliable conventional glued laminated coastal region Douglas fir, combined with our flexibility in hardware designs, allows easy selection of BROOKS bracing to match your existing system standards.

X-Braces should be ordered by specifying center to center pole spacings. All X-Brace members are shipped factory assembled with static proof fittings locked securely in place. Unless specified otherwise, all necessary mounting hardware required to install the assembly is included. Typical length mounting bolts have been pre-selected as noted by each style and will be shipped with the braces unless specified differently on the order. Refer to the ordering codes on the next page which explain other variations of ordering available for special applications or component combinations.

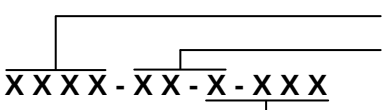
BROOKS has many other proven designs in addition to those illustrated. We welcome the opportunity to review your structure requirements or system standards to recommend the best X-Braces for your applications.

X-Brace Ordering Codes

For use when ordering by center to center (C/C) pole spacing

For 670, 671, 675, 677, 678, 6050, 6051, 6680, 6685, 6685A, 6695, 6696 & 41005 X-Brace Series

Ordering Information:



Additional Code Digits for Variable

NM …..No Mounting Hardware, Includes Center Clamp Assembly
NC ….. All Mounting Hardware, Less Center Clamp Assembly
NMC …No Mounting Hardware or Center Clamp Assembly
PC ……One Piece of X-Brace With Assembled End Fittings Only

Ordering Examples:

6685-15-6 = 1 set of X-Braces for 15'-6" C/C pole spacing, complete with (2) pieces of wood assembled to end fittings, all mounting hardware and center clamp assembly.

6685-15-6-NM = 1 set of X-Braces for 15'-6" C/C pole spacing, with (2) pieces of wood assembled to end fittings, with center clamp assembly only, less mounting hardware.

6685-15-6-NMC = 1 set of X-Braces for 15'-6" C/C pole spacing, with (2) pieces of wood assembled to end fittings, less mounting hardware and less center clamp assembly.

6685-15-6-PC = 1 piece of an X-Brace for 15'-6" C/C pole spacing (one piece of wood assembled to end fittings only, less mounting hardware and less center clamp assembly).

When mounting bolts are required in lengths other than those listed as standard for each style of X-Brace, indicate those lengths in a descriptive form along with the order number. As an example: 6685-15-6, mounting bolts 25% - 14", 50% - 16" and 25% - 18".

A variety of other ordering options is available which consider MHC of individual brace components as well as concerns for special mounting hardware combinations and bolt length arrangements. BROOKS welcomes the opportunity to assist in recommending the style of brace and confirm the appropriate catalog number which meets your system standards or structure requirements.

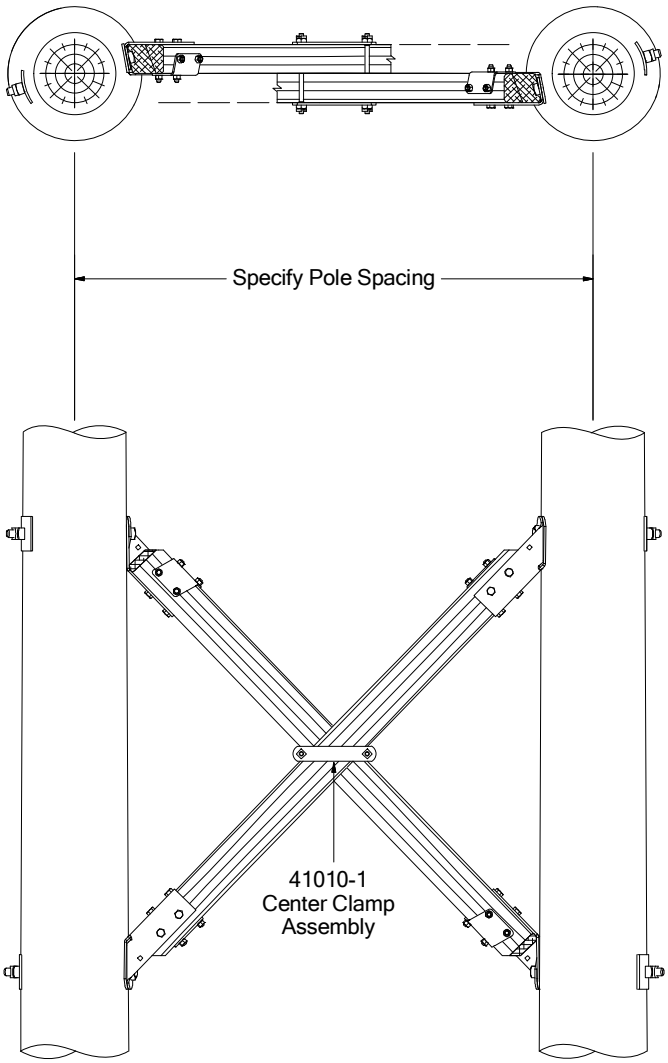
6680 Series X-Braces

Reference pages B3.5.16 to B3.5.18 for strength
Single Bolt Connection, Cut Thread. **Wood Section - 3⅜" x 4⅜".** **Fitting thickness - ¼".**

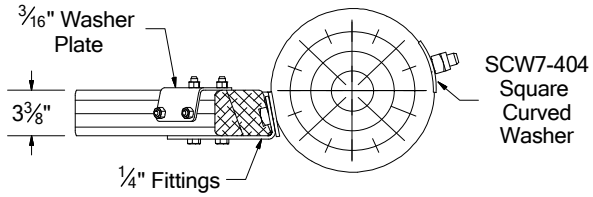
Mounting bolt diameters - ⅞". Unless specified otherwise, standard bolt length furnished are 50% - 14" and 50% - 16".

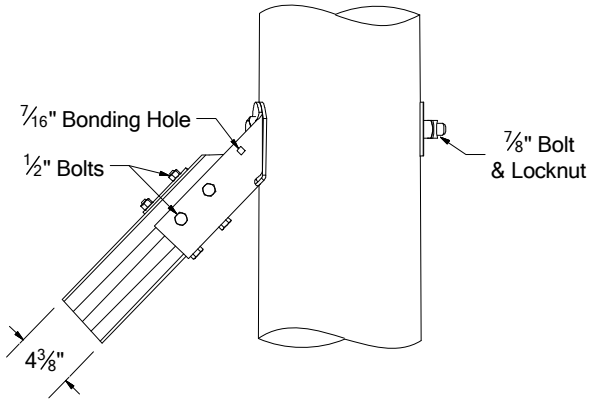
To estimate shipping weight of the assembly complete with all mounting hardware, multiply C/C pole spacing by 10.2, then add 53 pounds.

REA TM110A



Assembly View





Detail View

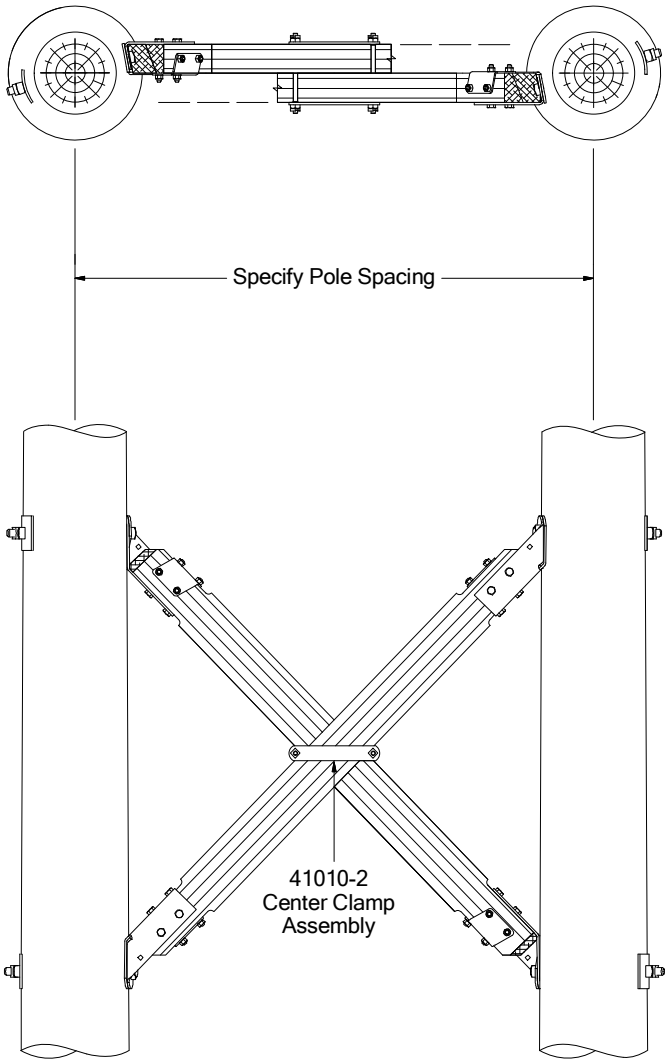
6685A Series X-Braces

Reference pages B3.5.16 to B3.5.18 for strength
Single Bolt Connection, Cut Thread. Wood Section - 3⅜" x 5⅜". Fitting thickness - ¼".

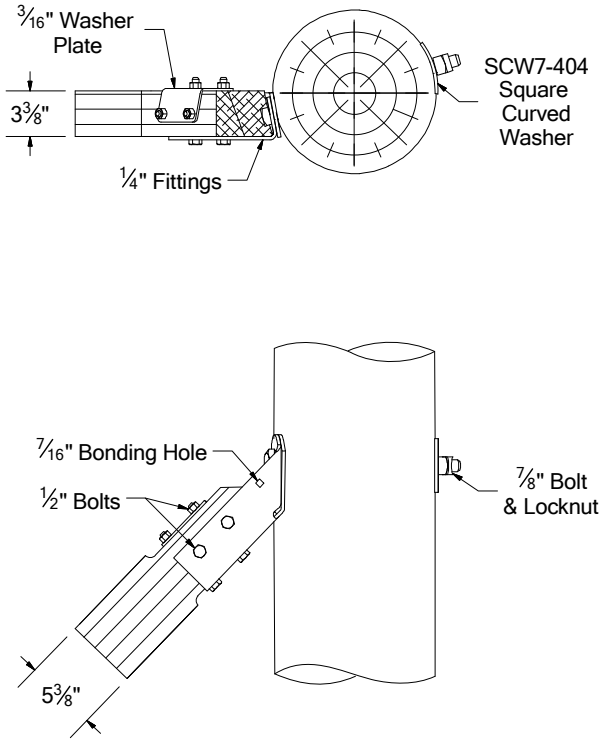
Mounting bolt diameters - ⅞". Unless specified otherwise, standard bolt length furnished are 50% - 14" and 50% - 16".

To estimate shipping weight of the assembly complete with all mounting hardware, multiply C/C pole spacing by 12.5, then add 54pounds.

REA TM110B



Assembly View



Detail View

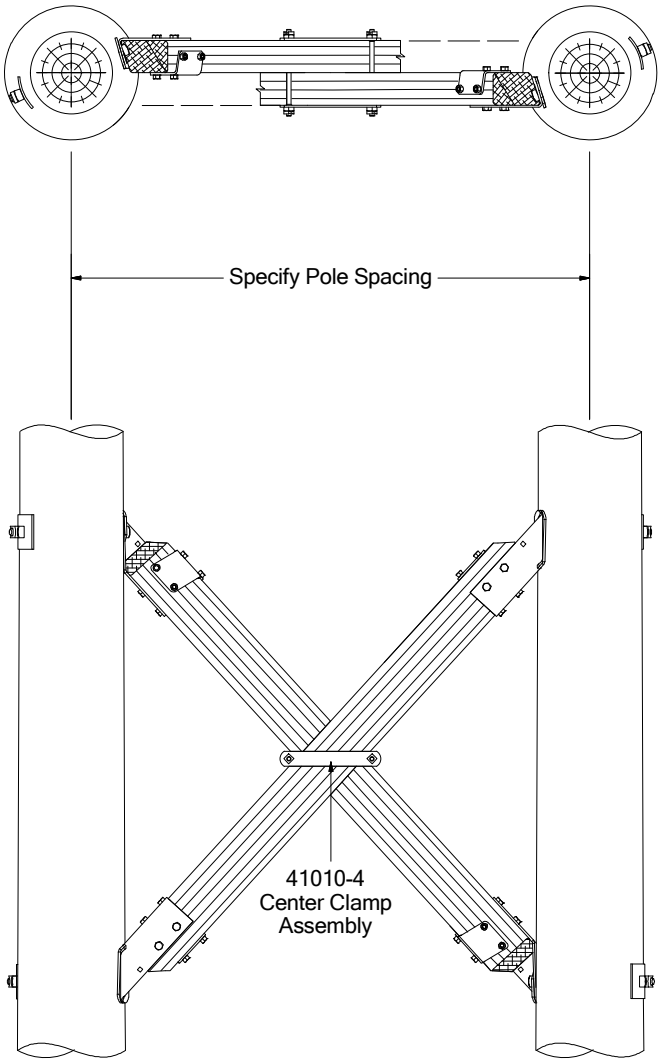
6685 Series X-Braces

Reference pages B3.5.16 to B3.5.18 for strength
Single Bolt Connection, Cut Thread. Wood Section - 3¾" x 5¾". Fitting thickness - ¼".

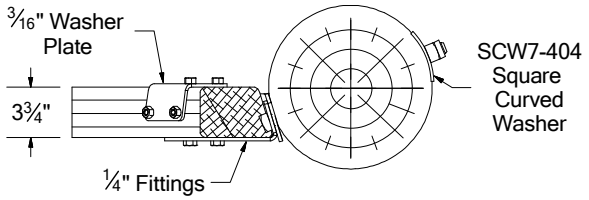
Mounting bolt diameters - ⅞". Unless specified otherwise, standard bolt length furnished are 50% - 14" and 50% - 16".

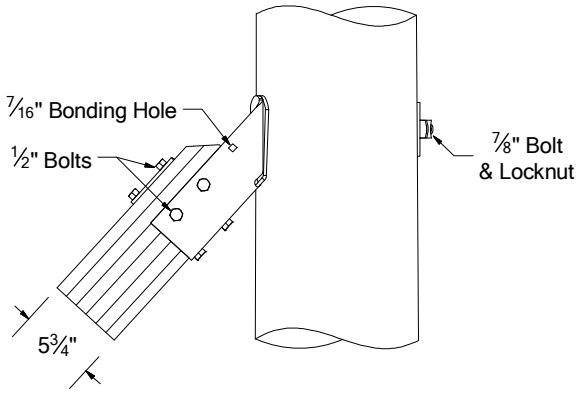
To estimate shipping weight of the assembly complete with all mounting hardware, multiply C/C pole spacing by 15.1, then add 60 pounds.

REA TM110B



Assembly View





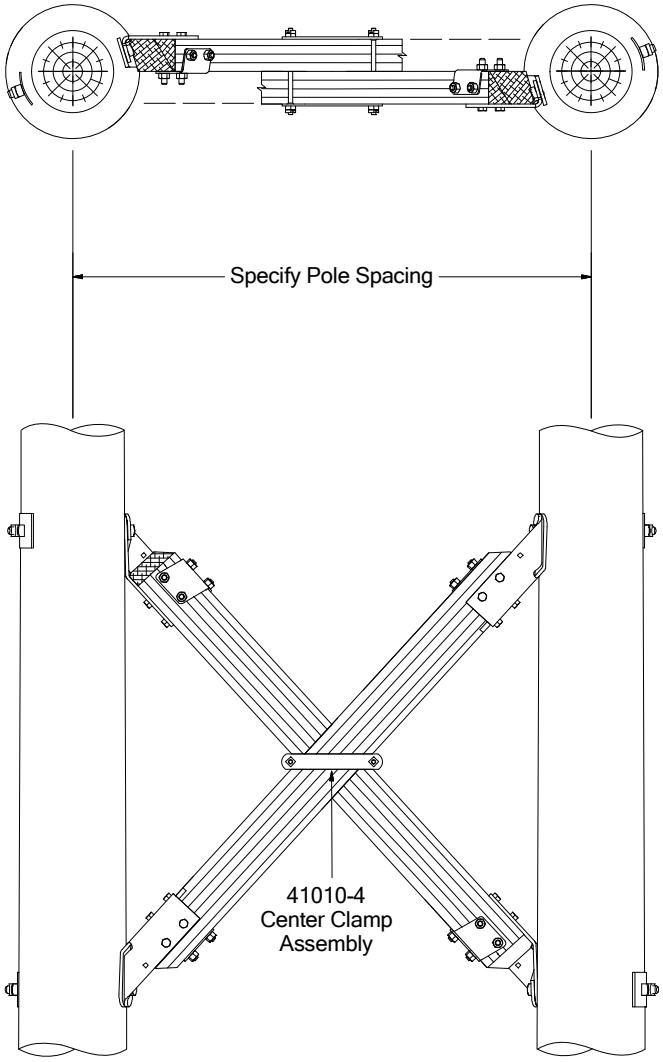
Detail View

6050 Series X-Braces

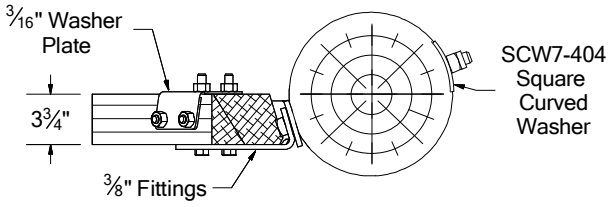
Reference pages B3.5.16 to B3.5.18 for strength
Single Bolt Connection, Cut Thread. Wood Section - 3¾" x 5¾". Fitting thickness - ⅜".

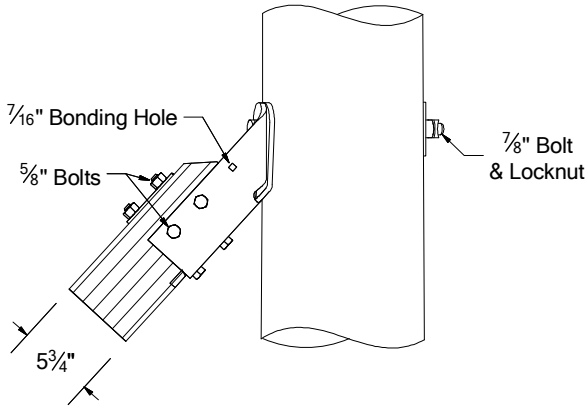
Mounting bolt diameters - ⅞". Unless specified otherwise, standard bolt length furnished are 50% - 14" and 50% - 16".

To estimate shipping weight of the assembly complete with all mounting hardware, multiply C/C pole spacing by 15.1, then add 76 pounds.



Assembly View





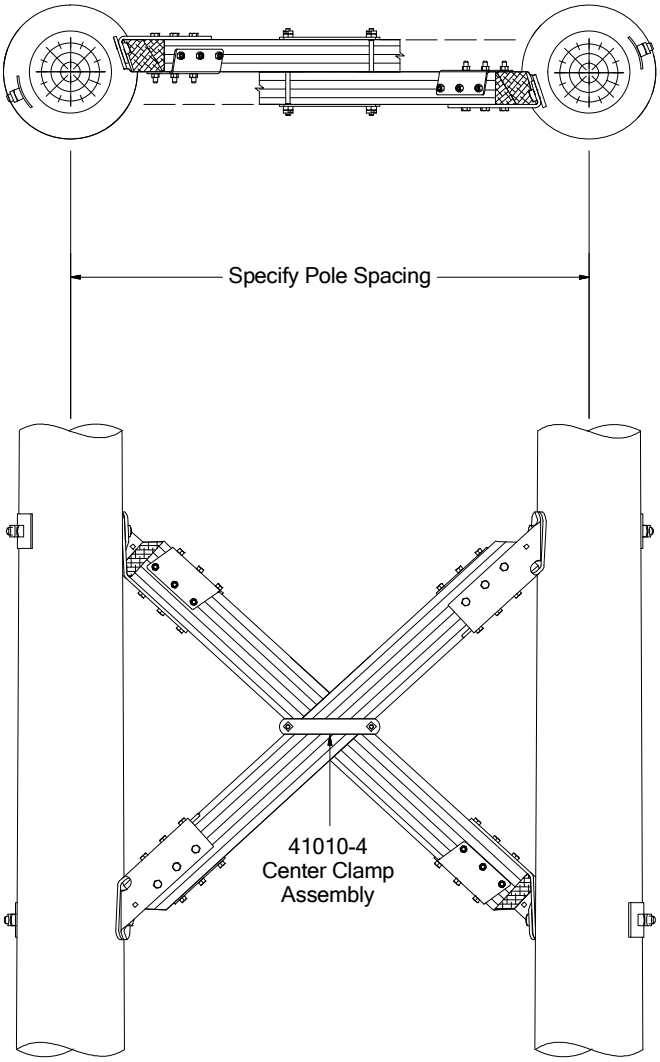
Detail View

6051 Series X-Braces

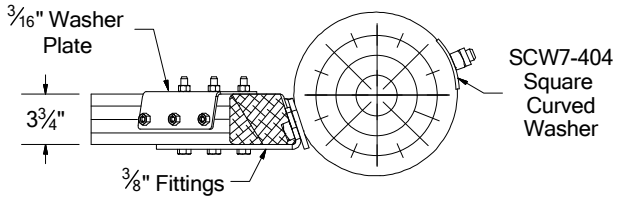
Reference pages B3.5.16 to B3.5.18 for strength
Single Bolt Connection, Cut Thread. Wood Section - 3¾" x 5¾". Fitting thickness - ⅜".

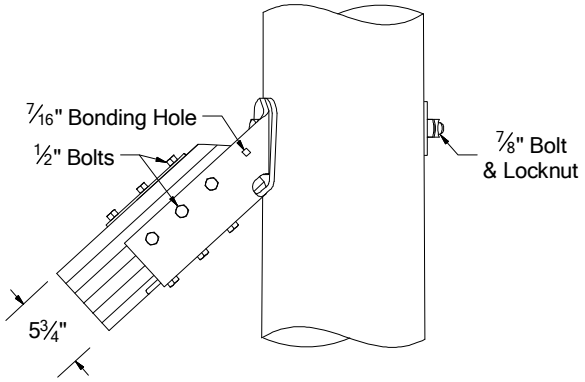
Mounting bolt diameters - ⅞". Unless specified otherwise, standard bolt length furnished are 50% - 14" and 50% - 16".

To estimate shipping weight of the assembly complete with all mounting hardware, multiply C/C pole spacing by 15.1, then add 96 pounds.



Assembly View





Detail View

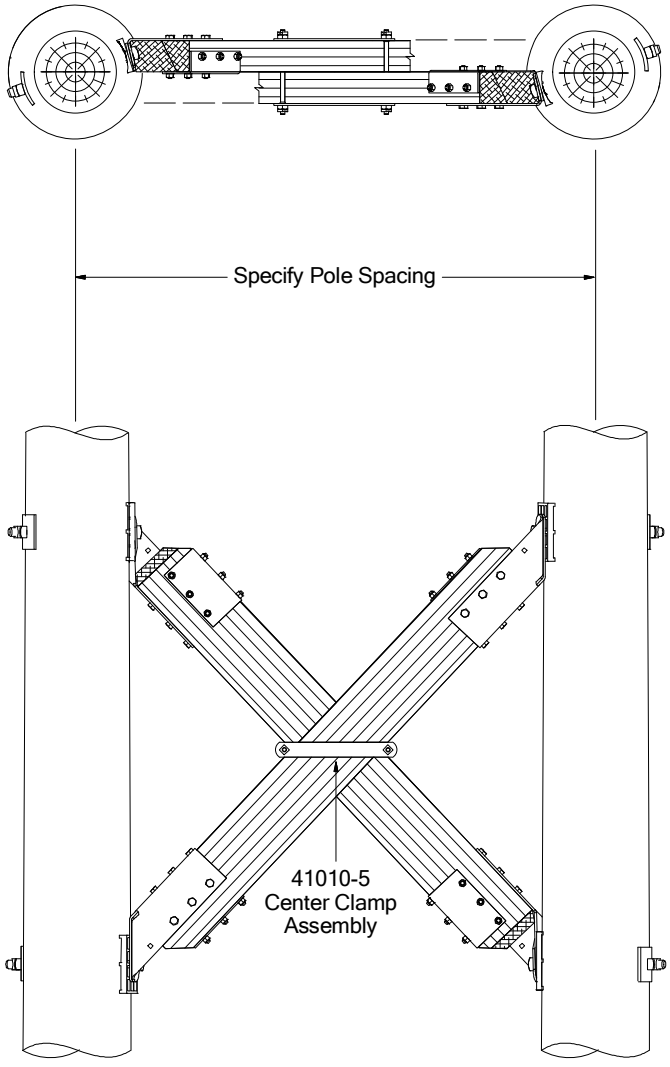
6695 Series X-Braces

Reference pages B3.5.16 to B3.5.18 for strength
Single Bolt Connection, Cut Thread. **Wood Section - 3⅝" x 7½".** **Fitting thickness - ¼".**

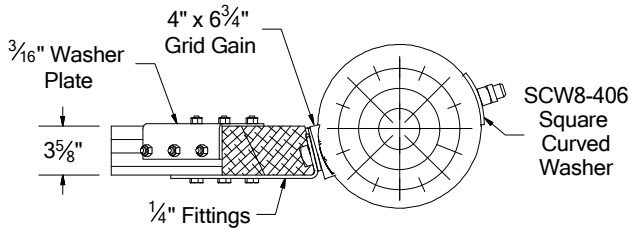
Mounting bolt diameters - 1". Unless specified otherwise, standard bolt length furnished are 50% - 14" and 50% - 16".

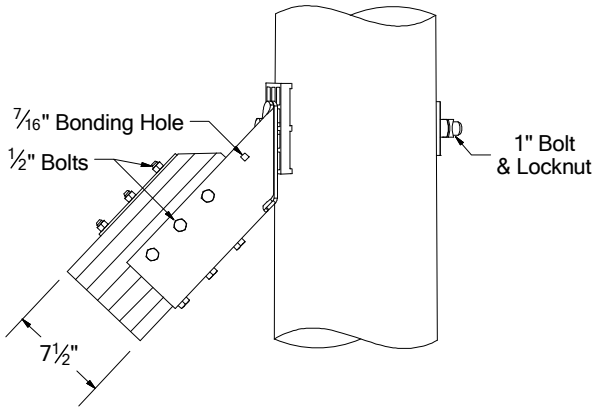
To estimate shipping weight of the assembly complete with all mounting hardware, multiply C/C pole spacing by 19.1, then add 92 pounds. Grid gains are furnished standard, unless otherwise specified.

REA TM110C



Assembly View





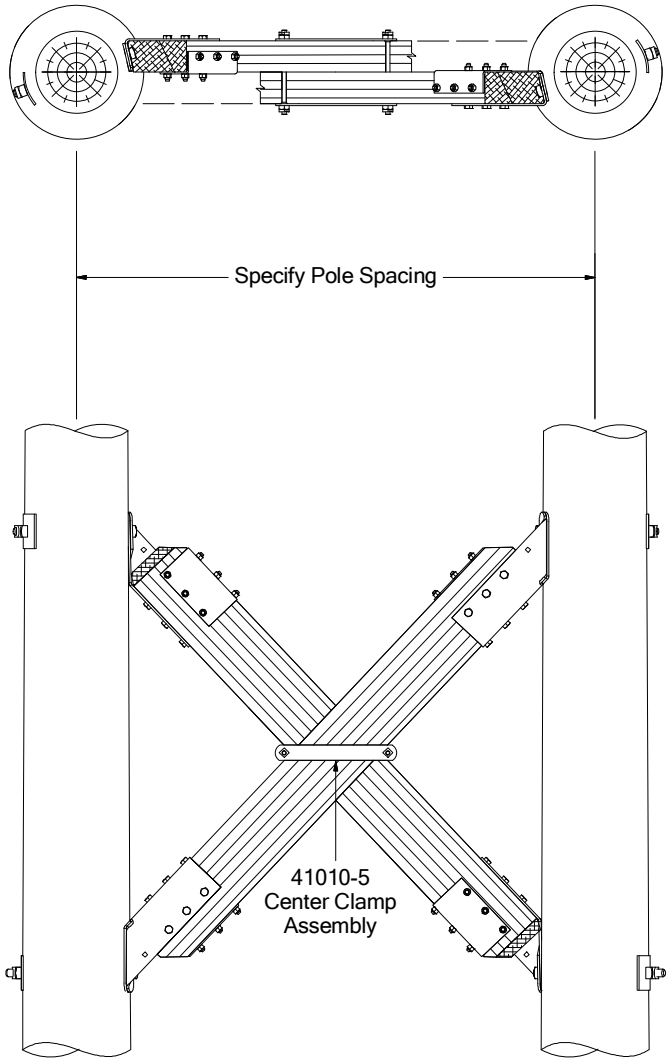
Detail View

6696 Series X-Braces

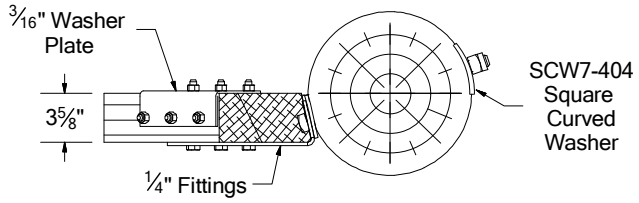
Reference pages B3.5.16 to B3.5.18 for strength
Single Bolt Connection, Cut Thread. Wood Section - 3⅝" x 7½". Fitting thickness - ¼".

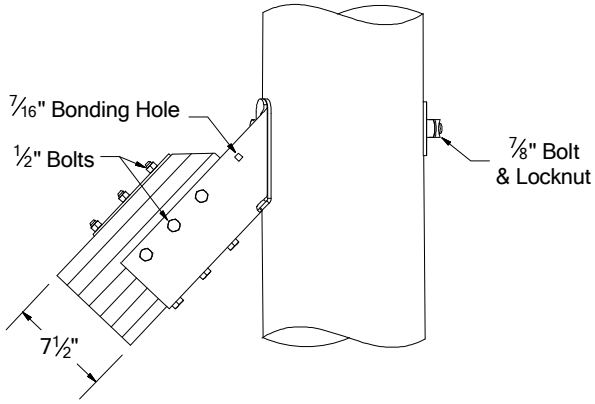
Mounting bolt diameters - ⅞". Unless specified otherwise, standard bolt length furnished are 50% - 14" and 50% - 16".

To estimate shipping weight of the assembly complete with all mounting hardware, multiply C/C pole spacing by 19.1, then add 81 pounds.



Assembly View





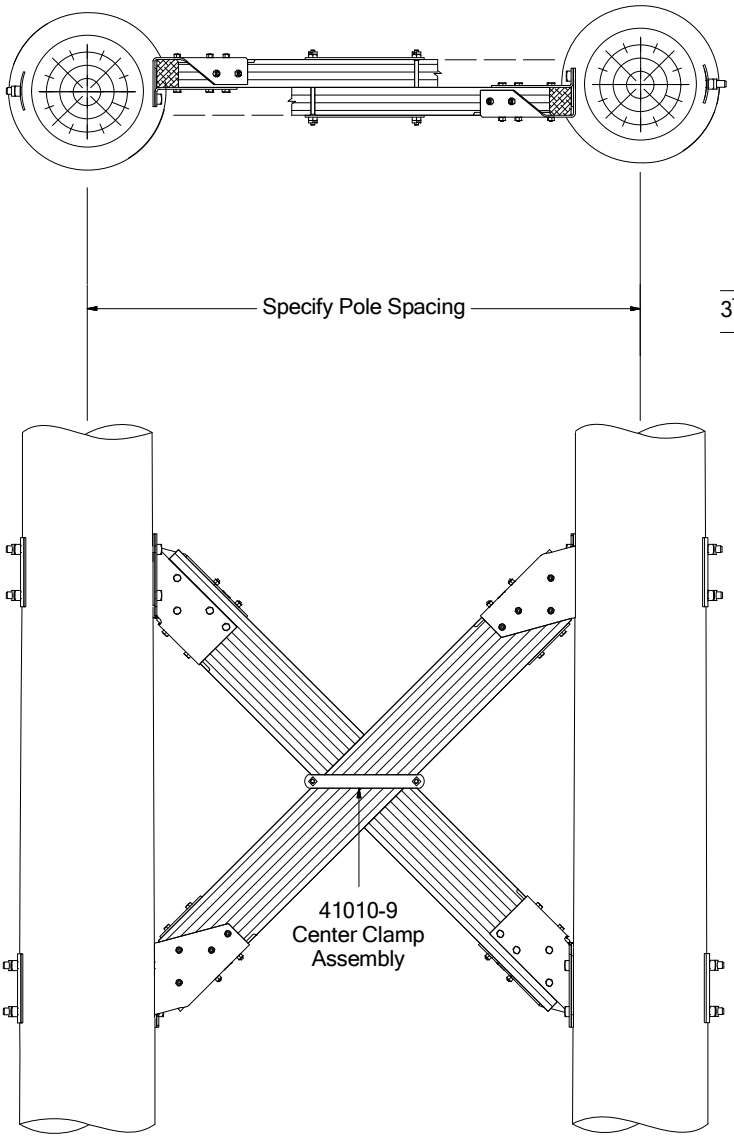
Detail View

41005 Series X-Braces

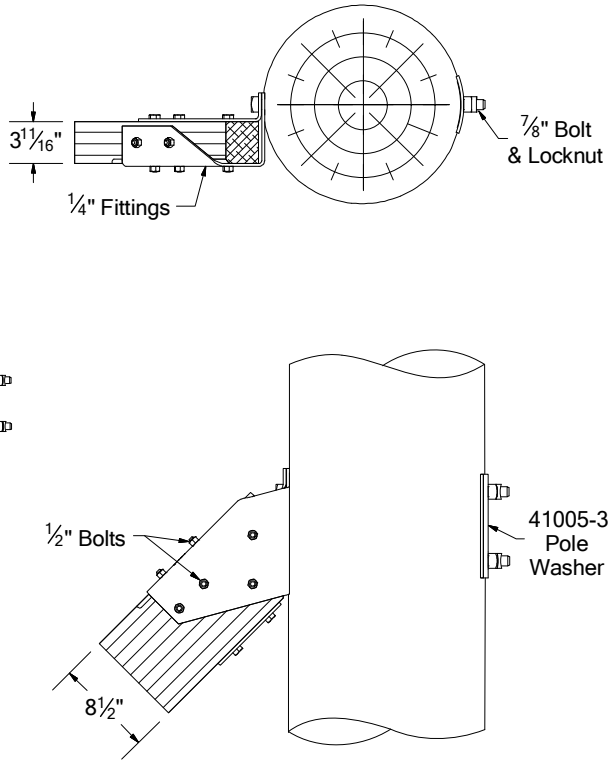
Reference pages B3.5.16 to B3.5.18 for strength
Single Bolt Connection, Cut Thread. Wood Section - 3⅝ " x 8½". Fitting thickness - ¼".

