



Composite Transmission and Distribution Products

- Composite Tuff-Poles®
- Lewtex® Tangent and Dead End Crossarms
- H-Frame Crossarms
- Sidearm and X-Braces
- Knee and Vee-braces
- Composite Buss and Switch Supports
- Tuff-Top Pole Extensions



COMPOSITE TUFF-POLE®

Tuff-Pole® Products On Location

Our composite
Transmission and
Distribution utility
poles are pictured in
real-world applications
in our On Location
brochure. Ask your
distributor for a copy...
or just call.



Shakespeare Composite Structures Transmission and Distribution Products

At-A-Glance

- Lightweight: one-third the weight of wood
- Non-splintering
- Environmentally safe–no chemical preservatives
- Excellent product memory and dielectric properties
- Impervious to insects, woodpeckers, and weather
- Aesthetically pleasing
- Easy installation: no special hardware needed
- Tight manufacturing tolerances



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 **Shakespeare
Composite Structures**

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Shakespeare Composite Structures' next-generation Tuff-Pole composite poles are stronger, lighter, and longer lasting. This is the result of the newest technologies in fiberglass and resin systems, along with advanced manufacturing process controls. To achieve the Tuff-Pole formula, Shakespeare Composite Structures has engineered new resin formulations and fiberglass configurations, applied new automated process controls, and added advanced UV inhibitors and coatings for long life in adverse weather conditions.

Composite Tuff-Poles stay strong. Fiberglass reinforced composite poles don't rot, rust, corrode, splinter, or decay. Insects and wildlife won't eat them, and woodpeckers won't make holes in them. The Tuff-pole will maintain its strength throughout its long life.

Manufacturing tolerances for composite Tuff-Pole transmission and distribution poles are tight, and they stay that way. That means the strength that you install remains constant.

Composite poles are ideal for installations where climate, wildlife, and other environmental issues tear into wood poles. Composite poles are also very light in weight, making it much easier and simpler to transport them to remote destinations. Airlifting, for example, requires lighter, less costly aircraft, and many installations in backyards or other planted areas can be achieved without heavy equipment—so the lawn isn't torn up by construction traffic. Available in a choice of colors, the hollow Tuff-Poles make an attractive, unobtrusive site possible.

Composite poles are installed just like any other pole. They can be field drilled or predrilled at the factory for installation of crossarms, brackets, braces, or other attachments. You can also order climbing steps, if needed.



Composite Poles Maximum Strength Available (Class equivalent)

Overall Pole Length	Maximum ANSI Tip Load 2' from Tip	@ Std Burial Depth (10%+2')	
		Maximum Groundline Moment (in)KIPS	Maximum Groundline Moment FT/LBS
30'	>15,500#	>4,278	>356,500
35'	>15,500#	>5,115	>426,250
40'	>15,500#	>5,952	>496,000
45'	>15,500#	>6,789	>565,750
50'	15,500#	7,626	635,500
55'	14,100#	7,699	641,550
60'	12,900#	7,740	645,000
65'	11,800#	7,717	643,100
70'	10,900#	7,717	643,100
75'	10,000#	7,620	635,000
80'	9,400#	7,670	639,200
85'	8,800#	7,656	638,000
90'	8,300#	7,669	639,100
95'	7,900#	7,726	643,850
100'	7,500#	7,740	645,000
105'	6,500#	7,059	588,250
110'	5,000#	5,700	475,000
115'	4,200#	5,015	417,900
120'	3,600#	4,493	374,400
125'	3,000#	3,906	325,500

All poles over 50' are two-piece poles; poles over 90' are three-piece poles



*Wood Pole Reference Data

$$\text{Required Load Rating} = \frac{\text{Design Load} \times \text{Overload Factor}}{\text{Strength Compensation Factor}}$$

Strength Compensation Factors:

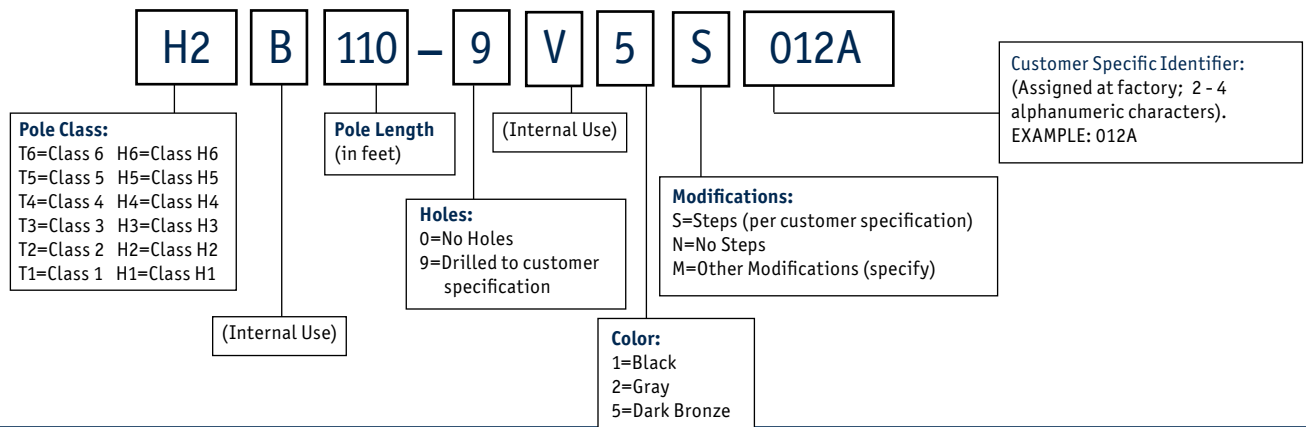
Wood poles: 0.65
 Engineered Composites (Fiber reinforced polymer structures): 1.0

Ref: Tables 253-1 and 261-1A, NESC (2007 National Electric Safety Code)

Shakespeare Engineered Composite Tuff-Poles do not require strength compensation. The strength you install does not change over time.

COMPOSITE TUFF-POLE

Ordering Template and Options



Length (Feet)	Class	ANSI Tip Load	Style #	Diameter (inches)			Weight (lbs.)
				Butt	Groundline	Tip	
100	H6	7,410	H6B100	22.49	20.81	9.90	3,911
95			H6B95	22.38	20.77	10.27	3,541
90			H6B90	22.26	20.72	10.95	3,235
85			H6B85	22.14	20.67	12.09	2,870
80			H6B80	22.14	20.74	12.38	2,539
75			H6B75	22.03	20.70	12.86	2,188
70			H6B70	21.91	20.65	13.36	1,864
65			H6B65	21.91	20.72	13.88	1,725
60			H6B60	21.79	20.67	14.41	1,454
55			H6B55	21.67	20.62	14.95	1,209
50			H6B50	21.67	20.69	15.07	1,229
45			H6B45	21.55	20.64	15.55	948
40			H6B40	21.43	20.59	16.05	702
35			H6B35	21.31	20.54	16.56	492
105	H5	6,500	H5B105	22.38	20.63	9.42	3844
100			H5B100	22.26	20.58	9.90	3476
95			H5B95	22.14	20.53	10.27	2107
90			H5B90	22.14	20.60	10.95	2959
85			H5B85	22.03	20.56	11.93	2599
80			H5B80	21.91	20.51	12.38	2223
75			H5B75	21.91	20.58	12.71	1944
70			H5B70	21.79	20.53	13.22	1633
65			H5B65	21.79	20.60	13.74	1506
60			H5B60	21.67	20.55	14.27	1248
55			H5B55	21.55	20.50	14.95	1051
50			H5B50	21.55	20.57	14.90	1053
45			H5B45	21.43	20.52	15.39	790
40			H5B40	21.43	20.59	16.05	702
35			H5B35	21.31	20.54	16.56	492
105	H4	5655	H4B105	22.10	20.35	9.42	3,231
100			H4B100	22.03	20.35	9.76	2,892
95			H4B95	21.98	20.37	10.41	2,664
90			H4B90	21.91	20.37	11.08	2,418
85			H4B85	21.85	20.38	11.69	2,202
80			H4B80	21.79	20.39	12.15	1,915
75			H4B75	21.72	20.39	12.62	1,646
70			H4B70	21.67	20.41	13.12	1,426
65			H4B65	21.60	20.41	13.74	1,250
60			H4B60	21.55	20.43	14.27	1,090
55			H4B55	21.47	20.42	14.95	942
50			H4B50	21.43	20.45	14.73	878
45			H4B45	21.43	20.52	15.39	790
40			H4B40	21.31	20.47	15.89	562
35			H4B35	21.21	20.44	16.43	392
110	H3	4,875	H3B110	22.03	20.21	8.96	3,125
105			H3B105	21.98	20.23	9.26	2,874
100			H3B100	21.91	20.23	9.76	2,576





