



HUGHES  **BROTHERS**
Quality Forged Daily.

2026 CATALOG

HUGHES BROTHERS

PRODUCT CATALOG



Quality Forged Daily.

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HUGHES BROTHERS

Quality Forged Daily.



Our facility is located in Seward, Nebraska with a satellite operation in Roseburg Oregon.

The four original Hughes brothers had a Corporate mission statement before such statements were popular. "Produce the highest quality material, price it competitively and ship it on time" was the policy when the Company was founded in 1921, and continues to be our daily guideline.

Early production was centered around wood products such as crossarms, braces, wood guy guards, and ground wire moulding. As the industry grew so did Hughes Brothers, Inc. In the early 1940's, pole line hardware and custom manufactured metal fittings and parts were added to the expanding product line. Today, our factory houses a complete wood, metal and fiberglass manufacturing operation.

Hughes Brothers has always preferred to keep all manufacturing "in-house". We have a versatile metal fabrication facility complete with our own galvanizing plant. Our wood working shops can handle almost any size material. We operate our own wood preserving facility which is maintained and operated completely in accordance with EPA guidelines.

The Hughes Engineering Department is the beneficiary of years of full scale testing of hundreds of different transmission and distribution components and full scale structures. Additionally, our association with the country's leading utility engineers has given us a unique background in the structural design of transmission and distribution products. We continue to offer this engineering experience and expertise to the utility industry without obligation.

We hope this catalog illustrates the part or component you require, but if not, please do not hesitate to call our Engineering and/or Sales Departments for more information. Thank you for your interest in Hughes Brothers products and services.

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CROSSARMS & DEAD END ASSEMBLIES

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Hughes Brothers manufactures Douglas-fir crossarms to a large variety of specifications and cross-sectional dimensions. This section is intended to help the user decide which crossarm specification is best suited to the application at hand.

Crossarms

1) Utility Specifications:

Hughes Brothers, Inc. can manufacture crossarms in accordance with any utility specification using material which has been pre-graded to WCLIB Paragraph 170 and 170a. Crossarms are also routinely manufactured in accordance with ANSI 05.3, RUS 1728H-701 and the old RUS DT-5B and EEI specification TD-90.

2) RUS Specification:

Unless specified otherwise, Hughes Brothers lumbergraders will apply the provisions of RUS 1728H-701 as the minimum acceptable quality of wood crossarm for any crossarm purchased. An overview of this specification is given later in this section.

Choice of structural materials:

Hughes Brothers, Inc. offers distribution crossarms made from solid sawn Douglas-fir, glue laminated wood in accordance with ANSI 05.2. By making all types of crossarms available, the customer can make the best choice based on economic and other factors present at that time.

Distribution Crossarms, 4" x 5" and smaller

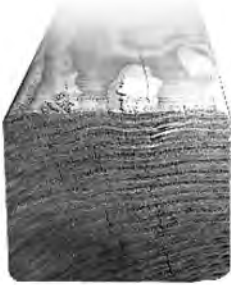


Hughes Brothers Crossarms are identified by RED ENDS



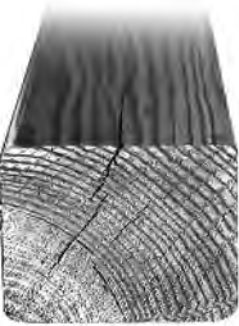
A CROSSARMS & DEAD END ASSEMBLIES

The following photographs and descriptions illustrate some of the naturally occurring properties of solid sawn wood which must be limited to ensure a certain average design stress is attained.



Rate of Growth

Close grain is defined as an average of approximately 6 rings per inch, but not more than approximately 30 annual rings per inch on either one end of the piece or the other. In Douglas-fir, pieces averaging 5 rings or more than 30 rings per inch are accepted as close grain if averaging 1/3 or more summerwood.



Seasoning Checks

Checks are defined as a separation of the wood normally occurring across or through the rings of annual growth and usually as the result of seasoning.



Slope of Grain

Slope of grain is the deviation of the wood fiber from a line parallel to the edge of the piece. The deviation

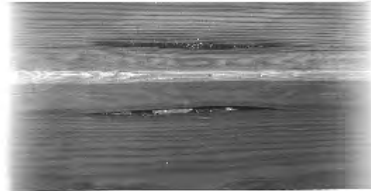
is expressed as a ratio of 1 inch per unit of length. Examples are 1 inch in 12 inches, 1 inch in 10 inches, etc. Hughes crossarms are limited to a slope of grain of 1 in 12 in the center one third of the arm and 1 in 10 in the outer sections. Twenty percent of a lot may have a slope of grain of 1 in 10 for the entire arm.



Free of Heart Center (FOHC or Boxed Heart)

FOHC means without pith. All Douglas-fir crossarms are manufactured FOHC on

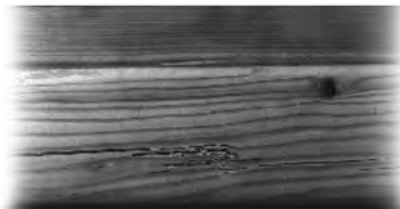
one end of the timber and no more than 1/4 of the length of the timber may show any heart on occasional pieces.



Pitch Pockets

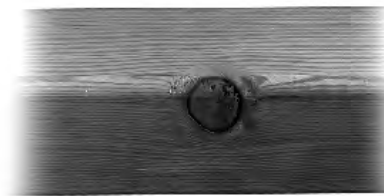
A pitch pocket is a pitch filled, well defined opening between the rings of annual

growth which develops during the growth of the tree. Pitch pockets are limited according to WCLIB Standard No. 17 to two small (1/16" x 6", 1/8" x 4" or 1/4" x 2") on the top face and three medium (1/16" x 12", 1/8" x 8" or 3/8" x 4") on all other faces.



Rot

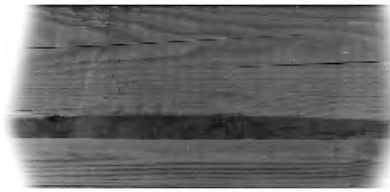
Rot, dote or red heart will not be permitted.



Knots

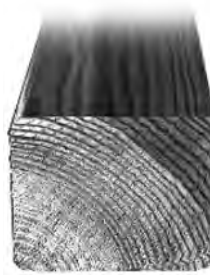
Knots are the portion of a branch or limb which has become incorporated

into a piece of lumber during the growth of the tree. Each utility specification has differing knot and knot location restrictions. In general, knots under 3/8" in diameter are pin knots and not considered. Knots are measured by averaging the least dimension of the knot on both faces. If the knot appears on one face only, the average would be the measured dimension divided by two.



Wane

Wane is the loss of wood on the corner of the piece due to bark or any other cause. It is limited to 1/2" measured diagonally.

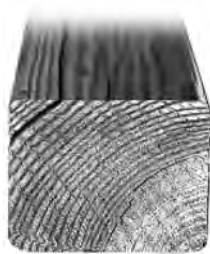


Sapwood

Sapwood in excess of 25% in volume of total arm will not be permitted.

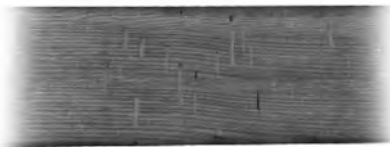
Warp

Warp exceeding 1/2 inch for crossarms 6 ft or less in length, 3/4 inch for crossarms 8 ft or less in length, and 1 inch for crossarms 10 ft or less in length. The warp shall be determined by measuring the offset between the crossarm and a straight-edge laid lengthwise on the concave face of the crossarm.



Shakes

Shake is the lengthwise separation of the wood which occurs between or through the rings of annual growth. True shake, where separation is evident, is prohibited.



Worm Holes

Worm holes or pieces containing dead wood will not be permitted.



Seasoning

Crossarms shall be made of thoroughly seasoned timber. The average moisture content of any lot of untreated arms shall not be less than 12% nor more than 19% and no piece shall exceed 25% as determined by approved resistance type moisture meter on oven dry weight.

Inspection

Inspection and acceptance may be made either at the point of manufacture or upon delivery of the finished product. Hughes Brothers shall give to the purchaser or his representative such access to the plant during working hours as is reasonable and necessary to determine the suitability of material to be supplied. Hughes Brothers shall also furnish all necessary apparatus, labor and other facilities for making the tests herein called for without cost to the purchaser. Waiving of inspection shall not relieve the manufacturer from obligation to furnish material in accordance with their specification.

Overview of RUS Bulletin 1728H-701

RUS Specification 1728H-701 describes the minimum acceptable quality of wood crossarms permitted to be purchased by or for RUS borrowers and the plans of procurement under which they may be purchased.

Material Requirements:

A. Material and Grade — All crossarms furnished under this specification shall be free of brashy wood, cracks, decay, and insect holes larger than 3/32 of an inch, shall meet additional requirements as shown on specific drawings, and shall be made of:

Douglas-fir - conforming to the provisions of Select Structural as described in paragraphs 169, 169a, 170 and 170a, Standard Grading Rules for West Coast Lumber. All references to Douglas-fir shall be that of coastal origin.

All laminated crossarms and structural timbers shall meet the requirements of ANSI 05.2.

Distribution Arms

No knot allowed within 1 knot diameter to pole mounting hole.

B. Knots — Only sound, firm and tight knots are allowed if well spaced.

Manufacture:

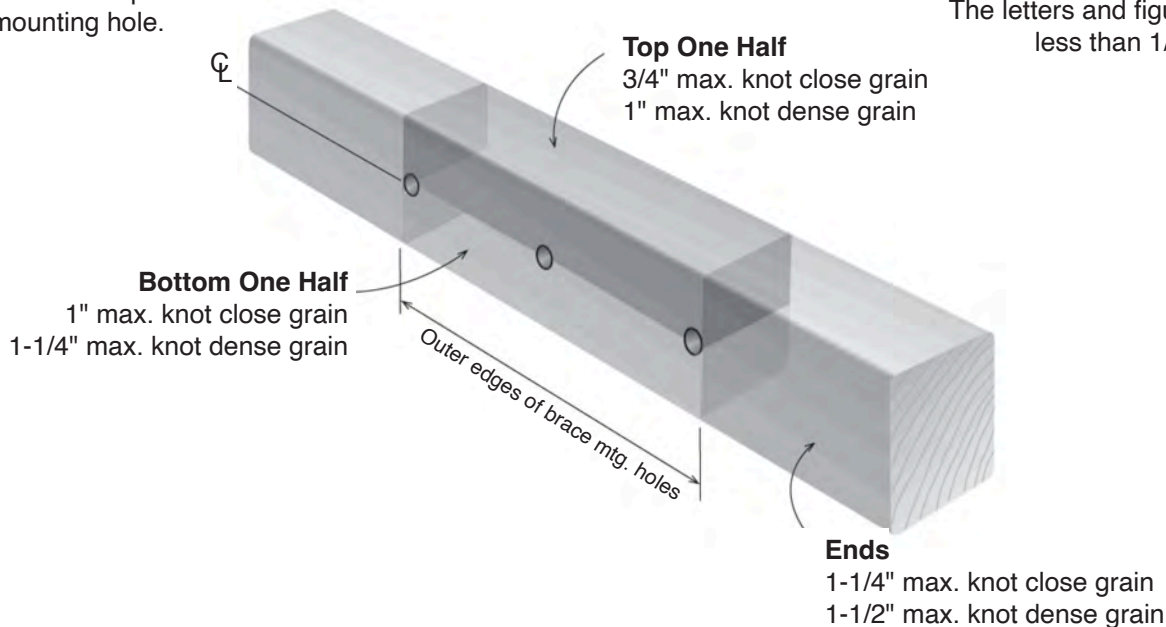
Results of Treatments:

Penetration — The penetration shall be no less than 3 inches from the end surfaces and from any pin and bolt holes, and at least 3/16 inch from the surface of any face for Douglas-fir heartwood.

When testing penetration, a borer core shall be taken from not less than 20 crossarms in each treating charge. The borings shall be taken from the side or bottom of the crossarms and should be taken in the end sections beyond the brace bolt holes. The bored holes shall be plugged with preservative treated plugs driven into the arm. Borings from laminated arms shall not be taken from the same laminate unless there is an end joint separation. The retention of DCOI shall be no less than 0.1 pounds per cubic foot for lums and .13 PCF for solids.

All crossarms shall be branded legibly to a depth of approximately 1/16 inch before treatment.

The letters and figures shall be not less than 1/2 inch in height.



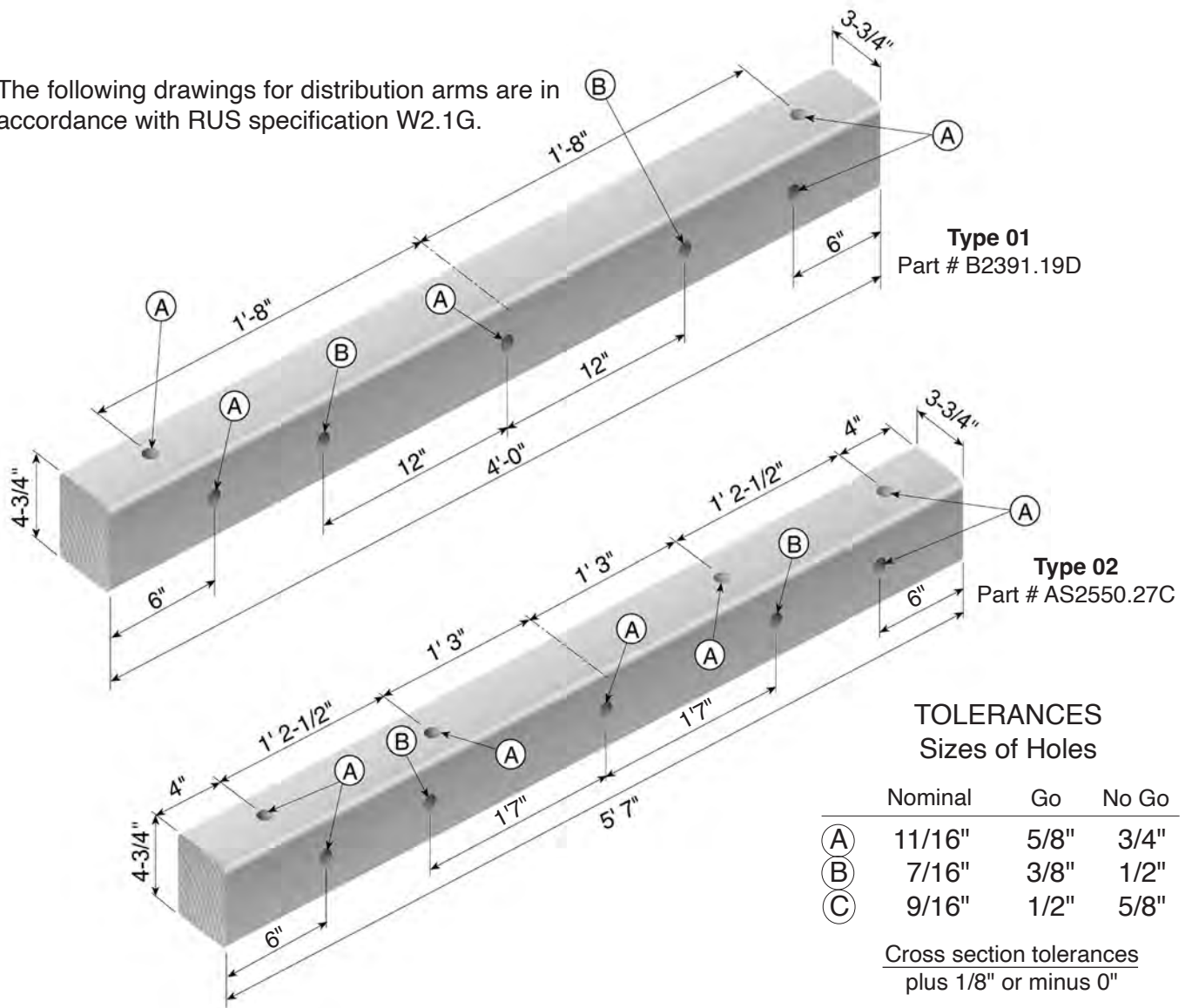
Marking & Specifications



The brand shall include:

- 1) The manufacturer's identifying symbol
- 2) Month and year of manufacture
- 3) Species of timber, i.e. DF for Douglas-fir
- 4) Preservative, DA for DCOI
- 5) Indication of preservative retention
- 6) WQC - Wood Quality Control program, if applicable.

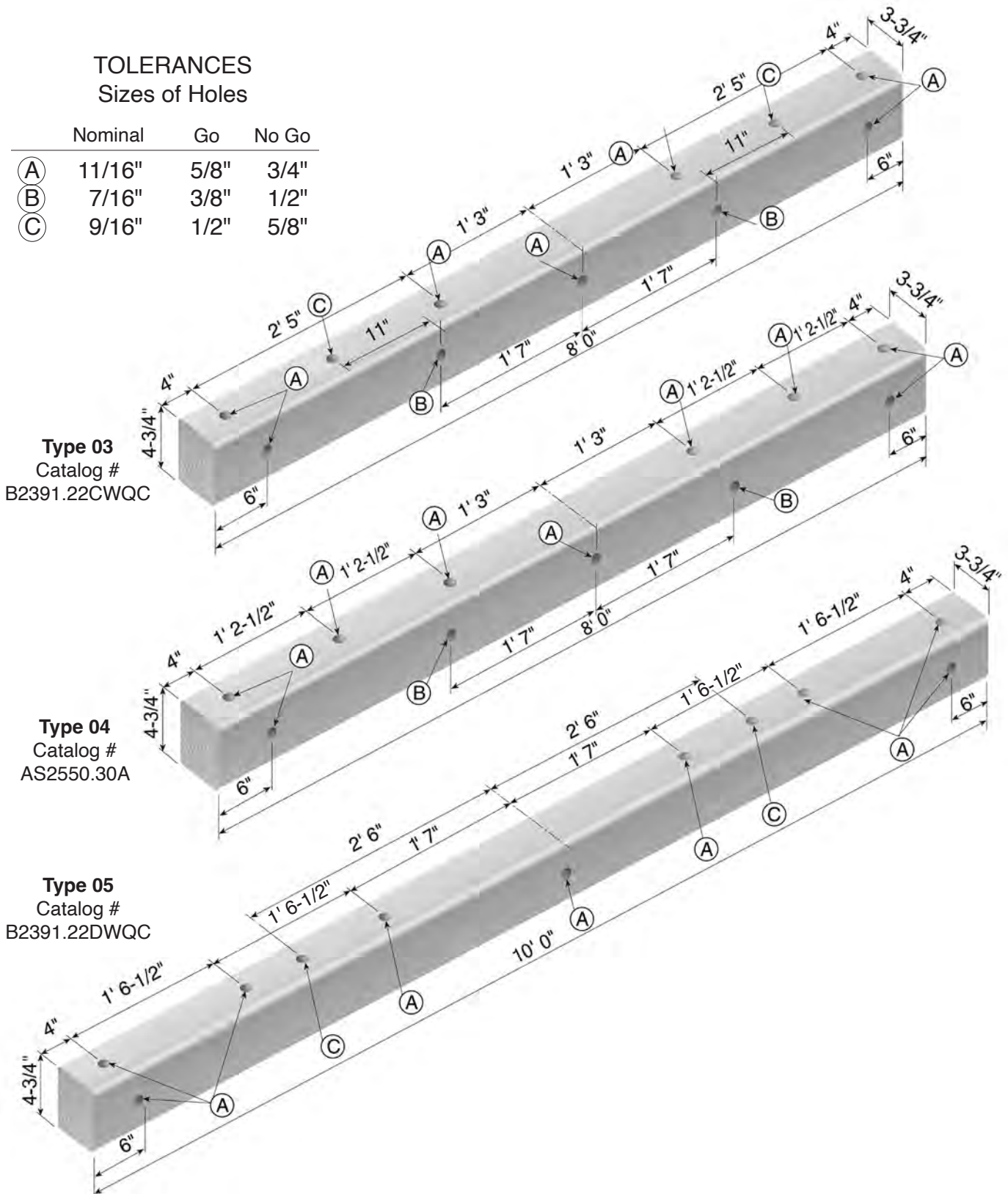
The following drawings for distribution arms are in accordance with RUS specification W2.1G.



A CROSSARMS & DEAD END ASSEMBLIES

TOLERANCES Sizes of Holes

	Nominal	Go	No Go
(A)	11/16"	5/8"	3/4"
(B)	7/16"	3/8"	1/2"
(C)	9/16"	1/2"	5/8"



(Hughes Brothers does not guarantee electrical characteristics of wood products. Values shown are typical and are intended for reference purposes only. Results are greatly dependent upon moisture content.)

CFO Voltage

Electrical Properties of Crossarms

Table 1

Critical flashover voltage of Douglas-fir wood crossarm, in kV

Condition	No.	1 ft	2 ft	3 ft	4 ft
Dry	1	224	368	529	603
	2	231	356	-	-
	3	225	396	-	-
	Avg.	227	373	529	603
Wet	1	202	321	411	487
	2	202	-	-	-
	3	207	-	-	-
	Avg.	204	321	411	487
Wet/Dry	Avg.	0.90	0.86	0.78	0.81

Typical measured results of critical flashover voltages are presented in Table 1

Calculated average CFO strength based on Table 1 is presented in Table 2.

CFO Strength

Table 2

Average critical flashover strength of wood crossarm, in kV/ft

Material	Condition	1 ft	2 ft	3 ft	4 ft
A	Dry	227	187	176	151
	Wet	204	161	137	122

Table 3

Summary of added CFO by wood crossarm

Results are greatly dependent on the moisture content of the crossarm.

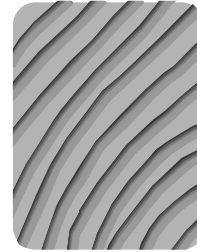
No.	Basic Insulation	Added CFO by Second Component Wood Crossarm		
		Length 0-2 ft	Length 2-4 ft	
I	1. Porcelain Insulator Pin-Type	Dry Condition	100 kV/ft	130 kV/ft
		Wet Condition	70 kV/ft	-
	2. Suspension Insulator	a) Vertical Position		
		Dry Condition	130 kV/ft	100 kV/ft
		Wet Condition	100 kV/ft	-
		b) Horizontal Position		
	Dry Condition	130 kV/ft	-	
	Wet Condition	50 kV/ft	-	
II	1. Polymer Insulator Suspension Insulator	a) Vertical Position		
		Dry Condition	170 kV/ft	140 kV/ft
	Wet Condition	50 kV/ft	50 kV/ft	
	d) Horizontal Position			
Dry Condition	150 kV/ft	130 kV/ft		
Wet Condition	90 kV/ft	90 kV/ft		

Source: IEEE Transactions, Vol. 6, no. 1 Jan '91 Jacob, Grzybowski, Ross

Ordering Information

Common Cross Sections

- 3-1/4" x 4-1/4"
- 3-1/2" x 4-1/2"
- 3-5/8" x 4-5/8"
- 3-3/4" x 4-3/4"



Governing Specification

Hughes Brothers will produce to any industry specification.

Corners rounded with 3/8" radius.

Treating

Treating will be performed in accordance with AWPA (American Wood Preservers Assoc.) standard C25-92 (Solid Sawn), C28-91 (Glue Laminated) with retention levels between 0.1 and 0.13 of DCOI PCF. Treating results are verified by Asoma™ analysis immediately following processing.

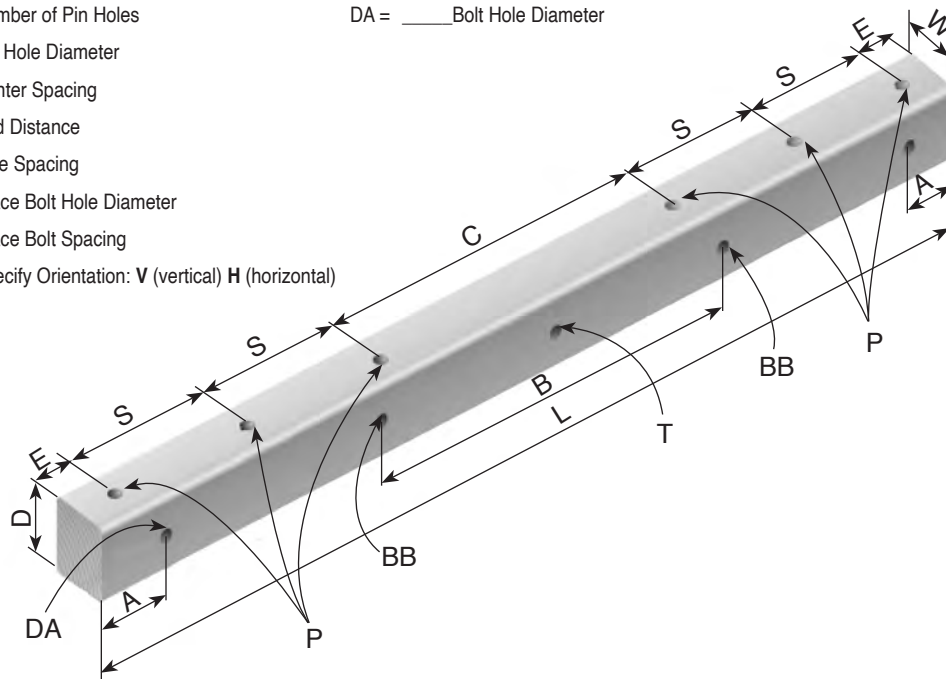
Incising

All arms can be incised when specified.

Boring / Drilling

For REA drilling simply reference the arm cross section, length and drilling type number. Other drilling configurations are available. For custom drilling requirements the following information is necessary.

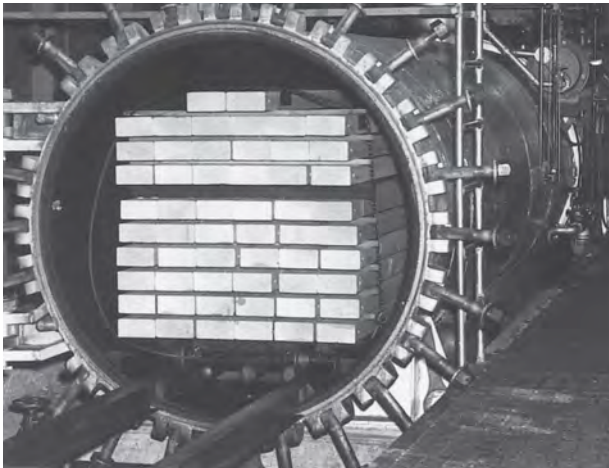
- | | | | |
|-------------------------|--|-----------------------------|--|
| Arm Size | W = ___ Width (top face) | Pole Through Bolt . . . | T = ___ Pole Through Bolt Hole Diameter |
| | D = ___ Depth (side face) | Double Arming Bolt . . | ___ Holes Required? Y (yes) N (no) |
| | L = ___ Overall Length | | A = ___ End Distance |
| Pin Holes | ___ Number of Pin Holes | DA = ___ Bolt Hole Diameter | |
| | P = ___ Pin Hole Diameter | | |
| | C = ___ Center Spacing | | |
| | E = ___ End Distance | | |
| | S = ___ Side Spacing | | |
| Brace Bolt Hole | BB = ___ Brace Bolt Hole Diameter | | |
| | B = ___ Brace Bolt Spacing | | |
| | ___ Specify Orientation: V (vertical) H (horizontal) | | |



Hughes Brothers has long recognized the advantage of treating exposed fibers of wood components of utility structures. Treated wood framing components have in some areas extended the life span of the components to fifty years. Hughes Brothers uses a proprietary, non-evaporating P9 oil as a carrier for the DCOI in the pressure treatment process. The final color after treatment is shade 5 or lighter according to standard color charts.

Industry Standards

AWPA P8-05, use category UC3B	Sawn products - preservative treatment by pressure processes.
ANSI 05.2	Specifications for wood products - structural glue laminated timber for utility structures.
ANSI 05.3	Specifications and dimensions - solid sawn wood crossarms and braces.
RUS 1728H-701	Specification for wood crossarms (solid and laminated), transmission timbers and pole keys.

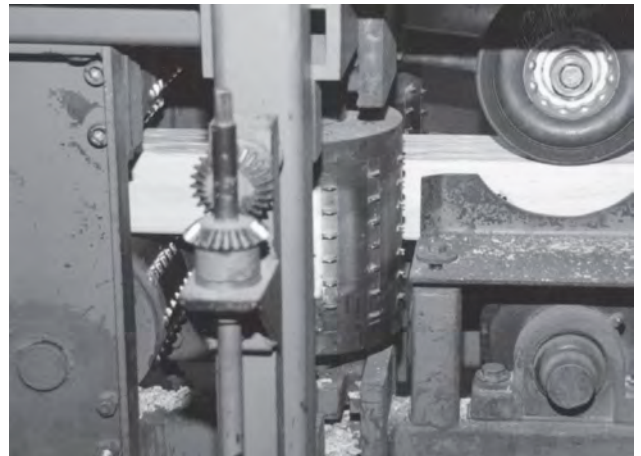


Hughes Brothers has two pressure treating retorts, 40'-0" and 65'-0" in length.

Incising

Incising is a process where small incisions are made along all faces of the crossarms. The benefits of incising are to aid in the penetration of preservative treatment and to relieve surface tension of the wood fiber, thus reducing the possibility of surface checks.

Hughes Brothers incising machines can handle pieces up to 6" x 12".



A CROSSARMS & DEAD END ASSEMBLIES

Hughes Brothers manufactures transmission crossarms to a variety of specifications and cross-sectional dimensions. This section is intended to help the end user determine which transmission crossarm is best suited for the application at hand.

Industry Standards

- ANSI 05.2 Specifications for wood products - structural glue laminated timber for utility structures.
- ANSI 05.3 Specifications and dimensions - solid sawn wood crossarms and braces.
- RUS 1728H-701 Specification for wood crossarms (solid and laminated), transmission timbers and pole keys.

Common Cross Sectional Sizes

Solid Sawn	3-1/2" x 4-1/2"	3-3/4" x 4-3/4"
	3-3/4" x 5-3/4"	3-5/8" x 7-1/2"
	4-5/8" x 5-5/8"	3-5/8" x 9-1/2"
	5-1/2" x 7-1/2"(*)	

*Suggest use of glue laminated due to availability and quality issues.

Glue Laminated (standard sizes)	3-1/8" x 7-1/2"	3-1/8" x 9"
	5-1/8" x 6"	5-1/8" x 7-1/2"
	5-1/8" x 9"	5-1/8" x 10-1/2"
	6-3/4" x 6"	6-3/4" x 7-1/2"
	6-3/4" x 9"	6-3/4" x 10-1/2"

Glue Laminated (special sizes)	3-5/8" x 7-1/2"	3-5/8" x 9-1/2"
	3-5/8" x 11-1/2"	4-3/4" x 5-3/4"
	5-1/2" x 7-1/2"	6" x 8"

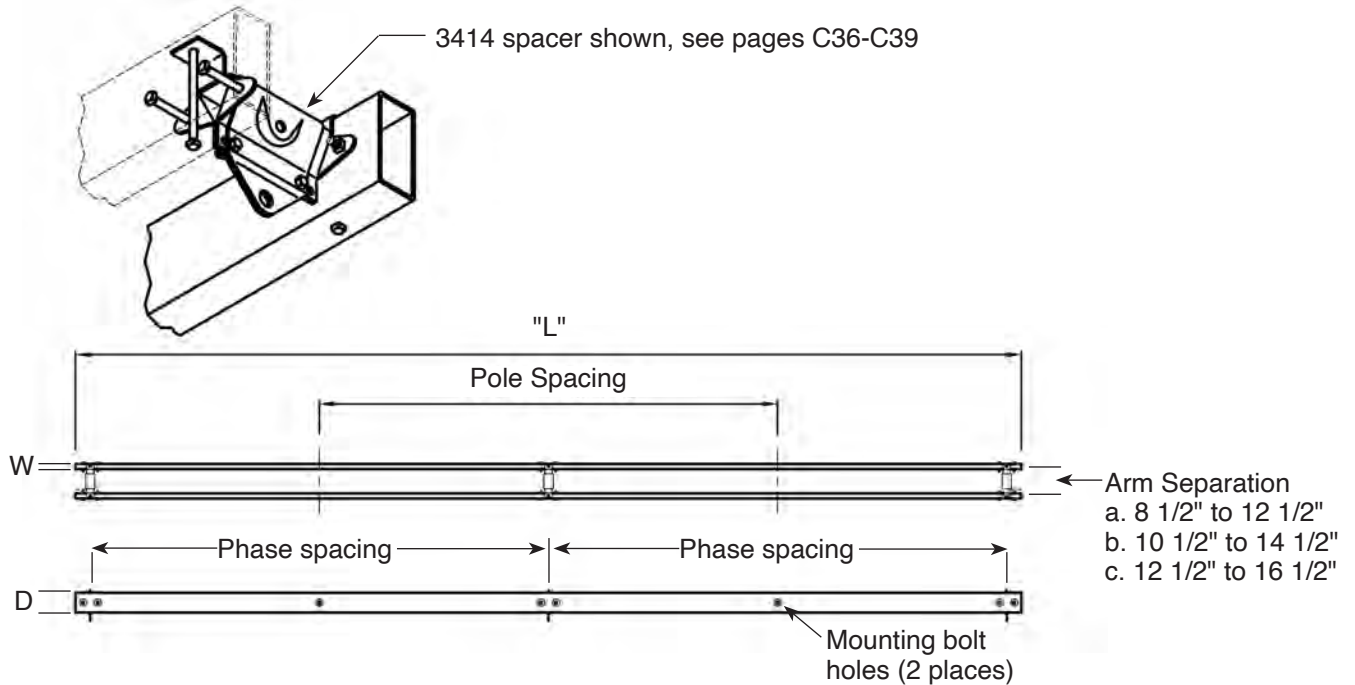
NOTE: Virtually any cross sectional size and length combination, as well as cambered units, are available in glue laminated crossarms.

Steel Tubes (common sizes)	6" x 4" x 3/16"
	6" x 4" x 1/4"
	6" x 2" x 3/16"
	8" x 6" x 1/4"
	8" x 2" x 3/16"

(Available in A500 Grade B galvanized or A847 self-weathering.)

Double Arm H-Frame Transmission Arm Assemblies - Tangent

Hughes Brothers is capable of supplying your H-Frame Transmission double arm assemblies in solid sawn, or laminated coastal douglas fir as well as galvanized or weathering steel tube. All double arm assemblies are pre-assembled in an efficient factory environment using crews of highly experienced assembly personnel. This is much more cost effective than paying construction crews to assemble these components in less than adequate conditions.



How to Order/Specify:

Hughes Brothers welcomes your own drawings for transmission double arm assemblies and will supply as directed. If you do not have such details, complete the following fields and supply this information when ordering.

Arm Size (see page A-10 for typical sizes)

- W = _____ width, top face
- D = _____ depth, side face
- L = _____ length, generally 2 x phase spacing + 1'0" (6" each end)
- T = _____ wall thickness (steel tube only)

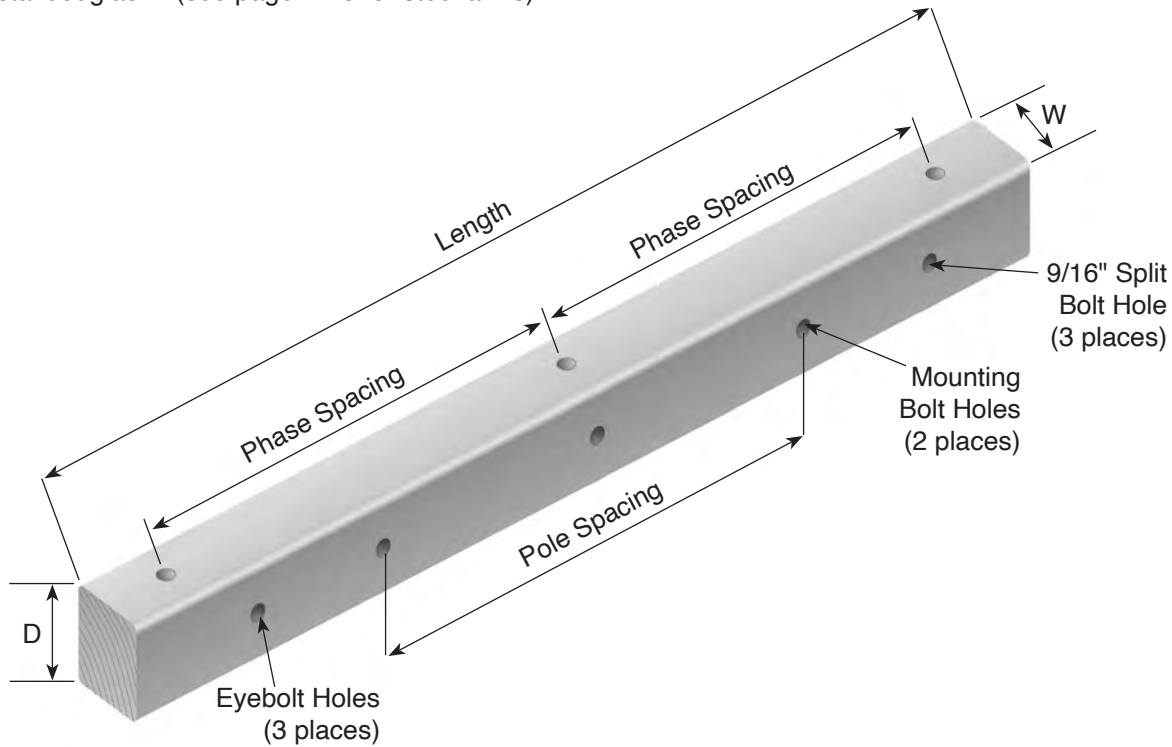


Holes and Spacing (holes typically 1/16" over bolt size)

- Phase Spacing = _____
- Pole Spacing = _____
- Mounting Bolt Holes = _____
- Arm Separation = _____

Single Arm H-Frame Transmission Arms

Hughes Brothers is capable of supplying your H-Frame Transmission single arms in solid sawn, or laminated coastal douglas fir (see page A-13 for steel arms).



How to Order/Specify:

Hughes Brothers welcomes your own drawings for transmission arms and will supply as directed. If you do not have such details, complete the following fields and supply this information when ordering.

Arm Size (see page A-10 for typical sizes)

W = _____ width, top face

D = _____ depth, side face

L = _____ length, generally 2 x phase spacing + 1'0" (6" each end)

Holes and Spacing (holes typically 1/16" over bolt size)

Phase Spacing = _____

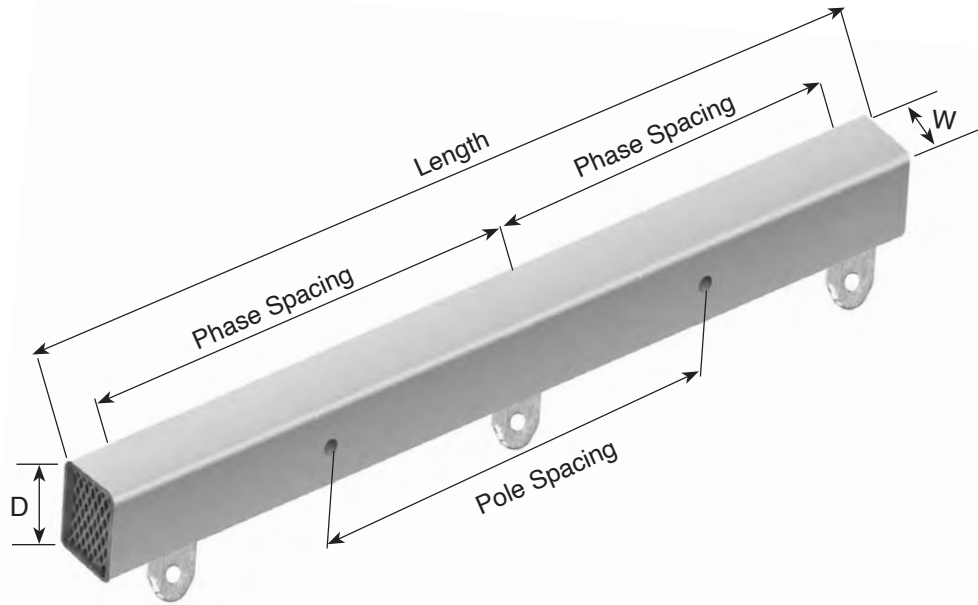
Pole Spacing = _____

Mounting Bolt Holes DIA = _____

Eyebolt Holes DIA = _____

Steel Single Arm H-Frame Transmission Arms

Hughes Brothers is capable of supplying your H-Frame Transmission single arms in galvanized or weathering steel tube. Galvanized steel tubes are manufactured from steel conforming to ASTM A500 grade B. Weathering steel tube arms are manufactured from ASTM A847 steel tube.

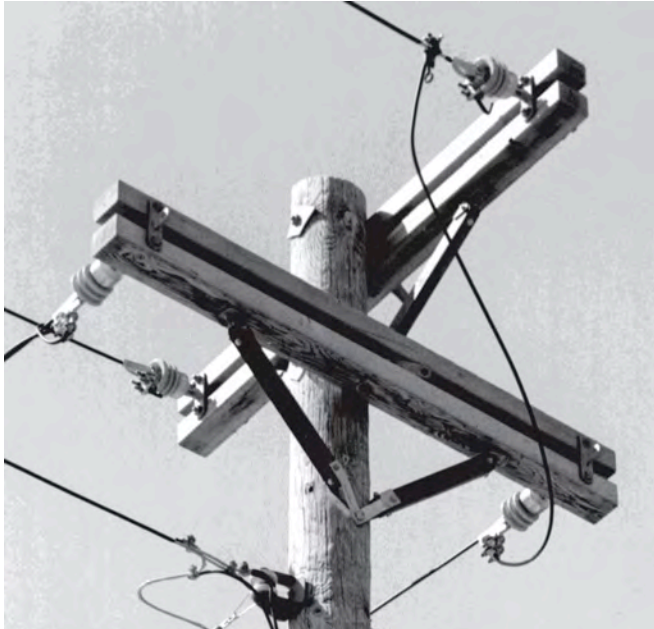


How to Order/Specify:

Hughes Brothers welcomes your own drawings for steel transmission arms and will supply as directed. It is generally best to consult the Engineering personnel at Hughes Brothers since there are many options on steel transmission arms.

Note: The crossarm above is just one example of a Hughes steel crossarm. Any other hang orientation or other customization can be provided

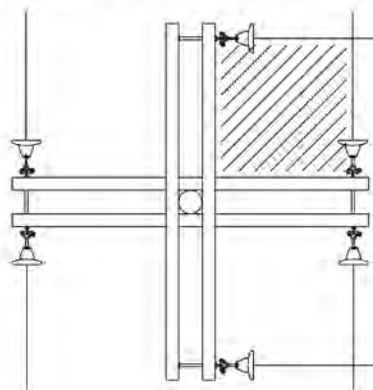
Double Arm Dead End Assemblies



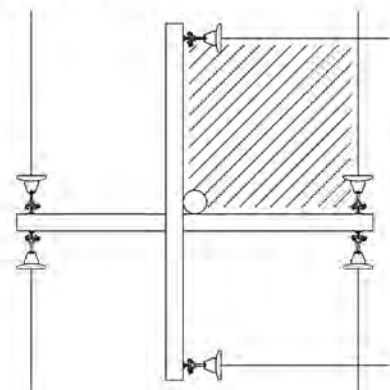
Hughes Brothers Dead End Assemblies are furnished factory assembled. Each unit is supplied with assembled double arms, braces, brace & arm mounting bolts, washers, nuts & locknuts, ready for field installation.

Hughes Brothers factory assembled dead ends are stronger than conventional dead ends. Hughes Brothers lumber graders carefully select each wood member in the assembly. The following chart enables the engineer to select a dead end assembly of known strength rating for the specific loading conditions. (See the comparison of the strength of Hughes Brothers Double Arm Dead End versus conventional dead end assemblies.) As with all Hughes Brothers wood products, special attention is given to all timber connections to ensure that timber shrinkage over time does not result in radio frequency interference.

.....Compare the climbing space!



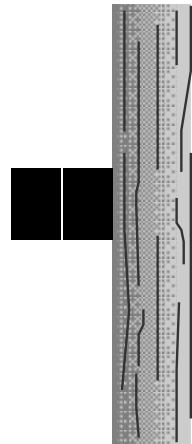
**Conventional
Double Arms**



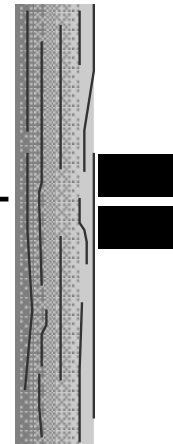
**Hughes 2890
Double Arms**

Buckarm vs. Hughes Dead End

Buckarm Type



Hughes Type



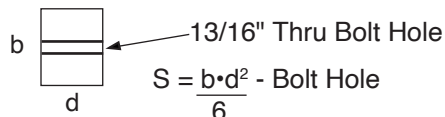
← Weaker

Stronger →

Assumptions:

- 3.5" x 4.5" Crossarm used in both situations
- 13/16" Thru holes for bolts
- Fiber Stress, $f=7400$ psi
- 8 ft. arm, all loads concentrated at ends of arm, 44" from center
- Ultimate Moment = fiber stress x section modulus
 $M=P(\text{lbs.}) \times \text{Dist}(\text{in.}) = f(\text{lb}/\text{in}^2) \times S(\text{in}^3)$

Buckarm Strength Calculations



$$S_{\text{Buckarm}} = \frac{(4.5)(3.5)^2 - \text{Bolt Hole}}{6}$$

$$= \frac{(4.5)(3.5)^2 - (.813)(3.5)^2}{6}$$

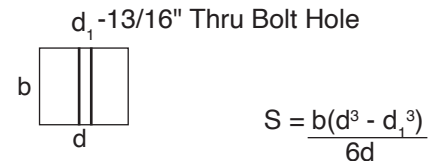
$$= 7.53 \text{ in.}^3$$

$$P = \frac{f \cdot s}{\text{dist}} = \frac{(7400 \text{ lb./in.}^2)(7.53 \text{ in.}^3)}{44 \text{ in.}} = 1266 \text{ lbs.}$$

$$P = 1255 \text{ lbs. for each stick times 3 sticks of wood}$$

$$(3)(P) = (3)(1266) = \boxed{3798 \text{ lbs}}$$

Hughes Dead End Strength Calculations



$$S_{\text{Hughes}} = \frac{3.5 (4.5^3 - .83^3)}{6 (4.5)}$$

$$= 11.74 \text{ in.}^3$$

$$P = \frac{f \cdot s}{\text{dist.}} = \frac{(7400 \text{ lb./in.}^2)(11.74 \text{ in.}^3)}{44 \text{ in.}} = 1975 \text{ lbs.}$$

$$P = 1975 \text{ lb. for each stick times 2 sticks}$$

$$(2)(P) = (2)(1975) = \boxed{3950 \text{ lbs}}$$

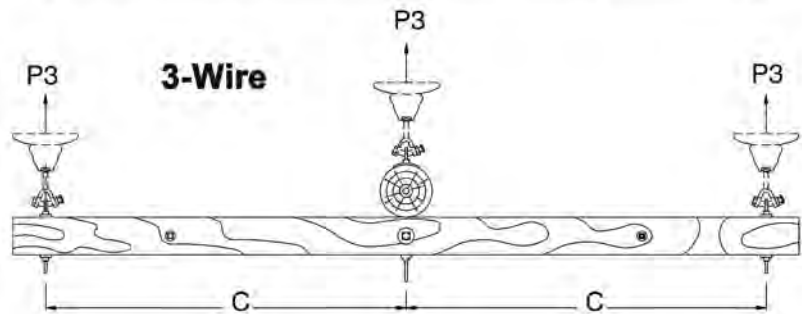
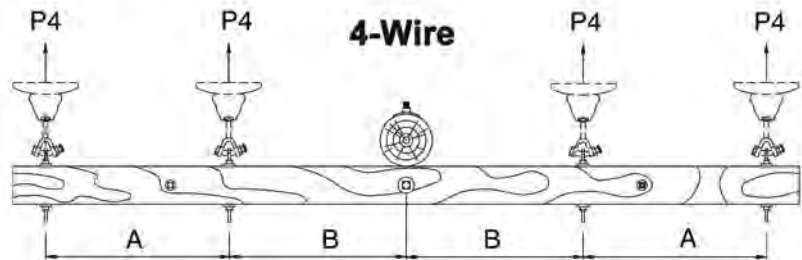
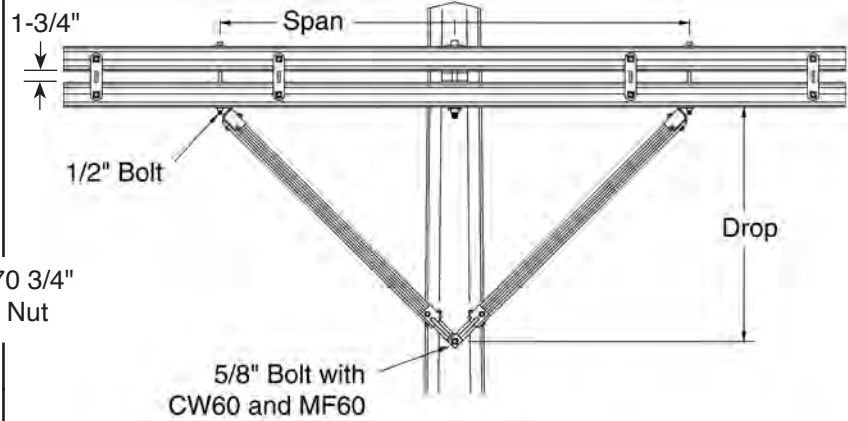
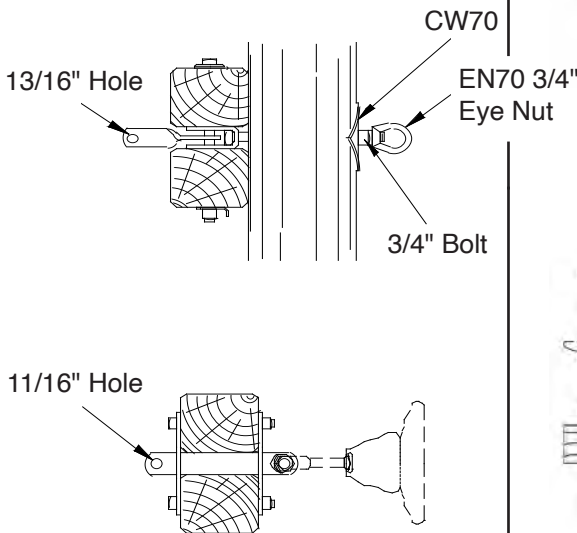
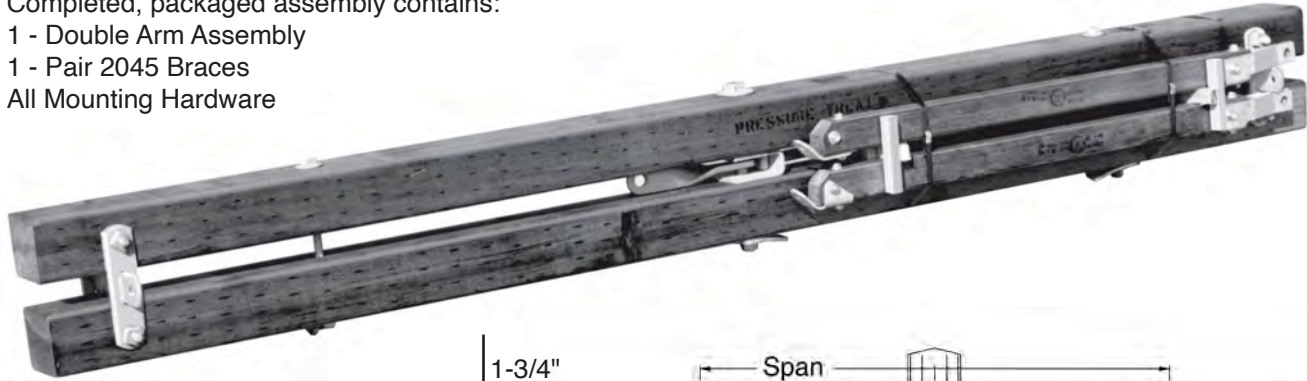
Conclusion:

The Hughes type dead end is stronger because:

- 1) Section modulus is greater when timbers are oriented as in the Hughes dead end.
- 2) Bolt holes are through center of gravity of arms.

2890 Double Arm Dead End

Completed, packaged assembly contains:
 1 - Double Arm Assembly
 1 - Pair 2045 Braces
 All Mounting Hardware

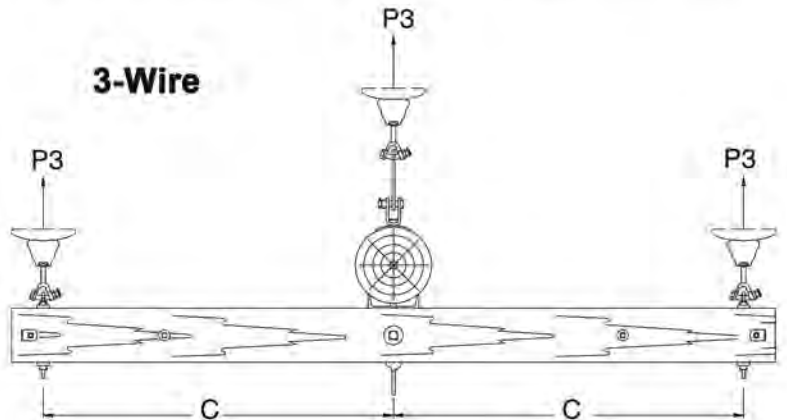
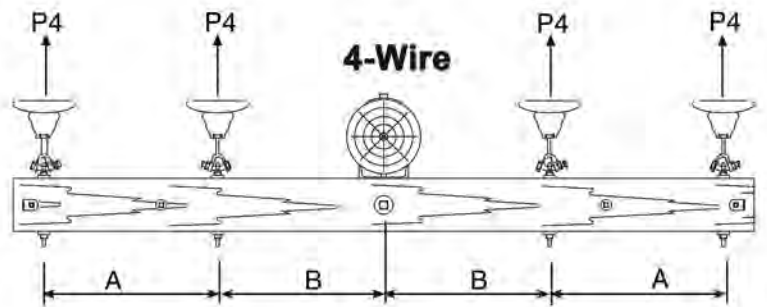
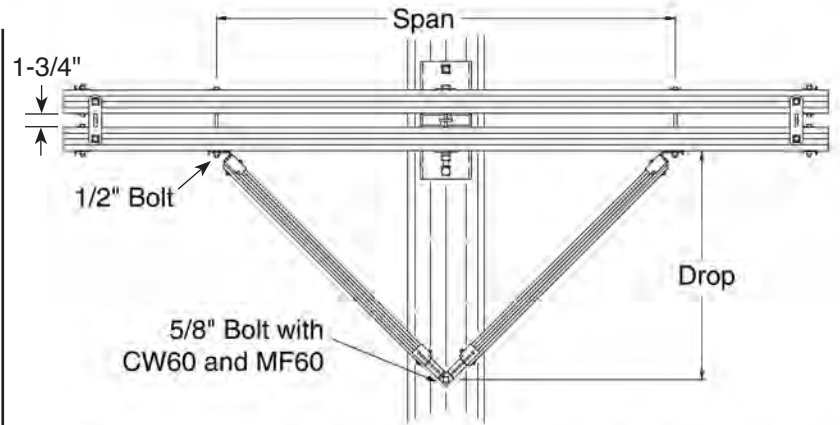
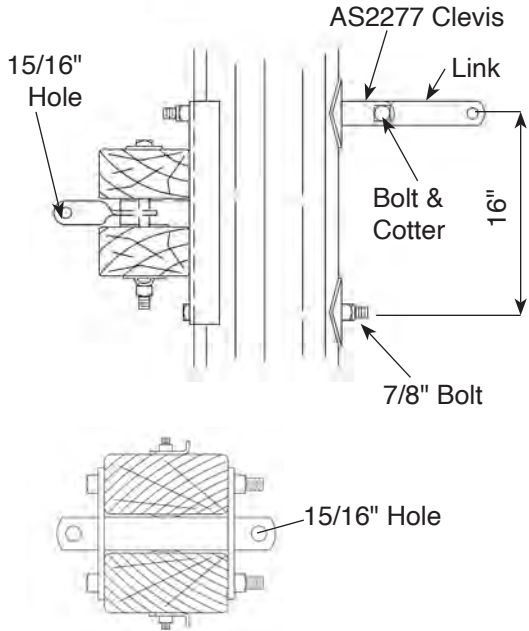
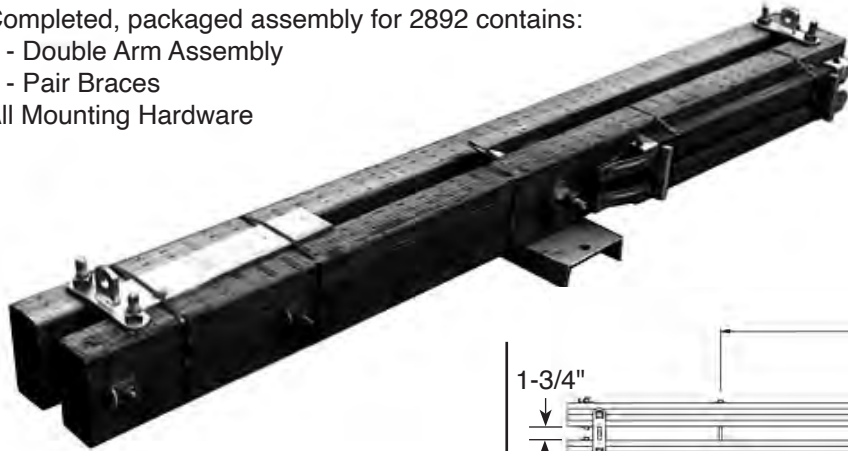


Arm Length	A	B	C
6'-0"	1'-9"	10"	2'-7"
8'-0"	2'-4"	1'-3"	3'-7"
10'-0"	2'-4"	2'-3"	4'-7"

Note:
 See chart on page A18 for
 maximum load "P3 or P4"

2892 Double Arm Dead End

Completed, packaged assembly for 2892 contains:
 1 - Double Arm Assembly
 1 - Pair Braces
 All Mounting Hardware



Arm Length	A	B	C
6'-0"	-	-	2'-7"
8'-0"	2'-4"	1'-3"	3'-7"
10'-0"	2'-4"	2'-3"	4'-7"
12'-0"	3'-9"	1'-10"	5'-7"

Note:
 See chart on page A-18 for maximum load "P3 or P4"

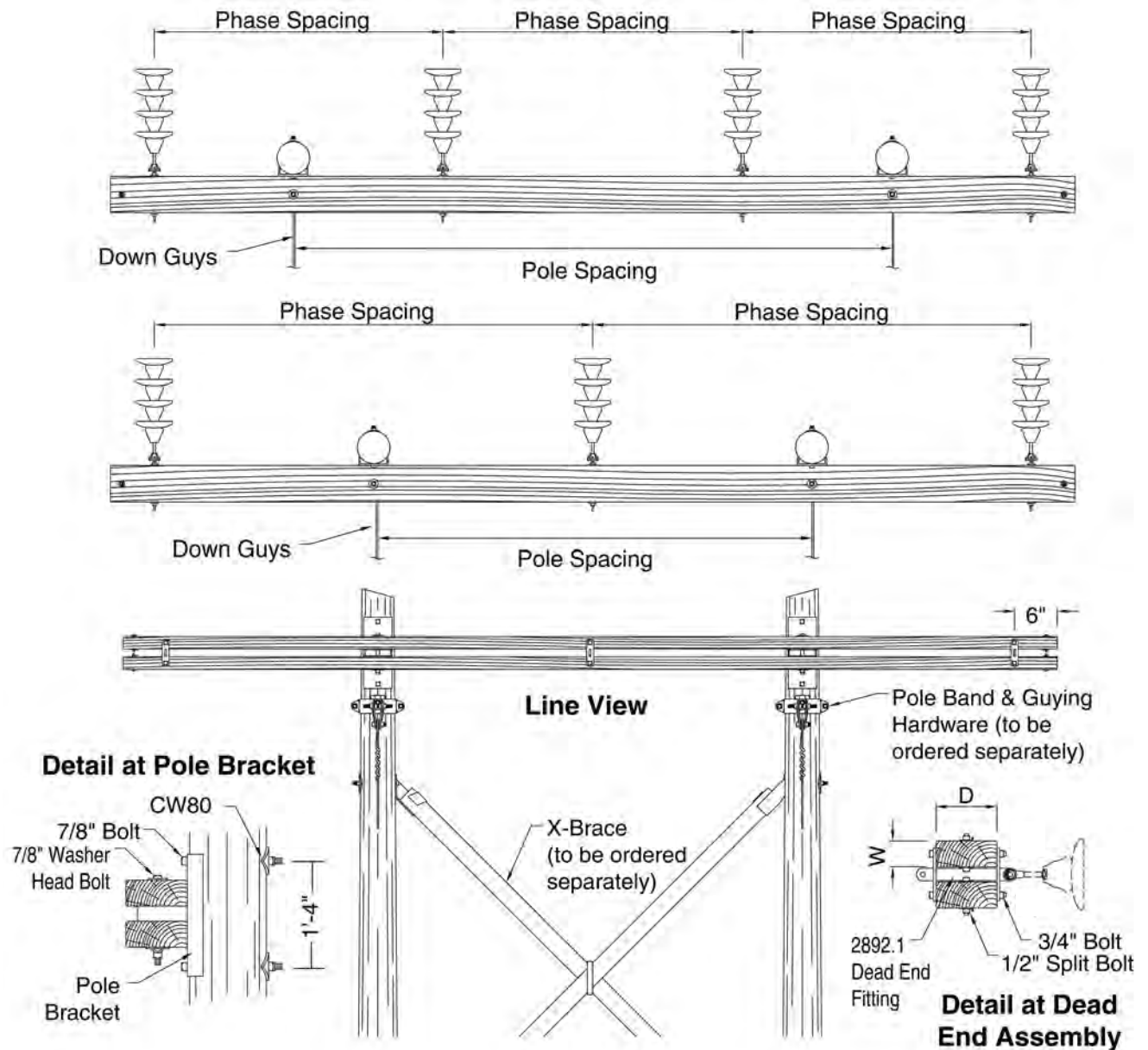
Ordering and Strength Charts

3-Wire	P3* Calculated		Arm Size	Brace Number	Spacing	Drop
	Ultimate Strength	Per Attachment (lbs)				
2890-J•	5,800		3-1/2" x 4-1/2" x 6'-0"	2045-AB45-9-11	37"	18.5"
2890-K	7,000		3-3/4" x 4-3/4" x 6'-0"	2045-D45-9-11	58"	31"
2890-L	10,000		3-3/4" x 5-3/4" x 6'-0"	2045-D45-9-11	58"	31"
2890-M	13,000		4-3/4" x 5-3/4" x 6'-0"	2045-D45-9-11	58"	31"
2890-A•	4,300		3-1/2" x 4-1/2" x 8'-0"	2045-CC30-9-11	60"	18"
2890-F	5,000		3-3/4" x 4-3/4" x 8'-0"	2045-D45-9-11	60"	30"
2890-B•	7,500		3-3/4" x 5-3/4" x 8'-0"	2045-D45-9-11	60"	30"
2890-G	9,500		4-3/4" x 5-3/4" x 8'-0"	2045-D45-9-11	60"	30"
2892-A•	12,200		3-5/8" x 7-1/2" x 8'-0"	2045-D45-9-11	60"	30"
2890-C	4,000		3-3/4" x 4-3/4" x 10'-0"	2045-E45-9-11	72"	36"
2890-E	6,000		3-3/4" x 5-3/4" x 10'-0"	2045-E45-9-11	72"	36"
2890-H	7,400		4-3/4" x 5-3/4" x 10'-0"	2045-E45-9-11	72"	36"
2892-B•	9,500		3-5/8" x 7-1/2" x 10'-0"	2045-E45-9-11	72"	36"
2892-D	11,800		3-5/8" x 8-1/2" x 10'-0"	2045-E45-9-11	72"	36"
B2218-B	14,600		3-5/8" x 9-1/2" x 10'-0"	2017BB48PR	72"	31"
B2218-J3	12,000		3-5/8" x 9-1/2" x 12'-0"	2016GB54.6PR	86"	33-1/2"

4-Wire	P4* Calculated		Arm Size	Brace Number	Spacing	Drop
	Ultimate Strength	Per Attachment (lbs)				
2890-J4	4,400		3-1/2" x 4-1/2" x 6'-0"	2045-AB45-9-11	37"	18.5"
2890-K4	5,300		3-3/4" x 4-3/4" x 6'-0"	2045-D45-9-11	58"	31"
2890-L4	7,800		3-3/4" x 5-3/4" x 6'-0"	2045-D45-9-11	58"	31"
2890-M4	9,900		4-3/4" x 5-3/4" x 6'-0"	2045-D45-9-11	58"	31"
2890-A4	3,000		3-1/2" x 4-1/2" x 8'-0"	2045-D45-9-11	60"	30"
2890-F4	3,400		3-3/4" x 4-3/4" x 8'-0"	2045-D45-9-11	60"	30"
2890-B4	5,500		3-3/4" x 5-3/4" x 8'-0"	2045-D45-9-11	60"	30"
2890-G4	7,000		4-3/4" x 5-3/4" x 8'-0"	2045-D45-9-11	60"	30"
2892-A4	8,600		3-5/8" x 7-1/2" x 8'-0"	2045-D45-9-11	60"	30"
2890-C4	2,600		3-3/4" x 4-3/4" x 10'-0"	2045-E45-9-11	72"	36"
2890-E4	3,900		3-3/4" x 5-3/4" x 10'-0"	2045-E45-9-11	72"	36"
2890-H4	5,000		4-3/4" x 5-3/4" x 10'-0"	2045-E45-9-11	72"	36"
2892-B4	6,000		3-5/8" x 7-1/2" x 10'-0"	2045-E45-9-11	72"	36"
2892-D4	7,800		3-5/8" x 8-1/2" x 10'-0"	2045-E45-9-11	72"	36"
B2218-B4	9,800		3-5/8" x 9-1/2" x 10'-0"	2017BB48PR	72"	31"
B2218-J8	9,060		3-5/8" x 9-1/2" x 12'-0"	2016GB54.6PR	86"	33-1/2"

*Note: As a minimum these strengths should meet or exceed the maximum design tension of the wire times an overload capacity factor of 2.54 (Load factor = 1.65, Material Strength Factor = 0.65).

2891 Dead End Assembly (H-Frame Const.)



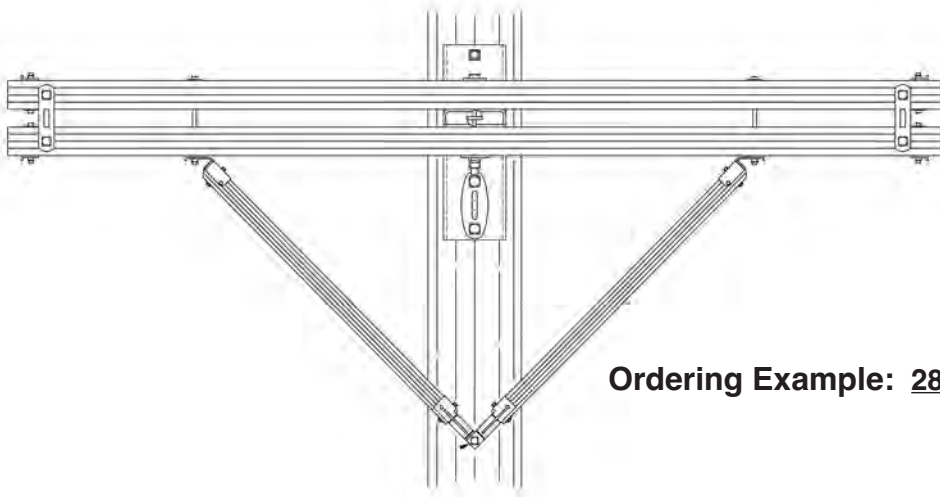
Ordering Information Specification Requirements

1. Phase Spacing
 2. Pole Spacing
 3. Load Requirements
(These will determine D&W)
- 2891A 3-126-150**
- Phase Spacing (inches)
 - Pole Spacing (inches)
 - Number of Wires
 - Arm Size Code

W	Arm Size		Code
	D		
3-5/8"	7-1/2"		A
3-5/8"	8-1/2"		B
3-5/8"	9-1/2"		C
5-5/8"	7-1/2"		D
5-1/8"	7-1/2"		E
3-1/8"	10-1/2"		F
5-1/8"	10-1/2"		G
5-1/8"	9"		H

A CROSSARMS & DEAD END ASSEMBLIES

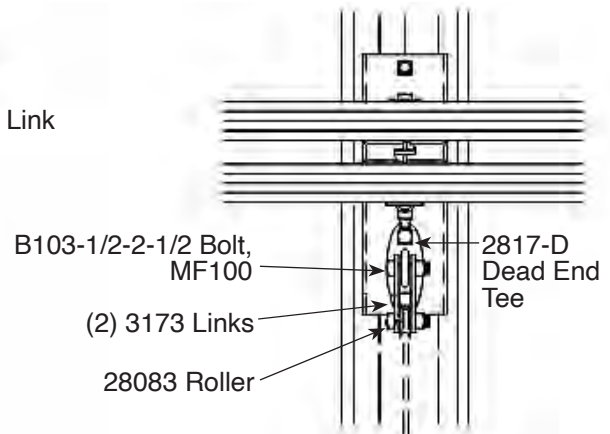
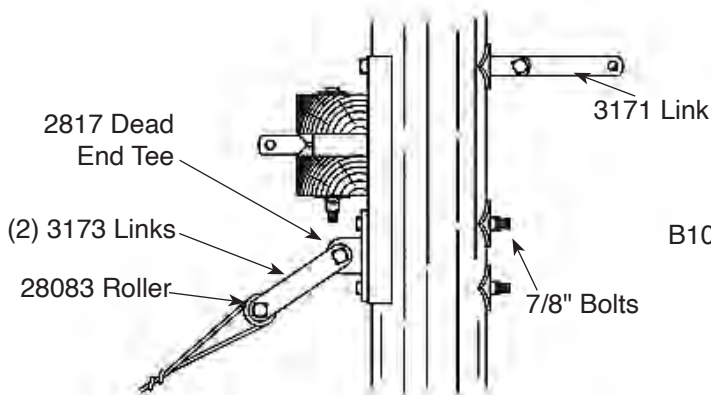
2890 / 2892 Dead End with 42,000 lb. Guying Kit



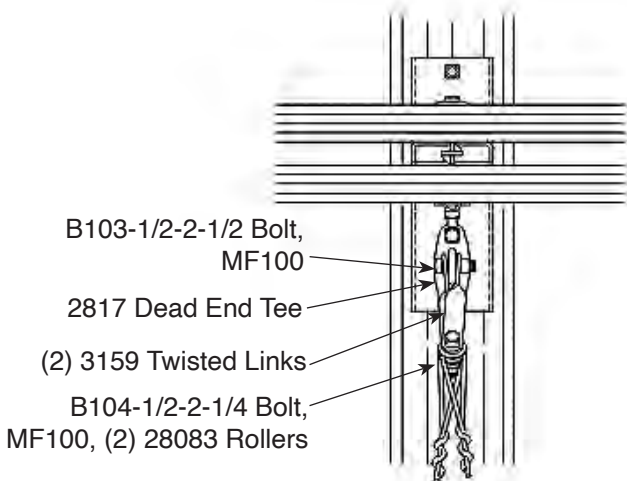
To order a 2892 dead end assembly and guying hardware (42,000 lb ultimate) in one of three variations, the appropriate suffix, G1, G2 or G2A is added to the dead end part number. These suffixes can be used on 2890's as well, only if 2890 has a "G" suffix.

Ordering Example: **2892-A G2**

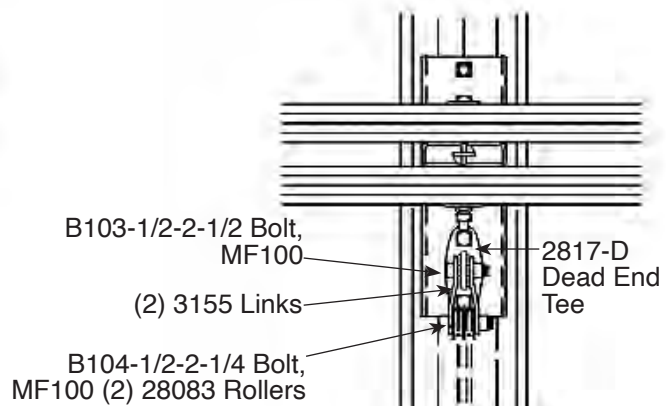
— Guying Hardware Assy.
— Dead End Type



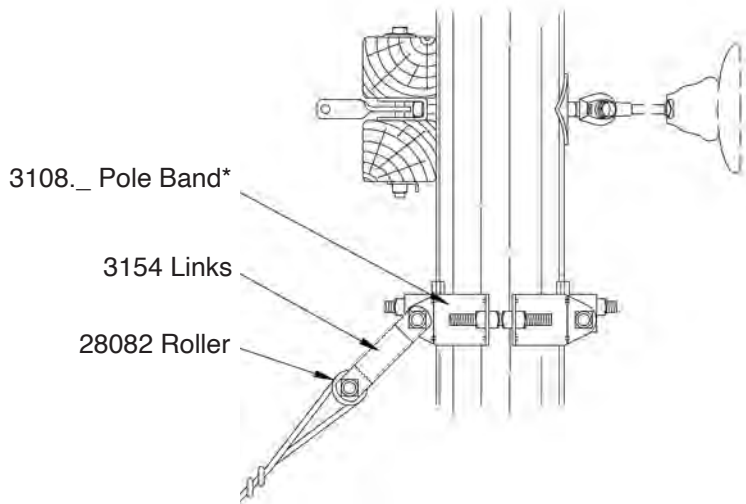
G1 Suffix



G2A Suffix



G2 Suffix



B2358-C 32,000 lb Guying Assembly Kits

The following pole band guying assemblies are used frequently in conjunction with 2890 or 2892 dead end assemblies.

Each guying kit provides an ultimate guy rating of 32,000 lbs.

Dead end assemblies purchased separately.

B2358-C1

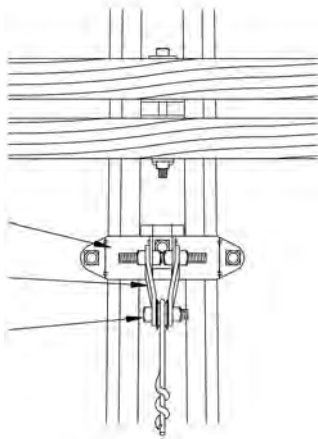
Guying Hardware for a single down guy.

3108._ Pole Band*

3154 Links

28082 Roller

7/8"x3" Bolt, MF80



Pole Diameter	Straight Links, One Roller	Straight Links, Two Rollers	Twisted Links, Two Rollers
7"-10"	B2358.5C1	B2358.5C2	B2358.5C2A
9"-12"	B2358.6C1	B2358.6C2	B2358.6C2A
11"-14"	B2358.7C1	B2358.7C2	B2358.7C2A
13"-16"	B2358.8C1	B2358.8C2	B2358.8C2A
15"-18"	B2358.9C1	B2358.9C2	B2358.9C2A
17"-20"	B2358.10C1	B2358.10C2	B2358.10C2A
19"-22"	B2358.11C1	B2358.11C2	B2358.11C2A
21"-24"	B2358.12C1	B2358.12C2	B2358.12C2A

B2358-C2

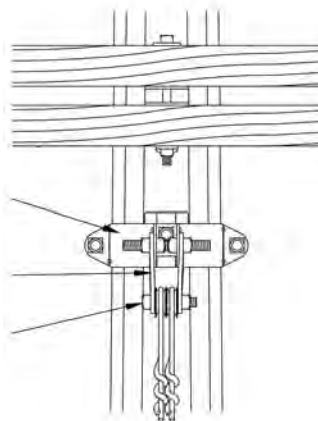
Double Guying

3108._ Pole Band*

3154 Links

2-28082 Rollers

7/8"x4" Bolt, MF80



B2358-C2A

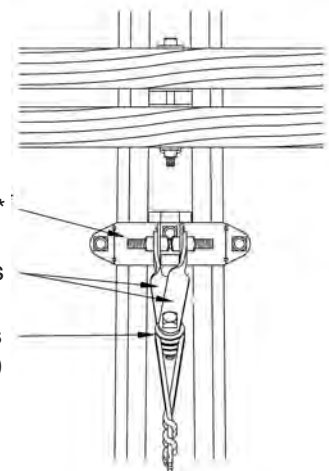
Double Guy with Twisted Links

3108._ Pole Band*

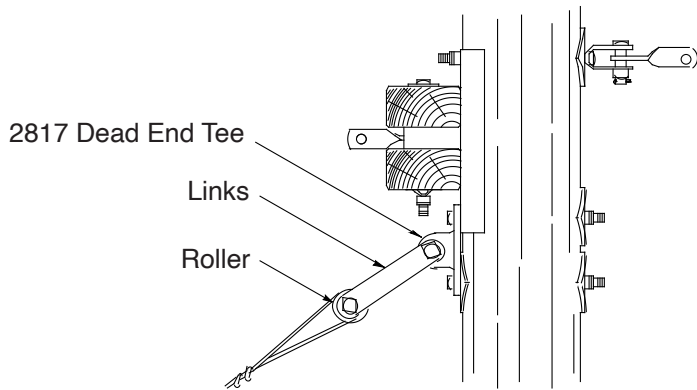
3159 Twisted Links

2-28082 Rollers

7/8"x4" Bolt, MF80



* Pole Bands must be sized to fit pole.

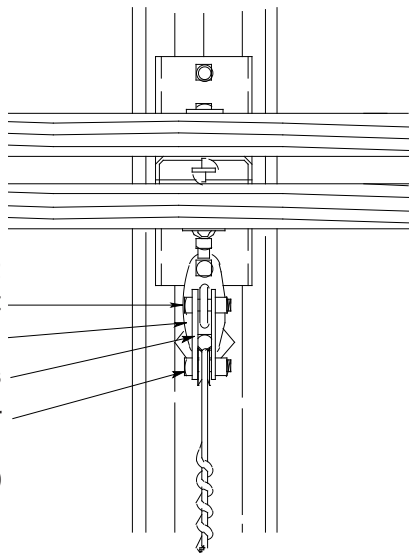


B2358-D 42,000 lb Guying Assembly Kits

The three guying assemblies shown on this page are used frequently in conjunction with 2892 & 3377 dead end assemblies. Each guying kit provides an ultimate guy rating of 42,000 lbs.

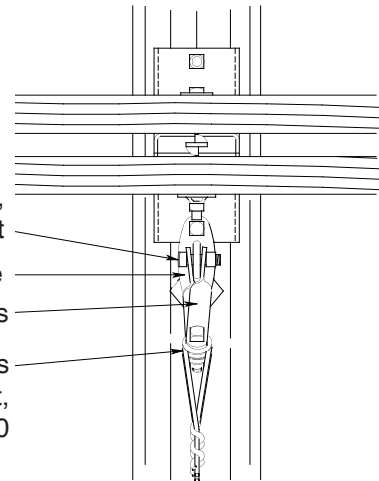
Dead end assemblies purchased separately.

B2358-D1 Guying Hardware for a single down guy



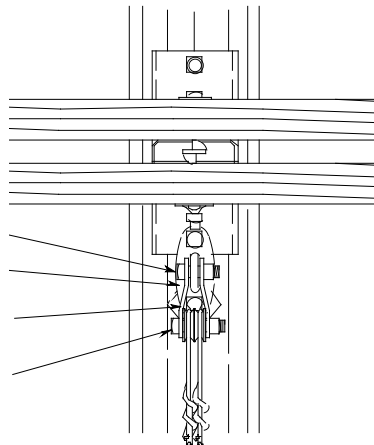
- B103-1/2-2-1/2 Bolt, Locknut
- 2817-15 Tee
- 3173 Links
- 28083 Roller
- B103-1/2-2-1/2 Bolt, MF100

B2358-D2A Double Guy with Twisted Links



- B103-1/2-2-1/2 Bolt, Locknut
- 2817-15 Tee
- 3159 Twisted Links
- 2- 28083 Rollers
- B105-3 Bolt, MF100

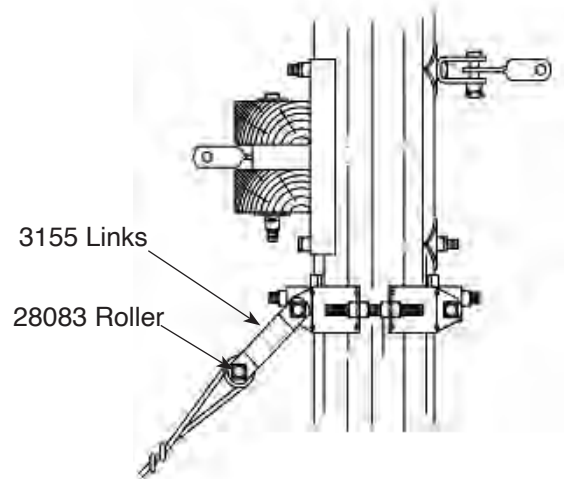
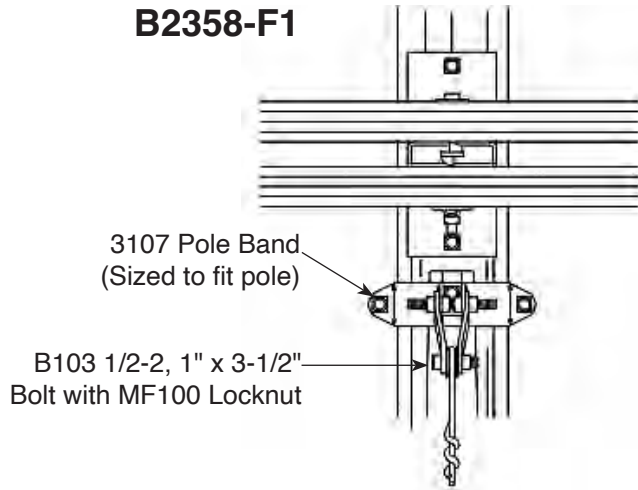
B2358-D2 Double Guy



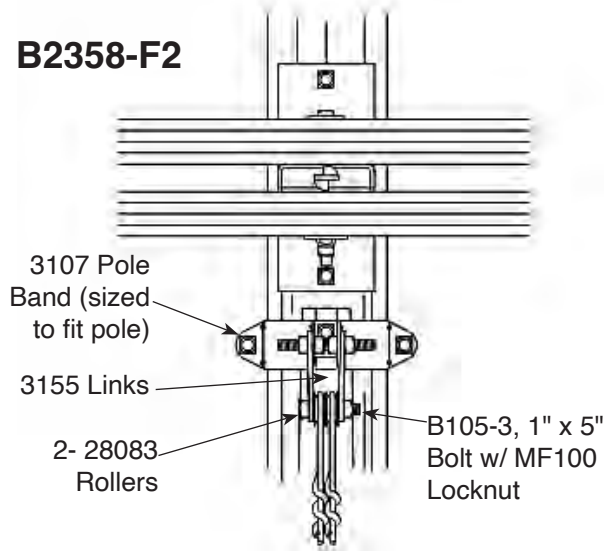
- B103-1/2-2-1/2 Bolt, Locknut
- 2817-15 Tee
- 3155 Links
- 2-28083 Rollers
- B105-3 Bolt, MF100

B2358-F 42,000 lb Guying Assembly Kits

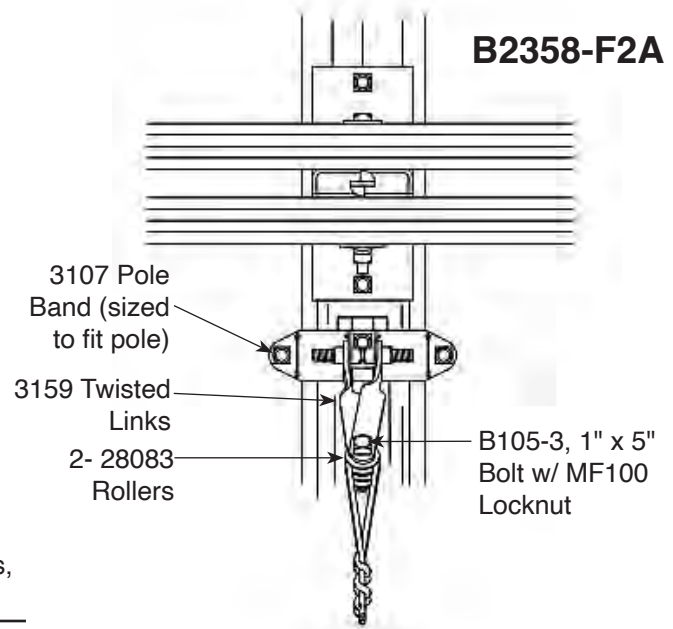
B2358-F1



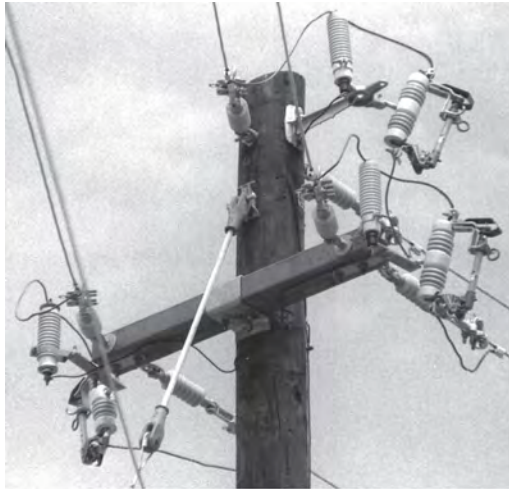
B2358-F2



B2358-F2A

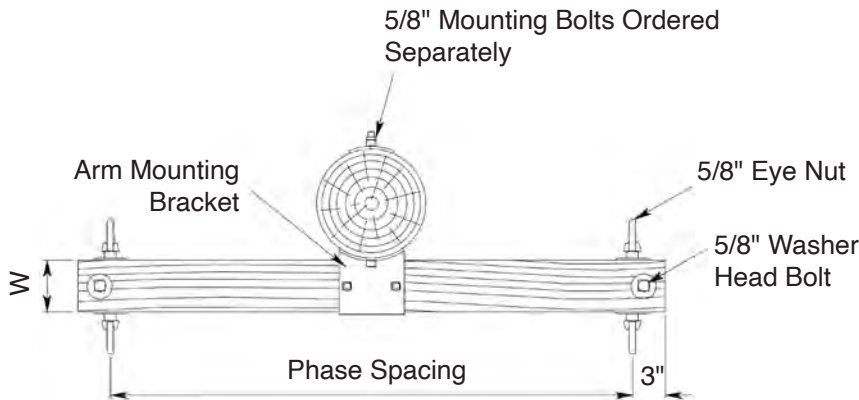


Pole Diameter	Straight Links, One Roller	Straight Links, Two Rollers	Twisted Links, Two Rollers
8"-10"	B2358.5F1	B2358.5F2	B2358.5F2A
10"-12"	B2358.6F1	B2358.6F2	B2358.6F2A
12"-14"	B2358.7F1	B2358.7F2	B2358.7F2A
14"-16"	B2358.8F1	B2358.8F2	B2358.8F2A
16"-18"	B2358.9F1	B2358.9F2	B2358.9F2A
18"-20"	B2358.10F1	B2358.10F2	B2358.10F2A

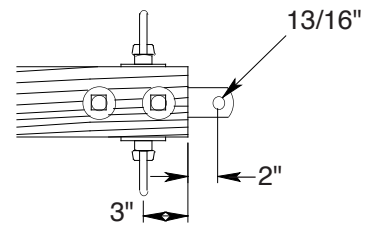


2894 Narrow Profile Dead End Arm

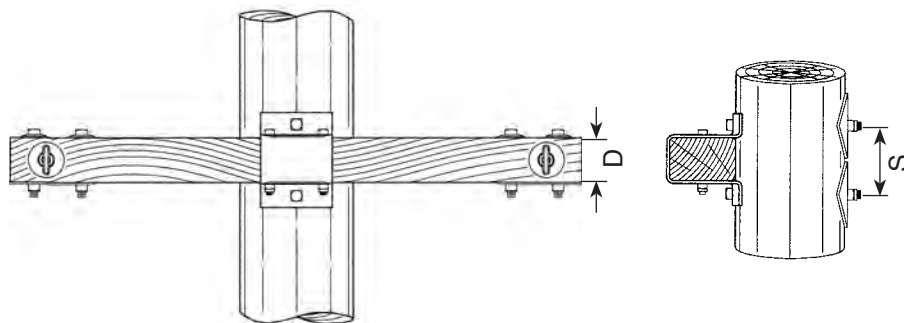
The Hughes Brothers 2894 braceless dead end arm is shipped completely assembled with eye nuts and optional take-off link. For wider phase spacing, consider the Hughes Brothers 3377 dead end arm. Pole mounting bolts ordered separately.



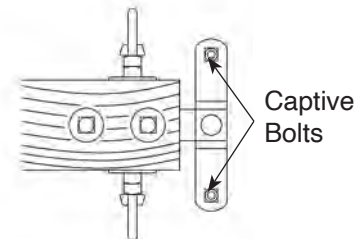
Take-Off Link Option



To order the 2894-A, B, C or D units complete with (2) take-off links add "L"
Example: **2894-AL30**



Equipment Link Option



To order the 2894-A, B, C or D units complete with (2) equipment links add "EL" Example: **2894-AEL30**

Ordering Example:

2894 - A L 42

- Phase Spacing
- Link Option, if Desired
- Stock No., See Chart

2894 Dimensions and Strengths

Stock No.	Phase Spacing	"D" Arm Depth	"W" Arm Width	"S" Bolt Spacing	Calculated Ultimate Longitudinal Strength Per Attachment - Balanced	Calculated Ultimate Vertical Strength Per Attachment - Balanced
2894-A36	3'-0"	3 3/4"	5 3/4"	6"	9,180 Lbs.	5,000 Lbs.
2894-A42	3'-6"	3 3/4"	5 3/4"	6"	7,870 Lbs.	4,800 Lbs.
2894-A48	4'-0"	3 3/4"	5 3/4"	6"	6,890 Lbs.	4,130 Lbs.
2894-A54	4'-6"	3 3/4"	5 3/4"	6"	6,120 Lbs.	3,635 Lbs.
2894-A60	5'-0"	3 3/4"	5 3/4"	6"	5,510 Lbs.	3,240 Lbs.
2894-A66	5'-6"	3 3/4"	5 3/4"	6"	5,000 Lbs.	2,925 Lbs.
2894-B36	3'-0"	3 1/2"	4 1/2"	6"	5,250 Lbs.	3,770 Lbs.
2894-B42	3'-6"	3 1/2"	4 1/2"	6"	4,000 Lbs.	3,170 Lbs.
2894-B48	4'-0"	3 1/2"	4 1/2"	6"	3,940 Lbs.	2,735 Lbs.
2894-B54	4'-6"	3 1/2"	4 1/2"	6"	3,500 Lbs.	2,400 Lbs.
2894-B60	5'-0"	3 1/2"	4 1/2"	6"	3,150 Lbs.	2,140 Lbs.
2894-B66	5'-6"	3 1/2"	4 1/2"	6"	2,860 Lbs.	1,930 Lbs.
2894-C36	3'-0"	4 3/4"	5 3/4"	8"	11,630 Lbs.	5,000 Lbs.
2894-C42	3'-6"	4 3/4"	5 3/4"	8"	9,970 Lbs.	5,000 Lbs.
2894-C48	4'-0"	4 3/4"	5 3/4"	8"	8,725 Lbs.	5,000 Lbs.
2894-C54	4'-6"	4 3/4"	5 3/4"	8"	7,755 Lbs.	5,000 Lbs.
2894-C60	5'-0"	4 3/4"	5 3/4"	8"	6,980 Lbs.	5,000 Lbs.
2894-C66	5'-6"	4 3/4"	5 3/4"	8"	6,345 Lbs.	4,690 Lbs.
2894-D36	3'-0"	3 3/4"	4 3/4"	6"	6,260 Lbs.	4,600 Lbs.
2894-D42	3'-6"	3 3/4"	4 3/4"	6"	5,370 Lbs.	3,870 Lbs.
2894-D48	4'-0"	3 3/4"	4 3/4"	6"	4,700 Lbs.	3,330 Lbs.
2894-D54	4'-6"	3 3/4"	4 3/4"	6"	4,170 Lbs.	2,930 Lbs.
2894-D60	5'-0"	3 3/4"	4 3/4"	6"	3,760 Lbs.	2,610 Lbs.
2894-D66	5'-6"	3 3/4"	4 3/4"	6"	3,400 Lbs.	2,360 Lbs.

*Note: As a minimum these longitudinal strengths should meet or exceed the maximum design tension of the wire times an overload capacity factor of 2.54 (Load factor = 1.65, Material Strength Factor = 0.65).

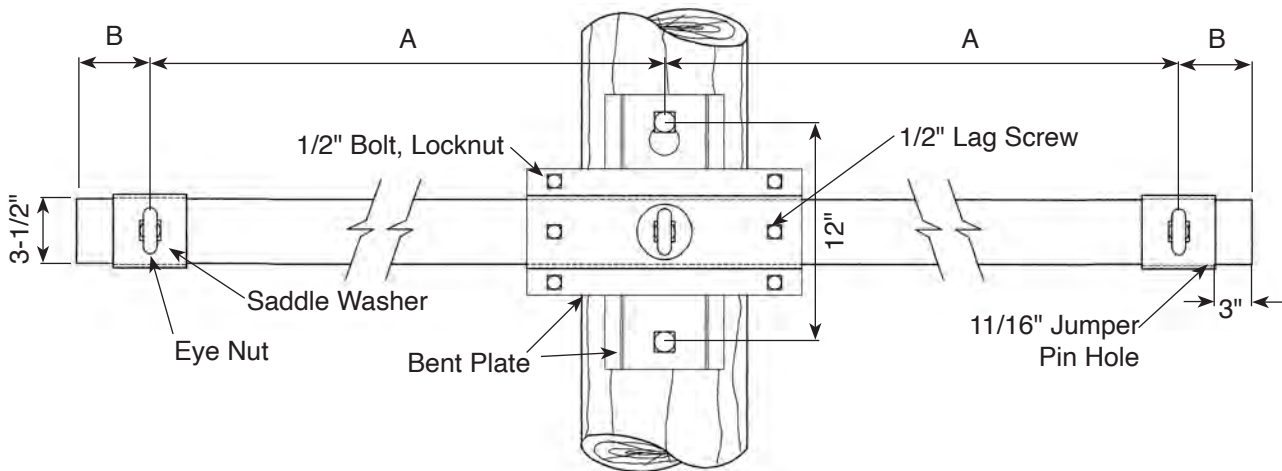


3377 Braceless Dead End Assembly

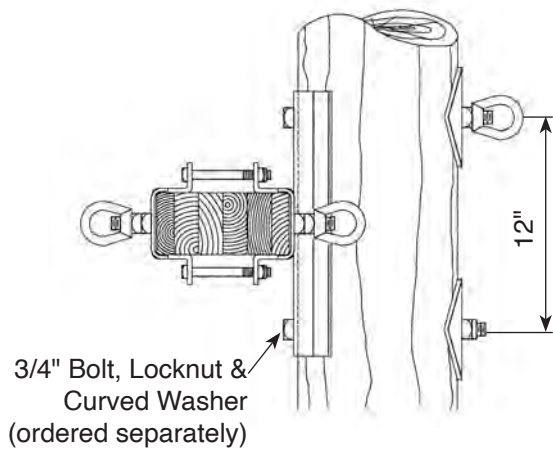
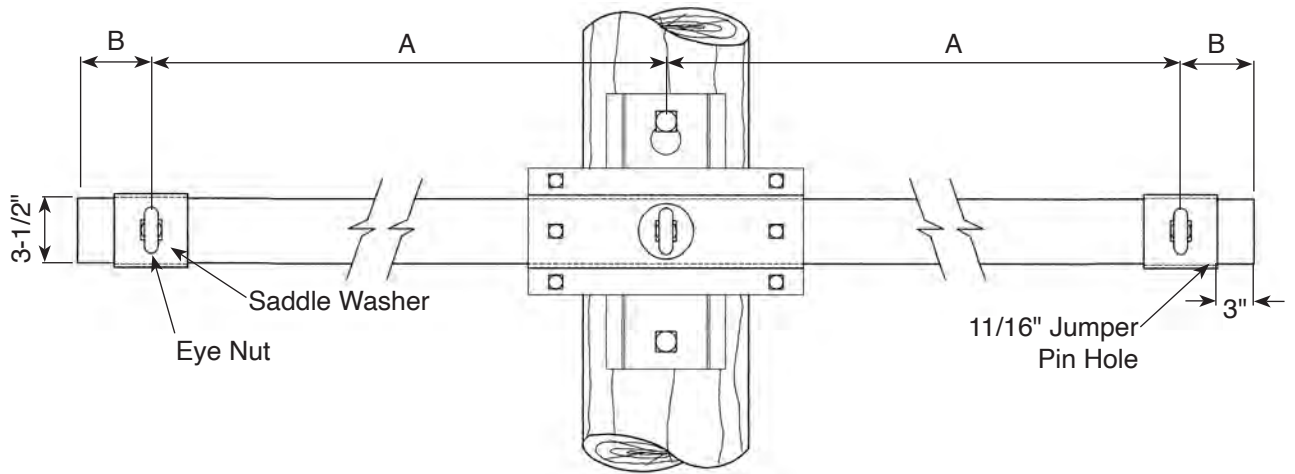
The Hughes Brothers 3377 Series of single arm, braceless dead ends offer a trim appearance.

The assembly uses either a solid sawn Douglas-fir or ANSI 05.2 glue-laminated timber with a galvanized steel mounting bracket. The unique mounting bracket features a keyhole and slot to ease installation and also provides greater climbing clearances than a dead end with braces.

Strength ratings shown are based on theoretical strength calculations. The 3377 is approved for REA construction.



3377 Dead End Assembly 3-Wire



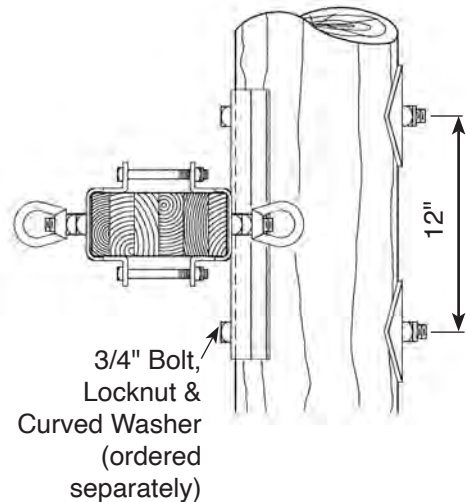
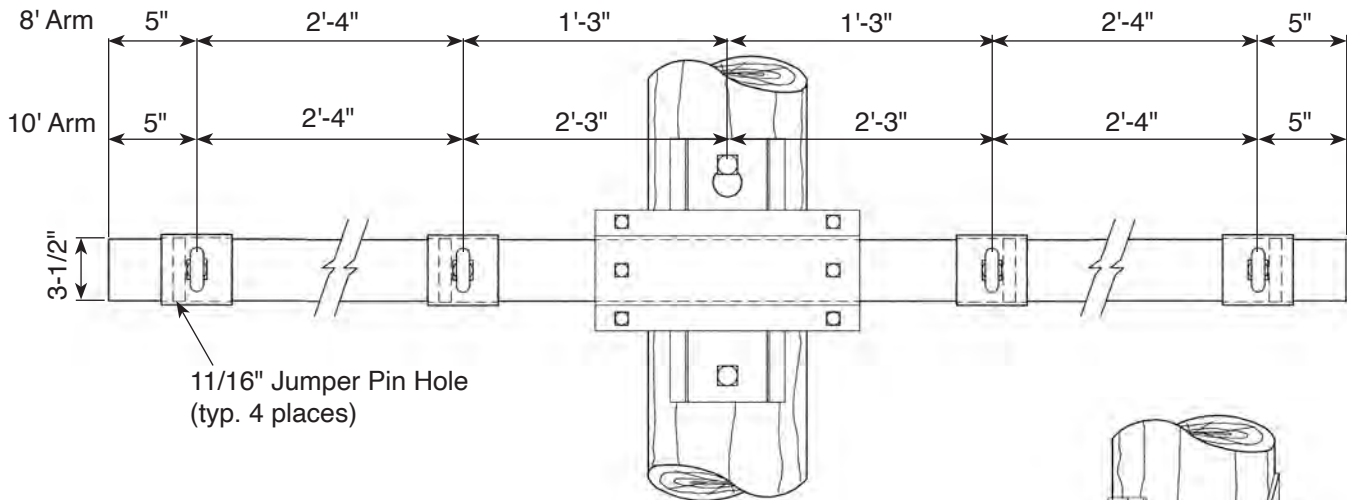
Ordering Example

3377-A 7.5

Beam depth
Length, see table

Stock No.	Arm Size	Weight	A	B	Calculated Ultimate Strength Rating Per Phase
3377-A7.5	3-1/2" x 7-1/2" x 8'-0"	94 lbs.	44"	4"	6,500
3377-A8.5	3-1/2" x 8-1/2" x 8'-0"	100 lbs.	44"	4"	8,500
3377-A9.5	3-1/2" x 9-1/2" x 8'-0"	108 lbs.	44"	4"	10,500
3377-C7.5	3-1/2" x 7-1/2" x 10'-0"	104 lbs.	55"	5"	5,100
3377-C8.5	3-1/2" x 8-1/2" x 10'-0"	112 lbs.	55"	5"	6,500
3377-C9.5	3-1/2" x 9-1/2" x 10'-0"	121 lbs.	55"	5"	8,200

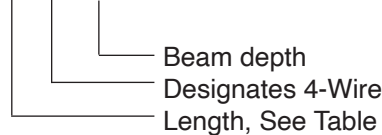
3377 Dead End Assembly 4-Wire



Stock No.	Arm Size	Weight	Calculated Ultimate Strength Rating Per Phase
3377-A4-7.5	3-1/2" x 7-1/2" x 8'-0"	97 lbs	5,600
3377-A4-8.5	3-1/2" x 8-1/2" x 8'-0"	103 lbs	7,200
3377-A4-9.5	3-1/2" x 9-1/2" x 8'-0"	111 lbs	9,000
3377-C4-7.5	3-1/2" x 7-1/2" x 10'-0"	107 lbs	3,600
3377-C4-8.5	3-1/2" x 8-1/2" x 10'-0"	115 lbs	4,650
3377-C4-9.5	3-1/2" x 9-1/2" x 10'-0"	121 lbs	5,800

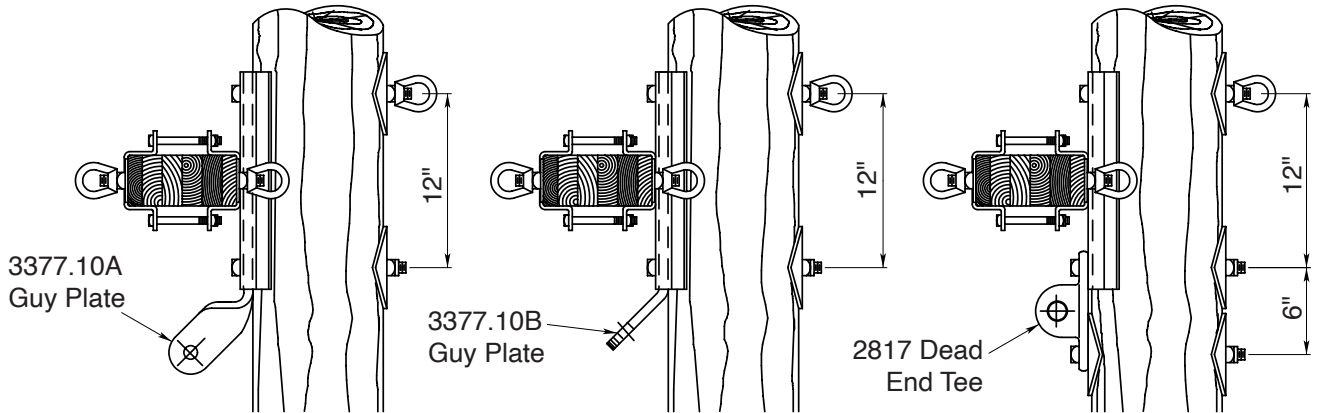
Ordering Example

3 3 7 7 - C 4 7.5



Guying Options

Also refer to Hughes Brothers B2358 Guying Assembly Kits shown on previous pages.



25,000 lb Ultimate Guy Rating
For 7-1/2" and 8-1/2"
3-wire arms

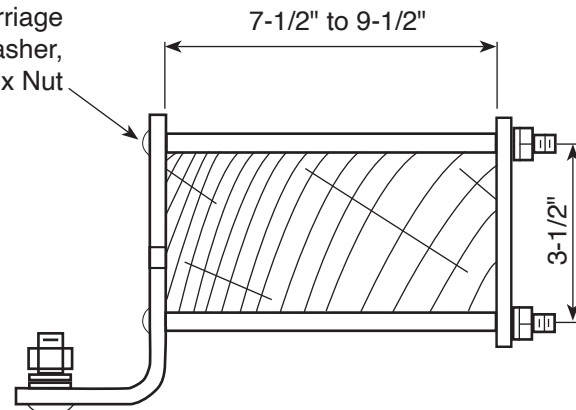
25,000 lb Ultimate Guy Rating
For 7-1/2" and 8-1/2"
3-wire arms

35,000 lb Ultimate Guy Rating
For 9-1/2" 3-wire and all
4-wire arms

A2121-D Cutout Arrestor Bracket for 3377 Dead Ends

BC3 *, 3/8" x * Carriage Bolt, Spring Lock Washer, Hex Nut

Stock No.	"*" Bolt Length
A2121-D7.5	10"
A2121-D8.5	12"
A2121-D9.5	12"

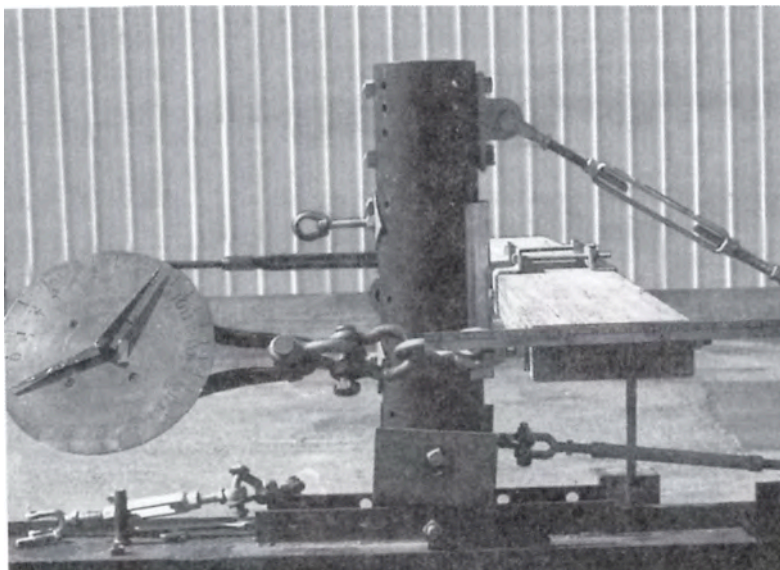


BC51-1/2, 1/2" x 1-1/2" Carriage Bolt, Spring Lock Washer, External Tooth Lock Washer, Hex Nut.

3377 Testing

As with all Hughes Brothers products, the 3377 has undergone rigorous testing.

NOTE: The 3377 Series was designed to carry heavy loads while minimizing the arm deflection. The 3377 has typical deflections less than 2" under ultimate loads.



Testing a 9-1/2" arm.



Testing a 3377.10B Guying Tee

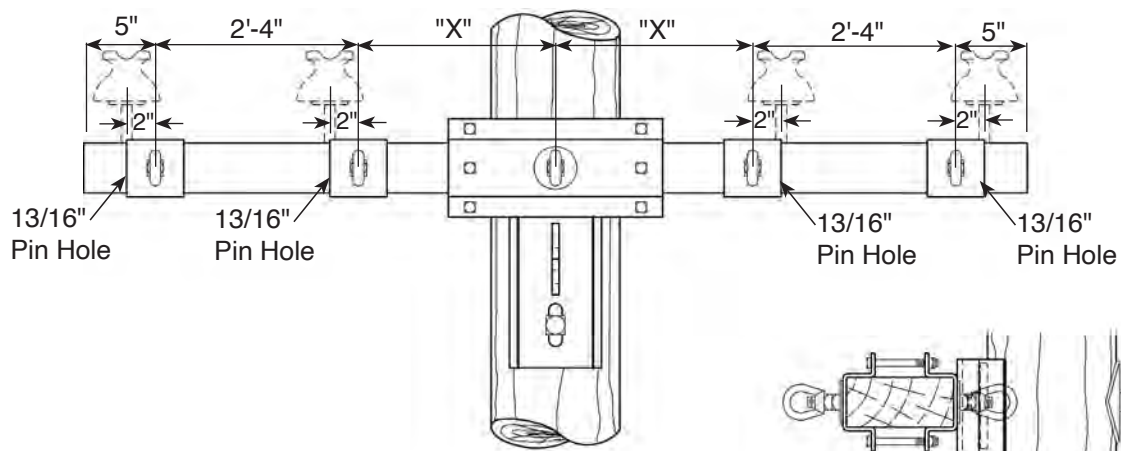
3376 3 or 4-Phase Universal Dead End



The 3376 Universal Dead End series is a 3 or 4-wire, braceless Dead End assembly with double guying option. The dead end is furnished assembled as shown, ready for use in 3 or 4-wire applications. No additional guying attachments are required.

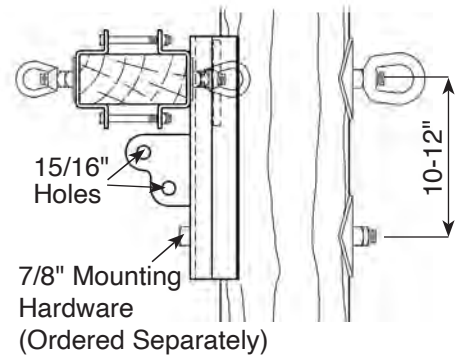
The bracket assembly is made of galvanized steel and features a key-hole slot allowing the whole assembly to be hung on a mounting bolt during installation. The bracket eliminates the need for crossarm braces.

The crossarm is made from transmission grade solid sawn Douglas-fir timber. Jumper pin holes are factory drilled prior to treating.



Ordering Information

Stock No.	Arm Size	Ultimate Strength Rating Per Phase		"X"
		3-Wire	4-Wire	
3376-A7.5	3-1/2" x 7-1/2" x 8'-0"	6,500 lbs.	5,600 lbs.	1'-3"
3376-A8.5	3-1/2" x 8-1/2" x 8'-0"	8,500 lbs.	7,200 lbs.	1'-3"
3376-A9.5	3-1/2" x 9-1/2" x 8'-0"	10,500 lbs.	9,000 lbs.	1'-3"
3376-E1-7.5	3-1/2" x 7-1/2" x 10'-0"	5,100 lbs.	3,600 lbs.	2'-3"
3376-E1-8.5	3-1/2" x 8-1/2" x 10'-0"	6,500 lbs.	4,650 lbs.	2'-3"
3376-E1-9.5	3-1/2" x 9-1/2" x 10'-0"	8,200 lbs.	5,800 lbs.	2'-3"



3375-A

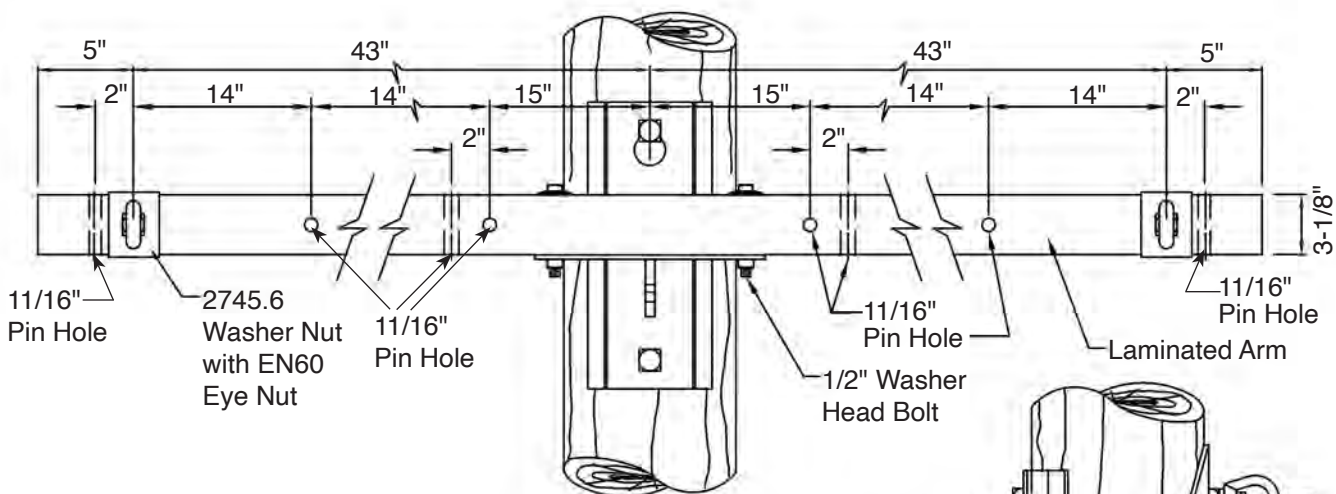
Light Duty Braceless Dead End

The 3375-A Light Duty Dead-End series is an 8'-0" lightweight braceless pre-assembled dead-end crossarm for less severe loading requirements.

The pole mounting bracket is galvanized steel and features a keyhole slot for ease of installation and a single guy attachment. The bracket elimi-

ates the need for crossarm braces and, in most cases, the need for additional guying attachments.

The crossarm is a laminated beam which makes the unit economical and predictable in its strength characteristics. Additional holes are provided for jumper pins.



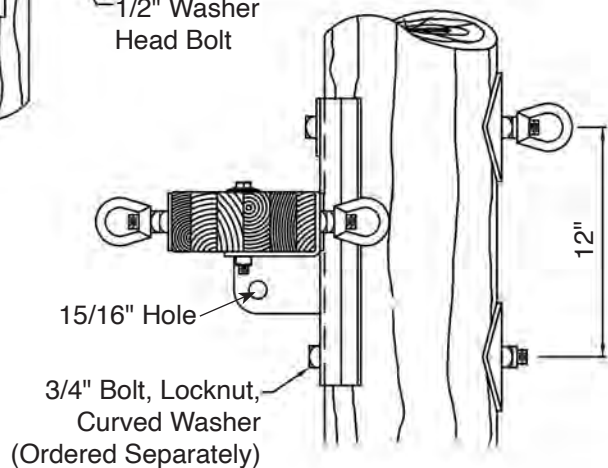
Ordering Information

Part No.	Arm Size (Laminated)	Weight	Ultimate Strength Per Phase
3375-A6.0L	3-1/8" x 6" x 8'-0"	54 lbs	2700 lbs
3375-A7.5L	3-1/8" x 7-1/2" x 8'-0"	62 lbs	4200 lbs
3375-A9.0L	3-1/8" x 9" x 8'-0"	70 lbs	6000 lbs

Note:

Packaged hardware to be ordered separately, **3375-A-PH**

- 1 - EN70, 3/4" Eyenut
- 2 - B712-6 3/4" x 12" Bolt
- 2 - MF70 Locknut
- 2 - CW70 3/4" Curved Washer



3375-B

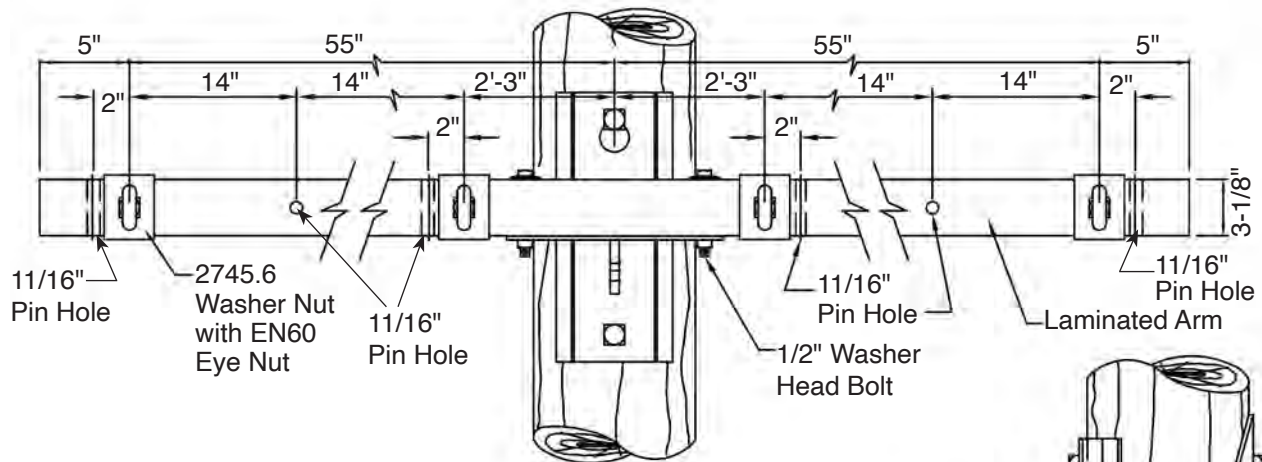
Light Duty Braceless Dead End

The 3375-B Light Duty Dead-End series is a 10'-0" lightweight braceless pre-assembled dead-end crossarm.

The pole mounting bracket is galvanized steel and features a keyhole slot for ease of installation and a single guy attachment. The bracket eliminates the

need for crossarm braces and, in most cases, the need for additional guying attachments.

The crossarm is a laminated beam which makes the unit economical and predictable in its strength characteristics. Additional holes are provided for jumper pins.



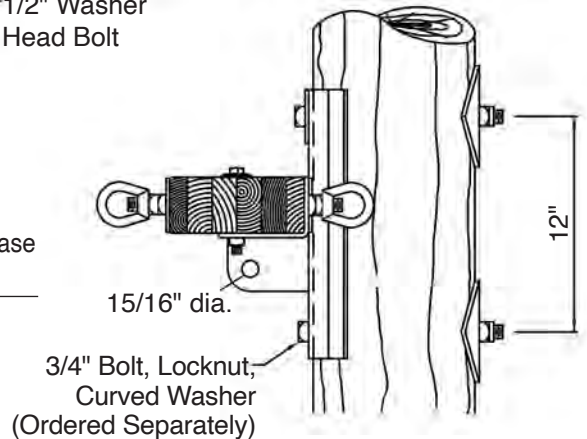
Ordering Information

Part No.	Arm Size (Laminated)	Weight	Ultimate Strength Per Phase	
			2-Wire	4-Wire
3375-B6.0L	3-1/8" x 6" x 10'-0"	66 lbs	2100 lbs	1400 lbs
3375-B7.5L	3-1/8" x 7-1/2" x 10'-0"	74 lbs	3300 lbs	2200 lbs
3375-B9.0L	3-1/8" x 9" x 10'-0"	82 lbs	4700 lbs	3200 lbs

Note:

Packaged hardware to be ordered separately, **3375-A-PH**

- 2 - B712-6 3/4" x 12" Bolt
- 2 - MF70 Locknut
- 2 - CW70 3/4" Curved Washer



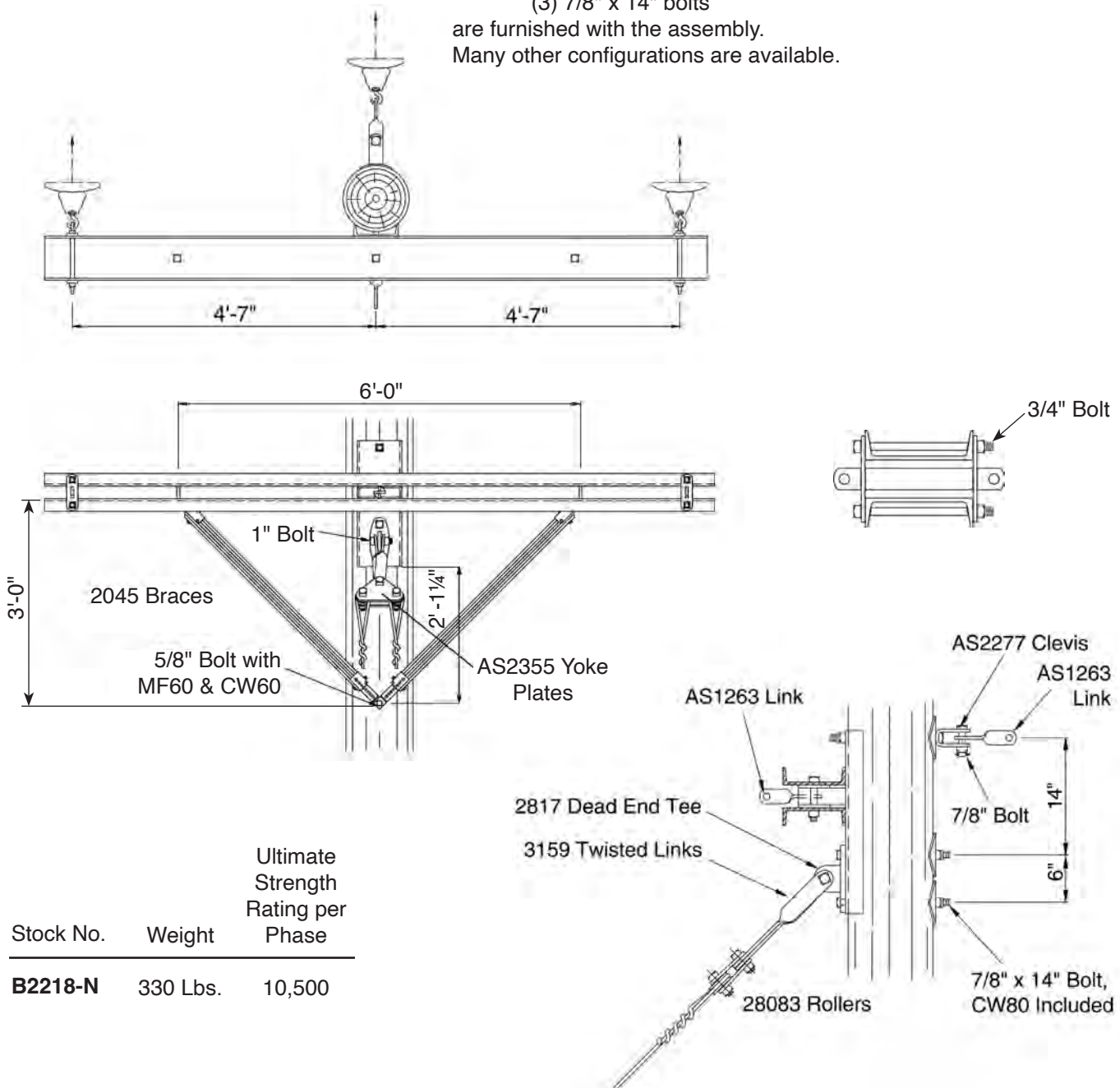
B2218-N Steel Dead End Assembly

The B2218-N is a 10 ft., 3-wire assembly featuring an adaptation to facilitate a down guy. Manufactured from steel channel. Guying Hardware is included in this assembly. Pole mounting hardware consisting of:

- (1) 5/8" x 14" and
- (3) 7/8" x 14" bolts

are furnished with the assembly.

Many other configurations are available.



Stock No.	Weight	Ultimate Strength Rating per Phase
B2218-N	330 Lbs.	10,500

B2218-E4 4-Wire Steel Dead End Assembly

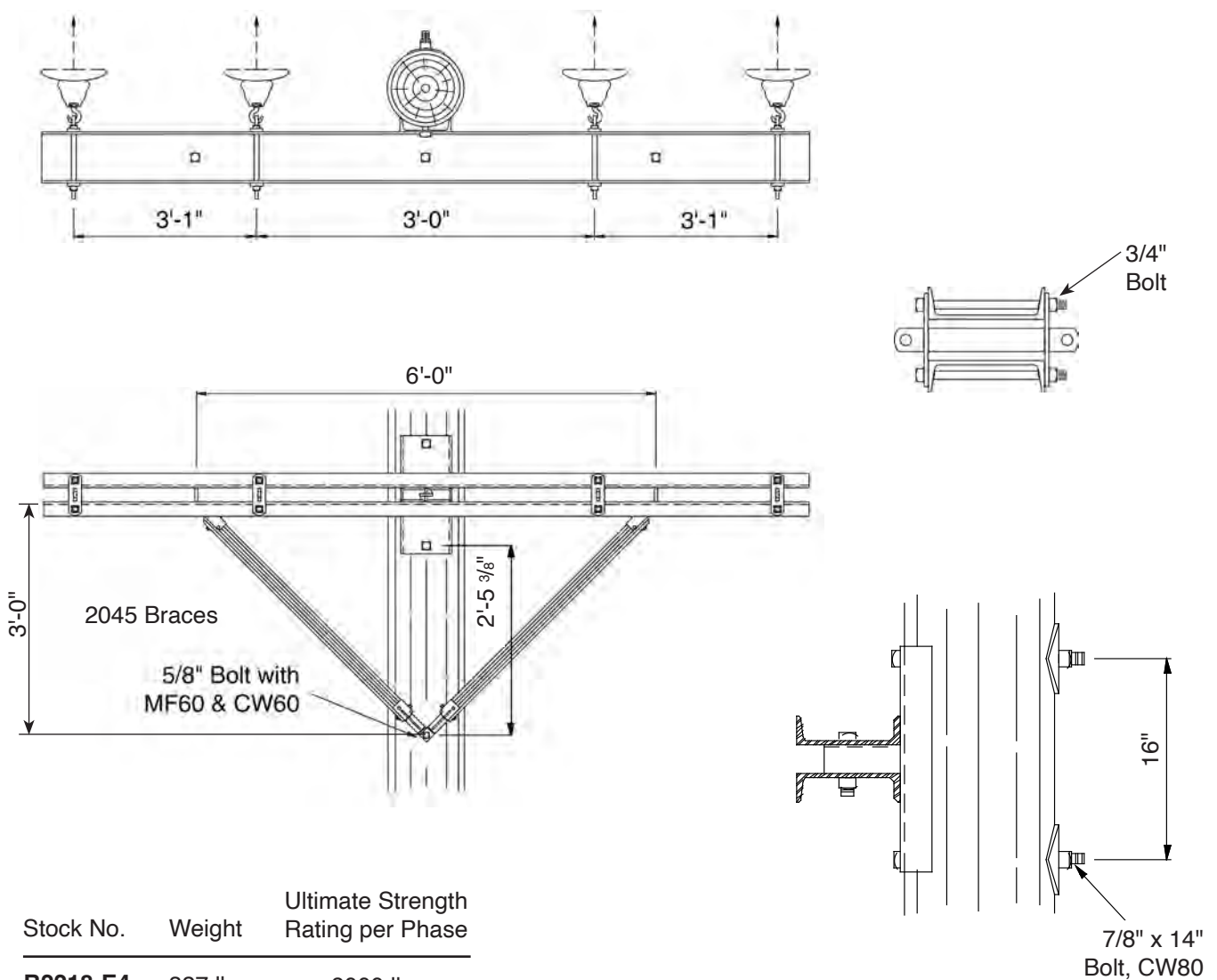
The B2218-E4 is a 10 ft. 4-wire assembly manufactured from steel channel.

Pole mounting hardware consisting of:

- (1) 5/8" x 14" and
- (2) 7/8" x 14" bolts

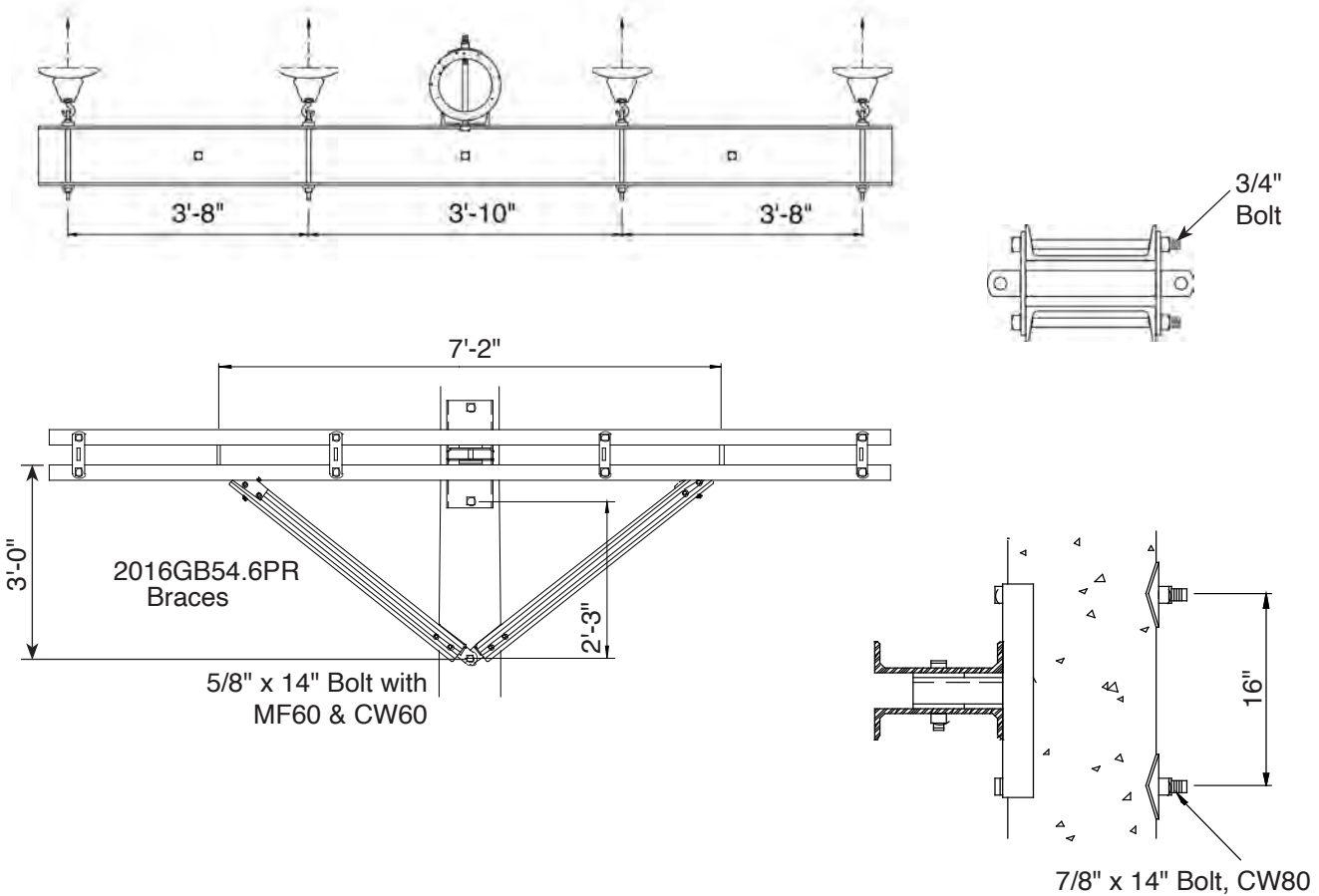
are furnished with the assembly.

Many other configurations are available.



B2218-K 4-Wire Steel Dead End Assembly

The B2218-K is a 12 ft. 4-wire assembly manufactured from steel channel. Pole mounting hardware consisting of:
 (1) 5/8" x 14" and
 (2) 7/8" x 14" bolts
 are furnished with the assembly.

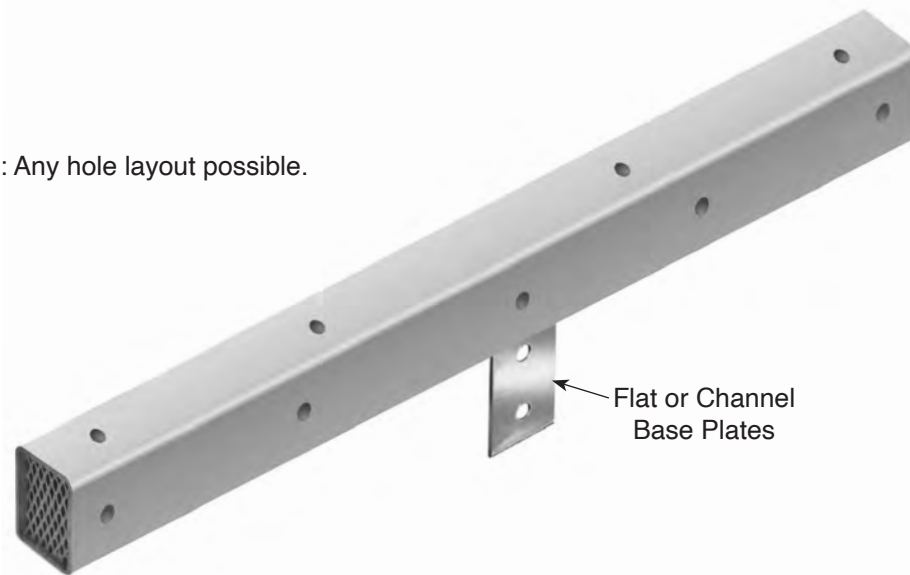


Stock No.	Weight	Ultimate Strength Rating per Phase
B2218-K	350 lbs	10,800 lbs.

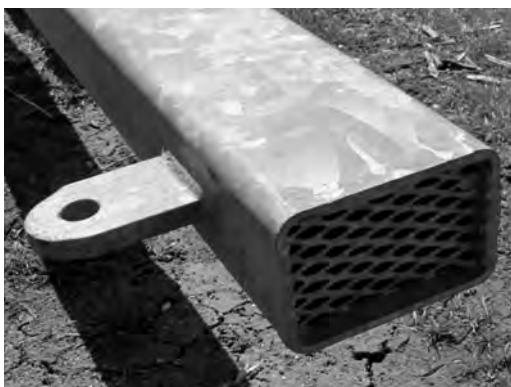
B2684 Series Tubular Steel Crossarms, Single Pole

Hughes Brothers tubular steel crossarms for single pole applications are available in a wide variety of sizes, base plate options and hole patterns. Available in either galvanized ASTM A500 grade B or ASTM A847 weathering steel tube.

NOTE: Any hole layout possible.



Expanded Metal End Detail

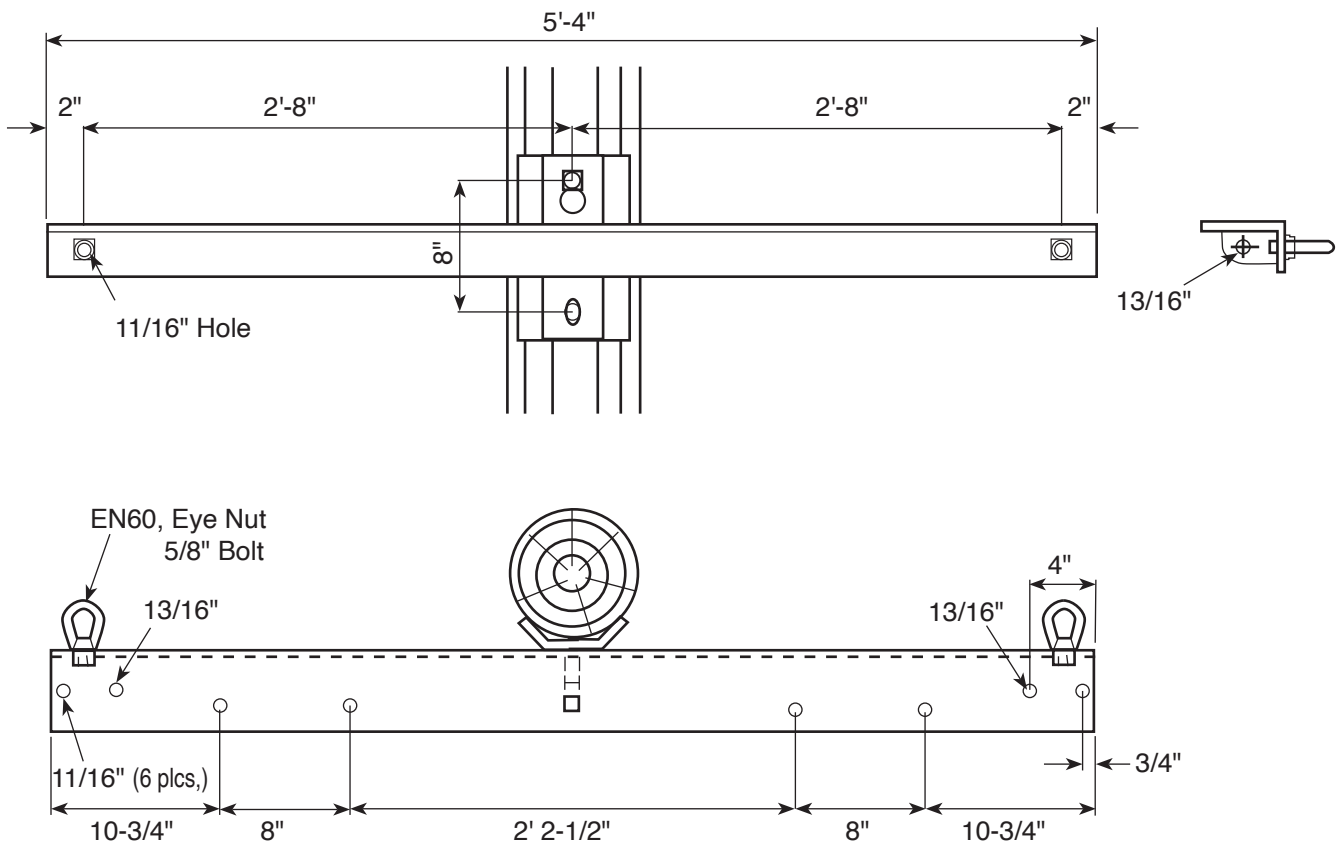


How to Order/Specify:

Hughes Brothers welcomes your own drawings for steel crossarms and can supply as specified. It is generally best to consult the Engineering personnel at Hughes Brothers in regard to steel arms since there are so many options.

B2684-Q Steel Dead End

The B2684-Q is a 3-wire, dead end arm manufactured from structural steel angle and ships with eyenuts assembled to the arm for phase attachment. Other configurations are available.

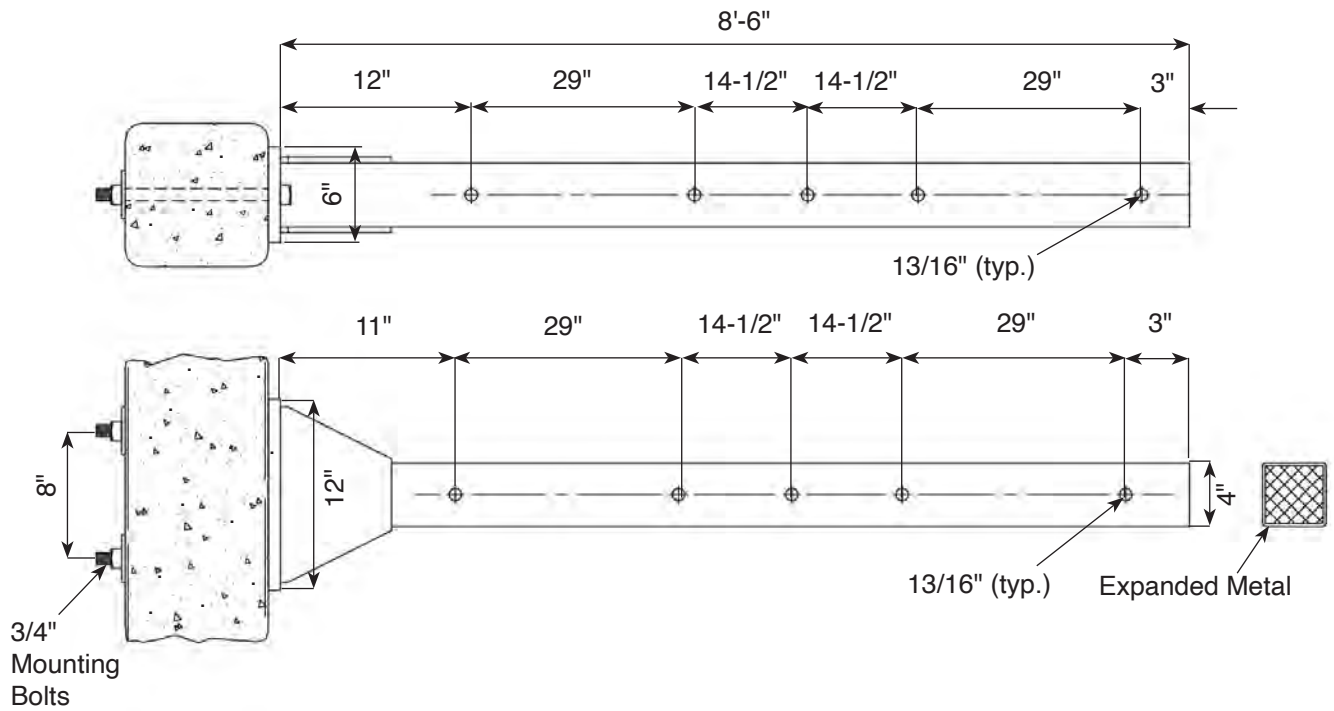


Stock No.	Weight	Ultimate Strength Rating per Phase
B2684-Q	65 lbs	5000 lbs.

B2684-F Steel Alley Arm

The B2684-F Steel Alley Arm is manufactured from structural steel tube. A diamond shaped mesh is welded in place at the end of the arm to prevent birds from nesting in the arm.

Other configurations are available.



Stock No.	Weight
-----------	--------

B2684-F	104 lbs
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NOTE: Mounting hardware not included.



BRACES

Crossarm Braces.....	B-1
Special Purpose Braces	B-11
Transmission.....	B-15
Knee & Vee	B-18
Tension	B-22
X-Braces	B-25



Hughes Brothers warehouse stocked with 2023 braces.

Wood Distribution Crossarm Braces

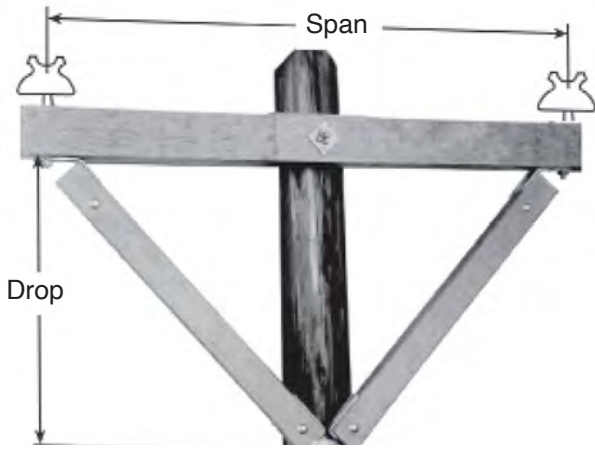
Hughes Brothers distribution crossarm braces are manufactured from clear, straight grained Douglas-fir and pressure treated with DCOI in oil. End fittings are hot dip galvanized per ASTM-A153. Each brace has been designed with tapped connections that eliminate radio frequency interference and ensure tight connections. Metal connections are designed to allow full drainage of moisture, leaving no place for decay to develop.

Electrically, wood distribution braces take full advantage of the insulating properties of wood crossarms. Any short circuit path between conductors is eliminated.

Special length braces can be furnished in any practical spacing or drop.



1152 Wood Crossarm Brace



Hughes Brothers 1152 crossarm braces differ from other braces we manufacture in that they feature a longer tongue on the arm fitting. This allows for the use of a socket wrench at installation. Right and left hand braces complete each pair. Fittings are hot dip galvanized per ASTM-A153.

Furnished with 13/16" hole in arm fitting and 11/16" hole in pole fitting unless otherwise specified.

Stock No.	Span Inches	Drop Inches	Wt. Lbs. Per Pair	Wood Section
1152.5	42	12	10	1-15/16" x 2-15/16"
1152.6	42	21	11	
1152.7	48	18	11	
1152.8	48	24	12	
1152.9	60	18	12	
1152.10	60	30	14	
1152.11	62	23-5/8	14	
1152.12	72	22	14	
1152.13	72	36	16	
1152.14	84	24	16	
1152.15	86	33-5/8	17	

Use "5T" designation for 1/2" tapped attachment holes.

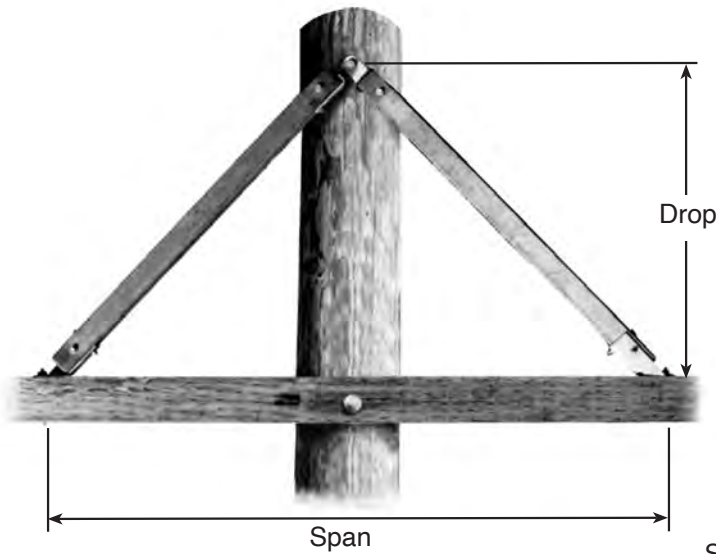
Special Length Braces furnished for any practical span or drop.

Standard package quantity 5 pair.

Ordering Information

1 1 5 2 . 9 - 1 3 - 1 1

Brace to pole fitting hole size in sixteenths (11/16")
 Brace to arm fitting hole size in sixteenths (13/16")
 Brace type (span & drop)



2002 Inverted Wood Crossarm Brace

Hughes Brothers 2002 Inverted Crossarm Braces are used primarily in tension applications although they can be used as a standard brace. End fittings and connections have been designed accordingly. Fittings are hot dip galvanized per ASTM A-153 after fabrication. Right and left hand braces complete each pair.



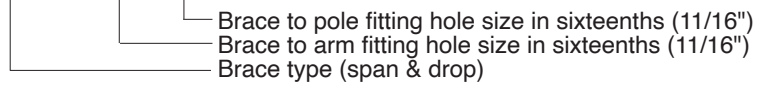
Unless specified otherwise, end fittings are furnished with 11/16" bolt holes.

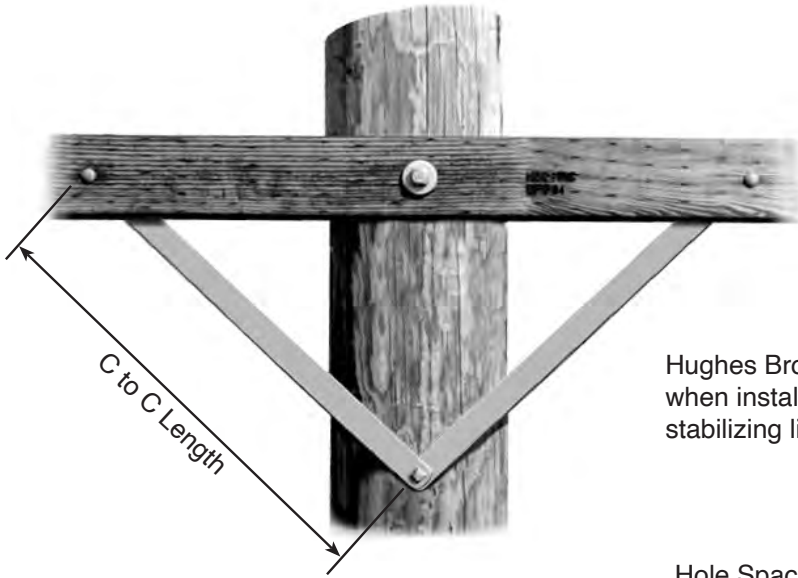
Stock No.	Span Inches	Drop Inches	Wt. Lbs. Per Pair	Wood Section
2002.5	60	18-1/4	17	1-15/16" x 2-15/16"
2002.6	60	30	19	
2002.7	62	23-7/8	18	
2002.8	66	20	18	
2002.9	72	22	19	
2002.10	72	36	22	
2002.11	84	23-1/2	21	
2002.12	84	42	25	
2002.13	84	27-3/8	22	
2002.14	86	33-5/8	23	
2002.15	88	38	24	
2002.16	90	33-5/8	24	
2002.17	90	45	26	
2002.18	96	36	25	
2002.19	96	48	26	
2002.20	108	42-1/4	26	
2002.21	110	34	27	
2002.22	110	54-5/8	32	
2002.23	112	37-13/16	28	

Standard Package Quantity 5 Pair.

Ordering Information

2002.6 - 11 - 11





2809 & 2819 Flat Steel Crossarm Brace

Hughes Brothers flat steel galvanized crossarm braces, when installed in pairs, provide an economical method for stabilizing light distribution construction.

Stock No.	Hole Spacing Center to Center	Length Inches	Metal Section	Approximate Weight Lbs. Per Set
2809.1	18"	20	1/4" x 1-1/4"	3.5
2809.2	20"	22		3.9
2809.3	22"	24		4.3
2809.4	24"	26		4.6
2809.5*	26"	28		4.8
2809.6	28"	30		5.3
2809.7	30"	32		5.7
2819.1	18"	20	3/16" x 1-1/4"	2.7
2819.2	20"	22		2.9
2819.3	22"	24		3.2
2819.4	24"	26		3.4
2819.5	26"	28		3.7
2819.6	28"	30		4.0
2819.7	30"	32		4.2

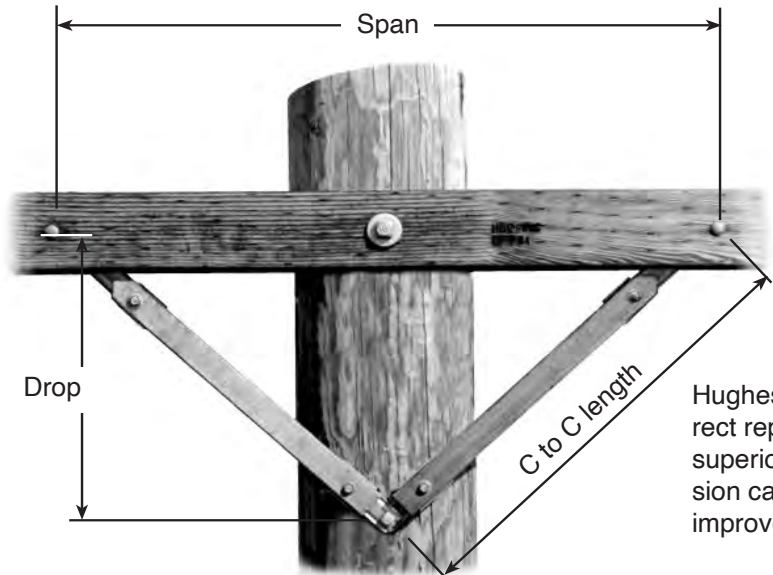
*RUS accepted

Note: Other sizes are available on request. The braces are furnished with one 9/16" and one 7/16" hole unless specified otherwise.

Ordering Information

2809.5

Specify by C to C length.



2023 Flat Wood Brace

Hughes Brothers 2023 flat wood braces are a direct replacement for flat steel braces, and provide superior mechanical strength due to their compression capability. Use of a wood distribution brace also improves the BIL of the pole top.

Each brace in a pair is identical and interchangeable (right or left hand side), and furnished with 7/16" hole in the arm fitting and 9/16" hole in the pole fitting. Other hole sizes are available.

Wood components are made of clear, straight grained Douglas-fir, 1" x 1-3/4" wood section. Fittings are formed from 11 ga. plate, hot-dip galvanized, threaded and attached to the wood with washer head bolts.

Stock No.	Brace Bolt	Span	Drop	Wt. Lbs. Per 100 Pr.	Wood Section
	Hole C. to C. Spacing				
§ 2023*	26"	38"	18"	390	1" x 1-3/4"
2023-18-3/4	18-3/4"	27-1/2"	12-3/4"	345	1" x 1-3/4"
2023-30	30"	44"	20-1/2"	409	1" x 1-3/4"

Any practical special length can be furnished.

Standard Package Quantity 10 Pair or Multiple Thereof

*RUS accepted

§ Stock item

Ordering Information

Use information above.



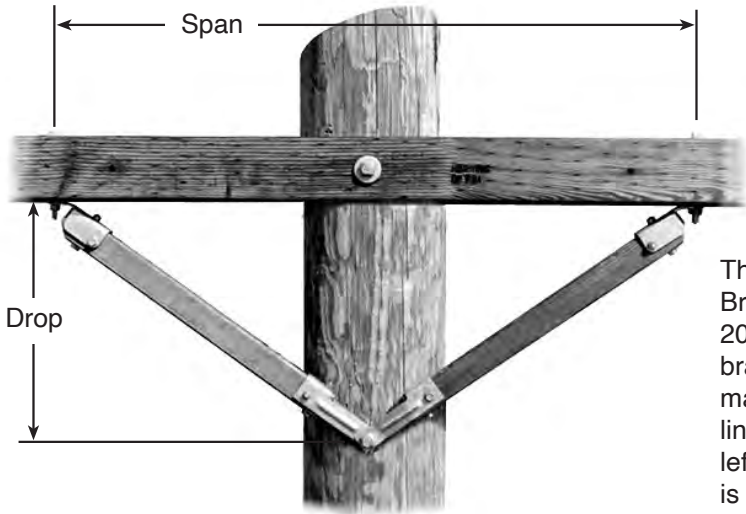
2023 Test Data



2023 Brace ready for testing in accordance with REA specs.



Pair of 2023 braces removed after 20 years of service ready for testing. These braces performed to full capacity when tested.



2045 Reversible Wood Crossarm Brace

The 2045 reversible crossarm brace is Hughes Brothers most popular distribution brace. The 2045 brace is Hughes Brothers best all purpose brace, and is able to withstand all normal and many excessive loads imposed on distribution lines. Each brace pair has identical right and left hand components. Each nutted connection is tapped to make a double nut connection ensuring permanently tight hardware. The 2045 has a wood section of 1-5/8" x 2-1/4".

Unless otherwise specified, the brace to arm fitting hole will be 9/16" and the brace to pole fitting hole 11/16". Special length braces can be furnished for any practical span or drop.

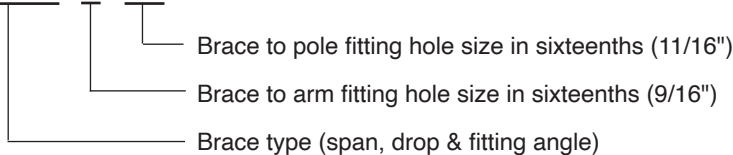
"5T" designates 1/2" tapped attachment holes, example; 2045-CC30-5T11.

Other span & drop sizes available.

Stock No.	Span Inches	Drop Inches	Wood Length Inches	Fitting Angle	Wt Lbs. Per Pair
2045-A30-9-11	42	12	18-1/2	30°	7.4
2045-AB45-9-11	37	18-1/2	21	45°	7.6
2045-B30-9-11	48	14-3/4	23	30°	
2045-B45-9-11	42	21	24-1/2	45°	
2045-BB30-9-11	48	18	24-1/2	30°	8.0
2045-C45-9-11	48	24	28-1/2	45°	8.8
2045-CC30-9-11*	60	18	29-1/2	30°	9.0
2045-D45-9-11*	60	30	37	45°	10.2
2045-E45-9-11	72	36	45-1/2	45°	11.8
2045-EE30-9-11	72	22	37	30°	
2045-F30-9-11	42	12-3/4	19	30°	7.7
2045-G45-9-11	60	26-1/2	34-1/2	45°	
2045-K30-9-11	48	14	22-1/2	30°	7.7
2045-L30-11-11	59	17	28-1/2	30°	8.8
2045-M30-9-11	84	24	43	30°	11.1
2045-W30-13-11	86	33-3/8	49	30°	12.5

Ordering Information

2045-CC30-9-11



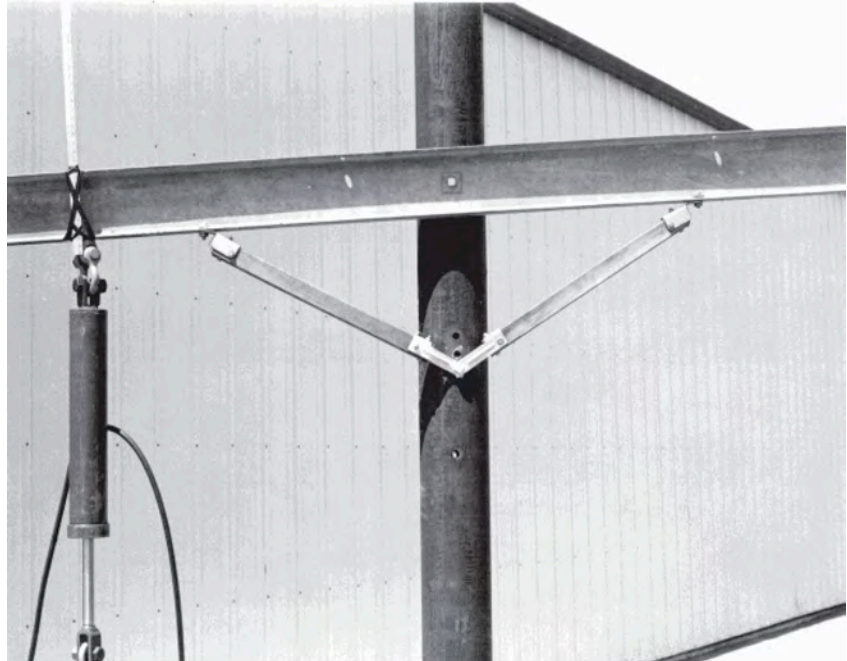
* RUS accepted

See next page for ultimate load information

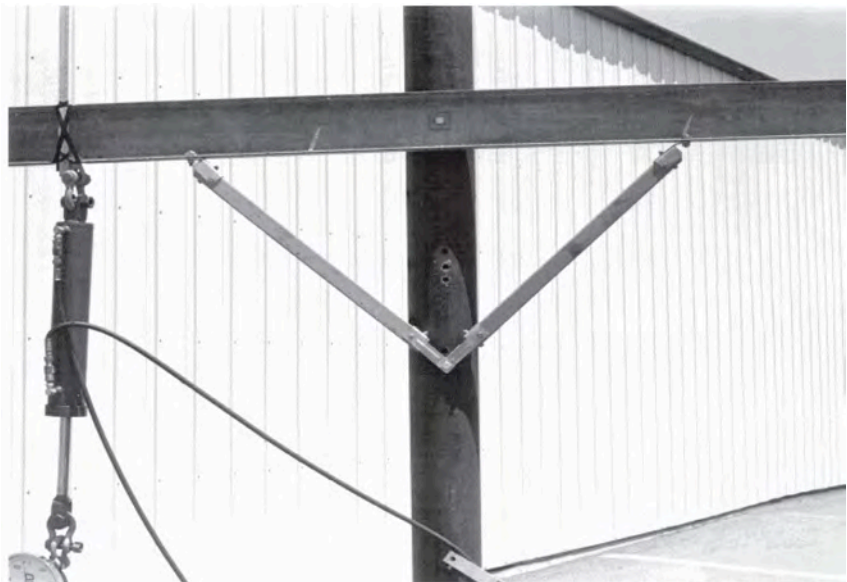


2045 Crossarm Brace Test Data

2045-CC30-9-11 Crossarm Brace
Unbalanced loading (44" Lever Arm)
2500 Pounds Shown
4300 Pound *Ultimate* Load



2045-D45-9-11 Crossarm Brace
Unbalanced loading (44" Lever Arm)
2500 Pounds Shown
5100 Pound *Ultimate* Load



NOTE: Please contact the Hughes Engineering Department for strength ratings of individual brace stock numbers.

Heavy Duty, Face Mounting Crossarm Braces 2016, 2017 & 2018

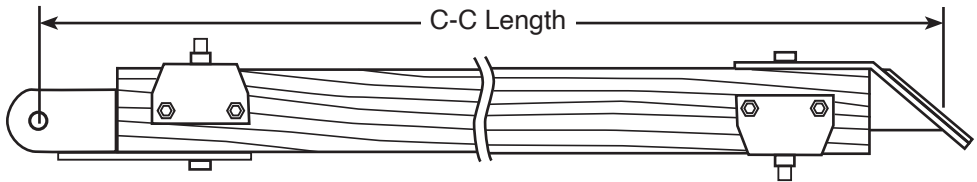


Table 1

	Fitting Angle	Arm Mounting Hole Size*	Arm Mounting Hole Size*
		2016/17	2018
A	30°	13/16"	15/16"
B	37°	13/16"	15/16"
C	45°	13/16"	15/16"
D	52°	13/16"	15/16"
E	60°	13/16"	15/16"
F	30°	11/16"	13/16"
G	37°	11/16"	13/16"
H	45°	11/16"	13/16"
J	52°	11/16"	13/16"
K	60°	11/16"	13/16"
L	55°	11/16"	—

* Hole Oversized 1/16" from mounting bolt

The Hughes 2016, 2017 & 2018 series braces are the strongest distribution braces available.

These braces are ordered by specifying brace length from mounting hole to mounting hole.

Face mounted braces are furnished in pairs (right & left side). Should it be necessary, braces can be converted from right to left side in the field by simply reversing one end fitting.

