

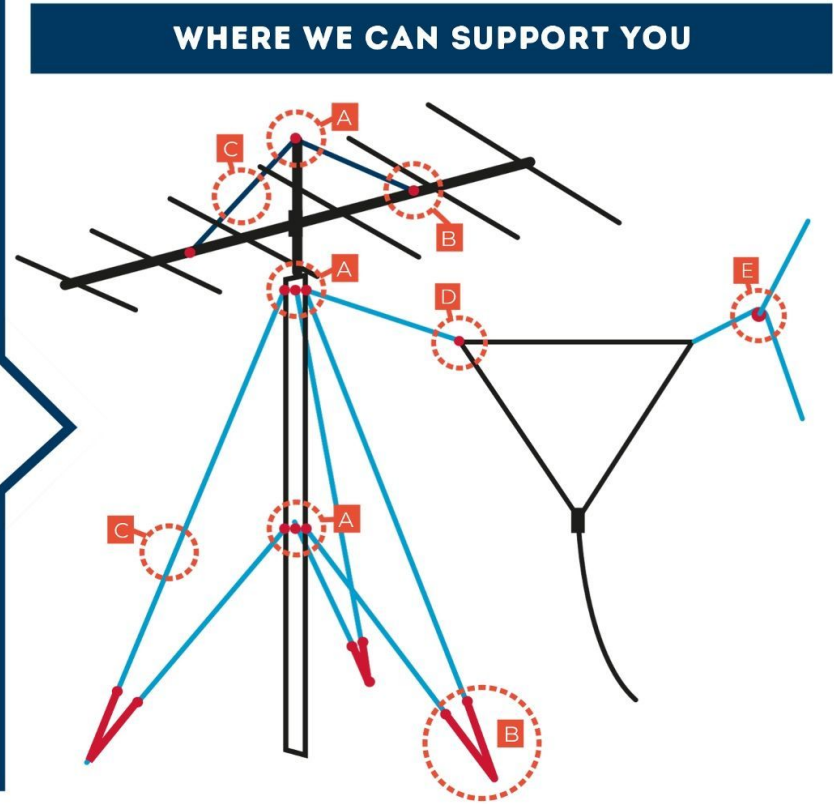
MASTRANT

ANTENNA GUYING

WHY GUY WITH SYNTHETIC ROPES?
 NO RF INTERACTION * LIGHT WEIGHT * EASY HANDLING * COST EFFECTIVE

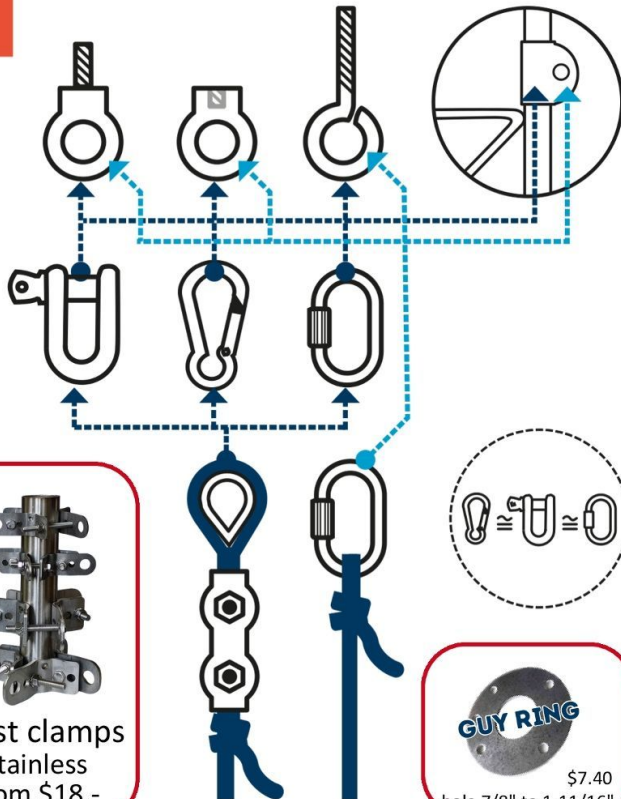
WHY MASTRANT?
 DESIGNED FOR GUYING * UV RESISTANCE * HIGH STRENGTH * LOW ELONGATION - NO STRETCH * WEATHER DURABILITY * WIDE RANGE OF ACCESSORIES AND TOOLS