Length (Feet)	Class	ANSI Tip Load	Style #	Diameter (inches)			Weight (lbs.)
				Butt	Groundline	Tip	
95			H3B95	21.85	20.24	10.41	2,378
90			H3B90	21.79	20.25	11.08	2,141
85			H3B85	21.72	20.25	11.62	1,911
80			H3B80	21.67	20.27	12.08	1,648
75			H3B75	21.60	20.27	12.62	1,413
70			H3B70	21.55	20.29	13.18	1,243
65			H3B65	21.51	20.32	13.71	1,071
60			H3B60	21.43	20.31	14.39	932
55			H3B55	21.37	20.32	15.07	814
50			H3B50	21.34	20.36	14.59	746
45			H3B45	21.31	20.40	15.22	632
40			H3B40	21.21	20.37	15.75	448
35			H3B35	21.19	20.42	16.40	369
115	H2	4,160	H2B115	21.91	20.02	8.36	2,957
110			H2B110	21.85	20.03	8.81	2,684
105			H2B105	21.79	20.04	9.17	2,396
100			H2100	21.72	20.04	9.76	2,200
95			H2B95	21.67	20.06	10.41	2,023
90			H2B90	21.64	20.10	11.08	1,884
85			H2B85	21.60	20.13	11.40	1,668
80			H2B80	21.55	20.15	11.90	1,448
75			H2B75	21.51	20.18	12.40	1,236
70			H2B70	21.47	20.21	12.96	1,079
65			H2B65	21.43	20.24	13.60	972
60			H2B60	21.34	20.22	14.27	814
55			H2B55	21.31	20.26	14.95	735
50			H2B50	21.31	20.33	14.55	702
45			H2B45	17.01	16.10	11.07	642
40			H2B40	16.92	16.08	11.59	492
35			H2B35	15.29	14.52	10.63	369
30			H2B30	15.25	14.55	11.24	296
120	H1	3,510	H1B120	21.79	19.83	7.82	2,805
115			H1B115	21.72	19.83	8.23	2,504
110			H1B110	21.67	19.85	8.69	2,328
105			H1B105	21.64	19.89	9.31	2,117
100			H1100	21.60	19.92	9.76	1,904
95			H1B95	21.55	19.94	10.41	1,726
90			H1B90	21.51	19.97	11.08	1,529
85			H1B85	21.47	20.00	11.16	1,368
80			H1B80	21.43	20.03	11.70	1,190
75			H1B75	21.37	20.04	12.25	993
70			H1B70	21.34	20.08	12.88	893
65			H1B65	21.31	20.12	13.56	814
60			H1B60	21.31	20.19	14.23	774
55			H1B55	21.24	20.19	14.92	636
50			H1B50	21.19	20.21	14.37	527
45			H1B45	16.92	16.01	10.94	553

Length (Feet)	Class	ANSI Tip Load	Style #	Diameter (inches)			Weight (lbs.)
				Butt	Groundline	Tip	
40			H1B40	16.85	16.01	11.48	421
35			H1B35	15.29	14.52	10.63	369
30			H1B30	15.19	14.49	11.15	257
25			H1B25	15.16	14.53	11.78	198
125	1	2,925	T1B125	21.64	19.61	11.47	2,532
120			T1B120	21.64	19.68	11.99	2,323
115			T1B115	21.60	19.71	12.53	2,084
110			T1B110	21.55	19.73	13.09	1,924
105			T1B105	21.51	19.76	13.77	1,766
100			T1B100	21.47	19.79	14.45	1,608
95			T1B95	21.43	19.82	15.13	1,469
90			T1B90	21.43	19.89	15.81	1,351
85			T1B85	21.37	19.90	11.20	1,164
80			T1B80	21.34	19.94	11.73	997
75			T1B75	17.15	15.82	7.95	1,221
70			T1B70	17.09	15.83	8.28	1,016
65			T1B65	17.02	15.83	8.73	843
60			T1B60	16.97	15.85	9.34	749
55			T1B55	16.89	15.84	10.01	630
50			T1B50	16.81	15.83	10.14	527
45			T1B45	16.85	15.94	10.82	474
40			T1B40	15.96	15.12	10.63	421
35			T1B35	15.19	14.42	10.49	300
30			T1B30	14.47	13.77	10.43	237
25			T1B25	11.88	11.25	8.59	198
125	2	2,405	T2B125	21.51	19.48	6.93	2,109
120			T2B120	21.47	19.51	7.40	1,886
115			T2B115	21.43	19.54	7.91	1,704
110			T2B110	21.43	19.61	8.46	1,588
105			T2B105	21.37	19.62	9.10	1,469
100			T2B100	21.37	19.69	9.76	1,430
95			T2B95	21.34	19.73	10.41	1,232
90			T2B90	21.31	19.77	11.08	1,153
85			T2B85	21.31	19.84	10.87	972
80			T2B80	17.04	15.64	7.36	1,161
75			T2B75	17.15	15.82	7.76	1,155
70			T2B70	17.04	15.78	8.20	932
65			T2B65	17.04	15.85	8.84	893
60			T2B60	17.04	15.92	9.49	853
55			T2B55	16.92	15.87	10.15	695
50			T2B50	16.81	15.83	10.14	527
45			T2B45	16.73	15.82	10.64	356
40			T2B40	15.82	14.98	10.42	316
35			T2B35	15.16	14.39	10.44	277
30			T2B30	14.47	13.77	10.43	237
25			T2B25	11.88	11.25	8.59	198





Length (Feet)	Class	ANSI Tip Load	Style #	Diameter (inches)			Weight (lbs.)
				Butt	Groundline	Tip	
90	3	1,950	T3B90	21.21	19.67	11.08	907
85			T3B85	21.19	19.72	10.91	814
80			T3B80	21.19	19.79	11.57	774
75			T3B75	21.19	19.86	12.25	735
70			T3B70	21.19	19.93	12.92	695
65			T3B65	16.85	15.66	8.84	656
60			T3B60	16.79	15.67	9.49	557
55			T3B55	16.76	15.71	10.15	488
50			T3B50	16.73	15.75	9.98	395
45			T3B45	16.73	15.82	10.64	356
40			T3B40	15.82	14.98	10.42	316
35			T3B35	15.16	14.39	10.44	277
30			T3B30	11.88	11.18	7.95	237
25			T3B25	11.88	11.25	8.59	198
70	4	1,560	T4B70	16.76	15.50	8.20	606
65			T4B65	16.73	15.54	8.84	537
60			T4B60	16.73	15.61	9.49	498
55			T4B55	16.73	15.68	10.15	458
50			T4B50	16.73	15.75	9.98	395
45			T4B45	16.73	15.82	10.64	356
40			T4B40	15.82	14.98	10.42	316
35			T4B35	15.16	14.39	10.44	277
30			T4B30	11.88	11.18	7.95	237
25			T4B25	11.88	11.25	8.59	198
35	5	1,235	T5B35	11.76	10.99	7.12	207
30			T5B30	11.76	11.06	7.76	178
25			T5B25	11.76	11.20	8.42	148
35	6	975	T6B35	11.76	10.99	7.12	207
30			T6B30	11.76	11.06	7.76	178
25			T6B25	11.76	11.20	8.42	148