Mounting bolt diameters - ⅞". Unless specified otherwise, standard bolt length furnished are 50% - 14" and 50% - 16".

To estimate shipping weight of the assembly complete with all mounting hardware, multiply C/C pole spacing by 22.2, then add 137 pounds.



Assembly View



Detail View

670 Series X-Braces

Reference pages B3.5.16 to B3.5.18 for strength Pin Connection.

Fitting thickness - Straight $\frac{3}{8}$", Bent $\frac{1}{4}$".

Cut thread mounting bolt diameters - $\frac{7}{8}$". Unless specified otherwise, standard bolt length furnished are 50% - 16" and 50% - 18".

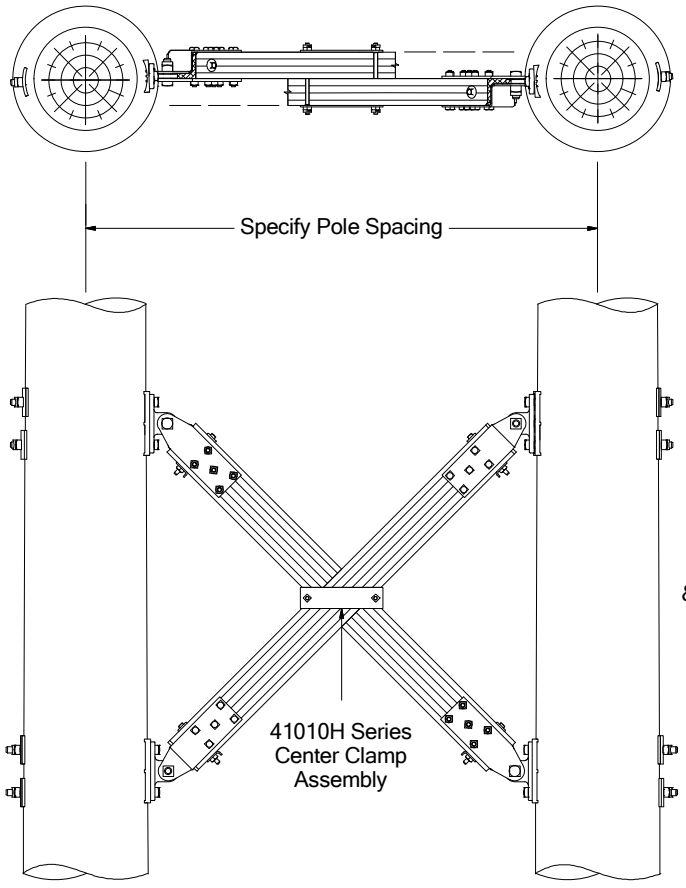
Unless specified otherwise, assembly is furnished complete with standard mounting hardware including mounting bolts, tees, pin bolts, washers, nuts and locknuts. To include grid gains, add suffix "-G" to part number when ordering.

Catalog Number	Wood Size W		D	Center Clamp Assembly No.
670A	$3\frac{3}{4}$"	x	$5\frac{3}{4}$"	41010H-4
670B	$5\frac{1}{8}$"	x	6"	41010H-11
♦ **670C**	$4\frac{5}{8}$"	x	$5\frac{5}{8}$"	41010H-12
670D	$4\frac{1}{2}$"	x	$5\frac{1}{2}$"	41010H-16

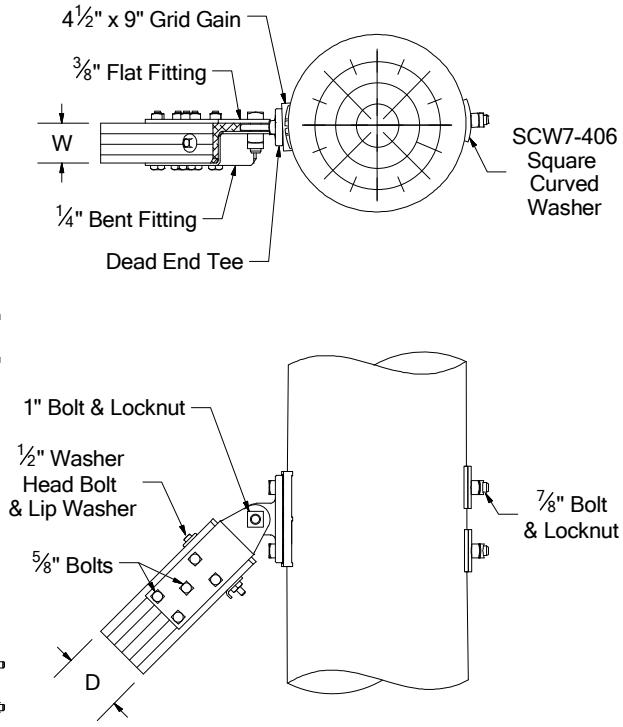
♦ REA TM-110D ($4\frac{5}{8}$" x $5\frac{5}{8}$")

To estimate complete assembly shipping weight:

C/C Pole Spacing Multiplied By				Approx. Shipping Wt. Lbs.
14.9	plus	134 lbs.	=	_____
20.5	plus	138 lbs.	=	_____
18.0	plus	135 lbs.	=	_____
17.5	plus	135 lbs.	=	_____



Assembly View



Detail View

671 Series X-Braces

Reference pages B3.5.16 to B3.5.18 for strength Pin Connection.

Fitting thickness - Straight $\frac{3}{8}$", Bent $\frac{1}{4}$".

Cut thread mounting bolt diameters - $\frac{7}{8}$". Unless specified otherwise, standard bolt length furnished are 50% - 16" and 50% - 18".

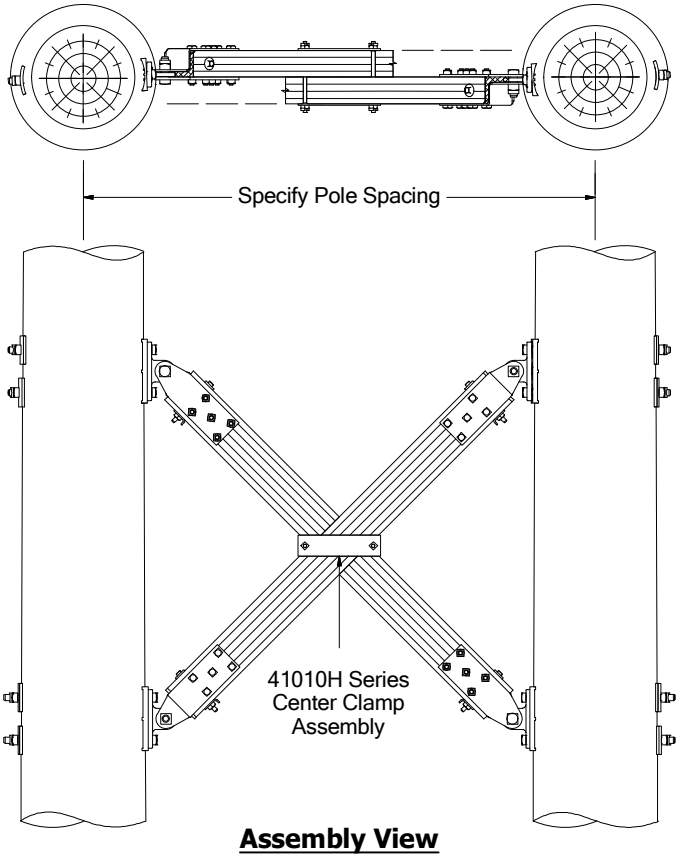
Unless specified otherwise, assembly is furnished complete with standard mounting hardware including mounting bolts, tees, pin bolts, washers, nuts and locknuts. To include grid gains, add suffix "-G" to part number when ordering.

Catalog Number	Wood Size W		D	Center Clamp Assembly No.
671A	$3\frac{5}{8}$"	x	$7\frac{1}{2}$"	41010H-5
671B	$3\frac{5}{8}$"	x	$8\frac{1}{2}$"	41010H-9
671C	$5\frac{1}{2}$"	x	$7\frac{1}{2}$"	41010H-13
♦ **671D**	$5\frac{1}{8}$"	x	$7\frac{1}{2}$"	41010H-8
671E	$4\frac{1}{2}$"	x	$6\frac{3}{4}$"	41010H-10
671F	6"	x	$6\frac{3}{4}$"	41010H-7
671G	$5\frac{1}{8}$"	x	9"	41010H-6

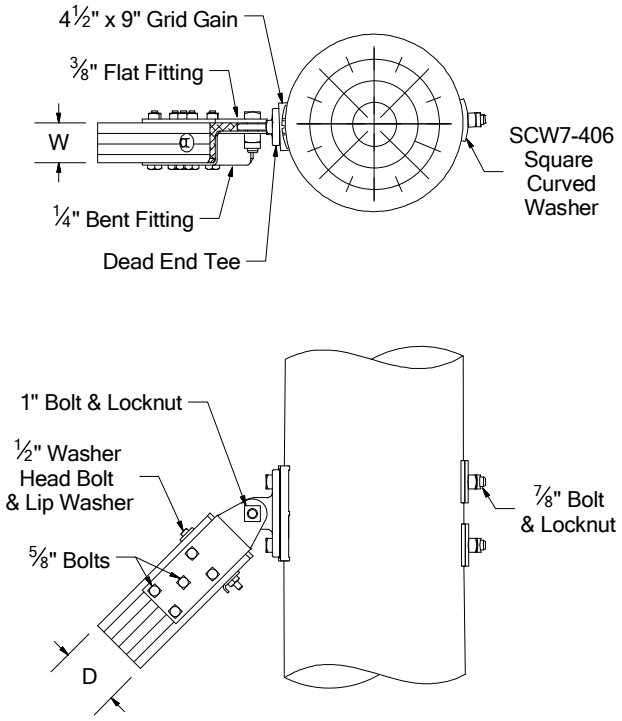
To estimate complete assembly shipping weight:

C/C Pole Spacing Multiplied By				Approx. Shipping Wt. Lbs.
19.2	plus	144 lbs.	=	_____
21.9	plus	153 lbs.	=	_____
28.9	plus	159 lbs.	=	_____
26.2	plus	156 lbs.	=	_____
21.2	plus	153 lbs.	=	_____
27.6	plus	153 lbs.	=	_____
32.9	plus	153 lbs.	=	_____

♦ REA TM-110E ($5\frac{1}{8}$" x $7\frac{1}{2}$")



Assembly View



Detail View

675 Series X-Braces

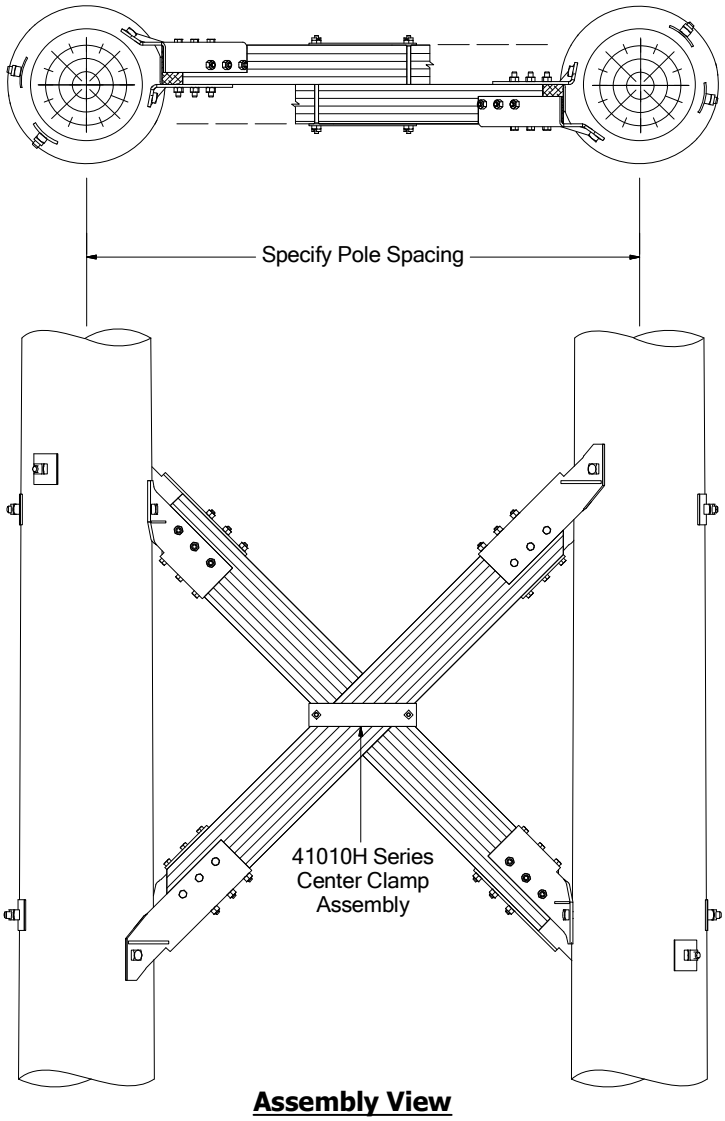
Reference pages B3.5.16 to B3.5.18 for strength
Wrap Around Two Bolt Connection, Cut Thread. **Fitting thickness - 3/8".**

Mounting bolt diameters - 7/8". Unless specified otherwise, standard bolt length furnished are 50% - 16" and 50% - 18".

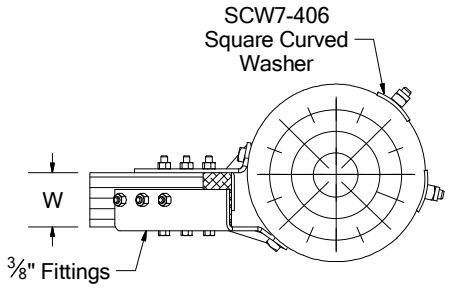
Catalog Number	Wood Size W		D	Center Clamp Assembly No.
675	5 1/8"	x	7 1/2"	41010H-8
675A	5 1/2"	x	7 1/2"	41010H-13
675B	5 1/8"	x	6"	41010H-11
675C	4 5/8"	x	5 5/8"	41010H-12

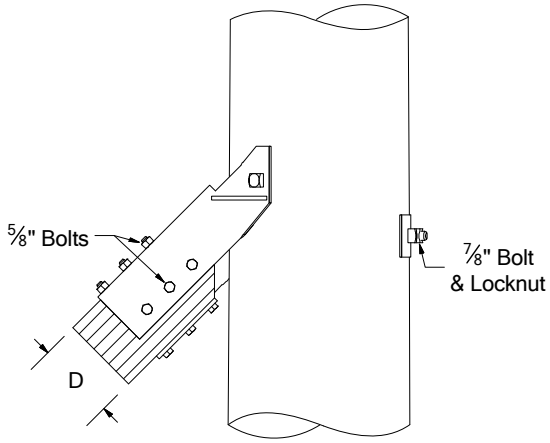
To estimate complete assembly shipping weight:

C/C Pole Spacing Multiplied By				Approx. Shipping Wt. Lbs.
26.5	plus	173 lbs.	=	_____
29.4	plus	174 lbs.	=	_____
22.2	plus	166 lbs.	=	_____
18.8	plus	176 lbs.	=	_____



Assembly View





Detail View

677 Series X-Braces

Reference pages B3.5.16 to B3.5.18 for strength Pin Connection.

Fitting thickness - 3/8".

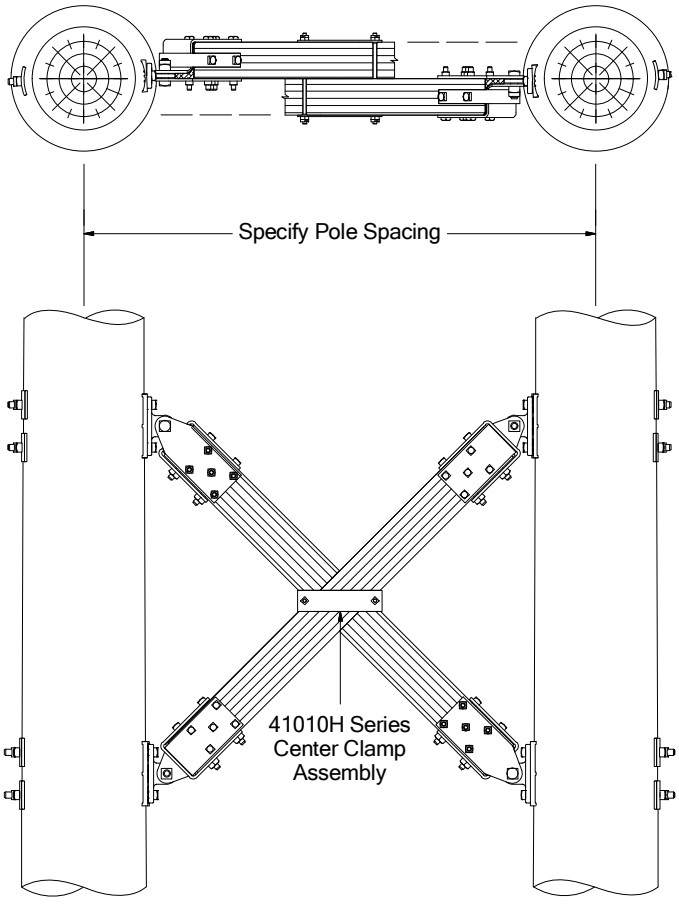
Cut thread mounting bolt diameters - 7/8". Standard bolt length furnished are 50% - 16" and 50% - 18".

Unless specified otherwise, assembly is furnished complete with all mounting hardware including tees, grid gains, pin bolts, washers, nuts and locknuts.

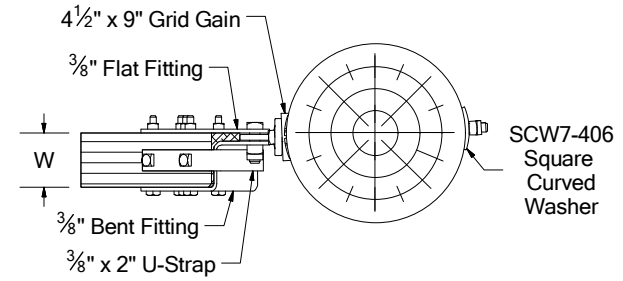
Catalog Number	Wood Size W		D	Center Clamp Assembly No.
677A	5 1/8"	x	6"	41010H-11
677B	5 1/8"	x	7 1/2"	41010H-8
677C	6"	x	6 3/4"	41010H-7
677D	6 3/4"	x	7 1/2"	41010H-17

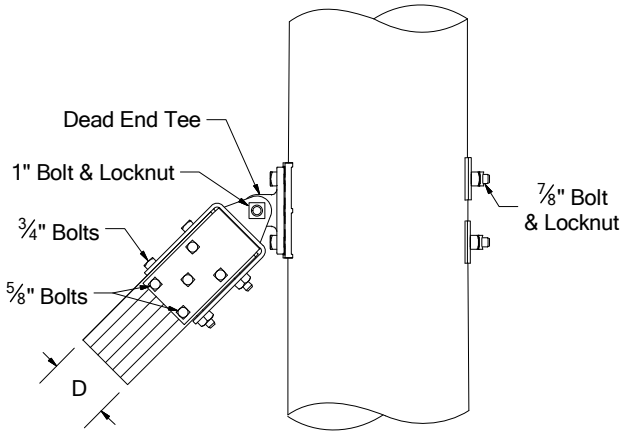
To estimate complete assembly shipping weight:

C/C Pole Spacing Multiplied By				Approx. Shipping Wt. Lbs.
20.8	plus	198 lbs.	=	_____
26.1	plus	200 lbs.	=	_____
27.5	plus	198 lbs.	=	_____
34.1	plus	203 lbs.	=	_____



Assembly View





Detail View

678 Series X-Braces

Reference pages B3.5.16 to B3.5.18 for strength
Pin Connection. **Fitting thickness - 3/8".**

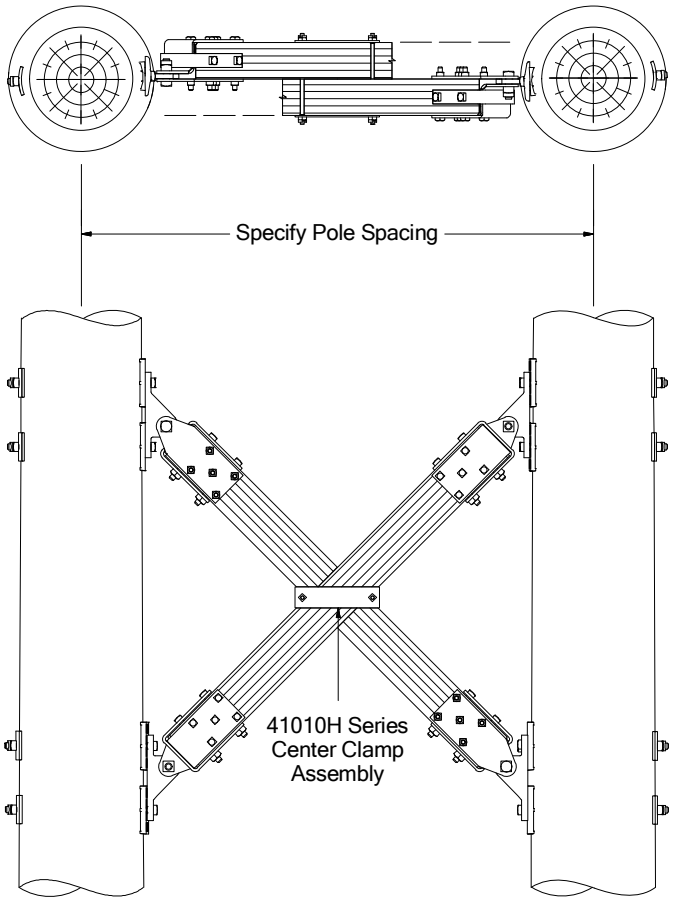
Cut thread mounting bolt diameters - 7/8". Standard bolt length furnished are 50% - 18" and 50% - 20".

Unless specified otherwise, assembly is furnished complete with all mounting hardware including tees, grid gains, pin bolts, washers, nuts and locknuts.

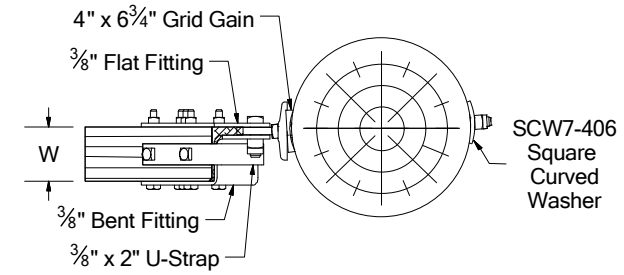
Catalog Number	Wood Size W		D	Center Clamp Assembly No.
678A	5 1/8"	x	7 1/2"	41010H-8
678B	6"	x	6 3/4"	41010H-7
678C	6 3/4"	x	7 1/2"	41010H-17
678D	5 1/2"	x	7 1/2	41010H-13

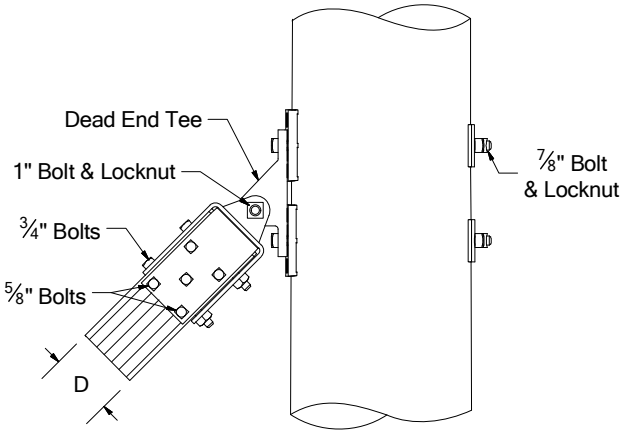
To estimate complete assembly shipping weight:

C/C Pole Spacing Multiplied By				Approx. Shipping Wt. Lbs.
27.5	plus	289 lbs.	=	_____
27.6	plus	289 lbs.	=	_____
33.2	plus	293 lbs.	=	_____
29.8	plus	285 lbs.	=	_____



Assembly View





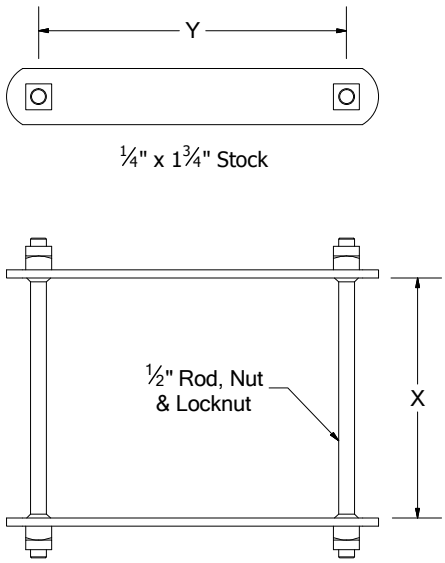
Detail View

X-Brace Center Clamps

Center clamps are furnished as sets of 2 straps and 2 shoulder rods, shipped complete with nuts and locknuts.

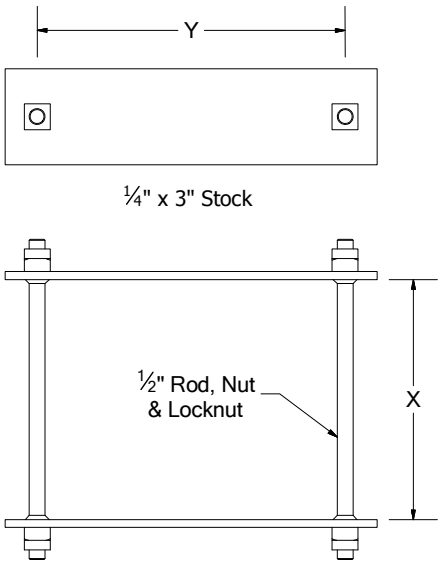
Center clamps function equally well when installed in either the vertical or horizontal plane. However, by mounting the center clamp straps in a horizontal plane, risk of damaging fallen conductor at the center phase is reduced.

41010 Series Center Clamps



Catalog Number	Rod Shoulder Width "X"	MHC Strap "Y"	Wood Section	Approx. Wt. Lbs.
41010-1	6¾"	7⅝"	3⅜" x 4⅜"	3.7
41010-2	6¾"	9"	3⅜" x 5⅜"	4.1
41010-3	7⅜"	13½"	3 11/16" x 8½"	5.1
41010-4	7½"	9⅝"	3¾" x 5¾"	3.9
41010-5	7¼"	12"	3⅝" x 7½"	4.9
41010-6	10¼"	14¼"	5⅛" x 9"	5.7
41010-7	12"	11"	6" x 6¾"	5.9
41010-8	10¼"	12"	5⅛" x 7½"	5.3
41010-9	7¼"	13½"	3⅝" x 8½"	5.1
41010-10	9"	11"	4½" x 6¾"	4.9
41010-11	10¼"	9⅞"	5⅛" x 6"	4.8
41010-12	9¼"	9⅜"	4⅝" x 5⅝"	4.4
41010-13	11"	12"	5⅝" x 7½"	5.2
41010-14	7½"	12"	3¾" x 7½"	4.7

41010H Series Center Clamps



Catalog Number	Rod Shoulder Width "X"	MHC Strap "Y"	Wood Section	Approx. Wt. Lbs.
41010H-4	7½"	9⅝"	3¾" x 5¾"	6.2
41010H-5	7¼"	12"	3⅝" x 7½"	7.5
41010H-6	10¼"	14¼"	5⅛" x 9"	8.8
41010H-7	12"	11"	6" x 6¾"	8.0
41010H-8	10¼"	12"	5⅛" x 7½"	7.8
41010H-9	7¼"	13½"	3⅝" x 8½"	8.1
41010H-10	9"	11"	4½" x 6¾"	7.2
41010H-11	10¼"	9⅞"	5⅛" x 6"	7.8
41010H-12	9¼"	9⅜"	4⅝" x 5⅝"	6.5
41010H-13	11"	12"	5⅝" x 7½"	7.8
41010H-15	9½"	9⅝"	4¾" x 5¾"	6.7
41010H-16	9"	9⅜"	4½" x 5½"	6.5
41010H-17	13½"	12"	6¾" x 7½"	8.4

The 41010H Series Heavy Center Clamps have ¼" x 3" straps and are used with BROOKS series 670, 671, 675, 677 and 678 Series X-Braces where heavier loading is imposed.

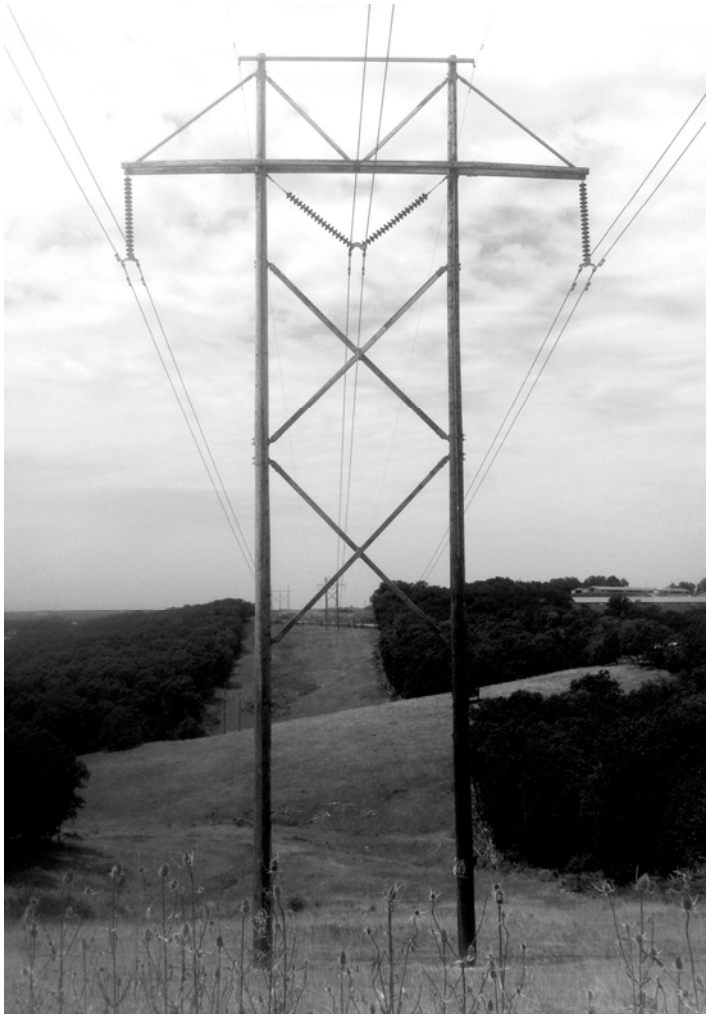
X-Brace Strength

X-Brace Axial Forces

X-braces are effective framing components for H-frame structures. Brace axial forces can be either tensile or compressive, and are a function of the specific structure configuration and the total imposed wind and gravity loads. Factors which affect X-brace axial forces include pole spacing, structure height, pole species and class, the quantity and position of the braces, stiffness of the upper H-frame truss, and class of soil.