HOW?
 CHOOSE APPROPRIATE GUYROPE * CALCULATE LENGTHS * THINK ABOUT IT * DO IT * REGULARLY CHECK IT



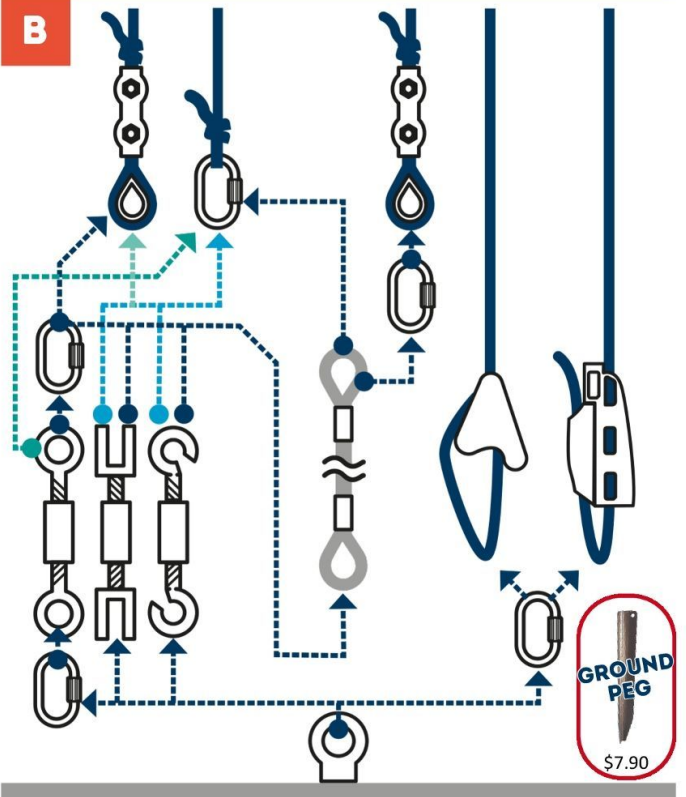
MAST / TOWER GUY POINT

A



TENSIONING + CONNECTING

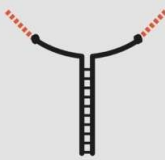



B



C

TYPICAL INSTALLATIONS + RECOMMENDED GUY ROPES

TYPE OF USE

Wire antenna suspension	Vertical antenna	Mast Ø 1 to 4"	Lattice tower
 <p>Conventional wire antennas</p> <p>High tension - heavy wire, 160m</p>	 <p>Up to 70 ft, Ø 1 to 2"</p> <p>Up to 130 ft, Ø 2 to 4"</p>	 <p>Up to 25 ft with 3 el. 3-B or long VHF Yagi</p> <p>Up to 70 ft, 5 el. Yagi for 20m</p>	 <p>Up to 70 ft 7 el. tribander</p> <p>Up to 200 ft 3 stack of 5 el. Yagi 20m</p>
	2-3 3-5	2-3 3-5	2-3 3-6



breaking strength (BS) [lbs.] working load limit (WLL)

ROPE TYPE

PRICE
\$
Longer spools available

Size of couplers
Carabiner Shackle Turnbuckle
Chain

Feet: 330, 100, 1

Ø SIZE **MASTRANT CLASSIC** STRETCH = ELONGATION: 2.4%, CORE = POLYESTER & POLYPROPYLENE, COVER = POLYESTER

Ø	SIZE	BS	WLL	ROPE TYPE	PRICE	FEET	COUPLERS			
2	1/16"	220	70	P	25	n/a	0.11	5	5	6
				R	27	n/a	0.12			
3	1/8"	440	130	P	35	14	0.15	5	5	6
				R	39	n/a	0.17			
3+	9/64"	660	200	P	49	19	0.21	6	5	6
				C	58	21	0.25			
4	5/32"	970	290	P	55	22	0.22	6	5	6
5	3/16"	1190	360	P	79	29	0.31	6	5	6
				R	96	n/a	0.38			
				O	n/a	37	0.47			
6	1/4"	1610	490	Q	115	n/a	0.42	8	6	8
				C	134	n/a	0.49			
				S	134	n/a	0.49			
8	5/16"	3750	1120	Q	156	n/a	0.57	10	6	8
11	7/16"	6130	1830	Q	219	n/a	0.80	HD	7	10
14	9/16"	7120	2140	Q	299	n/a	1.09	-	10	14