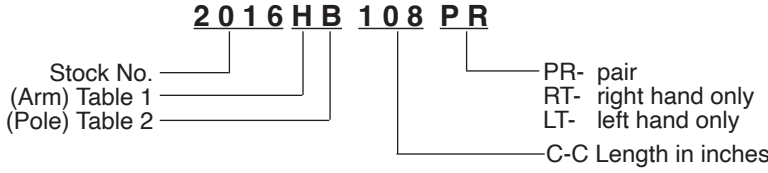
Table 2

		Pole Mounting Fitting Hole Size
2016	A	13/16"
	B	11/16"
2017	A	15/16"
	B	13/16"
	C	11/16"
2018	A	15/16"
	B	13/16"

Ultimate Ratings

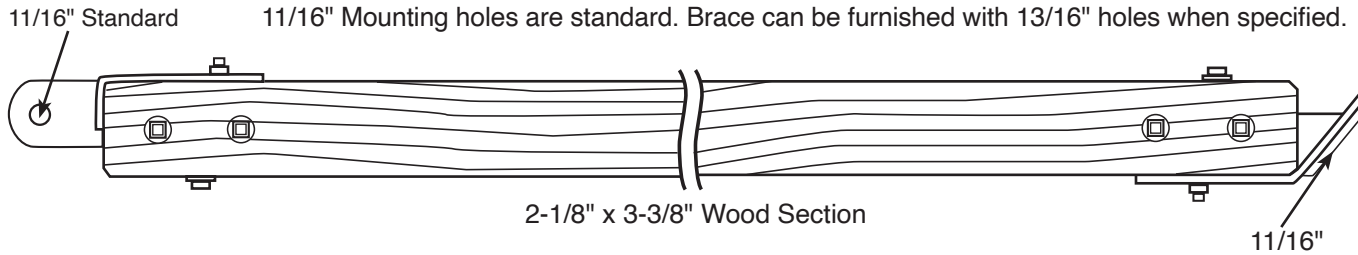
	2016 / 2017	2018
Tension	15,000 lbs	20,000 lbs

Ordering Information

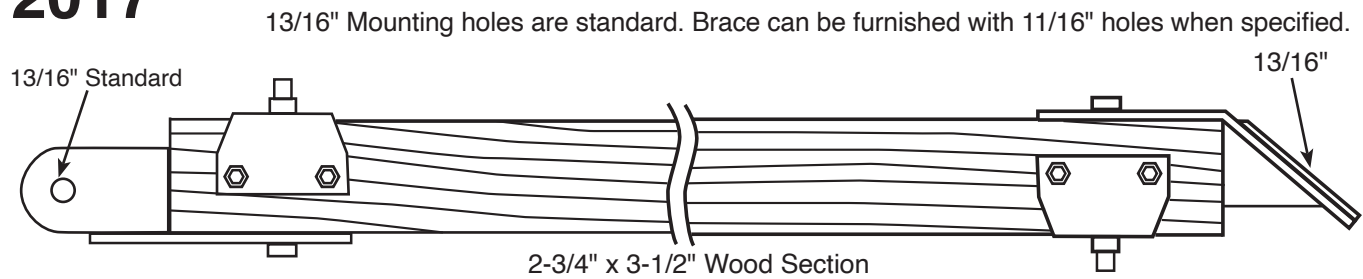


B BRACES

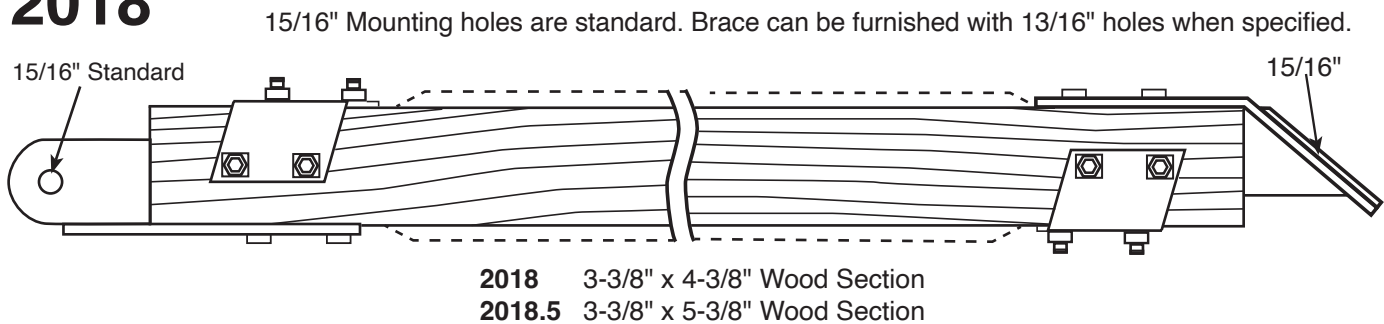
2016



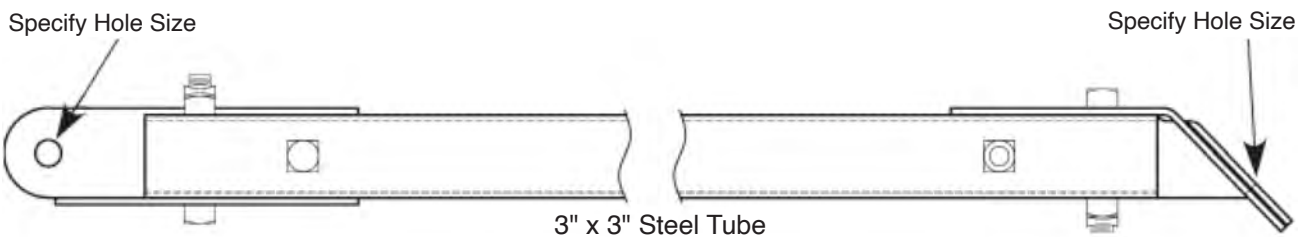
2017

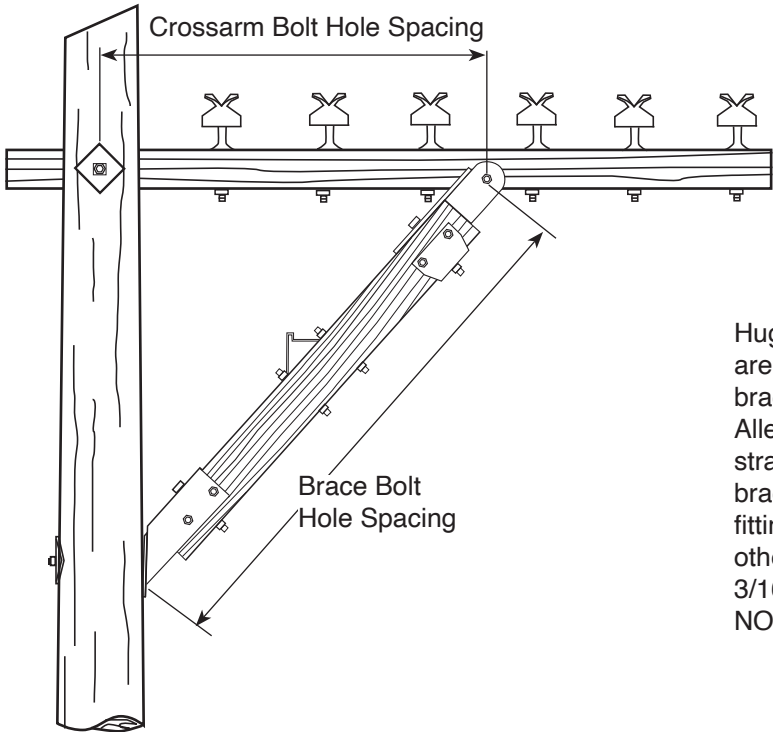


2018



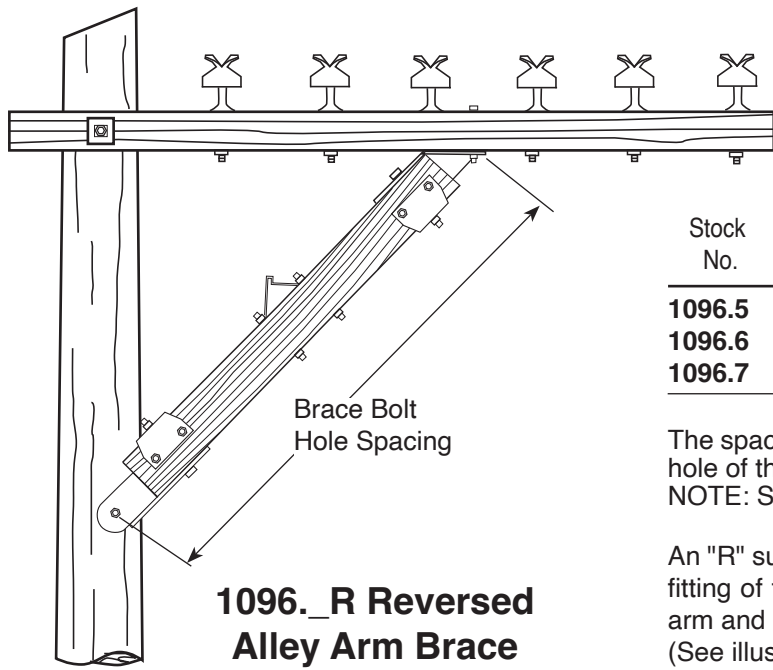
2018M





1096 Alley Arm Brace

Hughes Brothers 1096 Wood Alley Arm Braces are designed for greater strength than alley arm braces made from formed angle iron. The 1096 Alley Arm Brace is made from 2-3/4" x 3-1/2" straight grained, pressure treated Douglas-fir. The brace is furnished with an 11/16" hole at the arm fitting and an 11/16" hole at the pole fitting unless otherwise specified. Metal step is made from 3/16" x 1-3/16" stock.
 NOTE: Step is omitted for braces less than 4'-6".



1096._R Reversed Alley Arm Brace

Stock No.	Brace Bolt Hole C. to C. Spacing	Crossarm Bolt Hole C. to C. Spacing	Wt. Lbs. Each	Wood Section
1096.5	5'-0"	3'-10"	16	2-3/4" x 3-1/2"
1096.6	6'-0"	4'-8"	18	2-3/4" x 3-1/2"
1096.7	7'-0"	5'-4"	21	2-3/4" x 3-1/2"

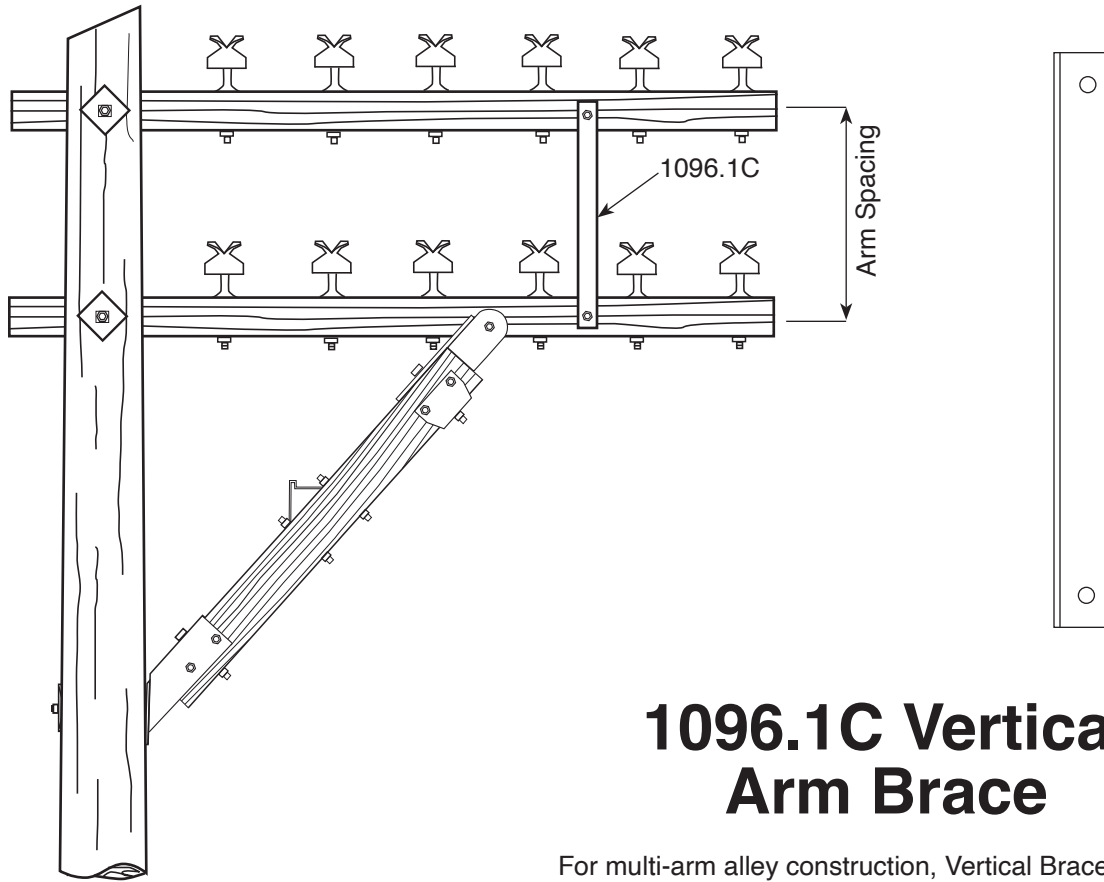
The spacing from the arm fitting bolt hole to the upper bolt hole of the metal step is 2'-6" unless otherwise specified.
 NOTE: Step is omitted on lengths less than 4'-6".

An "R" suffix designates a "Reversed Brace", i.e., the arm fitting of the Alley Arm Brace is for attachment under the arm and pole fitting is on face of pole. (See illustration at left).

Ordering Information

Use information above





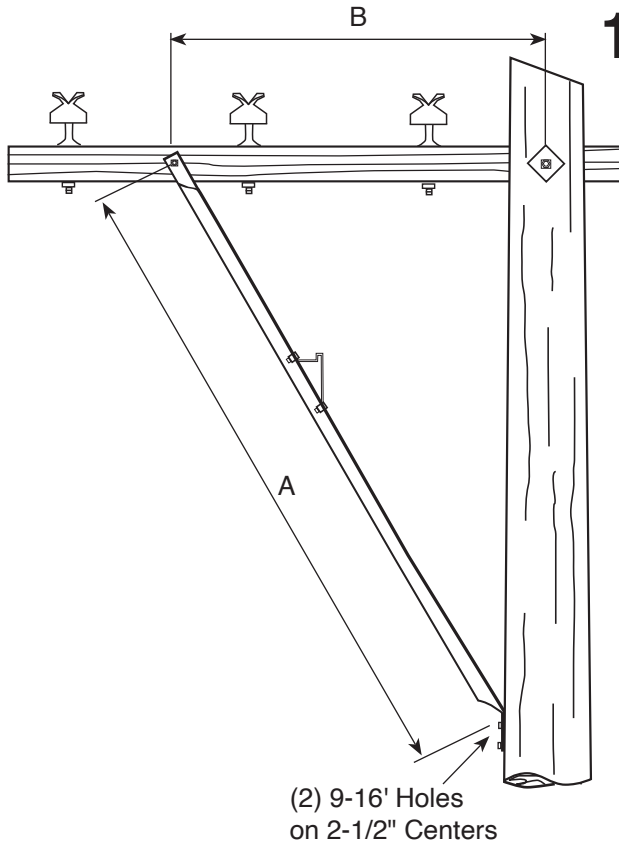
1096.1C Vertical Arm Brace

For multi-arm alley construction, Vertical Brace No. 1096.1C should be ordered. This vertical brace is made from 3/16" x 2" x 2-1/2" angle. Center to center spacing between 9/16" bolt holes varies by arm spacing. For longer vertical brace lengths, specify desired crossarm vertical spacing and mounting hole sizes.

Mounting bolts ordered separately.

Ordering Information

Stock No.	Arm Spacing	Weight
1096.1C-24	24"	5.5 lbs
1096.1C-36	36"	9.3 lbs
1096.1C-46	46"	10.5 lbs
1096.1C-48	48"	12.0 lbs



1097 Steel Alley Arm Brace

The 1097 Steel Alley Arm Brace is used where the arms are mounted on one side of the pole. The brace end is flattened for the pole or arm attachment. Manufactured from plate, which is folded and bent.

Ordering Information

Stock No.	"A"	"B"	Top Mtg. Hole
1097.1A60-9	60"	30"	9/16"
1097.1A84-11	84"	30"	11/16"

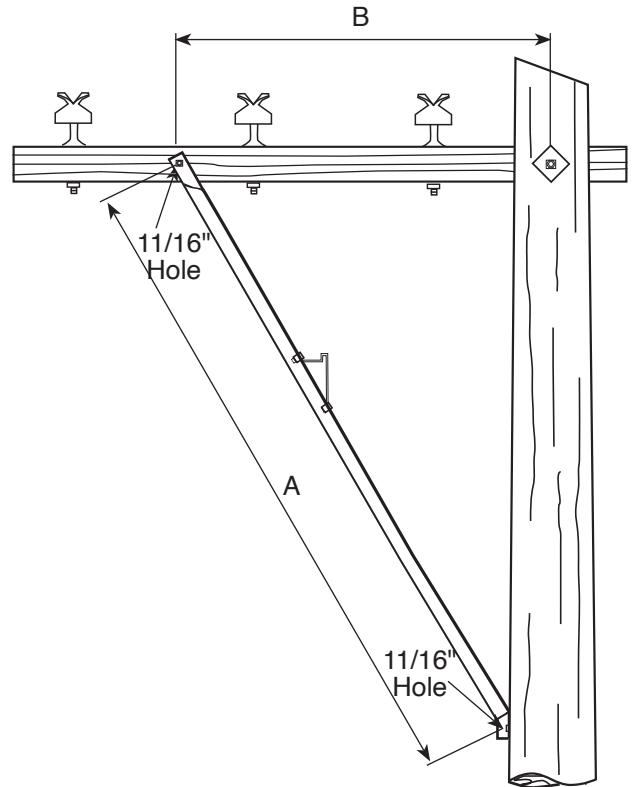
NOTE:

To order the brace reversed such that the brace mounts under the crossarm, add an "R" to the part number (i.e. 1097.1AR60-9).

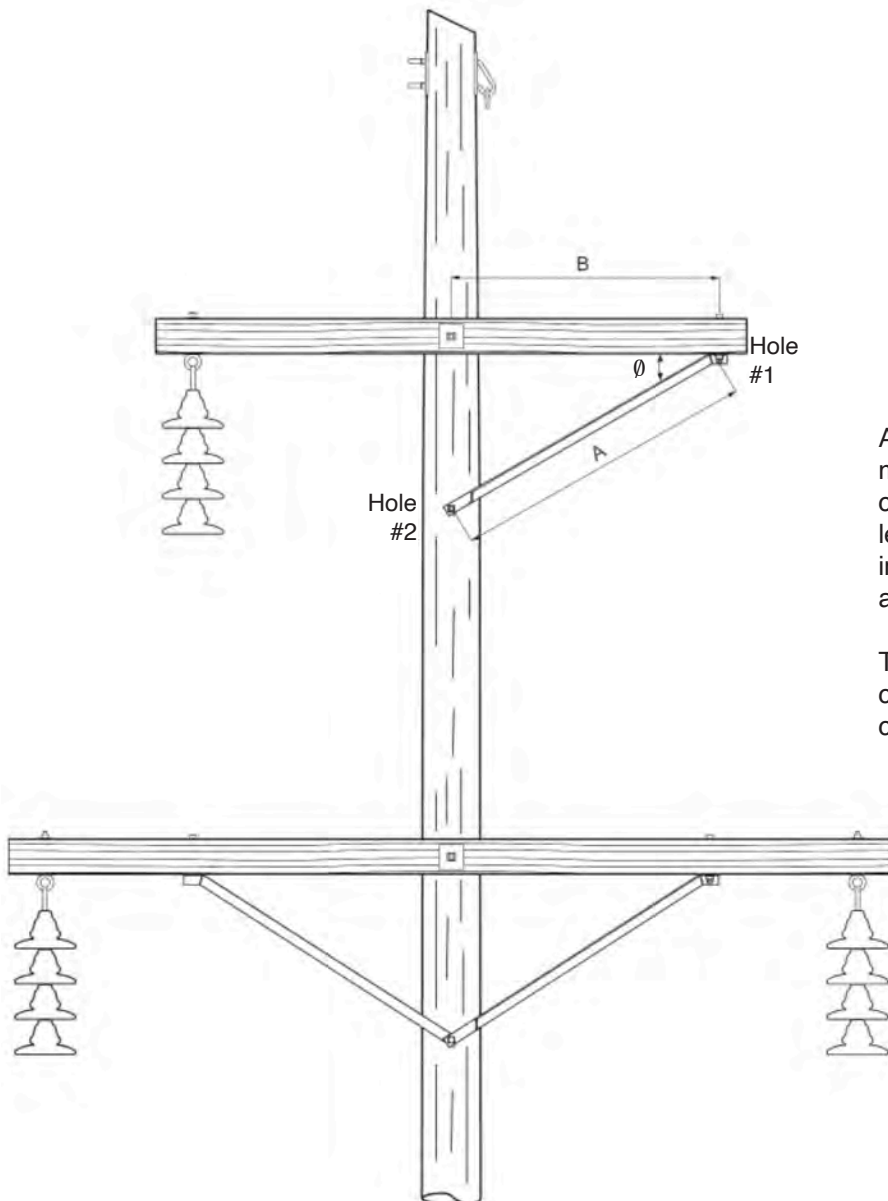
AS2329 Welded Steel Alley Arm Brace

Stock No.	"A"	"B"	Weight
AS2329	7'-0"	2'-6"	16.3 lbs
AS2329-D	- Same as AS2329 but reversed so that flat end mounts against pole.		16.3 lbs

The Hughes Brothers AS2329 Brace is manufactured from plate which is notched, bent and welded.



AS2309 Steel Angle Brace



A face mounted steel brace, the pole mounting end is flattened so the brace can be used as either a right hand or left hand member. A gap of 1/16" is left in the flattened portion of the brace to allow for moisture drainage.

The AS2309 is typically used in RUS construction as illustrated in this TSS-1 configuration.

Ordering Information

Use stock numbers at right

Stock No.	Section Size	"A"	"B"	Hole #1	Hole #2	ø	Wt/lbs
AS2309-A	3/16"x1 3/4"x1 3/4"	50"	3'6"	11/16"	11/16"	30°	9.0
AS2309-B	3/16"x1 3/4"x1 3/4"	36"	2'6"	13/16"	11/16"	35°	6.7
AS2309-C	3/16"x1 3/4"x1 3/4"	50"	3'6"	13/16"	11/16"	30°	8.6
AS2309-D	3/16"x1 1/2"x1 1/2"	30"	2'0"	9/16"	11/16"	38°	4.7
AS2309-E	3/16"x1 1/2"x1 1/2"	35"	2'6"	9/16"	11/16"	32°	7.0
AS2309-G*	3/16"x1 3/4"x1 3/4"	47"	2'6"	11/16"	11/16"	0°	8.5
AS2309-H	3/16"x1 3/4"x1 3/4"	40-1/4"	3'0"	11/16"	11/16"	30°	7.4

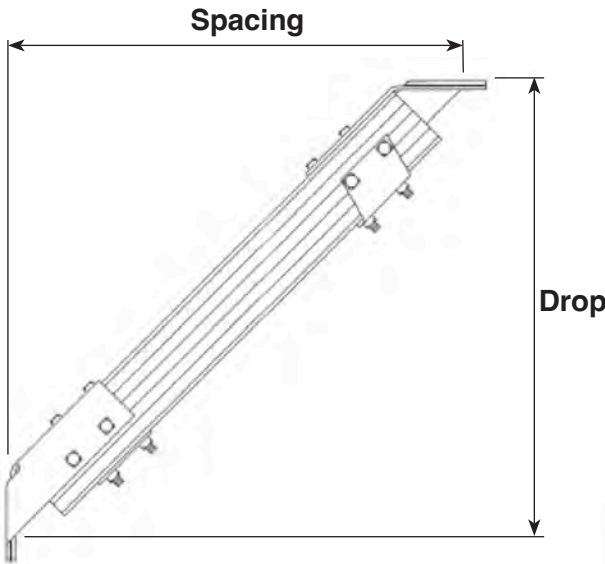
* AS2309-G is a straight brace folded on both ends.



Hughes Brothers Knee & Vee Braces

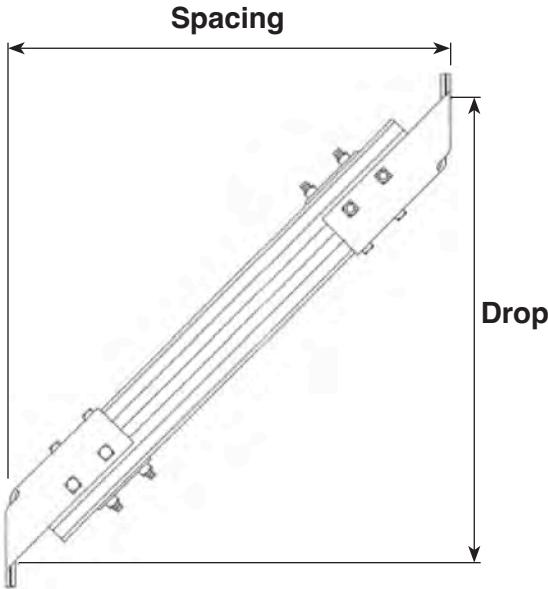
Hughes Brothers Knee & Vee Braces are made of select, straight grained Douglas-fir. The timbers are surfaced, graded, bored, pressure treated with DCOI and assembled with steel end fittings. End fitting through holes are tapped to provide double nut connections to ensure tight hardware as the wood shrinks over time. All end fittings are hot dip galvanized per ASTM-A123.

Wood members used in our braces are transmission grade timbers (more exacting standards than crossarms.)



Knee Braces

End fittings oriented perpendicular to each other.



Vee Braces

End fittings oriented parallel to each other.



2010 Light Duty Brace

The 2010 brace uses a 2-1/8" x 3-3/8" wood section. The 2010 is typically used when the spacing and drop does not exceed 5'-0" or the overall brace length does not exceed 7'-0". End fittings are fabricated from 3/16" steel. 11/16" mounting holes are standard.

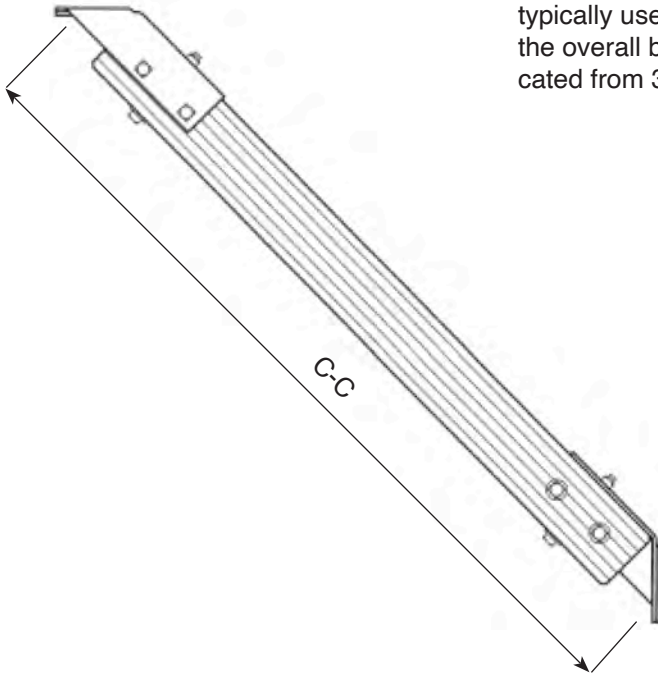


Table I

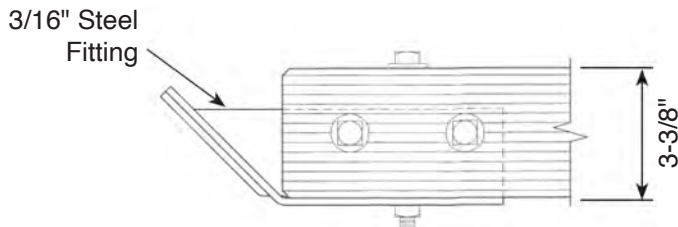
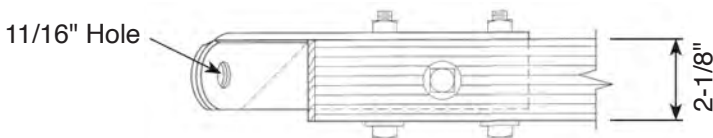
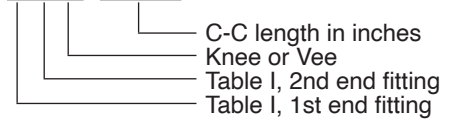
	Fitting Angle	Mounting Hole Size
A	30°	13/16"
B	37°	13/16"
C	45°	13/16"
D	52°	13/16"
E	60°	13/16"
F	30°	11/16"
G	37°	11/16"
H	45°	11/16"
J	52°	11/16"
K	60°	11/16"
L	55°	11/16"

Ultimate Ratings

Tension 15,000 lbs
 Compression 7,500 lbs @ 7' 0" C-C

Ordering Information

2010 GJK 59.5



1135 Medium Duty Brace

The 1135 uses a 2-3/4" x 3-1/2" wood section and is typically used when the spacing & drop does not exceed 7'-0" or the over-all brace length does not exceed 10'-0".

End fittings are fabricated from 1/4" steel and hot dip galvanized per ASTM-A153. 13/16" mounting holes are standard.

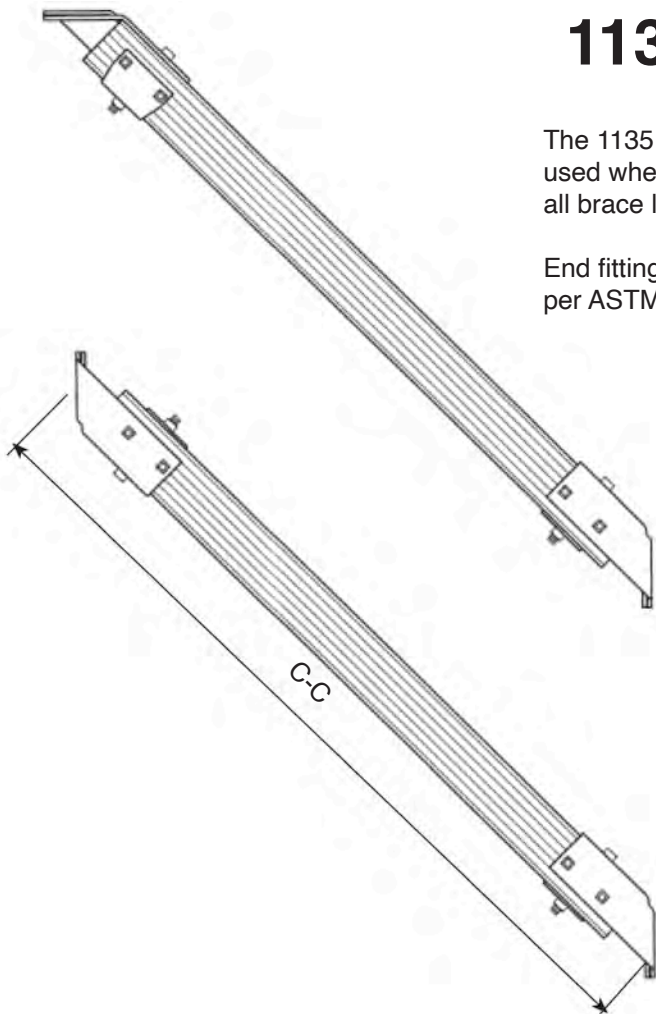


Table I

	Fitting Angle	Mounting Hole Size
A	30°	13/16"
B	37°	13/16"
C	45°	13/16"
D	52°	13/16"
E	60°	13/16"
F	30°	11/16"
G	37°	11/16"
H	45°	11/16"
J	52°	11/16"
K	60°	11/16"
L	45°	15/16"

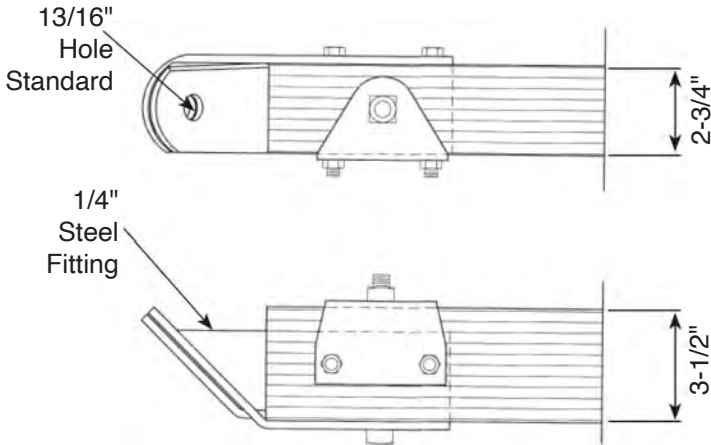
Ultimate Ratings

Tension 15,000 lbs
 Compression 7,500 lbs @ 10' 0" C-C Length

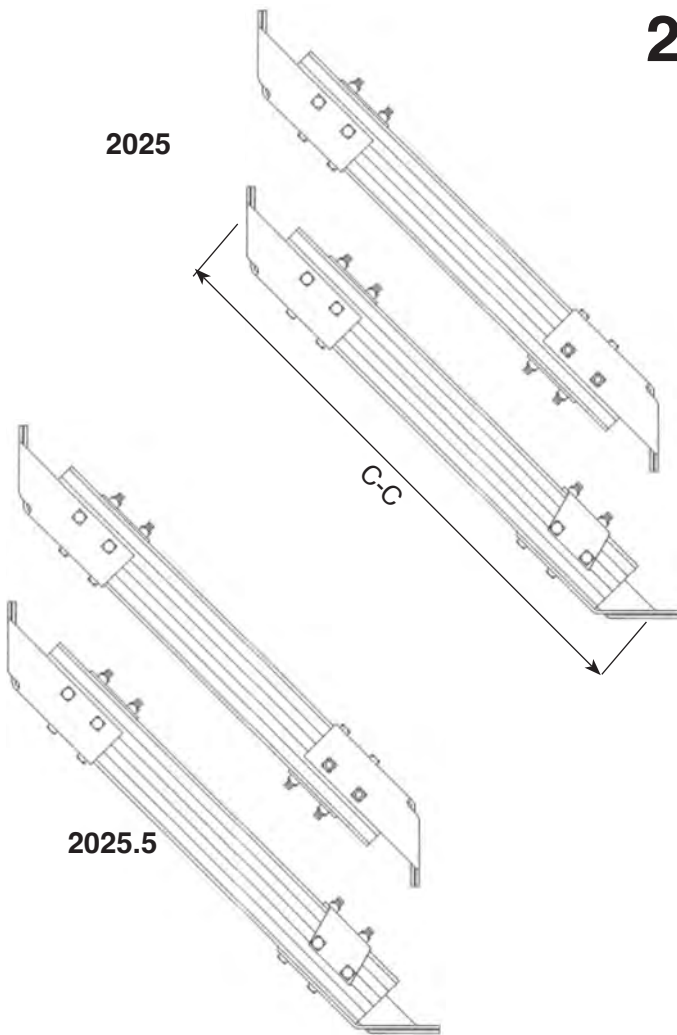
Ordering Information

1 1 3 5 B D V 1 2 3.8

└─ C-C length in inches
 └─ Knee or Vee
 └─ Table I, 2nd end fitting
 └─ Table I, 1st end fitting



2025 Knee & Vee Brace



The 2025 uses a 3-3/8" x 4-3/8" wood section and the 2025.5 a 3-3/8" x 5-3/8" wood section. The 2025 is typically used when the spacing & drop does not exceed 9'-6" or the overall brace length does not exceed 13'-6". For heavier compression loads the 2025.5 is used.

End fittings are fabricated from 1/4" steel and hot dip galvanized per ASTM-A153. 15/16" mounting holes are standard, 13/16" are available.

Ultimate Ratings

Tension	20,000 lbs
Compression	Dependent on C-C length and wood size

Ordering Information

2025 B D V 15 4.7

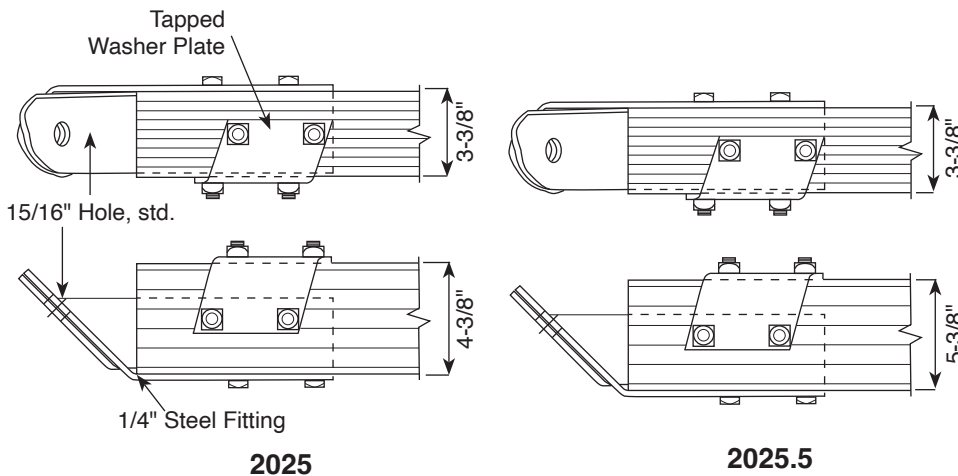
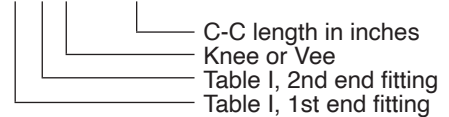
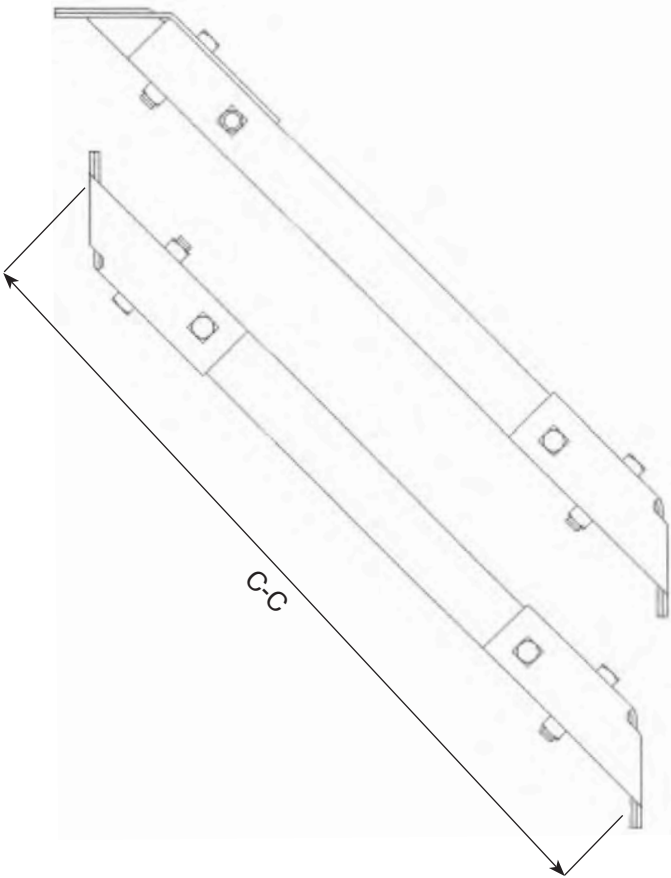


Table I	Fitting Angle	Mounting Hole Size
A	30°	15/16"
B	37°	15/16"
C	45°	15/16"
D	52°	15/16"
E	60°	15/16"
F	30°	13/16"
G	37°	13/16"
H	45°	13/16"
J	52°	13/16"
K	60°	13/16"
L	25°	15/16"
M	25°	13/16"

2025M Steel Knee & Vee Brace



The 2025M uses the same end fittings as standard 2025 braces but substitutes a 3" x 3" tubular steel member for the Douglas-fir timber.

End fittings are fabricated from 1/4" steel and hot dip galvanized per ASTM-A153. 15/16" mounting holes are standard, 13/16" available.

Ultimate Ratings

Tension 20,000 lbs
 Compression Dependent on C-C length

Ordering Information

2025M-BDV154.7

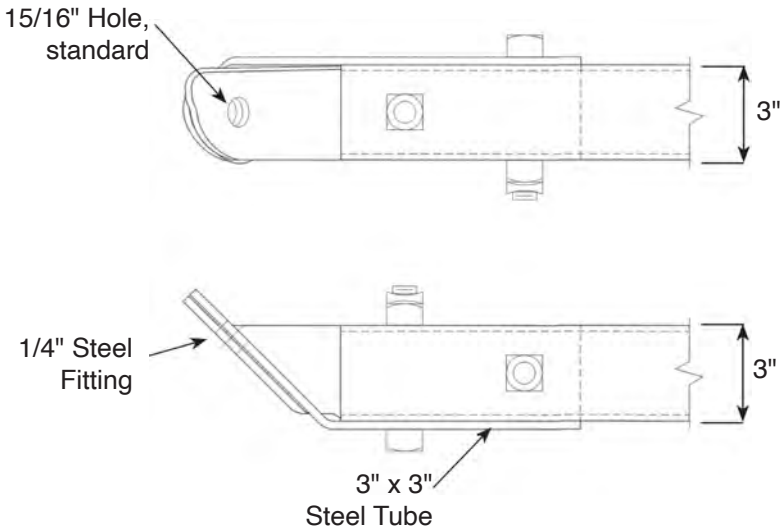
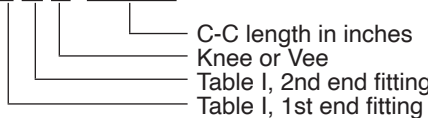
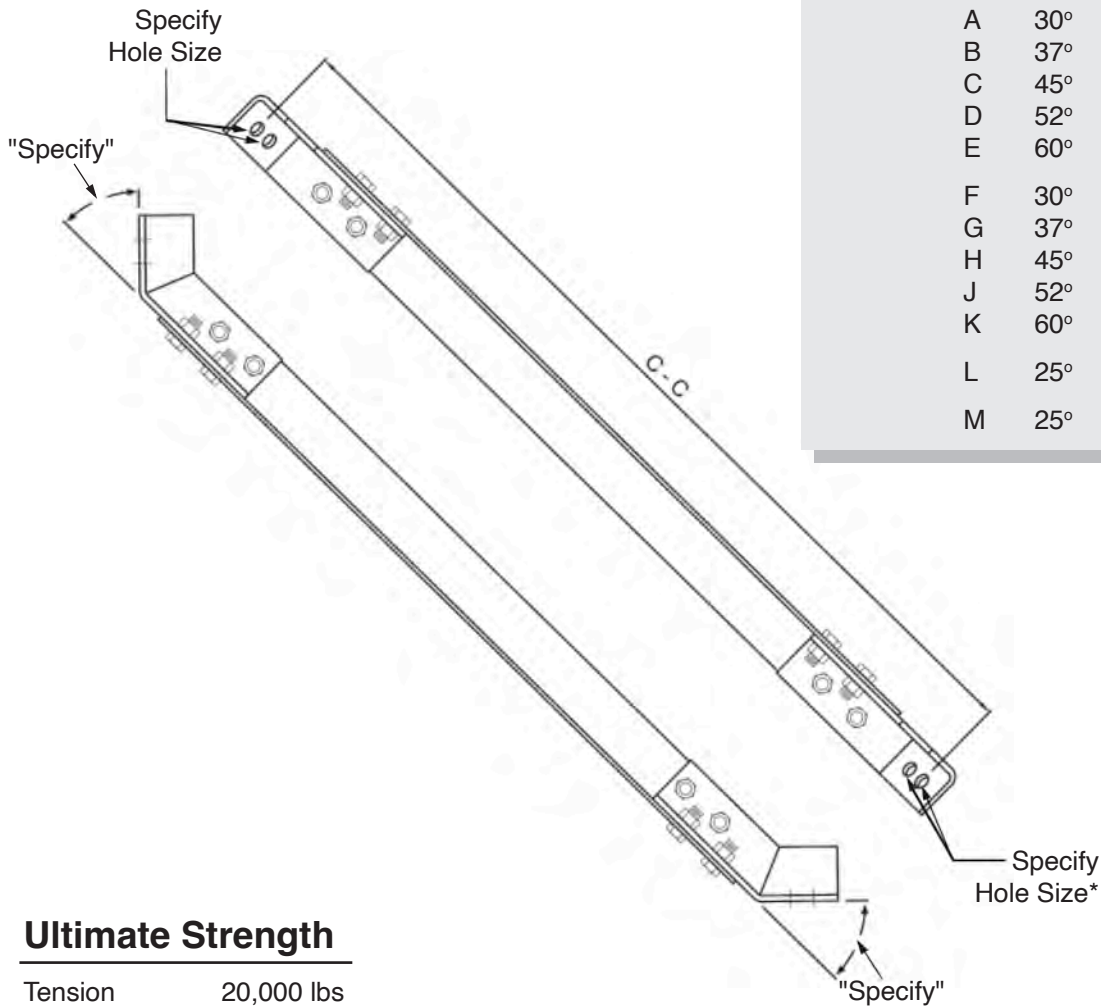


Table I	Fitting Angle	Mounting Hole Size
A	30°	15/16"
B	37°	15/16"
C	45°	15/16"
D	52°	15/16"
E	60°	15/16"
F	30°	13/16"
G	37°	13/16"
H	45°	13/16"
J	52°	13/16"
K	60°	13/16"
L	25°	15/16"
M	25°	13/16"

B2498-A Steel Angle Knee Brace

Table I

	Fitting Angle	Mounting Hole Size
A	30°	15/16"
B	37°	15/16"
C	45°	15/16"
D	52°	15/16"
E	60°	15/16"
F	30°	13/16"
G	37°	13/16"
H	45°	13/16"
J	52°	13/16"
K	60°	13/16"
L	25°	15/16"
M	25°	13/16"



Ultimate Strength

Tension 20,000 lbs

Ordering Information

B 2 4 9 8 - A - B D 1 2 0.7

— C-C length in inches
 — Fittings, from Table I

*Holes on 1-1/2" Centers.

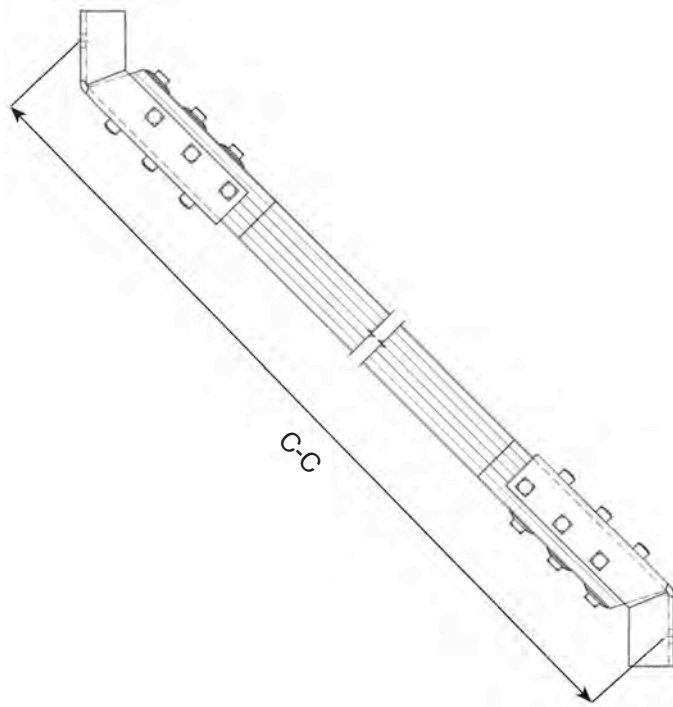
Note: 2025M Tubular Steel Brace is located on page B-19.

2038B, 2038C Heavy Duty Braces

The 2038 series knee/vee braces incorporate a 6-bolt, channel type end fitting and are used primarily for high loading conditions. The 2038B uses a 3-1/2" x 4-1/2" wood section, and the 2038C a 3-1/2" x 5-1/2" wood section. End fittings are fabricated from 3/8" steel and hot dip

galvanized per ASTM-A153. 15/16" mounting holes are standard.

We recommend contacting the Hughes Brothers engineering department to ensure proper application of the 2038 Heavy Duty Brace.

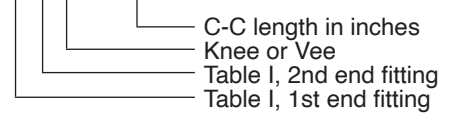


Ultimate Strength

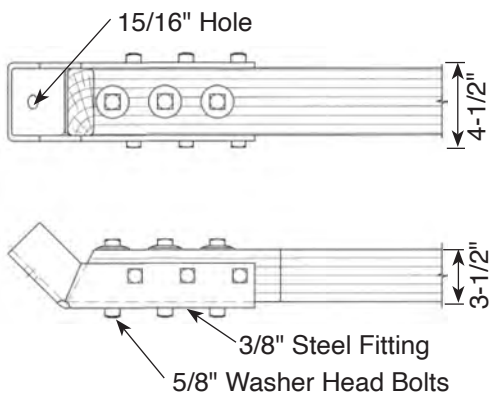
Tension - 35,000 lbs

Ordering Information

2038C-BDV 154.7



2038B



2038C

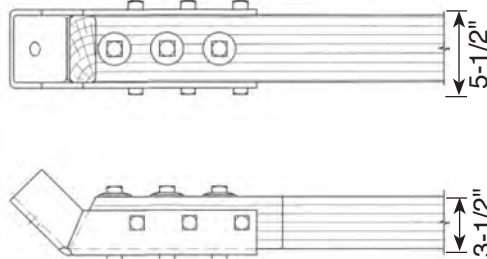
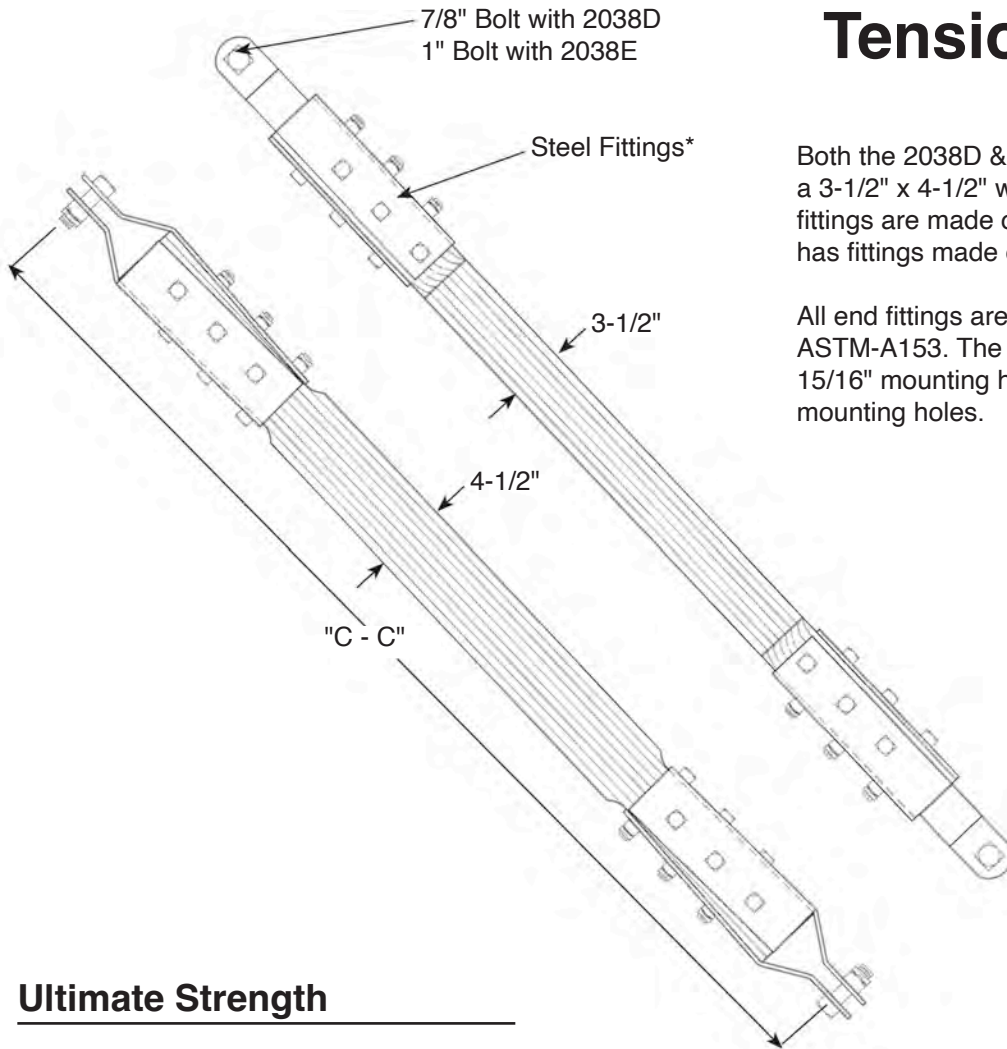


Table I Mounting

	Fitting Angle	Hole Size
A	30°	15/16"
B	37°	15/16"
C	45°	15/16"
D	52°	15/16"
E	60°	15/16"
F	55°	15/16"
G	25°	15/16"
H	37°	1-1/16"
J	52°	1-1/16"
K	34°	1-1/16"
L	42°	15/16"
M	48°	15/16"
N	45°	1-1/16"
P	30°	1-1/16"

2038D, 2038E Heavy Duty Tension Braces



Both the 2038D & 2038E Tension Braces use a 3-1/2" x 4-1/2" wood section. The 2038D end fittings are made of 1/4" steel while the 2038E has fittings made of 3/8" steel.

All end fittings are hot dip galvanized per ASTM-A153. The 2038D tension brace has 15/16" mounting holes, 2038E has 1-1/16" mounting holes.

Ultimate Strength

2038D Tension - 30,000 lbs
2038E Tension - 50,000 lbs

Ordering Information

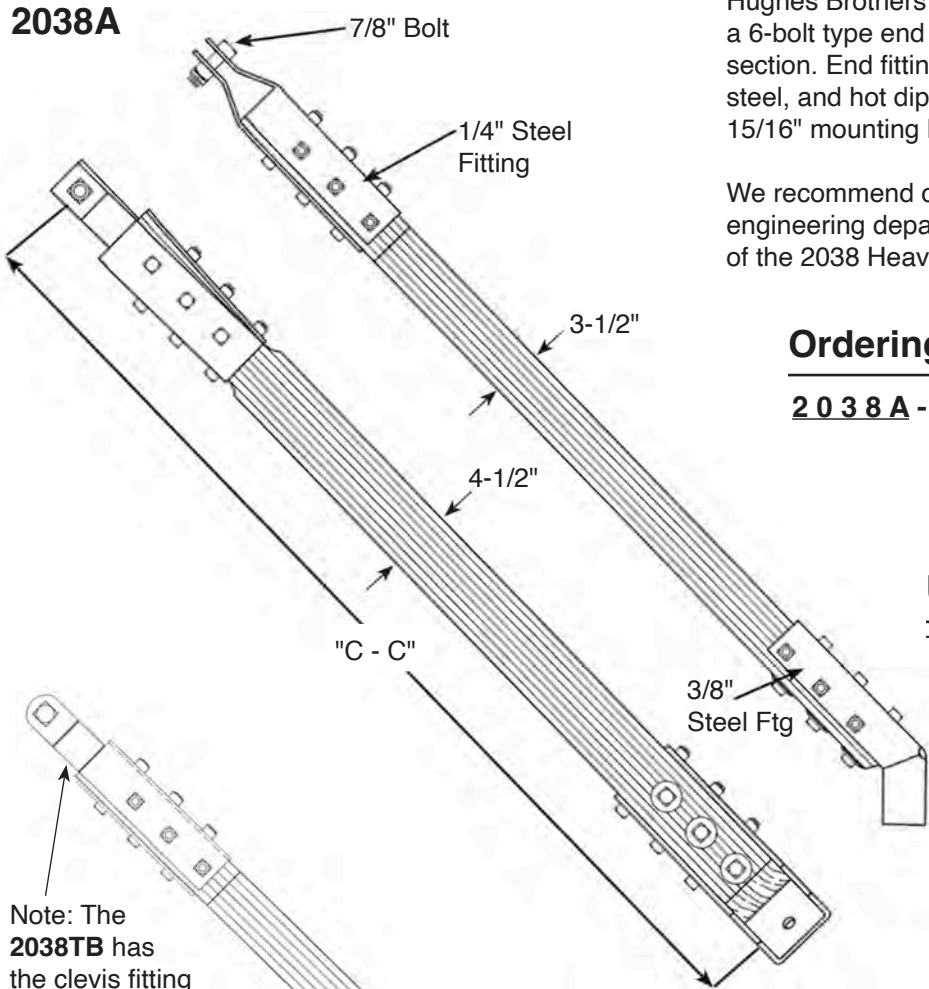
2038D - 208

C-C length in inches

*2038D has 1/4" steel fittings. 2038E has 3/8" steel fittings.

2038A & 2038TB Heavy Duty Tension Braces

2038A



Hughes Brothers 2038 tension braces incorporate a 6-bolt type end fitting with a 3-1/2" x 4-1/2" wood section. End fittings are fabricated from 1/4" & 3/8" steel, and hot dip galvanized per ASTM-A153. 15/16" mounting holes are standard.

We recommend contacting the Hughes Brothers engineering department to ensure proper application of the 2038 Heavy Duty Brace.

Ordering Information

2038A - B - 204
 C-C length in inches
 Table I, fitting angle
 & hole size

Ultimate Strength

Tension - 30,000 lbs

Note: The **2038TB** has the clevis fitting rotated 90° from the **2038A**

2038TB

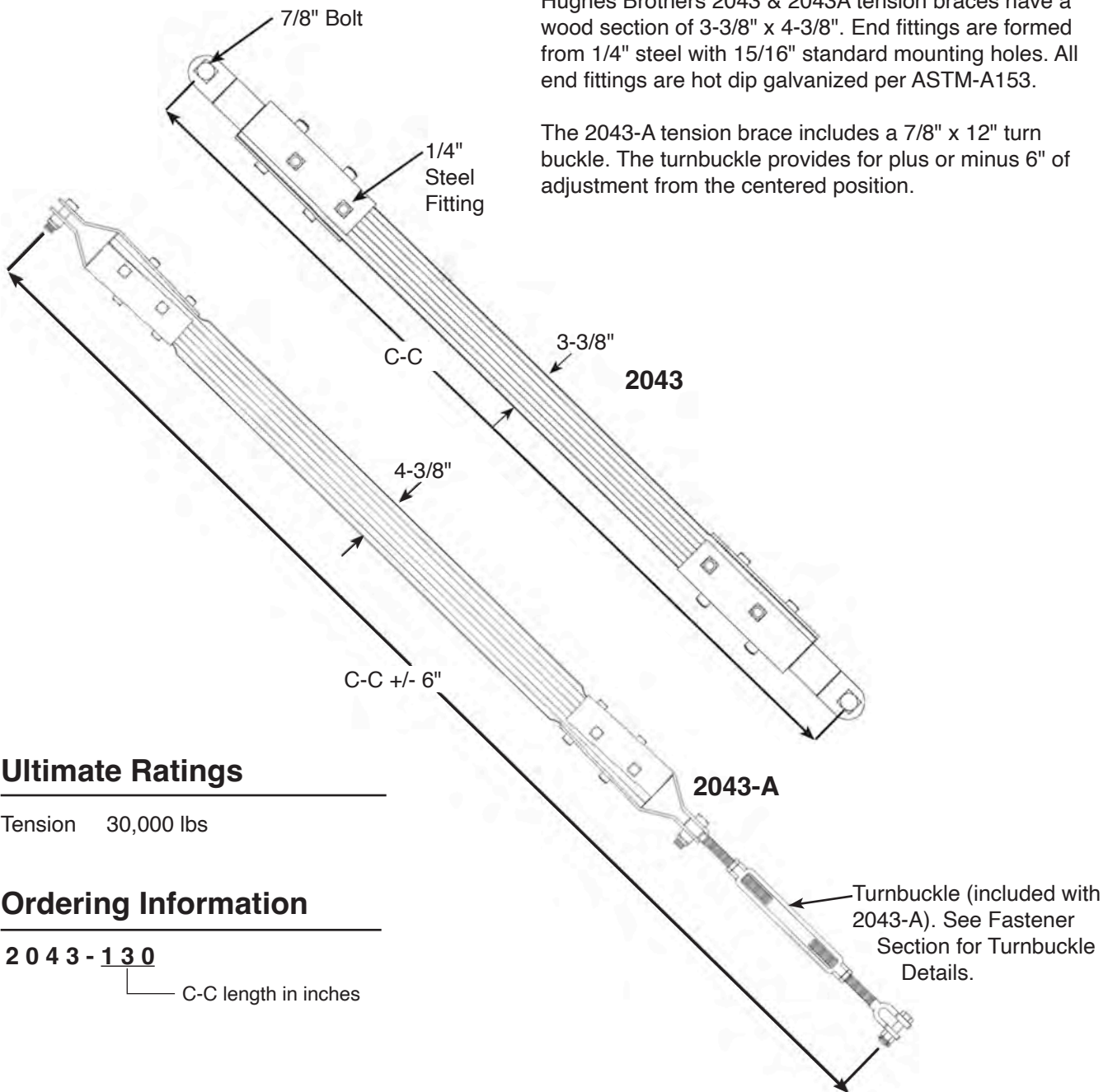
Table I	Fitting Angle	Mounting Hole Size
A	30°	15/16"
B	37°	15/16"
C	45°	15/16"
D	52°	15/16"
E	60°	15/16"
F	55°	15/16"
G	25°	15/16"
H	37°	1-1/16"
J	52°	1-1/16"
K	34°	1-1/16"
L	42°	15/16"
M	48°	15/16"

2043 Tension Brace

2043-A Adjustable Tension Brace

Hughes Brothers 2043 & 2043A tension braces have a wood section of 3-3/8" x 4-3/8". End fittings are formed from 1/4" steel with 15/16" standard mounting holes. All end fittings are hot dip galvanized per ASTM-A153.

The 2043-A tension brace includes a 7/8" x 12" turnbuckle. The turnbuckle provides for plus or minus 6" of adjustment from the centered position.



Ultimate Ratings

Tension 30,000 lbs

Ordering Information

2043-130

C-C length in inches

Wood X-Bracing for Transmission Structures

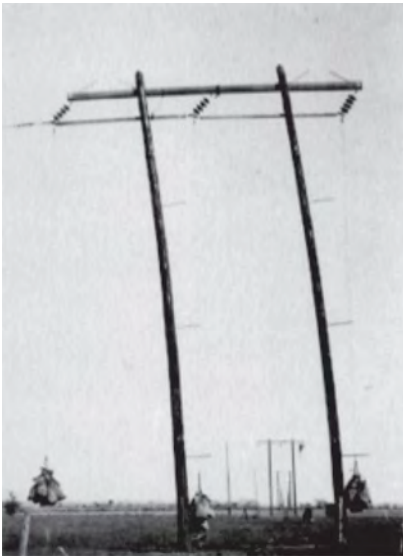
When the first unbraced H-Frame structure was erected on our testing site (in the late 1920's), excessive deflection under relatively small loads was obvious. Hughes Brothers immediately accepted the challenge of developing bracing to reduce deflection and to strengthen transmission and distribution structures. After hundreds of tests on fittings and full size structures, X-Braces were developed which today are as much a part of an "H-Frame" as the poles and crossarms.

Many years of experience in testing full scale, X-Braced structures plus years of actual operating experience enable our engineering department to provide practical assistance. There are many subtleties involved in the design of a Hughes X-Brace that cannot be duplicated by simple timber X-Bracing. Let the Hughes Engineering staff help you determine the optimal size & placement of your next X-Brace application. You are invited to submit your structural design requirements without obligation.

Maintenance costs of X-Braced structures are lower than unbraced structures because X-Braced structures remain straight and true for the life of the line.

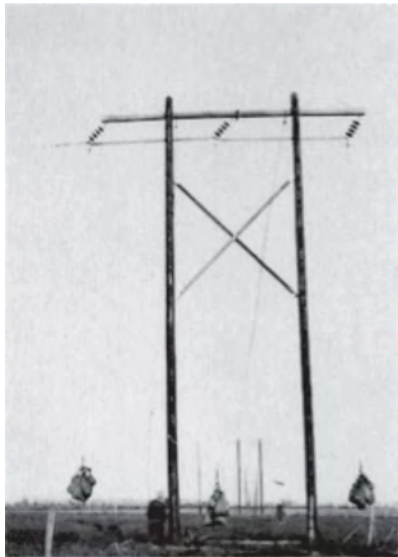
Please refer to the Engineering section for analysis of X-Brace design and location in structure systems.

Unbraced and X-Braced Hughes Brothers structures under the same load. Circa 1928



Unbraced

Top Deflection 58 in.
Calculated Strength 4060 lbs.



Hughes X-Braced

Top Deflection 6 in.
Calculated Strength 13,600 lbs.



1042 X-Brace

Hughes Brothers 1042 X-Braces are widely used because they increase the strength of H-Frames, reduce earth pressures and structure deflection, eliminate the necessity of storm guys, make possible the use of smaller poles, require no additional right of way and reduce to a minimum the overall maintenance costs. In addition to transmission lines, X-Braces are used on structures for river crossings, long span highway crossings, railroad crossings, switches, alleys and substations. Our engineering department will assist you with the correct application of X-Braces.

Hughes No. 1042 X-Braces are made of select Douglas-fir timber, and pressure treated with DCOI. The 1042 series incorporates a wood section of 3-3/8" x 4-3/8" for pole spacings up to 14'-0" and 3-3/8" x 5-3/8" for spacings 14'-6" and over.

All fittings, washer plates, center clamps, washers and bolts are hot dipped galvanized. Fittings are made from 1/4" material. Washer plates are threaded for 1/2" bolts, locking the bolt for "Static Proof" hardware. Mounting bolt holes are 15/16". Center clamps keep the brace in alignment under compression loads while permitting free movement of the wood. Center clamp straps are made from 1/4" x 1-3/4" stock, center clamp bolts are made from 1/2" steel rods with forged shoulders and cut threads on each end.

Hughes Brothers 1042 X-Braces are shipped as a complete set, assembled, mounting hardware packaged, ready to install, when ordered complete (CPT).

When ordering X-Braces, please specify center to center pole spacing and length of bolts. Unless otherwise specified, 50% of total bolts furnished are 7/8" x 14" and 50% are 7/8" x 16" cut thread machine bolts.

Ordering Information

1 0 4 2 - 1 2 - 6 - C P T

- Pole spacing in feet & inches*.
- Complete with mounting bolts, curved washers & center clamp. -CPT
- X-Brace with center clamp only. -CCO
- Provides just X-Brace assembly. No mounting hardware or center clamp. No Code
- One member only with fittings. -PC

*Use 6" increments only.

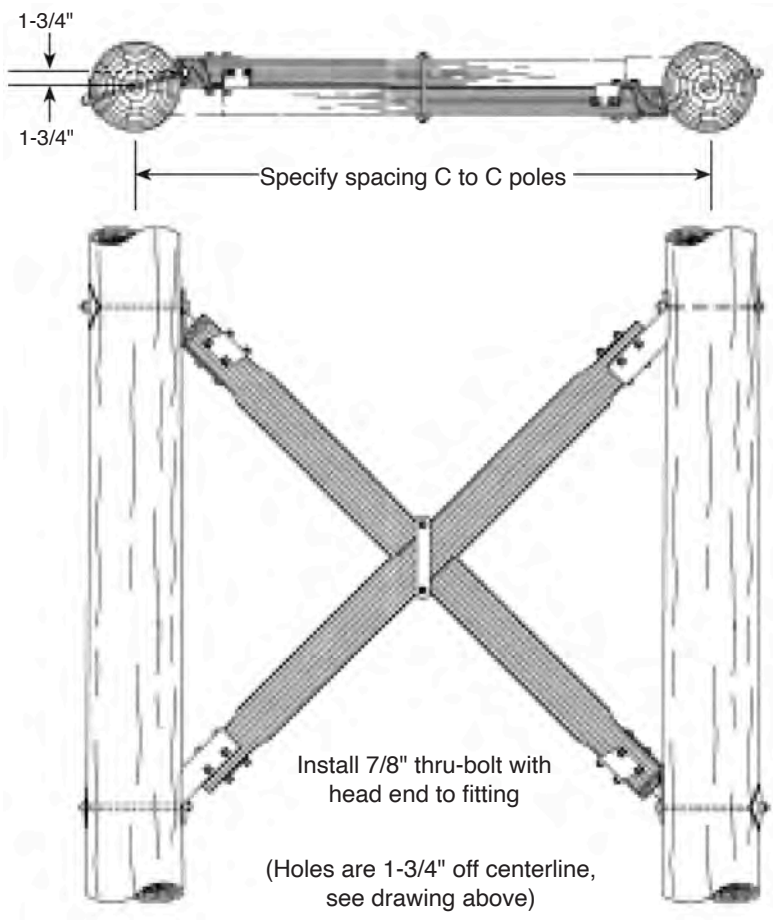
Ultimate Rating

The 1042 series has an ultimate rating of **20,000 lbs in tension**. It is recommended that the Hughes Brothers Engineering staff assist you in specifying the use of X-Bracing.



Stock No.	Pole Spacing Center to Center	Approx. Wt. - Lbs. Per Set	Wood Section
1042-7-0	7'-0"	121	3 3/8" x 4 3/8" for pole spacings 14'-0" and under unless specified otherwise.*
1042-7-6	7'-6"	128	
1042-8-0	8'-0"	131	
1042-8-6	8'-6"	133	
1042-9-0	9'-0"	141	
1042-9-6	9'-6"	147	
1042-10-0	10'-0"	149	
1042-10-6	10'-6"	158	
1042-11-0	11'-0"	164	
1042-11-6	11'-6"	166	
1042-12-0	12'-0"	174	3 3/8" x 5 3/8" for pole spacings 14'-6" and over unless specified otherwise.*
1042-12-6	12'-6"	181	
1042-13-0	13'-0"	186	
1042-13-6	13'-6"	192	
1042-14-0	14'-0"	197	
1042-14-6	14'-6"	232	
1042-15-0	15'-0"	245	
1042-15-6	15'-6"	252	
1042-16-0	16'-0"	252	
1042-16-6	16'-6"	267	
1042-17-0	17'-0"	272	
1042-17-6	17'-6"	281	
1042-18-0	18'-0"	287	

1042 X-Brace

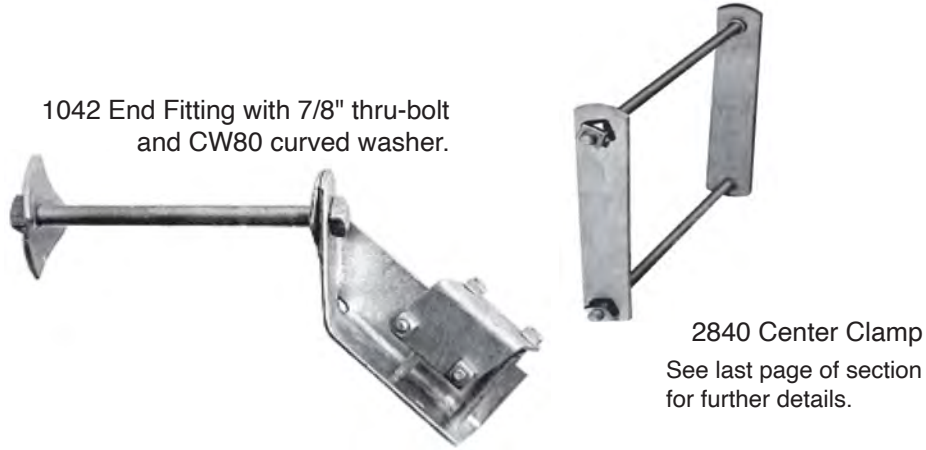


*Note:

Available for special order
1042-12-6-LWCPT

LW - Designates larger wood section, 3-3/8" x 5-3/8" on X-Braces with pole spacing less than 14'-6". (Always provided for pole spacing 14'-6" & over).

SW - Designates 3-3/8" x 4-3/8" wood section on X-Braces for 14'-6" pole spacing & greater.



1150 X-Brace

Hughes No. 1150 X-Braces are made of select Douglas-fir, 2-3/4" x 3-1/2", pressure treated with DCOI, for pole spacings up to 11'-0".

All fittings, washer plates, center clamps, curved washers and bolts are hot dip galvanized. Fittings are made from 1/4" material. Pole mounting holes are 13/16".

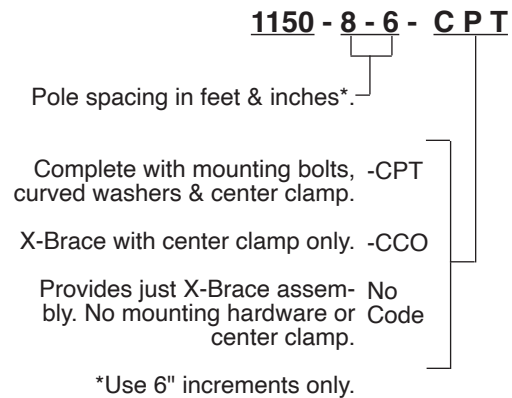
Center clamp straps are made from 1/4" x 1-3/4" stock. Center clamp bolts are made from steel rods which have cut threads for 1/2" nuts.

Hughes No. 1150 X-Braces are shipped as a complete set, assembled, mounting hardware packaged, ready to install. When ordering X-Braces, please specify center to center pole spacing and length of bolts.

Unless otherwise specified, 50% of total bolts furnished are 3/4" x 14" and 50% are 3/4" x 16" cut thread machine bolts, when ordered complete (CPT).



Ordering Information

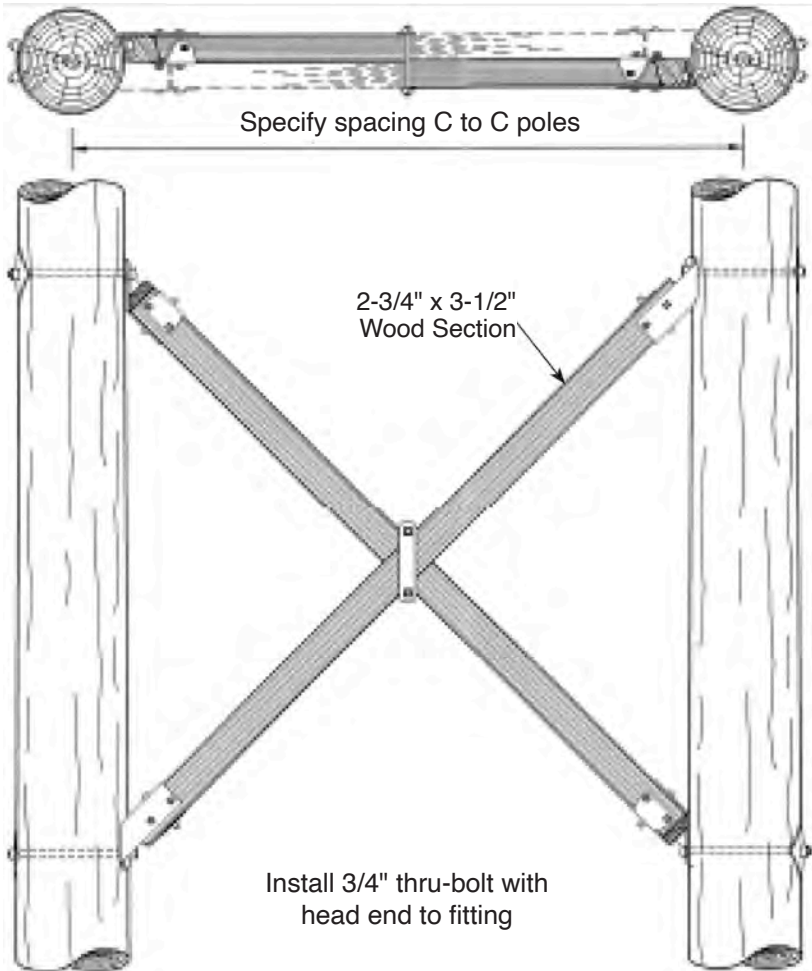


Ultimate Ratings

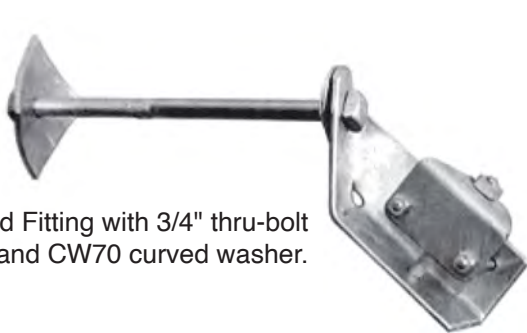
The 1150 X-Brace has an ultimate rating of **15,000 lbs. in tension**. It is recommended that our engineers assist you in determining proper applications of X-Bracing.

1150 X-Brace

Stock No.	Pole Spacing Center to Center	Approx. Wt. - Lbs. Per Set
1150-5-0	5'-0"	69
1150-5-6	5'-6"	73
1150-6-0	6'-0"	77
1150-6-6	6'-6"	81
1150-7-0	7'-0"	85
1150-7-6	7'-6"	89
1150-8-0	8'-0"	92
1150-8-6	8'-6"	96
1150-9-0	9'-0"	100
1150-9-6	9'-6"	104
1150-10-0	10'-0"	108
1150-10-6	10'-6"	111
1150-11-0	11'-0"	115



1150 End Fitting with 3/4" thru-bolt and CW70 curved washer.



2840 Center Clamp
See last page of section for further details.



2094 X-Brace

Hughes Brothers 2094 X-Braces were designed specifically for larger pole spacings such as found in long span, angle, river or railroad crossings. The brace is recommended for pole spacings up to 20'-0".

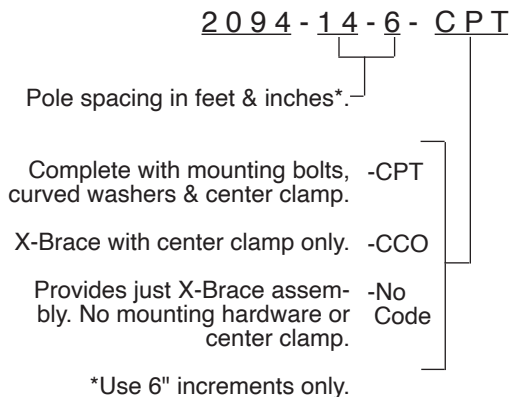
Hughes No. 2094 X-Braces are made of select Douglas-fir or glue laminated timbers, 3-3/4" x 5-3/4", pressure treated with DCOI.

All fittings, washer plates, center clamps, curved washers and bolts are hot dip galvanized. Fittings are made from 3/8" material. Pole mounting holes are 15/16".

Hughes Brothers 2094 X-Braces are shipped with end fittings assembled and complete with mounting bolts and center clamp, when ordered complete (CPT).

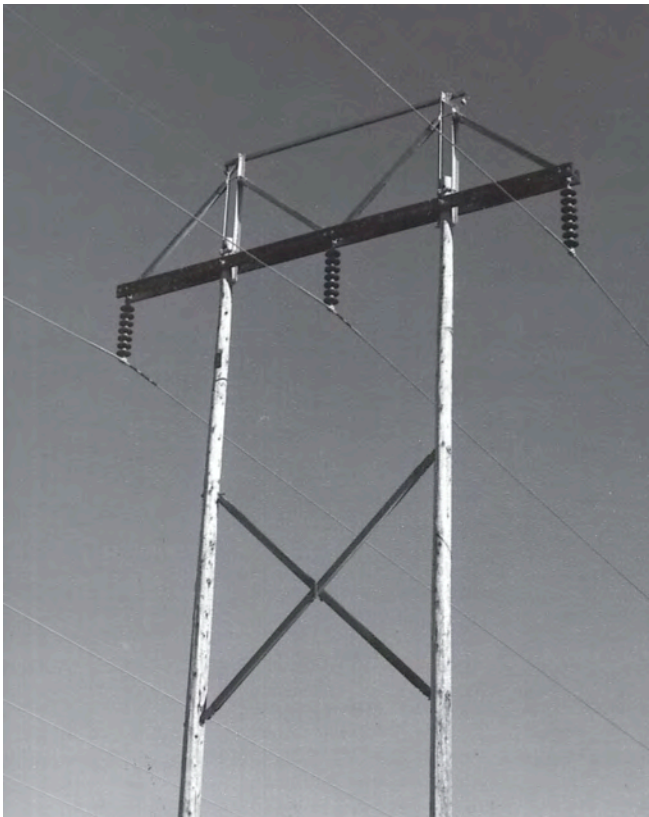
Unless otherwise specified, 50% of total bolts furnished are 7/8" x 14" and 50% are 7/8" x 16" cut thread machine bolts.

Ordering Information



Ultimate Rating

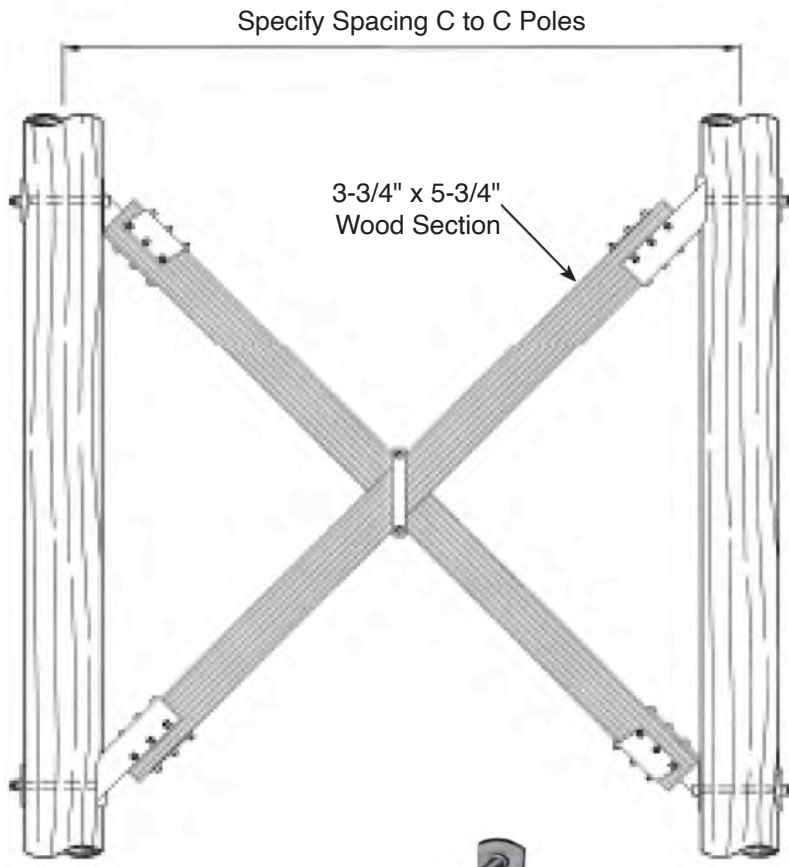
The 2094 X-Brace has an ultimate rating of **25,000 lbs. in tension**. It is recommended that our engineers assist you in determining proper applications of X-Bracing.



2094 X-Brace



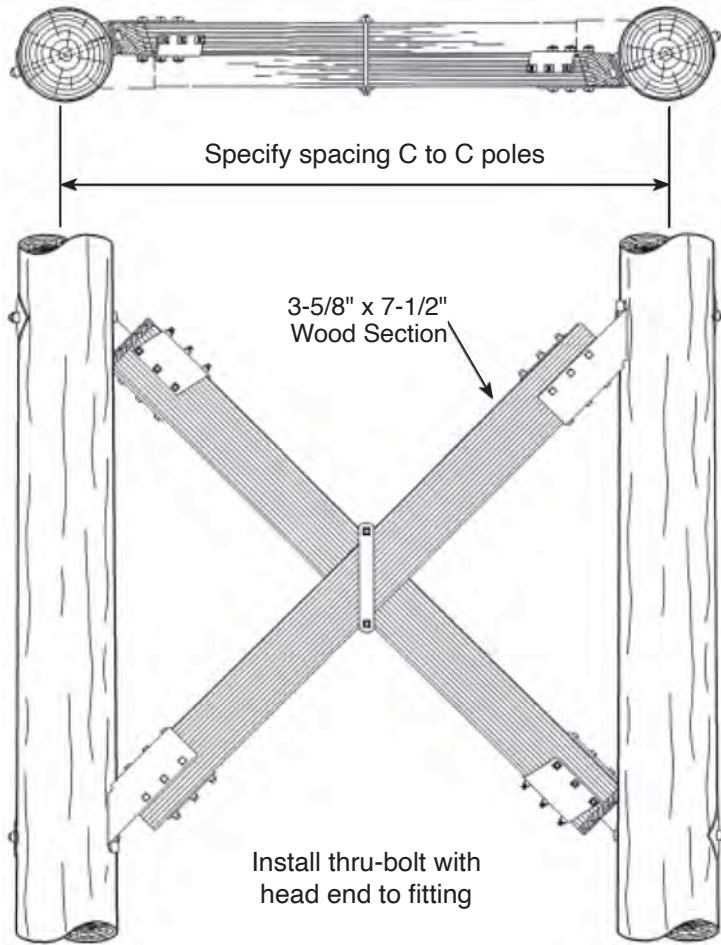
Stock No.	Pole Spacing Center to Center	Approx. Wt. - Lbs. Per Set
2094-14-6	14'-6"	298
2094-15-0	15'-0"	314
2094-15-6	15'-6"	322
2094-16-0	16'-0"	322
2094-16-6	16'-6"	340
2094-17-0	17'-0"	346
2094-17-6	17'-6"	357
2094-18-0	18'-0"	364
2094-18-6	18'-6"	370
2094-19-0	19'-0"	381
2094-19-6	19'-6"	389
2094-20-0	20'-0"	394



2840 Center Clamp
See last page of section for further details.



2061 & 2061-A X-Braces



Hughes Brothers 2061 X-Braces were designed specifically for pole spacings from 16 feet to 21 feet. A single bolt is used to connect the X-Brace to the pole.

2061 X-Braces are made from select Douglas-fir or glue laminated timbers, 3-5/8"x7-1/2", pressure treated with DCOI.

The 2061 X-Brace mounts to the pole with 7/8" bolts. The 2061-A X-Brace mounts to the pole with 1" bolts and grid gains.

Hughes 2061 X-Braces are shipped with end fittings assembled and complete with mounting bolts and center clamp, when ordered complete (CPT).

Stock No.	Pole Spacing Center to Center	Approx. Wt. - Lbs. Per Set
2061-16-0	16'-0"	401
2061-16-6	16'-6"	422
2061-17-0	17'-0"	431
2061-17-6	17'-6"	441
2061-18-0	18'-0"	453
2061-18-6	18'-6"	460
2061-19-0	19'-0"	473
2061-19-6	19'-6"	483
2061-20-0	20'-0"	493
2061-20-6	20'-6"	504
2061-21-0	21'-0"	513

Ordering Information

2061-18-6-CPT

2061 or 2061-A

Pole spacing in feet & inches*.

Complete with mounting hardware. -CPT

X-Brace with center clamp only. -CCO

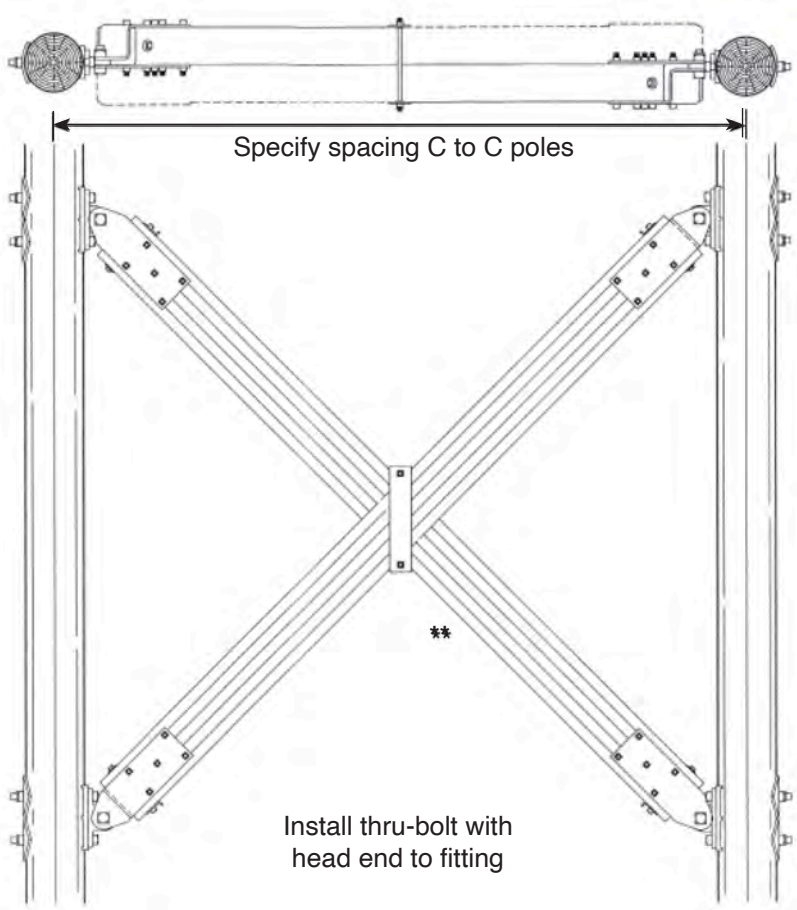
Provides just X-Brace assembly. No mounting hardware or center clamp. No Code

*Use 6" increments only.

Ultimate Ratings

The 2061 X-Brace has an ultimate rating of **25,000 lbs. in tension**. It is recommended that our engineers assist you in determining proper applications of X-Bracing.

Heavy Duty X-Brace, Pin Type Connection



Hughes Brothers Pin Type X-Braces are designed for the demands of EHV H-Frame construction with pole spacings of 18' to 30'. The X-Braces are furnished complete with mounting bolts, tees, pin bolts, center clamps and grid gains when required.

The pin type connection greatly simplifies structure framing operations while providing an excellent pole to brace connection.

Stock No.	Wood Section
2093	5-1/8" x 7-1/2" Laminate
2093A	3-5/8" x 7-1/2" Solid Sawn
2093K	5-1/8" x 7-1/2" Laminate
2095	5-1/8" x 9" Laminate
2095K	5-1/8" x 9" Laminate
2096*	4-5/8" x 5-5/8" Solid Sawn
2096A*	4-1/2" x 5-1/2" Laminate
2096B*+	4-5/8" x 5-5/8" Solid Sawn
2097	6" x 6-3/4" Laminate
2123**	6" x 6-3/4" Laminate
2121+	5-1/8" x 6" Laminate

Ordering Information

2 0 9 3 - 2 0 - 0 - C P T

- Pole spacing in feet & inches*.
- Complete with mounting hardware. -CPT
- X-Brace with center clamp only. -CCO
- Provides just X-Brace assembly. -No
- No mounting hardware or center clamp. Code

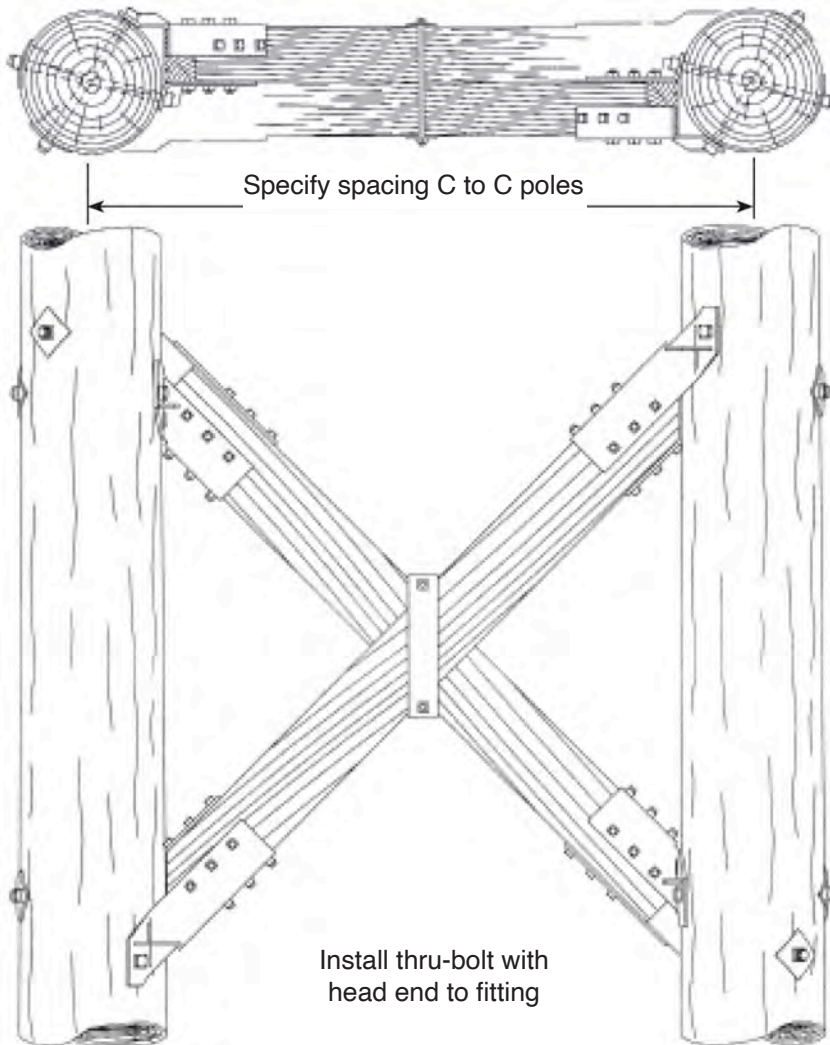
*Use 6" increments only.

Ultimate Ratings

The Heavy Duty Pin Type Connection X-Braces are rated at **35,000 lbs. ultimate in tension**. It is recommended that our Engineering staff assist you in specifying and applying these Heavy Duty X-Braces. For more detailed information, contact Hughes Brothers Engineering Department.

- *30,000 lbs ultimate in tension.
- **40,000 lbs ultimate in tension.
- +These X-Braces do not include grid gains.

Heavy Duty X-Braces, Wrap Around Type



Hughes Brothers wrap around type X-Braces provide the maximum strength obtainable from a two-piece X-Brace design. The load transfer between the X-Brace and pole is accomplished exceptionally well because of the unique end fitting design. The braces are normally recommended for use on structures with pole spacings up to 30' and are available in several wood sections.

Stock No.	Wood Section
2086	5-1/8" x 7-1/2" Laminate
2086A	5-1/8" x 6" Laminate
2087	4-5/8" x 5-5/8" Solid Sawn

Ordering Information

2086-20-0-CPT

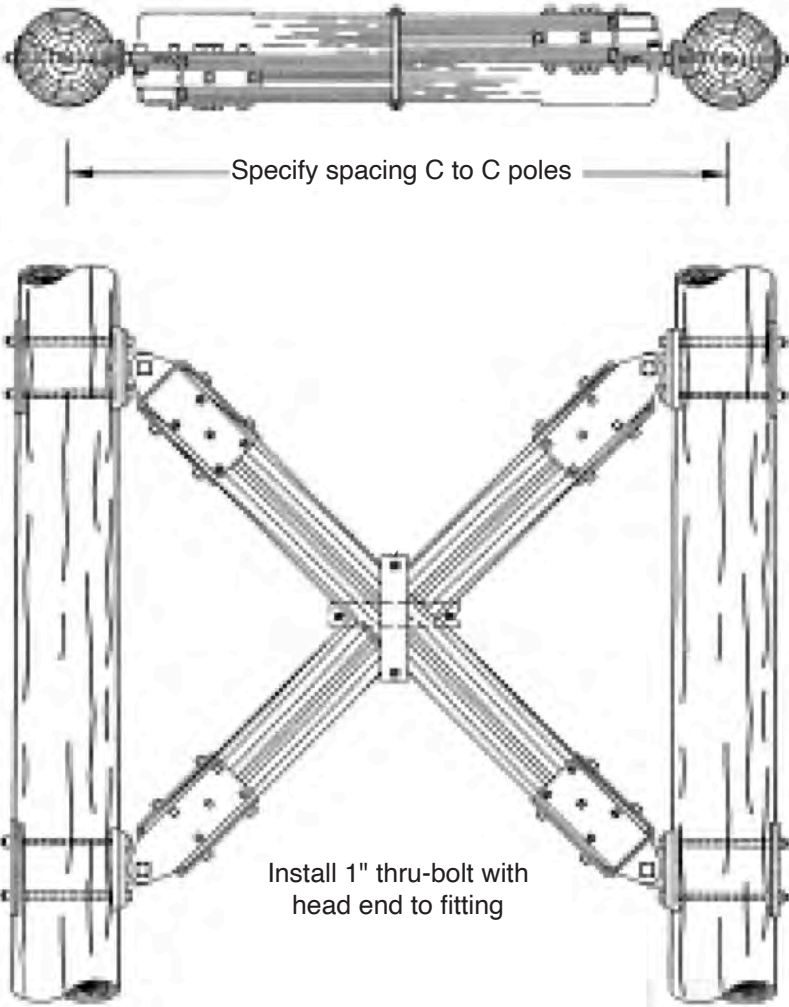
- Pole spacing in feet & inches*.
- Complete with mounting hardware. -CPT
- X-Brace with center clamp only. -CCO
- Provides just X-Brace assembly. No mounting hardware or center clamp. -No Code

*Use 6" increments only.

Ultimate Ratings

The Heavy Duty Wrap Around Type X-Braces are rated at **35,000 lbs. ultimate in tension**. It is recommended that our Engineering staff assist you in specifying and applying these Heavy Duty X-Braces. For more detailed information, contact Hughes Brothers Engineering Department.

2122 Extra Heavy Duty X-Brace, Pin Type Connection



Hughes Brothers Type 2122 X-Brace is designed for use on EHV two pole structures. The end fitting configuration will develop the very high loading capabilities required of these braces. The 2122 X-Braces can be furnished complete with mounting bolts, tees, pin bolts, center clamps and grid gains. Pin type connections greatly simplify structure framing operations while providing an excellent pole to brace connection.

Stock No.	Wood Section
2122	6" x 6-3/4" Laminate

Ordering Information

2122-20-0-CPT

Pole spacing in feet & inches*.

- Complete with mounting hardware. -CPT
- X-Brace with center clamp only. -CCO
- Provides just X-Brace assembly. No mounting hardware or center clamp. -No Code

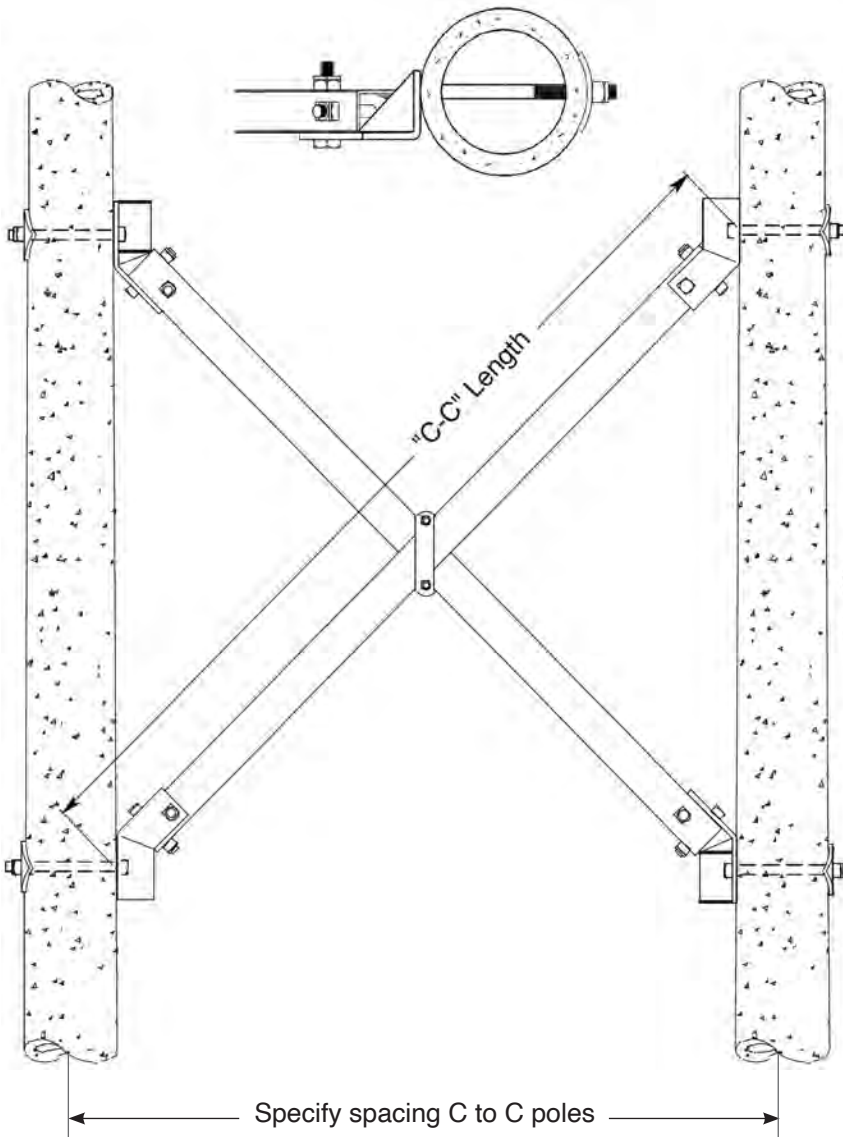
*Use 6" increments only.

Ultimate Ratings

The Extra Heavy Duty Pin type X-Braces are rated at **40,000 lbs. ultimate in tension**. It is recommended that our Engineering staff assist you in specifying and applying these Heavy Duty X-Braces. For more detailed information, contact Hughes Brothers Engineering Department.



B2508 Tubular Steel X-Brace



The B2508 Steel X-Brace is designed to compliment concrete and steel transmission poles. In certain applications, it can be justified for wood pole construction.

Ordering Information

B 2 5 0 8 - 1 5 - 0 - C P T

Pole spacing in feet & inches*.

Complete with mounting bolts, curved washers & center clamp. -CPT

X-Brace with center clamp only. -CCO

Provides just X-Brace assembly. No mounting hardware or center clamp. -No Code

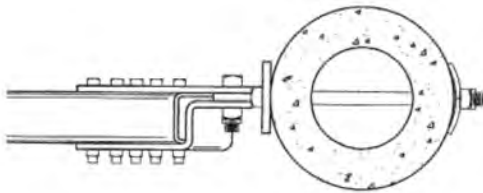
*Use 6" increments only.

When using with concrete poles, please specify CC length and pole diameters.

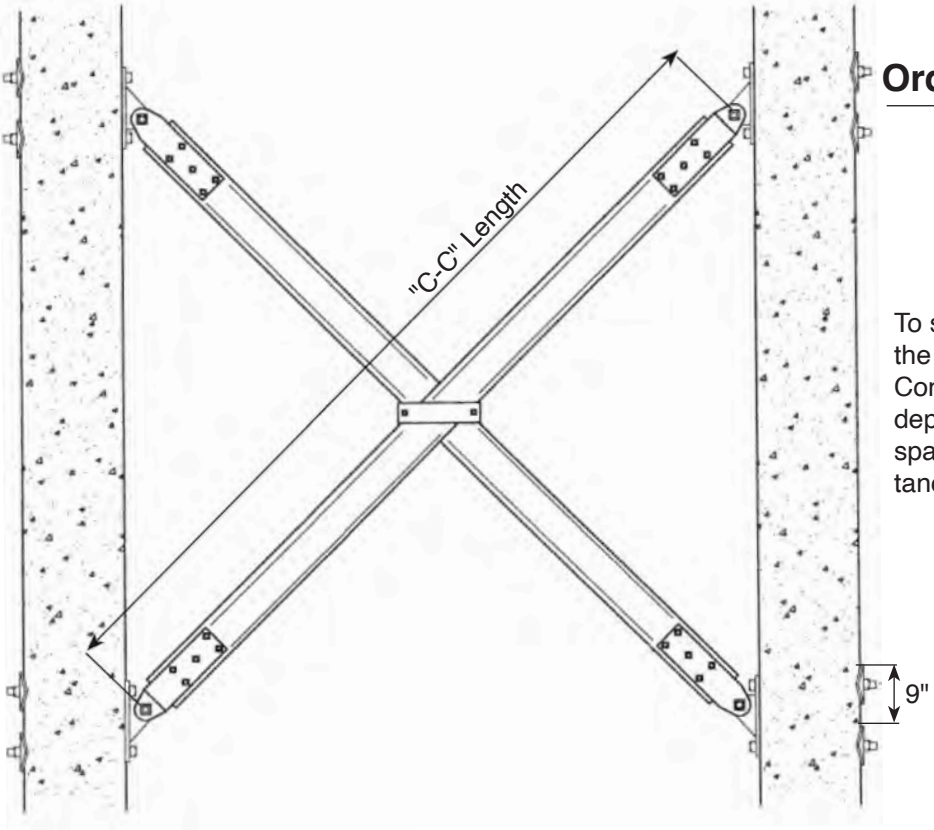
Ultimate Ratings

The B2508 Tubular Steel X-Brace is rated at **25,000 lbs. ultimate in tension**. It is recommended that our Engineering staff assist you in specifying and applying these Heavy Duty X-Braces. For more detailed information, contact the Hughes Brothers Engineering Department.

B2508-B Heavy Duty Steel X-Brace



The B2508-B Steel X-Brace is designed to compliment concrete and steel transmission poles. In certain applications, it can be justified for wood pole construction.



Ordering Information

B 2 5 0 8 - B - 1 8 8 C C

Center to center length, C-C in inches

To specify, reference B2508-B and the X-brace member length in inches. Contact Hughes Brothers engineering department and reference pole spacing and pole diameter for assistance in determining C-C length.

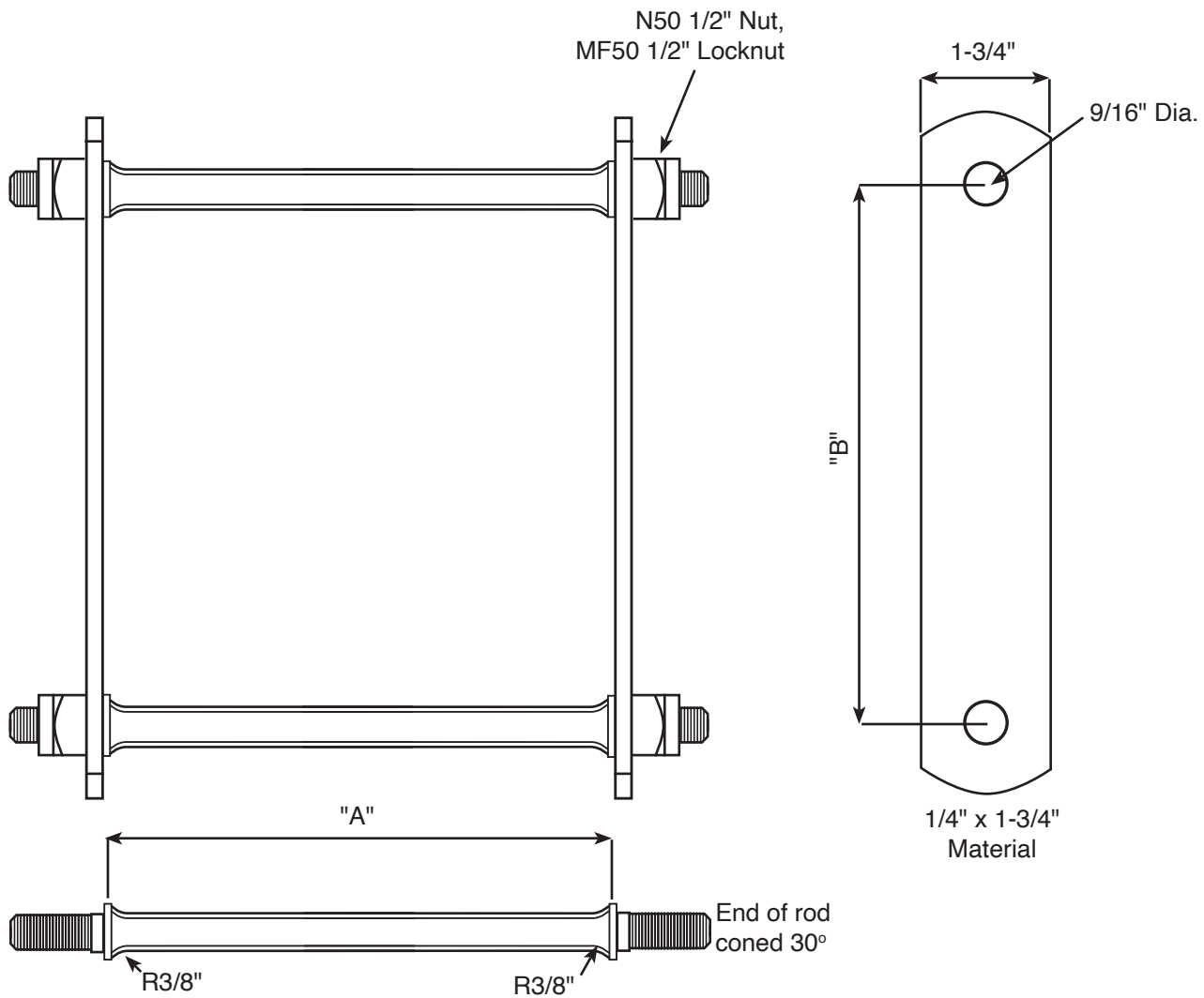
Ultimate Ratings

It is recommended that our Engineering staff assist you in specifying and applying these Heavy Duty X-Braces. For more detailed information, contact the Hughes Brothers Engineering Department.



2840 X-Brace Center Clamp

Center Clamps play a very important role in an X-Brace assembly. By clamping the center of an X-Brace, the effective length of the compression member is reduced by half. It is also important that the center clamp is free to move as the structure is loaded, since an H-frame is flexible, not rigid. Hughes Brothers center clamps are the result of years of full scale testing of H-Frames and a thorough understanding of the proper use of X-Bracing.



2840 X-Brace Center Clamp

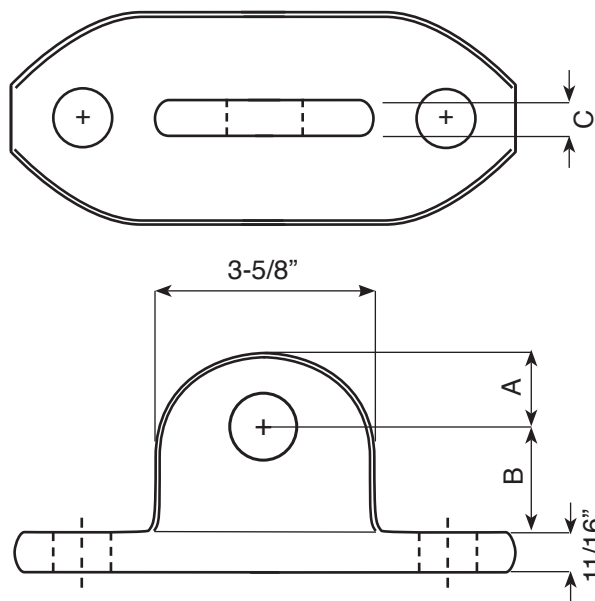
Stock No.	Type	Wood Section in Inches	Component Parts			
			Rod		Strap	
			Part No.	"A"(in.)	Part No.	"B"(in.)
2840-A	X-Brace	3-3/8 x 4-3/8	2840.1B	6-7/8	2840.2B	7-1/4
2840-B	X-Brace	3-3/4 x 4-3/4	2840.1C	7-5/8	2840.2C	7-3/8
2840-C	X-Brace	3-3/8 x 5-3/8	2840.1B	6-7/8	2840.2E	8-1/2
2840-D	X-Brace	4 x 5	2840.1D	8-1/8	2840.2D	8-1/8
2840-E	X-Brace	4-3/4 x 5-3/4	2840.1E	9-5/8	2840.2F	9-1/8
2840-F	X-Brace	2-3/4 x 3-1/2	2840.1A	5-5/8	2840.2A	6
2840-G	X-Brace	3-3/4 x 8-3/4	2840.1C	7-5/8	2840.2I	13-1/2
2840-H	A-Frame	3-3/8 x 4-3/8	2840.1B	6-7/8	2840.2E	8-1/2
2840-I	A-Frame	3-3/4 x 4-3/4	2840.1C	7-5/8	2840.2F	9-1/8
2840-J	A-Frame	3-3/8 x 5-3/8	2840.1B	6-7/8	2840.2H	10
2840-K	A-Frame	4 x 5	2840.1D	8-1/8	2840.2G	9-3/4
2840-L	A-Frame	2-3/4 x 3-1/2	2840.1A	5-5/8	2840.2B	7-1/4
2840-M	X-Brace	2-1/8 x 3-1/8	2840.1F	4-3/8	2840.2J	5-3/4
2840-N	A-Frame	4 x 6	2840.1D	8-1/8	2840.2K	11-1/4
2840-P	A-Frame	5-1/2 x 7-1/2	2840.1G	11-1/8	2840.2L	14-1/4
2840-Q	X-Brace	4 x 6	2840.1D	8-1/8	2840.2G	9-3/4
2840-R	X-Brace	5-1/2 x 7-1/2	2840.1G	11-1/8	2840.2M	12
2840-T	X-Brace	3-3/4 x 7-1/2	2840.1C	7-5/8	2840.2M	12
2840-W	X-Brace	3-3/4 x 5-3/4	2840.1C	7-5/8	2840.2G	9-3/4
2840-X	X-Brace	4-3/4 x 6-3/4	2840.1E	9-5/8	2840.2P	10-1/2
2840-Y	X-Brace	5-1/4 x 9	2840.1H	10-5/8	2840.2R	14
2840-Z	X-Brace	4-1/2 x 9	2840.1J	9-1/8	2840.2R	14



POLE LINE HARDWARE

Guying Attachments.....	C-1
Pole Bands.....	C-11
Links/Guying Assemblies.....	C-22
Pole/Crossarm/Spacer Fittings.....	C-36
Brackets/Bayonets.....	C-55
Pole Top Pins/Ridge Irons.....	C-83
Yoke Plates.....	C-93
Other Hardware.....	C-109

2817 Dead End Tee



The Hughes Brothers 2817 Dead End Tee is forged from high strength steel and can be used to make simple attachments at the pole, crossarm, X-brace or tension brace. The stem mounting holes can be chamfered for insulator, clevis, hook or other attachments.

Stock No.	Mounting Hole / in.	Stem Hole	Dimensions / Inches			Weight	Ultimate Strength ¹ / lbs
			A	B	C		
2817-11	11/16	1-1/4*	1-1/2	1-1/2	11/16	6.0 lbs	60,000
2817-13†	13/16	1-1/4*	1-1/2	1-1/2	11/16	6.0 lbs	
2817-15†	15/16	1-1/4*	1-1/2	1-1/2	11/16	6.0 lbs	
2817-17	1-1/16	1-1/4*	1-1/4	1-1/2	11/16	6.0 lbs	
2817-B-13	13/16	13/16*	1-1/4	1-5/8	11/16	6.0 lbs	60,000
2817-D†	15/16	1 1/8	1-1/4	1-3/4	11/16	6.0 lbs	60,000
2817-E	13/16	1-1/4x1-5/8*	1-1/4	1-3/4	11/16	5.8 lbs	60,000
2817-F	1-1/16	1-1/8	1-3/8	1-5/8	11/16	5.8 lbs	
2817-S-15	15/16	15/16	1-3/8	1-1/2	11/16	6.1 lbs	
2842.4A**	13/16	13/16	15/16	2-15/16	7/16	6.2 lbs	25,000
2842.4B**	15/16	11/16	15/16	2-15/16	7/16	6.2 lbs	25,000
2842.4C**	15/16	13/16	15/16	2-15/16	7/16	6.2 lbs	25,000

† Standard product version

* Chamfered Hole

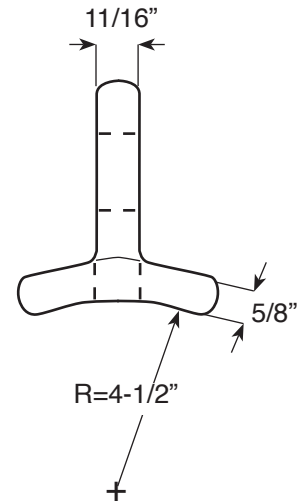
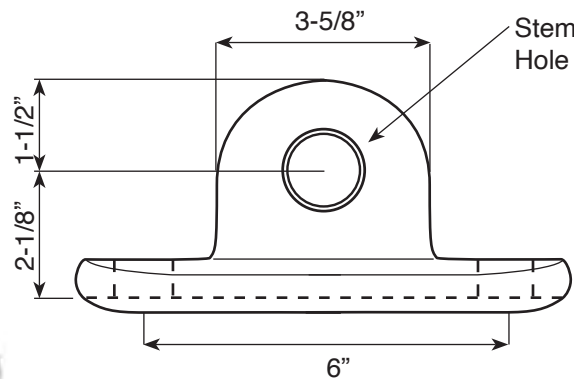
** Flame cut from I-beam

Unit weight is 6 lbs

¹ The *ultimate strength* shown is based solely on the strength of the tee. Some pole mounting hardware may not develop an equivalent ultimate strength.

2817R Curved Base Dead End Tee

The 2817R Curved Base Dead End Tee is similar to the standard 2817 but features a base with a 4-1/2" radius.



Stock No.	Mounting Holes	Stem Hole	Ultimate Strength ¹	Weight
2817R4.5-13-13	13/16"	13/16"	60,000 lbs.	6 lbs.
2817R4.5-13-15	13/16"	15/16"	60,000 lbs.	6 lbs.
2817R4.5-17-15	1-1/16"	15/16"	60,000 lbs.	6 lbs.

Ordering Example

2 8 1 7 R 4.5 - 15 - 15

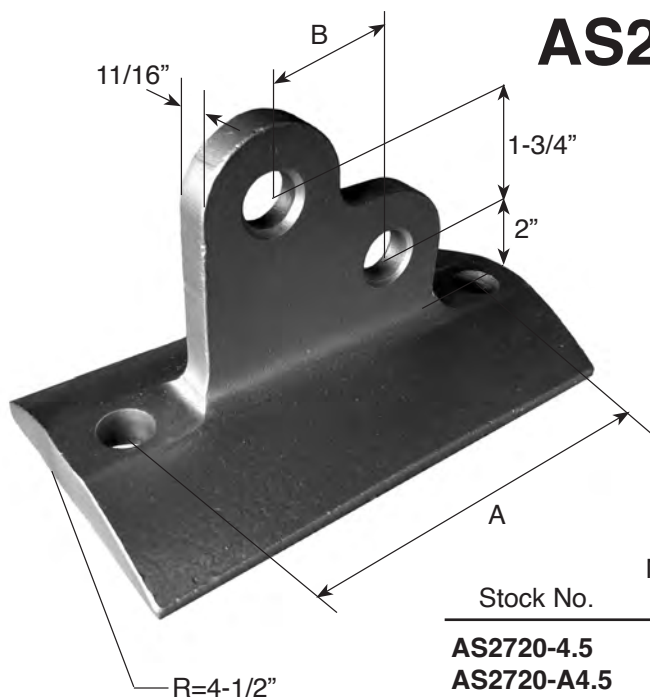
Mounting Hole Dia. ————
Stem Hole Dia. ————

To order unit with stem hole chamfered, add a "C" after hole diameter. (Example: 2817R4.5-15-15C).

Other stem and mounting hole configurations are available, consult Hughes Brothers Engineering department for assistance.

¹ The *ultimate strength* shown is based solely on the strength of the tee. Some pole mounting hardware may not develop an equivalent ultimate strength.

AS2720 Double Guying Tee



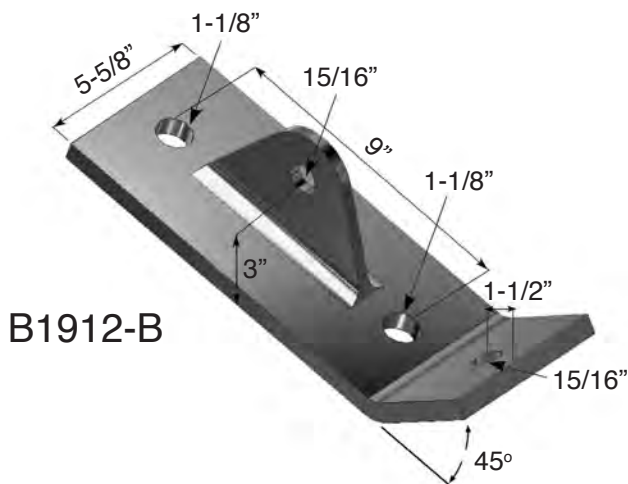
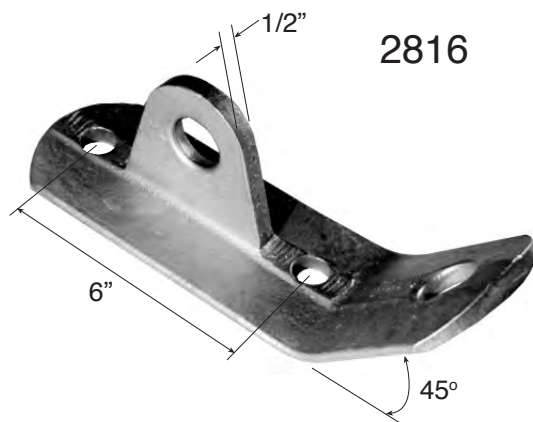
The Hughes Brothers AS2720 Guying Tee is designed to facilitate multiple guying attachments to one piece of hardware. The mounting base is formed to a 4-1/2" radius to provide a solid connection on concrete, steel and wood poles.

NOTE: The *ultimate strength* shown is based solely on the strength of the tee. Some pole mounting hardware may not develop an equivalent ultimate strength.

Stock No.	Mounting Holes	Chamfered Stem Holes	A	B	Ultimate Strength Per Attachment	Weight
AS2720-4.5	15/16"	15/16"	8"	2-1/2"	35,000 lbs.	13.2 lbs.
AS2720-A4.5	15/16"	15/16"	9"	3-1/2"	35,000 lbs.	14.3 lbs.
AS2720-A4.5-18	1-1/8"	15/16"	9"	3-1/2"	35,000 lbs.	14.3 lbs.

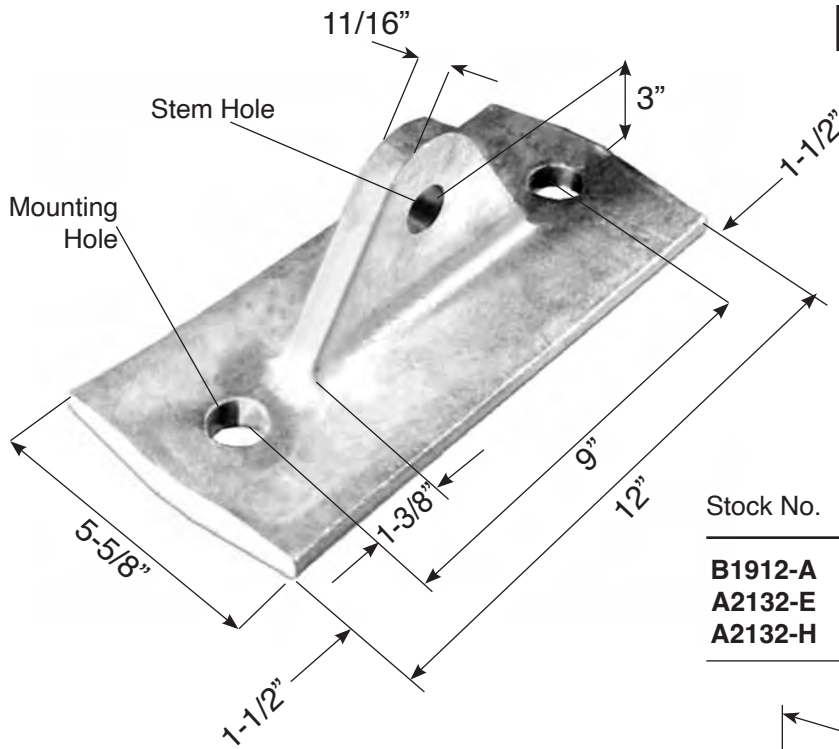
2816 & B1912-B Dead End & Guying Tees

Hughes Brothers 2816 & B1912-B Dead End & Guying Tees are flame cut from structural steel and are used for conductor or shield wire dead ends and down guys. Stem and guy mounting holes are chamfered for insulator, clevis, hook or other attachments.



Stock No.	Mounting Hole	Stem & Guy Hole	Ultimate Strength Per Attachment	Weight
2816-13	13/16"	1-1/4"	25,000 lbs	6 lbs
2816-15	15/16"	1-1/4"	25,000 lbs	6 lbs
2816-17	1-1/16"	1-1/4"	25,000 lbs	6 lbs
B1912-B	15/16"	15/16"	35,000 lbs	6 lbs

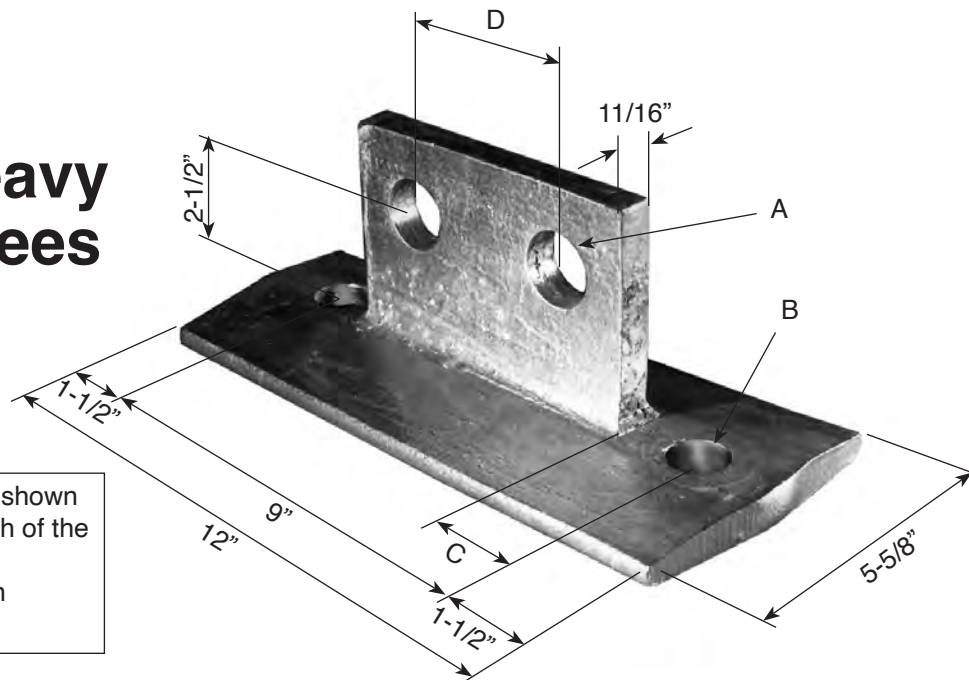
B1912-A & A2132 Heavy Dead End Tees



NOTE: The *ultimate strength* shown is based solely on the strength of the tee. Some pole mounting hardware may not develop an equivalent ultimate strength.

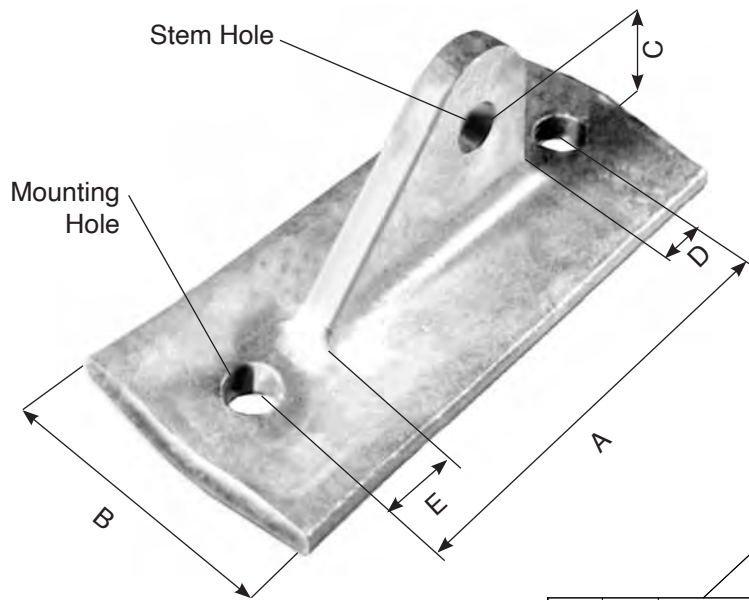
Stock No.	Stem Hole	Mtg. Hole	Ultimate Strength	Weight
B1912-A	15/16"	1-1/8"	70,000 lbs	15.7 lbs
A2132-E	1-1/8"	1-1/8"	70,000 lbs	15.5 lbs
A2132-H	1-1/8"	1-3/8"	70,000 lbs	15.5 lbs

A2132 Heavy Guying Tees

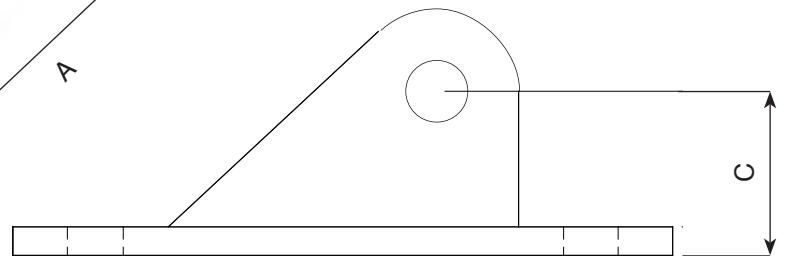


NOTE: The *ultimate strength* shown is based solely on the strength of the tee. Some pole mounting hardware may not develop an equivalent ultimate strength.

Stock No.	A	B	C	D	Ultimate Strength Per Attachment	Weight
A2132-F	1-3/8"	1-1/8"	1-1/4"	3-1/2"	35,000 lbs.	17 lbs
A2132-F1	1-1/8"	1-1/8"	1-1/4"	3-1/2"	35,000 lbs.	17 lbs
A2132-G	1-1/8"	1-3/8"	1-3/8"	3-1/4"	35,000 lbs.	17 lbs



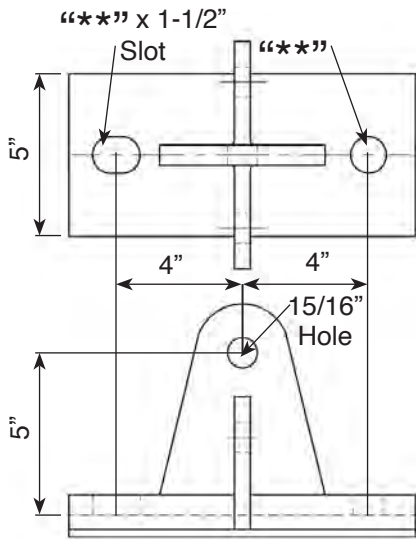
A2132 Heavy Dead End Tee



Dimensions in Inches

Stock No.	A	B	C	Mtg. Hole	Stem Hole	D	E	Wt./ lbs	Ultimate Strength
A2132	9	5-5/8	3	1-1/8	1-1/8	1-5/16	1-5/16	15.6	70,000 lbs
A2132-A	9	5-5/8	4	1-1/8	1-1/8	1-1/8	1-1/8	16.5	70,000 lbs
A2132-A1	12	5-5/8	3	1-1/8	1-1/8	1-5/16	1-5/16	19.4	70,000 lbs
A2132-A2	14	5-5/8	3	1-1/8	1-1/8	1-5/16	1-5/16	22.1	70,000 lbs
A2132-A4	9	5-5/8	3	15/16	1-3/8	1-5/16	1-5/16	15.5	70,000 lbs
A2132-D	9	5-5/8	3	1-1/8	1-3/8	1-5/16	1-5/16	15.3	70,000 lbs
A2132-HH	12	5-5/8	3	1-1/8	1-3/8	1-1/2	1-5/16	22	70,000 lbs
A2132-J	9	5-5/8	3	1-3/8	1-1/8	1-3/8	1-3/8	15	70,000 lbs
A2132-M	9	5-5/8	3	1-3/8	1-3/8	1-5/8	1-5/8	14.9	70,000 lbs

NOTE: The *ultimate strength* shown is based solely on the strength of the tee. Some pole mounting hardware may not develop an equivalent ultimate strength.



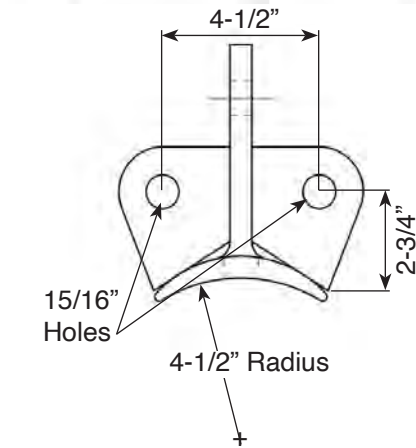
AS2720 E4.5** Curved Cross Tie & Static Dead End Tee

**Specify Hole Size in 16ths
Example: AS2720-E4.5-18

Ultimate Strength, stem hole: 70,000 lbs.

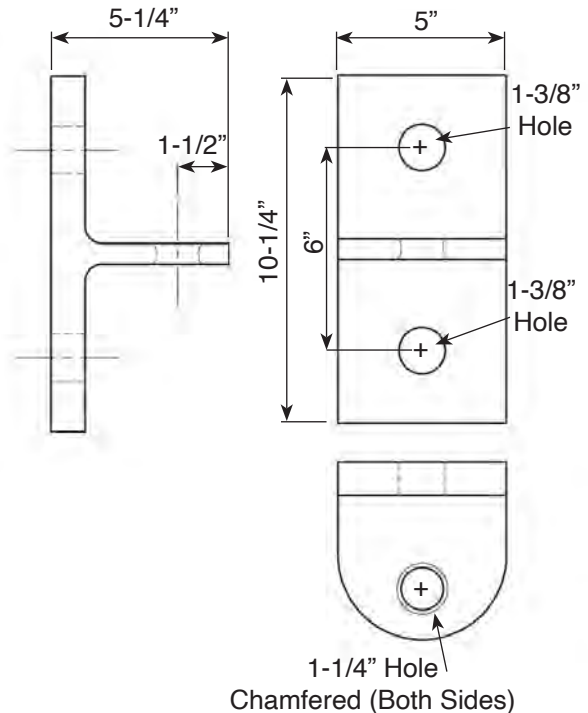
The Hughes AS2720-E Curved Cross Tie & Dead End Tee is designed to facilitate attaching a cross tie and dead-ending the static wires on an angle structure using only one piece of hardware. The mounting base is curved to provide a solid connection on concrete, wood or steel poles.

NOTE: The *ultimate strength* shown is based solely on the strength of the tee. Some pole mounting hardware may not develop an equivalent ultimate strength.

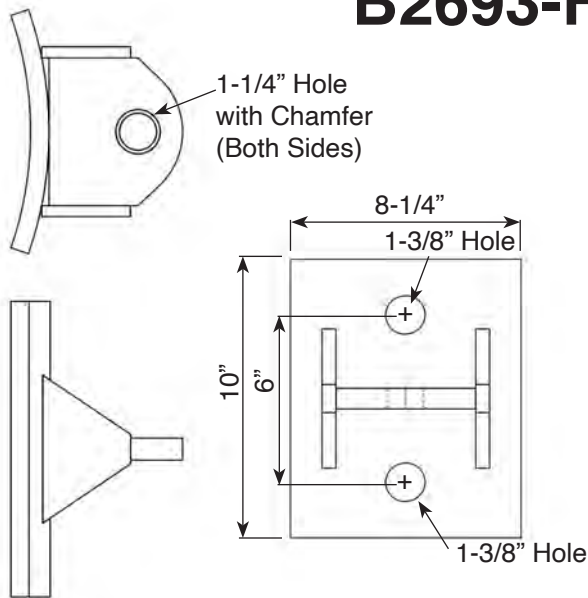


B2693-J Dead End Tee

Ultimate Strength: 50,000 lbs.

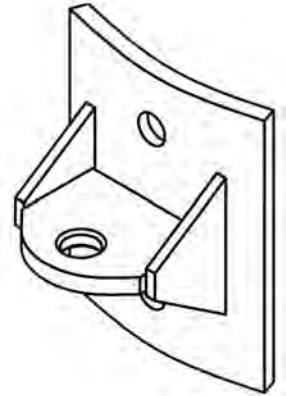


B2693-H Welded Dead End Plate

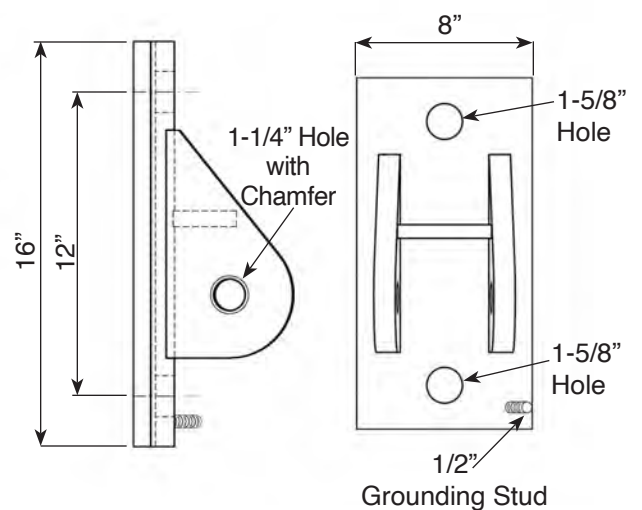
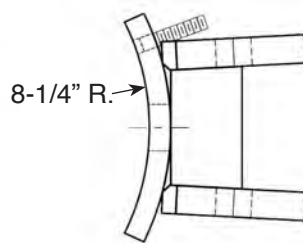


Ultimate Strength: 80,000 lbs.

NOTE: The *ultimate strength* shown is based solely on the strength of the tee. Some pole mounting hardware may not develop an equivalent ultimate strength.



B2693-H8 Steel Guy Plate



Ultimate Strength: 80,000 lbs. per position.

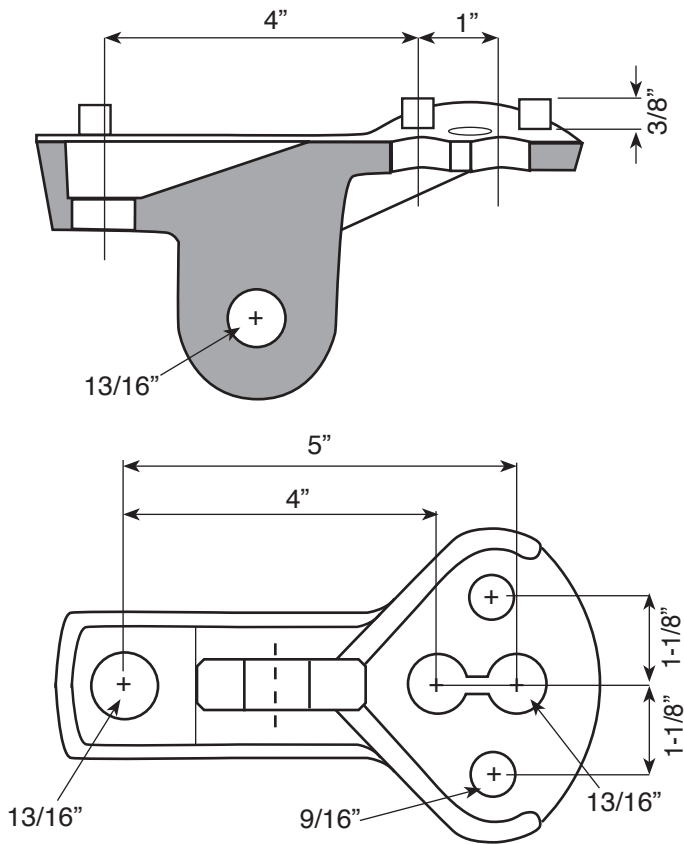
*Many other configurations available. Contact Hughes Brothers for more information.

C POLE LINE HARDWARE

1258 Pole Eye Plate

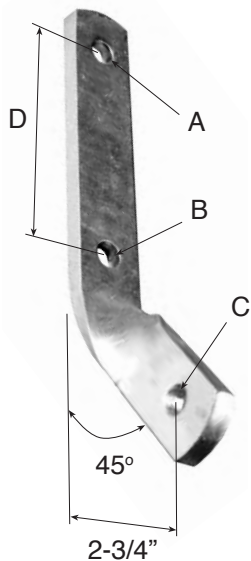
Hughes Brothers 1258 Pole Eye Plate is cast from 65-45-12 ductile iron. The Hughes design offers significant strength advantages over competing pole eye plates.

Mounting options are either by (2) mounting bolts on 4" or 5" spacing, or (1) mounting bolt & (2) lag screws. Galvanizing is per ASTM A153.



Stock No.	Mtg. Holes	Stem Hole	Ult. Strength	Weight
1258	13/16" or 9/16"	13/16"	28,000 lbs. at 45°	3.5 lbs. ea.

28261, 28262 & 28263 Guy Plate



The Hughes Brothers 28261, 28262 & 28263 Guy Plates allow for guying attachment with 2 mounting bolts and are manufactured from 1/2" x 1-3/4" steel.

Stock No.	D	Ultimate Strength	Approximate Weight
28261	4"	20,000 lbs	2.8 lbs
28262	6"	20,000 lbs	3.3 lbs
28263	10"	20,000 lbs	5.2 lbs
28264	12"	20,000 lbs	5.7 lbs
28265	8"	20,000 lbs	3.8 lbs

NOTE: The *ultimate strength* shown is based solely on the strength of the guy plate. Some pole mounting hardware may not develop an equivalent ultimate strength.

Ordering Example:

Stock No.	A	B	C
28262 - 11 - 11 - 13			

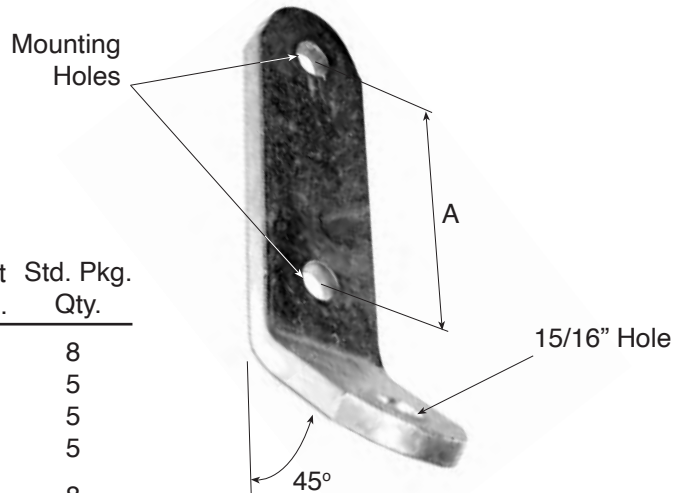
Designates 6" hole spacing (see table above)

Hole size in 1/16's (any combination of 9/16", 11/16", 13/16" & 15/16")

2822.2 Guy Plate

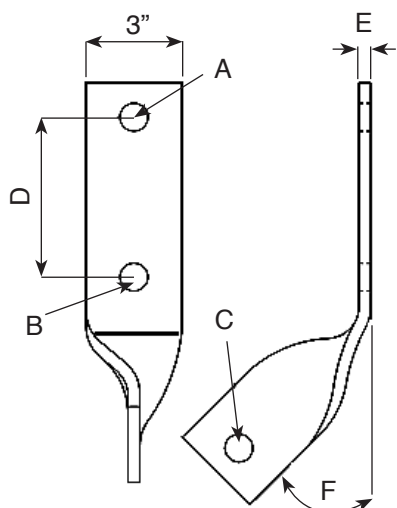
The Hughes Brothers 2822.2 is a sub-assembly of the 2822 Swinging Angle Bracket but functions well on its own as a heavy guy plate. The 2822.2 is manufactured from 5/8" x 3" steel.

Stock No.	A Inches	Mtg. Holes in Inches	Ultimate Strength -lbs	Weight lbs. ea.	Std. Pkg. Qty.
2822.2A-13	6"	13/16	35,000	7	8
2822.2B-13	9"	13/16		8.5	5
2822.2C-13	12"	13/16		10	5
2822.2D-13	15"	13/16		12	5
2822.2A-15	6"	15/16	35,000	7	8
2822.2B-15	9"	15/16		8.5	5
2822.2C-15	12"	15/16		10	5
2822.2D-15	15"	15/16		12	5



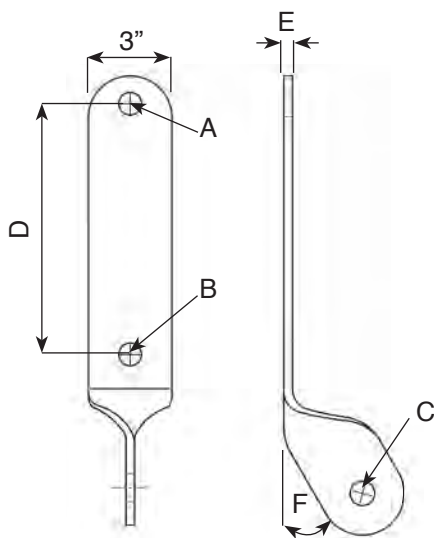
C POLE LINE HARDWARE

Guy Plates & Twisted Clips



Guy Plates

Stock No.	A	B	C	D	E	F	Weight/lbs
AS424	11/16"	11/16"	13/16"	4"	3/8"	30°	2.4
AS452	13/16"	13/16"	13/16"	6"	3/8"	30°	2.5
AS1459	11/16"	13/16"	13/16"	12"	5/16"	45°	3.8



Stock No.	A	B	C	D	E	F	Weight/lbs
AS1062	13/16	13/16	7/8"	9"	5/16"	30°	3.2
AS2276-L	15/16"	15/16"	1"	16"	1/2"	45°	11.05
AS2276-L1	15/16"	15/16"	1-1/8"	6"	5/8"	45°	7.8
AS2276-L3	1-1/8"	1-1/8"	1-1/8"	6"	5/8"	45°	8.5
AS2276-L4	1-1/8"	1-1/8"	1-1/8"	12"	5/8"	45°	11.09

Twisted Clips

C-C Hole

Stock No.	A	B	C	Before Bending	Weight/lbs
AS2276-*	15/16"	15/16"	1/2"	7"	3.0
AS2276-A-*	13/16"	15/16"	3/8"	7-1/2"	3.7
AS2276-C-*	13/16"	1-1/16"	3/8"	7-1/2"	3.7
AS2276-D-*	13/16"	13/16"	3/8"	7-1/2"	3.0
AS2276-E-*	13/16"	13/16"	3/8"	7-1/2"	
AS2276-F-*	13/16"	13/16"	1/2"	7"	3.0
AS2276-G-*	13/16"	13/16"	1/4"	7"	
AS2276-H-*	13/16"	13/16"	3/8"	7"	

* Degree of bend ** Square hole

Ordering Example: AS2276-D-52

Degree of bend
Stock number

Reasons to Consider Hughes Brothers Pole Bands





1111, 3100, 3102



1111-B & 3100-B

1111, 3100 & 3102 Distribution - Light Duty Pole Bands

Hughes Brothers 1111, 3100 & 3102 Pole Bands are used for conductor and guy attachments. They are designed for a variety of line angle attachments.

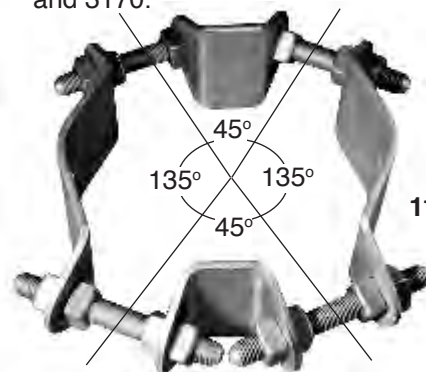
The 1111, 3100 & 3102 Pole Bands are easily adjustable to varying pole top diameters, and serve a dual purpose as anti-split devices.

For the 1111, 3100 & 3102 series, pole through bolts are not required. All hardware connections are double nutted to ensure hardware remains tight.

Band sections are made from 1/4" x 4" steel with embossed bends. Each band section has a 9/16" hole for 1/2" lag screws. 3/4" x 6" Threaded rods with 4 nuts are furnished.

Two bonding options are available. For bonding on the band section, order stock no. 2718.55. For bonding on the stud, order stock no. 2727.7 and an extra N70.

*Connecting Links & Guy Rollers are ordered separately. Suggested connecting links are 3150 and 3170.



1111-A & 3100-A

Stock No.	Wt. Lbs. Each	Std. Pkg. Quantity	Type	Pole Dia. Inches
1111	15	4	4-Way 90°	7 1/2-12
3100	13	4	4-Way 90°	6 1/2-10 1/2
3102.1	15	4	4-Way 90°	10-14
3102.4	18	2	4-Way 90°	13-17
3102.6	22	2	4-Way 90°	16-20
1111-A	15	2	4-Way 135°	7 1/2-12
3100-A	13	4	4-Way 135°	6 1/2-10 1/2
1111-B	15	4	3-Way 90°	7 1/2-12
3100-B	13	4	3-Way 90°	6 1/2-10 1/2

Suggested Maximum Conductor Working Load

- 6,000 Lbs., 45° Guy, 2 Way
- 3,500 Lbs., 30° Guy, 2 Way
- 4,500 Lbs., 45° Guy, 4 Way
- 2,600 Lbs., 30° Guy, 4 Way

NOTE: To order Pole Bands assembled, add suffix "ASSY" to part number i.e. **3102.4-ASSY**

3103 Medium Duty Pole Bands



Hughes Brothers 3103 Pole Bands are designed for conductor & guy attachments. 3103 Pole Bands are well suited to wood, concrete or steel pole applications.

Band sections are made from 3/8" x 4" steel. Each band section has a 9/16" hole to accommodate a 1/2" lag screw. 7/8" threaded rod with 4 nuts are furnished.

Two bonding options are available. For bonding on the band section, order stock no. 2718.55. For bonding on the stud, order stock no. 2727.8 and an extra N80.

Connecting Links & Guy Rollers are ordered separately. Suggested connecting links are 3151, 3152, 3153, 3154, and 3176.

NOTE: To order Pole Bands assembled, add suffix "ASSY" to part number i.e. **3103.5-ASSY**

Stock No.	Wt. Lbs. Each	Type	Pole Dia. Inches
3103.5	18	4-Way 90°	7 - 10
3103.6	21	4-Way 90°	9 - 12
3103.7	23	4-Way 90°	11 - 14
3103.8	26	4-Way 90°	13 - 16
3103.9	28	4-Way 90°	15 - 18
3103.10	32	4-Way 90°	17 - 20

Suggested Maximum Conductor Working Load

DE Load Rated at 7,000 Lbs with a 45° Guy
DE Load Rated at 4,000 Lbs with a 30° Guy

3105 Medium Duty Pole Bands



Hughes Brothers 3105 Pole Bands are designed for conductor & guy attachments. 3105 Pole Bands are well suited to wood, concrete or steel applications.

Band sections are made from 1/2" x 4" steel. Each band section has a 9/16" hole to accommodate a 1/2" lag screw. 7/8" threaded rods with 4 nuts are furnished.

Two bonding options are available. For bonding on the band section, order stock no. 2718.55. For bonding on the stud, order stock no. 2727.8 and an extra N80.

Connecting Links & Guy Rollers are ordered separately. Suggested connecting links are 3151, 3152, 3153, 3154, 3166, 3176 and 3184.

NOTE: To order Pole Bands assembled, add suffix "ASSY" to part number i.e. **3105.5-ASSY**

Stock No.	Wt. Lbs. Each	Type	Pole Dia. Inches
3105.5	23	4-Way 90°	7 - 10
3105.6	26	4-Way 90°	9 - 12
3105.7	30	4-Way 90°	11 - 14
3105.8	33	4-Way 90°	13 - 16
3105.9	36	4-Way 90°	15 - 18

Suggested Maximum Conductor Working Load

DE Load Rated at 10,000 lbs with a 45° Guy
DE Load Rated at 6,000 lbs with a 30° Guy.

3107 Heavy Duty Pole Band



Shown with 3157 Links & 28083 Roller, 2718.55 Bonding Clip and bolt.*

The Hughes Brothers 3107 Pole Band is designed for insulator & guying attachments on applications with heavy loading criteria.

The 3107 Pole Band uses a 1-1/4" pole through bolt and 1" studs.

Shear blocks are used to properly transfer stresses to the pole and guy. The principal function of the band sections is to prevent the splitting of the pole.

Band sections are made from 1/4" x 4" steel.

Two bonding options are available. For bonding on the band section, order stock no. 2718.55. For bonding on the stud, order stock no. 2727.10 and an extra N100.

Suggested connecting links are 3157, 3155, 3159, 3160 and 3167.

*Connecting links, guy rollers, and bolts are ordered separately.

Suggested Maximum Conductor Working Load

DE Load Rated at 18,000 Lbs with a 45° Guy
DE Load Rated at 10,500 Lbs with a 30° Guy

Stock No.	Wt. Lbs. Each	Type	Pole Dia. Inches	Description
3107.5	38	2-Way 180°	8 - 10	1-1/4" Thru Bolt
3107.6	39		10 - 12	1" Stud Bolts
3107.7	41		12 - 14	
3107.8	44		14 - 16	
3107.9	46		16 - 18	
3107.10	49		18 - 20	

NOTE: To order Pole Bands assembled, add suffix "ASSY" to part number i.e. **3107.6-ASSY**

3108 Heavy Duty Pole Bands



Shown with 3154 Links & 28082 Roller.*

The Hughes Brothers 3108 Pole Band is designed for insulator & guying attachments on applications with heavy loading criteria.

The 3108 Pole Band uses a 7/8" pole through bolt and 7/8" studs.

Shear blocks are used to properly transfer stresses to the pole and guy. The principal function of the band sections is to prevent the splitting of the pole.

Band sections are made from 1/4" x 4" steel.

Two bonding options are available. For bonding on the band section, order stock no. 2718.55. For bonding on the stud, order stock no. 2727.8 and an extra N80.

*Connecting Links, Guy Rollers & Bolts are ordered separately.

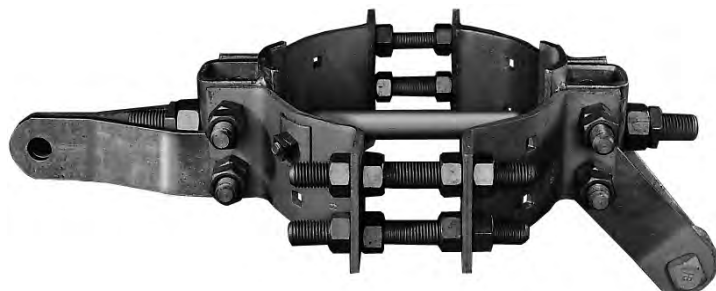
Suggested connecting links are 3151, 3152, 3153, 3154, 3166, 3176 and 3184.

Suggested Maximum Conductor Working Load

DE Load Rated at 14,000 Lbs with a 45° Guy
DE Load Rated at 8,500 Lbs with a 30° Guy

Stock No.	Wt. Lbs. Each	Type	Pole Dia. Inches	Description
3108.5	26	2-Way 180°	7 - 10	7/8" Thru Bolt
3108.6	28		9 - 12	7/8" Stud Bolts
3108.7	30		11 - 14	
3108.8	32		13 - 16	
3108.9	34		15 - 18	
3108.10	36		17 - 20	
3108.11	38		19 - 22	
3108.12	40		21 - 24	

NOTE: To order Pole Bands assembled, add suffix "ASSY" to part number i.e. **3108.6-ASSY**



Shown with 3157 Links and 2718.55 Bonding Clip.*

3112 Heavy Duty Pole Bands

Hughes Brothers 3112 Pole Bands are designed for insulator and guying attachments on applications with very heavy loading.

The 3112 Series uses a 1-1/4" pole thru bolt, with shear blocks to transfer loads to the pole and guy. An extra wide band section and double stud arrangement provides an excellent bearing surface on the pole to counter the vertical component of the guy load.

Band sections are made from 3/8" x 5" steel. 1" stud bolts are included.

Two bonding options are available. For bonding on the band section, order stock no. 2718.55. For bonding on the stud, order stock no. 2727.10 and an extra HN100.

*Connecting Links, Guy Rollers & Bolts are ordered separately.

Suggested connecting links are 3157, 3155, 3159, 3160 and 3167.

Suggested Maximum Conductor Working Load

DE Load Rated at 20,000 Lbs with a 45° Guy
 DE Load Rated at 12,500 Lbs with a 30° Guy

Stock No.	Wt. Lbs. Each	Type	Pole Dia. Inches
3112.5	64	2-Way 180°	8 - 11
3112.6	69		11 - 14
3112.7	74		12 - 17
3112.8	79		15 - 19
3112.9	84		17 - 21

NOTE: To order Pole Bands assembled, add suffix "ASSY" to part number i.e. **3112.5-ASSY**

3340 & 3341 Extra Heavy Duty Pole Bands

Hughes Brothers 3340 and 3341 Pole Bands are designed for insulator and guying attachments on applications with very heavy loading, such as dead end applications. Conductor loads are transferred to the guy and pole by a 1-1/4" threaded rod.

Large links and yoke plates at both conductor and down guy distribute loads equally.

Several variations of this arrangement are available. Before ordering, we suggest our engineers assist you in making a complete analysis of the application and associated links and yokes for these band assemblies.

Two bonding options are available. For bonding on the band section, order stock no. 2718.55. For bonding on the stud, order stock no. 2727.8 and an extra N80.



3340



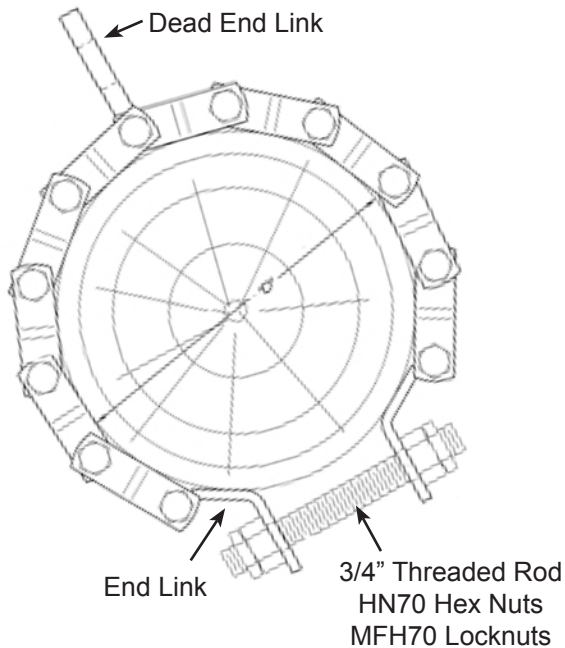
3341

Suggested Maximum Conductor Working Load

DE Load Rated at 22,000 Lbs with a 45° Guy
DE Load Rated at 12,700 Lbs with a 30° Guy

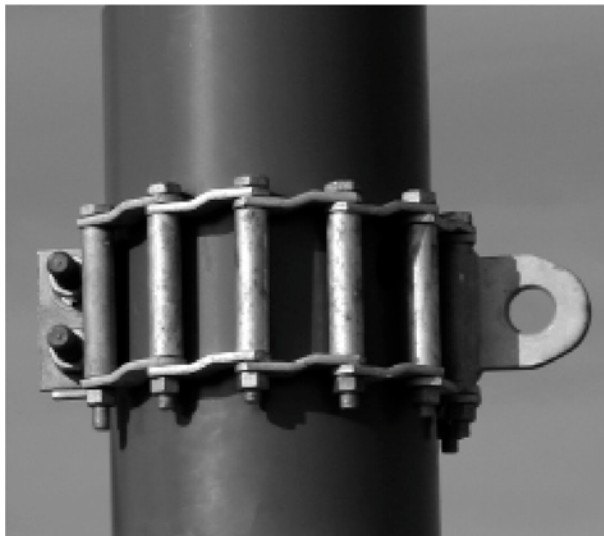
Stock No.	Wt. Lbs. Each	Type	Pole Dia. Inches
3340.5	112	2-Way 180°	8 - 13
3340.6	120	2-Way 180°	12 - 17
3341.5	217	2-Way 180°	8 - 13
3341.6	225	2-Way 180°	12 - 17

1200 Series Add-A-Link Pole Band

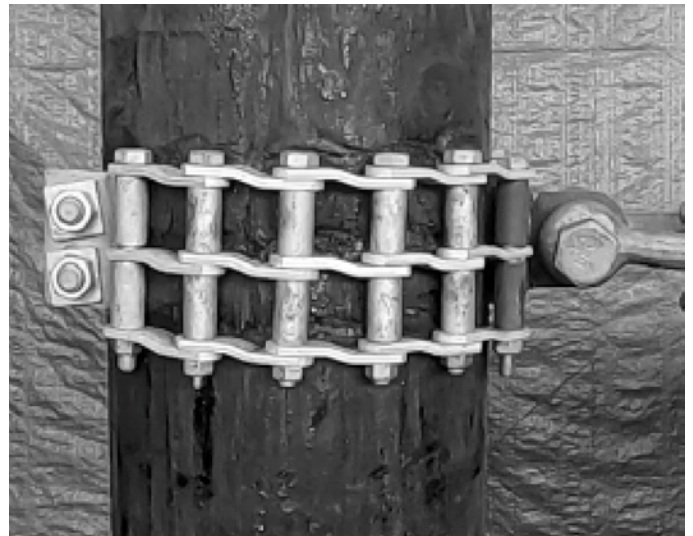


The 1200 series Add-A-Link bands are ideal for adding attachments onto existing wood, concrete, or steel poles without having to drill holes. They can go on any size pole and are more cost effective than a chain band. Our made in America bands are easy to modify for special conditions. Ships with additional links and bolts for field adjustment to actual pole diameter. 1200-A Dead End ultimate strength is 20,000 lb, 1200-B Dead End ultimate strength is 30,000 lb. Contact Hughes Brothers engineering department for more information and with your specific needs.