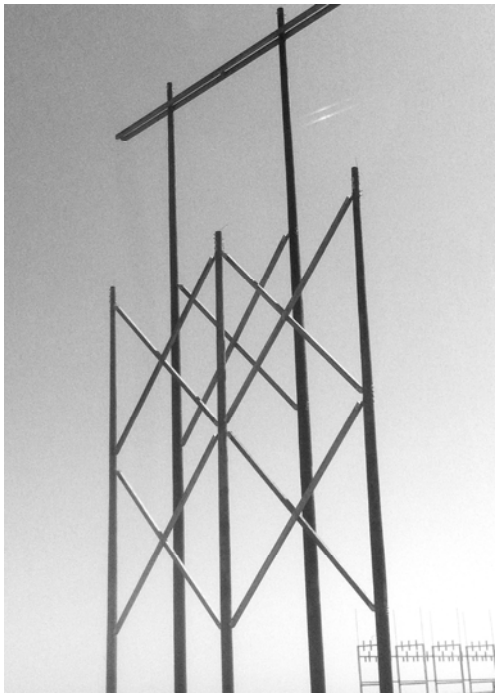
Strength & Stiffness Considerations

Several limiting factors must be balanced when selecting the most economical X-brace design for a given set of structure and loading parameters. Limits for these factors have been determined for a wide variety of connection designs and wood sizes, using data developed by the testing of components and full scale structures. Final brace selection is controlled by the most restrictive of these factors.



Axial Tension - End fittings must distribute the axial load into the wood member, controlling wood bearing stresses and fitting deformation.

Bearing On The Pole - Bearing stresses parallel or perpendicular to the grain in the wood pole are species sensitive, and must be limited under the fittings, washers, and bolts.

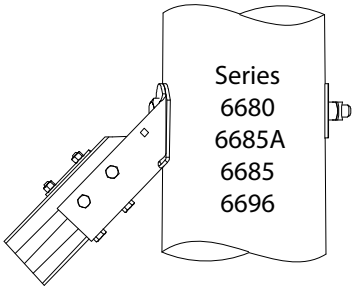


Compressive Buckling - The accepted industry method for determining the ultimate theoretical compressive strength of a wood X-brace, either solid or laminated, is an adjusted Euler buckling equation. It is dependent on the slenderness ratio and material modulus of elasticity, and is affected by end fitting relative fixity and load eccentricity.

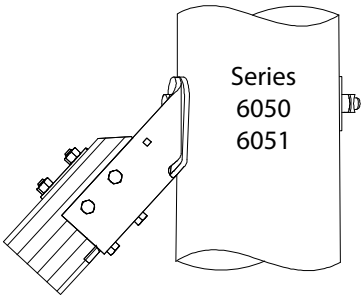
Vibration - Extremely slender compression members are subject to wind induced vibration. This can cause fatigue, and should be avoided.

X-Brace Strength continued..

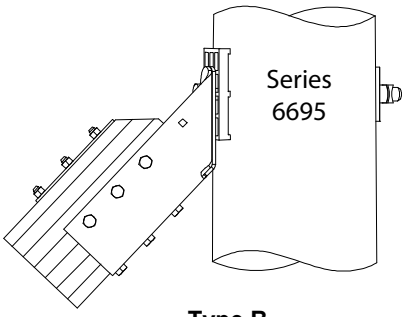
The curved portions of the nomograph on page B3.5.18 indicate relative X-Brace member compressive buckling strength for various wood sizes and pole spacing. Parameters selected for the curve plot include braces at 45 degrees, a conservative modulus of elasticity, a consistent adjustment factor for the Euler buckling equation, and a slenderness ratio maximum of 50. The curve position will vary with these parameters according to your specific application.



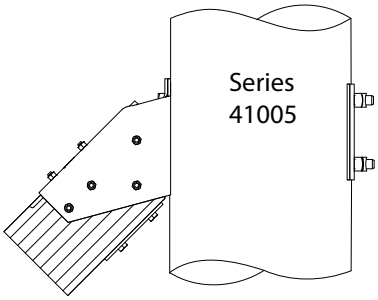
Type A
$\frac{7}{8}$" Bolt, $\frac{1}{4}$" Fitting



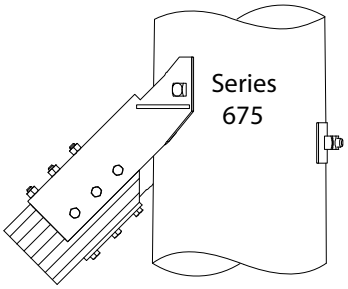
Type A1
$\frac{7}{8}$" Bolt, $\frac{3}{8}$" Fitting



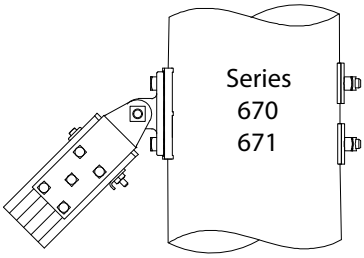
Type B
1" Bolt, $\frac{1}{4}$" Fitting



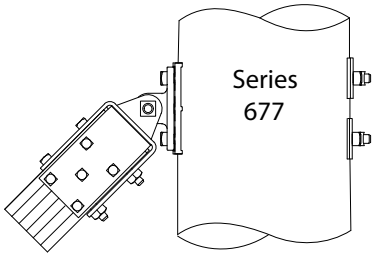
Type C
Double $\frac{7}{8}$" Bolt, $\frac{1}{4}$" Fitting



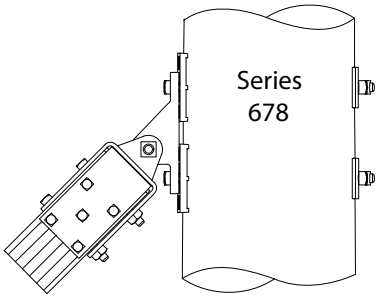
Type D
Wrap Around



Type E
Pinned



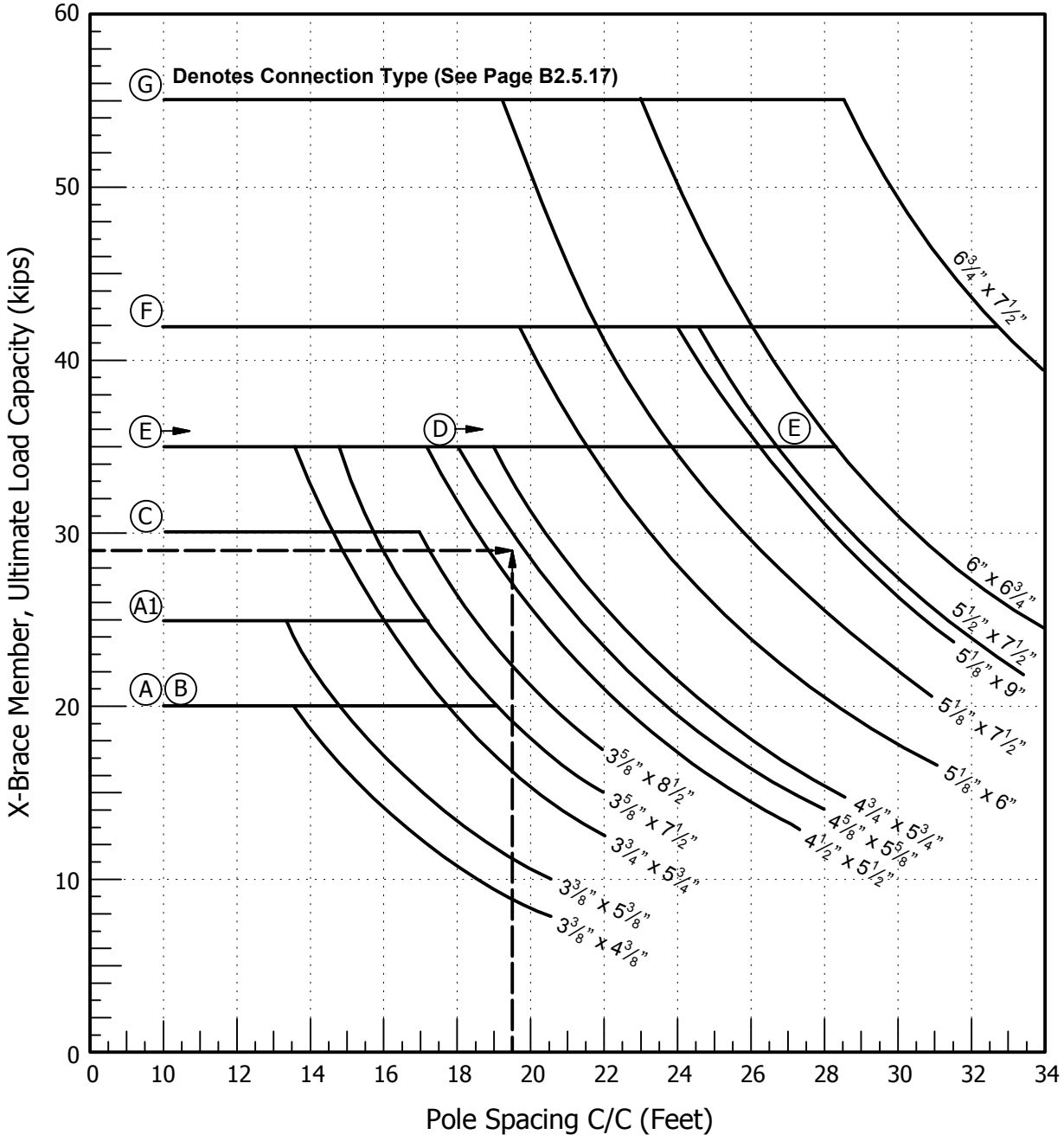
Type F
Heavy Pinned



Type G
Extra Heavy Pinned

The braces are also limited by the combination of axial tension in the connection and bearing on the pole. The various X-Brace Series connection designs have been classed as Types A through G as shown above. The member load limit for each connection type is indicated by a horizontal line on the page B3.5.18 nomograph.

X-Brace Member Axial Strength Limitations



Example for Preliminary Selection of X-Braces

Given: Pole Spacing = 19'-6" and X-Brace load = 29 kips

1. Enter pole spacing axis and project a vertical line up from 19.5 feet.
2. Enter X-brace ultimate load capacity axis and project a horizontal line right from 29 kips.
3. The intersection of the projected vertical and horizontal lines indicates that the minimum required section size is $4\frac{5}{8}$" x $5\frac{5}{8}$".
4. This intersection point also indicates that connection types D and E have a connection capacity in excess of 29 kips.
5. Refer to page B3.5.17. Initial selections would be 670C (page B3.5.10) or 675C (page B3.5.12).

Contact BROOKS Engineering Department for assistance in selecting the brace which will best serve your application.

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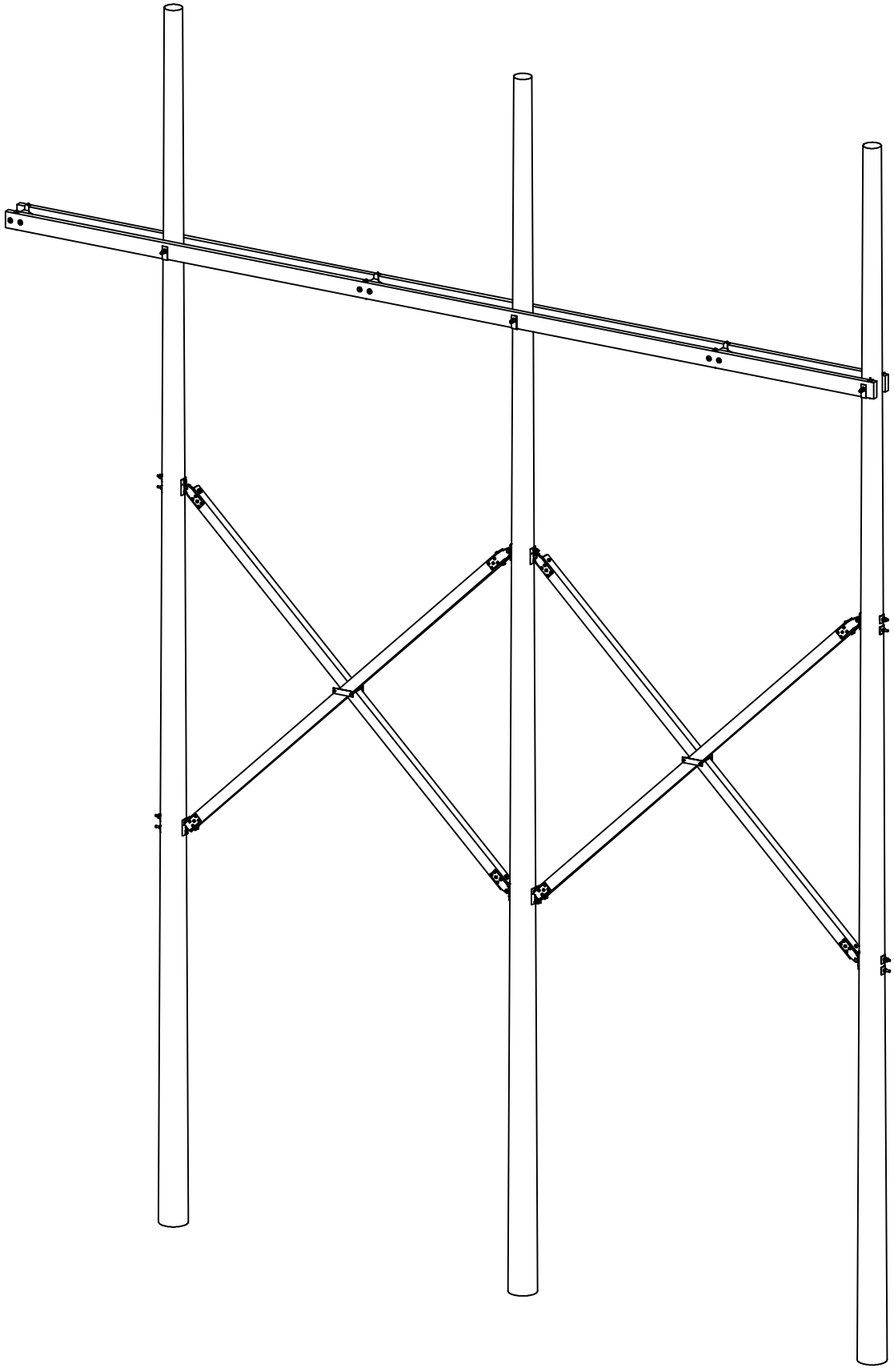
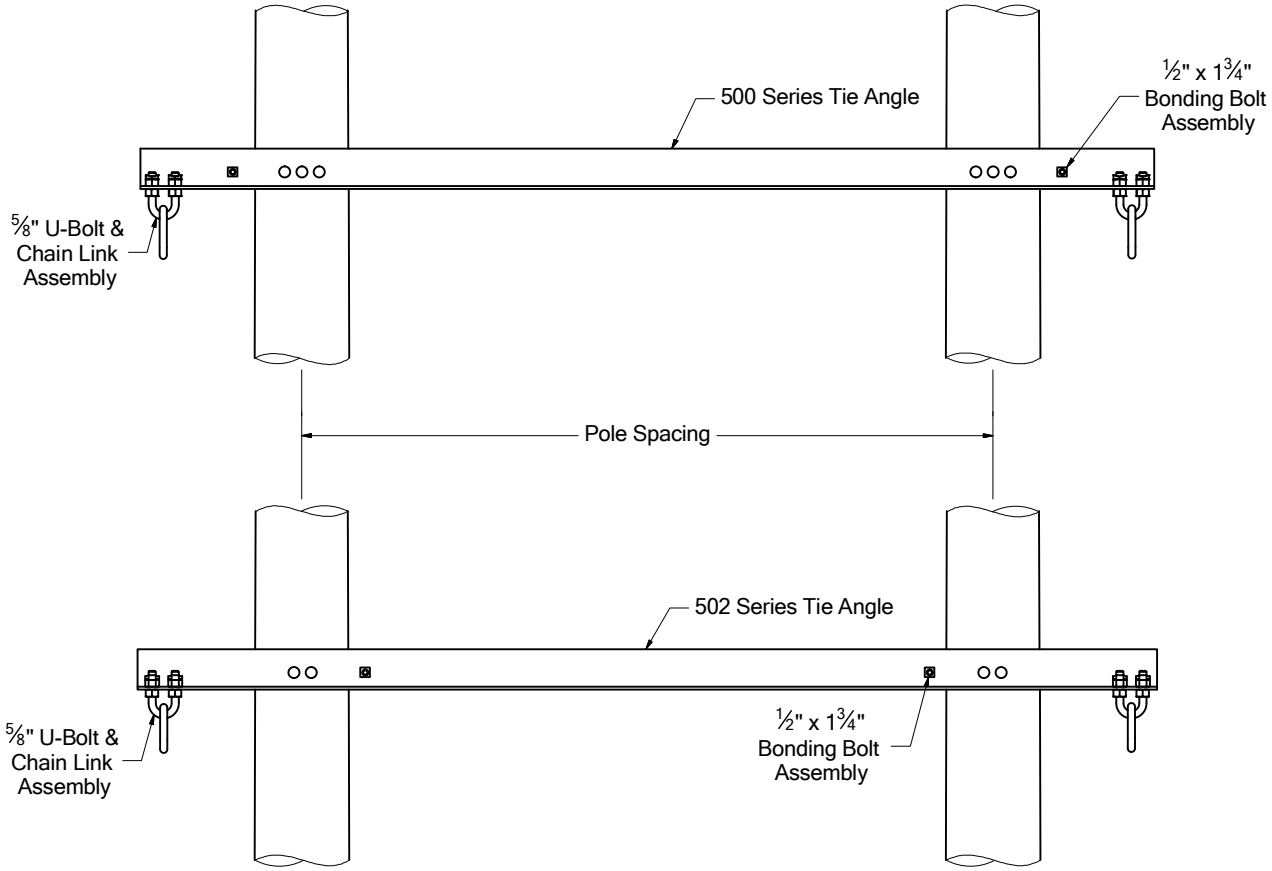
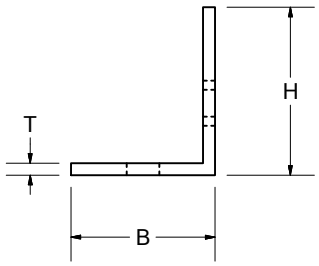


Tie Angles

BROOKS has a wide variety of tie angle assemblies to meet any H-frame structure requirements. All angles are furnished standard with U-bolts, forged chain links and bonding bolts factory assembled unless noted otherwise. Steel angle conforms to ASTM A-36 specifications and is hot dipped galvanized to ASTM A-153 standards.

The following tables will assist in ordering assemblies meeting most applications. BROOKS has a wide variety of other assemblies not illustrated and welcomes the opportunity to discuss those special applications individually. Please contact BROOKS Engineering Department.





End Detail

Tie Angle Ordering Codes

For 500 and 502 Series

Ordering Information:

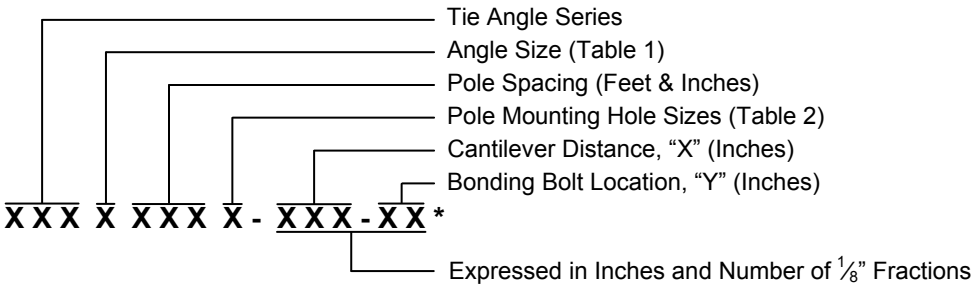


Table 1

Angle Size

Code	Width "W"	Height "H"	Thickness "T"
A	3"	3"	1/4"
B	3"	3 1/2"	1/4"
C	3"	4"	1/4"
D	3"	5"	1/4"
E	3"	5"	5/16"

Additional angle sizes are available

Table 2

Pole Mounting Hole Diameters

Hole Code	Size
L	13/16"
M	15/16"

Ordering Example: 500D156M-174-46 = Tie Angle Assembly, 3" x 5" x 1/4", for 15'-6" C/C pole spacing, 15/16" mounting holes. U-Bolts assembled 17 1/2" and bonding bolt assembled 4 3/4" from pole centerline mounting position.

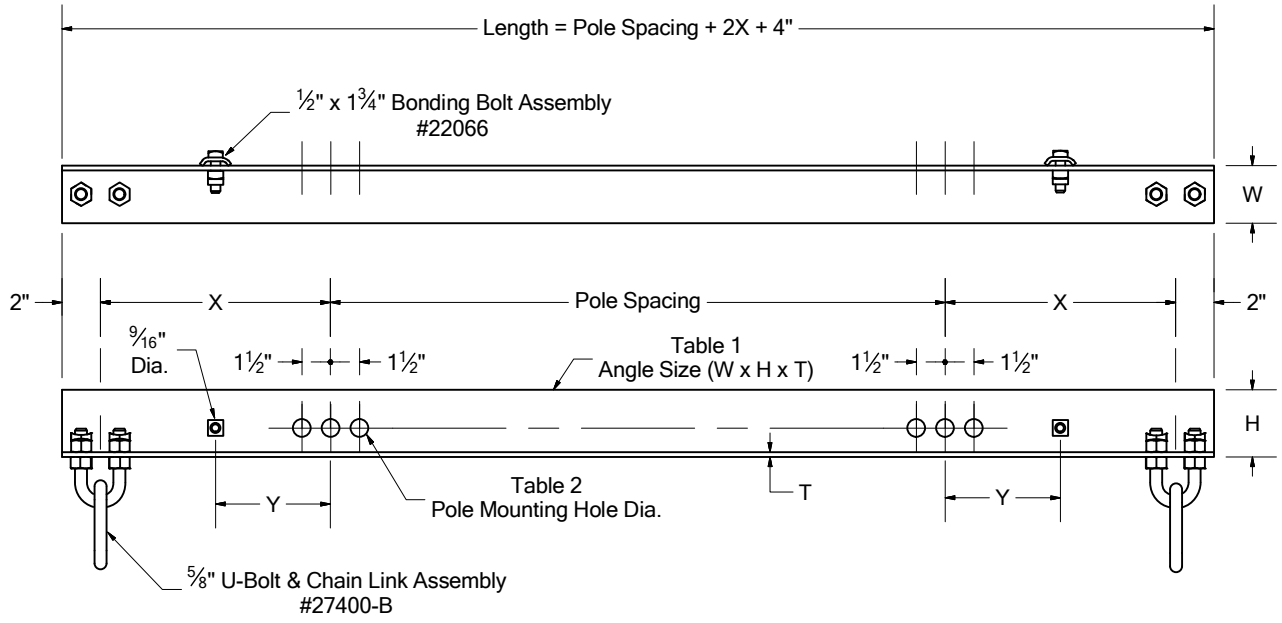
Ordering Example: 500C120L-130-60 = Tie Angle Assembly, 3" x 4" x 1/4", for 12'-0" C/C pole spacing, 13/16" mounting holes. U-bolts assembled 13" and bonding bolt assembled 6" from pole centerline mounting position.

* To order the tie angle only, without the assembled hardware, add the suffix "A" to the corresponding assembly number.

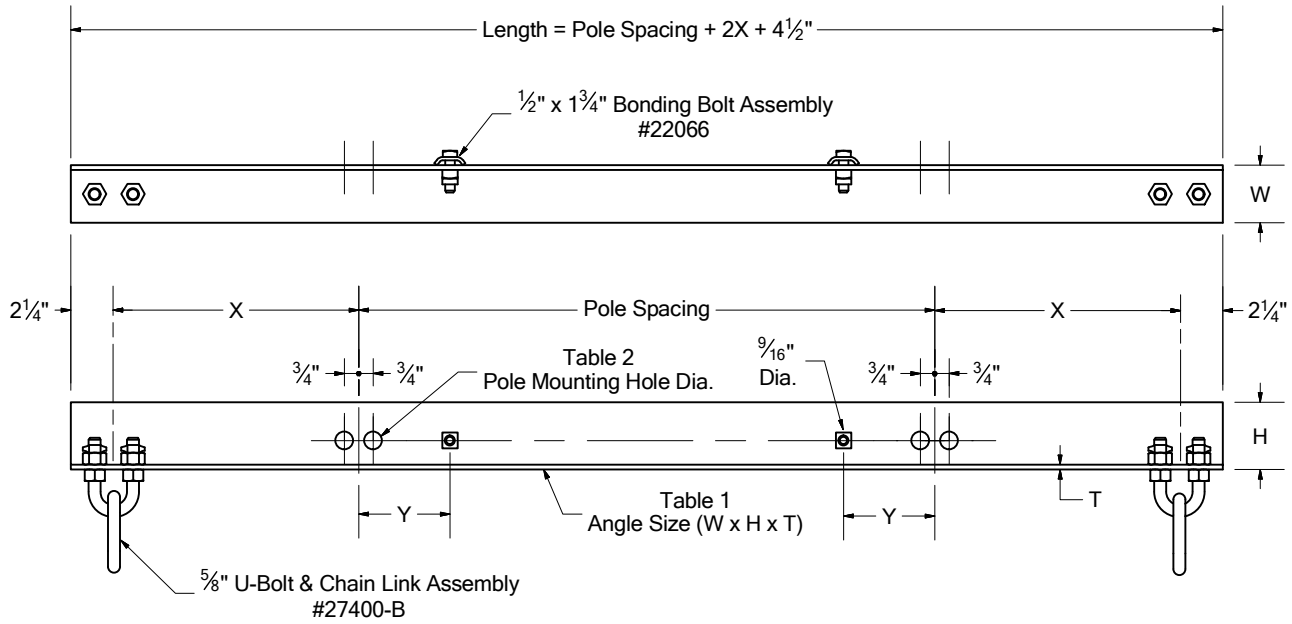
Ordering Example: 502B156M-126-56A = Tie Angle, 3" x 3 1/2" x 1/4", for 12'-6" C/C pole spacing, 15/16" mounting holes. U-bolt assembly holes 12 1/2" from edge and bonding bolt assembly hole 5 1/2" from pole centerline mounting position. Angle only, U-bolts and bonding bolts not assembled

Pole mounting hardware is not furnished standard as part of the assembly and should be ordered separately.

500 Series Tie Angles



502 Series Tie Angles



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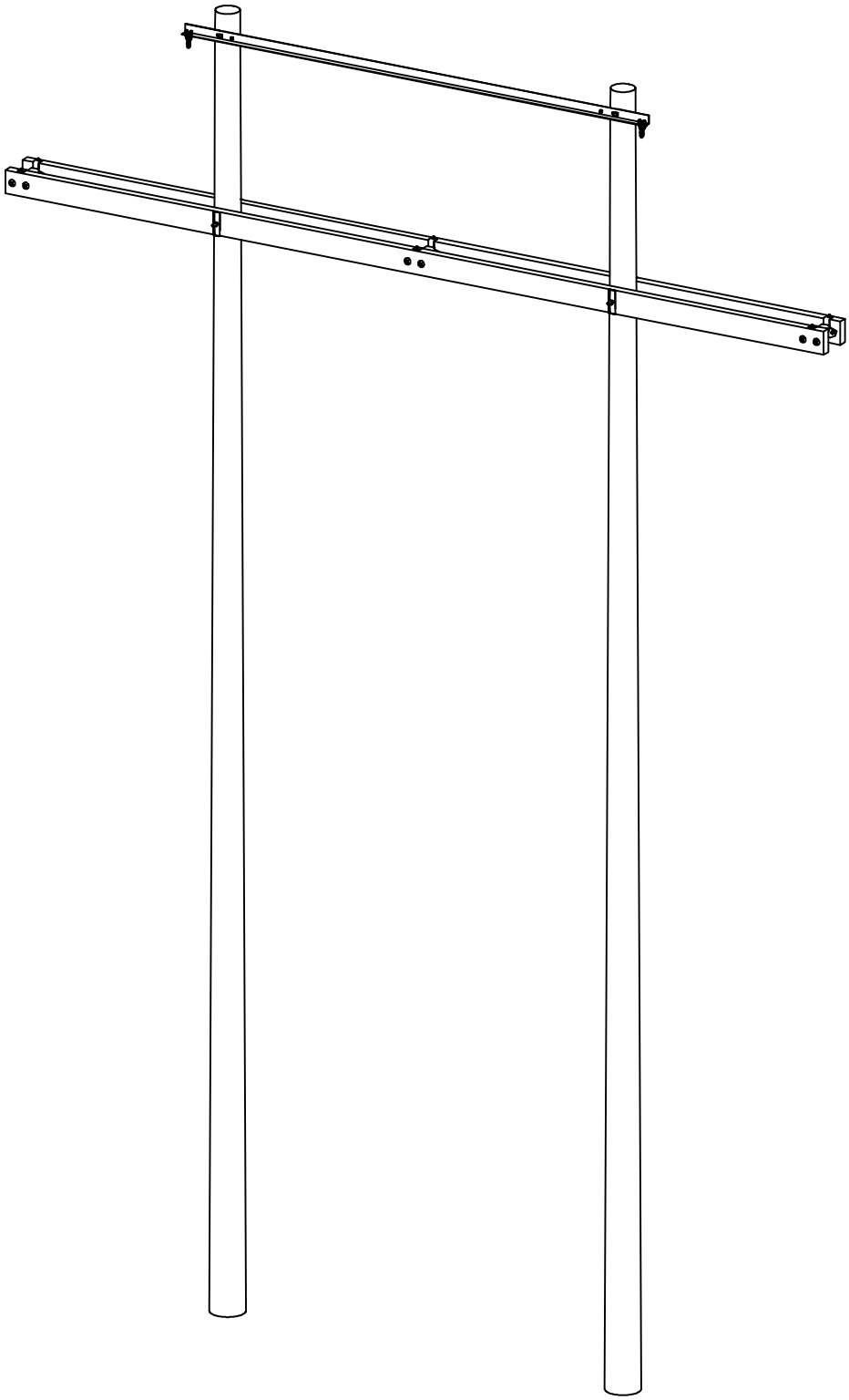
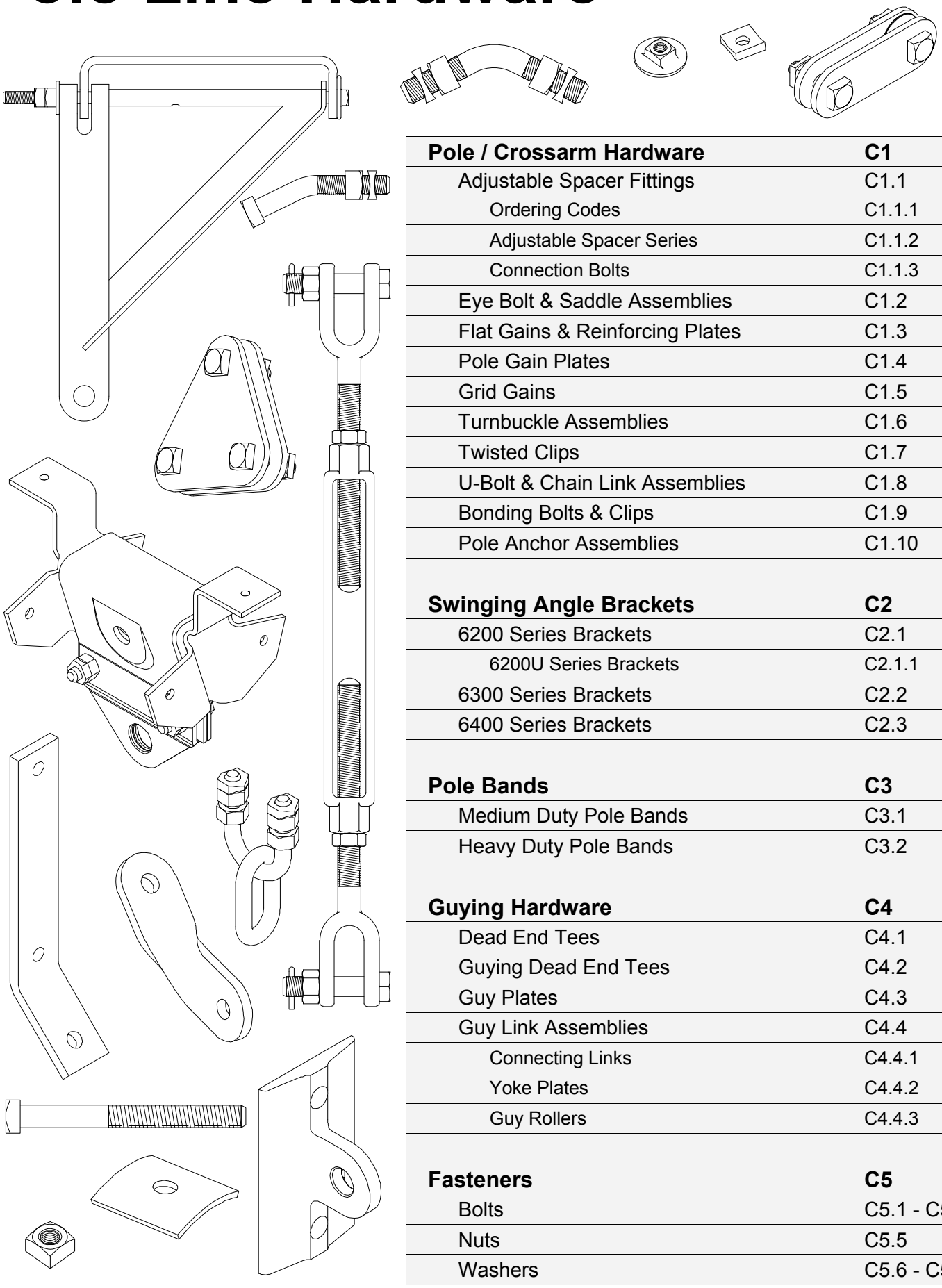
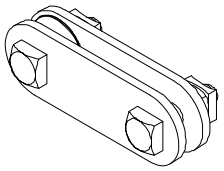
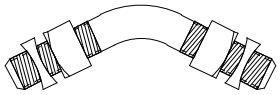