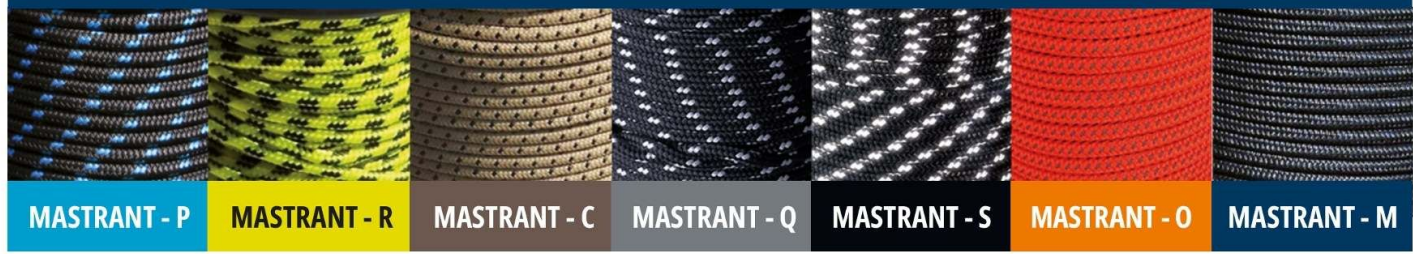
Ø SIZE **MASTRANT PREMIUM** EXTRA STRONG STRETCH = ELONGATION: <1.2%, CORE = DYNEEMA® DM 20, COVER = POLYESTER

Ø	SIZE	BS	WLL	ROPE TYPE	PRICE	FEET	COUPLERS			
1	3/64"	220	70	M	49	n/a	0.21	5	5	6
2	3/32"	490	150	M	55	21	0.23	5	5	6
3	1/8"	860	260	M	89	33	0.38	6	5	6
4	5/32"	1980	600	M	179	n/a	0.71	7	5	6
5	3/16"	2650	790	M	283	n/a	1.12	8	6	8
6	1/4"	4080	1220	M	351	n/a	1.28	10	7	10
8	5/16"	5730	1720	M	498	n/a	1.81	HD	8	12
10	3/8"	8490	2550	M	852	n/a	3.10	-	10	16
12	1/2"	12130	3640	M	1188	n/a	4.32	-	12	20

WHY PREMIUM?
Double strength for the same diameter + Half the stretch

* LEVELS = NUMBER OF GUY ATTACHMENT POINTS. OTHER ASSUMPTIONS: WIND SPEED UP TO 100mph, DISTANCE BETWEEN ANCHOR POINT AND BASE OF MAST > 70% OF THE HEIGHT

ALL ROPES ARE UV AND ALL-WEATHER RESISTANT. DESIGNED FOR GUYING. WWW.MASTRANT.COM



"JEWELRY FOR YOUR TOWER"

A: Terminating

Thimbles (stainless AISI 316)		
ATH02	2 mm (3/32", min.int.diam. 8 mm)	0.29
ATH03	3 mm (1/8", min.int.diam. 10 mm)	0.33
ATH04	4 mm (5/32", min.int.diam. 11 mm)	0.45
ATH05	5 mm (3/16", min.int.diam. 13 mm)	0.58
ATH06	6 mm (1/4", min.int.diam. 14 mm)	0.70
ATH08	8 mm (5/16", min.int.diam. 18 mm)	1.20
ATH10	10 mm (3/8", min.int.diam. 24 mm)	1.80
ATH12	12 mm (1/2", min.int.diam. 30 mm)	2.-
ATH14	14 mm (9/16", min.int.diam. 32 mm)	2.90



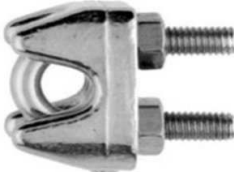
Duplex wire rope clips (stainless AISI 316)		
ADC02	2 mm (3/32", M4, wrench 7)	1.30
ADC03	3 mm (1/8", M4, wrench 7)	1.60
ADC04	4 mm (5/32", M5, wrench 8)	2.30
ADC05	5 mm (3/16", M5, wrench 8)	2.90
ADC06	6 mm (1/4", M6, wrench 10)	4.-
ADC08	8 mm (5/16", M8, wrench 13)	5.90
ADC10	10 mm (3/8", M10, wrench 16)	11.20



Fist-grips (galvanised)		
APC06	6 mm (1/4", 5-8 mm, M6)	2.90
APC08	8 mm (5/16", 8-10 mm, M6)	4.10
APC10	10 mm (3/8", 10-12, M8)	5.80
APC12	12 mm (1/2", 12-14, M10)	7.40
APC16	16 mm (5/8", 14-18, M12)	9.90



