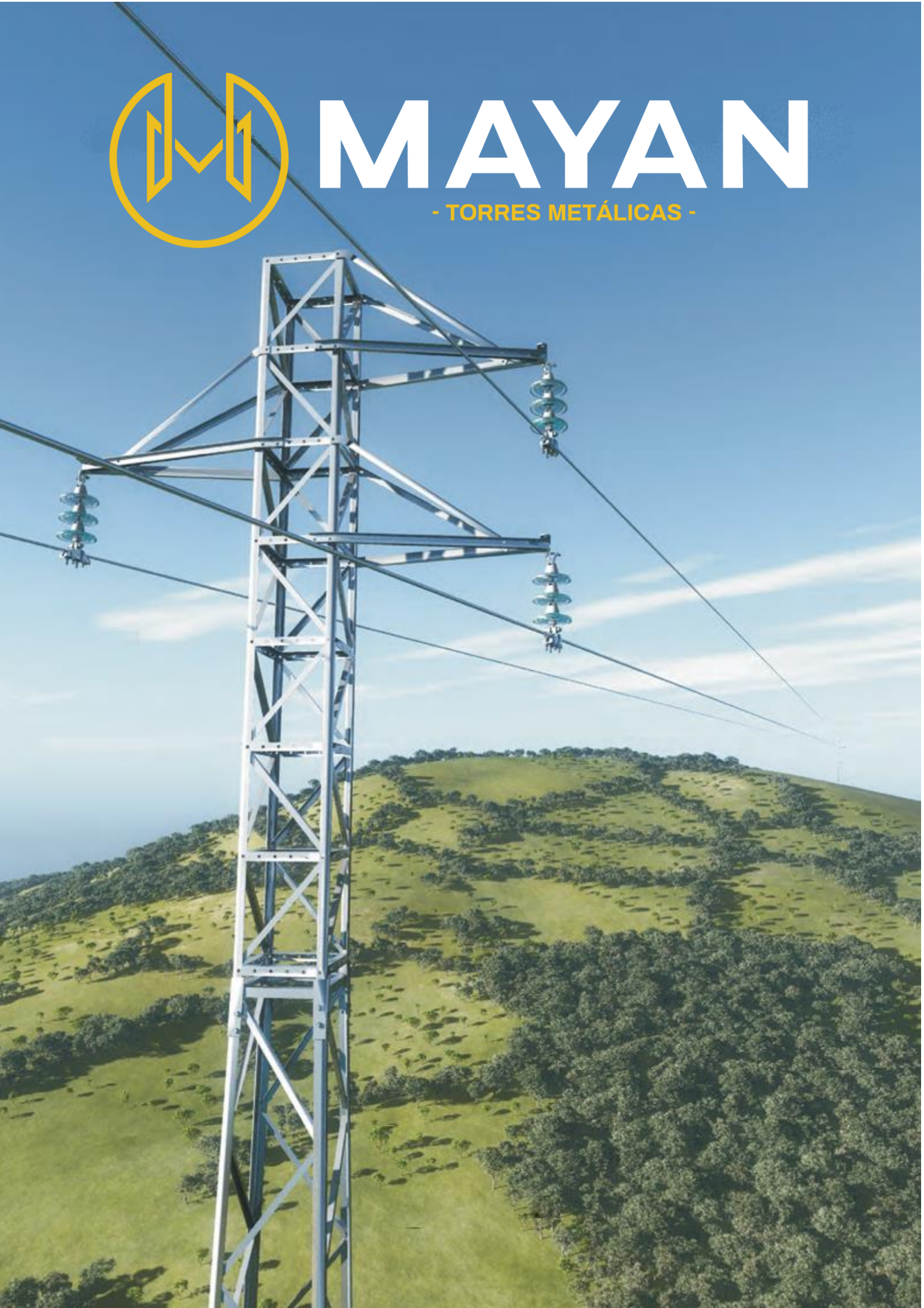




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GENERALITIES

The purpose of this catalog is to indicate the general characteristics of metal supports designed for electrical power distribution lines.

The data reflected in each support regarding its effort are useful, considering horizontal wind acting perpendicular to the surfaces it affects, at a speed of 120 km/h (33.3 m/s), as well as the vertical loads due to the weight of the different elements. Additionally, the application of a safety factor of 1.5 with respect to the yield limit is considered for normal hypotheses.

Regarding the foundations, three types of soil coefficients have been considered, establishing the structure of the post by means of a solid concrete mass and determining its dimensions through the Sulzberger method based on the horizontal reactions of the soil. Foundations with a tangent whose angle of rotation exceeds 0.01 are not allowed, aiming to achieve a balance between the maximum overturning actions and the reactions of the soil.

The calculations and indications in this catalog have been carried out in accordance with the High Voltage Electric Lines Regulations of 1968 and in accordance with the UNE 207017:2005 standard (RU 6704-A). We are also available to assist you with any other support not reflected in this catalog and offer our technical-commercial collaboration.



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**METAL SUPPORTS
RU SERIES**



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SUPPORT C-500

Post Ref.	DIMENSIONS OF SUPPORTS		
	HEIGHT	BASE	COGOLLA
C-500-10	10	0,78	0,51
C-500-12	12	0,88	0,51
C-500-14	14	0,97	0,51
C-500-16	16	1,07	0,51
C-500-18	18	1,16	0,51
C-500-20	20	1,26	0,51
C-500-22	22	1,35	0,51
C-500-24	24	1,45	0,51
C-500-26	26	1,54	0,51
C-500-28	28	1,64	0,51
C-500-30	30	1,74	0,51



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SUPPORT C-500

FOUNDATION TABLE									
SUPPORT	K=8			K=12			K=16		
	L	P	E	L	P	E	L	P	E
C-500-10	0,95	1,80	1,62	0,95	1,70	1,53	0,95	1,60	1,44
C-500-12	1,05	1,90	2,09	1,05	1,70	1,87	1,05	1,60	1,76
C-500-14	1,15	1,90	2,51	1,15	1,70	2,25	1,15	1,60	2,12
C-500-16	1,25	1,90	2,97	1,25	1,80	2,81	1,25	1,70	2,66
C-500-18	1,35	2,00	3,65	1,35	1,80	3,28	1,35	1,70	3,10
C-500-20	1,45	2,00	4,21	1,45	1,80	3,78	1,45	1,70	3,57
C-500-22	1,55	2,00	4,81	1,55	1,80	4,32	1,55	1,70	4,08
C-500-24	1,65	2,00	5,45	1,65	1,90	5,17	1,65	1,70	4,63
C-500-26	1,75	2,10	6,43	1,75	1,90	5,82	1,75	1,80	5,51
C-500-28	1,85	2,10	7,19	1,85	1,90	6,50	1,85	1,80	6,16
C-500-30	1,95	2,10	7,99	1,95	1,90	7,22	1,95	1,80	6,84

L = Side (m)
P = Depth (m)E =
Excavation (m3)



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- TORRES METÁLICAS -



SUPPORT C-1000

Post Ref.	DIMENSIONS OF SUPPORTS		
	HEIGHT	BASE	COGOLLA
C-1000-10	10	0,78	0,51
C-1000-12	12	0,88	0,51
C-1000-14	14	0,97	0,51
C-1000-16	16	1,07	0,51
C-1000-18	18	1,16	0,51
C-1000-20	20	1,26	0,51
C-1000-22	22	1,35	0,51
C-1000-24	24	1,45	0,51
C-1000-26	26	1,54	0,51
C-1000-28	28	1,64	0,51
C-1000-30	30	1,74	0,51



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- TORRES METÁLICAS -

SUPPORT C-1000

FOUNDATION TABLE									
SUPPORT	K=8			K=12			K=16		
	L	P	E	L	P	E	L	P	E
C-1000-10	0,95	1,80	1,62	0,95	1,70	1,53	0,95	1,60	1,44
C-1000-12	1,05	1,90	2,09	1,05	1,70	1,87	1,05	1,60	1,76
C-1000-14	1,15	1,90	2,51	1,15	1,70	2,25	1,15	1,60	2,12
C-1000-16	1,25	1,90	2,97	1,25	1,80	2,81	1,25	1,70	2,66
C-1000-18	1,35	2,00	3,65	1,35	1,80	3,28	1,35	1,70	3,10
C-1000-20	1,45	2,00	4,21	1,45	1,80	3,78	1,45	1,70	3,57
C-1000-22	1,55	2,00	4,81	1,55	1,80	4,32	1,55	1,70	4,08
C-1000-24	1,65	2,00	5,45	1,65	1,90	5,17	1,65	1,70	4,63
C-1000-26	1,75	2,10	6,43	1,75	1,90	5,82	1,75	1,80	5,51
C-1000-28	1,85	2,10	7,19	1,85	1,90	6,50	1,85	1,80	6,16
C-1000-30	1,95	2,10	7,99	1,95	1,90	7,22	1,95	1,80	6,84