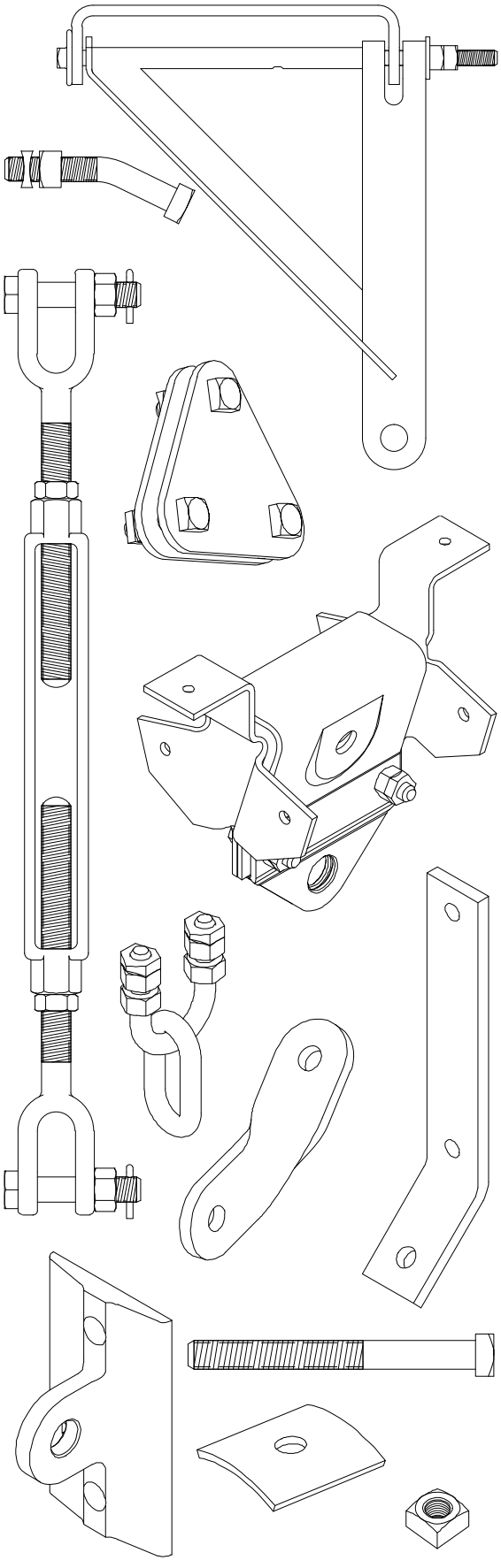
Pole Line Hardware



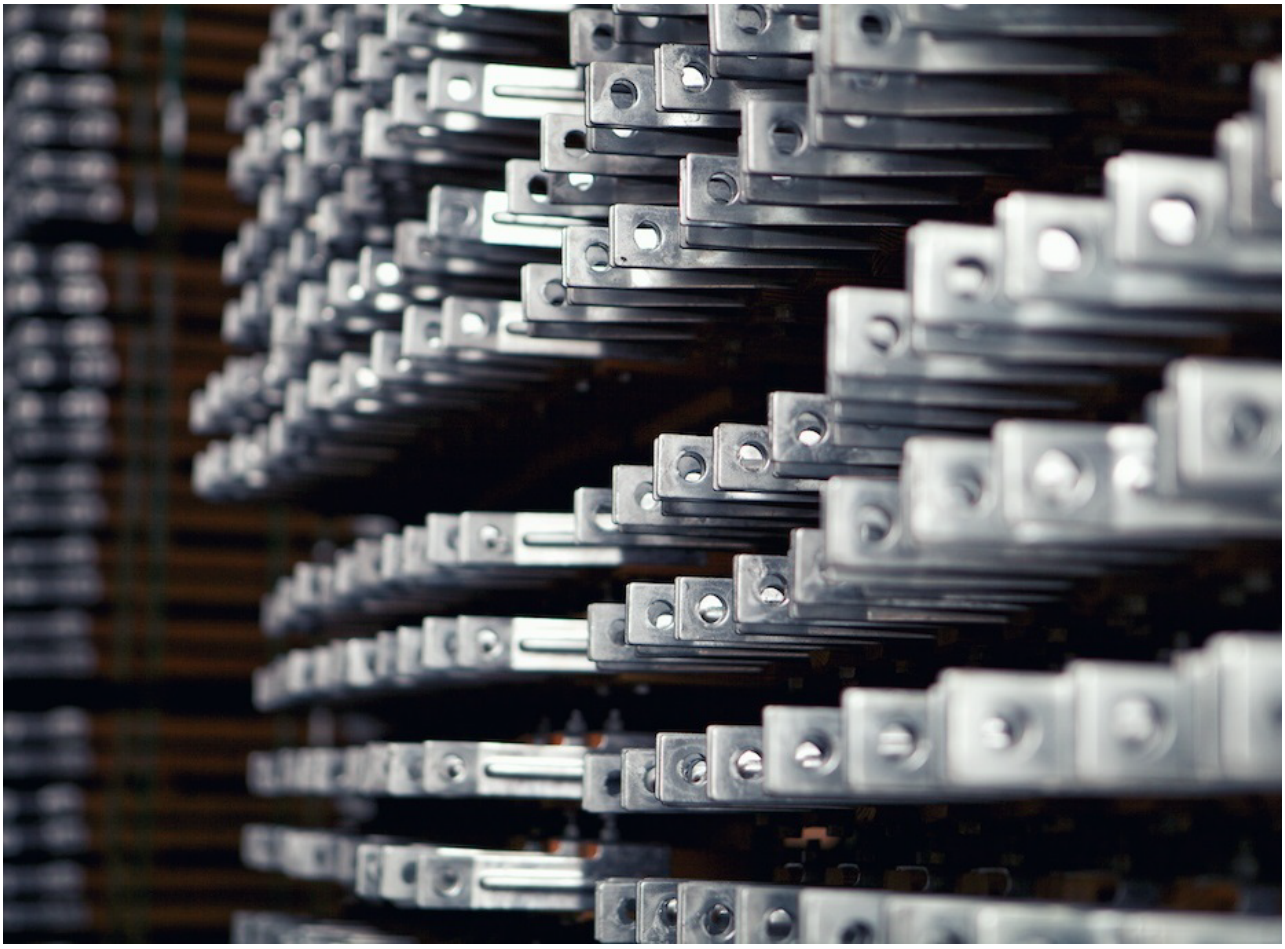
Pole Line Hardware





Pole Line Hardware



BROOKS has a wide variety of engineered hardware items and components which form an integral part of our structure designs and assembled wood products. We can provide complete structure framing kits and project packages including the field installed connection hardware and brackets.

Because of our diversity in designs, we are able to balance strength requirements with economy while maintaining features common to the industry. Our products easily interchange with your system standards. Our years of structure design and testing provide the unique knowledge and experience to understand the many considerations necessary to produce dependable wood and hardware systems.

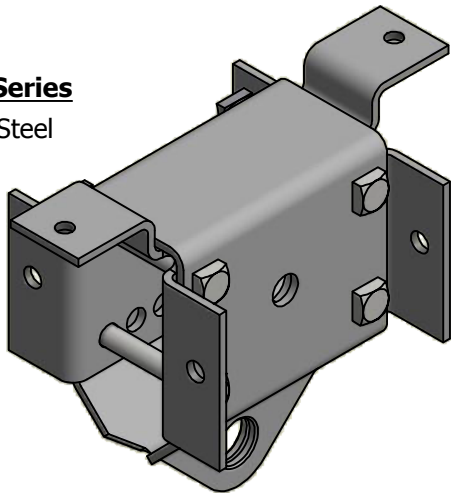
All BROOKS hardware items are subject to stringent quality control procedures to insure they are produced to the applicable standards. All of our hardware is hot dipped galvanized after fabrication.

The following sections illustrates many of our standard hardware items along with the necessary ordering information. BROOKS is not limited to the items noted in this catalog. We have provided numerous custom designed components and packages through 345kV, and welcome the opportunity to meet your specific requirements.

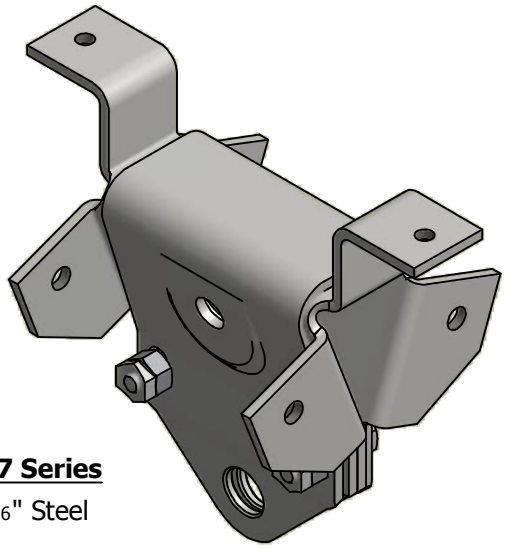
Adjustable Spacer Fittings

BROOKS Adjustable Spacer Fitting designs are available to meet any double arm and brace mounting application. BROOKS designs conform to accepted industry dimensions so bracing connections and mounting hole alignments will interchange with existing system standards. The adjustable features eliminates the need to gain poles and provides the ability to make easy field framing adjustments caused by varying pole diameters. Spacer fittings may be ordered by using the ordering codes on next page. BROOKS Spacer Fittings are tapped to assure the assembly remains tight and secure. The appropriate mounting bolt lengths are furnished standard with each spacer fitting when indicated in the ordering code.

584 Series
¼" Steel



586 Series
¼" Steel

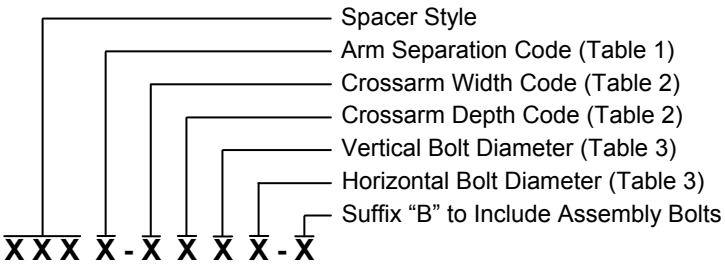


587 Series
5/16" Steel

Adjustable Spacer Fitting Ordering Codes

For 584, 586 and 587 Series

Ordering Information:



Ordering Example: 5861-3345-B = 586 Series Adjustable Spacer Fitting Style with $10\frac{3}{4}$" to $14\frac{3}{4}$" arm separation adjustment for $3\frac{5}{8}$" x $7\frac{1}{2}$" side arms. The spacer fitting is tapped for and furnished with (2) $\frac{1}{2}$" vertical and (4) $\frac{5}{8}$" horizontal assembly washer head bolts.

To order a spacer fitting only, less the assembly bolts, drop the suffix "-B" of the corresponding assembly number.

Ordering Example: 5870-9945 = 587 Series Adjustable Spacer Fitting Style with $8\frac{3}{4}$" to $12\frac{3}{4}$" arm separation adjustment for $3\frac{1}{8}$" x 9" side arms. The spacer fitting is tapped for $\frac{1}{2}$" vertical and $\frac{5}{8}$" horizontal assembly washer head bolts. Spacer fitting only; does not include assembly washer head bolts.

Table 1

Arm Separation Adjustment Range

Code	Separation
0	$8\frac{3}{4}$" to $12\frac{3}{4}$"
1	$10\frac{3}{4}$" to $14\frac{3}{4}$"
2	$12\frac{3}{4}$" to $16\frac{3}{4}$"

Table 2

Crossarm Size

Code	Width "W"	Depth "D"
1	$2\frac{5}{8}$"	$5\frac{5}{8}$"
2	$2\frac{3}{4}$"	$7\frac{3}{8}$"
3	$3\frac{5}{8}$"	$7\frac{1}{2}$"
4	$3\frac{3}{4}$"	$9\frac{3}{8}$"
5	$4\frac{5}{8}$"	$9\frac{1}{2}$"
6	$5\frac{1}{8}$"	$11\frac{1}{2}$"
7	$5\frac{1}{2}$"	$13\frac{1}{2}$"
8	$5\frac{5}{8}$"	$8\frac{1}{2}$"
9	$3\frac{1}{8}$"	9"
A	$3\frac{1}{2}$"	$7\frac{1}{4}$"
B	$4\frac{1}{2}$"	$6\frac{3}{4}$"
C	$3\frac{1}{4}$"	$7\frac{5}{8}$"
D	$5\frac{3}{4}$"	$7\frac{3}{4}$"
E	$6\frac{3}{4}$"	$8\frac{3}{4}$"

Table 3

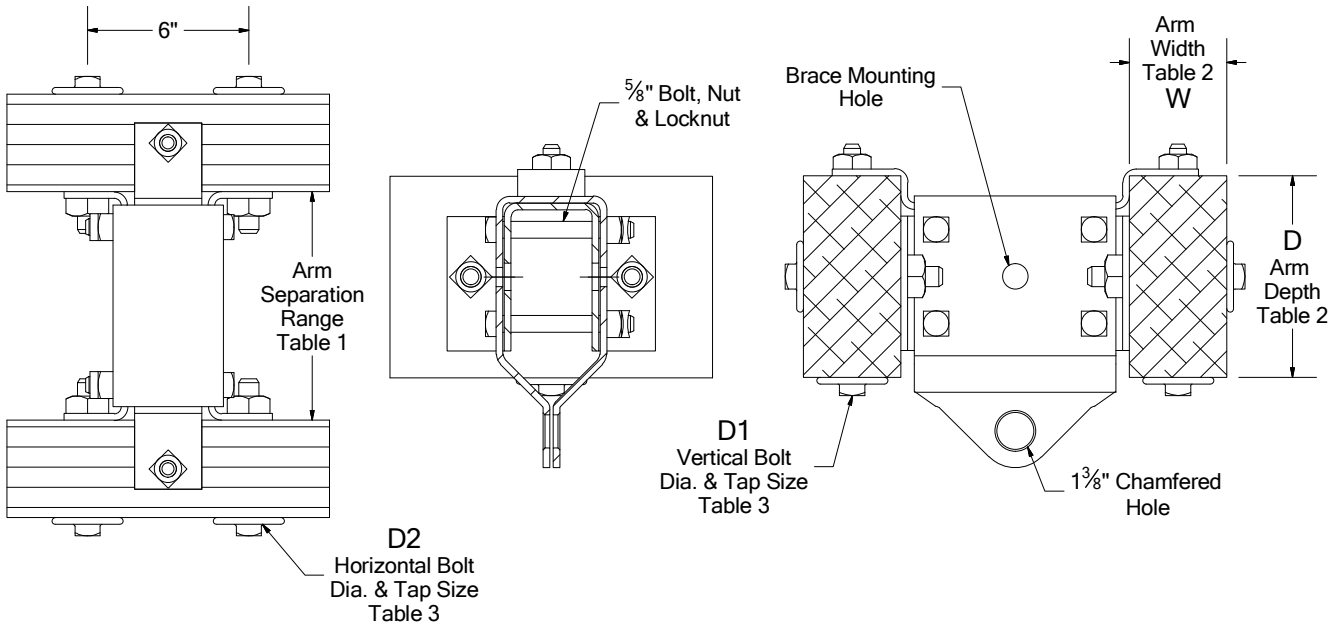
Mounting Bolt Diameter and Tap Size

Code	Vertical "D1"	Horizontal "D2"
4	$\frac{1}{2}$"	$\frac{1}{2}$"
5	$\frac{5}{8}$"	$\frac{5}{8}$"
6	$\frac{3}{4}$"	$\frac{3}{4}$"
7	$\frac{7}{8}$"	$\frac{7}{8}$"

Note: Spacers are available for additional arm sizes and mounting bolt arrangements upon request.

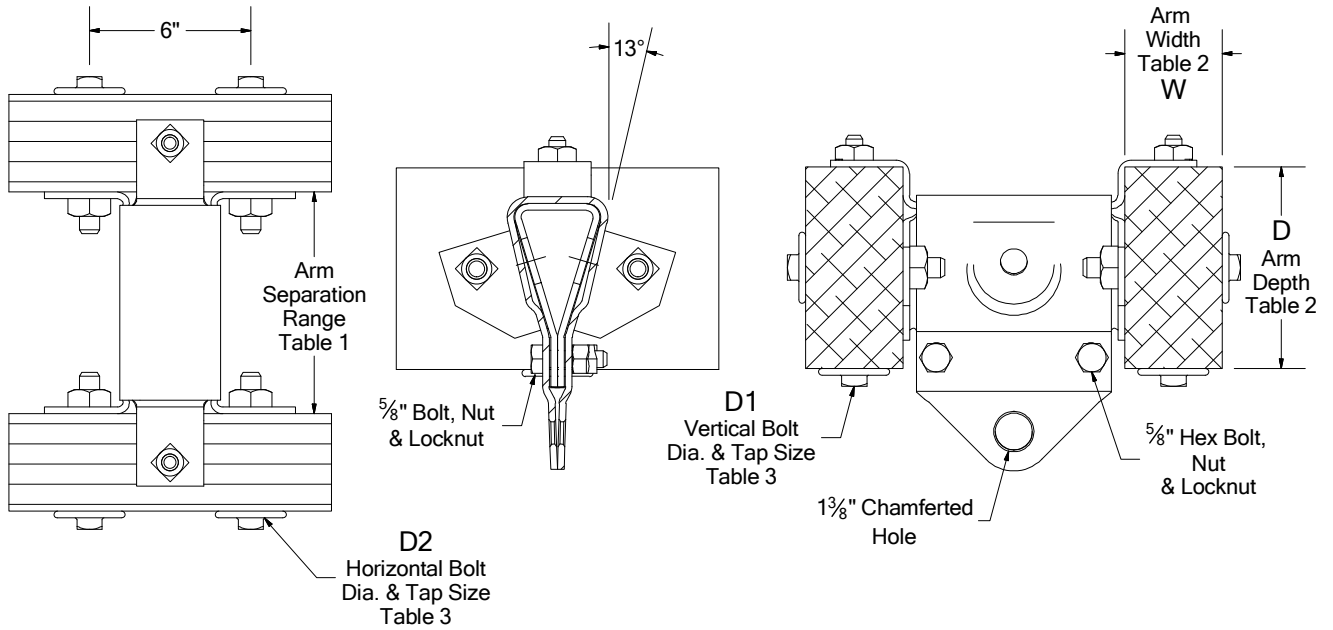
584 Series Adjustable Spacer Fitting

584 Series Spacer - 1/4" Steel, Approx. Wt. 31 Lbs.



586 & 587 Series Adjustable Spacer Fitting

586 Series Spacer - 1/4" Steel, Approx. Wt. 32 Lbs. **587 Series Spacer - 5/16" Steel, Approx. Wt. 39 Lbs.**



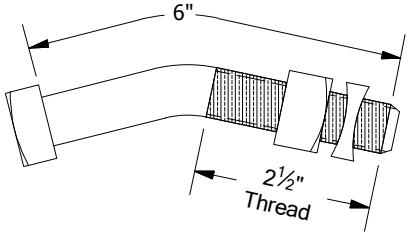
Spacer Fitting Brace Connection Bolts

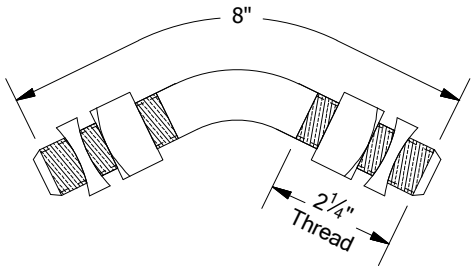
For connecting vee braces to the side of spacer fittings in double crossarm construction, 7/8" bolts are typically used. Depending on the style of spacer fittings, either bent or straight bolts or double end studs may be required. The bolts are used at the outside phase positions on the double arms where one brace is connected. It is recommended the bolt be installed with the head bearing on the brace fitting. Studs are used in the center position when braces are attached to both sides of the spacer fitting.

All bolts are shipped with nuts and locknuts factory assembled as illustrated.

7/8" Bent Bolts and Studs

For use with Spacer Fitting Styles 586 & 587 Series.





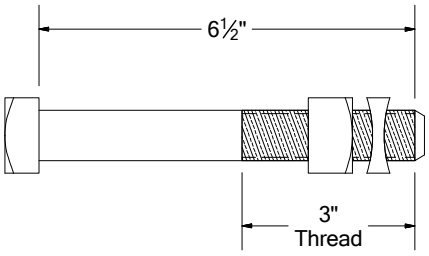
41058BB Bent Bolt

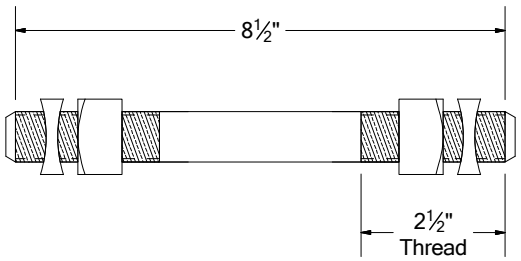
Catalog Number	Description	Approx. Wt. Lbs. Each
41058BB-SL	Bent Bolt w/ Square Nut & MF Locknut	1.5

41058BS Bent Stud

Catalog Number	Description	Approx. Wt. Lbs. Each
41058BS-2SL	Bent Stud w/ (2) Square Nuts & (2) MF Locknuts	2.0
41058BS-2RL	Bent Stud w/ (2) Recessed Nuts & (2) MF Locknuts	2.0

For use with Spacer Fitting Style 584 Series.





5840MB Straight Bolt

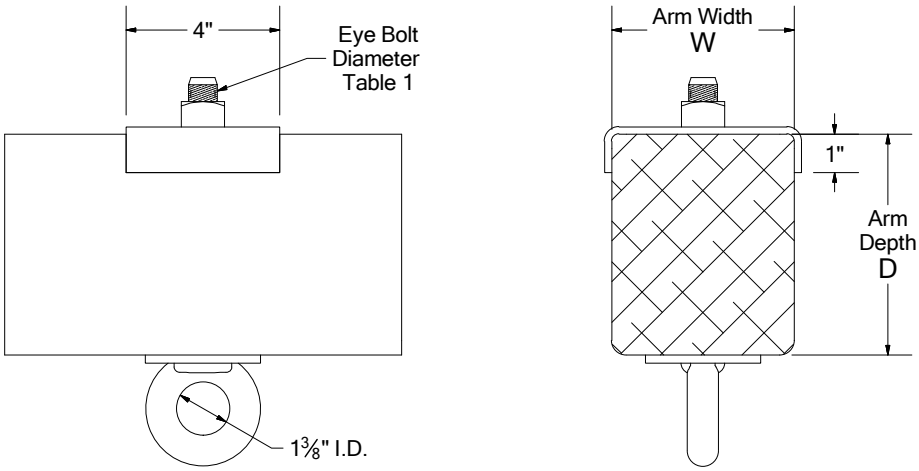
Catalog Number	Description	Approx. Wt. Lbs. Each
5840MB	Straight Bolt w/ Square Nut & MF Locknut	1.5

5840DEB Straight Stud

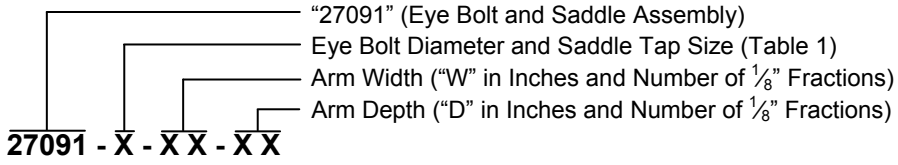
Catalog Number	Description	Approx. Wt. Lbs. Each
5840DEB	Straight Stud w/ (2)Square Nuts & (2) MF Locknuts	2.0

Eye Bolt & Saddle Assemblies

Eye bolt and saddle assemblies are used to attach suspension insulators in single crossarm construction and are available for any crossarm size. The eye bolt is locked securely in place with a nut after threading through the tapped saddle which is made from $^{3}/_{16}$" x 4" steel. Assemblies are furnished complete and may be ordered by indicating the appropriate information in the ordering code noted below. The eye bolt length will be a minimum of $1^{1}/_{4}$" longer than the indicated crossarm depth.



Eye Bolt & Saddle Assembly Ordering Code



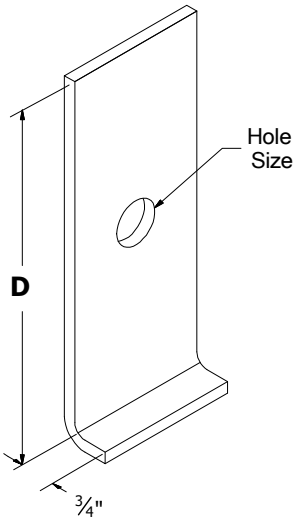
Example: 27091-6-35-74 = Eye Bolt and Saddle Assembly for a $3^{5}/_{8}$" x $7^{1}/_{2}$" crossarm, with $^{3}/_{4}$" x 9" eyebolt.

Table 1

Eye Bolt Diameter

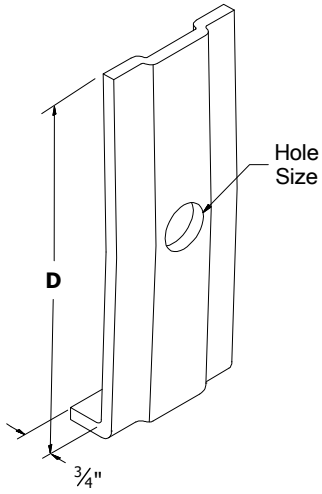
Code	Diameter
5	$^{5}/_{8}$"
6	$^{3}/_{4}$"
7	$^{7}/_{8}$"

Flat Gains & Reinforcing Plates



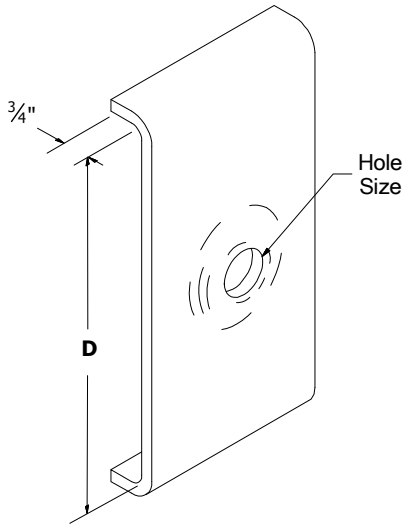
6028 Series

Flat Gain Plate
¼" x 3" Stock



6029 Series

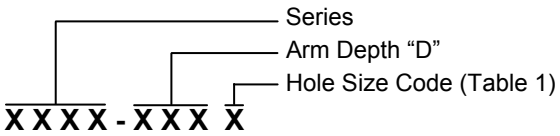
Ribbed Tie Plate
¼" x 3" Stock



6030 Series

Embossed Reinforcing Plate
¼" x 4" Stock

Flat Gains & Reinforcing Plates Ordering Codes



Example: 6028-094B = Flat Gain Plate for a 9½" crossarm with 15/16" mounting hole.

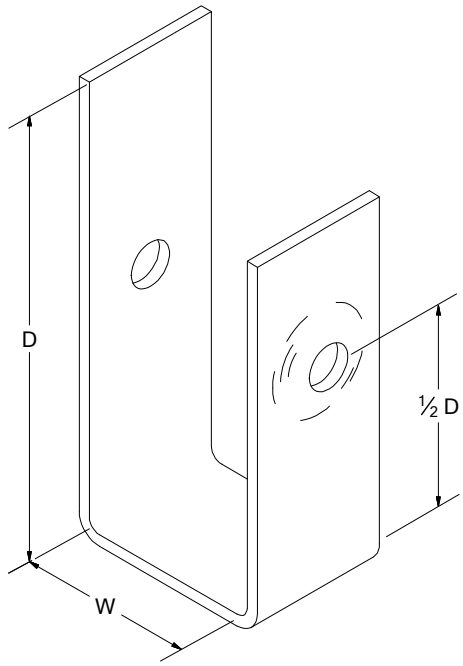
Table 1

Hole Size

Code	Diameter
A	13/16"
B	15/16"
C	1 1/16"

Pole Gain Plates

21847 Series



Pole Gain Plates Ordering Codes

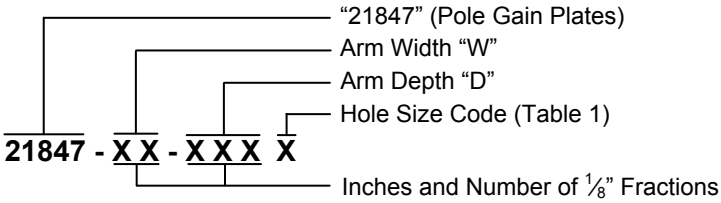


Table 1

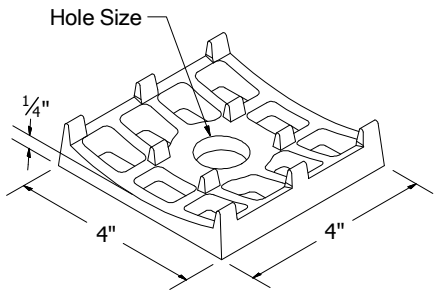
Hole Size

Code	Diameter
A	$^{13}/_{16}$"
B	$^{15}/_{16}$"
C	$1^{1}/_{16}$"

Example: 21847-35-094B = Pole Gain Plate for $3^{5}/_{8}$" x $9^{1}/_{2}$" crossarm, with $^{15}/_{16}$" mounting holes.

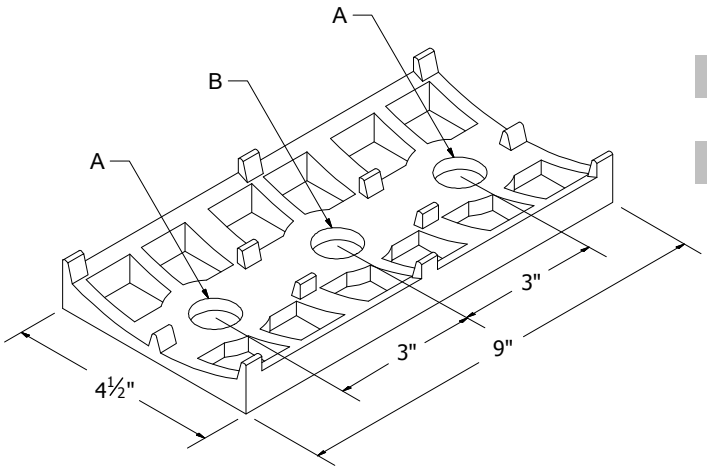
Grid Gains

PX122 Series



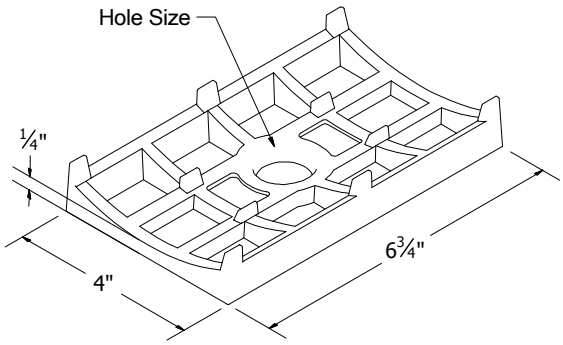
Catalog Number	Hole Size	Bonding	Approx. Wt. Lbs. Each
PX122	15/16"	No	1.2
PX122A	1 1/16"	No	1.2
PX122B	15/16"	Yes	1.2

PX260 Series



Catalog Number	A	B	Bonding	Approx. Wt. Lbs. Each
PX260	15/16"	15/16"	No	2.3
PX260A	1 1/16"	1 1/16"	No	2.3
PX260B	15/16"	15/16"	Center	2.3
PX260C	15/16"	1 1/16"	No	2.3

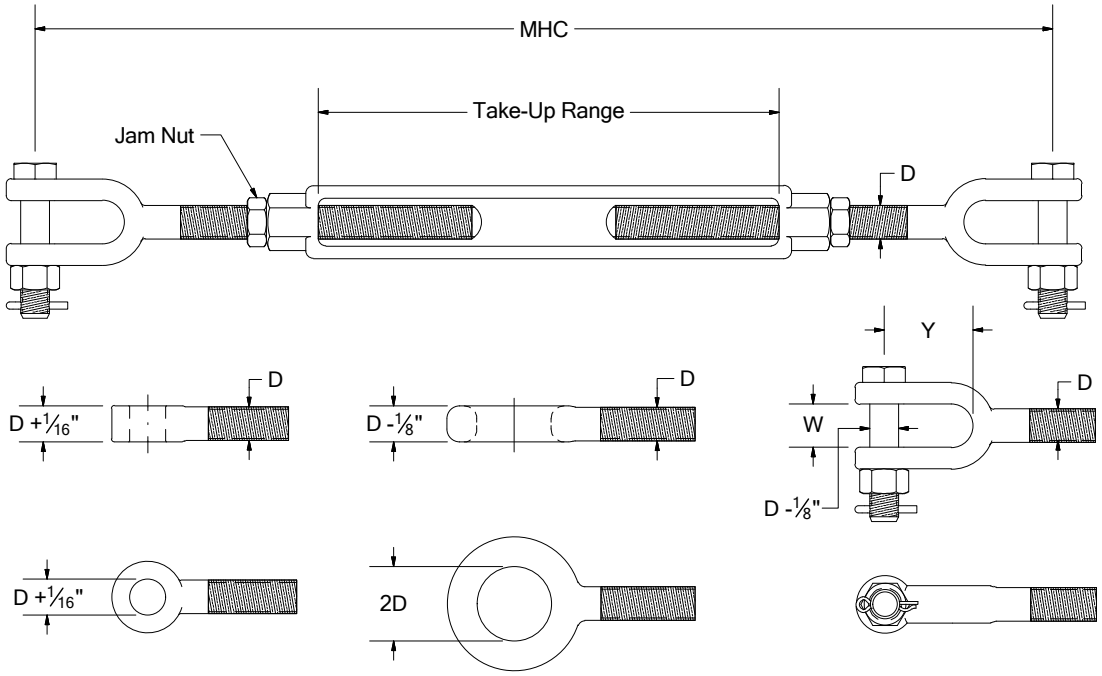
PX261 Series



Catalog Number	Hole Size	Bonding	Approx. Wt. Lbs. Each
PX261	15/16"	No	1.3
PX261A	1 1/16"	No	1.3
PX261B	15/16"	Yes	1.3

Turnbuckle Assemblies

BROOKS Turnbuckle Assemblies are available in a variety of diameters, ends and take-up ranges to satisfy a host of applications. Our turnbuckles are often used in combination with tension braces on H-frame construction when MHC distances are critical. The assemblies, manufactured from forged carbon steel, are shipped factory assembled complete with jam nuts. Jaw bolts are furnished complete with the pin bolt, nut and stainless steel cotter pin.