Bull-dog grips (stainless steel AISI 316)		
ASC02	2 mm (3/32", M3)	1.50
ASC03	3 mm (1/8", M3)	1.70
ASC04	4 mm (5/32", M4)	1.80
ASC05	5 mm (3/16", M5)	2.-
ASC06	6 mm (1/4", M6)	2.40
ASC08	8 mm (5/16", M6)	2.80
ASC10	10 mm (3/8", M8)	4.10
ASC12	12 mm (1/2", M10)	7.60
ASC13	13 mm (9/16", M10)	9.10



A, B: Coupling

Spring hooks - Carabiners (stainless AISI 316)		
AHO04	4 mm (5/32", BS: 500 lb.)	1.50
AHO05	5 mm (3/16", BS: 880 lb.)	1.60
AHO06	6 mm (1/4", BS: 1050 lb.)	1.90
AHO07	7 mm (9/32", BS: 1320 lb.)	2.80
AHO08	8 mm (5/16", BS: 1870 lb.)	3.50
AHO10	10 mm (3/8", BS: 2500 lb.)	6.40
AHOS05	smooth 5 mm (3/16", BS: 370 lb.)	2.-
AHOS07	smooth 7 mm (9/32", BS: 990 lb.)	2.90
AHOS10	smooth 10 mm (3/8", BS: 2000 lb.)	6.80



Chain quick-acting couplers (stainless AISI 316)		
ACC04	4 mm (5/32", max.opn.5.5 mm (1100 lb.)	1.80
ACC05	5 mm (3/16", max.opn.6.5 mm (3000 lb.)	2.10
ACC06	6 mm (1/4", max.opn.7.5 mm (4400 lb.)	3.20
ACC07	7 mm (9/32", max.opn.8.5 mm (5500 lb.)	4.50
ACC08	8 mm (5/16", max.opn.9.5 mm (7300 lb.)	4.90
ACC10	10 mm (3/8", max.opn.12 mm (12100 lb.)	8.70
ACC12	12 mm (1/2", max.opn.14.5 mm (15400 lb.)	13.-



Shackles (stainless AISI 316)		
ASE04	4 mm (5/32", 8x14 mm hole (1200 lb.)	2.-
ASE05	5 mm (3/16", 10x17 mm hole (2000 lb.)	2.30
ASE06	6 mm (1/4", 12x21 mm hole (2900 lb.)	2.70
ASE07	7 mm (9/32", 14x24 mm hole (3900 lb.)	3.-
ASE08	8 mm (5/16", 16x28 mm hole (5300 lb.)	3.30
ASE10	10 mm (3/8", 19x35 mm hole (8400 lb.)	6.20
ASE12	12 mm (1/2", 23x41 mm hole (12200 lb.)	8.90



Swivels (stainless AISI 316)		
ASW01	6 mm (1/4", 12x11 mm hole (2900 lb.)	6.20
ASW02	8 mm (5/16", 16x16 mm hole (5500 lb.)	10.70



B: Attaching

Fixing eyes (stainless steel AISI 316)		
AES061	eye - bolt M6 (hole 16, length 11, 1700 lb.)	2.40
AES081	eye - bolt M8 (hole 20, length 13, 3100 lb.)	3.20
AES101	eye - bolt M10 (hole 25, leng. 17, 5000 lb.)	6.10
AES121	eye - bolt M12 (hole 30, leng. 20, 7100 lb.)	7.20
AEN06	eye - nut M6 (hole 16, 1700 lb.)	1.90
AEN08	eye - nut M8 (hole 20, 3100 lb.)	2.80
AEN10	eye - nut M10 (hole 25, 5000 lb.)	4.70
AEN12	eye - nut M12 (hole 30, 7100 lb.)	6.70



Rope winder Mastrant (aluminium)		
ARW32A	Length 1 ft., for 60-150 ft. rope	7.90



B: Attaching

Mast clamps Mastrant (stainless steel)		
Parts can be used for both 3 or 4 directional setups.		
Heavy duty (thickness 5/32", height 1-1/2", screws 5/16")		
ACM1306	3 directions, masts 5/8" to 2"	23.-
ACM1310	3 directions, masts 5/8" to 4"	24.-
ACM1406	4 or 3 dir. (universal), masts 1-1/4" to 3-1/4"	31.-
ACM1410	4 or 3 dir. (universal), masts 1-1/4" to 5"	33.-



Light (thickness 3/32", height 1", screws 1/4")		
ACM230x	light 3 directions, masts 3/8" to 2-3/8"	18.-
ACM240x	light 3-4 directions, masts 1" to 2-3/8"	24.-