1200-A Series



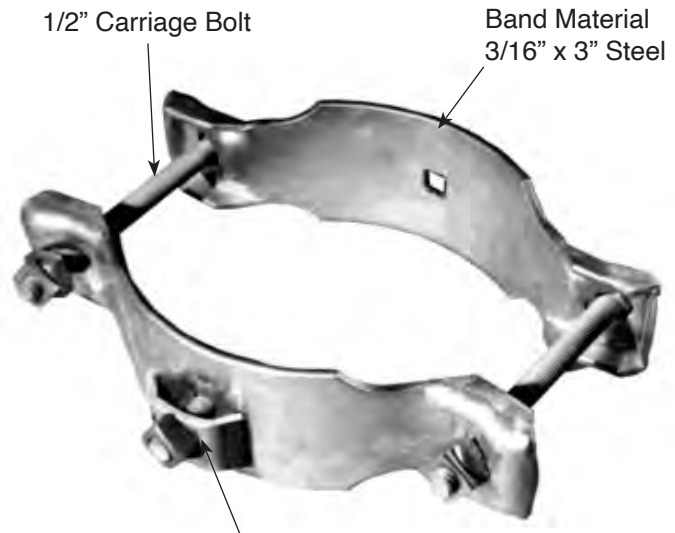
1200-B Series



2845 Pole Top Anti-Split Band

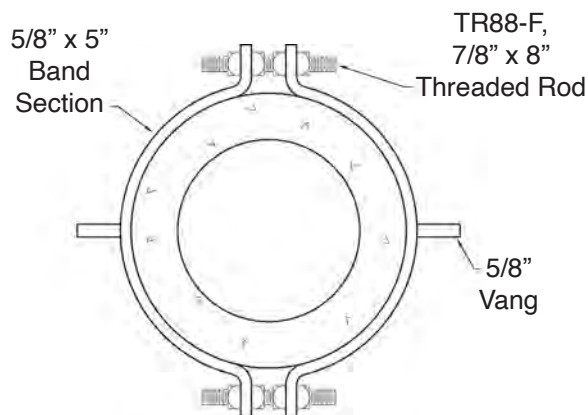
The 2845 can be used at various locations on a pole as a preventative measure against pole splits due to either induced loads or seasoning checks. The Hughes 2845 anti-split band is formed from 3/16" x 3" steel and clamps to the pole with 1/2" carriage bolts.

Stock No.	Pole Dia. Inches	Wt. Lbs. Each
2845.5	7 - 9	4
2845.6	8 1/2 - 10 1/2	5
2845.7	10 1/2 - 12 1/2	6



Ground Clip & 1/2" x 1 1/2" Carriage Bolt (Furnished when Specified).
Add suffix "2718.55".
EXAMPLE: **2845.5-2718.55**

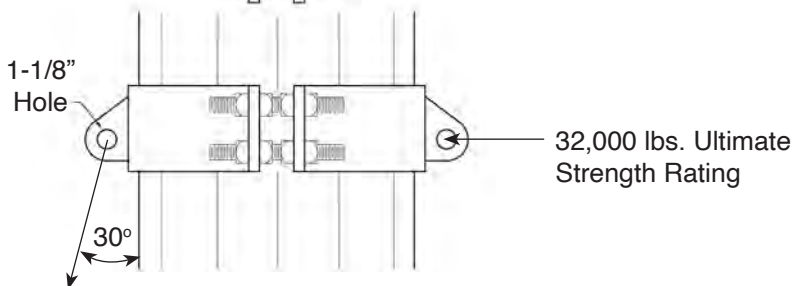
Type B2682-B Pole Band Assembly



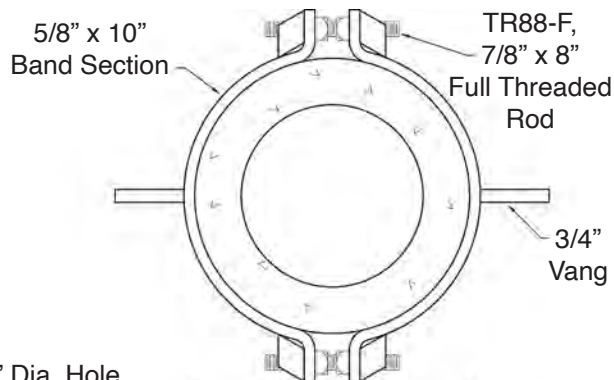
Ordering Example:

B 2 6 8 2 - B 7

└ Pole diameter in inches.
*Use 1" increments only.



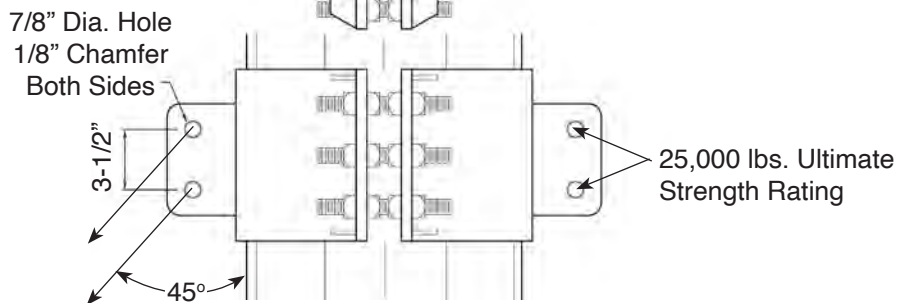
Type B2682-E Pole Band Assembly



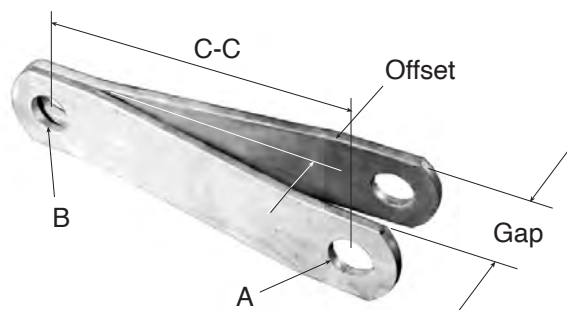
Ordering Example:

B 2 6 8 2 - E 8

└ Pole diameter in inches.
*Use 1" increments only.



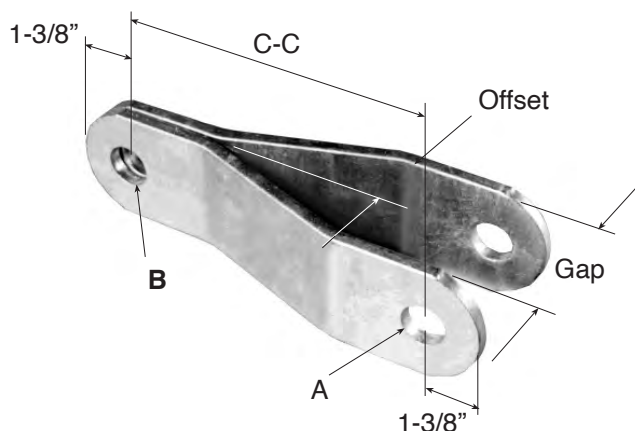
C POLE LINE HARDWARE



Connecting Links

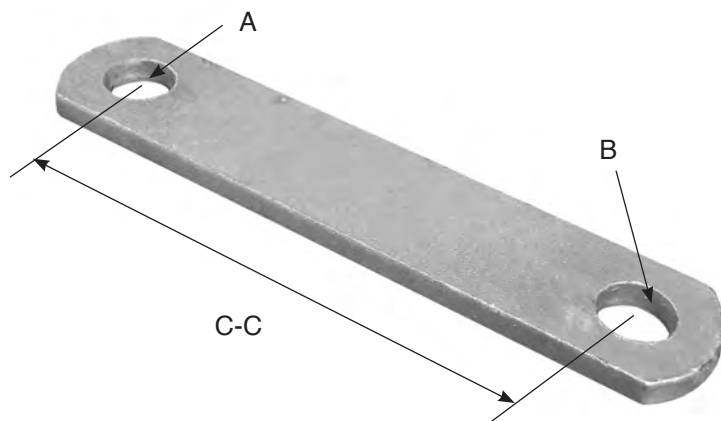
Stock No.	Size in Inches	CC Hole Length	Offset/ Link	Gap/ 2 Links	A	B	Ultimate Strength Rating**	Weight/ Each Lbs.	Standard Pkg. Qty.
3150	1/4 x 1-3/4 x 9-1/2	7-1/2"	3/4"	1-1/2"	13/16"	13/16"	20,000 lbs.	1.1	50
3152	1/4 x 2 x 9-1/2	7-1/2"	3/4"	1-1/2"	15/16"	15/16"	24,000 lbs.	1.2	40
3154	3/8 x 2 x 9-1/2	7-1/2"	1"	2"	15/16"	15/16"	38,000 lbs.	1.8	30
3170	1/4 x 2 x 9-1/2	7-1/2"	3/4"	1-1/2"	13/16"	13/16"	24,000 lbs.	1.2	50

** Rating per pair of links. All links sold individually.



Stock No.	Size in Inches	CC Hole Length	Offset/ Link	Gap/ 2 Links	A	B	Ultimate Strength Rating**	Weight/ Each Lbs.	Standard Pkg. Qty.
3151	1/4 x 3 x 9-1/2	7-1/4"	3/4"	1-1/2"	15/16"	1-1/4"	24,000 lbs.	1.8	30
3153	1/4 x 3 x 9-1/2	7"	3/4"	1-1/2"	15/16"	15/16"	24,000 lbs.	1.8	30
3155	3/8 x 3 x 10	7-1/4"	3/4"	1-1/2"	1-1/16"	1-1/16"	45,000 lbs.	2.8	20
3157	3/8 x 3 x 12	9-1/4"	1-3/8"	2-3/4"	1-1/16"	1-1/16"	45,000 lbs.	3.5	10
3160	3/8 x 3 x 9-1/2	7-1/8"	1"	2"	1-1/16"	1-1/4"	45,000 lbs.	2.6	20
3167	3/8 x 3 x 12	9-1/4"	1-3/8"	2-3/4"	1-1/16"	1-1/4"	45,000 lbs.	3.4	10
3168	5/16 x 3 x 12	9-1/4"	1-3/8"	2-3/4"	1-1/16"	1-5/16"	35,000 lbs.	3.0	20
3169	3/8 x 3 x 10	7-1/4"	3/4"	1-1/2"	1-1/16"	15/16"	38,000 lbs.	2.8	20
3172	3/8 x 3 x 9-3/4	7-1/2"	1"	2"	15/16"	1-1/4"	38,000 lbs.	2.7	20
3176	3/8 x 3 x 9-1/2	7-1/8"	1"	2"	15/16"	1-1/4"	38,000 lbs.	2.8	20

** Rating per pair of links. All links sold individually.

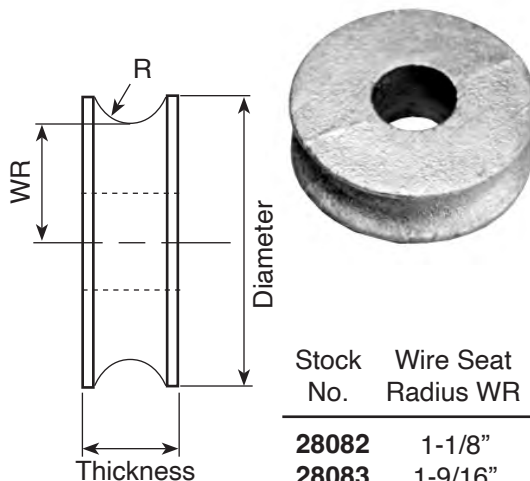
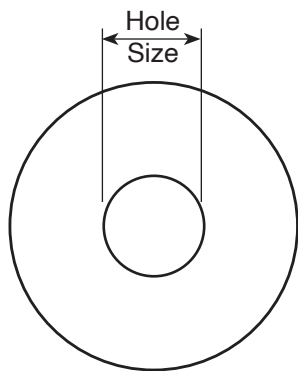


Straight Links

Stock No.	Size in Inches	CC Hole Length	A	B	Ultimate Strength Rating**	Weight/ Each Lbs.	Standard Pkg. Qty.
2450	1/4 x 3	3"	15/16"	15/16"	24,000 lbs.	1.1	40
3165	3/8 x 3	6"	15/16"	15/16"	38,000 lbs.	2.5	20
3171	3/8 x 2	7-1/2"	15/16"	15/16"	38,000 lbs.	1.8	30
3173	3/8 x 3	6"	1-1/8"	1-1/8"	45,000 lbs.	2.4	20
3175	1/2 x 3	6"	1-1/8"	1-1/8"	60,000 lbs.	3.2	20
AS942-A	1/2 x 1-3/4	6"	13/16"	13/16"	40,000 lbs.	1.8	25
A2273.1A	1/2 x 1-3/4	6"	13/16"	13/16"	40,000 lbs.	1.8	25

** Rating per pair of links. All links sold individually.

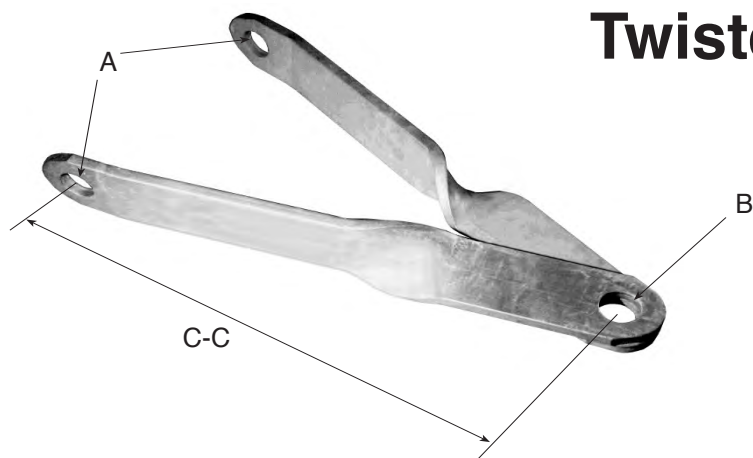
Guy Rollers



Hughes Brothers Guy Rollers are cast from 65-45-12 ductile iron. Galvanized per ASTM A 153.

Stock No.	Wire Seat Radius WR	Hole Size	Thickness/ Diameter	R	Wt.
28082	1-1/8"	15/16"	7/8" x 2 3/4"	3/8"	1.0 lbs
28083	1-9/16"	1 1/16"	1" x 3 1/4"	7/16"	1.6 lbs
28084	15/16"	13/16"	13/16" x 2 3/8"	5/16"	.6 lbs
28085	11/16"	11/16"	13/16" x 1 3/4"	5/16"	.3 lbs
28086	1-1/8"	15/16"	13/16" x 2 1/2"	3/8"	.8 lbs

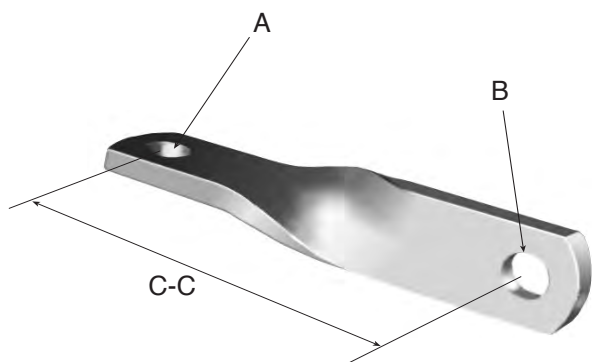
C POLE LINE HARDWARE



Twisted Links

Stock No.	Size in Inches	CC Hole Length	A	B	Ultimate Strength Rating**	Weight/ Each- Lbs.	Standard Pkg. Qty.
3159	3/8 x 3	20"	1-1/16"	1-1/16"	45,000 lbs.	6.8	5
3174	1/2 x 3	20"	1-3/8"	1-3/8"	60,000 lbs.	9.0	6
3166	3/8 x 2	12"	15/16"	15/16"	38,000 lbs.	2.8	10
3184	3/8 x 3	11"	15/16"	15/16"	45,000 lbs.	3.8	10

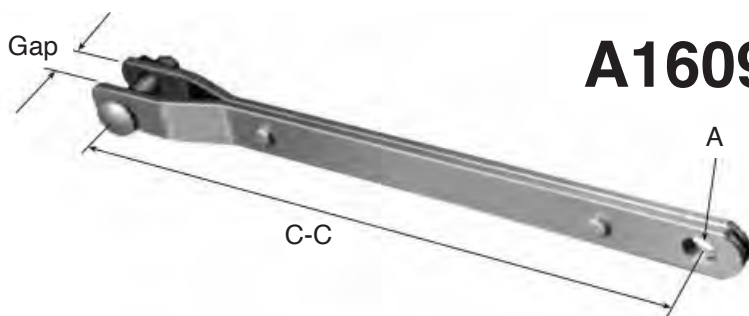
All links sold individually.



Twisted Links

Stock No.	Size in Inches	CC Hole Length	A	B	Ultimate Strength Rating	Weight/ Each Lbs.	Standard Pkg. Qty.
AS942	1/2 x 1-3/4	6"	13/16"	13/16"	20,000 lbs.	1.8	25
AS2019-8*	1/2 x 2	6"	15/16"	15/16"	24,000 lbs.	2.0	25
AS2019-10*	1/2 x 2	8"	15/16"	15/16"	24,000 lbs.	2.5	20
AS2019-12*	1/2 x 2	10"	15/16"	15/16"	24,000 lbs.	3.8	20
AS2469	3/8 x 2	7-1/4"	15/16"	15/16"	19,000 lbs.	1.9	25
AS1263	3/8 x 2	8"	15/16"	15/16"	19,000 lbs.	2.2	30

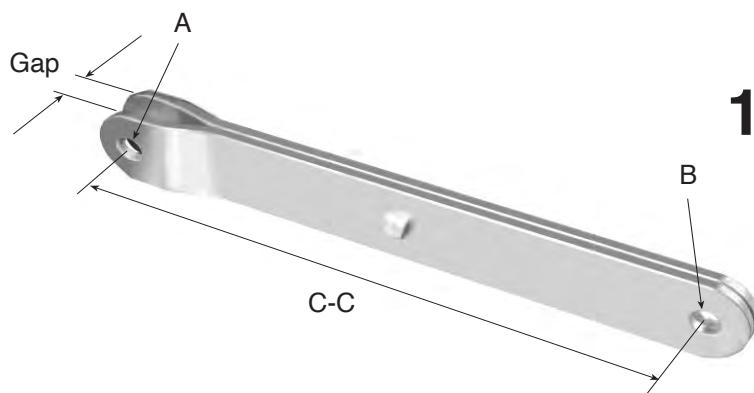
*Specify overall length in inches. Example, AS2019-18 = 18" link.



A1609 Extension Links

Shipped assembled as shown.

Stock No.	Size in Inches	CC Hole Length	Gap/ 2 Links	Clevis Pin Dia	A	Ultimate Strength Rating	Weight/ Each Lbs.	Standard Pkg. Qty.
A1609-10	3/16 x 1-1/4	10"	13/16"	5/8"	11/16"	13,000 lbs.	1.9	25
A1609-12		12"					2.1	25
A1609-14		14"					2.3	25
A1609-16		16"					2.6	25
A1609-18		18"					2.8	25
A1609-20		20"					3.0	20
A1609-22		22"					3.3	20
A1609-24		24"					3.6	15
A1609-30		30"					4.4	15
A1609-40		40"					5.6	10
A1609-42		42"					5.9	10



1906 Clevis Links

Shipped assembled as shown.

Stock No.	Size in Inches	CC Hole Length	Gap/ 2 Links	A	B	Ultimate Strength Rating	Weight/ Each Lbs.	Standard Pkg. Qty.
1906-9	3/8 x 3	9"	7/8"	15/16"	15/16"	45,000 lbs.	7.3	8
1906-12		12"					9.2	8
1906-14		14"					10.2	5
1906-20		20"					14.3	5
1906-24		24"					16.9	5
1906-30		30"					21.0	3
1906-40		40"					27.0	2
1906-47		47"					31.5	2
1906-53		53"					35.4	2

TG-92-1 RUS Type 1

The following RUS accepted material is furnished with a Hughes TG-92-1 (old style TG-22) RUS Type 1 Guy Link Assembly:



Stock No.	Description	Quantity
28082	Guy Roller	1
3165	Links	2
B83-2	7/8" x 3" Machine Bolts	2
N80	7/8" Square Nuts	2
MF80	7/8" Lock Nuts	2

Ordering Information

Stock No.	Description	Wt. ea. (lbs.)
TG-92-1	Assembled, 5/Box	7.6

TG-92-2 RUS Type 2

The following RUS Accepted material is furnished with a Hughes TG-92-2 (old style TG-22-2) RUS Type 2 Guy Link Assembly:



Stock No.	Description	Quantity
1896	Yoke Plates	2
28082	Guy Rollers	2
B83-2	7/8" x 3" Machine Bolts	3
N80	7/8" Square Nuts	3
MF80	7/8" Lock Nuts	3

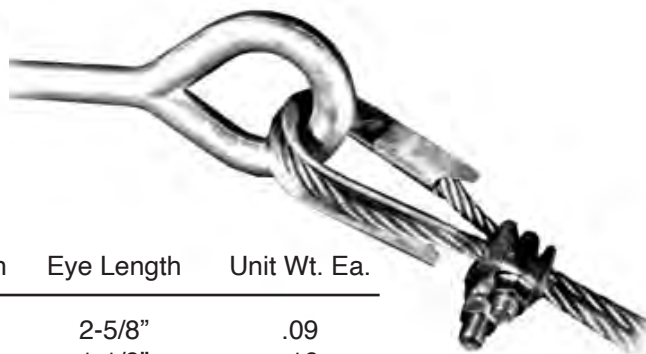
Ordering Information

Stock No.	Description	Wt. ea. (lbs.)
TG-92-2	Assembled, 4/Box	14.6



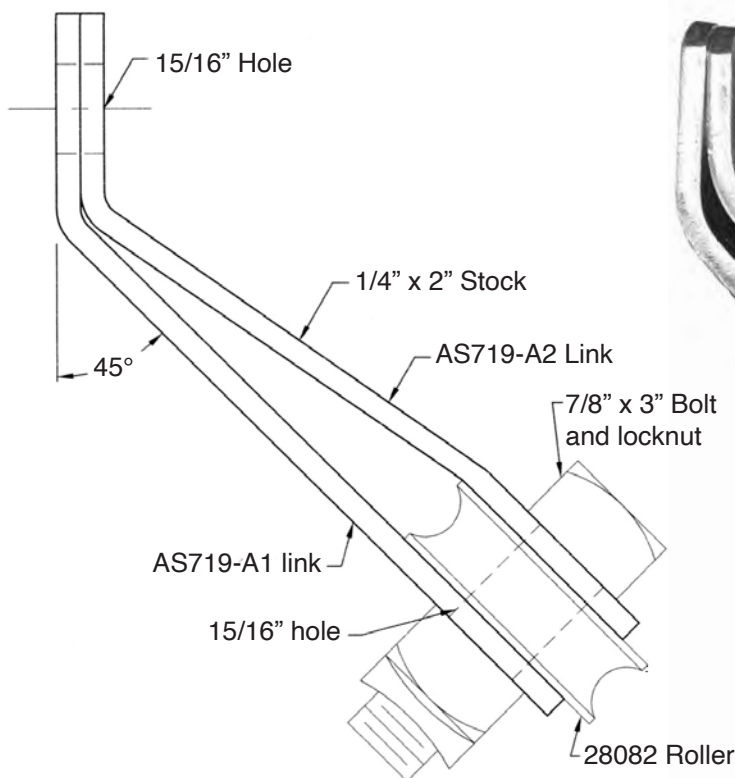
Guy Wire Thimbles

Hughes Brothers Guy Wire Thimbles prevent strand damage at attachment points.
(Recommended for use with wire rope only).



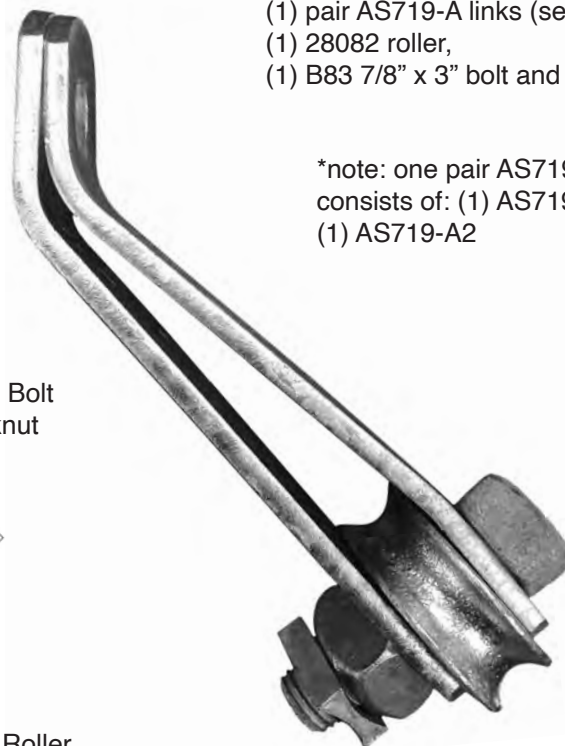
Stock No.	Strand Size	Opening Width	Eye Width	Eye Length	Unit Wt. Ea.
AS2731-A	3/8"	5/8"	7/8"	2-5/8"	.09
AS2731-B	1/2"	3/4"	1-1/8"	1-1/8"	.16
AS2731-C	5/8"	7/8"	1-5/16"	3-1/2"	.31

AS719 45° Link & Roller Assembly



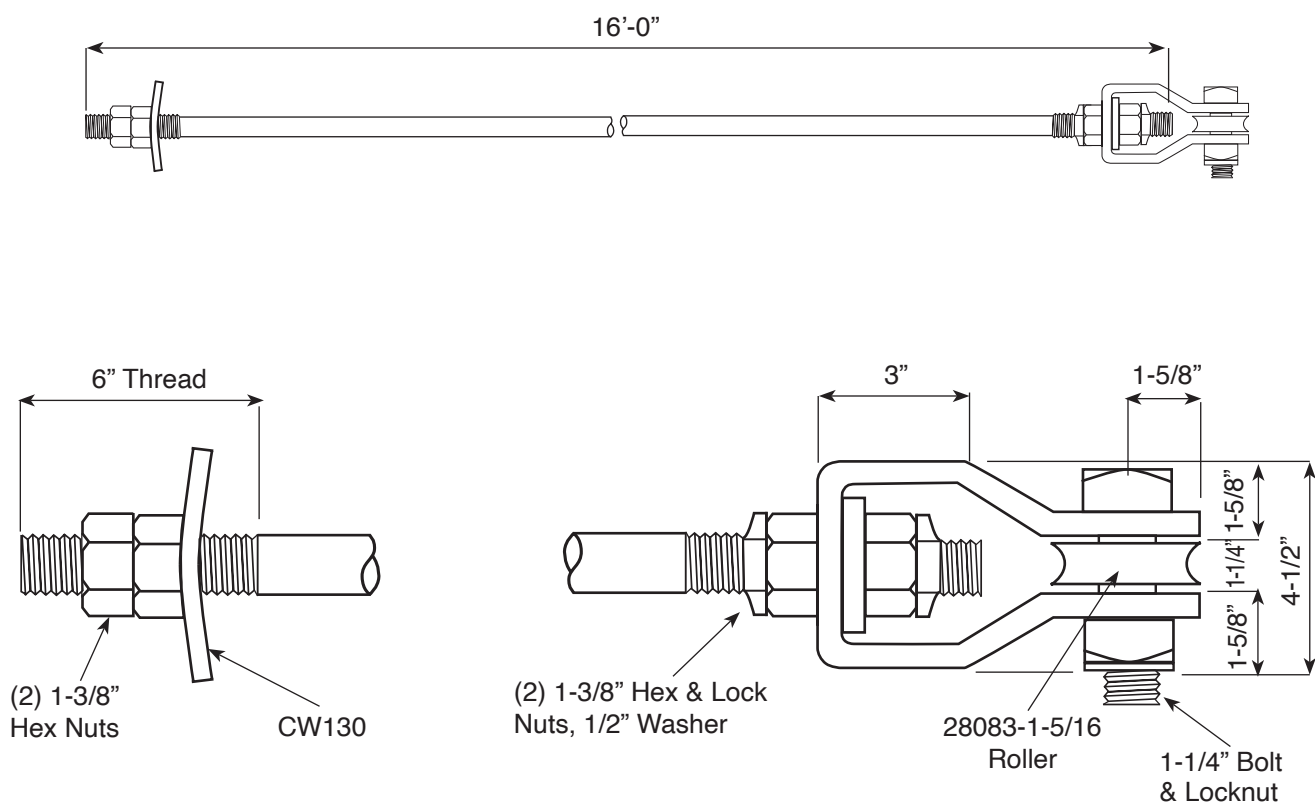
AS719 Assembly consists of:
 (1) pair AS719-A links (see note),
 (1) 28082 roller,
 (1) B83 7/8" x 3" bolt and locknut

*note: one pair AS719-A links consists of: (1) AS719-A1,
 (1) AS719-A2



B2286-C Guy Anchor Assembly

Hughes Brothers B2286-C Guy Anchor Assembly is made of 1-3/8" rod and is hot dip galvanized.

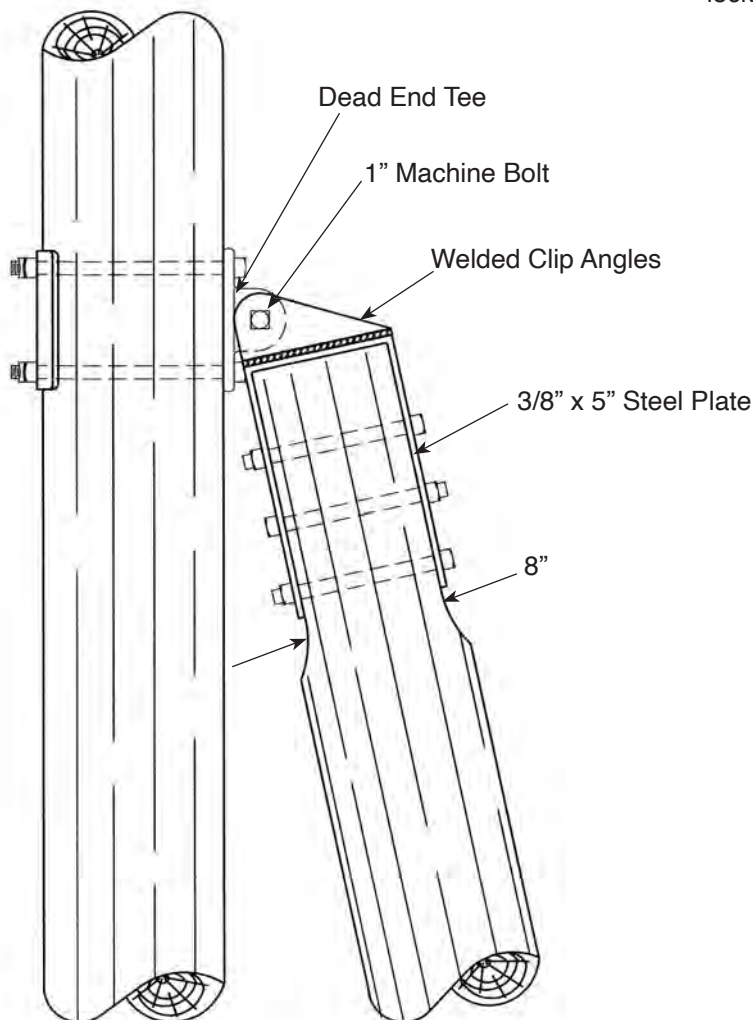




3002 Push Brace Assembly

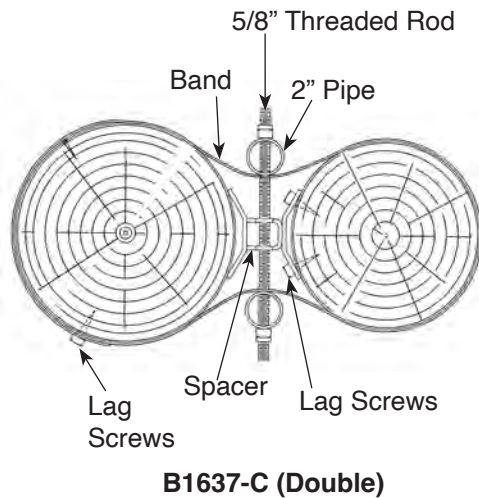
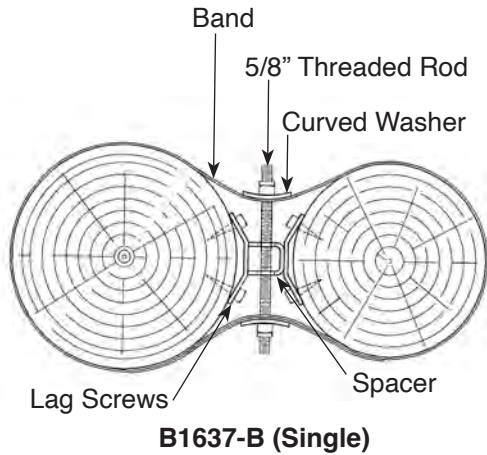
The 3002 Push Brace Assembly is used to facilitate field installation of a push pole. The push pole is trimmed to an 8" cross section and drilled for (3) 3/4" fitting bolts.

The assembly is furnished complete with fittings, mounting tee and washer plate, all bolts, nuts and locknuts.



	Pole Mounting Bolt Length
	<u>Unit Weight / lbs</u>
3002-10	43.7
3002-12	45.3
3002-14	44.8
3002-16	45.2

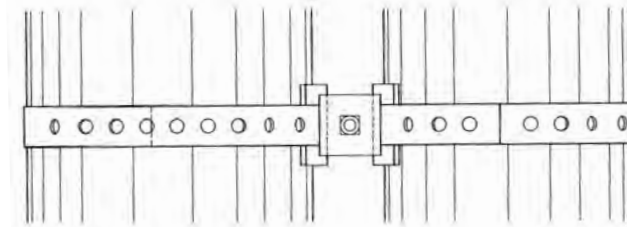
B1637 Pole Stubbing Band



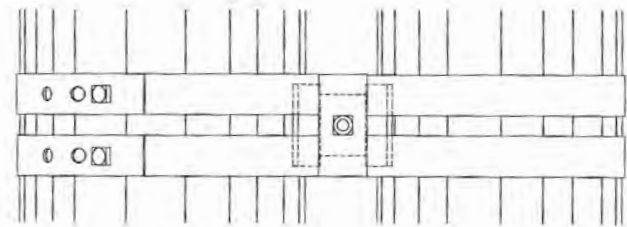
Hughes Brothers Pole Stubbing Bands provide an economical method of splinting a damaged or rotten pole, usually without disrupting service.

A Pole Stub should be installed beside the damaged pole to the same set depth as the original pole.

Each assembly includes band material, saddle spacer, lag screws and washers. A 5/8" x 12" threaded rod used to tighten the bands is also included.



Typical single band stubbing configuration.
(B1637-B Shown)



Typical double band stubbing configuration.
(B1637-C Shown)

Stock No.	Band Length	Wt. Lbs. Ea.
B1637-B6	6'-0"	12
B1637-B8	8'-0"	14
Band Only		
B1637.5-6	6'-0"	5.2
B1637.5-8	8'-0"	7.0
(Holes in Full Length of Band)		

Stock No.	Band Length	Wt. Lbs. Ea.
B1637-C8*	8'-0"	14.5
B1637-C10*	10'-0"	16.0
B1637-C12*	12'-0"	17
Band Only		
B1637.4-8*	8'-0"	6.0
B1637.4-10*	10'-0"	7.5
B1637.4-12*	12'-0"	9.0

*(Holes in Last 36" of Band Only)

2508 Wood Guy Markers



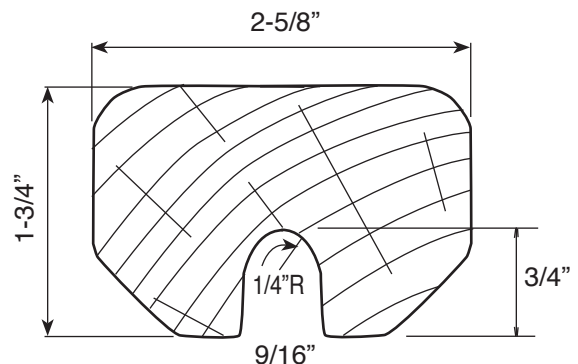
Hughes Brothers 2508 Wood Guy Markers are made of straight grain fir. They are dip painted in either high visibility white or yellow. Each guy guard is 1 3/4" x 2 5/8" x 8' in length with an inside groove 3/4" deep and 9/16" wide.

Three tie wires are attached to each marker and only a pair of lineman's pliers are necessary for installation. A 6" mortised end rests firmly on the anchor end of the guy. The guy markers have no bolts, bulky catches, hinges or parts to lose.

Hughes 2508 Guy Markers are wrapped in heavy kraft paper in bundles of 10 for shipping.

Wood Guy Markers work especially well in areas of high ultra-violet radiation, outlasting most resin based, plastic guy guards. Douglas-fir breaks down under average UV exposure at the rate of 1/4" per 100 years.

Stock No.	Color	Wt./Ea.
2508 W	White	7.4 lbs
2508 Y	Yellow	7.4 lbs

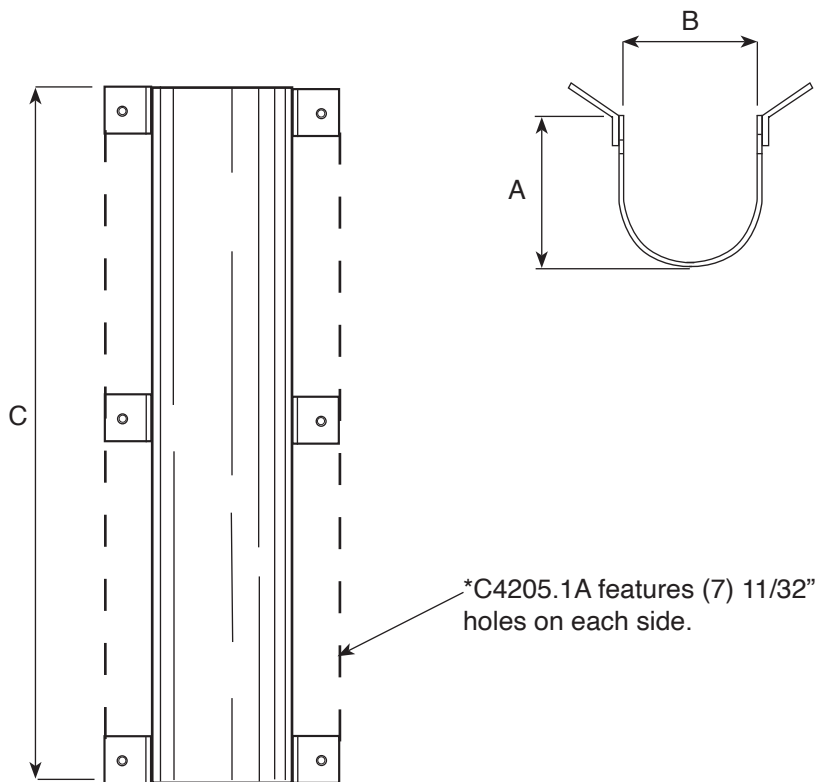


C4205 Cable Guard

The Hughes C4205 Cable Guard is designed to protect power & telephone riser cables. It is formed to match the shape of the standard PVC cable covers. Hughes Brothers Cable Guards are made of 14 Ga. steel with formed mounting flanges for easy installation. The C4205 is available with or without a covered vent hole. Lag screws are used for attachment, ordered separately.



Available covered vent hole reduces moisture build-up inside cover.



Stock No.	Mtg. Holes	"A"	"B"	"C"	Vent Holes
C4205.1A*	11/32"	5-3/8"	6-1/8"	10'	YES
C4205.3A	9/16"	6-3/4"	6-1/4"	9'	NO
C4205.4A	9/16"	4-7/8"	3-1/4"	8'	NO
C4205.4B	9/16"	5-3/8"	4-1/4"	8'	NO
C4205.4C	9/16"	5-7/8"	5-1/4"	8'	NO

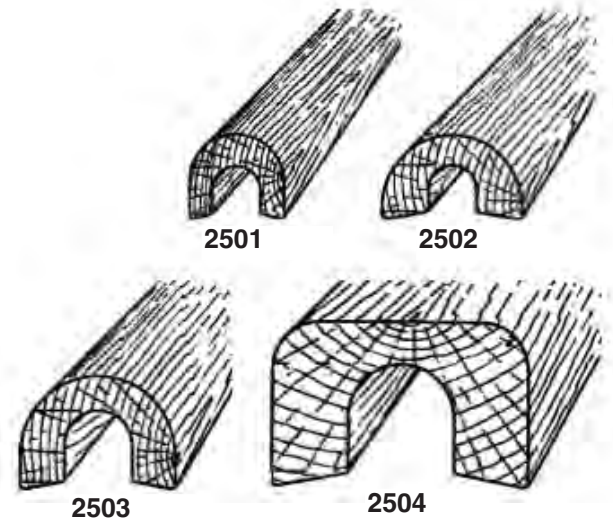
Ground Wire Moulding

Hughes Brothers Ground Wire Moulding provides a safe and economical cover for exposed ground wire. No. 2501 is the standard moulding used for most ground wire applications. No. 2503 is designed for additional protection and will not break when struck by a lineman's spike. No. 2504 will cover wires or pipe up to 1 inch in diameter. The moulding can be removed with standard hand tools allowing inspection of the cables.

Hughes Ground Wire Mouldings are manufactured from Douglas-fir or Hem-fir, in standard lengths of 8'-0".

All mouldings are carried in stock for immediate shipment. Special mouldings can be fabricated for any number of sizes of cables and for outside dimensions other than those shown.

Hughes Brothers mouldings are shipped in strapped, rectangular bundles.



Stock No.	Wt. per 1000 Lineal Ft.	Treatment	Width Inches	Height Inches	Groove Width Inches	Groove Height Inches	Length in Feet	Std. Bundle Qty.
2501.8	130	Penta	1	7/8	1/2	1/2	8	63
2502.8	180	Penta	1-1/2	7/8	1/2	1/2	8	25
2503.8	280	Penta	1-11/16	1-3/16	3/4	3/4	8	25
2504.8	990	Penta	2-11/16	1-11/16	1-1/8	1-1/8	8	4



25041



25031

Moulding Straps

Hughes Brothers Galvanized Steel Moulding Straps are used for attaching ground wire or multi-conductor cable moulding to the pole. These straps are made of 3/32" x 3/4" steel and are easy to remove for wire cable inspection. Two 2-1/2" galvanized nails are furnished with each strap.

Stock No.	For Use With	Wt. Lbs. per 1,000	Height Inches	Inside Width Inches	Recommended Spacing (ft)
25011	2501.8	60	7/8	1	2-1/2
25021	2502.8	70	7/8	1-1/2	2-1/2
25031	2503.8	85	1-3/16	1-11/16	2-1/2
25041	2504.8	130	1-11/16	2-11/16	2
25051	2505.8	200	2	3-1/4	2
25061	2506.8	290	3	4	2



Galvanized Moulding Staples

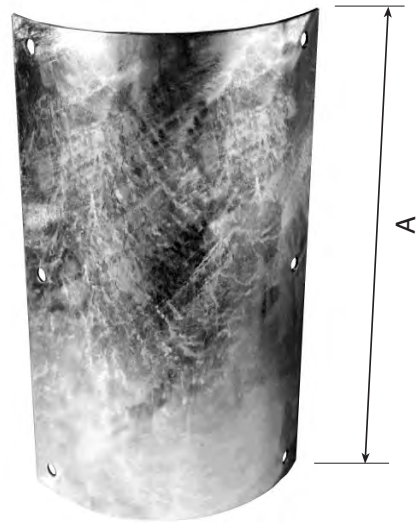
Hughes Galvanized Moulding Staples are used for attaching ground wire moulding to the pole, 2'-6" spacing recommended.

Stock No.	For Use With	Wt. Lbs. per 1,000	Height Inches	Inside Width Inches
25014	2501.8	72	3	1
25034	2503.8	78	3	1-11/16

3016 & 3018 Pole Guards

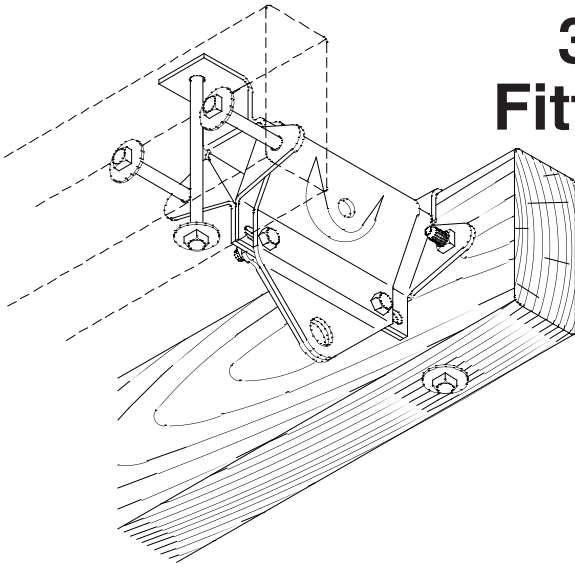


Pole guards are used to protect wood poles from vehicular damage in alleys, parking lots and street corners. All holes are 9/16" in diameter.



Stock No.	A	Radius	Weight / lbs.
3016	30"	7-1/2"	25
3016-B	23"	5-1/2"	11
3018	17-3/4"	7-1/2"	10

3414 Adjustable Spacer Fittings for H-Frame Double Arm Assemblies



Hughes Brothers 3414 Series Adjustable Spacer Fittings are used to facilitate double arm H-frame transmission arm construction.

The distance between side arms can be varied to accommodate different pole diameters. This adjustability also greatly eases field framing operations. The double arm assemblies can be spread wide and slipped down the poles into position where the side arms can then be tightened against the poles.

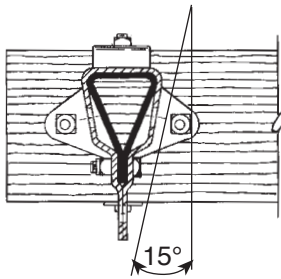
The 3414 allows for brace and insulator attachment while properly transferring loads to side arms.

The 3414 works equally well on our tubular steel arms.

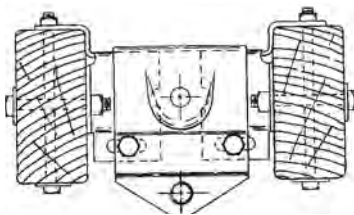
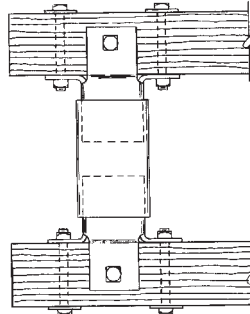
Ordering Example:

3414.6 F L - 100 - CPT

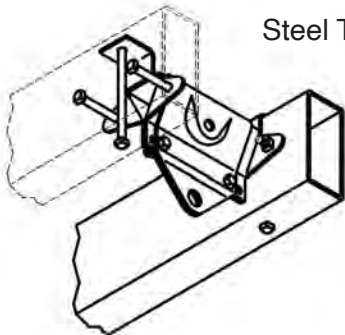
- Includes Spacer Bolts
- Adjustment Range (Table IV, pg C-38 or Table V, pg C-40)
- Depth of crossarm (Table III, pg C-37)
- Width of crossarm (Table II, pg C-37)
- Side plate vertical & horizontal bolt size (Table I, pg C-37)



Wood Arm



Steel Tube Arm



Explanation and Use of Tables - In ordering a 3414 Spacer Fitting, a code made up from the tables is used to identify the arm size, their spacing and bolt sizes with which they will be used. For example: a 3414.6FL-100 would indicate a spacer for a 3-3/4" x 8-3/4" arm, 8-1/2" to 12-1/2" adjustment, and tapped 5/8" vertical and horizontal bolts. Table I gives the bolt sizes for which the spacer is to be tapped. Tables II & III give the various dimensions of the finished spacer. Table IV (page C-38) gives the range of adjustment. To get bolts with spacer add suffix "CPT" to the end, see previous page.

Tables

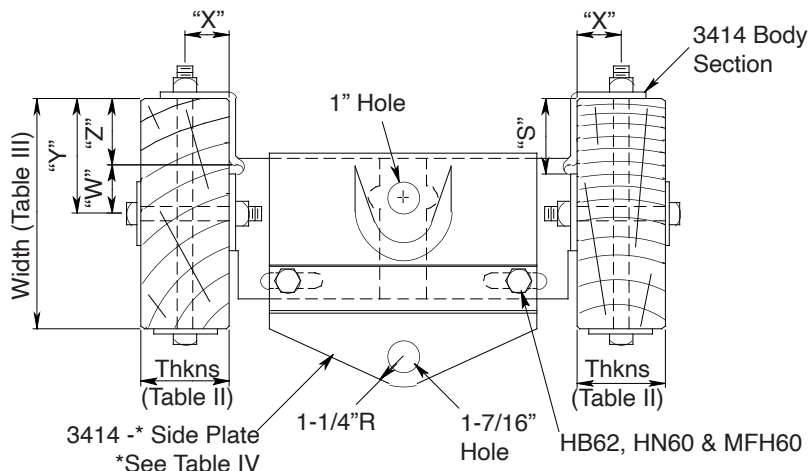


Table I

Stock No.	Vertical Bolt	Horizontal Bolt
3414.2	1/2"	5/8"
3414.4	5/8"	3/4"
3414.6	5/8"	5/8"
3414.7	3/4"	5/8"
3414.8	1/2"	3/4"
3414.9	3/4"	3/4"
3414.10	5/8"	7/8"
3414.11	Tap 5/8"	Punch 15/16"
3414.12	7/8"	7/8"
3414.13	1/2"	Punch 11/16"
3414.14	Punch 13/16"	Tap 3/4"
3414.15	Punch 15/16"	Tap 5/8"

Table II

Code	Thickness	"X"
A	2-5/8"	1-5/16"
B	2-3/4"	1-3/8"
C	2-7/8"	1-7/16"
D	3-1/2"	1-3/4"
E	3-5/8"	1-13/16"
F	3-3/4"	1-7/8"
G	3-7/8"	1-15/16"
H	4"	2"
J	4-1/2"	2-1/4"
K	4-5/8"	2-5/16"
L	4-3/4"	2-3/8"
M	4-7/8"	2-7/16"
N	5-1/2"	2-3/4"
P	5-3/4"	2-7/8"
Q	3-3/8"	1-11/16"
R	4-3/8"	2-3/16"
S	6"	3"
T	5-1/4"	2-5/8"
U	3-1/4"	1-5/8"
V	7-3/4"	3-7/8"
W	5-1/8"	2-9/16"
X	4-1/8"	2-1/16"
Y	3-1/8"	1-9/16"
Z	6-3/4"	3-3/8"
AA	2"	1"

Table III

Code	Width	"Y"	"W"	"Z"	"S"
A	4-3/4"	2-3/32"	2-3/32"	0"	-
B	5"	2-3/32"	"	0"	-
C	5-3/4"	2-3/32"	"	0"	-
D	6-1/2"	3-1/4"	"	1-5/32"	1-19/64"
E	6-3/4"	3-3/8"	"	1-9/32"	1-27/64"
F	7-1/2"	3-3/4"	"	1-21/32"	1-51/64"
G	7-5/8"	3-13/16"	"	1-23/32"	1-55/64"
H	7-3/4"	3-7/8"	"	1-25/32"	1-59/64"
J	8-1/2"	4-1/4"	"	2-5/32"	2-19/64"
K	8-5/8"	4-5/16"	"	2-7/32"	2-23/64"
L	8-3/4"	4-3/8"	"	2-9/32"	2-27/64"
M	8-7/8"	4-7/16"	"	2-11/32"	2-31/64"
N	9-1/2"	4-3/4"	"	2-21/32"	2-51/64"
P	5-3/8"	2-3/32"	"	0"	-
Q	10-1/2"	5-1/4"	"	3-5/32"	3-19/64"
R	4-1/2"	2-3/32"	"	0"	-
S	11-1/2"	5-3/4"	"	3-21/32"	3-51/64"
T	6"	2-3/32"	"	0"	-
U	9-3/4"	4-7/8"	"	2-25/32"	2-59/64"
V	9"	4-1/2"	"	2-13/32"	2-35/64"
W	7-1/4"	3-5/8"	"	1-17/32"	1-43/64"
X	8"	4"	"	1-29/32"	2-3/64"
Y	8-1/4"	4-1/8"	"	2-1/32"	2-11/64"
Z	10"	5"	"	2-29/32"	3-3/64"
AA	6"	3"	"	29/32"	1-3/64"

Range of Adjustment

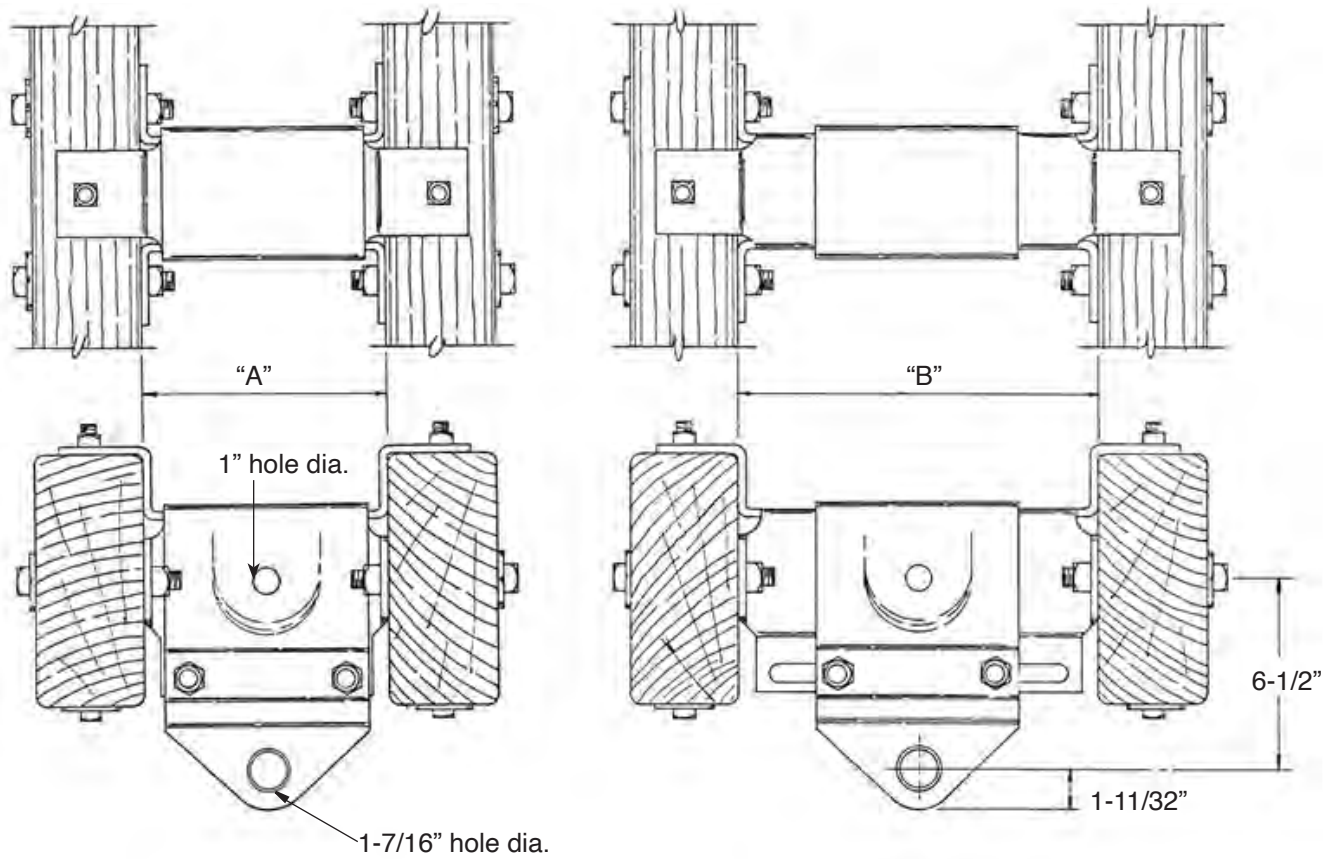
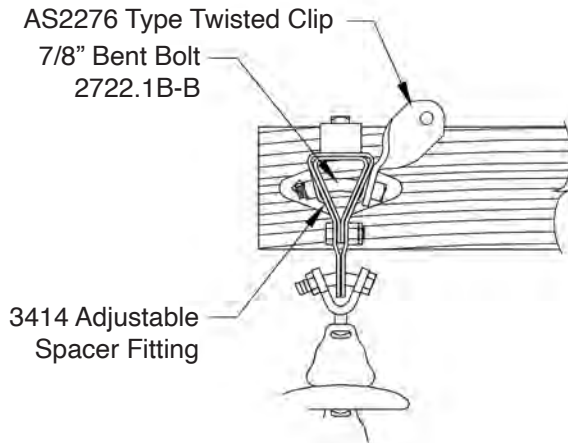


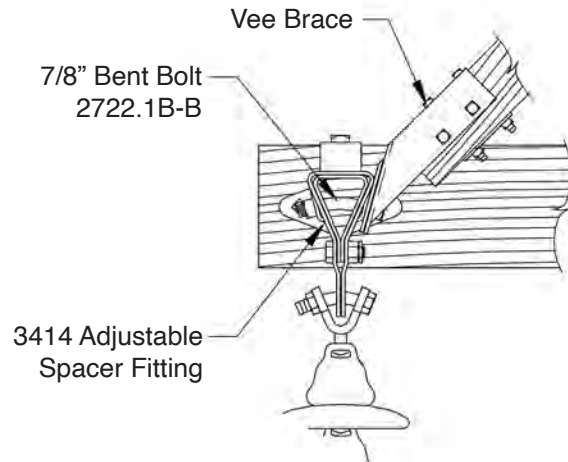
Table IV

Stock No.	Adjustability		
	A	B	Total Adj.
3414-100	8-1/2"	12-1/2"	4"
3414-120	10-1/2"	14-1/2"	4"
3414-140	12-1/2"	16-1/2"	4"

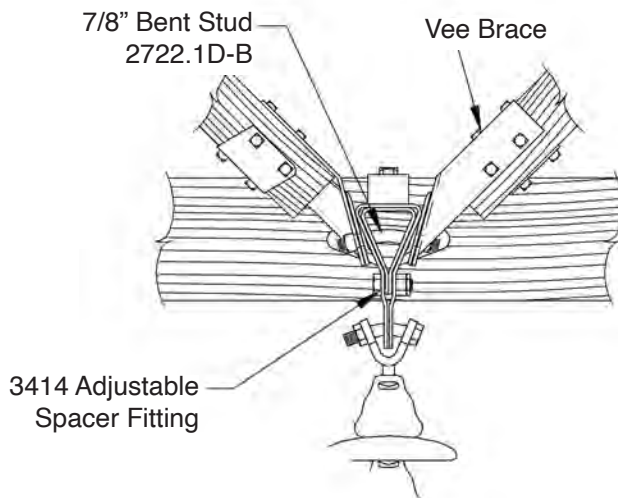
Applications



3414 Adjustable Spacer Fitting with Twisted Clip - Tension Brace Attachment



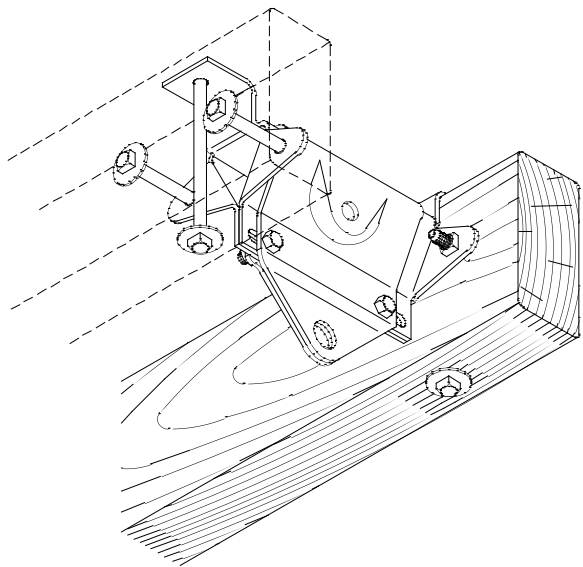
3414 Adjustable Spacer Fitting with Single Brace Attachment



3414 Adjustable Spacer Fitting with Double Brace Attachment

3415 Spacer Fitting

Uses 5/16" plate.



Spacer Fitting Variations



3414-200 Series Spacer Fitting

The 3414-200 series is used in non-horizontal applications such as those found on wishbone and K-frame structures.

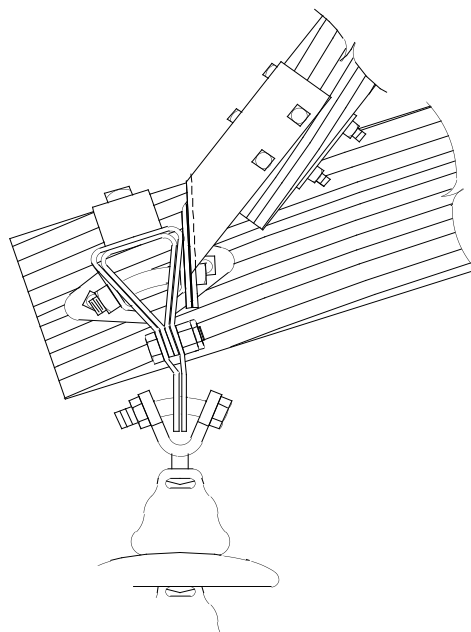
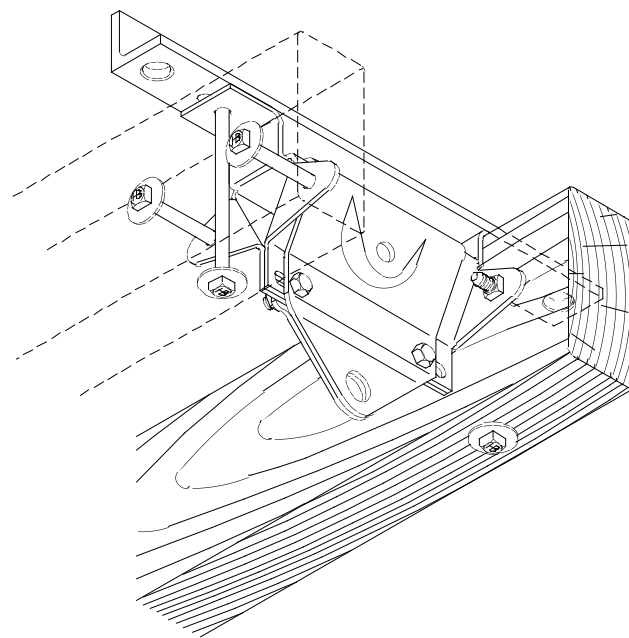
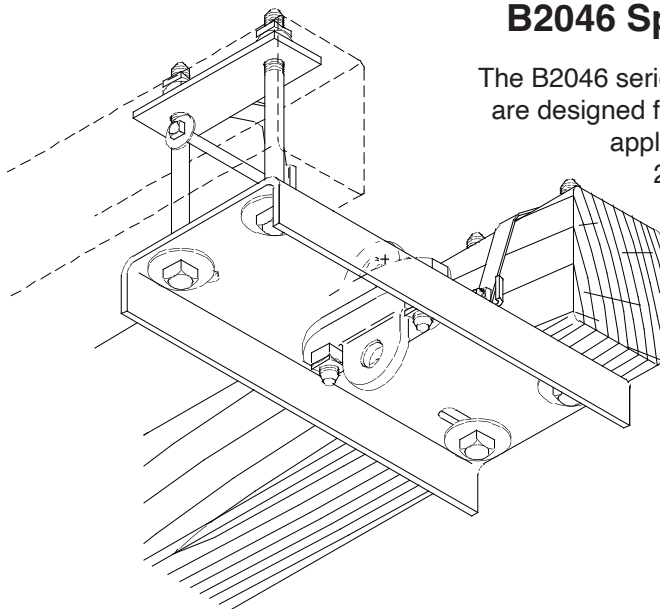


Table V

Stock No.	Adjustability		
	A	B	Total Adj.
3414-200	8-1/2"	12-1/2"	4"
3414-220	10-1/2"	14-1/2"	4"
3414-240	12-1/2"	16-1/2"	4"

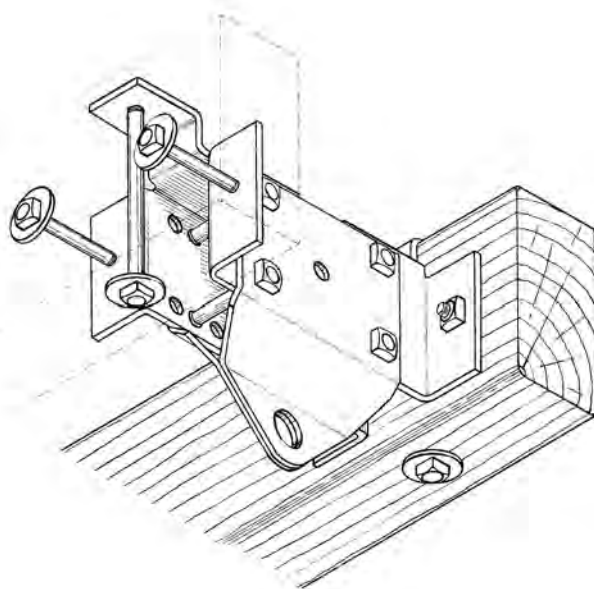
B2046 Spacer Fitting

The B2046 series of spacer fittings are designed for extra heavy-duty applications and uses a 2817 Dead End Tee for conductor attachment.



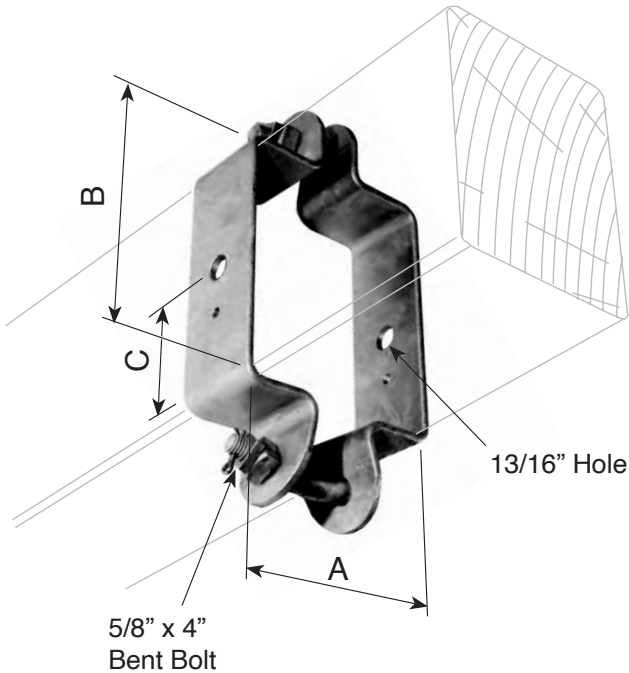
AS2419 Dead End Angle

The AS2419 angle is used for dead end applications on 3414/3415 adjustable spacer fittings (ordered separately).



3400 Spacer Fitting

B2351 Crossarm Phase Fitting



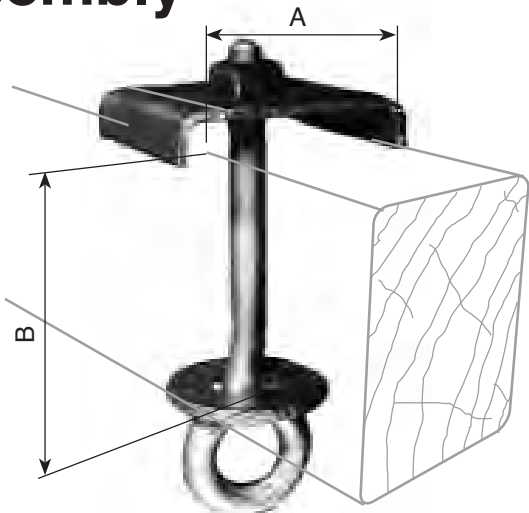
Hughes Brothers B2351 Crossarm Phase Fitting is used with suspension insulators and provides the option of a phase attachment without a crossarm through hole.

The assembly is provided complete with bolts, nuts and locknuts as shown. The phase attachment bent bolt is drilled and includes a cotter key. All material is hot dip galvanized per ASTM A153.

Stock No.	Arm Size			Wt./lbs
	"A"	"B"	"C"	
B2351.1A	5-1/2"	7-1/2"	3-3/4"	8.2
B2351.1B	4-3/4"	5-3/4"	2-7/8"	7.3
B2351.1C	4-3/4"	6-3/4"	3-3/8"	7.6
B2351.1D	5-3/4"	7-3/4"	3-7/8"	8.3
B2351.1E	5-1/8"	7-1/2"	3-3/4"	8.2

2824 Eye Bolt & Saddle Assembly

Hughes No.2824 Eye Bolt & Saddle Assemblies are used for phase attachment of suspension insulators. The 3/16" x 4" saddle washer features a tapped through-hole. By tapping the washer through-hole, a double nut connection between the washer and eye bolt is made, ensuring tight, radio frequency static proof hardware.



To Order just a Saddle Washer:

Stock No.	Tapped Hole	Through Hole
2824.1B-*	1/2"	-
2824.1C-*	5/8"	-
2824.1D-*	3/4"	-
2824.1E-*	-	13/16"
2824.1F-*	-	15/16"
2824.1G-*	7/8"	-

* Specify width of crossarm.

Example: **2824.1C-3-3/4** = 3-3/4" crossarm

Ordering Information:

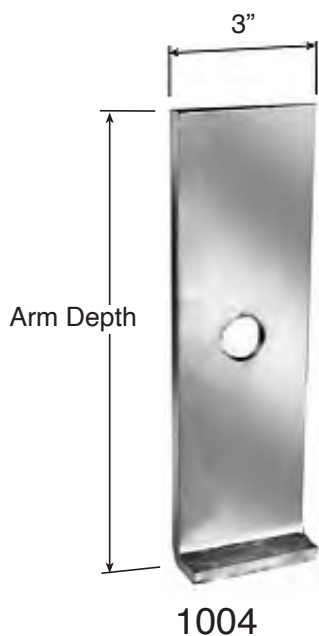
Example for an Eye Bolt & Saddle Assembly:

2 8 2 4 .5 -"A"- "B"

Arm Depth, Inches

Arm Width, Inches

Rod size (.5) for 5/8" or (.6) for 3/4"



1004 Flat Gain Plate & 1006 Embossed Gain Plate

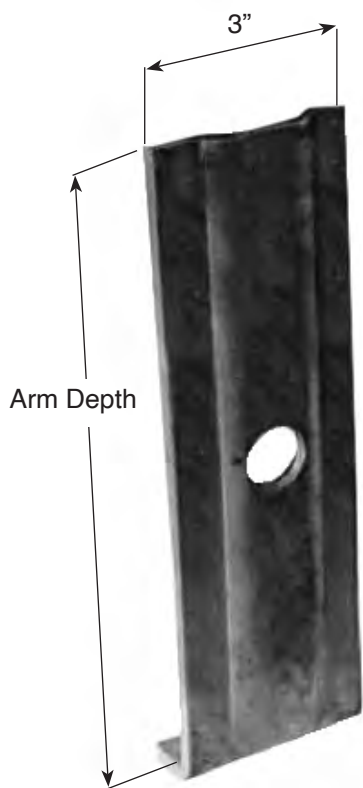
The Hughes Brothers 1004 and 1006 Gain Plates are used between the crossarm and pole allowing moisture to drain from the connection. Adequate drainage of moisture at this critical connection helps minimize long term decay of each of the wood members.

1004 Flat Gain Plates are formed from 1/4" mild steel, and are hot dip galvanized per ASTM A153. Standard package quantity is 25.

1006 Embossed Gain Plates add additional gripping capacity.



Arm Depth	Hole Size / Stock Number					Unit Wt/
	9/16"	11/16"	13/16"	15/16"	1 1/8"	
4-3/4"	1004.55	1004.65	1004.75	1004.85	_____	1.2 lbs
5-3/4"	1004.56	1004.66	1004.76	1004.86	_____	1.4 lbs
6-1/2"	1004.57	1004.67	1004.77	1004.87	1004.107	1.6 lbs
7-3/4"	1004.58	1004.68	1004.78	1004.88	_____	1.8 lbs
8-3/4"	1004.59	1004.69	1004.79	1004.89	_____	2.0 lbs
9"	_____	_____	_____	1004.895	_____	2.0 lbs
9-1/2"	1004.510	1004.610	1004.710	1004.810	1004.1010	2.3 lbs
10-1/2"	1004.511	1004.611	1004.711	1004.811	_____	2.4 lbs
11-1/2"	1004.512	1004.612	1004.712	1004.812	_____	2.6 lbs
13-1/2"	_____	_____	_____	1004.814	1004.1014	3.7 lbs
4-3/4"	1006.55	1006.65	1006.75	1006.85	_____	1.2 lbs
5-3/4"	1006.56	1006.66	1006.76	1006.86	_____	1.4 lbs
6-1/2"	1006.57	1006.67	1006.77	1006.87	1006.107	1.6 lbs
7-3/4"	1006.58	1006.68	1006.78	1006.88	1006.108	1.8 lbs
8-3/4"	1006.59	1006.69	1006.79	1006.89	_____	2.0 lbs
9"	_____	_____	_____	1006.895	_____	2.0 lbs
9-1/2"	1006.510	1006.610	1006.710	1006.810	1006.1010	2.3 lbs
10-1/2"	1006.511	1006.611	1006.711	1006.811	_____	2.4 lbs
11-1/2"	1006.512	1006.612	1006.712	1006.812	_____	2.6 lbs
12"	_____	_____	_____	1006.8125	_____	2.7 lbs
13-1/2"	_____	_____	_____	1006.814	1006.1014	3.7 lbs
15"	_____	_____	_____	_____	1006.1015	4.2 lbs

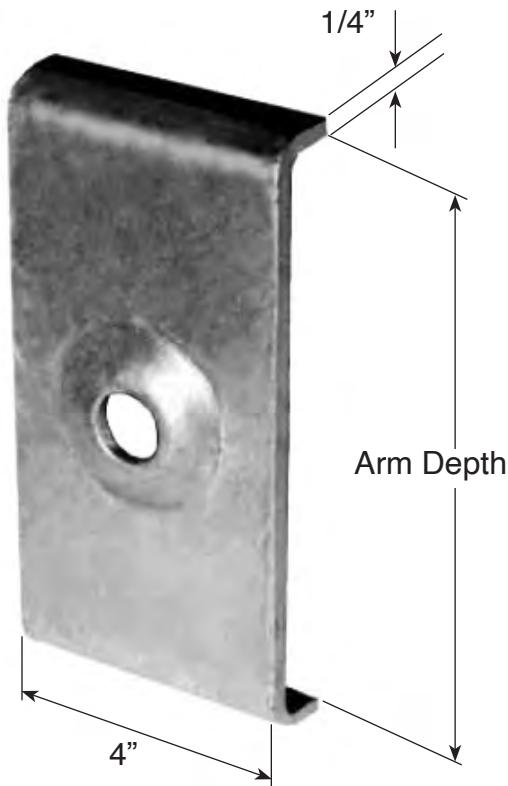


1005 Ribbed Tie Plate

Hughes Brothers 1005 Ribbed Tie Plate is used at the crossarm mounting hole to ensure the integrity of the mounting bolt connection at the crossarm.

1005 Flat Gain Plates are formed from 1/4" mild steel, and are hot dip galvanized per ASTM A153. Standard package quantity is 25.

Arm Depth	Hole Size / Stock Number					Unit Wt
	9/16"	11/16"	13/16"	15/16"	1 1/8"	
4-3/4"	1005.55	1005.65	1005.75	1005.85	1005.105	1.2 lbs
5-3/4"	1005.56	1005.66	1005.76	1005.86	1005.106	1.4 lbs
6-1/2"	1005.57	1005.67	1005.77	1005.87	1005.107	1.6 lbs
7-3/4"	1005.58	1005.68	1005.78	1005.88	1005.108	1.9 lbs
8-3/4"	1005.59	1005.69	1005.79	1005.89	1005.109	2.0 lbs
9"				1005.895		2.1 lbs
9-1/2"	1005.510	1005.610	1005.710	1005.810	1005.1010	2.1 lbs
11-1/2"	1005.512	1005.612	1005.712	1005.812	1005.1012	2.6 lbs



1113 Embossed Tie Plate

The Hughes Brothers 1113 Embossed Tie Plate is similar in function to the 1005 Ribbed Tie Plate. The 1113 Embossed Tie Plate maintains the integrity of the mounting bolt connection at the crossarm.

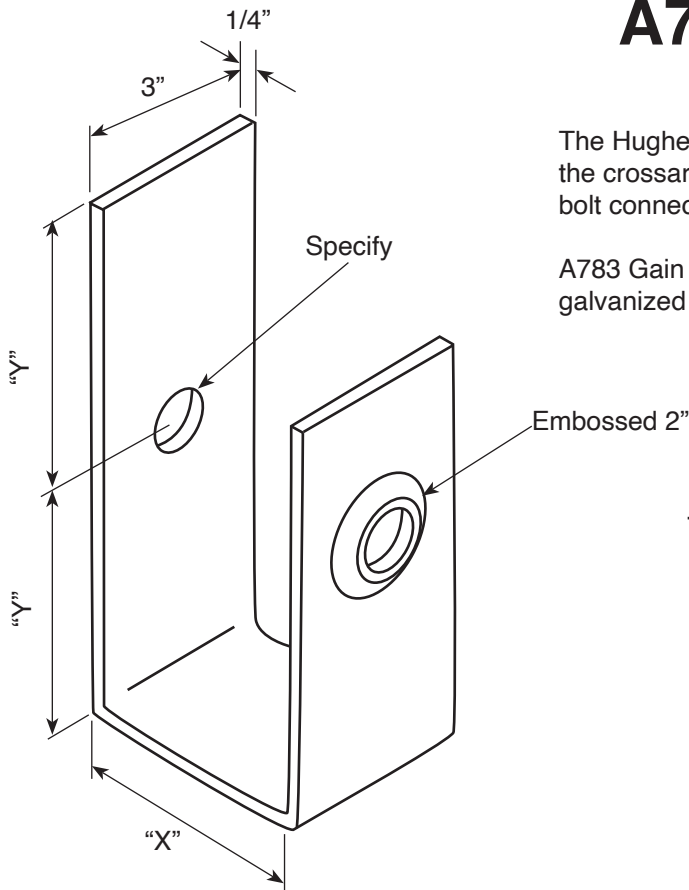
All 1113 Embossed Tie Plates are hot dip galvanized per ASTM A 153. The standard packaged quantity is 25.

Arm Depth	Hole Size / Stock Number					Unit Wt.
	9/16"	11/16"	13/16"	15/16"	1-5/16"	
4-3/4"	1113.55	1113.65	1113.75	1113.85	—————	1.8 lbs
5-3/4"	1113.56	1113.66	1113.76	1113.86	1113.126	2.1 lbs
7-1/2"	1113.58	1113.68	1113.78	1113.88	1113.128	2.6 lbs
8-1/2"	1113.59	1113.69	1113.79	1113.89	—————	2.9 lbs
9-1/2"	1113.510	1113.610	1113.710	1113.810	—————	3.2 lbs
10-1/2"	1113.511	1113.611	1113.711	1113.811	—————	3.3 lbs
11-1/2"	1113.512	1113.612	1113.712	1113.812	—————	3.7 lbs

A783 Pole Gain Fitting

The Hughes Brothers A783 series of pole gain fittings are used at the crossarm mounting hole to ensure the integrity of the mounting bolt connection at the crossarm.

A783 Gain Fittings are formed from 1/4" mild steel and are hot dip galvanized per ASTM A153. Standard package quantity is 10.



Stock No.	Wood Size (inches)	"X" (inches)	"Y" (inches)	Unit Weight
A783.1A	3-3/4 X 8-3/4	3-3/4	4-7/16	4.2
A783.1B	2-3/4 X 9-1/2	2-3/4	4-13/16	4.2
A783.1C	3-3/4 X 9-1/2	3-3/4	4-13/16	4.3
A783.1D	3-3/4 X 7-3/4	3-3/4	3-15/16	4.4
A783.1E	2-3/4 X 7-3/4	2-3/4	3-15/16	4.2
A783.1F	2-3/4 X 5-3/4	2-3/4	2-15/16	3.8
A783.1G	3-3/4 X 7-1/2	3-3/4	3-13/16	4.3
A783.1H	4-3/4 X 5-3/4	4-3/4	2-15/16	3.4
A783.1J	4-1/2 X 5-1/2	4-1/2	2-13/16	3.3
A783.1K	3-3/4 X 4-3/4	3-3/4	2-7/16	3.1
A783.1L	3-3/4 X 5-3/4	3-3/4	2-15/16	3.2
A783.1M	5-3/4 X 7-3/4	5-3/4	3-15/16	4.2
A783.1N	5-3/4 X 5-3/4	5-3/4	2-15/16	3.6
A783.1P	5-1/2 X 7-1/2	5-1/2	3-13/16	4.1
A783.1Q	3-5/8 X 9-1/2	3-5/8	4-13/16	4.3
A783.1R	3-5/8 X 7-1/2	3-5/8	3-13/16	3.7
A783.1S	3-1/2 X 7-1/2	3-1/2	3-13/16	4.1
A783.1T	2-5/8 X 9-1/2	2-5/8	4-13/16	4.2
A783.1U	3-1/8 X 9	3-1/8	4-9/16	3.1
A783.1V	3-5/8 X 8-1/2	3-5/8	4-5/16	4.1
A783.1W	5-1/8 X 7-1/2	5-1/8	3-13/16	4.0
A783.1X	3-1/8 X 10-1/2	3-1/8	5-5/16	4.5
A783.1Y	5-5/8 X 7-1/2	5-5/8	3-13/16	4.0
A783.1Z	3-1/8 X 7-1/2	3-1/8	3-13/16	3.6
A783.1AA	5-3/8 X 7	5-3/8	3-9/16	3.9
A783.1BB	5-1/8 X 7-3/4	5-1/8	3-15/16	3.9

Ordering Example:

A 7 8 3 . 1 N - 1 5

Mtg. Hole Size

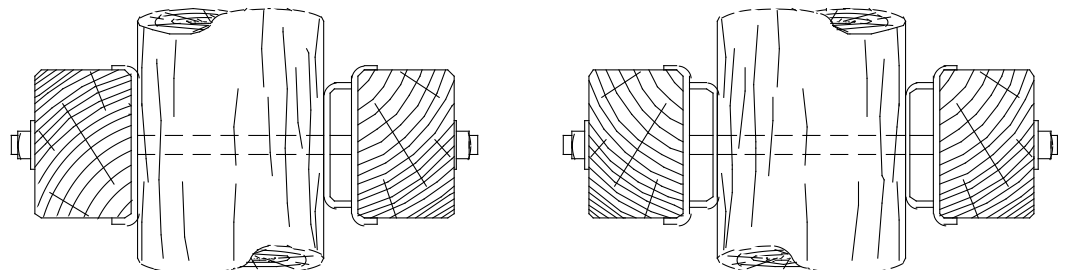
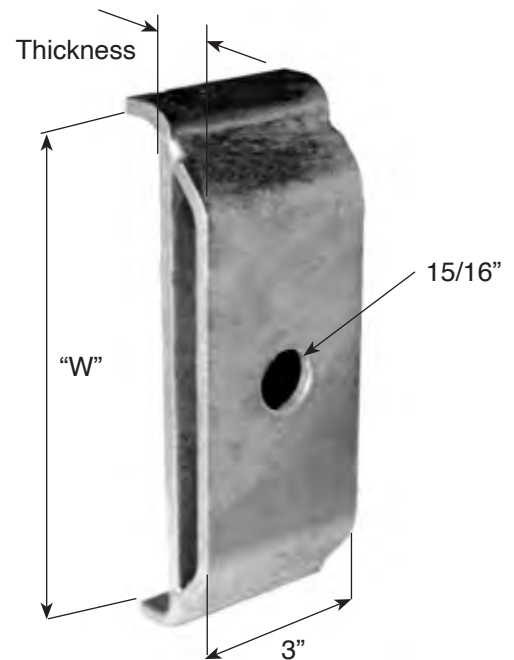
Arm Dimension

2844 Pole Shims

Stock No.	"W"	Thickness	Unit Wt/lbs
2844.2C	5-3/4"	1/4"	1.6
2844.2H	7-3/4"	1/4"	2.0
2844.2L	8-3/4"	1/4"	2.2
2844.2N	9-1/2"	1/4"	2.4
2844.2V	9"	1/4"	2.3
2844.2Q	10-1/2"	1/4"	2.6
2844.7C	5-3/4"	3/4"	3.0
2844.7H	7-3/4"	3/4"	3.5
2844.7L	8-3/4"	3/4"	4.0
2844.7N	9-1/2"	3/4"	4.2
2844.7V	9"	3/4"	4.0
2844.7Q	10-1/2"	3/4"	4.5
2844.10C	5-3/4"	1"	3.2
2844.10H	7-3/4"	1"	3.7
2844.10L	8-3/4"	1"	4.1
2844.10N	9-1/2"	1"	4.2
2844.10V	9"	1"	4.2
2844.10Q	10-1/2"	1"	4.7
2844.15C	5-3/4"	1 1/2"	3.4
2844.15H	7-3/4"	1 1/2"	3.9
2844.15L	8-3/4"	1 1/2"	4.3
2844.15N	9-1/2"	1 1/2"	4.4
2844.15V	9"	1 1/2"	4.2
2844.15Q	10-1/2"	1 1/2"	4.8
2844.20C	5-3/4"	2"	3.9
2844.20H	7-3/4"	2"	4.0
2844.20L	8-3/4"	2"	4.5
2844.20N	9-1/2"	2"	4.7
2844.20V	9"	2"	4.6

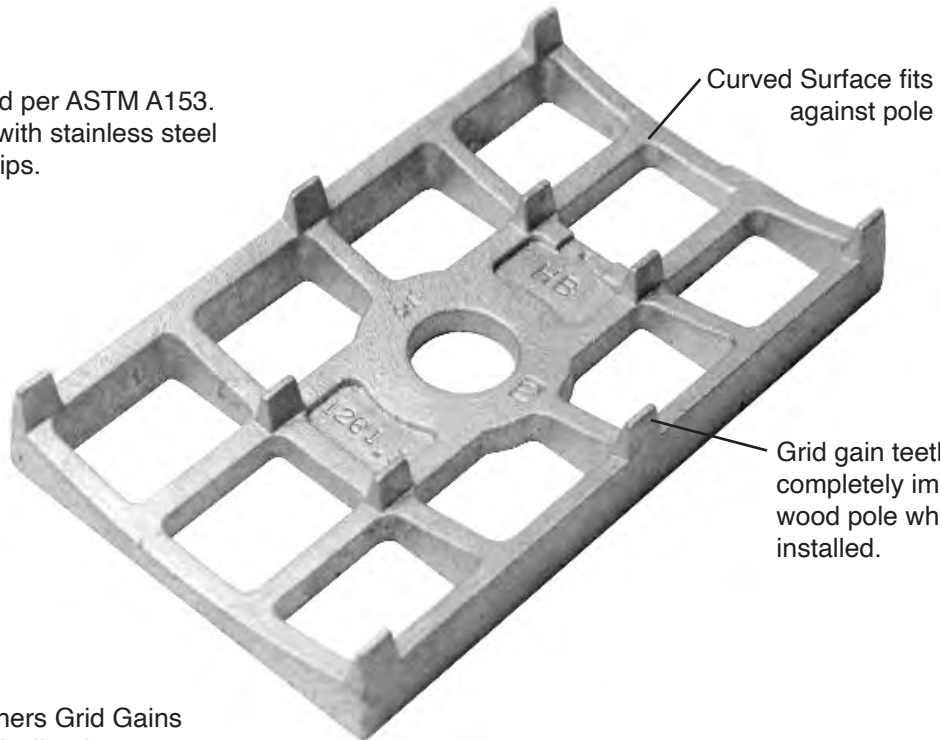
Hughes Brothers 2844 Pole Shims were used frequently before the advent of Hughes Brothers Adjustable Spacer Fittings in double arm assemblies. When a fixed spacer fitting is used, and variations between pole diameters occurs, 2844 Pole Shims are used as an alternative to gaining the larger pole in an H-Frame.

2844 Pole Shims are used predominantly in maintenance applications. Hot dip galvanized per ASTM A153.



Grid Gains

- Galvanized per ASTM A153.
- Available with stainless steel bonding clips.



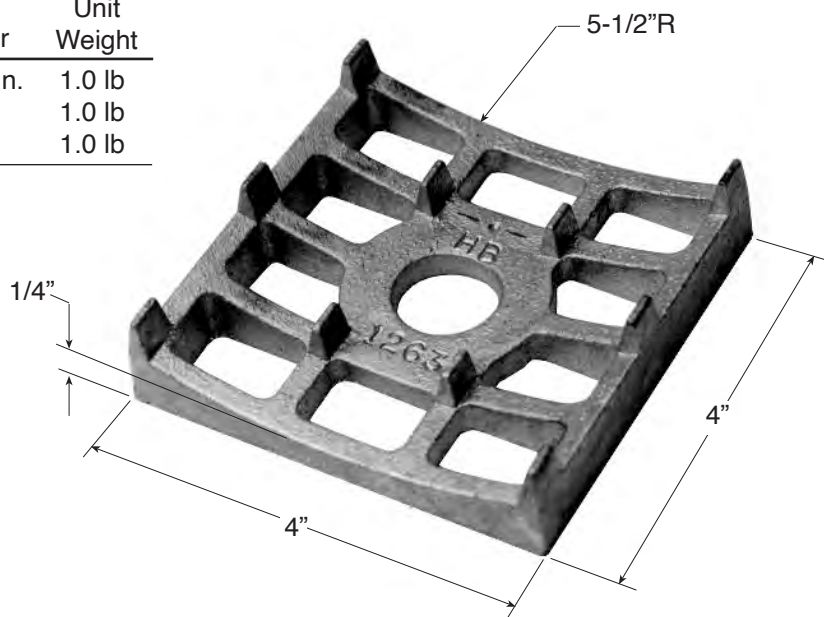
All Hughes Brothers Grid Gains are cast domestically of 65-45-12 Ductile Iron

Benefits of Grid Gains

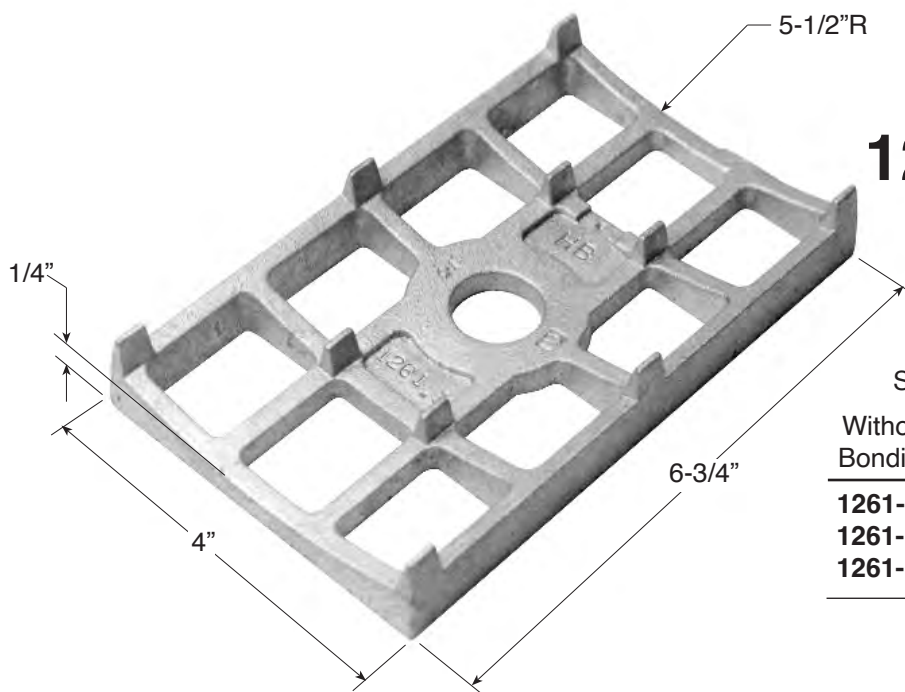
- Strengthens bolt connection at the pole by distributing the load over a larger area.
- Helps moisture drain from connections which improves pole and crossarm longevity.

1263 Grid Gain

Stock No.		Hole Diameter	Unit Weight
Without Bonding	With Bonding		
1263-A	1263-AB	31/32" min.	1.0 lb
1263-B	1263-BB	1-1/16"	1.0 lb
1263-C	1263-CB	1-5/16"	1.0 lb

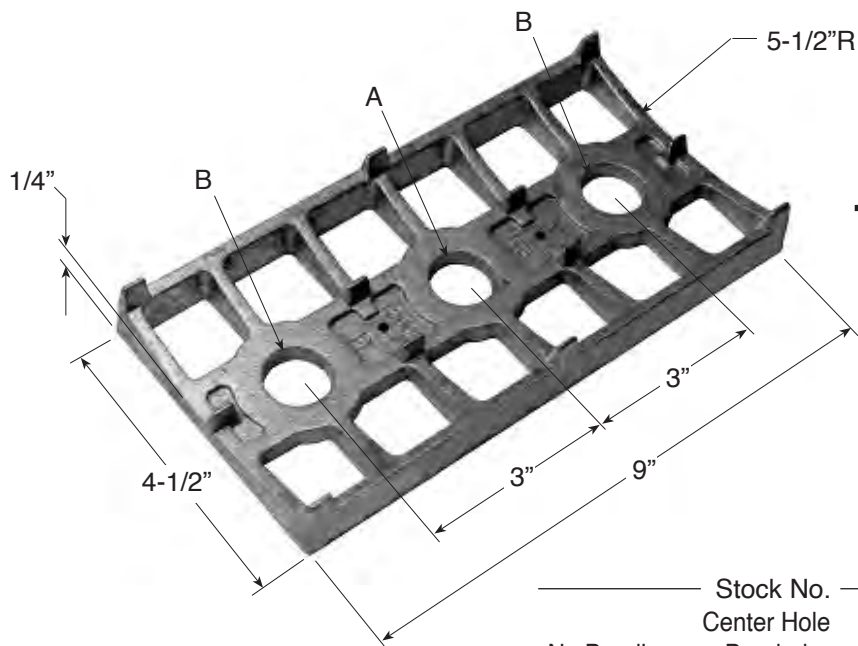


1261 Grid Gain



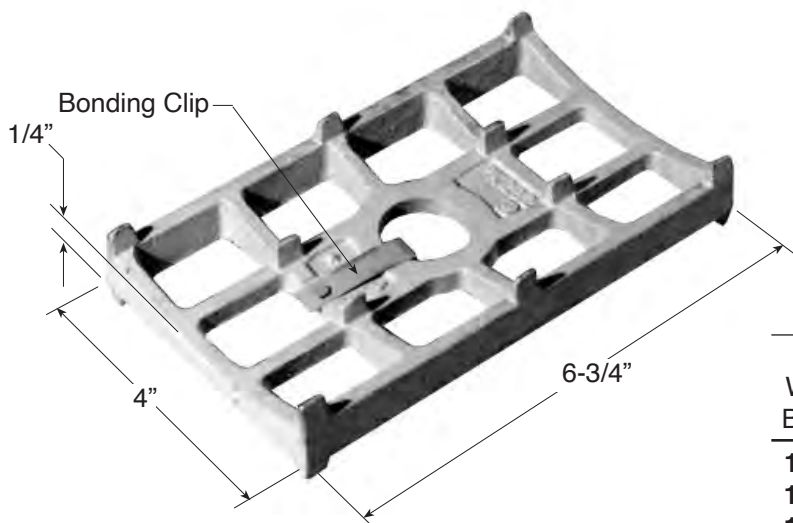
Stock No.		Hole Diameter	Unit Weight
Without Bonding	With Bonding		
1261-A	1261-AB	31/32" min.	1.3 lbs
1261-B	1261-BB	1-1/16"	1.3 lbs
1261-C	1261-CB	1-5/16"	1.3 lbs

C POLE LINE HARDWARE



1260 Grid Gain

Stock No.		Outer Holes Bonded	Hole "A"	Hole "B"	Wt.
No Bonding	Center Hole Bonded				
1260-A	1260-AB	1260-AB2	31/32"	31/32"	2.2 lbs
1260-B	1260-BB		1-1/16"	31/32"	2.2 lbs
1260-B2		1260-BB2	31/32"	1-1/16"	2.2 lbs



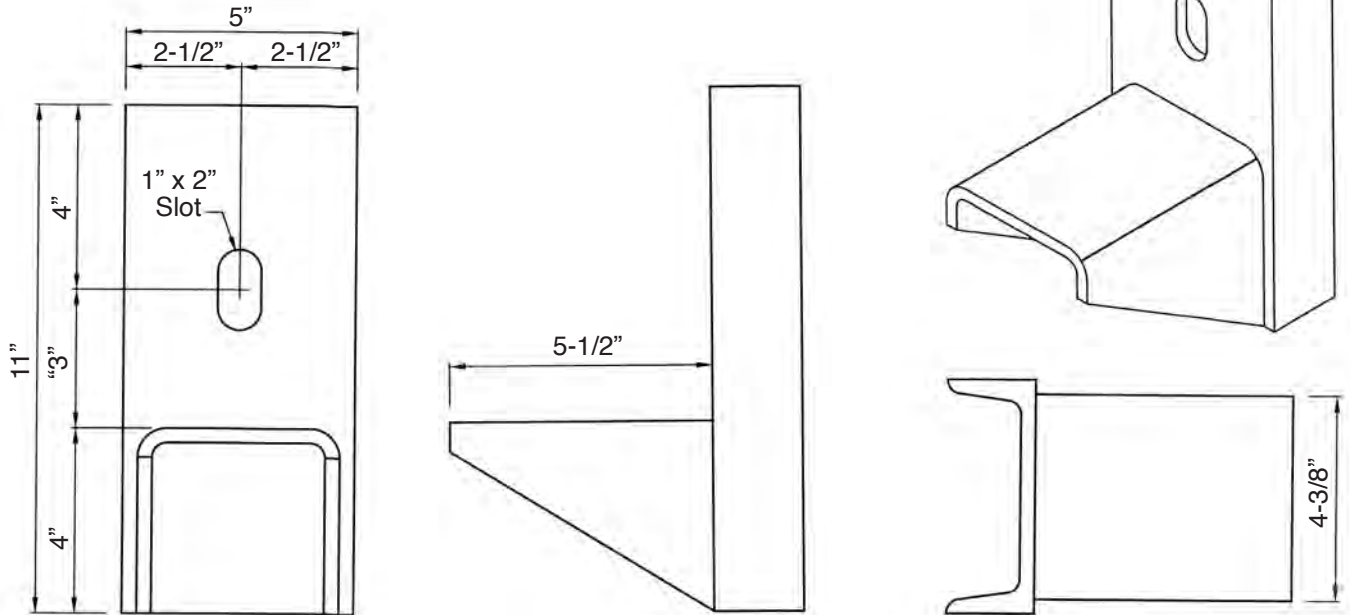
1262 Grid Gain

The 1262 has teeth on the pole and crossarm sides.

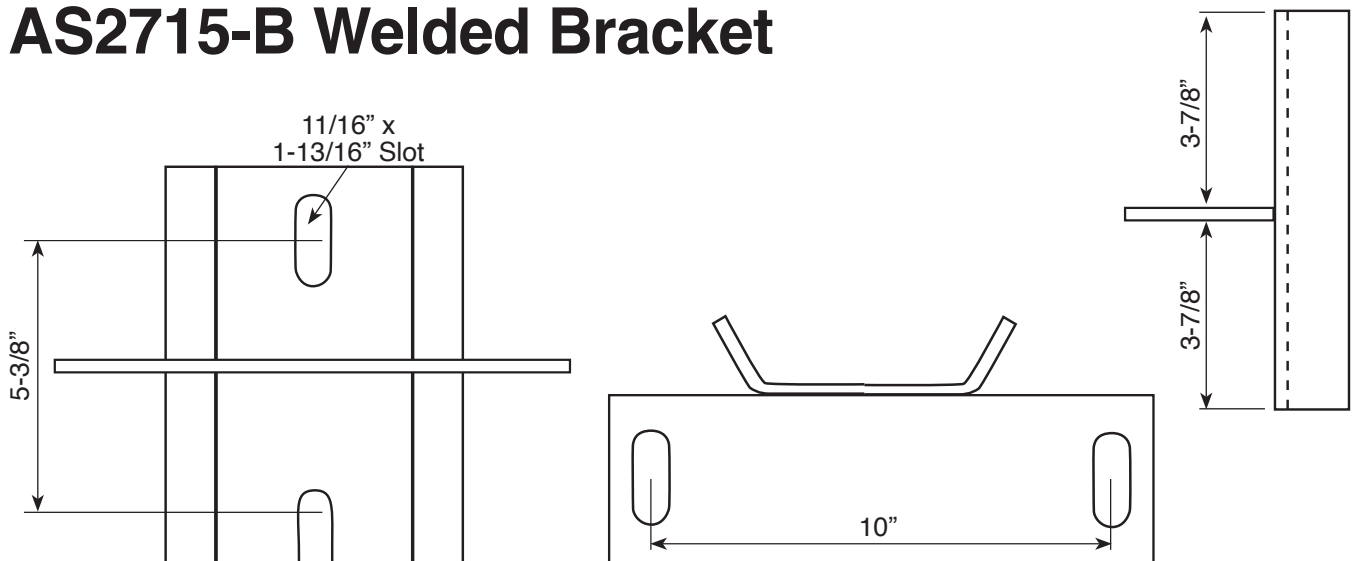
Stock No.		Hole Diameter	Wt.
Without Bonding	With Bonding		
1262-A	1262-AB	31/32" min.	1.4 lbs
1262-B	1262-BB	1-1/16"	1.4 lbs
1262-C	1262-CB	1-5/16"	1.4 lbs

AS2715-A Welded Shelf Gain Fitting

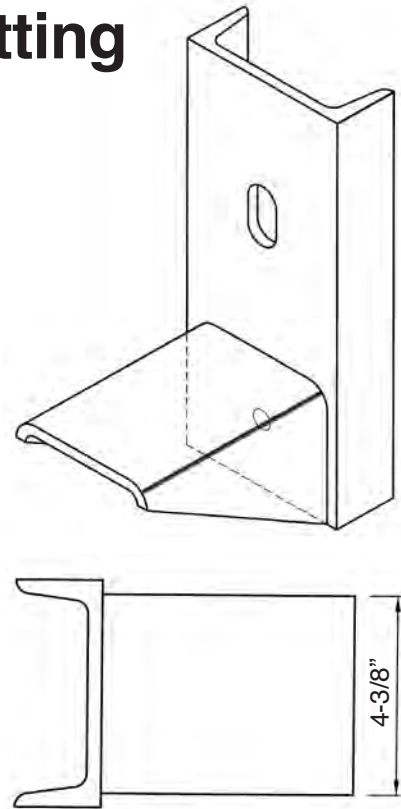
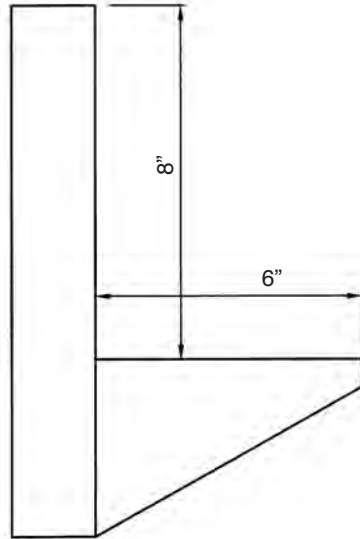
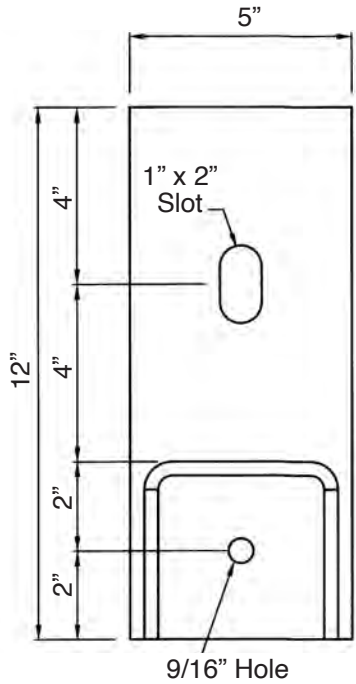
Hughes Brothers Welded Shelf Gain Fittings are manufactured from 5/16" plate and channel steel and are hot dip galvanized.



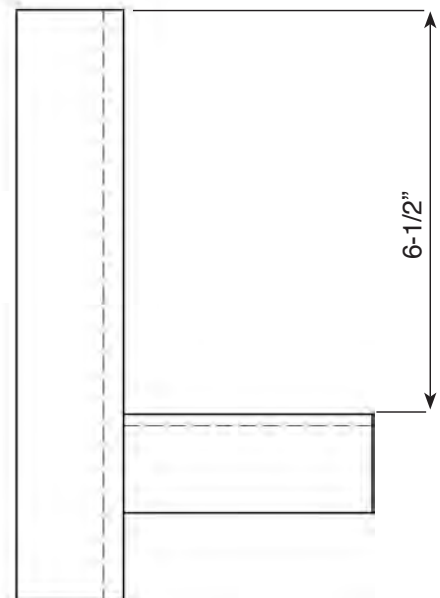
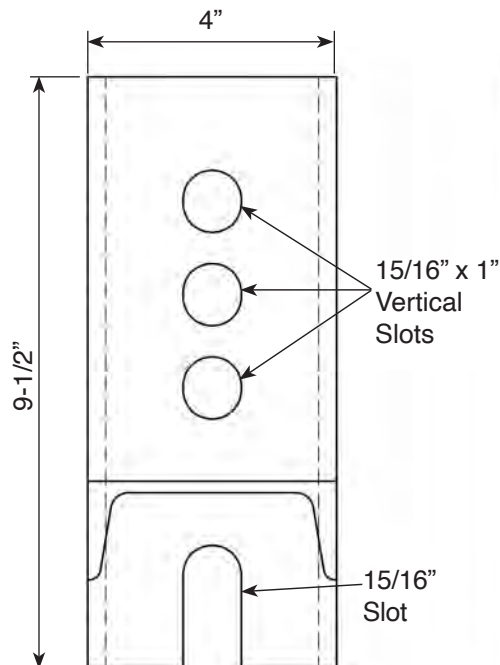
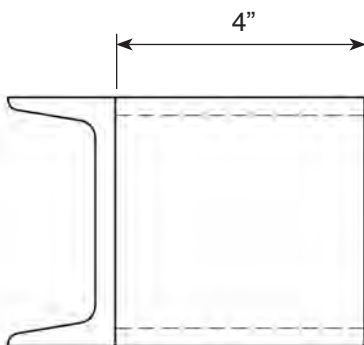
AS2715-B Welded Bracket



AS2715-C Welded Shelf Gain Fitting

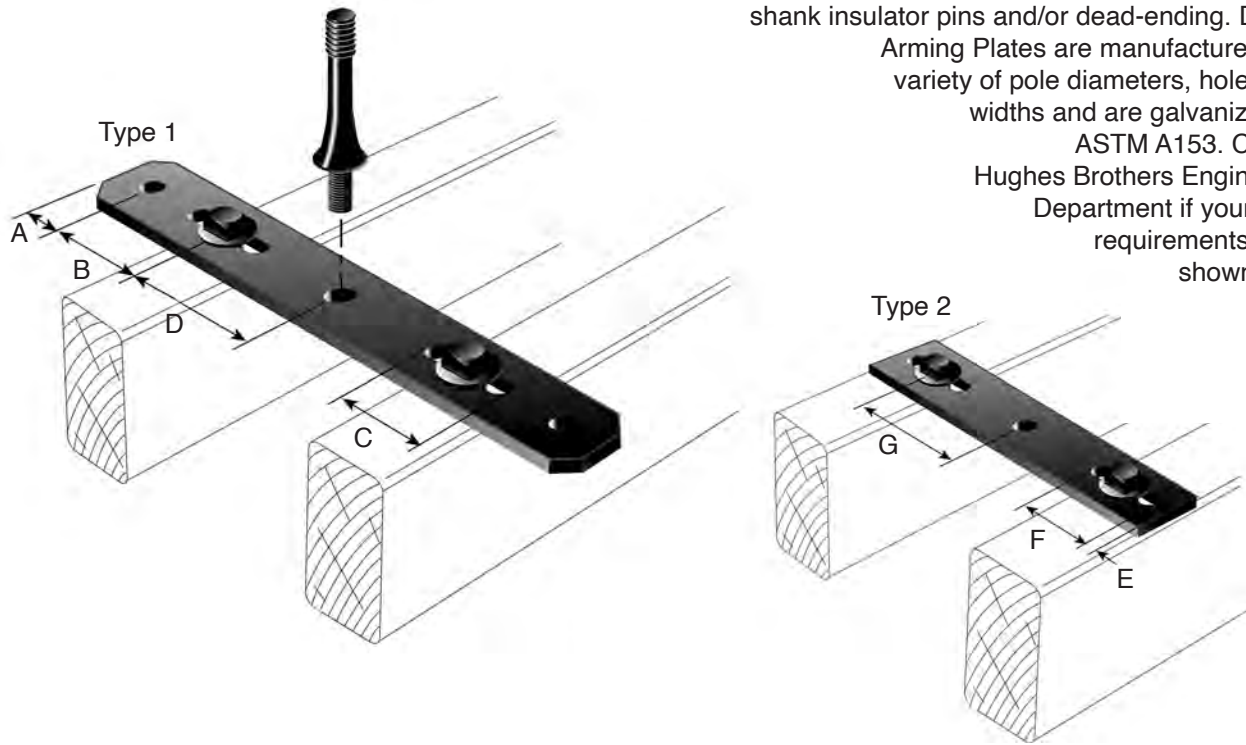


B2746.2A Shelf Gain



AS2349 Double Arming Plates

Hughes Brothers AS2349 Double Arming Plates are used in double arm construction for attaching short shank insulator pins and/or dead-ending. Double Arming Plates are manufactured for a variety of pole diameters, hole & slot widths and are galvanized per ASTM A153. Contact Hughes Brothers Engineering Department if your exact requirements aren't shown here.



Stock No.	Type (1 or 2)	Steel Size	Overall Length	"A"	"B"	"C"	"D"	Hole Size	Weight
AS2349-B	1	1/2" x 4"	24"	2"	4-1/4"	11/16" x 3-1/2"	5-3/4"	11/16"	12.6 lbs
AS2349-C	1	1/2" x 4"	24"	2"	4-1/4"	15/16" x 3"	5-3/4"	15/16"	12.4 lbs
AS2349-E2	1	1/2" x 4"	24"	2"	4-1/4"	13/16" x 3"	5-3/4"	13/16"	12.6 lbs
AS2349-E3	1	1/2" x 4"	28-1/4"	2"	4-1/4"	13/16" x 3"	7-7/8"	13/16"	14.8 lbs

Stock No.	Type (1 or 2)	Steel Size	Overall Length	"E"	"F"	"G"	Hole Size	Weight
AS2349-A	2	1/4" x 4"	21"	1"	11/16" x 3-1/2"	7-3/4"	11/16"	5.6 lbs
AS2349-A1	2	1/4" x 4"	20"	1"	13/16" x 3"	7-1/2"	13/16"	5.3 lbs
AS2349-D1	2	1/4" x 4"	17"	3/4"	11/16" x 3"	6-1/4"	11/16"	4.2 lbs
AS2349-E1	2	1/4" x 4"	23-1/2"	1"	11/16" x 3-1/2"	9"	11/16"	6.2 lbs
AS2349-F1	2	1/4" x 4"	17"	3/4"	11/16" x 3-1/2"	6"	13/16"	4.4 lbs
AS2349-F2	2	1/4" x 4"	17"	3/4"	13/16" x 3-1/2"	6"	13/16"	4.4 lbs
AS2349-F3	2	1/2" x 4"	17"	3/4"	11/16" x 3-1/2"	6"	13/16"	9.2 lbs
AS2349-G	2	1/4" x 4"	22"	1"	13/16" x 4"	8"	13/16"	5.5 lbs

RUS Double Arming Plates

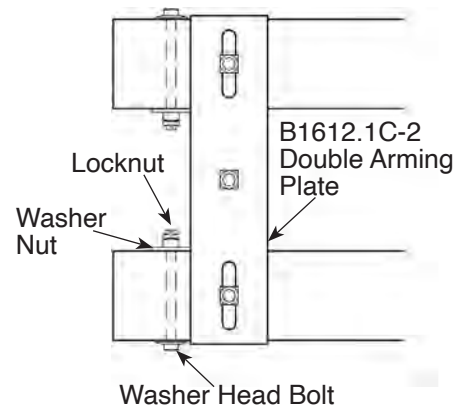
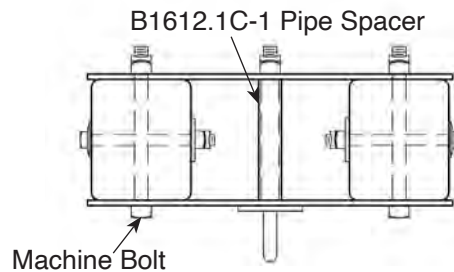
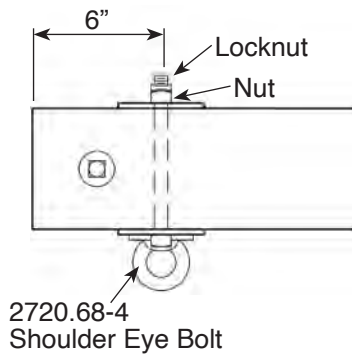
The following are examples of typical RUS type “TP”, TPD” and “TS” double arm construction using Hughes Brothers double arming plates and associated hardware.

4-5/8” x 5-5/8” Crossarm with Suspension Insulators “TS”

Hughes B1612.1C-2, 1/4” x 4” x 17” Double Arming Plate, RUS item “ct”.

Hughes B1612.1C-1, 3/4” x 5-5/8” Pipe Spacer, RUS item “dl”.

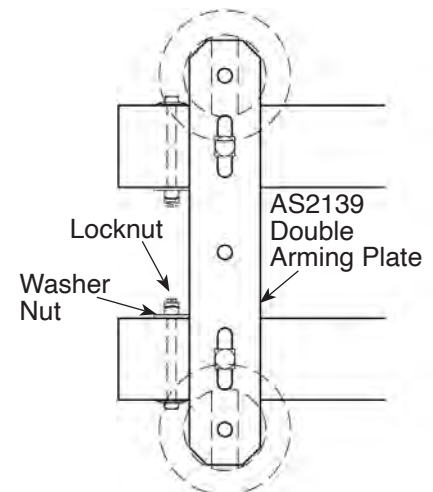
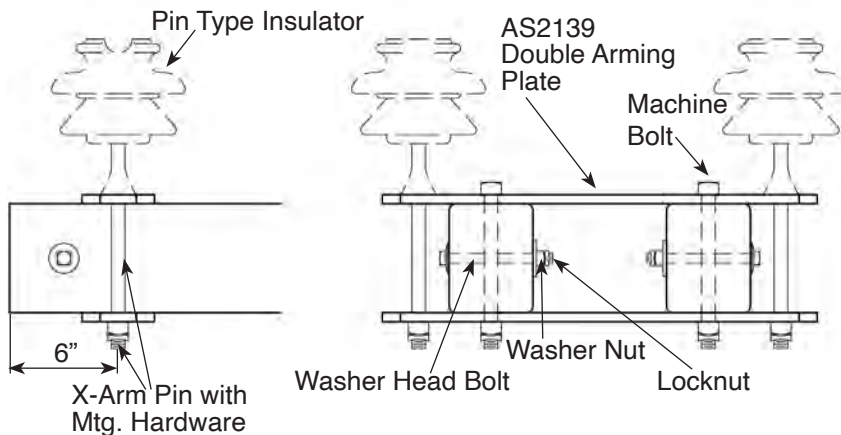
Hughes 2720.68-4, 5/8” x 8” Shoulder Eye Bolt.

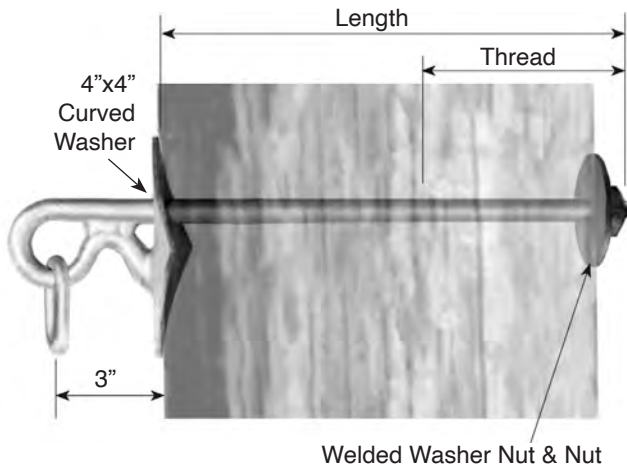


Pin-Type Insulator “TP” and “TPD”

Hughes AS2139, 1/2” x 4” x 24” Double Arm Plate, RUS item “ct”.

See Section F for washerhead bolt, machine bolt, and locknut details.



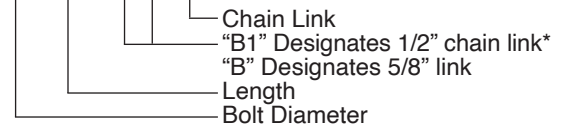


2812 Shield Wire Support Bracket

Hughes Brothers 2812 Shield Wire Supports are used on single pole and H-frame construction, providing an economical means of supporting the overhead shield wire. The 2812 is designed for adequate clearance between shield wire and pole. This support has greater vertical strength than an eye bolt due to the action of the support and welded curved washer.

Ordering Example:

2 8 1 2 . 5 - 1 2 - B 1 C L



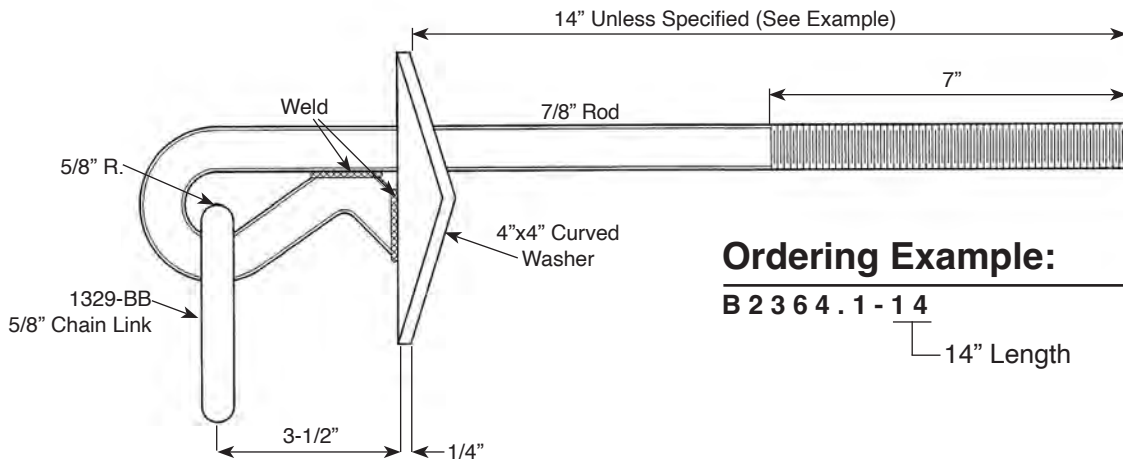
Stock No.	Bolt Diameter	Length	Thread Length	Weight/lbs	Suggested Max. Vertical Load
2812.5-10-B1CL	5/8"	10"	5"	3.1	5000 lbs
2812.5-12-B1CL		12"	6"	3.2	
2812.5-14-B1CL		14"	7"	3.3	
2812.5-16-B1CL		16"	8"	3.5	
2812.5-18-B1CL		18"	8"	3.8	
2812.6-10-BCL	3/4"	10"	5"	3.9	
2812.6-12-BCL		12"	6"	4	
2812.6-14-BCL		14"	7"	4.7	
2812.6-16-BCL		16"	8"	5.2	
2812.6-18-BCL		18"	8"	5.4	

*1/2" chain link furnished with 5/8" support (unless otherwise specified).

*5/8" chain link furnished with 3/4" support (unless otherwise specified).

The 2812 series is REA approved.

B2364.1-Length Shield Wire Support Assembly

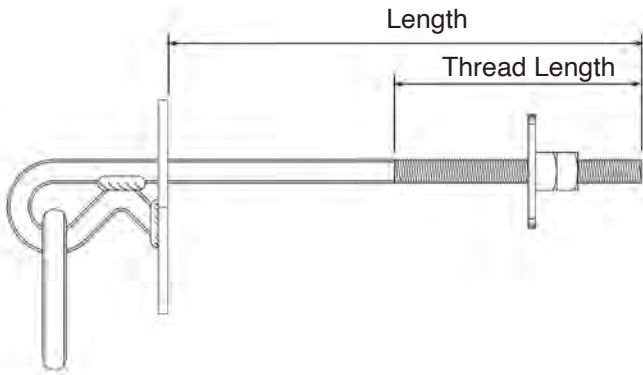


Ordering Example:

B 2 3 6 4 . 1 - 1 4

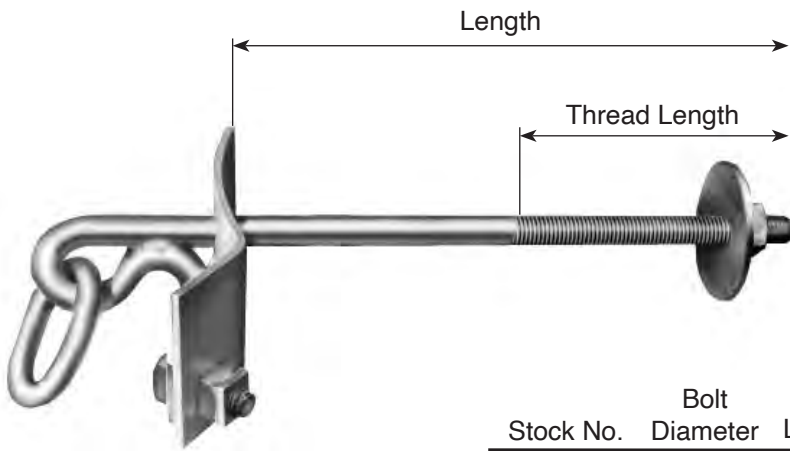


2855 Shield Wire Support Bracket



The 2855 Shield Wire Supports are identical to the 2812 series but feature a flat base washer for use on glue laminated wood poles or square static cast concrete poles.

Ordering, weights and load rating information is identical to the 2812 series, but 2855 is substituted for 2812.

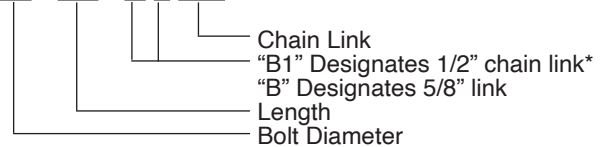


1501 Shield Wire Support Bracket

The Hughes Brothers 1501 Shield Wire Support is similar to the 2812 series but includes a ground wire bonding bolt.

Stock No.	Bolt Diameter	Length	Thread Length	Weight	Suggested Max. Vertical Load
1501.6-12	5/8"	12"	6"	3.2 lbs	5,000 lbs
1501.6-14	5/8"	14"	7"	3.3 lbs	
1501.6-16	5/8"	16"	8"	3.5 lbs	
1501.7-12	3/4"	12"	6"	4 lbs	5,000 lbs
1501.7-14	3/4"	14"	7"	4.7 lbs	
1501.7-16	3/4"	16"	8"	5.2 lbs	

1 5 0 1 . 6 - 1 2 - B 1 C L



*1/2" chain link furnished with 5/8" support (unless otherwise specified).

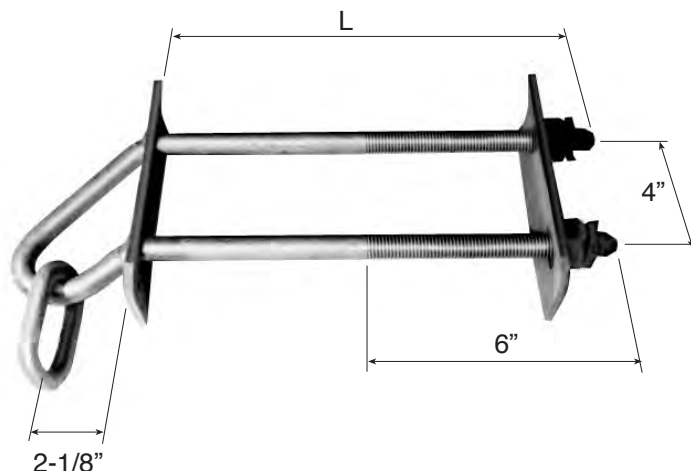
*5/8" chain link furnished with 3/4" support (unless otherwise specified).

2859 Shield Wire Support

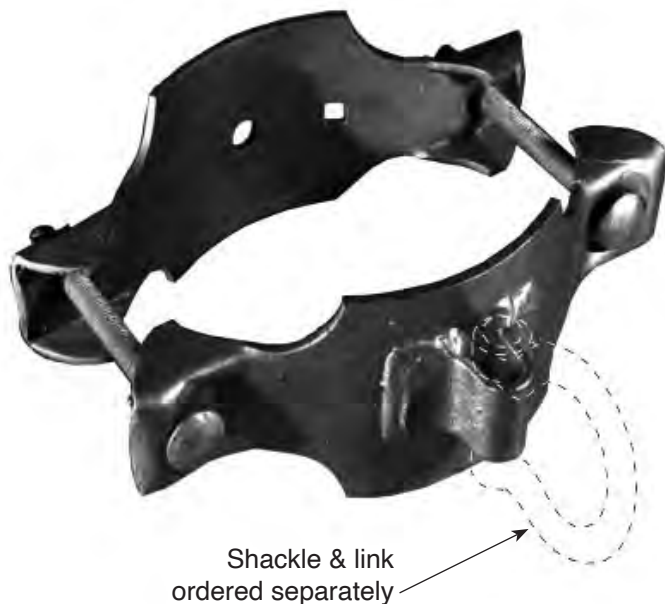
Stock No.	"L"	Weight	Suggested Max Load	
			Vertical	Longitudinal
2859.1-10	10"	5.5 lbs	5,000 lbs	2,500 lbs
2859.1-12	12"	6.1		
2859.1-14	14"	6.5		
2859.1-16	16"	6.8		
2859.1-18	18"	6.9		
2859.1-20	20"	7.2		

The 2859 series is RUS accepted.

The Hughes Brothers 2859 Shield Wire Support features two 5/8" through bolts, curved front & back plates and a 1/2" chain link. The curved front plate is welded to both through bolts. Shipped with nuts and locknuts as shown.



2837 Pole Band Shield Wire Support



Shackle & link ordered separately

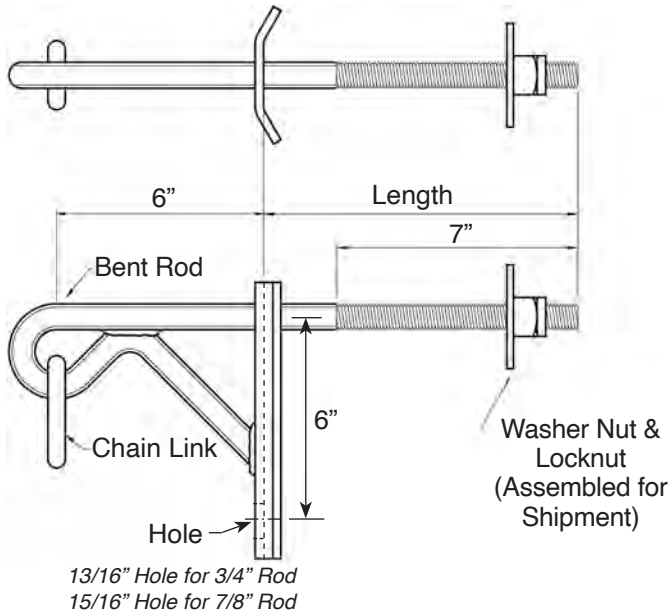
Hughes Brothers 2837 Light Duty Pole Band Shield Wire Support offers a provision for attachment of a shield wire support with a 5/8" shackle. In this application, the 2837 doubles as an anti-split band at the pole top.

The 2837 uses a 3/16" x 4" steel band section.

Assembly is provided with shackle by the "S" suffix.

Stock No.	Wt. Lbs. Each	Pole Dia. Inches
2837.5	5.5	7 - 9
2837.6	6.5	8 1/2 - 11
2837.7	7.8	10 - 13

AS2087 Series Shield Wire Support



Stock No.	Rod Dia.	Suggested Max Vertical Load
AS2087.7	3/4"	7,000 lb
AS2087.8	7/8"	8,500 lb

NOTE: When ordering AS2087 Shield Wire Support, Specify Length & Chain Link Size

Ordering Example:

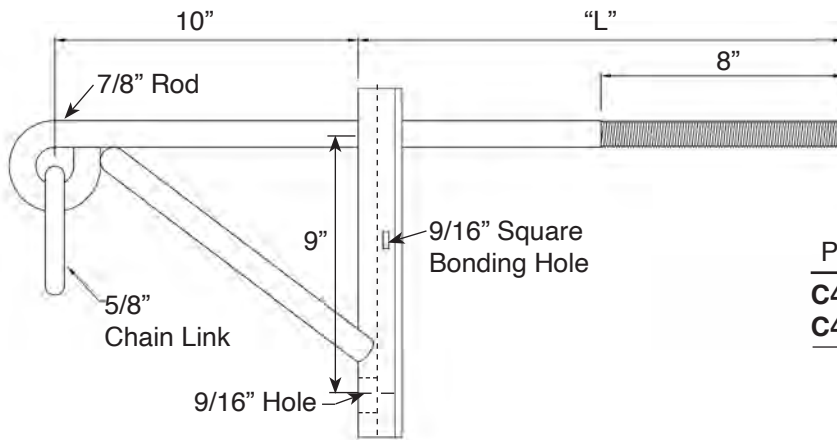
AS2087.7-18**

[Blank for no Chain Link
"B1CL" for 1/2" Chain Link
"BCL" for 5/8" Chain Link]

Length (in Inches)

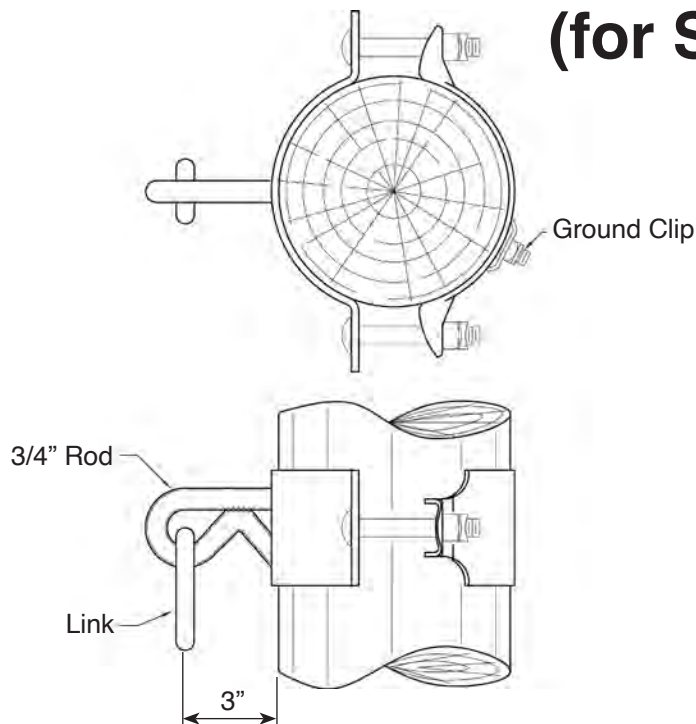
.7 = 3/4" Bent Rod Dia.
.8 = 7/8" Bent Rod Dia.

C4111.5 Shield Wire Bracket



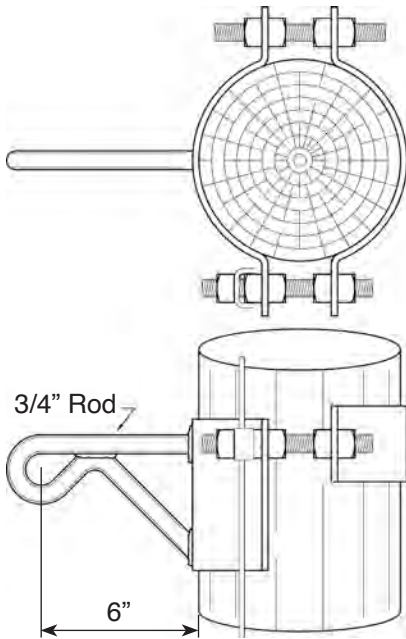
Part No.	"L"	Suggested Max. Vertical Load
C4111.5A	16"	4,000 lb
C4111.5B	18"	4,000 lb

2837-K Pole Band Assembly (for Shield Wire Support)



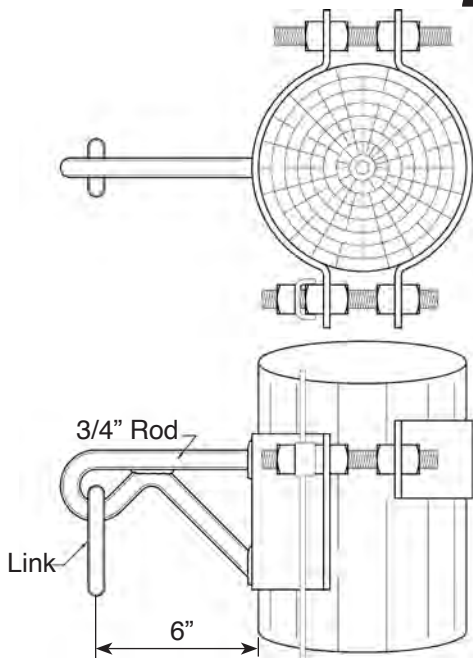
Stock No.	Pole Dia.	Suggested Max. Vertical Load
2837.5K	7" - 9"	1,000 lb
2837.6K	8-1/2" - 11"	1,000 lb
2837.7K	10" - 13"	1,000 lb

2837-K1 Pole Band Assembly Fiber Optic Support



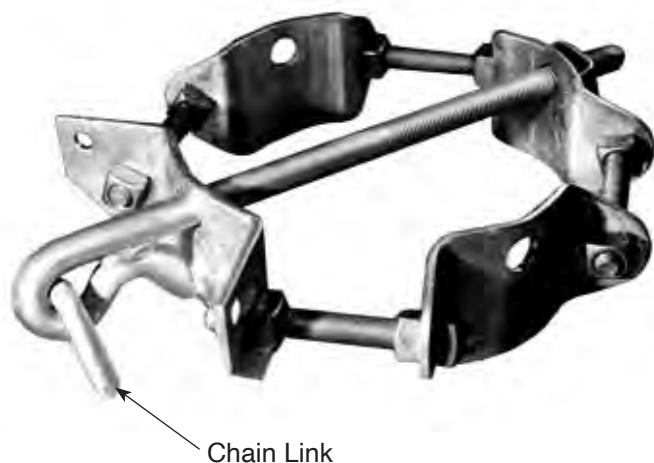
Stock No.	Pole Dia.	Suggested Max Vertical Load
2837.K1A	7" - 9"	2,000 lb
2837.K1B	8-1/2" - 11"	2,000 lb
2837.K1C	10" - 13"	2,000 lb

2837-K2 Pole Band Assembly Fiber Optic Support with 5/8" Chain Link



Stock No.	Pole Dia.	Suggested Max Vertical Load
2837.K2A	7" - 9"	2,000 lb
2837.K2B	8-1/2" - 11"	2,000 lb
2837.K2C	10" - 13"	2,000 lb

2835 & 2852 Pole Band Shield Wire Support



Hughes Brothers 2835 & 2852 Pole Band Shield Wire Support functions as a shield wire support and anti-split band. The 2835 & 2852 are used to prevent pole splits due to either induced loads or seasoning checks.

The 2835 uses a 3/4" (2835.7) or 5/8" (2835.6) shield wire support, 5/8" stud bolts and 1/4" x 4" band sections.

The Hughes 2852 Pole Band Shield Wire Support is identical to the 2835 except it uses a 7/8" shield wire support, 3/4" stud bolts and 1/4" x 4" band sections.

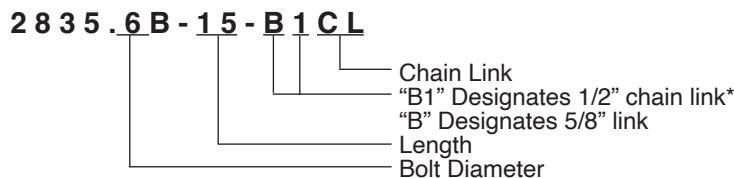
The band section is provided with a bonding hole to facilitate grounding.

Stock No.	Pole Dia. Inches	Wt. Lbs. Each
2835.6A-13	6-1/2 ~ 10	18.2
2835.6B-15	7-1/2 ~ 12	19.0
2835.7A-15	6-1/2 ~ 10	20.0
2835.7B-15	7-1/2 ~ 12	21.0

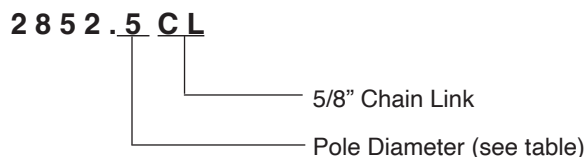
Add suffix B1CL for 1/2" chain link.
Add suffix BCL for 5/8" chain link.

Stock No.	Pole Dia. Inches	Wt. Lbs. Each
2852.5CL	6-1/2 ~ 10	18.2
2852.6CL	7-1/2 ~ 12	19.0
2852.7CL	12 ~ 15	20.0
2852.8CL	13 ~ 16	21.0
2852.9CL	15 ~ 18	22.5
2852.10CL	17 ~ 20	24.0

Ordering Example (2835 Series):

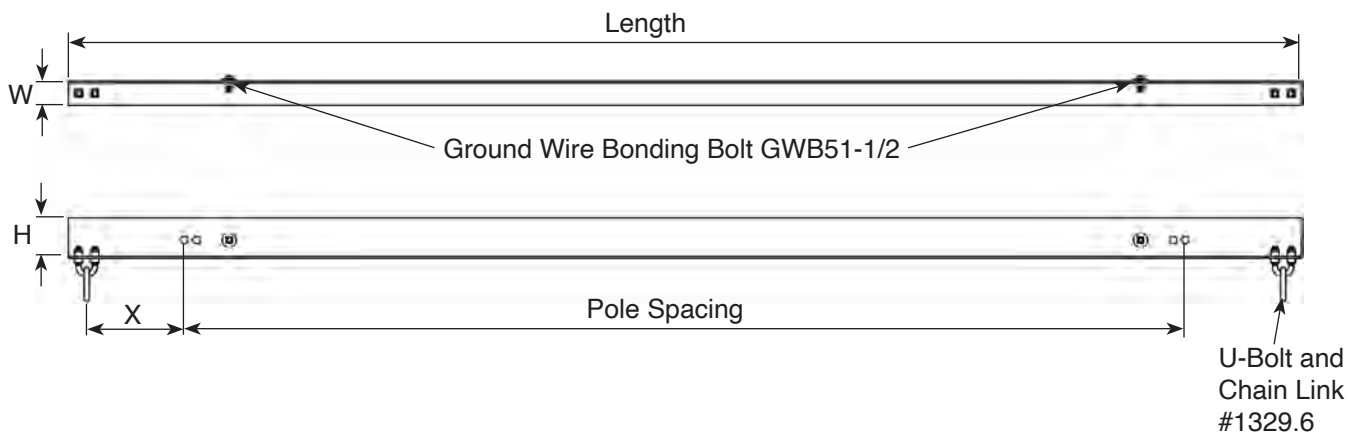


Ordering Example (2852 Series):



Pole Tie Angles

Hughes Brothers, Inc. can furnish your steel pole tie angles in any commercially available size angle iron. All tie angle assemblies are typically supplied with U-bolt and chain link assemblies as well as bonding bolts. Steel is ASTM A-36 galvanized in accordance with ASTM A-153.



Typical Angle Sizes

H	W	Thickness
3" x 3"	1/4"	
3-1/2" x 3"	1/4"	
4" x 3"	1/4"	
5" x 3"	1/4"	
5" x 3"	5/16"	

Standard RUS Tie Angle Assemblies

Hughes #	Reference	H	W	T	Length	Pole Spacing
C3511.1A	TM-7A	3-1/2"	3"	1/4"	15'-0"	12'-6"
C3316.1B	-7B	3-1/2"	3"	1/4"	18'-0"	15'-6"
C3316.1C	-7C	5"	3"	1/4"	18'-0"	15'-6"
C3338.1A	-7D	5"	3"	1/4"	22'-0"	19'-6"

*x = 12" on all the above.

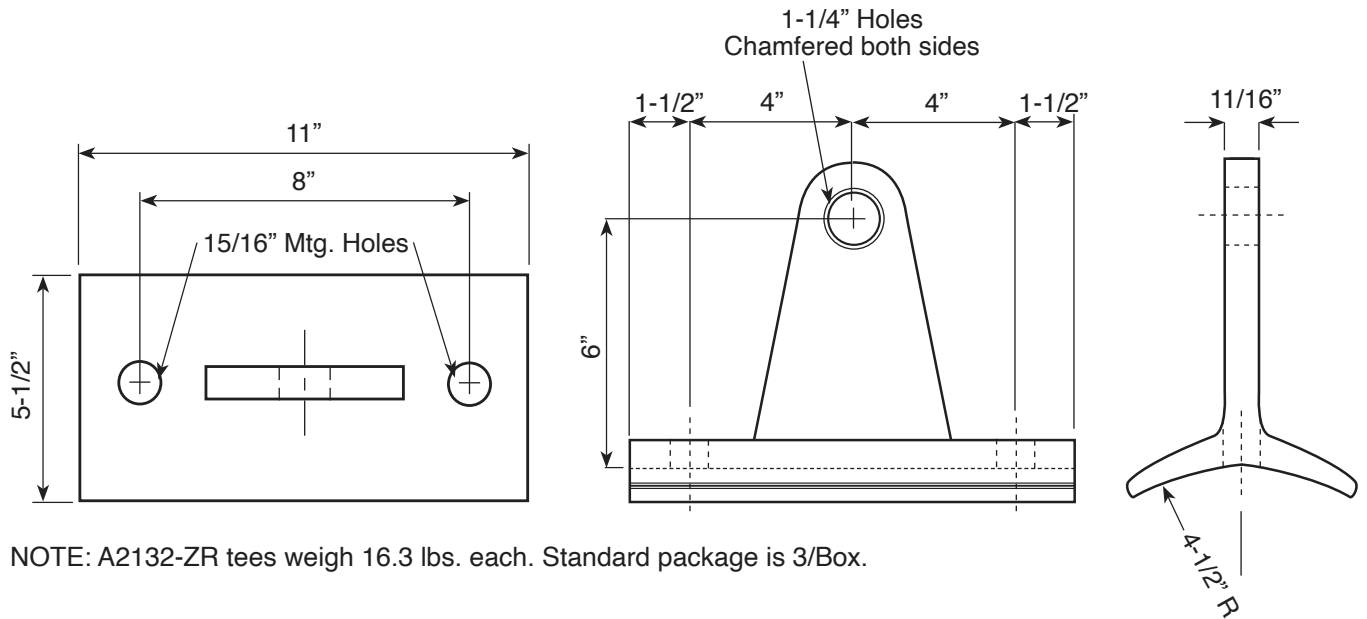
Other Tie Angle Assemblies

Hughes #	Pole Spacing	Length	"X"	H	W	T
C3511.1C	10'-6"	13'-0"	12"	3-1/2"	3"	1/4"
C3511.37B	12'-0"	14'-6"	12"	3-1/2"	3"	1/4"
C3511.1B	14'-6"	17'-0"	12"	3-1/2"	3"	1/4"

NOTE: To order a pole tie angle not listed above, supply the following information: Pole spacing, Length, Width, Height, and Thickness of angle and dimension "x" (or supply your own drawing).

A2132-ZR Curved Base Static Support Tees

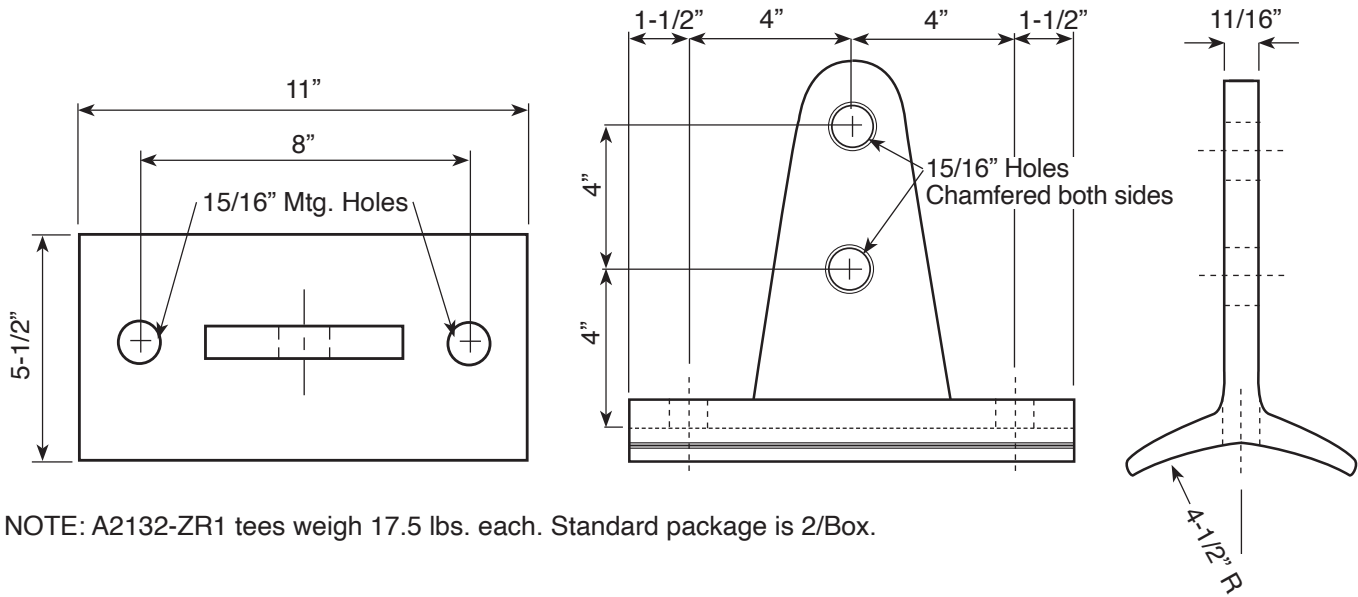
The Hughes Brothers A2132 series heavy tees are flame cut from structural steel and hot dip galvanized to ASTM A123. The base of the A2132 series has a 4.5" radius curve for round poles and mounting holes on 8" centers.



NOTE: A2132-ZR tees weigh 16.3 lbs. each. Standard package is 3/Box.

A2132-ZR1 Curved Base Static Support Tees

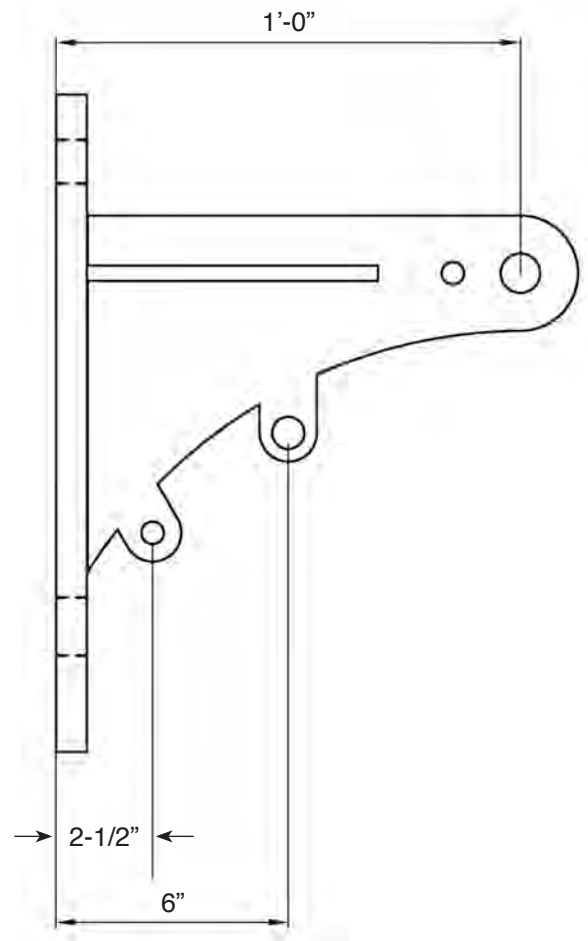
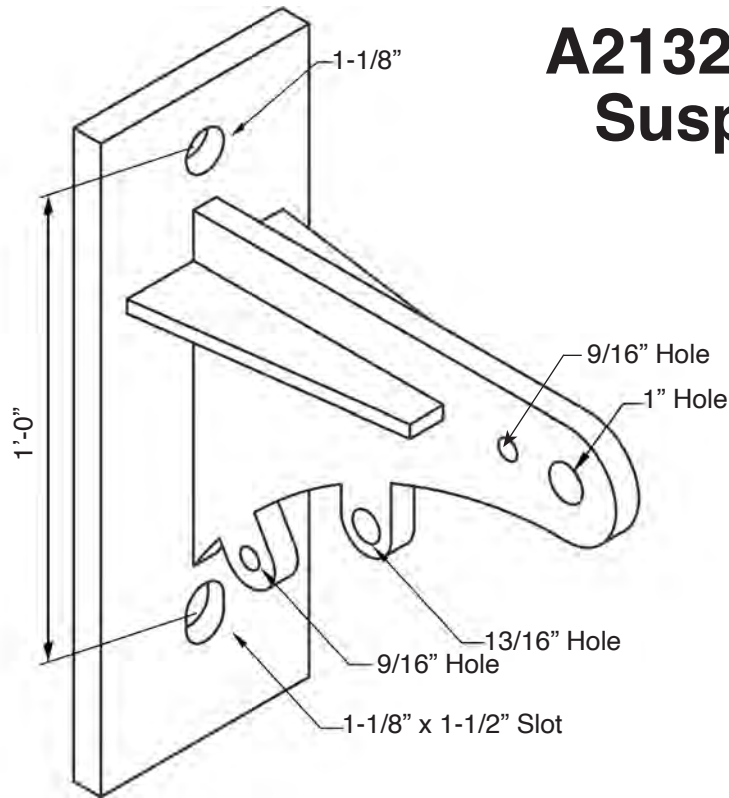
The Hughes Brothers A2132 series heavy tees are flame cut from structural steel and hot dip galvanized to ASTM A123. The base of the A2132 series has a 4.5" radius curve for round poles and mounting holes on 8" centers.

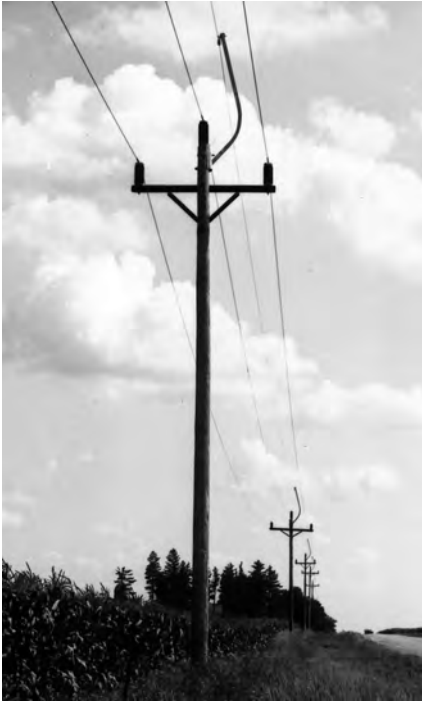


NOTE: A2132-ZR1 tees weigh 17.5 lbs. each. Standard package is 2/Box.



A2132-HHH Shield Wire Suspension Bracket





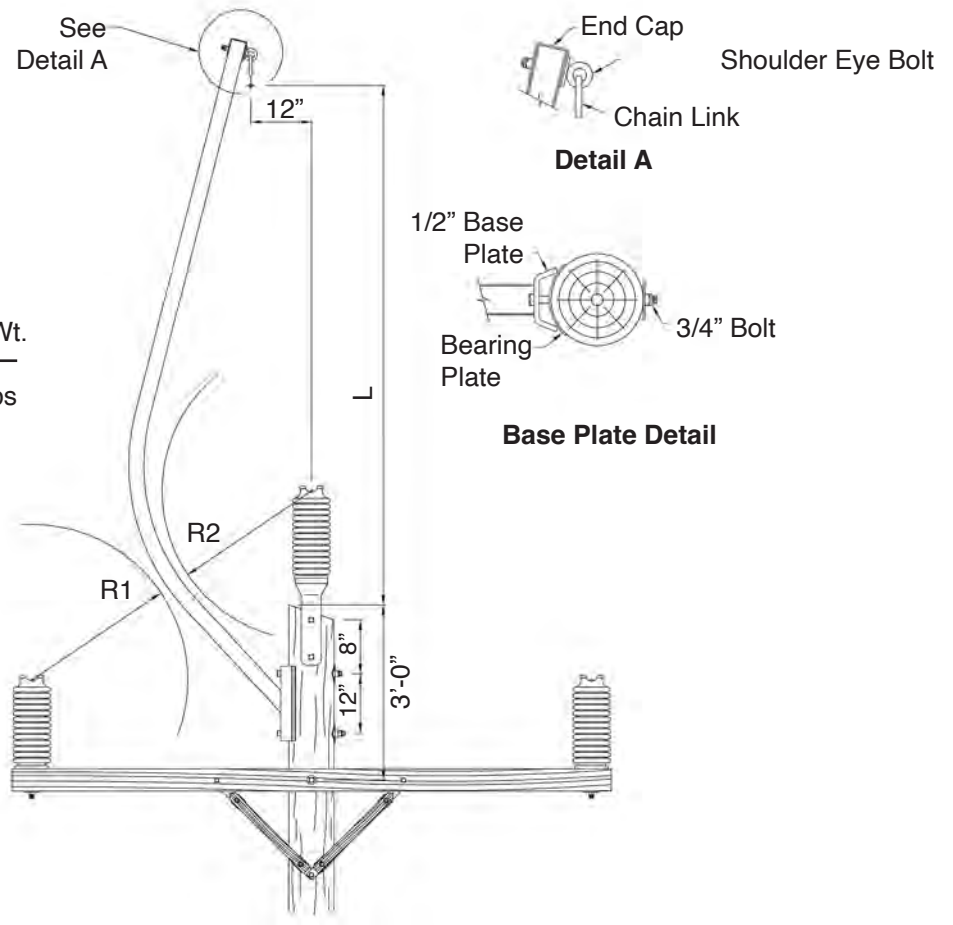
B2502 Shield Wire Bayonets

The Hughes Brothers B2502 shield wire bayonets allow for the installation of an overhead static wire or fiber optic static wire on unshielded lines without changing the existing conductor attachment locations or hardware. In many cases, the Hughes Brothers Shield Wire Bayonets will be used in addition to lightning arrestors.

Many other configurations with varying clearances for specific pole top assemblies are available.

Ordering Example:

Stock No.	"L"	R2	R1	Unit Wt.
B2502-C	7'-10"	25"	25"	110 lbs



B2502 Shield Wire Bayonet Test Results

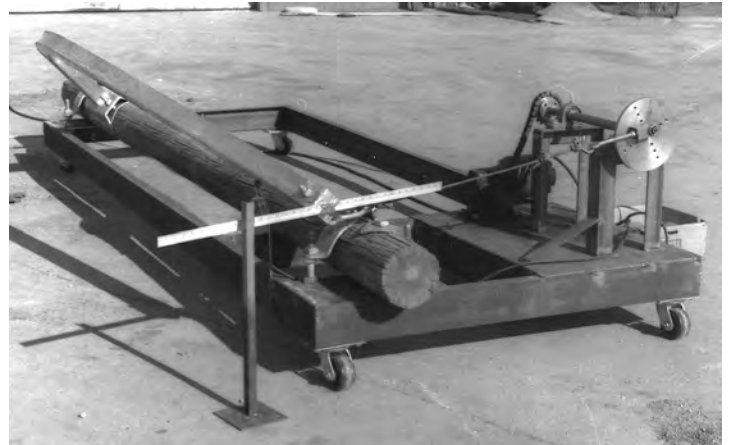
Type B2502-C Shield Wire
Bayonet Assembly

Vertical strength - 2300 lbs
Longitudinal Strength - 1000 lbs
Transverse strength - 1200 lbs

Cycle Test

No deformation or indication of fatigue failure occurred after cycle testing the B2502-C Shield Wire Bayonet Assembly for 1.5 million cycles.

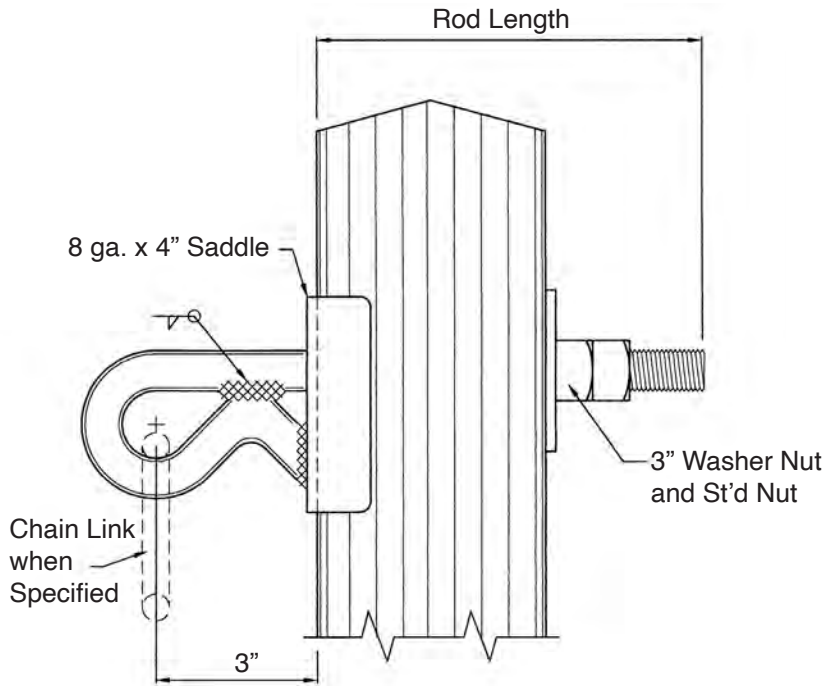
1 million cycles - 0 to 150 lbs
500,000 cycles - 0 to 300 lbs



Cycle tests

2813 Static Wire Support for Wood Bayonets

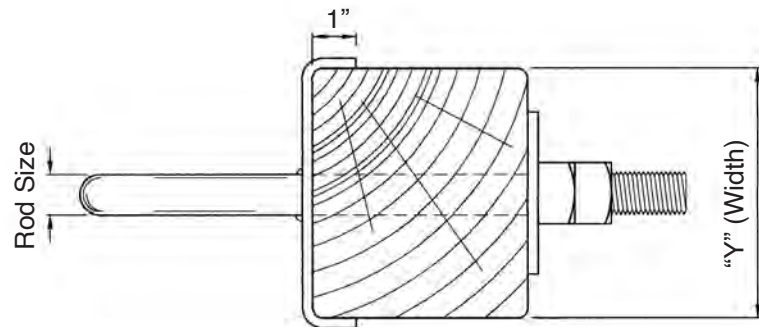
Side View



Saddle Sizes "Y" (Width)

A	"Y" = 4-3/4"
B	"Y" = 5-3/4"
C	"Y" = 3-3/4"
D	"Y" = 4-5/8"
E	"Y" = 3-1/8"
F	"Y" = 5-1/8"
G	"Y" = 2-1/8"

Plan View

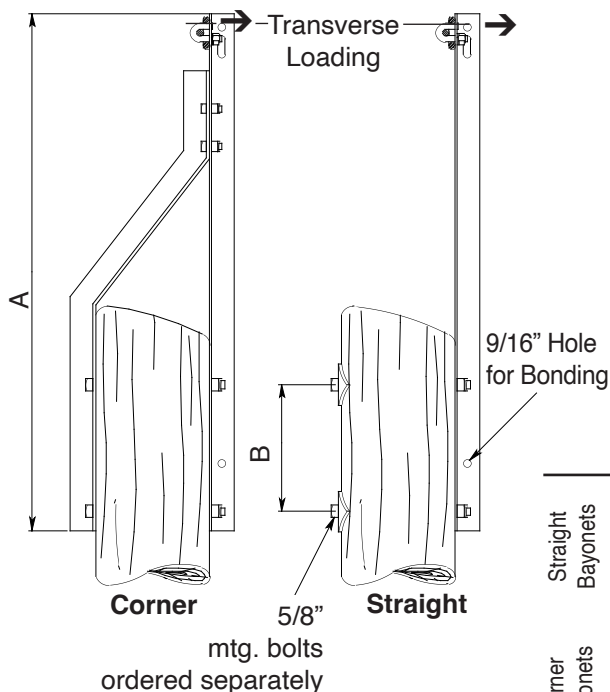


Example for Ordering:

2 8 1 3 . 6 8 - 3 A B 1 W N

- Washer Nut & Nut
- Chain Link "B" = 5/8", "B1" = 1/2"
- Saddle Size "Y"
- Thread Length (in.)
- Rod Length (in.)
- Rod Size (Dia.)

AS2613 Shield Wire Bayonet



Hughes Brothers AS2613 Series Shield Wire Bayonets are made from structural hot rolled angles and hot dip galvanized after fabrication.

The bayonets are furnished so the shield wire attachments may be attached to either leg of the angle. (The Shield Wire Attachments are not furnished as part of the bayonet and must be ordered separately.)

The Corner Bayonet bent angle is offset 8-1/2".