L = Side (m)
P = Depth (m) E =
Excavation (m3)



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- TORRES METÁLICAS -



SUPPORT C-2000

Post Ref.	DIMENSIONS OF SUPPORTS		
	HEIGHT	BASE	COGOLLA
C-2000-10	10	0,78	0,51
C-2000-12	12	0,88	0,51
C-2000-14	14	0,97	0,51
C-2000-16	16	1,07	0,51
C-2000-18	18	1,16	0,51
C-2000-20	20	1,26	0,51
C-2000-22	22	1,35	0,51
C-2000-24	24	1,45	0,51
C-2000-26	26	1,54	0,51
C-2000-28	28	1,64	0,51
C-2000-30	30	1,74	0,51



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- TORRES METÁLICAS -

SUPPORT C-2000

FOUNDATION TABLE									
SUPPORT	K=8			K=12			K=16		
	L	P	E	L	P	E	L	P	E
C-2000-10	0,95	2,10	1,90	0,95	1,90	1,71	0,95	1,80	1,62
C-2000-12	1,05	2,20	2,43	1,05	2,00	2,21	1,05	1,90	2,09
C-2000-14	1,15	2,20	2,91	1,15	2,00	2,65	1,15	1,90	2,51
C-2000-16	1,25	2,30	3,59	1,25	2,10	3,28	1,25	1,90	2,97
C-2000-18	1,35	2,30	4,19	1,35	2,10	3,83	1,35	1,90	3,46
C-2000-20	1,45	2,30	4,84	1,45	2,10	4,42	1,45	2,00	4,21
C-2000-22	1,55	2,30	5,53	1,55	2,10	5,05	1,55	2,00	4,81
C-2000-24	1,65	2,40	6,53	1,65	2,10	5,72	1,65	2,00	5,45
C-2000-26	1,75	2,40	7,35	1,75	2,20	6,74	1,75	2,00	6,13
C-2000-28	1,85	2,40	8,21	1,85	2,20	7,53	1,85	2,00	6,85
C-2000-30	2,00	2,40	9,60	1,95	2,20	8,37	1,95	2,00	7,61

L = Side (m)
P = Depth (m) E =
Excavation (m³)



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- TORRES METÁLICAS -



SUPPORT C-3000

Post Ref.	DIMENSIONS OF SUPPORTS		
	HEIGHT	BASE	COGOLLA
C-3000-10	10	0,78	0,51
C-3000-12	12	0,88	0,51
C-3000-14	14	0,97	0,51
C-3000-16	16	1,07	0,51
C-3000-18	18	1,16	0,51
C-3000-20	20	1,26	0,51
C-3000-22	22	1,35	0,51
C-3000-24	24	1,45	0,51
C-3000-26	26	1,54	0,51
C-3000-28	28	1,64	0,51
C-3000-30	30	1,74	0,51



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- TORRES METÁLICAS -

SUPPORT C-3000

FOUNDATION TABLE									
SUPPORT	K=8			K=12			K=16		
	L	P	E	L	P	E	L	P	E
C-3000-10	0,95	2,40	2,17	0,95	2,20	1,99	0,95	2,00	1,81
C-3000-12	1,05	2,40	2,65	1,05	2,20	2,43	1,05	2,10	2,32
C-3000-14	1,15	2,50	3,31	1,15	2,30	3,04	1,15	2,10	2,78
C-3000-16	1,25	2,50	3,91	1,25	2,30	3,59	1,25	2,10	3,28
C-3000-18	1,35	2,60	4,74	1,35	2,30	4,19	1,35	2,20	4,01
C-3000-20	1,45	2,60	5,47	1,45	2,30	4,84	1,45	2,20	4,63
C-3000-22	1,55	2,60	6,25	1,55	2,40	5,77	1,55	2,20	5,29
C-3000-24	1,65	2,60	7,08	1,65	2,40	6,53	1,65	2,20	5,99
C-3000-26	1,75	2,60	7,96	1,75	2,40	7,35	1,75	2,20	6,74
C-3000-28	1,85	2,60	8,90	1,85	2,40	8,21	1,85	2,20	7,53
C-3000-30	2,00	2,60	10,40	1,95	2,40	9,13	1,95	2,20	8,37

L = Side (m)
 P = Depth (m) E =
 Excavation (m3)



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- TORRES METÁLICAS -



SUPPORT C-4500

Post Ref.	DIMENSIONS OF SUPPORTS		
	HEIGHT	BASE	COGOLLA
C-4500-10	10	0,78	0,51
C-4500-12	12	0,88	0,51
C-4500-14	14	0,97	0,51
C-4500-16	16	1,07	0,51
C-4500-18	18	1,16	0,51
C-4500-20	20	1,26	0,51
C-4500-22	22	1,35	0,51
C-4500-24	24	1,45	0,51
C-4500-26	26	1,54	0,51
C-4500-28	28	1,64	0,51
C-4500-30	30	1,74	0,51



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- TORRES METÁLICAS -

SUPPORT C-4500

FOUNDATION TABLE									
SUPPORT	K=8			K=12			K=16		
	L	P	E	L	P	E	L	P	E
C-4500-10	0,95	2,60	2,35	0,95	2,40	2,17	0,95	2,20	1,99
C-4500-12	1,05	2,70	2,98	1,05	2,40	2,65	1,05	2,30	2,54
C-4500-14	1,15	2,70	3,57	1,15	2,50	3,31	1,15	2,30	3,04
C-4500-16	1,25	2,70	4,22	1,25	2,50	3,91	1,25	2,30	3,59
C-4500-18	1,35	2,80	5,10	1,35	2,50	4,56	1,35	2,40	4,37
C-4500-20	1,45	2,80	5,89	1,45	2,50	5,26	1,45	2,40	5,05
C-4500-22	1,55	2,80	6,73	1,55	2,60	6,25	1,55	2,40	5,77
C-4500-24	1,65	2,80	7,62	1,65	2,60	7,08	1,65	2,40	6,53
C-4500-26	1,75	2,90	8,88	1,75	2,60	7,96	1,75	2,40	7,35
C-4500-28	1,85	2,90	9,93	1,85	2,60	8,90	1,85	2,40	8,21
C-4500-30	2,00	2,90	11,60	1,95	2,60	9,89	1,95	2,50	9,51

L = Side (m)
P = Depth (m) E =
Excavation (m3)



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- TORRES METÁLICAS -

**METAL SUPPORTS
JP SERIES**



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- TORRES METÁLICAS -



SUPPORT JP-180

POST REF.	DIMENSIONS OF SUPPORTS		
	HEIGHT (H) m.	BASE (b) m.	COGOLLA (c) m.
JP-8-180	8,00	0,45	0,21
JP-9-180	9,00	0,48	0,21
JP-10-180	10,00	0,51	0,21
JP-11-180	11,00	0,54	0,21
JP-12-180	12,00	0,57	0,21

HEIGHT	FOUNDATIONS								
	S. Slight 4 kg/cm3			S. Medium 8 kg/cm3			S. Good 12 kg/cm3		
	a	h	e	a	h	e	a	h	e
8	0,78	1,40	0,85	0,68	1,25	0,58	0,59	1,20	0,41
9	0,85	1,40	1,01	0,74	1,25	1,68	0,63	1,20	0,47
10	0,92	1,40	1,18	0,76	1,30	0,75	0,69	1,20	0,57
11	0,92	1,45	1,22	0,82	1,30	0,87	0,69	1,25	0,59
12	1,00	1,45	1,45	0,84	1,30	0,92	0,72	1,25	0,64

a= side (m) h= depth (m) e= excavation (m³)