Galvanised mast clamps		
ACL330	3 directional, masts 1-3/16" to 2"	12.-
ACL445	4 directional, masts 3/4" to 3"	16.-



Guy rings Mastrant (aluminium)		
AGR1*	Outer diameter of the ring 4" (100 mm)	7.40
Tube diam. 22, 28, 31, 34, 37, 40, 43 mm (7/8" to 1-11/16")		



Ground peg Mastrant		
ASGP3A	Ground peg 1 ft aluminium	7.90



C: Terminated guy ropes Mastrant

Ready-made guy ropes with a thimble fitted on one end.		
	Length: 66 ft.	99 ft.
NP040x0	4 mm (5/32"), blue, BS: 500 lb.	19.- 25.-
NP050x0	5 mm (3/16"), blue, BS: 600 lb.	25.- 33.-
NR050x0	5 mm (3/16"), yellow, BS: 600 lb.	28.- 38.-
NO050x0	5 mm (3/16"), refl. orange, BS: 600 lb.	35.- 47.-
NQ060x0	6 mm (1/4"), grey, BS: 800 lb.	35.- 47.-
NQ080x0	8 mm (5/16"), grey, BS: 1870 lb.	44.- 59.-
NQ110x0	11 mm (7/16"), grey, BS: 3060 lb.	82.- 105.-



"JEWELRY FOR YOUR TOWER"

B: Tensioning

Turnbuckles (stainless steel AISI 316)

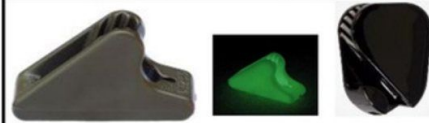
ASH*06*	eye-eye (hook) M6 (1/4")	4.20
ASH*08*	eye-eye (hook) M8 (5/16")	8.70
ASH*10*	eye-eye (hook) M10 (3/8")	12.80
ASH*12*	eye-eye (hook) M12 (1/2")	16.-
ASH*16*	eye-eye (hook) M16 (5/8")	33.-
ASH*20*	eye-eye (hook) M20 (13/16")	57.-



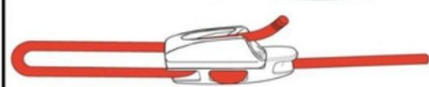
ASHF05*	jaw-jaw M5 (3/16", 1230 lb.)	7.80
ASHF06*	jaw-jaw M6 (1/4", 3000 lb.)	8.70
ASHF08*	jaw-jaw M8 (5/16", 4800 lb.)	10.70
ASHF10*	jaw-jaw M10 (3/8", 7600 lb.)	19.-
ASHF12*	jaw-jaw M12 (1/2", 11000 lb.)	28.-
ASHF14*	jaw-jaw M14 (9/16", 14000 lb.)	50.-
ASHF16*	jaw-jaw M16 (5/8", 23000 lb.)	74.-



Clamcleat® tensioners (UV stabilised)	black	glow	
CL266	Line-Lok tens. 1-3 mm (1/8")	0.45	0.64
CL260	Line-Lok tens. 2-4 mm (5/32")	0.75	1.10
CL276	Line-Lok tens. 3-5 mm (3/16")	2.-	2.70
CL271	Line-Lok tens. 4-8 mm (5/16")	4.90	8.70
CL223	Loop Cleat tens. 3-6 mm (1/4")	4.-	
CL234	Loop Cleat tens. 6-11 mm (1/2")	7.80	



Clamcleat® tensioners - adjustable (UV stabilised)		
CL828-63	Aero 3-4 mm (5/32")	7.90
CL828-70AN	Aero 3-4 mm (5/32", can rig 4:1)	14.-
CL826-72	Aero 4-6 mm (1/4")	9.90
CL829-11AN	Aero 4-6 mm (1/4", hard anodised)	17.-
CL827-03	Aero 4-6 mm long (1/4")	11.60
CL827-11AN	Aero 4-6 mm long (1/4", hard anod.)	18.-



Clamcleat® Tensioning Reel (UV stabilised)		
CLPT771	For ropes 5-6 mm (3/16" to 1/4")	28.-



To shorten guyline wrap round reel like this.