	Stock No.	"A" Inches	"B" Inches	Angle Size Inches	Wt. Lbs. Each	Ultimate Transverse Load Rating (lbs)
Straight Bayonets	AS2613.1A	36	10	2 x 2 x 1/4	10	300
	AS2613.2A	48	12	2 1/2 x 2 1/2 x 1/4	17	400
	AS2613.3A	66	15	2 1/2 x 2 1/2 x 1/4	25	250
	AS2613.4A	84	20	3 x 3 x 1/4	36	250
Corner Bayonets	AS2613-F1	36	10	2 x 2 x 3/16	15	575
	AS2613-F2	48	12	2 x 2 x 3/16	20	450
	AS2613-F3	66	15	2 x 2 x 1/4	36	375
	AS2613-F4	84	20	2 1/2 x 2 1/2 x 1/4	59	460

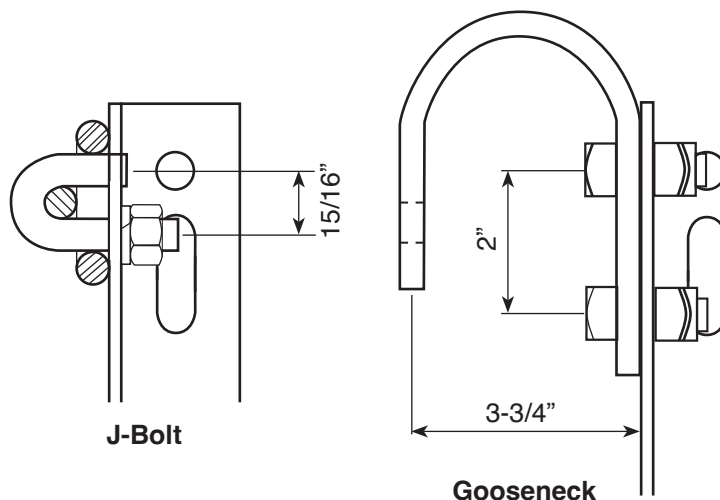
Shield Wire Attachments

Hughes AS2613-G J-Bolt is made from 1/2" diameter bar stock and furnished complete with one 3/8" diameter chain link, spring lock washer and hex nut.

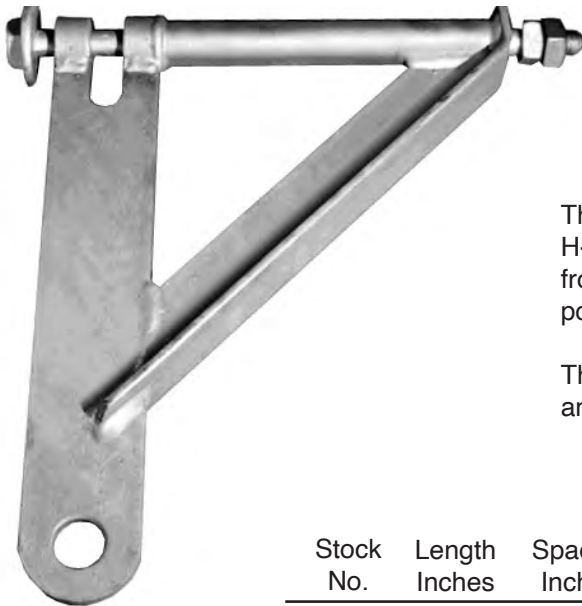
Hughes AS2613-H1 Gooseneck is formed from 1/2" x 2" flat strip stock. A 11/16" connection hole is centered 1" from the end. The Gooseneck is furnished complete with two 1/2" x 1-1/2" machine bolts with locknuts for mounting to the bayonet.

All parts are hot dip galvanized.

Stock No.	Style	Approx. Ship. Wt. Lbs. ea.
AS2613-G	J-Bolt	.5
AS2613-H1	Gooseneck	3.6



C POLE LINE HARDWARE

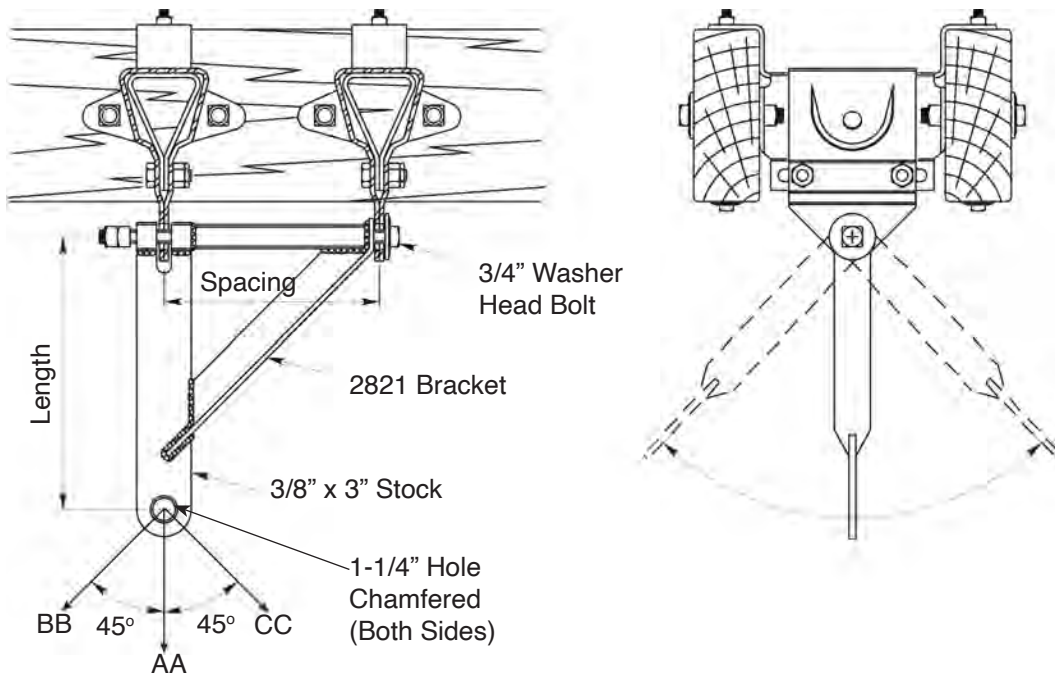


2821 Swinging Angle Brackets

The Hughes Brothers 2821 Swinging Angle bracket is used on H-Frame, double arm assemblies to provide additional clearance from conductor to crossarm when the insulators are in a deflected position as is the case on slight angle structures.

The 2821 Swinging Angle Bracket is furnished complete with bolt and nuts. Standard stock sizes are listed in the table.

Stock No.	Length Inches	Spacing Inches	Weight Lbs. ea.	Ultimate Load Rating / Lbs.		
				"AA"	"BB"	"CC"
2821.5	12	9	11	20,000	20,000	12,000
2821.6	15	12	13			
2821.7	18	15	16			
2821.8	21	18	19			



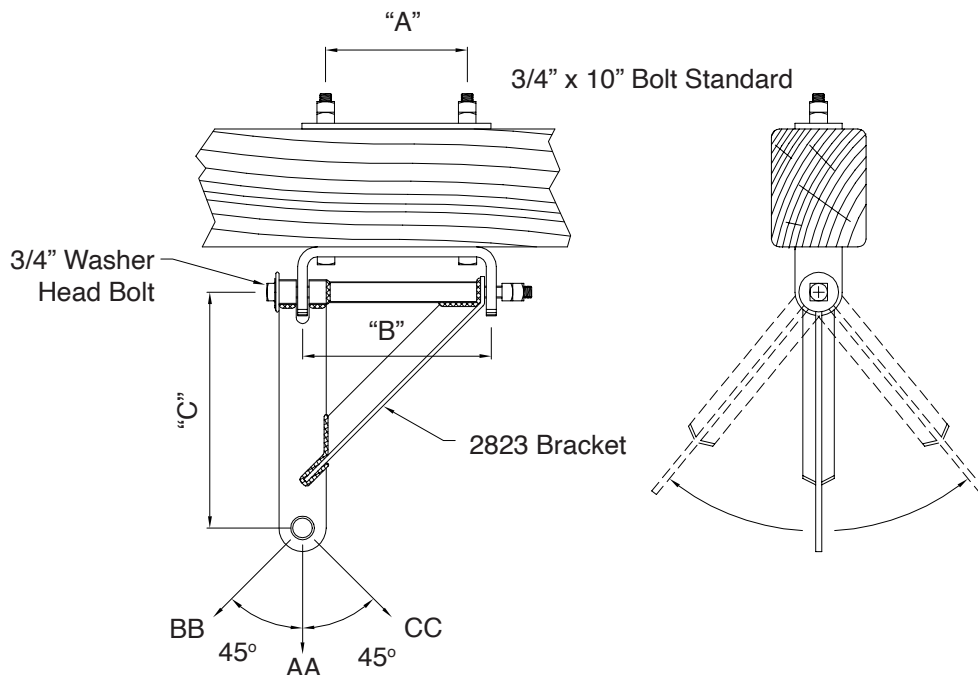


2823 Swinging Angle Bracket

The Hughes Brothers 2823 Swinging Angle bracket is used on single arm crossarm assemblies to provide additional clearance from conductor to crossarm when the insulators are subject to deflections as is the case on slight angle structures.

The 2823 Swinging Angle Bracket is furnished complete with bolts, nuts and washer plate. Other sizes can be ordered by stating length, spacing and crossarm size.

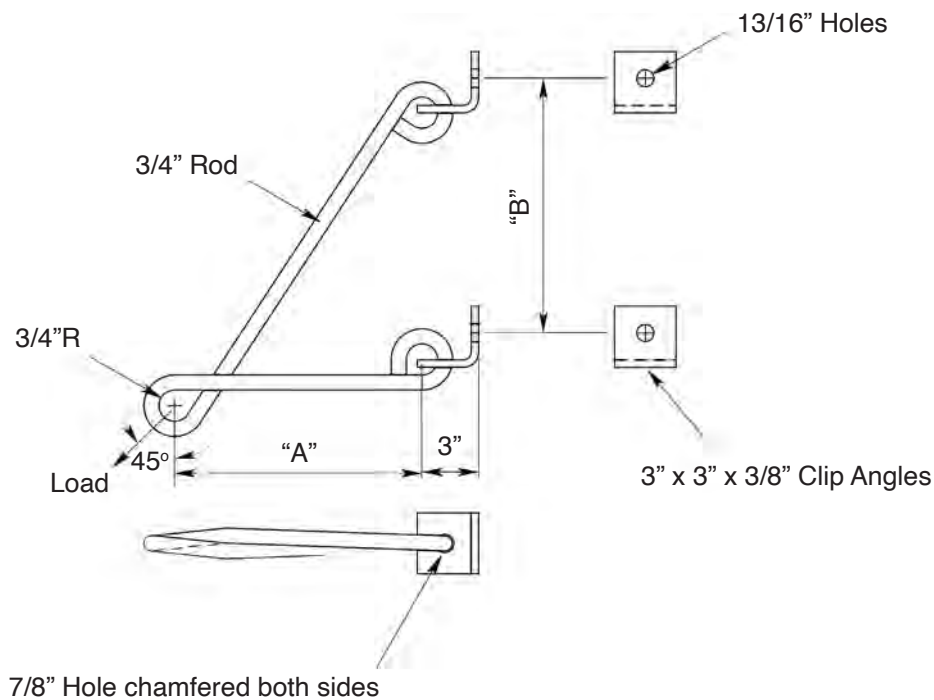
Stock No.	"A"	"B"	"C"	Crossarm Size	Weight Lbs. ea.	Ultimate Load Rating / lbs		
						"AA"	"BB"	"CC"
2823.5	6"	9	12	Specify	25	20,000	20,000	12,000
2823.6	9"	12	15		30			
2823.7	12"	15	18		35			
2823.8	15"	18	21		40			



2846 Swinging Angle Bracket

The Hughes Brothers 2846 Swinging Angle Brackets are used where the insulators are suspended from the pole, usually on angles from 6° to 25° depending on the conductor size and span length.

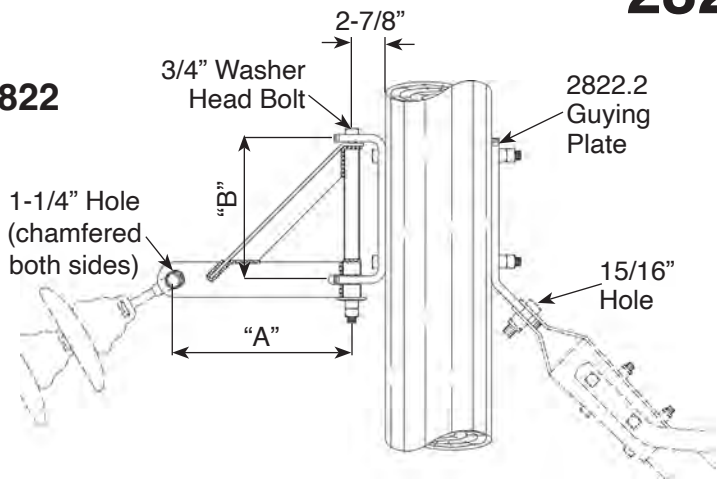
The principal function of the swinging angle bracket is to provide additional clearance from the conductor to the pole. The swinging action of the bracket relieves the pole from the torque load introduced by uneven tension in the conductor in adjacent spans or in the event of a broken conductor.



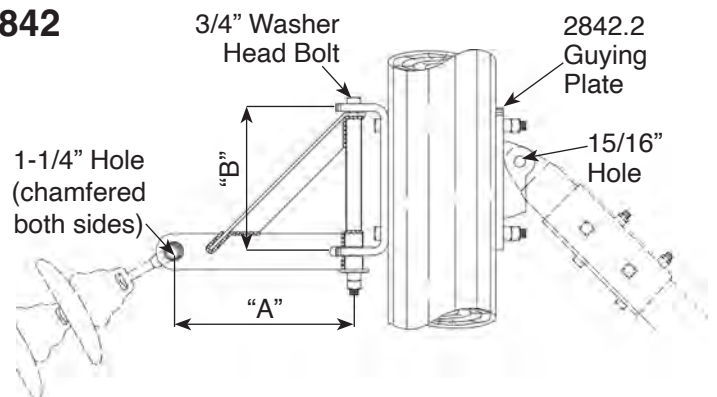
Stock No.	"A"	"B"	Wt. / lbs	Ultimate Load Rating
2846.6	9"	9"	8.8	5,000
2846.7	12"	12"	9.0	5,000

2822 & 2842 Swinging Angle Bracket

2822



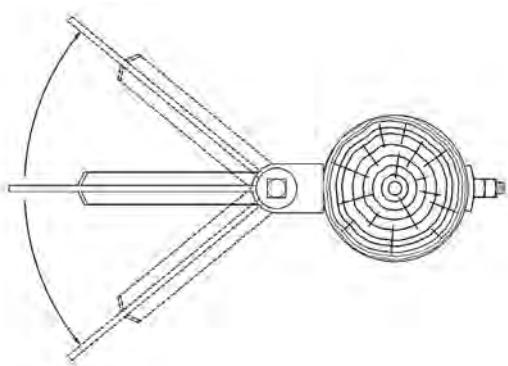
2842



Hughes Brothers 2822 & 2842 Swinging Angle Brackets are used where the insulators are suspended from the pole, usually on angles from 6° to 25° depending on the conductor size and span length.

The principal function of the swinging angle bracket is to provide additional clearance from the conductor to the pole. The swinging action of the bracket relieves the pole from the torque load introduced by uneven tension in the conductor in adjacent spans or in the event of a broken conductor.

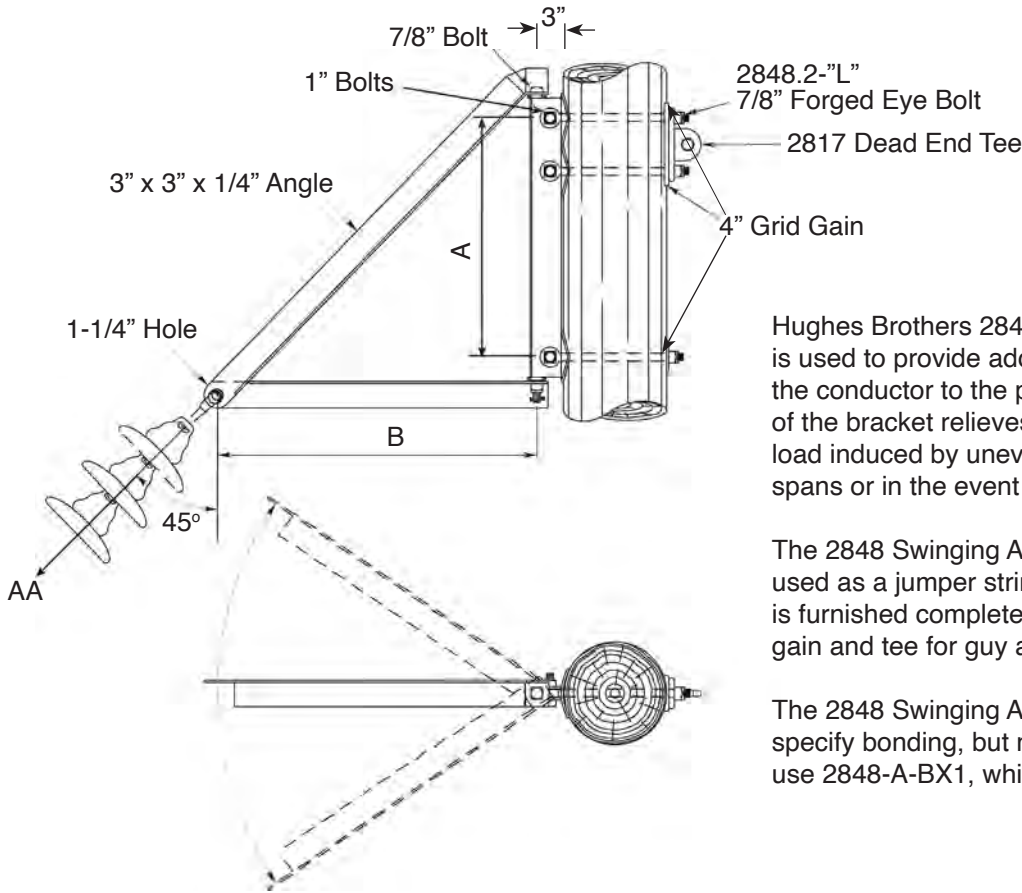
The 2822 & 2842 Swinging Angle Bracket assemblies are furnished complete as shown including two 3/4"x14" through bolts, other bolt lengths are available. The 2822 and 2842 are identical except for the type of guy plate used. (See illustration).



Stock No.	"A"	"B"	Mtg. Bolt Spacing	Ultimate Load Rating / lbs	
				45° at insulator connection	Weight Lbs. ea.
2822.5	12	9	6	20,000	29
2822.6	15	12	9		35
2822.7	18	15	12		41
2822.8	21	18	15		47
2842.5	12	9	6	20,000	28
2842.6	15	12	9		32
2842.7	18	15	12		38
2842.8	21	18	15		44

NOTE: When a bracket is required other than those listed in the tables, specify the bracket length and through-bolt spacing desired.

2848 Swinging Angle Bracket



Hughes Brothers 2848 Swinging Angle Bracket is used to provide additional clearance from the conductor to the pole. The swinging action of the bracket relieves the pole from the torque load induced by uneven tensions in adjacent spans or in the event of a broken conductor.

The 2848 Swinging Angle Bracket can also be used as a jumper string support. The bracket is furnished complete with mounting bolts, grid gain and tee for guy attachment.

The 2848 Swinging Angle Bracket does not specify bonding, but most all 2848 applications use 2848-A-BX1, which has bonding hardware.

NOTE: Supplied with (1) 16" and (2) 18" eyebolts.

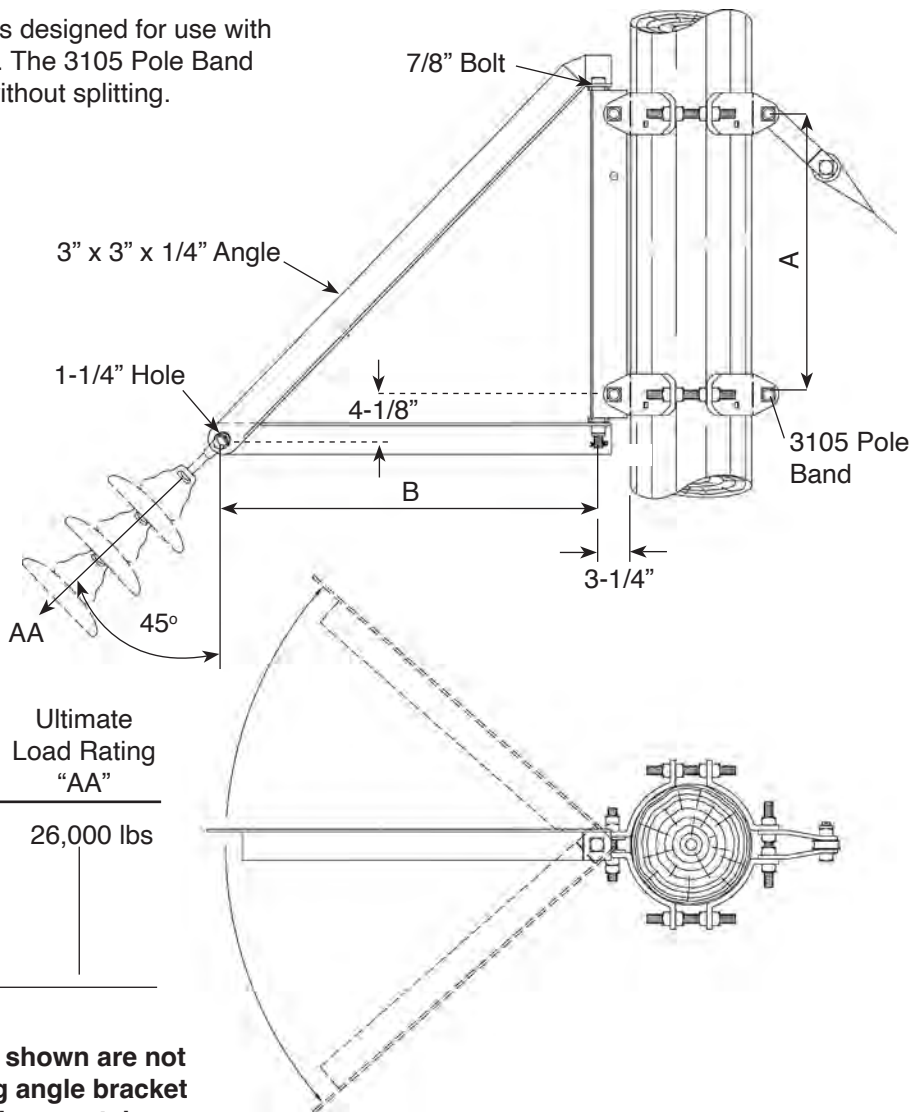
Ordering example for other lengths:

2848 - * - 20-22
 |
 20" and 22"
 2848.2 Eye Bolts

Stock No.	"A"	"B"	Weight Lbs. ea.	Ultimate Load Rating "AA"
2848-A	1'-9"	2'-0"	71	30,000 lbs
2848-B	1'-9"	2'-6"	75	
2848-C	1'-9"	3'-0"	81	
2848-D	2'-0"	2'-6"	77	
2848-E	2'-0"	3'-0"	86	
2848-F	2'-3"	3'-0"	88	
2848-G	2'-3"	3'-6"	94	
2848-H	2'-3"	4'-0"	102	
2848-J	2'-3"	5'-0"	112	
2848-K	2'-6"	3'-6"	69	
2848-L	3'-0"	4'-0"	108	
2848-M	3'-0"	4'-6"	116	

2831 Swinging Angle Bracket

The 2831 Swinging Angle Bracket is designed for use with Hughes Brothers 3105 Pole Bands. The 3105 Pole Band helps the pole carry a larger load without splitting.

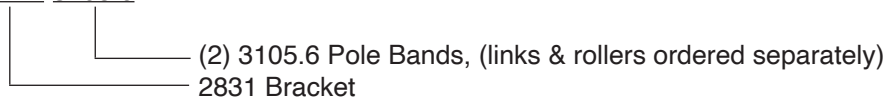


Stock No.	"A"	"B"	Weight Lbs. ea.	Ultimate Load Rating "AA"
2831-A	1'-9"	2'-0"	45	26,000 lbs
2831-B	1'-9"	2'-6"	49	
2831-C	1'-9"	3'-0"	53	
2831-D	2'-3"	3'-6"	63	
2831-E	2'-3"	5'-0"	76	

NOTE: The pole bands and links shown are not furnished as part of the swinging angle bracket assembly and should be ordered separately.

To order (2) 3105 Pole Bands with the 2831 bracket specify pole band and bracket as follows:

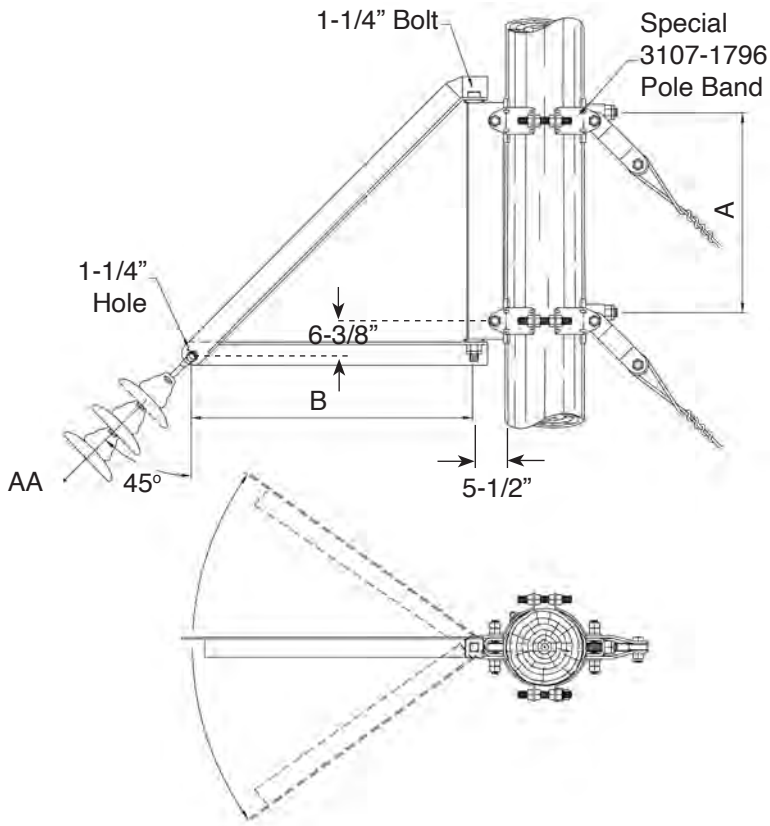
Example: 2831-B-3105.6*



*See pole bands for correct pole diameter.

1796 Swinging Angle Bracket

The 1796 Swinging Angle Bracket is designed for use with Hughes Brothers special 3107 Pole Band. The special 3107 Pole Band helps the pole carry a larger load without splitting and is furnished with this swinging angle bracket, only when specified.



Stock No.	"A"	"B"	Weight lbs. ea.	Ultimate Load Rating "AA"
1796-A	1'-9"	2'-0"	93	35,000 lbs
1796-B	2'-3"	4'-0"	121	
1796-C	2'-0"	3'-0"	102	
1796-D	2'-6"	3'-6"	122	
1796-E	4'-0"	5'-0"	177	
1796-F	3'-9"	4'-9"	164	

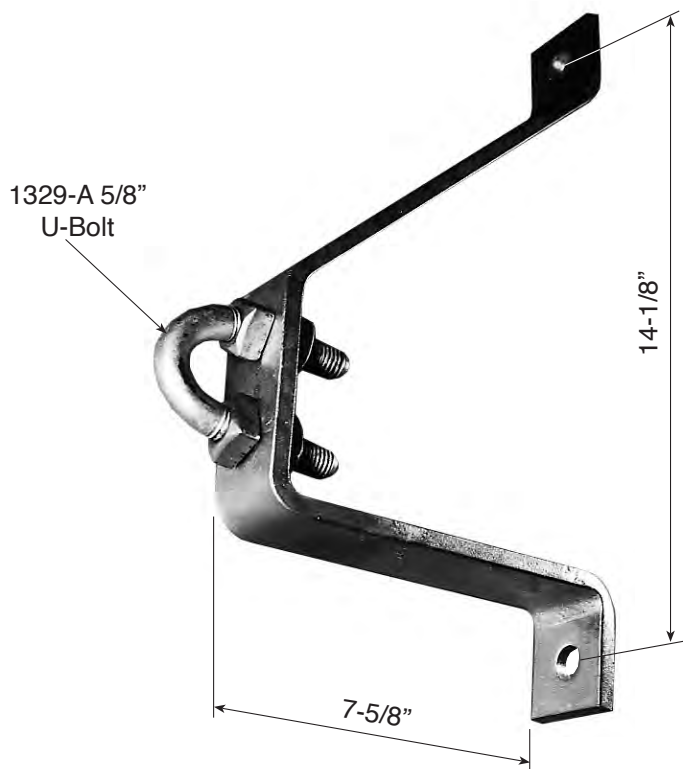
NOTE: The pole bands and links shown are not furnished as part of the swinging angle bracket assembly and should be ordered separately.

To order (2) 3107 Pole Bands with the 1796 bracket specify pole band and bracket as follows:

Example: 1796-B-3107.6*

└──┬── (2) 3107.6 Pole Bands, (links & rollers ordered separately)
 └──┴── 1796 Bracket

*See pole bands for correct pole diameter.



2839 Light Duty Corner Bracket

The Hughes Brothers 2839 Corner Bracket mounts to a pole with (2) 5/8" bolts ordered separately.

Stock No.	Unit Wt.
2839	6.5 lbs

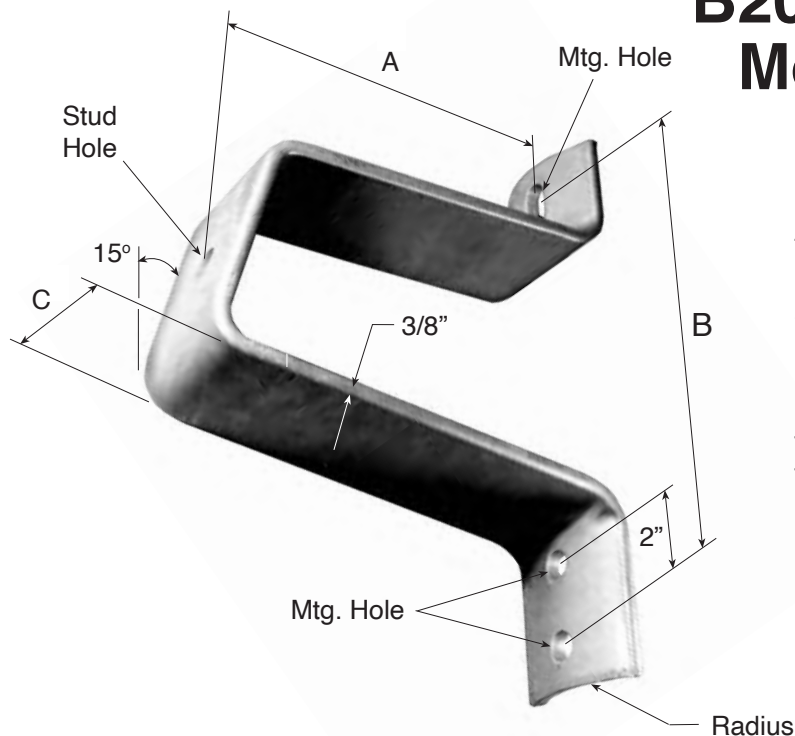
B2684.2C Service Drop Bracket

The B2684.2C Service Drop Link features four 7/32" holes for mounting on buildings or crossarms. Made from 3/16" x 1" stock with 7/16" attachment hole. Hot dip galvanized per ASTM A123.

Stock No.	Mtg. Holes	Attachment Hole	Weight
B2684.2C	7/32"	7/16"	.92 lbs



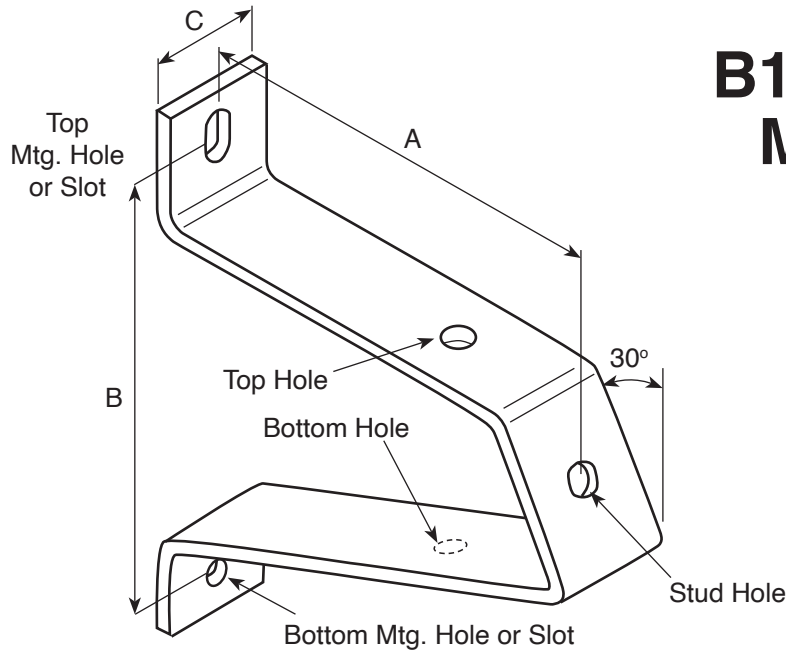
B2047 Post Insulator Mounting Bracket



The Hughes Brothers B2047 series Post Insulator Mounting Brackets feature a curved mounting base. A variety of material thicknesses and widths are offered.

Insulator mounting studs are also manufactured by Hughes Brothers. Please see fastener section, 2750 series.

Stock No.	A	B	C	Radius	Stud Hole	Top Mtg.Hole	Bottom Mtg.Hole	No. of Bottom Mtg Holes	Weight / lbs
B2047.1	10"	10"	4"	3-1/2"	13/16"	11/16"	11/16"x1-3/8"	1	12.0
B2047.2	6"	10"/12"	4"	3-1/2"	13/16"	11/16"	11/16"	2	9.5
B2047.3	10"	10"/12"	4"	3-1/2"	13/16"	11/16"	11/16"	2	13.2
B2047.4	15"	12"	4"	3-1/2"	13/16"	11/16"	11/16"x1-3/8"	1	17.0
B2047.8	6"	10"	4"	3-1/2"	13/16"	11/16"	11/16"x1-3/8"	1	17.0
B2047.9	15"	10"	6"	8"	15/16"	13/16"	11/16"x1-3/8"	1	24.5
B2047.11	5"	10"	3"	3-1/2"	11/16"	11/16"	11/16"x1-3/8"	1	6.0
B2047.13	15"	12"	4"	3-1/2"	13/16"	11/16"	11/16"x1-3/8"	1	16.6
B2047.15	15"	10"	4"	3-1/2"	13/16"	11/16"	11/16"x1-3/8"	1	16.4
B2047.18	9-1/2"	10"	4"	3-1/2"	13/16"	11/16"	11/16"x1-3/8"	1	12.0
B2047.19	10"	10"	4"	3-1/2"	13/16"	11/16"	11/16"x1-3/8"	1	12.0
B2047.20A	8-1/2"	10"/12"	4"	3-1/2"	13/16"	11/16"	11/16"	2	13.0
B2047.23	9"	10"	4"	3-1/2"	13/16"	13/16"	13/16"x1-1/2"	1	12.0
B2047.24	12"	10"	4"	3-1/2"	15/16"	13/16"	13/16"x1-1/4"	1	14.0



B1859 Post Insulator Mounting Bracket

The Hughes Brothers B1859 series Post Insulator Mounting Brackets have a flat mounting base. They are formed from 3/8" x 2-1/2" or 3" steel.

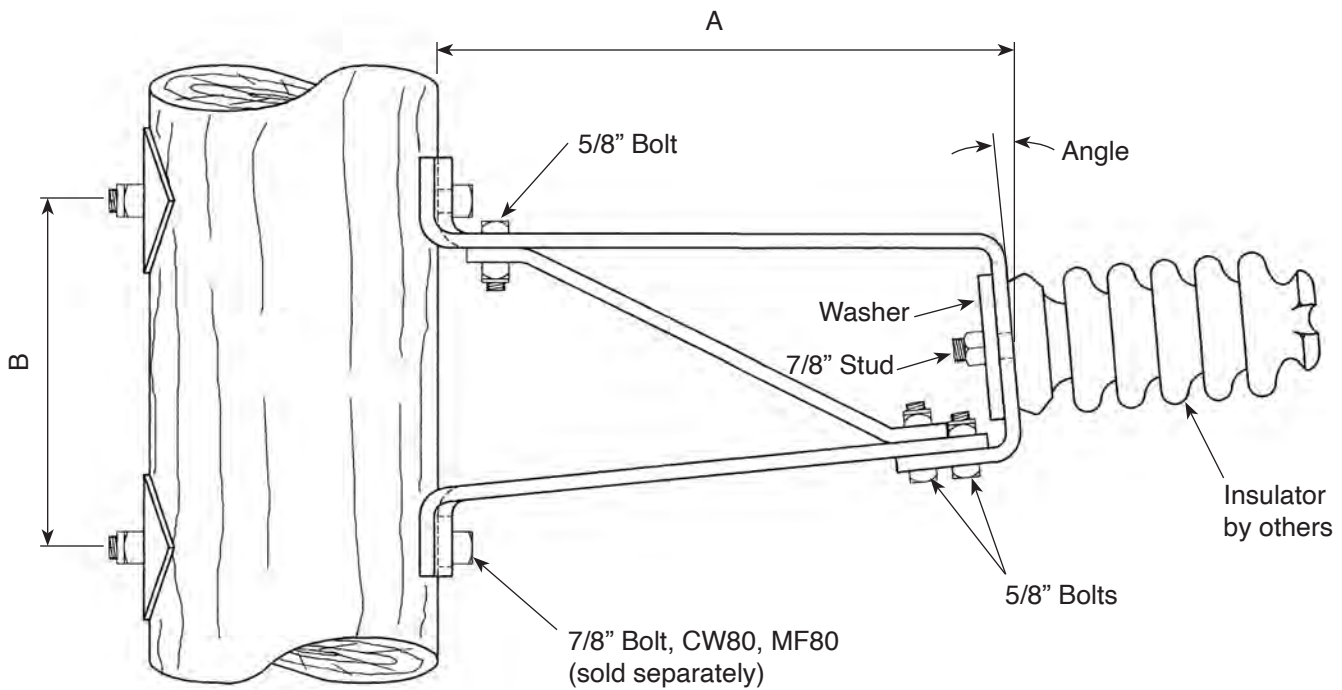
Insulator mounting studs are also manufactured by Hughes Brothers. Please see fastener section, 2750 series.

Stock No.	A	B	C	Stud Hole	Top Mounting Hole	Bottom Hole	Top Hole	Bottom Mtg. Hole	Weight / lbs
B1859.1	4-1/4"	8-1/2"	2-1/2"	11/16"	11/16" x 1-3/8"	-	-	11/16"	4.3
B1859.2	8-1/4"	8-1/2"	2-1/2"	11/16"	11/16"x1-3/8"	9/16"	11/16"	11/16"	6.2
B1859.3	15"	12"	3"	11/16"	11/16"	-	-	11/16"x1-3/8"	12.3
B1859.4	7-3/4"	8-1/2"	2-1/2"	13/16"	11/16" x 1-3/8"	15/16"	13/16"	11/16"	6.0
B1859.5	12"	12"	3"	13/16"	11/16"x1-3/8"	15/16"	13/16"	11/16"	10.4
B1859.6*	15"	10"	3"	13/16"	11/16"	-	-	11/16"x1-3/8"	12.0
B1859.7	12"	12"	3"	11/16"	11/16"x1-3/8"	15/16"	13/16"	11/16"	10.4

* 15° from horizontal insulator angle

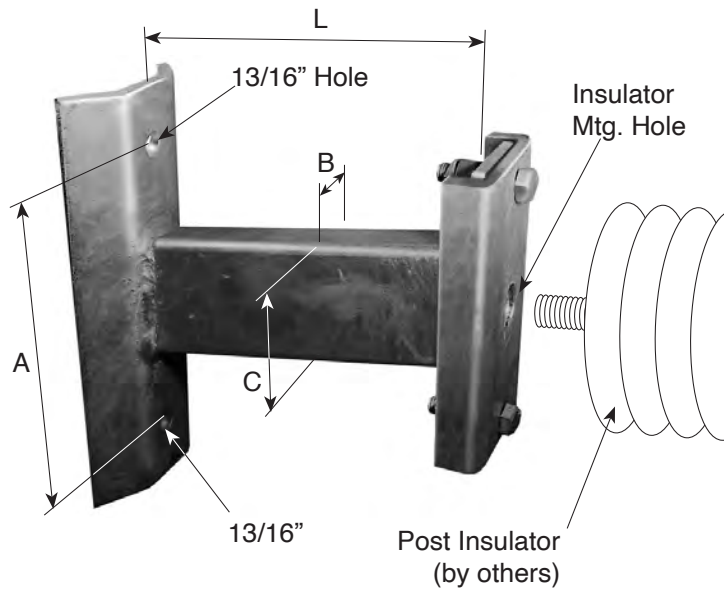
B2025 Heavy Post Insulator Mounting Bracket

The Hughes Brothers B2025 series of post insulator mounting brackets have a curved mounting base. The B2025 series is used for extra heavy loads and greater pole clearances.



Stock No.	A	B	Stud Hole	Mtg. Hole	Angle	Weight
B2025-P	20"	12"	13/16"	13/16"	5°	48 lbs.
B2025-P1	20"	12"	15/16"	15/16"	12°	48 lbs.
B2025-P2	14"	12"	15/16"	15/16"	12°	38 lbs.

C4466-B Post Insulator Stand-Off Arm



Hughes Brothers C4466-B Series of Line Post Insulator Stand-Off Arms are used for special applications requiring a 1 ft. to 3 ft. clearance from the pole.

Stock No.	L	A	B	C	Wt./lbs.
C4466-B1.0	12"	10"	2"	4"	33
C4466-B1.25	15"	10"	2"	4"	35
C4466-B1.5	18"	10"	2"	4"	37
C4466-B1.75	21"	10"	2"	4"	39
C4466-B2.0	24"	12"	2"	5"	43
C4466-B2.25	27"	12"	2"	5"	46
C4466-B2.5	30"	12"	2"	5"	49
C4466-B2.75	33"	12"	2"	5"	52
C4466-B3.0	36"	12"	2"	5"	55

Ordering Example:

C 4 4 6 6 - B 1 . 7 5 A

"A" for 13/16" ins. mtg. hole
 "B" for 15/16" ins. mtg. hole

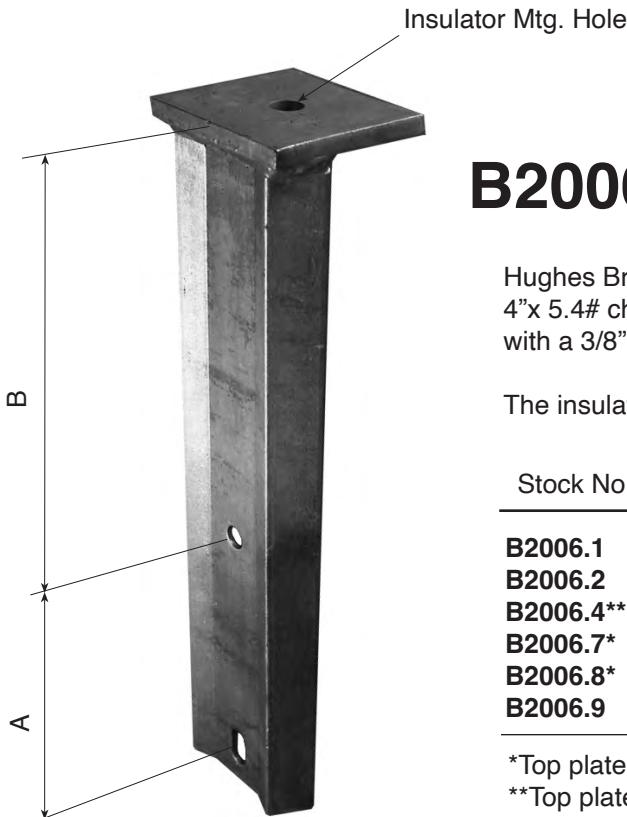
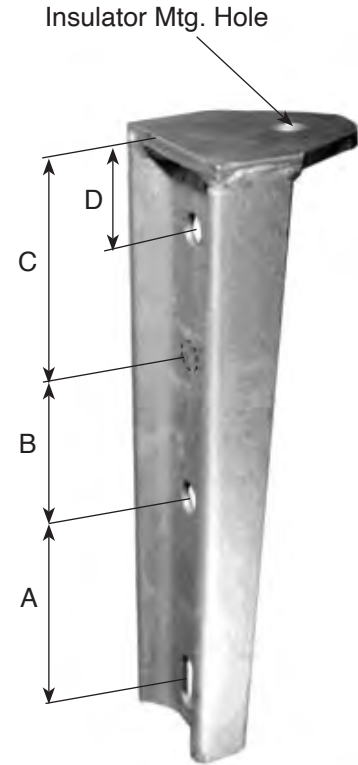
Length "L" in feet

A1977 Pole Top Bracket

The Hughes Brothers A1977 Pole Top Bracket is used to mount post insulators from 15kv to 34.5kv.

The tapered body is formed from 3/16" plate and welded to a 3/8" top plate. Pole and insulator mounting holes are 11/16". The A1977.5 is similar to the A1977.1 but uses 1/4" plate for the body and 1/2" top plate for greater strength.

Stock No.	Ins. Mtg Hole	Mtg. Hole	A	B	C	D	Weight
A1977.1	11/16"	11/16"	5"	NA	8-1/2"		6.3 lbs
A1977.5	13/16"	11/16"	5"	3"	3-1/4"	2"	9.2 lbs



B2006 Pole Top Bracket

Hughes Brothers B2006 Pole Top Bracket is made from 4"x 5.4# channel and has a body formed to fit the pole with a 3/8" x 4" x 5" top plate.

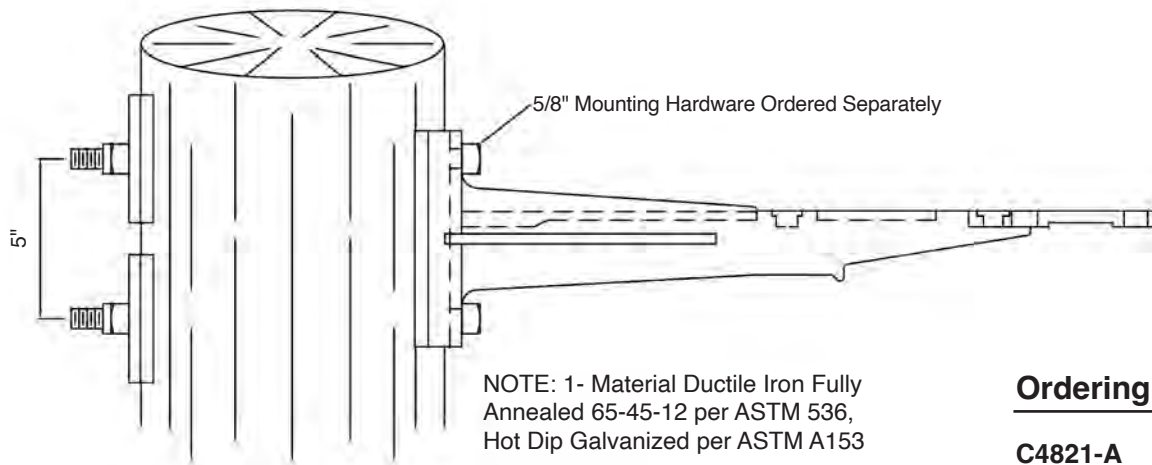
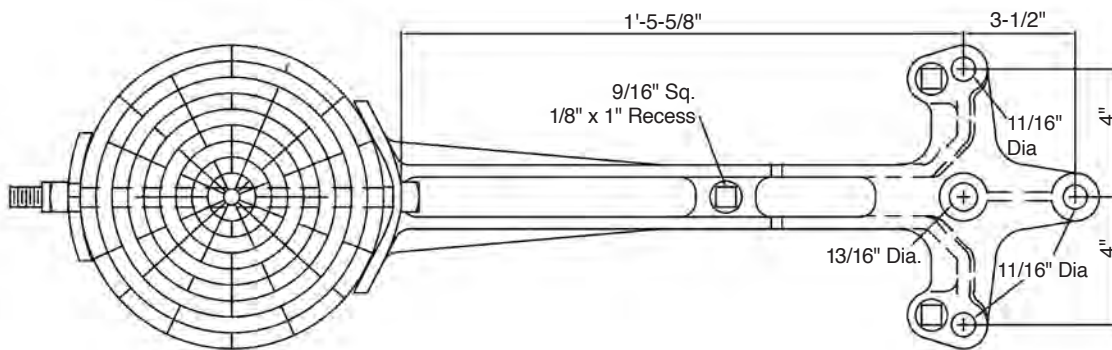
The insulator mounting hole is 13/16" in diameter.

Stock No.	Pole Mtg Hole	A	B	Weight / lbs
B2006.1	11/16"	5"	8"	8.7
B2006.2	11/16"	5"	5"	7.3
B2006.4**	11/16"	8"	12-1/8"	14.4
B2006.7*	11/16"	8"	12"	13.8
B2006.8*	11/16"	5"	24"	17.4
B2006.9	11/16"	8"	6"	9.0

*Top plate is 1/2" x 4-1/2" x 5"

**Top plate is 3/8" x 5-1/4" x 5-1/2", Channel-formed Plate

C4821-A Standoff Bracket



Ordering Example:

C4821-A Unit Wt. 15 lbs

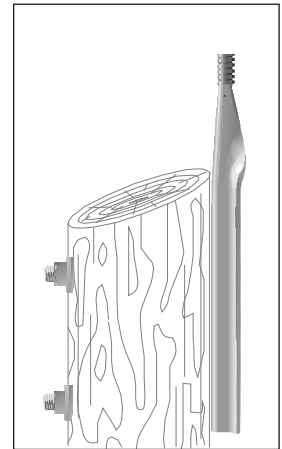
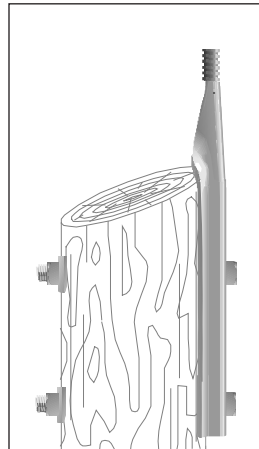
2770 Pole Top Pin with Nylon Alloy Threads

Hughes Brothers 2770 series of steel pole top pins feature a nylon alloy material as an alternative to cast lead threads.

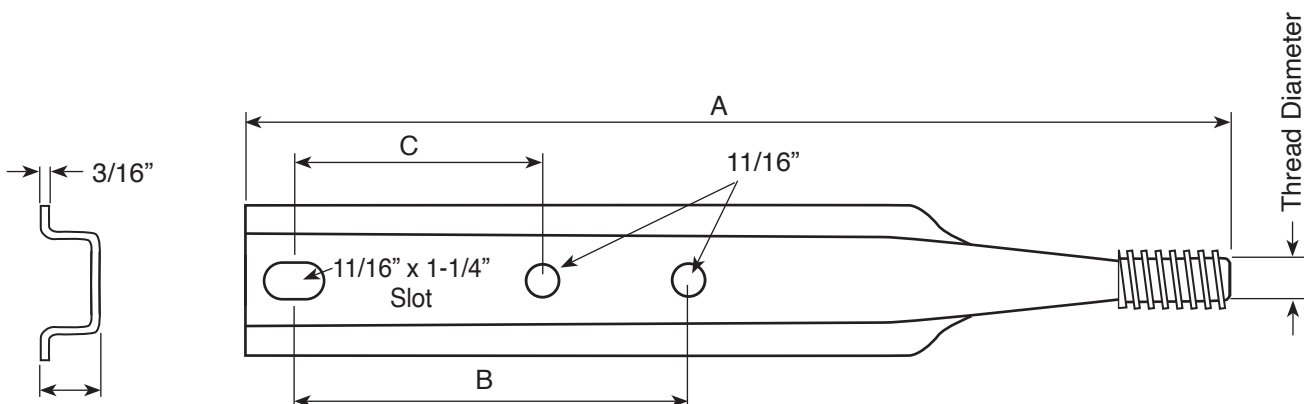
The use of a nylon alloy thread offers superior insulator to pole top pin fit and alignment. Also, handling, use and disposal problems associated with lead threads are eliminated. Extensive testing of the nylon alloy in the pole top application has been performed by Hughes Brothers.

Benefits of the Hughes Brothers Nylon Alloy threads are:

- A flexible more resilient thread than lead threads
- Superior insulator alignment
- A firm, stable fit with most common pin insulators ie. no rocking of the insulator
- Superior strength over lead threads



The 2770 is designed to be equally strong when mounted with channel facing or away from the pole. This feature allows for a 1" variation in pole mounting bolt length.



1-7/16" for 2770-A
1-5/16" for 2770-B

Ordering Example:

2770-A 20-C5-100

Stock No. ———
 ——— 100 = 1" threads
 ——— "C" dimension (when applicable)
 ——— Length "A" dimension

Stock No.	"A"	"B"	"C"	Unit Wt. lbs
2770-A24-100	24"	8"	NA	6.2
2770-A24-C5-100	24"	8"	5"	6.2
2770-A20-100	20"	8"	NA	4.7
2770-A20-C5-100	20"	8"	5"	4.7
2770-B18	18"	8"	NA	3.4
2770-B18-C5	18"	8"	5"	3.4
2770-B15	15"	5"	NA	2.9

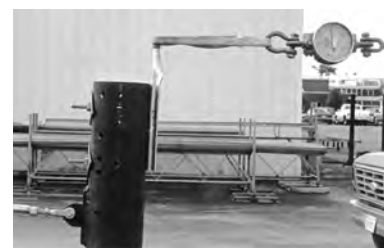
The 2770-A20-100 is RUS accepted.

Testing

Transverse and Longitudinal Loading



1500 lbs. transverse load with no deformation, 2770-A20-100.



1200 lbs. longitudinal load with no deformation, 2770-A20-100.

2301 Spool Bracket

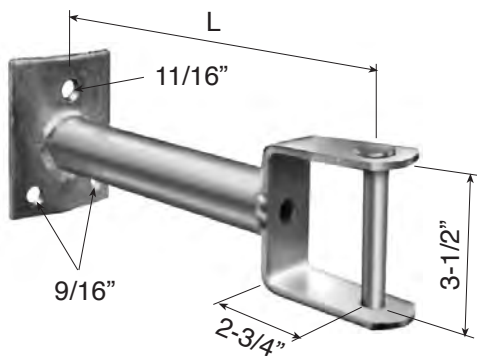
The 2301 Light Duty Spool Bracket is used as a service, street lighting or light load dead end bracket.

The 2301 is made from 2-1/2" x 3/16" steel, curved to fit the contour of the pole. A 5/8" pin with humpback cotter key is supplied assembled to the bracket.



Stock No. Unit Wt. Std Pkg.

2301	1.6	20
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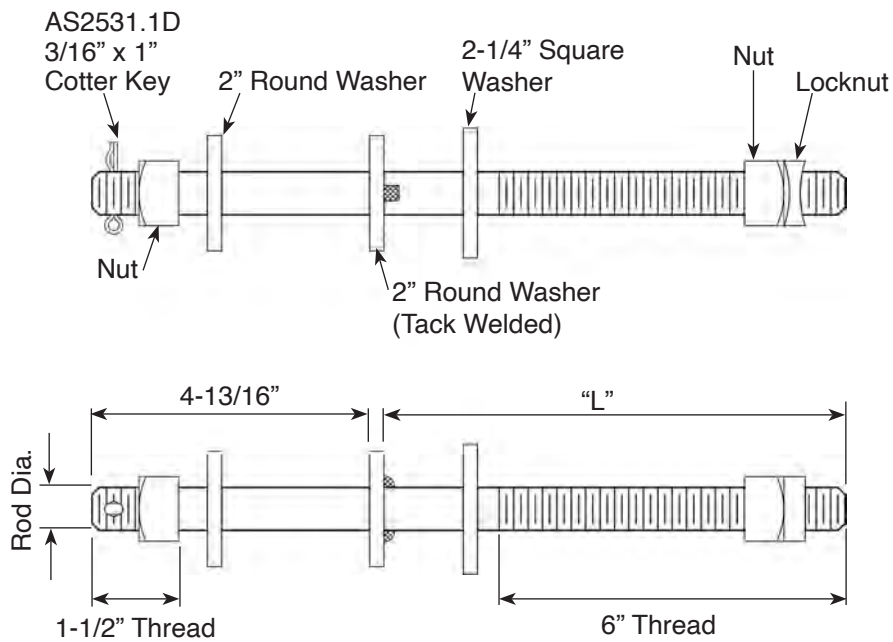


B2684-G Bracket

The B2684-G Neutral Standoff Bracket offsets the neutral wire from the pole allowing for more climbing space. The B2684-G uses a 5/8" pin & cotter key.

Stock No.	Unit Wt.	"L"
B2684-G	4.2 lbs	12"
B2684-G1	5.0 lbs	14-1/8"
B2684-G2	4.0 lbs	9"

AS2290 Neutral Support/Upset Bolt



Ordering Example:

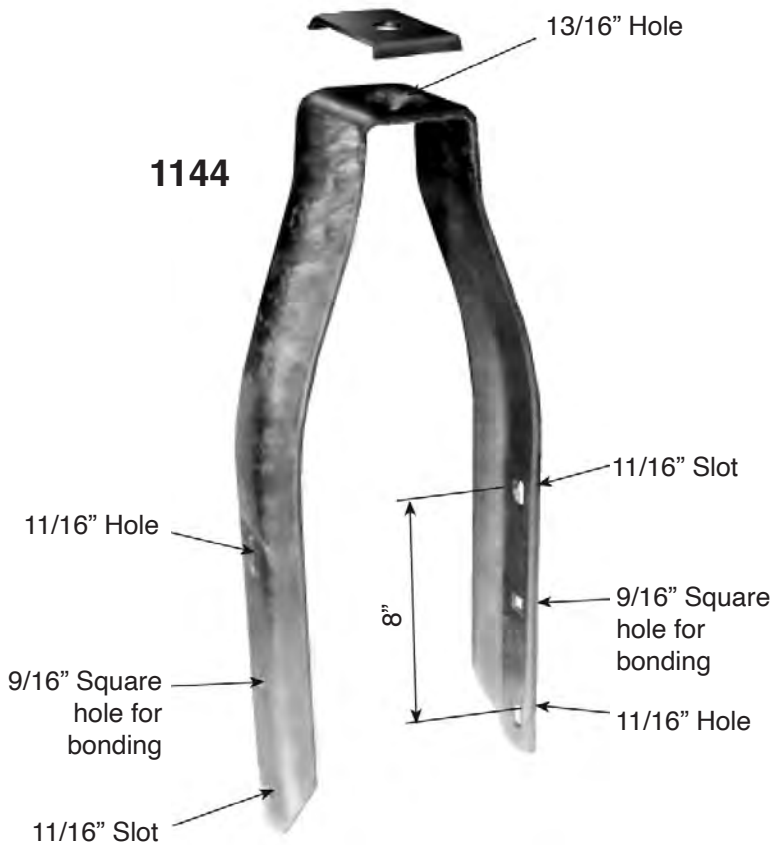
AS2290-A-12-CPT, Complete Assembly

Specify "L" Dimension

A= 5/8" Rod Diameter

B= 3/4" Rod Diameter

1144 Ridge Iron



Hughes Brothers developed these Ridge Irons which today are nationally accepted as a standard. The 1144 Ridge Irons were originally designed so utility companies could use the short shank pins they had on hand. The No. 1144-A are now preferred because they utilize the same long shank pins used in crossarms and because they are stronger due to the action of the pin-shank bracket.

Both the 1144 and 1144-A are simple in design, contain a minimum of parts and withstand all loads that can be carried by standard insulator pins.

These ridge irons are formed to fit the pole which helps to prevent pole-top splitting and are used primarily for 13.2 kv. to 44 kv. construction. The side members are formed from 4" x 3/16" steel.

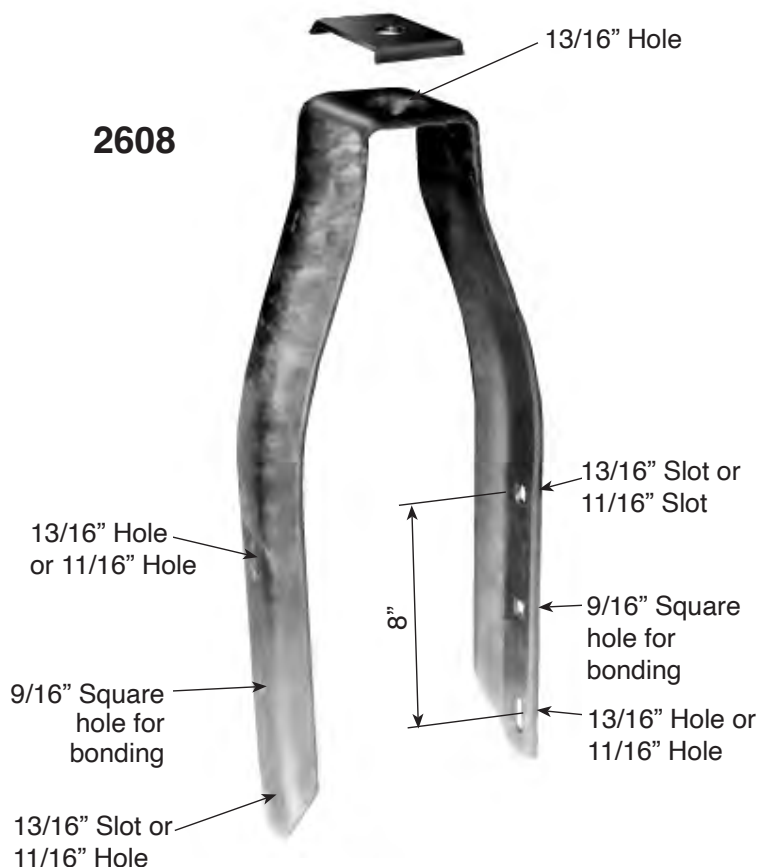
- Shipped in bundles of five ridge irons
- Insulator pins not included
- Mounting bolts should be ordered from our bolt section

1144-A



Stock No.	Pole Dia. in Inches	Unit Weight / lbs.
1144	6-1/2 - 9	10
1144-A	6-1/2 - 9	11

2608



2608 Ridge Iron

Hughes Brothers developed these Ridge Irons which today are nationally accepted as a standard. The 2608 Ridge Irons were originally designed so utility companies could use the short shank pins they had on hand. The No. 2608-A are now preferred because they utilize the same long shank pins used in crossarms and because they are stronger due to the action of the pin-shank bracket.

Both the 2608 and 2608-A are simple in design, contain a minimum of parts and withstand all loads that can be carried by standard insulator pins.

These ridge irons are formed to fit the pole which helps to prevent pole-top splitting and are used primarily for 13.2 kv. to 44 kv. construction. The side members are formed from 4" x 1/4" steel.

- Shipped in bundles of five ridge irons
- Insulator pins not included
- Mounting bolts not included, and should be ordered from our bolt section

2608-A



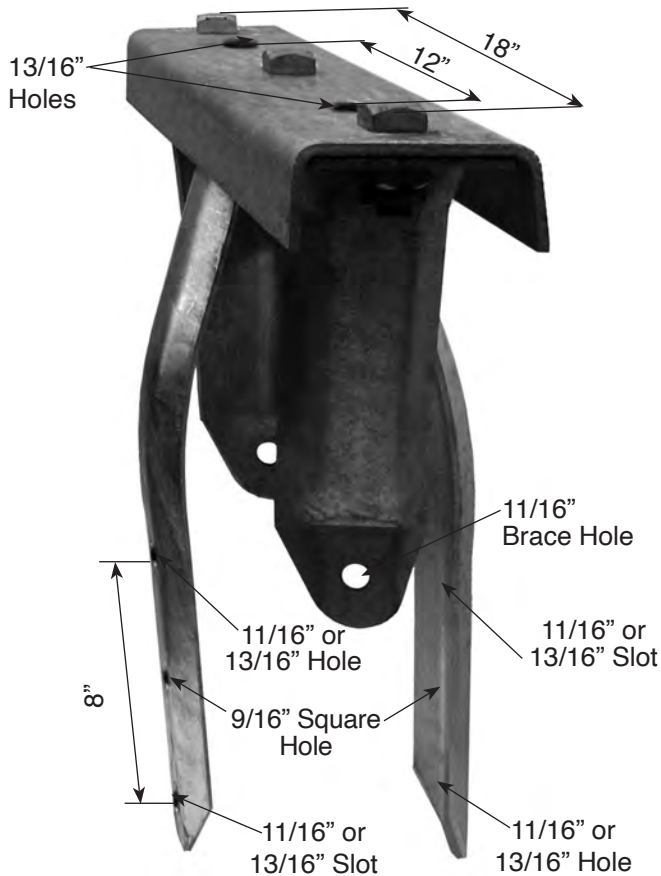
Stock No.	Pole Dia. in Inches	Unit Weight / lbs.	Mtg, Bolts
2608-11-13	6-1/2 - 9	13	5/8"
2608-13-13	6-1/2 - 9	15	3/4"
2608-A-11-13	6-1/2 - 9	15	5/8"
2608-A-13-13	6-1/2 - 9	15	3/4"
2608-A-13-15	6-1/2 - 9	15	3/4"

2600 Ridge Iron

The Hughes Brothers 2600 Ridge Irons are for use with short shank pins and the 2600-A for use with long shank pins. The 5" channel is assembled to the ridge iron and supported by two braces.

Side members, shaped to hug the pole, tend to prevent pole-top splitting.

- Shipped in bundles of five (5) ridge irons
- Insulator pins not included
- Mounting bolts are not included and should be ordered from Bolt Section.
- 2600-A includes pin shank supports.



Stock No.	Pole Dia. Inches	Unit Weight / lbs	Standard Mounting Bolts
2600	6-1/2 - 9	28	5/8"
2600-A	6-1/2 - 9	30	3/4"

Ordering Example:

2600 - 13 - 13

Pin Hole Size
Mounting Hole and Slot Size

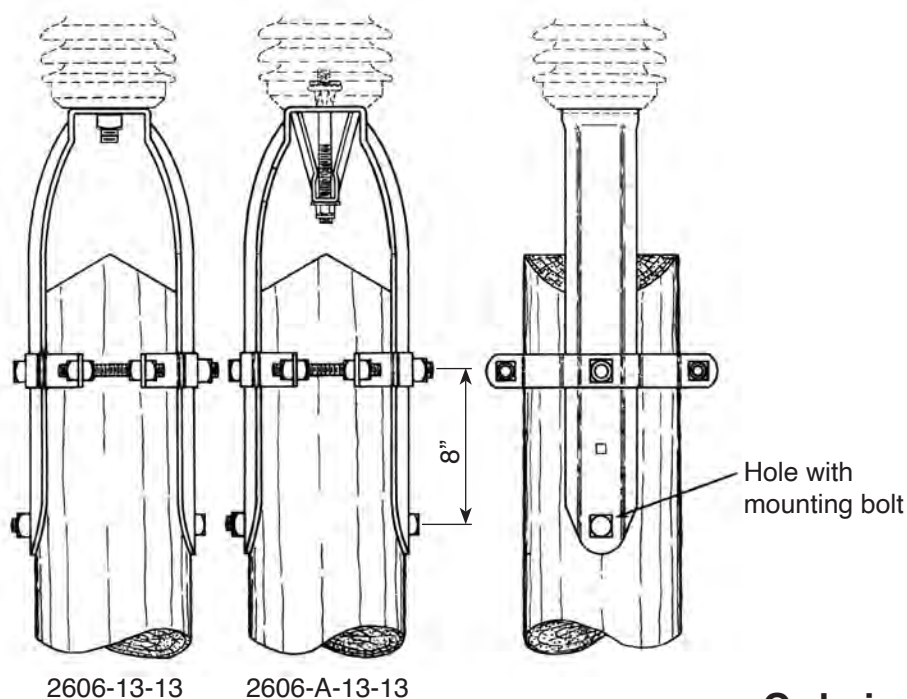
2606 Ridge Iron

Hughes Brothers 2606 and 2606-A Ridge Irons for line post construction are similar to the 2608 Ridge Iron. They are designed to increase the strength of the assembly by the use of a pole band.

The pole band, made from 1-3/4" x 1/4" steel, fits over the form-fitted side members of the Ridge Iron and pole and effectively reduces the possibility of pole replacements due to pole-top splitting.

- Studs and pin-shank brackets are boxed and bands and side members are bundled
- Insulator pins are not included
- Mounting bolts should be ordered from the Fastener Section

Stock No.	Top Dia. Inches	Unit weight / lbs
2606-11-13	6-1/2 - 9	13
2606-13-13	6-1/2 - 9	13
2606-A-11-13	6-1/2 - 9	15
2606-A-13-13	6-1/2 - 9	15
2606-A-13-15	6-1/2 - 9	15



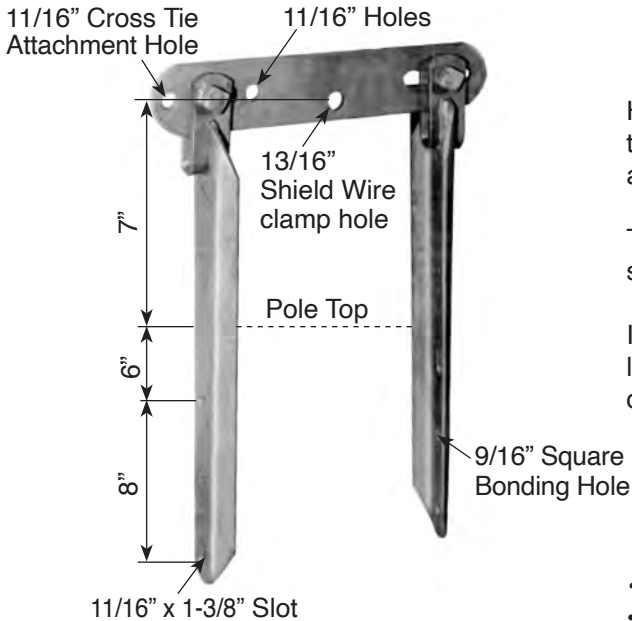
Ordering Example:

2 6 0 6 - 1 1 - 1 3

└── Pin Hole Size

└── Mounting Hole & Slot Size

2604 Ridge Iron



Hughes Brothers 2604 Ridge Iron is a complete assembly with two side members and cross plate, and is designed to be adaptable to varying pole diameters.

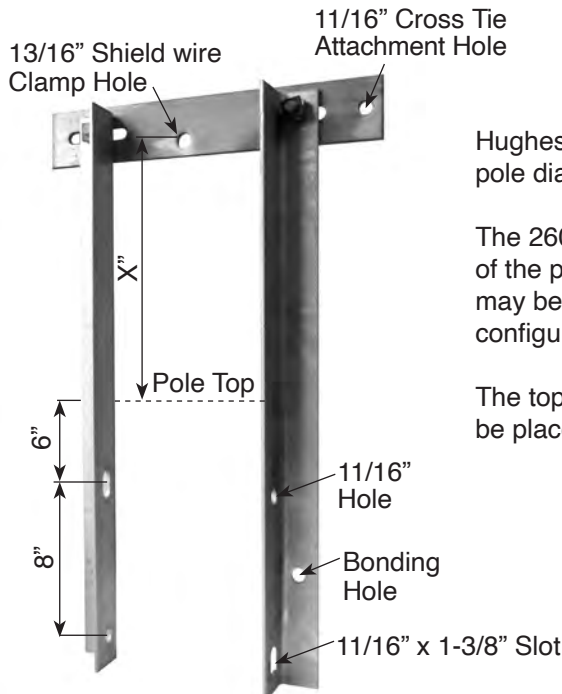
The top plate can be removed after installation to allow the shield wire to be placed in between the side plates.

In case of failure of the clamp or pin, or if the clamp becomes loose, the shield wire is held at the top of the pole and will not drop on the conductor.

Stock No.	Pole Dia / in	Weight Ea.
2604	7-1/2" - 12"	20 lbs.

- Side members and cross plates are bundled separately
- Mounting bolts should be ordered from the Fasteners Section.

2605 Ridge Iron



Hughes Brothers 2605 Ridge Irons, like the 2604, are adaptable to varying pole diameters.

The 2605 Ridge Iron is used where additional height is required at the top of the pole. When the "X" dimension exceeds 12" a heavier side angle may be required. Contact Hughes Brothers engineering staff for other configurations.

The top plate can be removed after installation to allow the shield wire to be placed in between the side plates.

Stock No.	Pole Dia / in	Weight Lbs. / Ea.
2605-9	6-1/2 - 11	14.0
2605-10		15.5
2605-12*		18.6
2605-14		19.7
2605-16		20.6

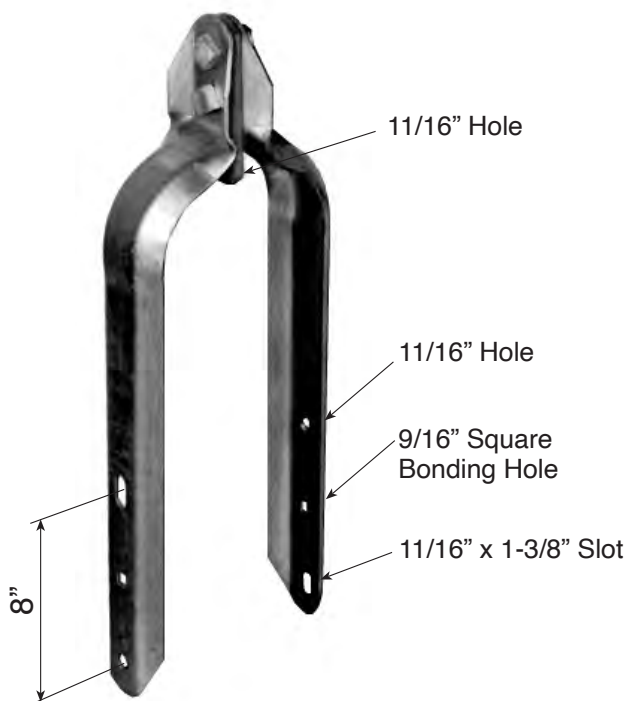
**Stock item*

Ordering Example:

2605 - "X"
 └── Distance above pole top

- Side members and cross plates are bundled separately
- Mounting bolts should be ordered from our Bolt Section
- Stock items are shipped 2 units per box
- Many other variations available

1155 Ridge Iron



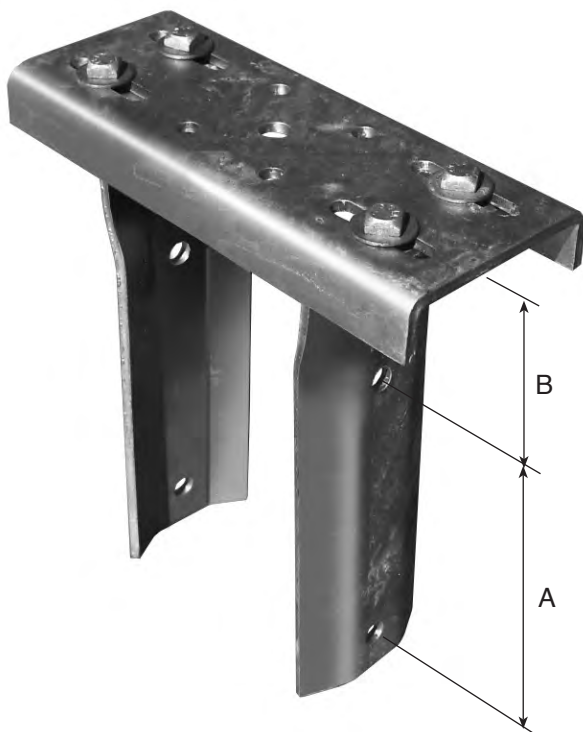
Hughes Brothers 1155 Ridge Iron is designed so that failure of the clamp or pin will not drop the shield wire on the conductor.

The 1155 is simple in design, containing a minimum of parts. The side members are form-fitted, shaped to fit the pole. The clamp attachment link is chamfered on both sides.

Stock No.	Pole Dia. Inches	Wt. Ea. Lbs.
1155	6-1/2 - 9	15

Pole mounting bolts to be ordered separately.

B2638 Ridge Irons



Hughes Brothers B2638 Ridge Irons for post insulator construction have a 5" bolt circle. The B2638 series provides for varying pole top diameters.

For single bolt insulator attachment, a 4" x 4" x 1/2" square washer with 15/16" hole is recommended.

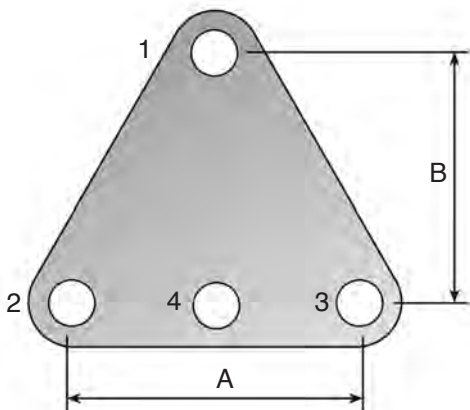
Stock No.	Pole Diameter	A	B	Weight Ea.
B2638-A	10-1/4" to 16"	10"	5-1/2"	38 lbs
B2638-B	6" to 11-3/4"	10"	5-1/2"	35 lbs
B2638-D	6" to 11-3/4"	9"	8-1/2"	47 lbs
B2638-E	6" to 11-3/4"	9"	22"	65 lbs

Pole Mounting holes are 13/16"

Insulator mounting holes are 11/16"

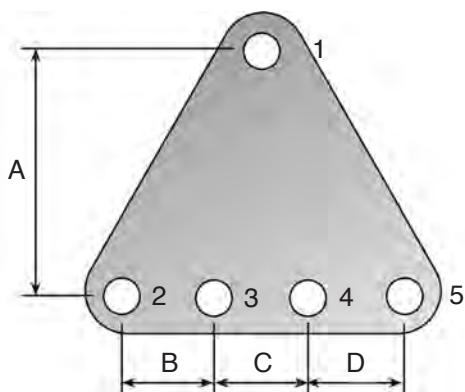
Center insulator mounting hole is 15/16"

C POLE LINE HARDWARE



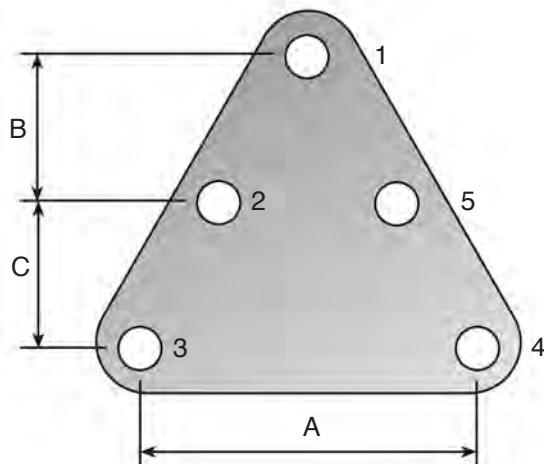
1896, AS2355 & AS2585 Yoke Plates

Stock No.	Thickness	Dimensions in Inches						Ultimate Strength Rating / lbs.	Weight/ Each lbs.
		A	B	1	2	3	4		
1896	3/8"	6	6	15/16	15/16	15/16		19,000	5.1
1896-B	1/2"	6	5-3/16	15/16	15/16	15/16		24,000	6.7
AS2355	3/8"	6	4	1-1/16	15/16	15/16		19,000	6.5
AS2355-A	1/2"	7	4	1-1/16	15/16	15/16		24,000	6.6
AS2355-B	3/4"	6	4	1-1/16	15/16	15/16		38,000	8.9
AS2355-C	3/4"	6	5-3/16	15/16	15/16	15/16		38,000	10.2
AS2355-D	3/8"	18	9	1-1/8	1-1/8	1-1/8		19,000	17.0
AS2355-D1	5/8"	18	9	15/16	15/16	15/16		30,000	27.4
AS2355-D2	3/4"	18	6-1/8	1-1/16	15/16	15/16	15/16	80,000	26.6
AS2355-E	3/4"	6	5-3/16	1-1/16	15/16	15/16		38,000	10.2
AS2355-F	5/8"	9	3-5/8	11/16	11/16	11/16		30,000	6.9
AS2355-G	1/2"	6	2-1/2	13/16	13/16	13/16	1	24,000	3.9
AS2355-H	3/4"	6	4	1-1/16	1-1/16	1-1/16	1-1/16	50,000	13.0
AS2355-J	5/8"	4-1/2	5	11/16	11/16	11/16		30,000	5.2
AS2355-K	3/4"	18	9	1-1/8	1-1/8	1-1/8		38,000	31.8
AS2355-L	5/8"	8	4	15/16	15/16	15/16	15/16	30,000	7.0
AS2355-M	3/4"	6	5-3/16	15/16	15/16	15/16	15/16	38,000	10.0
AS2355-Q	1/2"	10	6	1-1/2	3/4	3/4		24,000	12.2
AS2585-E	1/2"	12	6	13/16	13/16	13/16	1-1/4	24,000	9.2
AS2585-G	5/8"	10	5	1-1/4	1-1/4	1-1/4	1-1/4	30,000	10.7
AS2585-G3	5/8"	8	4-1/16	1-1/4	1-1/4	1-1/4	1-1/4	50,000	7.5
AS2585-K	3/4"	8	6-15/16	15/16	1-1/4	1-1/4		38,000	18.3
AS2585-Q	3/8"	6	5-3/16	15/16	15/16	15/16	15/16	19,000	5.1
AS2585-U	3/4"	13	3-1/2	7/8	7/8	7/8	7/8	38,000	14.1
AS2585-W	5/8"	13	3-11/16	13/16	11/16	11/16		30,000	10.2



AS2585-M & AS2585-P Yoke Plates

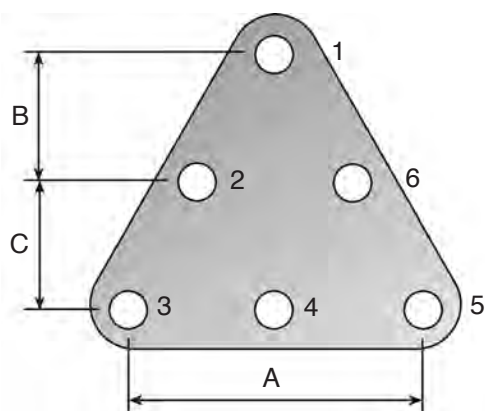
Stock No.	Thickness	Dimensions in Inches										Ultimate Strength Rating / lbs.	Weight each / lbs.
		A	B	C	D	1	2	3	4	5			
AS2585-M	7/8"	5	6	6	6	1-1/8	15/16	15/16	15/16	15/16	80,000	26.4	
AS2585-P	3/8"	12	3-3/8	3-3/8	3-3/8	1-1/8	15/16	15/16	15/16	15/16	19,000	12.7	



AS2585-C & AS2585-D Yoke Plates

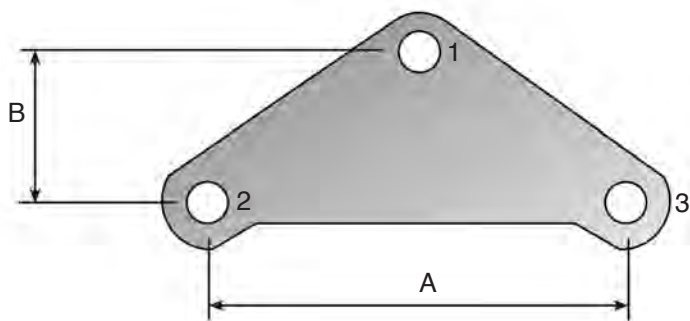
Stock No.	Thickness	Dimensions in Inches										Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	C	1	2	3	4	5				
AS2585-C	3/4"	32	5-1/4	5-1/4	1	13/16	13/16	13/16	13/16	38,000	54.0		
AS2585-D	3/4"	26	4-1/4	4-1/4	1	13/16	13/16	13/16	13/16	38,000	39.3		

C POLE LINE HARDWARE



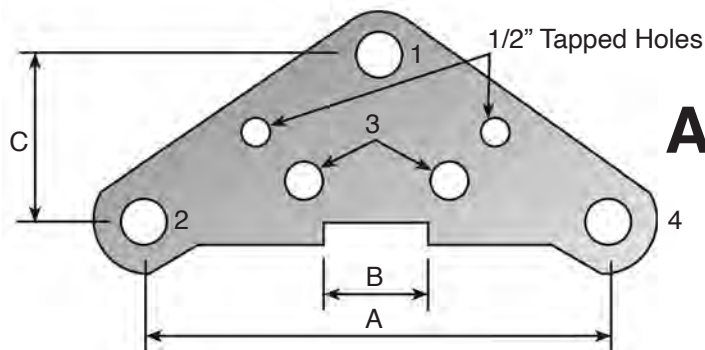
AS2355-P Yoke Plate

Stock No.	Thickness	Dimensions in Inches										Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	C	1	2	3	4	5	6			
AS2355-P	3/4"	18	3-1/8	3	1-1/16	15/16	15/16	15/16	15/16	15/16	15/16	38,000	26.0



AS2585-A, AS2585-B, AS2585-F, AS2585-L & AS2585-Z Yoke Plates

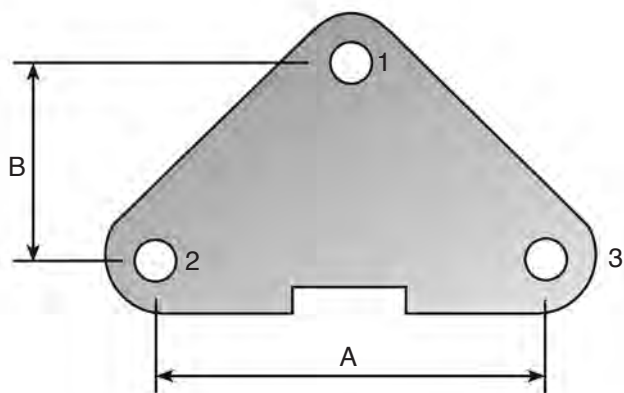
Stock No.	Thickness	Dimensions in Inches					Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	1	2	3		
AS2585-A	1/2"	12	4	13/16	13/16	13/16	30,000	5.9
AS2585-B	3/4"	32	10-1/2	1	13/16	13/16	50,000	43.2
AS2585-F	5/8"	22	7-1/4	1	13/16	13/16	40,000	20.7
AS2585-L	5/8"	12	4	13/16	13/16	13/16	40,000	7.2
AS2585-Z	5/8"	18	6-1/4	1	13/16	13/16	40,000	15.3
AS2585-Z1	3/4"	37	11-3/4	1	13/16	13/16	50,000	53
AS2585-Z2	3/4"	29	9-1/2	1	13/16	13/16	50,000	38



AS2585-ZZ Yoke Plate

Stock No.	Thickness	Dimensions in Inches							Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	C	1	2	3	4		
AS2585-ZZ	3/4"	18	4	3-5/8	1-1/4	1-1/4	1-1/4	1-1/4	40,000	16.7
AS2585-ZZ1*	3/4"	18	4	3-5/8	1-1/4	1-1/4	1-1/4	1-1/4	40,000	16.7

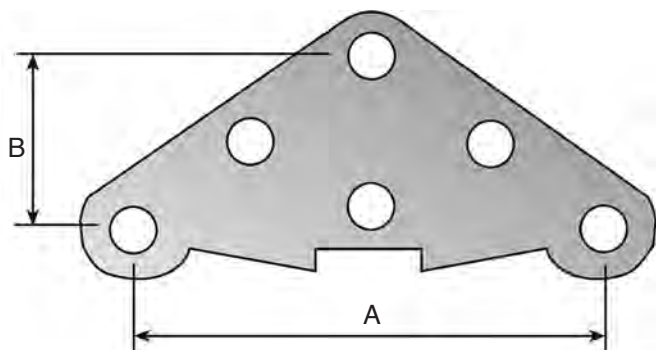
*AS2585-ZZ1 Does not have tapped holes



AS2585-R & AS2585-S Yoke Plates

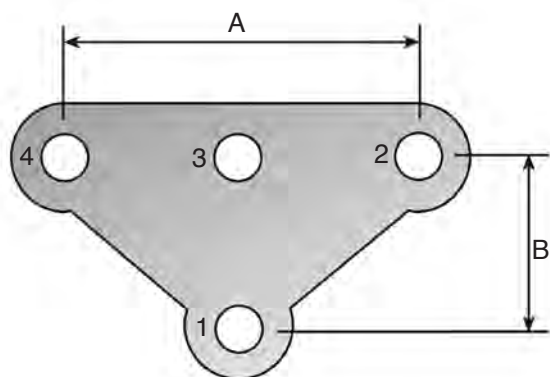
Stock No.	Thickness	Dimensions in Inches					Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	1	2	3		
AS2585-R	5/8"	18	4-1/2	15/16	15/16	15/16	30,000	16.5
AS2585-S	3/4"	18	4-1/2	15/16	15/16	15/16	38,000	19.8

Other configurations available.



AS2585-H Yoke Plate

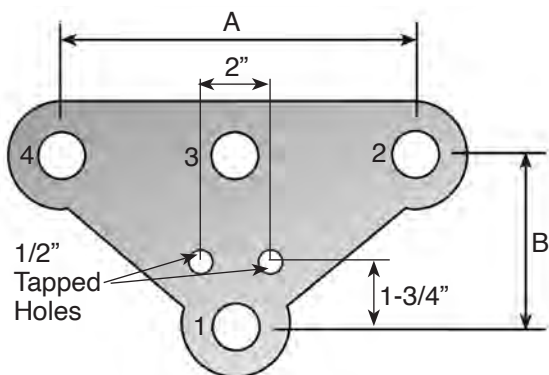
Stock No.	Thickness	Dimensions in Inches			Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B			
AS2585-H	5/8"	13	3-5/8	All Holes 15/16"	40,000	10.2



AS2585-J Vee String Yoke Plate

Stock No.	Thickness	Dimensions in Inches						Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	1	2	3	4		
AS2585-J	5/8"	8-1/2	4-1/4	1-1/4	1-1/4	15/16	1-1/4	30,000	8

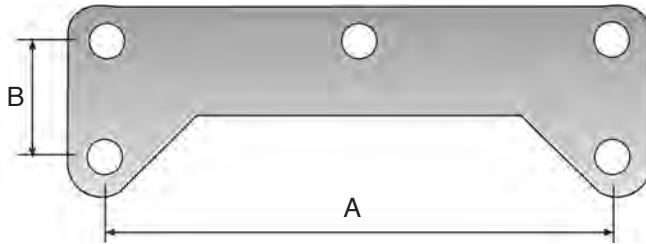
Other configurations available.



AS2585-J1 Vee String Yoke Plate

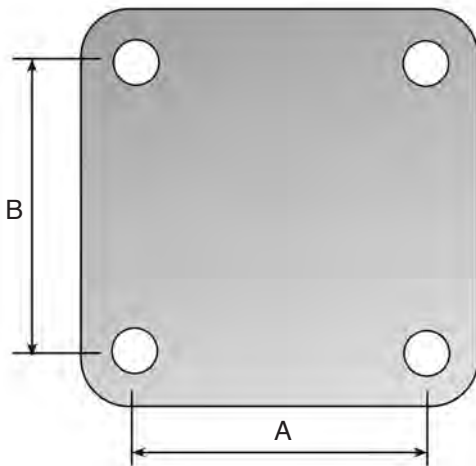
Stock No.	Thickness	Dimensions in Inches						Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	1	2	3	4		
AS2585-J	5/8"	8-1/2	4-1/4	1-1/4	1-1/4	15/16	1-1/4	30,000	7.9

Other configurations available.



AS2585-Y Yoke Plate

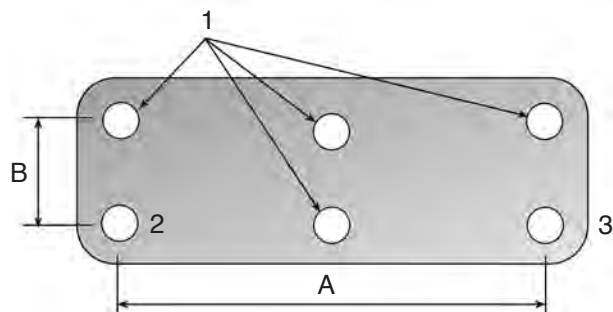
Stock No.	Thickness	Dimensions in Inches			Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	All Holes		
AS2585-Y	5/8"	13	4-1/2	All Holes 11/16	30,000	16.0



AS2355-N Yoke Plate

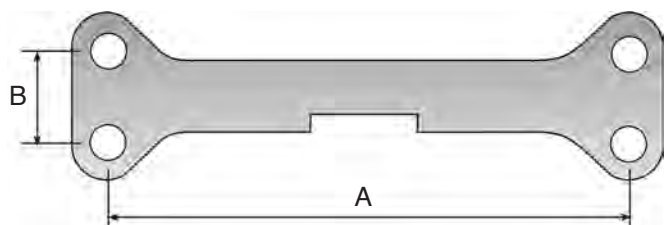
Stock No.	Thickness	Dimensions in Inches			Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	All Holes		
AS2355-N	5/8"	6	6	All Holes 13/16	30,000	10.2

C POLE LINE HARDWARE



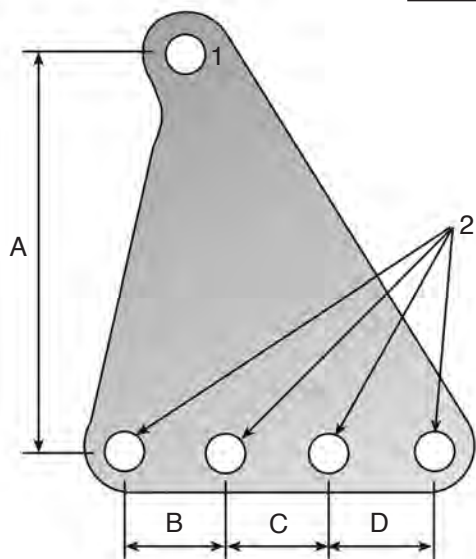
AS2585-V Yoke Plate

Stock No.	Thickness	Dimensions in Inches					Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	1	2	3		
AS2585-V	5/8"	13	2-1/2	7/8	1-1/4	1-1/4	30,000	20.0



AS2585-T Yoke Plate

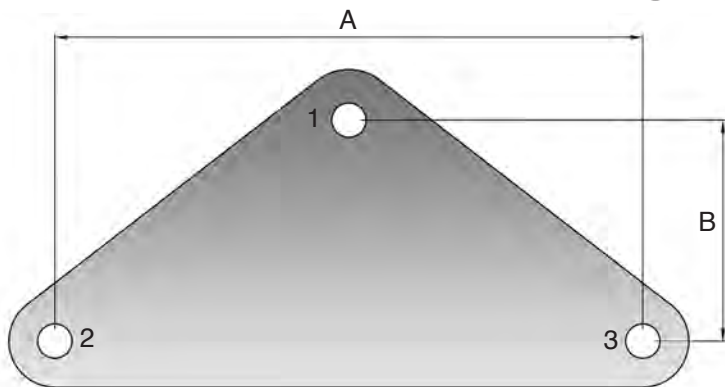
Stock No.	Thickness	Dimensions in Inches			Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	All Holes		
AS2585-T	5/8"	18	5	15/16	30,000	12.9



AS2585-N Yoke Plate

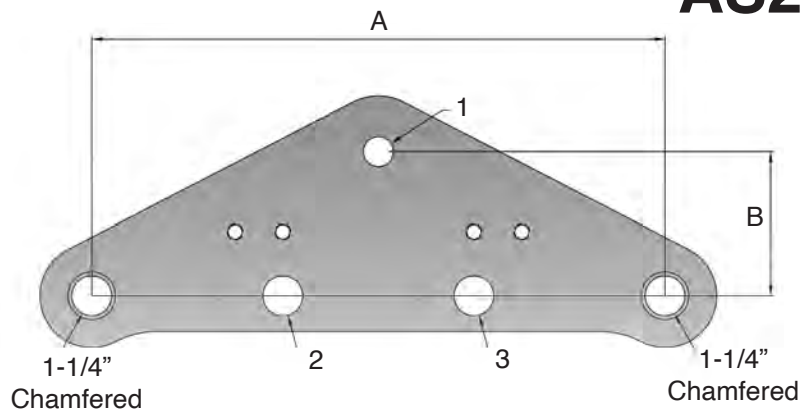
Stock No.	Thickness	Dimensions in Inches						Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	C	D	1	2		
AS2585-N	3/8"	12-1/2	3-3/8	3-3/8	3-3/8	1-1/8	15/16	19,000	11.4

AS2585-A1 & AS2585-W1 Yoke Plates



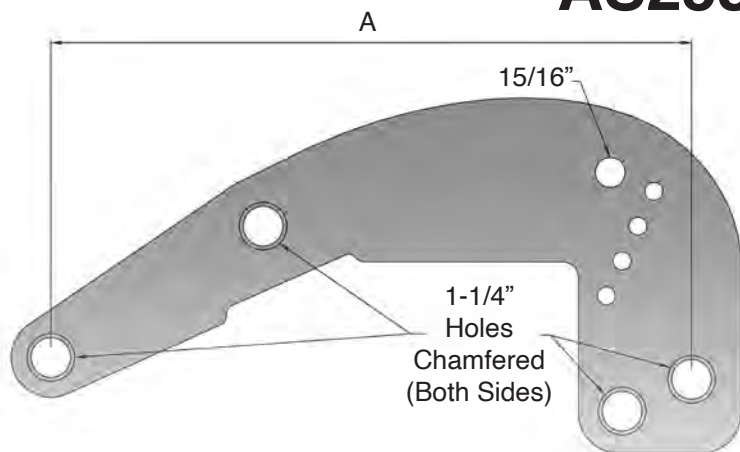
Stock No.	Thickness	Dimensions in Inches		Hole Sizes in Inches			Ultimate Strength Rating / lbs. (APEX)	Weight Each / lbs.
		A	B	1	2	3		
AS2585-A1	3/4"	16	6	15/16	15/16	15/16	60,000	22
AS2585-W1	3/4"	13	3-7/16	15/16	11/16	11/16	60,000	14

AS2585-B2 Yoke Plate



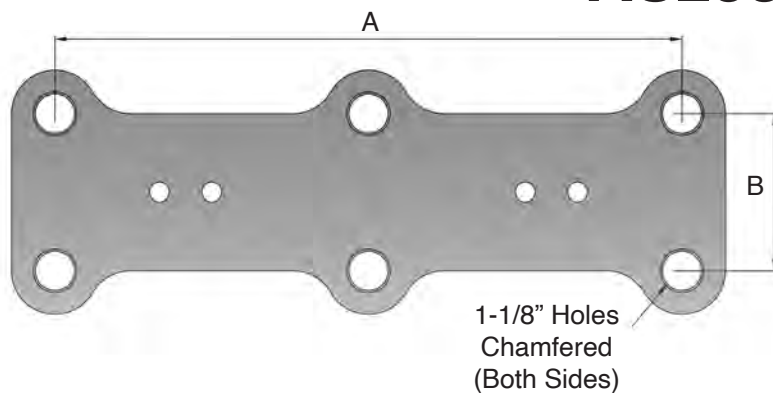
Stock No.	Thickness	Dimensions in Inches					Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	1	2	3		
AS2585-B2	3/4"	18	4-1/2	15/16	1-1/4	1-1/4	60,000	21

AS2585-J8 Yoke Plate



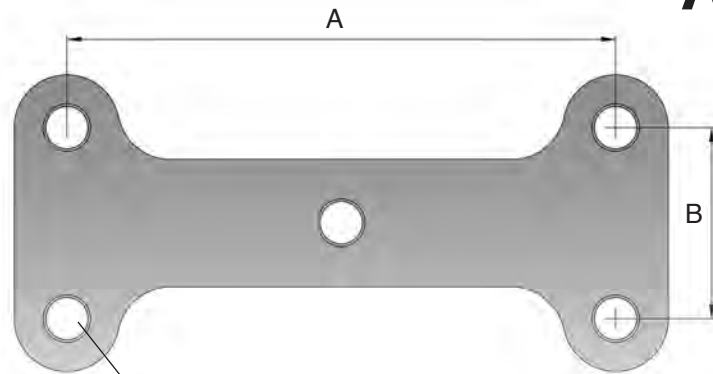
Stock No.	Dimensions in Inches		Ultimate Strength Rating / lbs.	Weight Each / lbs.
	Thickness	A		
AS2585-J8	5/8"	20-3/16"	40,000	20

AS2585-T2 Yoke Plate



Stock No.	Thickness	Dimensions in Inches			Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	All Holes		
AS2585-T2	3/4"	18	4-1/2	All Holes 1-1/8"	30,000	21

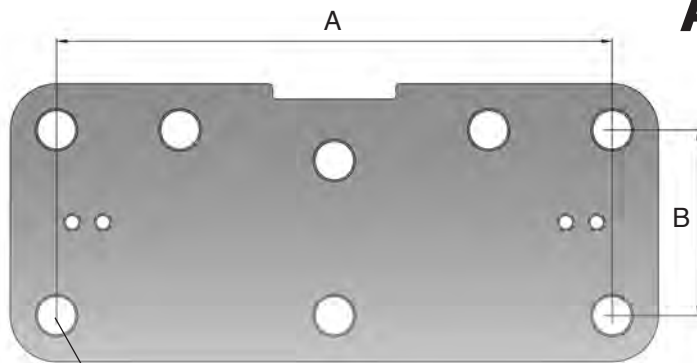
AS2585-T3 Yoke Plate



All Holes 1"
Chamfered
(Both Sides)

Stock No.	Thickness	Dimensions in Inches		All Holes	Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B			
AS2585-T3	3/4"	13	4-1/2	All Holes 1	30,000	13

AS2585-T4 Yoke Plate

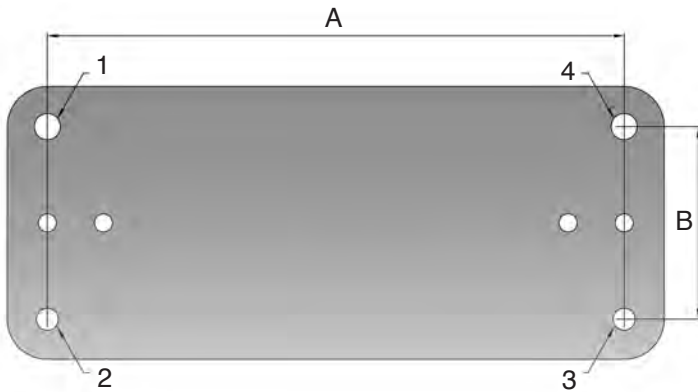


All Holes 1-1/4"
Chamfered
(Both Sides)

Stock No.	Thickness	Dimensions in Inches		All Holes	Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B			
AS2585-T4	3/4"	18	6	All Holes 1-1/4	30,000	37

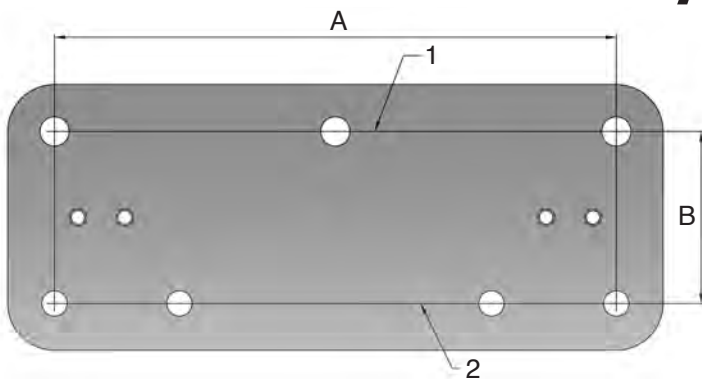
C POLE LINE HARDWARE

AS2585-V1 Yoke Plate



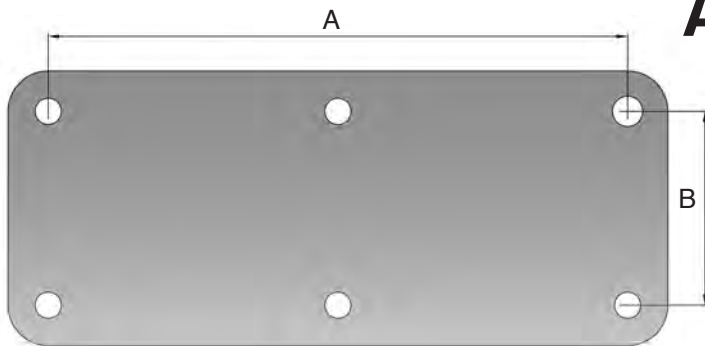
Stock No.	Thickness	Dimensions in Inches						Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	1	2	3	4		
AS2585-V1	3/4"	18	6	13/16	11/16	11/16	13/16	30,000	38

AS2585-V2 Yoke Plate



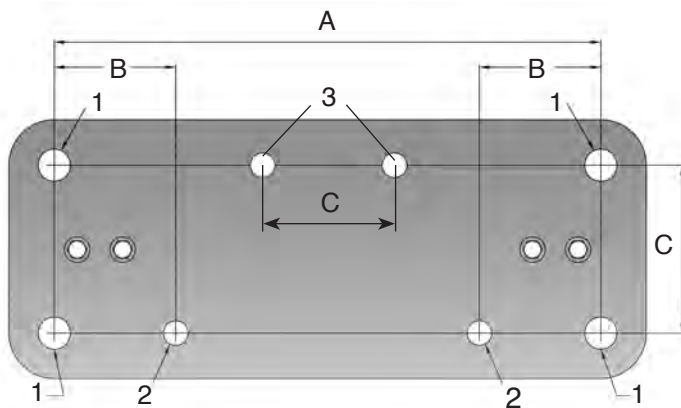
Stock No.	Thickness	Dimensions in Inches				Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	1	2		
AS2585-V2	3/4	18	5-1/2	15/16	13/16	50,000	38

AS2585-V3 Yoke Plate



Stock No.	Thickness	Dimensions in Inches			Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	All Holes		
AS2585-V3	3/4"	18	6	All Holes 15/16	60,000	37

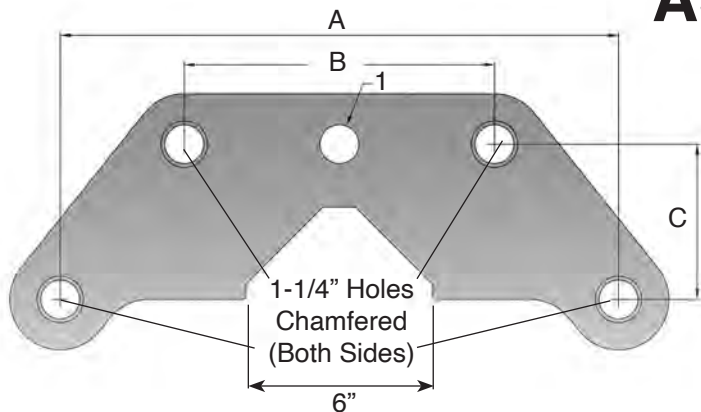
AS2585-V9 Yoke Plate Assembly*



Stock No.	Thickness	Dimensions in Inches						Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	C	1	2	3		
AS2585-V9	3/4"	18	4	5-1/2	1-1/16	13/16	13/16	50,000	36

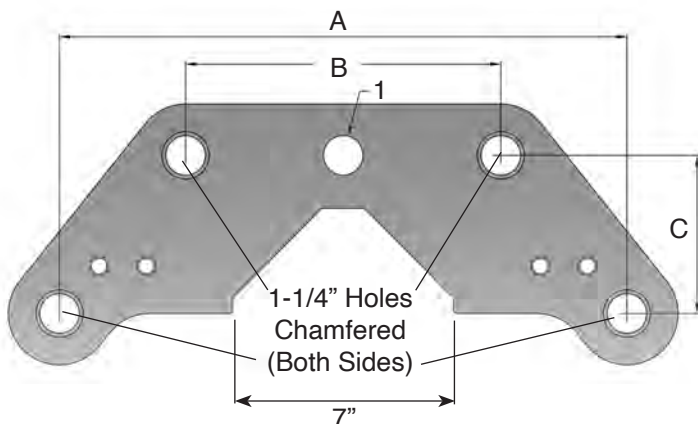
*Includes Four 1/2" Bolts with Spring Lock Washers

AS2585-V11 Yoke Plate



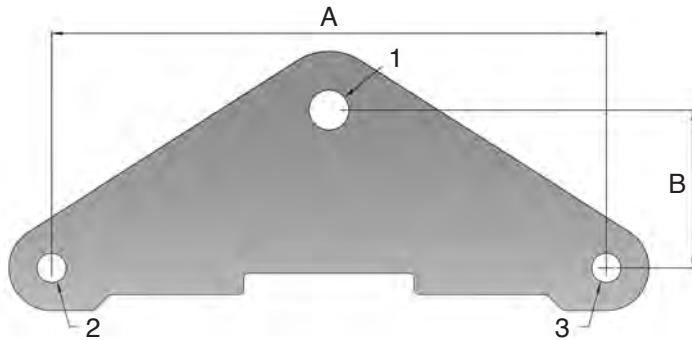
Stock No.	Thickness	Dimensions in Inches				Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	C	1		
AS2585-V11	3/4"	18	10	5	1-1/4	40,000	22

AS2585-V13 Yoke Plate



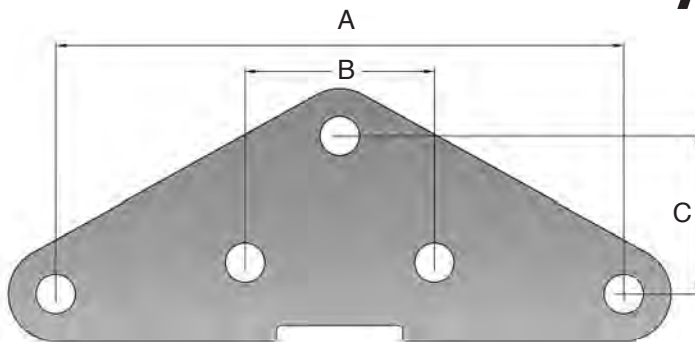
Stock No.	Thickness	Dimensions in Inches				Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	C	1		
AS2585-V13	3/4"	18	10	5	1-1/4	30,000	21

AS2585-W3 Yoke Plate



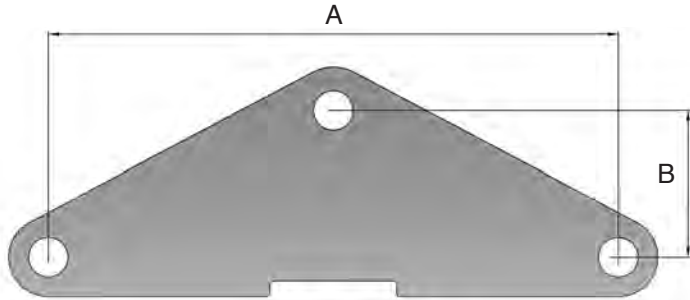
Stock No.	Thickness	Dimensions in Inches					Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	1	2	3		
AS2585-W3	3/4"	13	3-11/16	15/16	11/16	11/16	40,000	10

AS2585-Z6 Yoke Plate



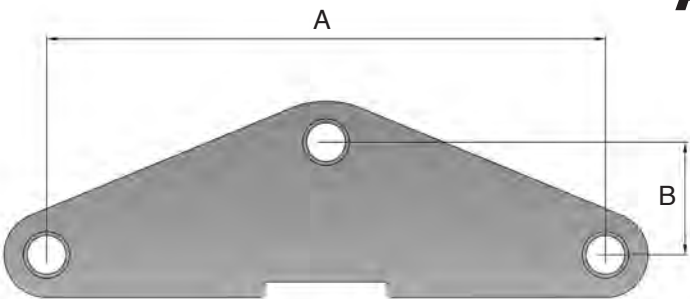
Stock No.	Thickness	Dimensions in Inches				Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B	C	All Holes		
AS2585-Z6	3/4"	18	6	5	All Holes 1-1/4	50,000	21

AS2585-Z7 Yoke Plate



Stock No.	Thickness	Dimensions in Inches			Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B			
AS2585-Z7	3/4"	18	4-5/8	All Holes 1-1/4	40,000	19

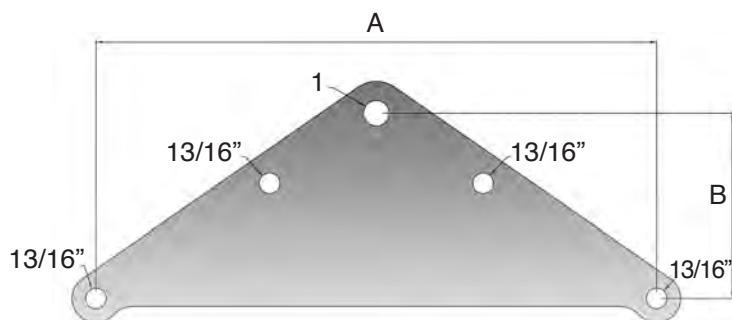
AS2585-Z8 Yoke Plate



*All Holes 1-1/4" Chamfered (Both Sides)

Stock No.	Thickness	Dimensions in Inches			Ultimate Strength Rating / lbs.	Weight Each / lbs.
		A	B			
AS2585-Z8	5/8"	18	3-5/8	All Holes 1-1/4	25,000	15

B2726 Yoke Plates



Stock No.	Dimensions in Inches			1	Ultimate Strength Rating / lbs.	Weight Each / lbs.
	Thickness	A	B			
B2726-A1	5/8	22	7-1/4	1	40,000	21
B2726-A2	3/4	26	8-1/2	1	50,000	33
B2726-A3	3/4	29	9-1/2	1	50,000	40
B2726-A4	3/4	32	10-1/2	1	50,000	48
B2726-A5	3/4	37	11-3/4	1	50,000	50
B2726-A6	5/8	18	6-1/4	1	40,000	16
B2726-A7	1-1/4	42	13	1-1/4	72,000	126

Yoke Plate Cross Reference*

Anderson	Hughes Bros.
79603-4001	AS2585-W1
92933-3002	AS2585-V9
93006-4004	AS2585-V11
94760-4001	AS2355-D2
95021-3002	AS2585-V2
97611-3002	AS2585-V1
YPD-30-18437-3	AS2585-ZZ1
YPD-40-10478	AS2585-Z7
YPD-40-18342-4	AS2585-ZZ
YPD-40-24465	AS2585-W3
YPD-50-18549-1	AS2585-Z6
YPD-50-24685	AS2585-G3
YPD-60-10795	AS2585-B2
YPR-30-17351-2	AS2585-T2
YPR-30-18722-1	AS2585-T4
YPR-30-24508	AS2585-T3
YPV-30-17259-1	AS2585-V13

Continental	Hughes Bros.
YPR-60-13-6	AS2585-V3
YPT-60-16-6	AS2585-A1
YPV-30-18-9	AS2355-D1

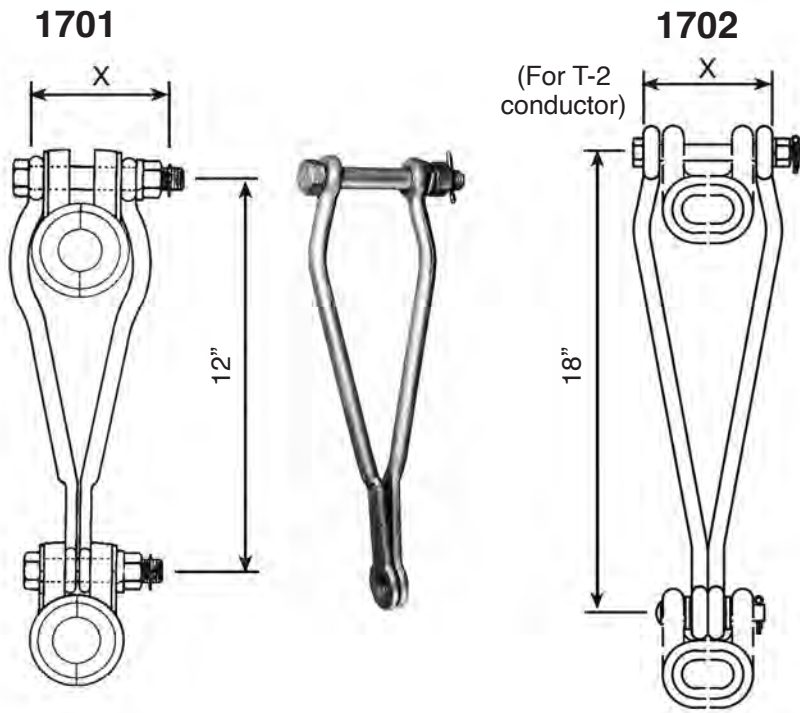
Ohio Brass	Hughes Bros.
99337	AS2585-J

Preformed	Hughes Bros.
YP5908	B2726-A6
YP5909	B2726-A1
YP5910	B2726-A2
YP5911	B2726-A3
YP5912	B2726-A4
YP5913	B2726-A5
65934	B2726-A7
YP5907	AS2585-A

* Ratings listed are for suggested Hughes Brothers equivalents. Ratings provided by other manufactures may differ.

C POLE LINE HARDWARE

1701 & 1702 Bundled Conductor Hanger Links



The Hughes Brothers 1701 & 1702 Hanger Links are used for vertical bundling of Armor Grip Suspension® (AGS) units.

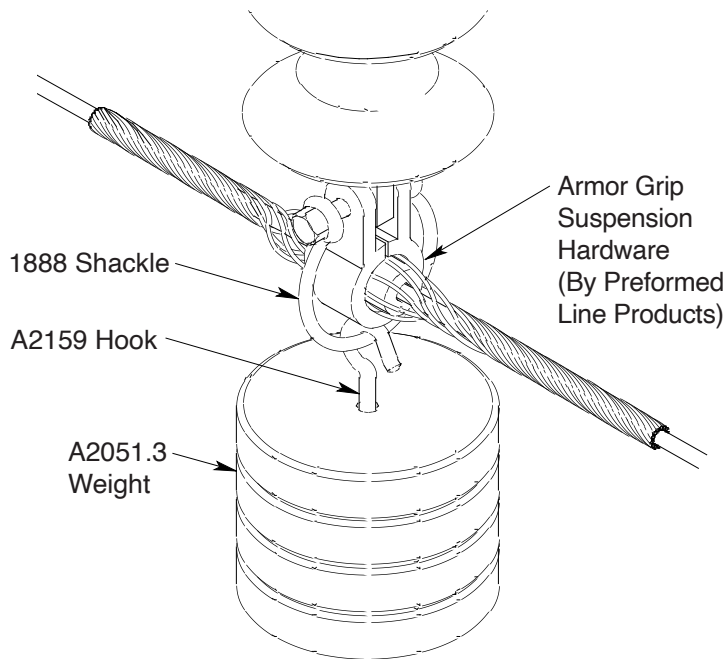
The link assembly includes two double eye links, hex bolt, hex nut, spring lock washer and cotter key.

Stock No.	Conductor Range	Link Diameter	Top Eye Thickness	Bottom Eye Thickness	Top Bolt Diameter	Dimension "X"	Bolt Length*	Ultimate Strength
1701-1	.482 to .542	1/2"	7/16"	1/4"	5/8"	4-1/8"	4-1/2"	12,500 lbs
1701-2	.543 to .645	1/2"	7/16"	1/4"	5/8"	4-1/8"	4-1/2"	12,500 lbs
1701-3	.646 to .750	1/2"	7/16"	5/16"	5/8"	4-1/8"	4-1/2"	12,500 lbs
1701-4	.751 to .907	5/8"	9/16"	5/16"	5/8"	4-7/8"	5-1/4"	24,000 lbs
1701-5	.908 to 1.005	5/8"	9/16"	5/16"	5/8"	5-1/8"	5-1/2"	24,000 lbs
1701-6	1.006 to 1.208	5/8"	9/16"	1/2"	5/8"	5-7/8"	6-1/4"	24,000 lbs
1701-7	1.209 to 1.355	5/8"	9/16"	1/2"	3/4"	6-3/8"	6-3/4"	24,000 lbs
1701-8	1.356 to 1.557	3/4"	5/8"	5/8"	3/4"	6-5/8"	7"	35,000 lbs
1701-9	1.558 to 1.828	3/4"	5/8"	3/4"	3/4"	7-1/2"	7-7/8"	35,000 lbs
1701-10	1.883 to 2.333	3/4"	5/8"	3/4"	3/4"	7-1/2"	7-7/8"	35,000 lbs
1702-1	2x.250 to 2x.447	5/8"	5/8"	5/8"	5/8"	3-3/4"	5"	24,000 lbs
1702-2	2x.448 to 2x.642	5/8"	5/8"	5/8"	5/8"	4-3/4"	6"	24,000 lbs
1702-3	2x.721 to 2x.858	5/8"	5/8"	5/8"	5/8"	5-1/2"	7"	24,000 lbs
1702-4	2x.859 to 2x1.108	3/4"	3/4"	3/4"	3/4"	5-1/2"	7"	35,000 lbs

*Thread Length = 1-1/2"

Unit weight approximately 3.5 lbs each

A2051-A Assembly

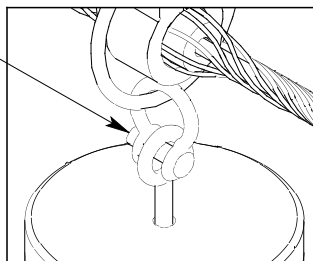


Ordering Example:

Assembly type A 2 0 5 1 - A - 1 0 0 . 4
 Total weight (50 lb increments)
 1888 stock number
 (see opposite page)

A2051 Assembly

NOTE: The A2051 assembly features an eye bolt and shackle

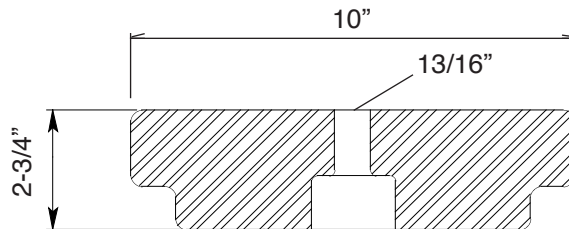


Ordering Example:

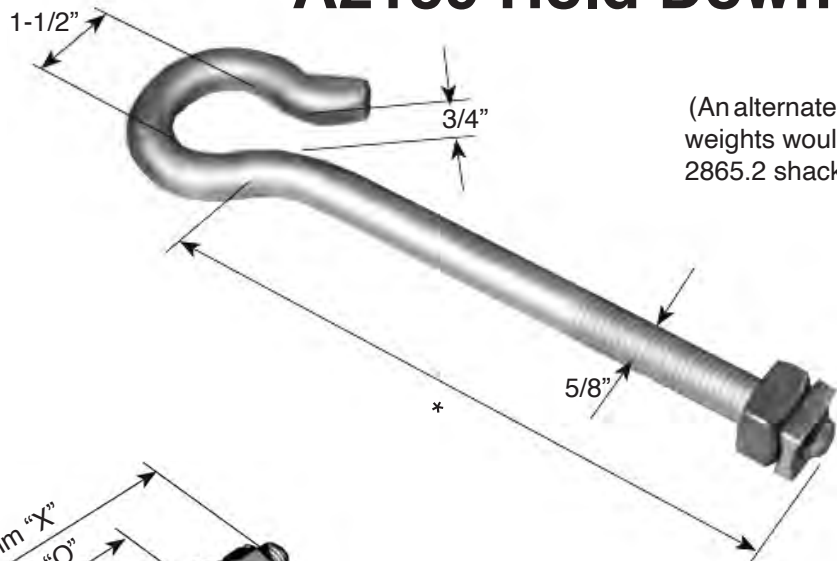
Assembly type A 2 0 5 1 - 1 0 0 . 4
 Total weight (50 lb increments)
 1888 stock number
 (see opposite page)

A2051.3 Hold Down Weight

Cast from ductile iron, each hold down weight weighs 50 lbs and is hot dip galvanized. All weights feature a cast lip to facilitate handling and a recessed hole for the nut.



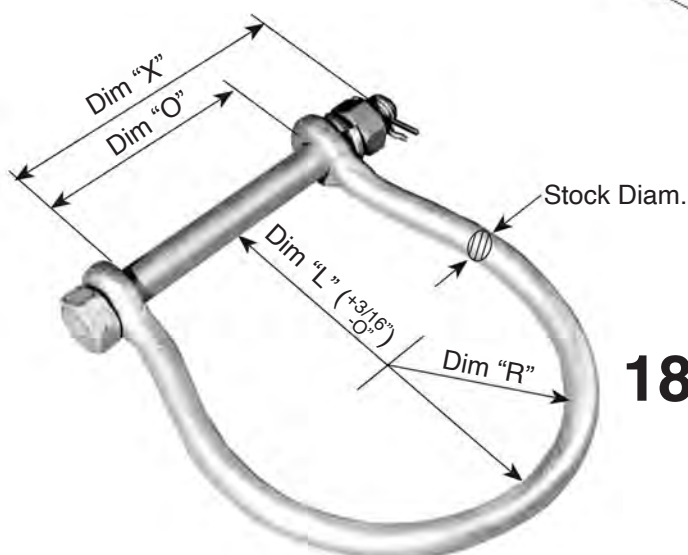
A2159 Hold Down Weight Hook



(An alternate method for suspending hold down weights would use a 2724 forged eye bolt and 2865.2 shackle.)

Stock No.	Wt. / lbs
A2159-*	1.7

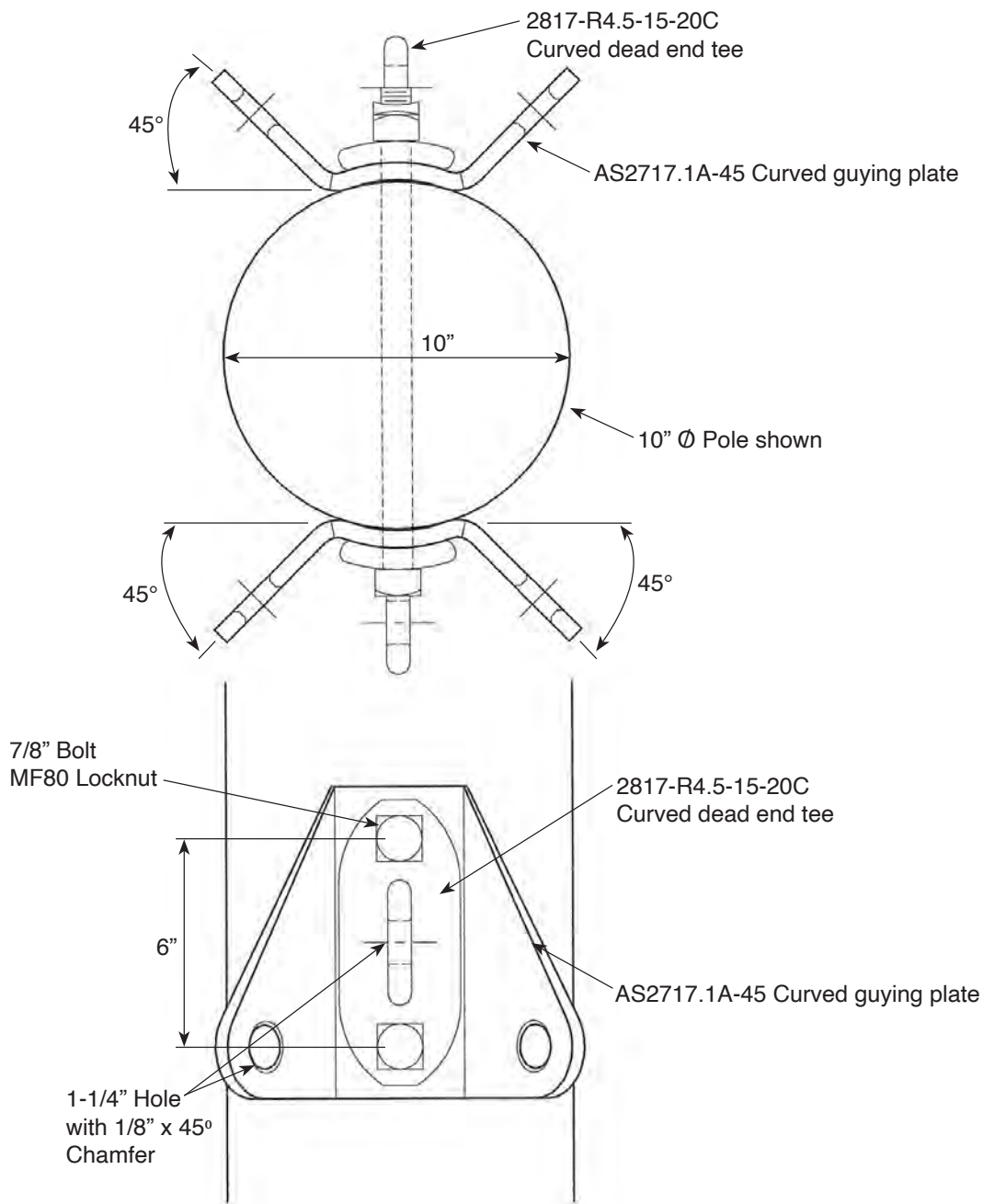
* Required length = no. of weights x 2.75 in. + 3 in.



1888 Hold Down Weight Shackles

Stock No.	Conductor Diam. Range	Armor-Grip Casting No.	Bolt Diam.	Stock Diam.	Dim "X"	Dim "O"	Dim "L"	Dim "R"	Bolt Length
1888.2	.482 to .750	60201-0, 60202-0, 60203-0	5/8"	1/2"	4-3/8"	2-3/8"	4-7/8"	1-7/8"	4-3/4"
1888.3	.751 to .907	60204-1	5/8"	1/2"	4-3/4"	2-3/4"	5-3/8"	2-3/8"	5-1/8"
1888.4	.908 to 1.005	60205-0	5/8"	1/2"	5-1/8"	3-1/8"	5-1/2"	2-1/2"	5-1/2"
1888.5	1.006 to 1.208	60206-0	5/8"	5/8"	6"	3-3/4"	6-1/2"	2-3/4"	6-3/8"
1888.6	1.209 to 1.355	60207-0	3/4"	5/8"	6"	3-3/4"	6-1/4"	3"	6-3/8"
1888.7	1.356 to 1.557	60208-0	3/4"	5/8"	6-1/2"	4-1/4"	6-1/2"	3"	6-7/8"
1888.8	1.558 to 1.828	60209-0	3/4"	5/8"	7-1/8"	4-7/8"	7-1/4"	3-1/4"	7-3/8"
1888.9	.304 to .500		5/8"	1/2"	3-5/8"	1-5/8"	4"	1-1/2"	4"
1888.10	1.356 to 1.557	60208-0	5/8"	5/8"	6-1/2"	4-1/4"	6-1/2"	3"	7"

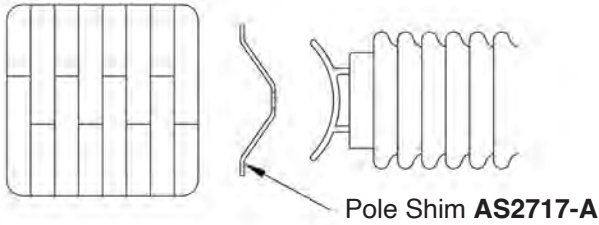
AS2717-P DEAD END & GUYING ASSEMBLY BACK TO BACK ARRANGEMENT



Available with radius for any pole diameter, this arrangement can be used on any round pole; wood, steel, concrete or fiberglass. Also available with no radius for 12 sided steel poles or lam poles.

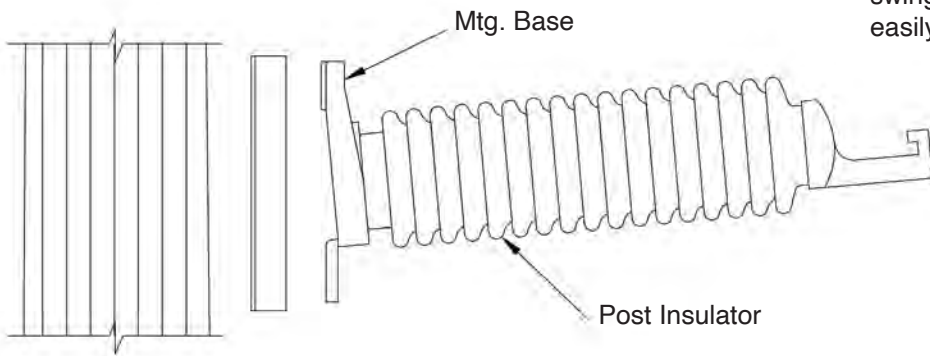
C POLE LINE HARDWARE

Pole Shims for Pole Insulators - Example

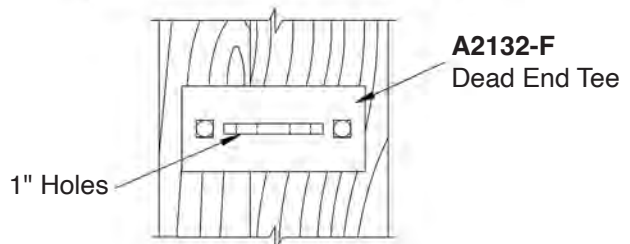
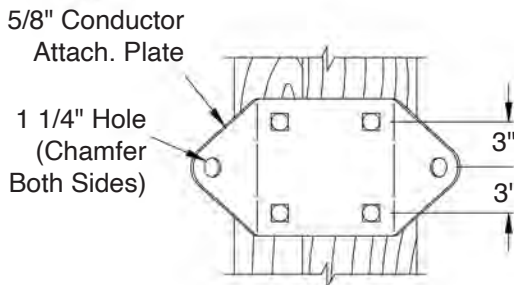
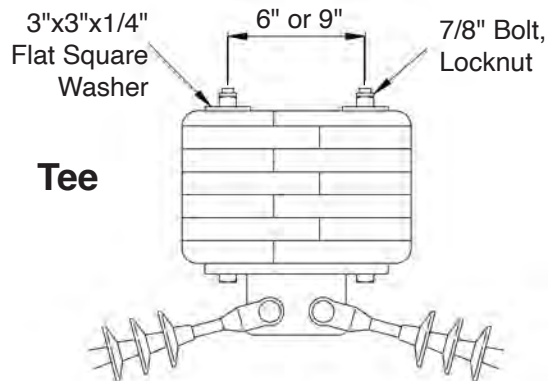
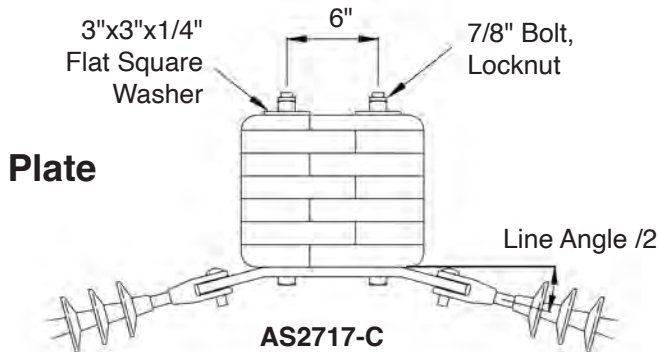


Hardware Accessories

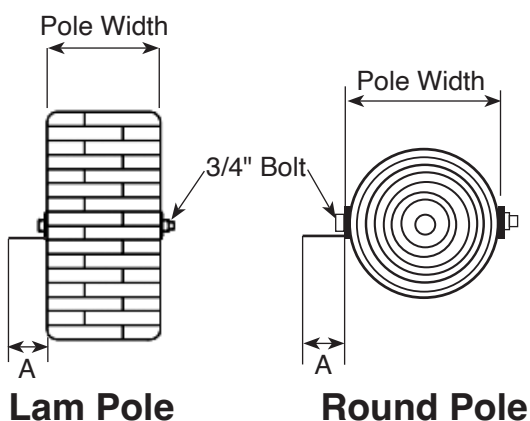
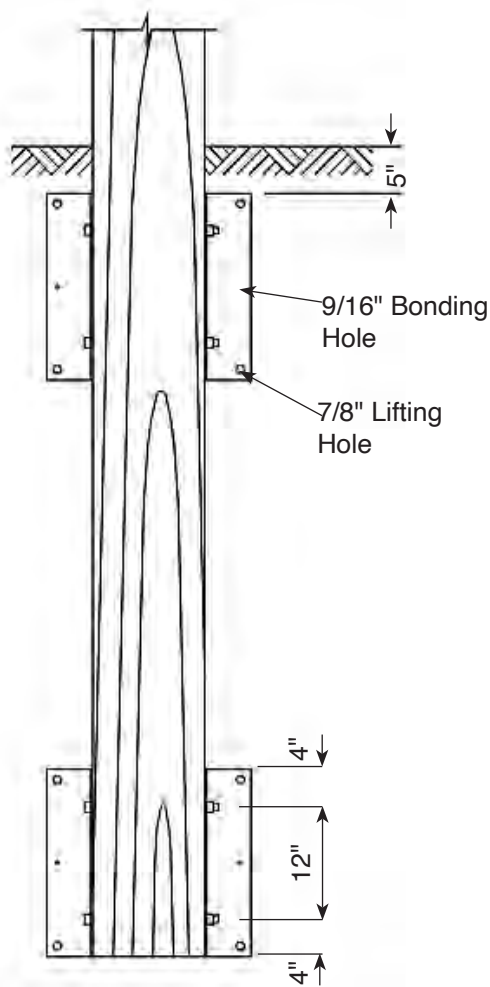
Hughes Brothers has developed special hardware to be used with rectangular wood poles. Shown below are some of the most common applications. Please note that in addition to the hardware shown here, standard pole line hardware such as dead end tees, eye bolts, swinging angle brackets, etc., may also easily be used.



Conductor & Dead End Hardware



Foundation Reinforcement Systems



Distribution - FD

6-3/4" Pole Width

Assembly Includes:
4 - Angles, 20" Long
4 - Bolts, Nuts & Locknuts
Field assembly required.

Assembly Number	A	Angle Size	Bolt Length	Weight Lbs.
FDA-4	4"	4" x 3" x 1/4"	10"	45
FDA-5	5"	5" x 3" x 1/4"	10"	50
FDA-6	6"	6" x 3-1/2" x 5/16"	10"	72
FDA-7	7"	7" x 4" x 3/8"	10"	97

8-3/4" Pole Width

Assembly Includes:
4 - Angles, 20" Long
4 - Bolts, Nuts & Locknuts
Field assembly required.

Assembly Number	A	Angle Size	Bolt Length	Weight Lbs.
FDB-4	4"	4" x 3" x 1/4"	12"	46
FDB-5	5"	5" x 3" x 1/4"	12"	51
FDB-6	6"	6" x 3-1/2" x 5/16"	12"	73
FDB-7	7"	7" x 4" x 3/8"	12"	98

10-1/4" Pole Width

Assembly Includes:
4 - Angles, 20" Long
4 - Bolts, Nuts & Locknuts
Field assembly required.

Assembly Number	A	Angle Size	Bolt Length	Weight Lbs.
FDC-4	4"	4" x 3" x 1/4"	14"	47
FDC-5	5"	5" x 3" x 1/4"	14"	52
FDC-6	6"	6" x 3-1/2" x 5/16"	14"	74
FDC-7	7"	7" x 4" x 3/8"	14"	99

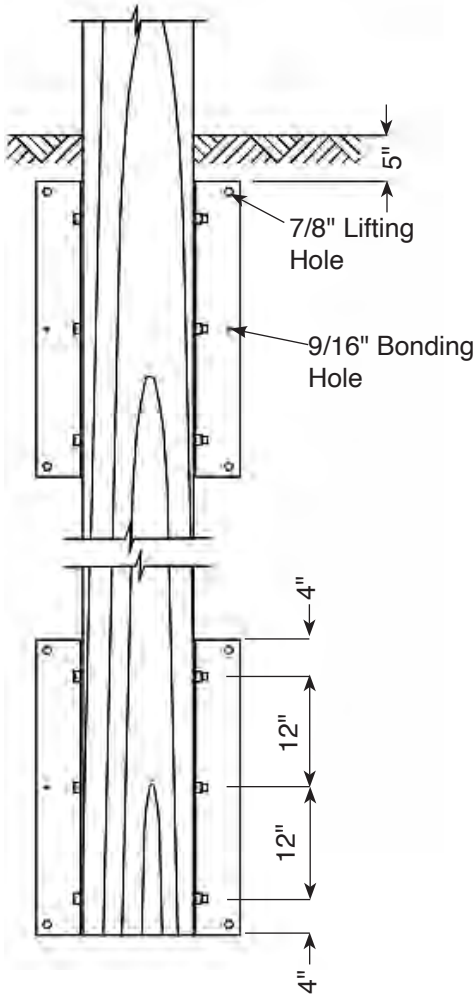
12-1/4" Pole Width

Assembly Includes:
4 - Angles, 20" Long
4 - Bolts, Nuts & Locknuts
Field assembly required.

Assembly Number	A	Angle Size	Bolt Length	Weight Lbs.
FDD-4	4"	4" x 3" x 1/4"	16"	48
FDD-5	5"	5" x 3" x 1/4"	16"	53
FDD-6	6"	6" x 3-1/2" x 5/16"	16"	74
FDD-7	7"	7" x 4" x 3/8"	16"	99

Foundation Reinforcement Systems

Transmission - FT



10-1/4" Pole Width

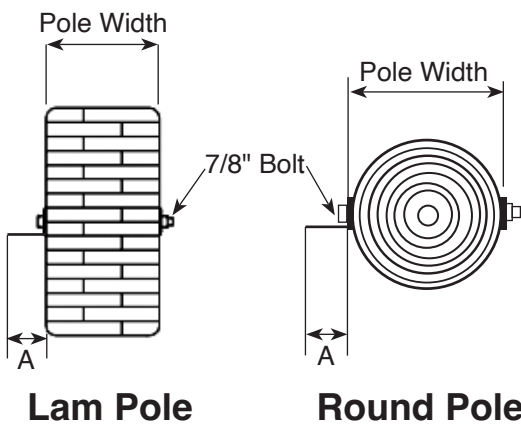
Assembly Includes:
4 - Angles, 32" Long
6 - Bolts, Nuts & Locknuts
Field assembly required.

Assembly Number	A	Angle Size	Bolt Length	Weight Lbs.
FTA-4	4"	4" x 3" x 1/4"	14"	80
FTA-5	5"	5" x 3" x 1/4"	14"	88
FTA-6	6"	6" x 3-1/2" x 5/16"	14"	122
FTA-7	7"	7" x 4" x 3/8"	14"	163

12-1/4" Pole Width

Assembly Includes:
4 - Angles, 32" Long
6 - Bolts, Nuts & Locknuts
Field assembly required.

Assembly Number	A	Angle Size	Bolt Length	Weight Lbs.
FTB-4	4"	4" x 3" x 1/4"	16"	82
FTB-5	5"	5" x 3" x 1/4"	16"	90
FTB-6	6"	6" x 3-1/2" x 5/16"	16"	124
FTB-7	7"	7" x 4" x 3/8"	16"	165

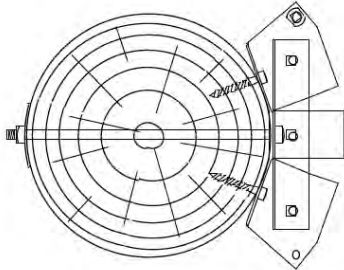


14-1/4" Pole Width

Assembly Includes:
4 - Angles, 32" Long
6 - Bolts, Nuts & Locknuts
Field assembly required.

Assembly Number	A	Angle Size	Bolt Length	Weight Lbs.
FTC-4	4"	4" x 3" x 1/4"	18"	85
FTC-5	5"	5" x 3" x 1/4"	18"	93
FTC-6	6"	6" x 3-1/2" x 5/16"	18"	127
FTC-7	7"	7" x 4" x 3/8"	18"	168

A1895 Pole Anchor Assembly

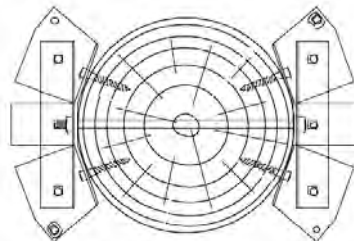


A1895-1*
One Section Anchor
(Consists of A1895.1A plus mtg hardware)

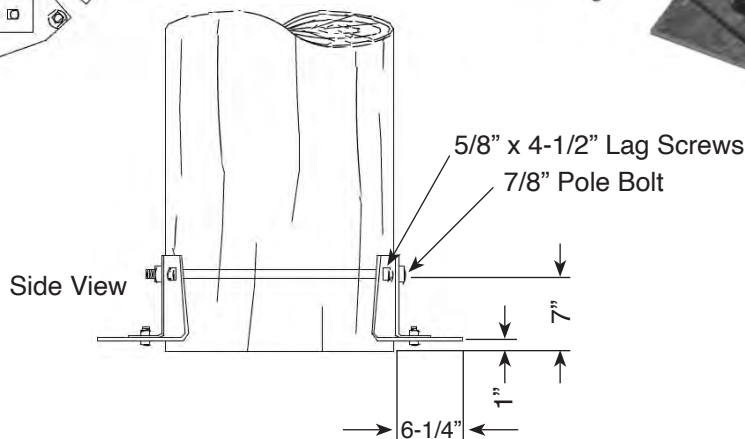
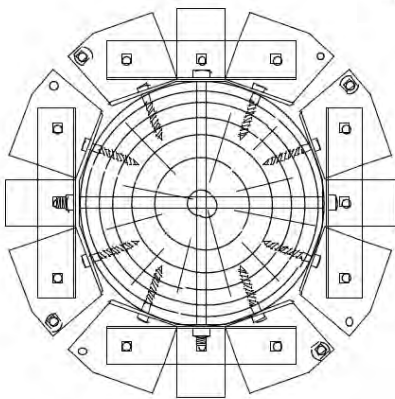
Hughes Brothers A1895 Pole Anchor Assemblies are used as thrust and uplift anchors. Each individual anchor assembly adds 106 in² of bearing area to a pole.

The bearing plates may be ordered as a single unit or complete with mounting hardware. Unless specified otherwise, 7/8" x 26" machine bolts are furnished. Each bearing plate has a provision for attaching a ground wire with a bonding bolt.

A1895-2*
Two Section Anchor



A1895-3*
Four Section Anchor



Note: The A1895.1A weighs 22 lbs.

Ordering Example **A 1 8 9 5 - 2 - 2 6**

- *Bolt length in inches. (26" unless specified otherwise)
- Assembly No.
- Stock No.



EQUIPMENT MOUNTS

Transformer Platforms	D-1
Potholders.....	D-14
Grates & Vault Covers.....	D-20
Fiber Optic Cases	D-25
Cutout & Arrestor Brackets.....	D-30
Conduit Support Brackets	D-36
Sports Field Lighting Brackets	D-41

Part No.	C to C Pole Spacing	Type	Width	Railings	Maximum Center Span Loading / lbs	Total Semi-Uniform Loading* / lbs	Weight / Lbs ea.
1034	12'-0"	open	5'-6"	B.S.	8,100	10,600	890
1036	16'-0"	open	5'-6"	B.S.	6,000	8,100	990
1070	14'-9"	open	5'-6"	B.S.	6,500	8,600	970
1073	14'-9"	open	5'-6"	B.S.	6,500	8,600	970
1035	12'-0"	alley	4'-3"	O.S.	8,100	10,600	710
1071	14'-9"	alley	4'-3"	O.S.	6,500	8,600	800
1040	12'-0"	bridge	2'-6"	none	8,100	10,600	619
1072	14'-9"	bridge	2'-6"	none	6,500	8,600	1072
2100-12-0	12'-0"	S.C.	6'-0"	B.S.	8,100	10,600	1360
2100-14-9	14'-9"	S.C.	6'-0"	B.S.	6,500	8,600	1620
2102-12-0	12'-0"	S.C.	6'-0"	B.S.	13,400	17,000	1700
2102-14-9	14'-9"	S.C.	6'-0"	B.S.	6,500	14,300	1800
2102-16-9	16'-9"	S.C.	6'-0"	B.S.	9,400	12,500	2000
2102-18-9	18'-9"	S.C.	6'-0"	B.S.	8,400	11,250	2200
2102-20-9	20'-9"	S.C.	6'-0"	B.S.	7,600	10,200	2400

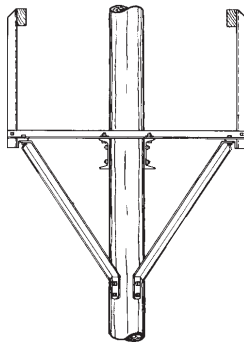
S.C. - Spread Channel
 B.S. - Both Sides
 O.S. - One Side

*Loads placed at the 1/3, 1/2, & 2/3 span locations

NOTE: Max. loads are actual transformer weight.

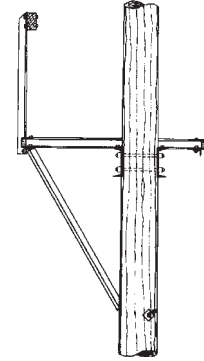
Open Type

Stock No's
1034
1036
1070
1073



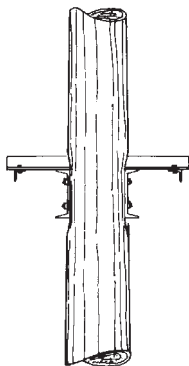
Alley Type

Stock No's
1035
1071



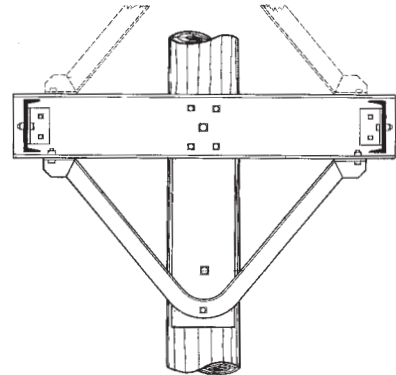
Bridge Type

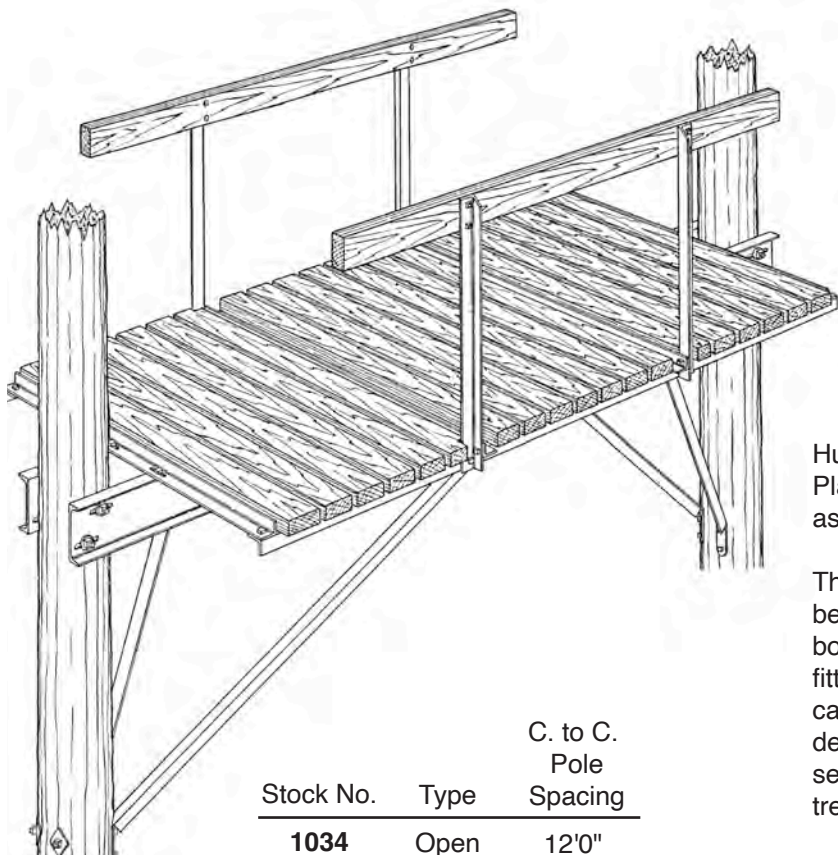
Stock No's
1040
1072



Spread Channel Type

Stock No's
2100-12-0
2100-14-9
2102-12-0
2102-14-9
2102-16-9
2102-18-9
2102-20-9





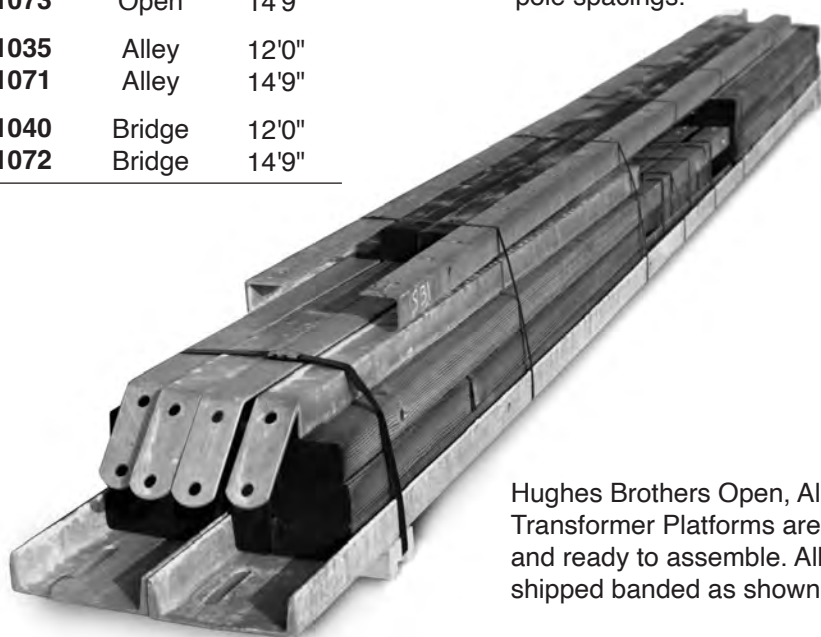
Open, Alley and Bridge Type Transformer Platforms

Hughes Brothers Standard Transformer Platforms are complete units partially factory assembled for quick and easy installation.

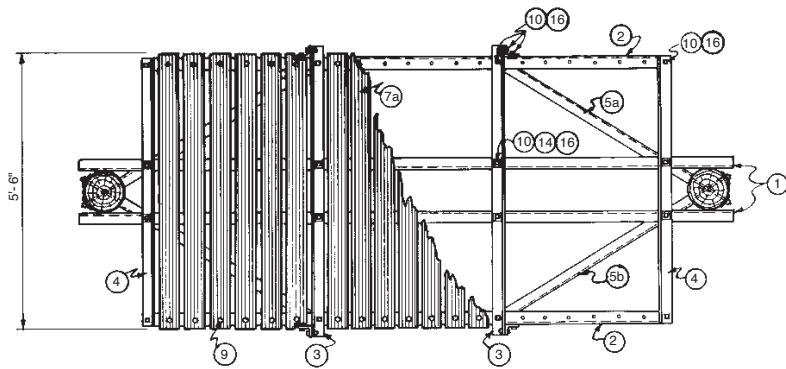
These prefabricated units are economical because no field work is required other than boring the pole holes; there's no cutting, fitting, waste or costly delays. Complete units can be relocated if necessary, to meet service demands. Wood members are made from select Douglas-fir components, pressure treated with DCOI.

The following pages show Open, Alley and Bridge type transformer platforms for various pole spacings.

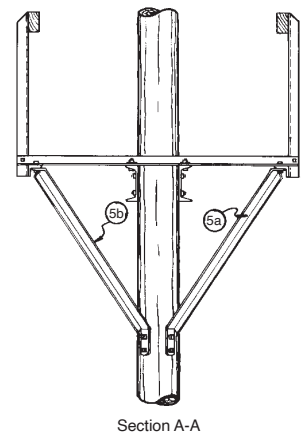
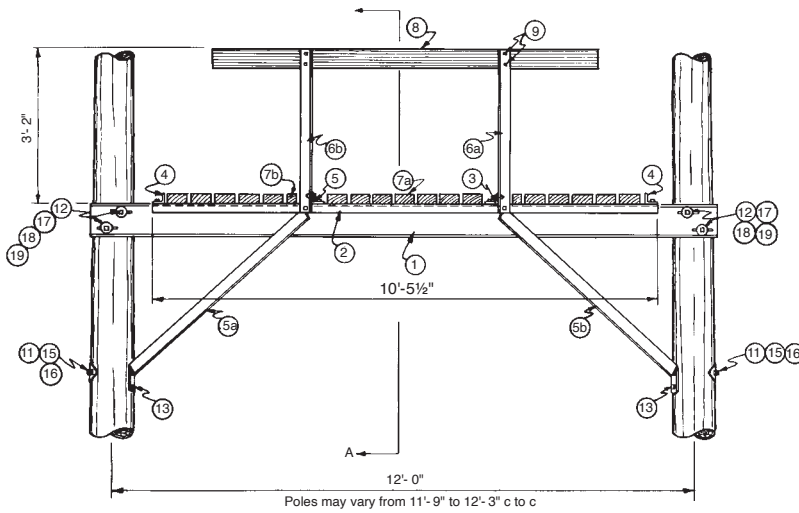
Stock No.	Type	C. to C. Pole Spacing
1034	Open	12'0"
1070	Open	14'9"
1036	Open	16'0"
1073	Open	14'9"
1035	Alley	12'0"
1071	Alley	14'9"
1040	Bridge	12'0"
1072	Bridge	14'9"



Hughes Brothers Open, Alley & Bridge Type Transformer Platforms are shipped complete and ready to assemble. All components are shipped banded as shown above.



1034 Transformer Platform

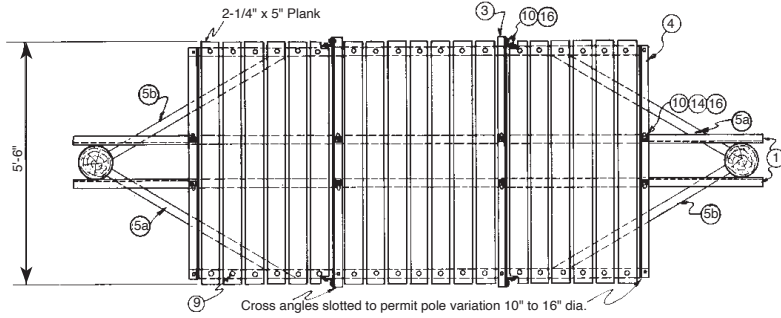


No. 1034 Bill of Material

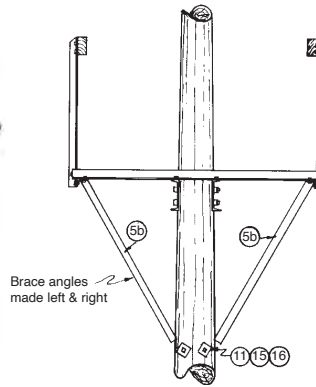
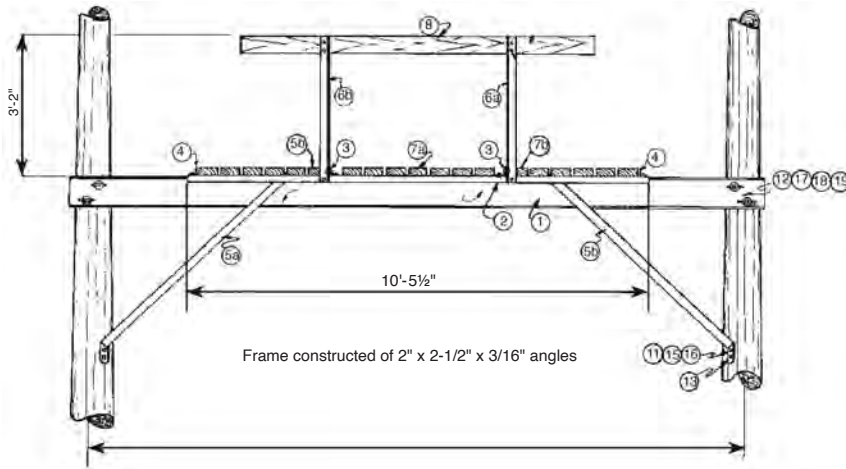
Item	Quan.	Part No.	Description
1	2	S1	8" Channel
2	2	S2	Side Angle
3	2	S6	Cross Angle
4	2	S3	Cross Angle
5a	2	S4R	Brace Angle (Right)
5b	2	S4L	Brace Angle (Left)
6a	2	S5R	Railing Support Angle (Right)
6b	2	S5L	Railing Support Angle (Left)
7a	17	W1	Plank
7b	2	W1N2	Plank with 2 Ends Notched
8	2	W2	Railing
9	46	BC33-F	3/8" x 3" Carriage Bolt
10	24	B61 3/4-1 1/4	5/8" x 1-3/4" Bolt
11	4	B618-6	5/8" x 18" Bolt
12	4	TR718-5	3/4" x 18" Thr'd Rod
12	4	LS64 1/2	5/8" x 4-1/2" Lag Screw
14	8	SW2-60	2" x Sq. Washer, 11/16" Hole
15	4	CW60	4" Sq. Curved Washer, 11/16" Hole
16	32	MF60	5/8" MF Locknut
17	8	RW2-70	2" Round Washer 13/16" Hole
18	8	N70	3/4" Std. Nut
19	8	MF70	3/4" MF Locknut

NOTE: Douglas-fir plank and railings are pressure treated with DCOI. Steel members and parts are hot dip galvanized.