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- TORRES METÁLICAS -



SUPPORT JP-250

POST REF.	DIMENSIONS OF SUPPORTS		
	HEIGHT (H) m.	BASE (b) m.	COGOLLA (c) m.
JP-8-250	8,00	0,45	0,21
JP-9-250	9,00	0,48	0,21
JP-10-250	10,00	0,51	0,21
JP-11-250	11,00	0,54	0,21
JP-12-250	12,00	0,57	0,21
JP-13-250	13,00	0,60	0,21
JP-14-250	14,00	0,63	0,21
JP-15-250	15,00	0,66	0,21
JP-16-250	16,00	0,69	0,21
JP-17-250	17,00	0,72	0,21

HEIGHT	FOUNDATIONS								
	S. Slight 4 kg/cm ³			S. Medium 8 kg/cm ³			S. Good 12 kg/cm ³		
	a	h	e	a	h	e	a	h	e
8	1,02	1,30	1,35	0,75	1,30	0,73	0,70	1,15	0,56
9	1,01	1,35	1,37	0,79	1,30	0,92	0,75	1,20	0,68
10	1,02	1,40	1,45	0,79	1,35	0,84	0,75	1,25	0,70
11	1,02	1,45	1,50	0,80	1,40	0,89	0,80	1,30	0,83
12	1,02	1,50	1,56	0,80	1,45	0,92	0,80	1,35	0,86
13	1,02	1,55	1,61	0,80	1,50	0,96	0,80	1,40	0,90
14	1,02	1,60	1,66	0,80	1,55	0,99	0,80	1,45	0,93
15	1,02	1,65	1,71	0,85	1,60	1,15	0,80	1,45	0,93
16	1,02	1,70	1,76	0,85	1,60	1,15	0,83	1,45	1,00
17	1,02	1,75	1,82	0,86	1,65	1,22	0,86	1,50	1,11

a= side (m) h= depth (m) e= excavation (m³)



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- TORRES METÁLICAS -



SUPPORT JP-350

POST REF	DIMENSIONS OF SUPPORTS		
	HEIGHT (H) m.	BASE (b) m.	COGOLLA (c) m.
JP-8-350	8,00	0,48	0,24
JP-9-350	9,00	0,51	0,24
JP-10-350	10,00	0,54	0,24
JP-11-350	11,00	0,57	0,24
JP-12-350	12,00	0,60	0,24
JP-13-350	13,00	0,63	0,24
JP-14-350	14,00	0,66	0,24
JP-15-350	15,00	0,69	0,24
JP-16-350	16,00	0,72	0,24
JP-17-350	17,00	0,75	0,24

HEIGHT	FOUNDATIONS								
	S. Slight 4 kg/cm3			S. Medium 8 kg/cm3			S. Good 12 kg/cm3		
	a	h	e	a	h	e	a	h	e
8	0,96	1,55	1,42	0,78	1,40	0,85	0,77	1,25	0,74
9	0,94	1,60	1,41	0,78	1,45	0,88	0,79	1,30	0,81
10	0,94	1,65	1,46	0,78	1,50	0,91	0,79	1,35	0,84
11	0,97	1,65	1,55	0,78	1,55	0,94	0,79	1,40	0,87
12	0,99	1,70	1,67	0,82	1,55	1,04	0,81	1,40	0,92
13	1,02	1,70	1,77	0,82	1,60	1,08	0,81	1,45	0,95
14	1,08	1,70	1,98	0,83	1,60	1,10	0,82	1,45	0,97
15	1,08	1,75	2,04	0,83	1,65	1,14	0,83	1,50	1,03
16	1,14	1,75	2,20	0,86	1,65	1,22	0,86	1,50	1,11
17	1,14	1,75	2,27	0,89	1,65	1,31	0,89	1,50	1,19

a= side (m) h= depth (m) e= excavation (m³)



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- TORRES METÁLICAS -



SUPPORT JP-500

POST REF.	DIMENSIONS OF SUPPORTS		
	HEIGHT (H) m.	BASE (b) m.	COGOLLA (c) m.
JP-9-500	9,00	0,54	0,27
JP-10-500	10,00	0,57	0,27
JP-11-500	11,00	0,60	0,27
JP-12-500	12,00	0,63	0,27
JP-13-500	13,00	0,66	0,27
JP-14-500	14,00	0,69	0,27
JP-15-500	15,00	0,72	0,27
JP-16-500	16,00	0,75	0,27
JP-17-500	17,00	0,78	0,27

HEIGHT	FOUNDATIONS								
	S. Slight 4 kg/cm3			S. Medium 8 kg/cm3			S. Good 12 kg/cm3		
	a	h	e	a	h	e	a	h	e
9	1,10	1,65	2,00	0,91	1,50	1,24	0,83	1,40	0,96
10	1,10	1,70	2,06	0,91	1,55	1,28	0,84	1,45	1,02
11	1,40	1,75	2,12	0,91	1,60	1,32	0,88	1,50	1,16
12	1,15	1,75	2,31	0,96	1,60	1,47	0,96	1,50	1,38
13	1,15	1,80	2,38	1,10	1,60	1,94	0,96	1,50	1,38
14	1,15	1,85	2,45	1,10	1,65	2,00	1,00	1,55	1,55
15	1,20	1,85	2,66	1,10	1,70	2,06	1,04	1,60	1,73
16	1,20	1,90	2,74	1,10	1,70	2,06	1,08	1,60	2,01
17	1,22	1,90	2,83	1,12	1,70	2,13	1,12	1,60	2,01

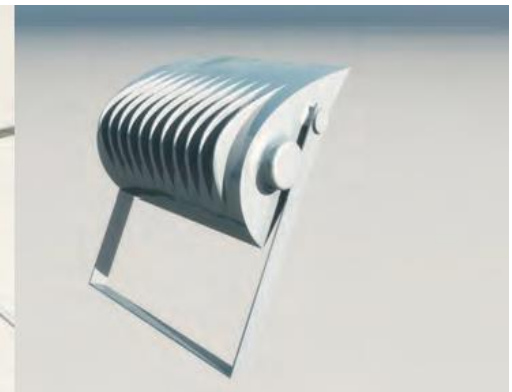
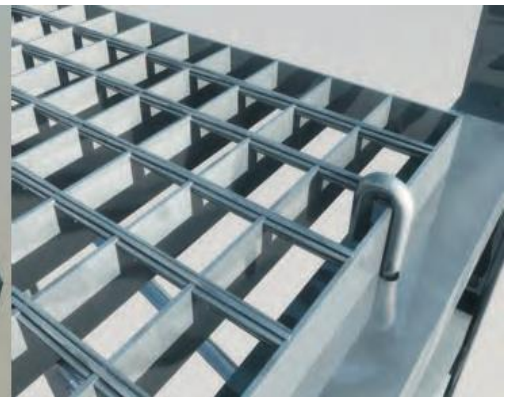
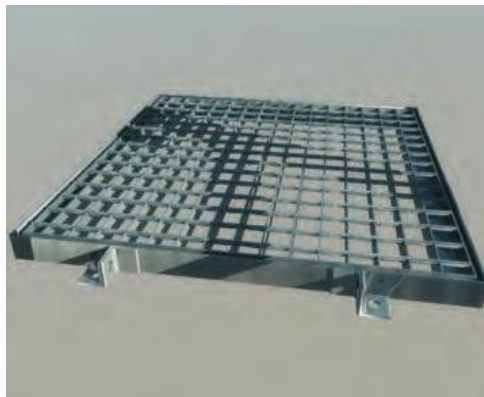
a= side (m) h= depth (m) e= excavation (m³)



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- TORRES METÁLICAS -

LIGHTING TOWER AND ACCESORIES





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- TORRES METÁLICAS -

**METAL SUPPORTS
JT SERIES**



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- TORRES METÁLICAS -



SUPPORT JT-600

POST REF.	DIMENSIONS OF SUPPORTS		
	HEIGHT (H) m.	BASE (b) m.	COGOLLA (c) m.
JT-9-600	9,00	0,66	0,30
JT-10-600	10,00	0,70	0,30
JT-11-600	11,00	0,74	0,30
JT-12-600	12,00	0,78	0,30
JT-13-600	13,00	0,82	0,30
JT-14-600	14,00	0,86	0,30
JT-15-600	15,00	0,90	0,30
JT-16-600	16,00	0,94	0,30
JT-17-600	17,00	0,98	0,30
JT-18-600	18,00	1,02	0,30
JT-19-600	19,00	1,06	0,30
JT-20-600	20,00	1,10	0,30
JT-21-600	21,00	1,14	0,30
JT-22-600	22,00	1,18	0,30
JT-23-600	23,00	1,22	0,30
JT-24-600	24,00	1,26	0,30