Lewtex® Composite Crossarms



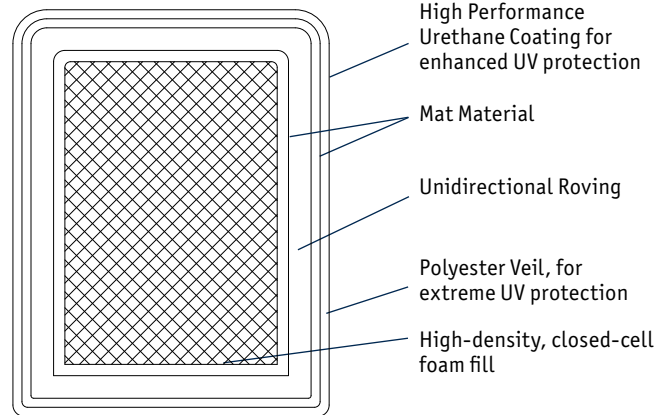
- For composite, concrete, metal, or wood poles
- Normal installation: no special equipment needed
- Environmentally safe—no chemical preservatives
- UV protection enhanced with inhibitor-laden resins, polyester veil, and sophisticated urethane coatings
- Will not rot or splinter, strength factors do not change
- Impervious to insects, woodpeckers, and weather
- Tight, computer-assisted manufacturing tolerances
- Can be pre-drilled at factory
- Extensive UV exposure testing, advanced Tangent Eccentric Load system testing, as well as industry-standard beam tests

Shakespeare's Lewtex composite crossarms bring proven strength and durability to your most demanding applications. Our extensive testing program includes industry-standard beam testing, as well as extended UV testing. Our tangent crossarms also undergo advanced, Tangent Eccentric Load testing. These tests result in data that are valid for the whole system, including the mounting hardware and the brackets, not just the crossarm. This testing is a far better indicator of real-world performance.

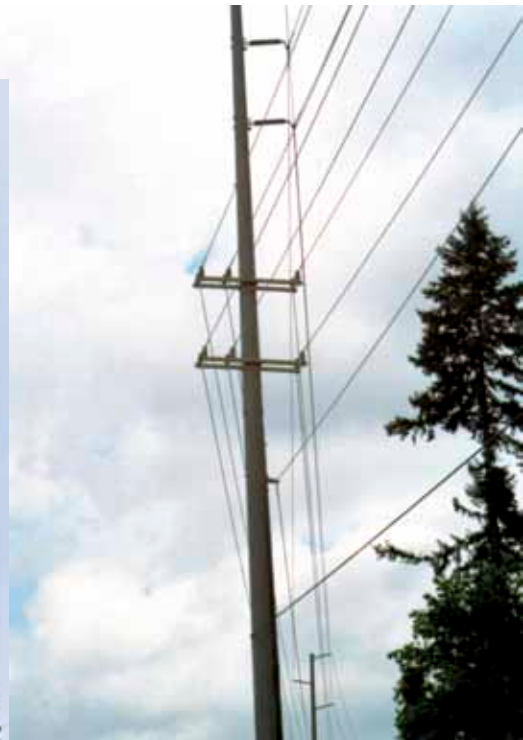


8' braceless
10,000# Dead End
assembly, 373' of
795 AAC

Lewtex Composite Structure



795 ACSR under build project.



477 ACSR under build project, 14' Lewtex arms



Frequently Asked Questions

Q How are the crossarms protected from ultraviolet light?

A Three ways: Ultraviolet inhibitors are formulated into the resin during manufacture. The crossarm's outer shell is covered with a polyester veil that provides a resin-rich surface to control blooming. And the finished product is coated with a UV-protective urethane coating that provides excellent UV resistance. Product performance is verified by extensive accelerated testing.

Q Can the crossarm be drilled in the field?

A Yes. Drill a few holes with standard tools—brace and bit, etc. For many holes, an electric or hydraulic drill with a carbide tip is suggested.

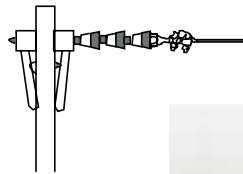
Q Does the core absorb water?

A No. NETRACC (SEI) electrical testing verifies that water will not permeate the closed cell foam.

Typical Dead End

Bill of Materials

- Crossarm, 8' Dbl arm Deadend
- 2 Bolt, Mach., Galv. 1/2" x 7"
- 1 Bolt, Mach., Galv. 5/8" x 10"
- 3 Bolt, Dbl. Arm Galv. 1/2" x 24"
- 4 Brace, Apitong, 36"
- 4 Nut, Lock, Galv. 1/2"
- 11 Nut, Lock, Galv. 5/8"
- 2 Nut, Oval Eye, 5/8" x 1 1/2"
- 4 Washer, Lock, Galv. Dbl. Cl Spring 1/2"
- 11 Washer, Lock, Galv. Dbl. Cl Spring 5/8"
- 8 Washer, Round, 1/2"
- 12 Washer, Square, 11/16" hole, 2 1/4" x 2"
- 2 XARM, 5x5x8FT Drilled for Distribution



Ult. Load:
5,000 lbs.

64 Items, total, to assemble and install

Material cost (64 pieces)	\$ 202.50
1.8 Hrs Labor/truck/overhead (@ 55.00/hr.)	135.00
TOTAL	\$ 337.50



Q Can ground wires be attached to the crossarm?

A Yes. Ground wires may be attached with clips using #10 sheet metal or self-tapping screws. The clips are available from many suppliers.

Q What is the expected life of the crossarm?

A Experience and accelerated testing show a minimum life of 40 years, after which the product may show some visual effects of aging but retain a very high percentage of its strength.

Q What special hardware is needed?

A None. The Lewtex® crossarm was designed to be used with existing inventories of hardware without any modifications.

Q What strength values can be expected?

A The standard crossarm will give the same minimum strength values as a wooden crossarm of the same dimensions. During load testing the Lewtex® composite crossarm outperformed a Douglas Fir crossarm.

Q What lengths and colors are available?

A Length is limited only by shipping practicalities, and the crossarms are available in a palette of three standard colors. Any color can be matched. Gray is standard.

Q What is the effect of continued flexing on the crossarm?

A Tests have not been able to produce a fatigue failure in composite utility products. This is one of the strengths of composites, hence their use in bridges, helicopter rotors, and gratings—applications where resistance to repeated flexing is critical.

Q How do temperature extremes affect the composite crossarm?

A Fiberglass reinforced composites have been used successfully in industrial applications requiring wide temperature variations. The material's smooth, strong surface provides no place for thawing ice to invade. Indeed, composites get stronger in cold weather.

Q After field drilling, is there hydrolizing of exposed edges?

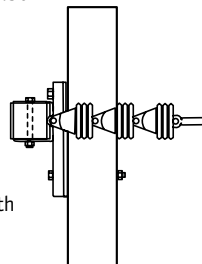
A Published technical data show that significant hydrolizing occurs only when the exposed edge is submerged. Natural exposure to environmental conditions has only minimal effect on the laminate.



Lewtex® Composite Dead End

Bill of Materials

- Crossarm #HDB096G12242 Dead End Arm with Center Mount Bracket
- 2 Bolts, Mach., Galv., 5/8"
- 2 Washer, Square, 11/16" hole, 2 1/4" x 2"
- 2 Nut, 5/8"
- 2 Washer, Lock, 5/8"



Ult. Load:
10,000 lbs.