D EQUIPMENT MOUNTS



1070 Transformer Platform

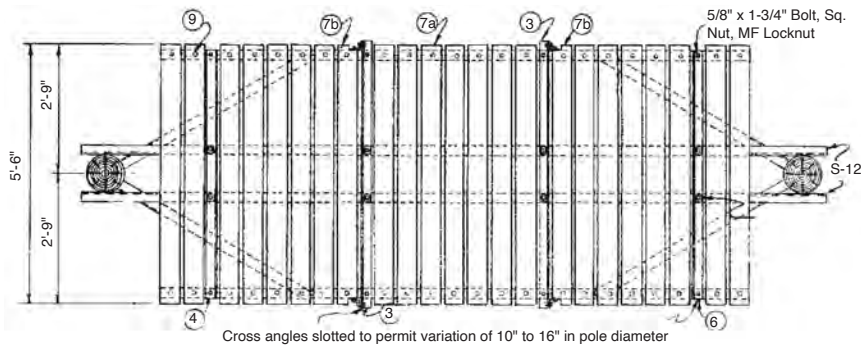


Poles may vary from 14'-6" to 15'-0" c to c

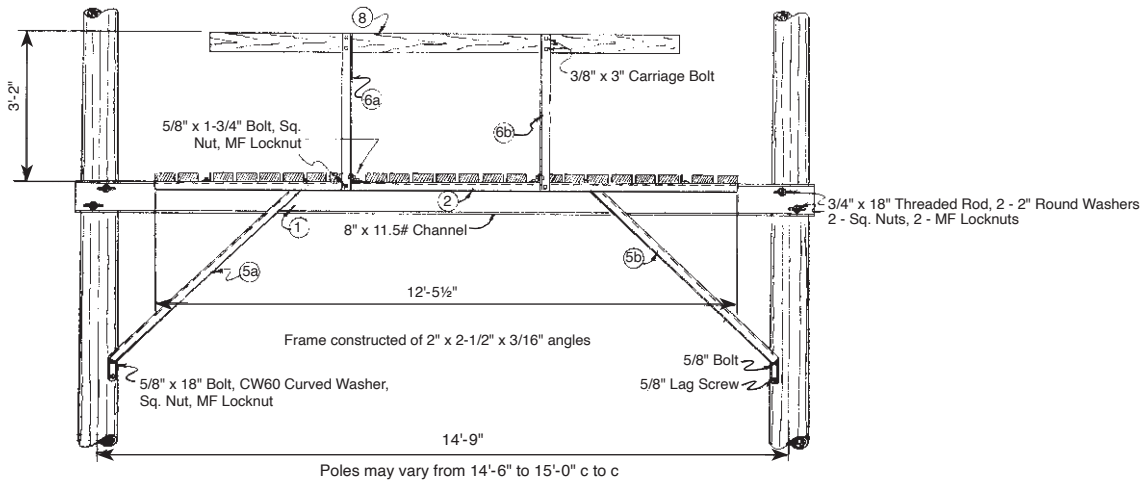
No. 1070 Bill of Material

Item	Quan.	Part No.	Description
1	2	S12	8" Channel
2	2	S2	Side Angle
3	2	S6	Cross Angle
4	2	S3	Cross Angle
5a	2	S4R	Brace Angle (Right)
5b	2	S4L	Brace Angle (Left)
6a	2	S5R	Railing Support Angle (Right)
6b	2	S5L	Railing Support Angle (Left)
7a	17	W1	Plank
7b	2	W1N2	Plank with 2 Ends Notched
8	2	W2	Railing
9	46	BC33-1	3/8" x 3" Carriage Bolt
10	28	B61 3/4-1 1/4	5/8" x 1-3/4" Bolt
11	4	B618-6	5/8" x 18" Bolt
12	4	TR718-5	3/4" x 18" Thr'd Rod
13	4	LS64 1/2	5/8" x 4-1/2" Lag Screw
14	8	SW2-60	2" x Sq. Washer, 11/16" Hole
15	4	CW60	4" Sq. Curved Washer, 11/16" Hole
16	32	MF60	5/8" MF Locknut
17	8	RW2-70	2" Round Washer 13/16" Hole
18	8	N70	3/4" Std. Nut
19	8	MF70	3/4" MF Locknut

NOTE: Douglas-fir plank and railings are pressure treated with DCOI. Steel members and parts are hot dip galvanized.



1073 Transformer Platform



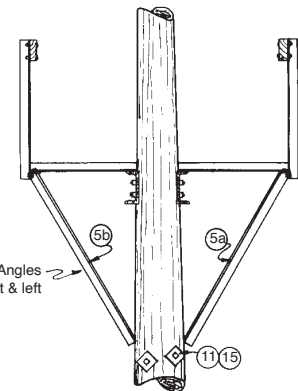
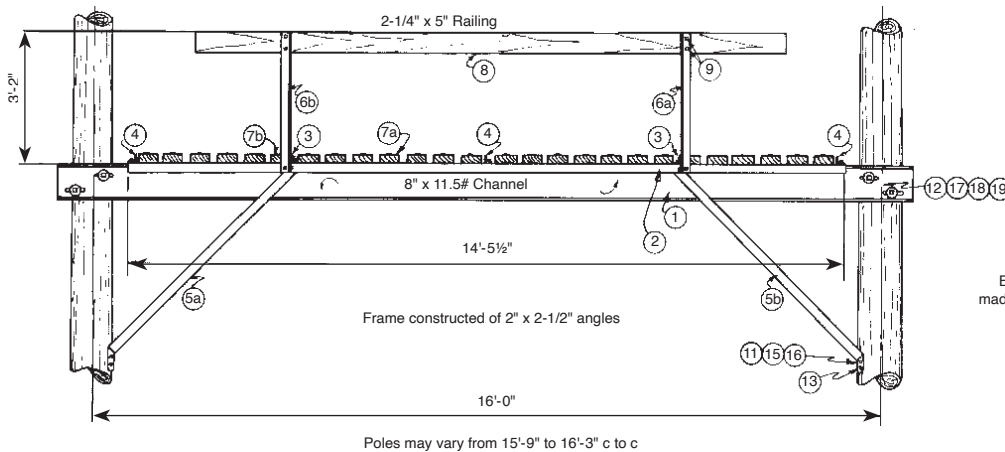
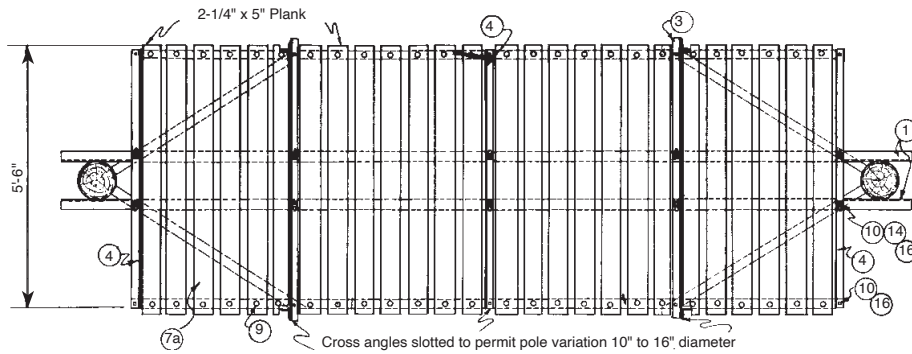
No. 1073 Bill of Material

Item	Quan.	Part No.	Description
1	2	S12	8" Channel
2	2	S31	Side Angle
3	2	S6	Cross Angle
4	2	S3	Cross Angle
5a	2	S4R	Brace Angle (Right)
5b	2	S4L	Brace Angle (Left)
6a	2	S5R	Railing Support Angle (Right)
6b	2	S5L	Railing Support Angle (Left)
7a	21	W1	Plank
7b	2	W1N2	Plank with 2 Ends Notched
8	2	W19	Railing
9	54	BC33-1	3/8" x 3" Carriage Bolt
10	28	B61 3/4-1 1/4	5/8" x 1-3/4" Bolt
11	4	B618-6	5/8" x 18" Bolt
12	4	TR718-5	3/4" x 18" Thr'd Rod
13	4	LS64 1/2	5/8" x 4-1/2" Lag Screw
14	8	SW2-60	2" x Sq. Washer, 11/16" Hole
15	4	CW60	4" Sq. Curved Washer, 11/16" Hole
16	32	MF60	5/8" MF Locknut
17	8	RW2-70	2" Round Washer 13/16" Hole
18	8	N70	3/4" Std. Nut
19	8	MF70	3/4" MF Locknut

NOTE: Douglas-fir plank and railings are pressure treated with DCOI. Steel members and parts are hot dip galvanized.

D EQUIPMENT MOUNTS

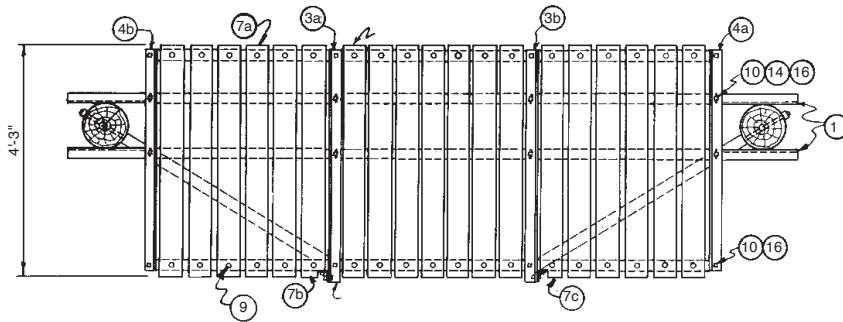
1036 Transformer Platform



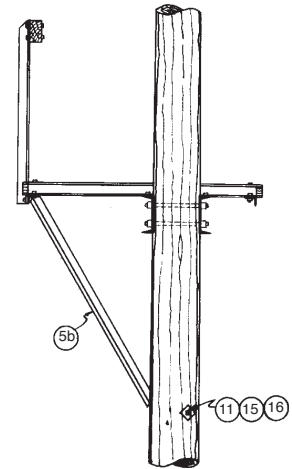
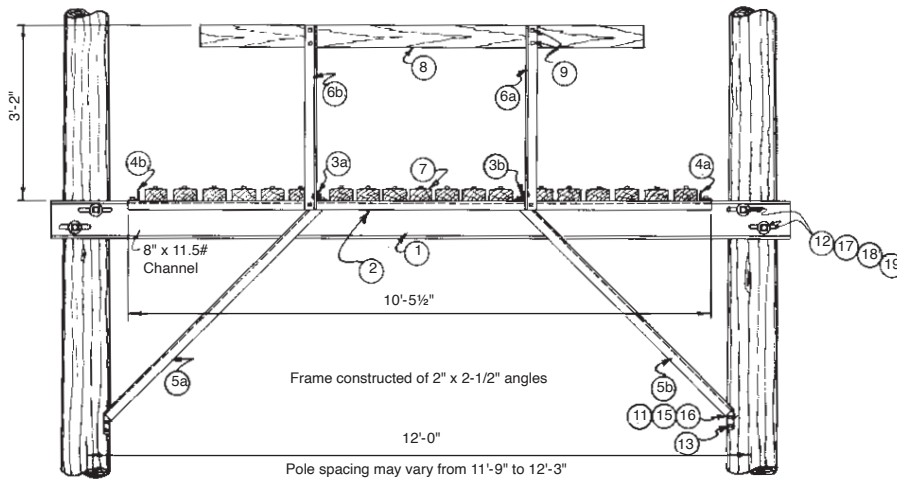
No. 1036 Bill of Material

Item	Quan.	Part No.	Description
1	2	S9	8" Channel
2	2	S10	Side Angle
3	2	S6	Cross Angle
4	2	S3	Cross Angle
5a	2	S4R	Brace Angle (Right)
5b	2	S4L	Brace Angle (Left)
6a	2	S5R	Railing Support Angle (Right)
6b	2	S5L	Railing Support Angle (Left)
7a	24	W1	Plank
7b	2	W1N2	Plank with 2 Ends Notched
8	2	W4	Railing
9	60	BC33-1	3/8" x 3" Carriage Bolt
10	28	B61 3/4-1 1/4	5/8" x 1-3/4" Bolt
11	4	B618-6	5/8" x 18" Bolt
12	4	TR718-5	3/4" x 18" Thr'd Rod
13	4	LS64 1/2	5/8" x 4-1/2" Lag Screw
14	10	SW2-60	2" x Sq. Washer, 11/16" Hole
15	4	CW60	4" Sq. Curved Washer, 11/16" Hole
16	32	MF60	5/8" MF Locknut
17	8	RW2-70	2" Round Washer 13/16" Hole
18	8	N70	3/4" Std. Nut
19	8	MF70	3/4" MF Locknut

NOTE: Douglas-fir plank and railings are pressure treated with DCOI. Steel members and parts are hot dip galvanized.



1035 Transformer Platform

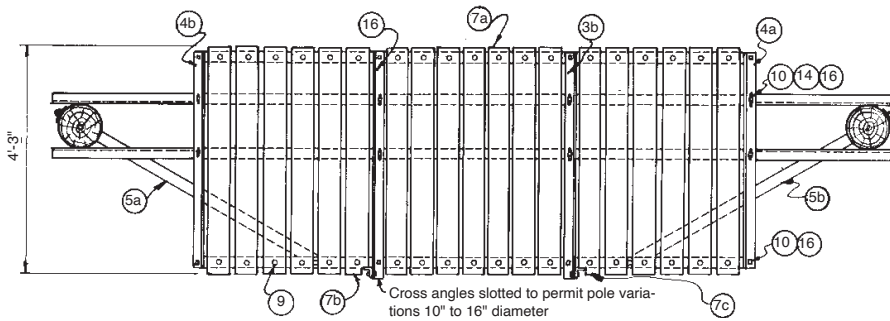


No. 1035 Bill of Material

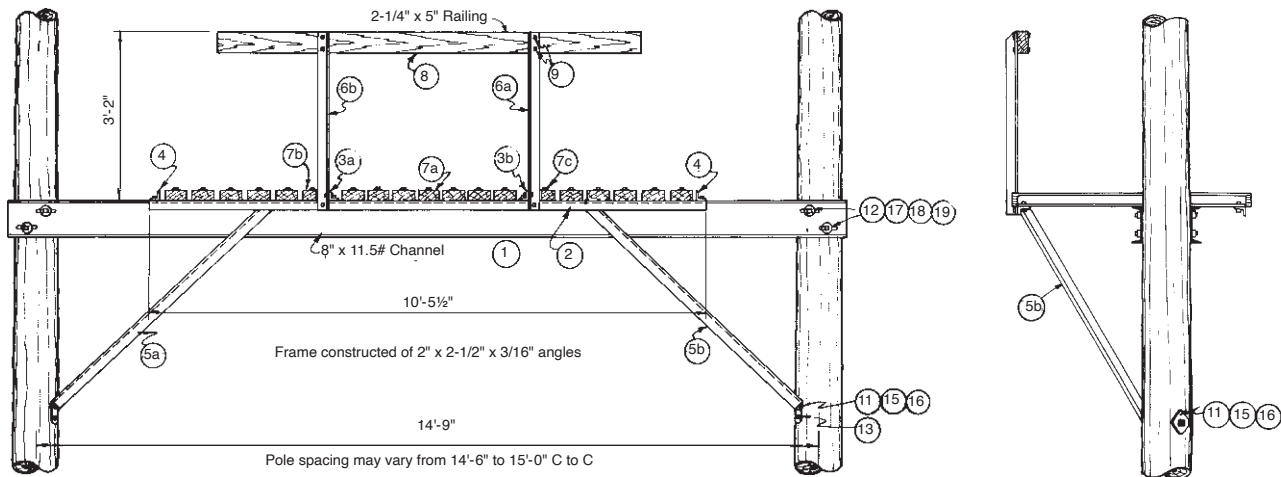
Item	Quan.	Part No.	Description
1	2	S1	8" Channel
2	2	S2	Side Angle
3a	1	S7R	Cross Angle (Right)
3b	1	S7L	Cross Angle (Left)
4a	1	S8R	Cross Angle (Right)
4b	1	S8L	Cross Angle (Left)
5a	1	S4R	Brace Angle (Right)
5b	1	S4L	Brace Angle (Left)
6a	1	S5R	Railing Support Angle (Right)
6b	1	S5L	Railing Support Angle (Left)
7a	17	W3	Plank
7b	1	W3N1RT	Plank with 1 End Notched (Right)
7c	1	W3N1LT	Plank with 1 End Notched (Left)
8	1	W2	Railing
9	42	BC33-1	3/8" x 3" Carriage Bolt
10	22	B61 3/4-1 1/4	5/8" x 1-3/4" Bolt
11	2	B618-6	5/8" x 18" Bolt
12	4	TR718-5	3/4" x 18" Thr'd Rod
13	2	LS64 1/2	5/8" x 4-1/2" Lag Screw
14	8	SW2-60	2" x Sq. Washer, 11/16" Hole
15	2	CW60	4" Sq. Curved Washer, 11/16" Hole
16	24	MF60	5/8" MF Locknut
17	8	RW2-70	2" Round Washer 13/16" Hole
18	8	N70	3/4" Std. Nut
19	8	MF70	3/4" MF Locknut

NOTE: Douglas-fir plank and railings are pressure treated with DCOI. Steel members and parts are hot dip galvanized.

D EQUIPMENT MOUNTS



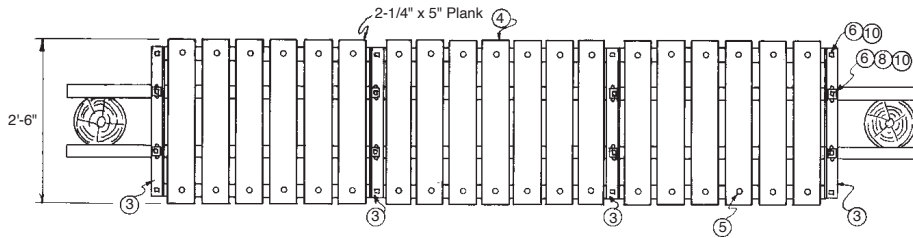
1071 Transformer Platform



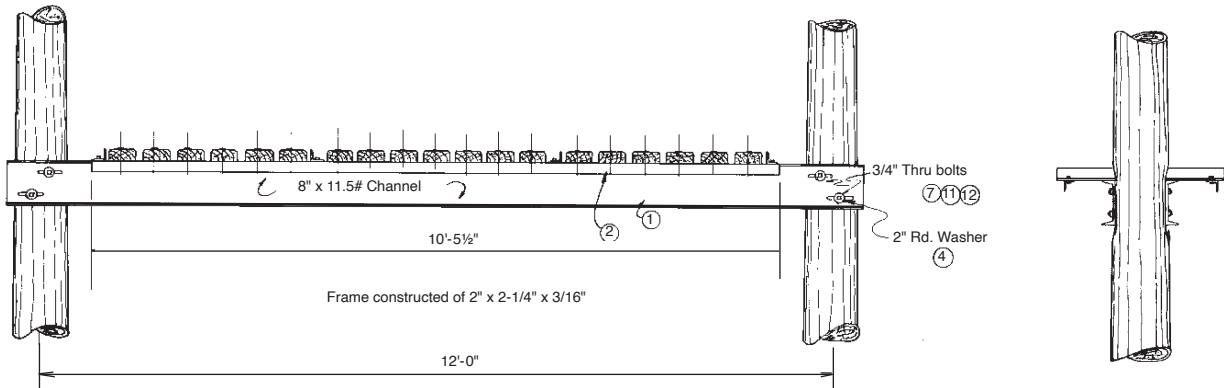
No. 1071 Bill of Material

Item	Quan.	Part No.	Description
1	2	S12	8" Channel
2	2	S2	Side Angle
3a	1	S7R	Cross Angle (Right)
3b	1	S7L	Cross Angle (Left)
4a	1	S8R	Cross Angle (Right)
4b	1	S8L	Cross Angle (Left)
5a	1	S4R	Brace Angle (Right)
5b	1	S4L	Brace Angle (Left)
6a	1	S5R	Railing Support Angle (Right)
6b	1	S5L	Railing Support Angle (Left)
7a	17	W3	Plank
7b	1	W3N1RT	Plank with 1 End Notched (Right)
7c	1	W3N1LT	Plank with 1 End Notched (Left)
8	1	W2	Railing
9	42	BC33-1	3/8" x 3" Carriage Bolt
10	22	B61 3/4-1 1/4	5/8" x 1-3/4" Bolt
11	2	B618-6	5/8" x 18" Bolt
12	4	TR718-5	3/4" x 18" Thr'd Rod
13	2	LS64 1/2	5/8" x 4-1/2" Lag Screw
14	8	SW2-60	2" x Sq. Washer, 11/16" Hole
15	2	CW60	4" Sq. Curved Washer, 11/16" Hole
16	24	MF60	5/8" MF Locknut
17	8	RW2-70	2" Round Washer 13/16" Hole
18	8	N70	3/4" Std. Nut
19	8	MF70	3/4" MF Locknut

NOTE: Douglas-fir plank and railings are pressure treated with DCOI. Steel members and parts are hot dip galvanized.



1040 Transformer Platform



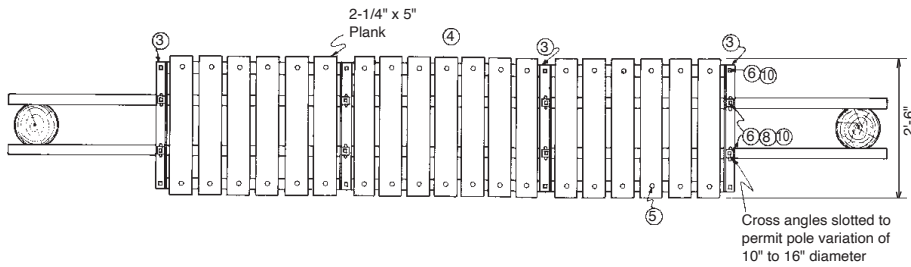
Poles may vary from 11'-9" to 12'-3" C to C

No. 1040 Bill of Material

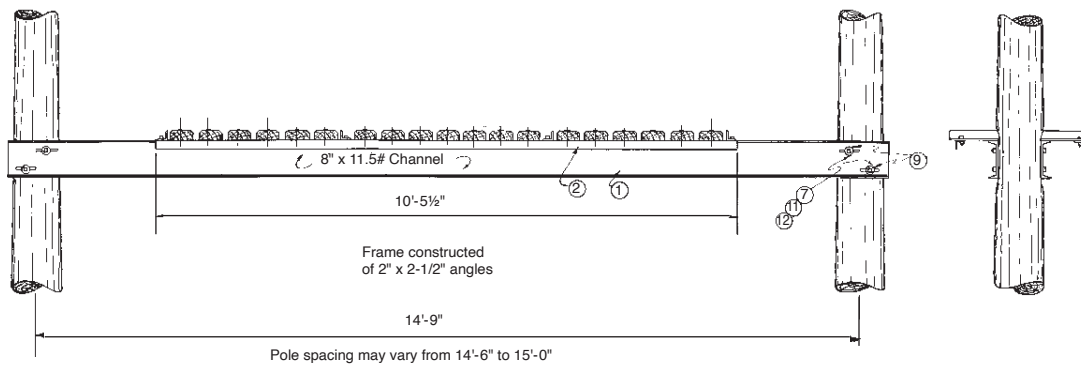
Item	Quan.	Part No.	Description
1	2	S1	8" Channel
2	2	S2	Side Angle
3	4	S11	Cross Angle
4	19	W5	Plank
5	38	BC33-1	3/8" x 3" Carriage Bolt
6	16	B61 3/4-1 1/4	5/8" x 1-3/4" Bolt
7	4	TR718-5	3/4" x 18" Thr'd Rod
8	8	SW2-60	2" x Sq. Washer, 11/16" Hole
9	8	RW2-70	2" Round Washer 13/16" Hole
10	16	MF60	5/8" MF Locknut
11	8	N70	3/4" Std. Nut
12	8	MF70	3/4" MF Locknut

NOTE: Douglas-fir plank and railings are pressure treated with DCOI. Steel members and parts are hot dip galvanized.

D EQUIPMENT MOUNTS



1072 Transformer Platform

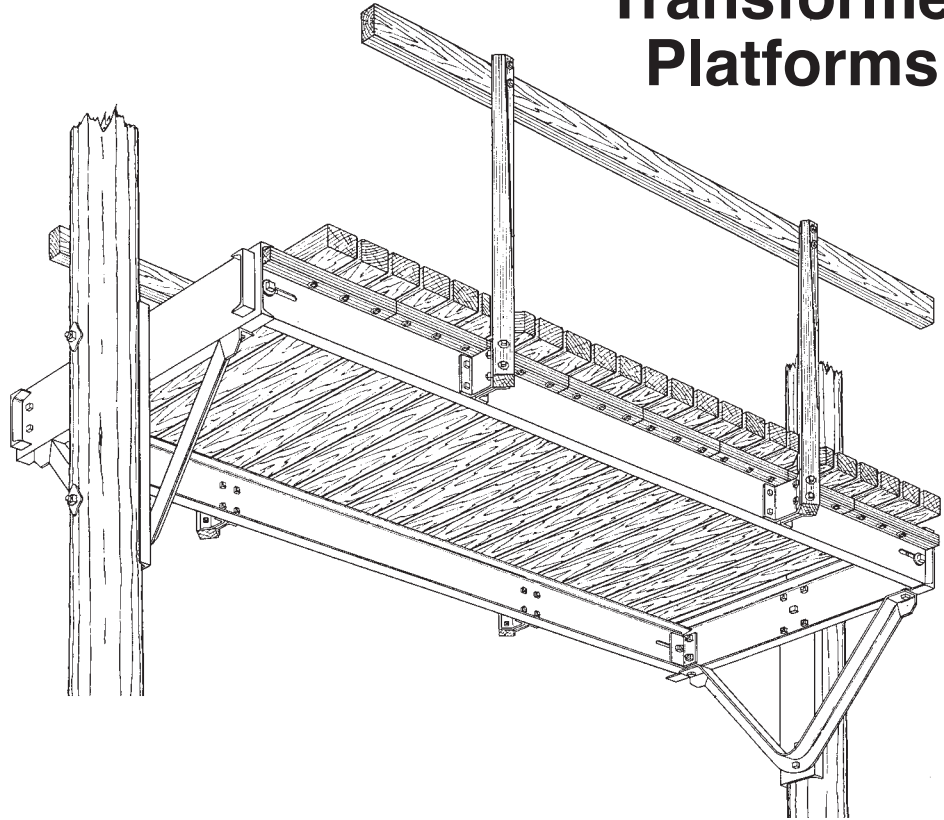


No. 1072 Bill of Material

Item	Quan.	Part No.	Description
1	2	S12	8" Channel
2	2	S2	Side Angle
3	4	S11	Cross Angle
4	19	W5	Plank
5	38	BC33-1	3/8" x 3" Carriage Bolt
6	16	B61 3/4-1 1/4	5/8" x 1-3/4" Bolt
7	4	TR718-5	3/4" x 18" Thr'd Rod
8	8	SW2-60	2" x Sq. Washer, 11/16" Hole
9	8	RW2-70	2" Round Washer 13/16" Hole
10	16	MF60	5/8" MF Locknut
11	8	N70	3/4" Std. Nut
12	8	MF70	3/4" MF Locknut

NOTE: Douglas-fir plank and railings are pressure treated with DCOI. Steel members and parts are hot dip galvanized.

Spread Channel Transformer Platforms



Hughes Brothers Spread Channel Transformer Platforms have side channels which are attached to channels rather than directly to the poles. This allows for greater vertical space under the platform.

The spread channel type platform has the planks made into removable panels allowing the transformer to be raised vertically through the platform. The panels are easily replaced in their proper positions.

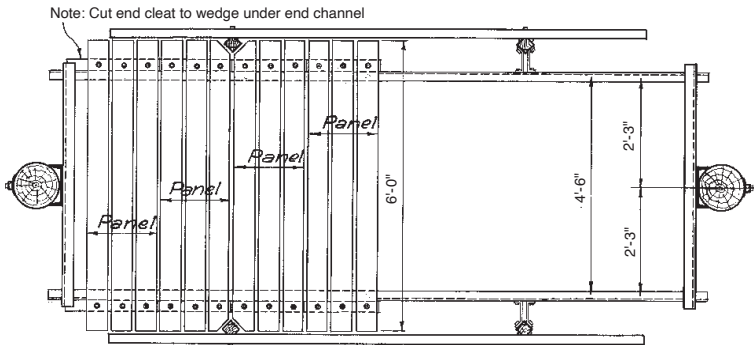
The same advantages are present in the removal of a transformer. Usually a transformer can be removed without disturbing the adjacent transformers.

Hughes Brothers transformer platforms are furnished complete, shipped with all bolts, ready to install. These prefabricated units are economical because no field work is required other than boring the pole holes; there's no cutting, fitting, waste or costly delays.

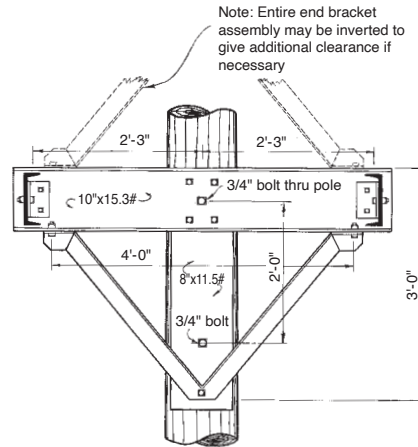
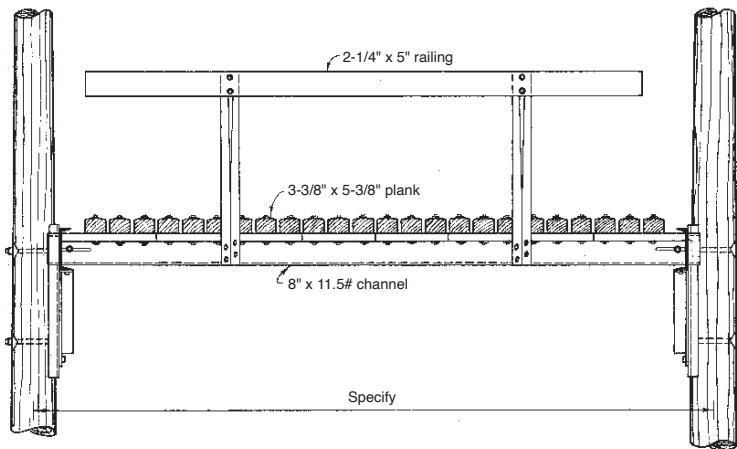
Wood parts are made from Douglas-fir, pressure treated with DCOI. Steel parts are hot dip galvanized.

D EQUIPMENT MOUNTS

2100 Transformer Platform



NOTE: Douglas-fir plank and railings are pressure treated with DCOI. Steel members and parts are hot dip galvanized.



Hughes Brothers No. 2100 Spread Channel Transformer Platforms are made for center to center pole spacing from 11'0" to 19'9" with guard rails and walking space on both sides.

Shipped complete, ready to install, Hughes No. 2100 Platform has two 8" x 11.5-lb. side or spread channels and two 10" x 15.3-lb. pole channels. The platform has two 8" x 11.5-lb. vertical pole channels; four clip angles and eight rail supports of 1/4" stock, and two 3" x 3" x 1/4" angle braces. It has two rail guards, 2-1/4" x 5" x 11'0"; the platform planks, 3-3/8" x 5-3/8" x 6'0", are cleated to removable panels; and the four posts for guard rails are 3" x 3" x 4'0".

Hughes Brothers Transformer Platforms can be furnished in sizes other than those shown. Consult the Hughes Brothers Engineering Department.

When ordering other than stock numbers shown, specify center to center pole spacing.

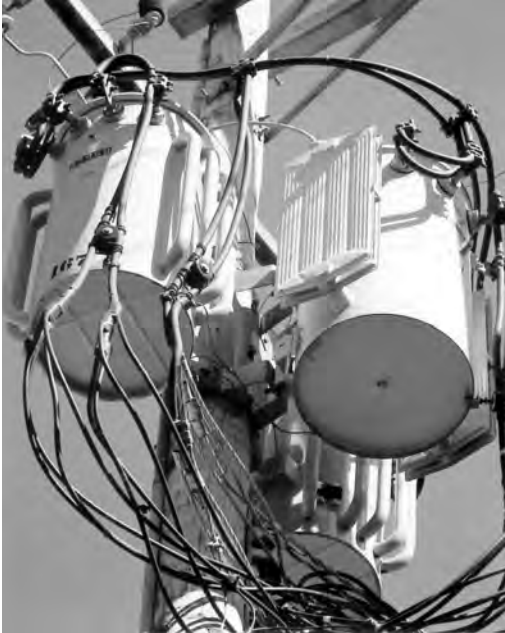
C. to C.
Pole

Stock No.	Spacing	Weight / lbs
2100-12-0	12'-0"	1360
2100-14-9	14'-9"	1620

Ordering Example:

2100 - 14 - 9

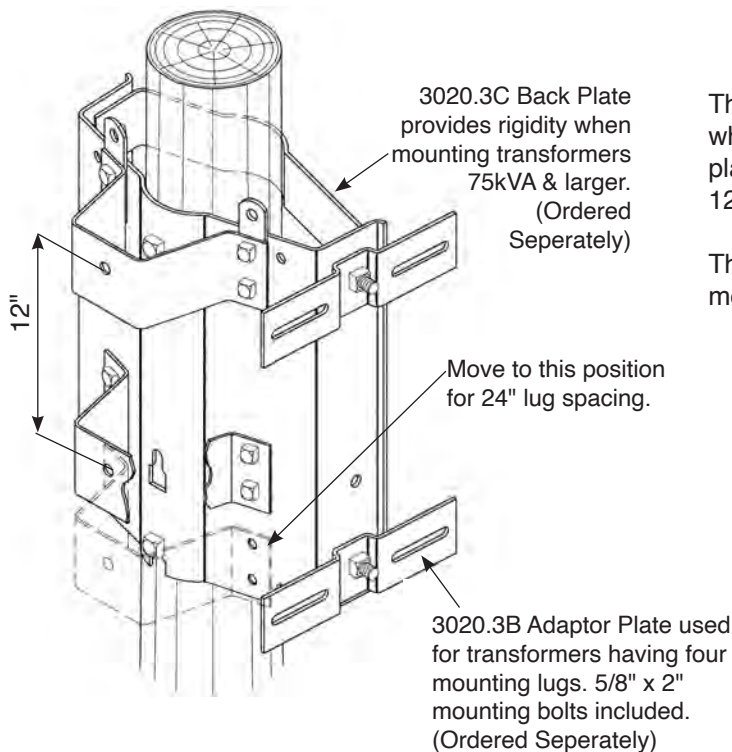
Inches } Pole Spacing
Feet }



Hughes Brothers Cluster Mounts

Hughes Brothers 3020 Cluster Mounts provide a reliable method of mounting very heavy transformers in a three plane or "cluster" arrangement.

The Hughes Brothers cluster mounts enable transformers to be attached on the ground and many electrical connections made before the cluster is raised into position.



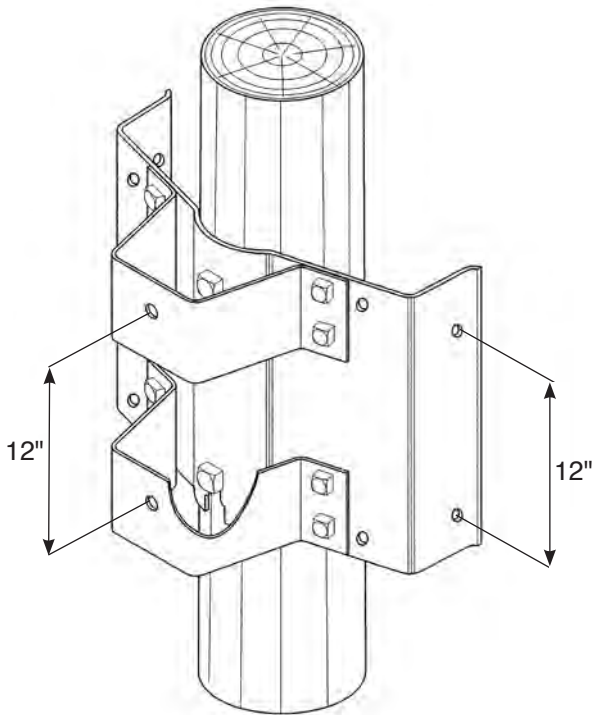
3020 Cluster Mount

The 3020 features key hole & key slot mounting holes which allow the unit to be hung on bolts already in place on the pole. Transformers with a lug spacing of 12" or 24" are accommodated.

The unit is furnished assembled as shown less pole mounting bolts.

Stock No.	Transformer Mounting Bolts	Max Transformer Weight ea.
3020-5/8	5/8" x 3"	3000 lbs
3020-3/4	3/4" x 2-1/2"	3000 lbs
3020-3/4-AP	Includes 3020.3B Adaptor Plates	
3020.3B	Adaptor Plate	
3020.3C	Back Plate	

The 3020 Cluster Mount is approved for use by RUS borrowers.



3021 Cluster Mount

The Hughes Brothers 3021 cluster mount is recommended for transformers with 12" lug spacing (3020 offers 12" & 24" lug spacing). Transformers may be mounted on the ground and the entire cluster raised into position. Key hole and key slot mounting holes on the unit enable the entire assembly to be placed on mounting bolts already in place on the pole.

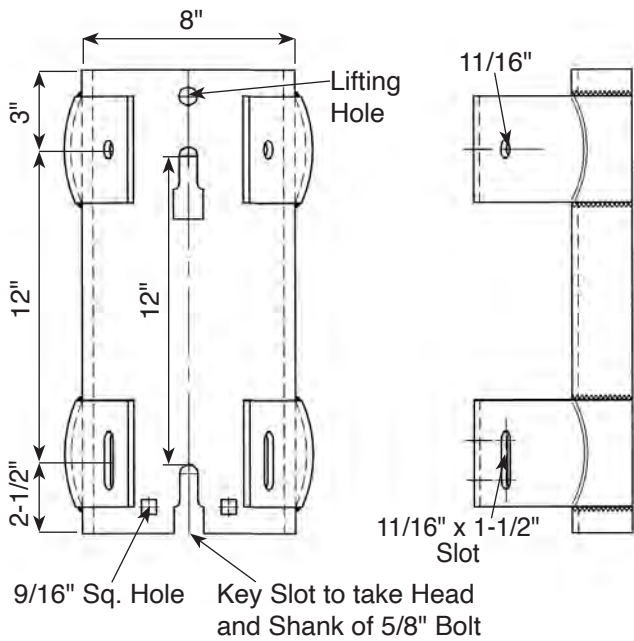
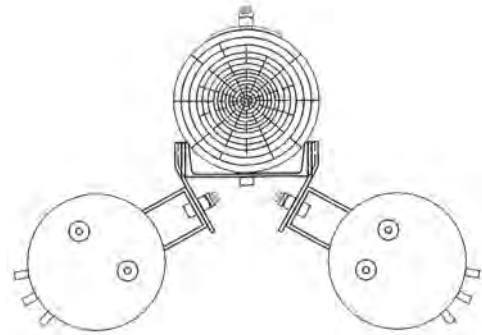
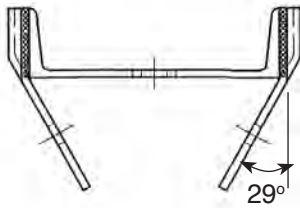
The unit is furnished assembled as shown along with six 5/8" x 2" transformer mounting bolts. Pole mounting hardware is sold separately.

The 3021 is approved for use by RUS borrowers.

Stock No.	Weight / lbs	Max Transformer weight
3021	56	2500 lbs

3022 Transformer Bracket

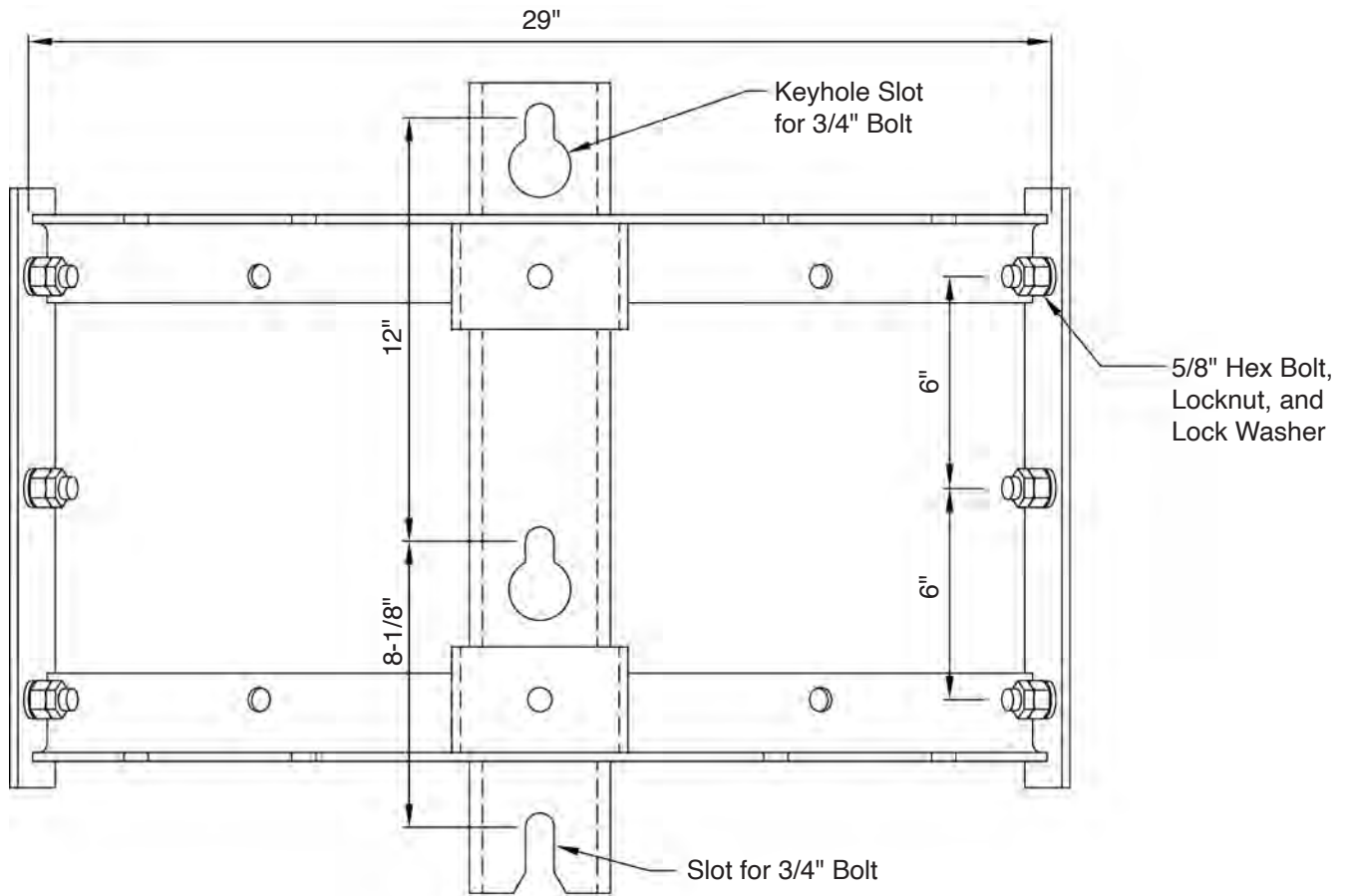
The 3022 Transformer Bracket is designed to mount two small transformers in parallel on a single bracket. The bracket is complete with four 5/8" x 1-1/2" transformer mounting bolts. 5/8" pole mounting bolts are ordered separately.



Stock No.	Weight lbs ea.	Max. Transformer Weight Ea
3022	24	2,000 lbs.

3025 Transformer Bracket

The Hughes Brothers 3025 Transformer Bracket is designed for use with three, 3kVA through 50kVA transformers with 12" lug spacing.



Stock No.	Weight lbs ea.	Max. Transformer Weight Ea
3025	43	1,000 lbs.

Banded Equipment Mounts

Hughes Brothers, Inc. can fabricate banded equipment mounts for situations where it is impractical to drill or cut holes into concrete or steel poles.

Pole diameters can range from 7 inches to 41 inches. Many other arrangements and styles

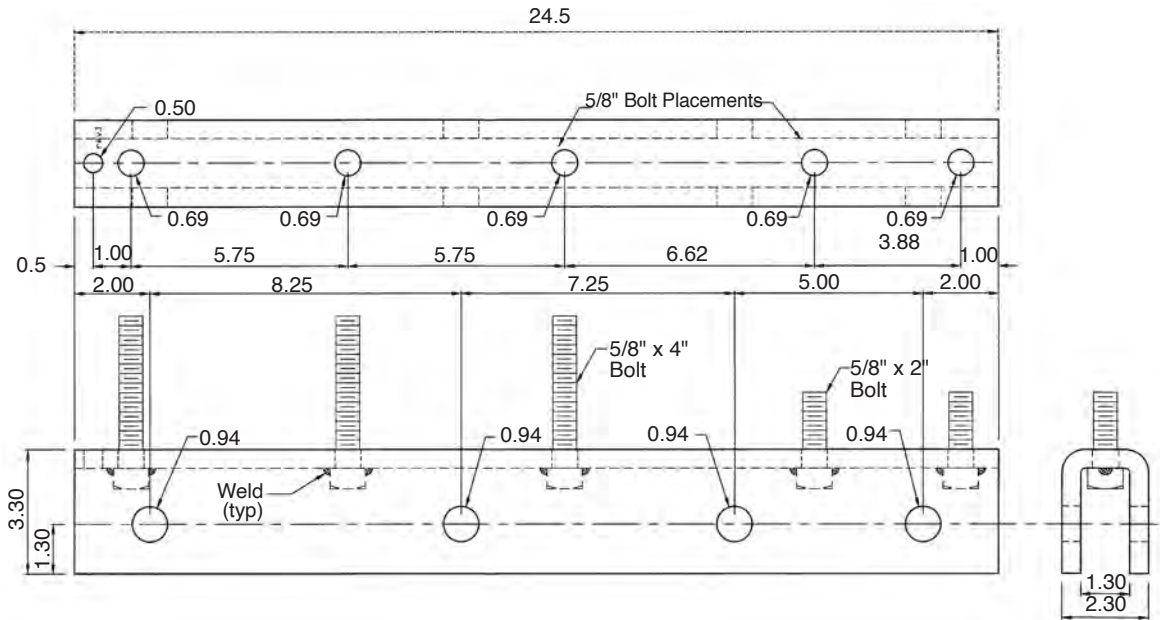
are available for mounting crossarms, post insulators, cutout-arrestor brackets, etc.

Hughes Brothers, Inc. can assist you with design and strength requirements.

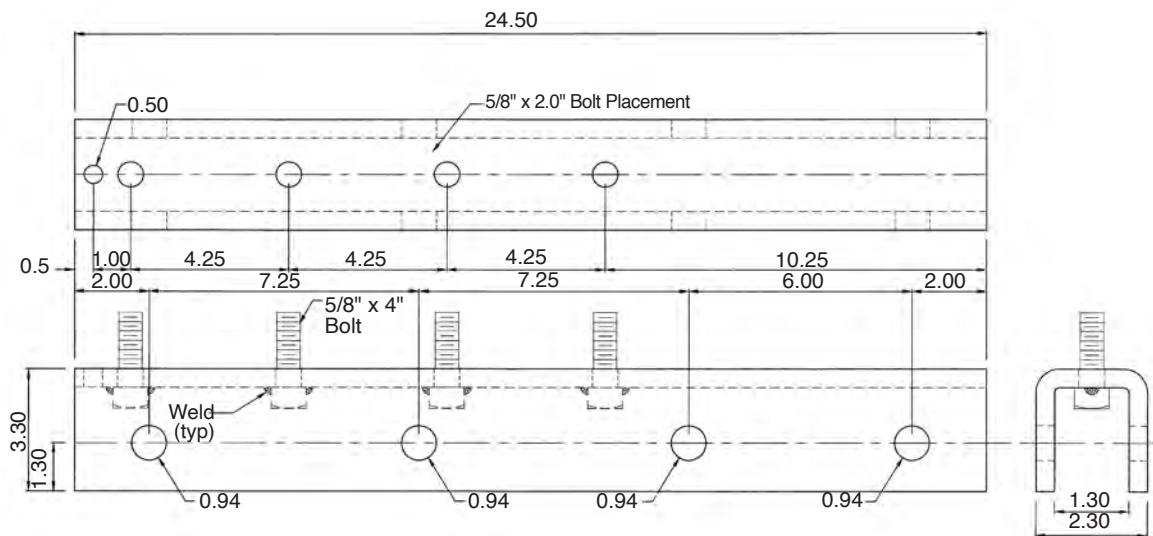


B2782 Banded Equipment Mounts

B2782-A Multiple Fig8 IN-LINE/2nd. TERM-GUY Support Bracket

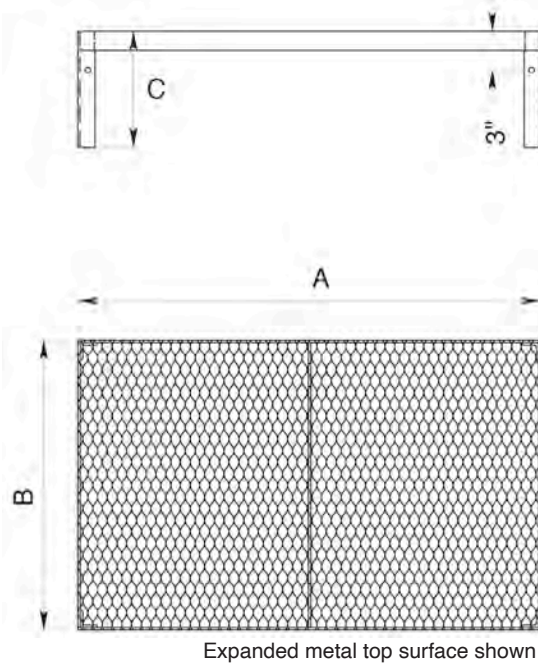
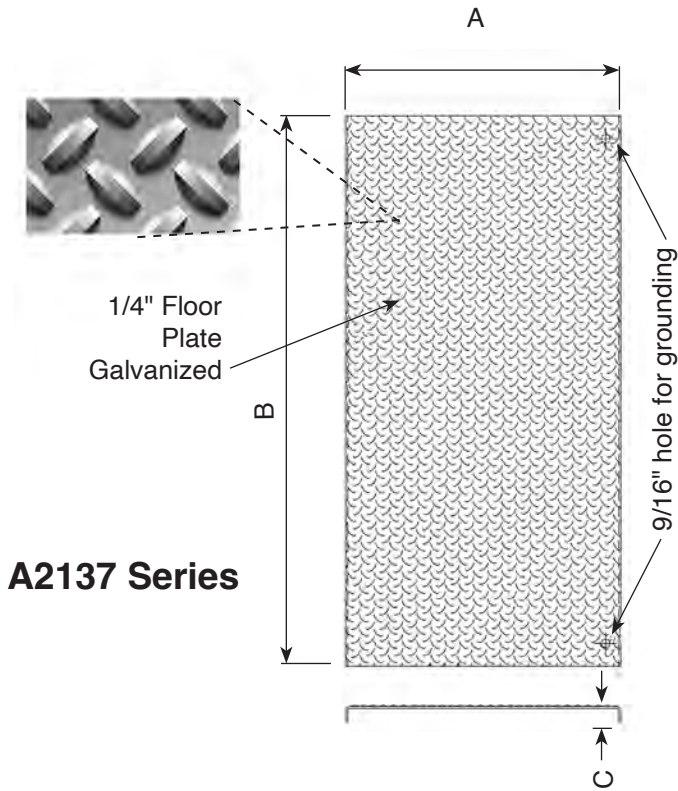


B2782-B Multiple Fig8 TERM/GUY Support Bracket



Grounding Platforms

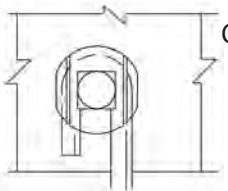
Hughes Brothers Grounding Platforms are used as an operating platform for switch structures and substations applications. Other configurations are available.



Grounding Detail



Furnished with two
GWB51-1/2 1/2" x 1-1/2"
Ground Wire Bonding
Bolts, with MF50
Locknuts



Grounding Detail

Stock No.	A	B	C	Bonding Option	Top Surface
AS2492-A	4'-0"	3'-0"	15"	(2) 9/16" holes on floor	Floor Plate
AS2492-B	5'-0"	4'-0"	15"	(2) 9/16" holes on floor	Floor Plate
AS2492-C	4'-0"	2'-6"	12"	(1) GWB51-1/2 on leg	Expanded Metal
AS2492-D	6'-0"	4'-0"	2'-0"	(2) 9/16" holes on side	Grating

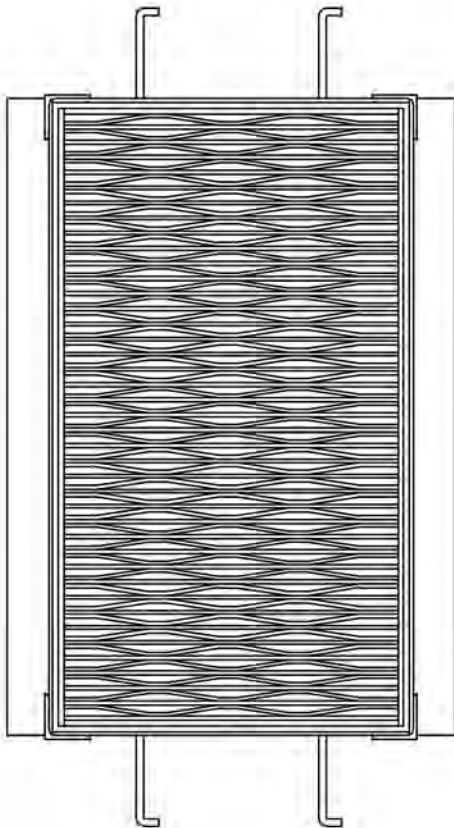
Stock No.	A	B	C	Wt./ lbs
A2137-A	3'-0"	4'-0"	2"	139
A2137-B	3'-6"	6'-0"	1-1/2"	247
A2137-C	3'-0"	6'-0"	2"	210
A2137-D	4'-0"	6'-0"	1-1/2"	265
A2137-E	2'-6"	4'-0"	2"	130

C3100, C4551 & C4664 Series Sidewalk Ventilating Grates

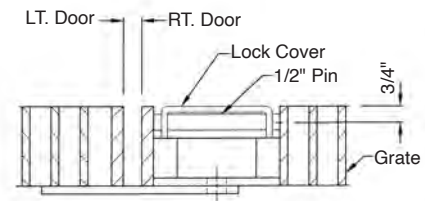
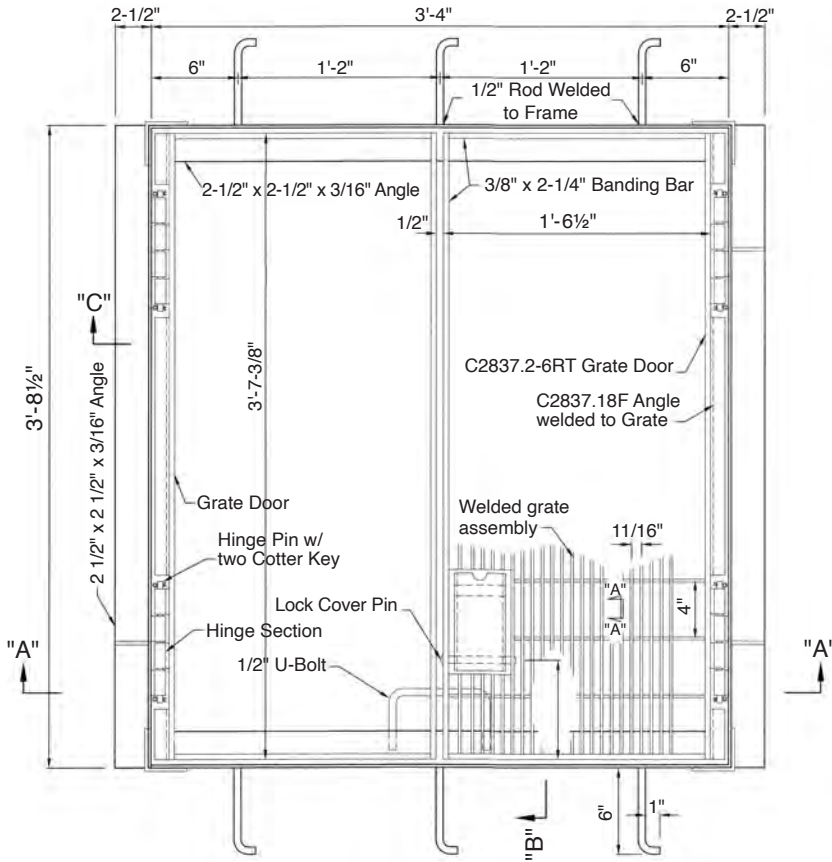
Hughes Brothers Ventilating Grates are custom fabricated to individual requirements. Compliance with NESC safety codes per Paragraph 323A are maintained or exceeded.

In order to fabricate a ventilating grate, Hughes Brothers Engineering department will require the following information:

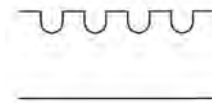
- Grate opening dimensions
- Design Loads
- Will the grating be subject to vehicular loads?
- For non-vehicular loading, the design live load shall not be less than 300 lbs / ft². Live loads shall be increased by 30% for impact.



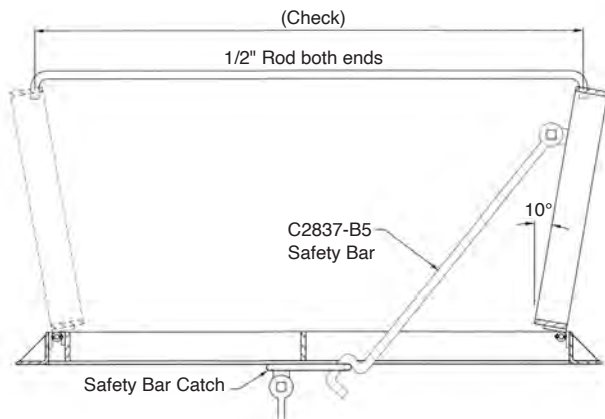
C2837-H Ventilating Grate, Frame & Door Alley Strength Side Walk Opening



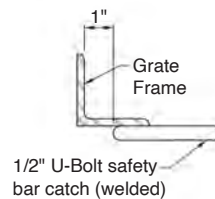
View "A-A" of Serrated Bearing Bar



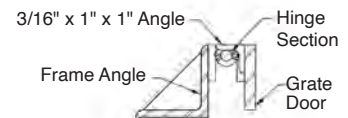
Section "A-A"



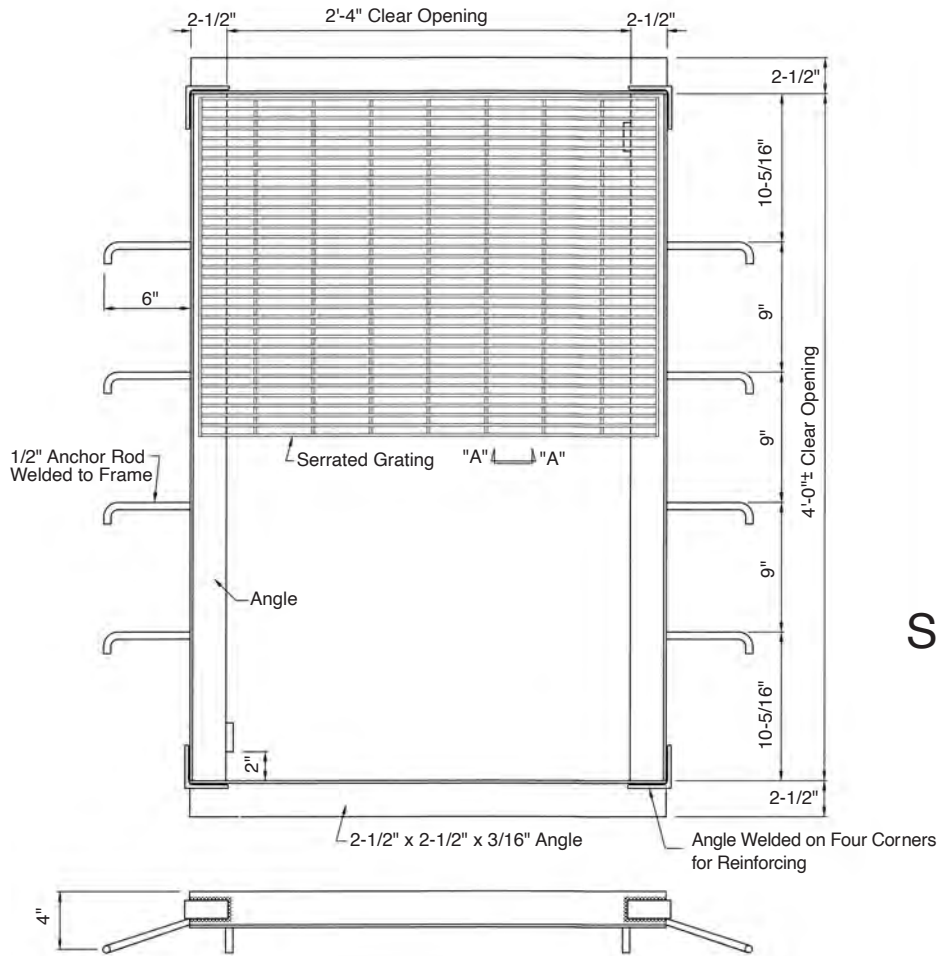
Section "B-B"



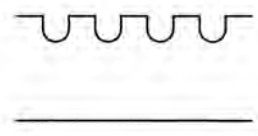
Section "C-C"



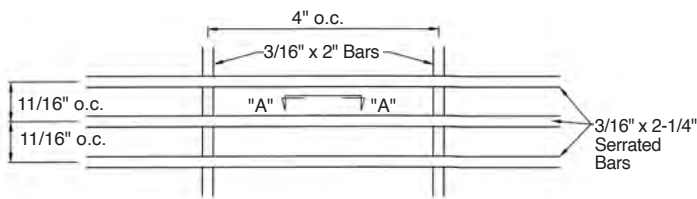
C2837-K Vent Opening



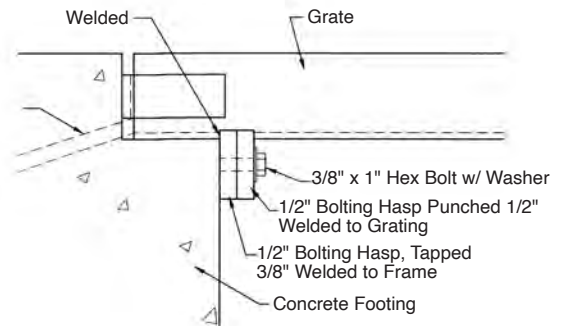
View "A-A" of Serrated Bearing Bar



Typical Grating Section

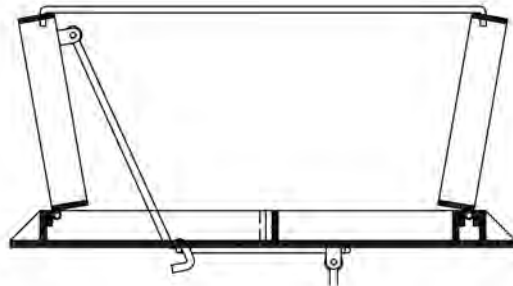
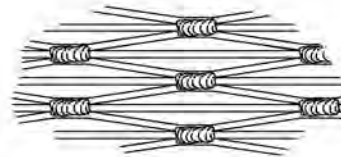
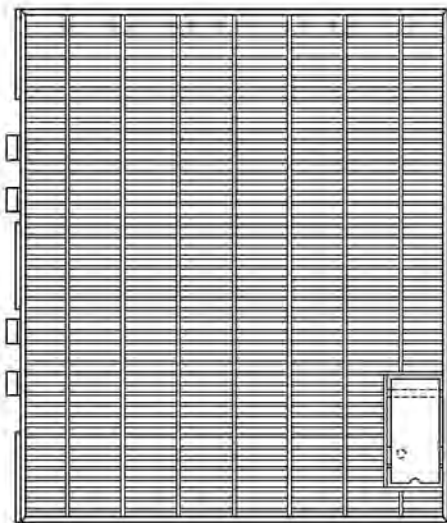
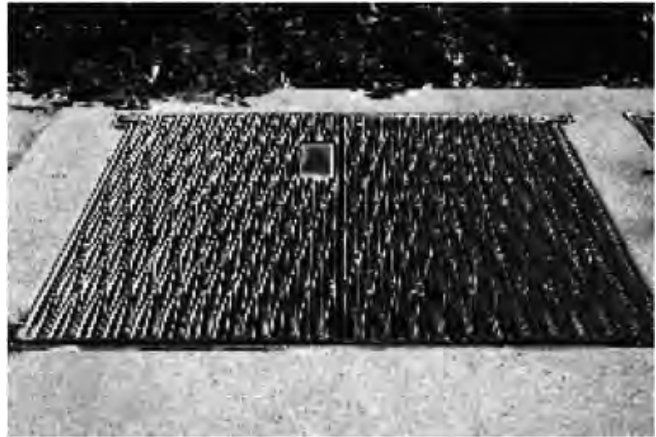
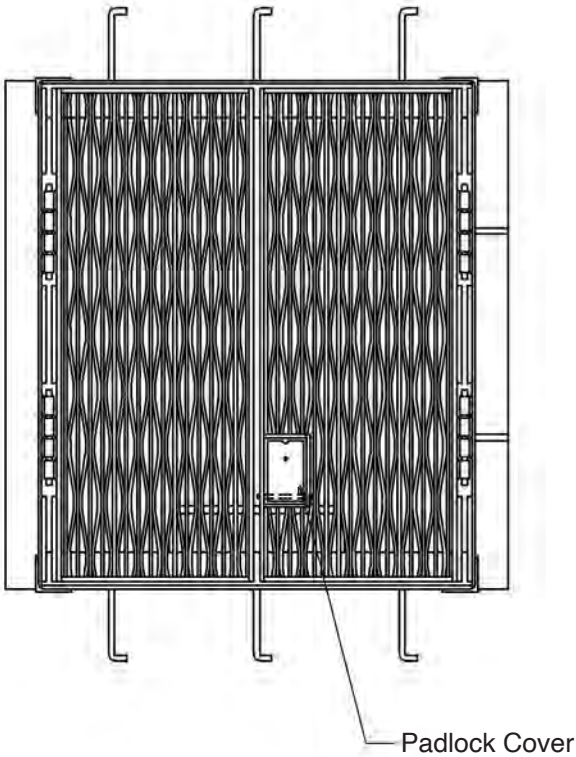


Detail of Bolting Device



C4060, C4059 & D259 Series Vault Covers

Hughes Brothers Vault Covers are similar to ventilating grates but feature hinged grating with safety bars and covered padlock pockets.



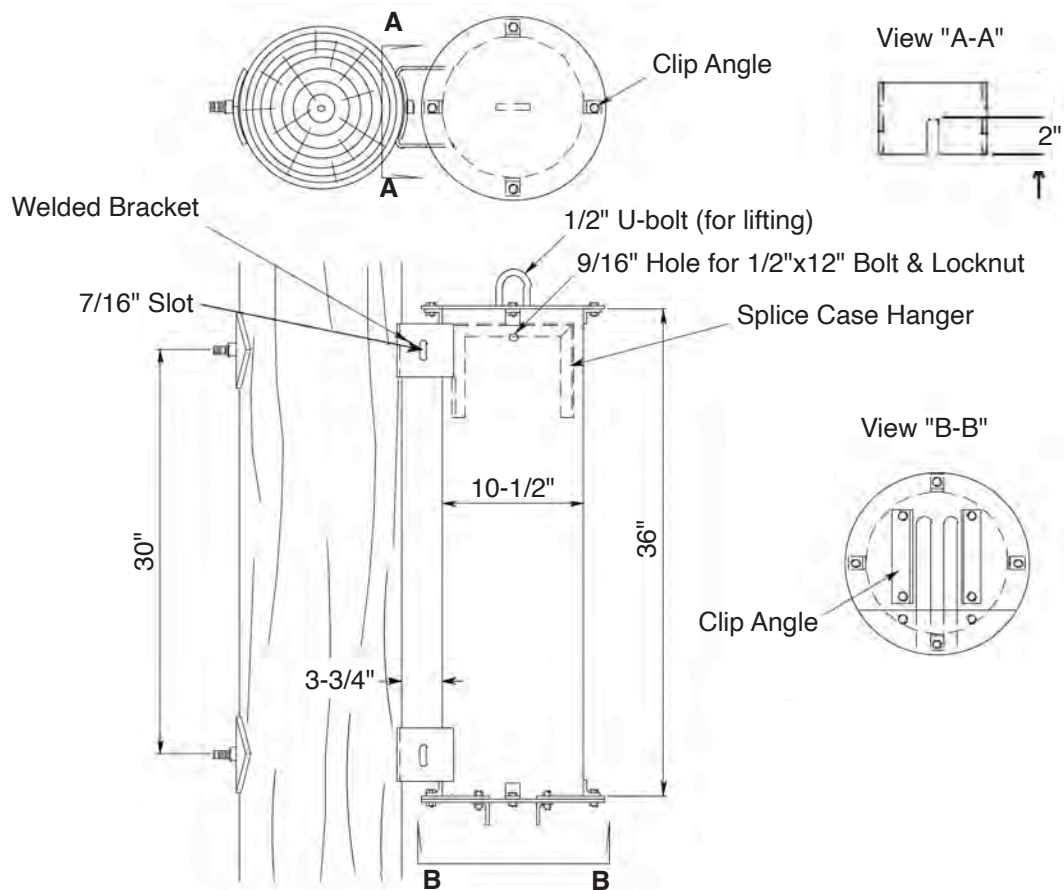


B2557-BB Protective Case for Fiber Optic Splices

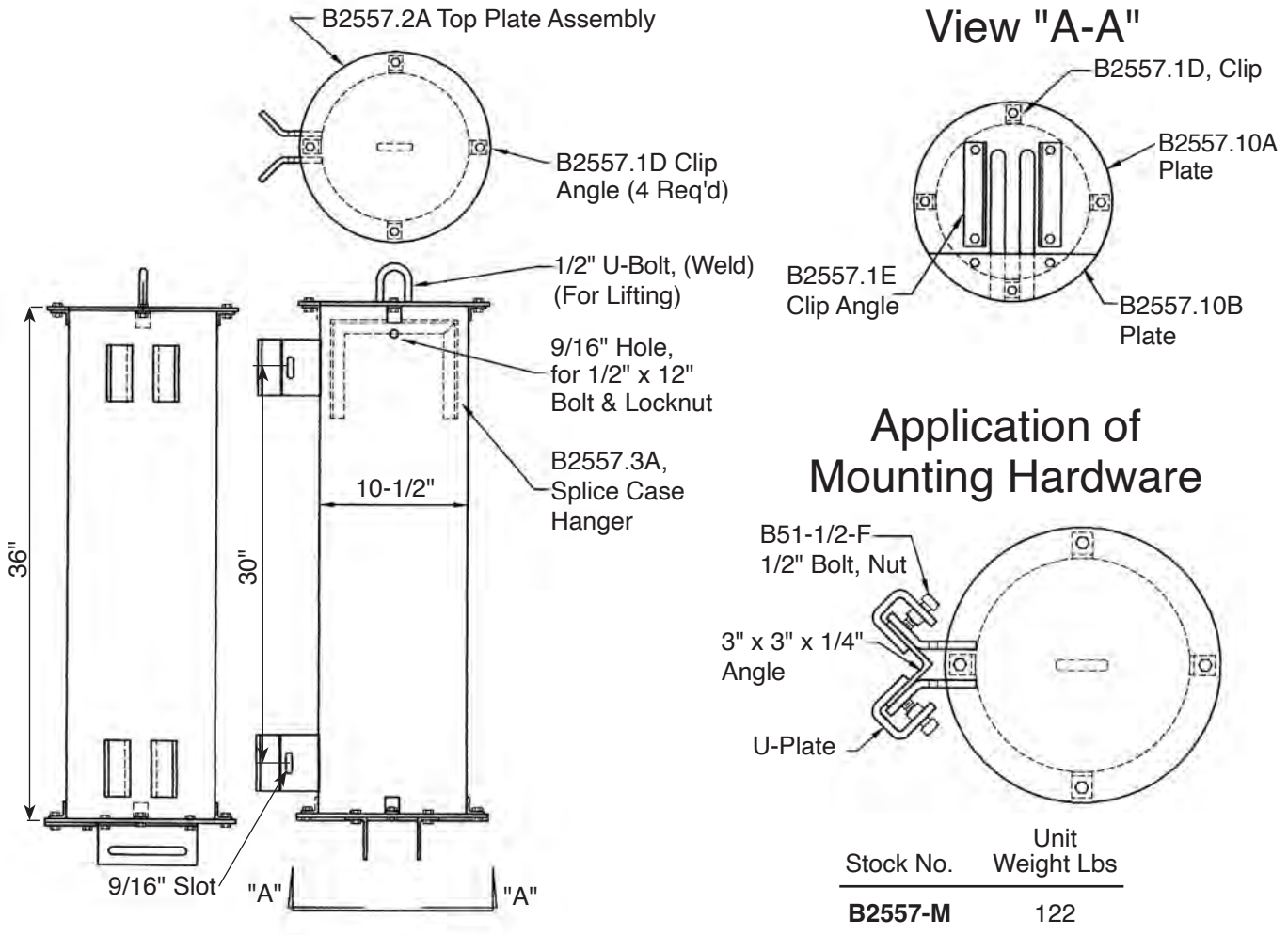
Hughes Brothers B2557-BB Fiber Optic Splice Case offers vandal and bullet resistant covering for Preformed Line Products' fiber optic splices. We also offer a version for the "coyote".

The unit is mounted to the pole by 5/8" bolts on 30" centers. The splice case features two slotted tabs and a 1/2" U-bolt for lifting and installation on the pole. Other configurations are available upon request.

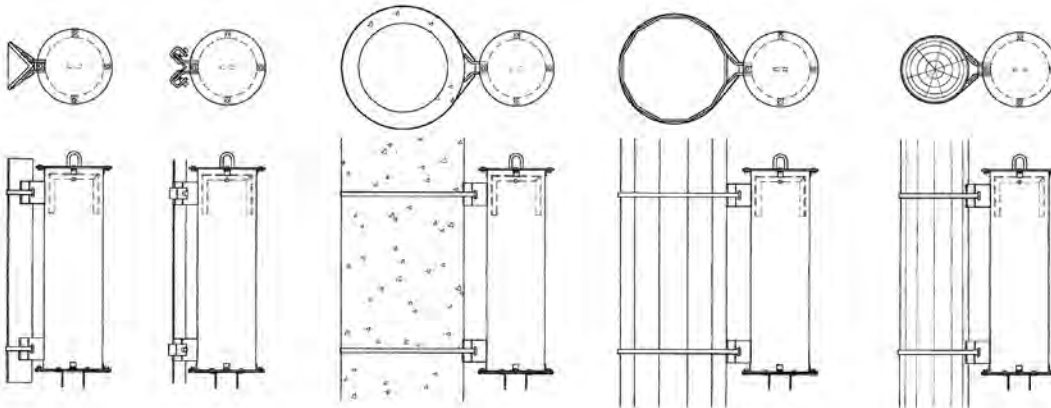
Stock No.	Unit Wt. Lbs
B2557-BB	118



B2557-M Protective Case for Fiber Optic Splices



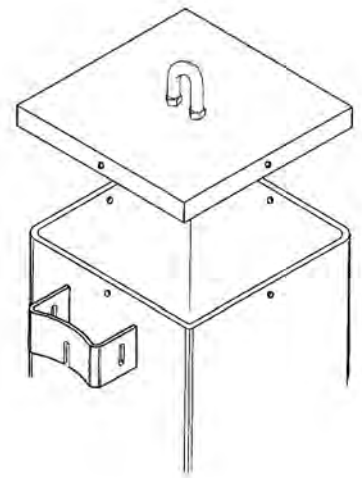
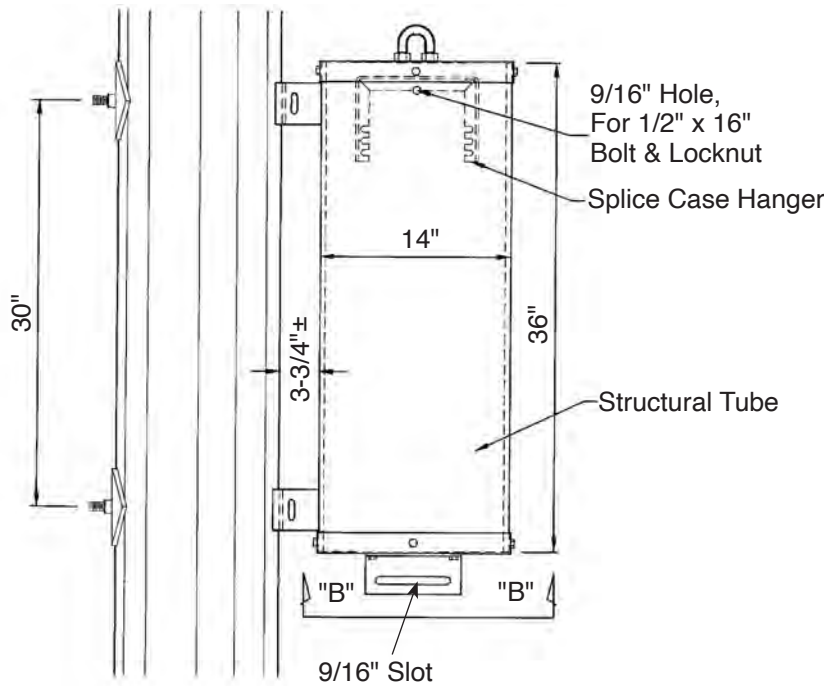
Applications of Mounting Hardware



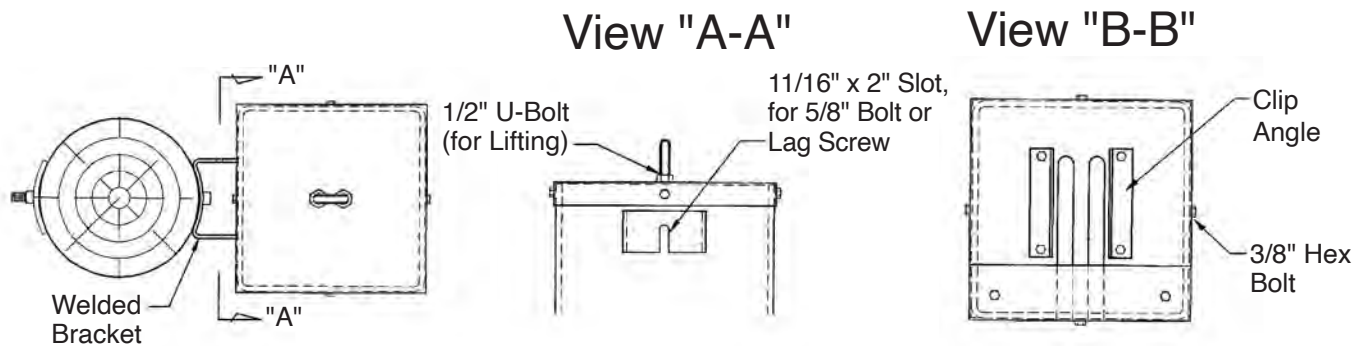
B2557-N Protective Case for Fiber Optic Splices

Hughes Brothers B2557-N Fiber Optic Splice Case offers vandal and bullet resistant covering for Preformed Line Products "Coyote"® fiber optic enclosures.

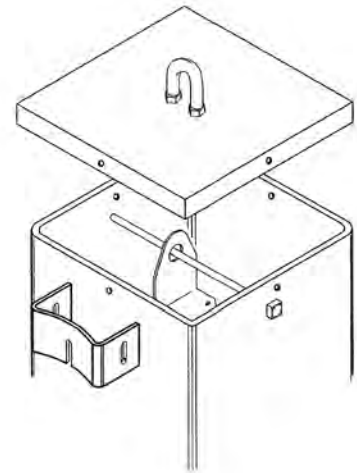
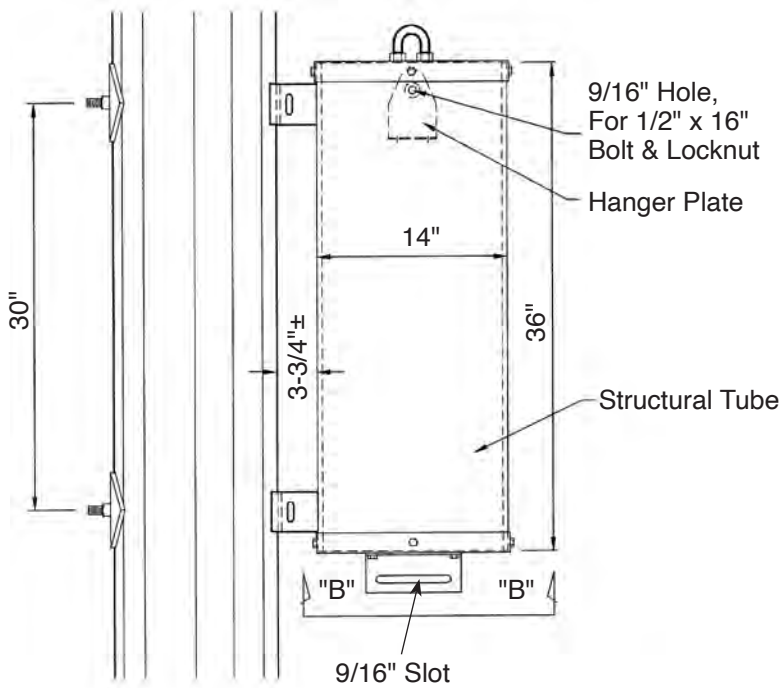
The unit is mounted to the pole with 5/8" bolts on 30" centers. The splice case features two slotted tabs and a 1/2" U-bolt for lifting and installation on the pole. **Other configurations are available upon request.**



Stock No.	Unit Weight Lbs
B2557-N	240



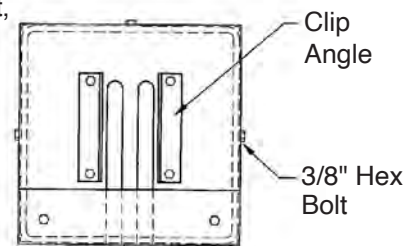
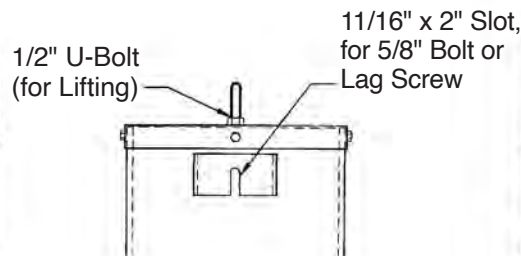
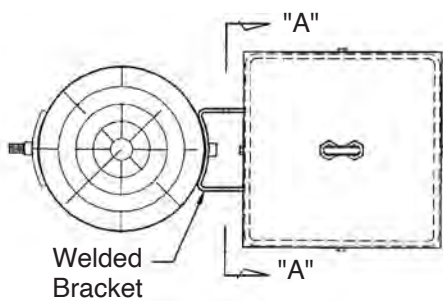
B2557-NC Protective Case for Fiber Optic Splices



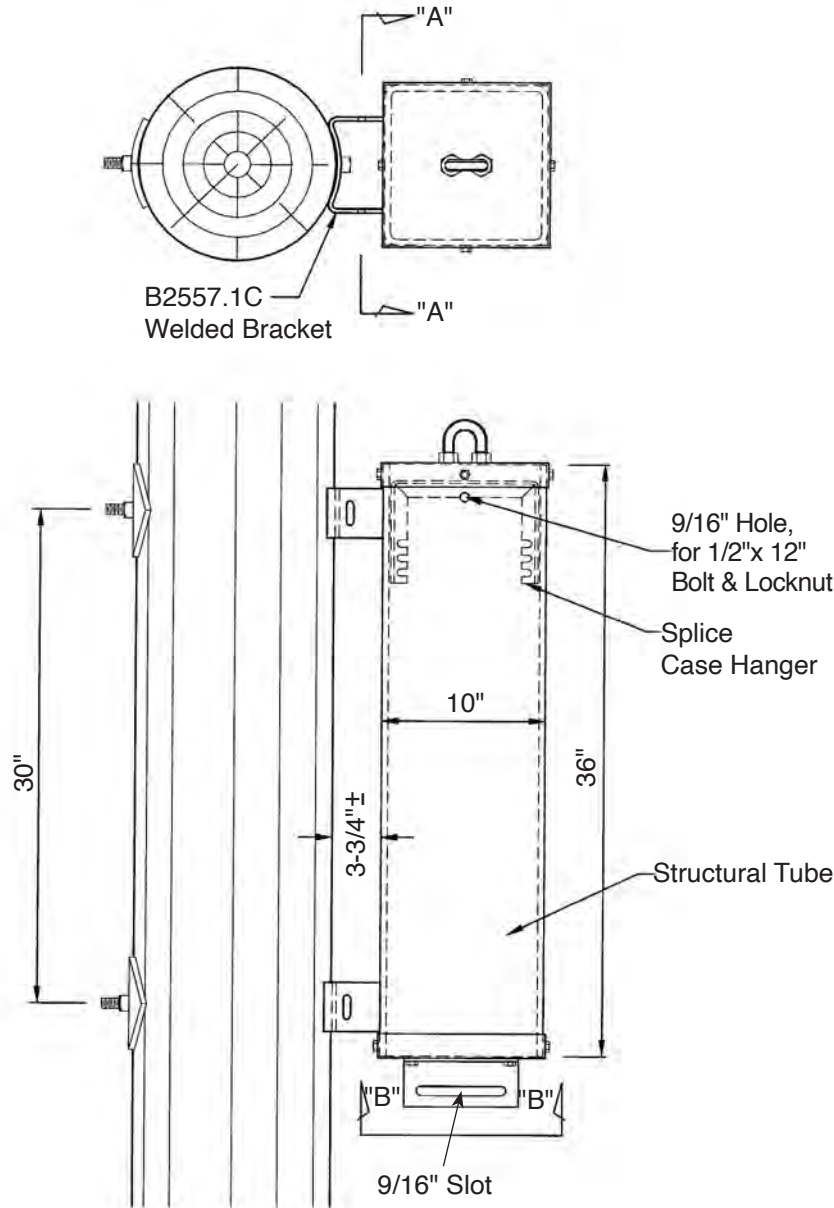
Stock No.	Unit Weight Lbs
B2557-NC	238

View "A-A"

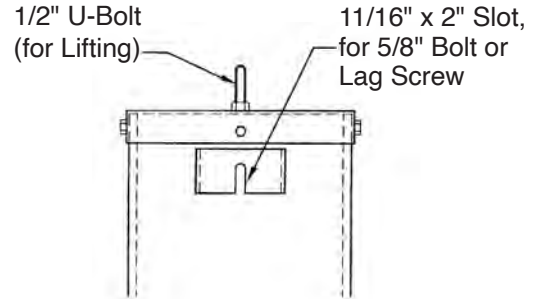
View "B-B"



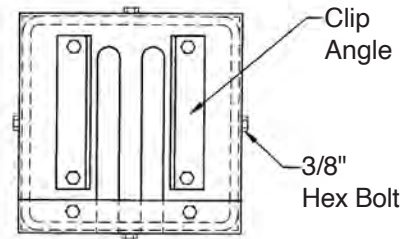
B2557-P Protective Case for Fiber Optic Splices



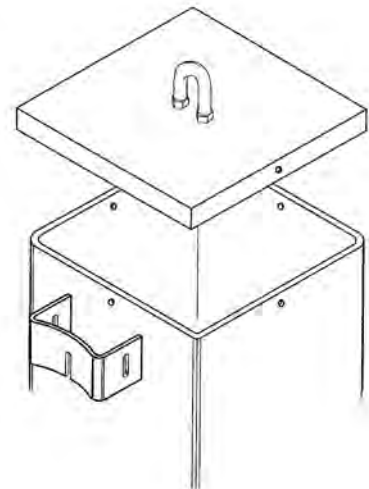
View "A-A"



View "B-B"

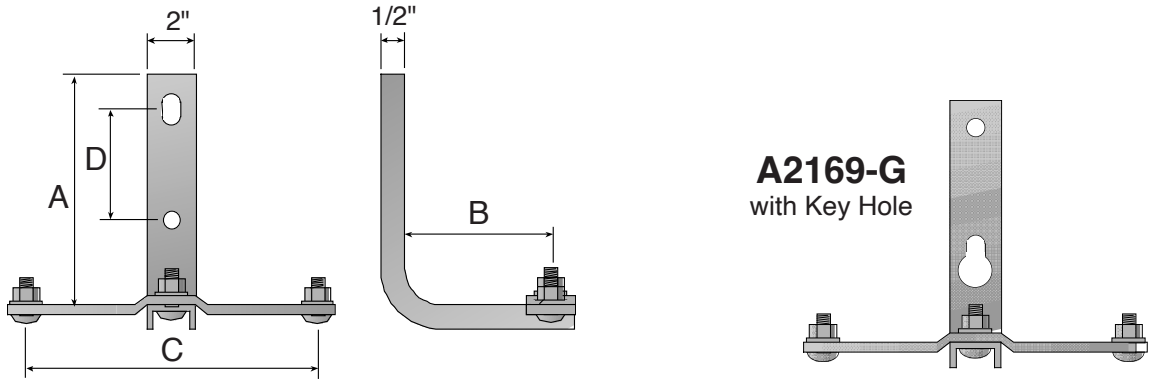


Stock No.	Unit Weight Lbs
B2557-P	168



Pole Mounted Cutout, Arrestor and Terminal Mounting Brackets

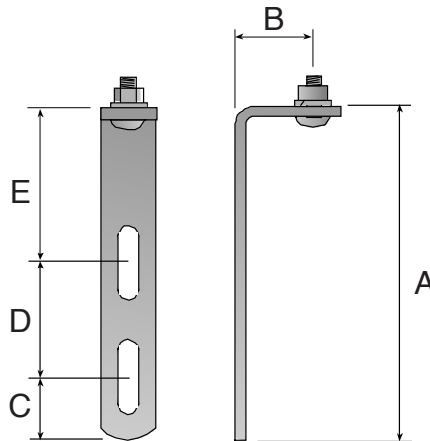
A2169



Stock No.	A	B	C	Top Mtg. Hole	Bot. Mtg. Hole	D	Strap	Captive Bolt Size
A2169-L	10"	10"	8"	11/16"x1-3/8"	11/16"	4 5/8"	3/8"x2"	1/2" x 1-1/2"
A2169-D	10"	4"	8"	1 1/16"x1-3/8"	11/16"	4 5/8"	3/8"x2"	
A2169-F	9"	5-1/2"	12 -1/2"	11/16"x1"	11/16"	6"	3/8"x1-1/2"	
A2169-N*	7-5/8"	10"	8-3/4"	11/16"x1-1/4"	11/16"	5"	3/8"x 2"	
A2169-G	7-1/2"	5"	8-1/2"	11/16"	11/16" x 1-5/16"	3-3/8"	3/8"x1-1/2"	

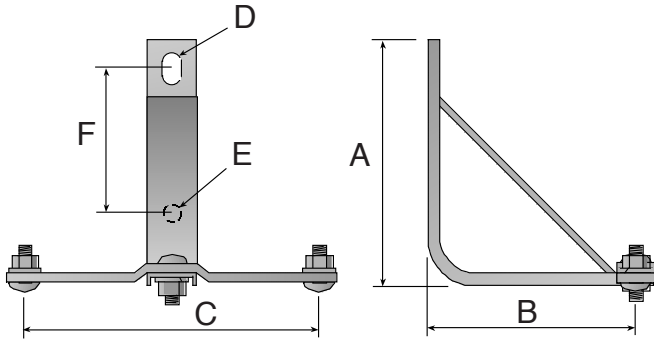
* 2" x 1" channel.

A2185

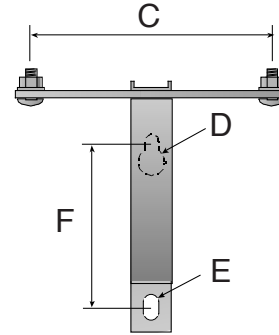


Stock No.	A	B	C	D	E	Slot Size	Material Size	Captive Bolt Size
A2185.5	8"	2-9/16"	1-7/8"	2-1/2"	3-5/8"	9/16"x2-1/4"	5/16"x1-1/2"	1/2"x1-5/8"
A2185.6	15"	2-9/16"	1-7/8"	9-1/2"	3-5/8"	9/16"x2-1/4"	5/16"x1-1/2"	1/2"x1-5/8"

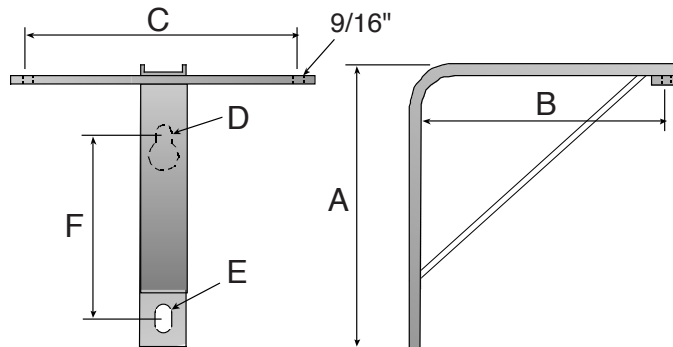
A2169-Q



A2169-J

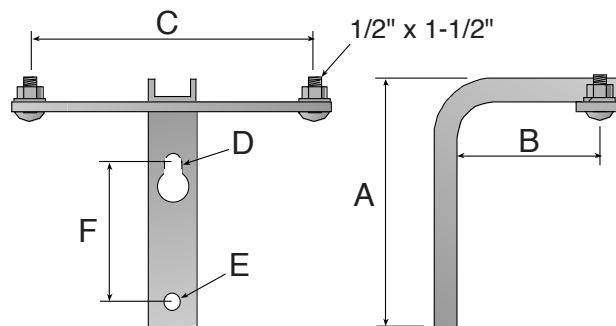


Stock No.	A	B	C	D	E	F	Channel	Strap	Captive Bolt Size
A2169-Q	12-1/2"	12"	10-1/2"	11/16"x1-1/2"	11/16"	8"	1/8"x1/2"x2"	3/8"x 1-1/2"	1/2"x1-5/8"
A2169-J	12-9/16"	12-1/8"	10"	11/16"x1-5/16"	11/16"x1-1/4"	8"	2"x9/16"x3/16"	3/8"x1-1/4"	1/2"x1-1/2"



A2169.14A

Stock No.	A	B	C	D	E	F	Channel	Strap
A2169.14A	12-9/16"	12-1/8"	10"	11/16"x1-5/16"	11/16"x1-1/4"	8"	2"x9/16"x3/16"	3/8"x1-1/4"

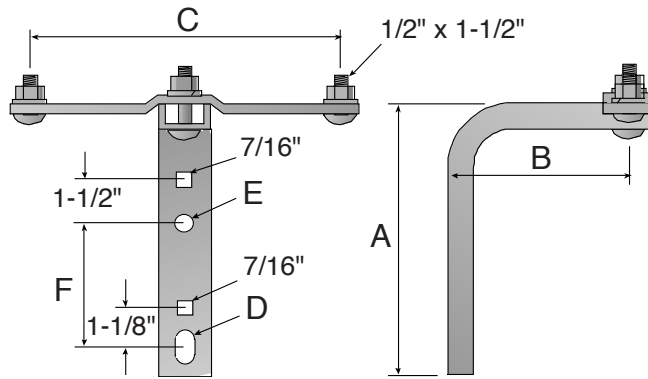


B2255-A

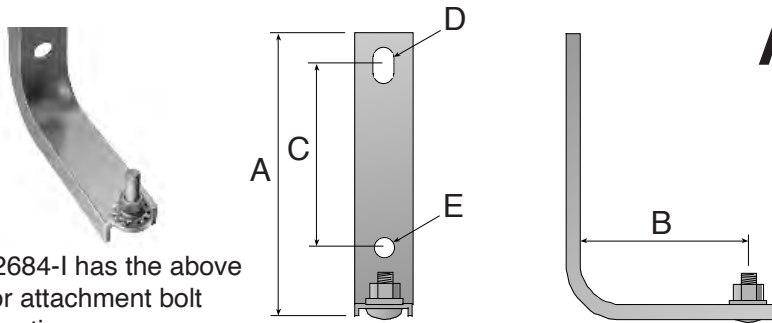
Stock No.	A	B	C	D	E	F	Channel	Strap
B2255-A	10-1/4"	9-1/4"	12-1/2"	11/16"x1-3/8"	11/16"	6"	2"x1"x3/16"	3/8"x1-1/2"

D EQUIPMENT MOUNTS

A2169-A



Stock No.	A	B	C	D	E	F	Channel	Strap
A2169-A	10-1/2"	7"	12"	11/16"x1"	11/16"	5-1/8"	2"x1/2"x1/8"	3/8"x2"



A2169.29C

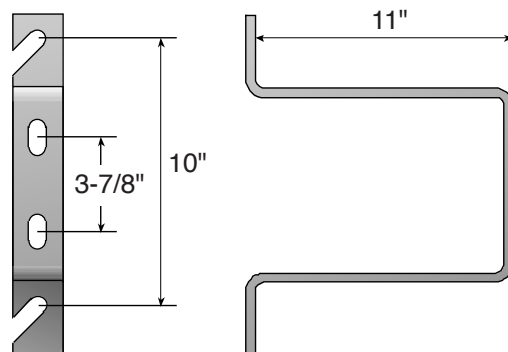
Also available with strap
(A2169.29B)

Order with strap,
bracket assembly
(A2169.29A)

The B2684-I has the above
arrestor attachment bolt
configuration.

Stock No.	A	B	C	D	E	Channel	Captive Bolt Size
A2169.29C	11-3/4"	8"	8"	13/16"x1-1/2"	13/16"	2"x1/2"x1/8"	1/2"x2"
B2684-I	14"	8"	9"	13/16" x 3"	13/16"	2" x 1" x 3/16"	1/2"x2"
A2169.17A	11"	12-1/4"	8"	11/16"x1-1/4"	11/16"	2"x9/16"x3/16"	1/2"x1-1/2"

B2387.1

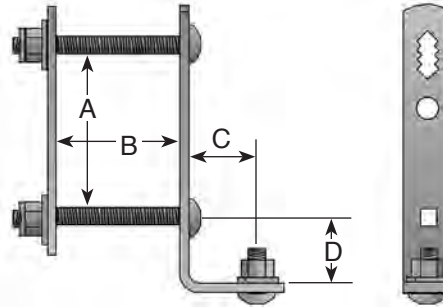


Made from 3/8"x2" steel, the B2387.1 features 11/16" slotted base mounting holes and 7/16"x1-1/2" apparatus mounting holes.

Stock No.	Weight
B2387.1	6.7 lbs

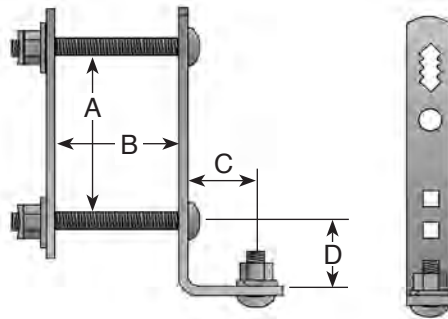
Crossarm Mounted Cutout, Arrestor & Terminator Mounting Brackets

All Hughes Brothers Crossarm Mounted Cutout, Arrestor & Terminator Mounting Brackets consist of front & back plates, two 3/8" carriage bolts, nuts & locknuts and a 1/2" carriage bolt with nut, spring lock washer and external tooth lock washer.



A2121

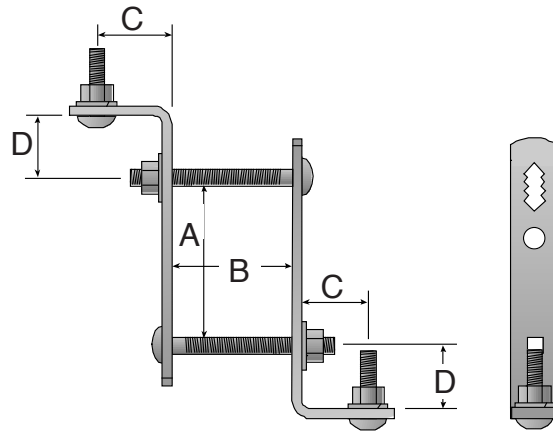
Stock No.	A	B	C	D	Material Thick.	Captive Bolt Size
A2121	4-1/8" ~ 5-1/8"	2-11/16" ~ 4"	2-1/4"	1-1/2"	3/8"x1-3/4"	1/2"x1-5/8"
A2121-A	4-1/8" ~ 5-1/8"	2-11/16" ~ 4"	2-1/4"	1-1/2"	5/16"x1-1/2"	1/2"x1-1/2"
A2121-B	4-1/2" ~ 5-1/2"	5-3/8" ~ 6-7/8"	2-1/4"	1-1/2"	3/8"x1-3/4"	1/2"x1-1/2"
A2121-C	5-1/2" ~ 6-1/2"	4-3/8" ~ 6-7/8"	2-1/4"	1-1/2"	3/8"x1-3/4"	1/2"x1-5/8"



AS2324

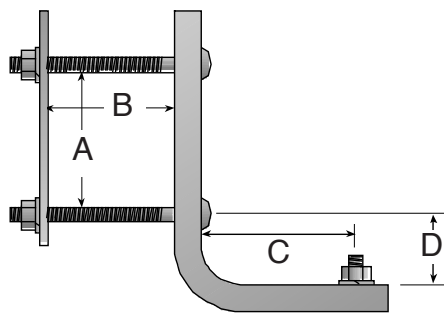
Stock No.	A	B	C	D	Material Thick.	Captive Bolt Size
AS2324-A	4-1/8" ~ 6-1/8"	0" ~ 4-1/2"	2-1/4"	1-1/2"	3/8"x1-1/2"	1/2"x1-1/2"
AS2324-D	4-1/8" ~ 6-1/8"	0 ~ 4-3/4"	2-1/4"	1-1/2"	3/8"x1-1/2"	1/2"x2"

D EQUIPMENT MOUNTS



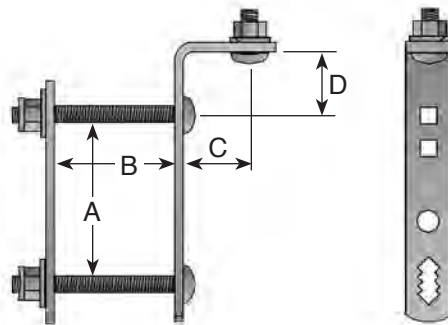
A2185-B

Stock No.	A	B	C	D	Material Thick.	Captive Bolt Size
A2185-B	4-1/8" ~ 5-5/32"	2-11/16" ~ 4"	2-1/4"	1-1/2"	3/8"x1-3/4"	1/2"x 2"



A2169-P A2185-C

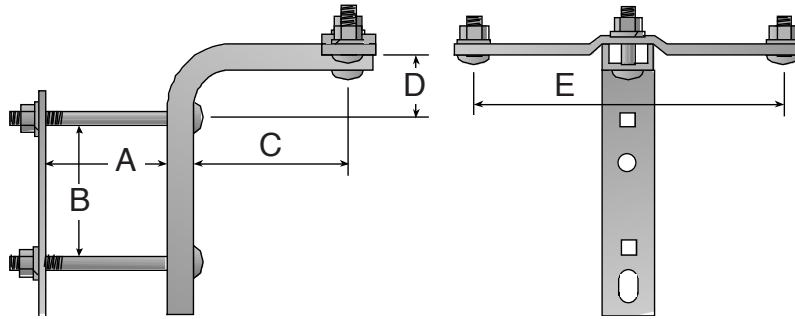
Stock No.	A	B	C	D	Captive Bolt Size	Channel Size
A2185-C	4-1/8" ~ 5-1/8"	0" ~ 4-1/2"	8-3/16"	1-1/2"	1/2"x1-5/8"	2"x9/16"x3/16"
A2169-P	4-9/16" ~ 6-1/8"	0 ~ 4"	7-1/4"	3-1/4"	1/2"x1-1/2"	2"x9/16"x3/16"



AS2324-B

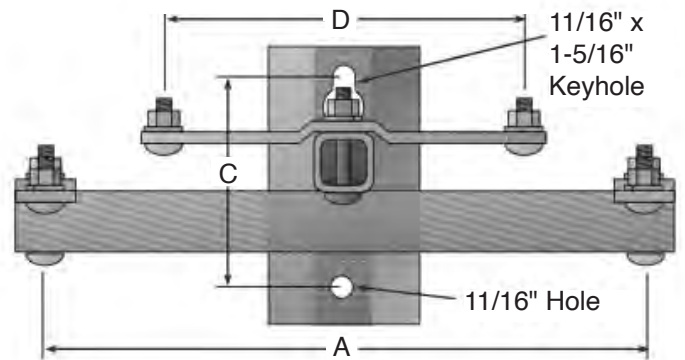
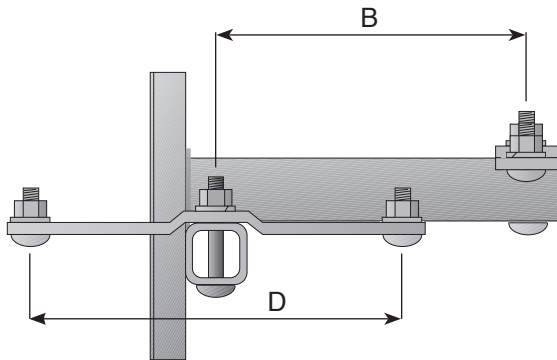
Stock No.	A	B	C	D	Captive Bolt Size	Material Thk.
AS2324-B	4-1/8" ~ 5-5/32"	0" ~ 4"	2-1/4"	1-1/2"	1/2"x1-1/2"	3/8"x1-1/2"

A2169-B



Stock No.	A	B	C	D	E	Captive Bolt Size	Material Size
A2169-B	5-1/8"	0" ~ 4-3/4"	6-1/2"	2-5/8"	12"	1/2"x1-1/2"	2"x1/2"x1/8"

B2251



Stock No.	A	B	C	D	Captive Bolt Size	Unit Weight
B2251-C*	40"	18"	8"	12-1/2"	1/2"x1-5/8"	40 lbs
B2251-D**	40"	17-3/4"	8"	12-1/2"	1/2"x1-5/8"	26 lbs

*Material - 2" x 2" x 3/16" Tubing.

**Material - 2" x 2" x 3/16" Angle.

B2379 Conduit / Pipe Hanger

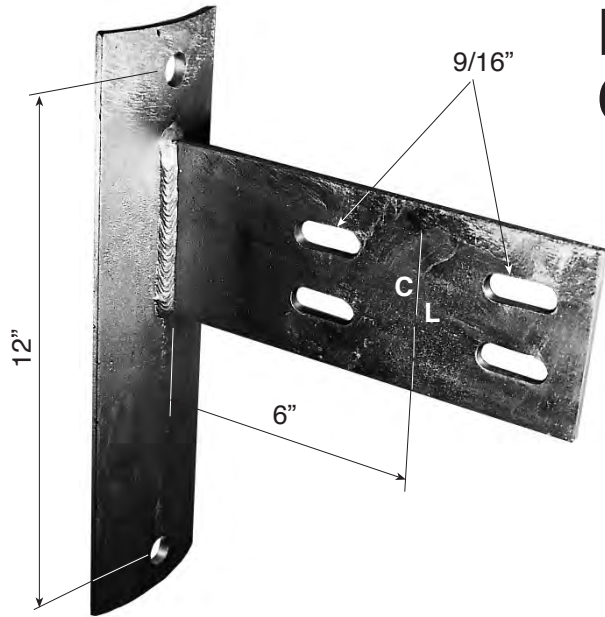
The B2379 Series Conduit / Pipe Hangers facilitate the mounting of equipment to conduit, steel poles or pipe. Each bracket assembly has 1/2" bolts staked to a band section.



Stock No.	Diameter	Unit Wt.	No. of Equipment Mtg. Holes
B2379-A	6-3/4"	3.9 lbs.	1
B2379-B	6"	3.5 lbs.	1
B2379-C	5"	3.0 lbs.	1
B2379-E*	8"	5.3 lbs.	1
B2379-F*	9"	5.5 lbs.	1
B2379-KGE-1A**	3-1/2" to 4"	3.0 lbs.	1
B2379-KGE-1B**	4" to 5"	3.2 lbs.	1
B2379-KGE-2A**	3-1/2" to 4"	3.0 lbs.	2
B2379-KGE-2B**	4" to 5"	3.7 lbs.	2
B2379-KGE-2C**	5" to 6"	4.1 lbs.	2

*Bracket comes complete with 5/8" x 1-1/2" bolt and spring lock washer in each 11/16" equipment mounting hole.

**Bracket comes complete with 5/8" x 2" bolt and spring lock washer in each equipment mounting hole.



B1964 Single or Double Conduit Support Bracket

Hughes Brothers B1964 Single or Double Conduit Support Bracket is a single piece welded steel unit. The conduit is attached by a 1/2" U-bolt. A 6" clearance from the pole to the center of the conduit is maintained for conduit 2" to 4" in outside diameter. The bracket is attached to the pole by 5/8" lag screws or 5/8" bolts.

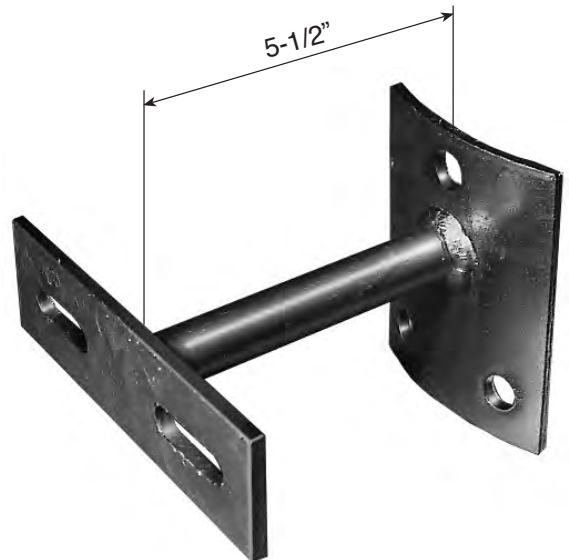
Stock No.	Unit wt.	Std Pkg.
B1964	6.7 lbs	8

B1963 Single Conduit Support Bracket

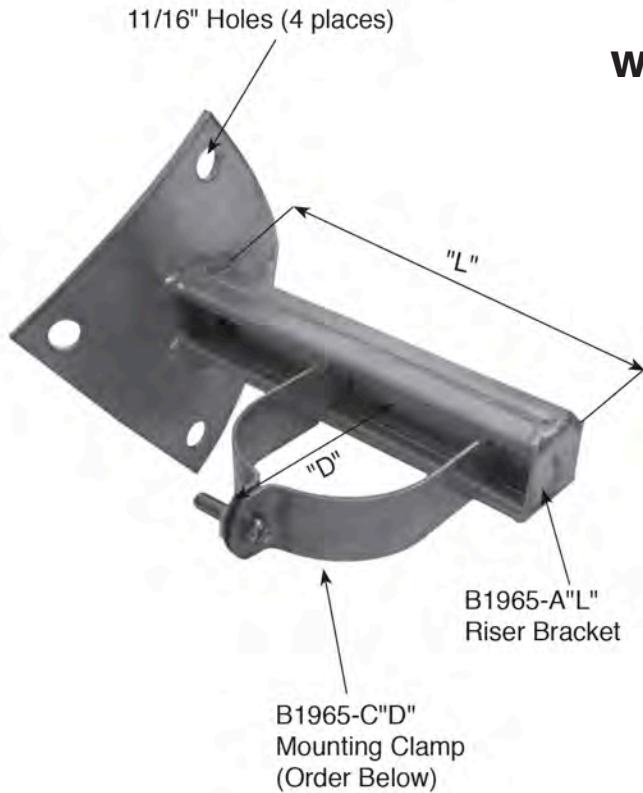
The B1963 Single Conduit Support Bracket is a single piece, welded steel unit. The conduit is attached by 3/8" U-bolt. For use with conduit 2" to 4" in outside diameter. The bracket is attached to the pole by (2) 1/2" lag screws and (1) 5/8" machine bolt.

Stock No.	Unit wt.	Std Pkg.
B1963	3.3 lbs	10

To order 3/8" U-bolt for 2" conduit, use stock no. AS2477.2A.
To order 3/8" U-bolt for 4" conduit, use stock no. AS2477.6A.



B1965-A Conduit Riser Bracket with B1965-C Mounting Clamp



Hughes Brothers B1965-A Conduit Riser Bracket features a formed channel which provides for quick adjustment of the mounting straps. The galvanized steel brackets and mounting straps will fit conduit diameters of 2" to 8" or combinations of multiple conduits within that range. The bracket can be mounted to the supporting structure with lag screws or bolts.

B1965-A "L" Riser Bracket

Stock No.	"L"	Unit Wt. Lbs.	Std. Pkg.
B1965-A8-1/2	8-1/2"	3.5	10

Other sizes available.

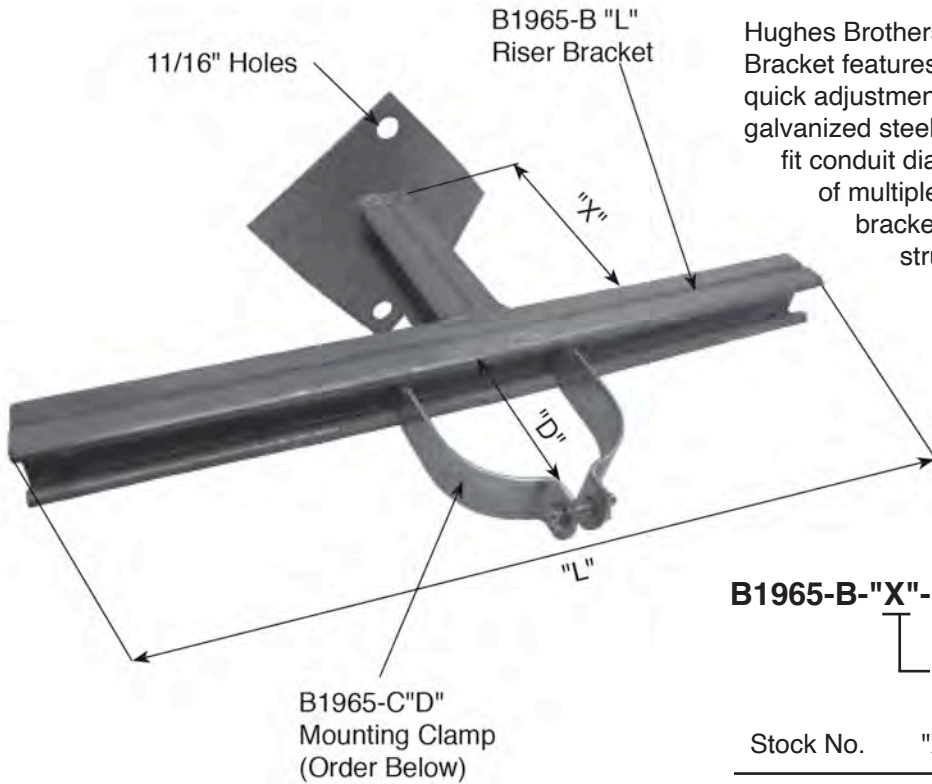
Example: **B1965-A8-1/2**
└── "L" Length

B1965-C "D" Mounting Clamp

Stock No.	Pipe Dia. "D"
B1965-C2.0	2"
B1965-C2.5	2-1/2"
B1965-C3.0	3"
B1965-C3.5	3-1/2"
B1965-C4.0	4"
B1965-C4.5	4-1/2"
B1965-C5.0	5"
B1965-C6.0	6"
B1965-C7.0	7"
B1965-C8.0	8"

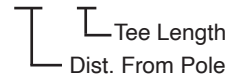
Example:
B1965-C2.5
└── "D" Pipe Dia.

B1965-B Conduit Riser Bracket with B1965-C Mounting Clamp



Hughes Brothers B1965-B Tee Mount Conduit Riser Bracket features a formed channel which provides for quick adjustment of the mounting straps. The galvanized steel brackets and mounting straps will fit conduit diameters of 2" to 8" or combinations of multiple conduits within that range. The bracket can be mounted to the supporting structure with lag screws or bolts.

B1965-B-"X"-"L" Riser Bracket



Stock No.	"X"	"L"	Unit Wt. Lbs.	Std. Pkg.
B1965-B-4-12	4"	12"	5.0	5

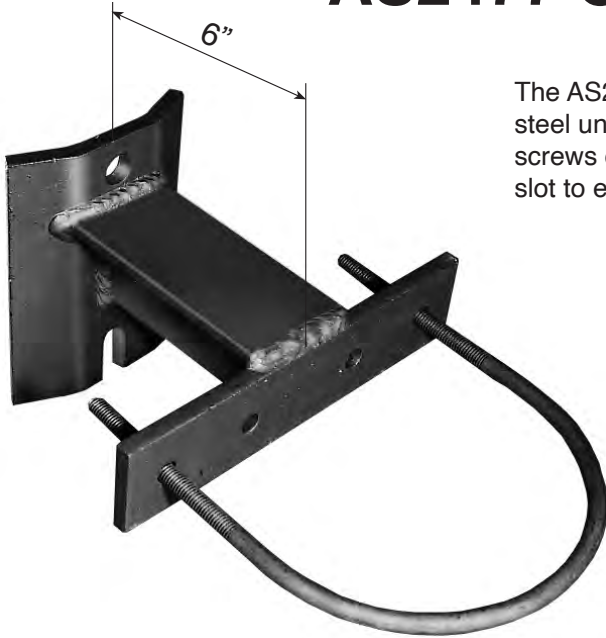
Other sizes available.

B1965-C"D" Mounting Clamp

Stock No.	"D"
B1965-C2.0	2"
B1965-C2.5	2-1/2"
B1965-C3.0	3"
B1965-C3.5	3-1/2"
B1965-C4.0	4"
B1965-C4.5	4-1/2"
B1965-C5.0	5"
B1965-C6.0	6"
B1965-C7.0	7"
B1965-C8.0	8"

Example:
B1965-C2.5
 └──"D" Pipe Dia.

AS2477 Conduit Support Bracket



The AS2477 series Conduit Support Brackets are welded steel units. The bracket is attached to the pole by 5/8" lag screws or 5/8" bolts. The bottom base fitting hole is an open slot to ease installation.

Stock No.	Unit wt.	Conduit Dia.
AS2477-A	9.6	(2) 4" or (2) 2"
AS2477-B	8.6	2" or 6"
AS2477-C	6.8	2", 4" or 5"
AS2477-D	9.0	2", 5" or 6"

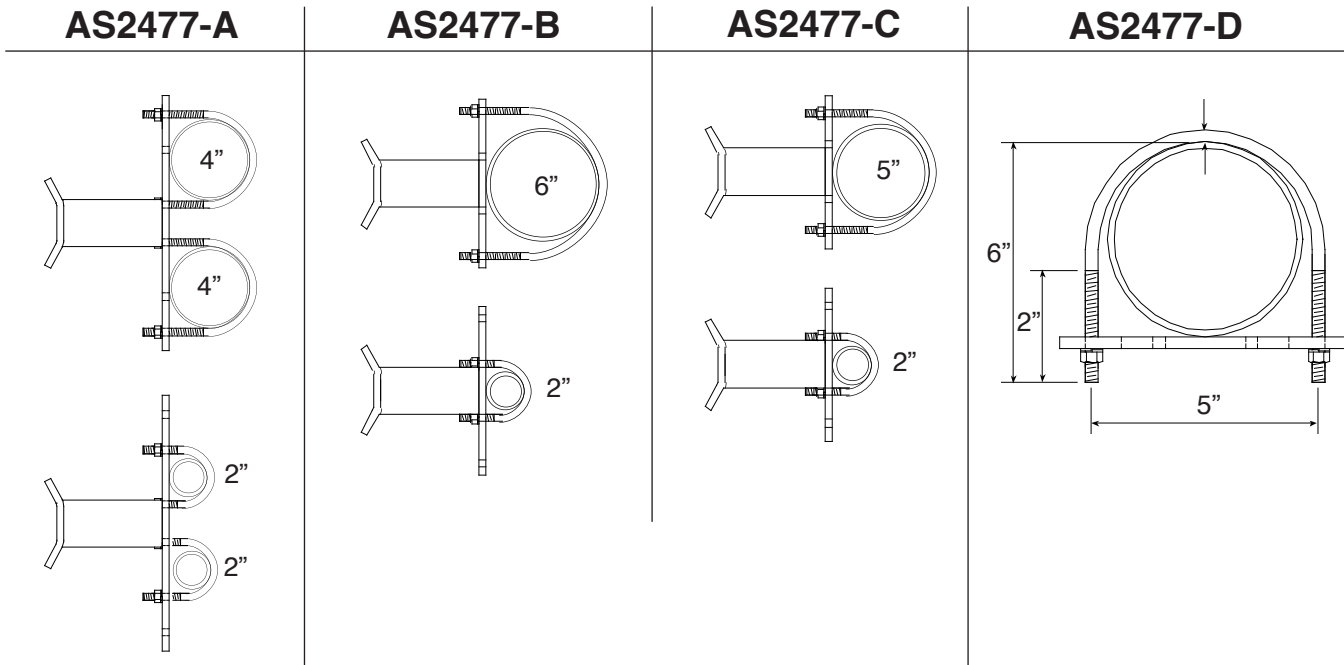
Ordering Example:

Bracket only - **AS2477-B**

Bracket with U-bolt(s) - **AS2477-B6**

U-bolt / Conduit Size

NOTE: AS2477-A4 or AS2477-A2 includes two (2) U-bolts.
Each AS2477 bracket can be ordered with or without U-bolts as part of the assembly.



A2288 Series Fiberglass Pole Bearing Plates

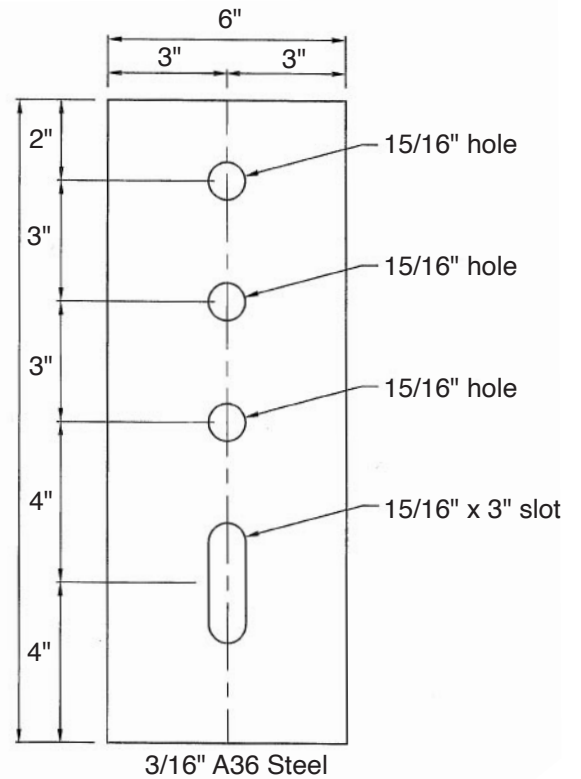
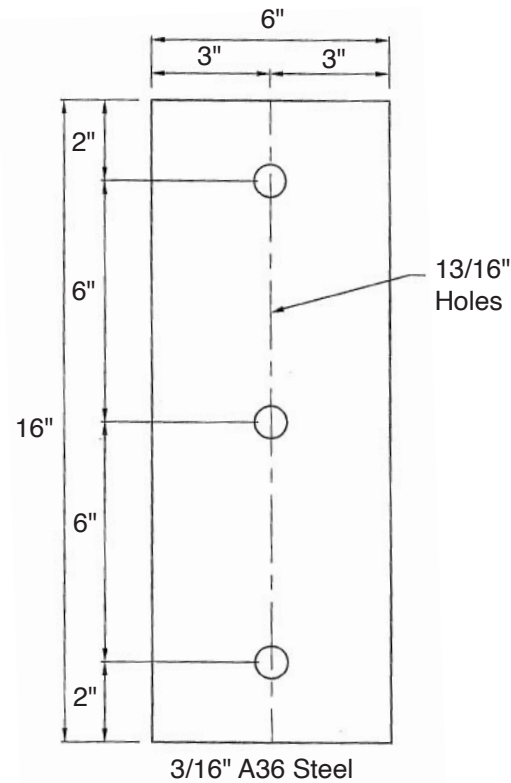
Fiberglass pole bearing plates for any bolted attachment. Fiberglass pole manufacturers recommend using bearing plates to Avoid sharp edge contact and to Spread the load over the pole surface, Hardware components designed with a small radius will result in a sharp edge contacting the pole wall, Hughes A2288 bearing plates and curved washers can eliminate these issues. Available in any radius with any hole configuration. Contact Hughes Brothers with your specific needs.



A2288-A* Curved Bearing Plate



A2288-B* Curved Bearing Plate





FASTENERS

Fastener Specifications	E-1
Bolts	E-3
Threaded Rods.....	E-20
U-Bolts/Links.....	E-26
Clips.....	E-28
Studs	E-29
Nuts	E-35
Washers	E-38
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Standard Specifications for Fasteners

Standards for Fasteners from American Society for Testing and Materials (ASTM)

ASTM Fastener Standards

ASTM A194 Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service.

This specification covers a variety of carbon and alloy steel nuts. These steel nuts are used with A 325 Bolts. Hughes Brothers uses Grade 2H.

ASTM A307 Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

This specification covers the chemical and mechanical requirements of two grades of carbon steel bolts and studs in sizes 1/4 inch through 4 inch. Grade A bolts are used for general applications.

ASTM A325 Standard Specification for High-Strength Bolts for Structural Steel Joints.

This specification covers the chemical and mechanical requirements of various types of quenched and tempered steel bolts commonly known as "high strength structural bolts," intended for use in structural joints.

Type 1: Bolts made of medium carbon steel.

Type 3: Bolts having atmospheric corrosion resistance.

ASTM A394 Standard Specification for Zinc Coated Steel Transmission Tower Bolts.

This specification covers the chemical and mechanical requirements of hexagon and squarehead zinc coated steel bolts and atmospheric corrosion resistant bolts in nominal thread diameters of 1/2, 5/8, 3/4, 7/8 and 1 inch for use in the construction of transmission towers, substations, and similar steel structures.

Type 0: Zinc coated bolts made of low or medium carbon steel.

Type 3: Bolts having atmospheric corrosion resistance and weathering characteristics comparable to that of steel covered in Specifications A242, A588 and A709.

ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts.

This specification covers chemical and mechanical requirements for eight grades of carbon and alloy steel nuts for general structural and mechanical uses on bolts, studs, and other externally threaded parts. Grade A nuts are used for general applications.

ASTM A193 Standard Specification for Alloy Steel, Special Purpose Applications.

This specification covers alloy steel and stainless steel bolting materials for other special purpose applications.

ASTM A449 Standard Specification for Bolts and Studs, Heat-treated for General Use.

This specification covers quenched and tempered steel bolts and studs having a minimum tensile strength.

ASTM Steel Standards for Fasteners

ASTM A36 Standard Specification for Structural Steel Interchangeable with SAE C1018 Low Carbon, General Purpose, Special Quality Machinery Steel. This specification covers carbon steel shapes, plates, and bars of structural quality for use in riveted, bolted, or welded construction of bridges and buildings, and for general structural purposes.

ASTM A242, A588, and A709 Standard Specifications for High Strength Low Alloy Structural Steels with enhanced atmospheric corrosion resistance.

ASTM A536 Ductile Iron Castings.

This specification covers castings made of ductile iron, also known as spheroidal or nodular iron is used for eye nuts and washer nuts, Grade 65-45-12.

ASTM A320 Alloy Steel Bolting Material for Low-Temperature Service.

This specification covers alloy steel bolting materials for pressure vessels, valves, flanges, and fittings for low-temperature service. The term "bolting material" as used in this specification covers rolled, forged, or strain hardened bars, bolts, screws, studs, and stud bolts. The material may be further processed by centerless grinding or by cold drawing. Austenitic stainless steel may be solution annealed or annealed and strain-hardened. Several grades are available.

ASTM Galvanizing Standards

ASTM A123 Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

This specification covers the requirements for zinc coating (galvanizing) by the hot dip process on iron and steel products made from rolled, pressed and forged shapes, castings, plates, bars and strips.

This specification covers both unfabricated products and fabricated products, for example, assembled steel products, structural steel fabrications, large tubes already bent or welded before galvanizing, and wire work fabricated from uncoated steel wire.

This specification also covers steel forgings and iron castings incorporated into pieces fabricated before galvanizing or which are too large to be centrifuged (or otherwise handled to remove excess galvanizing bath metal).

ASTM A153 Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.

This specification covers zinc coatings applied by the hot dip process on iron and steel hardware.

This document is intended to be applicable to hardware items that are centrifuged or otherwise handled to remove excess galvanizing bath metal (free zinc).

ASTM B695 Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.

This specification covers the requirements for zinc coatings that are mechanically deposited on iron or steel basis metals. The seven thickest classes are usually referred to as “mechanically galvanized.”

Pole Line Hardware Standards

ANSI/ASME 18.2.2 Standard for Square and Hex Nuts.

This standard is intended to cover the complete general and dimensional data for the various types of inch series square and hex nuts.

ANSI C135.80 Standard for Fasteners for Overhead Line Construction.

This standard covers zinc-coated bolts, lag screws, threaded rods, nuts and eye nuts commonly used in overhead line construction.

ANSI/ASME B1.1 Standard for Unified Inch Screw Threads (UN and UNR Thread Form).

This specification specifies the thread form, series, class, allowance, tolerance, and designation for unified screw threads.

ANSI/ASME B18.2.1 Standard for Square and Hex Bolts and Screws.

This Standard is intended to cover the complete general and dimensional data for the various types of inch series square and hex bolts and screws.

ANSI/ASME B18.5 Standard for Round Head Bolts (Carriage Bolts).

This standard covers the complete general and dimensional data for the various types of inch series bolts generally classified as round head bolts.

Dimension Table

Bolt Size	Nominal Width	Head Height	Threads per in.
3/8"	9/16"	1/4"	-
1/2"	3/4"	21/64"	13
5/8"	15/16"	27/64"	11
3/4"	1-1/8"	1/2"	10
7/8"	1-5/16"	19/32"	9
1"	1-1/2"	21/32"	8
1-1/4"	1-7/8"	27/32"	7



Square Head Bolts

Hughes Brothers Square Head Machine Bolts are manufactured in accordance with ANSI C135.80 using SAE C1018 cold drawn or ASTM A36 steel. The machine bolts are galvanized in accordance with ASTM A153. Each bolt is shipped with an assembled nut. All bolts feature a 60° semi-cone point.

Following ANSI specifications, the unthreaded portion of any machine bolt is capable of being bent 180°, about a diameter equal to the diameter of the bolt without cracking the steel on the outside portion of the bend.

*Some bolts of smaller diameter or shorter length may not display the HB symbol therefore C135.80 will not apply.

Shear Strengths

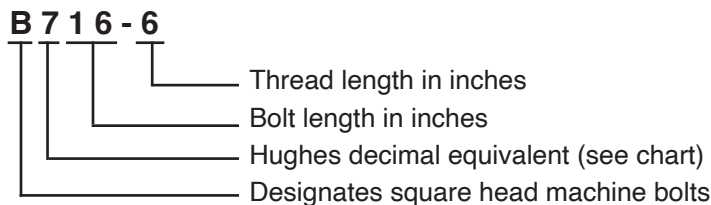
Bolt Diameter	Single Shear Through Threads	Single Shear Through Shaft
1/2"	5,200 lbs.	7,950 lbs.
5/8"	8,330 lbs.	12,420 lbs.
3/4"	12,440 lbs.	17,890 lbs.
7/8"	17,270 lbs.	24,350 lbs.
1"	22,690 lbs.	31,800 lbs.
1-1/4"	36,590 lbs.	49,700 lbs.

Tensile Strengths

Bolt Diameter	Minimum Tensile Strength
1/2"	7,800 lbs.
5/8"	12,400 lbs.
3/4"	18,350 lbs.
7/8"	25,400 lbs.
1"	33,500 lbs.
1-1/4"	53,300 lbs.

Decimal Equivalency Chart		
Fraction	Decimal	HUGHES
1/2"	.5	5
5/8"	.6	6
3/4"	.7	7
7/8"	.8	8
1"	1	10
1-1/8"	1.125	11
1-1/4"	1.25	12

Ordering Information



Square Head Bolts



Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.	Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1/2" Square Head Bolts				3/4" Square Head Bolts			
B51-1/2-1-1/4	1/2" x 1-1/2"	250	20 lbs.	B72-1-3/4	3/4" x 2"	100	56 lbs.
B52-1-1/4	1/2" x 2"	250	23 lbs.	B72-1/2-1-3/4	3/4" x 2-1/2"	100	62 lbs.
B52-1/2-1-1/4	1/2" x 2-1/2"	250	25 lbs.	B73-1-3/4	3/4" x 3"	100	68 lbs.
B53-1-1/4	1/2" x 3"	250	28 lbs.	B74-2	3/4" x 4"	50	80 lbs.
B53-1/2-1-1/4	1/2" x 3-1/2"	200	31 lbs.	B75-2	3/4" x 5"	50	91 lbs.
B54-1-1/4	1/2" x 4"	100	33 lbs.	B76-3	3/4" x 6"	50	103 lbs.
B54-1/2-1-1/4	1/2" x 4-1/2"	100	36 lbs.	B77-3	3/4" x 7"	40	115 lbs.
B55-1-3/4	1/2" x 5"	100	39 lbs.	B78-4	3/4" x 8"	40	127 lbs.
B55-1/2-1-1/4	1/2" x 5-1/2"	100	41 lbs.	B710-4	3/4" x 10"	30	151 lbs.
B56-3	1/2" x 6"	100	44 lbs.	B712-6	3/4" x 12"	30	175 lbs.
B57-3	1/2" x 7"	100	49 lbs.	B714-6	3/4" x 14"	30	198 lbs.
B58-4	1/2" x 8"	100	55 lbs.	B716-6	3/4" x 16"	25	222 lbs.
B59-4	1/2" x 9"	50	60 lbs.	B718-6	3/4" x 18"	20	246 lbs.
B510-4	1/2" x 10"	50	65 lbs.	B720-6	3/4" x 20"	20	270 lbs.
B512-6	1/2" x 12"	50	76 lbs.	B722-6	3/4" x 22"	20	293 lbs.
B514-6	1/2" x 14"	50	87 lbs.	B724-6	3/4" x 24"	15	317 lbs.
5/8" Square Head Bolts				B726-6	3/4" x 26"	15	341 lbs.
B61-1/2-1-1/4	5/8" x 1-1/2"	100	31 lbs.	B728-8	3/4" x 28"	15	365 lbs.
B61-3/4-1-1/4	5/8" x 1-3/4"	100	33 lbs.	B730-8	3/4" x 30"	10	390 lbs.
B62-1-1/2	5/8" x 2"	100	35 lbs.	B732-8	3/4" x 32"	10	424 lbs.
B63-1-1/2	5/8" x 3"	100	44 lbs.				
B64-1-1/2	5/8" x 4"	100	52 lbs.				
B65-1-1/2	5/8" x 5"	100	60 lbs.				
B66-1-1/2	5/8" x 6"	50	68 lbs.				
B67-3	5/8" x 7"	50	77 lbs.				
B68-4	5/8" x 8"	50	85 lbs.				
B610-4	5/8" x 10"	50	101 lbs.				
B612-6	5/8" x 12"	40	118 lbs.				
B614-6	5/8" x 14"	40	134 lbs.				
B616-6	5/8" x 16"	40	151 lbs.				
B618-6	5/8" x 18"	30	167 lbs.				
B620-6	5/8" x 20"	30	184 lbs.				

Note: Other lengths available.

Square Head Bolts



Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
7/8" Square Head Bolts			
B82-F	7/8" x 2"	50	83 lbs.
B82-1/2-2	7/8" x 2-1/2"	50	91 lbs.
B83-2	7/8" x 3"	50	93 lbs.
B84-2	7/8" x 4"	50	115 lbs.
B85-2-1/2	7/8" x 5"	50	131 lbs.
B86-2-1/2	7/8" x 6"	40	147 lbs.
B88-3	7/8" x 8"	30	180 lbs.
B810-6	7/8" x 10"	25	212 lbs.
B812-6	7/8" x 12"	20	244 lbs.
B814-6	7/8" x 14"	20	277 lbs.
B816-6	7/8" x 16"	15	309 lbs.
B818-6	7/8" x 18"	15	341 lbs.
B820-6	7/8" x 20"	15	373 lbs.
B822-6	7/8" x 22"	10	406 lbs.
B824-6	7/8" x 24"	10	438 lbs.
B826-8	7/8" x 26"	10	470 lbs.
B828-8	7/8" x 28"	10	503 lbs.
B830-8	7/8" x 30"	10	535 lbs.
B832-8	7/8" x 32"	10	570 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1" Square Head Bolts			
B103-2	1" x 3"	40	137 lbs.
B103-1/2-2-1/2	1" x 3-1/2"	40	148 lbs.
B104-2-3/4	1" x 4"	40	158 lbs.
B105-3	1" x 5"	30	179 lbs.
B106-2	1" x 6"	25	201 lbs.
B108-4	1" x 8"	25	243 lbs.
B1010-4	1" x 10"	20	285 lbs.
B1012-6	1" x 12"	15	327 lbs.
B1014-6	1" x 14"	15	369 lbs.
B1016-6	1" x 16"	10	412 lbs.
B1018-6	1" x 18"	10	454 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1" Square Head (con't.)			
B1020-6	1" x 20"	10	496 lbs.
B1022-6	1" x 22"	10	538 lbs.
B1024-6	1" x 24"	10	581 lbs.
B1026-8	1" x 26"	10	624 lbs.
B1028-8	1" x 28"	5	667 lbs.
B1030-8	1" x 30"	5	710 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1-1/4" Square Head Bolts*			
B123-1/2-2	1-1/4" x 3-1/2"	20	259 lbs.
B124-2	1-1/4" x 4"	20	275 lbs.
B125-3	1-1/4" x 5"	20	308 lbs.
B126-3	1-1/4" x 6"	20	341 lbs.
B127-3	1-1/4" x 7"	15	374 lbs.
B128-3	1-1/4" x 8"	10	407 lbs.
B1210-4	1-1/4" x 10"	10	473 lbs.
B1212-6	1-1/4" x 12"	10	539 lbs.
B1214-6	1-1/4" x 14"	10	605 lbs.
B1216-6	1-1/4" x 16"	5	671 lbs.
B1218-6	1-1/4" x 18"	5	737 lbs.
B1220-6	1-1/4" x 20"	5	803 lbs.
B1222-6	1-1/4" x 22"	5	869 lbs.
B1224-8	1-1/4" x 24"	5	935 lbs.
B1226-8	1-1/4" x 26"	5	1000 lbs.

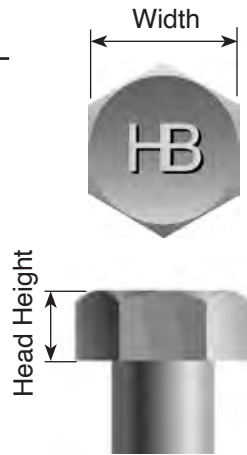
*1-1/4" Bolts include hex nuts.

Note: Other lengths available.

Hex Head Bolts

Dimension Table

Bolt Size	Nominal Width	Head Height	Threads per in.
3/8"	9/16"	1/4"	-
1/2"	3/4"	11/32"	13
5/8"	15/16"	27/64"	11
3/4"	1-1/8"	1/2"	10
7/8"	1-5/16"	37/64"	9
1"	1-1/2"	43/64"	8
1-1/4"	1-7/8"	27/32"	7



Hughes Brothers Hex Head Bolts are manufactured in accordance with ANSI C135.80 and ASTM A307, using SAE C1018 cold drawn or ASTM A36 steel. Hex head bolts are galvanized in accordance with ASTM A153.

Each bolt is shipped with an assembled nut. All hex head bolts feature a 60° semi-cone point.

The unthreaded portion of any hex bolt is capable of being bent 180°, about a diameter equal to the diameter of the bolt without cracking the steel on the outside portion of the bend.

*Some bolts of smaller diameter or shorter length may not display the HB symbol, therefore do not meet C135.

Shear Strengths for ANSI C135.80

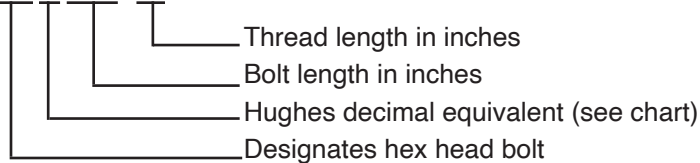
Bolt Diameter	Single Shear Through Threads	Single Shear Through Shaft
3/8"	-	-
1/2"	5,200 lbs.	7,950 lbs.
5/8"	8,330 lbs.	12,420 lbs.
3/4"	12,440 lbs.	17,890 lbs.
7/8"	17,270 lbs.	24,350 lbs.
1"	22,690 lbs.	31,800 lbs.
1-1/4"	36,590 lbs.	49,700 lbs.

Tensile Strengths for ANSI C135.80

Bolt Diameter	Minimum Tensile Strength
3/8"	4,250 lbs.
1/2"	7,800 lbs.
5/8"	12,400 lbs.
3/4"	18,350 lbs.
7/8"	25,400 lbs.
1"	33,500 lbs.
1-1/4"	53,300 lbs.

Ordering Information

HB 7 1 6 - 6



Fraction	Decimal	HUGHES
1/4"	.2	2
3/8"	.3	3
1/2"	.5	5
5/8"	.6	6
3/4"	.7	7
7/8"	.8	8
1"	.1	10
1-1/8"	1.125	11
1-1/4"	1.25	12

Hex Head Bolts



Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1/2" Hex Head Bolts			
HB51-1/2-1-1/4	1/2" x 1-1/2"	250	20 lbs.
HB52-1-1/4	1/2" x 2"	250	23 lbs.
HB52-1/2-1-1/4	1/2" x 2-1/2"	250	25 lbs.
HB53-1-1/4	1/2" x 3"	250	28 lbs.
HB53-1/2-1-1/4	1/2" x 3-1/2"	200	31 lbs.
HB54-1-1/4	1/2" x 4"	100	33 lbs.
HB54-1/2-1-1/4	1/2" x 4-1/2"	100	36 lbs.
HB55-1-3/4	1/2" x 5"	100	39 lbs.
HB55-1/2-1-1/4	1/2" x 5-1/2"	100	41 lbs.
HB56-3	1/2" x 6"	100	44 lbs.
HB57-3	1/2" x 7"	100	49 lbs.
HB58-4	1/2" x 8"	100	55 lbs.
HB59-4	1/2" x 9"	50	60 lbs.
HB510-4	1/2" x 10"	50	65 lbs.
HB512-6	1/2" x 12"	50	76 lbs.
HB514-6	1/2" x 14"	50	87 lbs.
5/8" Hex Head Bolts			
HB61-1/2-1-1/4	5/8" x 1-1/2"	100	31 lbs.
HB61-3/4-1-1/4	5/8" x 1-3/4"	100	33 lbs.
HB62-1-1/2	5/8" x 2"	100	35 lbs.
HB63-1-1/2	5/8" x 3"	100	44 lbs.
HB64-1-1/2	5/8" x 4"	100	52 lbs.
HB65-1-1/2	5/8" x 5"	100	60 lbs.
HB66-1-1/2	5/8" x 6"	50	68 lbs.
HB67-3	5/8" x 7"	50	77 lbs.
HB68-4	5/8" x 8"	50	85 lbs.
HB610-4	5/8" x 10"	50	101 lbs.
HB612-6	5/8" x 12"	40	118 lbs.
HB614-6	5/8" x 14"	40	134 lbs.
HB616-6	5/8" x 16"	40	151 lbs.
HB618-6	5/8" x 18"	30	167 lbs.
HB620-6	5/8" x 20"	30	184 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
3/4" Hex Head Bolts			
HB72-1-3/4	3/4" x 2"	100	56 lbs.
HB72-1/2-1-3/4	3/4" x 2-1/2"	100	62 lbs.
HB73-1-3/4	3/4" x 3"	100	68 lbs.
HB74-2	3/4" x 4"	50	80 lbs.
HB75-2	3/4" x 5"	50	91 lbs.
HB76-3	3/4" x 6"	50	103 lbs.
HB77-3	3/4" x 7"	40	115 lbs.
HB78-4	3/4" x 8"	40	127 lbs.
HB710-4	3/4" x 10"	30	151 lbs.
HB712-6	3/4" x 12"	30	175 lbs.
HB714-6	3/4" x 14"	30	198 lbs.
HB716-6	3/4" x 16"	25	222 lbs.
HB718-6	3/4" x 18"	20	246 lbs.
HB720-6	3/4" x 20"	20	270 lbs.
HB722-6	3/4" x 22"	20	293 lbs.
HB724-6	3/4" x 24"	15	317 lbs.
HB726-6	3/4" x 26"	15	341 lbs.
HB728-8	3/4" x 28"	15	365 lbs.
HB730-8	3/4" x 30"	10	390 lbs.
HB732-8	3/4" x 32"	10	424 lbs.

Note: Other lengths available.



Hex Head Bolts



Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
7/8" Hex Head Bolts			
HB82-F	7/8" x 2"	50	83 lbs.
HB82-1/2-2	7/8" x 2-1/2"	50	91 lbs.
HB84-2	7/8" x 4"	50	115 lbs.
HB85-2-1/2	7/8" x 5"	50	131 lbs.
HB86-2-1/2	7/8" x 6"	40	147 lbs.
HB88-3	7/8" x 8"	30	180 lbs.
HB810-6	7/8" x 10"	25	212 lbs.
HB812-6	7/8" x 12"	20	244 lbs.
HB814-6	7/8" x 14"	20	277 lbs.
HB816-6	7/8" x 16"	15	309 lbs.
HB818-6	7/8" x 18"	15	341 lbs.
HB820-6	7/8" x 20"	15	373 lbs.
HB822-6	7/8" x 22"	10	406 lbs.
HB824-6	7/8" x 24"	10	438 lbs.
HB826-8	7/8" x 26"	10	470 lbs.
HB828-8	7/8" x 28"	10	503 lbs.
HB830-8	7/8" x 30"	10	535 lbs.
HB832-8	7/8" x 32"	10	570 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1" Hex Head Bolts			
HB103-2	1" x 3"	40	137 lbs.
HB103-1/2-2-1/2	1" x 3-1/2"	40	148 lbs.
HB104-2-3/4	1" x 4"	40	158 lbs.
HB105-3	1" x 5"	30	179 lbs.
HB106-2	1" x 6"	25	201 lbs.
HB108-4	1" x 8"	25	243 lbs.
HB1010-4	1" x 10"	20	285 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1" Hex Head Bolts (con't.)			
HB1012-6	1" x 12"	15	327 lbs.
HB1014-6	1" x 14"	15	369 lbs.
HB1016-6	1" x 16"	10	412 lbs.
HB1018-6	1" x 18"	10	454 lbs.
HB1020-6	1" x 20"	10	496 lbs.
HB1022-6	1" x 22"	10	538 lbs.
HB1024-6	1" x 24"	10	581 lbs.
HB1026-8	1" x 26"	10	624 lbs.
HB1028-8	1" x 28"	5	667 lbs.
HB1030-8	1" x 30"	5	710 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1-1/4" Hex Head Bolts			
HB123-1/2-2	1-1/4" x 3-1/2"	20	259 lbs.
HB124-2	1-1/4" x 4"	20	275 lbs.
HB125-3	1-1/4" x 5"	20	308 lbs.
HB126-3	1-1/4" x 6"	20	341 lbs.
HB127-3	1-1/4" x 7"	15	374 lbs.
HB128-3	1-1/4" x 8"	10	407 lbs.
HB1210-4	1-1/4" x 10"	10	473 lbs.
HB1212-6	1-1/4" x 12"	10	539 lbs.
HB1214-6	1-1/4" x 14"	10	605 lbs.
HB1216-6	1-1/4" x 16"	5	671 lbs.
HB1218-6	1-1/4" x 18"	5	737 lbs.
HB1220-6	1-1/4" x 20"	5	803 lbs.
HB1222-6	1-1/4" x 22"	5	869 lbs.
HB1224-8	1-1/4" x 24"	5	935 lbs.
HB1226-8	1-1/4" x 26"	5	1000 lbs.

Note: Other lengths available.



Type "O" Tower Bolts

Hughes Brothers Type "O" Tower Bolts are manufactured in accordance with ASTM A394. Type "O" Tower Bolts are hot dip galvanized in accordance with ASTM A153. Tower Bolts are shipped with a hex nut.

Bolt threads are unified coarse thread series and class 2A tolerance as defined in ANSI/ASME B1.1. Threads are cut to conform to the following:

Tensile Strengths

Bolt Size	Minimum Tensile Strength
1/2"	10,500 lbs.
5/8"	16,700 lbs.
3/4"	24,700 lbs.

Shear Strengths

Bolt Size	Single Shear Through Threads	Single Shear Through Shaft
1/2"	6,950 lbs.	9,000 lbs.
5/8"	11,150 lbs.	14,100 lbs.
3/4"	16,650 lbs.	20,250 lbs.

Threads

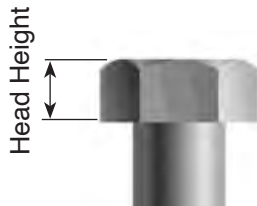
Bolt Size	Threads Per Inch
1/2"	13
5/8"	11
3/4"	10

Dimension Table

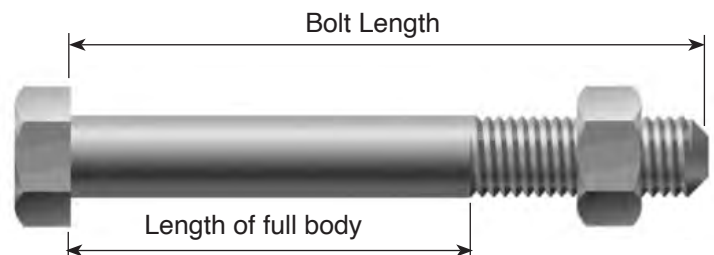
Bolt Dia.	Nominal Width	Head Height
1/2"	3/4"	11/32"
5/8"	15/16"	27/64"
3/4"	1-1/8"	1/2"

Required Thread Length in Inches, Per ASTM A394

Diameter	1"	1-1/4"	1-1/2"	1-3/4"	2" & Longer
1-2"	29/32"	1-3/32"	1-3/32"	1-3/32"	1-3/32"
5/8"	15/16"	1-3/16"	1-1/4"	1-1/4"	1-1/4"
3/4"	N/A	1-3/16"	1-3/8"	1-3/8"	1-3/8"
7/8"	N/A	N/A	1-5/16"	1-1/2"	1-1/2"

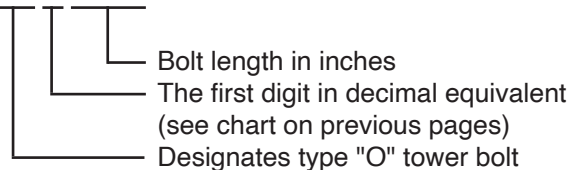


Note: Full body is the distance from the underside of the head to the first scratch of threads.



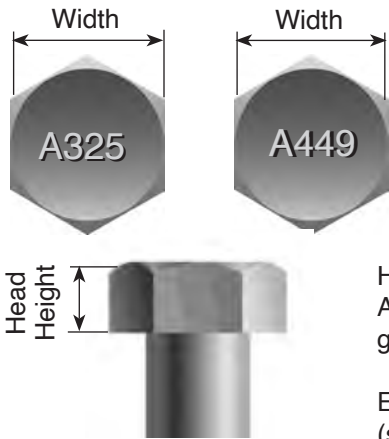
Ordering Information

BT 6 4-1/2



Example: BT 6 4-1/2

5/8" diameter, 4-1/2" bolt length
3-1/4" full body, 1-1/4" threads



High Strength Bolts Grade A325 or A449 (Type 1 & Type 3)

Hughes Brothers High Strength Bolts are manufactured in accordance with ASTM A325 or A449 as applicable. All Type 1 high strength bolts are hot dip galvanized in accordance with ASTM A153.

Each bolt is shipped with an assembled nut. All high strength bolts are hex head (see dimension table).

A325 and A449 bolts are identical with regard to strength and chemistry. A325 bolts are heavy hex head bolts only, and are designed for structural steel connections, mostly in commercial construction. They have a shorter thread length than a typical heavy hex bolt. For example, a 1" diameter A325 bolt that exists in the marketplace with have only 1-3/4" of thread.

A449 should be used in lieu of A325 when a nonstandard thread length is needed on bolts, per A325 specification. This specification is applicable to heavy hex structural bolts only. For bolts of other configurations and thread lengths with similar mechanical properties, see specification A449.

Dimension Table

Bolt Size	Nominal Width	Head Height	Threads per in.
1/2"	7/8"	5/16"	13
5/8"	1-1/16"	25/64"	11
3/4"	1-1/4"	15/32"	10
7/8"	1-7/16"	35/64"	9
1"	1-5/8"	39/64"	8
1-1/4"	2"	25/32"	7

Tensile Strengths

Bolt Diameter	Minimum Tensile Strength
1/2"	17,050 lbs.
5/8"	27,100 lbs.
3/4"	40,100 lbs.
7/8"	55,450 lbs.
1"	72,700 lbs.
1-1/4"	105,000 lbs.

Decimal Equivalency Chart

Fraction	Decimal	HUGHES
1/4"	.2	2
3/8"	.3	3
1/2"	.5	5
5/8"	.6	6
3/4"	.7	7
7/8"	.8	8
1"	.1	10
1-1/8"	1.125	11
1-1/4"	1.25	12

Ordering Information

AB 7 1 6 - 6 CT

- Add suffix "CT" to get Type 3 bolt
- Thread length in inches
- Bolt length in inches
- The first digit in decimal equivalent (see chart)
- Designates high strength bolts

High Strength Bolts



Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1/2" High Strength Bolts			
AB51-1/2-1	1/2" x 1-1/2"	250	20 lbs.
AB52-1	1/2" x 2"	250	23 lbs.
AB52-1/2-1	1/2" x 2-1/2"	250	25 lbs.
AB53-1	1/2" x 3"	250	28 lbs.
AB53-1/2-1	1/2" x 3-1/2"	200	31 lbs.
AB54-1	1/2" x 4"	100	33 lbs.
AB54-1/2-1	1/2" x 4-1/2"	100	36 lbs.
AB55-1	1/2" x 5"	100	39 lbs.
AB55-1/2-1	1/2" x 5-1/2"	100	41 lbs.
AB56-1	1/2" x 6"	100	44 lbs.
AB57-3	1/2" x 7"	100	49 lbs.
AB58-4	1/2" x 8"	100	55 lbs.
AB59-4	1/2" x 9"	50	60 lbs.
AB510-4	1/2" x 10"	50	65 lbs.
AB512-4	1/2" x 12"	50	76 lbs.
AB514-6	1/2" x 14"	50	87 lbs.

5/8" High Strength Bolts			
AB61-1/2-1-1/4	5/8" x 1-1/2"	100	31 lbs.
AB61-3/4-1-1/4	5/8" x 1-3/4"	100	33 lbs.
AB62-1-1/4	5/8" x 2"	100	35 lbs.
AB63-1-1/4	5/8" x 3"	100	44 lbs.
AB64-1-1/4	5/8" x 4"	100	52 lbs.
AB65-1-1/4	5/8" x 5"	100	60 lbs.
AB66-1-1/4	5/8" x 6"	50	68 lbs.
AB67-3	5/8" x 7"	50	77 lbs.
AB68-4	5/8" x 8"	50	85 lbs.
AB610-4	5/8" x 10"	50	101 lbs.
AB612-6	5/8" x 12"	40	118 lbs.
AB614-6	5/8" x 14"	40	134 lbs.
AB616-6	5/8" x 16"	40	151 lbs.
AB618-6	5/8" x 18"	30	167 lbs.
AB620-6	5/8" x 20"	30	184 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
3/4" High Strength Bolts			
AB72-1-3/8	3/4" x 2"	100	56 lbs.
AB72-1/2-1-3/8	3/4" x 2-1/2"	100	62 lbs.
AB73-1-3/8	3/4" x 3"	100	68 lbs.
AB74-1-3/8	3/4" x 4"	50	80 lbs.
AB75-1-3/8	3/4" x 5"	50	91 lbs.
AB76-1-3/8	3/4" x 6"	50	103 lbs.
AB77-3	3/4" x 7"	40	115 lbs.
AB78-4	3/4" x 8"	40	127 lbs.
AB710-4	3/4" x 10"	30	151 lbs.
AB712-4	3/4" x 12"	30	175 lbs.
AB714-6	3/4" x 14"	30	198 lbs.
AB716-6	3/4" x 16"	25	222 lbs.
AB718-6	3/4" x 18"	20	246 lbs.
AB720-6	3/4" x 20"	20	270 lbs.
AB722-6	3/4" x 22"	20	293 lbs.
AB724-6	3/4" x 24"	15	317 lbs.
AB726-6	3/4" x 26"	15	341 lbs.
AB728-8	3/4" x 28"	15	365 lbs.
AB730-8	3/4" x 30"	10	390 lbs.
AB732-8	3/4" x 32"	10	424 lbs.

Note: Other lengths and specified thread lengths are available. Check with representatives or factory for availability.

High Strength Bolts



Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
7/8" High Strength Bolts			
AB82-1-1/2	7/8" x 2"	50	83 lbs.
AB82-1/2-1-1/2	7/8" x 2-1/2"	50	91 lbs.
AB84-1-1/2	7/8" x 4"	50	115 lbs.
AB85-1-1/2	7/8" x 5"	50	131 lbs.
AB86-1-1/2	7/8" x 6"	40	147 lbs.
AB88-3	7/8" x 8"	30	180 lbs.
AB810-6	7/8" x 10"	25	212 lbs.
AB812-6	7/8" x 12"	20	244 lbs.
AB814-6	7/8" x 14"	20	277 lbs.
AB816-6	7/8" x 16"	15	309 lbs.
AB818-6	7/8" x 18"	15	341 lbs.
AB820-6	7/8" x 20"	15	373 lbs.
AB822-6	7/8" x 22"	10	406 lbs.
AB824-6	7/8" x 24"	10	438 lbs.
AB826-8	7/8" x 26"	10	470 lbs.
AB828-8	7/8" x 28"	10	503 lbs.
AB830-8	7/8" x 30"	10	535 lbs.
AB832-8	7/8" x 32"	10	570 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1" High Strength Bolts			
AB103-1-3/4	1" x 3"	40	137 lbs.
AB103-1/2-1-3/4	1" x 3-1/2"	40	148 lbs.
AB104-1-3/4	1" x 4"	40	158 lbs.
AB105-1-3/4	1" x 5"	30	179 lbs.
AB106-1-3/4	1" x 6"	25	201 lbs.
AB108-4	1" x 8"	25	243 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1" High Strength Bolts (cont.)			
AB1010-4	1" x 10"	20	285 lbs.
AB1012-4	1" x 12"	15	327 lbs.
AB1014-6	1" x 14"	15	369 lbs.
AB1016-6	1" x 16"	10	412 lbs.
AB1018-6	1" x 18"	10	454 lbs.
AB1020-6	1" x 20"	10	496 lbs.
AB1022-6	1" x 22"	10	538 lbs.
AB1024-6	1" x 24"	10	581 lbs.
AB1026-6	1" x 26"	10	624 lbs.
AB1028-8	1" x 28"	5	667 lbs.
AB1030-8	1" x 30"	5	710 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1-1/4" High Strength Bolts			
AB123-1/2-2	1-1/4" x 3-1/2"	20	259 lbs.
AB124-2	1-1/4" x 4"	20	275 lbs.
AB125-2	1-1/4" x 5"	20	308 lbs.
AB126-2	1-1/4" x 6"	20	341 lbs.
AB127-3	1-1/4" x 7"	15	374 lbs.
AB128-3	1-1/4" x 8"	10	407 lbs.
AB1210-4	1-1/4" x 10"	10	473 lbs.
AB1212-6	1-1/4" x 12"	10	539 lbs.
AB1214-6	1-1/4" x 14"	10	605 lbs.
AB1216-6	1-1/4" x 16"	5	671 lbs.
AB1218-6	1-1/4" x 18"	5	737 lbs.
AB1220-6	1-1/4" x 20"	5	803 lbs.
AB1222-6	1-1/4" x 22"	5	869 lbs.
AB1224-8	1-1/4" x 24"	5	935 lbs.
AB1226-8	1-1/4" x 26"	5	1000 lbs.

Note: Other lengths and specified thread lengths are available. Check with representatives or factory for availability.



Washer Head Bolts

Hughes Brothers Washer Head Bolts are manufactured in accordance with ANSI C135.80 using SAE C1018 cold drawn or ASTM A36 steel. Washer head bolts are hot dip galvanized in accordance with ASTM A153.

Each bolt is shipped with an assembled nut. All washer head bolts are square head (see dimension table) and feature a 60° semi-cone point.

The unthreaded portion of any washer head bolt is capable of being bent 180°, about a diameter equal to the diameter of the bolt without cracking the steel on the outside portion of the bend.

*Some bolts of smaller diameter or shorter length may not display the HB symbol.

Dimension Table

Bolt Size	Nominal Width	Head Height	O.D. Nominal	Threads per in.
1/2"	3/4"	21/64"	1-3/4"	13
5/8"	15/16"	27/64"	2-5/8"	11
3/4"	1-1/8"	1/2"	2-3/4"	10
7/8"	1-5/16"	1/2"	3"	9

Shear Strengths

Bolt Dia.	Single Shear Through Threads	Single Shear Through Shaft
1/2"	5,200 lbs.	7,950 lbs.
5/8"	8,330 lbs.	12,420 lbs.
3/4"	12,440 lbs.	17,890 lbs.
7/8"	17,270 lbs.	24,350 lbs.

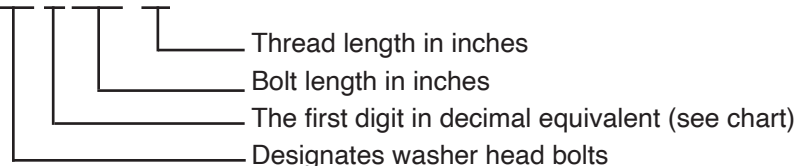
Tensile Strengths

Bolt Diameter	Minimum Tensile Strength
1/2"	7,800 lbs.
5/8"	12,400 lbs.
3/4"	18,350 lbs.
7/8"	25,400 lbs.