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- TORRES METÁLICAS -

APOYO JT-600

HEIGHT	FOUNDATIONS								
	S. Slight 4 kg/cm ³			S. Medium 8 kg/cm ³			S. Good 12 kg/cm ³		
	a	h	e	a	h	e	a	h	e
9	1,02	1,80	1,87	0,88	1,60	1,24	0,80	1,50	0,96
10	1,02	1,85	1,92	0,88	1,65	1,25	0,84	1,55	1,09
11	1,09	1,85	2,20	0,94	1,65	1,46	0,88	1,55	1,20
12	1,09	1,90	2,26	0,94	1,70	1,50	0,88	1,55	1,20
13	1,15	1,90	2,51	0,99	1,70	1,67	0,96	1,60	1,47
14	1,15	1,95	2,58	1,00	1,75	1,75	0,96	1,60	1,47
15	1,20	1,95	2,81	1,04	1,75	1,75	1,04	1,65	1,78
16	1,25	1,95	3,05	1,08	1,75	2,04	1,08	1,65	1,92
17	1,25	2,00	3,13	1,08	1,80	2,10	1,12	1,70	2,13
18	1,29	2,00	3,33	1,12	1,80	2,26	1,16	1,70	2,29
19	1,33	2,00	3,54	1,16	1,80	2,42	1,20	1,70	2,45
20	1,33	2,05	3,63	1,20	1,85	2,66	1,24	1,75	2,69
21	1,36	2,05	3,79	1,24	1,85	2,84	1,28	1,75	2,87
22	1,40	2,05	4,02	1,28	1,85	3,03	1,32	1,75	3,05
23	1,44	2,05	4,25	1,32	1,85	3,22	1,36	1,75	3,24
24	1,44	2,10	4,35	1,66	1,90	3,51	1,40	1,80	3,53

a= side (m) h= depth (m) e= excavation (m³)



MAYAN

- TORRES METÁLICAS -



SUPPORT JT-800

POST REF.	DIMENSIONS OF SUPPORTS		
	HEIGHT (H) m.	BASE (b) m.	COGOLLA (c) m.
JT-9-800	9,00	0,74	0,38
JT-10-800	10,00	0,78	0,38
JT-11-800	11,00	0,82	0,38
JT-12-800	12,00	0,86	0,38
JT-13-800	13,00	0,90	0,38
JT-14-800	14,00	0,94	0,38
JT-15-800	15,00	0,98	0,38
JT-16-800	16,00	1,02	0,38
JT-17-800	17,00	1,06	0,38
JT-18-800	18,00	1,10	0,38
JT-19-800	19,00	1,14	0,38
JT-20-800	20,00	1,18	0,38
JT-21-800	21,00	1,22	0,38
JT-22-800	22,00	1,26	0,38
JT-23-800	23,00	1,30	0,38
JT-24-800	24,00	1,34	0,38



MAYAN

- TORRES METÁLICAS -

SUPPORT JT-800

HEIGHT	FOUNDATIONS								
	S. Slight 4 kg/cm ³			S. Medium 8 kg/cm ³			S. Good 12 kg/cm ³		
	a	h	e	a	h	e	a	h	e
9	1,08	1,90	2,22	0,88	1,75	1,36	0,88	1,60	1,24
10	1,10	1,95	2,36	0,92	1,80	1,52	0,92	1,65	1,40
11	1,18	1,95	2,72	0,96	1,80	1,66	0,96	1,65	1,52
12	1,18	2,00	2,78	1,00	1,85	1,85	1,00	1,70	1,70
13	1,24	2,00	3,08	1,04	2,00	2,00	1,04	1,70	1,84
14	1,24	2,05	3,15	1,08	2,22	2,22	1,08	1,75	2,04
15	1,30	2,05	3,46	1,12	2,38	2,38	1,12	1,75	2,20
16	1,36	2,05	3,79	1,16	2,56	2,56	1,16	1,75	2,35
17	1,36	2,10	3,88	1,20	2,81	2,81	1,20	1,80	2,59
18	1,40	2,10	4,12	1,24	3,00	3,00	1,24	1,80	2,77
19	1,45	2,10	4,42	1,28	3,10	3,10	1,28	1,80	2,95
20	1,50	2,10	4,73	1,32	3,40	3,40	1,32	1,80	3,14
21	1,50	2,15	4,84	1,36	3,70	3,70	1,36	1,85	3,42
22	1,52	2,15	4,97	1,40	3,92	3,92	1,40	1,85	3,63
23	1,57	2,15	5,30	1,44	4,15	4,15	1,44	1,85	3,84
24	1,62	2,15	5,64	1,48	4,38	4,38	1,48	1,85	4,05

a= side (m) h= depth (m) e= excavation (m³)



MAYAN

- TORRES METÁLICAS -



SUPPORT JT-1000

POST REF.	DIMESIONS OF SUPPORTS		
	HEIGHT (H) m.	BASE (b) m.	COGOLLA (c) m.
JT-9-1000	9,00	0,74	0,38
JT-10-1000	10,00	0,78	0,38
JT-11-1000	11,00	0,82	0,38
JT-12-1000	12,00	0,86	0,38
JT-13-1000	13,00	0,90	0,38
JT-14-1000	14,00	0,94	0,38
JT-15-1000	15,00	0,98	0,38
JT-16-1000	16,00	1,02	0,38
JT-17-1000	17,00	1,06	0,38
JT-18-1000	18,00	1,10	0,38
JT-19-1000	19,00	1,14	0,38
JT-20-1000	20,00	1,18	0,38
JT-21-1000	21,00	1,22	0,38
JT-22-1000	22,00	1,26	0,38
JT-23-1000	23,00	1,30	0,38
JT-24-1000	24,00	1,34	0,38



MAYAN

- TORRES METÁLICAS -

SUPPORT JT-1000

HEIGHT	FOUNDATIONS								
	S. Slight 4 kg/cm ³			S. Medium 8 kg/cm ³			S. Good 12 kg/cm ³		
	a	h	e	a	h	e	a	h	e
9	1,26	1,90	3,02	1,00	1,75	1,75	0,97	1,60	1,51
10	1,28	1,95	3,19	1,02	1,80	1,87	0,97	1,65	1,55
11	1,36	1,95	3,61	1,10	1,80	2,18	1,05	1,65	1,82
12	1,37	2,00	3,75	1,10	1,85	2,24	1,04	1,70	1,84
13	1,44	2,00	4,15	1,16	1,85	2,49	1,12	1,70	2,13
14	1,51	2,00	4,56	1,23	1,85	2,80	1,18	1,70	2,37
15	1,51	2,05	4,67	1,23	1,90	2,87	1,18	1,75	2,44
16	1,57	2,05	5,05	1,28	1,90	3,36	1,27	1,75	2,82
17	1,63	2,05	5,45	1,33	1,90	3,11	1,27	1,75	2,82
18	1,63	2,10	5,58	1,33	1,95	3,45	1,27	1,80	2,90
19	1,67	2,10	5,86	1,36	1,85	3,61	1,28	1,80	2,95
20	1,73	2,10	6,29	1,41	1,95	3,88	1,33	1,80	3,18
21	1,77	2,10	6,58	1,46	1,95	4,16	1,38	1,80	3,43
22	1,82	2,10	6,96	1,51	1,95	4,45	1,43	1,80	3,68
23	1,82	2,15	7,12	1,51	2,00	4,56	1,43	1,85	3,78
24	1,84	2,15	7,28	1,52	2,00	4,62	1,43	1,85	3,78

a= side (m) h= depth (m) e= excavation (m³)