D: Elastic ropes for tensioning

stretch 100% e.g. for tightening of wire antennas to trees		
ER06	Elastic rope 6 mm (1/4", 10 kg / 22 lb), 1 ft	0.50
ER08	Elastic rope 8 mm (5/16", 25 kg / 55 lb), 1 ft	1.-

E: Pulleys

Pulleys galvanised

APUN05	nylon, 5 mm (3/16")	1.60
APUN06	nylon, 6 mm (1/4")	1.90
APUN08	nylon, 8 mm (5/16")	3.30
APUN10	nylon, 9 mm (3/8")	5.30
APU005	anti-tangle metal, 5 mm (3/16")	2.10
APU006	anti-tangle metal, 6 mm (1/4")	2.40
APU007	anti-tangle metal, 7 mm (9/32")	3.30
APU008	anti-tangle metal, 8 mm (5/16")	5.70
APU010	anti-tangle metal, 10 mm (3/8")	9.20



Pulleys stainless

APUS10A	up to 10 mm (3/8"), sheave plastic	7.70
APUX06S	up to 6 mm, sheave plastic, shackle	6.80
APUS03A	up to 3 mm (1/8"), plastic	5.90
APUX09B	anti-tangle, up to 9 mm, Ø 25 mm	7.20
APUX10A	anti-tangle, up to 10 mm, Ø 32 mm	11.-
APUX14A	anti-tangle, up to 14 mm, Ø 50 mm	16.-



APUS05A	pulley up to 5 mm (3/16"), sh. plastic	9.30
APUS05D	pulley up to 5 mm, sh. brass nicked	11.40
APUS05G	double up to 5 mm, sheave plastic	12.90
APUS05J	double up to 5 mm, sh. brass nicked	16.-



APUS06M	metal cheek, up to 6 mm (1/4"), bow	14.-
APUS08M	metal cheek, up to 8 mm (5/16"), bow	17.-
APUS10M	metal cheek, up to 10 mm (3/8"), bow	19.-



APUS08Q	HD up to 8 mm (5/16", 1320 lb.)	15.-
APUS08X	HD up to 8 mm (5/16"), needle bearing	22.-
APUS10Q	HD up to 10 mm (3/8", 2000 lb.)	17.-
APUS12Q	HD up to 12 mm (1/2", 2640 lb.)	24.-



APUS08T	anti-tangle HD up to 8 mm (5/16")	25.-
APUS10S	anti-tangle HD up to 10 mm (3/8")	31.-
APUS12S	anti-tangle HD up to 12 mm (1/2")	35.-



APUS06P	HD for wires, up to 6 mm (1/4")	20.-
APUS20	HD, up to 16 mm (5/8", 30 kN, alum.)	45.-



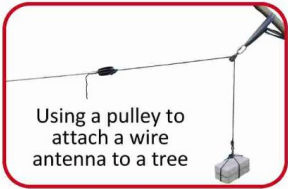
We would be happy to assist you with your future projects.
Do not hesitate to contact us at info@mastrant.com!

WWW.MASTRANT.COM

US Distributors: R&L Electronics, GigaParts, DX Engineering

SOLUTIONS

Need some advice?
A tailor-made solution?
Contact us!
info@mastrant.com
Mark K1RX, Ken KB5YBI, Martin OLSY



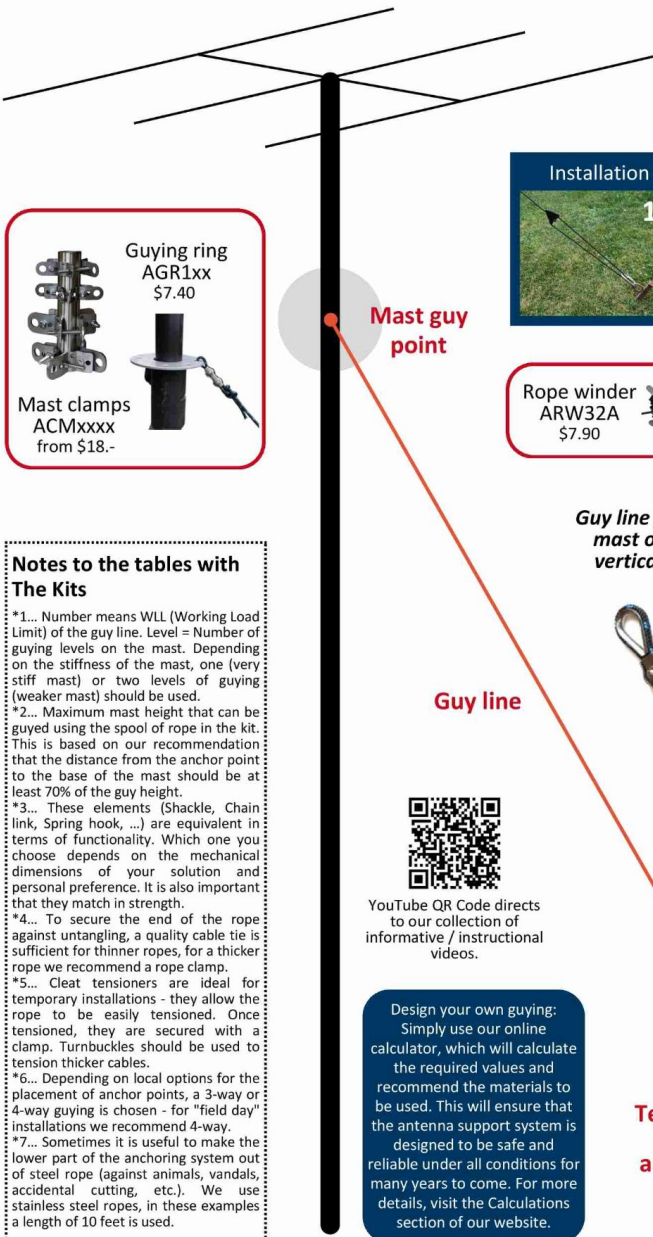
Using a pulley to attach a wire antenna to a tree