Rod Eye End Code "R" | **Large Eye End Code "E"** | **Jaw End Code "J"**

End Code Designation

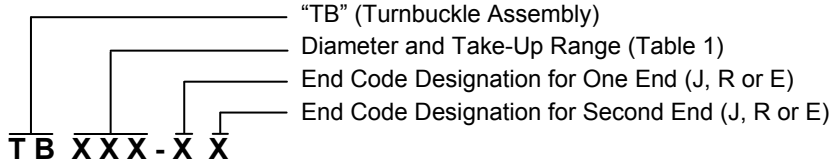
"D"	"W"	"Y"
5/8"	7/8"	1 5/8"
3/4"	15/16"	1 13/16"
7/8"	1 1/8"	2 1/4"
1"	1 3/16"	2 3/8"

Table 1

Diameter and Take-Up Range

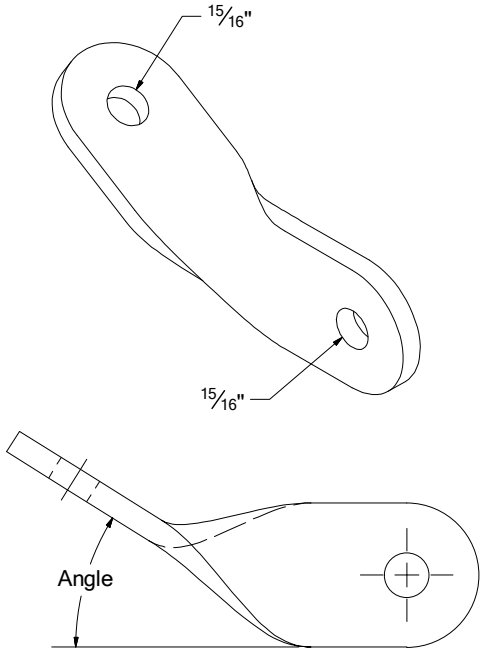
Code Number	Diameter	Take-Up	Ultimate Strength Lbs.	Approx. Wt. Lbs. Each
509	5/8"	9"	16,000	3.5
512	5/8"	12"	16,000	4.0
609	3/4"	9"	25,000	5.2
612	3/4"	12"	25,000	6.3
712	7/8"	12"	35,000	8.6
812	1"	12"	45,000	12.7

Turnbuckle Ordering Codes



Example: TB609-JE = Turnbuckle Assembly, 3/4" x 9" with one jaw eye and one large eye end.

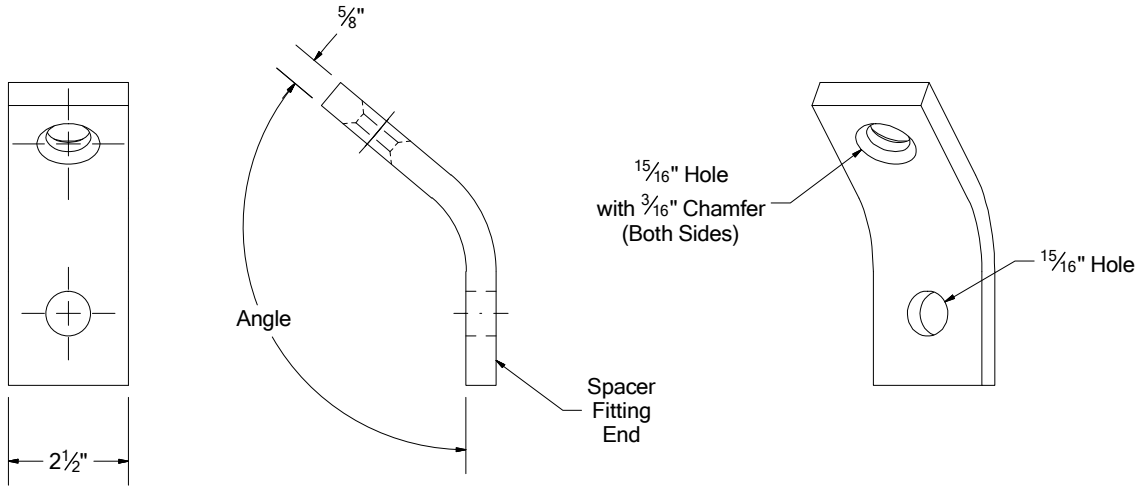
Twisted Clips



Catalog Number	Angle	Approx. Wt. Lbs. Each
41052-15-15-15	15°	3.90
41052-30-15-15	30°	3.90
41052-32-15-15	32½°	3.90
41052-35-15-15	35°	3.90
41052-37-15-15	37½°	3.90
41052-40-15-15	40°	3.90
41052-47-15-15	47½°	3.90
41052-52-15-15	52½°	3.90
41052-55-15-15	55°	3.90
41052-60-15-15	60°	3.90

Other angles are available upon request.

Brace Lugs

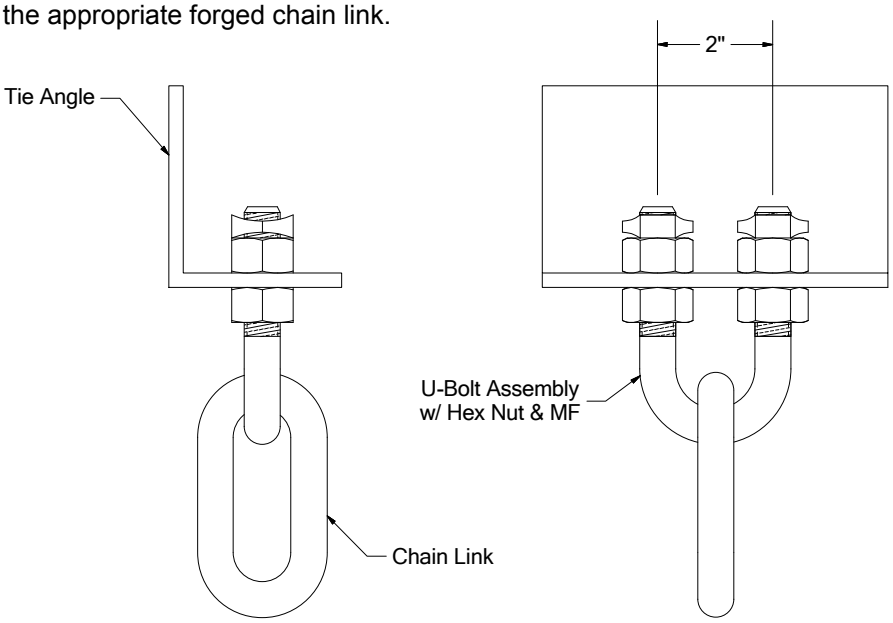


Catalog Number	Angle	Approx. Wt. Lbs. Each
41024-130	130°	3.90
41024-138	138°	3.90
41024-144	144°	3.90

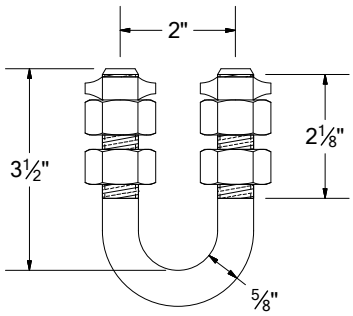
Other angles are available upon request.

U-Bolt & Chain Link Assemblies

The BROOKS 27400 Series U-Bolt and Chain Links are usually assembled on shield wire tie angles commonly used in H-Frame construction. The assemblies are furnished standard with 4 hex nuts and 2 locknuts along with the appropriate forged chain link.

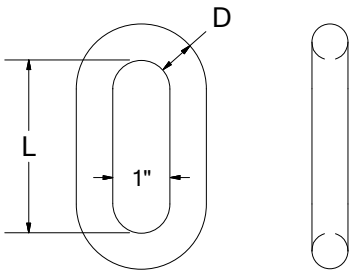


Catalog Assembly Number	U-Bolt Number	Chain Link Number	Approx. Wt. Lbs. Each
27400-A	**27400**	**7751**	1.5
27400-B	**27400**	**7754**	1.7



⅝" U-Bolt & Nut Assembly

Catalog Number	Approx. Wt. Lbs. Each
27400	0.9



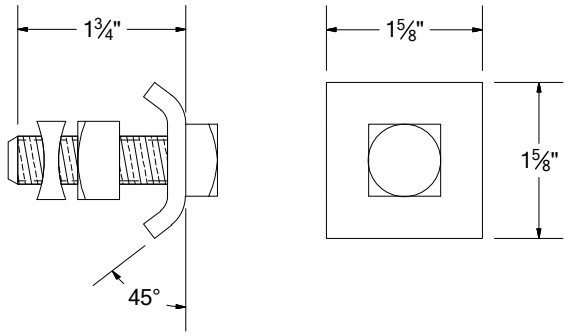
Forged Chain Links

Catalog Number	Diameter "D"	Length "L"	Ultimate Strength	Approx. Wt. Lbs. Each
7751	½"	2¼"	30 Kips	0.5
7754	⅝"	3"	40 Kips	0.8

Bonding Bolts & Clips

22066 Bonding Bolt Assembly

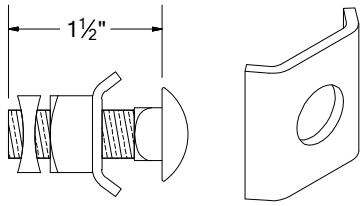
BROOKS 22066, ½" x 1¾" bonding bolt assembly is used to attach a ground wire to a steel surface where a 9/16" diameter clearance hole is available. This assembly, furnished complete as illustrated, is often used to bond ground wires to shield wire tire angles on H-frame structures.



Catalog Number	Approx. Wt. Lbs. Each
22066	0.35

325281 Series

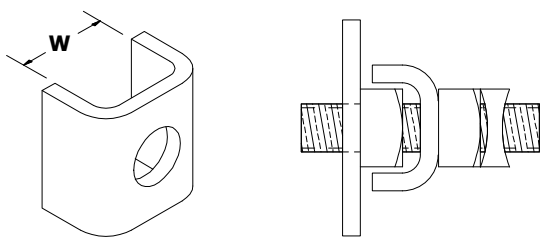
The 325281 Series Bonding Clips are also used where it is desirable to secure a ground wire to a metal surface. The clips may be ordered individually or as an assembly complete with a 1½" carriage bolt, nut and locknut.



Clip Only Catalog Number	Approx. Wt. Lbs. Each	Bolt Size	Hole Size	Assembly Catalog Number	Approx. Wt. Lbs. Each
325281-3	0.11	3/8"	7/16"	**325281-3A**	0.22
325281-4	0.11	1/2"	9/16"	**325281-4A**	0.29
325281-5	0.10	5/8"	11/16"	**325281-5A**	0.42
325281-6	0.10	3/4"	13/16"		
325281-7	0.09	7/8"	15/16"		

BC Series

The BC Series Bonding Clips provide a simple and inexpensive method of attaching a ground wire to the threaded end of a bolt. The catalog number is for the clip only and the nuts and locknuts required to secure the installation should be ordered separately.

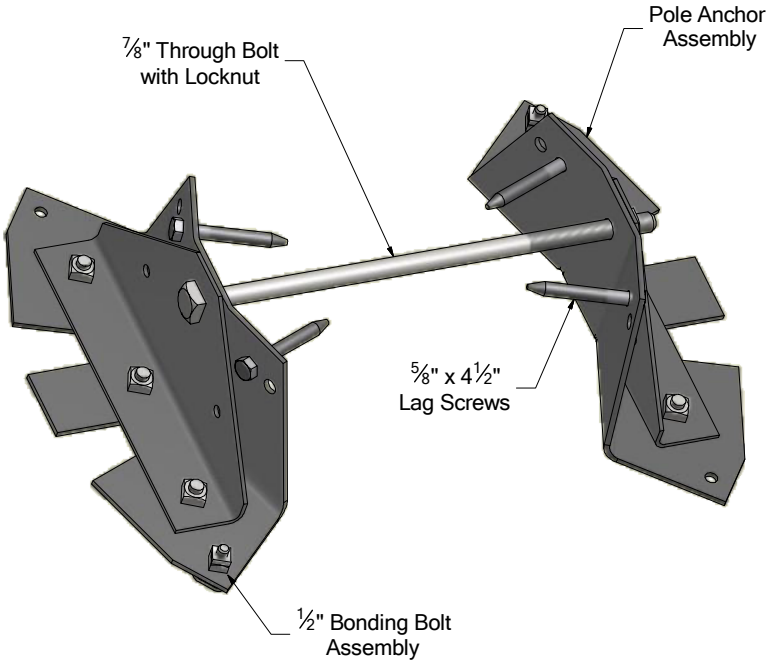


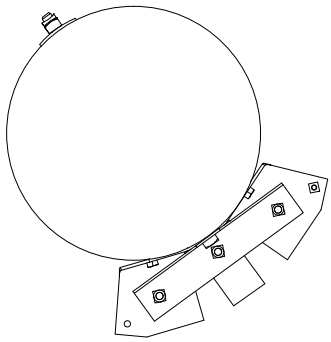
Clip Only Catalog Number	Bolt Size	Hole Size	Width "W"	Approx. Wt. Lbs. Each
BC4	1/2"	9/16"	15/16"	0.13
BC5	5/8"	11/16"	1 1/8"	0.14
BC6	3/4"	13/16"	1 1/4"	0.22
BC7	7/8"	15/16"	1 1/2"	0.24
BC8	1"	1 1/16"	1 5/8"	0.25

Pole Anchor Assemblies

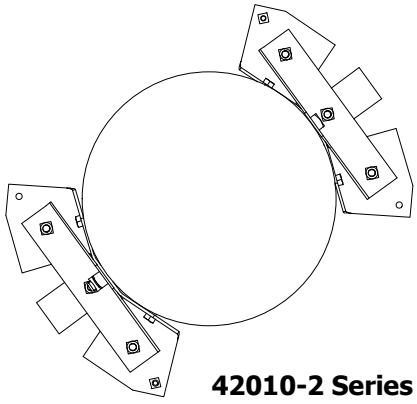
42010 Series

BROOKS 42010 Series Pole Anchor Assembly is made with $^{3}/_{16}$" & $^{1}/_{4}$" thick steel plates per ASTM A36 and hot dip galvanized per ASTM A153. Each individual anchor assembly adds roughly 106 in^2 of bearing area to a pole. Typically sold with the mounting hardware, these bearing plates can be sold individually, in pairs, or sets of 4. Each bearing plate also includes a bonding bolt for attaching a ground wire.

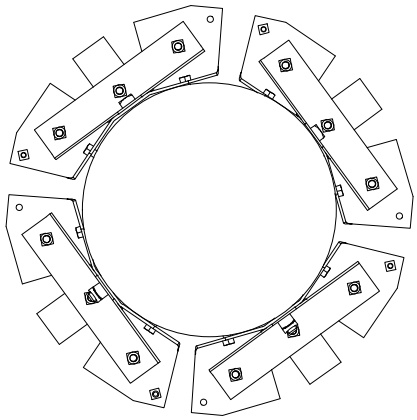




42010-1 Series



42010-2 Series



42010-4 Series

Pole Anchor Ordering Codes

"42010" (Pole Anchor Assembly)
Number of Single Pole Anchors (1, 2, or 4)
Through Bolt Length (Inches)

42010 - X - X X

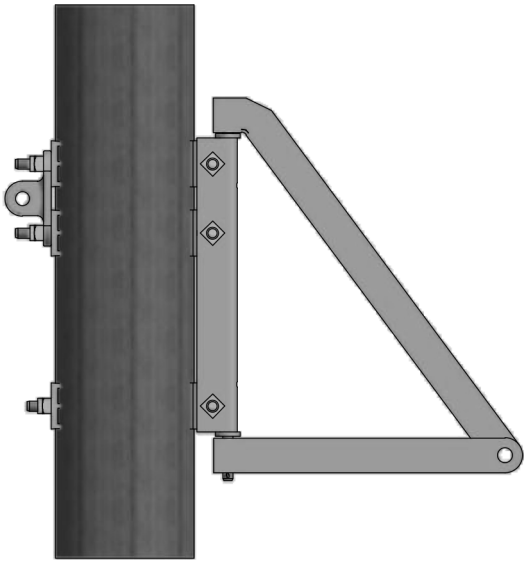
Example: 42010-2-28 = Pole Anchor Assembly, pair, with $^{7}/_{8}$" x 28" through bolt.

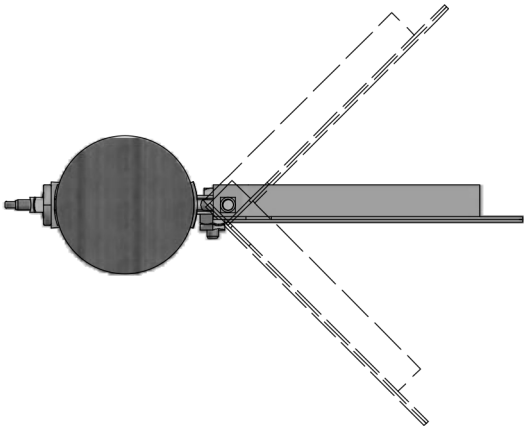
Swinging Angle Brackets

Swinging angle brackets are commonly used on line angle structures to maintain clearance between the crossarm and conductor during swing deflection of the insulator string. The swinging action also adds another degree of rotation thereby eliminating problems associated with unequal tensions.

Typical Pole Application

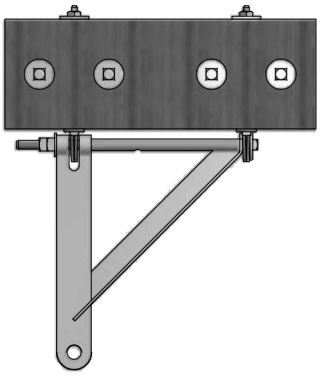
6300 Series Swinging Angle Bracket Illustrated

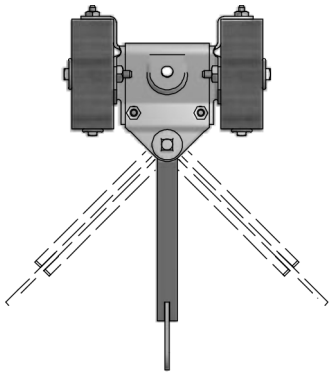




Typical Double Arm Application

6200 Series Swinging Angle Bracket Illustrated

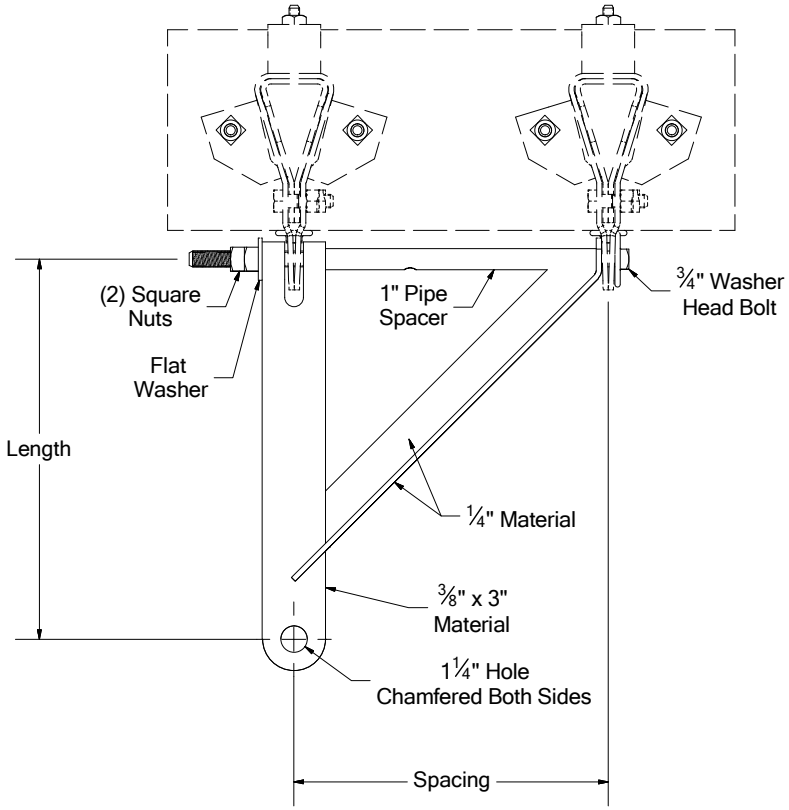




6200 Series Swinging Angle Brackets

BROOKS 6200 Series Swinging Angle Brackets are furnished complete with pin bolts and fasteners. The spacer fittings are not furnished as part of the assembly and must be ordered as separate items.

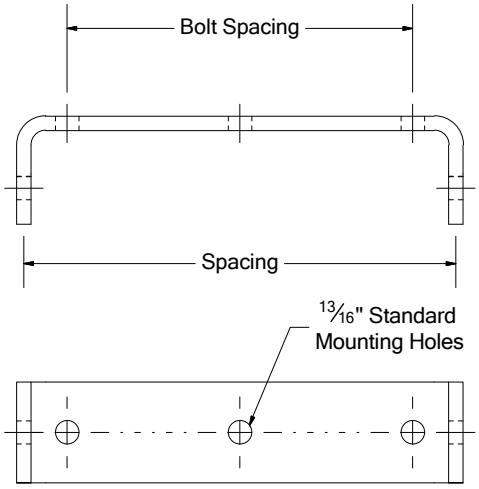
Typical Double Arm Application



Catalog Number	Length	Spacing	Approx. Wt. Lbs. Each
6200	12”	9”	13
6201	15”	12”	15
6202	18”	15”	18
6203	21”	18”	21

6200U Series Swinging Angle Brackets

The 6200 Series bracket illustrated on the previous page is easily adaptable for single arm and pole mounting installations by incorporating the use of a U-Plate. All mounting bolts, washers and guy plates necessary to complete the installations must be ordered separately.



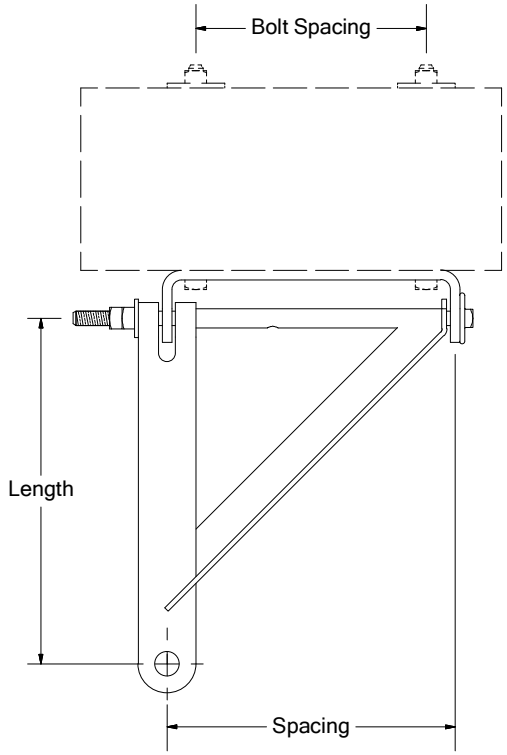
U-Plate Only

Catalog Number	Spacing	Bolt Spacing	Approx. Wt. Lbs. Each
6200U-1	9”	6”	6.5
6201U-1	12”	9”	8.0
6202U-1	15”	12”	9.5
6203U-1	18”	15”	11.0

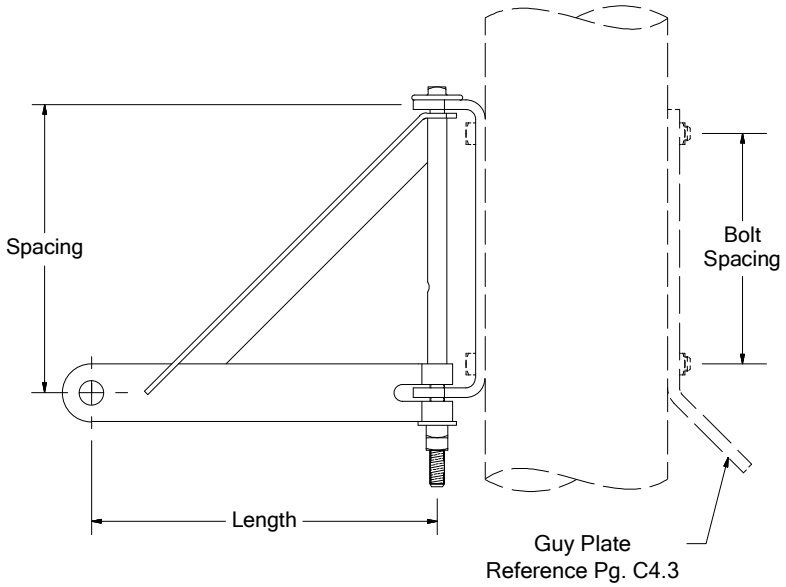
U-Plate & Bracket Assembly

Catalog Number	Length	Spacing	Bolt Spacing	Approx. Wt. Lbs. Each
6200U	12”	9”	6”	19
6201U	15”	12”	9”	23
6202U	18”	15”	12”	28
6203U	21”	18”	15”	32

Typical Single Arm Application

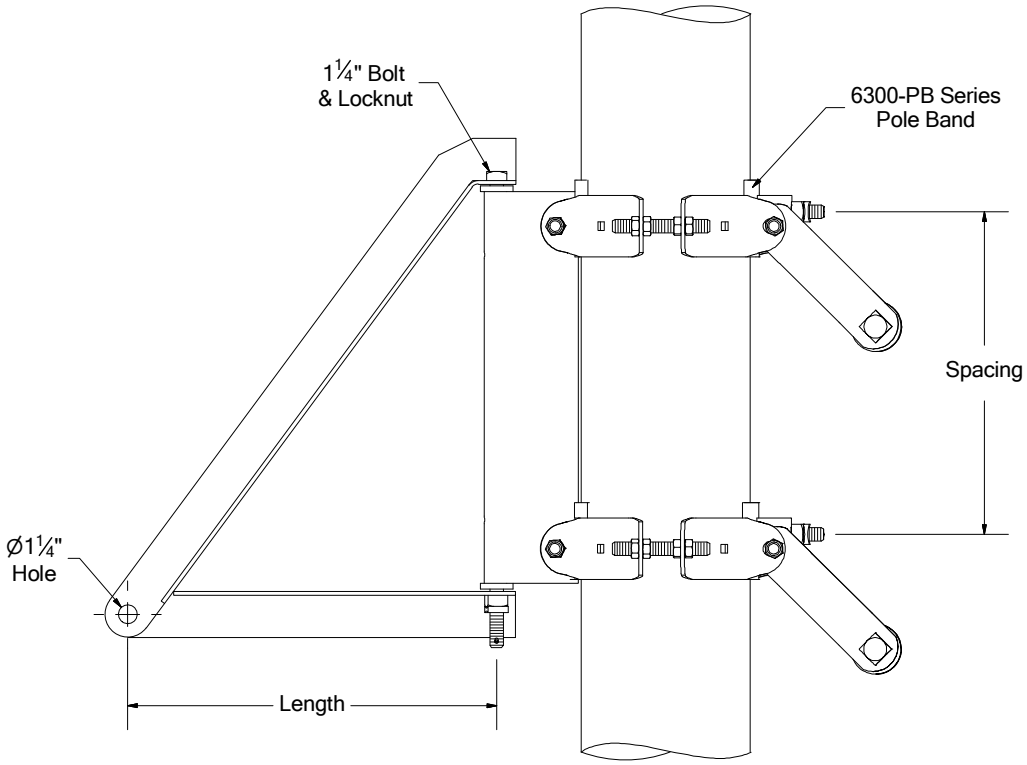


Typical Pole Application



6250 Series Swinging Angle Brackets

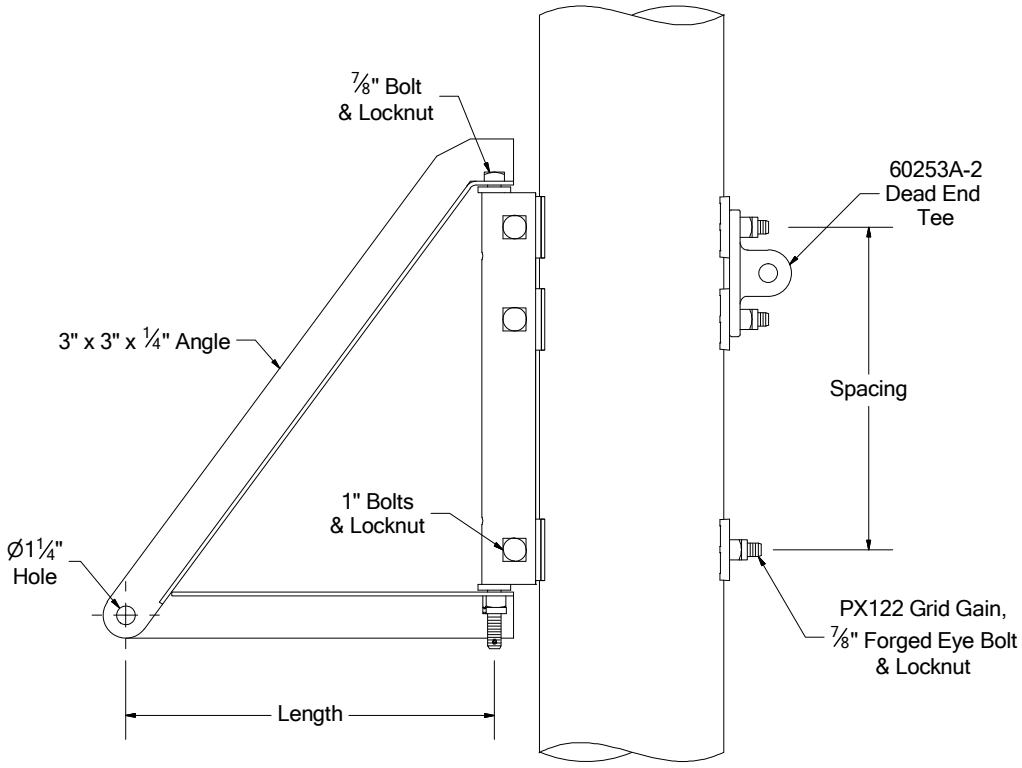
When used with a similar version of BROOKS PB3107 Series Pole Band, the 6250 Series Swinging Angle Bracket helps the pole carry a larger load without splitting. Please specify the pole diameter at time of order.



Catalog Number	Length "L"	Spacing "S"	Approx. Wt. Lbs. Each
6250	2'-0"	1'-9"	93
6251	3'-0"	2'-0"	102
6252	3'-6"	2'-6"	122
6253	4'-0"	2'-3"	121
6254	4'-9"	3"-9"	164

6300 Series Swinging Angle Brackets

BROOKS 6300 Series Swinging Angle Bracket is furnished complete with mounting bolts, a grid gain, and a dead end tee for guy attachment. Supplied standard with (1) 14” and (2) 16” forged eye bolts, unless otherwise specified.