MAYAN

- TORRES METÁLICAS -



SUPPORT JT-1200

POST REF.	DIMENSIONS OF SUPPORTS		
	HEIGHT (H) m.	BASE (b) m.	COGOLLA (c) m.
JT-9-1200	9,00	0,74	0,38
JT-10-1200	10,00	0,78	0,38
JT-11-1200	11,00	0,82	0,38
JT-12-1200	12,00	0,86	0,38
JT-13-1200	13,00	0,90	0,38
JT-14-1200	14,00	0,94	0,38
JT-15-1200	15,00	0,98	0,38
JT-16-1200	16,00	1,02	0,38
JT-17-1200	17,00	1,04	0,38
JT-18-1200	18,00	1,08	0,38
JT-19-1200	19,00	1,12	0,38
JT-20-1200	20,00	1,16	0,38
JT-21-1200	21,00	1,20	0,38
JT-22-1200	22,00	1,24	0,38
JT-23-1200	23,00	1,28	0,38
JT-24-1200	24,00	1,32	0,38



MAYAN

- TORRES METÁLICAS -

SUPPORT JT-1200

HEIGHT	FOUNDATIONS								
	S. Slight 4 kg/cm ³			S. Medium 8 kg/cm ³			S. Good 12 kg/cm ³		
	a	h	e	a	h	e	a	h	e
9	1,28	2,00	3,28	0,99	1,85	1,81	0,94	1,70	1,50
10	1,36	2,00	3,70	1,08	1,85	2,16	1,02	1,70	1,77
11	1,38	2,05	3,90	1,09	1,90	2,26	1,02	1,75	1,82
12	1,46	2,05	4,37	1,16	1,90	2,56	1,09	1,75	2,08
13	1,46	2,10	4,48	1,16	1,95	2,62	1,09	1,80	2,14
14	1,54	2,10	4,98	1,23	1,95	2,95	1,15	1,80	2,38
15	1,61	2,10	5,44	1,29	1,95	3,24	1,22	1,80	2,68
16	1,61	2,15	5,57	1,29	2,00	3,33	1,22	1,85	2,75
17	1,66	2,15	5,92	1,34	2,00	3,59	1,25	1,85	2,75
18	1,72	2,15	6,36	1,39	2,00	3,86	1,31	1,85	3,17
19	1,72	2,20	6,51	1,39	2,05	3,96	1,31	1,90	3,26
20	1,76	2,20	6,81	1,42	2,05	4,13	1,32	1,90	3,31
21	1,82	2,20	7,29	1,47	2,05	4,43	1,37	1,90	3,57
22	1,87	2,20	7,69	1,52	2,05	4,74	1,43	1,90	3,89
23	1,92	2,20	8,11	1,57	2,05	5,05	1,48	1,90	4,16
24	1,97	2,20	8,54	1,62	2,05	5,38	1,52	1,90	4,39

a= side (m) h= depth (m) e= excavation (m³)



MAYAN

- TORRES METÁLICAS -



SUPPORT JT-1400

POST REF.	DIMESIONS OF SUPPORTS		
	HEIGHT (H) m.	BASE (b) m.	COGOLLA (c) m.
JT-9-1400	9,00	0,74	0,38
JT-10-1400	10,00	0,78	0,38
JT-11-1400	11,00	0,82	0,38
JT-12-1400	12,00	0,86	0,38
JT-13-1400	13,00	0,90	0,38
JT-14-1400	14,00	0,94	0,38
JT-15-1400	15,00	0,98	0,38
JT-16-1400	16,00	1,02	0,38
JT-17-1400	17,00	1,04	0,38
JT-18-1400	18,00	1,08	0,38
JT-19-1400	19,00	1,12	0,38
JT-20-1400	20,00	1,16	0,38
JT-21-1400	21,00	1,20	0,38
JT-22-1400	22,00	1,24	0,38
JT-23-1400	23,00	1,28	0,38
JT-24-1400	24,00	1,32	0,38



MAYAN

- TORRES METÁLICAS -

SUPPORT JT-1400

HEIGHT	FOUNDATIONS								
	S. Slight 4 kg/cm ³			S. Medium 8 kg/cm ³			S. Good 12 kg/cm ³		
	a	h	e	a	h	e	a	h	e
9	1,33	2,05	3,63	0,98	1,90	1,82	0,90	1,75	1,42
10	1,36	2,10	3,88	1,00	1,95	1,95	0,92	1,80	1,52
11	1,46	2,10	4,48	1,08	1,95	2,27	1,00	1,80	1,80
12	1,46	2,15	4,58	1,09	2,00	2,38	1,01	1,85	1,89
13	1,54	2,15	5,10	1,16	2,00	2,69	1,08	1,85	2,16
14	1,61	2,15	5,57	1,24	2,00	3,08	1,15	1,85	2,45
15	1,62	2,20	5,77	1,24	2,05	3,15	1,15	1,90	2,51
16	1,69	2,20	6,28	1,29	2,05	3,41	1,20	1,90	2,74
17	1,75	2,20	6,74	1,36	2,05	3,79	1,26	1,90	3,02
18	1,75	2,25	6,89	1,36	2,10	3,88	1,26	1,95	3,10
19	1,80	2,25	7,29	1,40	2,10	4,12	1,29	1,95	3,24
20	1,68	2,25	6,35	1,45	2,10	4,42	1,34	1,95	3,50
21	1,95	2,25	8,21	1,51	2,10	4,79	1,40	1,95	3,82
22	1,91	2,30	8,39	1,51	2,15	4,90	1,40	2,00	3,92
23	1,94	2,30	8,66	1,53	2,15	5,03	1,44	2,00	4,15
24	1,99	2,30	9,11	1,58	2,15	5,37	1,48	2,00	4,38

a= side (m) h= depth (m) e= excavation (m³)



MAYAN

- TORRES METÁLICAS -



SUPPORT JT-1800

POST REF.	DIMENSIONS OF SUPPORTS		
	HEIGHT (H) m.	BASE (b) m.	COGOLLA (c) m.
JT-9-1800	9,00	0,74	0,38
JT-10-1800	10,00	0,78	0,38
JT-11-1800	11,00	0,82	0,38
JT-12-1800	12,00	0,86	0,38
JT-13-1800	13,00	0,90	0,38
JT-14-1800	14,00	0,94	0,38
JT-15-1800	15,00	0,98	0,38
JT-16-1800	16,00	1,02	0,38
JT-17-1800	17,00	1,06	0,38
JT-18-1800	18,00	1,10	0,38
JT-19-1800	19,00	1,14	0,38
JT-20-1800	20,00	1,18	0,38
JT-21-1800	21,00	1,22	0,38
JT-22-1800	22,00	1,26	0,38
JT-23-1800	23,00	1,30	0,38
JT-24-1800	24,00	1,34	0,38



MAYAN

- TORRES METÁLICAS -

APOYO JT-1800

HEIGHT	FOUNDATIONS								
	S. Slight 4 kg/cm ³			S. Medium 8 kg/cm ³			S. Good 12 kg/cm ³		
	a	h	e	a	h	e	a	h	e
9	1,27	2,25	3,63	1,01	2,05	2,09	0,93	1,90	1,64
10	1,37	2,25	4,22	1,10	2,05	2,48	1,01	1,90	1,94
11	1,40	2,30	4,51	1,12	2,10	2,63	1,02	1,95	2,03
12	1,49	2,30	5,11	1,20	2,10	3,02	1,10	1,95	2,36
13	1,50	2,35	5,29	1,20	2,15	3,10	1,10	2,00	2,42
14	1,58	2,35	5,87	1,28	2,15	3,52	1,12	2,00	2,51
15	1,67	2,35	6,55	1,35	2,15	3,92	1,24	2,00	3,08
16	1,67	2,40	6,69	1,35	2,20	4,04	1,24	2,05	3,15
17	1,73	2,40	7,18	1,36	2,20	4,07	1,28	2,05	3,36
18	1,79	2,40	7,69	1,46	2,20	4,69	1,34	2,05	3,68
19	1,79	2,45	7,85	1,46	2,25	4,80	1,34	2,10	3,77
20	1,84	2,45	8,29	1,50	2,25	5,06	1,40	2,10	4,12
21	1,90	2,45	8,84	1,56	2,25	5,48	1,42	2,10	4,12
22	1,96	2,45	9,41	1,61	2,25	5,83	1,47	2,10	4,54
23	2,02	2,45	10,00	1,66	2,25	6,20	1,53	2,10	4,92
24	2,02	2,50	10,20	1,66	2,30	6,34	1,53	2,15	5,03

a= side (m) h= depth (m) e= excavation (m³)