Basic Guy line for tower

Guy line for tower with steel rope tails



Example of the guying kit



Mast clamps ACMxxxx from \$18.-

Guy line for mast or vertical



YouTube QR Code directs to our collection of informative / instructional videos.

Design your own guying: Simply use our online calculator, which will calculate the required values and recommend the materials to be used. This will ensure that the antenna support system is designed to be safe and reliable under all conditions for many years to come. For more details, visit the Calculations section of our website.

Tensioning and anchoring

Ground peg ASPG3A \$7.90

Notes to the tables with The Kits

*1... Number means WLL (Working Load Limit) of the guy line. Level = Number of guying levels on the mast. Depending on the stiffness of the mast, one (very stiff mast) or two levels of guying (weaker mast) should be used.

*2... Maximum mast height that can be guyed using the spool of rope in the kit. This is based on our recommendation that the distance from the anchor point to the base of the mast should be at least 70% of the guy height.

*3... These elements (Shackle, Chain link, Spring hook, ...) are equivalent in terms of functionality. Which one you choose depends on the mechanical dimensions of your solution and personal preference. It is also important that they match in strength.

*4... To secure the end of the rope against untagling, a quality cable tie is sufficient for thinner ropes, for a thicker rope we recommend a rope clamp.

*5... Cleat tensioners are ideal for temporary installations - they allow the rope to be easily tensioned. Once tensioned, they are secured with a clamp. Turnbuckles should be used to tension thicker cables.

*6... Depending on local options for the placement of anchor points, a 3-way or 4-way guying is chosen - for "field day" installations we recommend 4-way.

*7... Sometimes it is useful to make the lower part of the anchoring system out of steel rope (against animals, vandals, accidental cutting, etc.). We use stainless steel ropes, in these examples a length of 10 feet is used.

Part	Options	Sets (*1)				
		Light 1 level (130 lb.)	Light 2 levels (130 lb.)	Medium 1 level (200 lb.)	Medium 2 levels (200 lb.)	
Mast Capture	Mast clamp ACM#, Guy ring AGR#					
Connection	Shackle, Chain link, Spring hook (*3)	ASE05	ASE05	ASE06	ASE06	
Rope protection	Thimble	ATH03	ATH03	ATH03	ATH03	
Rope clamping	Rope clip	ADC03	ADC03	ADC03	ADC03	
Rope securing	Knots					
Rope hold	Cable tie, Rope clip (*4)					
Rope	Mastrant - type	MP03	MP03	MPA3	MPA3	
Rope hold	Cable tie, Rope clip (*4)	Length [ft.]	102	330	165	330
Rope securing	Knots					
Rope protection	Thimble	ADC03	ADC03	ADC03	ADC03	
Tensioner	Cleat or turnbuckle (*5)	CL260	CL260	CL276	CL276	
Connection	Shackle, Chain link, Spring hook	ACC06	ACC06	ACC06	ACC06	
Ground anchor	Peg, Stake, Eye					
KR 3-way (*6)	Price USD:	\$ 43	\$ 94	\$ 64	\$ 118	
	Rope length (*2) for maximum mast height [ft.]:	25	51	42	81	
KR 4-way (*6)	Price USD:	\$ 53	\$ 113	\$ 76	\$ 140	
	Rope length (*2) for maximum mast height [ft.]:	18	38	31	38	
Options (check catalog or web):	Different rope color, different rope type (thickness, strength) and length					
	Different connecting elements					
	Mast clamps ACM#, Guy rings AGR#, Ground pegs ASG#					