9 Items, total, to install

Material cost (9 pieces)	\$ 200.00
0.5 Hrs Labor/truck/overhead (@ 55.00/hr.)	37.50
TOTAL	\$ 237.50

Conclusion: The Lewtex® crossarm saves \$100.00 in installation cost.

Tangent Crossarms 3½x4½

Standard Tangent - Brace Type

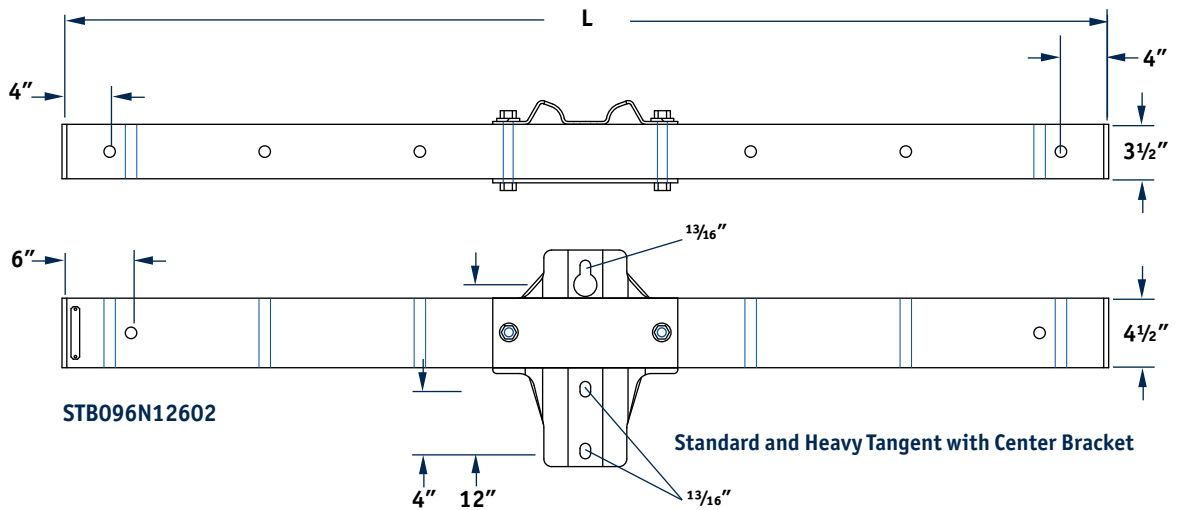
Catalog Number	Length (in.) ("L")	No. of Wire Positions	Dimensions (In.)	Weight (Lbs.)	Beam Strength Ultimate Load per Side (Lbs.)
STN096N00402REA	96	3	3½x4½	24	5,000
STN096N00602REA	96	3	3½x4½	24	5,000
STN120N00602REA	120	4	3½x4½	29	4,000

Heavy Tangent - Brace Type

Catalog Number	Length (in.) ("L")	No. of Wire Positions	Dimensions (In.)	Weight (Lbs.)	Beam Strength Ultimate Load per Side (Lbs.)
HTN096N00402REA	96	3	3½x4½	39	10,000
HTN096N00602REA	96	3	3½x4½	39	10,000
HTN120N00602REA	120	4	3½x4½	49	9,400



Lewtex® Crossarms being installed on a Shakespeare Composite Structures Tuff-Pole®



Standard Tangent - with Center Bracket

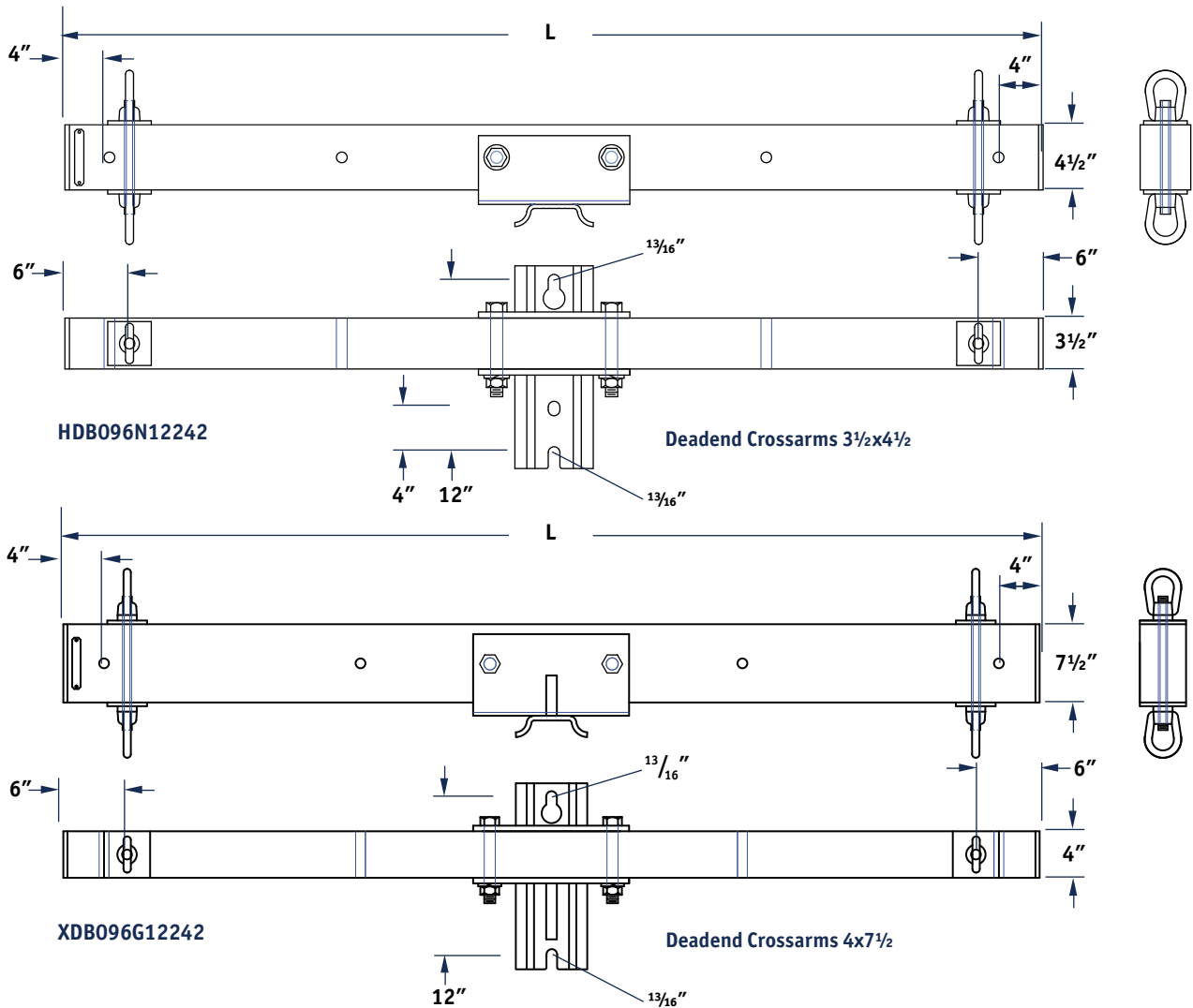
Catalog Number	Length (in.) ("L")	No. of Wire Positions	Dimensions (In.)	Weight (Lbs.)	Beam Strength Ultimate Load per Side (Lbs.)	Assembly Strength (Lbs.)
STB096N12602	96	6	3½x4½	38	5,000	4,000
STB120N12602	120	6	3½x4½	43	4,150	3,000
STB144N12402	144	4	3½x4½	49	3,150	2,400