Decimal Equivalency Chart		
Fraction	Decimal	HUGHES
1/4"	.2	2
3/8"	.3	3
1/2"	.5	5
5/8"	.6	6
3/4"	.7	7
7/8"	.8	8
1"	.1	10
1-1/8"	1.125	11
1-1/4"	1.25	12

Ordering Information

WB 7 1 6 - 6



Washer Head Bolts



Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1/2" Washer Head Bolts			
WB51-1/2-1-1/4	1/2" x 1-1/2"	250	31 lbs.
WB52-1-1/4	1/2" x 2"	250	34 lbs.
WB52-1/2-1-1/2	1/2" x 2-1/2"	250	36 lbs.
WB53-1-1/4	1/2" x 3"	250	38 lbs.
WB53-1/2-1-1/2	1/2" x 3-1/2"	200	40 lbs.
WB54-1-1/4	1/2" x 4"	100	45 lbs.
WB54-1/2-1-1/4	1/2" x 4-1/2"	100	47 lbs.
WB55-1-1/4	1/2" x 5"	100	49 lbs.
WB55-1/2-1-1/4	1/2" x 5-1/2"	100	51 lbs.
WB56-3	1/2" x 6"	100	54 lbs.
WB57-3	1/2" x 7"	100	58 lbs.
WB58-4	1/2" x 8"	100	63 lbs.
WB59-4	1/2" x 9"	50	67 lbs.
WB510-4	1/2" x 10"	50	72 lbs.
WB512-4	1/2" x 12"	50	81 lbs.
WB514-6	1/2" x 14"	50	90 lbs.
5/8" Washer Head Bolts			
WB61-1/2-1-1/4	5/8" x 1-1/2"	100	50 lbs.
WB61-3/4-1-1/4	5/8" x 1-3/4"	100	52 lbs.
WB62-1-1/2	5/8" x 2"	100	54 lbs.
WB63-1-1/2	5/8" x 3"	100	63 lbs.
WB64-1-3/4	5/8" x 4"	50	71 lbs.
WB65-1-3/4	5/8" x 5"	50	80 lbs.
WB66-3	5/8" x 6"	50	89 lbs.
WB67-3	5/8" x 7"	50	97 lbs.
WB68-4	5/8" x 8"	50	106 lbs.
WB610-4	5/8" x 10"	30	123 lbs.
WB612-4	5/8" x 12"	30	140 lbs.
WB614-6	5/8" x 14"	30	157 lbs.
WB616-6	5/8" x 16"	30	175 lbs.
WB618-6	5/8" x 18"	30	191 lbs.
WB620-6	5/8" x 20"	25	209 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
3/4" Washer Head Bolts			
WB72-1-3/4	3/4" x 2"	100	86 lbs.
WB72-1/2-1-3/4	3/4" x 2-1/2"	100	93 lbs.
WB73-1-3/4	3/4" x 3"	50	99 lbs.
WB73-2	3/4" x 3"	50	99 lbs.
WB74-1-3/4	3/4" x 4"	50	111 lbs.
WB75-1-3/4	3/4" x 5"	40	123 lbs.
WB76-3	3/4" x 6"	30	136 lbs.
WB77-3	3/4" x 7"	25	148 lbs.
WB78-4	3/4" x 8"	25	160 lbs.
WB710-4	3/4" x 10"	25	185 lbs.
WB712-6	3/4" x 12"	25	209 lbs.
WB714-6	3/4" x 14"	20	234 lbs.
WB716-6	3/4" x 16"	20	259 lbs.
WB718-6	3/4" x 18"	15	283 lbs.
WB720-6	3/4" x 20"	15	308 lbs.
WB722-6	3/4" x 22"	15	332 lbs.
WB724-6	3/4" x 24"	15	357 lbs.
WB726-6	3/4" x 26"	15	382 lbs.
WB728-6	3/4" x 28"	10	406 lbs.
WB730-8	3/4" x 30"	10	431 lbs.
WB732-8	3/4" x 32"	10	455 lbs.

Note: Other lengths available.



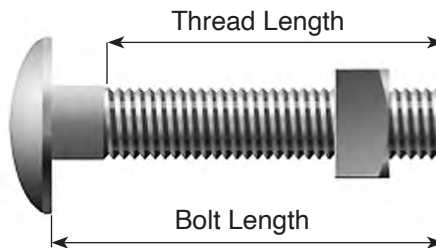
Washer Head Bolts



Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
7/8" Washer Head Bolts			
WB82-1/2-2	7/8" x 2-1/2"	50	117 lbs.
WB84-2	7/8" x 4"	50	142 lbs.
WB85-2-1/2	7/8" x 5"	50	159 lbs.
WB86-3	7/8" x 6"	40	175 lbs.
WB88-3	7/8" x 8"	25	209 lbs.
WB810-3	7/8" x 10"	25	243 lbs.
WB812-6	7/8" x 12"	20	276 lbs.
WB814-6	7/8" x 14"	15	310 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
7/8" Washer Head Bolts			
WB816-6	7/8" x 16"	15	344 lbs.
WB818-6	7/8" x 18"	15	378 lbs.
WB820-6	7/8" x 20"	15	411 lbs.
WB822-6	7/8" x 22"	10	445 lbs.
WB824-6	7/8" x 24"	10	479 lbs.
WB826-8	7/8" x 26"	10	513 lbs.
WB828-8	7/8" x 28"	10	546 lbs.
WB830-8	7/8" x 30"	10	580 lbs.
WB832-8	7/8" x 32"	10	614 lbs.

Note: Other lengths available.



Carriage Bolts

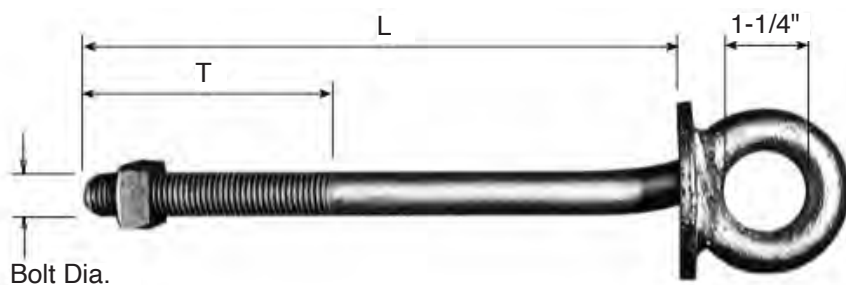
Stock No.	Bolt Length Inches	Thread Length Inches	Weight 100 Pcs.
3/8" Carriage Bolts*			
BC32-F	2	Full	8 lbs.
BC33-F	3	Full	10 lbs.
BC34-F	4	Full	14 lbs.
BC34-1/2-F	4-1/2	Full	13 lbs.
BC35-F	5	Full	14 lbs.
BC35-1/2-F	5-1/2	Full	16 lbs.
BC36-F	6	Full	17 lbs.
BC37-6	7	6	20 lbs.
BC38-3	8	3	25 lbs.

Stock No.	Bolt Length Inches	Thread Length Inches	Weight 100 Pcs.
1/2" Carriage Bolts			
BC52-F	2	Full	14 lbs.
BC52-1/2-F	2-1/2	Full	16 lbs.
BC53-F	3	Full	17 lbs.
BC54-F	4	Full	23 lbs.
BC55-F	5	Full	30 lbs.
BC55-1/2-1-1/2	5-1/2	1-1/2	31 lbs.
BC56-F	6	Full	32 lbs.
BC57-1-1/2	7	1-1/2	41 lbs.
BC58-F	8	Full	41 lbs.

Stock No.	Bolt Length Inches	Thread Length Inches	Weight 100 Pcs.
5/8" Carriage Bolts			
BC61-1/2-F	1-1/2	Full	19 lbs.
BC62-F	2	Full	24 lbs.
BC64-F	4	Full	38 lbs.
BC65-1/2-1-1/2	5-1/2	1-1/2	46 lbs.
BC66-F	6	Full	52 lbs.
BC68-6	8	6	58 lbs.
3/4" Carriage Bolts			
BC72-F	2	Full	46 lbs.
BC73-1-3/4	3	1-3/4	46 lbs.

*3/8" Carriage Bolts include hex nuts.





2720 Shoulder Eyebolt

Stock No.	Bolt Dia.	Length L	Thread T	Weight 100 Pcs.
1/2" Shoulder Eyebolts				
2720.54-1-1/8	1/2"	4"	1-1/8"	102 lbs.
2720.55-1-1/4	1/2"	5"	1-1/4"	110 lbs.
2720.56-3	1/2"	6"	3"	118 lbs.
2720.57-3	1/2"	7"	3"	126 lbs.
2720.58-4	1/2"	8"	4"	134 lbs.
2720.510-4	1/2"	10"	4"	142 lbs.
2720.512-4	1/2"	12"	4"	150 lbs.

5/8" Shoulder Eyebolts				
2720.64-3	5/8"	4"	3"	120 lbs.
2720.66-3	5/8"	6"	3"	168 lbs.
2720.68-4	5/8"	8"	4"	192 lbs.
2720.610-4	5/8"	10"	4"	204 lbs.
2720.612-6	5/8"	12"	6"	216 lbs.
2720.614-6	5/8"	14"	6"	235 lbs.
2720.616-6	5/8"	16"	6"	240 lbs.
2720.618-6	5/8"	18"	6"	250 lbs.
2720.620-6	5/8"	20"	6"	268 lbs.
2720.622-6	5/8"	22"	6"	288 lbs.
2720.624-6	5/8"	24"	6"	308 lbs.

3/4" Shoulder Eyebolts				
2720.74-3	3/4"	4"	3"	168 lbs.
2720.76-3	3/4"	6"	3"	200 lbs.
2720.78-3	3/4"	8"	3"	245 lbs.
2720.710-4	3/4"	10"	4"	270 lbs.
2720.712-6	3/4"	12"	6"	293 lbs.
2720.714-6	3/4"	14"	6"	320 lbs.
2720.716-6	3/4"	16"	6"	340 lbs.
2720.718-6	3/4"	18"	6"	360 lbs.
2720.720-6	3/4"	20"	6"	374 lbs.
2720.722-6	3/4"	22"	6"	396 lbs.
2720.724-6	3/4"	24"	6"	421 lbs.
2720.726-6	3/4"	26"	6"	443 lbs.
2720.728-8	3/4"	28"	8"	470 lbs.

Stock No.	Bolt Dia	Length L	Thread T	Weight 100 Pcs.
7/8" Shoulder Eyebolts				
2720.810-4	7/8"	10"	4"	302 lbs.
2720.812-6	7/8"	12"	6"	341 lbs.
2720.814-6	7/8"	14"	6"	379 lbs.
2720.816-6	7/8"	16"	6"	417 lbs.
2720.818-6	7/8"	18"	6"	455 lbs.
2720.820-6	7/8"	20"	6"	494 lbs.
2720.822-6	7/8"	22"	6"	532 lbs.
2720.824-6	7/8"	24"	6"	570 lbs.
2720.826-8	7/8"	26"	8"	608 lbs.
2720.828-8	7/8"	28"	8"	647 lbs.
2720.830-8	7/8"	30"	8"	685 lbs.
2720.832-8	7/8"	32"	8"	723 lbs.
2720.834-8	7/8"	34"	8"	761 lbs.
2720.836-8	7/8"	36"	8"	800 lbs.

Hughes Brothers Welded Shoulder Eyebolts feature a 3" round washer welded to an eyebolt. The 2720 shoulder eyebolts are manufactured from SAE C1018 cold drawn or ASTM A36 steel. All shoulder eyebolts are galvanized in accordance with ASTM A153. Each shoulder eyebolt is furnished with one nut.

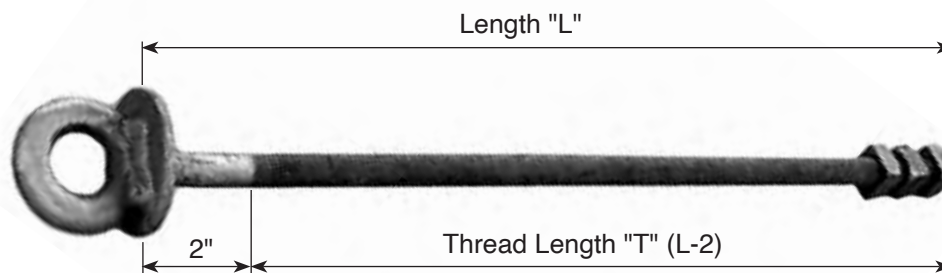
Tensile Strengths

Bolt Diameter	Minimum Tensile Strength
1/2"	7,800 lbs.
5/8"	12,400 lbs.
3/4"	18,350 lbs.
7/8"	25,400 lbs.

2720.7 Double Arming Eyebolt

Hughes Brothers Welded 3/4" Double Arming Eyebolts feature a 3" round washer welded to an eyebolt. The 2720 double arming eyebolts are manufactured from SAE C1018 cold drawn or ASTM A36 steel. All eyebolts are galvanized in accordance with ASTM A153.

NOTE: Each eyebolt is supplied with three square nuts.

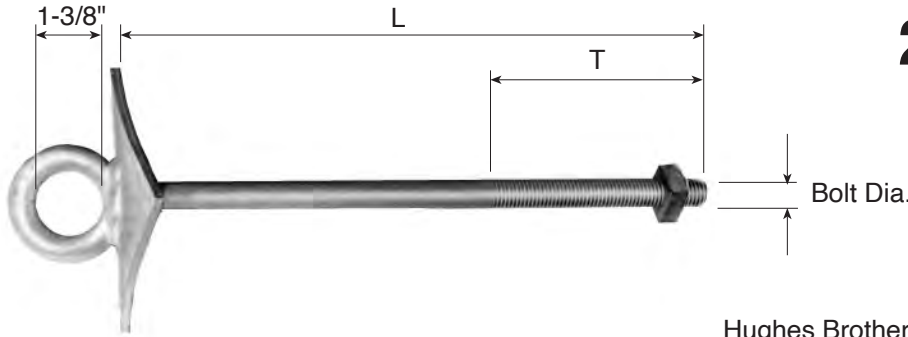


Ordering Example:

2720.726-24

- Thread Length "T" in inches
- Length "L" in inches
- Diameter = 3/4 inches

Minimum Tensile Strength 18,350 lbs.
(for 3/4" Diameter Bolt)



2721 Shoulder Eyebolt

Hughes Brothers 2721 Welded Shoulder Eyebolt has a 4" curved washer welded to an eyebolt. The 2721 shoulder eyebolts are manufactured from SAE C1018 cold drawn or ASTM A36 steel, and are galvanized in accordance with ASTM A153. Each 2721 shoulder eyebolt is furnished with one nut.

Stock No.	Bolt Dia.	Length L	Thread T	Weight 100 Pcs.
1/2" Shoulder Eyebolts				
2721.54-1-1/8	1/2"	4"	1-1/8"	158 lbs.
2721.55-1-1/4	1/2"	5"	1-1/4"	166 lbs.
2721.56-3	1/2"	6"	3"	174 lbs.
2721.57-3	1/2"	7"	3"	182 lbs.
2721.58-4	1/2"	8"	4"	190 lbs.
2721.510-4	1/2"	10"	4"	198 lbs.
2721.512-4	1/2"	12"	4"	206 lbs.

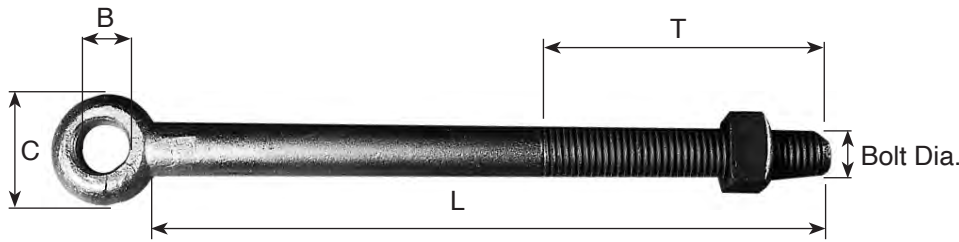
5/8" Shoulder Eyebolts				
2721.64-3	5/8"	4"	3"	198 lbs.
2721.65-3	5/8"	5"	3"	212 lbs.
2721.66-3	5/8"	6"	3"	225 lbs.
2721.68-4	5/8"	8"	4"	232 lbs.
2721.610-4	5/8"	10"	4"	242 lbs.
2721.612-4	5/8"	12"	4"	262 lbs.
2721.614-6	5/8"	14"	6"	282 lbs.
2721.616-6	5/8"	16"	6"	299 lbs.
2721.618-6	5/8"	18"	6"	315 lbs.
2721.620-6	5/8"	20"	6"	325 lbs.
2721.622-6	5/8"	22"	6"	350 lbs.
2721.624-6	5/8"	24"	6"	366 lbs.

3/4" Shoulder Eyebolts				
2721.76-3	3/4"	6"	3"	249 lbs.
2721.78-4	3/4"	8"	4"	276 lbs.
2721.710-4	3/4"	10"	4"	303 lbs.
2721.712-4	3/4"	12"	4"	330 lbs.
2721.714-6	3/4"	14"	6"	357 lbs.
2721.716-6	3/4"	16"	6"	384 lbs.
2721.718-6	3/4"	18"	6"	411 lbs.
2721.720-6	3/4"	20"	6"	438 lbs.
2721.722-6	3/4"	22"	6"	465 lbs.
2721.724-6	3/4"	24"	6"	492 lbs.
2721.726-6	3/4"	26"	6"	519 lbs.
2721.728-8	3/4"	28"	8"	546 lbs.

Tensile Strengths

Bolt Diameter	Minimum Tensile Strength
1/2"	7,800 lbs.
5/8"	12,400 lbs.
3/4"	18,350 lbs.
7/8"	25,400 lbs.

Stock No.	Bolt Dia.	Length L	Thread T	Weight 100 Pcs.
7/8" Shoulder Eyebolts				
2721.86-3	7/8"	6"	3"	316 lbs.
2721.88-4	7/8"	8"	4"	350 lbs.
2721.810-4	7/8"	10"	4"	386 lbs.
2721.812-6	7/8"	12"	6"	414 lbs.
2721.814-6	7/8"	14"	6"	479 lbs.
2721.816-6	7/8"	16"	6"	486 lbs.
2721.818-6	7/8"	18"	6"	519 lbs.
2721.820-6	7/8"	20"	6"	557 lbs.
2721.822-6	7/8"	22"	6"	570 lbs.
2721.824-6	7/8"	24"	6"	600 lbs.
2721.826-8	7/8"	26"	8"	653 lbs.
2721.828-8	7/8"	28"	8"	684 lbs.



2724 Forged Eyebolt

Tensile Strengths

Bolt Diameter	Minimum Tensile Strength
1/2"	7,800 lbs.
5/8"	12,400 lbs.
3/4"	18,350 lbs.
7/8"	25,400 lbs.

Hughes Brothers 2724 Forged Eyebolts are manufactured from SAE C1018 cold drawn or ASTM A36 steel. Hughes Brothers eyebolts are hot dip galvanized in accordance with ASTM A153. Each 2724 shoulder eyebolt is furnished with one nut.

Also available in 1" and 1-1/4" diameter rod by special order.

NOTE: Not for use with 2848 swinging angle brackets.

Stock No.	Bolt Dia.	L	T	B	C	Weight 100 Pcs.	Stock No.	Bolt Dia.	L	T	B	C	Weight 100 Pcs.
1/2" Forged Eyebolts							3/4" Forged Eyebolts						
2724.56-4	1/2"	6"	4"	11/16"	1-1/4"	39 lbs.	2724.74-2	3/4"	4"	2"	13/16"	1-7/8"	80 lbs.
2724.58-4	1/2"	8"	4"	11/16"	1-1/4"	51 lbs.	2724.75-3	3/4"	5"	3"	13/16"	1-7/8"	88 lbs.
2724.510-4	1/2"	10"	4"	11/16"	1-1/4"	62 lbs.	2724.76-3	3/4"	6"	3"	13/16"	1-7/8"	105 lbs.
2724.512-4	1/2"	12"	4"	11/16"	1-1/4"	73 lbs.	2724.77-3	3/4"	7"	3"	13/16"	1-7/8"	116 lbs.
2724.514-4	1/2"	14"	4"	11/16"	1-1/4"	84 lbs.	2724.78-4	3/4"	8"	4"	13/16"	1-7/8"	128 lbs.
2724.516-4	1/2"	16"	4"	11/16"	1-1/4"	95 lbs.	2724.710-4	3/4"	10"	4"	13/16"	1-7/8"	150 lbs.
2724.518-4	1/2"	18"	4"	11/16"	1-1/4"	107 lbs.	2724.712-4	3/4"	12"	4"	13/16"	1-7/8"	175 lbs.
2724.520-4	1/2"	20"	4"	11/16"	1-1/4"	117 lbs.	2724.714-6	3/4"	14"	6"	13/16"	1-7/8"	199 lbs.
5/8" Forged Eyebolts							7/8" Forged Eyebolts						
2724.64-2	5/8"	4"	2"	13/16"	1-5/8"	48 lbs.	2724.716-6	3/4"	16"	6"	13/16"	1-7/8"	219 lbs.
2724.64-3	5/8"	4"	3"	13/16"	1-5/8"	48 lbs.	2724.718-6	3/4"	18"	6"	13/16"	1-7/8"	246 lbs.
2724.65-3	5/8"	5"	3"	13/16"	1-5/8"	60 lbs.	2724.720-6	3/4"	20"	6"	13/16"	1-7/8"	271 lbs.
2724.66-3	5/8"	6"	3"	13/16"	1-5/8"	68 lbs.	2724.722-6	3/4"	22"	6"	13/16"	1-7/8"	295 lbs.
2724.68-4	5/8"	8"	4"	13/16"	1-5/8"	85 lbs.	2724.724-6	3/4"	24"	6"	13/16"	1-7/8"	321 lbs.
2724.610-4	5/8"	10"	4"	13/16"	1-5/8"	101 lbs.	2724.726-8	3/4"	26"	8"	13/16"	1-7/8"	345 lbs.
2724.612-4	5/8"	12"	4"	13/16"	1-5/8"	124 lbs.	2724.728-8	3/4"	28"	8"	13/16"	1-7/8"	369 lbs.
2724.614-6	5/8"	14"	6"	13/16"	1-5/8"	132 lbs.							
2724.616-6	5/8"	16"	6"	13/16"	1-5/8"	150 lbs.							
2724.618-6	5/8"	18"	6"	13/16"	1-5/8"	167 lbs.							
2724.620-6	5/8"	20"	6"	13/16"	1-5/8"	187 lbs.							
2724.622-6	5/8"	22"	6"	13/16"	1-5/8"	200 lbs.							
2724.624-6	5/8"	24"	6"	13/16"	1-5/8"	220 lbs.							
2724.626-8	5/8"	26"	8"	13/16"	1-5/8"	236 lbs.							
2724.628-8	5/8"	28"	8"	13/16"	1-5/8"	252 lbs.							
2724.630-8	5/8"	30"	8"	13/16"	1-5/8"	268 lbs.							
2724.632-8	5/8"	32"	8"	13/16"	1-5/8"	289 lbs.							
2724.634-8	5/8"	34"	8"	13/16"	1-5/8"	307 lbs.							
							2724.85-3	7/8"	5"	3"	15/16"	2-1/8"	108 lbs.
							2724.86-3	7/8"	6"	3"	15/16"	2-1/8"	126 lbs.
							2724.87-3	7/8"	7"	3"	15/16"	2-1/8"	145 lbs.
							2724.88-4	7/8"	8"	4"	15/16"	2-1/8"	163 lbs.
							2724.810-4	7/8"	10"	4"	15/16"	2-1/8"	201 lbs.
							2724.812-4	7/8"	12"	4"	15/16"	2-1/8"	237 lbs.
							2724.814-6	7/8"	14"	6"	15/16"	2-1/8"	276 lbs.
							2724.816-6	7/8"	16"	6"	15/16"	2-1/8"	308 lbs.
							2724.818-6	7/8"	18"	6"	15/16"	2-1/8"	344 lbs.
							2724.820-6	7/8"	20"	6"	15/16"	2-1/8"	379 lbs.
							2724.822-6	7/8"	22"	6"	15/16"	2-1/8"	407 lbs.
							2724.824-6	7/8"	24"	6"	15/16"	2-1/8"	452 lbs.
							2724.826-8	7/8"	26"	8"	15/16"	2-1/8"	467 lbs.

Threaded Rods (Double Arming Bolts)



Shear Strengths for ANSI C135.80

Bolt Diameter	Single Shear Through Threads	Single Shear Through Shaft	Threads per in.
1/2"	5,200 lbs.	7,950 lbs.	13
5/8"	8,330 lbs.	12,420 lbs.	11
3/4"	12,440 lbs.	17,890 lbs.	10
7/8"	17,270 lbs.	24,350 lbs.	9
1"	22,690 lbs.	31,800 lbs.	8
1-1/4"	36,590 lbs.	49,700 lbs.	7

Hughes Brothers Threaded Rods are manufactured in accordance with ANSI C135.80 and ASTM A307, using ASTM A36 or SAE C1018 cold drawn steel. The threaded rods are hot dip galvanized in accordance with ASTM A153. Various ordering options are available for full thread, or any portion of thread. Standard thread length options are listed. Threaded rod with partial threads are furnished with one nut on each end unless otherwise specified. Full threaded rod (double arming bolts) are furnished with 4 nuts unless otherwise specified. The suffix "2N" designates only 2 nuts for full threaded rod.

Tensile Strengths for ANSI C135.80

Minimum Bolt Diameter	Tensile Strength
1/2"	7,800 lbs.
5/8"	12,400 lbs.
3/4"	18,350 lbs.
7/8"	25,400 lbs.
1"	33,500 lbs.
1-1/4"	53,300 lbs.

Decimal Equivalency Chart		
Fraction	Decimal	HUGHES
1/4"	.2	2
3/8"	.3	3
1/2"	.5	5
5/8"	.6	6
3/4"	.7	7
7/8"	.8	8
1"	.1	10
1-1/8"	1.125	11
1-1/4"	1.25	12

Ordering Information

TR 7 1 6 - F 2N

- Designates threaded rod
- First digit in decimal equivalent (see chart)
- Bolt length, in 2" increments
- Designates full threads
- Without the "2N" suffix, 4 nuts are always supplied on full threaded rod, or "NN" designates no nuts.
- Designates only 2 nuts (full threaded rod only).

Full Threaded Rods



Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1/2" Full Threaded Rods			
TR512-F	1/2" x 12"	50	75 lbs.
TR514-F	1/2" x 14"	50	84 lbs.
TR516-F	1/2" x 16"	50	94 lbs.
TR520-F	1/2" x 20"	50	112 lbs.
TR522-F	1/2" x 22"	50	121 lbs.
TR524-F	1/2" x 24"	50	130 lbs.
5/8" Full Threaded Rods			
TR612-F	5/8" x 12"	25	125 lbs.
TR614-F	5/8" x 14"	25	139 lbs.
TR616-F	5/8" x 16"	25	154 lbs.
TR620-F	5/8" x 20"	25	182 lbs.
TR622-F	5/8" x 22"	25	196 lbs.
TR624-F	5/8" x 24"	25	211 lbs.
3/4" Full Threaded Rods			
TR712-F	3/4" x 12"	30	180 lbs.
TR714-F	3/4" x 14"	30	205 lbs.
TR716-F	3/4" x 16"	25	221 lbs.
TR718-F	3/4" x 18"	25	242 lbs.
TR720-F	3/4" x 20"	20	262 lbs.
TR722-F	3/4" x 22"	20	283 lbs.
TR724-F	3/4" x 24"	15	304 lbs.
TR726-F	3/4" x 26"	15	325 lbs.
TR728-F	3/4" x 28"	15	346 lbs.
TR730-F	3/4" x 30"	15	366 lbs.
TR732-F	3/4" x 32"	10	387 lbs.
TR734-F	3/4" x 34"	10	408 lbs.
TR736-F	3/4" x 36"	10	429 lbs.
TR738-F	3/4" x 38"	10	449 lbs.
TR740-F	3/4" x 40"	10	470 lbs.
TR742-F	3/4" x 42"	10	491 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
7/8" Full Threaded Rods			
TR812-F	7/8" x 12"	20	262 lbs.
TR814-F	7/8" x 14"	20	291 lbs.
TR816-F	7/8" x 16"	15	320 lbs.
TR818-F	7/8" x 18"	15	349 lbs.
TR820-F	7/8" x 20"	15	378 lbs.
TR822-F	7/8" x 22"	15	406 lbs.
TR824-F	7/8" x 24"	10	435 lbs.
TR826-F	7/8" x 26"	10	464 lbs.
TR828-F	7/8" x 28"	10	493 lbs.
TR830-F	7/8" x 30"	10	522 lbs.
TR832-F	7/8" x 32"	10	551 lbs.
TR834-F	7/8" x 34"	10	580 lbs.
TR836-F	7/8" x 36"	10	609 lbs.
TR838-F	7/8" x 38"	10	638 lbs.
TR840-F	7/8" x 40"	5	667 lbs.
TR842-F	7/8" x 42"	5	696 lbs.

Full Threaded Rods



Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.	Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1" Full Threaded Rods				1-1/4" Full Threaded Rods*			
TR1012-F	1" x 12"	15	356 lbs.	TR1212-F	1-1/4" x 12"	10	468 lbs.
TR1014-F	1" x 14"	15	392 lbs.	TR1214-F	1-1/4" x 14"	10	538 lbs.
TR1016-F	1" x 16"	15	431 lbs.	TR1216-F	1-1/4" x 16"	10	607 lbs.
TR1018-F	1" x 18"	10	468 lbs.	TR1218-F	1-1/4" x 18"	5	677 lbs.
TR1020-F	1" x 20"	10	506 lbs.	TR1220-F	1-1/4" x 20"	5	747 lbs.
TR1022-F	1" x 22"	10	544 lbs.	TR1222-F	1-1/4" x 22"	5	817 lbs.
TR1024-F	1" x 24"	10	581 lbs.	TR1224-F	1-1/4" x 24"	5	887 lbs.
TR1026-F	1" x 26"	10	619 lbs.	TR1226-F	1-1/4" x 26"	5	956 lbs.
TR1028-F	1" x 28"	5	656 lbs.	TR1228-F	1-1/4" x 28"	5	1026 lbs.
TR1030-F	1" x 30"	5	694 lbs.	TR1230-F	1-1/4" x 30"	5	1096 lbs.
TR1032-F	1" x 32"	5	732 lbs.	TR1232-F	1-1/4" x 32"	5	1166 lbs.
TR1034-F	1" x 34"	5	769 lbs.	TR1234-F	1-1/4" x 34"	5	1236 lbs.
TR1036-F	1" x 36"	5	807 lbs.	TR1236-F	1-1/4" x 36"	5	1305 lbs.
TR1038-F	1" x 38"	5	844 lbs.	TR1238-F	1-1/4" x 38"	4	1375 lbs.
TR1040-F	1" x 40"	5	882 lbs.	TR1240-F	1-1/4" x 40"	4	1445 lbs.
TR1042-F	1" x 42"	5	920 lbs.	TR1242-F	1-1/4" x 42"	4	1515 lbs.

*1-1/4" rods include hex nuts.

Threaded Double End Rods



Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
5/8" Threaded Double End Rods			
TR612-5	5/8" x 12"	30	136 lbs.
TR614-5	5/8" x 14"	30	142 lbs.
TR616-5	5/8" x 16"	25	160 lbs.
TR618-5	5/8" x 18"	25	173 lbs.
TR620-5	5/8" x 20"	20	187 lbs.
TR622-5	5/8" x 22"	20	204 lbs.
TR624-5	5/8" x 24"	15	224 lbs.
TR626-5	5/8" x 26"	15	236 lbs.
TR628-5	5/8" x 28"	15	256 lbs.
TR630-5	5/8" x 30"	15	264 lbs.
TR632-5	5/8" x 32"	10	284 lbs.
TR634-5	5/8" x 34"	10	298 lbs.
TR636-5	5/8" x 36"	10	325 lbs.
TR638-5	5/8" x 38"	10	339 lbs.
TR640-5	5/8" x 40"	10	351 lbs.
TR642-5	5/8" x 42"	10	365 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
7/8" Threaded Double End Rods			
TR812-5	7/8" x 12"	20	222 lbs.
TR814-5	7/8" x 14"	20	256 lbs.
TR816-5	7/8" x 16"	15	290 lbs.
TR818-5	7/8" x 18"	15	324 lbs.
TR820-5	7/8" x 20"	15	358 lbs.
TR822-5	7/8" x 22"	15	392 lbs.
TR824-5	7/8" x 24"	10	425 lbs.
TR826-5	7/8" x 26"	10	455 lbs.
TR828-5	7/8" x 28"	10	493 lbs.
TR830-5	7/8" x 30"	10	527 lbs.
TR832-5	7/8" x 32"	10	561 lbs.
TR834-5	7/8" x 34"	10	595 lbs.
TR836-5	7/8" x 36"	10	629 lbs.
TR838-5	7/8" x 38"	10	662 lbs.
TR840-5	7/8" x 40"	10	696 lbs.
TR842-5	7/8" x 42"	10	730 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
3/4" Threaded Double End Rods			
TR712-5	3/4" x 12"	30	196 lbs.
TR714-5	3/4" x 14"	30	220 lbs.
TR716-5	3/4" x 16"	25	240 lbs.
TR718-5	3/4" x 18"	25	252 lbs.
TR720-5	3/4" x 20"	20	275 lbs.
TR722-5	3/4" x 22"	20	300 lbs.
TR724-5	3/4" x 24"	15	313 lbs.
TR726-5	3/4" x 26"	15	336 lbs.
TR728-5	3/4" x 28"	15	362 lbs.
TR730-5	3/4" x 30"	15	388 lbs.
TR732-5	3/4" x 32"	10	414 lbs.
TR734-5	3/4" x 34"	10	440 lbs.
TR736-5	3/4" x 36"	10	465 lbs.
TR738-5	3/4" x 38"	10	491 lbs.
TR740-5	3/4" x 40"	10	517 lbs.
TR742-5	3/4" x 42"	10	543 lbs.

Note: The last digit of the stock number indicates the standard thread length at each end of the threaded double end rods.

Threaded double end rods are furnished with two square nuts.

Threaded Double End Rods



Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1" Threaded Double End Rods			
TR1012-5	1" x 12"	15	297 lbs.
TR1014-5	1" x 14"	15	341 lbs.
TR1016-5	1" x 16"	15	385 lbs.
TR1018-5	1" x 18"	15	429 lbs.
TR1020-5	1" x 20"	10	473 lbs.
TR1022-5	1" x 22"	10	517 lbs.
TR1024-5	1" x 24"	10	561 lbs.
TR1026-5	1" x 26"	10	605 lbs.
TR1028-5	1" x 28"	5	649 lbs.
TR1030-6	1" x 30"	5	693 lbs.
TR1032-6	1" x 32"	5	737 lbs.
TR1034-6	1" x 34"	5	781 lbs.
TR1036-6	1" x 36"	5	825 lbs.
TR1038-6	1" x 38"	5	869 lbs.
TR1040-6	1" x 40"	5	913 lbs.
TR1042-6	1" x 42"	5	957 lbs.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
1-1/4" Threaded Double End Rods			
TR1212-6	1-1/4" x 12"	10	468 lbs.
TR1214-6	1-1/4" x 14"	10	538 lbs.
TR1216-6	1-1/4" x 16"	10	607 lbs.
TR1218-6	1-1/4" x 18"	5	677 lbs.
TR1220-6	1-1/4" x 20"	5	747 lbs.
TR1222-6	1-1/4" x 22"	5	817 lbs.
TR1224-6	1-1/4" x 24"	5	887 lbs.
TR1226-6	1-1/4" x 26"	5	956 lbs.
TR1228-6	1-1/4" x 28"	5	1026 lbs.
TR1230-6	1-1/4" x 30"	5	1096 lbs.
TR1232-6	1-1/4" x 32"	5	1166 lbs.
TR1234-6	1-1/4" x 34"	5	1236 lbs.
TR1236-6	1-1/4" x 36"	5	1305 lbs.
TR1238-6	1-1/4" x 38"	4	1375 lbs.
TR1240-6	1-1/4" x 40"	4	1445 lbs.
TR1242-6	1-1/4" x 42"	4	1515 lbs.

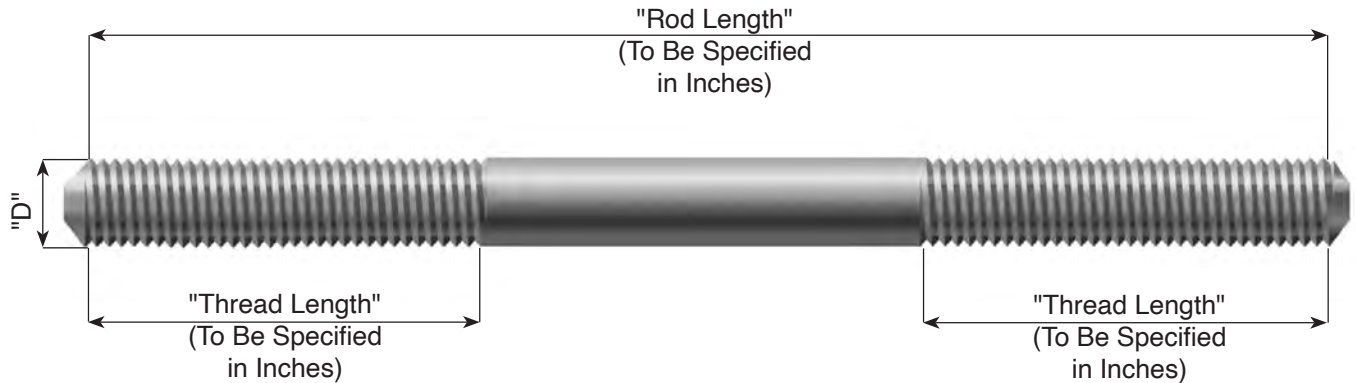
Note: The last digit of the stock number indicates the standard thread length at each end of the threaded double end rods.

Threaded double end rods are furnished with two square nuts.

*1-1/4" rods include hex nuts.

A193B7 Threaded Rod

Hughes Brothers A193B7 threaded rods conform to ASTM A193-B7 specification for quenched and tempered alloy steel fasteners. These threaded rods are available as both fully threaded rods and as double end bolts. Nuts are not included, unless specified.



*Specify "F" for fully threaded rods.

Note: Material: Conforms to ASTM A193 Grade B7 Minimum Tensile 125 Ksi.

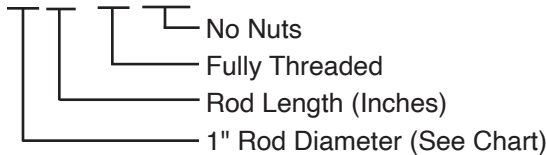
Nuts to be ordered separately, unless specified in ordering. See examples below.

Stock No.	"D"
A193B7-5 _ _	1/2"
A193B7-6 _ _	5/8"
A193B7-7 _ _	3/4"
A193B7-8 _ _	7/8"
A193B7-10 _ _	1"
A193B7-12 _ _	1-1/4"

Ordering Information:

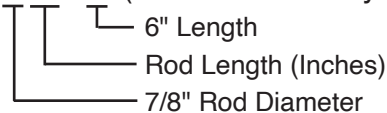
Standard Ordering Package:

A193B7 - 1012 - F NN



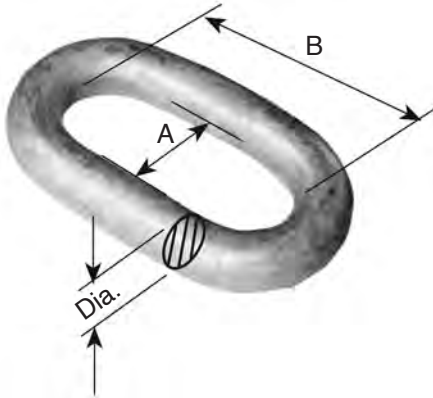
Ordering Package with Hex Nuts:

A193B7 - 824 - 6 (Includes 2 Heavy Hex Nuts)



Chain Links

Hughes Brothers Chain Links are forged from ASTM A36 steel.



Stock No.	Dia.	A	B	Weight 100 Pcs.	Ultimate Strength
1329-B	5/8"	1"	3"	73 lbs.	30,000 lbs.
1329-B1	1/2"	1"	2-1/4"	41 lbs.	20,000 lbs.

1329 U-Bolt & Chain Link Assembly

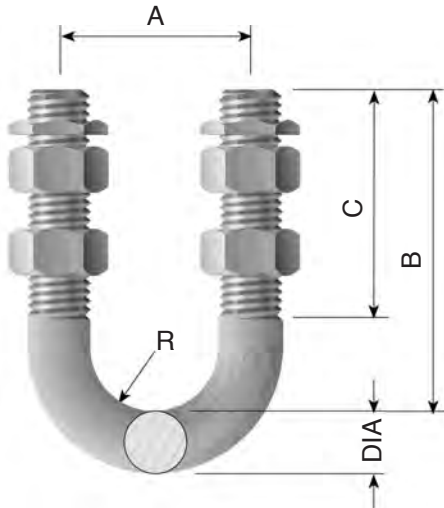
To order Hughes Brothers 1329 U-Bolt and Chain Link Assembly, specify the following:



Stock No.	Item Description	Weight 100 Pcs.
1329.5	5/8" U-Bolt & 1/2" Link Assembly	160 lbs.
1329.6	5/8" U-Bolt & 5/8" Link Assembly	190 lbs.

U-Bolts

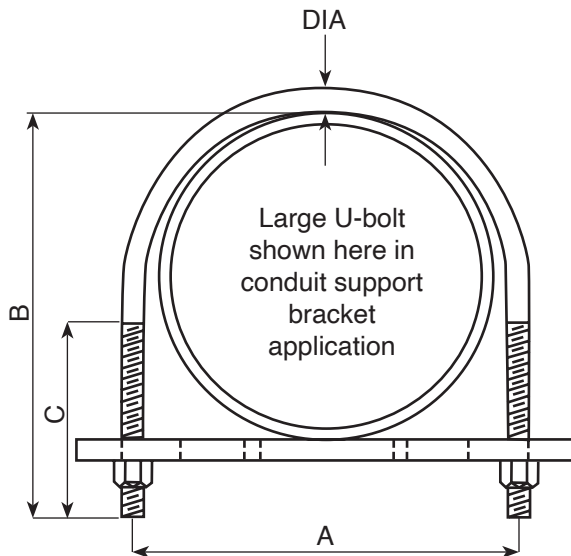
Hughes Brothers U-Bolts are used primarily on steel angle H-frame cross ties.



Stock No.	Bolt Dia.	A	B	C	R	Weight 100 Pcs.	Ult. Strength
U-Bolt with 4 nuts and 2 locknuts							
1327-CPT**	5/8"	3"	3-1/2"	2"	1-3/16"	114 lbs.	25,000 lbs.
1331-CPT**	3/4"	3"	4-1/2"	2-1/2"	1-1/8"	200 lbs.	36,000 lbs.
1327-A-CPT**	5/8"	3"	4-1/2"	3"	1-3/16"	132 lbs.	25,000 lbs.
1328-A-CPT	1/2"	1-1/2"	2-1/2"	1-1/2"	1/2"	116 lbs.	16,000 lbs.
1329-A-CPT*	5/8"	2"	3-5/8"	2"	11/16"	116 lbs.	25,000 lbs.
1330-A-CPT	5/8"	1-1/2"	3"	2"	7/16"	96 lbs.	25,000 lbs.
1328-B-CPT	1/2"	1-1/2"	2-1/2"	1-3/4"	1/2"	116 lbs.	16,000 lbs.

*Uses square nuts.

**Also includes 2 single coil split lockwashers.



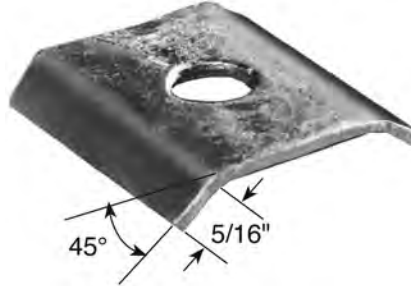
Stock No.	Dia.	"A"	"B"	"C"	Pipe / Conduit Size
U-Bolt, with 2 hex nuts & 2 split lock washers (for conduit support brackets)					
AS2477.2	3/8"	2-7/8"	3-1/2"	2"	2"
AS2477.3	3/8"	7"	7-3/4"	4"	6"
AS2477.5	3/8"	6"	6-1/2"	3-1/4"	5"
AS2477.6	3/8"	4-3/4"	5-1/2"	3"	4"
B1964.1A	1/2"	3-1/4"	4"	2-5/8"	2"
B1964.1B	1/2"	5"	6"	3"	4"
B1964.1C	1/2"	7"	8"	4"	6"

Note: Other sizes available, contact Hughes Brothers.

2718 Bonding Clip

Stock No.	Bolt Dia.	Max. Wire Dia.	Min. Wire Dia.	Std. Pkg.	Weight 100 Pcs.
2718.3	3/8"	7/16"	1/4"	250	8 lbs.
2718.5	1/2"	7/16"	1/4"	250	9 lbs.
2718.6	5/8"	7/16"	1/4"	250	19 lbs.
2718.7	3/4"	7/16"	1/4"	250	18 lbs.
2718.8	7/8"	7/16"	1/4"	250	18 lbs.
2718.10	1"	7/16"	1/4"	250	16 lbs.
2718.33*	3/8"x1-1/2"	7/16"	1/4"	250	19 lbs.
2718.55*	1/2"x1-1/2"	7/16"	1/4"	200	29 lbs.
2718.66*	5/8"x1-3/4"	7/16"	1/4"	100	53 lbs.

The Hughes Brothers 2718 Bonding Clip is used to attach the ground wire to any flat steel surface. The mounting bolt is not included, unless specified.



*Includes bonding clip, carriage bolt, nut, and locknut.

2727 Bonding Clip

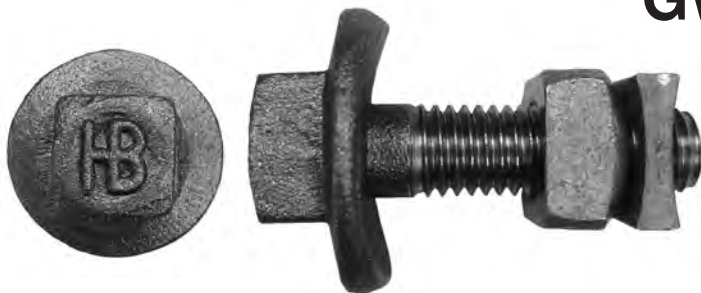
Stock No.	Bolt Dia.	Max. Wire Dia.	Std. Pkg.	Weight 100 Pcs.
2727.5	1/2"	5/16"	500	10 lbs.
2727.6	5/8"	5/16"	500	10 lbs.
2727.7	3/4"	5/16"	250	14 lbs.
2727.8	7/8"	5/16"	250	20 lbs.
2727.10	1"	7/16"	150	26 lbs.
2727.12	1-1/4"	7/16"	150	26 lbs.

The Hughes Brothers 2727 Bonding Clip provides a simple and practical method of bonding the threaded end of bolts. Nut ordered separately.

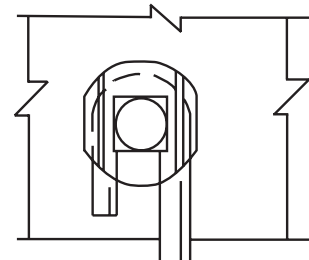
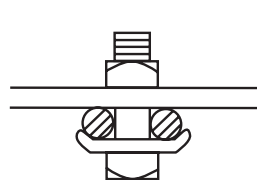


GWB 51-1/2 Bonding Bolt

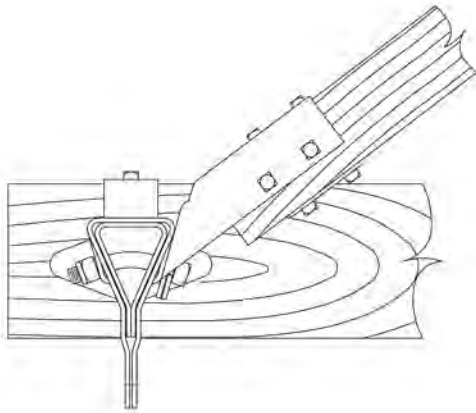
The Hughes Brothers ground wire bonding bolt is a simple method of attaching a ground wire to a flat steel surface. A lip is forged into the washer-head bolt, acting as a clamp to hold the ground wire securely in place.



Stock No.	Bolt Dia.	Length	Max. Wire Dia.	Std. Pkg.	Weight 100 Pcs.
GWB51-1/2	1/2"	1-1/2"	7/16"	200	32 lbs.



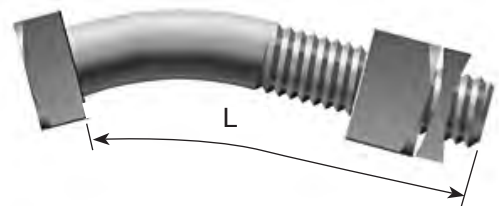
2722 Bent Bolt & Stud



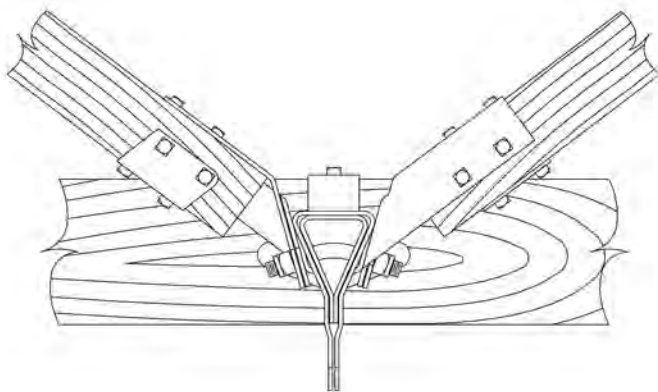
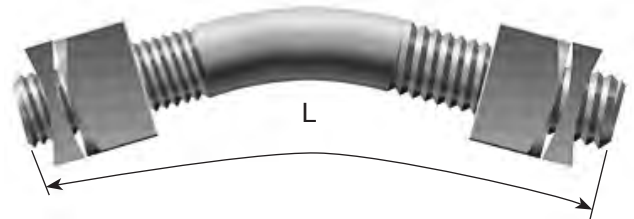
Hughes Brothers 2722 Bent Bolts and Bent Studs are used primarily for connecting transmission braces to spacer fittings in transmission double arm assemblies. They are manufactured from SAE C1018 cold drawn or ASTM A36 steel. All bent bolts and bent studs are galvanized in accordance with ASTM A153.

Each bent bolt is furnished with a nut and locknut. Each bent stud is furnished with two nuts and two locknuts.

2722 Bent Bolt



2722 Bent Stud



Stock No.	Item Description	Length L	Bend Radius	Full Body Length	Weight 100 Pcs.
Bent Bolts					
2722.1A-B	3/4" Bent Bolt	6"	3-3/8"	3-3/4"	109 lbs.
2722.1B-B	7/8" Bent Bolt	6"	3-3/8"	3-3/4"	158 lbs.
2722.2A*	7/8" Bent Bolt	6-1/2"	3-3/8"	4-1/4"	182 lbs.
Bent Studs					
2722.1C-B	3/4" Bent Stud	8"	3-3/8"	2-1/2"	133 lbs.
2722.1D-B	7/8" Bent Stud	8"	3-3/8"	2-1/2"	182 lbs.
2722.2B*	7/8" Bent Stud	10"	3-3/8"	4-1/2"	230 lbs.

Tensile Strengths and Shear Strengths of Hughes Brothers 2722 Bent Bolts and Bent Studs conform to ANSI C135.80.

*RUS accepted item - features recessed nut.

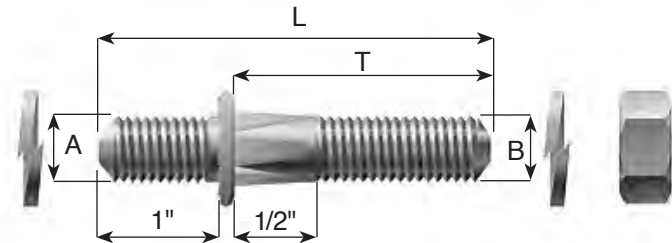
Insulator Mounting Studs

Hughes Brothers Insulator Mounting Studs are threaded to diameters specified in ANSI CZ9.7 and are galvanized in accordance with ASTM A153.

Insulator mounting studs are furnished assembled with hardware as shown. Tensile strengths of Hughes Brothers insulator mounting studs are the same as the tensile strengths of Hughes Brothers machine bolts. (See page E-3.)

The serrated collar and lock washer ensure a tight hardware connection. Longer studs, for wood crossarms feature a wrench shoulder below the serrated collar.

For Use on Steel

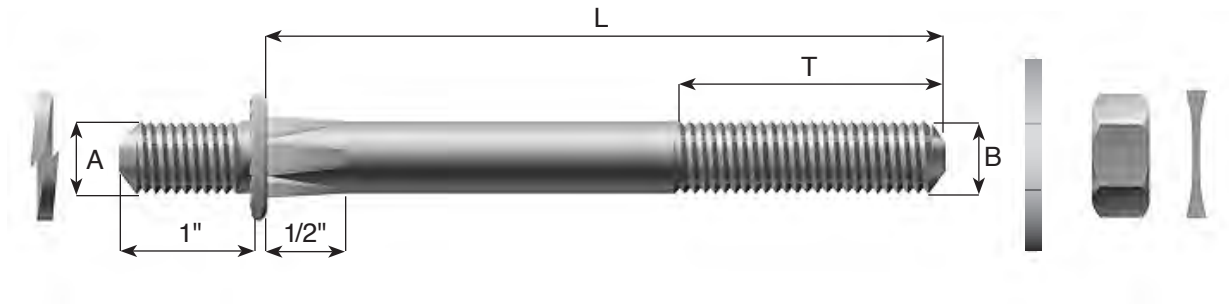


Stock No.	"L"	"T"	"A"	"B"	Weight 100 Pcs.
2750.1A	2-7/8"	1-3/4"	3/4"	5/8"	43 lbs.
2750.2A	2-1/4"	1-1/8"	3/4"	5/8"	37 lbs.
2750.4A	3-5/8"	2-1/2"	3/4"	5/8"	51 lbs.
2751.1A	3"	1-7/8"	3/4"	3/4"	63 lbs.
2751.3A	3-7/8"	2-3/4"	3/4"	3/4"	73 lbs.
2751.4A	3-1/2"	2-3/8"	3/4"	3/4"	68 lbs.
2755.1A	3-3/16"	2"	7/8"	7/8"	63 lbs.
2755.3A	4-3/16"	3"	7/8"	7/8"	73 lbs.
2755.4A	5-3/16"	4"	7/8"	7/8"	68 lbs.

Standard Package: 100

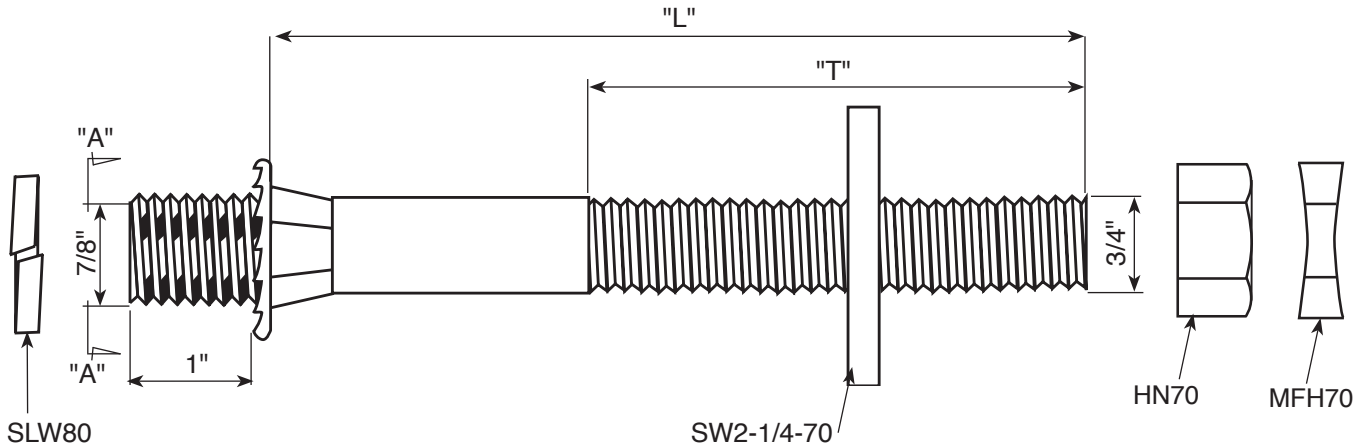
Insulator Mounting Studs

For Use on Wood



Stock No.	"L"	"T"	"A"	"B"	Weight 100 Pcs.
2752 Mounting Studs					
2752.1A	7"	4"	3/4"	5/8"	118 lbs.
2752.2A	7-1/2"	4"	3/4"	5/8"	121 lbs.
2752.3A	8"	4"	3/4"	5/8"	125 lbs.
2752.4A	9"	6"	3/4"	5/8"	132 lbs.
2752.5A	10"	6"	3/4"	5/8"	139 lbs.
2752.6A	11"	6"	3/4"	5/8"	146 lbs.
2752.7A	14"	6"	3/4"	5/8"	167 lbs.
2752.8A	16"	6"	3/4"	5/8"	181 lbs.
2752.9A	12"	6"	3/4"	5/8"	153 lbs.
Standard Package: 40					
2753 Mounting Studs					
2753.1A	7"	4"	3/4"	3/4"	140 lbs.
2753.2A	8"	4"	3/4"	3/4"	152 lbs.
2753.3A	9"	6"	3/4"	3/4"	163 lbs.
2753.4A	10"	6"	3/4"	3/4"	172 lbs.
2753.5A	11"	6"	3/4"	3/4"	183 lbs.
2753.6A	12"	6"	3/4"	3/4"	194 lbs.
2753.7A	14"	6"	3/4"	3/4"	214 lbs.
2753.8A	16"	6"	3/4"	3/4"	234 lbs.
Standard Package: 30					
2754 Mounting Studs					
2754.1A	6-1/2"	4"	7/8"	7/8"	168 lbs.
2754.2A	7"	4"	7/8"	7/8"	175 lbs.
Standard Package: 30					

2757 Line Post Insulator Pin



View @ "A-A"



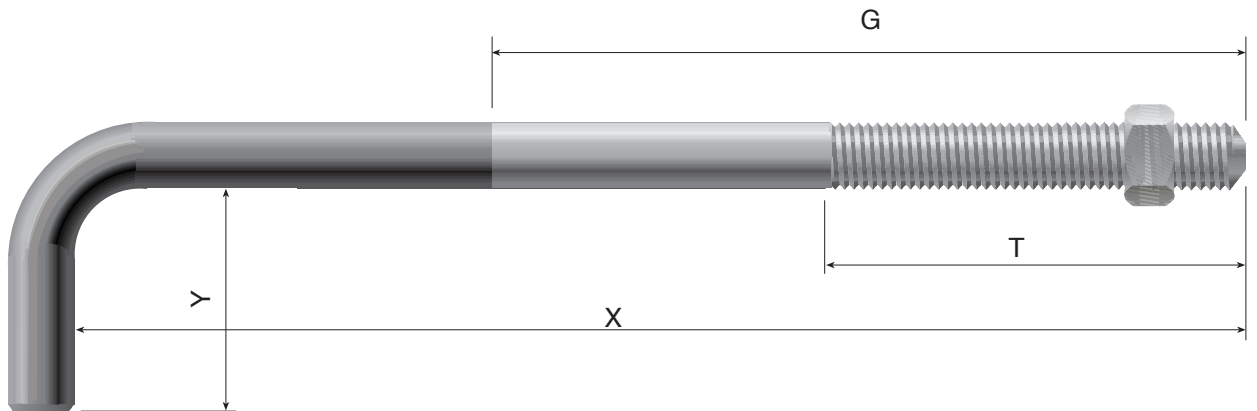
Note: Assemble SLW80 Washer under HN70 for shipment.

Assy. No.	Stud No.	"L"	"T"
2757.1A	2757.1	32"	8"
2757.2A	2757.2	3-3/16"	2"
2757.3A	2757.3	7"	3"
2757.4A	2757.4	10"	4"
2757.5A	2757.5	12"	6"
2757.6A	2757.6	20"	6"
2757.7A	2757.7	22"	6"
2757.8A	2757.8	24"	6"
2757.9A	2757.9	28"	8"
2757.10A	2757.10	30"	8"
2757.11A	2757.11	34"	8"
2757.12A	2757.12	36"	8"
2757.13A	2757.13	2"	1-1/2"
2757.14A	2757.14	14"	6"
2757.15A	2757.15	18"	6"
2757.16A	2757.16	16"	6"



Anchor Bolts

Hughes Brothers Anchor Bolts are manufactured from SAE C1018 cold drawn or ASTM A36 steel. The threads meet ANSI / ASME B1.1 specifications. The minimum bend radius is equal to the diameter of the anchor bolt. Each anchor bolt is supplied with one standard hex nut, unless otherwise specified.



Ordering Information*

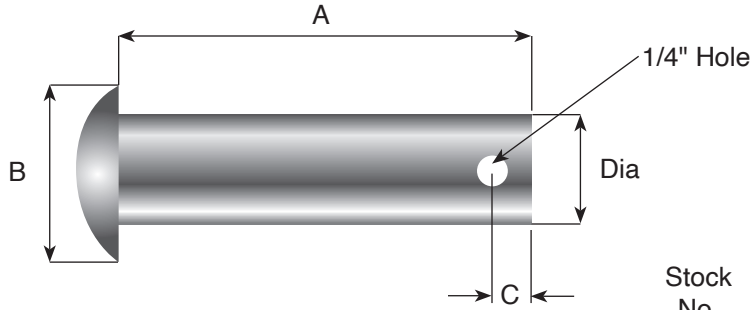
A N B 1 0 3 6 - 8 B 6 G 2 0

- _____ Galvanizing length (G) from threaded end, in inches, or "F" for fully galvanized
- _____ Bend length (Y) in inches
- _____ Thread length (T) in inches
- _____ Rod length (X) in inches
- _____ Rod diameter (see table)
- _____ Designates anchor bolt

*Please limit to whole length numbers.

Rod Diameter Table

Rod Diameter	Decimal Equivalent
5/8"	6
3/4"	7
7/8"	8
1"	10
1-1/8"	11
1-1/4"	12
1-3/8"	13



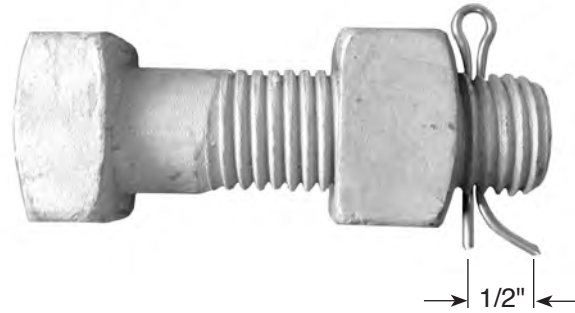
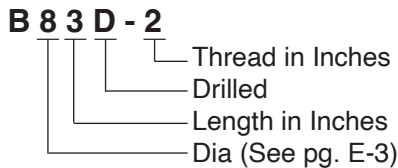
2743 Clevis Pins

(Round flat head may be substituted depending on availability)

Stock No.	Dia.	A	B	C	Weight 100 Pcs.
2743.62-1/4	5/8"	2-1/4"	1-1/16"	1/4"	19 lbs.
2743.64-1/2	5/8"	4-1/2"	1-1/16"	1/4"	46 lbs.
2743.65	5/8"	5"	1-1/16"	1/4"	48 lbs.
2743.72	3/4"	2"	1-1/16"	1/4"	36 lbs.
2743.72-1/4	3/4"	2-1/4"	1-1/16"	1/4"	37 lbs.
2743.72-1/2	3/4"	2-1/2"	1-1/16"	1/4"	38 lbs.
2743.72-3/4	3/4"	2-3/4"	1-1/16"	1/4"	39 lbs.
2743.82-3/4	7/8"	2-3/4"	1-3/16"	3/8"	51 lbs.
2743.83	7/8"	3"	1-3/16"	3/8"	55 lbs.
2743.84	7/8"	4"	1-3/16"	3/8"	73 lbs.

Drilled Bolts

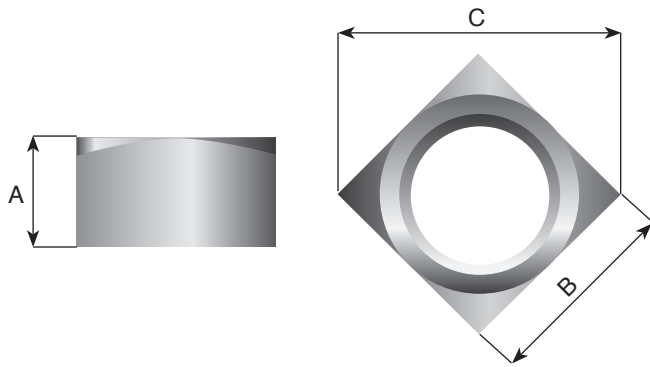
To order any bolt drilled and with a AS2531.1D cotter pin, add suffix "D" after the bolt length as follows:



AS2531 Cotter Keys

Hughes Brothers AS2531 Cotter Keys are made of stainless steel.

Stock No.	Item Description
AS2531.1A	3/16" x 1" (straight)
AS2531.1H	3/16" x 1-1/2" (straight)
AS2531.1E	1/8" x 1-1/2" (straight)
AS2531.1D	5/32" x 1-1/4" (humpback)



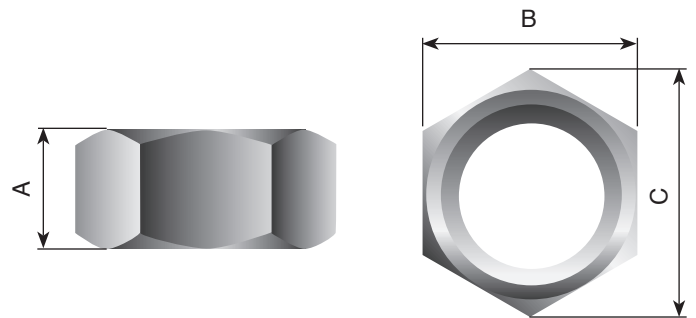
Square Nuts

Hughes Brothers Square nuts are compatible with all ANSI C135.80 hardware. Nuts are tapped oversize in accordance with ASTM A563 for proper fit on galvanized bolts.

Stock No.	Item Description	A	B	C	Weight 100 Pcs.
N30	3/8"	21/64"	5/8"	7/8"	2.3 lbs.
N50	1/2"	7/16"	13/16"	1-1/8"	5 lbs.
N60	5/8"	35/64"	1"	1-3/8"	9 lbs.
N70	3/4"	21/32"	1-1/8"	1-1/2"	15 lbs.
N80	7/8"	49/64"	1-5/16"	1-3/4"	24 lbs.
N100	1"	7/8"	1-1/2"	2"	37 lbs.

Hex Nuts

Hughes Brothers Hex Nuts are compatible with all ANSI C135.80 hardware. Hex nuts are tapped oversize in accordance with ASTM A563.



Stock No.	Item Description	A	B	C	Weight 100 Pcs.
HN30	3/8"	21/64"	9/16"	5/8"	2 lbs.
HN50	1/2"	7/16"	3/4"	7/8"	4 lbs.
HN60	5/8"	35/64"	15/16"	1-1/16"	9 lbs.
HN70	3/4"	41/64"	1-1/8"	1-1/4"	10 lbs.
HN80	7/8"	3/4"	1-5/16"	1-1/2"	20 lbs.
HN100	1"	55/64"	1-1/2"	1-11/16"	27 lbs.
HN120	1-1/4"	1-3/32"	1-7/8"	2-1/8"	55 lbs.

2745 Welded Washer Nut



Hughes Brothers 2745 Welded Washer Nut has a 3/16" x 3" round washer which is welded to a standard square nut.

Stock No.	Bolt Dia.	Std. Pkg.	Weight 100 Pcs.
2745.5*	1/2"	100	26 lbs.
2745.6	5/8"	100	46 lbs.
2745.7	3/4"	100	49 lbs.
2745.8	7/8"	100	60 lbs.

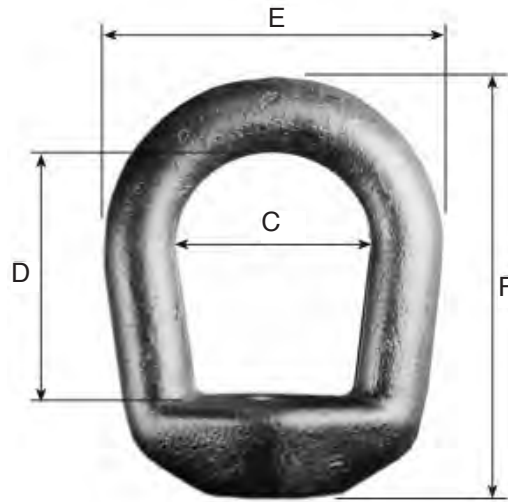
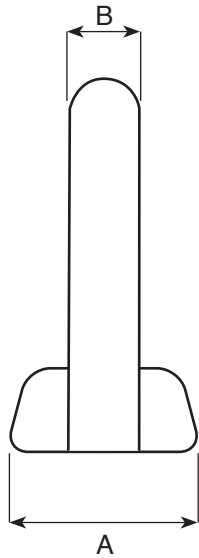
*2" Washer

2746 Cast Washer Nut

Hughes Brothers 2746 Cast Washer Nuts are cast from ASTM A536, grade 65-45-12 ductile iron.

Stock No.	Bolt Dia.	Washer Dia.	Std. Pkg.	Weight 100 Pcs.
2746.7	3/4"	3"	100	65 lbs.
2746.8	7/8"	3-3/4"	50	106 lbs.
2746.10	1"	3-3/4"	50	106 lbs.





EN80 & EN100 forged

Oval Eye Nuts

Hughes Brothers Oval Eye Nuts have strength and dimensions are per ANSI C135.5.



EN50, EN60 & EN70 cast

Part Number	Bolt Dia.	A	B	C	D	E	F	Ultimate Tensile Strength	Wt / lbs	Std Pkg Quantity
EN50	1/2	1-1/4	1/2	1-1/8	1-1/8	2-1/8	2-5/8	7,800	.5	100
EN60	5/8	1-3/8	9/16	1-1/2	1-3/4	2-5/8	3	13,550	.6	100
EN70	3/4	1-3/8	9/16	1-1/2	1-3/4	2-5/8	3	20,050	.6	100
EN80	7/8	1-7/8	3/4	2	2-5/8	3-1/2	4-5/16	25,400	1.5	25
EN100	1	1-7/8	3/4	2	2-5/8	3-1/2	4-5/16	33,500	1.5	25

Locknuts



Stock No.	Description	Std. Pkg.	Weight 100 Pcs.
MF50	1/2" Square Locknut	1,000	2.3 lbs.
MF60	5/8" Square Locknut	1,000	3.9 lbs.
MF70	3/4" Square Locknut	700	5.4 lbs.
MF80	7/8" Square Locknut	500	7.2 lbs.
MF100	1" Square Locknut	400	11.7 lbs.

Hex Locknuts

Stock No.	Description	Std. Pkg.	Weight 100 Pcs.
MFH50	1/2" Hex Locknut	1,000	2.1 lbs.
MFH60	5/8" Hex Locknut	1,000	2.6 lbs.
MFH70	3/4" Hex Locknut	500	4.6 lbs.
MFH120	1-1/4" Hex Locknut	300	11.7 lbs.



Split Lock Washers



Stock No.	Bolt Dia.	Std. Pkg.	Weight 100 Pcs.
SLW30	3/8"	1,000	.6 lbs.
SLW50	1/2"	1,000	2.0 lbs.
SLW60	5/8"	1,000	2.5 lbs.
SLW70	3/4"	1,000	4.2 lbs.
SLW80	7/8"	500	6.3 lbs.
SLW100	1"	500	8.9 lbs.
SLW120	1-1/4"	250	16.3 lbs.

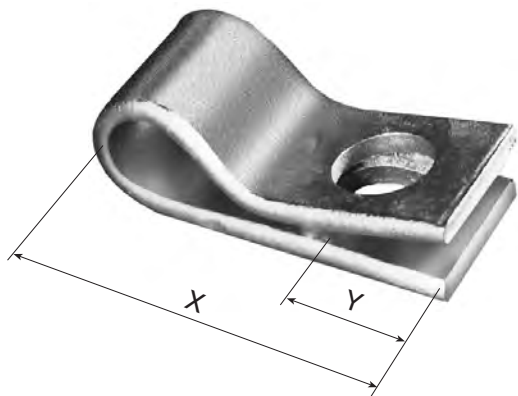
	Stock No.	Bolt Dia.	Std. Pkg.	Weight 100 Pcs.
Standard	SLW2-30	3/8"	1,000	2.6 lbs.
	SLW2-50	1/2"	1,000	2.7 lbs.
	SLW2-60	5/8"	500	4.5 lbs.
	SLW2-70	3/4"	500	7.7 lbs.
	SLW2-80	7/8"	500	10.5 lbs.
	SLW2-100	1"	250	23.2 lbs.
Extra Heavy	SLW2-60EM	5/8"		5.3 lbs.
	SLW2-70EM	3/4"		8.7 lbs.
	SLW2-80EM	7/8"		12.5 lbs.
	SLW2-100EM	1"		16.2 lbs.

Double Coil Spring Lock Washers



2702 Spring Washer

Hughes Brothers 2702 Spring Washers are used in bolted wood to steel connections to keep the connections tight and static proof.



Stock No.	Bolt Size	X	Y	Hole Size	Std. Pkg.	Weight 100 Pcs.
2702.5	1/2"	2-1/2"	5/8"	9/16"	100	23 lbs.
2702.6	5/8"	3-1/2"	1"	11/16"	50	92 lbs.
2702.7	3/4"	3-1/2"	1"	13/16"	50	88 lbs.
2702.8	7/8"	3-1/2"	1"	15/16"	50	87 lbs.
2702.10	1"	3-1/2"	1"	1-1/16"	50	85 lbs.

PAL Locknuts

PAL Locknuts are mechanically zinc plated and do not meet ASTM A153 specifications.



Stock No.	Bolt Dia.	Weight 100 Pcs.
PL30	3/8"	.1 lbs.
PL50	1/2"	.7 lbs.
PL60	5/8"	1.0 lbs.
PL70	3/4"	1.6 lbs.
PL100	1"	2.6 lbs.

Square Washers

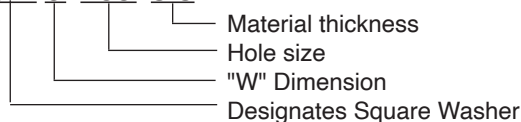
Hughes Brothers Square Washers are galvanized in accordance with ASTM A153 standards.

Stock No.	Bolt Size	Hole Size	"W"/ Thickness	Std. Pkg.	Weight 100 Pcs.
SW2-50	1/2"	9/16"	2" x 2" x 1/4"	200	25 lbs.
SW2-50-1/8	1/2"	9/16"	2" x 2" x 1/8"	200	12 lbs.
SW2-1/4-50	1/2"	9/16"	2-1/4" x 2-1/4" x 1/4"	200	34 lbs.
SW3-50	1/2"	9/16"	3" x 3" x 1/4"	100	62 lbs.
SW2-60	5/8"	11/16"	2" x 2" x 1/4"	200	25 lbs.
SW2-1/4-60	5/8"	11/16"	2-1/4" x 2-1/4" x 1/4"	200	34 lbs.
SW2-1/2-60	5/8"	11/16"	2-1/2" x 2-1/2" x 1/4"	200	42 lbs.
SW3-60	5/8"	11/16"	3" x 3" x 1/4"	100	63 lbs.
SW4-60	5/8"	11/16"	4" x 4" x 1/4"	50	113 lbs.
SW2-70	3/4"	13/16"	2" x 2" x 1/4"	200	25 lbs.
SW2-70-1/8	3/4"	13/16"	2" x 2" x 1/8"	200	12 lbs.
SW2-1/4-70	3/4"	13/16"	2-1/4" x 2-1/4" x 1/4"	200	34 lbs.
SW3-70	3/4"	13/16"	3" x 3" x 1/4"	100	63 lbs.
SW3-70-3/8	3/4"	13/16"	3" x 3" x 3/8"	100	95 lbs.
SW4-70	3/4"	13/16"	4" x 4" x 1/4"	50	113 lbs.
SW4-70-3/8	3/4"	13/16"	4" x 4" x 3/8"	50	170 lbs.
SW2-1/2-80	7/8"	15/16"	2-1/2" x 2-1/2" x 1/4"	200	63 lbs.
SW3-80	7/8"	15/16"	3" x 3" x 1/4"	100	63 lbs.
SW3-80-3/8	7/8"	15/16"	3" x 3" x 3/8"	100	95 lbs.
SW3-1/2-80-3/8	7/8"	15/16"	3-1/2" x 3-1/2" x 3/8"	100	130 lbs.
SW4-80	7/8"	15/16"	4" x 4" x 1/4"	50	113 lbs.
SW4-80-3/8	7/8"	15/16"	4" x 4" x 3/8"	50	170 lbs.
SW3-100	1"	1-1/16"	3" x 3" x 1/4"	100	63 lbs.
SW3-1/2-100	1"	1-1/16"	3-1/2" x 3-1/2" x 1/4"	100	87 lbs.
SW3-1/2-100-3/8	1"	1-1/16"	3-1/2" x 3-1/2" x 3/8"	100	130 lbs.
SW4-100	1"	1-1/16"	4" x 4" x 1/4"	50	113 lbs.
SW4-100-3/8	1"	1-1/16"	4" x 4" x 3/8"	50	170 lbs.
SW6-100-3/8	1"	1-1/16"	6" x 6" x 3/8"	25	334 lbs.
SW6-100-1/2	1"	1-1/16"	6" x 6" x 1/2"	25	445 lbs.



Ordering Example:

SW 6-100-3/8





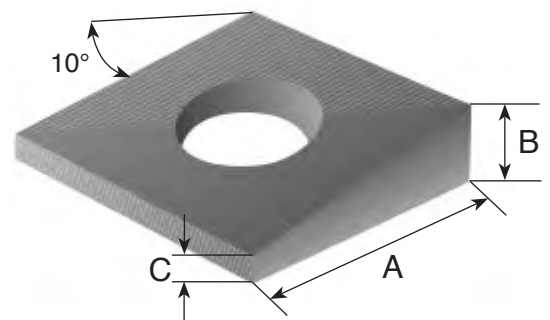
Round Washers

Hughes Brothers Round Washers are galvanized in accordance with ASTM A153 standards.

Stock No.	Bolt Size	Hole Size	Outside Dia.	Thickness	Std. Pkg.	Weight 100 Pcs.
RW1-30	3/8"	7/16"	1"	14 ga.	1,000	2 lbs.
RW2-30	3/8"	7/16"	2"	11 ga.	200	21 lbs.
RW1-3/8-50	1/2"	9/16"	1-3/8"	10 ga.	500	3 lbs.
RW1-1/2-50	1/2"	9/16"	1-1/2"	11 ga.	500	10 lbs.
RW2-50	1/2"	9/16"	2"	1/4"	200	21 lbs.
RW1-1/2-60	5/8"	11/16"	1-1/2"	11 ga.	500	10 lbs.
RW2-60	5/8"	11/16"	2"	1/4"	200	21 lbs.
RW3-60	5/8"	11/16"	3"	1/4"	100	50 lbs.
RW2-70	3/4"	13/16"	2"	1/4"	200	21 lbs.
RW3-70	3/4"	13/16"	3"	1/4"	100	50 lbs.
RW2-80	7/8"	15/16"	2"	1/4"	200	21 lbs.
RW3-80	7/8"	15/16"	3"	1/4"	100	45 lbs.
RW3-100	1"	1-1/16"	3"	1/4"	100	42 lbs.

Beveled Washers

Stock No.	Bolt Dia.	Weight 100 Pcs.	A	B	C
BW-1/2	1/2"	9 lbs.	1-1/4"	1-1/32"	5/32"
BW-5/8	5/8"	13 lbs.	1-1/2"	13/32"	5/32"
BW-3/4	3/4"	15 lbs.	1-1/2"	15/32"	7/32"
BW-7/8	7/8"	34 lbs.	2"	9/16"	7/32"



Square Curved Washers



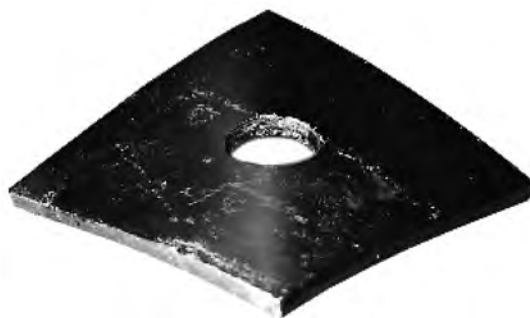
Hughes Brothers Square Curved Washers are curved edge-to-edge. Square curved washers are galvanized in accordance with ASTM A153.

Stock No.	Bolt Size	Hole Size	Outside Dimensions/ Thickness	Std. Pkg.	Weight 100 Pcs.
SCW3-50	1/2"		3" x 3" x 1/4"	100	63 lbs.
SCW3-60	5/8"	11/16"	3" x 3" x 1/4"	100	63 lbs.
SCW3-70	3/4"	13/16"	3" x 3" x 1/4"	100	63 lbs.
SCW4-60	5/8"	11/16"	4" x 4" x 1/4"	50	113 lbs.
SCW4-70	3/4"	13/16"	4" x 4" x 1/4"	50	113 lbs.
SCW4-80	7/8"	15/16"	4" x 4" x 1/4"	50	113 lbs.
SCW4-100	1"	1-1/8"	4" x 4" x 1/4"	50	113 lbs.
SCW4-120	1-1/4"	1-3/8"	4" x 4" x 1/4"	50	113 lbs.

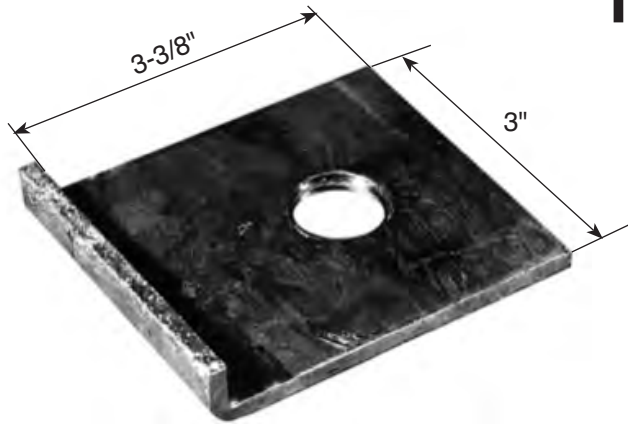
NOTE: Standard thickness is 1/4". Different thickness amounts are available.

Curved Washers

Hughes Brothers Curved Washers are curved corner-to-corner to make a diamond shaped washer. Curved washers are galvanized in accordance with ASTM A153.



Stock No.	Bolt Size	Hole Size	Outside Dimensions/ Thickness	Std. Pkg.	Weight 100 Pcs.
CW60	5/8"	11/16"	4" x 4" x 1/4"	50	113 lbs.
CW70	3/4"	13/16"	4" x 4" x 1/4"	50	113 lbs.
CW80	7/8"	15/16"	4" x 4" x 1/4"	50	113 lbs.
CW100	1"	1-1/16"	4" x 4" x 1/4"	50	113 lbs.
CW80-3/8	7/8"	15/16"	4" x 4" x 3/8"	40	162 lbs.
CW100-3/8	1"	1-1/16"	4" x 4" x 3/8"	40	162 lbs.
CW80-1/2	7/8"	15/16"	4" x 4" x 1/2"	30	216 lbs.
CW100-1/2	1"	1-1/16"	4" x 4" x 1/2"	30	216 lbs.



Tapped Flange Washers

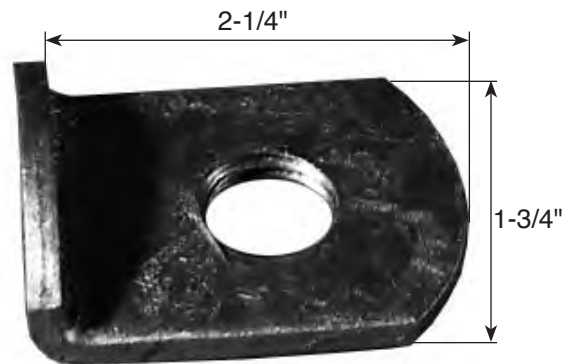
Hughes Brothers Tapped Flange Washers are used under insulator pins where crossarm braces are attached or wherever a static proof connection is required. The flange provides a means for tightening the washer using a crescent wrench.

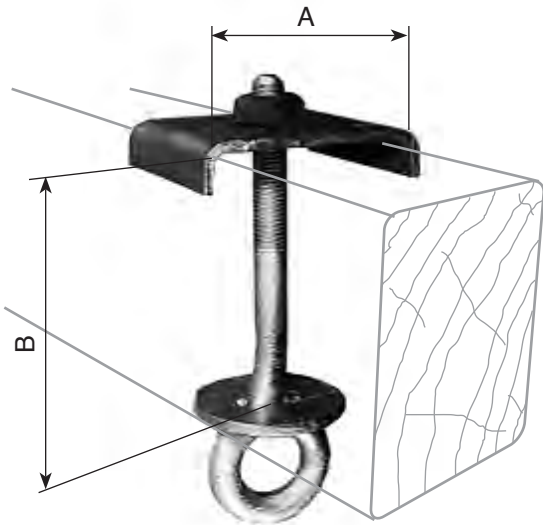
Stock No.	Bolt Size	Outside Dimensions/ Thickness	Std. Pkg.	Weight 100 Pcs.
FW50T	1/2"	3-1/2" x 3" x 3/16"	100	66 lbs.
FW60T	5/8"	3-1/2" x 3" x 3/16"	100	66 lbs.
FW70T	3/4"	3-1/2" x 3" x 3/16"	100	66 lbs.
FW80T	7/8"	3-1/2" x 3" x 3/16"	100	66 lbs.

Tapped Lip Washers

Hughes Brothers Tapped Lip Washers are used for crossarm anti-split bolts and where crossarm braces attach to the crossarm. The lip provides a means for tightening the washer with a crescent wrench. The tapped through hole and nut provide a secure double nut connection.

Stock No.	Bolt Size	Outside Dimensions/ Thickness	Std. Pkg.	Weight 100 Pcs.
LW50T	1/2"	2-1/4" x 1-3/4" x 3/16"	250	23 lbs.
LW60T	5/8"	2-1/4" x 1-3/4" x 3/16"	250	23 lbs.
LW70T	3/4"	2-1/4" x 1-3/4" x 3/16"	250	23 lbs.





2824 Eye Bolt & Saddle Assemblies

Hughes Brothers 2824 Eye Bolt & Saddle Assemblies are used for phase attachment of suspension insulators. The 3/16" x 4" saddle washer features a tapped through hole. By tapping the washer through hole, a double nut connection between the washer and eye bolt is made, ensuring tight, radio frequency static proof hardware.

Ordering Information:

Example for an Eye Bolt & Saddle Assembly:

2 8 2 4 .5 - "A"-"B"

Arm depth 4.5" to 9.5"

Arm width 3" to 6"

Rod size (.5) for 5/8" or (.6) for 3/4"

To Order just a Saddle Washer:

Stock No.	Tapped Hole	Through Hole
2824.1B-*	1/2"	-
2824.1C-*	5/8"	-
2824.1D-*	3/4"	-
2824.1E-*	-	13/16"
2824.1F-*	-	15/16"
2824.1G-*	7/8"	-

*Specify width of crossarm.

Example: **2824.1C-3-3/4** = 3-3/4" crossarm

Gimlet Point Lag Screws

For maximum holding strength, Hughes Brothers Gimlet Point Lag Screws should be installed with a wrench, rather than a hammer.

*Conform to ANSI C135.80

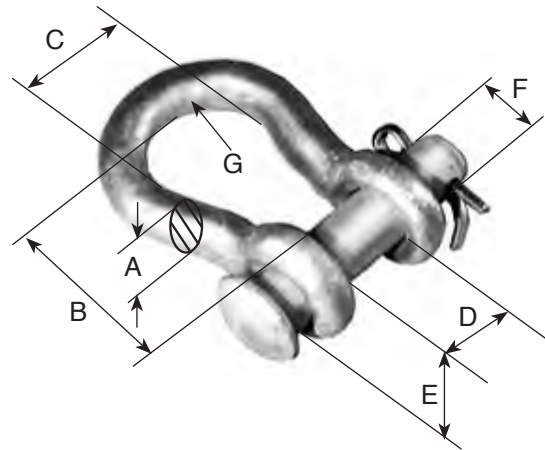
Item provided may be square or hex head.

Stock No.	Item Description	Std. Pkg.	Weight 100 Pcs.
LS21-1/4	1/4" x 1-1/4"	1,000	2 lbs.
LS22-1/2	1/4" x 2-1/2"	1,000	4 lbs.
LS5/16-2	5/16" x 2"	1,000	4 lbs.
LS32-1/2	3/8" x 2-1/2"	500	8 lbs.
LS33	3/8" x 3"	500	8 lbs.
LS34	3/8" x 4"	500	10 lbs.
LS36	3/8" x 6"	250	15 lbs.
LS52	1/2" x 2"	500	11 lbs.
LS53	1/2" x 3"	250	15 lbs.
LS53-1/2	1/2" x 3-1/2"	250	20 lbs.
LS54	1/2" x 4"	250	20 lbs.
LS55	1/2" x 5"	250	25 lbs.
LS56	1/2" x 6"	200	29 lbs.
LS57	1/2" x 7"	150	40 lbs.
LS64	5/8" x 4"	150	32 lbs.
LS64-1/2	5/8" x 4-1/2"	150	35 lbs.
LS65	5/8" x 5"	150	40 lbs.
LS74	3/4" x 4"	150	51 lbs.



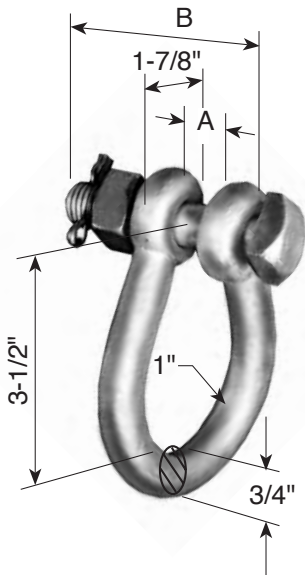
2865 Shackles

Hughes Brothers 2865 Shackles are forged from ASTM A36 steel.



Stock No.	A	B	C	D	E	F	G	Ultimate Strength	Std. Pkg.	Weight 100 Pcs.
2865.1	1/2"	2-5/16"	1-1/2"	13/16"	1-1/4"	5/8"	3/4"	18,000 lbs	50	72 lbs.
2865.2	5/8"	2-7/8"	1-3/4"	1-1/16"	1-5/8"	3/4"	7/8"	25,000 lbs	40	143 lbs.
2865.3	3/4"	3"	2"	1-1/4"	1-7/8"	7/8"	1"	45,000 lbs	20	215 lbs.
2865.4	7/8"	3-3/4"	2-5/8"	1-7/16"	2-1/8"	1"	1-1/8"	65,000 lbs	N/A	355 lbs.
2865.5	1"	3-3/4"	2-3/4"	1-11/16"	2-1/2"	1-1/8"	1-1/6"	80,000 lbs	N/A	530 lbs.
2865-B1*	1/2"	2-5/16"	1-1/2"	13/16"	1-1/4"	5/8"	3/4"	18,000 lbs	50	72 lbs.
2865-B2*	5/8"	2-7/8"	1-3/4"	1-1/16"	1-5/8"	3/4"	7/8"	25,000 lbs	40	143 lbs.
2865-B3*	3/4"	3"	2"	1-1/4"	1-7/8"	7/8"	1"	35,000 lbs	20	215 lbs.

*Includes bolt, nut and cotter instead of pin and cotter.

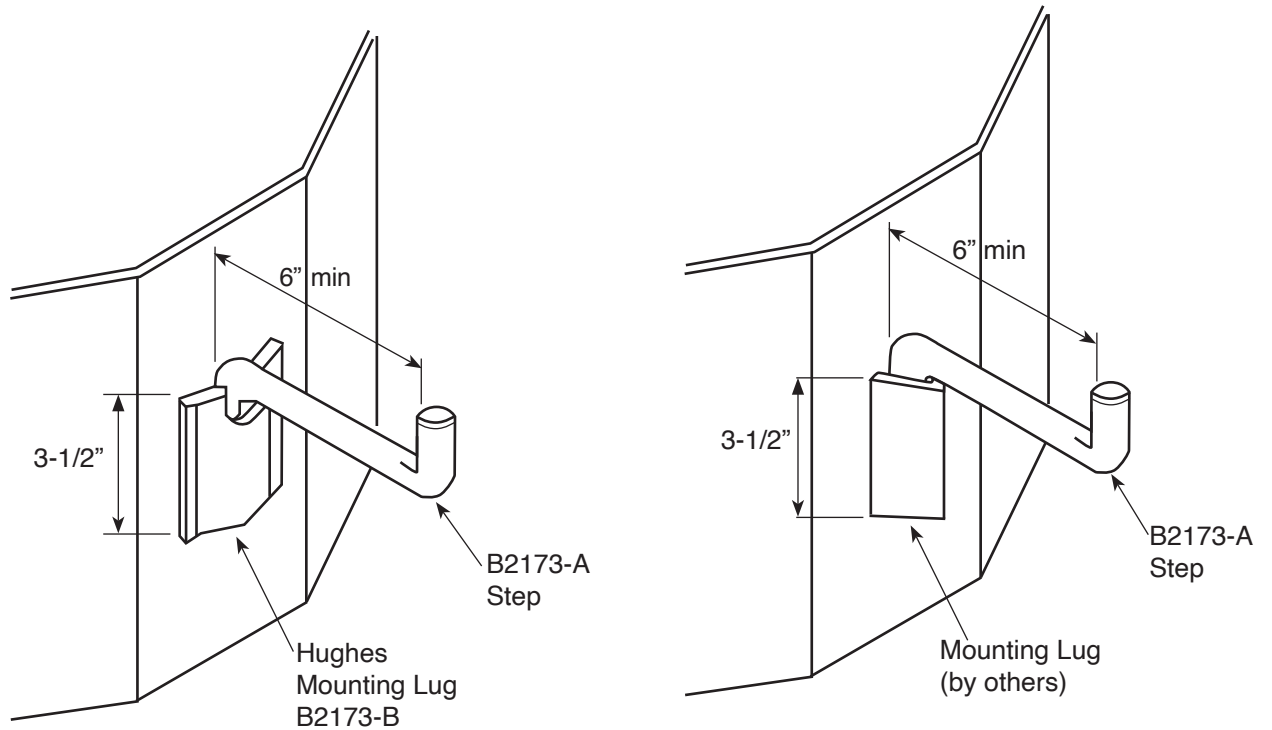


2866 Twisted Shackles

Hughes Brothers 2866 Twisted Shackles are forged from ASTM A36 steel. The shackle comes complete with a 3/4" bolt, nut and cotter.

Stock No.	A	B	Ultimate Strength	Std. Pkg.	Weight 100 Pcs.
2866	1/2"	3-1/2"	25,000 lbs.	25	220 lbs.
2866-A	1-1/8"	4"	25,000 lbs.	25	241 lbs.
2866-B	5/8"	3-1/2"	25,000 lbs.	25	220 lbs.

B2173-A Step



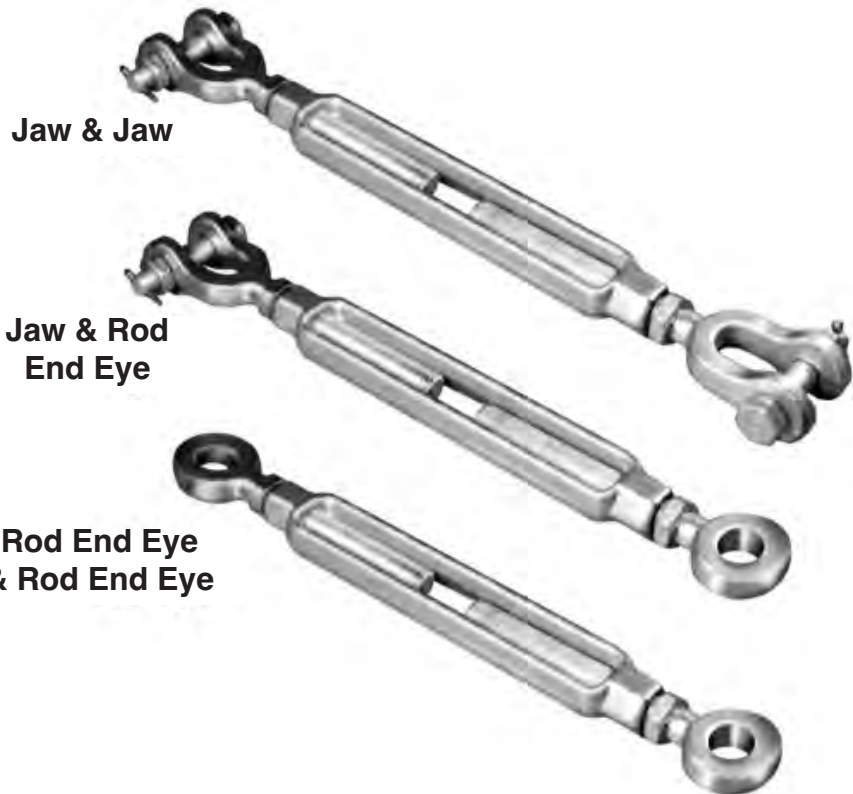
The B2173-A step is designed for easy installation on lattice towers and tubular steel poles.

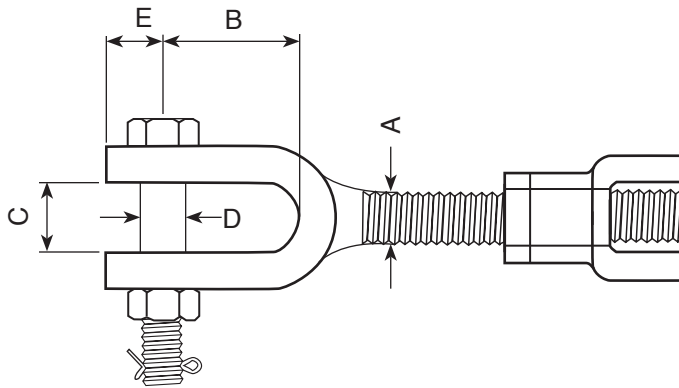
The step is designed to fit the two most widely used mounting lug configurations shown above.

Other configurations are available upon request.

AS2545 Turnbuckles

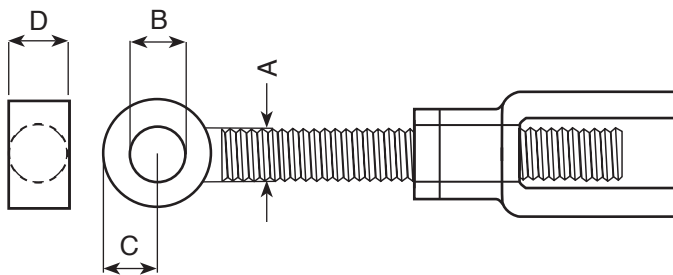
Hughes Brothers Turnbuckles are forged from carbon steel. They are normally furnished with a bolt, nut and cotter in the jaw of the turnbuckle. Rod end eyes have a hole size 1/16" larger than the rod size.





Jaw Dimensions

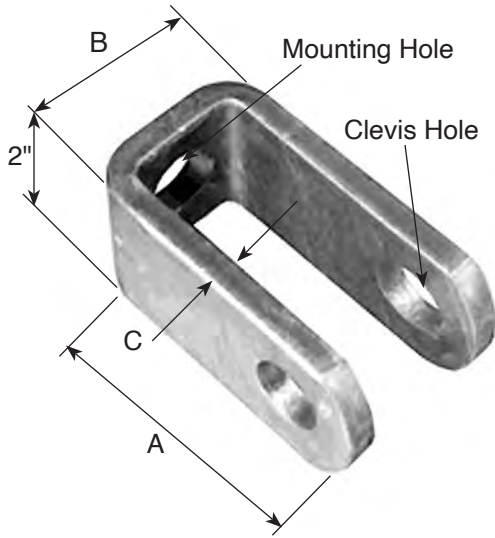
A	B	C	D	E
3/4"	1-27/32"	15/16"	5/8"	13/16"
7/8"	1-31/32"	1-5/32"	3/4"	29/32"
1"	2-13/32"	1-3/16"	7/8"	1-1/16"



Eye Dimensions

A	B	C	D
3/4"	13/16"	27/32"	3/4"
7/8"	15/16"	15/16"	1"
1"	1-1/16"	1-1/16"	31/32"

Stock No.	size	Description	CC Length @ Midposition	Ultimate Strength	Weight 100 Pcs.	Min Length	Max Length
AS2545-Z	3/4" x 6"	Jaw & Jaw	18"	28,000	450 lbs.	14-7/8"	21-1/2"
AS2545-BB		Jaw & Rod End	18"	28,000	450 lbs.	14"	21"
AS2545-A	3/4" x 9"	Jaw & Jaw	22"	28,000	525 lbs.	17-1/2"	26-1/2"
AS2545-B		Jaw & Rod End	22"	28,000	525 lbs.	17-1/2"	26-1/2"
AS2545-X		Rod End & Rod End	17-1/2"	28,000	525 lbs.	13"	22"
AS2545-FF	3/4" x 12"	Jaw & Jaw	27"	28,000	600 lbs.	21"	33"
AS2545-BBB		Jaw & Rod End	25"	28,000	600 lbs.	19"	31"
AS2545-T	7/8" x 6"	Jaw & Jaw	20-1/2"	35,000	600 lbs.	17-1/2"	23-1/2"
AS2545-TT		Jaw & Rod End	20-1/2"	35,000	600 lbs.	17-1/2"	23-1/2"
AS2545-C	7/8" x 12"	Jaw & Jaw	29"	35,000	850 lbs.	23"	35"
AS2545-D		Jaw & Rod End	27"	35,000	850 lbs.	21"	33"
AS2545-Y		Rod End & Rod End	27"	35,000	850 lbs.	21"	33"
AS2545-E	1" x 12"	Jaw & Jaw	30"	45,000	1200 lbs.	24"	36"
AS2545-F		Jaw & Rod End	30"	45,000	1200 lbs.	24"	36"



AS2277 Clevis

The Hughes Brothers AS2277 Clevis allows for a simple method for making a jaw or clevis connection at the pole. The clevis is used with standard machine bolts, sold separately.

Stock No.	A	B	C	Clevis Hole	Mtg. Hole	Ultimate Tensile*	Std. Pkg.	Weight 100 Pcs.
AS2277	4"	2-1/4"	3/8"	15/16"	15/16"	25,400 lbs.	30	172 lbs.
AS2277-A	4"	2-1/4"	3/8"	13/16"	13/16"	18,350 lbs.	30	177 lbs.
AS2277-B	4"	2-1/4"	3/8"	1-1/16"	13/16"	18,350 lbs.	30	170 lbs.
AS2277-C	4"	2-1/4"	3/8"	Specify	Specify	18,350 lbs.	30	170 lbs.
AS2277-F	4-3/4"	1-13/16"	1/4"	13/16"	11/16"	12,400 lbs.	30	140 lbs.
AS2277-G	4-3/4"	2"	1/4"	13/16"	13/16"	18,350 lbs.	30	144 lbs.
AS2277-H	6-3/4"	2"	1/4"	13/16"	13/16"	18,350 lbs.	30	196 lbs.
AS2277-J	4-1/2"	2-1/4"	3/8"	Specify	Specify	25,400 lbs.	30	198 lbs.

* Controlled by bolt strength.



FIBERGLASS

Guy Strain Insulators.....	F-2
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Two Phase	F-18
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Raptor Protection	F-48



Pultruded Fiberglass Reinforced Plastic Rod Data Sheet

Hughes Brothers Fiberglass Reinforced Polyester Rod is designed and manufactured for high performance in applications where resistance to stress, weathering and corrosive atmospheres are important. FRP Rod is produced by pultrusion process. The glass strands are held at a constant tension and are drawn through a resin bath where the strands are completely saturated with resin. The glass/resin rovings are then pulled through a sizing die to remove excess resin and through a radio frequency pre-heater. Polymerization takes place in a heated final sizing die and the rod exits this die in a thermoset shape.

FRP Rod is produced in a variety of cross section diameters. The standard color is a medium-dark gray. All rod is veiled to protect against UV degradation.

Properties

Tensile Strength	ASTM	D-638	100,000 PSI min.
Modulus of Elasticity, Tension	ASTM	D-638	6.0x10 ⁶ PSI min.
Flexural Strength	ASTM	D-790	100,000 PSI min.
Modulus of Elasticity, Flexural	ASTM	D-790	6.0x10 ⁶ PSI min.
Compressive Strength	ASTM	D-695	65,000 PSI min.
Modulus of Elasticity, Compressive	ASTM	D-695	6.0x10 ⁶ PSI min.
Barcol Hardness	55-65		
Dielectric Strength	60kV/in		
Approximate Flashover Value (Dry)	100 kv/ft		

Strain Insulators

Hughes Brothers Guy Strains are manufactured from Fiberglass Reinforced Plastic (FRP) with ductile iron fittings. The plastic material is a Polyester matrix containing ultraviolet protective inhibitors, and a resin-rich protective outer veil.

Each guy strain is factory tested to 100% of its rating. The month and year of manufacture are stamped on the lead filler plug at the end of each strain.

All Hughes Brothers Guy Strains are manufactured utilizing an epoxy wedge system. Adequate glue bond to the FRP Rod is ensured by roughening the FRP Rod Surface prior to glue up.

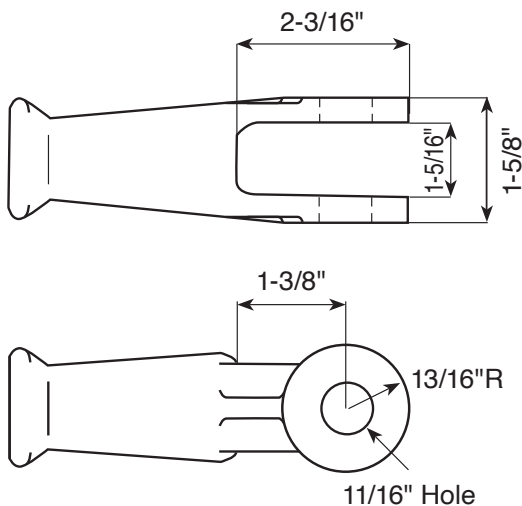
Ductile iron is 65-45-12 with hot dip galvanizing.

Lengths other than those shown are readily available.

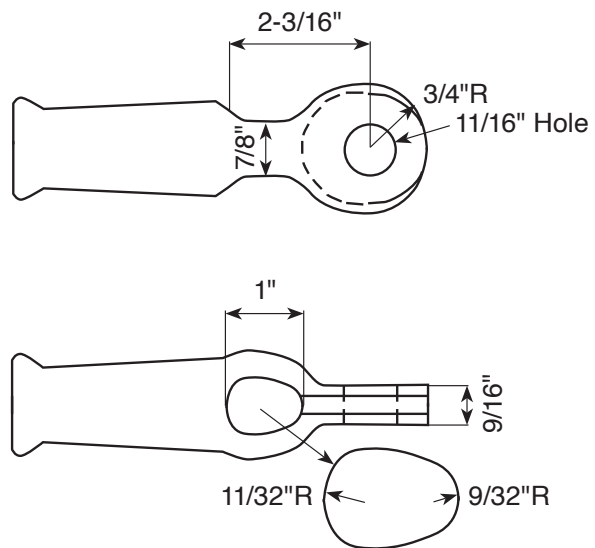


Guy Strain End Fitting Details

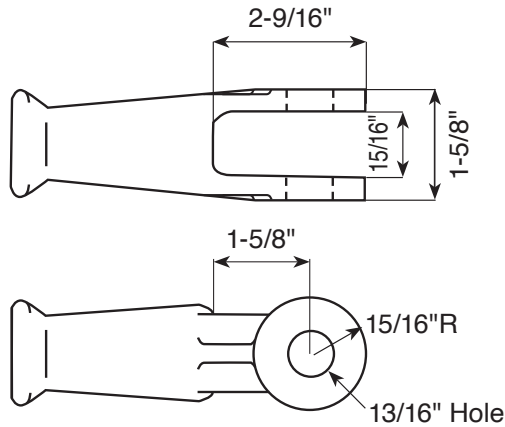
CF692 - CF693 15,000 lb Clevis
(5/8" dia. Pin)



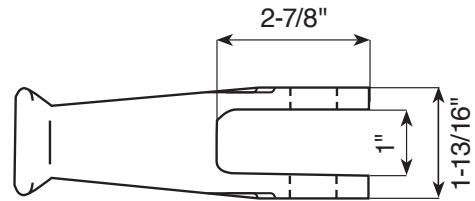
CF693 15,000 lb Thimble Eye
(5/8" dia. Pin)



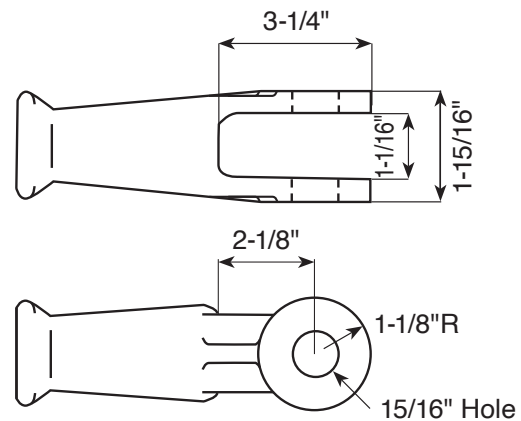
CF694 21,000 lb Clevis (3/4" dia. Pin)



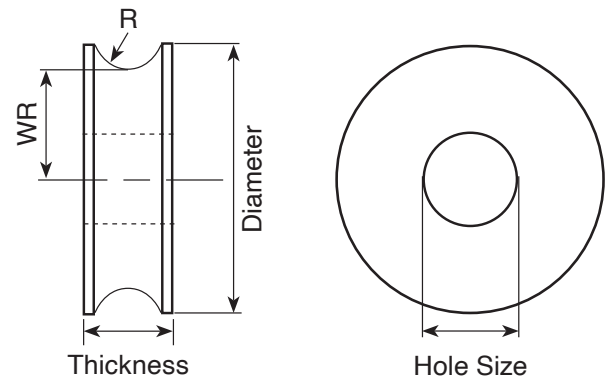
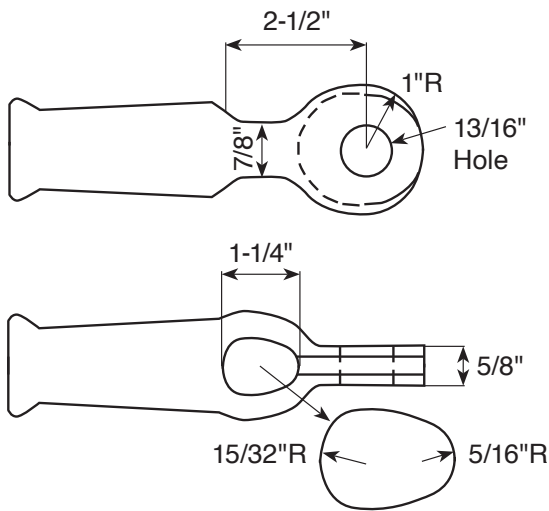
CF695 30,000 lb Clevis (3/4" dia. Pin)



CF696 35,000 lb Clevis (7/8" dia. Pin)



CF694 21,000 lb Thimble (3/4" dia. Pin)



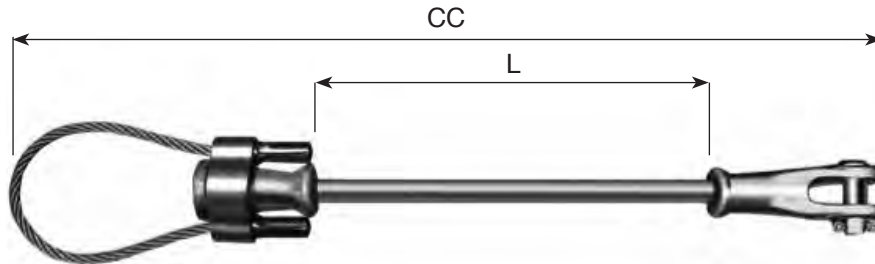
Guy Rollers

Stock No.	Wire Seat Radius WR	Hole Size Inches	Thickness/ Diameter Inches	R Inches	Where Used
28082	1-1/8	15/16	7/8 x 2-3/4	3/8	696
28084	15/16	13/16	13/16 x 2-3/8	5/16	694/695
28085	11/16	11/16	13/16 x 1-3/4	5/16	692/693
28086	1-1/8	15/16	13/16 x 2-1/2	3/8	696



CF690 - 15,000 lb Flexible Bail Guy Strain

with Clevis End Fitting



Stock No.	L Inches	CC Inches
CF690-24	24	38-11/16
CF690-36	36	50-11/16
CF690-54	54	68-11/16
CF690-72	72	86-11/16
CF690-120	120	134-11/16



Note: Add "R" suffix to part number to add a guy roller; i.e. CF690-24R.

CF690T-"L" - 15,000 lb Flexible Bail Guy Strain

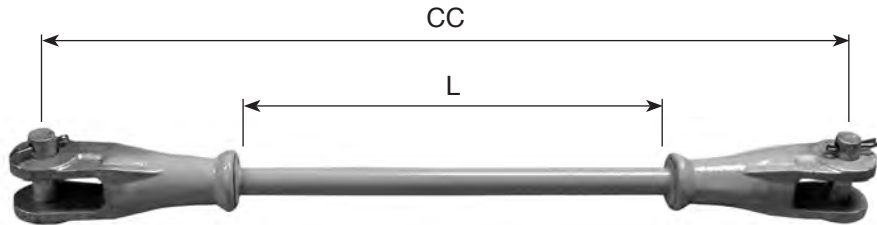
with Thimble-Eye End Fitting

Stock No.	L Inches	CC Inches
CF690T-24	24	39-9/16
CF690T-36	36	51-9/16
CF690T-54	54	69-9/16
CF690T-72	72	87-9/16
CF690T-120	120	135-9/16



CF692 - 15,000 lb Guy Strain Clevis

with Clevis End Fitting



Stock No.	L Inches	CC Inches	Wt. Lbs. Each
CF692-12	12	20-7/8	4.60
CF692-18	18	26-7/8	4.75
CF692-24	24	32-7/8	4.90
CF692-30	30	38-7/8	5.05
CF692-36	36	44-7/8	5.20
CF692-42	42	50-7/8	5.35
CF692-54	54	62-7/8	5.65
CF692-72	72	80-7/8	6.00
CF692-78	78	86-7/8	6.25
CF692-90	90	98-7/8	6.88
CF692-96	96	104-7/8	7.45
CF692-120	120	128-7/8	8.05
CF692-144	144	152-7/8	8.65

The **CF692** and **CF693** series uses 5/8" dia. fiberglass rod.

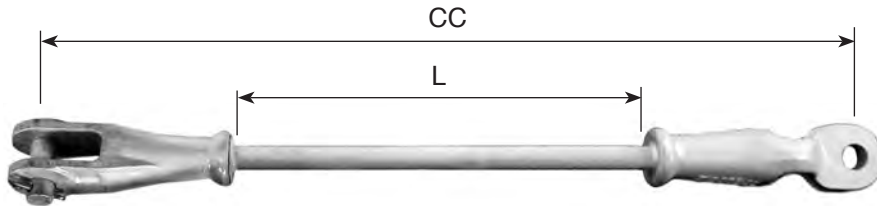
CF692 and **CF693CT** guy roller is #28085.

Note: For specific fitting dimensions, see "End Fitting Details" on pages F-2 & F-3.

For guy rollers, add suffix "R" for one roller on one end. Add "R2" suffix for one roller on both ends.

CF693 - 15,000 lb Strain Insulators

Clevis-Thimble Eye or Thimble Eye-Thimble Eye End Fittings



The **CF693** series uses 5/8" dia. fiberglass rod.

Note: For specific fitting dimensions, see "End Fitting Details" on pages F-2 & F-3.

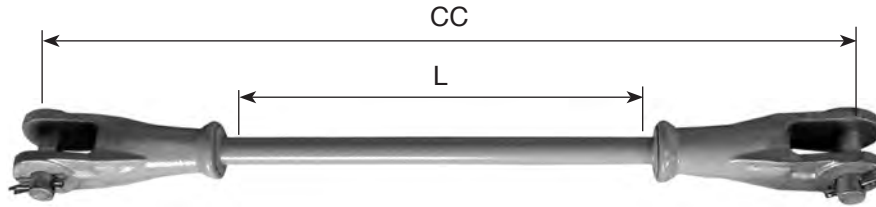
CF693 TT Thimble-Thimble Eye

Stock No.	L Inches	CC Inches	Wt. Lbs. Each
CF693TT-12	12	22-3/8	4.10
CF693TT-18	18	28-3/8	4.40
CF693TT-24	24	34-3/8	4.70
CF693TT-30	30	40-3/8	5.00
CF693TT-36	36	46-3/8	5.30
CF693TT-42	42	52-3/8	5.60
CF693TT-54	54	58-3/8	5.90
CF693TT-78	78	88-3/8	7.10

CF693 CT Clevis-Thimble Eye

Stock No.	L Inches	CC Inches	Wt. Lbs. Each
CF693CT-12	12	22-3/8	4.10
CF693CT-18	18	28-3/8	4.40
CF693CT-24	24	34-3/8	4.70
CF693CT-30	30	40-3/8	5.00
CF693CT-36	36	46-3/8	5.30
CF693CT-42	42	52-3/8	5.60
CF693CT-54	54	63-3/8	5.90
CF693CT-78	78	88-3/8	7.10

CF694 - 21,000 lb Guy Strain



The **CF694** series uses 3/4" dia. fiberglass rod.

Stock No.	L Inches	CC Inches	Wt. Lbs. Each
CF694-12	12	21-3/4	5.60
CF694-18	18	27-3/4	5.78
CF694-24	24	33-3/4	5.96
CF694-30	30	39-3/4	6.14
CF694-36	36	45-3/4	6.32
CF694-42	42	51-3/4	6.50
CF694-54	54	63-3/4	6.86
CF694-78	78	87-3/4	7.58
CF694-96	96	105-3/4	8.30
CF694-120	120	129-3/4	9.02
CF694-144	144	153-3/4	9.74

Note: For specific fitting dimensions, see "End Fitting Details" on pages F-2 & F-3.

For guy rollers, add suffix "R" for one roller on one end. Add "R2" suffix for one roller on both ends.

CF694 TT Thimble-Thimble Eye

Stock No.	L Inches	CC Inches
CF694TT-12	12	23-3/4
CF694TT-18	18	29-3/4
CF694TT-24	24	35-3/4
CF694TT-30	30	41-3/4
CF694TT-36	36	47-3/4
CF694TT-42	42	53-3/4
CF694TT-54	54	59-3/4
CF694TT-78	78	89-3/4

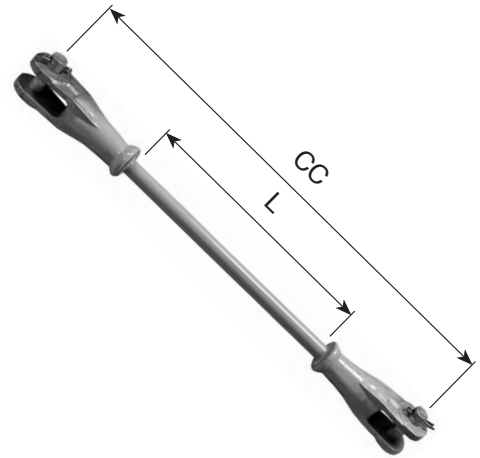
CF694 CT Clevis-Thimble Eye

Stock No.	L Inches	CC Inches
CF694CT-12	12	23-3/4
CF694CT-18	18	29-3/4
CF694CT-24	24	35-3/4
CF694CT-30	30	41-3/4
CF694CT-36	36	47-3/4
CF694CT-42	42	53-3/4
CF694CT-54	54	59-3/4
CF694CT-78	78	88-1/2

For one guy roller, add suffix "R".

CF695 - 30,000 lb Guy Strain

Stock No.	L Inches	CC Inches	Wt. Lbs. Each
CF695-12	12	23-3/8	7.20
CF695-18	18	29-3/8	7.50
CF695-24	24	35-3/8	7.80
CF695-30	30	41-3/8	8.10
CF695-36	36	47-3/8	8.40
CF695-42	42	53-3/8	8.70
CF695-54	54	65-1/8	9.00
CF695-78	78	89-3/8	9.60
CF695-96	96	107-3/8	10.20
CF695-108	108	119-3/8	10.80
CF695-120	120	131-3/8	12.00
CF695-144	144	155-3/8	12.00
CF695-168	168	179-3/8	12.60



The **CF695** and **CF696** series use 13/16" dia. fiberglass rod.

CF695 & CF696 End Fitting Options

Suffix	Figs.	Fittings	Example	Example
R	1 & 2	Clevis / Clevis with 1 Roller	CF695-36 R	CF696-36 R
R2	2 & 2	Clevis / Clevis with 2 Rollers	CF695-36 R2	CF696-36 R2

CF696 - 35,000 lb Guy Strain

Stock No.	L Inches	CC Inches	Wt. Lbs. Each
CF696-18	18	29-7/8	8.93
CF696-24	24	35-7/8	9.33
CF696-30	30	41-7/8	9.73
CF696-36	36	47-7/8	10.13
CF696-42	42	53-7/8	10.53
CF696-54	54	65-7/8	10.93
CF696-60	60	71-7/8	11.73
CF696-78	78	89-7/8	12.93
CF696-90	90	101-7/8	14.53
CF696-96	96	107-7/8	16.13

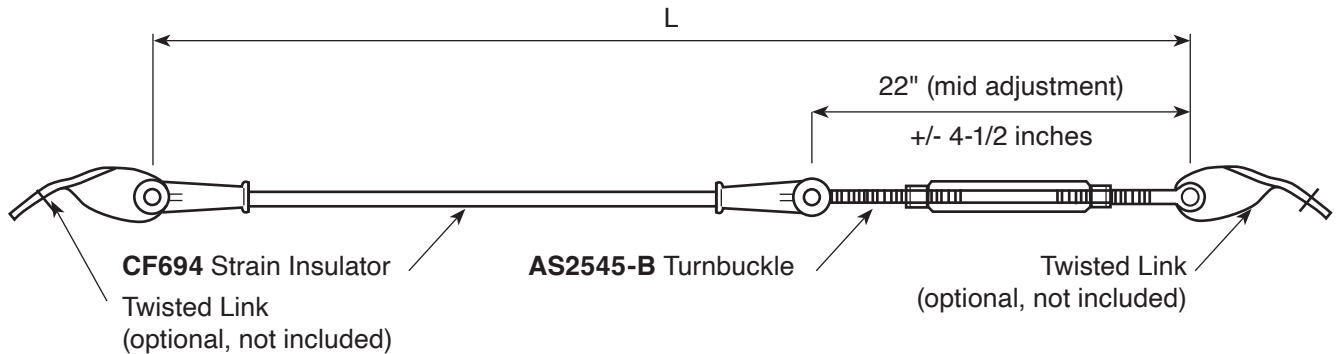
Notes:

For specific fitting dimensions, see "End Fitting Details" on pages F-2 & F-3.

CF695 uses Roller #28084.
CF696 uses Roller #28086 or #28082.

CF694TB 21,000 lb Adjustable Guying Assembly

The Hughes Brothers Guy Strain and Turnbuckle Assembly is superior to adjustable guy strains incorporating a turnbuckle onto the end of the guy strain. The Hughes assembly allows for adjustment of the turnbuckle without having to unbolt an end of the assembly.



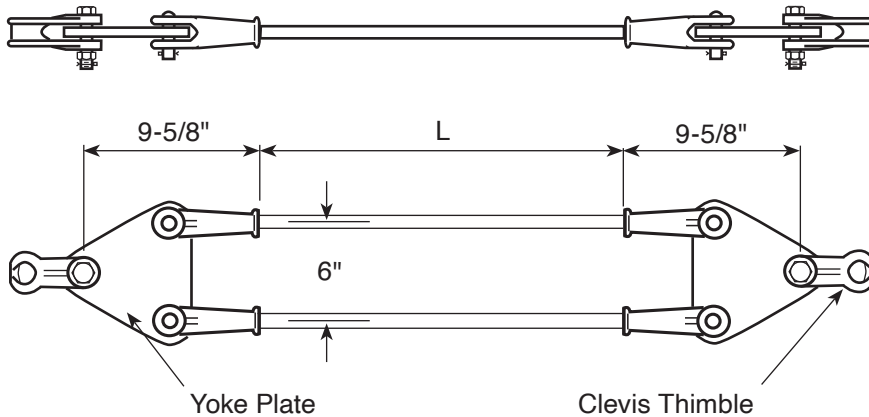
AS2276 series twisted links are ordered separately. See catalog page C-10.

Ordering Example:

CF694TB-36
 Specifies "L" length
 Guy strain type with turnbuckle

CF999TT-"L" 60,000 lb Guying Assembly

A 60,000 lb guy strain can be made by combining two CF695 30,000 lb Guy Strains. To order as an assembly, use the stock no. **CF999TT-"L"**.



Fiberglass Pole Top Pins

Hughes Brothers Fiberglass Pole Top Pins are manufactured from Fiberglass Reinforced Plastic (FRP) with ductile iron fittings. The plastic material is a Polyester matrix containing ultraviolet protective inhibitors and a resin-rich protective outer veil.

The insulator threads are in accordance with ANSI C29.5 and are coated with a semi-conductive heat shrink material.

Ductile iron is 65-45-12.

Lengths other than those shown are readily available.

CF500 Pole Top Pin

The **CF500** series has 1" or 1-3/8" threads conforming to ANSI C29.5 cut directly into the FRP rod. One inch threads conforming to ANSI C29.5 are standard.

Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	Ultimate Strength-Lbs.		
				Trans	Longitud.	Tensile & Vert.
1" Insulator Thread						
CF500-13	1-1/2	6.25	13	1500	1450	2500
CF500-15	1-1/2	6.75	15	1450	1400	2500
CF500-19	1-1/2	7.25	19	1450	1400	2500
CF500-21	1-1/2	7.50	21	1300	1300	2500
1-3/8" Insulator Thread						
CF500-13B	1-1/2	6.25	13	1600	1500	2500
CF500-15B	1-1/2	6.75	15	1500	1400	2500
CF500-19B	1-1/2	7.25	19	1300	1300	2500
CF500-21B	1-1/2	7.50	21	1200	1200	2500



CF859A Pole Top Pin

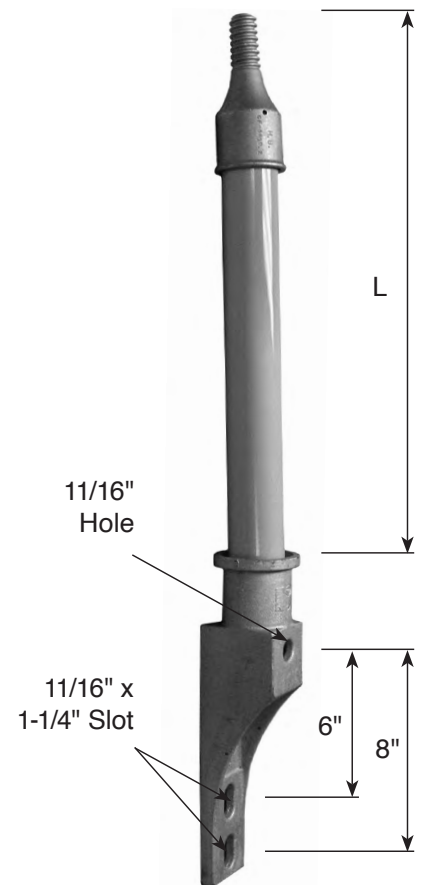
The **CF859A** Series feature 1-3/8" threads conforming to ANSI C29.5. Threads are cut directly into the FRP rod and coated with a semi-conductive heat shrink material.

Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	Ultimate Strength-Lbs.		
				Trans	Longitud.	Tensile & Vert.
CF859A-24	2	9.25	24	1700	1700	2500
CF859A-27	2	10.00	27	1500	1500	2500
CF859A-32	2	10.60	32	1150	1150	2500
CF859A-45	2	14.00	45	900	900	2500

CF859 Pole Top Pin

The **CF859** Series feature ductile iron fittings with 1" threads conforming to ANSI C29.5. Threads are coated with a semi-conductive heat shrink material.

Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	Ultimate Strength-Lbs.		
				Trans	Longitud.	Tensile & Vert.
CF859-24	2	9.25	24	1700	1700	2500
CF859-27	2	10.00	27	1500	1500	2500
CF859-32	2	10.60	32	1150	1150	2500
CF859-45	2	14.00	45	900	900	2500



CF578 Light Duty Jumper Bracket

Hughes Brothers Light Duty Jumper Brackets are manufactured from Fiberglass Reinforced Plastic (FRP) with ductile iron fittings. The plastic material is a Polyester matrix containing ultraviolet protective inhibitors and a resin-rich outer protective veil.

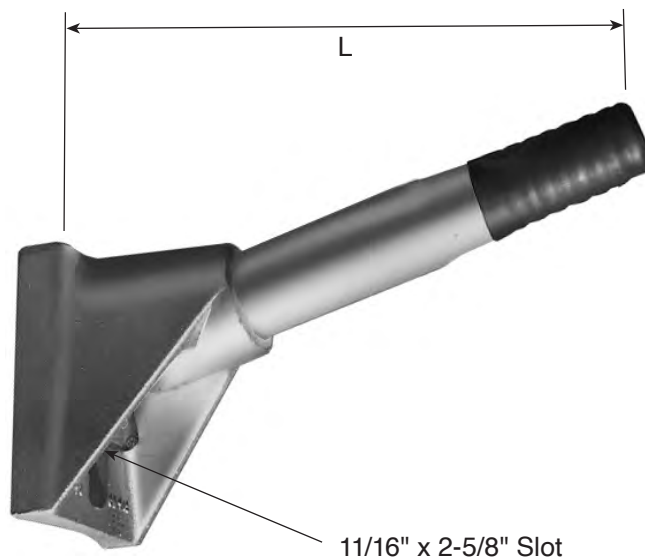
The **CF578** features 1" threads per ANSI C29.5 cut directly into the FRP rod. The threads are coated with a semi-conductive heat shrink material.

Casting is ductile iron 65-45-12 hot dip galvanized.

Lengths other than those shown are readily available.



Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	Ultimate Strength-Lbs.		
				Trans	Longitud.	Tensile & Vert.
CF578-12	1-1/4	7.60	12	1000	800	1500
CF578-14	1-1/4	9.00	14	900	700	1500
CF578-16	1-1/4	10.25	16	800	600	1500
CF578-18	1-1/4	11.50	18	700	500	1500



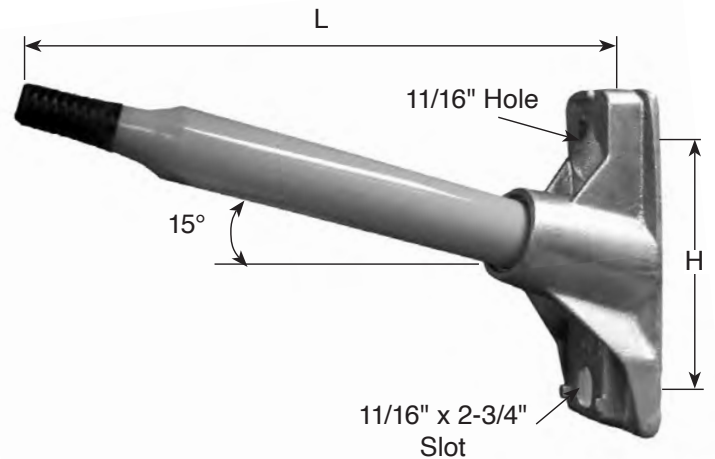
Fiberglass Single Phase, Horizontal Standoff Brackets

Fiberglass Standoff Brackets are manufactured from Fiberglass Reinforced Plastic (FRP) with ductile iron fittings. The plastic material is a Polyester matrix containing ultraviolet protective inhibitors and a resin-rich protective outer veil.

The insulator threads are 1" or 1-3/8" (see below) in accordance with ANSI C29.5 and are coated with a semi-conductive heat shrink material.

Ductile iron is 65-45-12 hot dip galvanized.

Lengths other than those shown are readily available.



CF560 & CF626 Horizontal Standoff Bracket

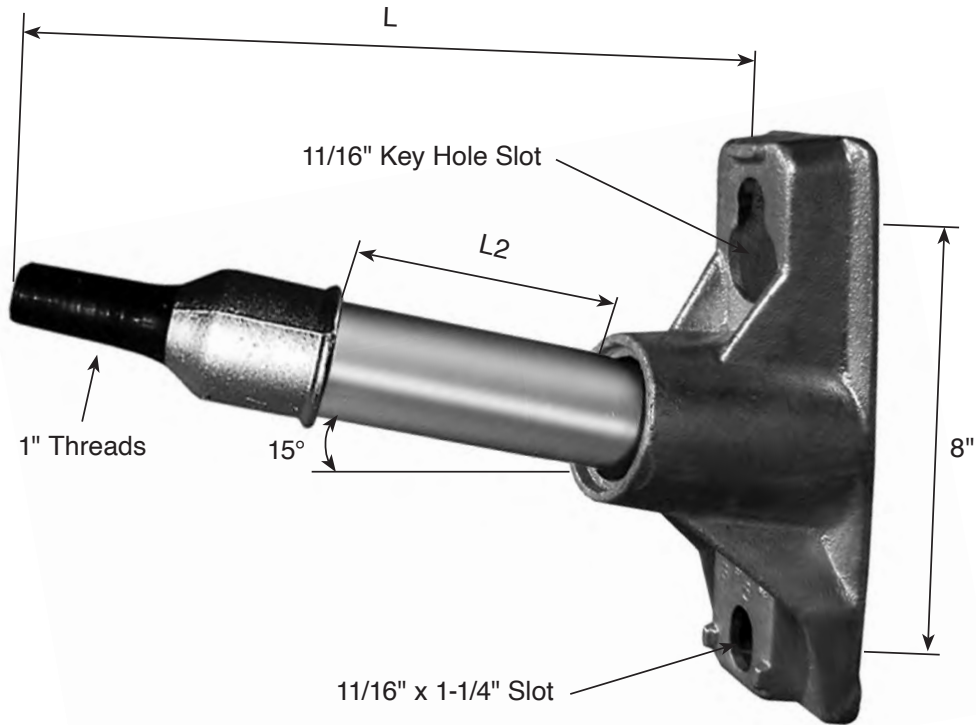
Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	H Inches	Ultimate Strength-Lbs.		
					Trans	Longitud.	Tensile & Vert.
CF560-13	1-1/2	7.30	13	6-8	1500	1100	2500
CF560-16	1-1/2	8.25	16	6-8	1400	1100	2500
CF560-18	1-1/2	8.56	18	6-8	1000	950	2500
CF560-24	1-1/2	10.37	24	6-8	900	900	2500

ANSI C29.5 threads cut directly in to the FRP rod.

Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	H Inches	Ultimate Strength-Lbs.		
					Trans	Longitud.	Tensile & Vert.
CF626-24	2	13.70	24	8	1700	1350	2500
CF626-30	2	15.00	30	8	1400	1000	2500

Note: For 1-3/8" insulator threads add suffix "A" to CF560 & CF626 series; i.e. **CF560A-15**.

CF888 Horizontal Standoff Bracket



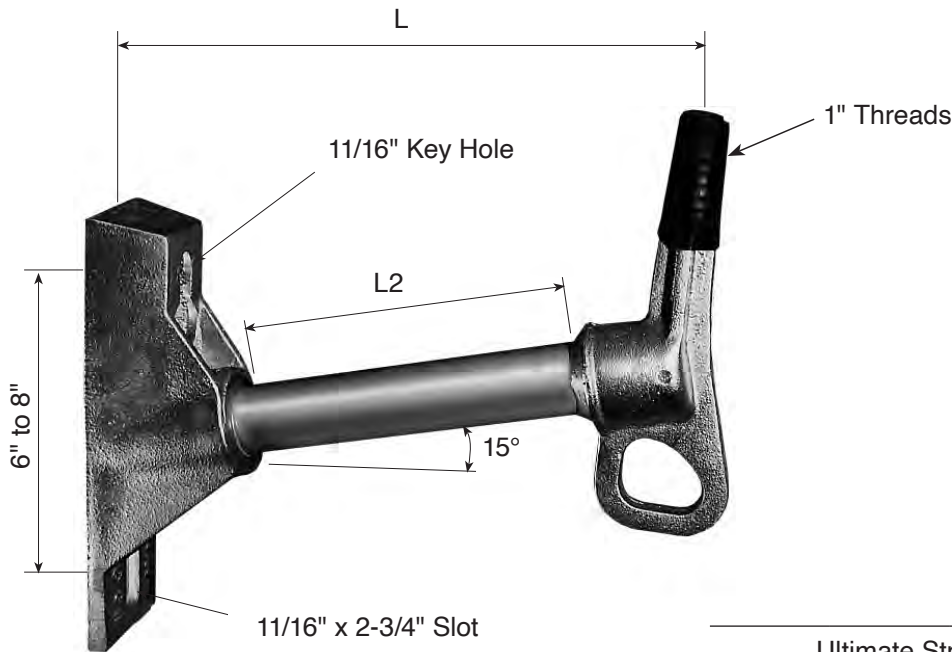
Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	L2 Inches	Ultimate Strength-Lbs.		
					Vertical	Longitud.	Transv.
CF888-15	2	14.10	15	5-3/8	1400	1100	2500
CF888-18	2	14.40	18	7-3/8	1200	950	2500
CF888-24	2	14.70	24	14-5/8	900	700	2500

Ordering Example:

CF888-"L"

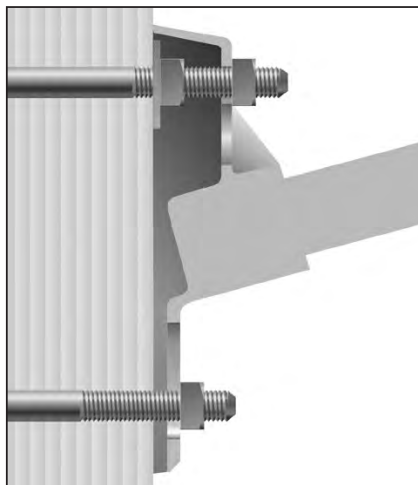
 Specifies "L" length

CF810 Vertical Single Standoff Bracket



Ultimate Strength-Lbs.

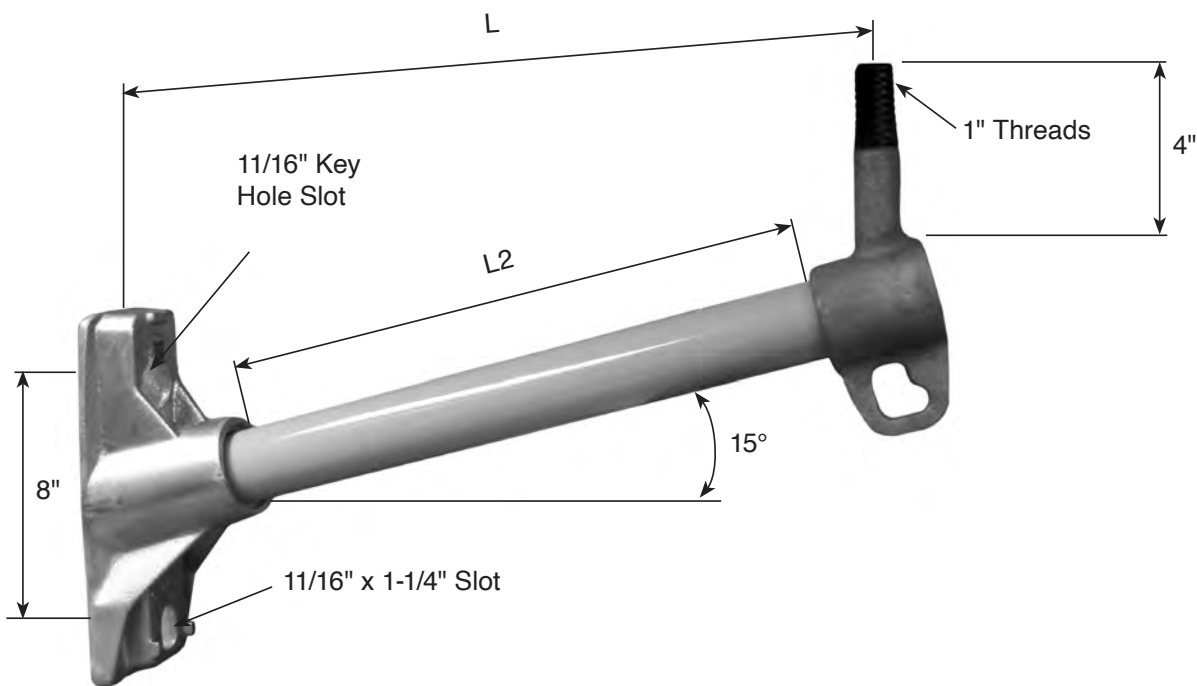
Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	L2 Inches	Vertical	Longitud.	Trans. Insulator	Trans. Eye
CF810-14	1-1/2	9.70	14	9	2000	1200	2000	5000
CF810-16	1-1/2	10.00	16	11	1600	1000	2000	5000
CF810-18	1-1/2	10.80	18	13	1500	900	2000	5000
CF810-21	1-1/2	11.00	21	16	1200	800	2000	5000
CF810-24	1-1/2	11.80	24	19	1000	700	2000	5000



The **CF810** features a base fitting design which allows for the removal of one phase on a two phase installation.



CF830C Vertical Single Standoff Bracket



Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	L2 Inches	Ultimate Strength-Lbs.			
					Vertical	Longitud.	Trans. Insulator	Trans. Eye
CF830C-15	2	18.25	15	9-1/4	2400	1950	2000	5000
CF830C-18	2	19.50	18	12-1/4	2250	1900	2000	5000
CF830C-24	2	22.00	24	18-1/4	2100	1850	2000	5000
CF830C-30	2	23.00	30	24-1/4	1800	1750	2000	5000

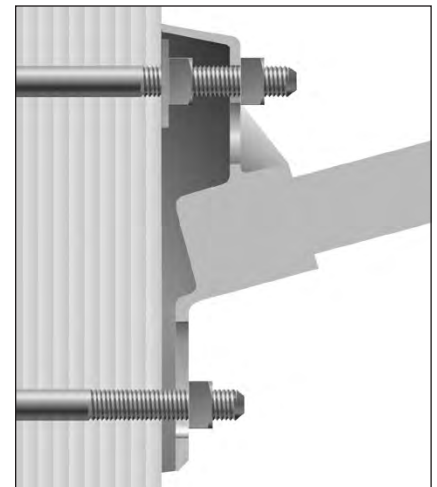
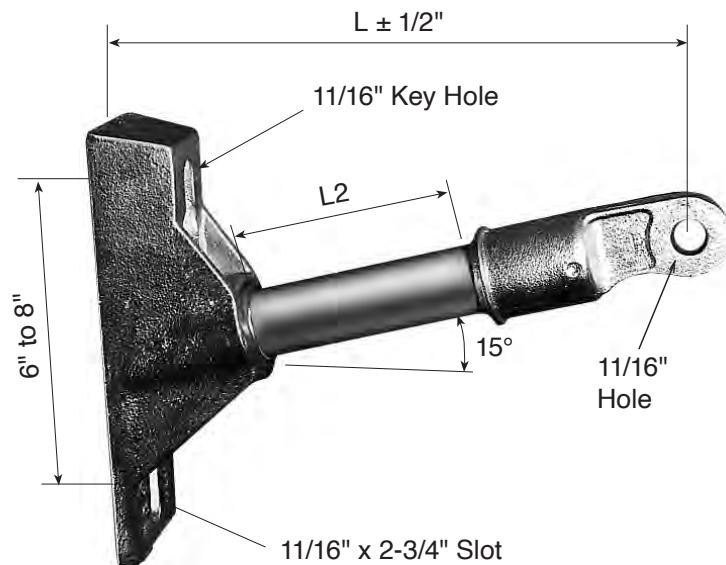
Fiberglass Suspension Brackets

Hughes Brothers Fiberglass Suspension Brackets are manufactured from Fiberglass Reinforced Plastic (FRP) with ductile iron fittings. The plastic material is a Polyester matrix each containing ultraviolet protective inhibitors and a resin-rich protective outer veil.

Ductile iron is 65-45-12 hot dip galvanized.

Lengths other than those shown are readily available.

CF615 Suspension Bracket



The **CF615** features a base fitting design which allows for the removal of one phase on a two phase installation.

Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	L2 Inches	Ultimate Strength-Lbs.		
					Vertical	Longitud.	Transv.
CF615-12	1-1/2	8.60	12	5-1/4	1800	1300	5000
CF615-14	1-1/2	8.90	14	7-5/16	1600	1200	5000
CF615-16	1-1/2	9.10	16	9-3/8	1400	1100	5000
CF615-18	1-1/2	9.40	18	11-7/16	1200	1000	5000
CF615-21	1-1/2	9.70	21	14-9/16	1050	850	5000
CF615-24	1-1/2	10.00	24	17-5/8	900	700	5000

Two Phase Angle Brackets

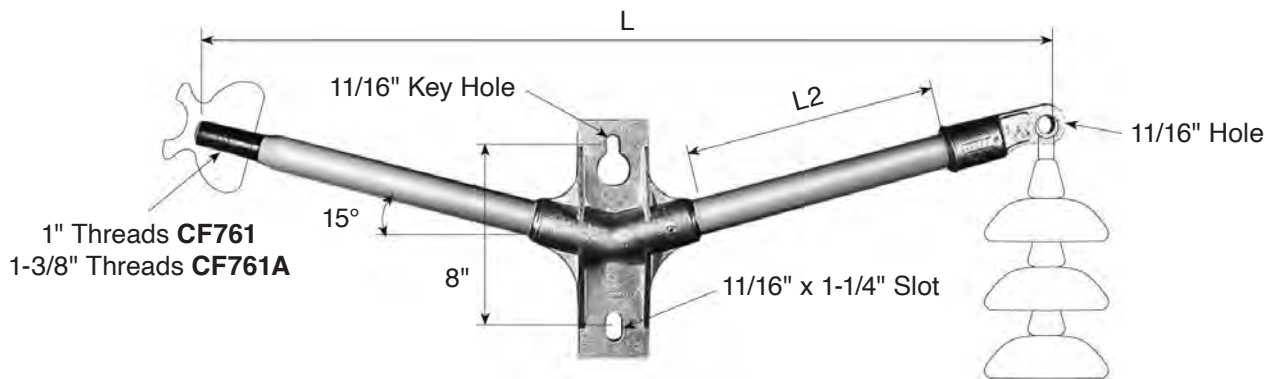
Hughes Brothers Two Phase Brackets are manufactured from Fiberglass Reinforced Plastic (FRP) with ductile iron fittings. The plastic material is a Polyester matrix containing ultraviolet protective inhibitors and a resin-rich protective outer veil.

The insulator threads are in accordance with ANSI C29.5. Threads are coated with a semi-conductive heat shrink material.

Ductile iron is 65-45-12 with hot dip galvanizing.

Lengths other than those shown are readily available.

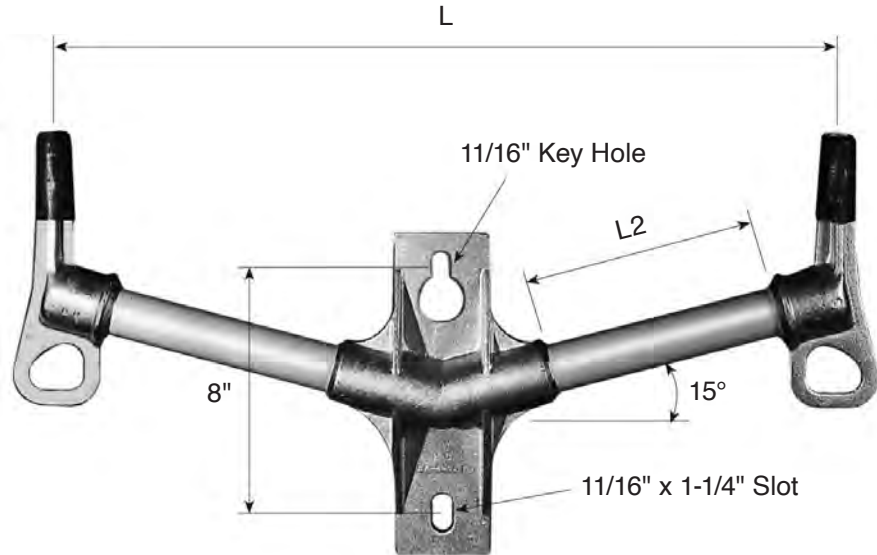
CF761 & CF761A Two Phase Angle Bracket



Ultimate Strength-Lbs.

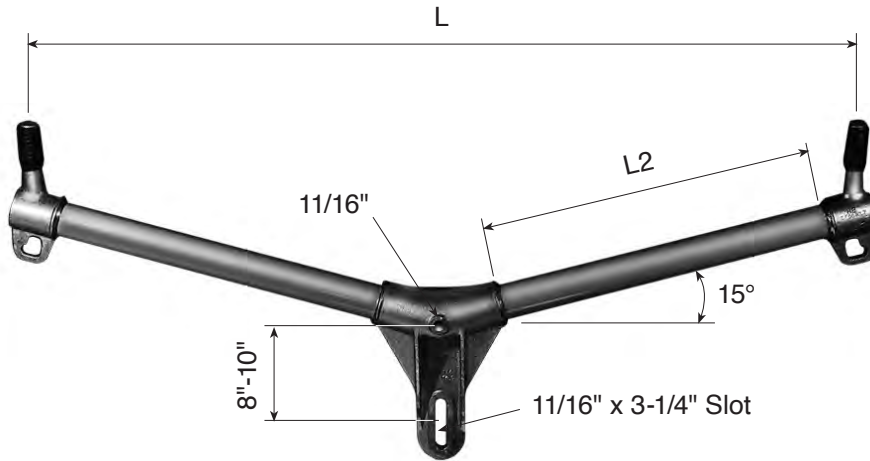
Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	L2 Inches	Ultimate Strength-Lbs.			
					Vertical	Longitud.	Transv. Fit. Eye	Transv. Pin
CF761-36-8	1-1/2	8.75	36	10.7	1200	1200	5000	1500
CF761-48-8	1-1/2	11.00	48	16.9	900	900	5000	1500

CF813 Two Phase Vertical Standoff Brackets



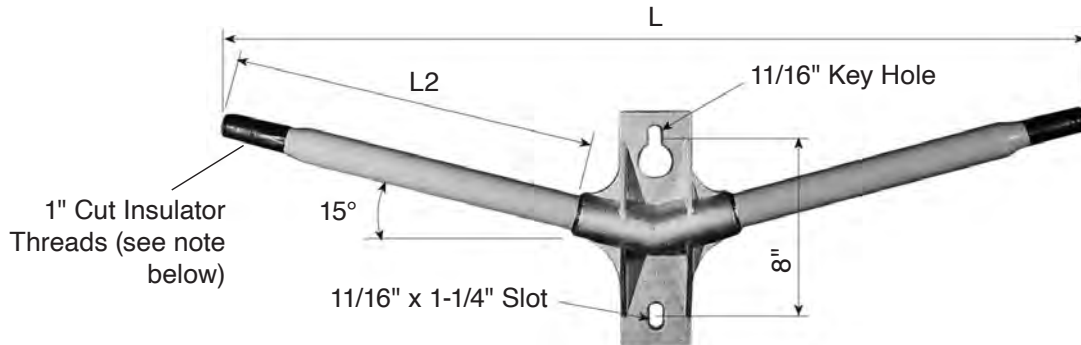
Stock No.	Thread Size	Rod Dia. Inches	Wt. Lbs. Each	L Inches	L2 Inches	Ultimate Strength-Lbs.			
						Vertical	Longitud.	Trans. Insulator	Trans. Eye
CF813-30	1"	1-1/2	12.40	30	10-1/8	1700	1100	2000	5000
CF813-36	1"	1-1/2	13.00	36	13-1/4	1500	900	2000	5000
CF813-42	1"	1-1/2	13.30	42	16-3/8	1100	800	2000	5000
CF813-48	1"	1-1/2	15.30	48	19-1/2	1000	700	2000	5000

CF861A Two Phase Vertical Standoff Bracket with 2" Diameter Fiberglass Rod



Stock No.	Thread Size	Rod Dia. Inches	Wt. Lbs. Each	L Inches	L2 Inches	Ultimate Strength-Lbs. per Phase			
						Vertical	Longitud.	Trans. Insulator	Trans. Eye
CF861A-36	1"	2	27.00	36	12-7/16	2550	2000	2000	5000
CF861A-44	1"	2	29.00	44	16-9/16	2300	1925	2000	5000
CF861A-48	1"	2	30.00	48	18-11/16	2250	1900	2000	5000

CF636 & CF637 Two Phase Horizontal Standoff Brackets



Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	L2 Inches	Mechanical Strength-Lbs. per Phase		
					Vertical	Longitud.	Transv.
CF636-30	1-1/2	15.70	30	11-5/8	1500	1500	1500
CF636-36	1-1/2	16.40	36	15-3/8	1200	1200	1500
CF636-42	1-1/2	17.00	42	17-7/8	1000	100	1500
CF636-48	1-1/2	18.00	48	21-1/8	900	900	1500

Note: For 1-3/8" cut insulator threads, unit number is **CF637**.

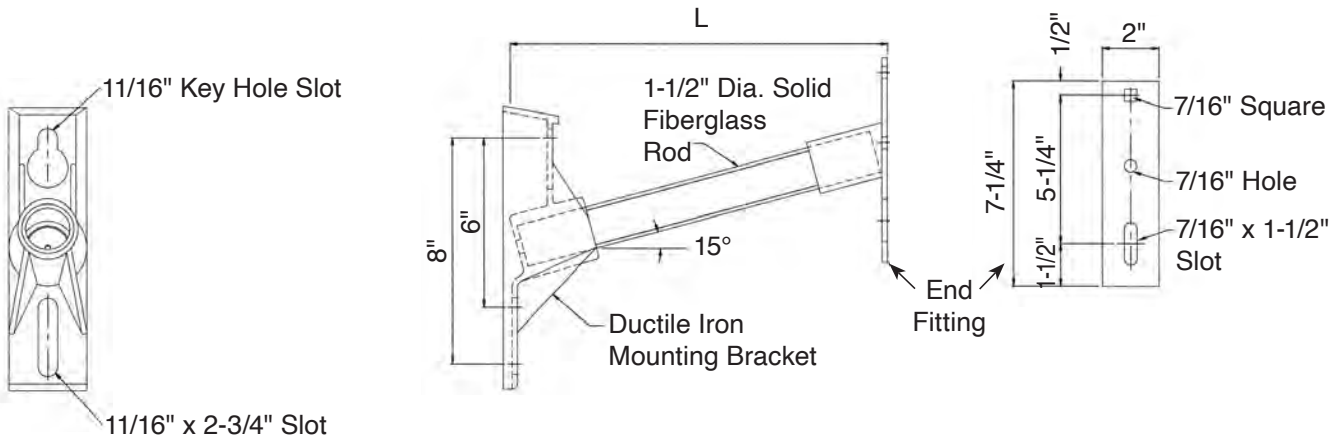
Cutout, Arrestor and Apparatus Mounting Brackets

Hughes Brothers Cutout, Arrestor and Apparatus Mounting Brackets are manufactured from Fiberglass Reinforced Plastic (FRP) with ductile iron fittings. The plastic material is a Polyester matrix containing ultraviolet (UV) protective inhibitors and a resin-rich outer protective veil.

Ductile iron is 65-45-12 hot dip galvanized.

Lengths other than those shown are readily available.

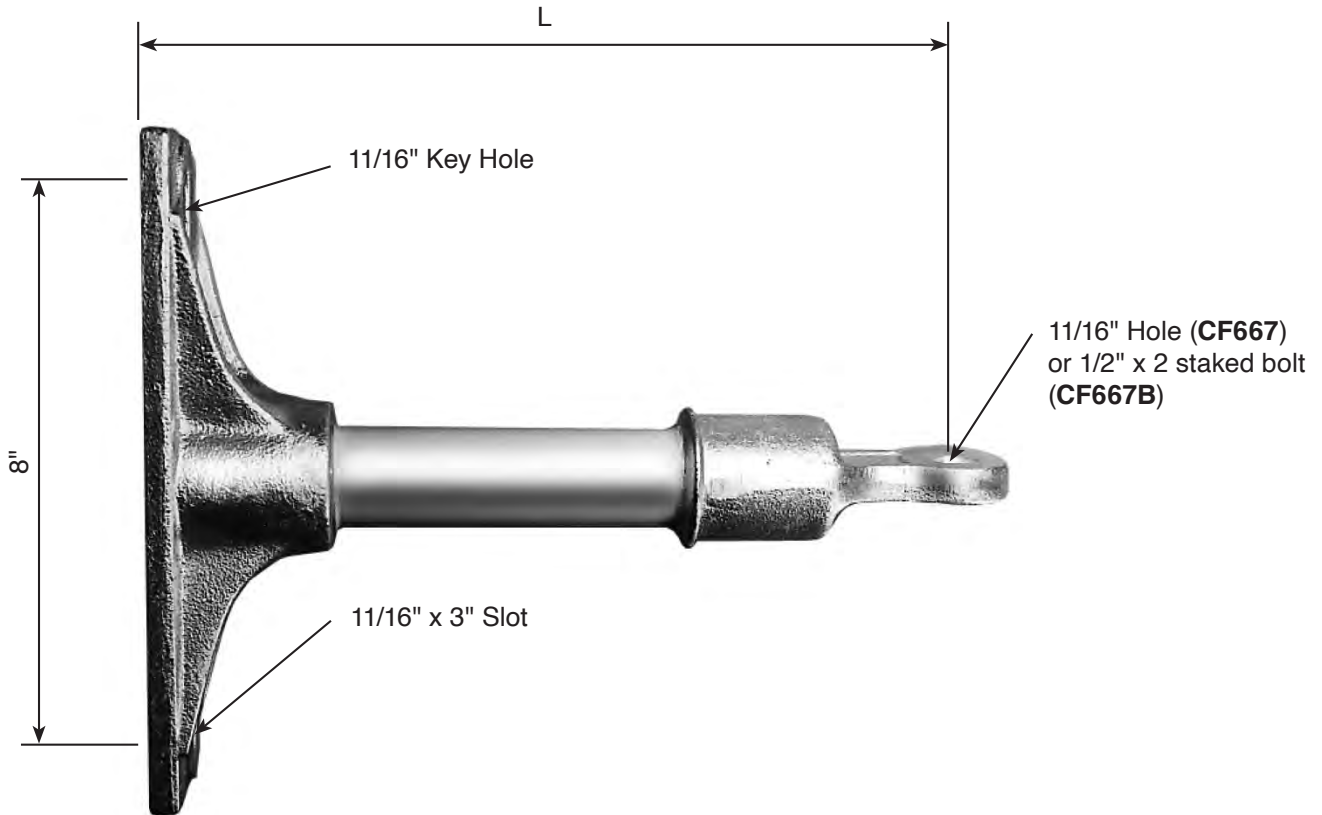
CF667A Single Phase Cutout & Arrestor Bracket



Ultimate Strength-Lbs.

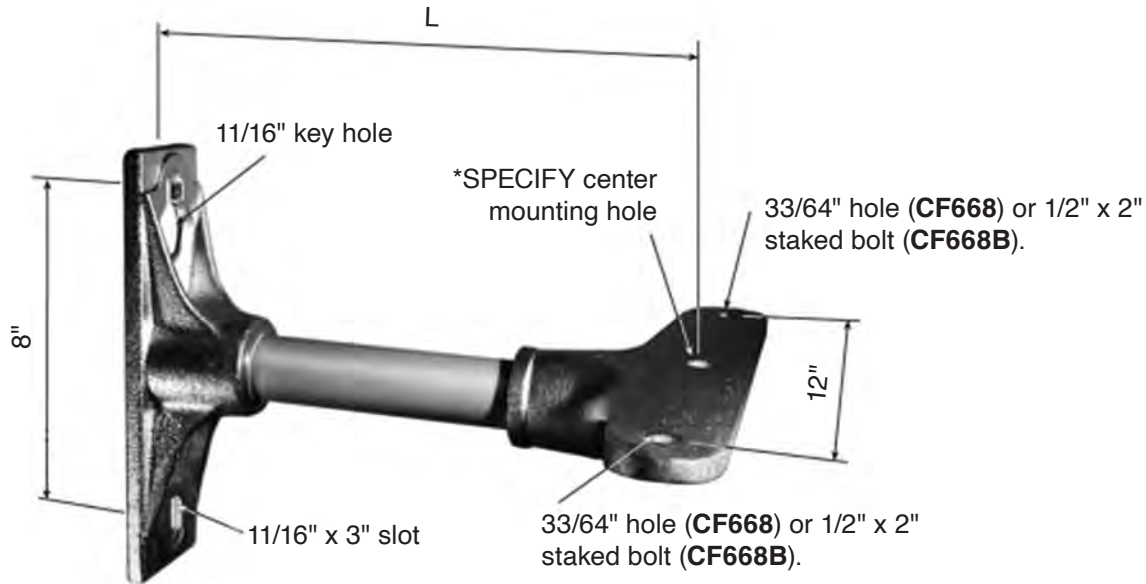
Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	Vertical	Trans.
CF667A-15	1-1/2	9.17	15	1500	5000
CF667A-18	1-1/2	9.64	18	1200	5000

CF667 & CF667B Single Phase Cutout & Arrestor Brackets



Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	Ultimate Strength-Lbs.	
				Vertical	Trans.
CF667 with 9/16" Hole					
CF667-12	1-1/2	8.00	12	1800	5000
CF667-15	1-1/2	8.30	15	1500	5000
CF667-18	1-1/2	8.80	18	1200	5000
CF667B with 1/2" x 2" Captive Bolt					
CF667B-12	1-1/2	8.00	12	1800	5000
CF667B-15	1-1/2	8.30	15	1500	5000
CF667B-18	1-1/2	8.80	18	1200	5000

CF668 & CF668B Single Phase Cutout & Arrestor Brackets

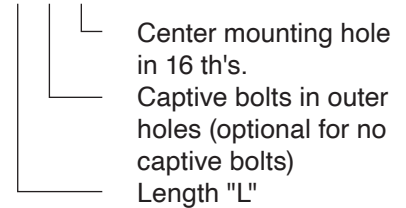


Ultimate Strength-Lbs.

Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	Vertical	Trans.
CF668 with 33/64" outside holes					
CF668-12-*	1-1/2	10.00	12	1800	5000
CF668-13-*	1-1/2	10.50	13	1700	5000
CF668-15-*	1-1/2	11.50	15	1500	5000
CF668-18-*	1-1/2	13.00	18	1200	5000
CF668-20-*	1-1/2	14.00	20	1000	5000
CF668B with 1/2" x 2" captive bolts in outside holes					
CF668-12B-*	1-1/2	10.00	12	1800	5000
CF668-13B-*	1-1/2	10.50	13	1700	5000
CF668-15B-*	1-1/2	11.50	15	1500	5000
CF668-18B-*	1-1/2	13.00	18	1200	5000
CF668-20B-*	1-1/2	14.00	20	1000	5000

Ordering Example:

CF668-13 B-11



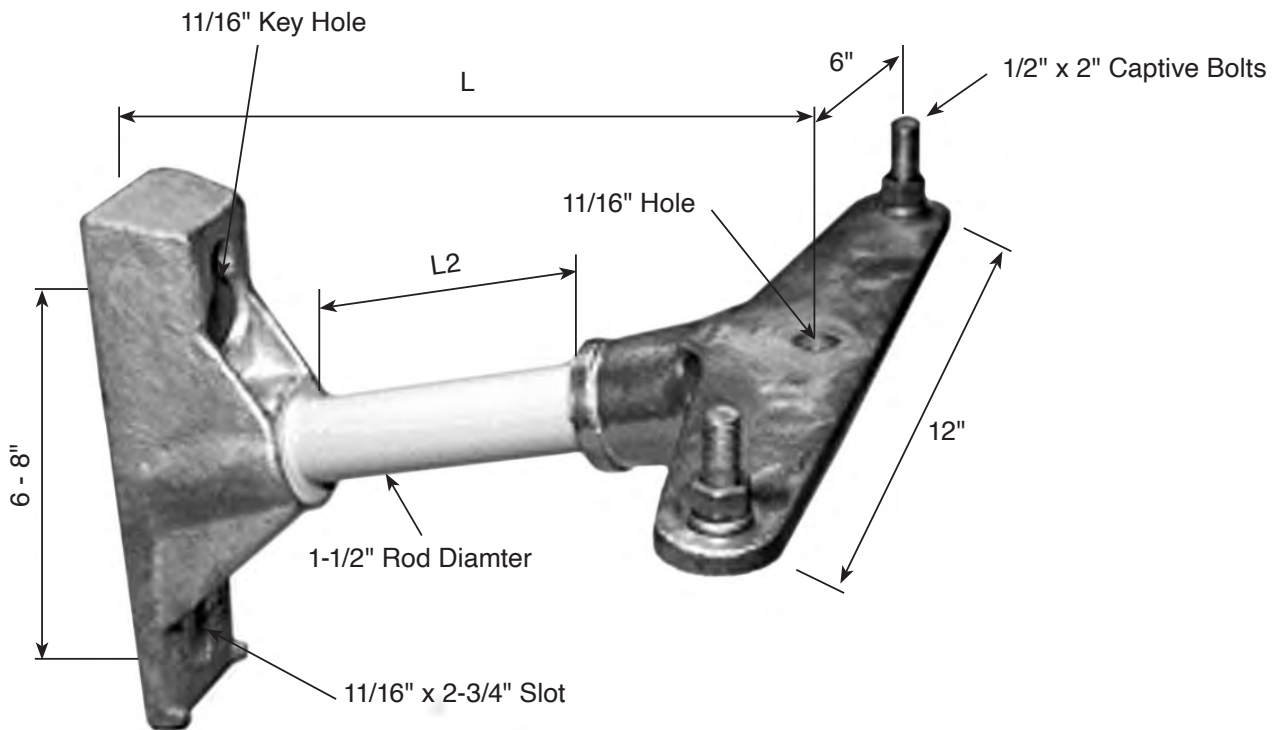
*SPECIFY "11" for 11/16" center hole or "13" for 13/16" center hole.

Each captive bolt includes one split lock washer and one hex nut.

CF868B Single Phase Cutout Arrestor Bracket, 15° Rise

Ductile iron is 65-45-12 hot dip galvanizing per ANSI/ASTM A153 with 15° rise.

Lengths other than those shown are readily available.



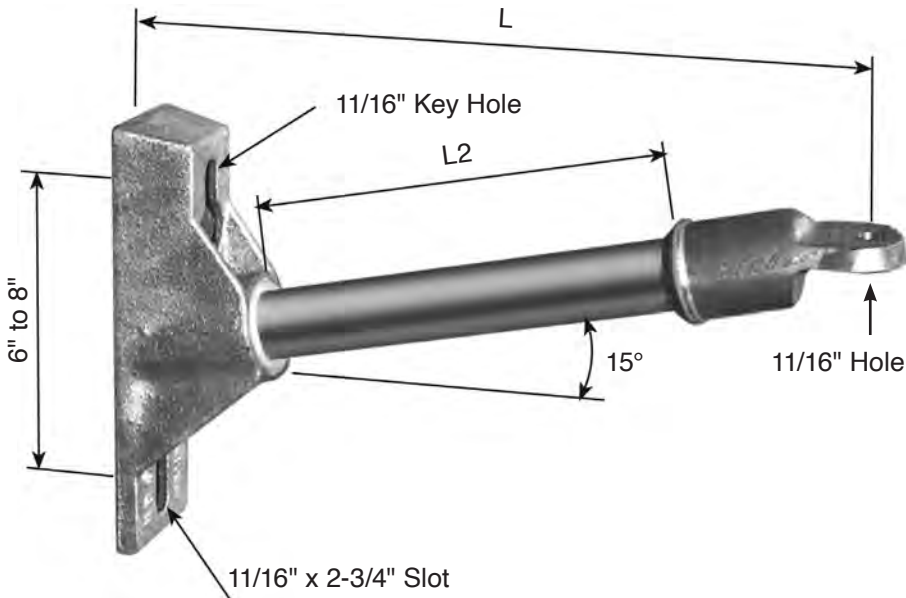
Stock No.	L Inches	L2 Inches	Ultimate Strength-Lbs.		
			Vertical	Longitud.	Transv.
CF868B-13	13	6-7/8	1650	900	5000
CF868B-15	15	8-15/16	1400	900	5000
CF868B-18	18	12-1/16	1200	900	5000

Ordering Example:

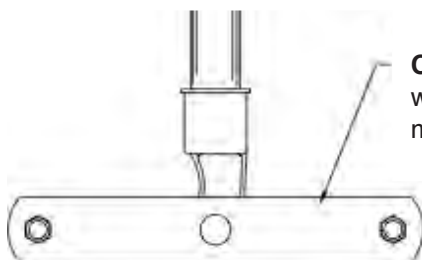
CF868-15
 Length "L"

Each captive bolt includes one split lock washer and one hex nut.

CF700 Single Phase Cutout & Arrestor Bracket, 15° Rise



Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	L2 Inches	Ultimate Strength-Lbs.		
					Vertical	Longitud.	Transv.
CF700-12	1-1/2	7.98	12	5-1/8	1800	900	5000
CF700-16	1-1/2	8.00	16	9-1/4	1350	900	5000
CF700-18	1-1/2	8.00	18	11-3/8	1200	900	5000
CF700-24	1-1/2	9.96	24	17-9/16	900	900	5000



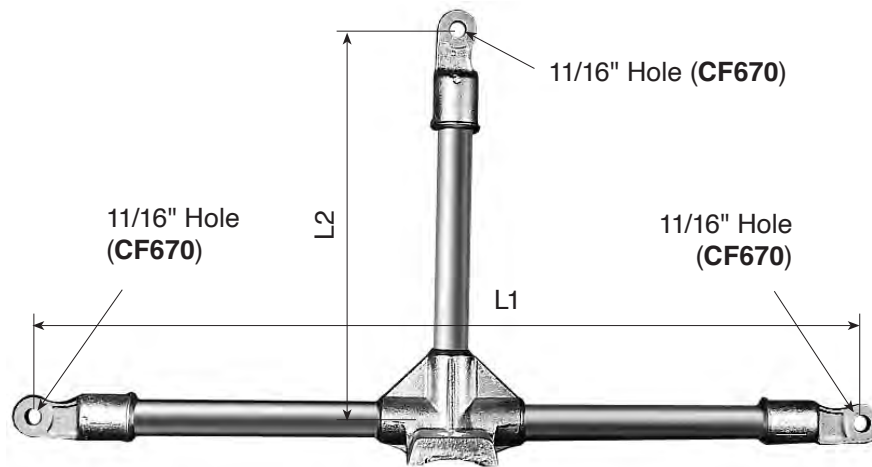
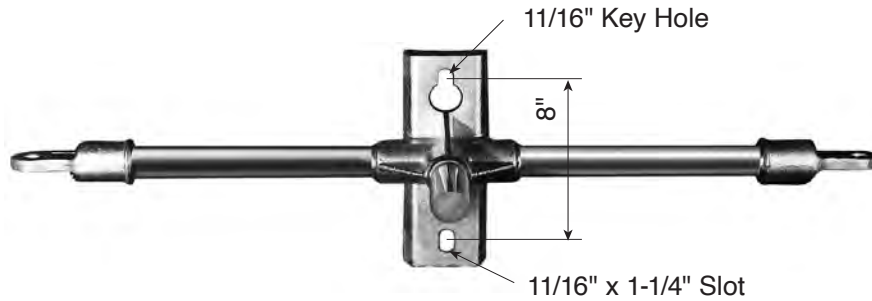
CF759 Strap, 1/4" x 2" x 12"
with 1/2" captive bolts and 5/8"
mounting bolt option available.

Ordering Example:

CF700-18 B

For 1/2" x 2"
captive bolt

CF670 & CF670B Three Phase Cutout & Arrestor Brackets

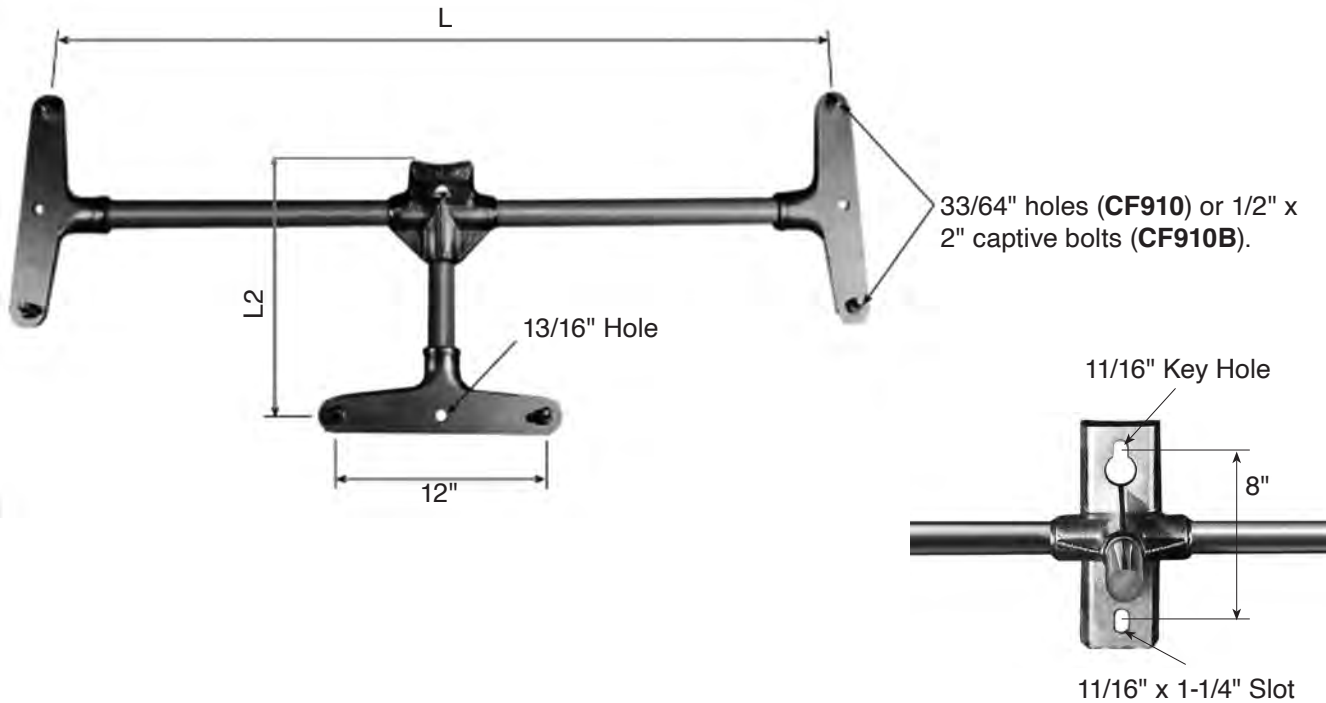


Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	L2 Inches	Ultimate Strength Per Arm-Lbs.
					Vertical
CF670 with 11/16" Holes					
CF670-48-13	1-1/2	16.20	48	13	900
CF670-48-18	1-1/2	24.00	48	18	900
CF670B w 1/2" x 2" Captive Bolts					
CF670B-48-13	1-1/2	17.33	48	13	900
CF670-48-18	1-1/2	24.00	48	18	900

Ordering Example:

CF670-"L1"- "L2"

CF910 & CF910B Three Phase Cutout & Arrestor Brackets



Ultimate Strength Per Arm-Lbs.

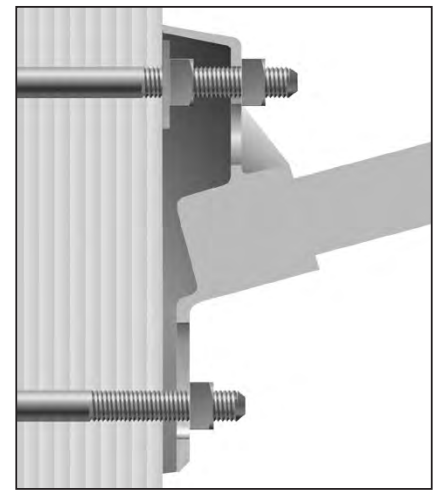
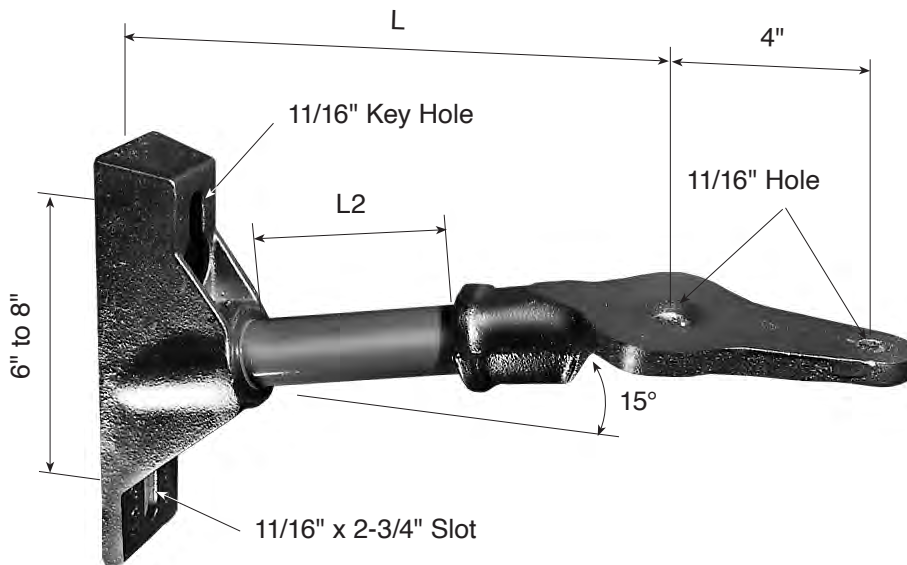
Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	L2 Inches	Vertical
CF910 with 33/64" Outside Holes					
CF910	1-1/2	28.00	48	13	900
CF910-1	1-1/2	20.00	36	13	900
CF910-2	1-1/2	35.00	60	30	700
CF910-3	1-1/2	31.00	48	18	900
CF910-4	1-1/2	32.00	48	24	900
CF910B w 1/2" x 2" Captive Bolts					
CF910-B	1-1/2	29.00	48	13	900
CF910-B1	1-1/2	26.00	36	13	900
CF910-B3	1-1/2	30.00	48	18	900
CF910-B4	1-1/2	33.00	48	24	900

CF592 Apparatus Mounting Bracket

Hughes Apparatus Mounting Brackets are manufactured from Fiberglass Reinforced Plastic (FRP) with ductile iron fittings. The plastic material is a Polyester matrix each containing ultraviolet protective inhibitors and a resin-rich protective outer veil.

Ductile iron is 65-45-12 hot dip galvanizing per ANSI/ASTM A153.

Lengths other than those shown are readily available.



The **CF592** features a base fitting design which allows for the removal of one phase on a two phase installation.

Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	L2 Inches	Ultimate Strength-Lbs.		
					Vertical	Longitud.	Transv.
CF592-12	1-1/2	10.40	12	5-1/8	1800	900	5000
CF592-16	1-1/2	11.30	16	9-1/4	1350	900	5000
CF592-18	1-1/2	11.80	18	11-3/8	1200	900	5000
CF592-24	1-1/2	13.20	24	17-9/16	900	900	5000

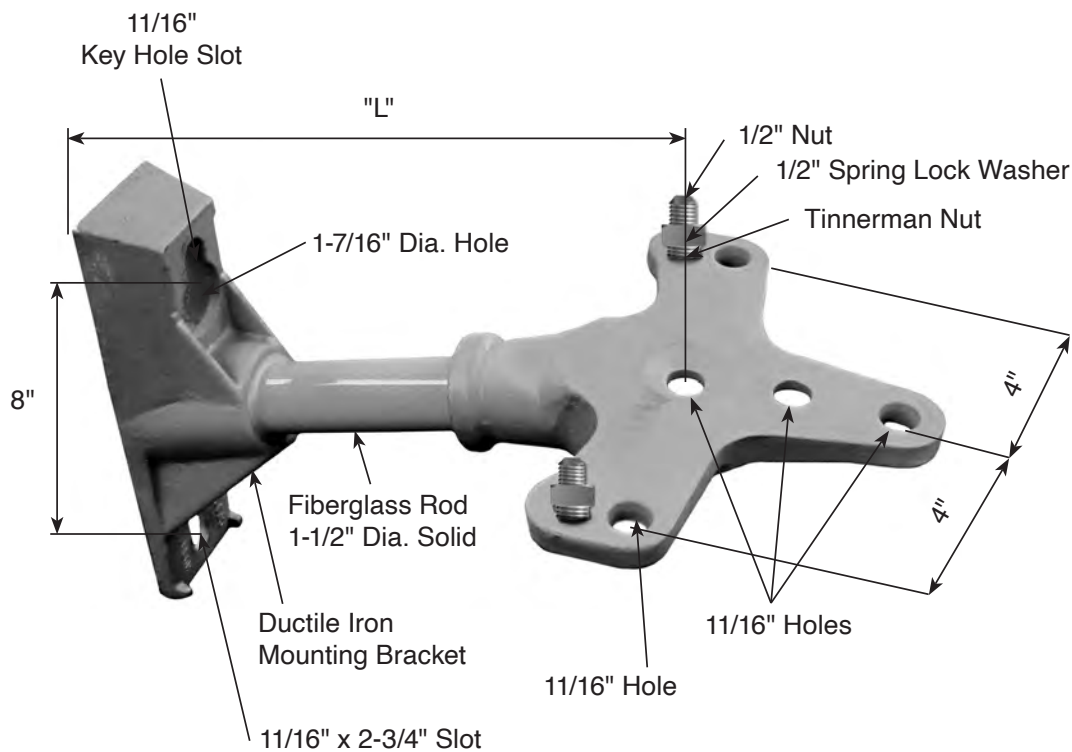
Ordering Example:

CF592-12
 _____ Length "L"

CF893 & CF893B Apparatus Mounting Bracket

The **CF893** and **CF893B** are multi-purpose fiberglass mounting bracket capable of providing a mount for a post insulator, and/or arrestors and cut-outs.

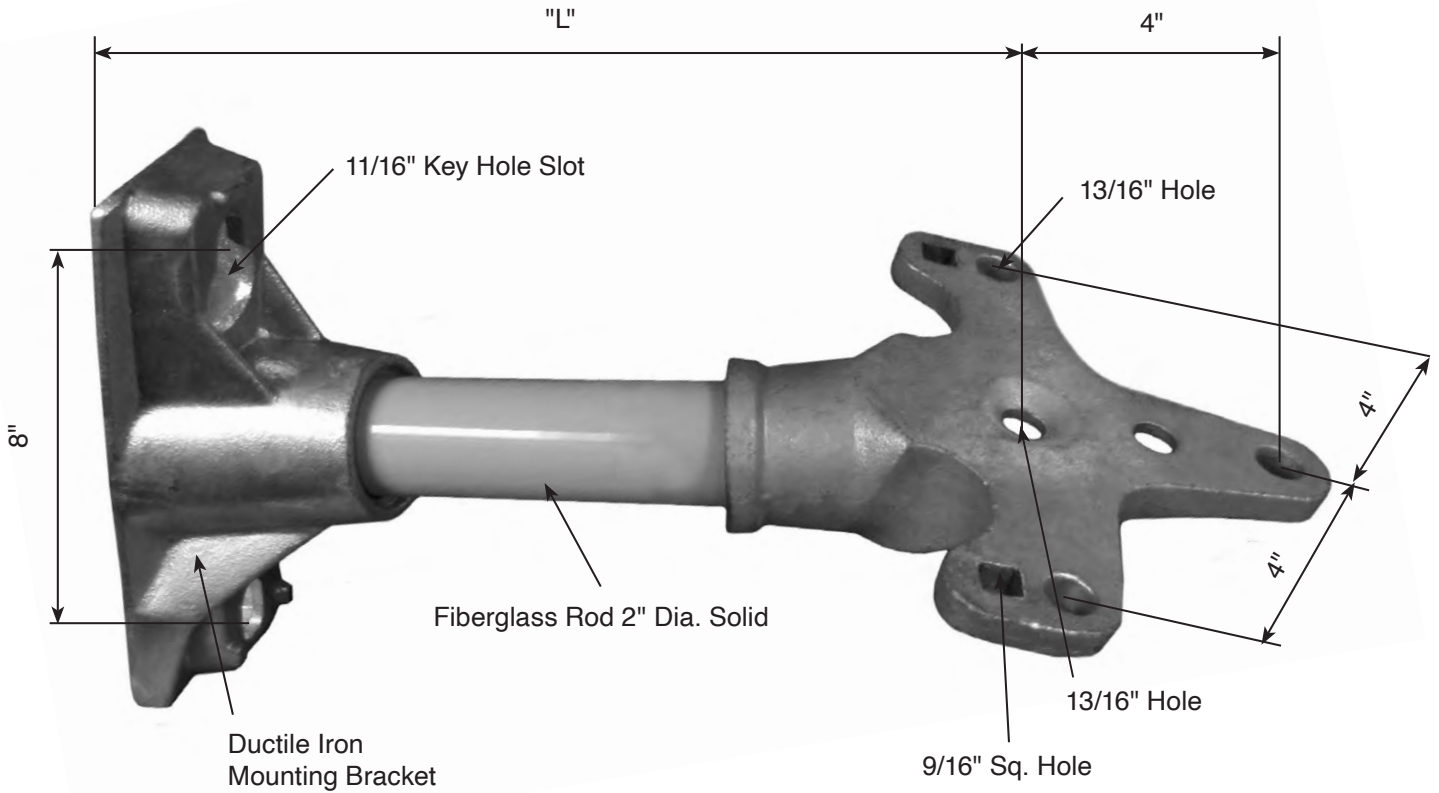
The pole and pad mount castings are 65-45-12 ductile iron, hot dip galvanized. Fiberglass rod is 1-1/2" diameter with the standard resin-rich protective outer veil.



Stock No.	Wt. Lbs. Each	L Inches	Ultimate Strength-Lbs.		
			Vertical	Longitud.	Transv.
CF893B-16	12.75	16	1350	900	5000
CF893B-18	12.75	18	1200	900	5000
CF893B-20	12.75	20	1080	900	5000
CF893B-22	13.00	22	980	900	5000
CF893B-24	13.00	24	900	900	5000

Note: To order without the captive bolts, remove the "B" from the part number, i.e. **CF893-18**.

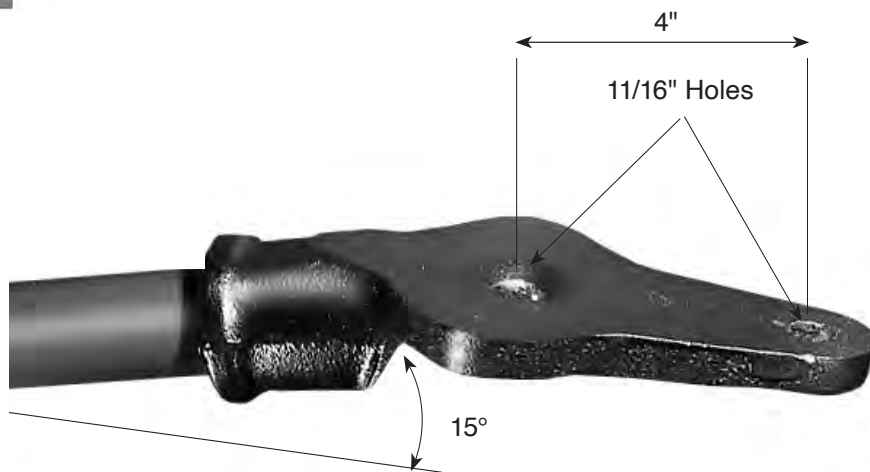
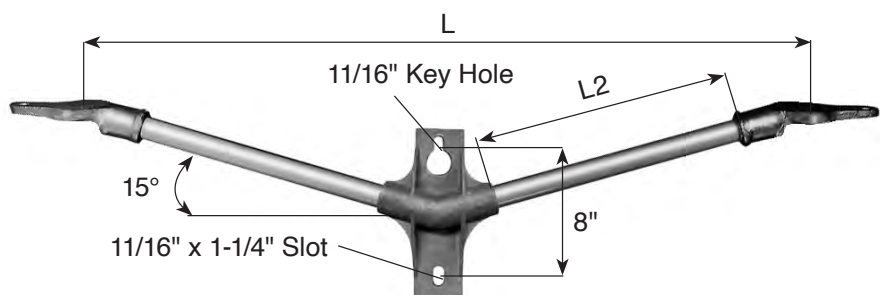
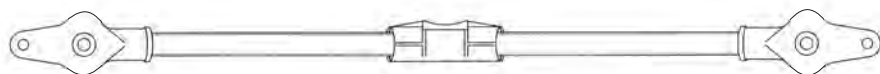
CF921 & CF921B Apparatus Brackets



Stock No.	Wt. Lbs. Each	L Inches	Ultimate Strength-Lbs.		
			Vertical	Longitud.	Transv.
CF921-16	16.75	16	2250	2100	5000
CF921-18	17.00	18	2000	1900	5000
CF921-20	17.25	20	1800	1700	5000
CF921-22	17.50	22	1600	1600	5000

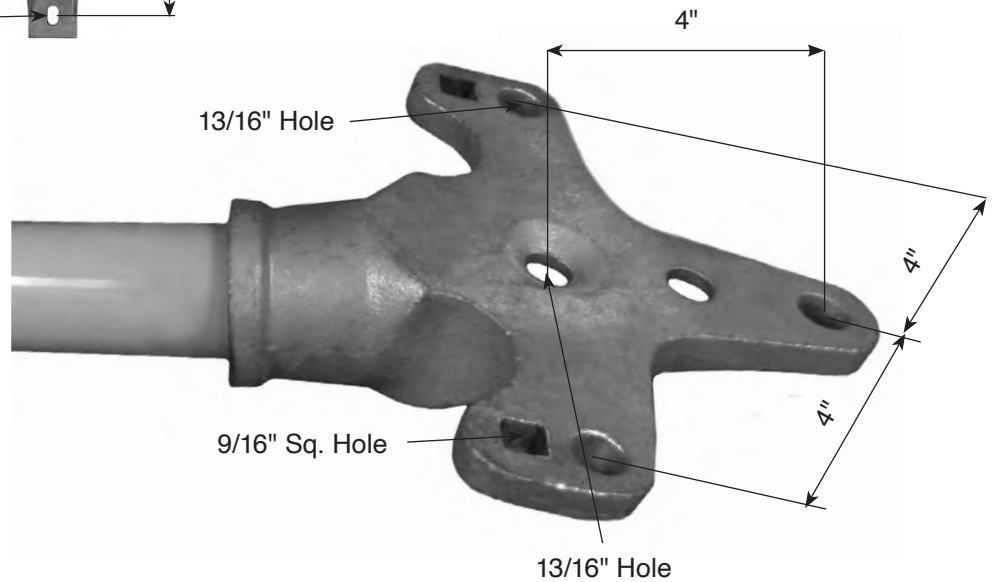
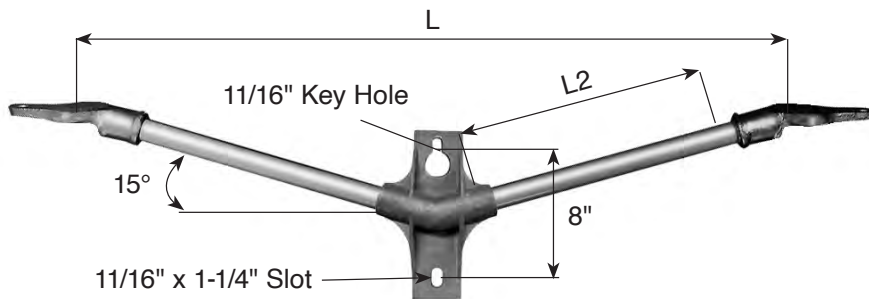
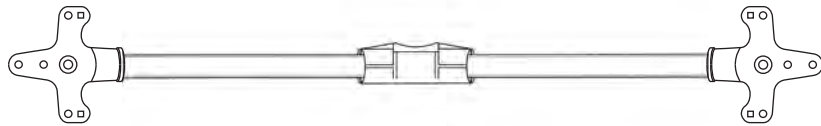
Note: To order with two captive bolts, add "B" from the part number, i.e. **CF921B-18.**

CF590 Two Phase Apparatus Mounting Bracket



Stock No.	Rod Dia. Inches	Wt. Lbs. Each	L Inches	L2 Inches	Ultimate Strength-Lbs. per Phase		
					Vertical	Longitud.	Transv.
CF590-30	1-1/2	9.00	30	7-3/8	1440	900	5000
CF590-36	1-1/2	14.00	36	10-1/2	1200	900	5000
CF590-42	1-1/2	19.00	42	13-1/2	1025	900	5000
CF590-48	1-1/2	24.00	48	16-5/8	900	900	5000

CF550 Two Phase Apparatus Mounting Bracket



Stock No.	Rod Dia. Inches	L Inches	L2 Inches	Ultimate Strength-Lbs.		
				Vertical	Longitud.	Transv.
CF550-30	1-1/2	30	7-3/8	1440	900	5000
CF550-36	1-1/2	36	10-1/2	1200	900	5000
CF550-42	1-1/2	42	13-1/2	1025	900	5000
CF550-48	1-1/2	48	16-5/8	900	900	5000

Transmission Crossarm Assemblies

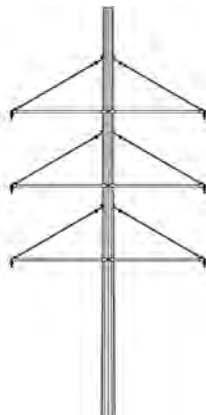
Hughes Brothers Fiberglass Medium Duty Transmission Crossarm Assemblies are manufactured from Fiberglass Reinforced Plastic (FRP) with ductile iron fittings. The plastic material is a Polyester matrix containing ultraviolet protective inhibitors and a resin-rich protective outer veil.

Ductile iron is 65-45-12 hot dip galvanizing per ANSI/ASTM A153.

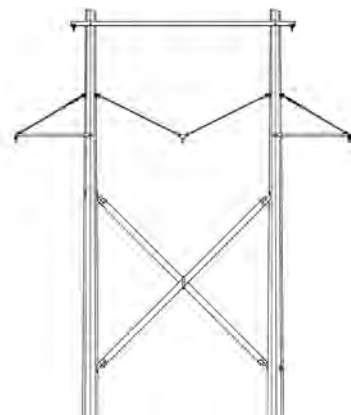
Lengths other than those shown are readily available.



Single Pole Single Circuit



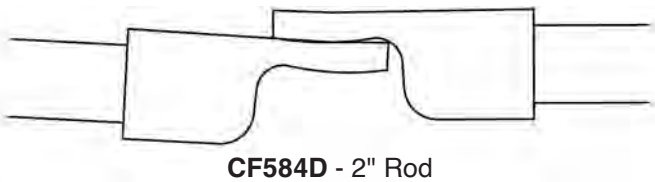
Single Pole Double Circuit



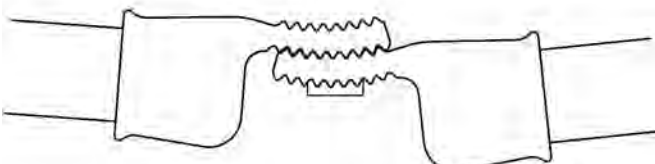
H-Frame

Hughes Brothers Fiberglass Transmission Arms are available in either 2" or 2-1/2" diameter compression rods. The compression rods mount to the pole by means of an overlap style fitting or a pinned bracket.

Overlap Details

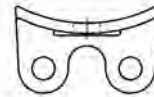


CF584D - 2" Rod

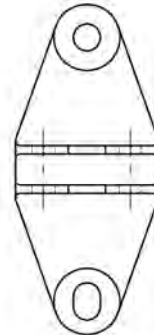


CF584K - 2" Rod

Pinned Bracket Detail

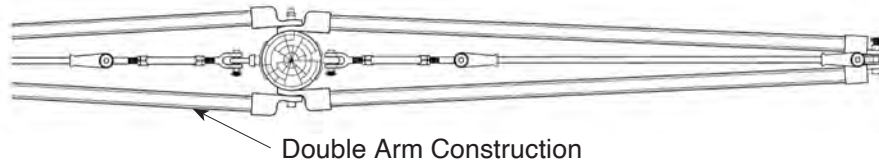


CF885B - 2"

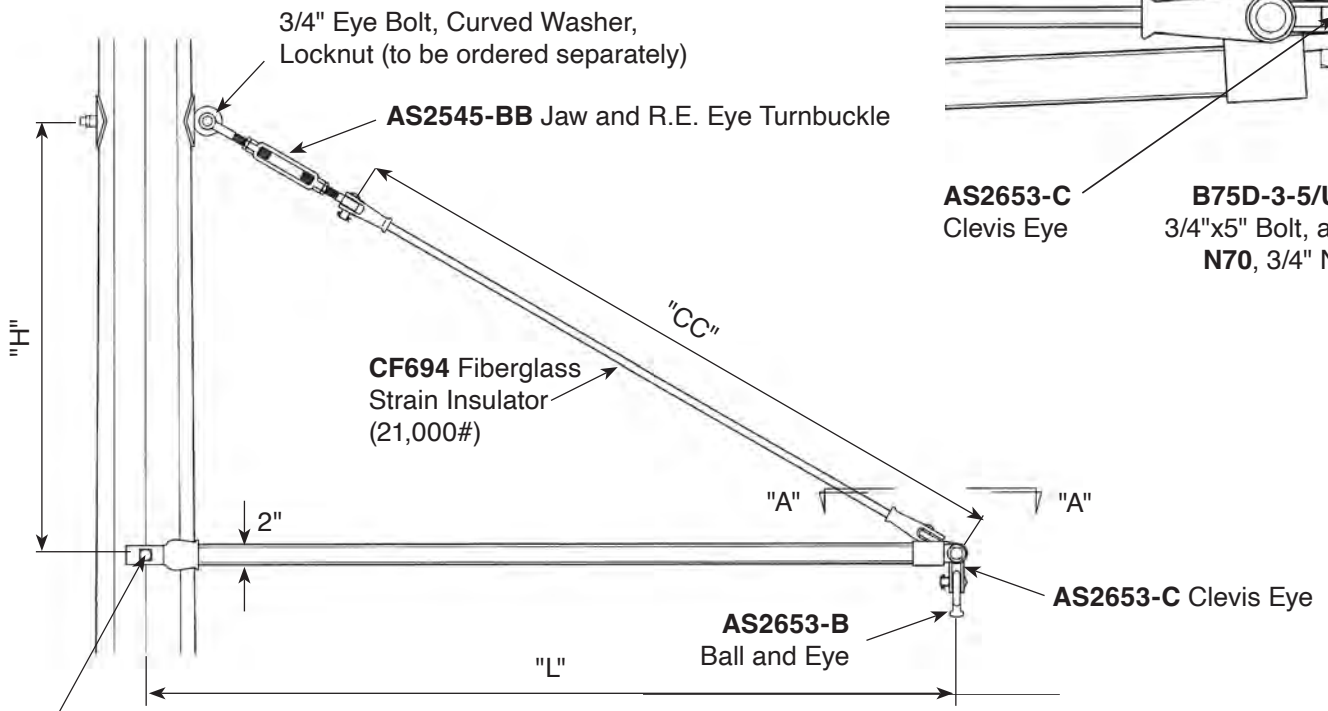
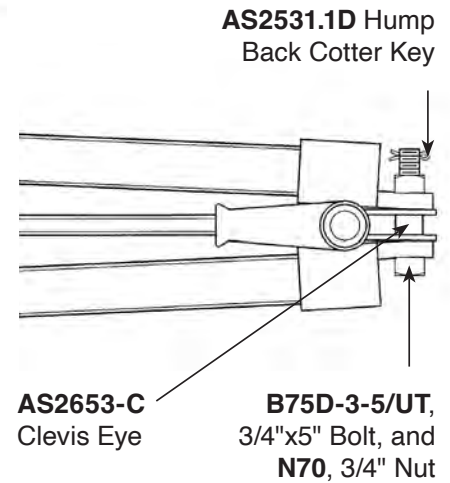


CF896-A

CF584D-"L"- "H" Fiberglass Transmission Crossarm



View "A-A"



3/4" Threaded Rod or 3/4 Bolt w/ MF70 (to be ordered separately)

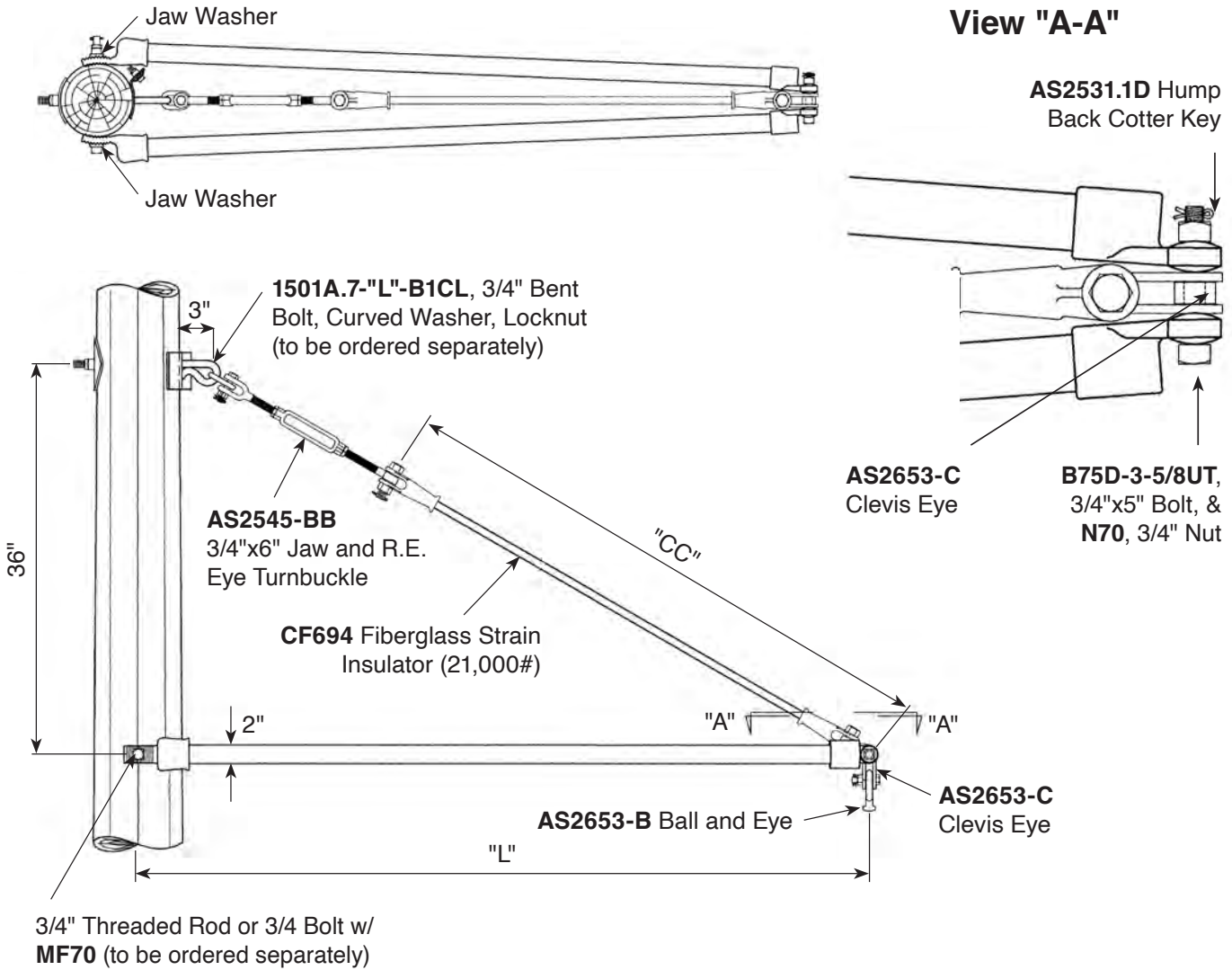
Stock No.	Wt. Lbs. Each	L Inches	H Inches	Ultimate Strength-Lbs.		
				Vertical	Longitud.	Transv.
CF584D-53-27	48.00	53	27	7500	1300	10000
CF584D-64-33	51.00	64	33	7500	1200	10000
CF584D-78.5-42	54.00	78.5	42	5000	1000	10000
CF584D-84-45	62.00	84	45	5000	900	10000

Ordering Example:

CF584D-84-45-2

Double arm, assembly (add -2 suffix to order double arm unit)

CF584-K Fiberglass Transmission Crossarm



Ultimate Strength-Lbs.

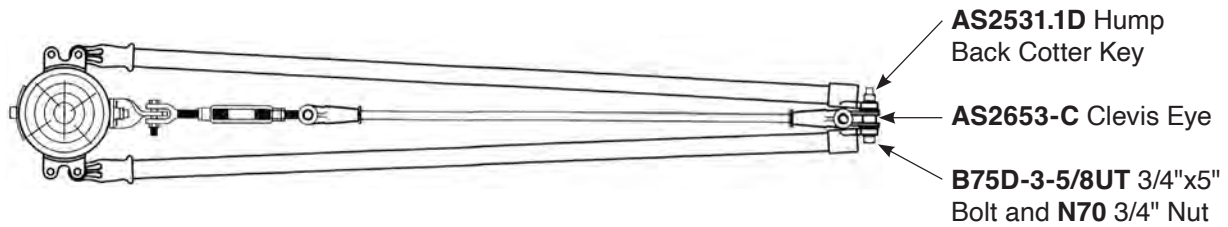
Stock No.	Wt. Lbs. Each	L Inches	CC Inches	Ultimate Strength-Lbs.		
				Vertical	Longitud.	Transv.
CF584-K-60	51.00	60	39-3/4	5000	900	10000
CF584-K-72	53.00	72	49-3/4	5000	800	10000

Ordering Example:

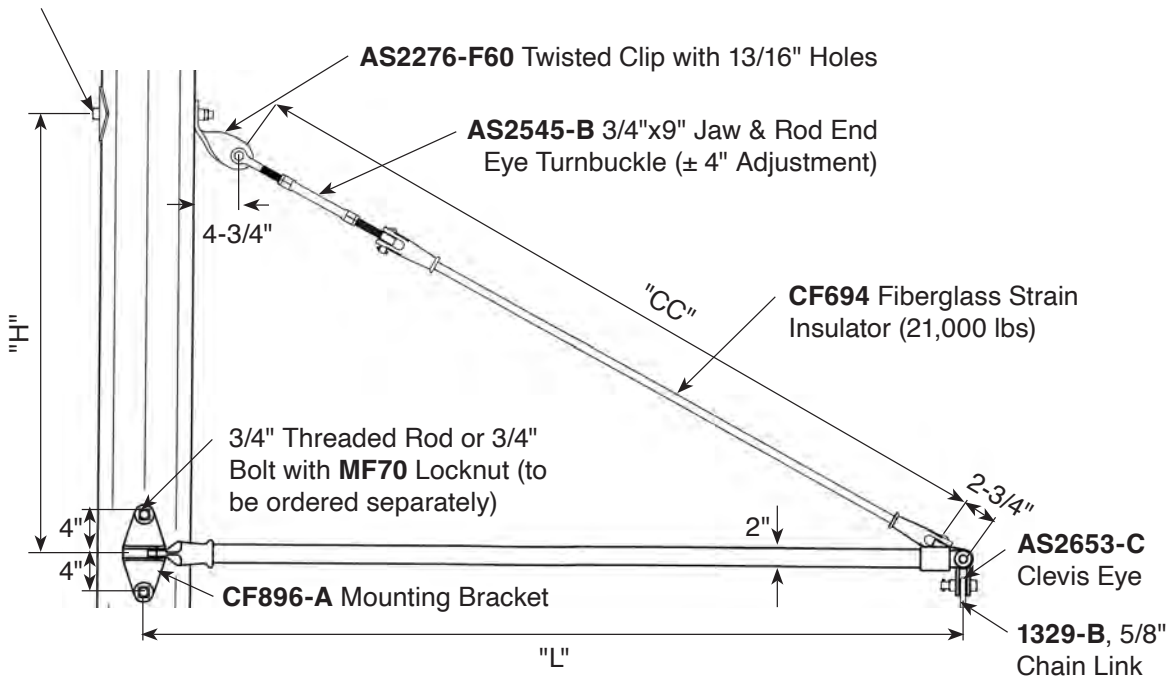
CF584-K-"L"

Arm Length "L" in Inches

CF885B-1 Transmission Crossarm



3/4" Bolt with MF70 Locknut, CW70 Curved Washer (to be ordered separately)



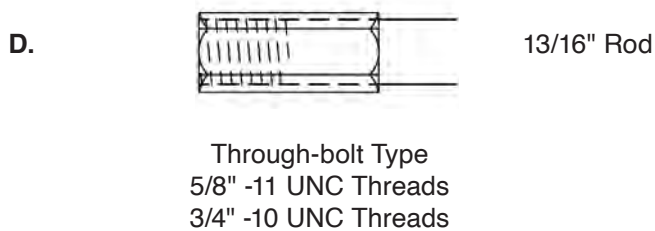
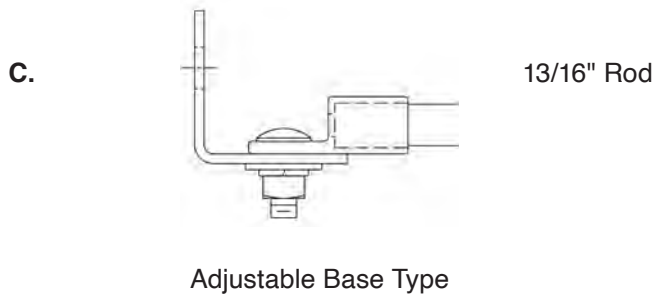
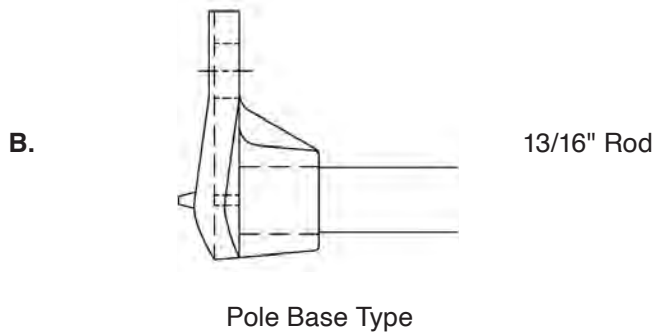
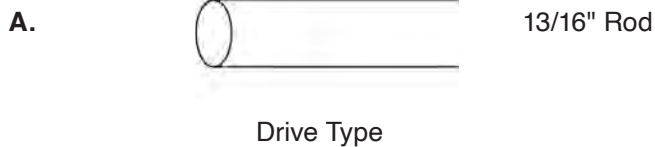
Stock No.	L Inches	H Inches	CC Inches	Ultimate Strength-Lbs.		
				Vertical	Longitud.	Transv.
CF885B-84-48-1	84	48	82-1/2	5000	900	10000
CF885B-96-52-1	96	52	96-1/4	5000	800	10000

Fiberglass Downlead Standoff Brackets

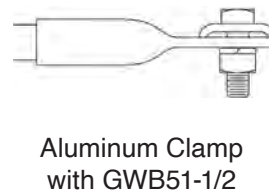
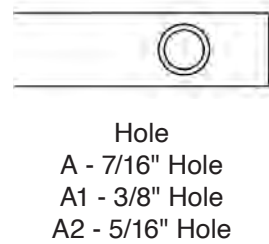
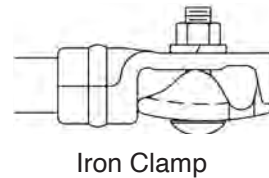
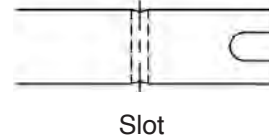
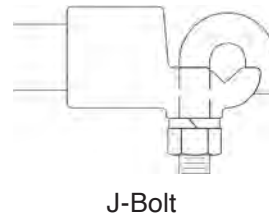
Hughes Brothers Downleads are manufactured from Fiberglass Reinforced Plastic (FRP) with ductile iron or steel fittings. The plastic material is a Polyester matrix each containing ultraviolet protective inhibitors and a resin-rich protective outer veil.

Ductile iron is 65-45-12 hot dip galvanizing per ANSI/ASTM A153.

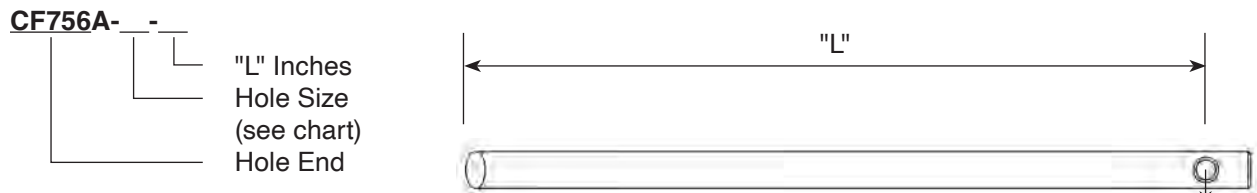
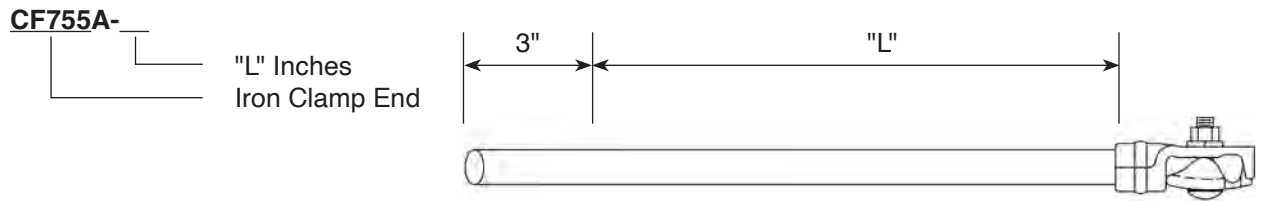
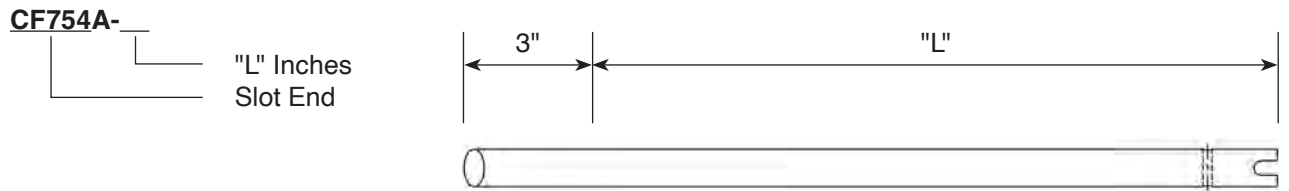
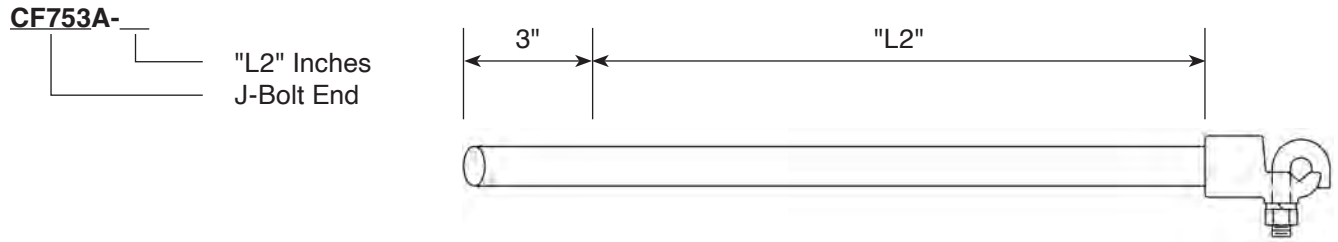
Pole Attachment Ends



Wire Attachment Ends

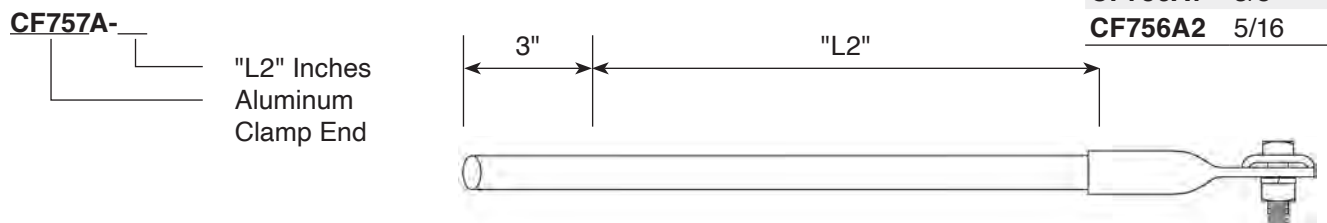


A. Drive Type



Stock No. Hole Size

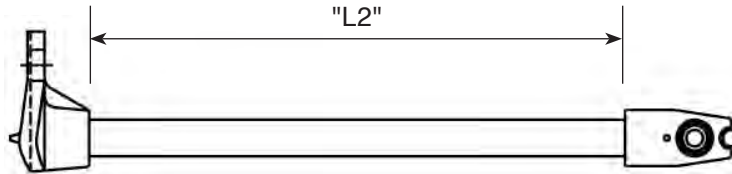
CF756A	7/16
CF756A1	3/8
CF756A2	5/16



B. Pole Base Type

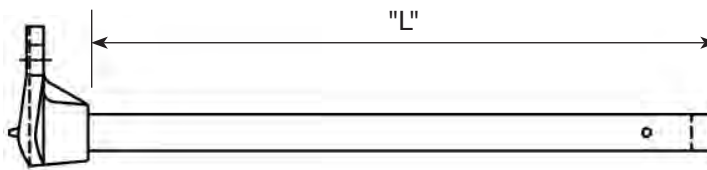
CF753B-

"L2" Inches
J-Bolt End



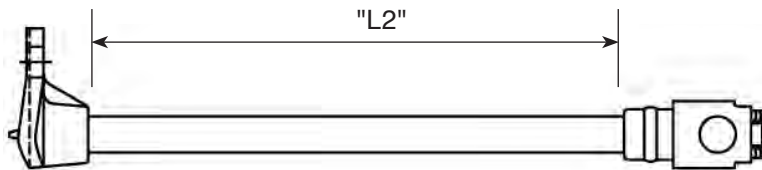
CF754B-

"L" Inches
Slot End



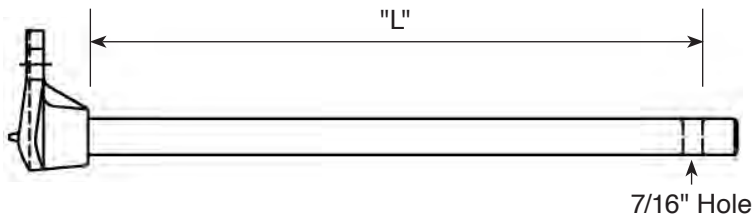
CF755B-

"L2" Inches
Iron Clamp End



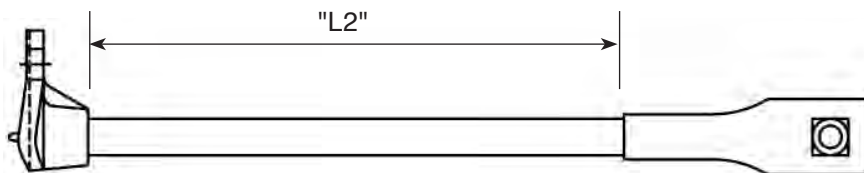
CF756B-

"L" Inches
Hole End



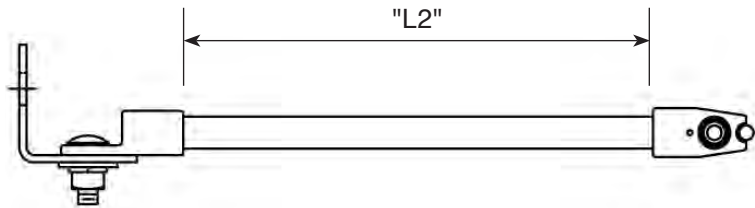
CF757B-

"L2" Inches
Aluminum
Clamp End

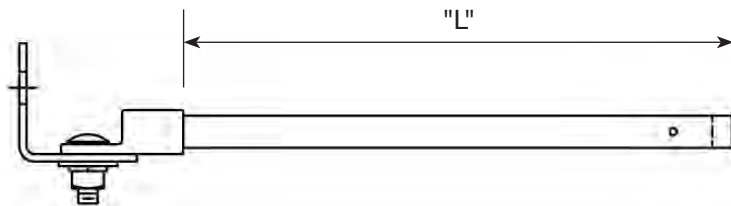


C. Adjustable Base Type

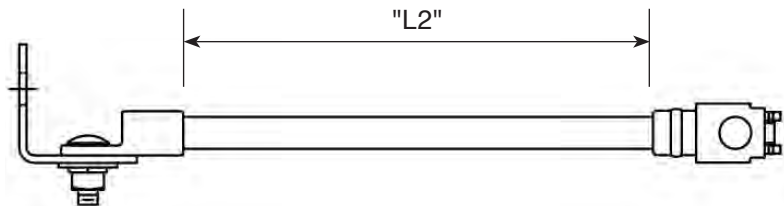
CF753C-
 "L2" Inches
 J-Bolt End



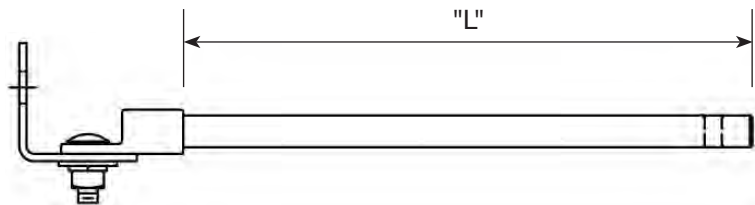
CF754C-
 "L" Inches
 Slot End



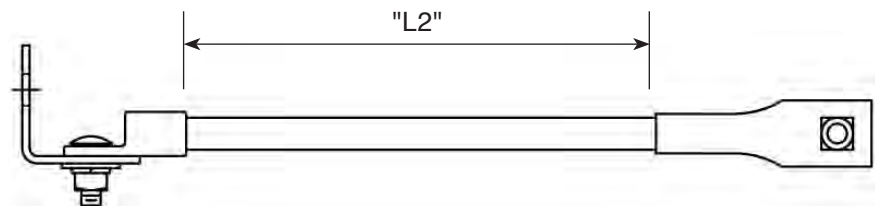
CF755C-
 "L2" Inches
 Iron Clamp End



CF756C-
 "L" Inches
 Hole End, 7/16"



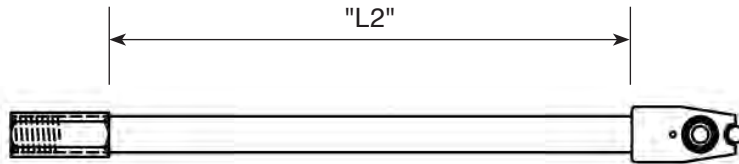
CF757C-
 "L2" Inches
 Aluminum
 Clamp End



D. Through-Bolt Type

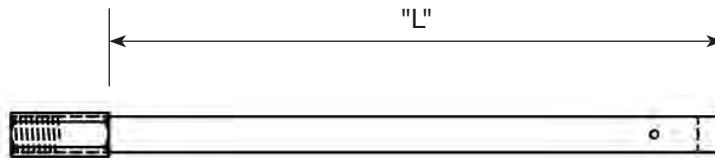
CF753- -

"L2" Inches
Designate 6 for
5/8"; 7 for 3/4"
J-Bolt End



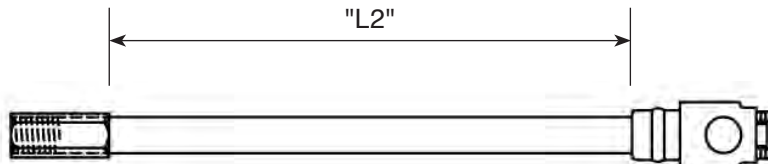
CF754- -

"L" Inches
Designate 6 for
5/8"; 7 for 3/4"
Slot End



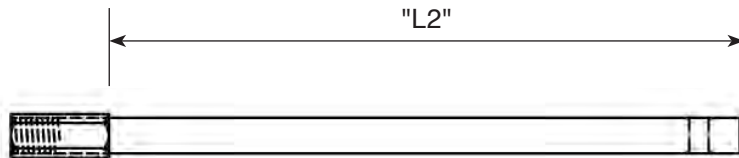
CF755- -

"L2" Inches
Designate 6 for
5/8"; 7 for 3/4"
Iron Clamp End



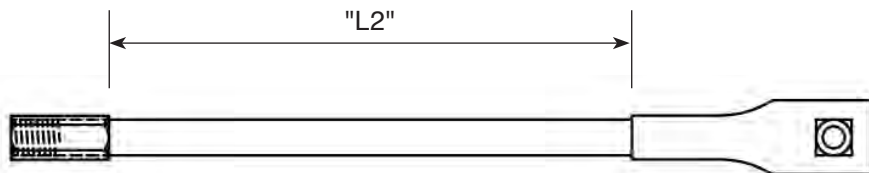
CF756- -

"L2" Inches
Designate 6 for
5/8"; 7 for 3/4"
Hole End, 7/16"

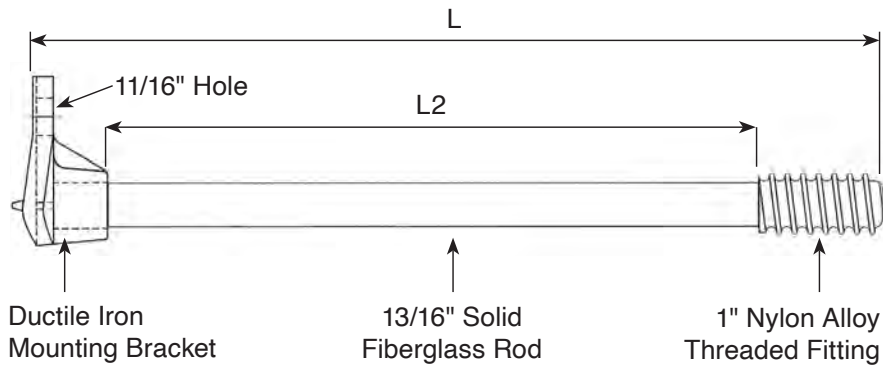


CF757- -

"L2" Inches
Designate 6 for
5/8"; 7 for 3/4"
Aluminum
Clamp End



CF753D-"L" Down Lead Bracket

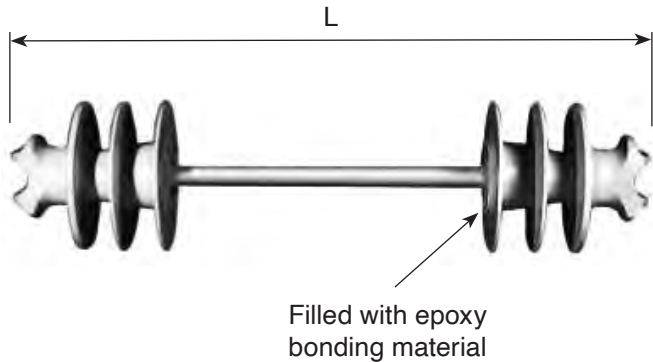


Stock No.	L Inches	L2 Inches
CF753D-12	15-1/4	12
CF753D-18	21-1/4	18
CF753D-24	27-1/4	24

Mid-Span Phase Spacers

Hughes Brothers Mid-Span Phase Spacers are manufactured from Fiberglass Reinforced Plastic (FRP). The material is a Polyester matrix containing ultraviolet protective inhibitors and a resin-rich protective outer veil.

All CF800 series Phase Spacers are made-to-order. Any reasonable length is available. Specify "L" in inches if a suitable length is not listed below.



CF800 Conductor Phase Spacer, 35KV

Stock No.	Rod Dia. Inches	Insulator Threads Inches	L Inches	Approx. Wt. Lbs.
CF800-18	1	1	18	7.00
CF800-24	1	1	24	8.00
CF800-36	1	1	36	9.30
CF800-48	1	1	48	10.60
CF800-66	1	1	66	11.50

All CF800 Phase Spacers use "F" neck polyethelene insulators.

CF800-"L"C Conductor Phase Spacer, 15 KV

Stock No.	Rod Dia. Inches	Insulator Threads Inches	L Inches	Approx. Wt. Lbs.
CF800-18C	1	1	18	7.00
CF800-24C	1	1	24	8.00
CF800-36C	1	1	36	9.30
CF800-48C	1	1	48	10.60
CF800-66C	1	1	66	11.50

All CF800-"L"C Phase Spacers use "C" neck polyethelene insulators.

CF800D 35kV Mid-Span Phase Spacer

Hughes Brothers **CF800**-**"L"**D & E enable the installation of a phase spacer using hot sticks. The Hendrix or PLP vise-top insulator features options for two conductor installation locations. Insulator jaws open to virtually any conductor size* (see notes below).

Stock No.

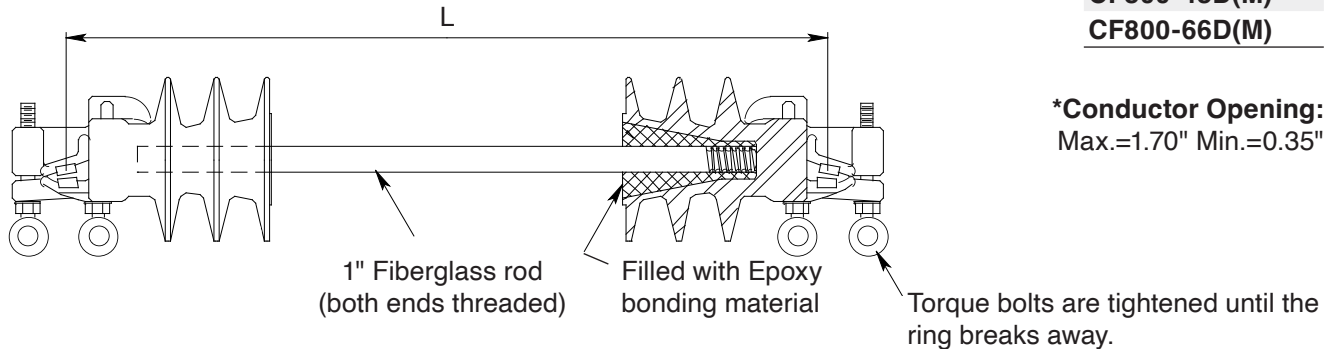
CF800-18D(M)

CF800-24D(M)

CF800-36D(M)

CF800-48D(M)

CF800-66D(M)



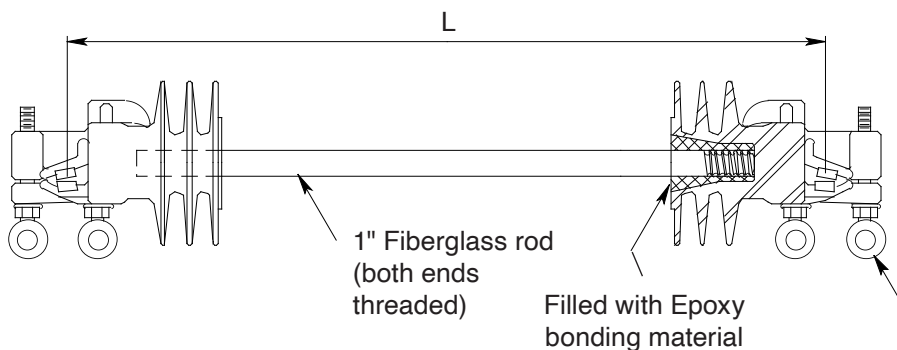
***Conductor Opening:**
Max.=1.70" Min.=0.35"

Ordering Example:

CF800-"L"DM

Designates bare conductor application.
Length

CF800E 15kV Mid-Span Phase Spacer



Stock No.

CF800-18E(M)

CF800-24E(M)

CF800-36E(M)

CF800-48E(M)

CF800-66E(M)

***Conductor Opening:**
Max.=1.70" Min.=0.312"

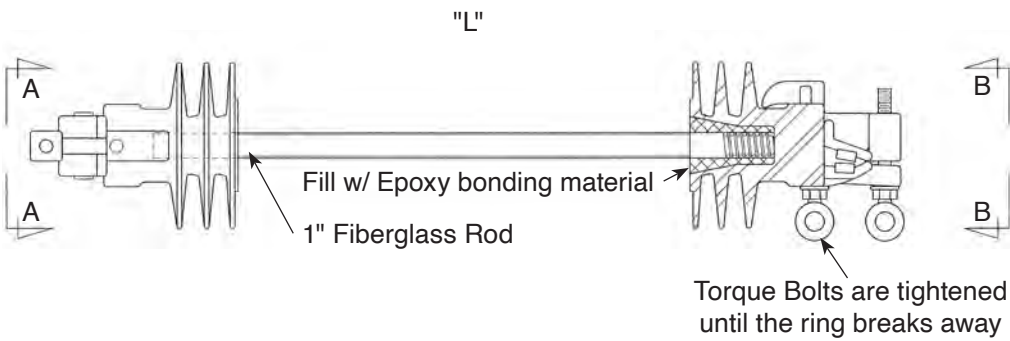
Torque bolts are tightened until the ring breaks away.

Ordering Example:

CF800-"L"EM

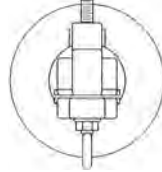
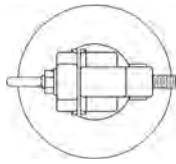
Designates bare conductor application
Length

CF800-"L" G(M) Mid-Span Phase Spacer



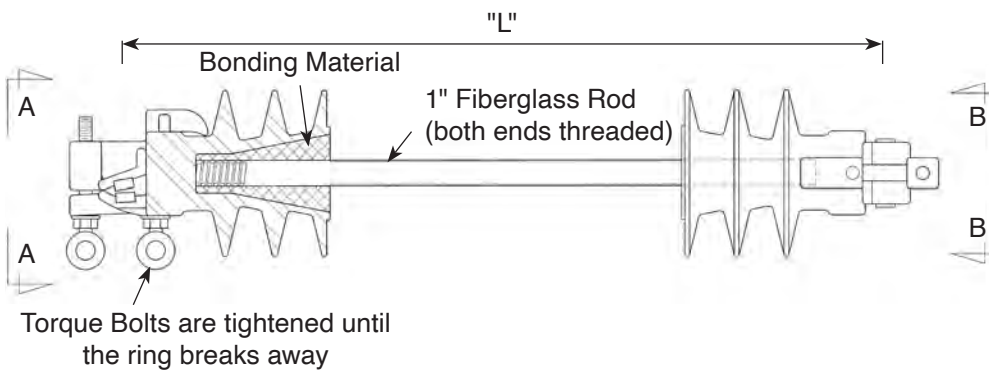
View at A-A

View at B-B



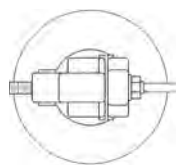
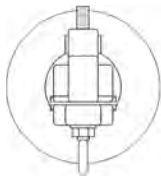
Stock No.	L Inches
CF800-18G	18
CF800-18GM	18

CF800-"L" J Mid-Span Phase Spacer



View at A-A

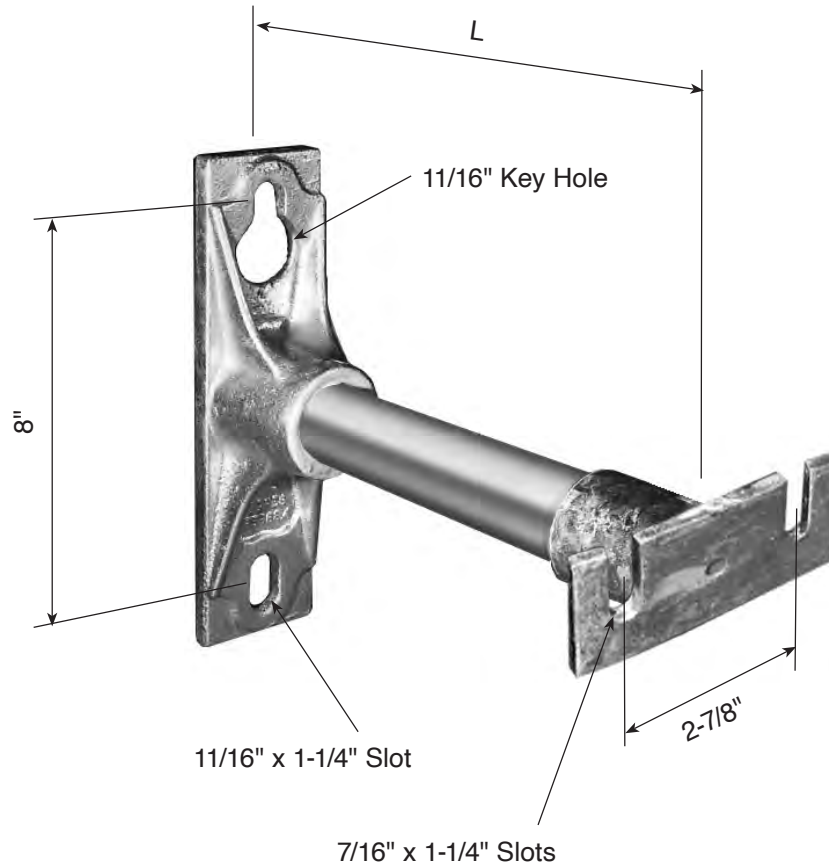
View at B-B



Stock No.	L Inches
CF800-18J	18
CF800-24J	24

CF635 Cable Extension

The **CF635** Cable Extension Bracket allows for attachment by a 2 bolt clamp or by Cable TV or Telephone Cable Hangers.



Stock No.	Rod Dia. Inches	L Inches	Ultimate Strength-Lbs.	
			Vertical Cant.	Tensile
CF635-12	1-1/2	12	1800	5000
CF635-13	1-1/2	13	1700	5000
CF635-15	1-1/2	15	1500	5000
CF635-18	1-1/2	18	1200	5000
CF635-20	1-1/2	20	1000	5000

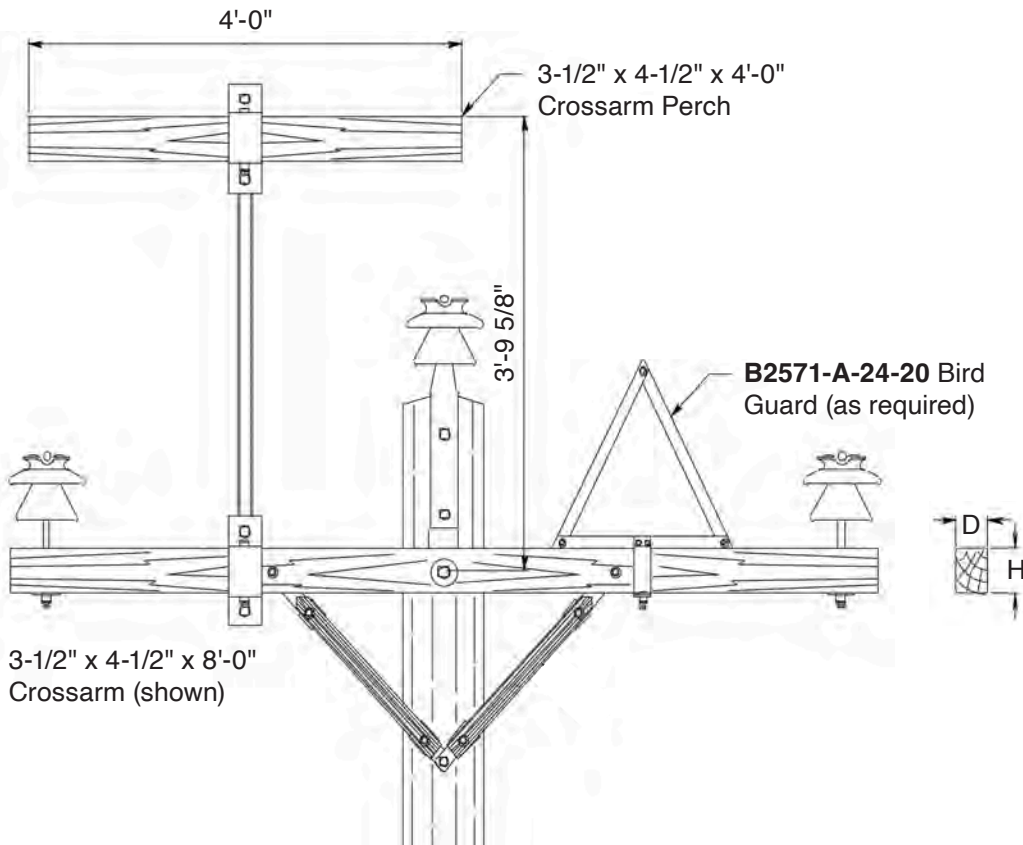
B2502-Q Raptor Perch

Electrocution is one of the leading causes of eagle and raptor mortality. Hughes Brothers **B2502-Q** Perches provide a safe place for raptors to land on single pole structures.

The **B2502-Q** features a 1-1/2" fiberglass rod as the perch shaft to help maintain the basic insulating level of the pole top assembly. The perch clamps to the crossarm so that no field drilling is required.

The **B2502** is often used in conjunction with the **B2571** Bird Guard.

Other configurations available upon request. Please contact Hughes Brothers engineering staff for assistance.



Other configurations available upon request. Please contact Hughes Brothers engineering staff for assistance.

Stock No.	Wt. Lbs. Each	Crossarm Size Inches	
		D	H
B2502-Q3A	42.00	5-3/4	5-3/4
B2502-Q3B	41.00	3-3/4	4-3/4
B2502-Q3C	41.00	3-1/2	4-1/2
B2502-Q3D	41.00	4-3/4	5-3/4
B2502-Q3E	41.00	3-3/4	5-3/4

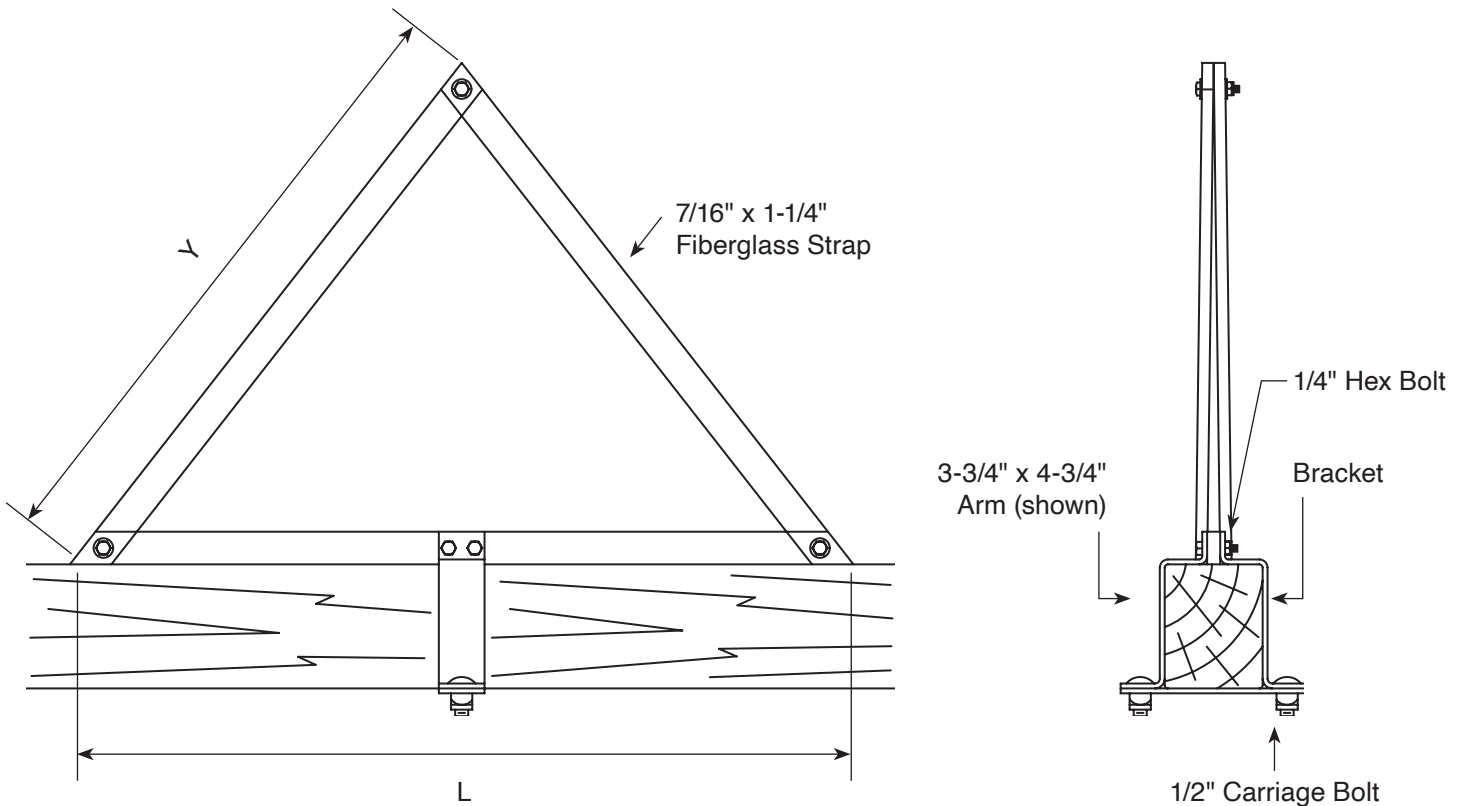
B2571 Bird Guard

Hughes Brothers **B2571** Bird Guard helps deter raptors from landing on the crossarm between phases of single pole structures. Large raptors risk electrocution on take-off and landing since their wing spans are often large enough to short circuit between phases.

Many sizes are available. Contact Hughes Brothers for more information.

The **B2571** is made of sturdy 7/16" X 1-1/4" fiberglass to help maintain the basic insulating level of the pole top assembly. The bird guard clamps to the crossarm so that no field drilling is required.

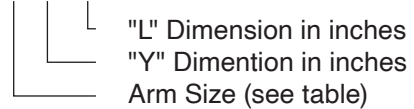
The **B2571** is often used in conjunction with the **B2502-Q** series of raptor perches.



Stock No.	Arm Size Inches	Wt. Lbs. Each
B2571-A-20-20	3-3/4 x 4-3/4	6.00
B2571-A-22-18	3-3/4 x 4-3/4	6.00
B2571-A-24-20	3-3/4 x 4-3/4	6.00
B2571-A-24-24	3-3/4 x 4-3/4	7.00
B2571-A-24-30	3-3/4 x 4-3/4	7.00
B2571-AA-24-20	3-1/2 x 4-1/2	7.00
B2571-AA-30-36	3-1/2 x 4-1/2	7.00
B2571-A1-24-20	3-3/4 x 5-3/4	6.00
B2571-A1-30-30	3-3/4 x 5-3/4	7.00

Ordering Example:

B2571-A1-20-20





DAVIT ARMS

Hughes Brothers Steel Davit Arms



Each Hughes Brothers Steel Davit is stamped with the order number at the time of manufacture. This allows us to trace material, welding and other manufacturing procedures. After producing over 500,000 steel davit arms since the late 1970's we have yet to have a single failure. Davits can be custom designed for your particular application.

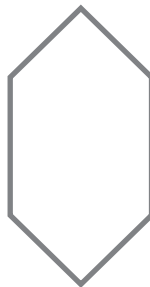
100% mechanical proof loading and magnetic particle verification of critical welds per ASTM E709, in conjunction with ANSI / AWS D1.1, are also available as quality control options. Our standard production procedure utilizes mil-standard 105D sampling for proof load testing unless specified otherwise.

Hughes Brothers provides Steel Davits for use on wood, concrete or steel poles.

Ordering Information

This catalog section will help you determine which base plate & phase attachment option are most suited to your individual application. Please contact our engineering department for many, many other options.

Typical cross section of Davit tubes

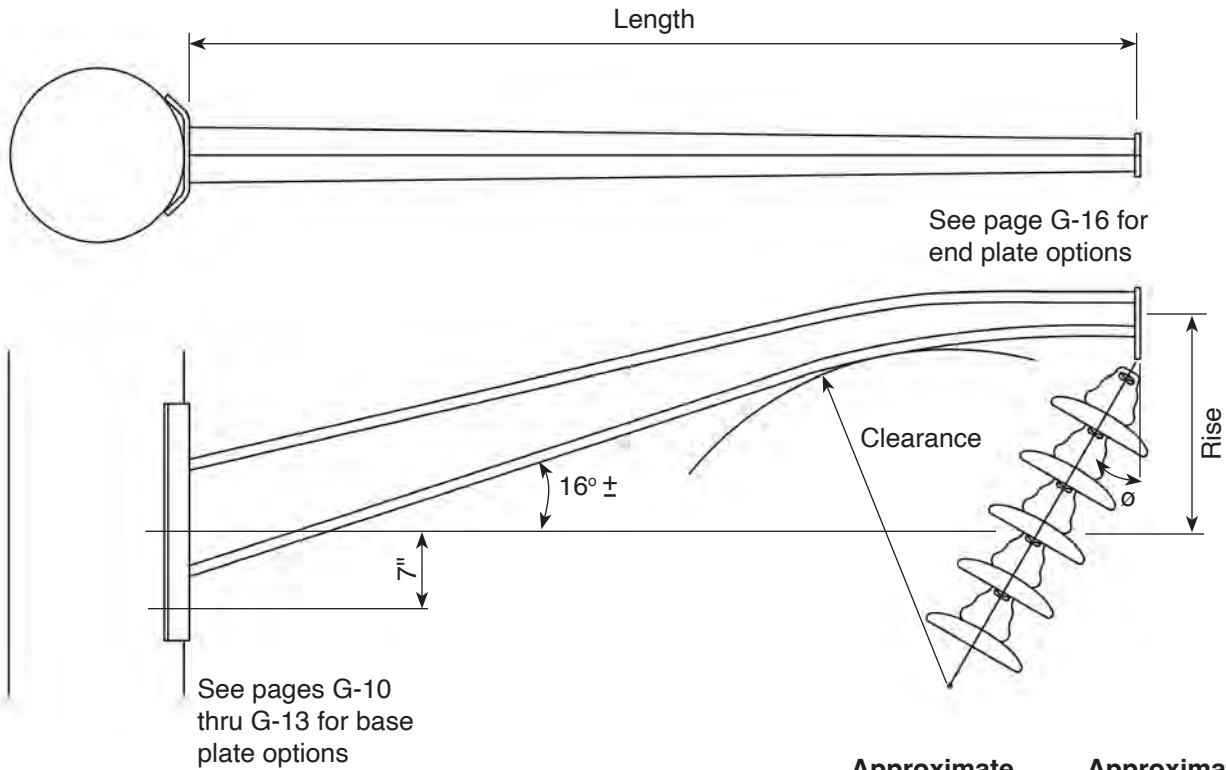


4000/4010
See pages
G-2 to G-5



4020/4030
See pages
G-6 to G-9

4000 Series, 16° Rise Angle, Heavy Duty Steel Davit Arms

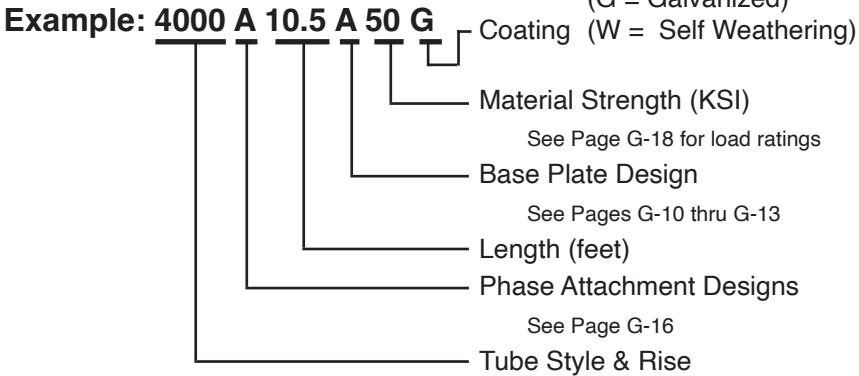


Insulator String Length	Approximate Clearance @ $\theta=45^\circ$ Swing Angle	Approximate Clearance @ $\theta=30^\circ$ Swing Angle
2'-0"	1'-6 1/2"	1'-11"
3'-0"	2'-1"	2'-8"
4'-0"	2'-6"	3'-5"
5'-0"	3'-0"	4'-1"
6'-0"	3'-6"	4'-9"
7'-0"	4'-0"	5'-6"

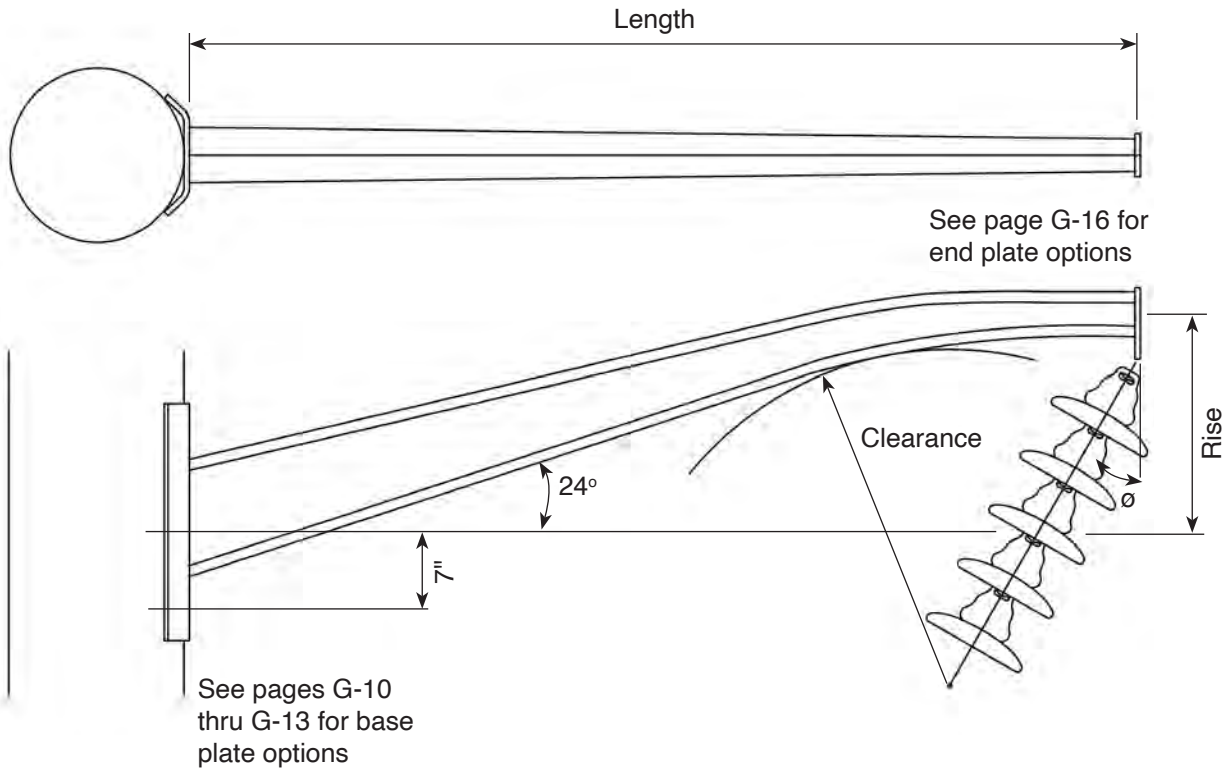
4000 Series

Stock No.	Arm Length	Rise	Approx. Wt. (lbs.)
4000A3.5A50G	3'-6"	0'-5"	65
4000A4.0A50G	4'-0"	0'-7"	70
4000A4.5A50G	4'-6"	0'-9"	75
4000A5.0A50G	5'-0"	0'-11"	80
4000A5.5A50G	5'-6"	1'-1"	90
4000A6.0A50G	6'-0"	1'-3"	95
4000A6.5A50G	6'-6"	1'-5"	105
4000A7.0A50G	7'-0"	1'-7"	115
4000A7.5A50G	7'-6"	1'-9"	120
4000A8.0A50G	8'-0"	1'-11"	130
4000A8.5A50G	8'-6"	2'-1"	135
4000A9.0A50G	9'-0"	2'-3"	145
4000A9.5A50G	9'-6"	2'-5"	150
4000A10.0A50G	10'-0"	2'-7"	160
4000A10.5A50G	10'-6"	2'-9"	170
4000A11.0A50G	11'-0"	2'-11"	185

Ordering Options



4010 Series, 24° Rise Angle, Heavy Duty Steel Davit Arms

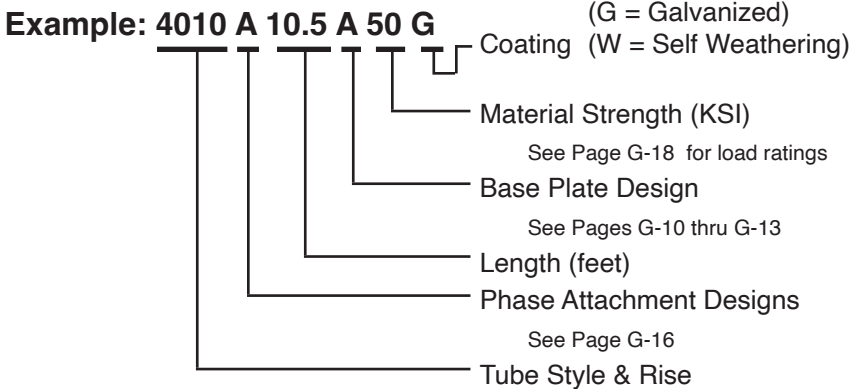


Insulator String Length	Approximate Clearance @ $\theta=45^\circ$ Swing Angle	Approximate Clearance @ $\theta=30^\circ$ Swing Angle
2' - 0"	1' - 4 1/2"	1' - 9 1/4"
3' - 0"	1' - 9"	2' - 5"
4' - 0"	2' - 1 1/2"	3' - 0"
5' - 0"	2' - 6"	3' - 7"
6' - 0"	2' - 10 1/2"	4' - 2"
7' - 0"	3' - 3"	4' - 9"

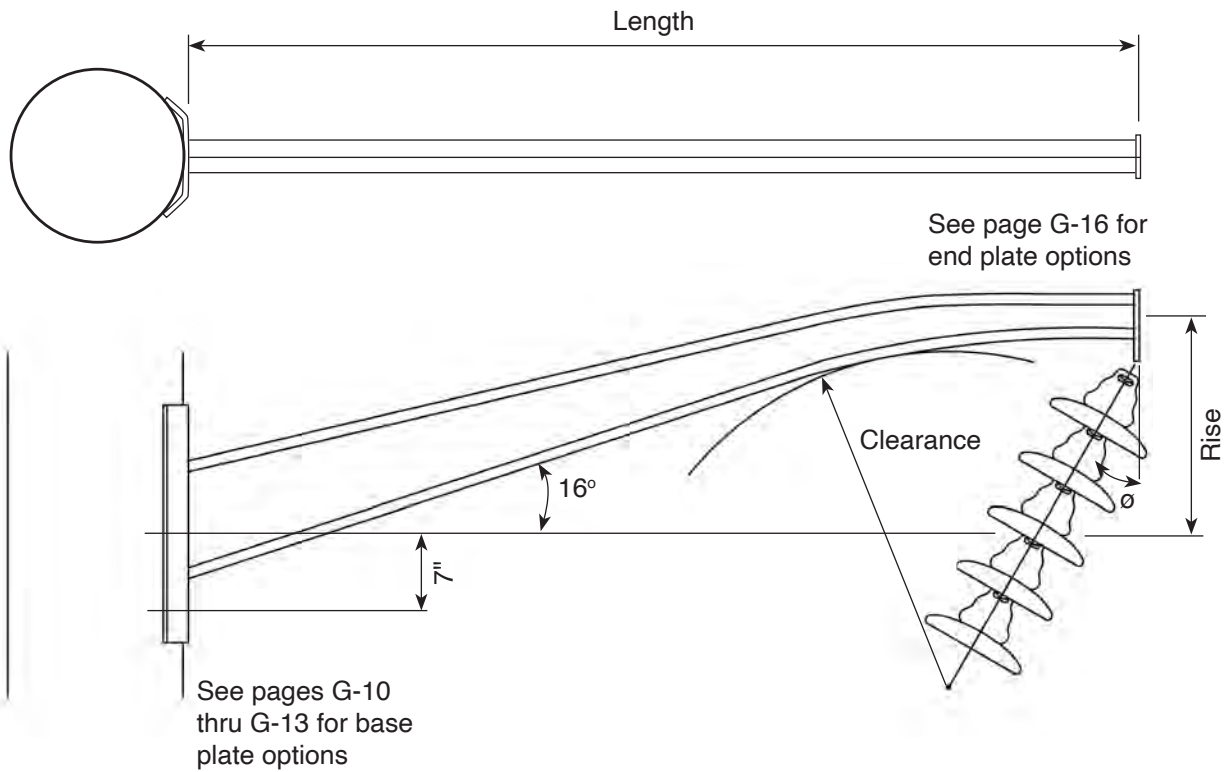
4010 Series

Stock No	Arm Length	Rise	Approx. Wt. (lbs.)
4010A3.5A50G	3'-6"	0'-11"	65
4010A4.0A50G	4'-0"	1'-2"	70
4010A4.5A50G	4'-6"	1'-5"	75
4010A5.0A50G	5'-0"	1'-7"	80
4010A5.5A50G	5'-6"	1'-10"	90
4010A6.0A50G	6'-0"	2'-0"	95
4010A6.5A50G	6'-6"	2'-3"	105
4010A7.0A50G	7'-0"	2'-5"	115
4010A7.5A50G	7'-6"	2'-8"	120
4010A8.0A50G	8'-0"	2'-10"	130
4010A8.5A50G	8'-6"	3'-1"	135
4010A9.0A50G	9'-0"	3'-3"	145
4010A9.5A50G	9'-6"	3'-6"	150
4010A10.0A50G	10'-0"	3'-8"	160
4010A10.5A50G	10'-6"	3'-11"	170
4010A11.0A50G	11'-0"	4'-1"	185

Ordering Options



4020 Series, 16° Rise Angle, Medium Duty Steel Davit Arms



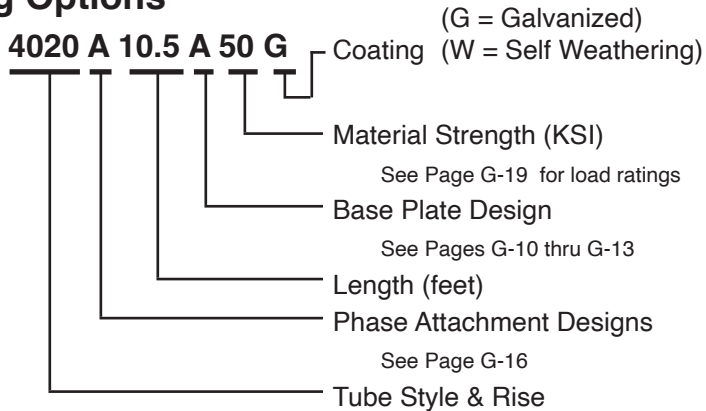
Insulator String Length	Approximate Clearance @ $\theta=45^\circ$ Swing Angle	Approximate Clearance @ $\theta=30^\circ$ Swing Angle
2' - 0"	1' - 6 7/8"	1' - 11 1/8"
3' - 0"	2' - 1"	2' - 8 1/4"
4' - 0"	2' - 6 1/2"	3' - 5"
5' - 0"	3' - 0 1/4"	4' - 1 1/4"
6' - 0"	3' - 6"	4' - 9 1/2"
7' - 0"	4' - 0"	5' - 6"

4020 Series

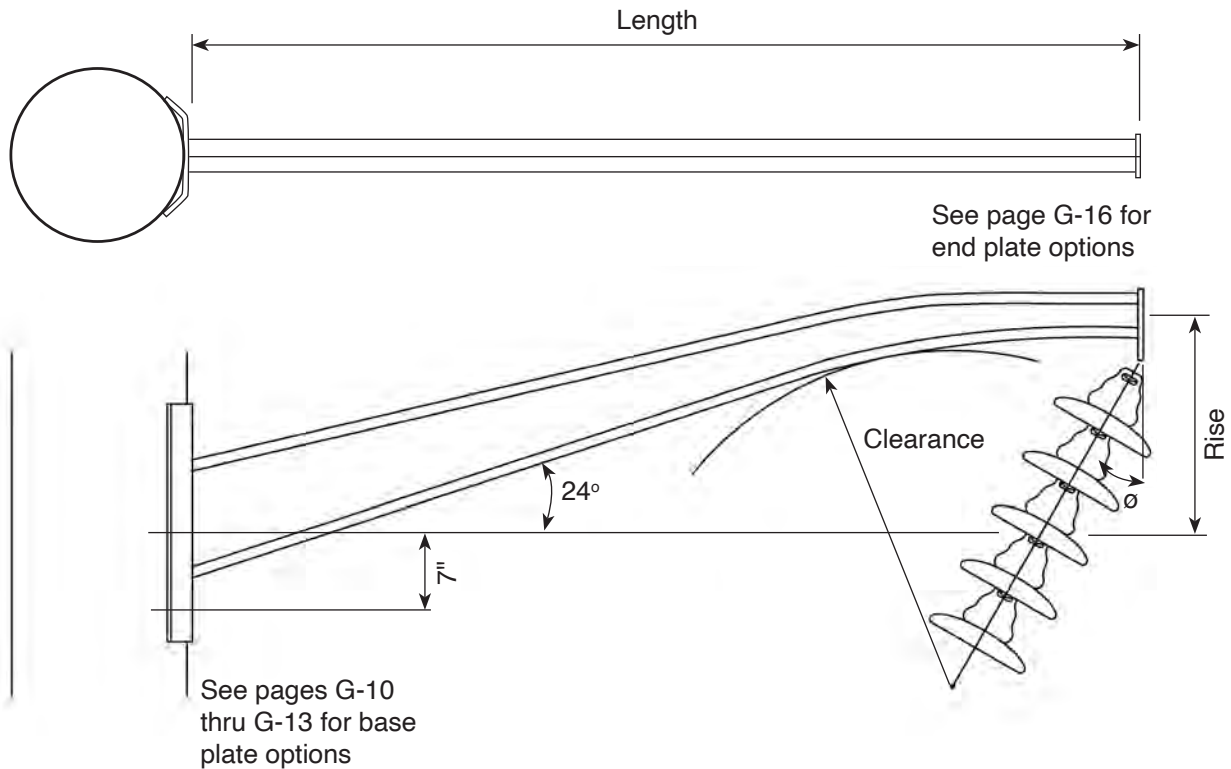
Stock No.	Arm Length	Rise	Approx. Wt. (lbs.)
4020A3.5A50G	3'-6"	0'-5"	60
4020A4.0A50G	4'-0"	0'-7"	65
4020A4.5A50G	4'-6"	0'-9"	70
4020A5.0A50G	5'-0"	0'-11"	75
4020A5.5A50G	5'-6"	1'-1"	85
4020A6.0A50G	6'-0"	1'-3"	90
4020A6.5A50G	6'-6"	1'-5"	95
4020A7.0A50G	7'-0"	1'-7"	105
4020A7.5A50G	7'-6"	1'-9"	110
4020A8.0A50G	8'-0"	1'-11"	120
4020A8.5A50G	8'-6"	2'-1"	125
4020A9.0A50G	9'-0"	2'-3"	135
4020A9.5A50G	9'-6"	2'-5"	140
4020A10.0A50G	10'-0"	2'-7"	145
4020A10.5A50G	10'-6"	2'-9"	150
4020A11.0A50G	11'-0"	2'-11"	160

Ordering Options

Example: 4020 A 10.5 A 50 G



4030 Series, 24° Rise Angle, Medium Duty Steel Davit Arms



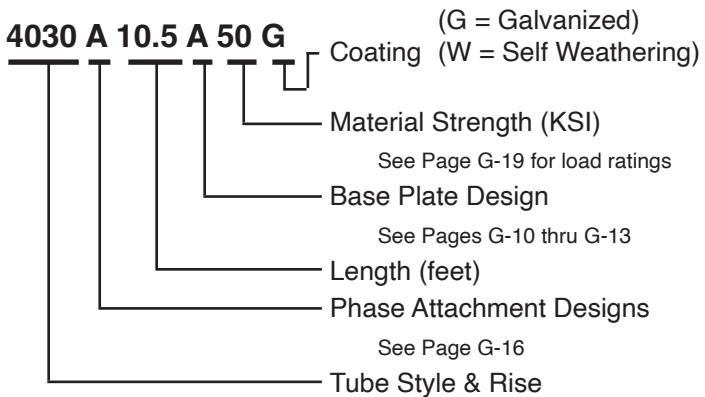
Insulator String Length	Approximate Clearance @ $\theta=45^\circ$ Swing Angle	Approximate Clearance @ $\theta=30^\circ$ Swing Angle
2' - 0"	1' - 4 1/2"	1' - 9 1/4"
3' - 0"	1' - 9"	2' - 5"
4' - 0"	2' - 1 1/2"	3' - 0"
5' - 0"	2' - 6"	3' - 7"
6' - 0"	2' - 10 1/2"	4' - 2"
7' - 0"	3' - 3"	4' - 9"

4030 Series

Stock No.	Arm Length	Rise	Approx. Wt. (lbs.)
4030A3.5A50G	3'-6"	0'-11"	60
4030A4.0A50G	4'-0"	1'-2"	65
4030A4.5A50G	4'-6"	1'-5"	70
4030A5.0A50G	5'-0"	1'-7"	75
4030A5.5A50G	5'-6"	1'-10"	85
4030A6.0A50G	6'-0"	2'-0"	90
4030A6.5A50G	6'-6"	2'-3"	95
4030A7.0A50G	7'-0"	2'-5"	105
4030A7.5A50G	7'-6"	2'-8"	110
4030A8.0A50G	8'-0"	2'-10"	120
4030A8.5A50G	8'-6"	3'-1"	125
4030A9.0A50G	9'-0"	3'-3"	135
4030A9.5A50G	9'-6"	3'-6"	140
4030A10.0A50G	10'-0"	3'-8"	145
4030A10.5A50G	10'-6"	3'-11"	150
4030A11.0A50G	11'-0"	4'-1"	160

ORDERING OPTIONS

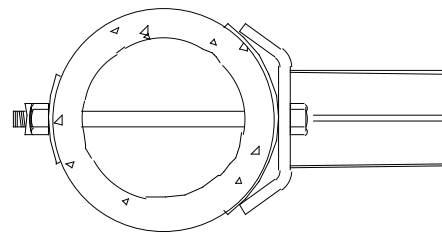
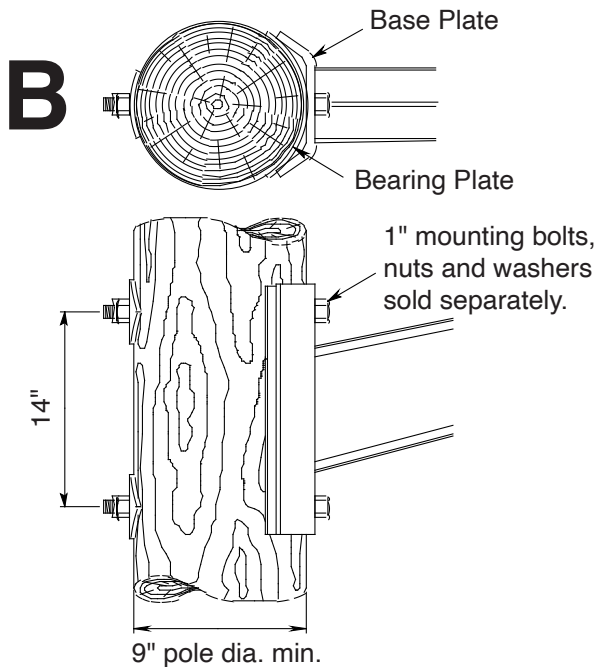
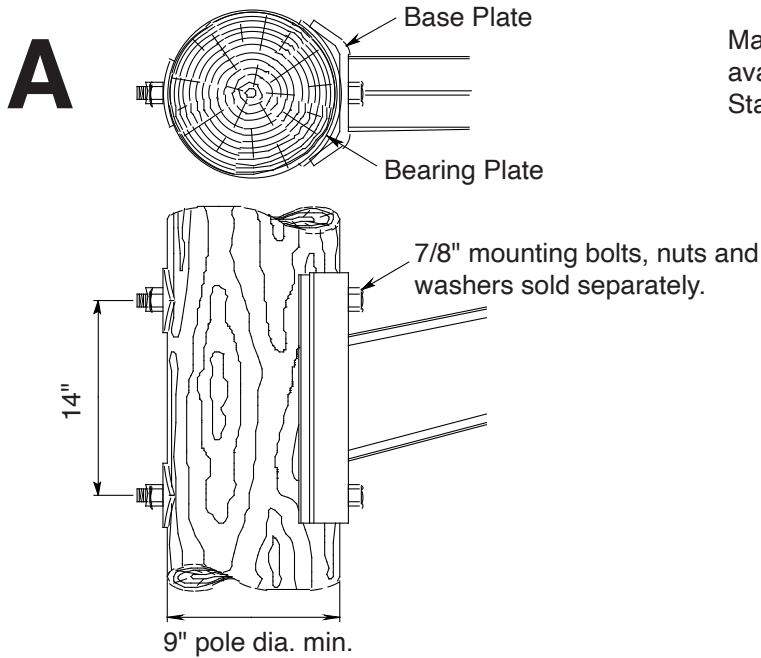
Example: **4030 A 10.5 A 50 G**



Base Plate Options

See Table A on page G-17

Many variations of base plate options are available. Consult Hughes Brothers Engineering Staff before ordering.

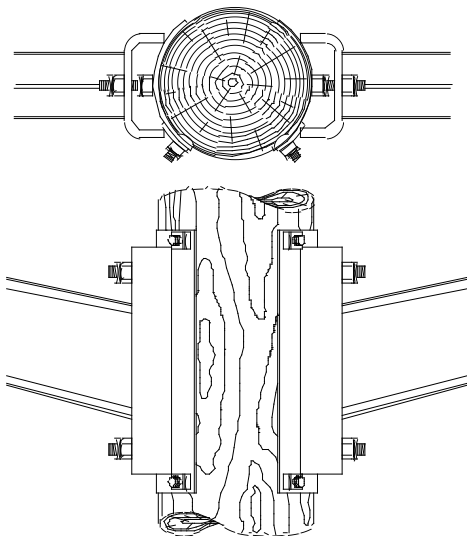
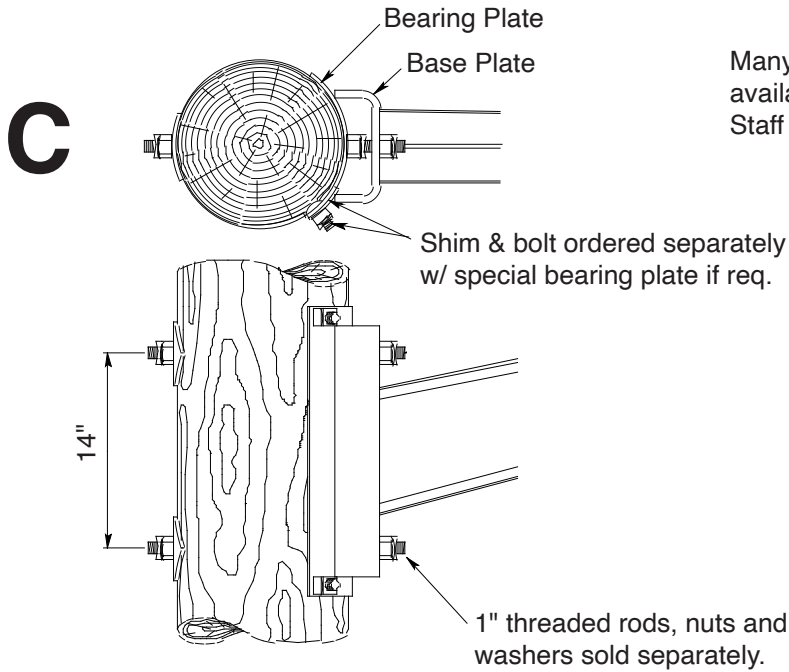


Styles A & B work equally well on concrete poles.

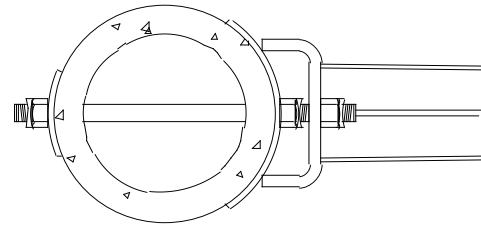
Base Plate Options

See Table A on page G-17

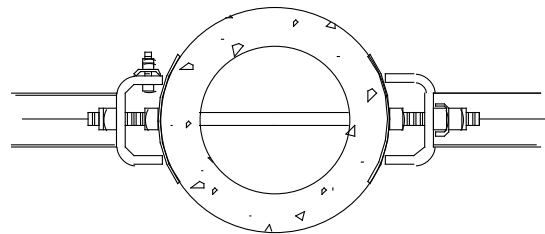
Many variations of base plate options are available. Consult Hughes Brothers Engineering Staff before ordering.



Option C in double circuit configuration on wood pole.



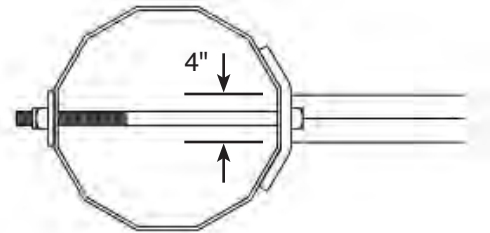
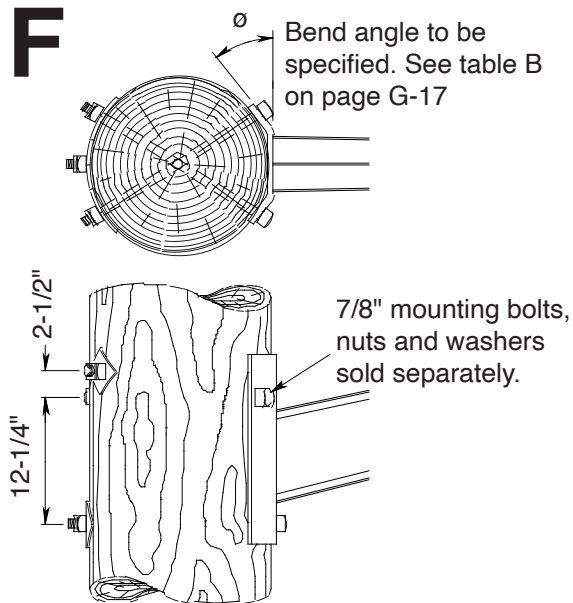
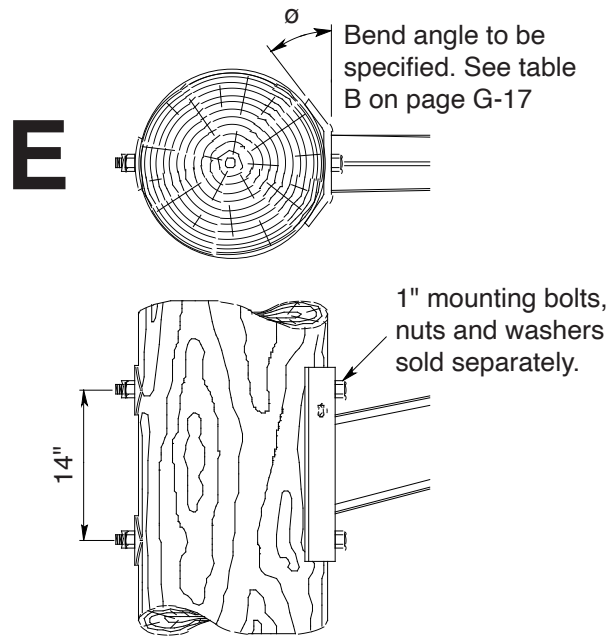
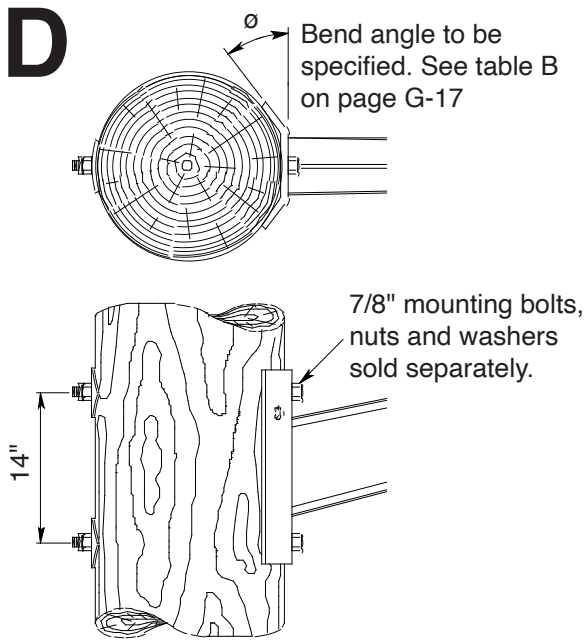
Option C works equally well on concrete poles.



Base Plate Options

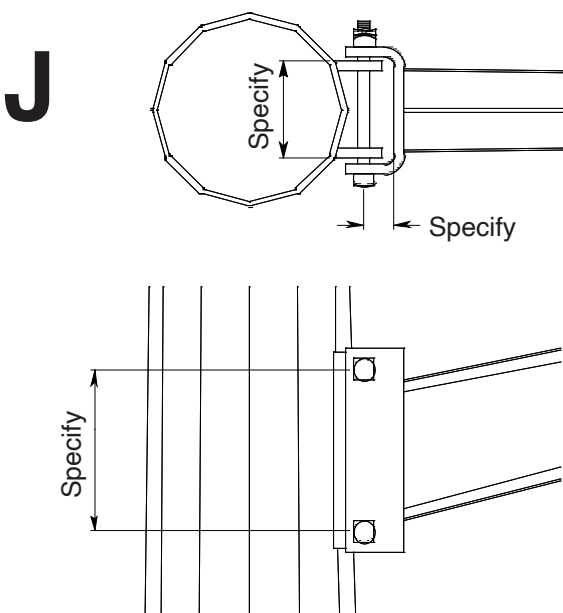
See Table A on page G-17

Many variations of base plate options are available. Consult Hughes Brothers Engineering Staff before ordering.



Options D & E shown here in a steel pole application.

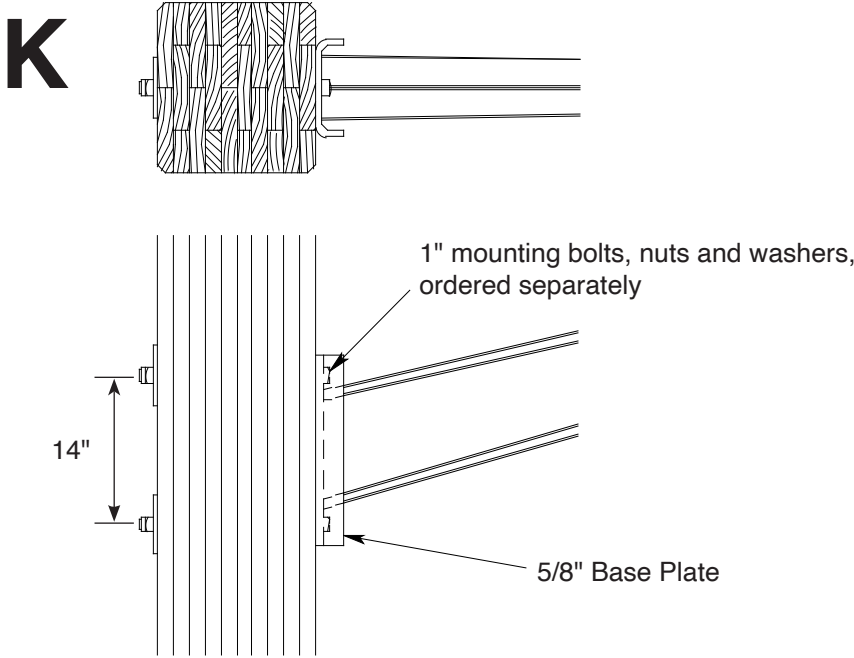
Minimum pole diameter= 15".



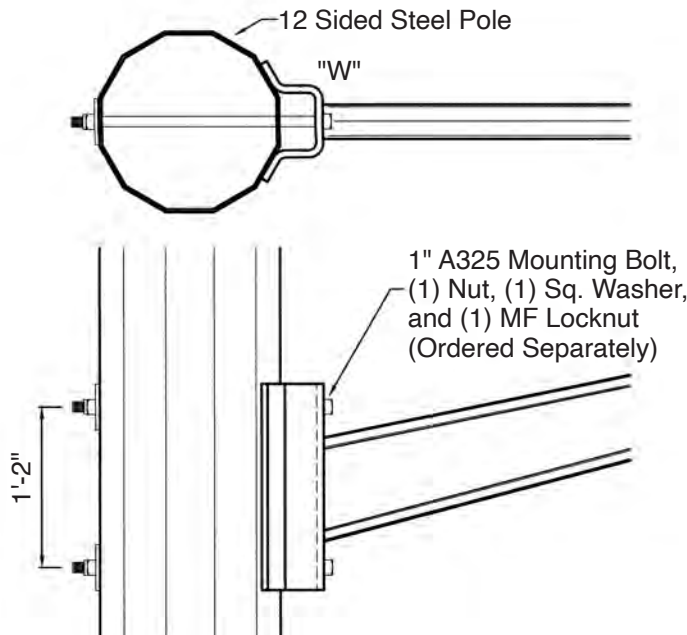
Base Plate Options

See Table A on page G-17

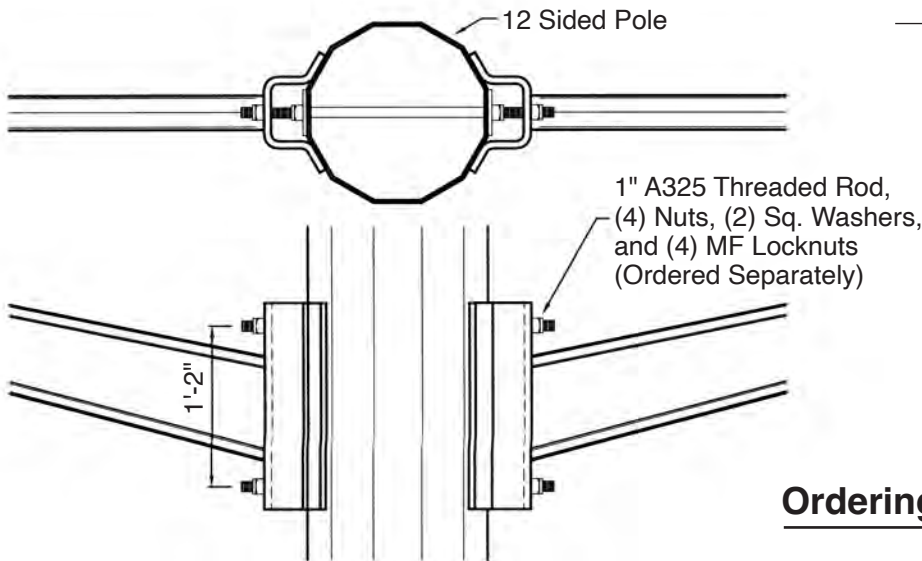
Many variations of base plate options are available. Consult Hughes Brothers Engineering Staff before ordering.



C4485-V Steel Davit Arm

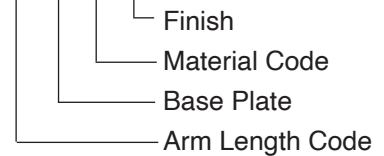


Base Plate Code	"W" Width	Pole Dia. Range (Flat-Flat)
A	4"	10" - 16"
B	5"	14" - 20"
C	6"	16" - 24"
D	7"	17" - 28"

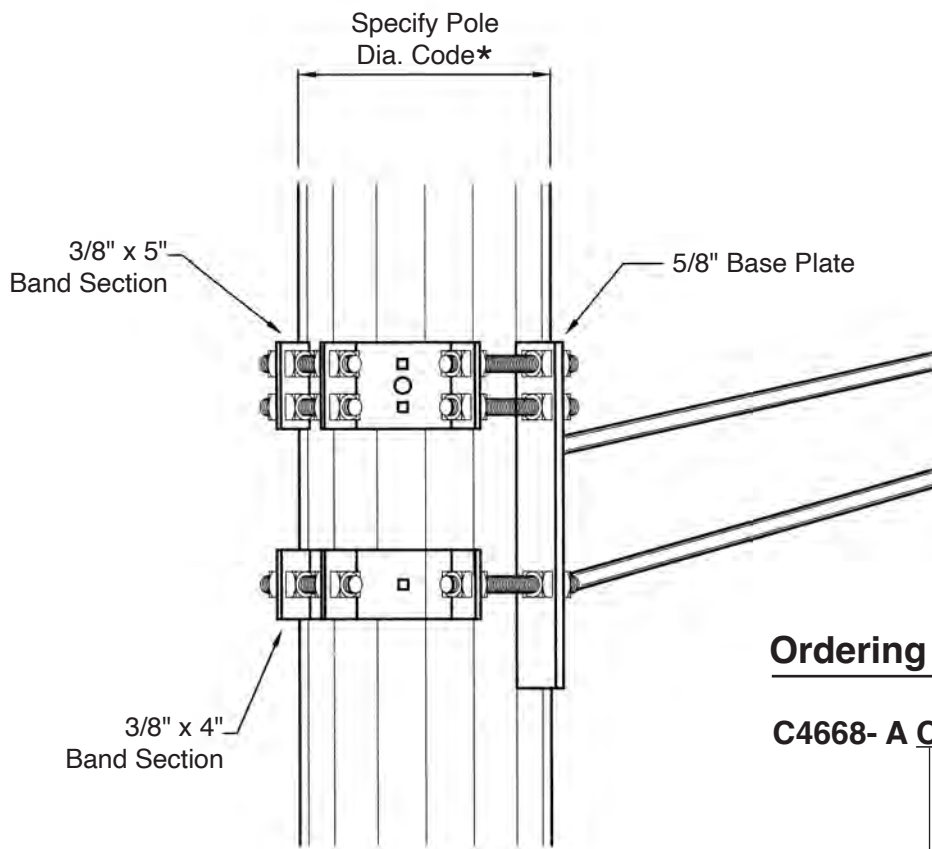
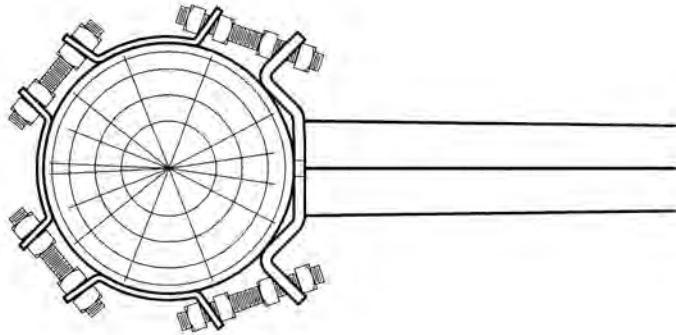


Ordering Example

C4485- V4.0 A 65 G



C4668-A Steel Davit Arm

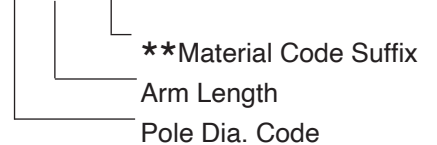


***Pole Dia. Code**

A	10"-12"
B	12"-14"
C	14"-16"
D	16"-18"
E	18"-20"

Ordering Example

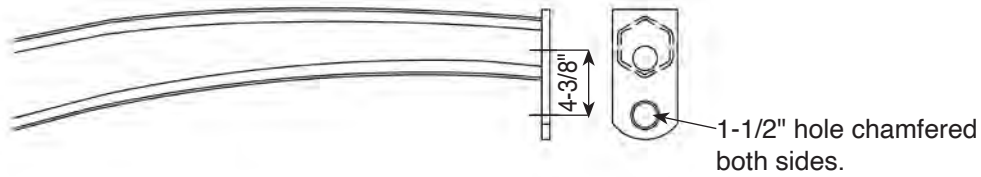
C4668- A C 8.0 MS



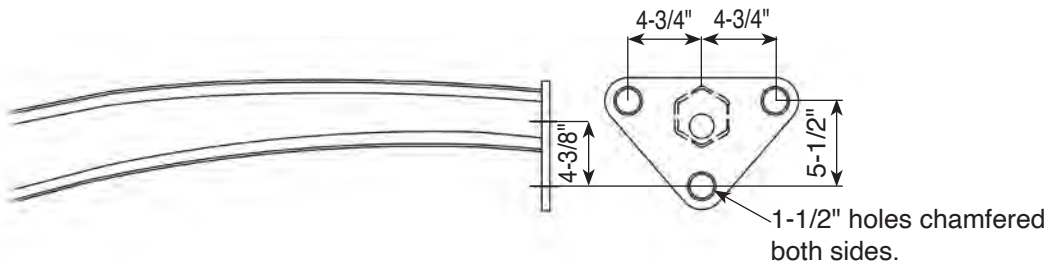
**Material Code Suffix
 MS= Mild Steel
 CT= Cor-Ten Steel

Phase Attachment Options

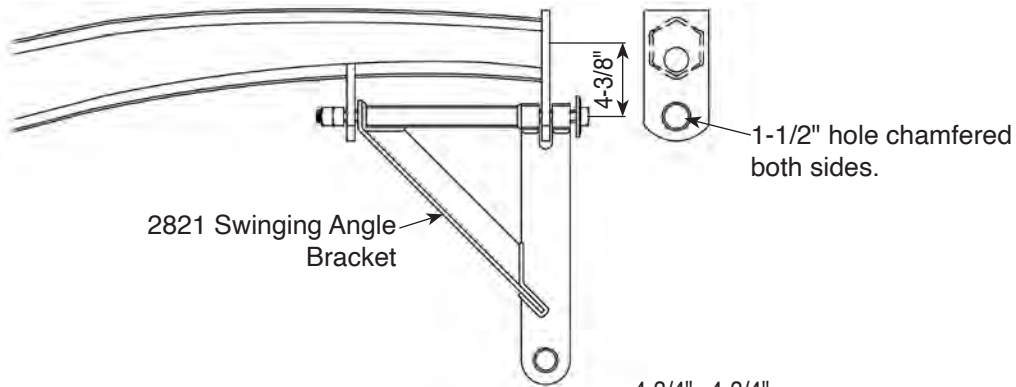
A



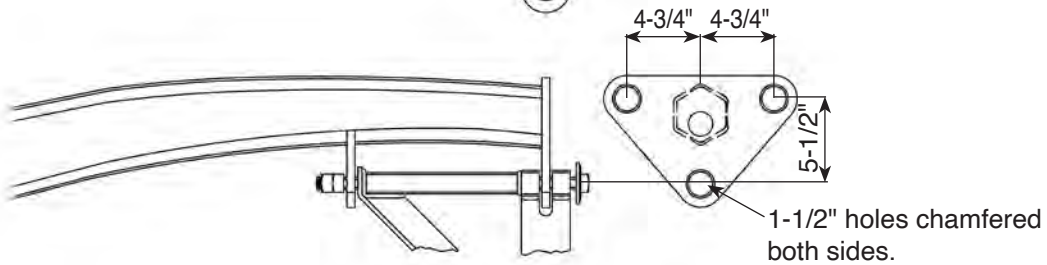
B



C



D



AT



TABLE A

Ultimate Vertical Strength Based on ANSI C135.1 Bolt Strength and 14" Base Plate Bolt Spacing

Base Plate Configuration Type

Arm Length (feet)	Base Plate Configuration Type		
	A&D (2) 7/8" Bolts <i>T=25,400 lbs each</i>	B, C, & E (2) 1" Bolts <i>T=33,500 lbs each</i>	F (3) 7/8" Bolts <i>T=25,400 lbs each</i>
3.0	9860	13010	17000
3.5	8450	11150	14500
4.0	7400	9760	12900
4.5	6575	8670	11500
5.0	5910	7800	10300
5.5	5370	7100	9400
6.0	4920	6500	8600
6.5	4550	6000	7900
7.0	4210	5580	7400
7.5	3950	5200	6900
8.0	3700	4870	6450
8.5	3470	4580	6100
9.0	3280	4330	5700
9.5	3100	4100	5450
10.0	2950	3900	5170
10.5	2810	3710	4920
11.0	2680	3550	4700

Design Note: Check both the ultimate tube strength and the ultimate strength based on bolt strengths.

Contact Hughes Brothers Engineering Dept. for ultimate strengths based on other types of bolts.

TABLE B

Base Plate Bend Angles

Davit Series	Base Plate Bend Angle Designation	Pole Dia.	Bend Angle (degrees)
4020 & 4030	H	7"	60
	I	8"	55
	J	9"	47
	K	10"	44
	L	11"	40
	M	12"	36
4000 & 4010	N	9"	68
	O	10"	63
	P	11"	58
	Q	12"	54
	R	13"	50
	S	14"	47
	T	16"	42
	U	18"	37
	V	20"	30
	W	22"	30

TABLE C

Strength Table 4000 / 4010 Series Steel Davits



Ultimate Tube Strength, lb.
(Based on yield strength of steel)

ARM LENGTH (FEET)	VERTICAL				LONGITUDINAL			
	80KSI	65KSI	50KSI	36KSI	80KSI	65KSI	50KSI	36KSI
3.0	7550	6150	4700	3500	6250	5000	3900	2800
3.5	7550	6150	4700	3500	6250	5000	3900	2800
4.0	7550	6150	4700	3500	6250	5000	3900	2800
4.5	7550	6150	4700	3500	6250	5000	3900	2800
5.0	7550	6150	4700	3500	6250	5000	3900	2800
5.5	7550	6150	4700	3500	6250	5000	3900	2800
6.0	7550	6150	4700	3500	6250	5000	3900	2800
6.5	7550	6150	4700	3500	6250	5000	3900	2800
7.0	7550	6150	4700	3500	6250	5000	3900	2800
7.5	7550	6150	4700	3500	6250	5000	3900	2800
8.0	7550	6150	4700	3500	6250	5000	3900	2800
8.5	7550	6150	4700	3500	6250	5000	3900	2800
9.0	7550	6150	4700	3500	6250	5000	3900	2800
9.5	7550	6150	4700	3500	6250	5000	3900	2800
10.0	7550	6150	4700	3500	6250	5000	3900	2800
10.5	7550	6150	4700	3500	6250	5000	3900	2800
11.0	7550	6150	4700	3500	6250	5000	3900	2800

NOTE:

Check both the ultimate tube strength and the ultimate bolt strength.
The ultimate strength of the complete unit is the lesser of the two strengths.



TABLE C
(cont'd)

Strength Table

4020 / 4030 Series Steel Davits



Ultimate Tube Strength, lb.
(Based on yield strength of steel)

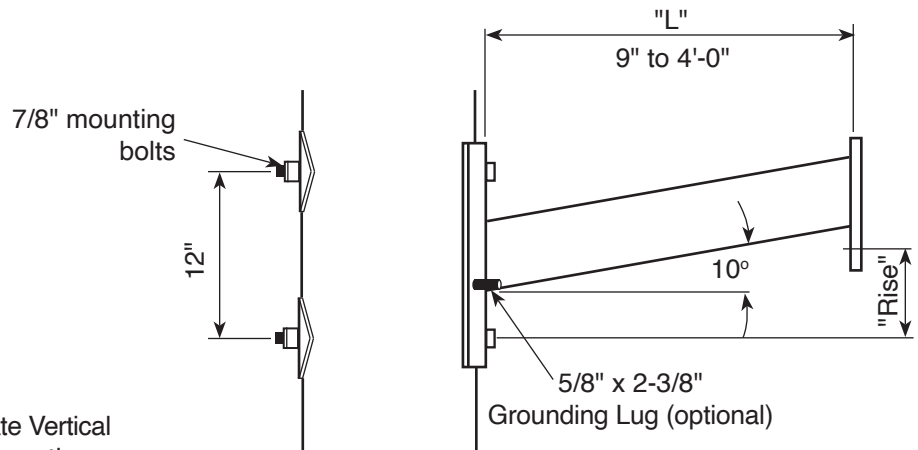
ARM LENGTH (FEET)	VERTICAL				LONGITUDINAL			
	80KSI	65KSI	50KSI	36KSI	80KSI	65KSI	50KSI	36KSI
3.0	6550	5350	4100	3000	5920	4810	3700	2660
3.5	6550	5350	4100	3000	5420	4400	3390	2440
4.0	6550	5350	4100	3000	5050	4100	3150	2270
4.5	6550	5350	4100	3000	4760	3860	2970	2140
5.0	6550	5350	4100	3000	4520	3620	2820	2030
5.5	6550	5350	4100	3000	4330	3520	2710	1950
6.0	6550	5350	4100	3000	4170	3390	2610	1880
6.5	6550	5350	4100	3000	4040	3280	2520	1820
7.0	6550	5350	4100	3000	3920	3190	2450	1760
7.5	6550	5350	4100	3000	3820	3110	2390	1720
8.0	6550	5350	4100	3000	3740	3040	2330	1680
8.5	6550	5350	4100	3000	3660	2970	2290	1640
9.0	6550	5350	4100	3000	3590	2920	2240	1610
9.5	6550	5350	4100	3000	3530	2870	2210	1590
10.0	6550	5350	4100	3000	3480	2820	2170	1560
10.5	6550	5350	4100	3000	3430	2780	2140	1540
11.0	6550	5350	4100	3000	3380	2750	2110	1520

NOTE:

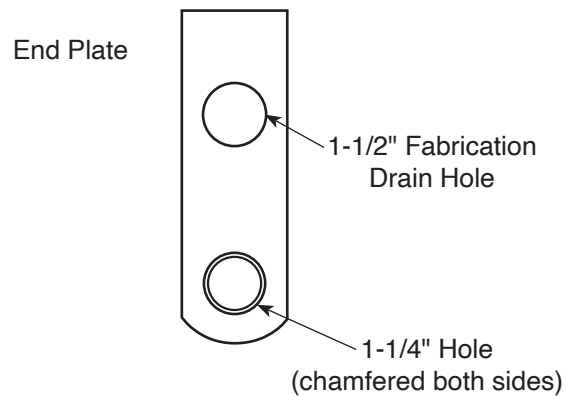
Check both the ultimate tube strength and the ultimate bolt strength.
The ultimate strength of the complete unit is the lesser of the two strengths.

C4484-C Static Support Arm

Hughes Brothers C4484-C Static Support Arms are used to offset the shield wire a greater distance from the pole. Tube sizes can be changed to accommodate load requirements, and other base and end fittings are possible. Contact Hughes Brothers Engineering staff for assistance.



Stock No.	"L"	Rise	Ultimate Vertical Strength
C4484-C9	9"	3-1/2"	9,000 lbs.
C4484-C12	12"	4"	6,700 lbs.
C4484-C14	14"	4-3/8"	5,700 lbs.
C4484-C16	16"	4-5/8"	5,000 lbs.
C4484-C18	18"	5"	4,500 lbs.
C4484-C24	24"	6"	3,300 lbs.
C4484-C27	27"	6-5/8"	3,000 lbs.
C4484-C30	30"	7-3/8"	2,700 lbs.
C4484-C36	36"	8-1/8"	2,200 lbs.
C4484-C42	42"	9-1/4"	1,900 lbs.
C4484-C48	48"	10-3/8"	1,600 lbs.

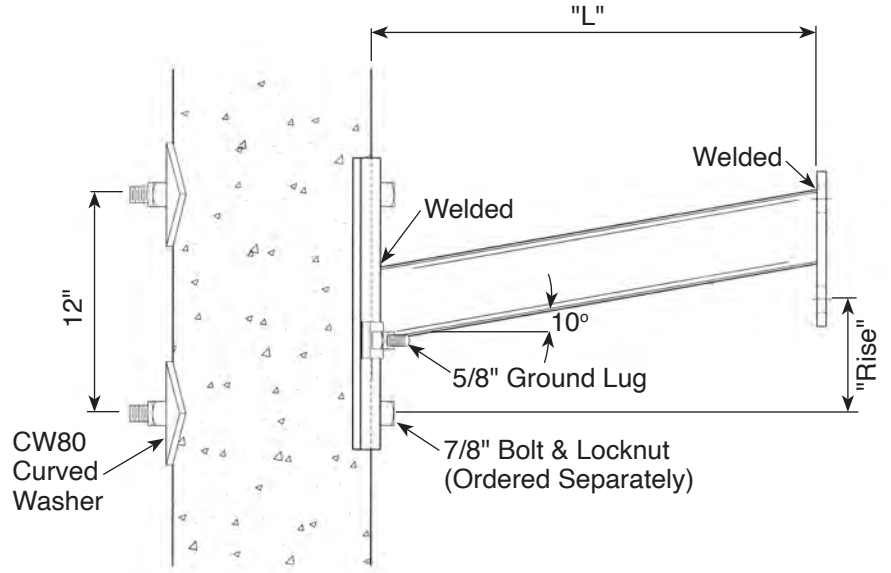


Ordering Example

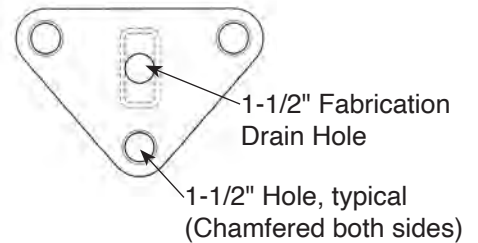
C4484- C "L" G
 └── Grounding Lug (optional)
 └── "L" Length in inches

C4484-CDE Static Support Arm

The C4484-CDE Static Support Arms steel are used to offset the shield wire a greater distance from the pole. Tube sizes can be changed to accommodate load requirements and other base and end fittings are possible. Contact Hughes Brothers Engineering staff for assistance.



Stock No.	"L"	Rise	Ultimate Vertical Strength
C4484-CDE6	6"	3"	17,250 lbs.
C4484-CDE9	9"	3-1/2"	11,500 lbs.
C4484-CDE12	12"	4"	8,600 lbs.
C4484-CDE14	14"	4-3/8"	7,300 lbs.
C4484-CDE16	16"	4-3/4"	6,400 lbs.
C4484-CDE18	18"	5"	5,700 lbs.
C4484-CDE24	24"	6"	4,300 lbs.
C4484-CDE27	27"	6-5/8"	3,800 lbs.
C4484-CDE30	30"	7-3/8"	3,400 lbs.
C4484-CDE36	36"	8-1/8"	2,800 lbs.
C4484-CDE42	42"	9-1/4"	2,400 lbs.
C4484-CDE48	48"	10-3/8"	2,100 lbs.



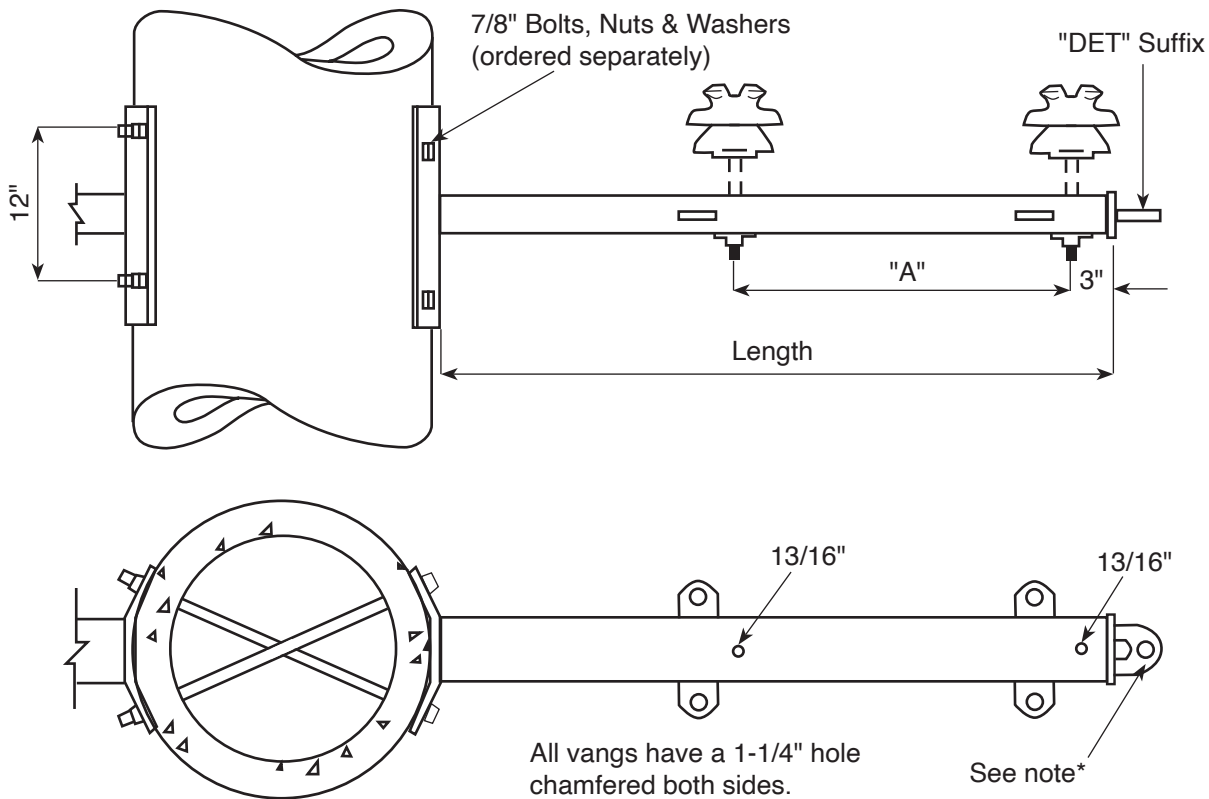
Ordering Example:

C4484-CDE-12 G W

- Add W for Cor-Ten Weathering Steel
- Add G for Ground Lug Welded to Base Plate
- "L" Length (inches)

C4484 Distribution Underbuild Arms

Hughes Brothers C4484 Series of Distribution Underbuild Arms are manufactured from tube steel. The tube size varies with loading requirements. Contact Hughes Brothers Engineering staff for assistance.



Ordering Example

C4484-B4.5A

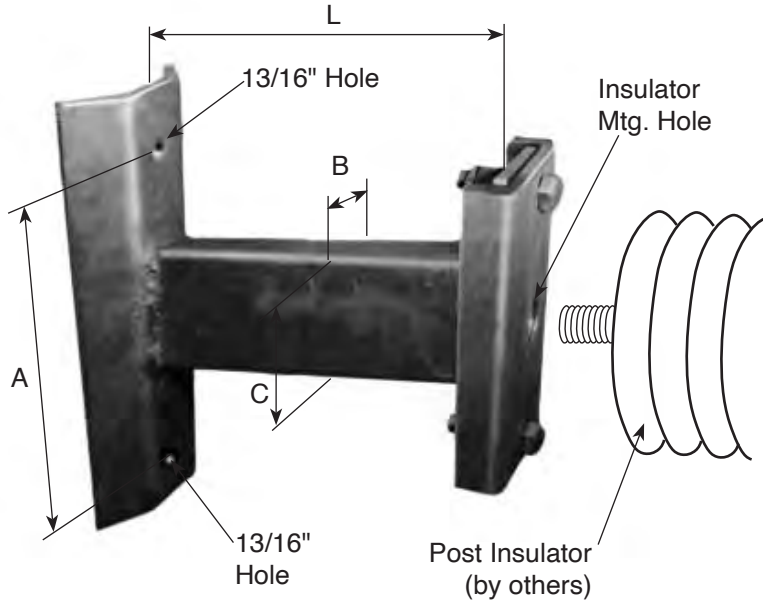
└─ Base Plate Code Suffix

Base Plate Type	Pole Dia. Range	Stock No.	Length	"A"
A	15"-18"	C4484-B4.0	4' - 0"	2' - 0"
B	18"-21"	C4484-B4.5	4' - 6"	2' - 3"
C	21"-24"	C4484-B5.5	5' - 6"	3' - 3"
D	24"-28"			
E	12"-15"			
F	26"-31"			

*Take off link available as an option by adding suffix "DET" as follows: **C4484-BDET4.5A**

C4466 Post Insulator Stand-Off Arm

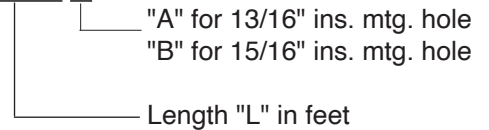
Hughes Brothers C4466 Series of Line Post Insulator Stand-Off Arms are used for special applications requiring a 1 ft. to 3 ft. clearance from the pole.



Stock No.	L	A	B	C	Wt./lbs.
C4466-B1.0	12"	10"	2"	4"	33
C4466-B1.25	15"	10"	2"	4"	35
C4466-B1.5	18"	10"	2"	4"	37
C4466-B1.75	21"	10"	2"	4"	39
C4466-B2.0	24"	12"	2"	5"	43
C4466-B2.25	27"	12"	2"	5"	46
C4466-B2.5	30"	12"	2"	5"	49
C4466-B2.75	33"	12"	2"	5"	52
C4466-B3.0	36"	12"	2"	5"	55

Ordering Example:

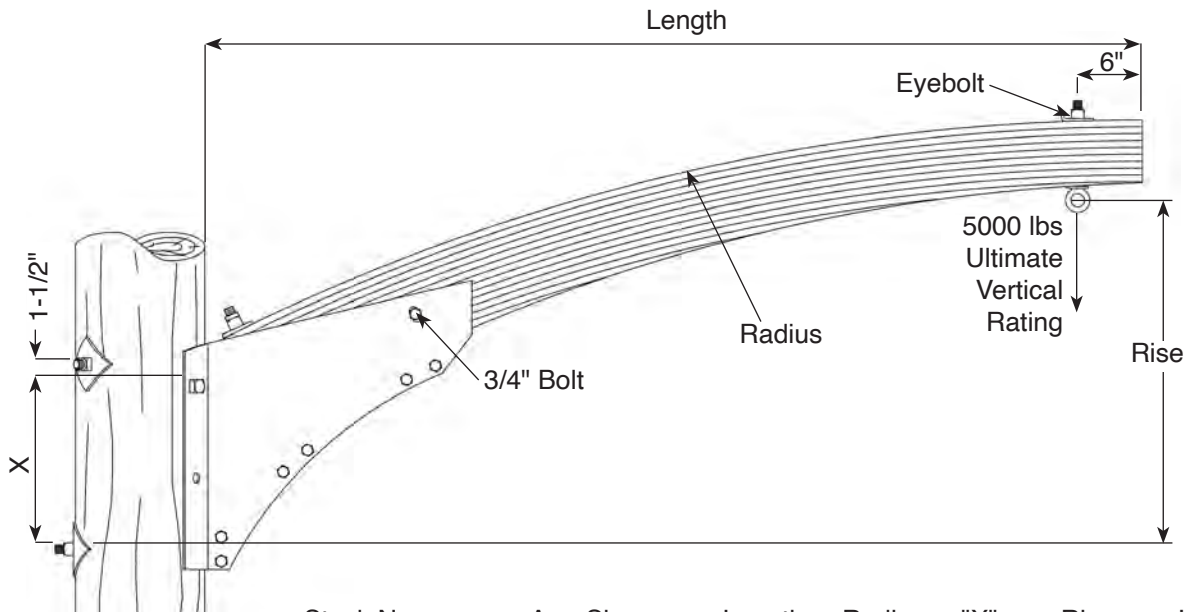
C 4 4 6 6 - B 1 . 7 5 A





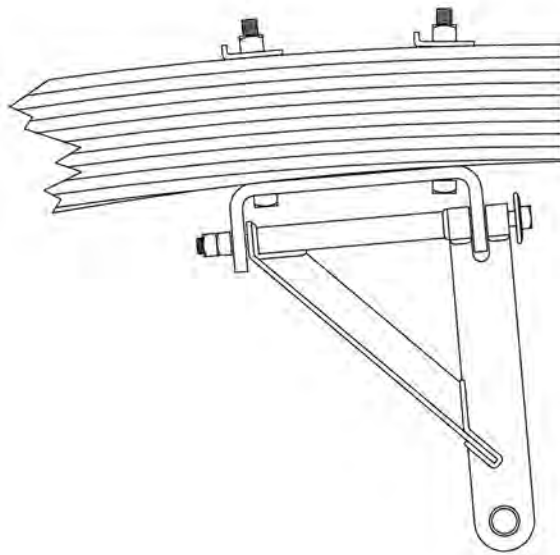
C4080 Series, Medium Duty Wood Davit Arm

The Hughes Brothers C4080 Series Wood Davits make a visually pleasing structure. Manufactured using ANSI 05.2 Douglas-fir glue-laminated timbers which are DCOI treated and assembled to a steel base. A variety of conductor attachment configurations are available. The unit mounts with (3) 7/8" mounting bolts (ordered separately).



Stock No.	Arm Size	Length	Radius	"X"	Rise	Unit Wt.
C4080-B 4.5	5 1/8" x 5" - 8"	4' - 6"	10' - 7"	12"	1' - 10"	123 lbs
C4080-B 5.0	5 1/8" x 5" - 8 1/4"	5' - 0"	11' - 7"	12"	1' - 11 1/2"	130 lbs
C4080-A 5.5	5 1/8" x 5 3/4" - 8 1/2"	5' - 6"	12' - 7"	16"	1' - 11 3/4"	142 lbs
C4080-A 6.0	5 1/8" x 5 3/4" - 8 3/4"	6' - 0"	13' - 7"	16"	2' - 1 3/8"	150 lbs
C4080-A 6.5	5 1/8" x 5 3/4" - 9"	6' - 6"	14' - 7"	16"	2' - 2 7/8"	158 lbs
C4080-A 7.0	5 1/8" x 5 3/4" - 9 1/4"	7' - 0"	15' - 7"	16"	2' - 4 1/2"	167 lbs
C4080-A 7.5	5 1/8" x 6 7/8" - 9 1/2"	7' - 6"	16' - 7"	16"	2' - 6"	180 lbs
C4080-A 8.0	5 1/8" x 6 7/8" - 9 3/4"	8' - 0"	17' - 7"	16"	2' - 7 5/8"	194 lbs
C4080-A 8.5	5 1/8" x 6 7/8" - 9 7/8"	8' - 6"	18' - 7"	16"	2' - 9 1/2"	208 lbs
C4080-A 9.0	5 1/8" x 6 7/8" - 10 1/8"	9' - 0"	19' - 7"	16"	2' - 10 3/4"	223 lbs

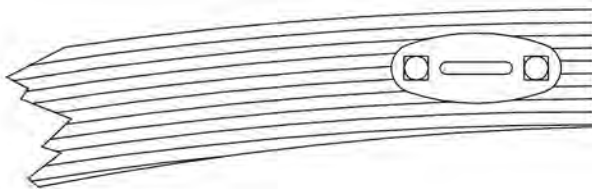
Optional Conductor Attachment Configurations



Swinging Angle Bracket

Note:

C4080-C Series, substitute C4080-C for C4080-A sizes to order swinging angle bracket.



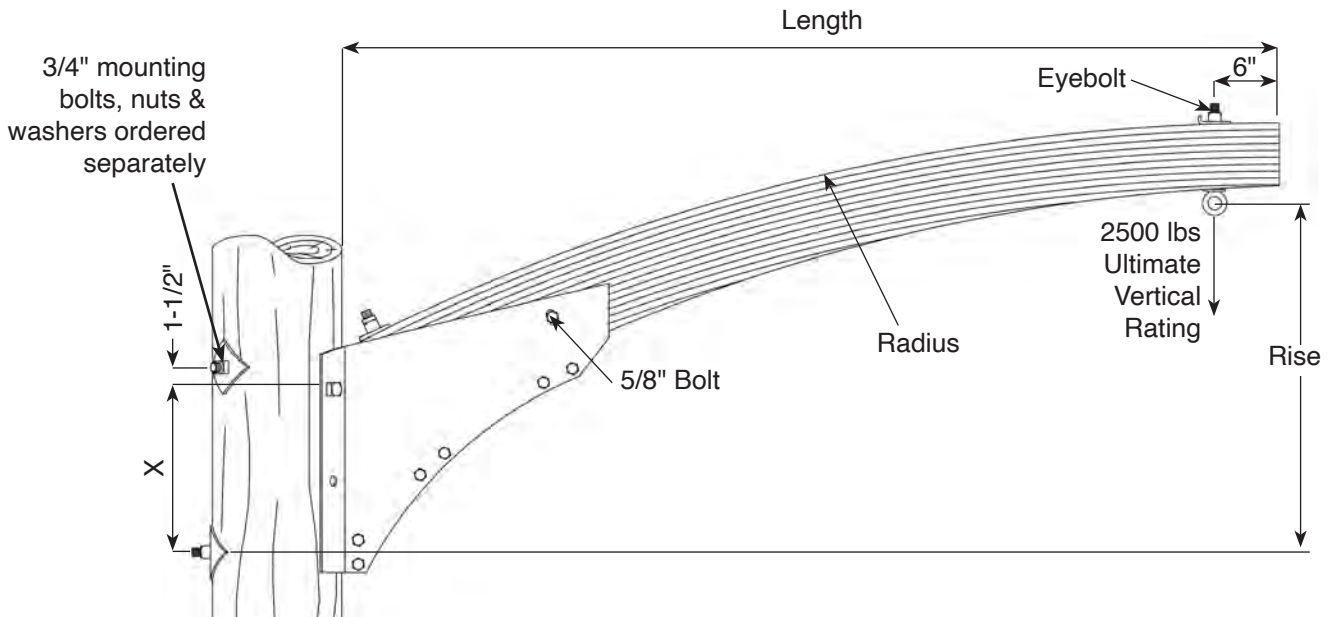
Dead End Tee

Note:

C4080-D Series, substitute C4080-D for C4080-A to order with dead end tee option.