Catalog Number	Length “L”	Spacing “S”	Approx. Wt. Lbs. Each
6300	2’-0”	1’-9”	71
6301	2’-6”	1’-9”	75
6302	2’-6”	2’-0”	77
6303	3’-0”	1’-9”	81
6304	3’-0”	2’-0”	86
6305	3’-0”	2’-3”	88
6306	3’-6”	2’-3”	94
6307	3’-6”	2’-6”	69
6308	4’-0”	2’-3”	102
6309	4’-0”	3’-0”	108
6310	4’-6”	3’-0”	116
6311	5’-0”	2’-3”	112

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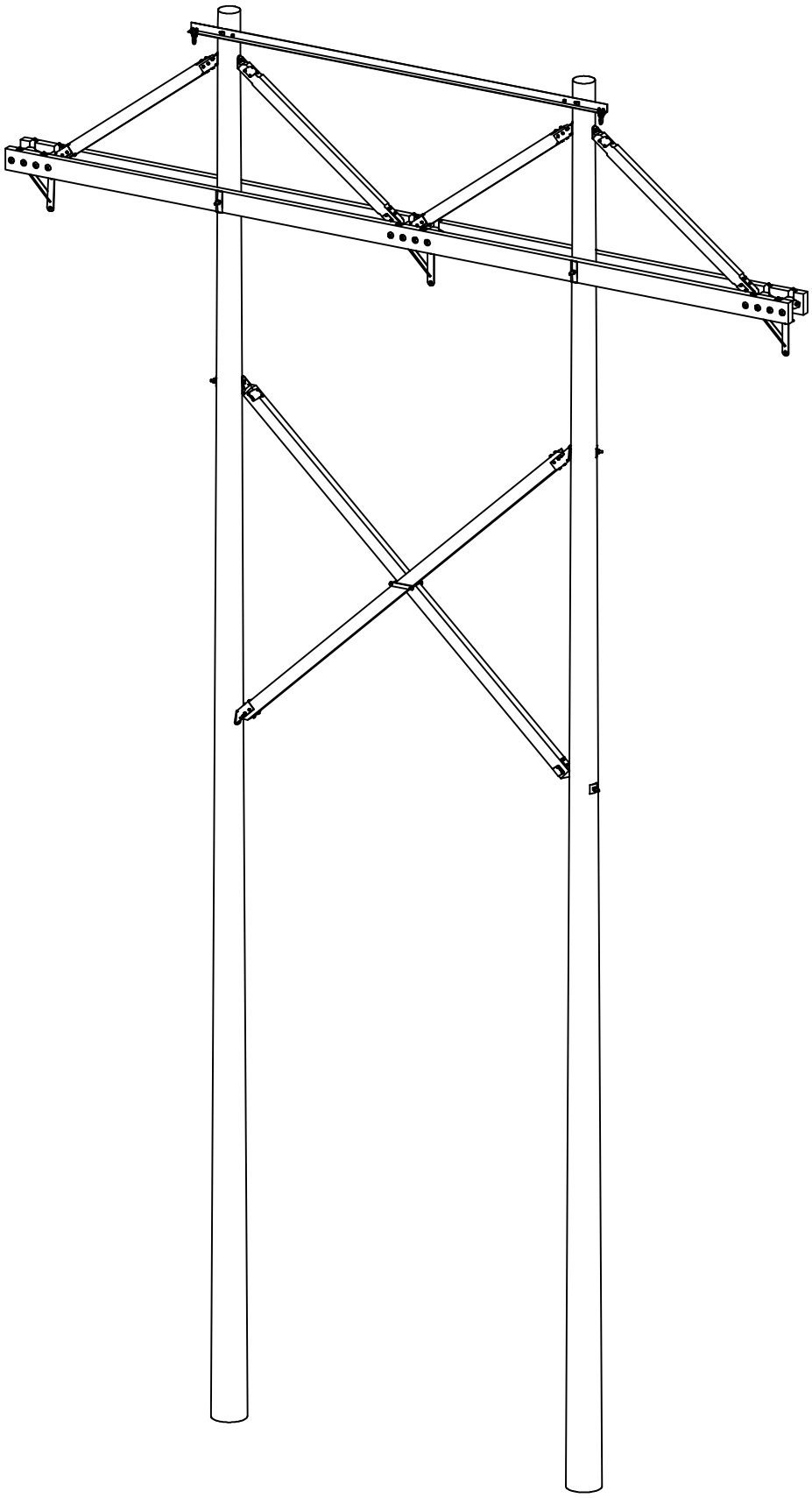


Pole Bands

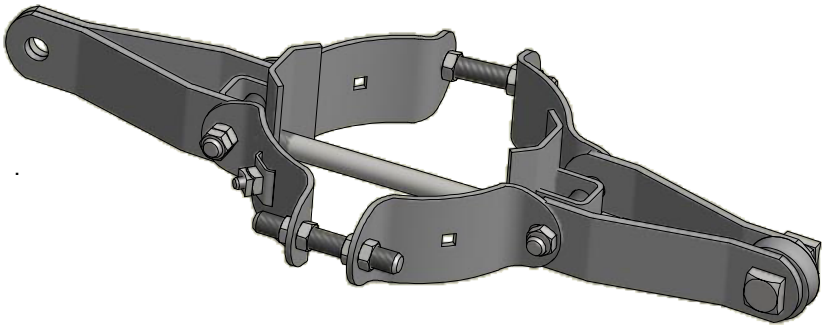
BROOKS PB Series Pole Bands are used for conductor, insulator and guy attachments.

Each pole band series is available in many sizes to accommodate a great range of pole diameters. Please see the tables on the following pages.

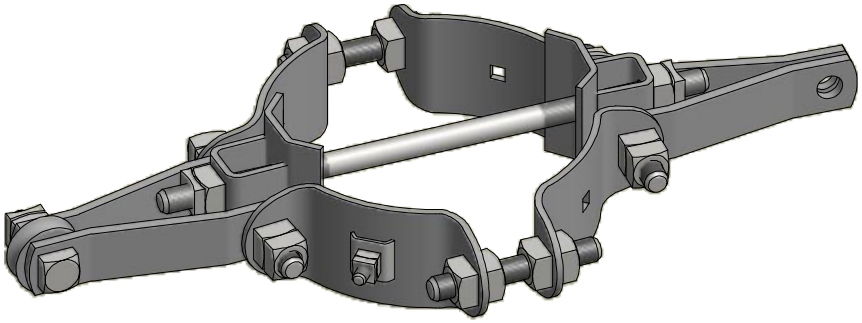
Connecting links, guy rollers and bonding clips are all sold separately.

PB3103 Series

PB3105 Series



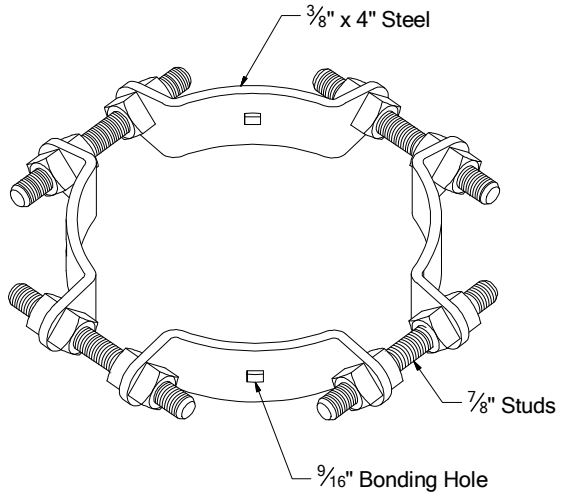
PB3107 Series



PB3108 Series

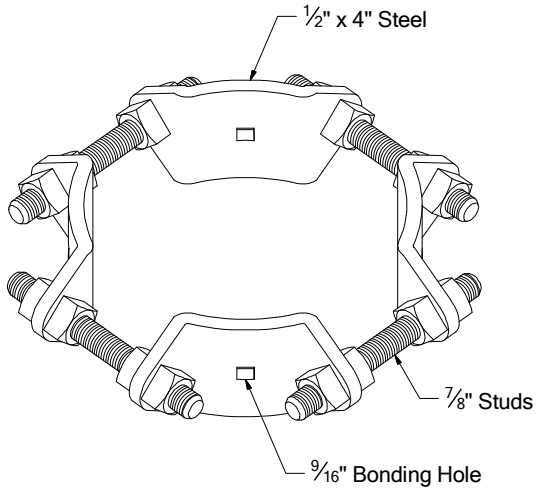
Medium Duty Pole Bands

PB3103 Series



Catalog Number	Type	Pole Diameter	Approx. Wt. Lbs. Each
PB3103-5	4-Way 90°	7” - 10”	18
PB3103-6	4-Way 90°	9” - 12”	21
PB3103-7	4-Way 90°	11” - 14”	23
PB3103-8	4-Way 90°	13” - 16”	26

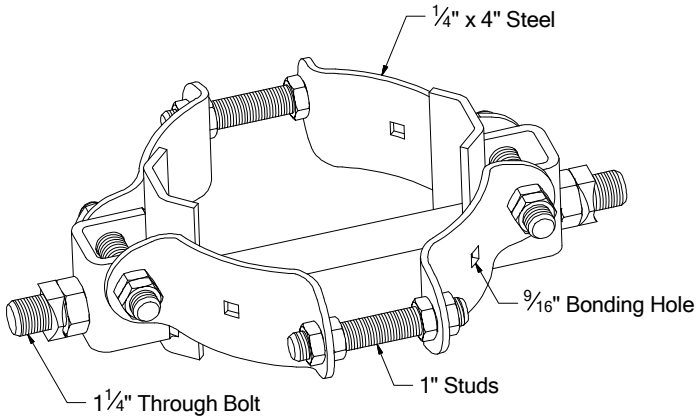
PB3105 Series



Catalog Number	Type	Pole Diameter	Approx. Wt. Lbs. Each
PB3105-5	4-Way 90°	7” - 10”	23
PB3105-6	4-Way 90°	9” - 12”	26
PB3105-7	4-Way 90°	11” - 14”	30
PB3105-8	4-Way 90°	13” - 16”	33

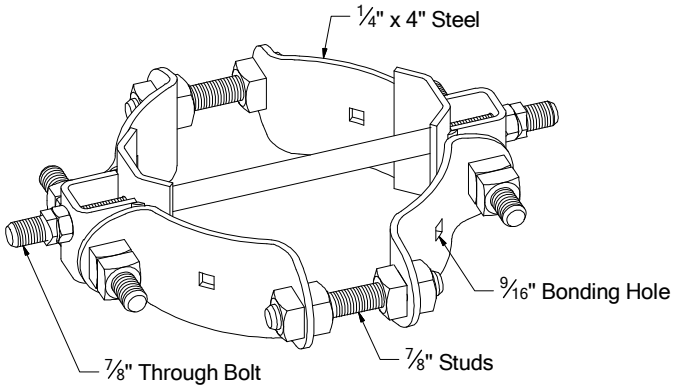
Heavy Duty Pole Bands

PB3107 Series



Catalog Number	Type	Pole Diameter	Approx. Wt. Lbs. Each
PB3107-5	2-Way 180°	8” - 10”	38
PB3107-6	2-Way 180°	10” - 12”	39
PB3107-7	2-Way 180°	12” - 14”	41
PB3107-8	2-Way 180°	14” - 16”	44

PB3108 Series



Catalog Number	Type	Pole Diameter	Approx. Wt. Lbs. Each
PB3108-5	2-Way 180°	7” - 10”	26
PB3108-6	2-Way 180°	9” - 12”	28
PB3108-7	2-Way 180°	11” - 14”	30
PB3108-8	2-Way 180°	13” - 16”	32

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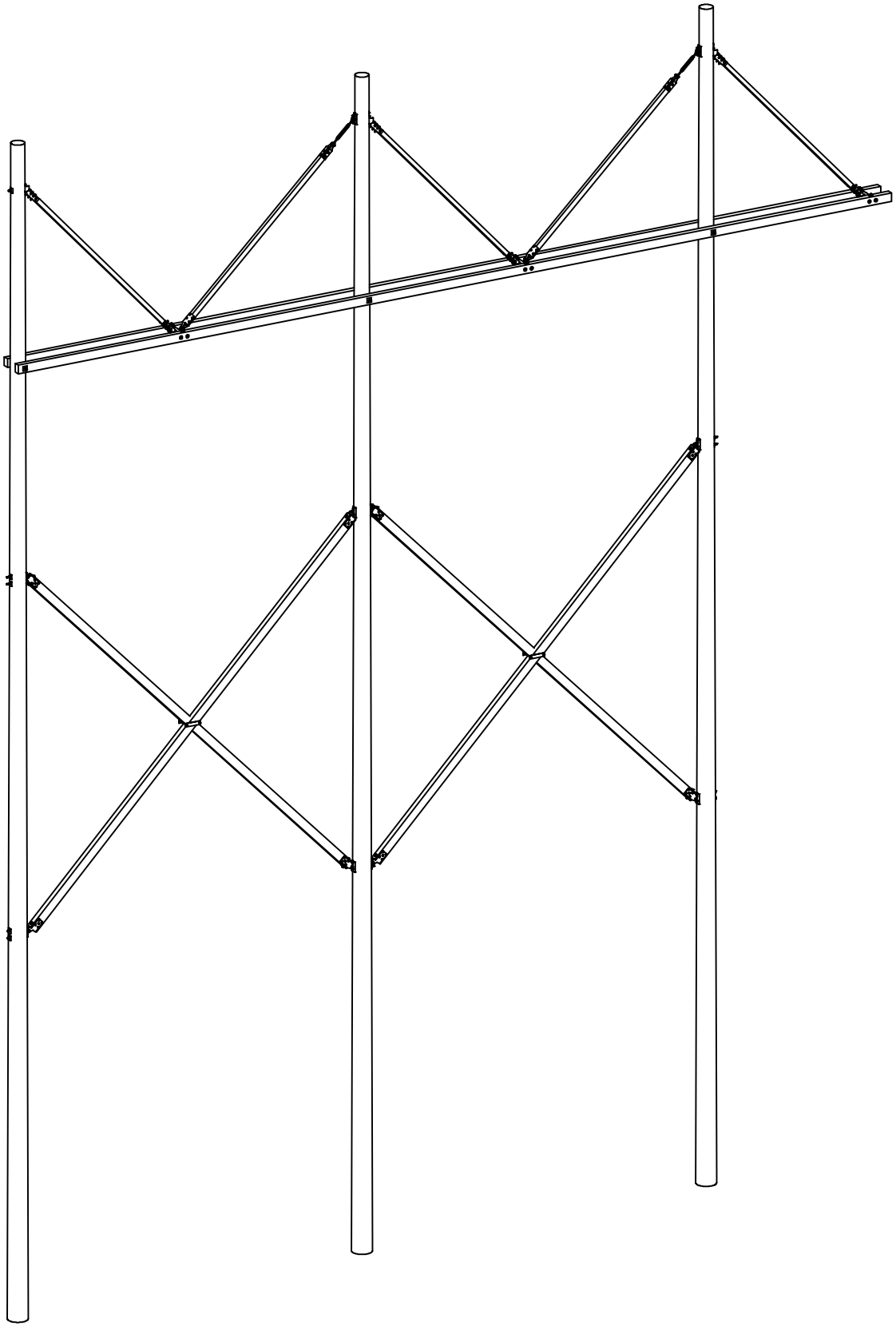
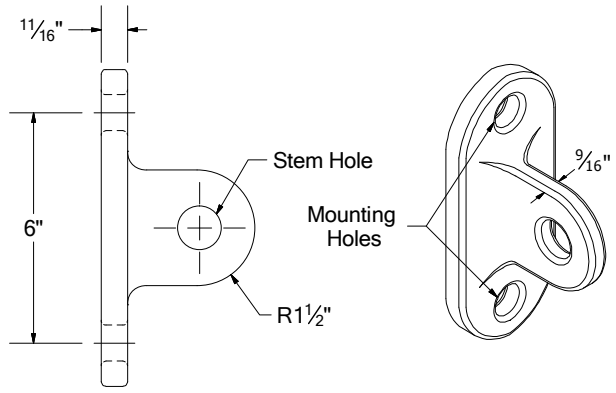


Dead End Tees

Forged Dead End Tees

60,000 Lbs. Ultimate Strength Rating

The BROOKS Forged Dead End Tees can be used to satisfy a multitude of applications in transmission framing, including dead ending conductors, down guying or as a component in making a pinned connection for tension braces and X-braces in H-Frame structures.



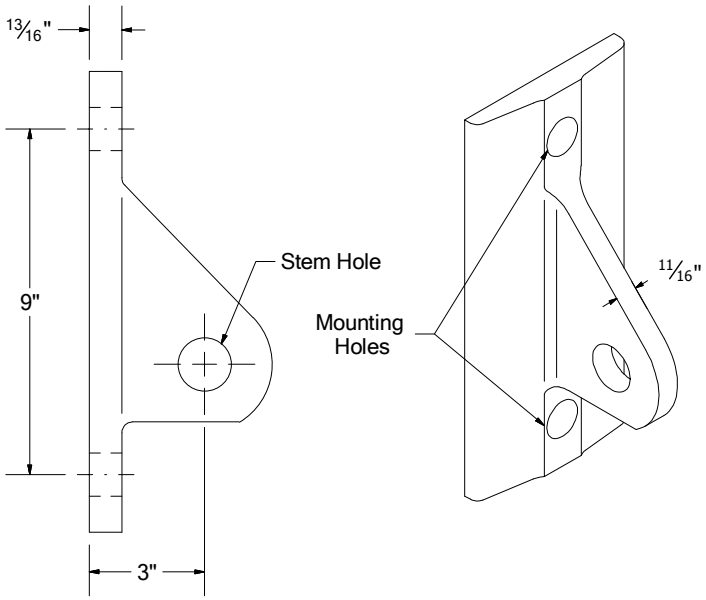
Catalog Number	Mounting Holes	Stem Hole	Approx. Wt. Lbs. Each
60253A	15/16"	15/16"	6.25
60253A-1	15/16"	1 1/8"	6.25
60253A-2	15/16"	1 1/4" Reamed	6.25
60253A-3	13/16"	1 1/4" Reamed	6.25
60255	1 1/16"	1 1/4"	6.25

Heavier tees are available upon request.

Heavy Duty Tee

41083 Series

70,000 Lbs. Ultimate Strength Rating



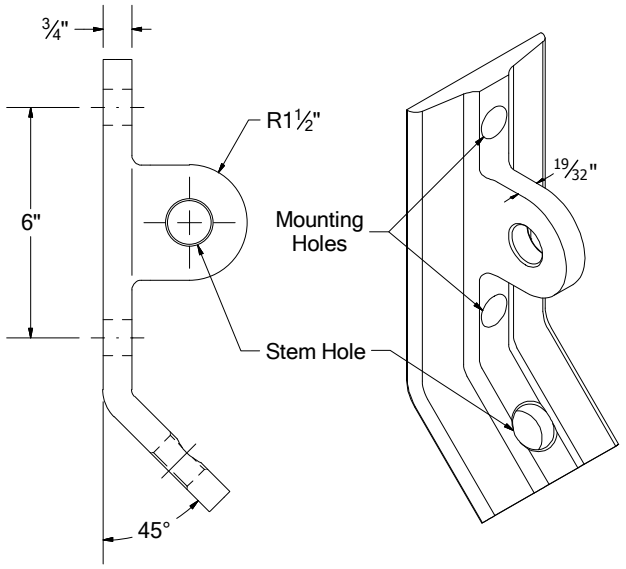
Catalog Number	Mounting Holes	Stem Hole	Approx. Wt. Lbs. Each
41083	1 1/8"	1 1/8"	15.5
41083A	15/16"	1 5/16"	15.5
41083B	1 3/8"	1 3/8"	15.5
41083C	1 1/8"	1 3/8"	15.5

Guying Dead End Tees

60254 Series

42,000 Lbs. Ultimate Strength (7/8" Bolts) Dead Ending
35,000 Lbs. Ultimate Strength (7/8" Bolts) Guying Tab

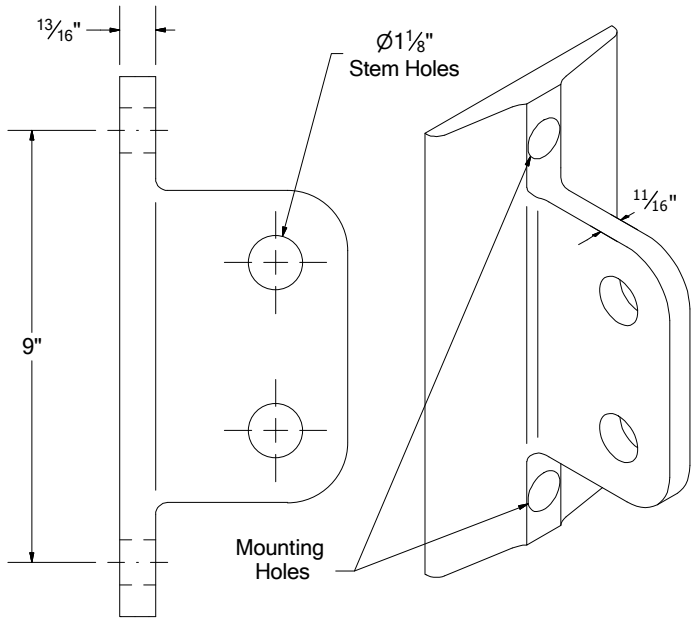
The 60254 Series Combination Tee provides an inexpensive and strong unit for dual purpose dead ending and guying applications which are subjected to heavy tensions in transmission construction. The tees are furnished with 1 1/4" reamed connection holes for use with either C hooks or clevis attachments.



Catalog Number	Mounting Holes	Stem Hole	Approx. Wt. Lbs. Each
60254	15/16"	1 1/4" Reamed	9
60254-1	13/16"	1 1/4" Reamed	9

41084 Series

35,000 Lbs. Ultimate Strength Per Attachment



Catalog Number	Mounting Holes	Stem Hole	Approx. Wt. Lbs. Each
41084	1 1/8"	1 1/8"	17.7
41084A	15/16"	1 1/8"	17.7

Other similar varieties are also available.

Guy Plates

22714 Series

21,000 Lbs. Ultimate Strength (¾" Mounting Bolts)
35,000 Lbs. Ultimate Strength (⅞" Mounting Bolts)

BROOKS 22714 Series Guy Plates offer the flexibility to satisfy a number of applications for guying at 45 degrees. From the tables listed below, a combination of hole sizes and bolt spacing may be selected to meet individual requirements.

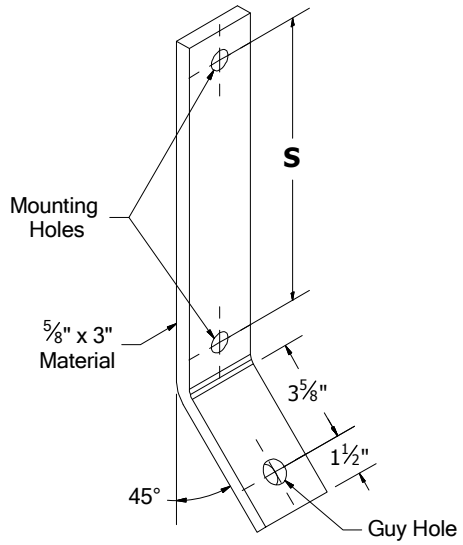


Table 1

Bolt Spacing "S"

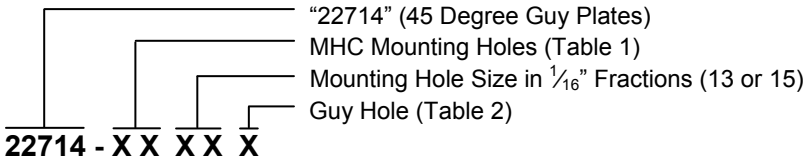
Code	MHC	Approx. Wt. Lbs. Each
06	6"	7
09	9"	9
12	12"	11
15	15"	13

Table 2

Guy Hole

Code	Diameter
A	13/16"
B	15/16"
C	1¼" Reamed

22714 Series Guy Plate Ordering Code

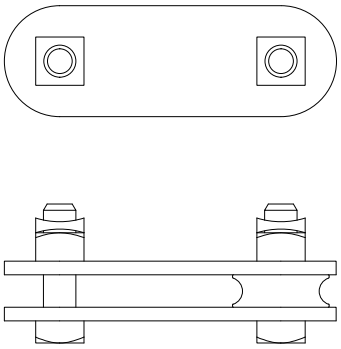


Example: 22714-1213B = 45 Degree Guy Plate with 15/16" guy hole, and 13/16" mounting holes spaced 12" apart.

Guy Links, Guy Rollers & Yoke Plates

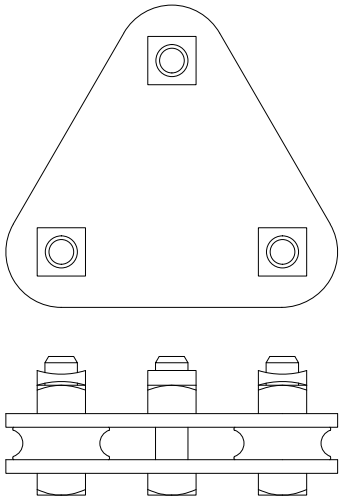
Guy links and yoke plates are typically used in pairs for down guying and are connected to guy plates, dead end tees or pole bands. Components may be ordered individually or as complete assemblies as noted below. The catalog number represents individual units, not pairs. Other links, yoke plates and guy rollers are available.

Guy Link & Yoke Plate Assemblies



27261 Type 1

Guy Link Assembly
Single Guy



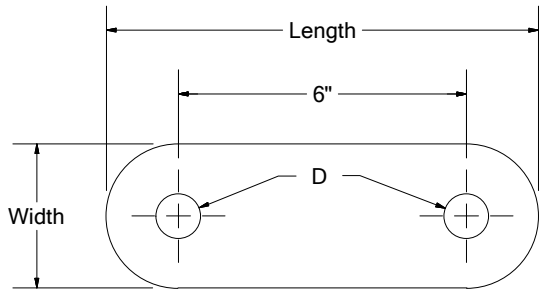
27262 Type 2

Guy Link Assembly
Double Guys

Catalog Number		
Material List Per Assembly	**27261**	**27262**
22421 Link	2	
22523 Yoke Plate		2
R-26-7 Guy Roller	1	2
M7030-2, $\frac{7}{8}$" x 3" Bolt	2	3
N7, $\frac{7}{8}$" Square Nut	2	3
MF7, $\frac{7}{8}$" MF Locknut	2	3
Approx. Wt. Lbs. Each	**8.2**	**15.5**

Connecting Links

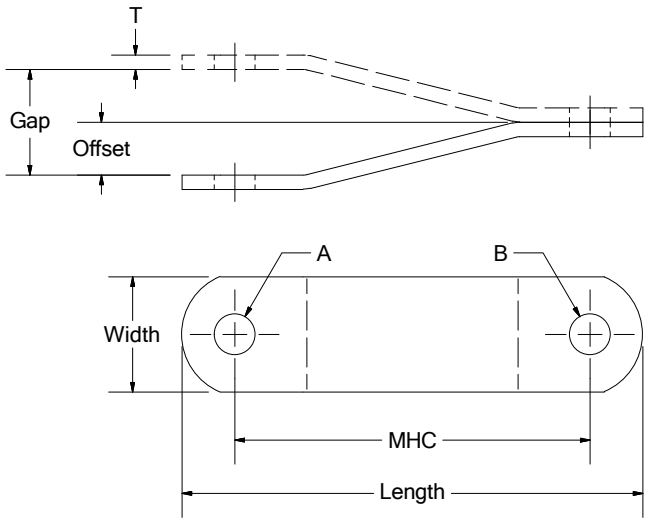
Straight Links



Catalog Number	Dimensions	Diameter "D"	Approx. Wt. Lbs. Each
22421	3/8" x 3" x 9"	15/16"	2.6
22421-A	3/8" x 3" x 9"	1 1/8"	2.6
22421-B	3/8" x 2" x 8 1/2"	15/16"	1.6
22421-C	1/4" x 2" x 8 1/2"	15/16"	1.1
22421-D	1/2" x 3" x 9"	1 1/8"	3.2

Links sold individually. Other links also available.

Bent Links



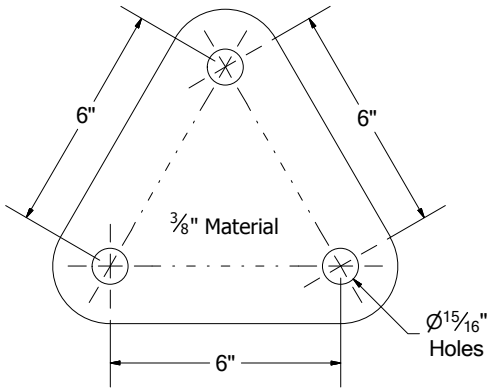
Catalog Number	Dimensions	MHC	Offset (1 Link)	Gap (2 Links)	A	B	Approx. Wt. Lbs. Each
3151	1/4" x 3" x 9 1/2"	7 1/4"	3/4"	1 1/2"	15/16"	1 1/4"	1.8
3152	1/4" x 2" x 9 1/2"	7 1/2"	3/4"	1 1/2"	15/16"	15/16"	1.2
3153	1/4" x 3" x 9 1/2"	7"	3/4"	1 1/2"	15/16"	15/16"	1.8
3154	3/8" x 2" x 9 1/2"	7 1/2"	1"	2"	15/16"	15/16"	1.8
3155	3/8" x 3" x 10"	7 1/4"	3/4"	1 1/2"	1 1/16"	1 1/16"	2.8
3157	3/8" x 3" x 12"	9 1/4"	1 3/8"	2 3/4"	1 1/16"	1 1/16"	3.5
3160	3/8" x 3" x 9 1/2"	7 1/8"	1"	2"	1 1/16"	1 1/4"	2.6
3176	3/8" x 3" x 9 1/2"	7 1/8"	1"	2"	15/16"	1 1/4"	2.8

Links sold individually. Other links also available.

Yoke Plates

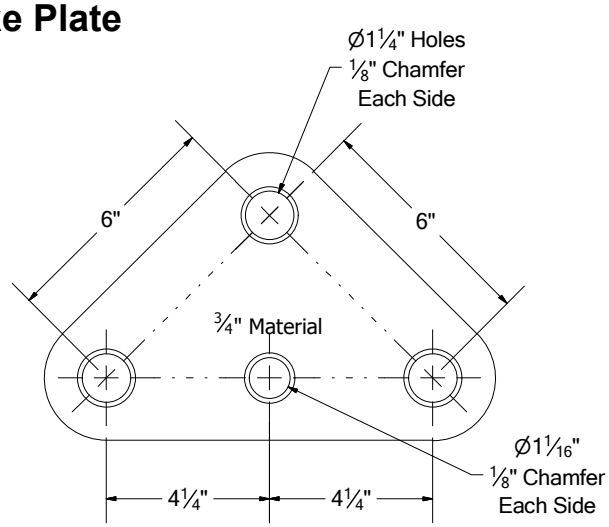
22523 Yoke Plate

Double Guy



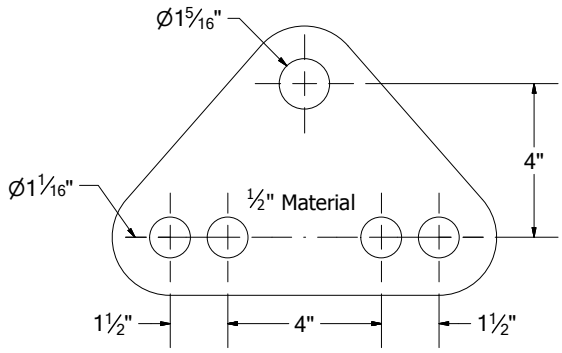
Catalog Number	Approx. Wt. Lbs. Each
22523	5.5

22524 Yoke Plate



Catalog Number	Approx. Wt. Lbs. Each
22524	9.1

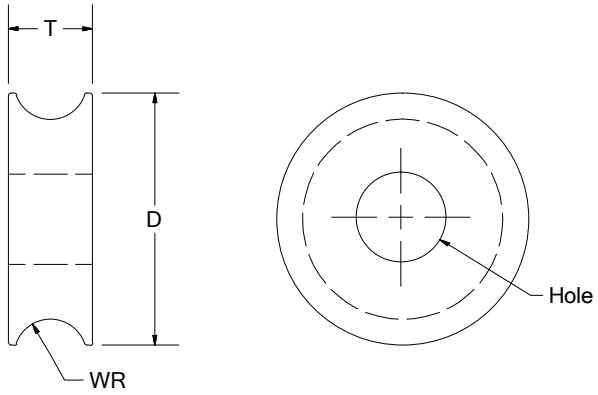
22525 Yoke Plate



Catalog Number	Approx. Wt. Lbs. Each
22525	5.0

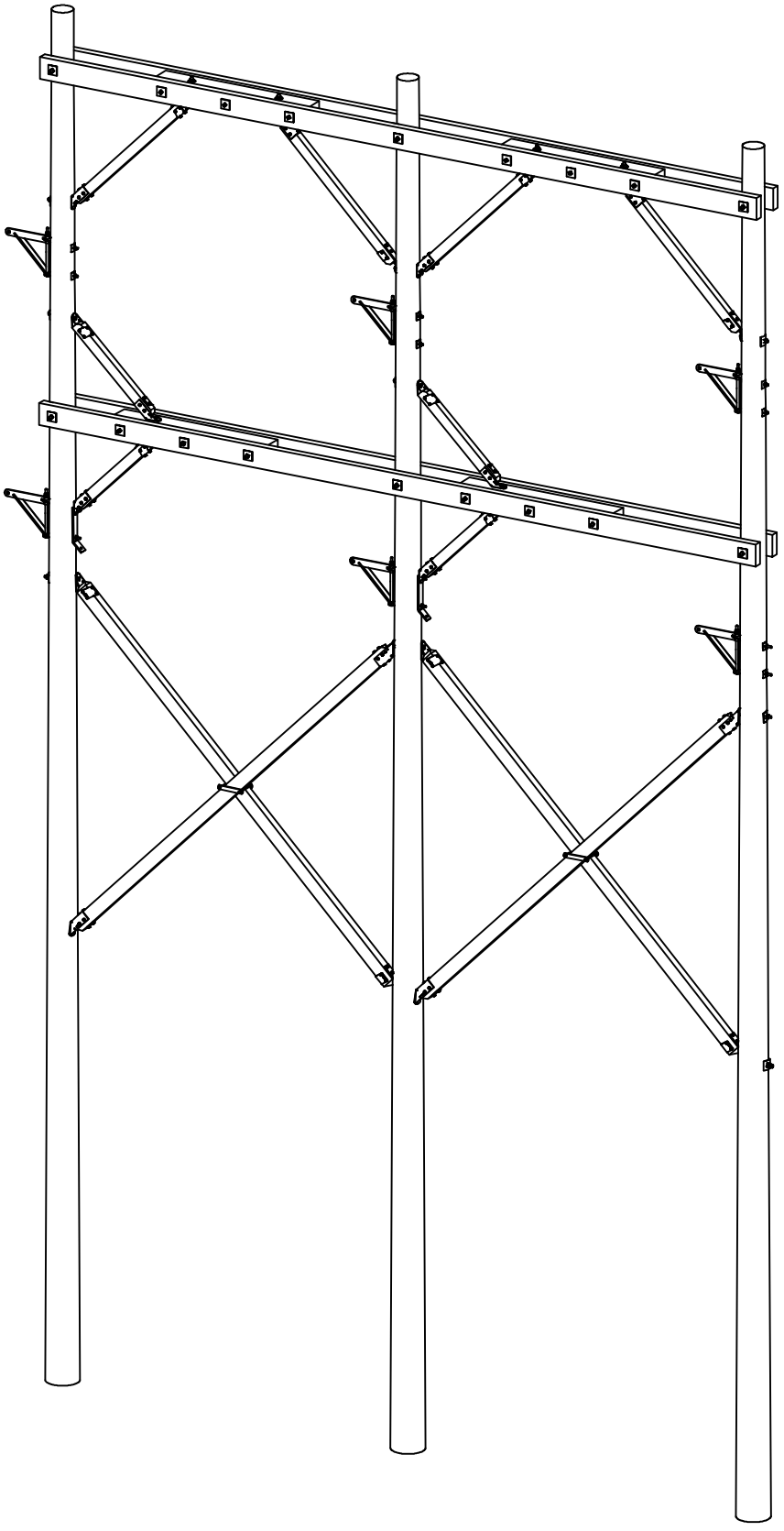
Guy Rollers

BROOKS Guy Rollers are ductile iron grade 604512 and hot dipped galvanized to ASTM A-153.