Heavy Tangent - with Center Bracket

Catalog Number	Length (in.) ("L")	No. of Wire Positions	Dimensions (In.)	Weight (Lbs.)	Beam Strength Ultimate Load per Side (Lbs.)	Assembly Strength (Lbs.)
HTB096N12602	96	6	3½x4½	53	10,000	6,800
HTB120N12602	120	6	3½x4½	63	9,400	6,450
HTB144N12402	144	4	3½x4½	73	7,500	5,000



Deadend Crossarm Assemblies

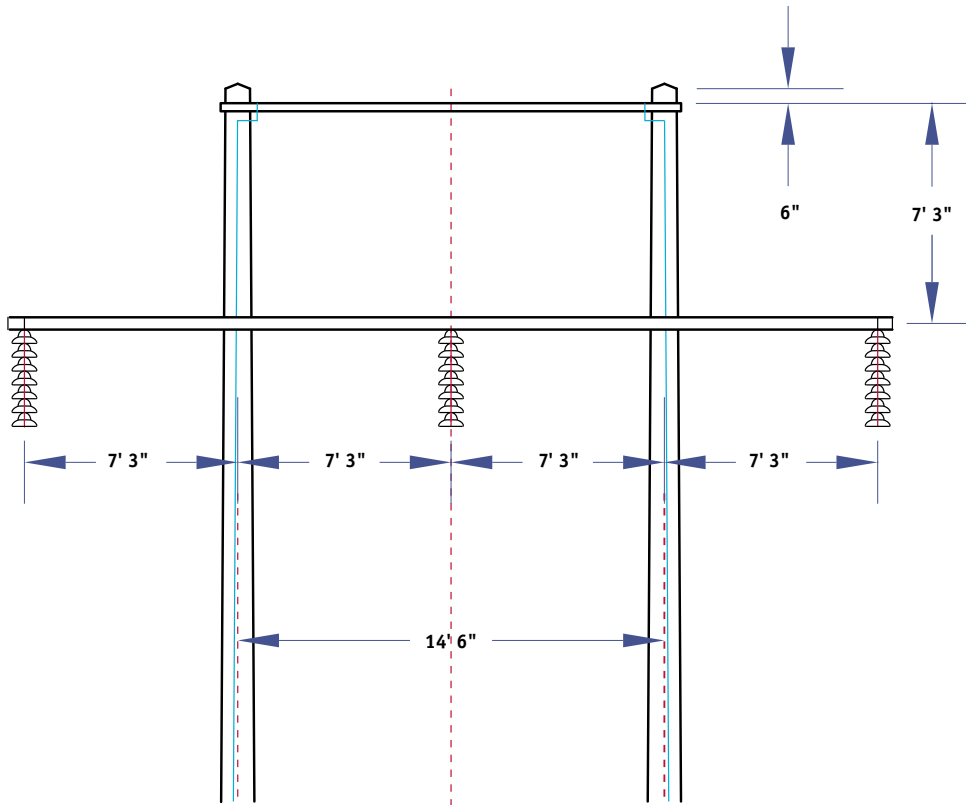


Deadend Crossarm Assemblies

Sample Catalog Number	Length (in.) ("L")	No. of Wire Positions	Dimensions (In.)	Weight (Lbs.)	Ultimate Load per Wire Position (Lbs.)
HDB063N12242	63	2	3½x4½	41	10,000 @ 2 positions
HDB096N12242	96	2	3½x4½	56	10,000 @ 2 positions
HDB120N12242	120	2	3½x4½	66	9,400 @ 2 positions
IDB096N12242	96	2	4"x6"	65	14,500 @ 2 positions
IDB120N12242	120	2	4"x6"	78	12,460 @ 2 positions
XDB096G12242	96	2	4"x7½"	85	18,000 @ 2 positions
XDB120G12222	120	2	4"x7½"	95	18,000 @ 2 positions
XDB144G12242	144	2	4"x7½"	130	14,250 @ 2 positions



H-Frame Crossarms 4x7½



H-Frame Crossarms

H-Frame Crossarm Assemblies

Catalog Number	Length (in.) ("L")	Dimensions	Weight (lbs.)	Max. Load per Phase (Lbs.)
XHN264N00302	264	4x7½	176	6,000
XHN297N00302	297	4x7½	198	5,000
XHN360N00302	360	4x7½	240	4,200
XHN384N00302	384	4x7½	256	3,800



HOW TO ORDER



Lewtex® Crossarms Ordering Template and Options

Profile: S=3.5"x4.5" STD H=3.5"x4.5" HVY I=4"x6" X=4"x7.5" Q=4"x4" R=5"x5"	X	D	B	096	G	12	2	4	2	123	Special Drill Pattern or Special Requirements: (Unique designation assigned at factory). Example: 123
	Application: T=Tangent D=Deadend E=Extra Capacity Deadend B=Double Arm Deadend H=H-Frame Z=Other	Guy Attachment: G=Double Guy N=None			Gain Hole Spacing: 08=8"* 10=10"* 12=12" ZZ=Other (contact factory) *Guy Attachment not available with less than 12" spacing			Number of Attachments: 2=2 4=4 6=6 8=8 A=10 B=11 C=12 D=13 E=14 F=15 G=16 (etc.)			
Mounting Hardware: B=Standard Bracket Assy N=None Z=Special Mounting Hdw			Length in Inches: Examples: 036=3' 054=4'6" 072=6' 096=8' 120=10' 144=12'			Wire Positions: 2=2 4=4 6=6					

Test Data Summary

Tangent Arms	Length	Wire Positions	Ultimate Load Test		Deflection per 1K per Position
			Test Procedure #2 Tangent Assembly Vertical Load	Test Procedure #1 Beam Strength Vertical Load	
S-Series 3 1/2" x 4 1/2"	8'	2	4000	5000	.73"
	10'	2	3000	4150	1.54"
	12'	2	2400	3150	2.78"
H-Series 3 1/2" x 4 1/2"	8'	2	6800	10000	.39"
	10'	2	6450	9400	.65"
	12'	2	5000	7500	1.19"

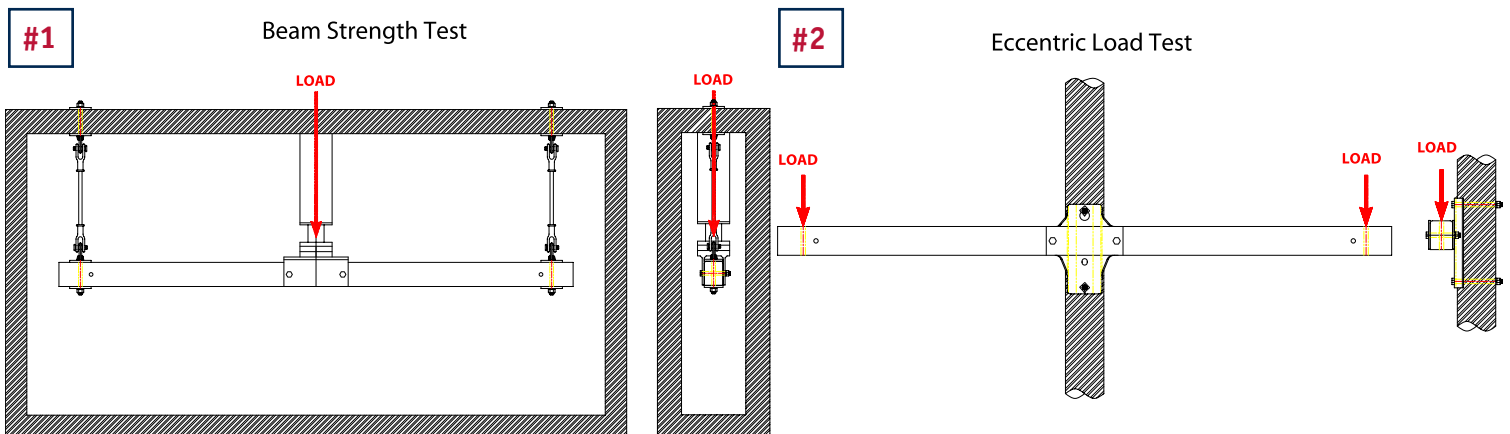
Deadend Arms	Length	Wire Positions		Deadend Assembly Horizontal Load	Deflection per 1K per Position	
H-Series 3 1/2" x 4 1/2"	5'	2		10000	0.13	
	8'	2		10000	0.39	
			4		8000	0.49
	10'	2		9400	0.65	
			4		6500	0.93
	12'	2		7500	1.19	
I-Series 4" x 6"			4	5400	1.65	
	8'	2		14250	0.26	
			4		12000	0.31
	10'	2		11500	0.44	
			4		7900	0.64
	12'	2		9400	0.79	
X-Series 4" x 7 1/2"			4	6800	1.09	
	8'	2		18000	0.18	
			4		15000	0.22
	10'	2		18000	0.28	
			4		12000	0.42
	12'	2		14250	0.53	
		4		10000	0.73	