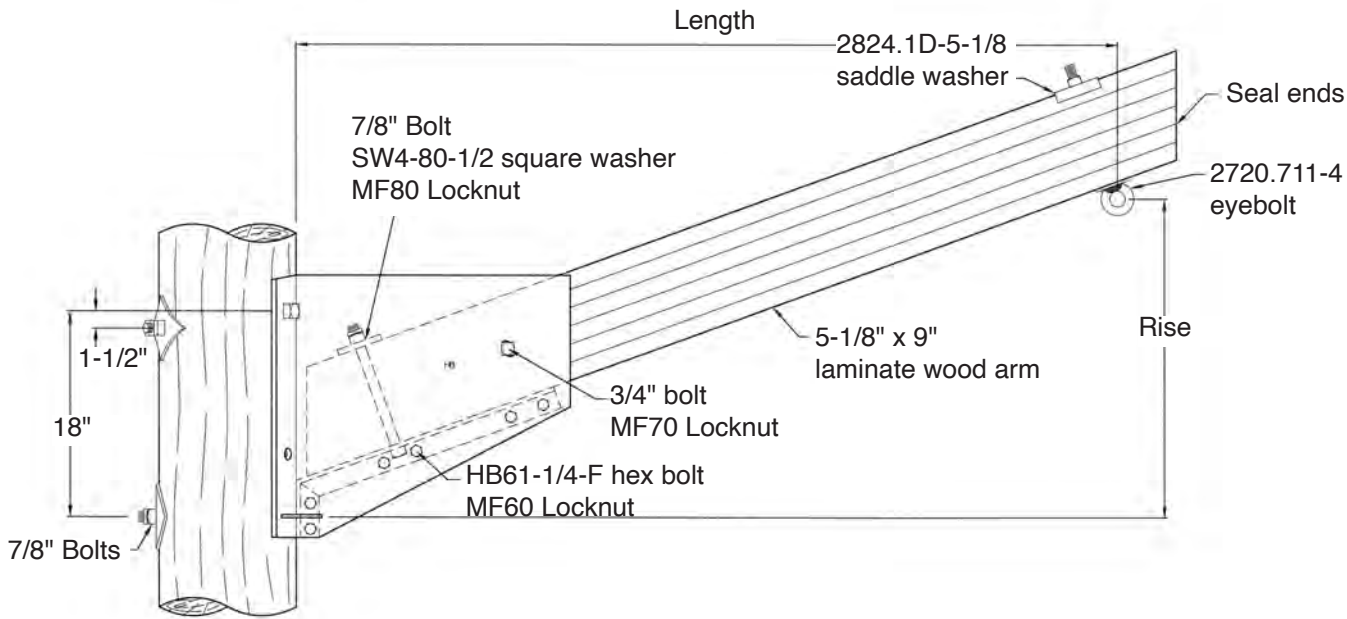
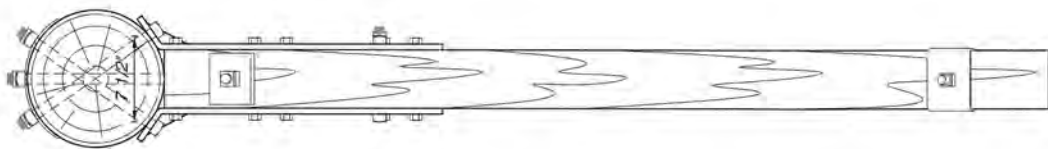
C4113 Series, Light Duty Wood Davit Arm

The Hughes Brothers C4113 Series uses a smaller wood section for lighter loading criteria.



Stock No.	Arm Size	Length	Radius	"X"	Rise	Unit Wt.
C4113-B 4.5	3 1/8" x 5" - 8"	4' - 6"	10' - 7"	12"	1' - 11"	95 lbs
C4113-B 5.0	3 1/8" x 5" - 8"	5' - 0"	11' - 7"	12"	2' - 0 5/8"	99 lbs
C4113-A 5.5	3 1/8" x 5" - 8"	5' - 6"	12' - 7"	16"	2' - 2 1/8"	103 lbs
C4113-A 6.0	3 1/8" x 5" - 8"	6' - 0"	13' - 7"	16"	2' - 3 3/8"	108 lbs
C4113-A 6.5	3 1/8" x 5" - 8"	6' - 6"	14' - 7"	16"	2' - 5 3/8"	112 lbs
C4113-A 7.0	3 1/8" x 5" - 8 1/4"	7' - 0"	15' - 7"	16"	2' - 7 1/8"	116 lbs
C4113-A 7.5	3 1/8" x 5" - 8 1/4"	7' - 6"	16' - 7"	16"	2' - 9"	121 lbs
C4113-A 8.0	3 1/8" x 5" - 8 3/4"	8' - 0"	17' - 7"	16"	2' - 10 7/8"	127 lbs
C4113-A 8.5	3 1/8" x 5" - 9"	8' - 6"	18' - 7"	16"	3' - 0 3/4"	133 lbs

C4477-H Laminate Wood Davit Arm



Stock No.	Length	Rise	Ultimate Vertical Strength
C4477-H5.0	5'-0"	1'-11 1/2"	8,500 lbs
C4477-H6.0	6'-0"	2'-3 7/8"	7,000 lbs
C4477-H7.0	7'-0"	2'-8 1/4"	6,000 lbs

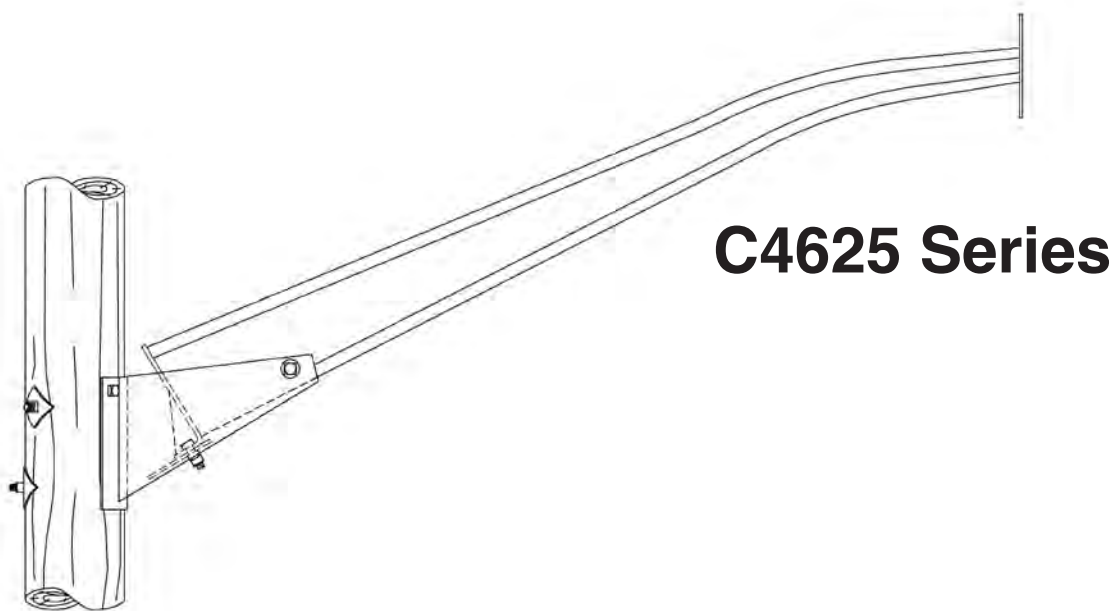
Ordering Example:

C4477 - H6.0
 "X" = 6'-0"



Steel Davit Replacement For Wood Davits

If maintenance is required, one option may be to replace the wood member with the C4625 or C4619 replacement davit. The steel tube is furnished to fit in the existing base fitting used by the wood davit. Contact Hughes Brothers Engineering staff for assistance.





STRUCTURE REPAIR,
STORM RESPONSE,
& REFRAMING





Structure Rebuild / Upgrade Kits

Hughes Brothers has helped utilities develop economical solutions for rebuilding and upgrading existing H-frame structures.

Each upgrade project is unique with its own set of variables, objectives and goals. For this reason, close cooperation with the experienced Hughes engineering staff is required.

The following benefits can be realized as the result of an upgrade project:

- Maintenance of existing right of way while operating lines at higher capacity
- Increased conductor clearances
- Increased service life of existing towers through repair/restoration
- Improved transmission reliability through increased structure strength
- Bring non-compliant towers into compliance with NESC codes

Hughes Brothers is prepared to assist in the project completion by:

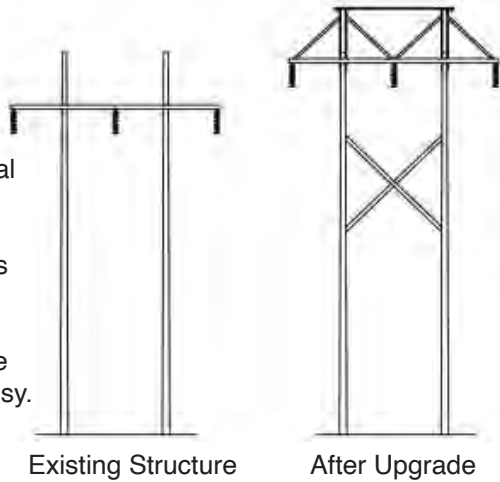
- assisting in structural design analysis to salvage as much of the existing structure as possible
- performing full scale tests to verify designs
- supply material in “kit form” to ease field construction
- ensure timely delivery of material to proper location(s)

C4700 Series Reframing Configurations

C4700

Bill of Material to Include:

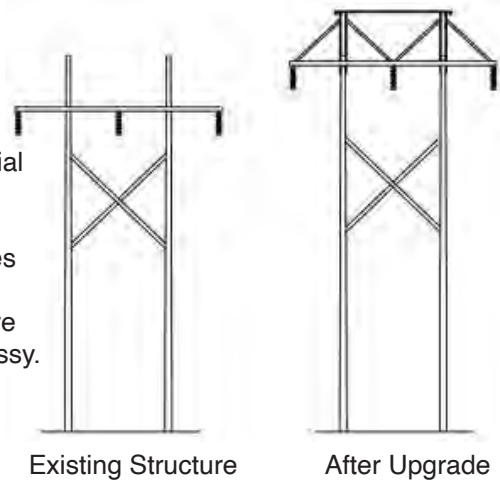
- 4-Vee Braces
- 1-X Brace
- 2-Bayonets
- 1-Shield Wire Support Assy.



C4701

Bill of Material to Include:

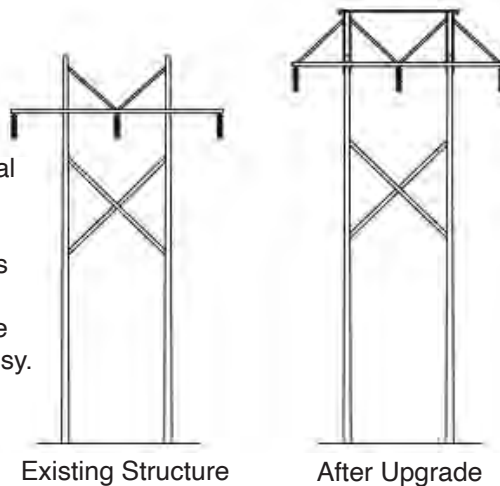
- 4-Vee Braces
- 2-Bayonets
- 1-Shield Wire Support Assy.



C4702

Bill of Material to Include:

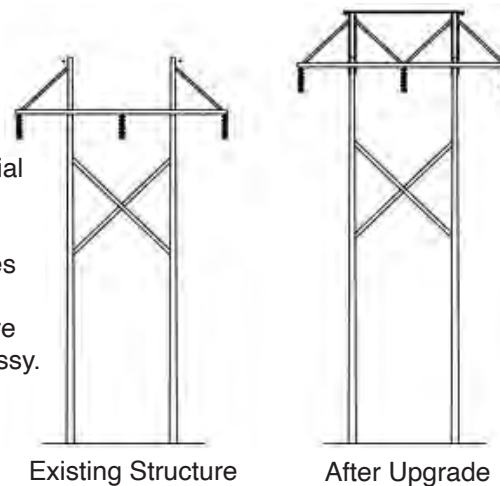
- 2-Vee Braces
- 2-Bayonets
- 1-Shield Wire Support Assy.



C4703

Bill of Material to Include:

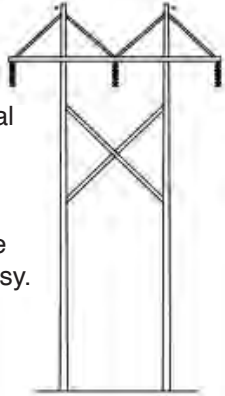
- 2-Vee Braces
- 2-Bayonets
- 1-Shield Wire Support Assy.



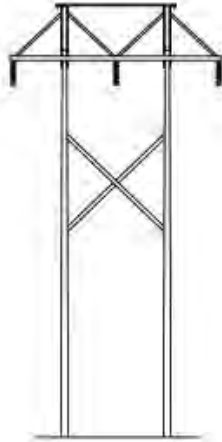
C4704

Bill of Material to Include:

- 2-Bayonets
- 1-Shield Wire Support Assy.



Existing Structure

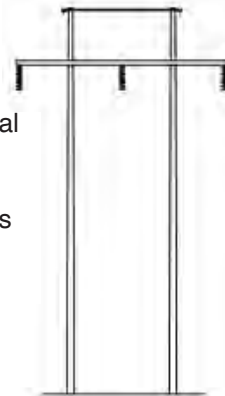


After Upgrade

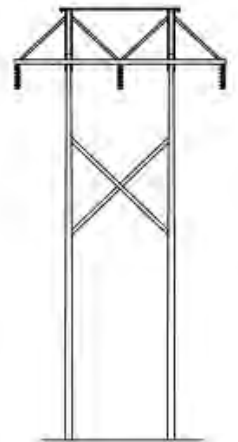
C4705

Bill of Material to Include:

- 4-Vee Braces
- 1-X Brace
- 2-Bayonets



Existing Structure

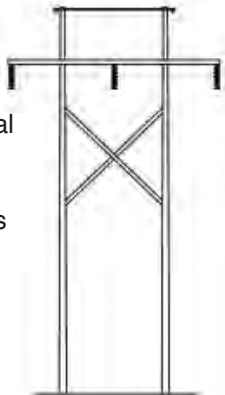


After Upgrade

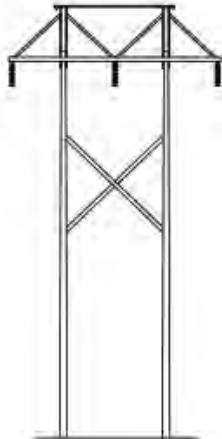
C4706

Bill of Material to Include:

- 4-Vee Braces
- 2-Bayonets



Existing Structure

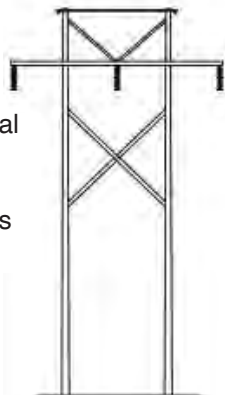


After Upgrade

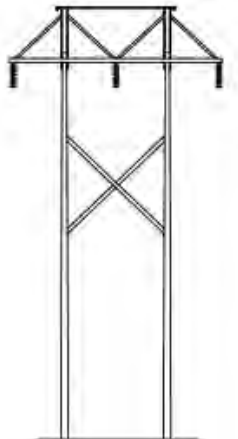
C4707

Bill of Material to Include:

- 2-Vee Braces
- 2-Bayonets



Existing Structure

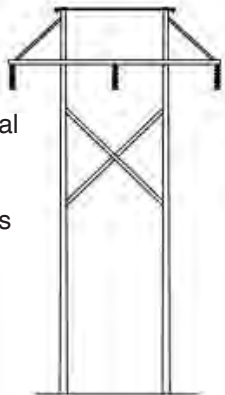


After Upgrade

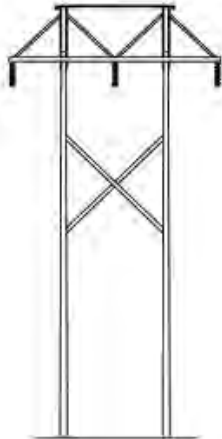
C4708

Bill of Material to Include:

- 2-Vee Braces
- 2-Bayonets



Existing Structure

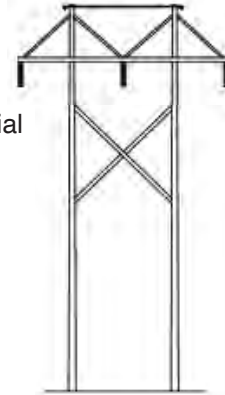


After Upgrade

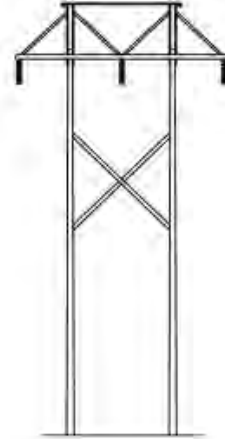
C4709

Bill of Material to Include:

- 2-Bayonets



Existing Structure



After Upgrade

H STRUCTURE REFRAMING

Use the drawings and tables on the following pages to determine which upgrade kit is best suited to your needs. Please record all information on this form to assist Hughes Brothers Engineering staff in analyzing your situation.

Existing Structure Information Form

Customer _____

Ordering Number _____

Existing line voltage _____ kV

Rebuild line voltage _____ kV

Miles of line _____ miles

Estimated material delivery date _____

Age of line _____ years (example: installed age)

Pole type(s): Douglas fir _____ Southern Yellow Pine _____ Western Red Cedar _____

Pole heights _____ feet thru _____ feet

Pole classes _____ thru _____

Existing Crossarm height _____ feet _____ (from top of pole)

Pole spacing _____ feet _____

Arm Relocation Height _____ feet _____ "Y" _____ feet

"IL" _____ feet

Phase spacing _____ feet

Maximum vertical span _____ feet

Maximum transverse span _____ feet

Ruling span _____ feet

Existing conductor type _____ (example: 795 ACSR 26/7)

New conductor type (if applicable) _____ (example: 954 ACSR 26/7)

Number of conductors per phase _____

Shield wire type _____ (example: 3/8" EHS steel strand)

Number of shield wires (total) _____

Maximum tangent structure line angle _____

Conductor Maximum design tension _____ pounds

Shield wire maximum design tension _____ pounds

Cone of protection angle (example: 30°) _____

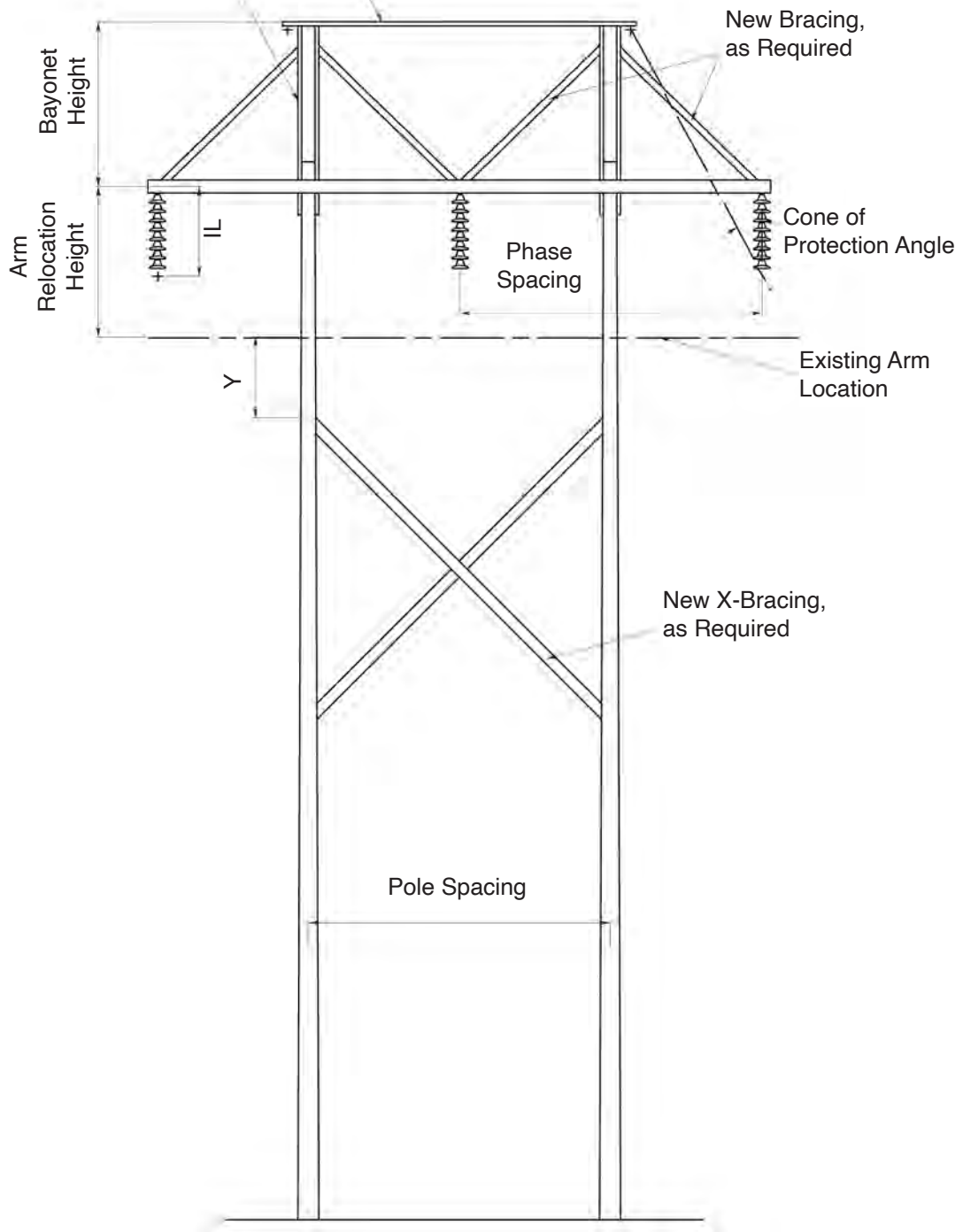
Step Bolt Option _____ Yes _____ No

NOTE: Additional copies of this form may be obtained by contacting Hughes Brothers.

Ordering Information

New Shield Wire Support Assembly

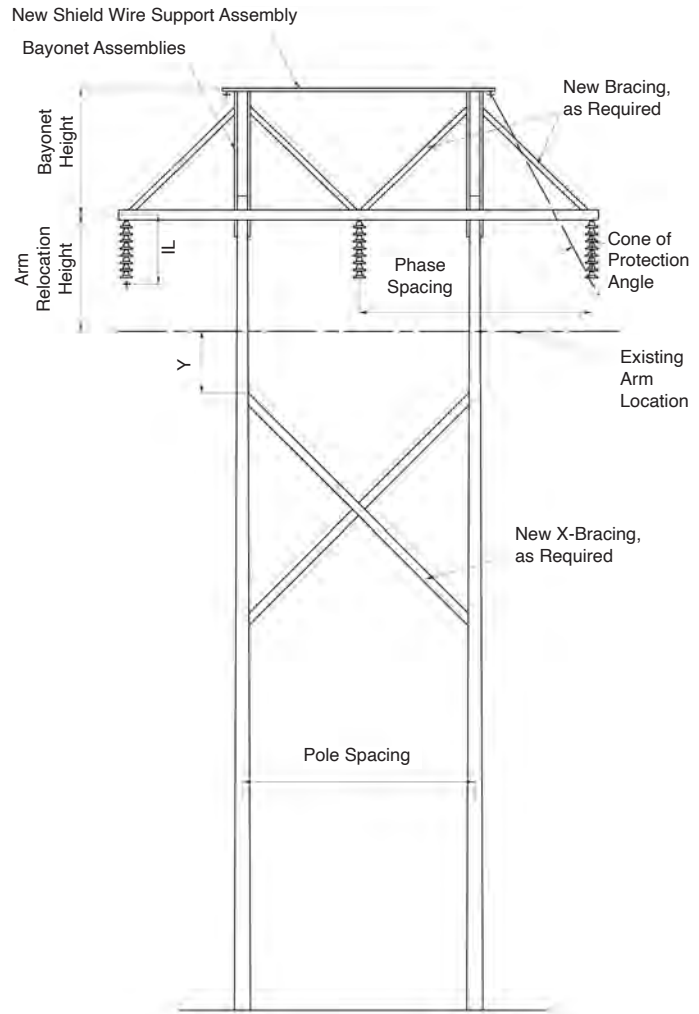
Bayonet Assemblies



Ordering Information (cont'd)

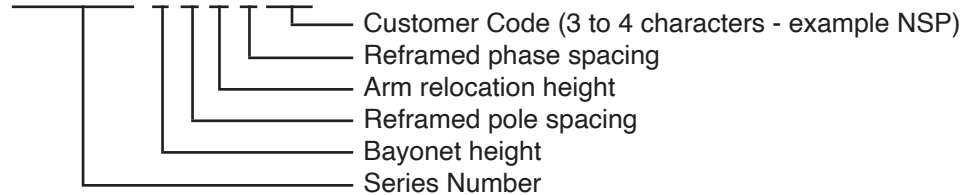
Reframing Ordering Codes

Ordering Code	Pole Spacing	Phase Spacing	Ordering Code	Bayonet Height	Arm Relocation Height
1	9'-0"	9'-0"	A	1'-0"	1'-0"
2	9'-6"	9'-6"	B	1'-6"	1'-6"
3	10'-0"	10'-0"	C	2'-0"	2'-0"
4	10'-6"	10'-6"	D	2'-6"	2'-6"
5	11'-0"	11'-0"	E	3'-0"	3'-0"
6	11'-6"	11'-6"	F	3'-6"	3'-6"
7	12'-0"	12'-0"	G	4'-0"	4'-0"
8	12'-6"	12'-6"	H	4'-6"	4'-6"
9	13'-0"	13'-0"	I	5'-0"	5'-0"
10	13'-6"	13'-6"	J	5'-6"	5'-6"
11	14'-0"	14'-0"	K	6'-0"	6'-0"
12	14'-6"	14'-6"	L	6'-6"	6'-6"
13	15'-0"	15'-0"	M	7'-0"	7'-0"
14	15'-6"	15'-6"	N	7'-6"	7'-6"
15	16'-0"	16'-0"	P	8'-0"	8'-0"
16	16'-6"	16'-6"	Q	8'-6"	8'-6"
17	17'-0"	17'-0"	R	9'-0"	9'-0"
18	17'-6"	17'-6"	S	9'-6"	9'-6"
19	18'-0"	18'-0"	T	10'-0"	10'-0"
20	18'-6"	18'-6"	U	10'-6"	10'-6"
21	19'-0"	19'-0"	V	11'-0"	11'-0"
22	19'-6"	19'-6"	W	11'-6"	11'-6"
23	20'-0"	20'-0"	X	12'-0"	12'-0"
24	20'-6"	20'-6"	Y	12'-6"	12'-6"
25	21'-0"	21'-0"	Z	13'-0"	13'-0"
26	21'-6"	21'-6"			
27	22'-0"	22'-0"			
28	22'-6"	22'-6"			
29	23'-0"	23'-0"			
30	23'-6"	23'-6"			
31	24'-0"	24'-0"			
32	24'-6"	24'-6"			
33	25'-0"	25'-0"			
34	25'-6"	25'-6"			
35	26'-0"	26'-0"			
36	26'-6"	26'-6"			
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38	27'-6"	27'-6"			
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42	29'-6"	29'-6"			
43	30'-0"	30'-0"			

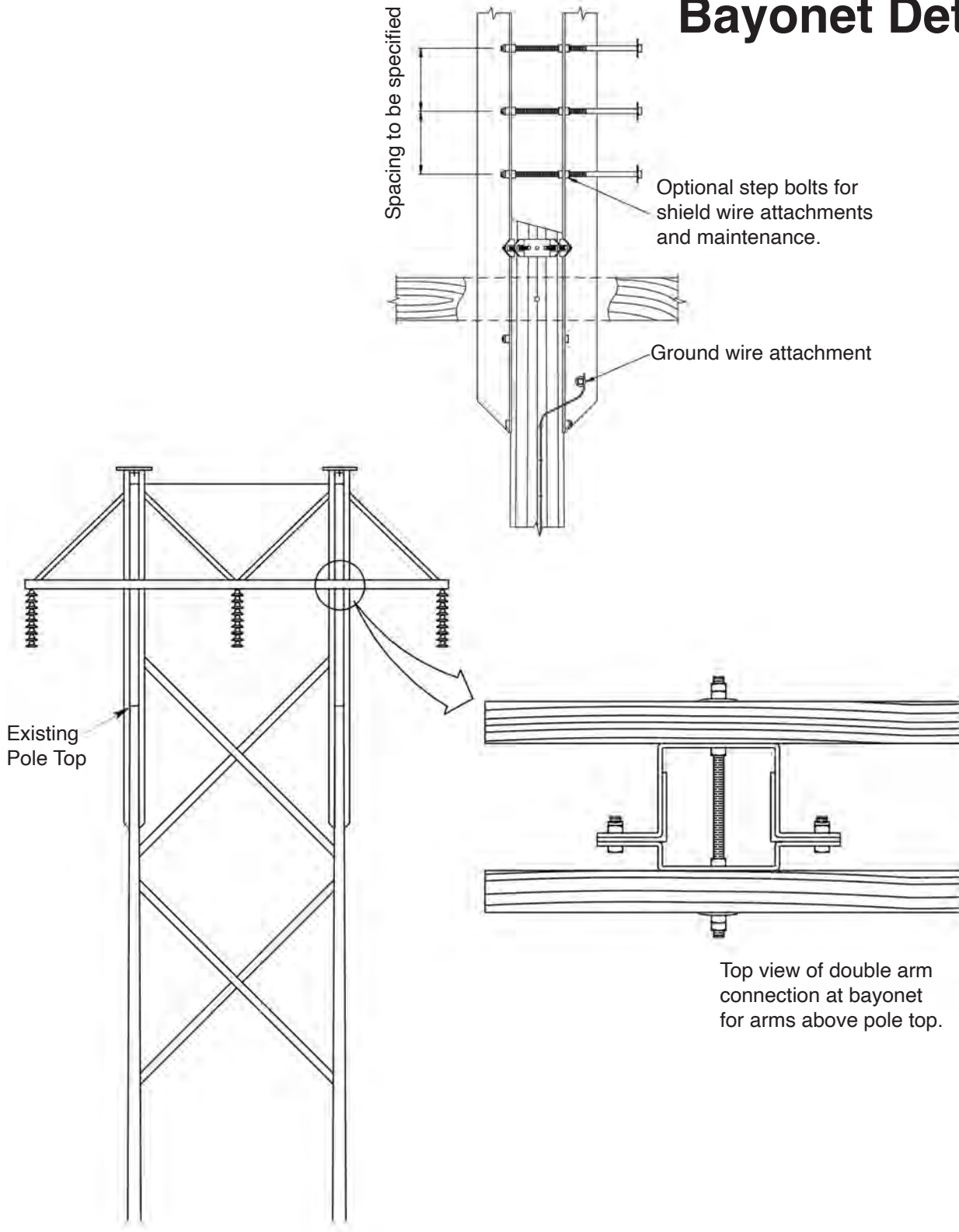


Ordering Example

C 4 7 0 1 G 2 E 2 ****

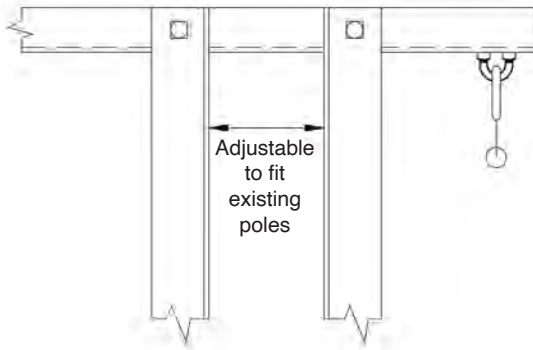


Bayonet Details

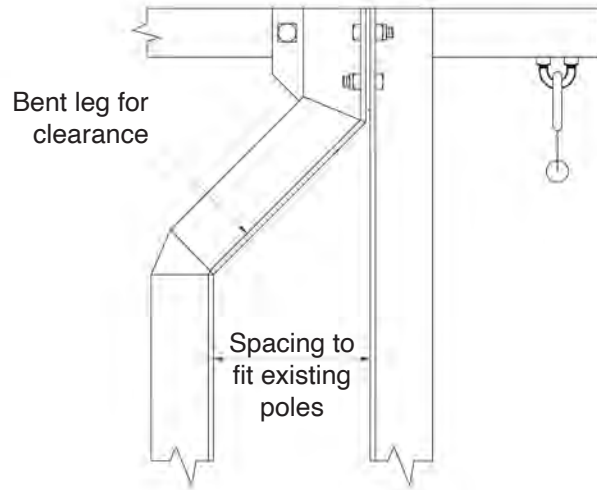


Top Attachment Details

New Shield Wire Attachment

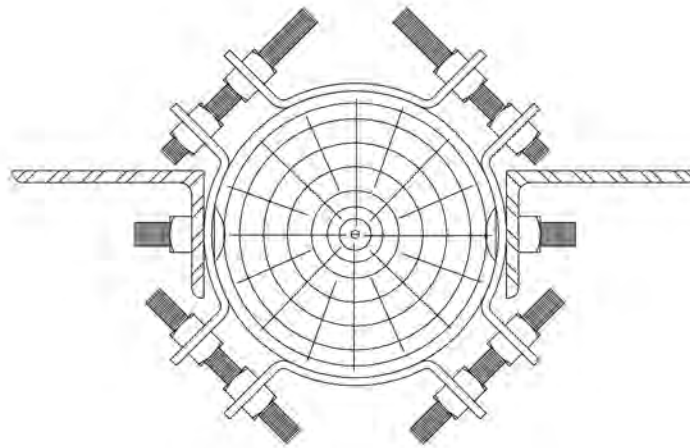


Existing Shield Wire Attachment



Pole Band Top Support

Maintains the structural integrity of the pole top.



Basic H-frame Installation Procedure



1 Prepare Bayonet on ground



2 Disassemble shield wire attachments from top of pole



3 Unbolt existing knee braces (if applicable)



4 Loosen crossarm mounting hardware but do not remove.



5 Top steel angle removed and lowered to the ground



6 Drill poles for new bayonets and crossarms



7 Crane cable is attached to crossarm. Double arm assembly is spread apart at each pole using hydraulic jacks. Crossarm bolts are removed.



8 Crane raises arm to new location

H STRUCTURE REFRAMING



9 New arm mounting bolts are installed and spreading jacks are removed.



10 Shield wire angle is bolted to bayonet extensions on the ground and raised to position. Pole bands are slipped over top of pole and into position.



11 Bayonet mounting holes are drilled and mounting bolts installed.



12 Shield wire installed back on attachments.



13 Knee and vee braces are bolted into position on bayonets.

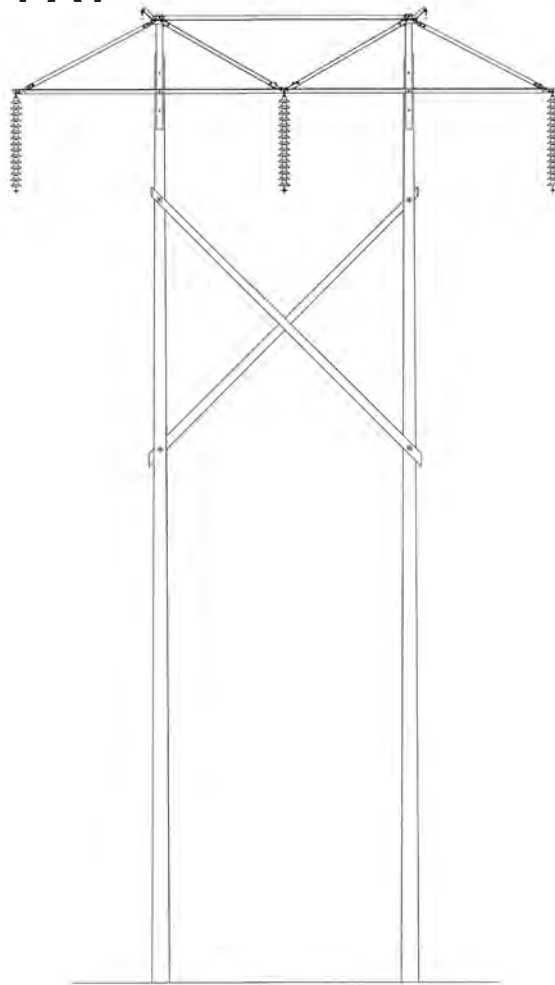


14 Ground wire is installed.

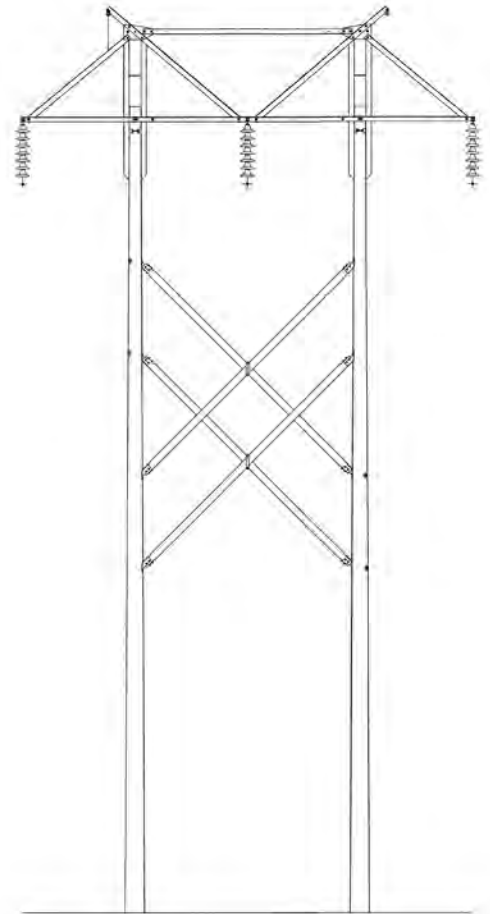
C4754-A1 and C2561-S Series Reframing Trusses

Hughes Brothers has also supplied pre-assembled steel trusses and bayonets to upgrade lines or replace aging spar arm structures. Many configurations are available. Trusses are pre-assembled in the factory and installed on poles or steel bayonets of varying lengths. Available in galvanized steel or self-weathering steel, please contact Hughes Brothers engineering department for assistance.

C4754-A1

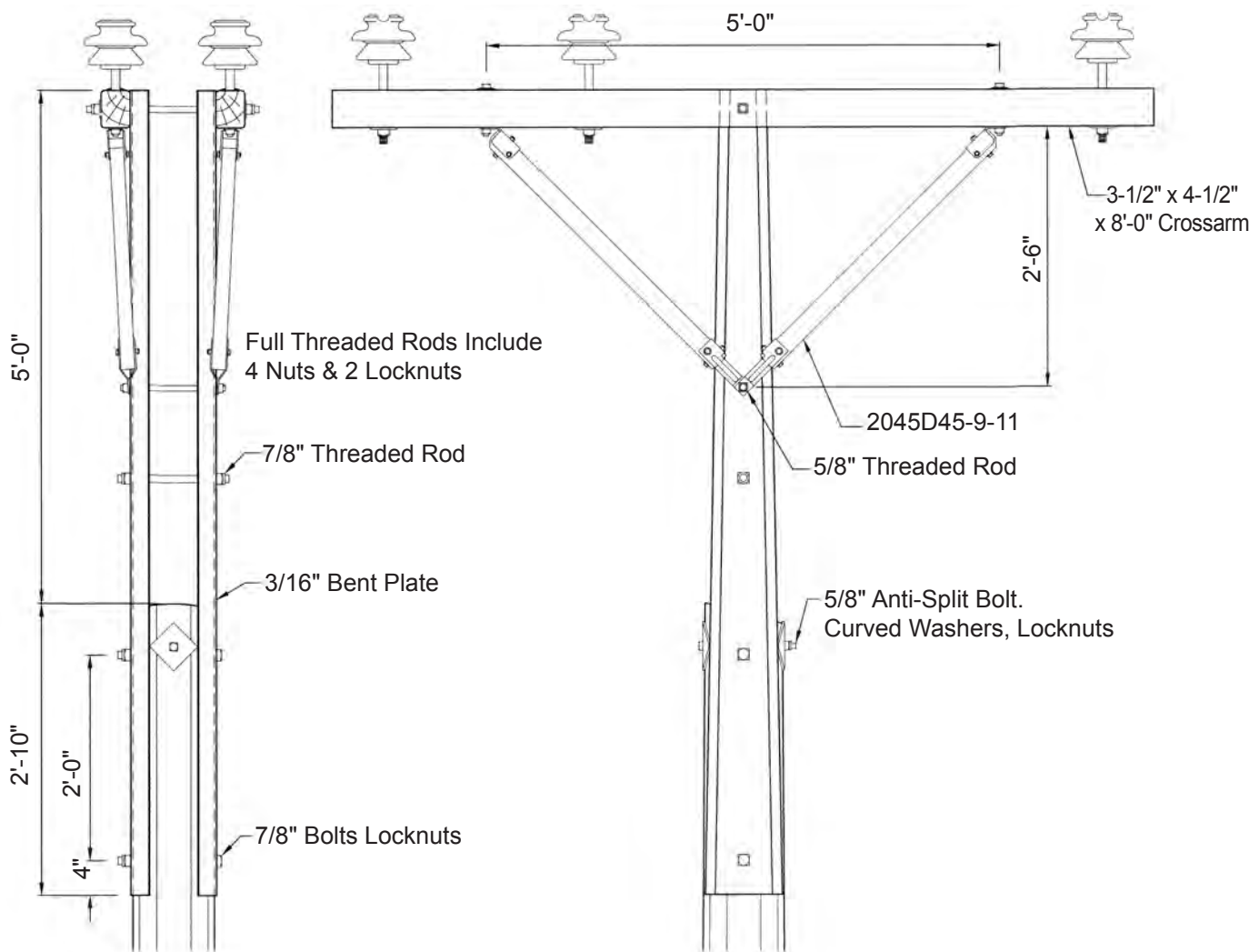


C2561-S1/S2

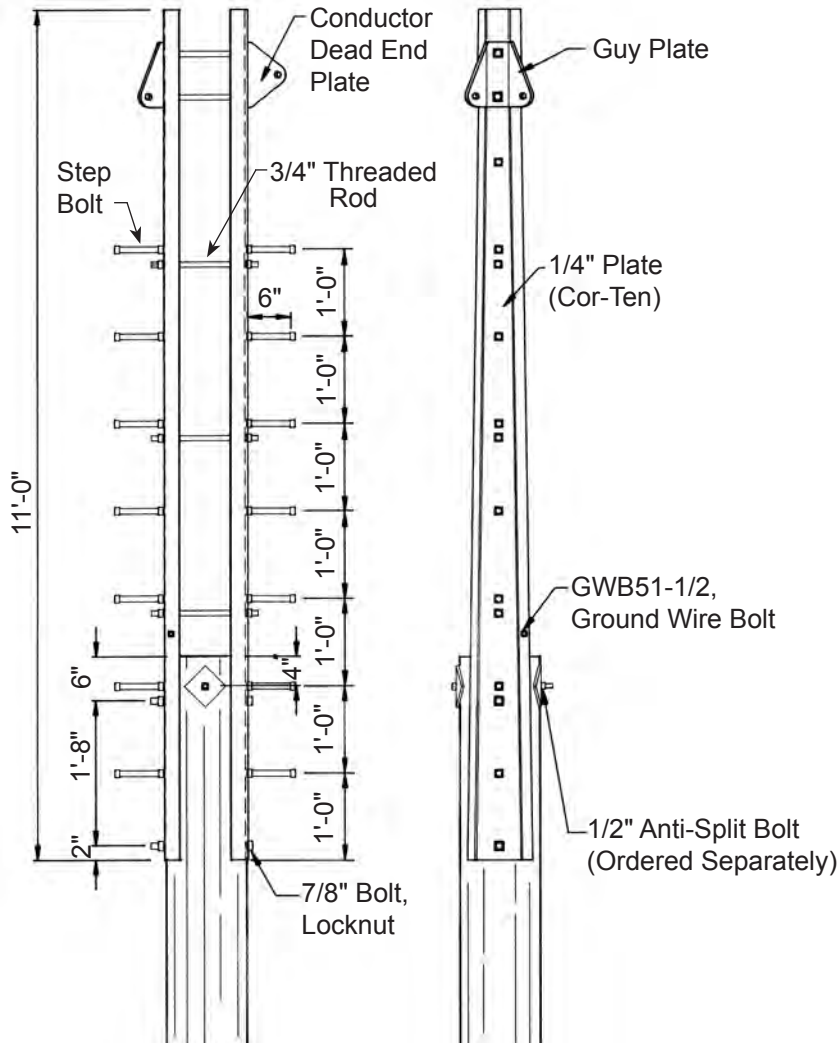


B2511-N1 Pole Top Extension (For Crossarm Attachment)

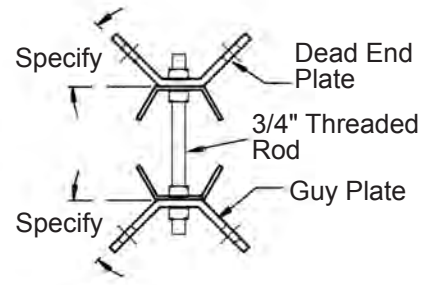
The B2511 series extensions can be used to raise the pole height, add a shield wire or repair a damaged pole. Many configurations are available. Available in galvanized steel or self-weathering steel, please contact Hughes Brothers engineering department for assistance.



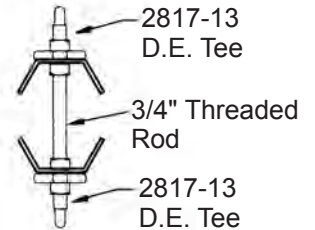
B2511-R Pole Top Extension



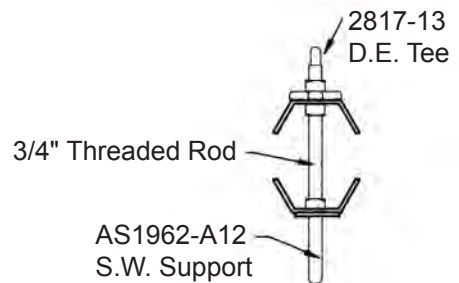
Type B2511-R1 S.W. Dead End / Angle



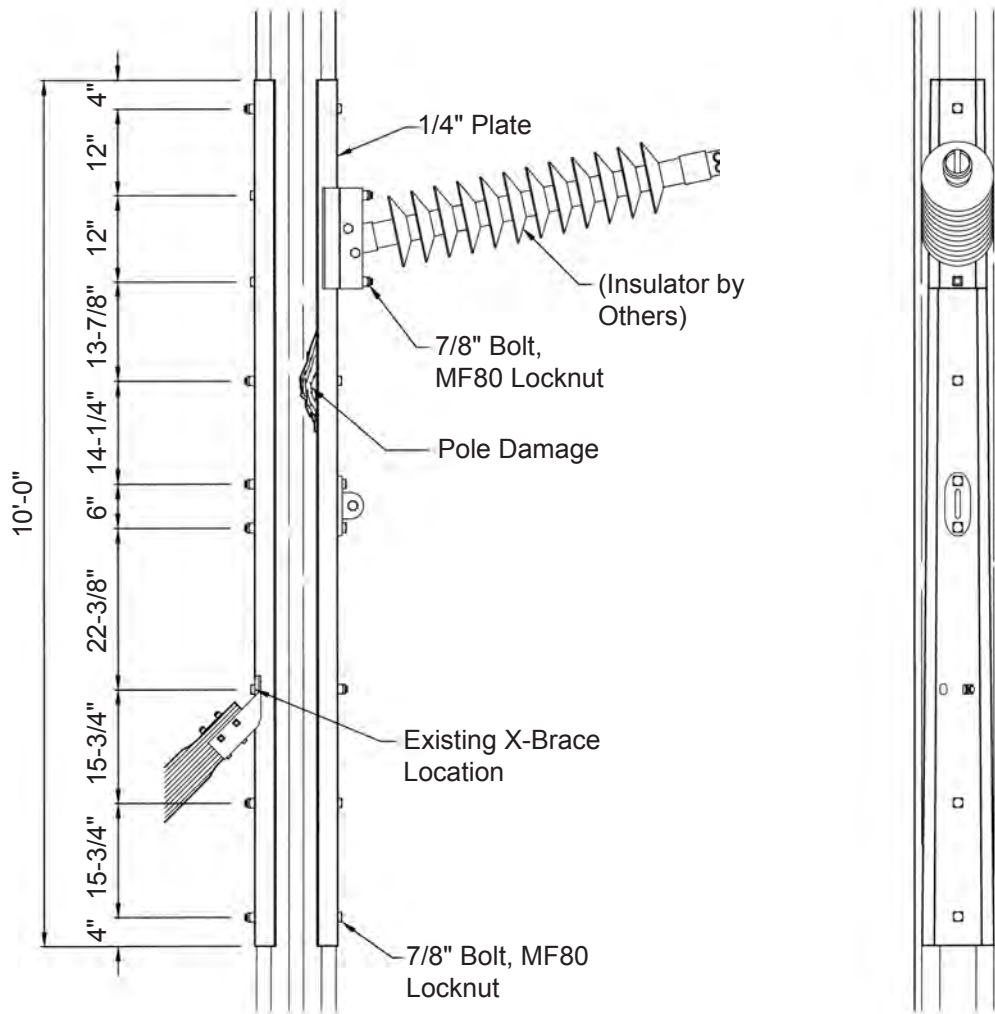
Type B2511-R2 In-Line Dead End (Extensions turned 90° on Pole)



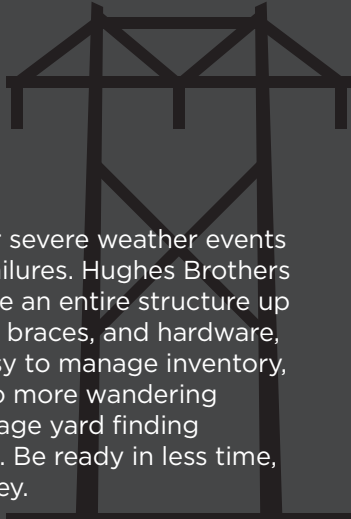
Type B2511-R3 Running Angle



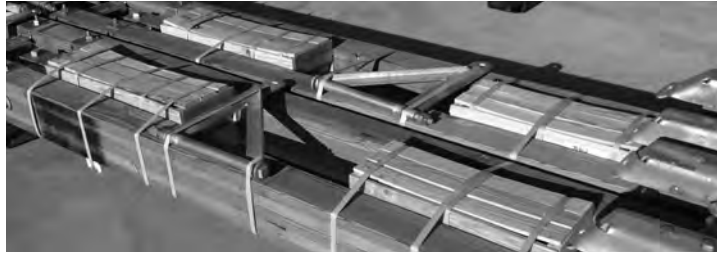
B2511-HB Pole Repair



Bundled Structure Kits



Be prepared for severe weather events and structure failures. Hughes Brothers can pre-package an entire structure up to 345kV: arms, braces, and hardware, into one kit. Easy to manage inventory, easy to load. No more wandering around the storage yard finding individual items. Be ready in less time, save more money.



Convenience

Our bundled structure kits make inventory management and receiving much easier. No more multiple line items, means no missed parts in the field when you really need them. No harried calls to Hughes Brothers about missing a component. There are not multiple items scattered around a warehouse or yard leading to increased likelihood of items being misplaced, pilfered or mis-allocated. The kits can be drop shipped from the yard to each individual structure location saving a contractor time and saving you money.

Customization

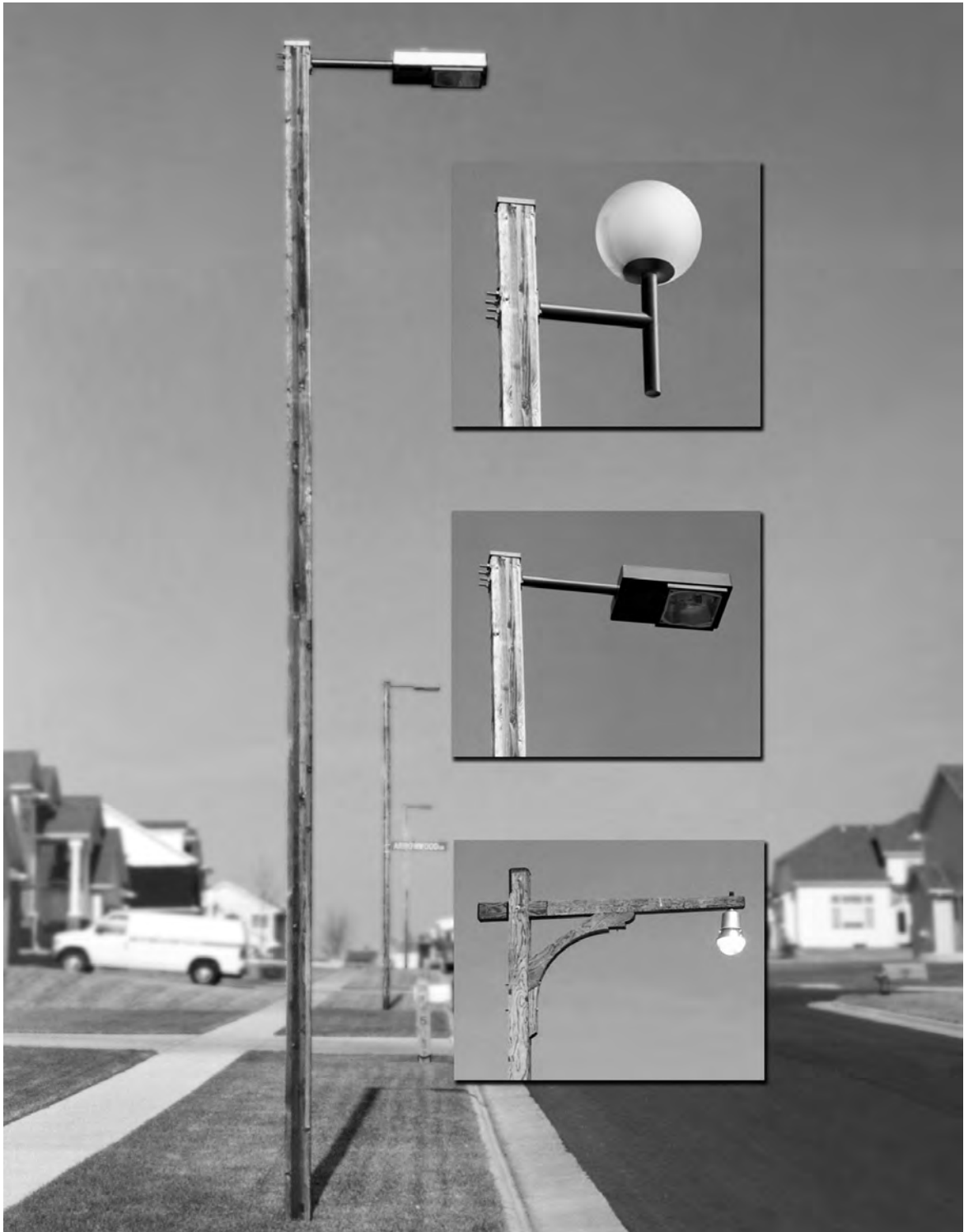


Hughes Brothers has purchased material from other vendors to make an even MORE complete kit. We can include insulators, clamps, copper connectors, etc in many cases to make it even more convenient when emergencies happen. Save time, save money, be prepared. Contact the Hughes Brothers engineering or sales teams with your exact needs.

Weather happens; we've got you covered
402-643-2991 • www.hughesbros.com



LIGHTING POLES & SIGN POSTS



Laminated Wood Lighting Poles

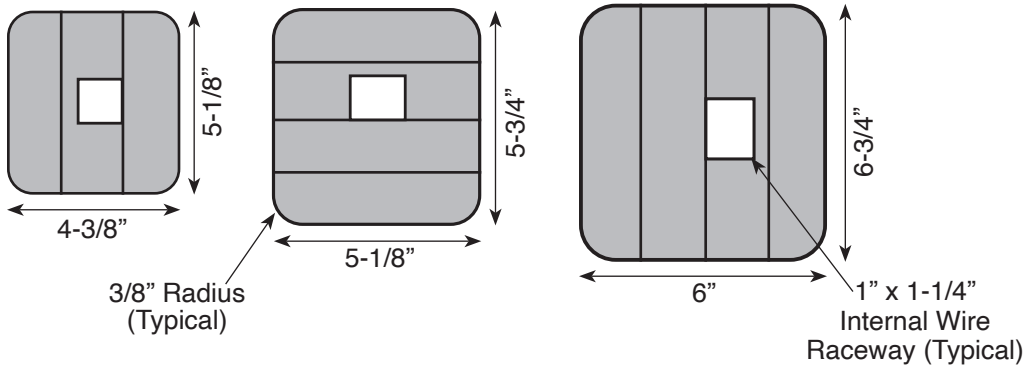
Laminated wood lighting poles are aesthetically pleasing in formal or rustic settings and are manufactured from 100% renewable, natural coastal douglas fir.

Treated with DCOI, they will offer many years of service. These poles are directly embedded, and are field friendly...can be drilled, nailed, or cut on-site.

The internal raceway hides and protects wiring.

Cataloged poles are straight, but custom ordered curved poles are available.

Standard Sizes (Virtually any size available, inquire Hughes Brothers Engineering Department.)

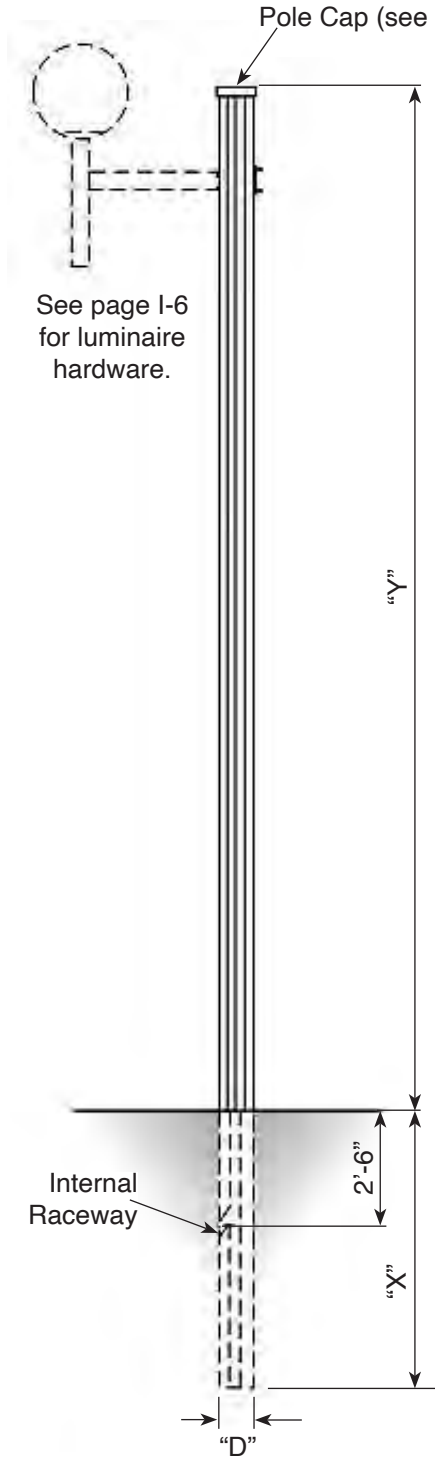


EPA Rating Table

Pole Size & Height Above Ground/Set Depth

Wind Speed (mph)	5-1/8" x 4-1/8" 12'-0"/3'-6"	5-1/8" x 4-3/8" 15'-0"/4'-0"	5-1/8" x 5-3/4" 20'-0"/4'-6"	5-1/8" x 5-3/4" 25'-0"/5'-0"	6-3/4" x 6" 30'-0"/5'-6"
70	10.4	8.3	6.2	4.8	8.7
80	8	6.3	4.7	3.6	6.6
90	6.2	4.9	3.6	2.8	5.2
100	5	4	2.9	2.2	4.2
110	4.1	3.2	2.4	1.8	3.4

C4773 Laminated Wood Lighting Standard



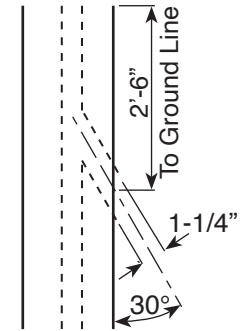
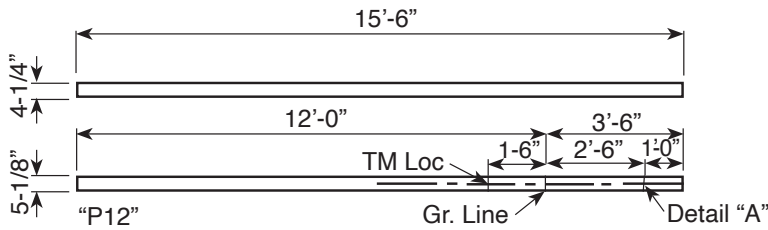
Specifications:

- Open defects such as knot holes exceeding 1/2" in diameter or wane exceeding 1/4"x12" shall be filled with wood filler. Sides shall be S4S with edges eased to 3/8" radius.
- Tolerances shall be from +0 to -1/8" for width and ±1/4" in length.
- Lumber is coast region Douglas-Fir only, L1 laminating grade for strength and appearance.
- Each Standard shall be branded with a trademark 18" above intended ground line including month and year of manufacture.
- Luminaire hardware and pole caps are not included with the pole.
- All lighting standards are treated with DCOI.
- Internal raceway is 1" x 1-1/4" and runs the full length of the pole.

Pole Length	Part No.	"X"	"Y"	"W"	"D"
15'-6"	C4773.1A-1L	3'-6"	12'-0"	4-1/4"	5-1/8"
19'-0"	C4773.1B-1L	4'-0"	15'-0"	4-1/4"	5-1/8"
24'-6"	C4773.1C-1L	4'-6"	20'-0"	5-1/8"	5-3/4"
30'-0"	C4773.1D-1L	5'-0"	25'-0"	5-1/8"	5-3/4"
18'-0"	C4773.2A-1L	4'-0"	14'-0"	4-1/4"	5-1/8"

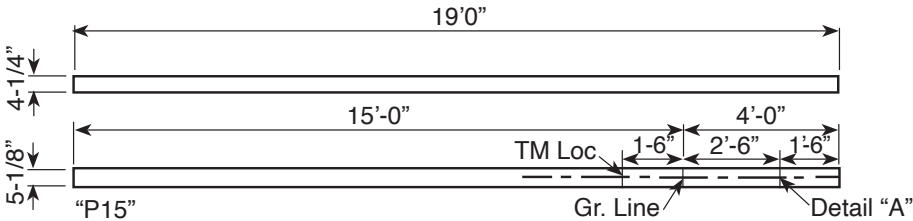
C4773.1 Laminated Light Pole Series

C4773.1A-1L Light Pole (Lam.)

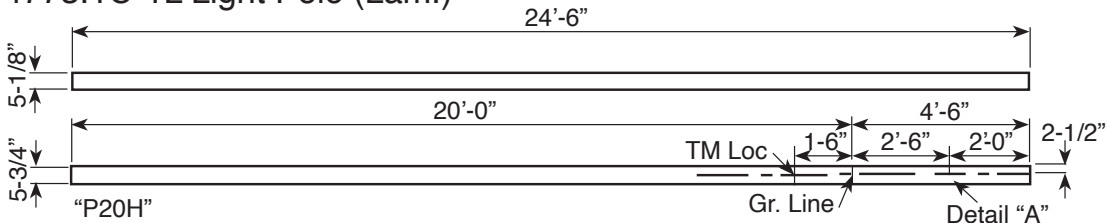


Detail "A"

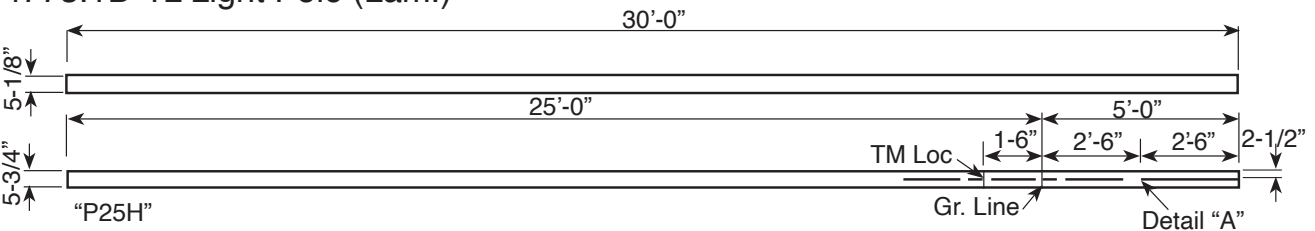
C4773.1B-1L Light Pole (Lam.)



C4773.1C-1L Light Pole (Lam.)



C4773.1D-1L Light Pole (Lam.)

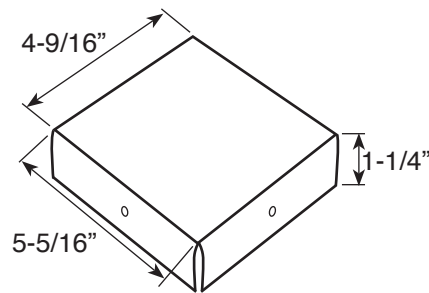


Laminated Wood Lighting Pole Accessories

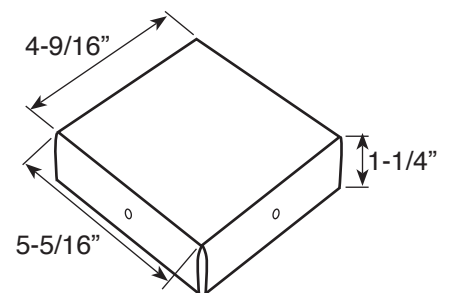
Pole Caps

Protect the top of the pole by installing pole caps. These are manufactured from 11 gauge steel and are available in galvanized or power coated finishes.

Pole Size	Galvanized	Powder Coat (Specify Color)	Aluminum
4-3/8" x 5-1/8"	C4773.3A	C4773.3A-B(color)	C4773.3A-A
5-1/8" x 5-3/4"	C4773.3B	C4773.3B-B(color)	C4773.3B-A



(For 4-3/8" x 5-1/8" Pole Top)

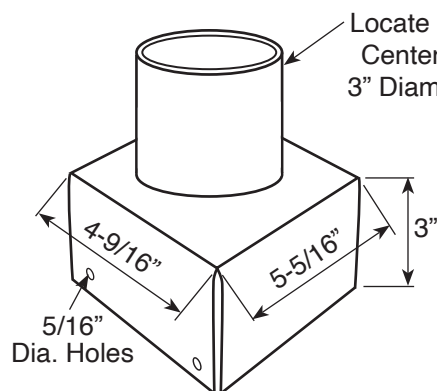


(For 5-1/8" x 5-3/4" Pole Top)

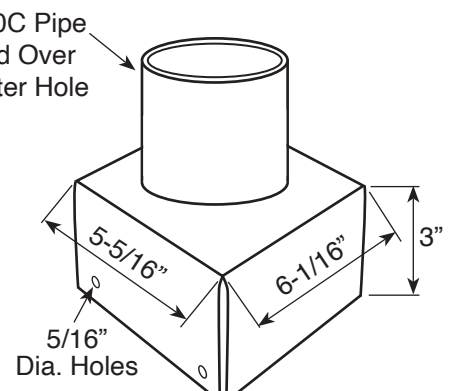
Pole Top Luminary Supports

The pole top luminary support provides a means to mount slipfit fixtures on a 3" OD pipe at the top of the pole.

Pole Size	Galvanized	Powder Coat (Specify Color)
4-3/8" x 5-1/8"	C4773.10A	C4773.10A-B (color)
5-1/8" x 5-3/4"	C4773.10	C4773.10B-B (color)
6" x 6-3/4"	C4773.11B	C4773.11B-B (color)



(For 4-3/8" x 5-1/8" Pole Top)



(For 5-1/8" x 5-3/4" Pole Top)

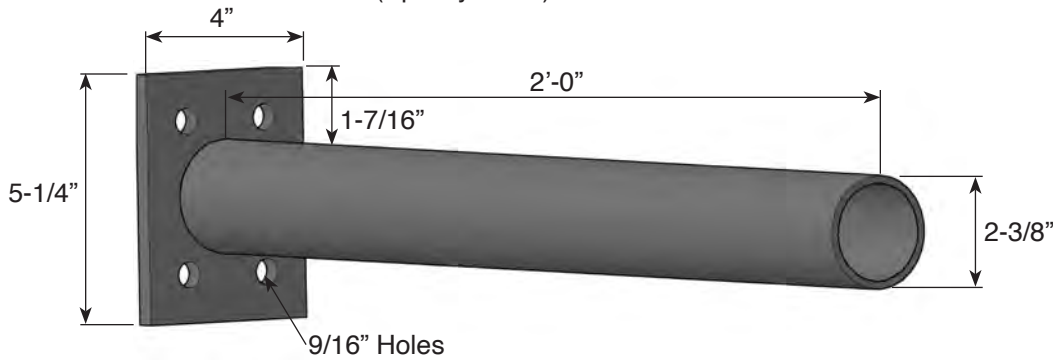
Laminated Wood Lighting Pole Accessories

Pole Side Luminary Brackets

Mount luminaries vertically or horizontally with these pole side brackets. These brackets mount to the pole side with 4 bolts (not provided).

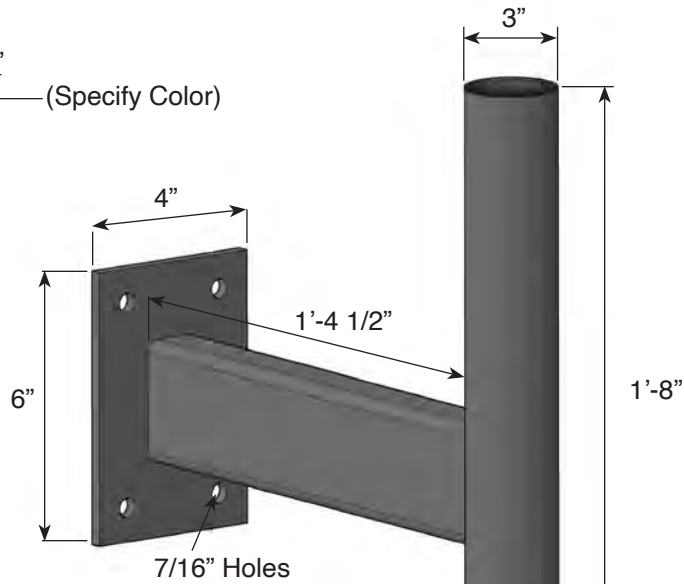
C4773.5A and C4773.5A-"B"

(Specify Color)



C4773.6A and C4773.6A-"B"

(Specify Color)



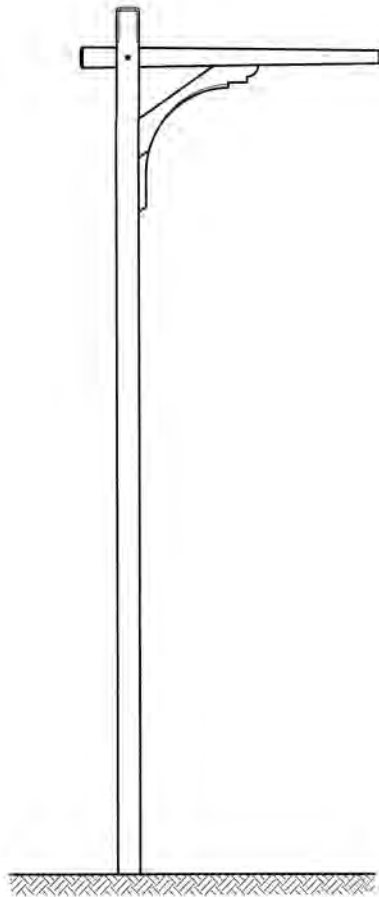
LVL Lighting Poles



B2676 Series

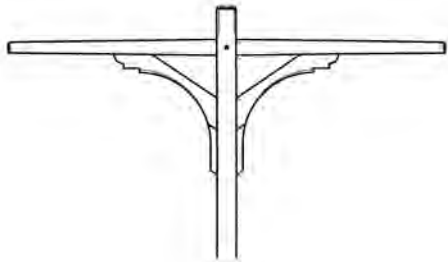
LVL breakaway lightpoles provide the ideal combination of economy, safety, durability and aesthetics. The simple one-step installation and saw cut breakaway feature reduces installation and replacement costs versus alternatives that require a multi-step installation process of concrete footings and attachment hardware. The hollow box shape makes LVL lightpoles lighter and easier to install, while resisting twist and bow. Full depth penetration of the DCOI treatment ensures long service life. Conforms to current NCHRP Report 350.

Many other custom poles can be made. Contact Hughes Brothers Engineering Department.

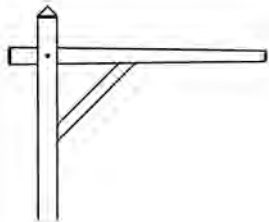


B2676-B

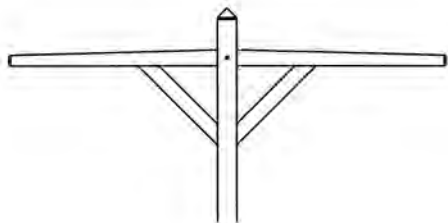
B2676 Series (cont.)



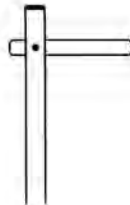
B2676-B2



B2676-D



B2676-D2



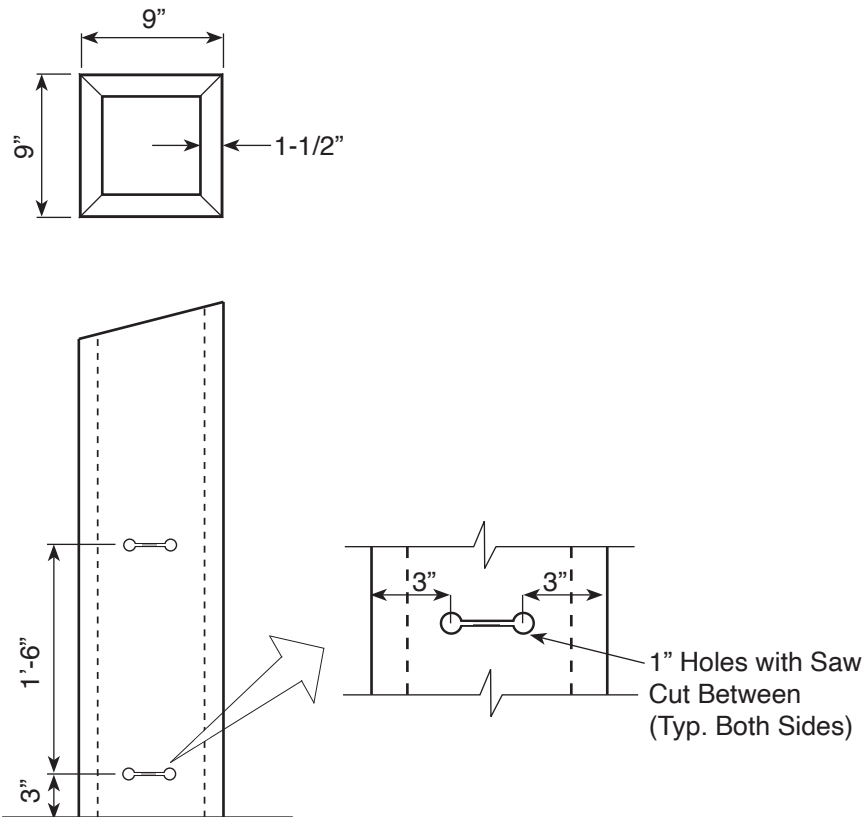
B2676-E



B2676-B2

Installation of LVL Breakaway Poles

Holes for the posts should be bored with a 24" auger. The holes should be bored to an embedment depth following standard specifications for each particular application. Each should be backfilled with a granular fill as a minimum. Anchor plates or concrete may be required and the owner should verify on-site soil conditions.



Breakaway Sign Posts

LVL breakaway signposts and lightpoles provide the ideal combination of economy, safety, durability and aesthetics. The simple one-step installation and saw cut breakaway feature reduces installation and replacement costs versus alternatives that require a multiple-step installation process of concrete footings and attachment hardware. The hollow box shape makes LVL signposts and lightpoles lighter and easier to install, while resisting twist and bow. Both products are treated with DCOI to provide long life, and each conforms to current NCHRP Report 350.

- Simple one-step installation
- Supports large signs and high wind loads
- More attractive than steel or aluminum
- Preservative treated to AWPA standards for durability
- Hollow box design resists twist and bow



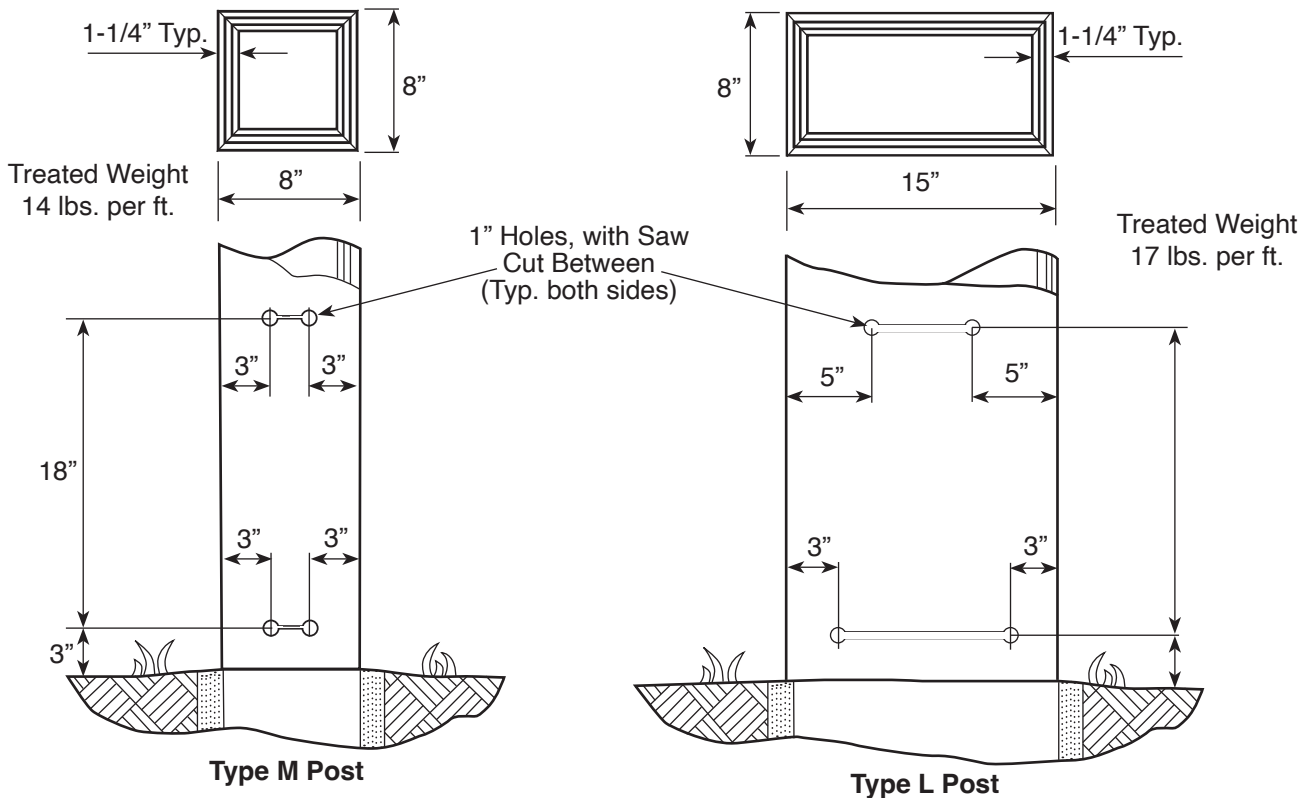
Breakaway Sign Posts Installation, Handling, & Storage

Installation

Holes for the posts should be bored with an auger. The type L post requires a 30" diameter hole, and the type M post requires a 24" diameter hole. The holes should be bored to an embedment depth following standard state specifications for each particular sign application. Each should be backfilled with a granular fill in a manner as specified in the state's standard specifications. The breakaway feature should be cut into the signpost after the posts are set. First, carefully drill one inch holes at the proper locations on the signpost, then cut the web between the holes, taking care not to cut beyond them.

Do not splice LVL breakaway signposts together or remove the protective metal cap from the top of the post.

Fasten the sign panel to the posts with lag screws in predrilled pilot holes. Fastener values (nails, bolts, screws, etc.) are as provided for solid sawn Douglas fir in the National Design Specification® for Wood Construction published by the NFPA. The lag screws should be installed and tightened with a hand wrench.





TRANSMISSION DESIGN

General Engineering	J-1
Structural Analysis	J-4
Pole Dimensions	J-11
Stresses in Down Guys.....	J-14
Double Arm Assemblies.....	J-15
Davit Arm vs Post Insulator	J-16
Testing	J-18
Tower Configurations	J-22

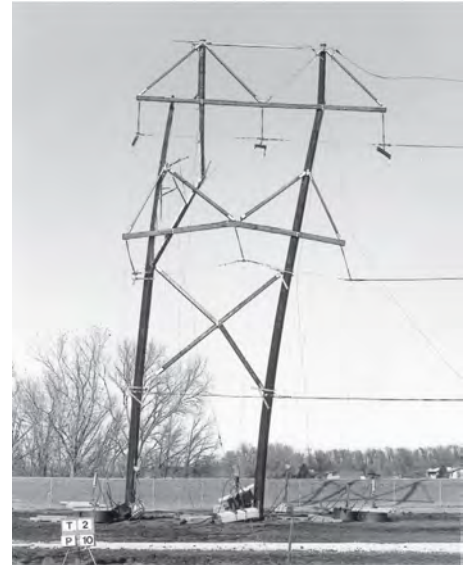


General Engineering

Since the early 1920's, the Hughes Brothers' engineering staff has assisted in the construction of hundreds of thousands of circuit miles of overhead construction.

Our engineering staff is prepared to offer their assistance by providing:

- Structural analysis of tower configurations
- Full scale testing
- Design & computer aided drafting
- Cost analysis and competitive bid analysis
- Project administration i.e., order processing, expediting, delivery coordination for the materials we supply.



Transmission engineers are fully aware that the mere assembly of poles, arms, braces, insulators, conductors, guys and hardware is not transmission construction. Properly designed transmission structures result from a complete study of all the conditions affecting the project.

This catalog section gives full consideration to the following important design criteria:

1) The most economically designed tangent structure, which considers only a maximum span, does not usually or necessarily result in the most economical transmission line.

2) Properly designed, efficient transmission structures result from a complete study of the route of the line, including profile, soil types, number and magnitude of angles, and the unusual and local conditions which are a part of any line.

3) Braced H-Frame lines have been built at a savings over unbraced H-Frame lines, resulting in greater strength and lower maintenance.

4) H-Frame lines can and have been built at a savings in cost over single pole lines.

5) Full size tests should be made on new developments before they are used in actual construction.

6) Successful transmission line construction is not based on the length of time in service, but whether it has been subjected to the load for which it was designed.

In the presentation of this information, we have tried to indicate to designers, operators and builders of overhead construction that our staff of engineers and our testing facilities are available to the utility industry.

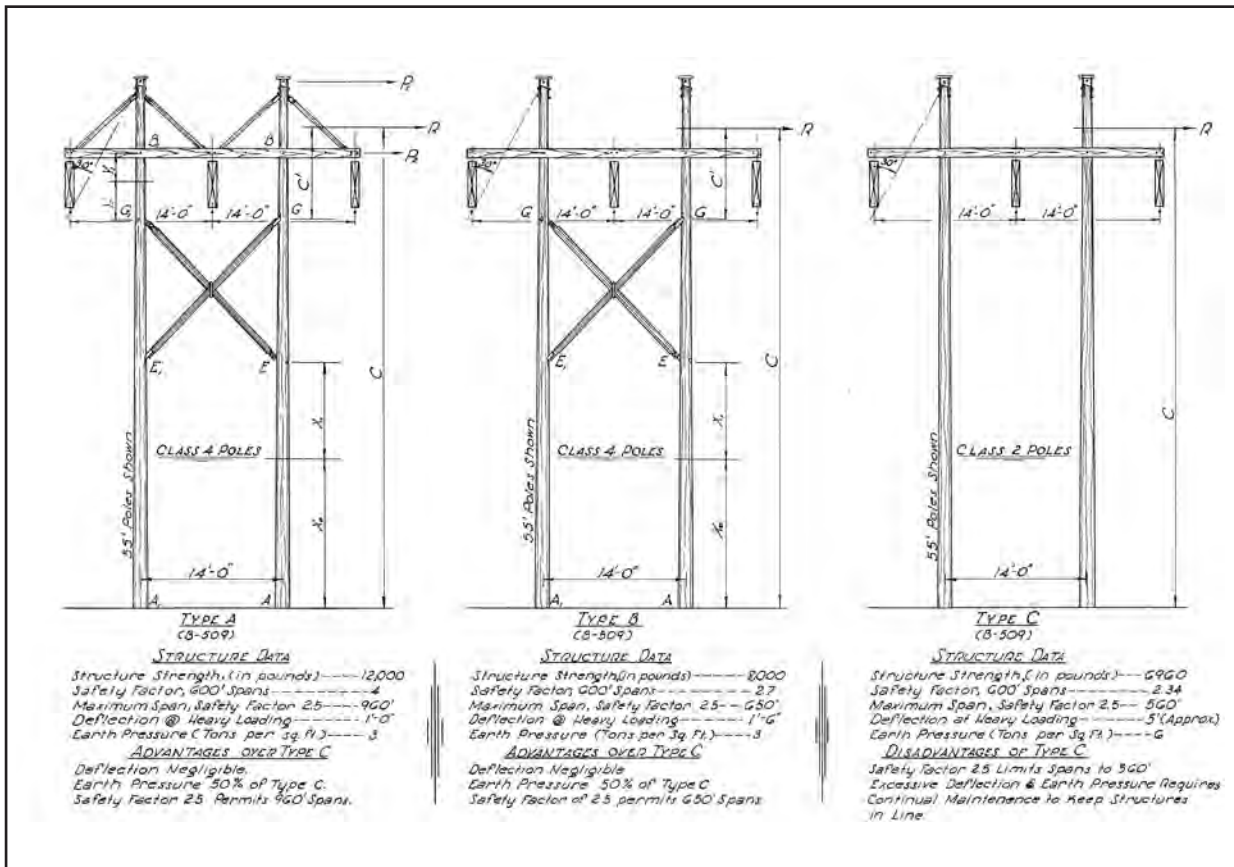
J TRANSMISSION DESIGN

The selection of the design of the tangent structure should be made with reference to the overall cost of the line which will include an analysis of the profile, conductor, right of way and local conditions affecting span lengths.

In general, Type C construction shown below, will rarely produce the most economical line. The span length will be limited, requiring more structures and associated parts; the deflection and earth pressure will be excessive.

The simple installation of the X-brace, as in Type B will eliminate deflection, reduce earth pressure, permit the use of smaller poles and result in longer spans and greater safety factors.

The Type A design will usually result in the safest, strongest and most economical long span, high voltage structure. The knee or vee braces permit the pole tops to act as guided cantilevers by introducing a point of inflection between the cross arm and top of the X-braces. Without these braces, the poles above the X-Braces act as simple cantilevers.



Taken from Hughes Brothers 1937 catalog.

Full Scale Structure Tests - A Continuing Process

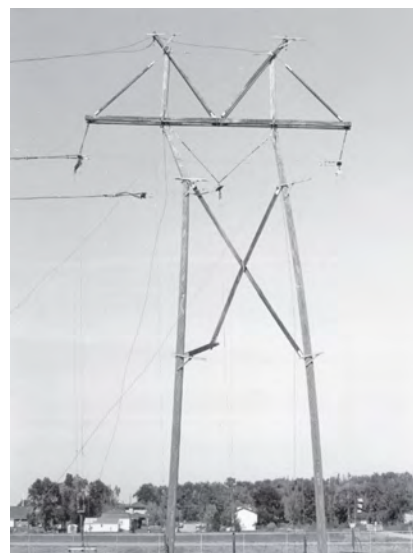
1955



1935



1986



Principles that were used 50 years ago are still applicable today

earth ← pressures →

The figure shows the principal forces acting on a pole set in compressible soil and subjected to a horizontal load at a certain distance above the ground line. The pressures developed are considered as the ordinates to a parabola located such that the pressure area on one side of the pole bears the same relation to that on the other side as R does to P, these being the butt reactions. By the principle of moments,

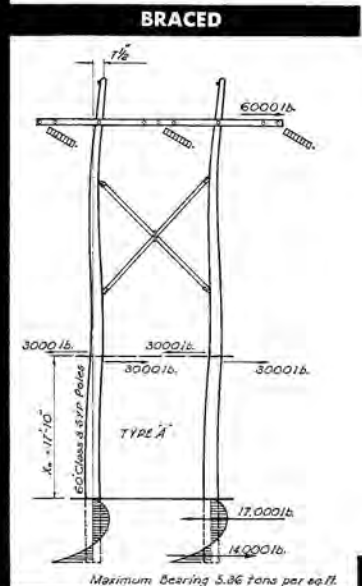
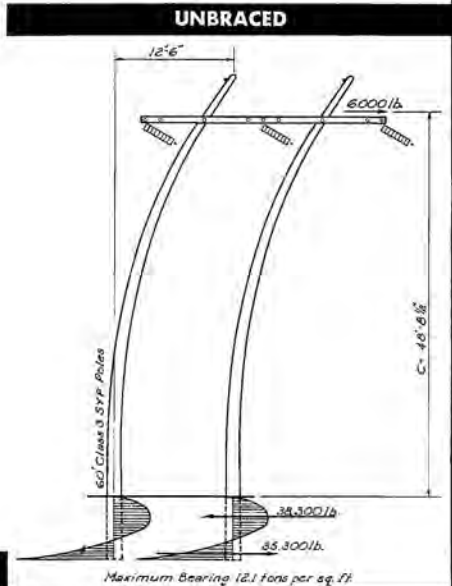
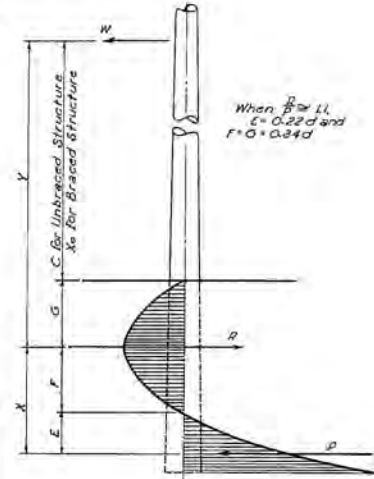
$$P = W \frac{Y}{X} \text{ and } R = P + W.$$

Maximum unit pressures developed are calculated by the formula

$$p \text{ (tons per square foot)} = \frac{0.003 R}{d \times D} \text{ where}$$

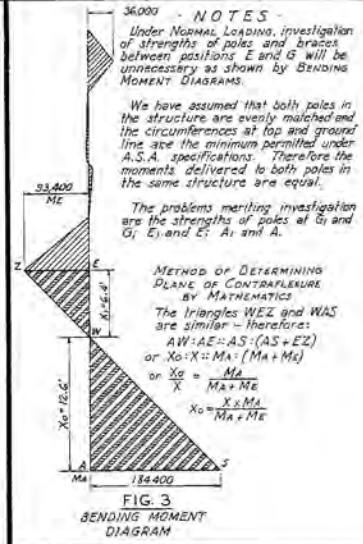
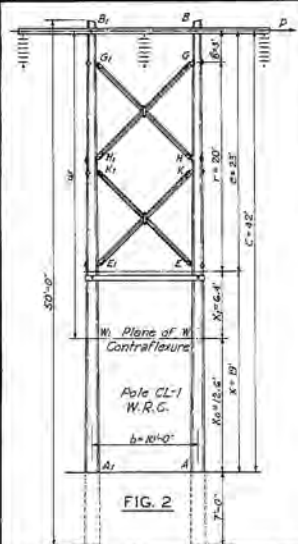
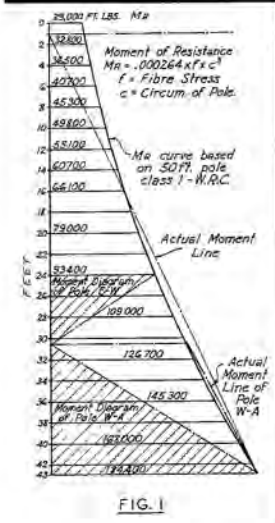
d = setting depth in feet and D = butt diameter in feet.

Since the effective point of load application of a braced structure is lowered to about 2/5 that of an unbraced fixture (Examples at bottom of page), the corresponding earth pressures are greatly reduced. Hence, a properly braced structure will stay in alignment under severe loading conditions whereas an unbraced structure will not. Maintenance costs of a braced line are thereby sharply reduced.



Reprinted by request from Hughes Brothers Catalog No. 11, circa late 1940's

X-BRACED H FRAMES



Reprinted by request from Hughes Brothers Catalog No. 11, circa late 1940's

TYPICAL DESIGN PROCEDURE

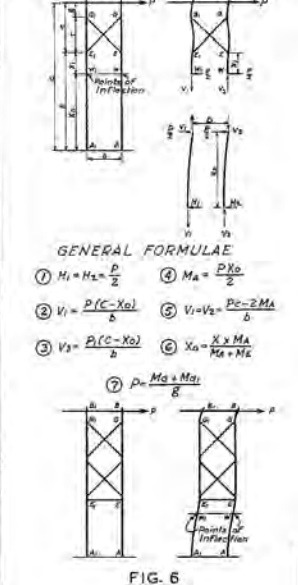
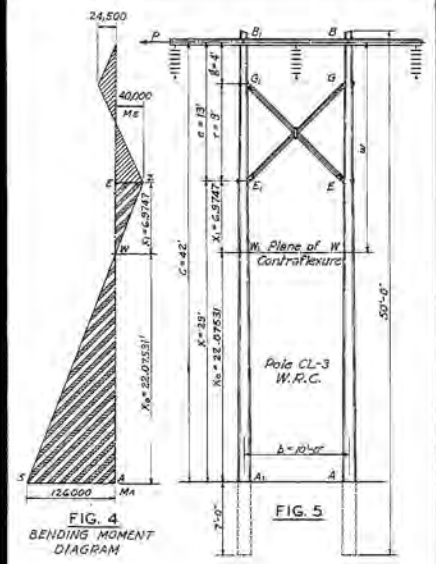
POLE DATA
 Assume 30' Class 3-W.R.C.
 Position CIRC. Mr.
 G = G1 25.4" 24500
 E = E1 29.9" 33900
 A = A1 44.1" 126000

CALCULATIONS
 To Determine Plane of Contraflexure
 $X_0 = \frac{V \times MA}{Me + Ma} = \frac{29 \times 126000}{33900 + 24500} = 22.02531$
 $X_1 = X - X_0 = 29 - 22.02531 = 6.97469$
 @ E or E1 $\frac{P}{2} = \frac{Me}{X_1} = \frac{33900}{6.9747} = 5720.66$
 @ A or A1 $\frac{P}{2} = \frac{Ma}{X_0} = \frac{126000}{22.02531} = 5720.69$
 $P = 2 \times 5720.66 = 11441 \text{ lbs. Ulf. Strength.}$

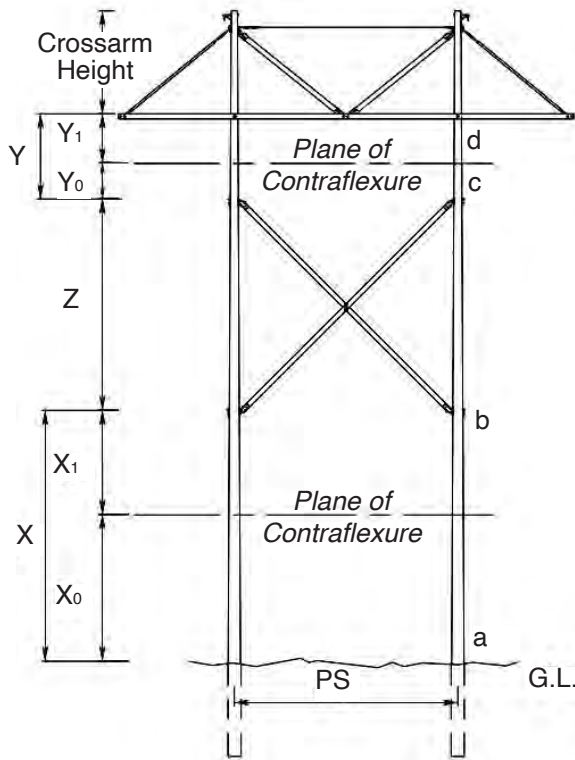
$MA @ G \text{ or } G_1 = \frac{24500}{4} = 6125$
 $P = 6125 \times 2 = 12250 \text{ lbs.}$

VERTICAL UPLIFT
 $P \times (C - X_0) = \frac{11441 \times (42 - 22)}{9} = 25422 \text{ lbs. Uplift.}$

Value of pole in uplift where soil pressure is good for 1000* per surface foot of pole:
 $3.67 \times 7 = 25.69 \text{ sq. ft.}$
 $25.69 \times 1000 = 25690 \text{ lbs.}$
 No anchors required.



Theoretical Maximum Transverse Span Analysis of Hughes Brothers H-Frame Structures



Initial Conditions:

1. Bending stress of pole = 8,000 psi
2. $Y = 6'-6''$
3. Crossarm height = $8'-9''$
4. $Z =$ Pole spacing minus 1 ft
5. 70', class 2 Douglas-fir poles
6. Set depth = $9'-0''$
7. Pole spacing = $15'-6''$

Find ultimate pole moments at locations a, b, c, d:

$$M = s f = \frac{\pi d^3}{(12)32} (f) = \frac{\pi c^3}{32\pi^3 (12)} (f) \text{ therefore:}$$

$$M = 0.000264fc^3 \text{ (ft - lbs.)}, \text{ where}$$

$f =$ Bending stress of pole

$c =$ Circumference(inches) at each location

$s =$ Section modulus at each location(in^3)

$M =$ Moment (ft - lbs.)

Location	Circumference in Inches	Ultimate Pole Moment (ft-lbs.)
a	46.92	218,183
b	35.69	96,025
c	30.48	59,808
d	28.14	46,804

List of Assumptions

1. Plane surfaces will remain plane and bracing will create a plane of contraflexure (point of zero moment).
2. Horizontal load is equally distributed between the poles.
3. Pole taper is to be uniform for the entire length of pole.
4. Foundations are rigid and fixed.

NOTE: Circumferences are based on ANSI minimum dimensions.

Find location of planes of contraflexure:

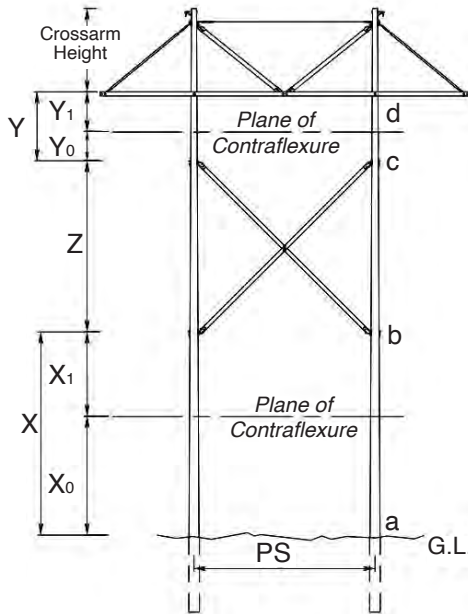
$$X_0 = \frac{X M_a}{M_a + M_b} = \frac{31.25 \text{ ft.} \times 218,183 \text{ ft - lbs.}}{218,183 \text{ ft - lbs.} + 96,025 \text{ ft - lbs.}} = 21.70 \text{ ft.}$$

$$X_1 = X - X_0 = 31.25 \text{ ft.} - 21.70 \text{ ft.} = 9.55 \text{ ft.}$$

$$Y_0 = \frac{Y M_c}{M_c + M_d} = \frac{6.5 \text{ ft.} \times 59,808 \text{ ft - lbs.}}{59,808 \text{ ft - lbs.} + 47,084 \text{ ft - lbs.}} = 3.64 \text{ ft.}$$

$$X_0 = Y - Y_0 = 6.5 \text{ ft.} - 3.64 \text{ ft.} = 2.86$$

H-Frame Structure Strength Analysis (cont'd)



List of Assumptions

1. Plane surfaces will remain plane and bracing will create a plane of contraflexure (point of zero moment).
2. Horizontal load is equally distributed between the poles.
3. Pole taper is uniform for the entire length of pole.
4. Foundations are rigid and fixed.

Find maximum load (P) to fail poles at each location:

$$P_a = \frac{2Ma}{X_0} = \frac{2 \times 218,183 \text{ ft} \cdot \text{lbs.}}{21.70 \text{ ft.}} = 20,109 \text{ lbs.}$$

$$P_b = \frac{2Mb}{X_1} = \frac{2 \times 96,025 \text{ ft} \cdot \text{lbs.}}{9.55 \text{ ft.}} = 20,109 \text{ lbs.}$$

$$P_c = \frac{2Mc}{Y_0} = \frac{2 \times 59,808 \text{ ft} \cdot \text{lbs.}}{3.64 \text{ ft.}} = 32,890 \text{ lbs.}$$

$$P_d = \frac{2Md}{Y_1} = \frac{2 \times 47,084 \text{ ft} \cdot \text{lbs.}}{2.86 \text{ ft.}} = 32,890 \text{ lbs.}$$

Maximum P allowed:

Assume 15% strength reduction due to bolt holes etc.

$$20,109 \text{ lbs.} \cdot (.85) = 17,093 \text{ lbs.}$$

II. Check Strength of 1042 style X - Brace

A. Compression

Theoretical X - Brace Strength [Px] from Euler's Formula

$$P_x = \frac{\pi^2 EI}{L^2}$$

where: L = Unbraced length in inches, assumed to be 1/2 of the brace length

I = Moment of inertia

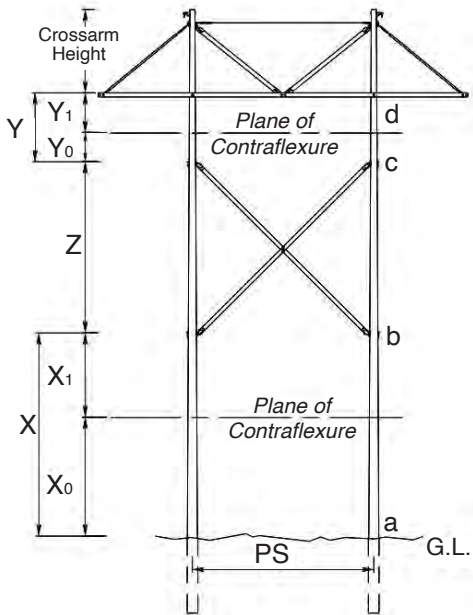
E = Modulus of Elasticity

$$P_x = \frac{\pi^2 \times 1.6 \times 10^6 \text{ psi} \times 17.22 \text{ in.}^4}{\left(\frac{14.5}{\cos 45} (0.5) \text{ ft.} \times 12 \text{ in./ft.}\right)^2} = 17,963 \text{ lbs.}$$

B. Tension

The Hughes Brothers 1042X - Brace is limited to 20,000 pounds which is determined empirically

H-Frame Structure Strength Analysis (cont'd)



List of Assumptions

1. Plane surfaces will remain plane and bracing will create a plane of contraflexure (point of zero moment).
2. Horizontal load is equally distributed between the poles.
3. Pole taper is uniform for the entire length of pole.
4. Foundations are rigid and fixed.

C. Load to Fail the X -Brace

Note: Starting from the top of the structure and moving down

$$1. \quad \underline{\Sigma F_v = 0, \quad V_1 = V_1}$$

Assume: The transverse load is equally divided between the poles.

$$\Sigma ME = 0: \quad [P \times L] = [V_1 \times b]$$

$$V_1 = \frac{P \times L}{b}$$

$$2. \quad \underline{\Sigma MF = 0:}$$

$$2[P / 2(Y_0 + Z + X_1)] + [V_1 \times b] - [V_2 \times b] = 0$$

$$V_2 = \frac{P(Y_0 + Z + X_1) + V_1}{b}$$

$$\phi = 45^\circ$$

$$\underline{\Sigma MG = 0:}$$

$$[XBr_2 Z \cos \phi] - [[P / 2 \times Y_0] + [P / 2 \times (Z + X_1)]] = 0$$

$$XBr_2 = \frac{P / 2[Y_0 + Z + X_1]}{Z \cos \phi}$$

$$\underline{\Sigma MH = 0:}$$

$$[XBr_1 Z \sin \phi] - [[P / 2 \times X_1] + [P / 2 \times (Z + Y_0)]] = 0$$

$$XBr_1 = \frac{P / 2[Y_0 + Z + X_1]}{Z \sin \phi}$$

$$\text{Since } \phi = 45^\circ$$

$$XBr_2 = XBr_1$$

Note: Replace XBr_1 with P_x (Theoretical X - Brace Strength) and solve for P (Load to Fail X - Brace).

$$P = \frac{2 P_x Z \sin \phi}{X_1 + Z + Y_0} = \frac{2 \times 17,963 \text{ lbs.} \times 14.5 \text{ ft.} \times \sin 45^\circ}{(9.55 \text{ ft.} + 14.5 \text{ ft.} + 3.64 \text{ ft.})} = 13,303 \text{ lbs.}$$

H-Frame Structure Strength Analysis (cont'd)

III. Wind Loading

Assume: 3 / 8" Shield, 795 ACSR 26 / 7
 NESC "Light" Loading - 9 lb Wind on Bare Conductor
 Overload Factor = 4.0

A. Wind on Pole (w)

w= Wind Load on One Pole Applied at the Crossarm Position

$$= 9 \text{ lbs./ft}^2 \times \frac{(25 \text{ in.} + 46.9 \text{ in.})}{(2 \pi \times 12 \text{ in./ft.})} \times 61 \text{ ft.} \times 4.0 = 2,094 \text{ lbs.}$$

B. Wire Loads - (per ft.)

$$\text{Conductor Loads (3)} = 9 \text{ lbs./ft.}^2 \times \frac{1.108 \text{ in.}}{12 \text{ in./ft.}} \times 4.0 \times 3 = 9.972 \text{ lbs./ft.}$$

$$\text{Shield Wire (2)} = 9 \text{ lbs./ft.}^2 \times \frac{0.375 \text{ in.}}{12 \text{ in./ft.}} \times 4.0 \times 2 = \underline{2.160 \text{ lbs./ft.}}$$

$$\text{Total wire load} = 12.132 \text{ lb./ft.}$$

IV. Maximum Span

$$\text{Maximum Span} = \frac{13,303 \text{ lbs.} - 2,094 \text{ lbs.}}{12.132 \text{ lbs./ft.}} = 924 \text{ ft.}^*$$

* X - Brace Strength Controls

See Hughes Brothers computer span analysis on next page

Maximum Theoretical Transverse Spans

X-Brace= 1042

Fiber Stress= 8000 psi

Crossarm Height= 8.75 ft

Y= 6.5 ft

Pole Spacing= 15.5 ft

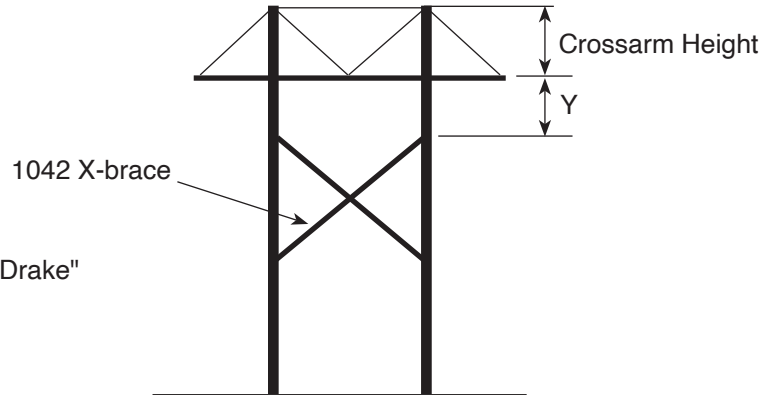
Conductor- 795 ACSR, 26/7 "Drake"

Shield Wire- 3/8" EHS

X-Brace Height= 3.375 in

X-Brace Width= 5.375 in

X-Brace Strength= 20,000 lbs



Wind Load= 9 lbs

Radial Ice= 0 in

Safety Factor= 4

of Conductors= 3

of Shield Wires= 2

Conductor Diameter= 1.108 in

Shield Wire Diameter= 0.36 in

Transverse Wire Tension= 0 lbs

	POLE CLASS					
	H3	H2	H1	1	2	3
55	1055*	1065*	1076*	1086*	1096*	1107*
60	981*	993*	1005*	1017*	1029*	1041*
65	918*	931*	944*	958*	972*	987*
70	864*	877*	892*	908*	924*	940*
75	815*	831*	847*	864*	880*	866
80	771*	787*	806*	825*	843*	769
85	730*	749*	769*	788*	808*	689
90	693*	713*	733*	754*	778*	624
95	653*	676*	699*	720*	745*	-
100	617*	640*	665*	689*	691	-
105	589*	614*	638*	664*	641	-
110	555*	581*	609*	635*	591	-
115	521*	550*	579*	607*	546	-
120	491*	519*	550*	580*	506	-

*Denotes X-brace controlling.

Determining Pole Diameters

To determine the diameter of a pole at any given distance from the top:

1. Find the butt circumference by selecting the pole class in row 1
2. Move down the column to the desired pole length
3. Select the pole top circumference from row 2
4. Perform the following calculation:

NOTE: Pole circumference tables located on pages J-12 & J-13

$$\text{Circumference at any point} = \left(\frac{\text{Circumference at 6 ft. from Butt - Top Circumference}}{(\text{Pole Length} - 6)} \times \text{Distance from Top} \right) + \text{Top Circumference}$$

$$\text{Diameter at any point} = \frac{\text{Circumference}}{\pi} \quad \pi = 3.14$$

Special Note: The diameter found is a minimum pole dimension, based on ANSI 05.1. Most poles will run larger than this dimension.

Dimensions of Douglas-fir (both types) and Southern Pine Poles from ANSI 05.1-1992

Class		H-6	H-5	H-4	H-3	H-2	H-1	1	2	3	4	5	6	7	9	10
Minimum circumference at top (in.)		39	37	35	33	31	29	27	25	23	21	19	17	15	15	12
Length of pole (ft.)	Groundline** distance from butt (ft.)	Minimum circumference at 6 ft from butt (in.)														
		20	4.0	-	-	-	-	-	31.0	29.0	27.0	25.0	23.0	21.0	19.5	17.5
25	5.0	-	-	-	-	-	33.5	31.5	29.5	27.5	25.5	23.0	21.5	19.5	15.0	
30	5.5	-	-	-	-	-	36.5	34.0	32.0	29.5	27.5	25.0	23.5	20.5	-	
35	6.0	-	-	-	-	43.5	39.0	36.5	34.0	31.5	29.0	27.0	25.0	-	-	
40	6.0	-	-	51.0	48.5	46.0	41.0	38.5	36.0	33.5	31.0	28.5	-	-	-	
45	6.5	58.5	56.0	53.5	51.0	48.5	43.0	40.5	37.5	35.0	32.5	30.0	-	-	-	
50	7.0	61.0	58.5	55.5	53.0	50.5	45.0	42.0	39.0	36.5	34.0	-	-	-	-	
55	7.5	63.5	60.5	58.0	55.0	52.0	46.5	43.5	40.5	38.0	-	-	-	-	-	
60	8.0	65.5	62.5	59.5	57.0	54.0	48.0	45.0	42.0	39.0	-	-	-	-	-	
65	8.5	67.5	64.5	61.5	58.5	55.5	49.5	46.5	43.5	40.5	-	-	-	-	-	
70	9.0	69.0	66.5	63.5	60.5	57.0	51.0	48.0	45.0	41.5	-	-	-	-	-	
75	9.5	71.0	68.0	65.0	62.0	59.0	52.5	49.0	46.0	-	-	-	-	-	-	
80	10	72.5	69.5	66.5	63.5	60.0	54.0	50.5	47.0	-	-	-	-	-	-	
85	10.5	74.5	71.5	68.0	65.0	61.5	55.0	51.5	48.0	-	-	-	-	-	-	
90	11.0	76.0	73.0	69.5	66.5	63.0	56.0	53.0	49.0	-	-	-	-	-	-	
95	11.0	77.5	74.5	71.0	67.5	64.5	57.0	54.0	-	-	-	-	-	-	-	
100	11.0	79.0	76.0	72.5	69.0	65.5	58.5	55.0	-	-	-	-	-	-	-	
105	12.0	80.5	77.0	74.0	70.5	67.0	59.5	56.0	-	-	-	-	-	-	-	
110	12.0	82.0	78.5	75.0	71.5	68.0	60.5	57.0	-	-	-	-	-	-	-	
115	12.0	83.5	80.0	76.5	72.5	69.0	61.5	58.0	-	-	-	-	-	-	-	
120	12.0	85.0	81.0	77.5	74.0	70.0	62.5	59.0	-	-	-	-	-	-	-	
125	12.0	86.0	82.5	78.5	75.0	71.0	63.5	59.5	-	-	-	-	-	-	-	

NOTE: Classes and lengths for which circumferences at 6 feet from the butt are listed in boldface type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.

** The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.



Dimensions of Western Red Cedar* and Ponderosa Pine Poles from ANSI 05.1-1992

Class		H-6	H-5	H-4	H-3	H-2	H-1	1	2	3	4	5	6	7	9	10
Minimum circumference at top (in.)		39	37	35	33	31	29	27	25	23	21	19	17	15	15	12
Length of pole (ft.)	Groundline** of distance from butt (ft.)	Minimum circumference at 6 ft from butt (in.)														
		20	4.0	-	-	-	-	-	33.5	31.5	29.5	27.0	25.0	23.0	21.5	18.5
25	5.0	-	-	-	-	-	37.0	34.5	32.5	30.0	28.0	25.5	24.0	20.5	16.5	16.5
30	5.5	-	-	-	-	-	40.0	37.5	35.0	32.5	30.0	28.0	26.0	22.0	-	-
35	6.0	-	-	-	-	48.0	45.5	40.0	37.5	34.5	32.0	30.0	27.5	-	-	-
40	6.0	-	-	56.5	53.5	51.0	48.0	42.5	39.5	36.5	34.0	31.5	-	-	-	-
45	6.5	64.5	62.0	59.0	56.0	53.5	50.5	44.5	41.5	38.5	36.0	33.0	-	-	-	-
50	7.0	67.0	64.5	61.5	58.5	55.5	52.5	46.5	43.5	40.0	37.5	-	-	-	-	-
55	7.5	70.0	67.0	64.0	61.0	57.5	54.5	48.5	45.0	42.0	-	-	-	-	-	-
60	8.0	72.0	69.0	66.0	63.0	59.5	56.5	50.0	46.5	43.5	-	-	-	-	-	-
65	8.5	74.5	71.5	68.0	65.0	61.5	58.5	51.5	48.0	45.0	-	-	-	-	-	-
70	9.0	76.5	73.5	70.0	67.0	63.5	60.0	53.0	49.5	46.0	-	-	-	-	-	-
75	9.5	78.5	75.5	72.0	68.5	65.0	61.5	54.5	51.0	-	-	-	-	-	-	-
80	10	80.5	77.0	74.0	70.5	67.0	63.0	56.0	52.0	-	-	-	-	-	-	-
85	10.5	82.5	79.0	75.5	72.0	68.5	64.5	57.0	53.5	-	-	-	-	-	-	-
90	11.0	84.5	81.0	77.0	73.5	70.0	66.0	58.5	54.5	-	-	-	-	-	-	-
95	11.0	86.0	82.5	79.0	75.0	71.5	67.5	59.5	-	-	-	-	-	-	-	-
100	11.0	87.5	84.0	80.5	76.5	72.5	69.0	61.0	-	-	-	-	-	-	-	-
105	12.0	89.5	85.5	82.0	78.0	74.0	70.0	62.0	-	-	-	-	-	-	-	-
110	12.0	91.0	87.0	83.5	79.5	75.5	71.5	63.0	-	-	-	-	-	-	-	-
115	12.0	92.5	88.5	84.5	80.5	76.5	72.5	64.0	-	-	-	-	-	-	-	-
120	12.0	84.0	90.0	86.0	82.0	78.0	74.0	65.0	-	-	-	-	-	-	-	-
125	12.0	95.5	91.5	87.5	83.0	79.0	75.0	66.0	-	-	-	-	-	-	-	-

NOTE: Classes and lengths for which circumferences at 6 feet from the butt are listed in boldface type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.

* Dimensions of H classes are applicable for western red cedar only.

** The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.

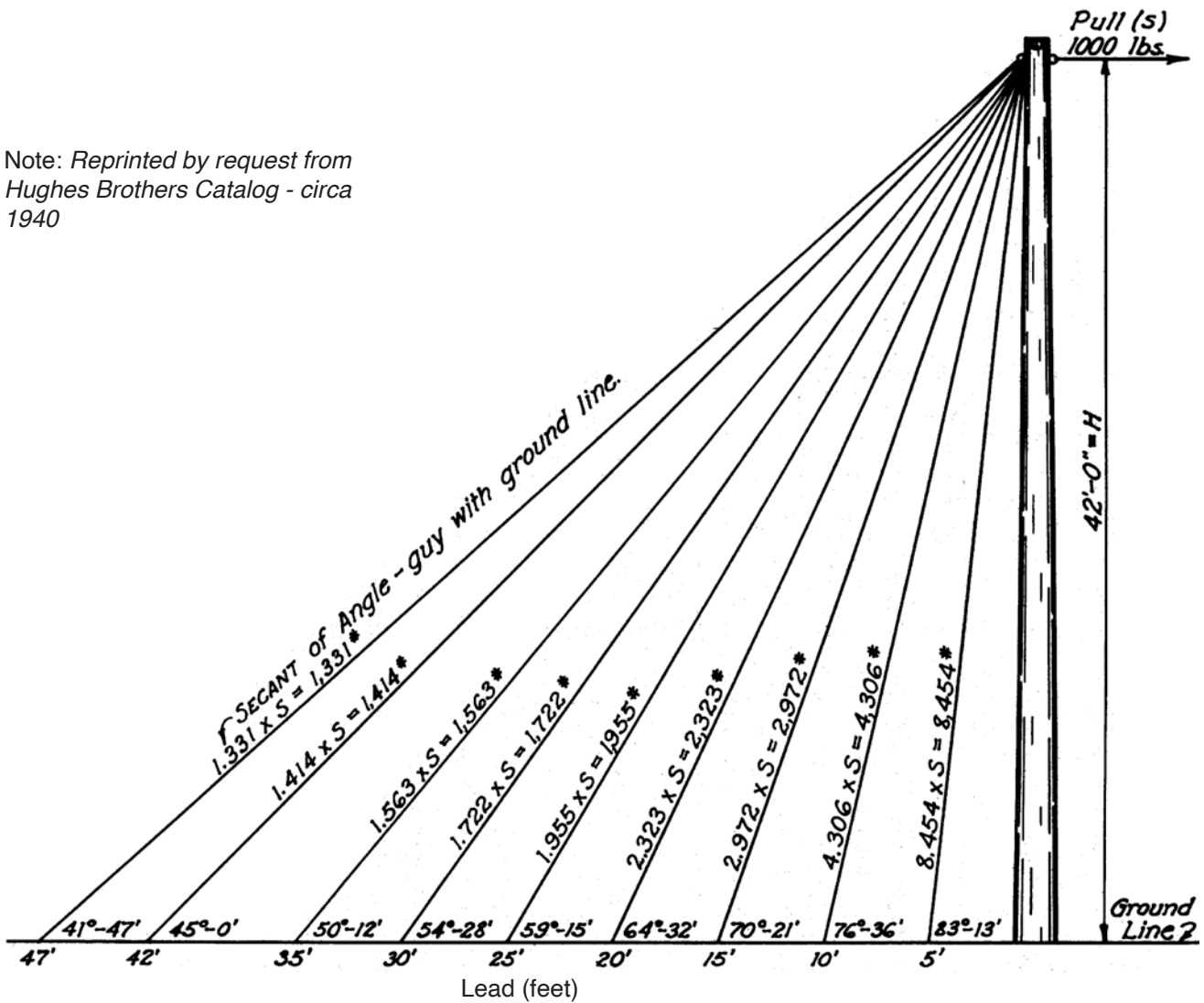


Trigonometric Diagram

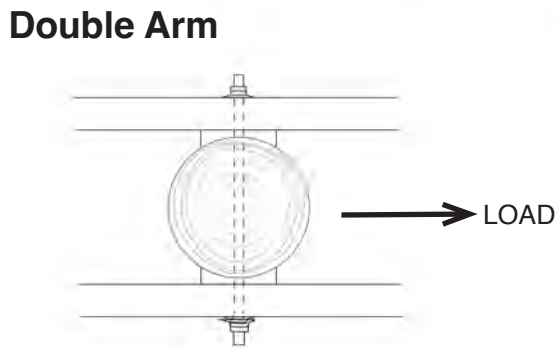
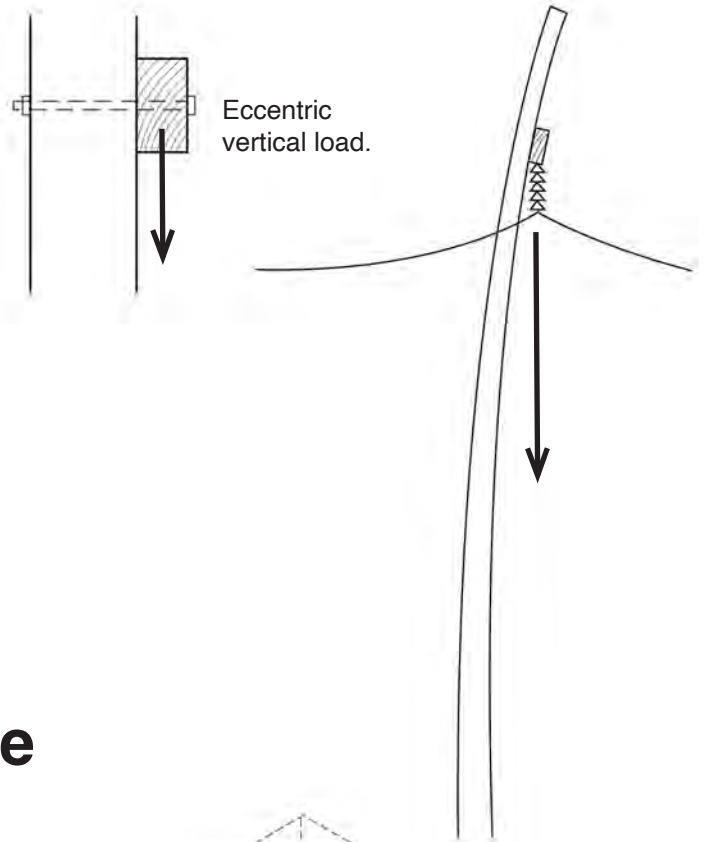
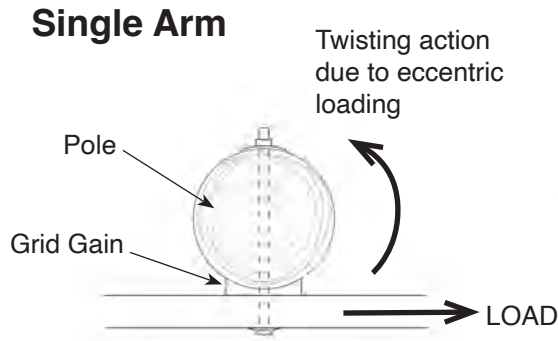
NOTE: To find the angle a guy wire makes with the ground line, divide Height "H" by the lead. The result will be the Tangent of the Angle.

Find the Secant of this Angle from the table of Natural Trigonometric Functions and Multiply by Pull "s", the result of which will be the stress in the Guy Wire.

Note: Reprinted by request from
Hughes Brothers Catalog - circa
1940

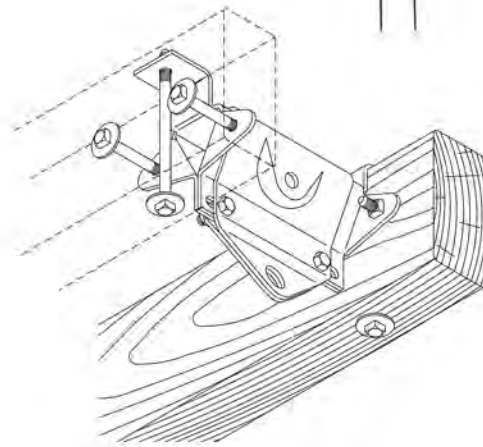


Eliminate Eccentric Loading with Hughes Brothers Double Arm Assemblies and Adjustable Spacer Fittings



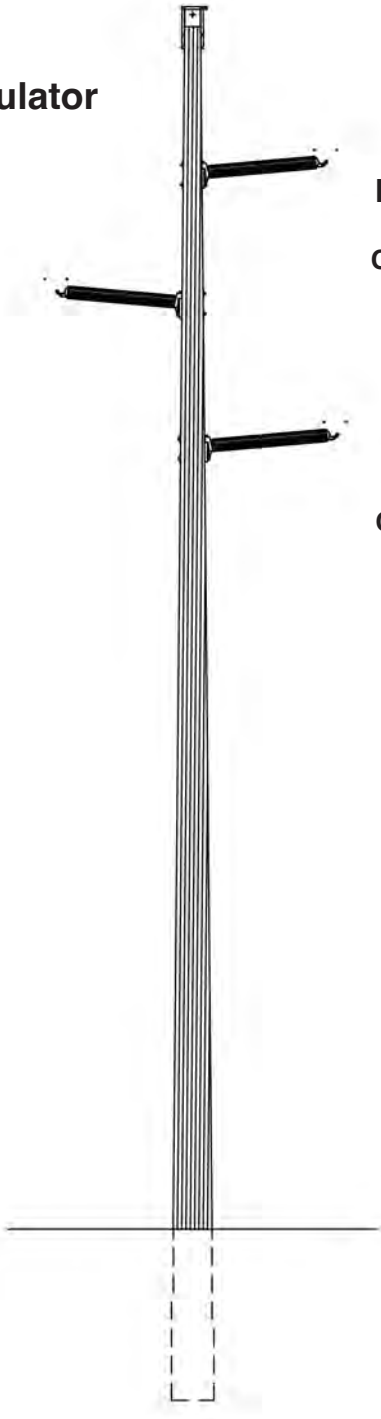
Hughes Adjustable Spacer Fittings

Hughes Adjustable Spacer Fittings with double arm assemblies eliminate eccentric loading and distribute shear forces on mounting hardware. The adjustable spacer fitting allows for variations in pole diameter. It also helps ease installation of the pre-assembled crossarms by enabling crews to widen the arm assemblies, slide them over the top of the poles, and tighten the arm assembly.
 See Pole Line Hardware section for Adjustable Spacer Fitting information.



Hughes Brothers Davit Arm vs Post Insulator

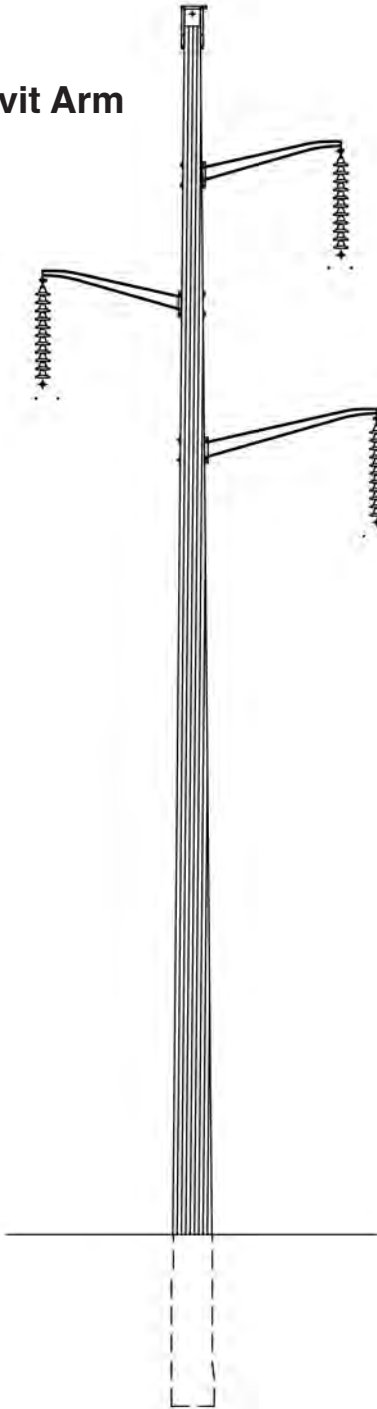
Post Insulator



Post Insulator Construction

Case 1 NESC "Heavy"
230 kv line
Conductor: 795 26/7 ACSR (Drake) bundled
Vert. load = $2.0942 \text{ lbs./ft} \times 2 \times 1.5 \text{ OCF} = \underline{6.2826 \text{ lb./ft.}}$
Post Insulator L=73.75 in.
Max. vert. = 2800 lbs.
Max. span = 445 ft. 11.86 structures/mile

Case 2 NESC "Heavy"
230kv line
Conductor: 795 54/7 ACSR (Condor) bundled
Vert load = $2.4421 \text{ lb/ft} \times 2 \times 1.5 \text{ OCF} = \underline{7.3263 \text{ lb/ft}}$
Post Insulator L=73.75 in.
Max. vert. = 2800 lbs
Max. span = 382 ft. 13.82 structures/mile

Davit Arm**Davit Arm Construction**

- Case 1** NESC "Heavy"
 230 kv line
 Conductor: 795 26/7 ACSR (Drake) bundled
 Vert. load = $2.0942 \text{ lbs./ft} \times 2 \times 1.5 \text{ OCF} = 6.2826 \text{ lbs./ft.}$
Davit Arm 6'-6" arm - Hughes No. 4020A6.5C50G
 Max. vert. = 3630 lbs.
 Max. span = 577 ft. 9.15 structures/mile
- Case 2** NESC "Heavy"
 230kv line
 Conductor: 795 54/7 ACSR (Condor) bundled
 Vert load = $2.4421 \text{ lbs./ft} \times 2 \times 1.5 \text{ OCF} = 7.3263 \text{ lbs./ft.}$
Davit Arm 6'-6" arm - Hughes No. 4020A6.5C50G
 Max.vert. = 3630 lbs.
 Max. span = 495 ft. 10.66 structures/mile

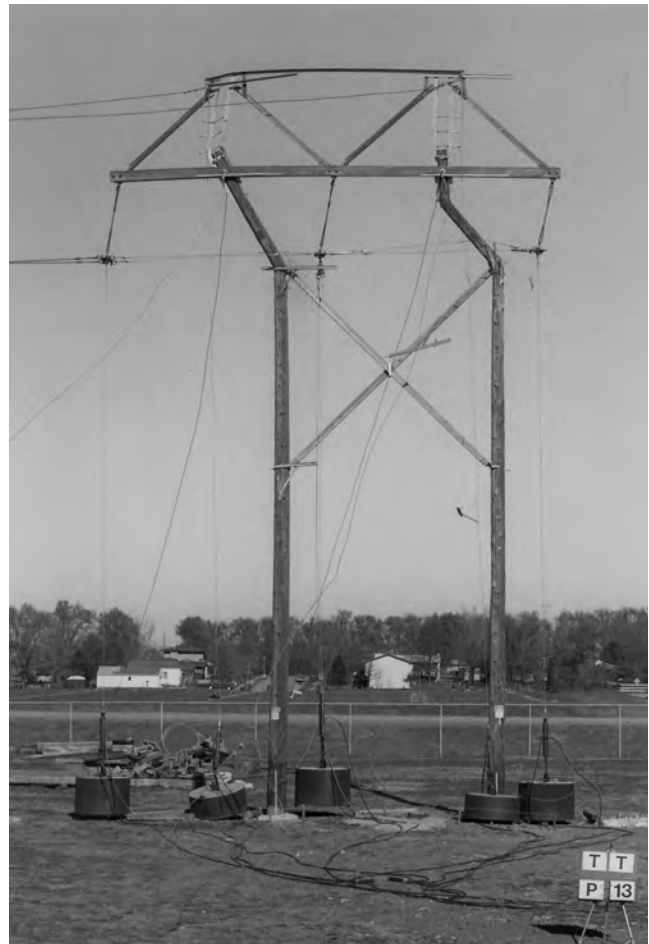
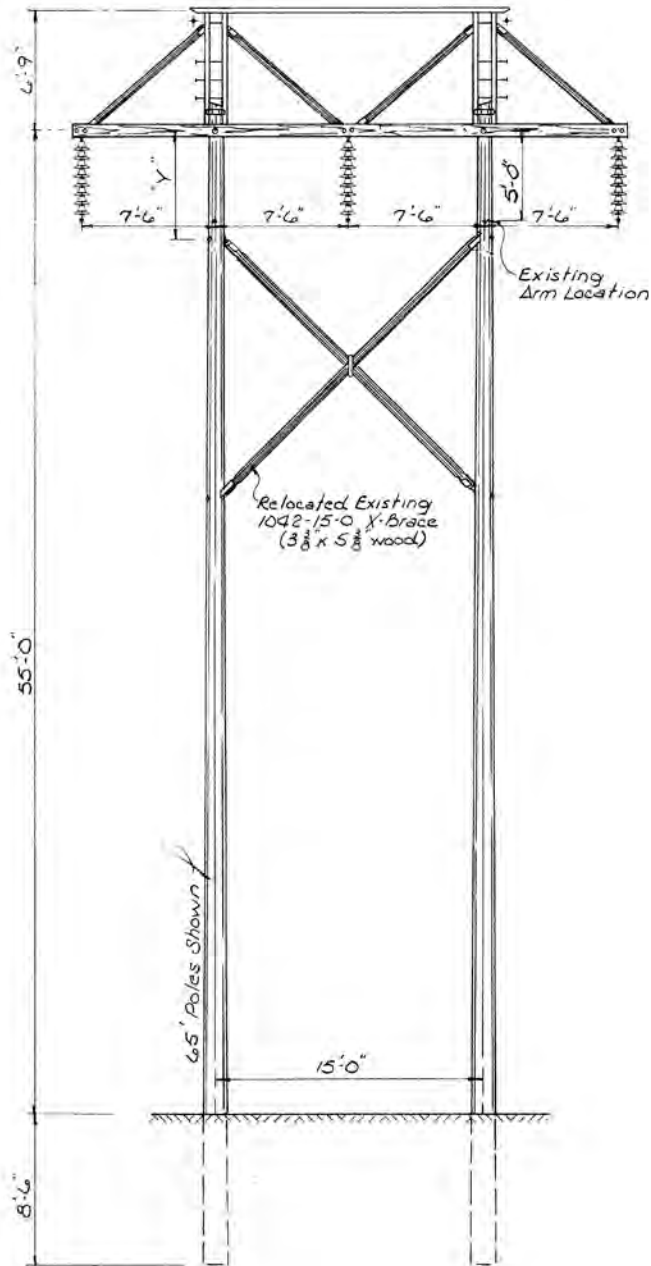
Conclusion

Hughes Brothers Davit Arms can provide a more economical means of supporting conductors than post insulators. The longer spans that are obtained with davit arm construction translate into total project cost savings. Fewer poles, insulators, and less labor lower the construction cost. In the long run, less equipment in the fields means lower maintenance costs.

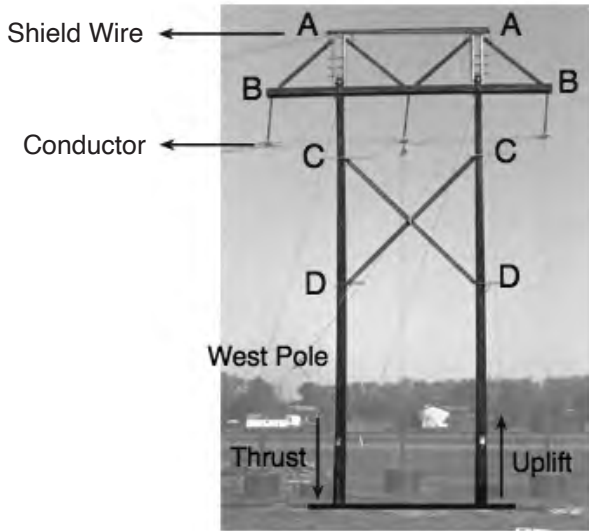
Please contact Hughes Brothers for cost comparisons of single pole post-insulator construction versus H-frame construction.

J TRANSMISSION DESIGN

Full scale testing is used by Hughes Brothers, Inc. to confirm design calculations. Hughes' design methods have been proven by dozens of full scale structure tests.



Full scale structure test of a 38 yr old H-frame conducted for Dairyland Power Cooperative, November 10, 1988.



Dairyland Power Cooperative

Type C2214-AR1 Reframed 161 kV Construction Tangent Structure

November 10, 1988

Test Purpose: The purpose of this test was to verify the structural integrity of a 38 yr. old, reframed wood H-frame structure.

Test No. 1

Vertical Loads - Conductor (each) 4,000 lbs.
Shield Wire (each) 2,500 lbs.

Transverse Loads

LOAD IN LBS.				DEFLECTIONS IN INCHES										
Load No.	Per S.W.	Per Phase	Total Load	West Pole					East Pole					
				A	B	C	D	Thrust	A	B	C	D	Uplift	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	VERTICAL LOAD			0	0	0	0	0	0	0	0	0	0	0
3	300	400	1800	2-1/2	2-3/8	1-3/4	1-1/2	0	1-3/4	2-1/8	1-1/4	1-3/8	0	
4	450	567	2600	3-5/8	3-5/8	2-1/4	2-1/4	0	3-1/8	3-1/4	2-3/8	2-3/8	0	
5	600	767	3500	4-7/8	5	3-3/4	3-1/8	0	4-3/8	4-1/2	3-1/4	3-1/8	0	
6	750	967	4400	6-3/4	6-7/8	5-1/8	4-1/8	0	6-1/4	6-1/4	4-5/8	4-3/8	0	
7	900	1167	5300	8-1/2	8-1/2	6-1/2	5-1/8	0	8-3/8	8-1/8	6-1/8	5-3/4	0	
8	1050	1367	6200	10-3/4	10-5/8	8-1/4	6-1/2	0	9-3/4	9-7/8	7-3/8	6-3/4	0	
9	1200	1567	7100	12-3/8	12-3/8	9-5/8	7-1/2	0	11-1/2	11-3/4	8-7/8	8-3/8	0	
10	1350	1767	8000	14-7/8	14-7/8	11-1/2	9	0	13-7/8	14-1/8	10-1/2	10-1/8	0	
11	1500	1967	8900	17-1/2	17-1/2	13-1/2	10-3/8	0	17-1/8	17-1/8	13	12-7/8	0	
12	1650	2167	9800	21-5/8	21-1/2	16-1/4	12-1/4	0	20-7/8	21	16-1/8	NA	0	
13	1800	2367	10700	FAILURE										

Test Procedure

Vertical loads are applied by suspending pre-weighed concrete and steel weights at each phase and shield wire position. The weights are raised by remotely operated hydraulic cylinders. Transverse loads are applied by means of power operated winches. The loads are monitored by certified dynamometers. Deflections are measured at selected points on the structure by reading calibrated rulers with a transit. All data is recorded at the time it is generated.

Load 3

1,800 lbs.



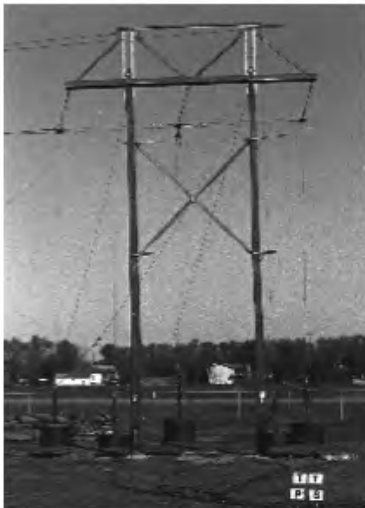
Load 7

5,300 lbs.



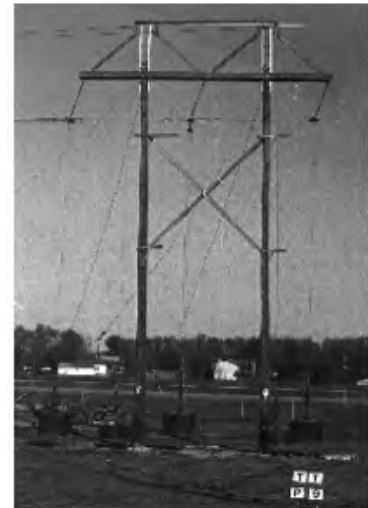
Load 8

6,200 lbs.



Load 9

7,100 lbs.



Load 12

9,800 lbs.

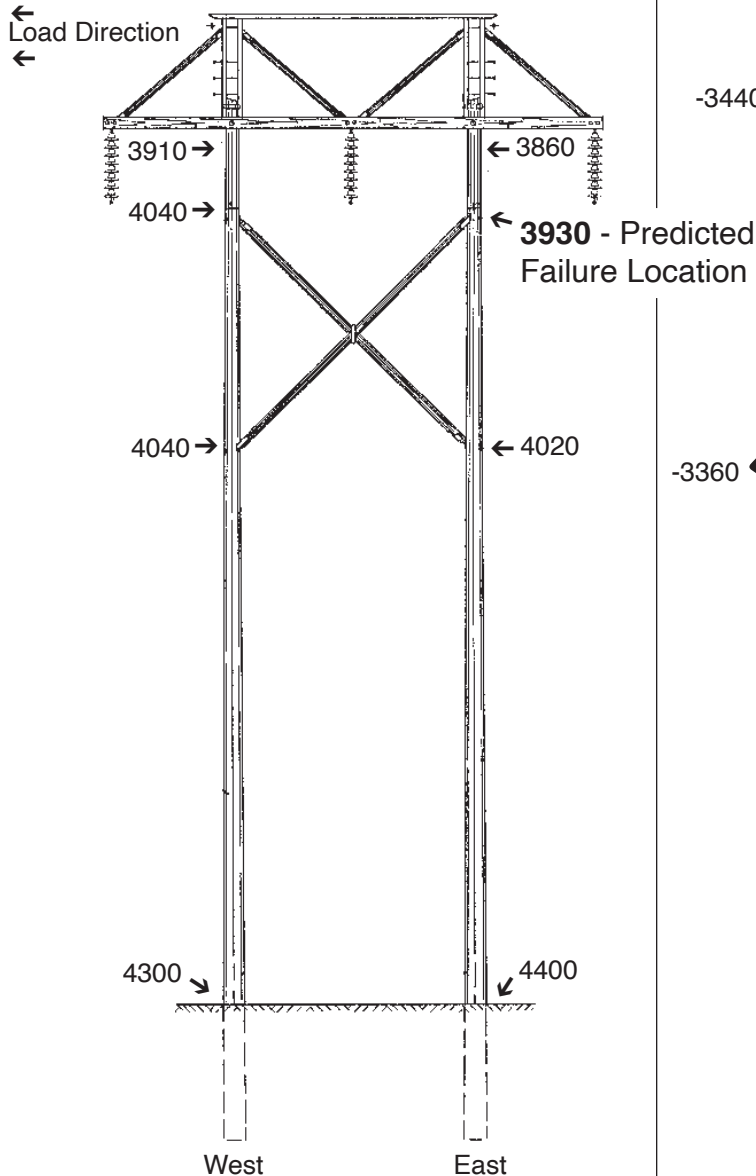


Load 13

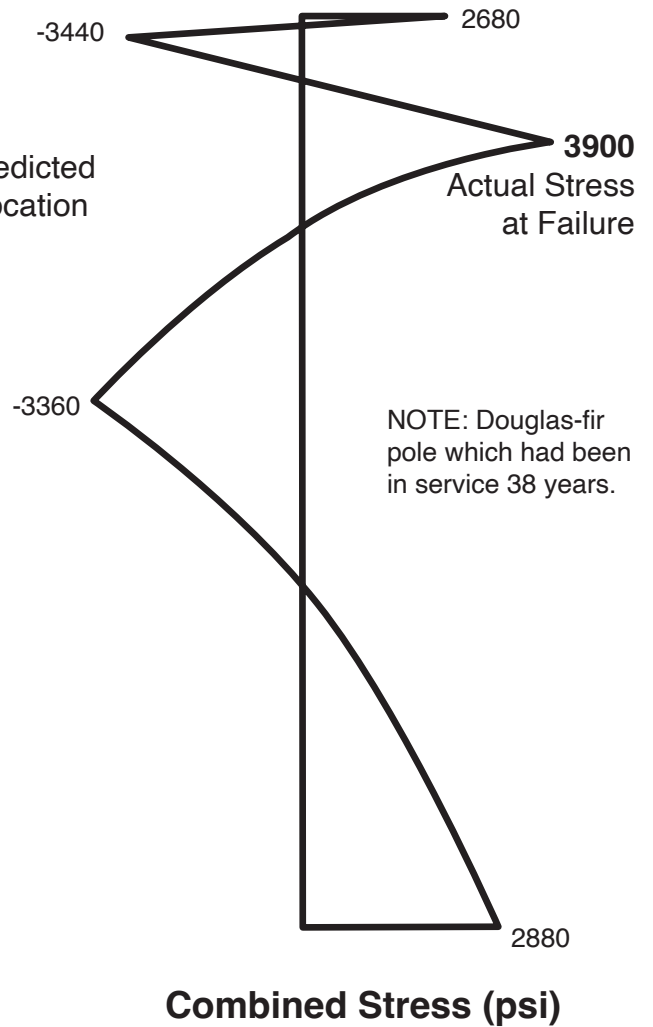
Failure



Predicted Failure Stresses in Poles



Stress Distribution in East Pole at Failure



The above figures indicate the bending strengths of the poles predicted through nondestructive evaluation as well as the actual stresses at failure determined through structural analysis. While strength predictions will not always be this accurate (strength prediction was within 1% of stress failure), the test results illustrate the value of assessing the reliability of existing structures and making improved upgrading and reframing decisions.

Transmission Design Configurations

Since 1921, Hughes Brothers has been developing a diverse selection of framing designs for wood, concrete and steel construction. Each structure is designed to meet the specific loading, geographical, right of way and construction preferences of the project at hand.

Our library of structure designs is without equal in the industry. Before embarking on a new transmission structure design, we hope that you will contact Hughes Brothers engineering staff. Our tower design expertise is offered without obligation.

69 kV - 161 kV

Wood tension braces provide maximum conductor clearance. Compression braces (braces attached below the crossarms) are also available.

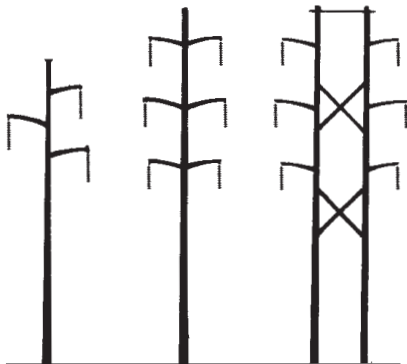


69 kV - 230 kV

"Wishbone" framing with single or double arm assemblies is a very cost effective type of framing for single pole construction.



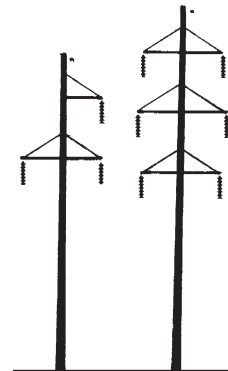
69 kV - 161 kV



Wood or steel Davits used on wood, concrete and steel poles for both single and double circuit construction and have proven to be more economical than post insulator construction for many applications.

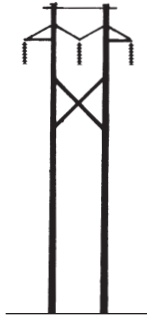
69 kV - 230 kV

Fiberglass is an attractive option for both single and double circuit construction with either wood, concrete or steel poles.



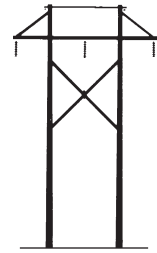
69 kV - 230 kV

Fiberglass framing in conjunction with wood X-Bracing is an effective option for maintenance or upgrading existing structures.



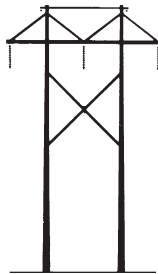
69 kV - 161 kV

Double or single (laminated or solid sawn) arms are available for the standard H-Frame with or without knee or vee braces.



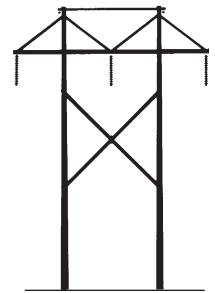
69 kV - 161 kV

The framing for a typical H-Frame in this voltage range may be sized for either a single or bundled conductor.



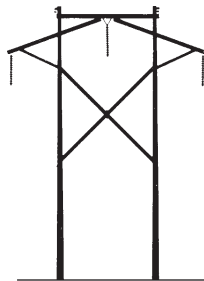
230 kV

The framing for this typical H-Frame is sized to provide electrical clearances required for lines of this voltage and may be sized for either a single or bundled conductor. Typically pole spacings are greater than for 69 - 161 kV construction.



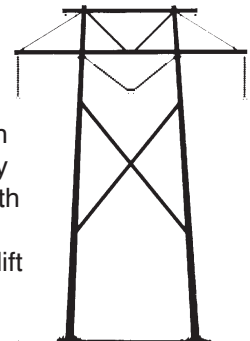
230 kV

The framing for this K-Frame structure uses relatively short crossarm timbers which are more readily available from solid sawn lumber. The timbers may be sized for either a single or bundled conductor.



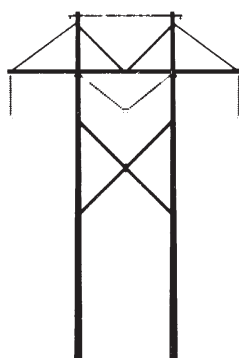
345 kV

This wide based H-Frame with the center phase supported by a vee string, reduces the length and cost of framing members and also reduces potential uplift and thrust problems.



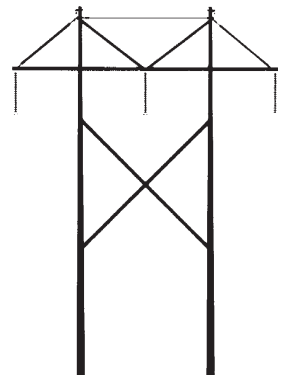
345 kV

This narrow pole spacing H-Frame uses a vee string for support of the center phase and is especially suited for narrow right-of-way applications.



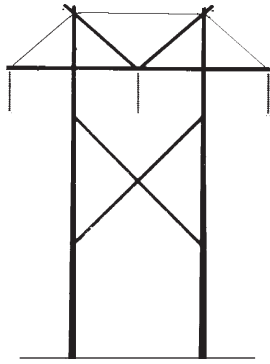
345 kV

This is a typical H-Frame for EHV. The framing members are custom designed for specified wire sizes and span lengths.



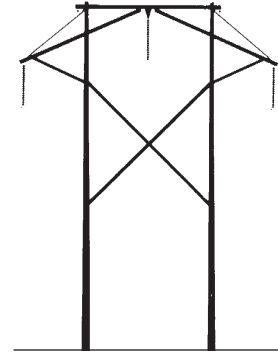
345 kV

This H-Frame is constructed with extended double center crossarm braces to support the shield wires and is often used when the shield wires are insulated or if the structure is designed for large transverse loads.



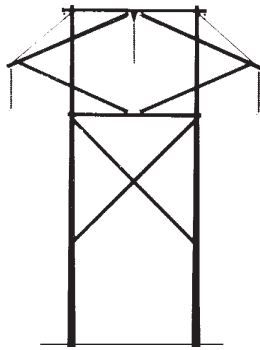
345 kV

The 345 kV K-Frame structure utilizes shorter, more readily available timbers. The shorter members are also easier to transport in rough terrain.



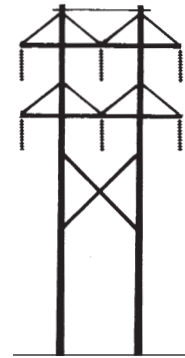
345 kV

The double K-Frame is designed for long spans and/or larger conductor sizes.



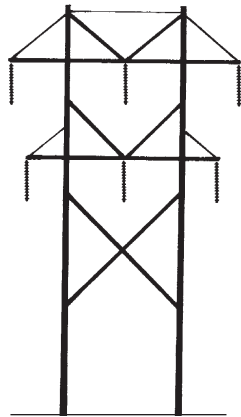
69 kV - 230 kV

Wood double circuit tangent structures have proven to be reliable and very economical for most voltage ranges.

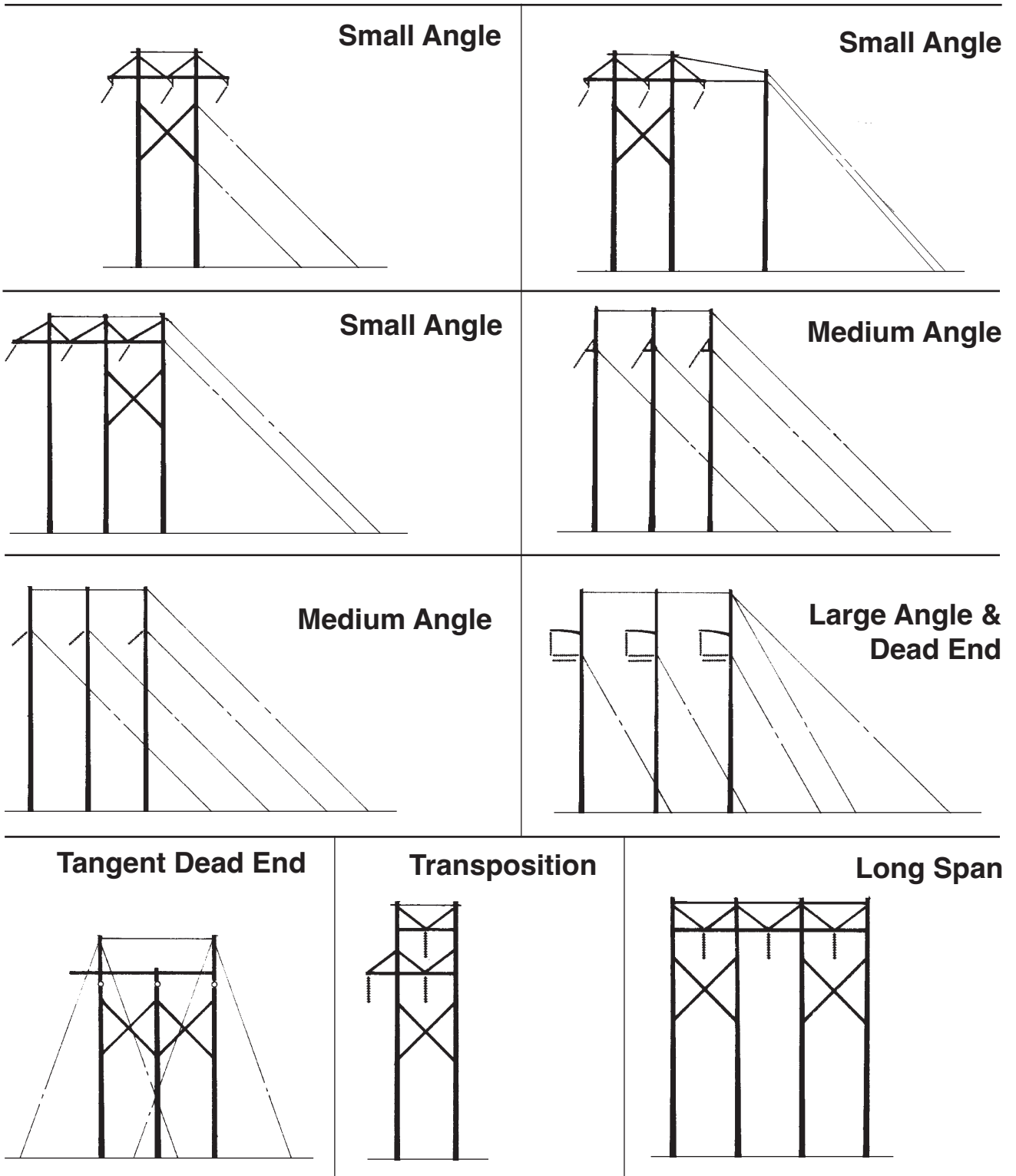


345 kV / 230 kV

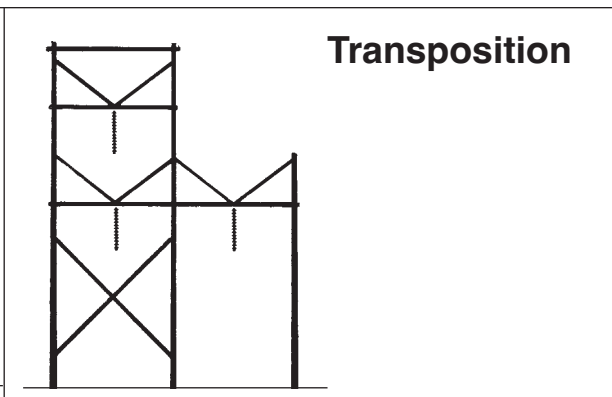
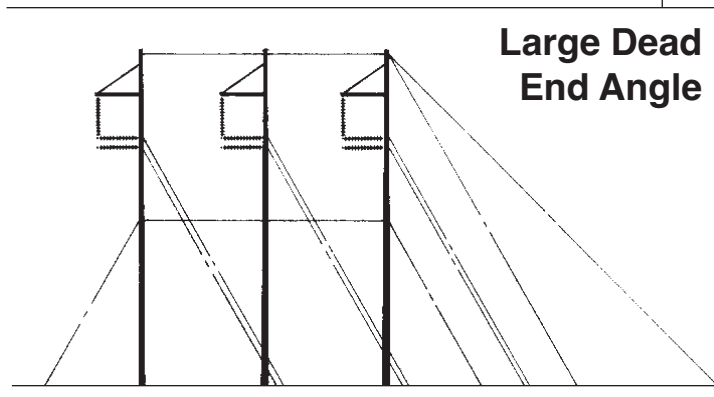
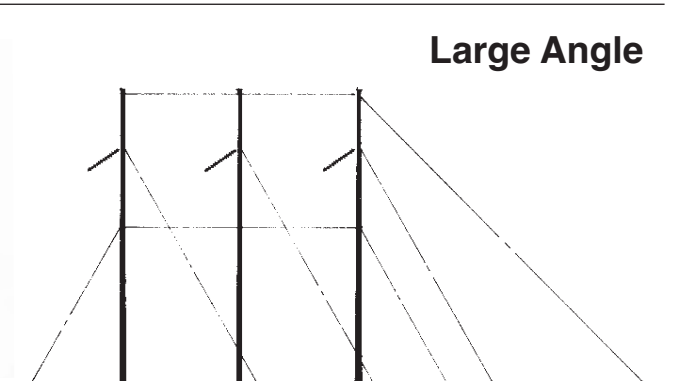
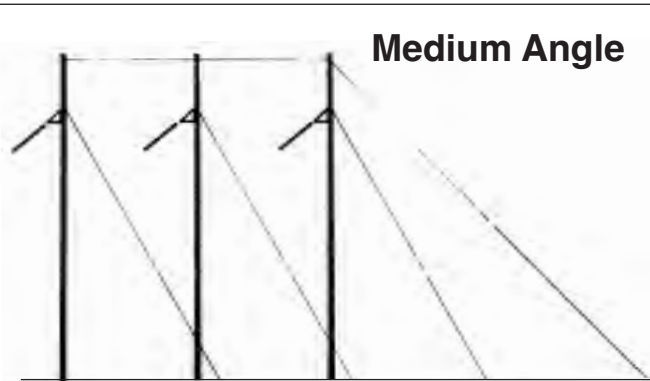
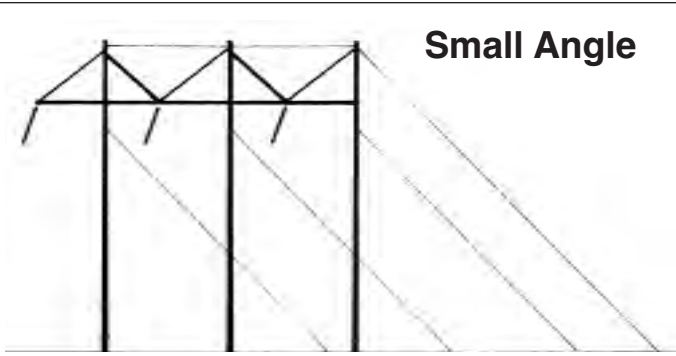
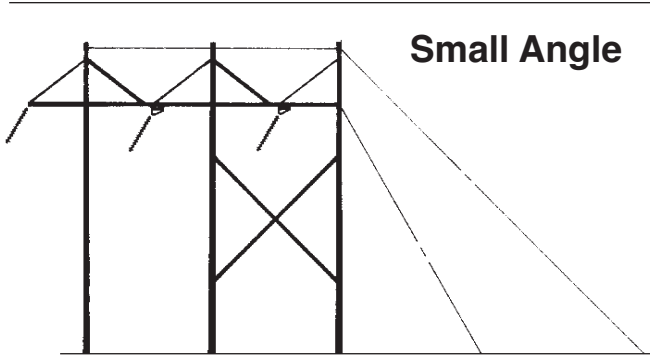
Wood double circuit tangent structures with different voltages are effective and economical for voltages through 345 kV / 230 kV.



Angled Structures for Single Conductor Lines



Angle Structures for Bundled Conductor Lines



A

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Apparatus Bracket	CF921	F31
Apparatus Bracket	CF921B	F31
Apparatus Mounting Bracket, Fiberglass	CF592	F29
Apparatus Mounting Bracket, Fiberglass	CF550	F33
Apparatus Mounting Bracket, Fiberglass	CF590	F32
Apparatus Mounting Bracket, Fiberglass	CF893	F30
Apparatus Mounting Bracket, Fiberglass	CF893B	F30

B

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Bolt, Insulator Mounting Stud	2755	E30
Bolt, Insulator Mounting Stud	2752	E31
Bolt, Insulator Mounting Stud	2753	E31
Bolt, Insulator Mounting Stud	2754	E31
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Bolts, Drilled	B*	E34
Bolts, Drilled with Cotter Key		E34
Bolts, Forged Eyebolt	2724	E19
Bolts, Hex Head	HB*	E8
Bolts, High Strength, Type A325	AB*	E10
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Brace, Crossarm, Flat Steel	2819	B4
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Brace, Crossarm, Steel, Heavy Duty	2018M	B10
Brace, Crossarm, Steel, Knee & Vee	2025M	B19
Brace, Crossarm, Wood	1152	B2
Brace, Crossarm, Wood	2023	B5
Brace, Crossarm, Wood, Heavy Duty	2016	B9 & B10
Brace, Crossarm, Wood, Heavy Duty	2017	B9 & B10
Brace, Crossarm, Wood, Heavy Duty	2018	B9 & B10
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Brace, Crossarm, Wood, Heavy Duty	2038C	B21
Brace, Crossarm, Wood, Heavy Duty	2038D	B22
Brace, Crossarm, Wood, Heavy Duty	2038E	B22
Brace, Crossarm, Wood, Heavy Duty	2038TB	B23
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Brace, Crossarm, Wood, Knee & Vee	2025	B18
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Bracket, Cutout/Arrestor, Fiberglass	CF670B	F27
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