Catalog Number	Wire Seat Radius "WR"	Hole Size	Thickness "T"	Diameter "D"	Approx. Wt. Lbs. Each
R-26-7	1 1/8"	15/16"	7/8"	2 5/8"	0.9
R-31-1	1 9/16"	1 1/16"	1"	3 1/4"	1.6

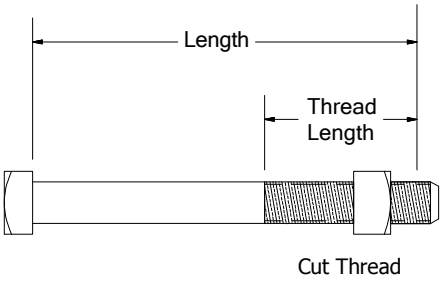
BROOKS
MANUFACTURING CO.



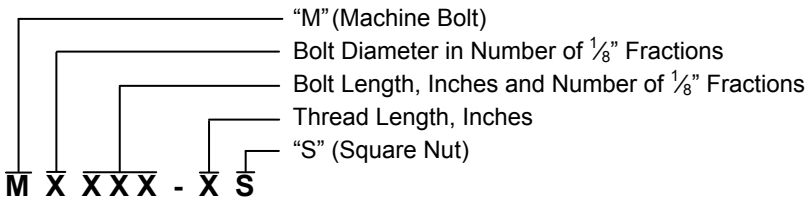
Bolts

Machine Bolts

All BROOKS bolts meet the requirements of ANSI C135.1. All square head machine bolts are furnished standard with (1) square nut. Other lengths are available on request.



Furnished standard with (1) square nut.



Example: M5104-4S = 5/8" x 10 1/2" Machine Bolt with (1) nut.

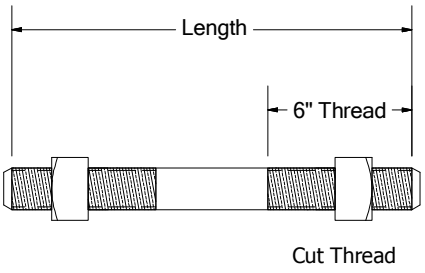
Catalog Number	Length	Thread Length	Approx. Wt. Lbs. Each
3/4" Diameter—18,350 Lbs. Minimum Tensile Strength			
M6080-4S	8"	4"	1.33
M6100-4S	10"	4"	1.35
M6120-6S	12"	6"	1.60
M6140-6S	14"	6"	1.88
M6160-6S	16"	6"	2.06
M6180-6S	18"	6"	2.14
M6200-6S	20"	6"	2.41
M6220-6S	22"	6"	2.73
M6240-6S	24"	6"	2.78
1" Diameter—33,500 Lbs. Minimum Tensile Strength			
M8140-6S	14"	6"	3.56
M8160-6S	16"	6"	4.03
M8180-6S	18"	6"	4.48
M8200-6S	20"	6"	4.92
M8220-6S	22"	6"	5.38
M8240-6S	24"	6"	5.83
M8260-6S	26"	6"	6.28
M8280-6S	28"	6"	6.73

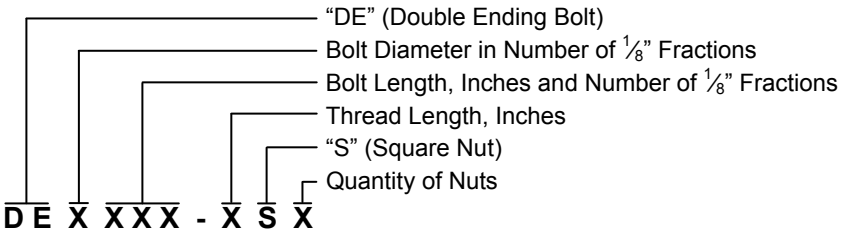
Catalog Number	Length	Thread Length	Approx. Wt. Lbs. Each
7/8" Diameter—25,400 Lbs. Minimum Tensile Strength			
M7030-2S	3"	2"	1.21
M7080-4S	8"	4"	1.80
M7100-4S	10"	4"	2.12
M7120-6S	12"	6"	2.44
M7140-6S	14"	6"	2.77
M7160-6S	16"	6"	3.09
M7180-6S	18"	6"	3.41
M7200-6S	20"	6"	3.73
M7220-6S	22"	6"	4.05
M7240-6S	24"	6"	4.38
M7260-6S	26"	6"	4.70

Double End Bolts

BROOKS Double End Bolts are commonly used to attach double crossarm transmission assemblies at the pole locations. BROOKS Double End Bolts meet the requirements of ANSI C135.1, are threaded 6" on each end and furnished standard with (2) square nuts. Other lengths and thread lengths are available on request.

Furnished standard with (2) square nuts.





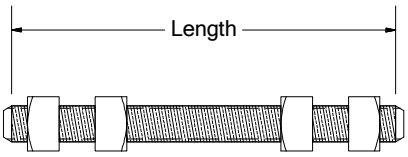
Example: DE6260-6S2 = ¾" x 26" Double Ending Bolt with (2) nuts.

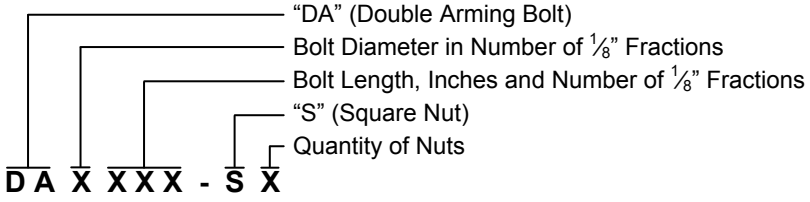
Catalog Number	Length	Approx. Wt. Lbs. Each
⅞" Diameter—25,400 Lbs. Minimum Tensile Strength		
DE7180-6S2	18"	3.38
DE7200-6S2	20"	3.63
DE7220-6S2	22"	3.99
DE7240-6S2	24"	4.25
DE7260-6S2	26"	4.66
DE7280-6S2	28"	4.96
DE7300-6S2	30"	5.26

Catalog Number	Length	Approx. Wt. Lbs. Each
1" Diameter—33,500 Lbs. Minimum Tensile Strength		
DE8200-6S2	20"	4.68
DE8220-6S2	22"	5.13
DE8240-6S2	24"	5.58
DE8260-6S2	26"	6.03
DE8280-6S2	28"	6.48
DE8300-6S2	30"	6.93
DE8320-6S2	32"	7.38

Double Arming Bolts

Furnished standard with (4) square nuts.

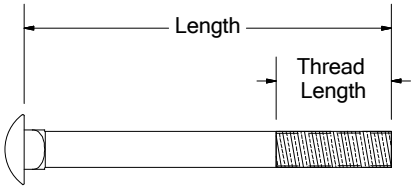


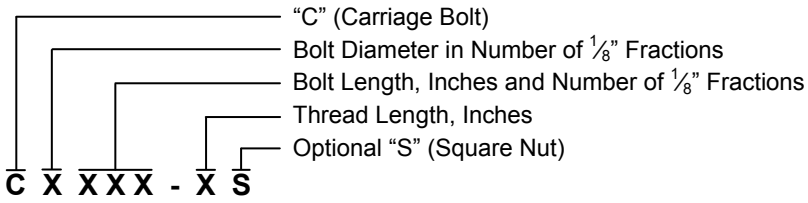


Example: DA6240-S4 = ¾" x 24" Double Arming Bolt with (4) nuts.

Carriage Bolts

Square nuts ordered separately.

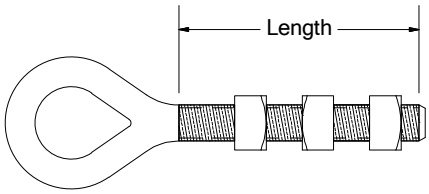


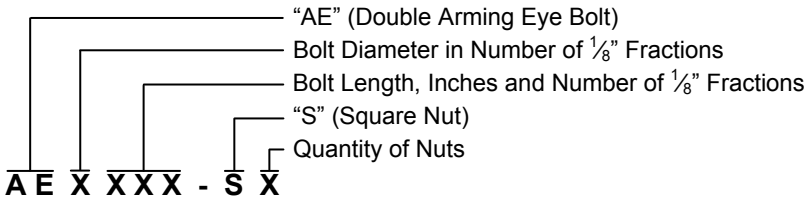


Example: C5074-3S = $\frac{5}{8}$" x 7$\frac{1}{2}$" Carriage Bolt with (1) nut.

Double Arming Eye Bolts

Furnished standard with (3) square nuts.

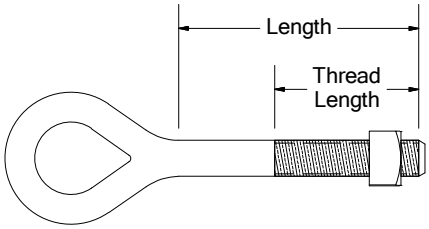


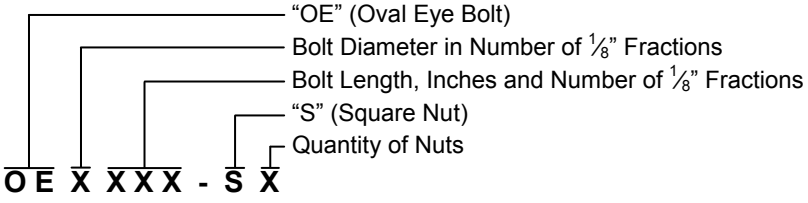


Example: AE6200-S3 = $\frac{3}{4}$" x 20" Double Arming Eye Bolt with (3) nuts.

Oval Eye Bolts

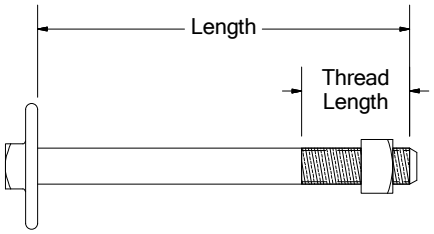
Furnished standard with (1) square nut.





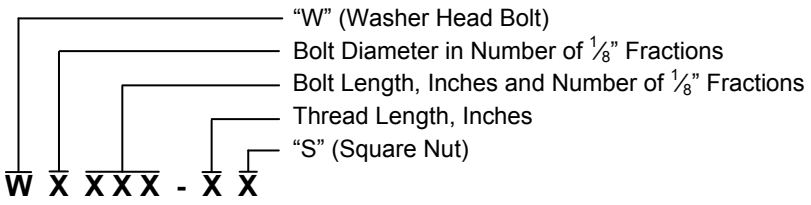
Example: OE5100-4S = $\frac{5}{8}$" x 10" Oval Eye Bolt with (1) nut.

Washer Head Bolts



Furnished standard with (1) square nut.

Bolt Size	Washer Diameter Minimum
3/8"	7/8"
1/2"	1 3/8"
5/8"	2"
3/4"	2 1/4"
7/8"	2 1/2"
1"	3"

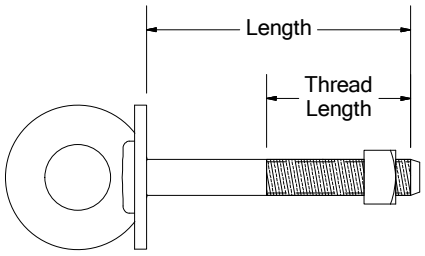


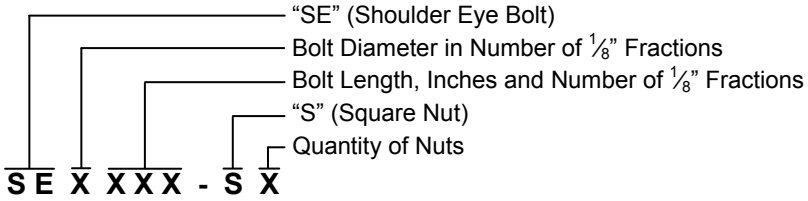
Example: W5104-4S = 5/8" x 10 1/2" Washer Head Bolt with (1) nut.

Welded Shoulder Eye Bolts

BROOKS Shoulder Eye Bolts are typically used to support suspension insulators in single crossarm construction. The inside eye diameter is 1 3/8" which accepts either a C-hook or a clevis connection. Each bolt is furnished standard with (1) square nut.

Furnished standard with (1) square nut.





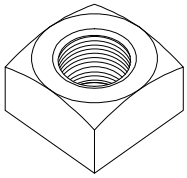
Example: SE5100-4S = 5/8" x 10" Shoulder Eye Bolt with (1) nut.

Catalog Number	Length	Thread Length	Approx. Wt. Lbs. Each
5/8" Diameter—12,400 Lbs. Minimum Tensile Strength			
SE5060-3S	6"	3"	1.64
SE5070-3S	7"	3"	1.73
SE5080-4S	8"	4"	1.82
SE5100-4S	10"	4"	1.99
SE5120-6S	12"	6"	2.16

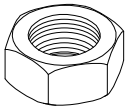
Catalog Number	Length	Thread Length	Approx. Wt. Lbs. Each
3/4" Diameter—18,350 Lbs. Minimum Tensile Strength			
SE6060-3S	6"	3"	2.20
SE6070-3S	7"	3"	2.30
SE6080-4S	8"	4"	2.45
SE6100-4S	10"	4"	2.68
SE6120-6S	12"	6"	2.93

Nuts

Square Nuts



Hex Nuts

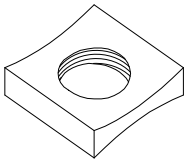


Catalog Number	Bolt Diameter	Approx. Wt. Lbs. Per C.
N3	3/8"	3
N4	1/2"	6
N5	5/8"	10
N6	3/4"	14
N7	7/8"	24
N8	1"	37

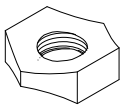
To order Hex Nuts, add suffix "-H" to the above numbers.

MF Locknuts

Square MF Locknuts



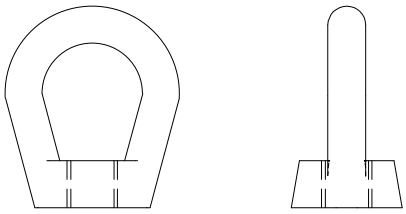
Hex MF Locknuts



Catalog Number	Bolt Diameter	Approx. Wt. Lbs. Per C.
MF3	3/8"	1
MF4	1/2"	2
MF5	5/8"	4
MF6	3/4"	6
MF7	7/8"	8
MF8	1"	12

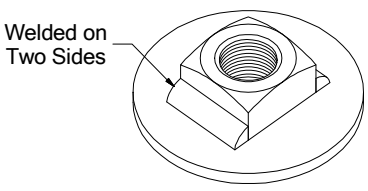
To order Hex Nuts, add suffix "-H" to the above numbers.

Eye Nuts



Catalog Number	Bolt Diameter	Approx. Wt. Lbs. Per C.
EN5	5/8"	60
EN6	3/4"	60
EN7	7/8"	150

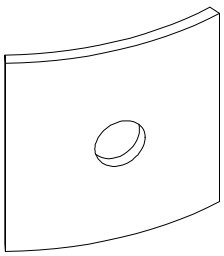
Welded Washer Nuts



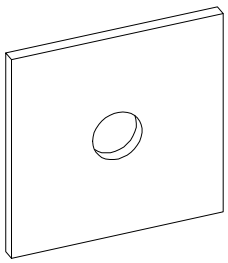
Catalog Number	Bolt Diameter	Outside Diameter "OD"	Washer Thickness "T"	Approx. Wt. Lbs. Per C.
WN4	1/2"	2"	9/64"	26
WN5	5/8"	2 1/2"	1/4"	42
WN6	3/4"	3"	1/4"	61
WN7	7/8"	3"	5/16"	105
WN8	1"	3 3/4"	3/8"	165

Washers

Square Curved Washers



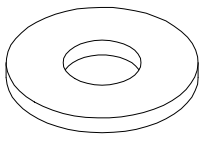
Square Flat Washers



Catalog Number				Approx. Wt.
Curved Washers	Flat Washers	Dimensions	Hole Size	Lbs. Each
SCW5-304	**SFW5-304**	3" x 3" x 1/4"	11/16"	0.65
SCW6-304	**SFW6-304**	3" x 3" x 1/4"	13/16"	0.63
SCW7-304	**SFW7-304**	3" x 3" x 1/4"	15/16"	0.61
SCW6-404	**SFW6-404**	4" x 4" x 1/4"	13/16"	1.12
SCW7-404	**SFW7-404**	4" x 4" x 1/4"	15/16"	1.08
SCW8-404	**SFW8-404**	4" x 4" x 1/4"	1 1/8"	1.07
SCW7-406	**SFW7-406**	4" x 4" x 3/8"	15/16"	1.60
SCW8-406	**SFW8-406**	4" x 4" x 3/8"	1 1/8"	1.58

Other washer sizes and hole sizes are available.

Round Washers

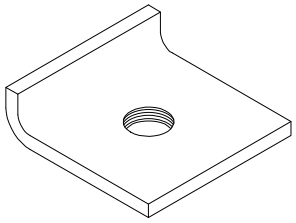


Catalog Number	Dimensions	Hole Size	Approx. Wt. Lbs. Each
RW3-10	1" x 1/8"	7/8"	0.02
RW4-13	1 3/8" x 1/8"	9/16"	0.04
RW4-30	3" x 3/16"	9/16"	0.48
RW5-16	1 3/4" x 1/8"	11/16"	0.07
RW6-20	2" x 1/8"	13/16"	0.12
RW7-22	2 1/4" x 1/8"	15/16"	0.15
RW7-30	3" x 1/8"	15/16"	0.20
RW8-30	3" x 1/8"	1 1/16"	0.15

Other round washer sizes are available.

Lock Washers

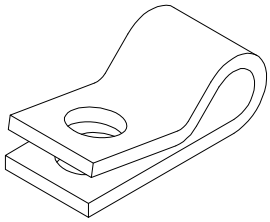
Tapped Lip Washers



Catalog Number	Dimensions	Bolt Diameter	Approx. Wt. Lbs. Each
64596-4	2" x 2 3/16" x 3/16"	1/2"	0.27
64596-5	2" x 2 3/16" x 3/16"	5/8"	0.27
64596-6	3" x 3" x 1/4"	3/4"	0.65
64596-7	3" x 3" x 1/4"	7/8"	0.82

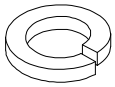
Other tapped lip washer sizes are also available.

Spring Washers



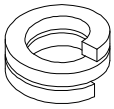
Catalog Number	Bolt Diameter	Approx. Wt. Lbs. Per C.
SW4	1/2"	24
SW5	5/8"	90
SW6	3/4"	90
SW7	7/8"	70
SW8	1"	89

Split Lock Washers



Catalog Number	Bolt Diameter	Approx. Wt. Lbs. Per C.
LW4	1/2"	2.0
LW5	5/8"	3.0
LW6	3/4"	5.0
LW7	7/8"	7.0
LW8	1"	12.0

Double Coil Spring Lock Washers



Catalog Number	Bolt Diameter	Approx. Wt. Lbs. Per C.
LW2-4	1/2"	3.0
LW2-5	5/8"	5.0
LW2-6	3/4"	8.0
LW2-7	7/8"	11.0
LW2-8	1"	15.0

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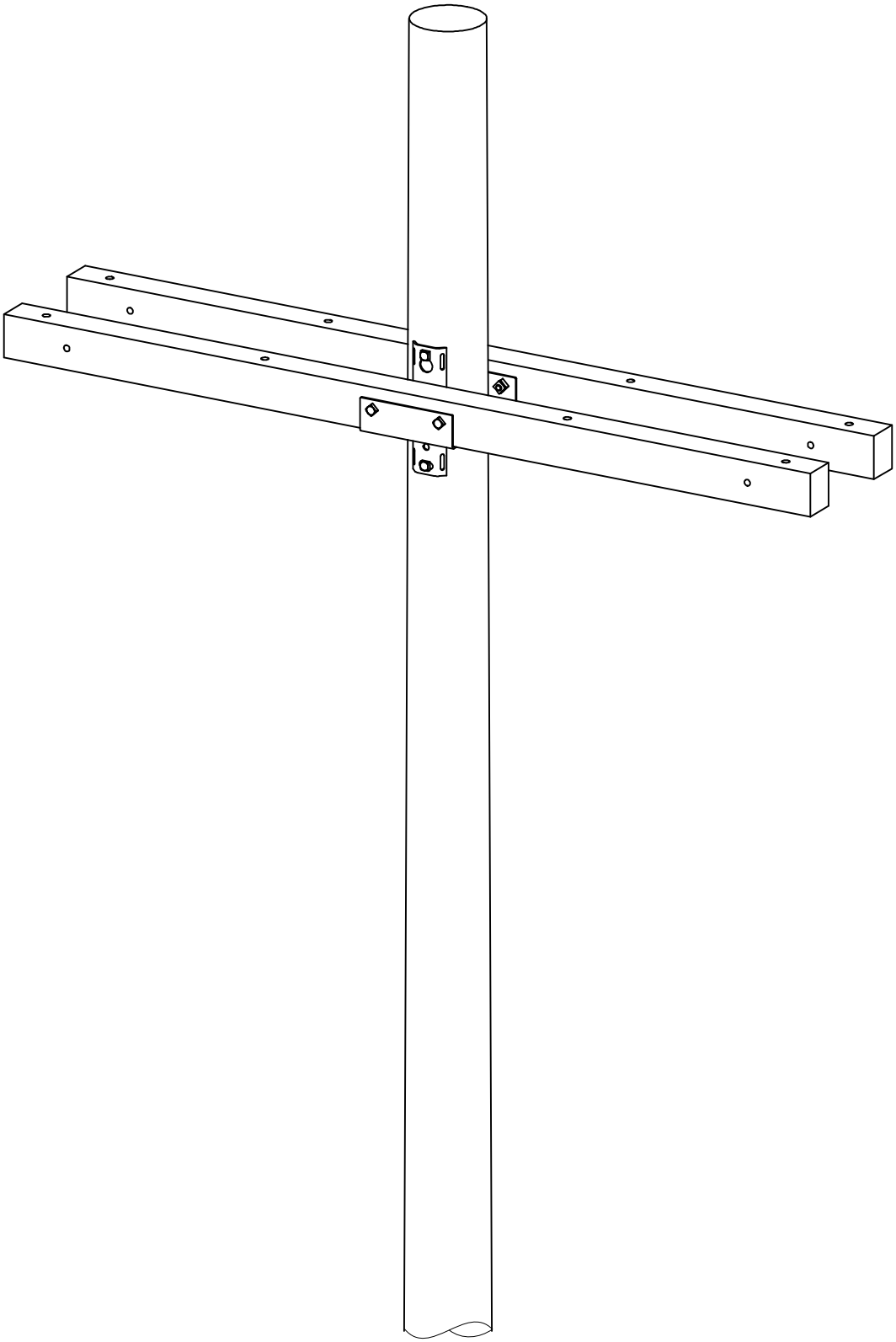
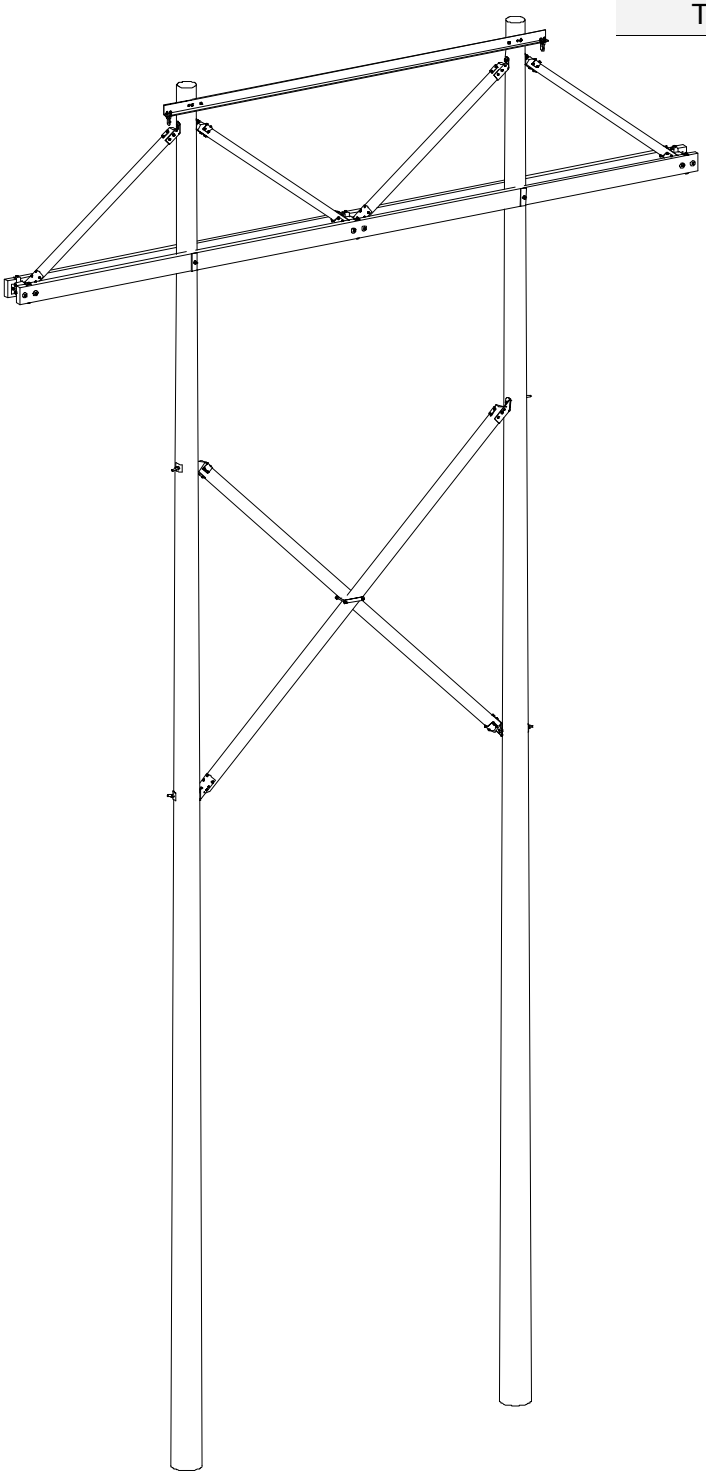
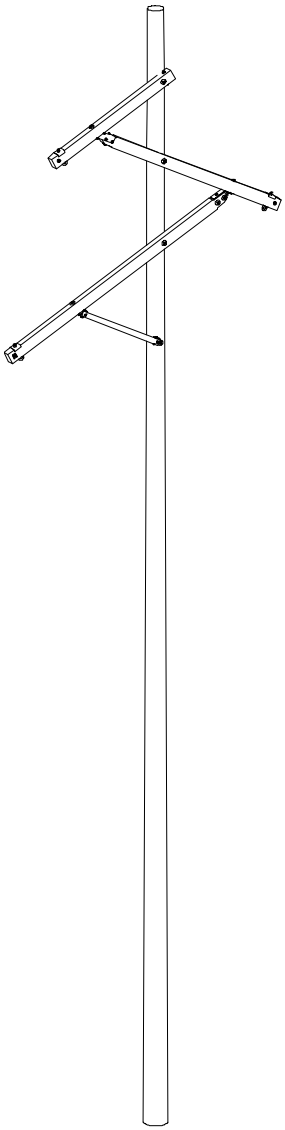
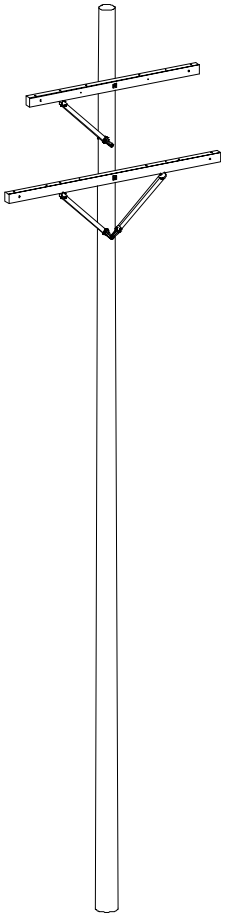


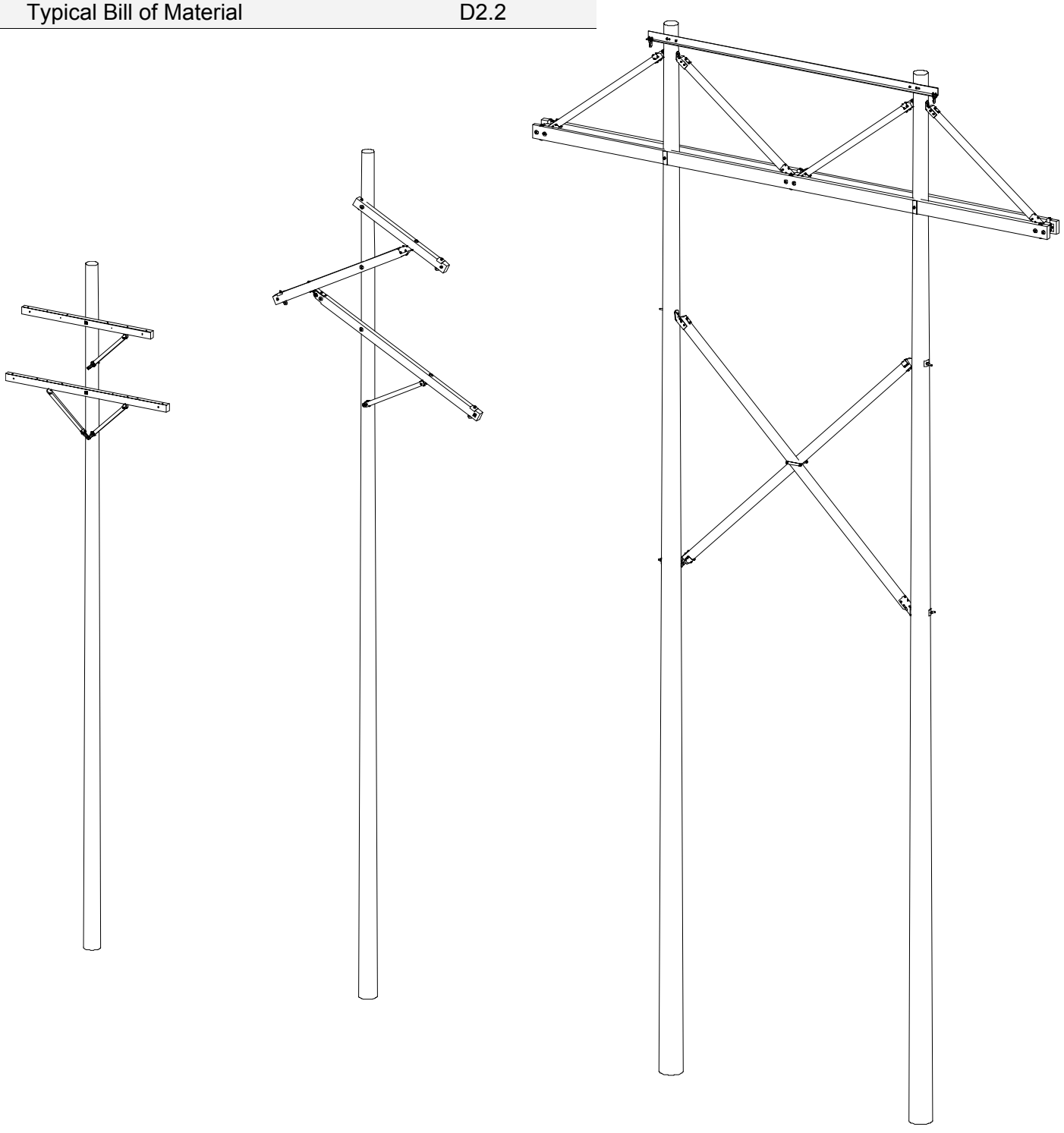
Structure Applications





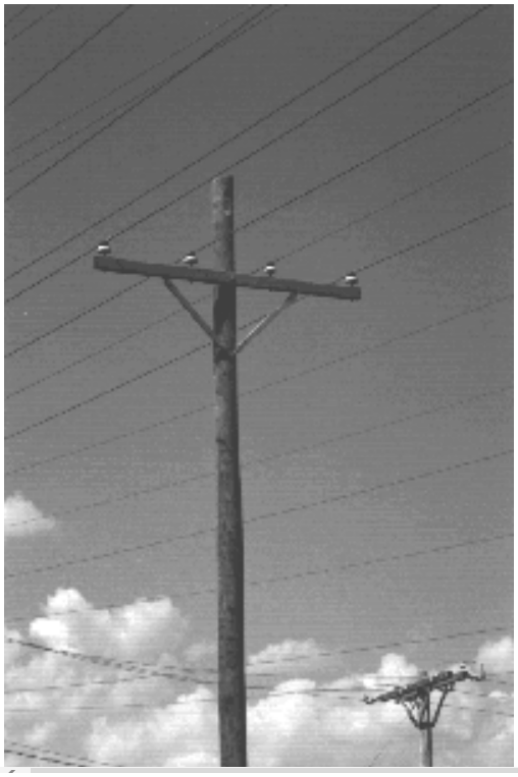


Structure Applications

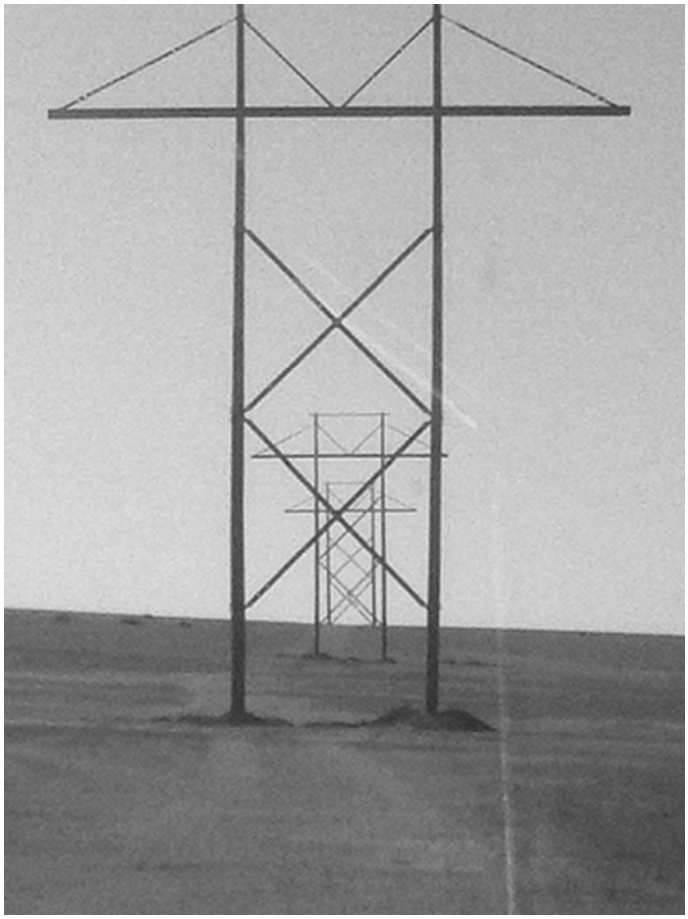


Structure Applications & Designs

BROOKS Manufacturing Co. is much more than a manufacturer of quality distribution crossarms and braces. For over 60 years, BROOKS has been designing and manufacturing transmission products including individual components, structure framing kits and complete structures up through 345kV construction. The cornerstone of BROOKS product design is proper application of sound engineering principles, verified by full scale testing, and backed by many years of successful field installations. BROOKS engineers will match products to your existing framing designs, or work with you designing custom products that meet your specific requirements.