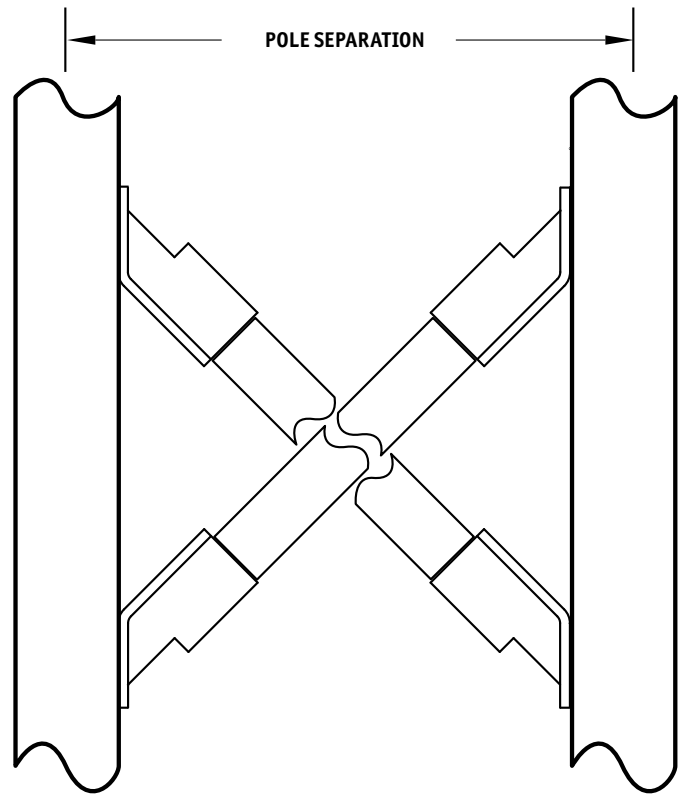
Primary Axis Loading



Current as of January 31, 2009

Lewtex Crossarms Testing



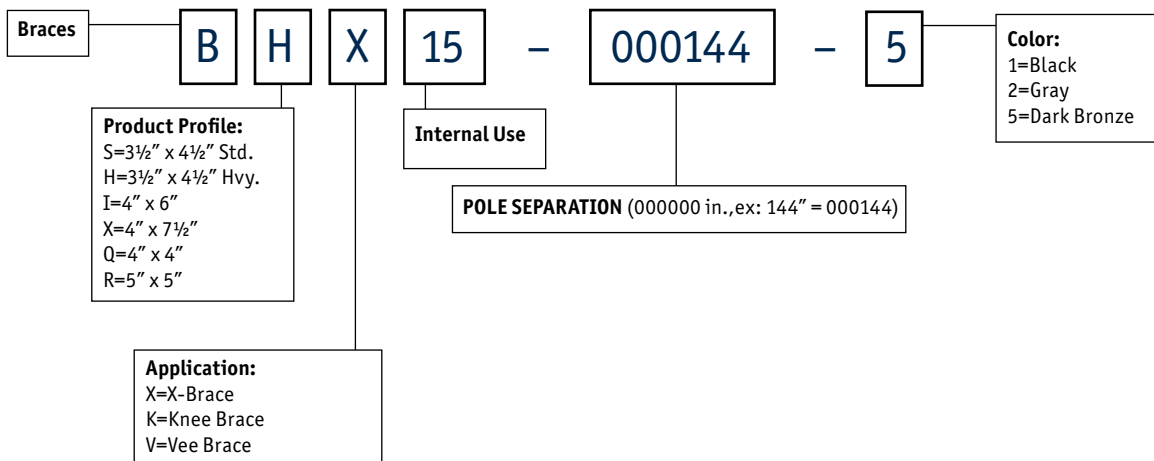


X-BRACES

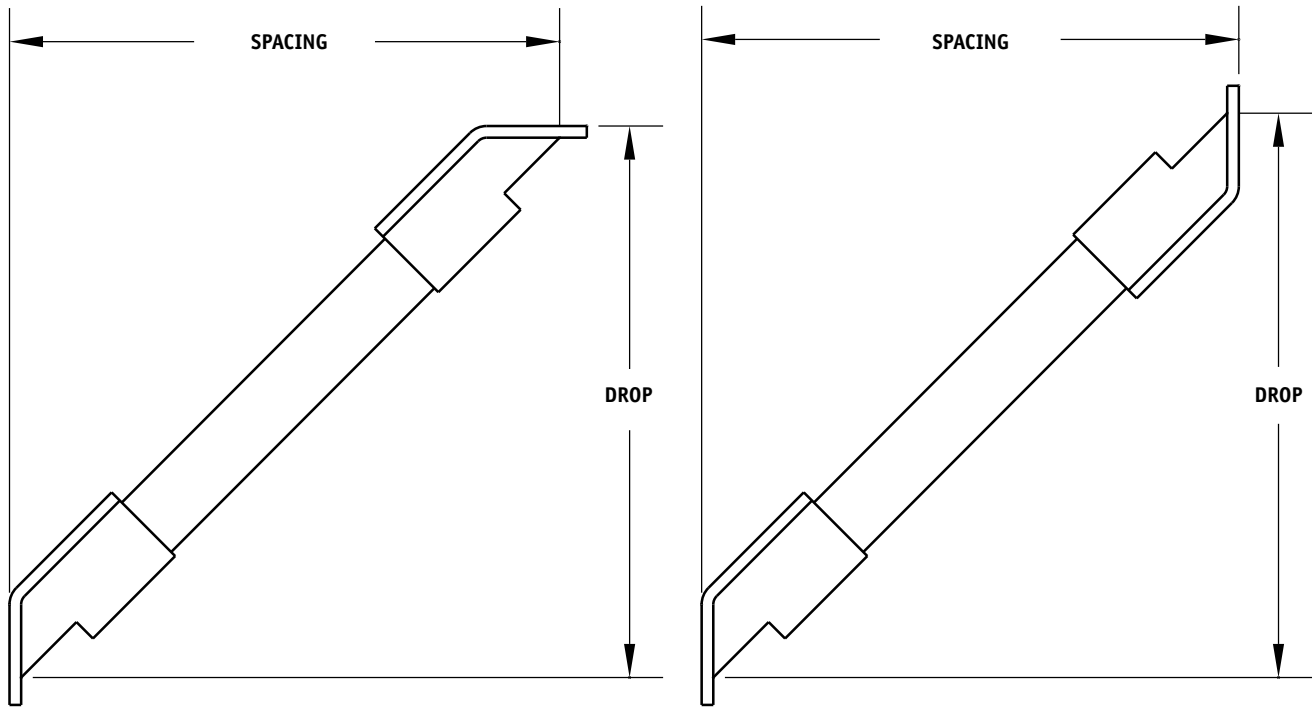
X-Braces

Catalog Number	POLE SPACING (in.)	Profile Dimensions
BSX15-000144-5	144	3½" x 4½"
BHX15-000144-5	144	3½" x 4½"
BIX15-000144-5	144	4" x 6"
BXX15-000144-5	144	4" x 7½"