MAYAN

- TORRES METÁLICAS -



SUPPORT JT-2200

POST REF.	DIMENSIONS OF SUPPORTS		
	HEIGHT (H) m.	BASE (b) m.	COGOLLA (c) m.
JT-9-2200	9,00	0,90	0,54
JT-10-2200	10,00	0,94	0,54
JT-11-2200	11,00	0,98	0,54
JT-12-2200	12,00	1,02	0,54
JT-13-2200	13,00	1,06	0,54
JT-14-2200	14,00	1,10	0,54
JT-15-2200	15,00	1,14	0,54
JT-16-2200	16,00	1,18	0,54
JT-17-2200	17,00	1,22	0,54
JT-18-2200	18,00	1,26	0,54
JT-19-2200	19,00	1,30	0,54
JT-20-2200	20,00	1,34	0,54
JT-21-2200	21,00	1,38	0,54
JT-22-2200	22,00	1,42	0,54
JT-23-2200	23,00	1,46	0,54
JT-24-2200	24,00	1,50	0,54



MAYAN

- TORRES METÁLICAS -

SUPPORT JT-2200

HEIGHT	FOUNDATIONS								
	S. Slight 4 kg/cm ³			S. Medium 8 kg/cm ³			S. Good 12 kg/cm ³		
	a	h	e	a	h	e	a	h	e
9	1,46	2,25	4,80	1,19	2,05	2,90	1,18	1,85	2,58
10	1,50	2,30	5,18	1,22	2,10	3,13	1,29	1,85	3,08
11	1,60	2,30	5,89	1,31	2,10	3,60	1,29	1,90	3,16
12	1,62	2,35	6,17	1,32	2,15	3,75	1,39	1,90	3,67
13	1,71	2,35	6,87	1,41	2,15	4,27	1,39	1,95	3,77
14	1,80	2,35	7,61	1,41	2,20	4,37	1,47	1,95	4,21
15	1,81	2,40	7,86	1,49	2,20	4,88	1,55	1,95	4,68
16	1,88	2,40	8,48	1,56	2,20	5,35	1,55	2,00	4,81
17	1,96	2,40	9,22	1,56	2,25	5,48	1,60	2,00	5,12
18	2,03	2,24	9,89	1,61	2,25	5,83	1,67	2,00	5,58
19	2,03	2,45	10,10	1,68	2,25	6,35	1,67	2,05	5,72
20	2,09	2,45	10,70	1,74	2,25	6,81	1,70	2,05	5,92
21	2,15	2,45	11,30	1,81	2,25	7,37	1,76	2,05	6,35
22	2,15	2,25	11,50	1,81	2,30	7,54	1,82	2,05	6,79
23	2,19	2,50	11,90	1,84	2,30	7,79	1,88	2,05	7,25
24	2,25	2,50	12,60	1,90	2,30	8,30	12,60	8,30	7,42

a= side (m) h= depth (m) e= excavation (m³)



MAYAN
- TORRES METÁLICAS -

**PROFILES
AND
SCREWS**

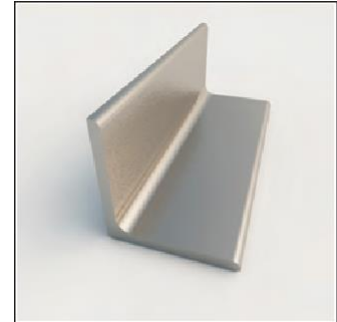


MAYAN

- TORRES METÁLICAS -

L PROFILES

EQUAL LEG ANGLES (NORMAL SERIES A)
CALCULATION DATA



SYMBOL	DESIGNATION
I	Moment of inertia
W	Section Modulus
i	Radius of gyration = $\sqrt{\frac{I}{A}}$

Profile Designation		Moment of inertia cm ⁴			Section modulus cm ³		Radius of gyration cm			Position of the centre of gravity cm			
		$I_{x=y}$	I_z	I_T	W_x	W_T	i_x	i_z	i_T	d	Z_1	V_1	V_2
L 35 x	3*	2,29	3,63	0,95	0,9	0,7	1,06	1,34	0,68	0,96	2,47	1,36	1,23
	4*	2,95	4,68	1,23	1,18	0,86	1,05	1,33	0,68	1,00	2,47	1,42	1,24
	5	3,56	5,64	1,49	1,45	1,01	1,04	1,31	0,67	1,04	2,47	1,48	1,25
L 40 x	4*	4,47	7,09	1,86	1,55	1,17	1,21	1,52	0,78	1,12	2,83	1,58	1,40
	5*	5,43	8,6	2,26	1,91	1,37	1,20	1,51	0,77	1,16	2,83	1,64	1,42
	6	6,31	9,98	2,65	2,26	1,56	1,19	1,49	0,77	1,20	2,83	1,70	1,43
L 45 x	4*	6,43	10,2	2,67	1,97	1,55	1,36	1,71	0,88	1,23	3,18	1,75	1,57
	5*	7,84	12,4	3,26	2,43	1,8	1,35	1,70	0,87	1,28	3,18	1,81	1,58
	6*	9,16	14,5	3,82	2,88	2,05	1,34	1,69	0,87	1,32	3,18	1,87	1,59
L 50 x	4*	8,97	14,2	3,72	2,46	1,94	1,52	1,91	0,98	1,36	3,54	1,92	1,75
	5*	11,0	17,4	4,54	3,05	2,29	1,51	1,90	0,97	1,40	3,54	1,99	1,76
	6*	12,8	20,3	5,33	3,61	2,61	1,50	1,89	0,97	1,45	3,54	2,04	1,77
	7	14,6	23,1	6,11	4,16	2,91	1,49	1,88	0,96	1,49	3,54	2,10	1,78
L 60 x	8	16,3	25,7	6,87	4,68	3,19	1,48	1,86	0,96	1,52	3,54	2,16	1,80
	5*	19,4	30,7	8,08	4,45	3,45	1,82	2,30	1,17	1,64	4,24	2,32	2,11
	6*	22,8	36,2	9,43	5,29	3,95	1,82	2,29	1,17	1,69	4,24	2,39	2,11
	8*	29,2	46,2	12,2	6,89	4,86	1,80	2,26	1,16	1,77	4,24	2,50	2,14
L 70 x	10	34,9	55,1	14,8	8,41	5,67	1,78	2,23	1,16	1,85	4,24	2,61	2,17
	6*	36,9	58,5	15,3	7,27	5,59	2,13	2,68	1,37	1,93	4,95	2,73	2,46
	7*	42,3	67,1	17,5	8,41	6,27	2,12	2,67	1,36	1,97	4,95	2,79	2,47
	8*	47,5	75,3	19,7	9,52	6,91	2,11	2,66	1,36	2,01	4,95	2,85	2,47
L 80 x	10	57,2	90,5	23,9	11,7	8,10	2,09	2,63	1,35	2,09	4,95	2,96	2,50
	8*	72,2	115	29,9	12,6	9,36	2,43	3,06	1,56	2,26	5,66	3,19	2,82
	10*	87,5	139	36,3	13,4	11,0	2,41	3,03	1,55	2,34	5,66	3,30	2,85
L 90 x	12	102	161	42,7	18,2	12,5	2,39	3,00	1,55	2,41	5,66	3,41	2,89
	8*	104	166	43,1	16,1	12,2	2,74	3,45	1,76	2,50	6,36	3,53	3,17
	10*	127	201	52,5	19,8	14,4	2,72	3,43	1,75	2,58	6,36	3,65	3,19
L 100 x	12	148	234	61,7	23,3	16,4	2,70	3,40	1,74	2,66	6,36	3,76	3,22
	8*	145	230	59,8	19,9	15,5	3,06	3,85	1,96	2,74	7,07	3,87	3,52
	10*	177	280	72,9	24,6	18,3	3,04	3,83	1,95	2,82	7,07	3,99	3,54
	12	207	323	85,7	29,1	20,9	3,02	3,80	1,94	2,90	7,07	4,11	3,57
L 120 x	15	249	393	104	25,6	24,4	2,89	3,75	1,93	3,02	7,07	4,27	3,61
	10*	313	497	129	36,0	27,5	3,67	4,63	2,36	3,31	8,49	4,69	4,23
	12*	368	584	152	42,7	31,5	3,65	4,60	2,35	3,40	8,49	4,80	4,28
L 150 x	15	445	705	185	52,4	37,1	3,62	4,56	2,33	3,51	8,49	4,97	4,31
	12*	737	1.170	303	67,7	52,0	4,60	5,80	2,95	4,12	10,60	5,83	5,29
	15*	898	1.430	370	83,5	61,6	4,57	5,76	2,93	4,25	10,60	6,01	5,33
L 180 x	18	1.050	1.670	435	98,7	70,4	4,54	5,71	2,92	4,37	10,60	6,17	5,38
	15*	1.590	2.520	653	122	92,6	5,52	6,96	3,54	4,98	12,70	7,05	6,36
	18	1.870	2.960	768	145	106	5,49	6,92	3,52	5,10	12,70	7,22	6,41
L 200 x	20	2.040	3.240	843	159	115	5,47	6,89	3,51	5,18	12,70	7,33	6,44
	16*	2.540	3.720	960	162	123	6,16	7,76	3,94	5,52	14,10	7,81	7,09
	18*	2.600	4.130	1.070	181	135	6,13	7,73	3,93	5,60	14,10	7,93	7,12
	20	2.850	4.530	1.170	199	146	6,11	7,70	3,92	5,68	14,10	8,04	7,15
L 200 x	24	3.330	5.280	1.380	235	167	6,06	7,64	3,90	5,84	14,10	8,26	7,21