Distribution

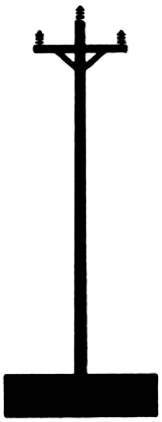


Transmission

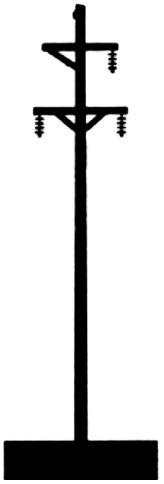
Typical Tangent Structures

BROOKS has standard designs or will work with you on creating custom designs for complete structures or structure components for application from distribution through 345kV construction.

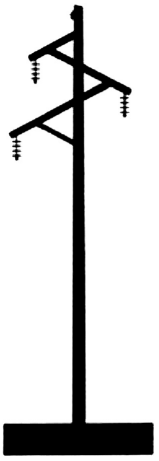
Single Pole Structures



SPT-1 Distribution to 115kV

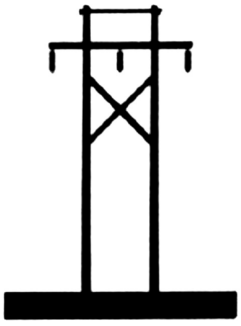


SPT-2 Distribution to 138kV

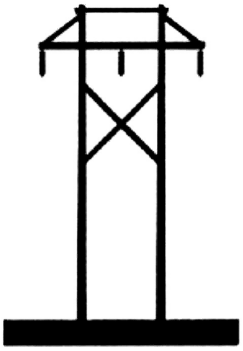


SPT-3 Distribution to 138kV

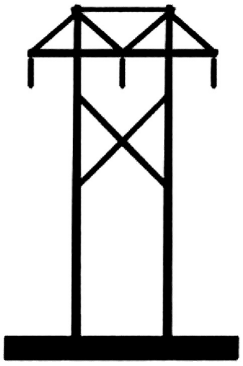
H-Frame Structures - 69kV to 230kV



HT-1

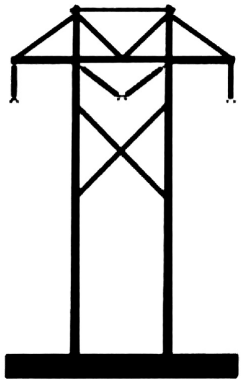


HT-2

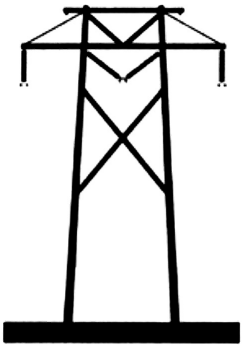


HT-3

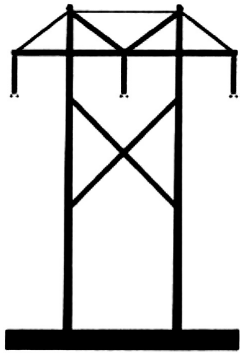
H-Frame Structures - 345kV



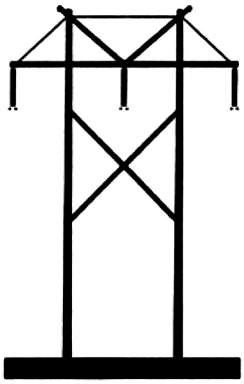
HT-4



HT-5



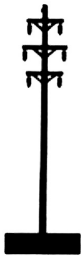
HT-6



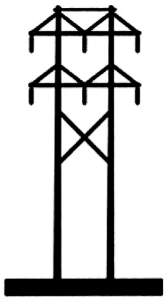
HT-7

Double Circuit Structures

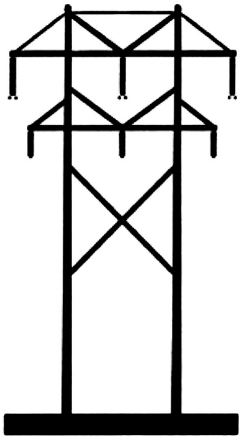
Distribution to 69kV
SPT-DC-1



Distribution to 115kV
SPT-DC-2



34.5kV to 230kV
HT-DC-1

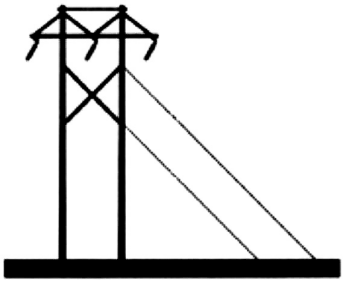


69/34.5kV to 345/230kV
HT-DC-2

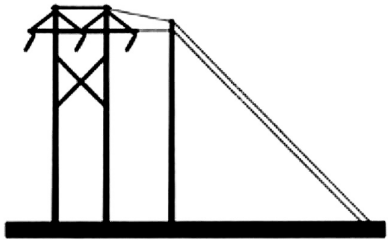
Angle & Dead End Structures

BROOKS offers structure designs and framing kits for a complete range of angle structures and dead end structures.

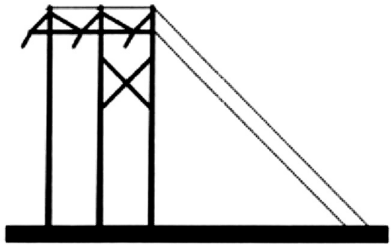
Single Conductor Structures - 34.5kV to 230kV



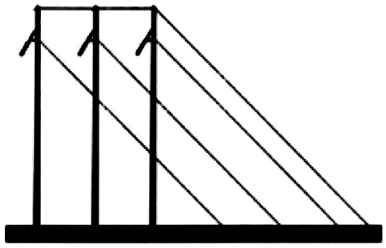
SA-1 Small Angle



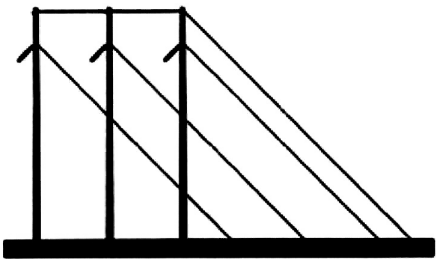
SA-2 Small Angle



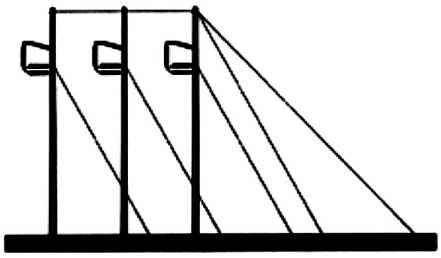
SA-3 Small Angle



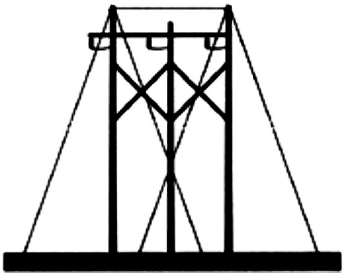
MA-1 Medium Angle



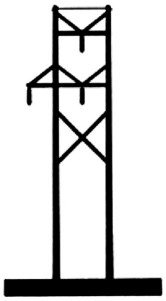
LA-1 Large Angle



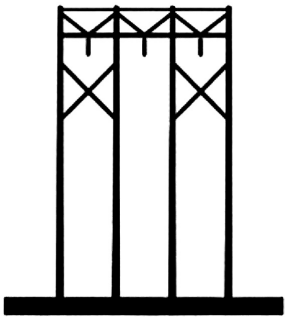
LADE-1 Large Angle Dead End



DET-1 Tangent Dead End

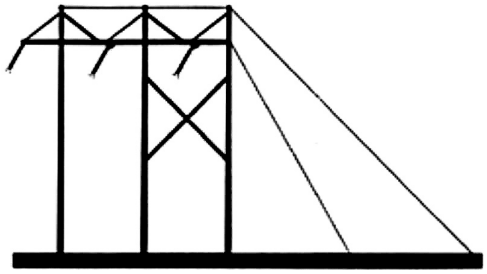


TRAN-1 Transposition

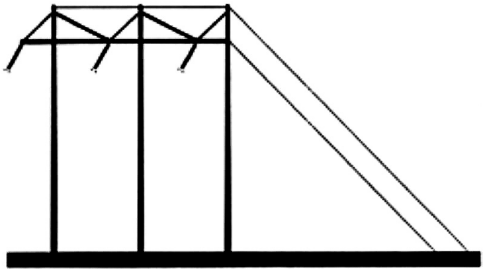


LSHT-1 Long Span Tangent

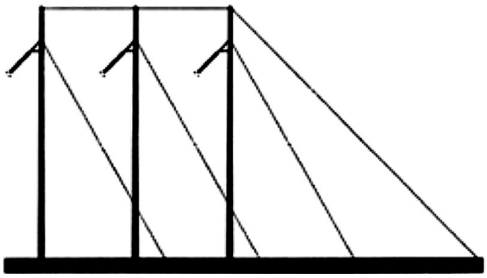
Bundled Conductor Structures - 115kV to 345kV



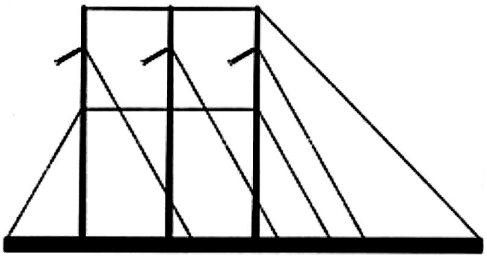
SAB-1 Small Angle



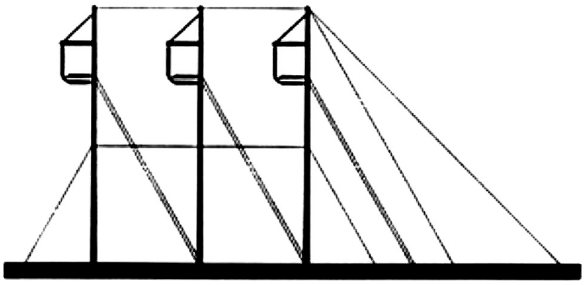
SAB-2 Small Angle



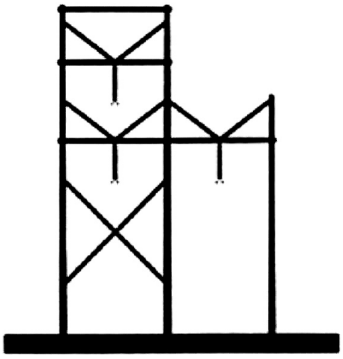
MAB-1 Medium Angle



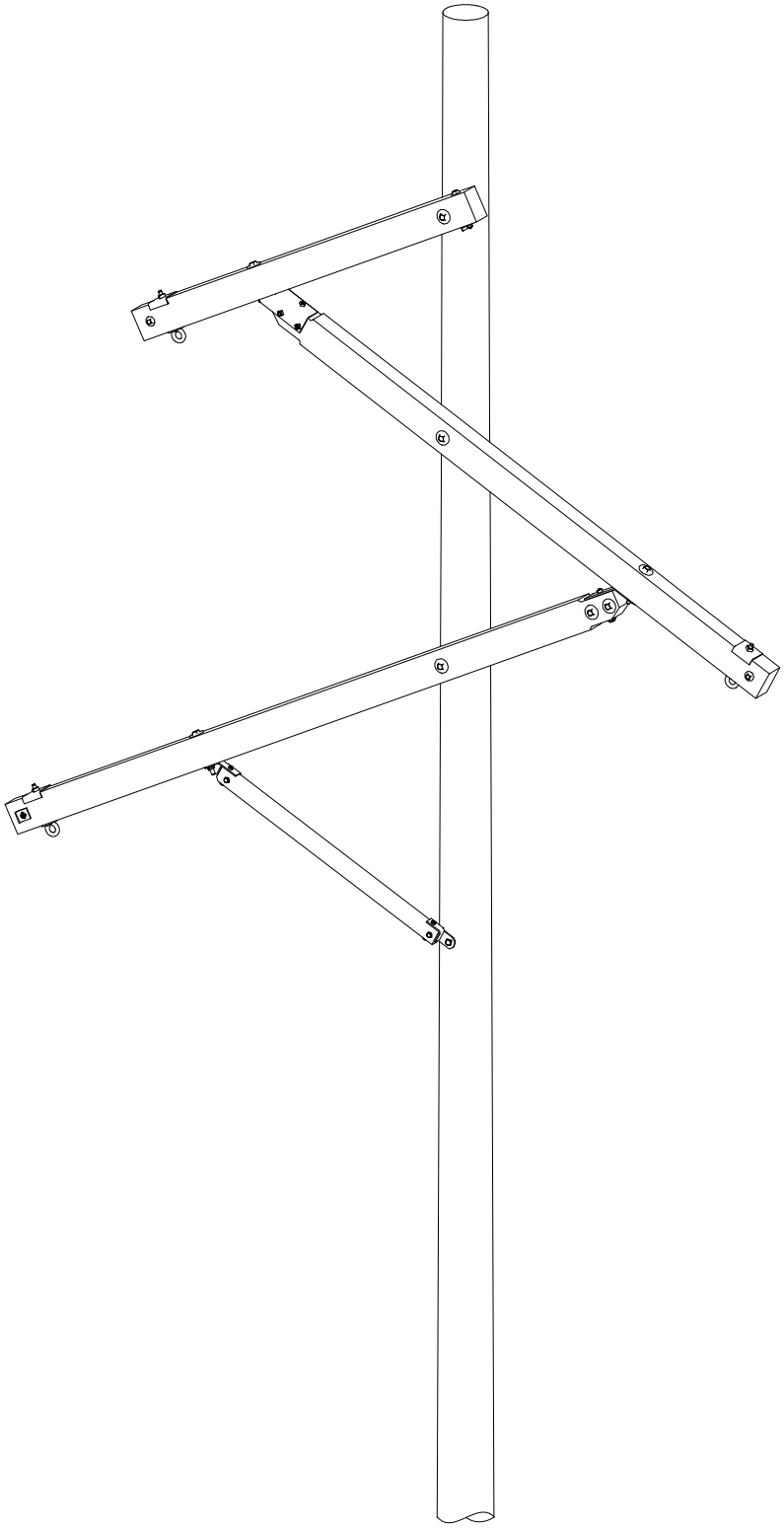
LAB-1 Large Angle



LADEB-1 Large Angle Dead End

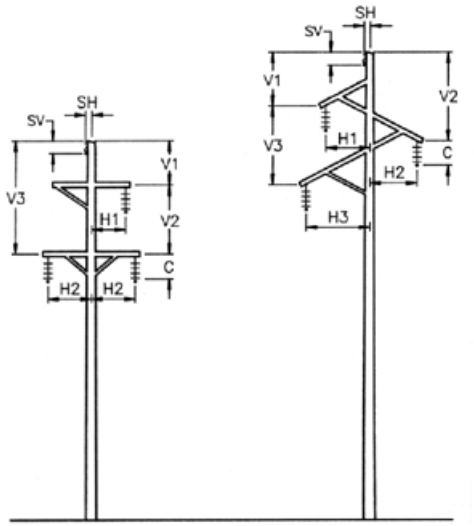


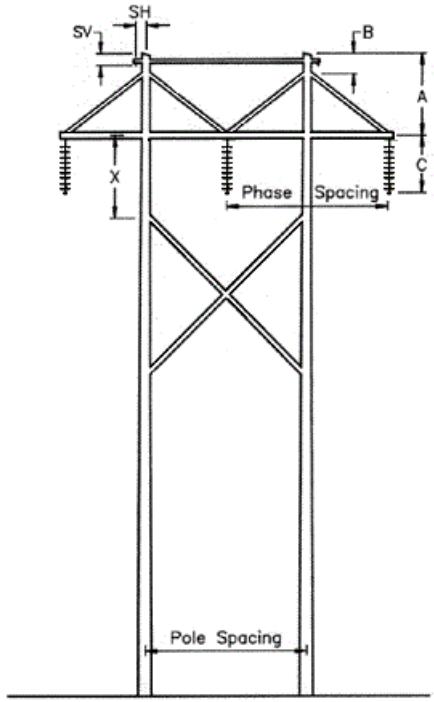
TRANB-1 Transposition



Structure Design Data

This “structure design data” will provide our Engineering Department with the necessary loading and design information to select a standard design or develop a custom design to optimize your construction dollars.





Single Pole Data

V1 _____ Feet H1 _____ Feet

V2 _____ Feet H2 _____ Feet

V3 _____ Feet H3 _____ Feet

H-Frame Data

A _____ Feet X _____Feet

Phase Spacing _____ Feet

Pole Spacing _____ Feet

Single Pole & H-Frame Data

Structure Type Number _____ Line Voltage _____kV Miles of Line _____

Quantity of Structures _____ Estimated Deliver Date _____

Pole Type(s) ❑ Douglas Fir ❑ Southern Yellow PIne ❑ Western Red Cedar ❑ Laminated Douglas Fir

Pole Lengths _____ Feet Through _____ Feet Pole Classes _____ Through _____

Maximum Weight Span _____ Feet Maximum Wind Span _____ Feet

Ruling Span _____ Feet

Conductor Type _____ (Ex: 795 ACSR 26/7) Number of Conductors Per Phase _____

Shield Wire Type _____ (Ex: ⅜” EHS Steel Strand) Number of Shield Wires (Total) _____

Structure Line Angle _____ Degrees

Conductor Maximum Design Tension _____ Pounds

Shield Wire Maximum Design Tension _____ Pounds

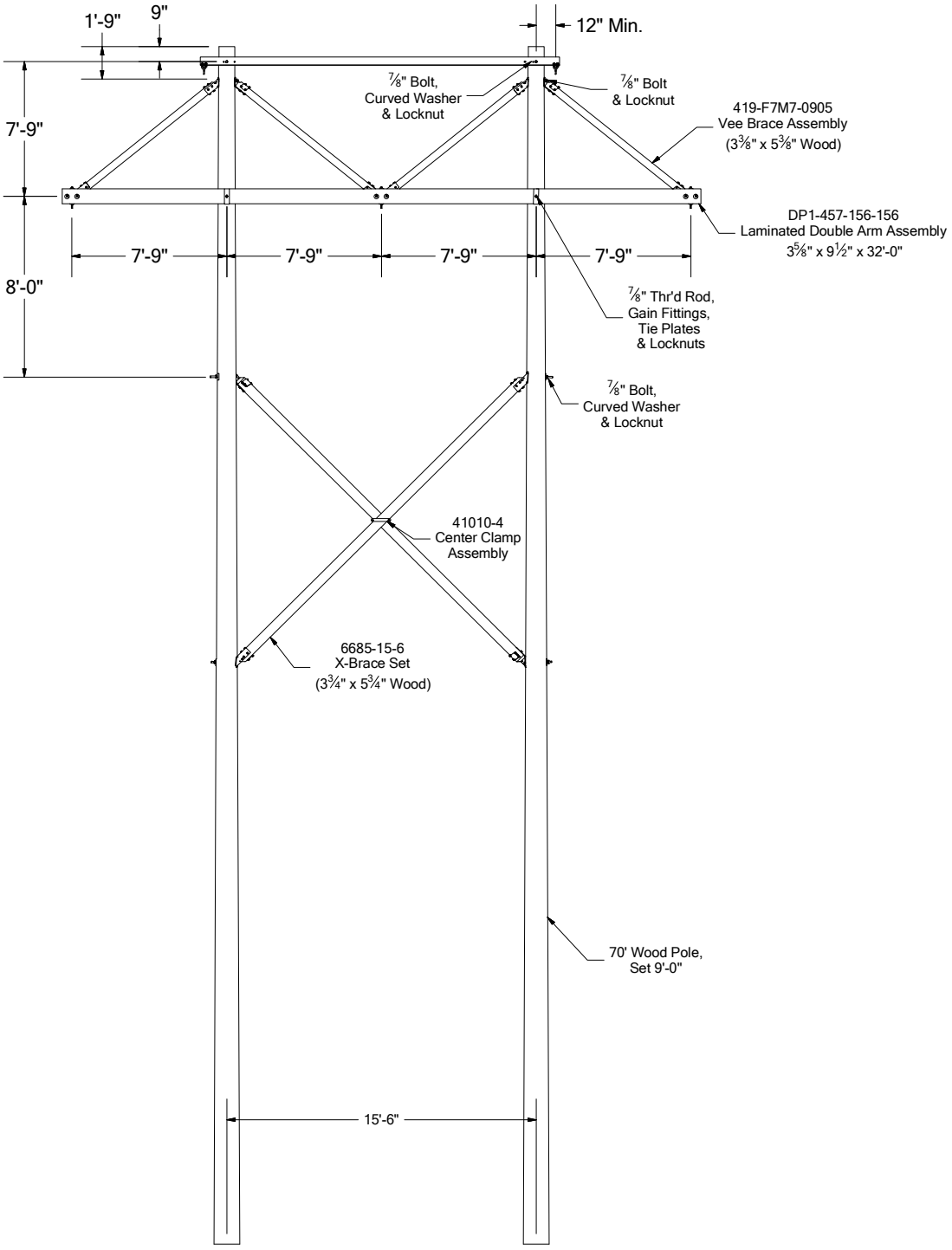
SH _____ Feet SV _____ Feet C _____ Feet

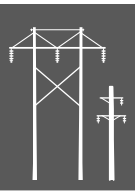
Specify your standard NESC loading condition and / or any special loading conditions.

Case _____ Radical Ice _____ Wind psf _____ Load Factors _____

Typical Design & Structure Drawing

161 kV H-Frame Tangent





Typical Bill of Material

161 kV H-Frame Tangent

BROOKS Manufacturing Co.
Bill of Material
Date
Page 1 of 1

Catalog Number Bill of Material
XYZ Company, Anywhere, USA
161kV H-Frame Tangent Structure

Qty.	Catalog No.	Description	Cross Ref. Pages*
		Crossarm Shop Assembly & Mounting Hardware	
1	DP1-457-156-156	Double Arm Assembly	B1
2	DP1-457-156-156W	3 5/8" x 9 1/2" x 32'-0" Laminated Crossarm	B1.1
3	5860-3545	Adjustable Spacer Fitting Assembly, 8 3/4" to 12 3/4"	C1.1.2
6	W4104-4S	1/2" x 10 1/2" Washer Head Bolt w/ Square Nut	C5.3
1	W5050-3S	5/8" x 5" Washer Head Bolt w/ Square Nut	C5.3
2			
1	41058BS-2SL	7/8" x 8" Bent Stud w/ (2) Square Nut, (2) MF Locknut	C1.1.3
2	41058BB-SL	7/8" x 6" Bent Bolt w/ Square Nut & MF Locknut	C1.1.3
2	DE7240-6S2	7/8" x 24" Double End Bolt w/ (2) Square Nut	C5.2
4	6028-094B	3" x 9 1/2" x 1/4" Flat Gain Plate	C1.3
4	6029-094B	3" x 9 1/2" x 1/4" Ribbed Tie Plate	C1.3
4	MF7	7/8" MF Locknut	C5.5
		X-Brace Shop Assembly & Mounting Hardware	
1	6685-15-6-NMC	3 3/4" x 5 3/4" X-Brace Set, 15'-6" PS	B3.5.4
1	41010-4	Center Clamp Assembly	B3.5.15
2	M7140-6S	7/8" x 14" Machine Bolt w/ Square Nut	C5.1
2	M7160-6S	7/8" x 16" Machine Bolt w/ Square Nut	C5.1
4	SCW7-404	1/4" x 4" Square Curved Washer	C5.6
4	MF7	7/8" MF Locknut	C5.5
		Vee-Brace & Mounting Hardware	
4	419-F7M7-0905	3 3/8" x 5 3/8" x 9'-5" MHC, 37 1/2° & 52 1/2° Fittings	B3.2.3
2	M7140-6S	7/8" x 14" Machine Bolt w/ Square Nut	C5.1
2	MF7	7/8" MF Locknut	C5.5
		Shield Wire Support Assembly & Mounting Hardware	
1	502B156M-126-56	Shield Wire Support Assembly	B4
1	502B156M-126-56A	3" x 3 1/2" x 1/4" x 18'-0" Tie Angle	B4.2
2	7754	5/8" Chain Link	C1.8
2	27400	5/8" U-Bolt w/ (4) Hex Nuts & (2) MF Locknuts	C1.8
2	22066	1/2" x 1 3/4" Bonding Clip Assembly	C1.9
2	M7120-6S	7/8" x 12" Machine Bolt w/ Square Nut	C5.1
2	SCW7-404	1/4" x 4" Square Curved Washer	C5.6
2	MF7	7/8" MF Locknut	C5.5

* For catalog only.

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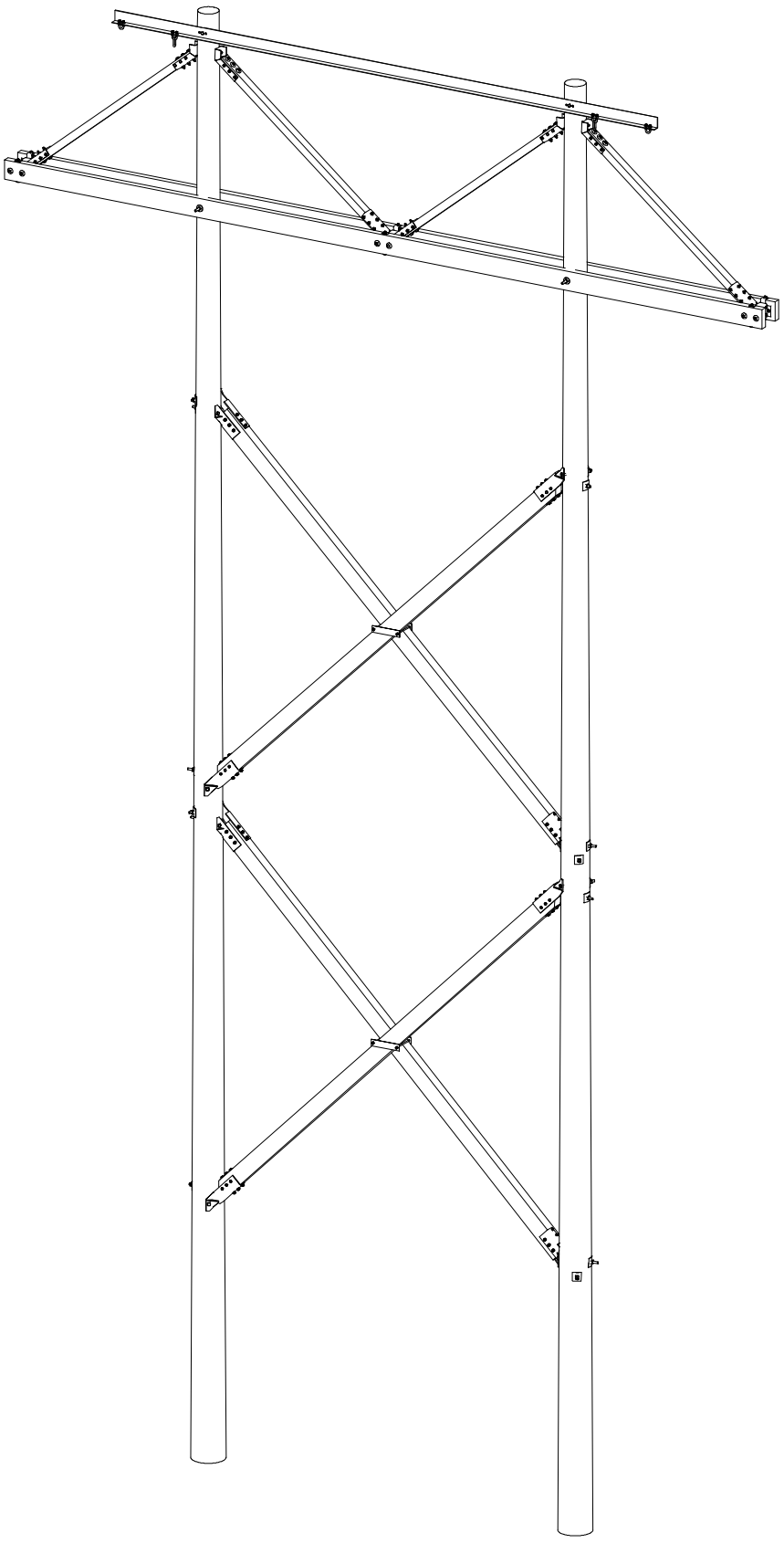

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22524	Yoke Plate	C4.4.2	
22525	Yoke Plate	C4.4.2	
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502 Series	Tie Angle Assemblies	B4.2	
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