Composite X-Braces



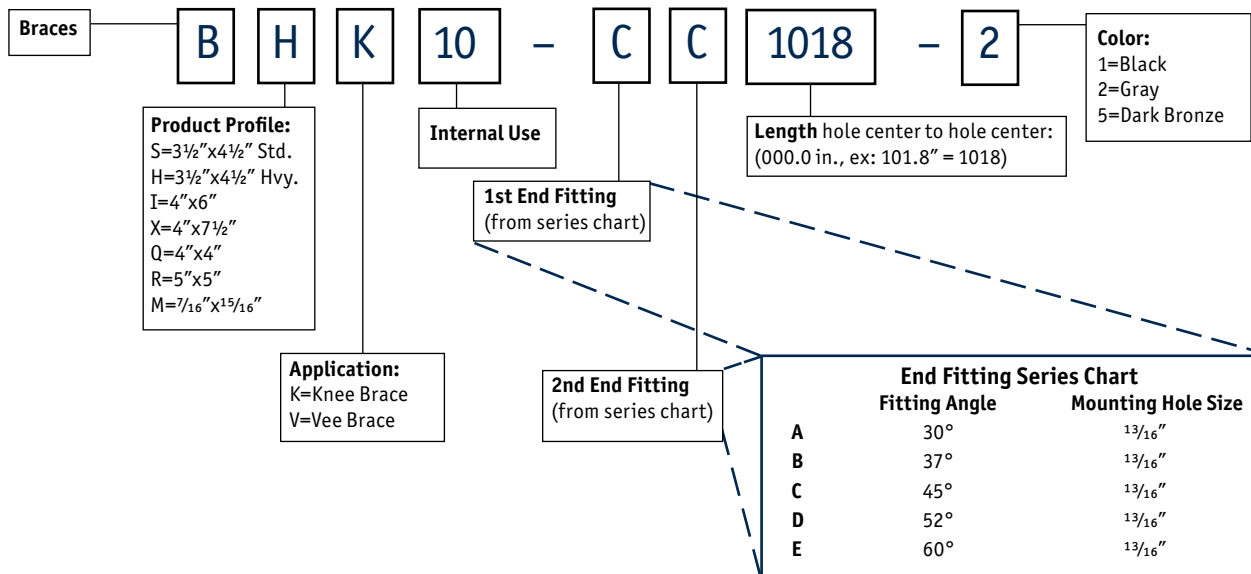
Composite Knee and Vee Braces



KNEE BRACES

VEE BRACES

Composite Knee and Vee Braces

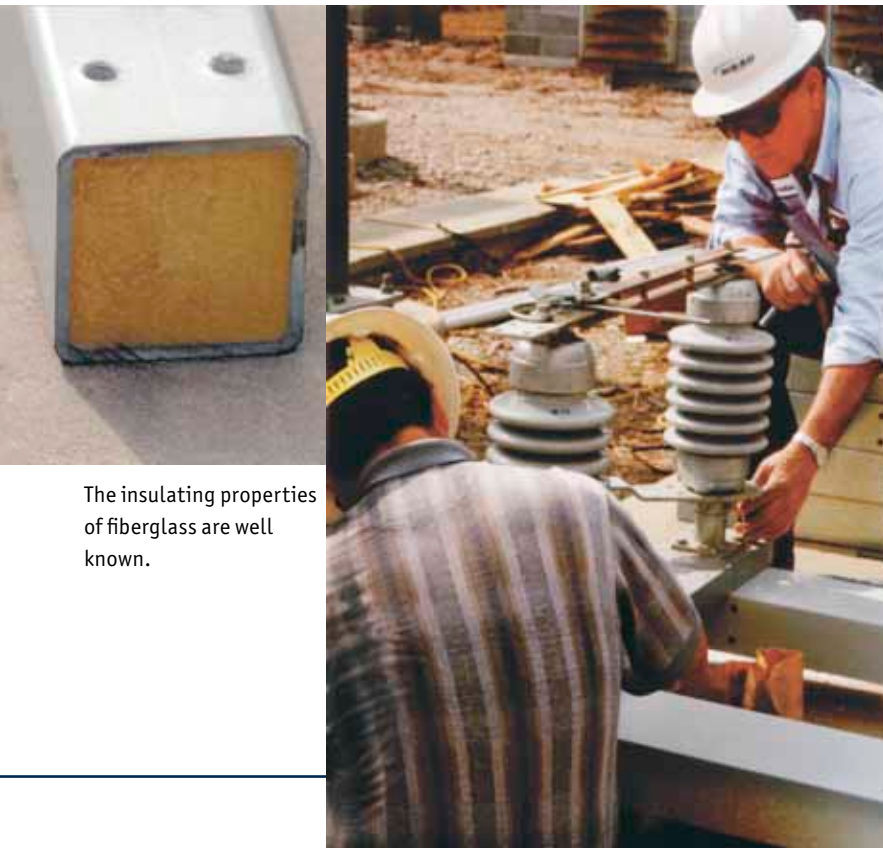


Composite Buss and Switch Supports

- Greatly reduce outages caused by wildlife intrusion or contact
- Light weight, high load capacities
- Easily installed using standard construction practice
- Custom fabricated to your specification
- Predrilled to your specifications, or drill on site
- Custom fabricated attachment brackets



Stop the switching station barbecue, and make your customers happy!



The insulating properties of fiberglass are well known.

Here come the squirrels! It only takes a single squirrel to interrupt thousands of people's dinner, just because the squirrel can't read "High Voltage" on the fence around your switching station. Our strong, attractive fiberglass reinforced composite switch supports are a squirrel's best friend. And yours, too. Those pesky squirrels and other wildlife can poke their noses where they don't belong and not have to notify their next of kin. They can hop onto our fiberglass composite buss and switch supports with a much lower possibility for shorting to ground, causing an outage for your customers.

Shakespeare Composite Structures switch supports are built to your specifications using strong, field-tested fiberglass reinforced composite beams, plus custom fabricated brackets and hardware. The supports can be predrilled for fast assembly on site, or you can field drill them as necessary.

For more information, *just call.*

Tuff-Top Pole Extensions

- Standard and Heavy styles
- Light weight, high load capacities
- Adjustable 6" to 10" for pole diameter (19" to 31" circumference)
- Customer specified lengths up to 20'
- Unexcelled strength
- Composite crossarms available
- Aesthetically pleasing
- Fast, easy installation

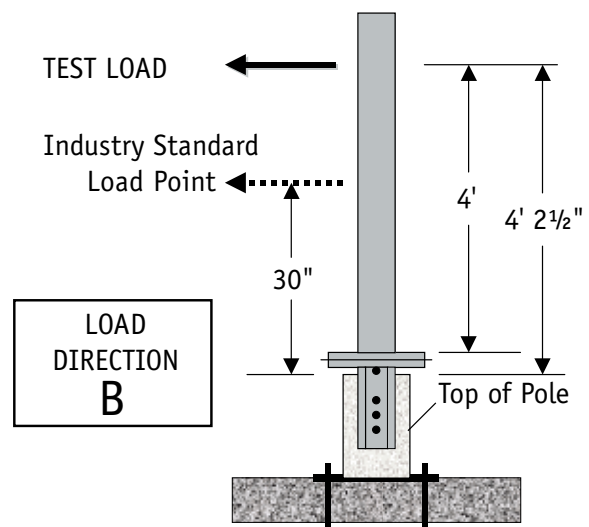
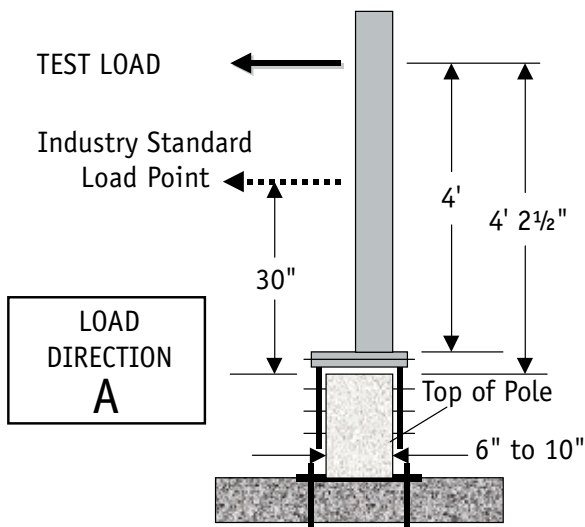
Look to the top, there's always room for more!