Part	Options	Sets (*1)					
		Light 1 level (290 lb.)	Medium 1 level (360 lb.)	Medium 2 levels (360 lb.)	HD mast 1 level (490 lb.)	HD mast 2 levels (490 lb.)	EHD mast 2 levels (1220 lb.)
Mast Capture	Mast clamp ACM#, Guy ring, Tower guy bracket, Tower torque arm stabilizer						
Connection	Shackle, Chain link, Spring hook (*3)	ASE06	ASE07	ASC06	ASE08	ASE08	ASE08
Rope protection	Thimble	ATH04	ATH05	ATH05	ATH06	ATH06	ATH06
Rope clamping	Rope clip	ADC04	ADC05	ADC05	ADC06	ADC06	ADC06
Rope securing	Knots			ASC06	ASC06	ASC06	
Rope hold	Cable tie, Rope clip (*4)						
Rope	Mastrant - type	MP04	MP05	MP05	MP06	MP06	MM06
Rope hold	Cable tie, Rope clip (*4)	Length [ft.]	330	330	330	660	660
Rope securing	Knots			ASC06	ASC06	ASC06	
Rope clamping	Rope clip	ADC04	ADC05	ADC05	ADC06	ADC06	ADC06
Rope protection	Thimble	ATH04	ATH05	ATH05	ATH06	ATH06	ATH06
Tensioner	Cleat or turnbuckle (*5)	CL276	CL234	CL234	ASHF08	ASHF08	ASHF08
Connection	Shackle, Chain link, Spring hook	ACC06	ACC08	ACC08	ACC08	ACC08	ACC08
Ground anchor	Peg, Stake, Eye						
KR 3-way (*6)	Price USD:	\$ 94	\$ 145	\$ 213	\$ 214	\$ 429	\$ 901
	Rope length (*2) for maximum mast height [ft.]:	87	87	51	87	104	104
KR 4-way (*6)	Price USD:	\$ 107	\$ 167	\$ 257	\$ 247	\$ 495	\$ 967
	Rope length (*2) for maximum mast height [ft.]:	65	65	38	65	78	78
Options (check catalog or web):	Different rope color, different rope type (reflective, thickness, strength) and length						
	Different connecting elements						
	Mast clamps ACM#, Guy rings AGR#, Ground pegs ASG#						

Part	Options	Sets (*1)				
		Rohn 25 1 level (1220 lb.)	Rohn 25 2 levels (1220 lb.)	Rohn 45 2 levels (1720 lb.)	Rohn 45 2 levels (2550 lb.)	
Mast Capture	Mast clamp, Tower guy bracket, Tower torque arm stabilizer					
Connection	Shackle, Chain link, Spring hook (*3)	ASE08	ASE08	ASE08	ASE10	
Rope protection	Thimble	ATH06	ATH06	ATH08	ATH10	
Rope clamping	Rope clip	ADC06	ADC06	ADC08	ADC10	
Rope securing	Knots					
Rope hold	Cable tie, Rope clip (*4)	ASC06	ASC06	ASC08	ASC10	
Rope	Mastrant - type	MM06	MM06	MM08	MM10	
Rope hold	Cable tie, Rope clip (*4)	Length [ft.]	330	660	660	660
Rope securing	Knots	ASC06	ASC06	ASC08	ASC10	
Rope clamping	Rope clip	ADC06	ADC06	ADC08	ADC10	
Rope protection	Thimble	ATH06	ATH06	ATH08	ATH10	
Tensioner	Cleat or turnbuckle (*5)	ASH08	ASH08	ASH10	ASH12	
Connection	Shackle, Chain link, Spring hook	ACC08	ACC08	ACC08	ACC10	
Ground anchor	Ground screw anchor, Eye on ground rod					
Kit w/o steel tail (*7)	Price USD:	\$ 444	\$ 889	\$ 1 241	\$ 2 093	
	Rope length (*2) for maximum mast height [ft.]:	87	104	104	104	
Kit with steel tail (*7)	Price USD:	\$ 570	\$ 1 140	\$ 1 522	\$ 2 513	
	Rope length (*2) for maximum mast height [ft.]:	96	109	109	109	
Options (check catalog or web):	Different rope type (thickness, strength) and length					
	Different connecting elements					