* Recommended profiles to be used preferably.



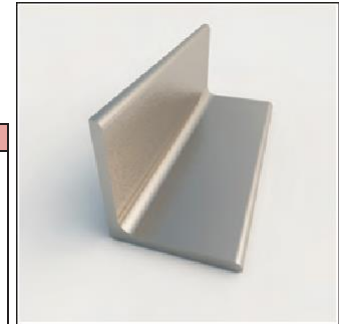
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- TORRES METÁLICAS -

EQUAL SIDE ANGLES (NORMAL A SERIES)

GENERAL DATA

SYMBOL	DESIGNATION
a	Length of the flanges
e	Flange thickness
r	Flange radius
r ₁	Radius of Edge rounding
u	Outer Surface per 1m lenght
A	Area of straight cross section
M	Weight per meter



PROFILE DESIGNATION		Measurements mm				A cm ²	M kg/m	u m ² /m
		a	e	r	r ₁			
L 35 x	3*	35	3	5	2,5	2,04	1,60	0.136
	4*	35	4	5	2,5	2,67	2,09	
	5	35	5	5	2,5	3,28	2,57	
L 40 x	4*	40	4	6	3	3,08	2,42	0.155
	5*	40	5	6	3	3,79	2,97	
	6	40	6	6	3	4,48	3,52	
L 45 x	4*	45	4	7	3,5	3,49	2,74	0.174
	5*	45	5	7	3,5	4,30	3,38	
	6*	45	6	7	3,5	5,09	4,00	
L 50 x	4*	50	4	7	3,5	3,89	3,06	0.194
	5*	50,0	5	7	3,5	4,80	3,77	
	6*	50	6	7	3,5	5,69	4,47	
	7	50	7	7	3,5	6,56	5,15	
	8	50	8	7	3,5	7,41	5,82	
L 60 x	5*	60	5	8	4	5,82	4,57	0.233
	6*	60	6	8	4	6,91	5,42	
	8*	60	8	8	4	9,03	7,09	
	10	60	10	8	4	11,10	8,69	
L 70 x	6*	70	6	9	4,5	8,13	6,38	0.272
	7*	70	7	9	4,5	9,40	7,38	
	8*	70	8	9	4,5	10,60	8,36	
	10	70	10	9	4,5	13,10	10,30	
L 80 x	8*	80	8	10	5	12,30	9,63	0.311
	10*	80	10	10	5	15,10	11,90	
	12	80	12	10	5	17,90	14,00	
L 90 x	8*	90	8	11	5,5	13,90	10,90	0.351
	10*	90	10	11	5,5	17,10	13,40	
	12	90	12	11	5,5	20,3	15,90	
L 100 x	8*	100	8	12	6	15,50	12,20	0.390
	10*	100	10	12	6	19,20	15,00	
	12	100	12	12	6	22,70	17,80	
	15	100	15	12	6	33,90	21,90	
L 120 x	10*	120	10	13	6,5	34,80	18,20	0.469
	12*	120	12	13	6,5	43,00	21,60	
	15	120	15	13	6,5	51,00	26,60	
L 150 x	12*	150	12	16	8	52,10	27,30	0,59
	15*	150	15	16	8	61,90	33,80	
	18	150	18	16	8	68,30	40,10	
L 180 x	15*	180	15	18	9	52,10	40,90	0.705
	18	180	18	18	9	61,90	48,60	
	20	180	20	18	9	68,30	53,70	
L 200 x	16*	200	16	18	9	61,80	48,50	0,79
	18*	200	18	18	9	69,10	54,20	
	20	200	20	18	9	76,30	59,90	
	24	200	24	18	9	90,60	71,10	



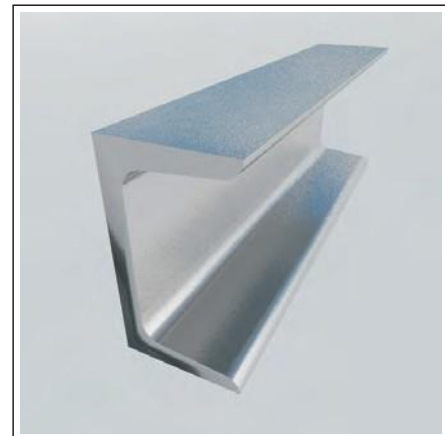
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UPN PROFILES

NORMAL U-PROFILE (UPN)

SYMBOL	DESIGNATION
h	Total height nominal
h ₁	Length of the straight part of the web
b	Wing width
e	Core thickness
e ₁	Wing thickness measured at a distance from the tip
r	Radius of the agreement between the soul and the wing
r ₁	Soul rounding radius
I	Moment of inertia
W	Resistant module
i	Turning radius
S _x	Static moment of half section
S _x =	Distance between centers of compression and traction
d	Distance from the center of gravity G to the outer face of a
A	Area of straight cross section
M	Weight per meter
u	Outer surface per 1m length



GENERAL DATA

Profile designation	Measurements mm						A cm ²	M kg/m	u m ² /m
	h	b	e=r	e ₁	r ₁	h ₁			
UPN 60	60	30	6,00	6,00	3,00	35	6,50	5,07	0,215
UPN 80	80	45	6,00	8,00	4,00	46	11,00	8,65	0,312
UPN 100	100	50	6,00	8,50	4,50	64	13,50	10,60	0,372
UPN120	120	55	7,00	9,00	4,50	82	17,00	13,40	0,434
UPN 140	140	60	7,00	10,00	5,00	98	20,40	16,00	0,489
UPN 160	160	65	7,50	10,50	5,50	115	24,00	18,80	0,546
UPN 180	180	70	8,00	11,00	5,50	133	28,00	22,00	0,611
UPN 200	200	75	8,50	11,50	6,00	151	32,20	25,30	0,611
UPN 220	220	80	9,00	12,50	6,50	167	37,40	29,40	0,718
UPN 240	240	85	9,50	13,00	6,50	184	42,30	33,20	0,775
UPN 260	260	90	10,00	14,00	7,00	200	48,30	37,90	0,834
UPN 280	280	95	10,00	15,00	7,50	216	53,30	41,80	0,890
UPN 300	300	100	10,00	16,00	8,00	232	58,80	46,20	0,950