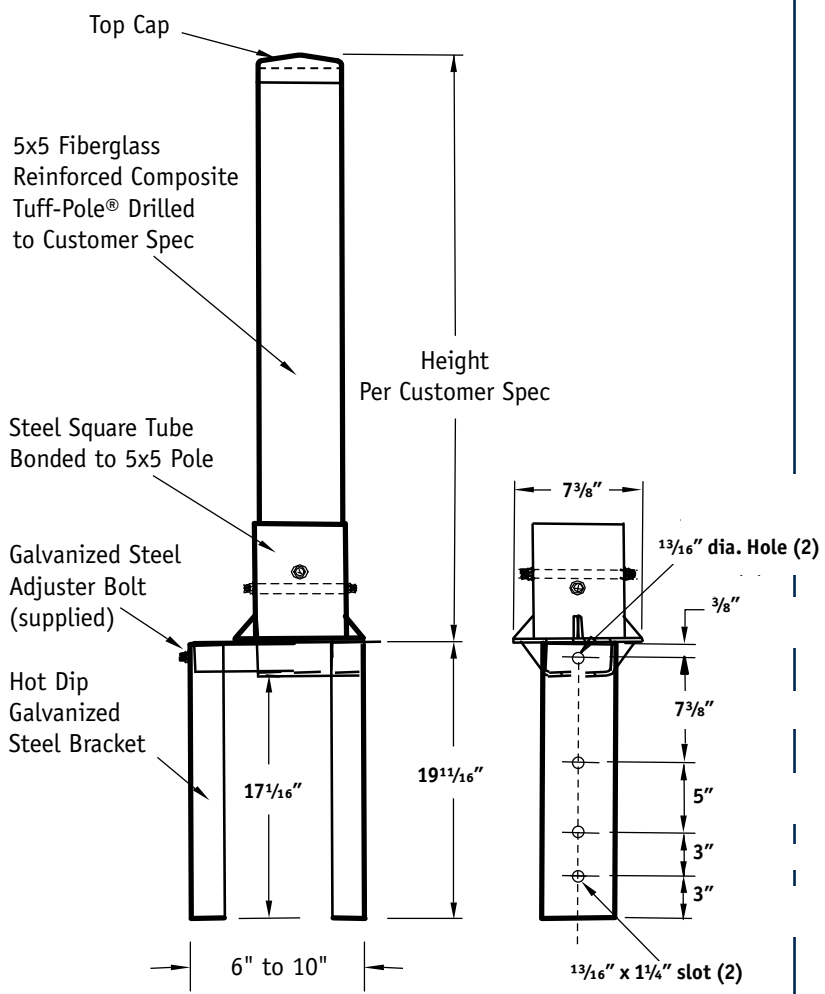
Shakespeare Composite Structures' Tuff-Top Pole Extensions provide a convenient, inexpensive, and durable way to add conductors or increase clearance on an existing pole installation, whether composite or other type of pole. These strong, attractive extensions are made of a length of 5"x5" fiberglass reinforced pole, plus a versatile attachment bracket. You can add crossarms to the extension, if needed.



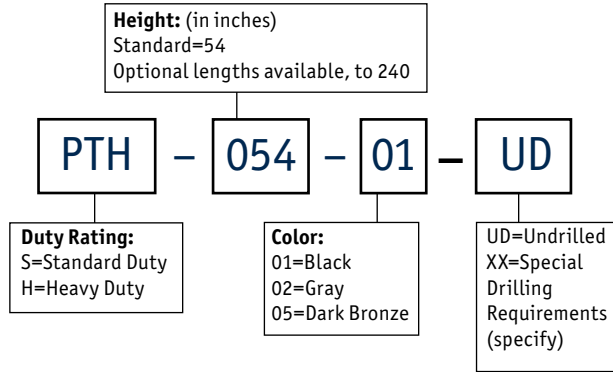
Passing the test

Shakespeare Composite Structures' Heavy Duty Tuff-Top Pole Extension withstood a 5,000 pound pull in Load Direction A and a 4,000 pound pull in Load Direction B during industry-standard engineering testing.





Shakespeare Tuff-Top Pole Extensions



Weight of standard unit: 72 lbs.

How to order

The Tuff-Top Pole Extension ordering logic is shown at left. Use this checklist and the diagram above to specify the product you need. If you need assistance, *just call*.

	Standard	Specify
Length	54"	_____
Color	Black (01)	_____
Dia. of drilled holes	1 1/16"	_____
Hole locations	See diagram	(supply drawing)
Other		_____

Back Yard Composite Tuff-Poles®

- Shoulder carryable to reach hard-to-access areas
- Attractive and inexpensive
- Easily installed using minimal equipment
- No rust, rot, woodpecker, or insect damage ever, for extra long installed life
- Predrilled to your specifications, or drill on site
- Excellent for drops, lights, telecommunications, etc.



Have you worn out your welcome in your customers' back yards?



The auger's bad enough, but those big transports and lifting equipment are definitely going to raise a fuss. Your customers often need a pole in places where they won't welcome heavy equipment. Imagine their relief when they watch your crew bring in a shoulder-carryable, lightweight, long-life composite pole that doesn't ruin the looks of their back yards, or damage the lawn.

Shakespeare Composite Structures fiberglass reinforced composite Tuff-Poles won't rot, rust, or get eaten by insects. They look good (you can even get them in a palette of colors), and you can carry them into a customer's prize garden without removing (and paying to reinstall) the landscaping. The poles come predrilled to your specification, or you can drill them on site. They can also be equipped with climbing steps.

For back yards, or for any hard to reach areas, choose the good-looking pole that installs quickly with minimal crew and no need for heavy transport and lifting equipment. Your customers will appreciate it, and so will their lawns.



Many styles are available. See charts, beginning on Page 4.



Shakespeare's innovative Energy Absorbing Poles

- By far, the lowest cost "TL-2 Device" solution
- Can greatly reduce injuries in vehicle impacts
- Pole lengths to 50'
- Full-scale tested
- Light weight, easily transported and installed
- No chemical additives
- Virtually maintenance-free
- FHWA accepted as Test Level 2 (TL-2) device
- Patent Pending

Ask for information and brochure,



Acoustawall™ quiets and shields transformers

- Attractive, effective solution for noise and visibility shielding around substations and switches
- Easy, quick install with minimal equipment and crew
- Heights to 24'
- Fiberglass composite plank construction
- Hollow planks can be filled with recycled rubber for extra acoustic performance
- Virtually maintenance-free
- Will never rust or rot, and insects won't attack it
- Wide choice of colors

Ask for information and brochure,



Shakespeare Composite Structures is a Philips group brand.

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