CALCULATION DATA

Profile designation	Moment of inertia cm ²		Section modulus cm ³		Radius of gyration cm		S _x cm ³	S _x cm	d cm
	I _x	I _y	W _x	W _y	i _x	i _y			
UPN 60	30,6	4,5	10,50	2,16	2,21	0,84			0,910
UPN 80	106	19,4	26,50	6,36	3,10	1,33	15,90	6,65	1,450
UPN 100	206	29,3	41,20	8,49	3,91	1,47	24,50	8,42	1,550
UPN120	364	43,2	60,70	11,10	4,62	1,59	36,30	10,00	1,600
UPN 140	605	62,7	86,40	14,80	5,45	1,75	51,40	11,80	1,750
UPN 160	925	85,3	116,00	18,30	6,21	1,89	66,80	13,30	1,840
UPN 180	1350	114	150,00	22,40	6,95	2,02	89,60	15,10	1,920
UPN 200	1910	148	191,00	27,00	7,70	2,14	114,00	16,80	2,010
UPN 220	2690	197	245,00	33,60	8,48	2,3	146,00	18,50	2,140
UPN 240	3600	248	300,00	39,60	9,22	2,42	179,00	20,10	2,230
UPN 260	4820	317	371,00	47,70	9,99	2,56	221,00	21,80	2,360
UPN 280	6280	399	448,00	57,20	10,90	2,74	266,00	23,60	2,530
UPN 300	8030	495	535,00	67,80	11,70	2,9	316,00	25,40	2,700



HEXAGONAL SCREWS

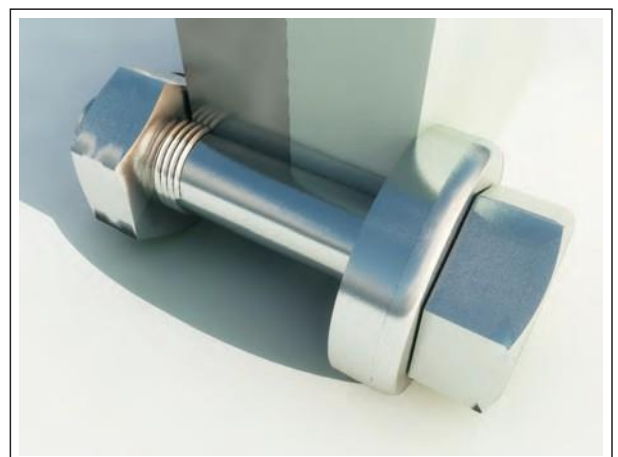
MOST COMMONLY USED HEXAGONAL SCREWS

d_1	M12	M16	M20	M24
b	19,5	23	26	29,5
x	2,5	3	4	4,5
e min	20,88	26,17	32,95	39,55
k	8	10	13	15
m	10	13	16	19
r	0,6	0,6	0,8	0,8
s	19	24	30	36
d_2	13,5	17,5	21,5	25,5

WEIGHT PER UNIT WITH NUT DIN 555 AND WASHER DIN 7989				
d_1	M12	M16	M20	M24
Lenght L	(KG)			
20	0,069			
25	0,073			
30	0,076			
35	0,081			
40	0,085			
45	0,09			
50	0,094			
55	0,098			
60	0,102			
65	0,106			
70	0,11			
75	0,114			
80	0,118			
90	0,127			
100	0,135			
110	0,144			
120	0,152			
130	0,16			
140	0,169			
150	0,177			
160	0,186			
170	0,194			

Nut weight	0,015	0,031	0,06	0,097
Washer weight	0,019	0,029	0,042	0,062

STITCHING THICKNESSES	LENGHTS OF SCREWS WITH WASHER DIN 7989			
	d_1			
	12	16	20	24
8	30	35	40	45
9	35			
10		40		
11			45	
12				
13				50
14	40			
15		45		
16			50	
17				
18				55
19	45			
20		50		
21			55	
22				
23				60
24	50			
25		55		
26			60	
27				
28				65
29	55			
30		60		
31			65	
32				
33				70
34	60			
35		65		
36			70	
37				
38				75
39	65			
40		70		
41			75	
42				
43				80
44	70			
45		75		
46			80	
47				
48				85
49	75			
50		80		





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SUMMARY OF THE HIGH VOLTAGE REGULATIONS



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VOLTAGES (ARTICLE. 2)

The standardized nominal voltajes, as well as the corresponding values of the higher voltajes – as included in the following table:

Line category	Nominal Voltage (Kv)	Higher Voltage (Kv)
3º	3	3,6
	6	7,2
	10	12
	15	17,5
	20	24
2º	30	36
	45	52
	66	72,5
1º	132	145
	220	245
	380	420

WIND PRESSURES (ARTICLE.16)

A wind speed of 120 km/h (33 m/s) is considered. The horizontal wind will be assumed to act perpendicular to the surfaces it affects.

The action of this wind results in the following pressures on the different elements of the line:

- On conductors and earth wires with a diameter equal to or less than 16mm: 60 kg/m²
- On conductors and earth wires with a diameter greater than 16mm: 50 kg/m²
- On flat surfaces: 100 kg/m²
- On cylindrical surfaces of supports, such as wooden or concrete poles, pipes, etc.: 70 kg/m²
- On four-sided lattice structures made of normal metal profiles:

Windward side - 160 (1-n) kg/m²

Leeward side - 80 (1-n) kg/m²



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- On four-sided lattice structures made of cylindrical profiles:

Windward side - 90 (1-n) kg/m²

Leeward side - 45 (1-n) kg/m²

UNBALANCE OF TENSIONS (ARTICLE.18)

Unbalance in alignment and angle supports

An equivalent longitudinal stress is considered, equivalent to 8% of the unilateral tensions of all conductors and earth wires.

Unbalance in anchor supports

An equivalent stress will be considered, equivalent to 50% of the unilateral tensions of all conductors and earth wires.

Unbalance in end-of-line supports

An equal stress Will be considered, equal to 100% of the unilateral tensions of all conductors and earth wires.

CURRENT DENSITY IN THE CONDUCTORS (ARTICLE.22)

The maximum current densities in steady-state operation shall not exceed the values indicated in the accompanying table.

Nominal section Mm ²	Current density Amperes / mm ²		
	Copper	Aluminium	Alignment Aluminium
10	8.75		
15	7.60	6.00	5.60
25	6.35	5.00	4.65
35	5.75	4.55	4.25
50	5.10	4.00	3.70
70	4.50	3.55	3.30
95	4.05	3.20	3.00
125	3.70	2.90	2.70
160	3.40	2.70	2.50
200	3.20	2.50	2.30
250	2.90	2.30	2.15
300	2.75	2.15	2.00
400	2.50	1.95	1.80
500	2.30	1.80	1.70
600	2.10	1.65	1.55



SAFETY DISTANCES (ARTICLE.25)

Distance of the conductors to the ground

The height of the supports shall be such that the conductors, with their maximum vertical sag, are positioned above any point on the ground or non-navigable water surfaces, at a minimum height of:

$$5,3 + \frac{U}{150} \text{ meters}$$

With a minimum of 6 meters.

Distance between the conductors, and between them and the supports

The minimum distance between conductors shall be determined by the following formula:

$$D = \sqrt{F^2 + L} + \frac{U}{150}$$

In which:

D = separation between conductors in meters

K = coefficient that depends on the oscillation of the conductors with the wind, which will be taken from the accompanying table

Angle of Oscillation	Values of K	
	1st and 2nd category lines	3rd category lines
Greater than 65°	0,7	0,65
tween 40° and 65°	0,65	0,6
Less than 40°	0,6	0,55

F = Maximum sag in meters according to "device 3" of Article 27

L = Length in meters of the suspension chain, in the case of conductors fixed to the support by tie chains or rigid insulators L = 0

U = Nominal line voltage in kV

The minimum separation between the conductors and their accessories under tension and the supports shall not be less than:

$$0,1 + \frac{U}{150} \text{ meters}$$



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CONDUCTORS (ARTICLE.27)

Maximum allowable tension

The maximum tension of the conductors and earth wires shall not exceed their breaking load, multiplied by 2.5 for cables or divided by 3 for wires, considering them subjected to the following overload hypothesis based on the defined overload zones in Article 17.

In Zone A: subjected to the action of their own weight and to a wind overload according to Article 16 at a temperature of -5°C .

In Zone B: subjected to the action of their own weight and to the ice overload corresponding to the zone according to Article 17 at a temperature of -15°C .

In Zone C: subjected to the action of their own weight and to the ice overload corresponding to the zone according to Article 17 at a temperature of -20°C .

Maximum sag of the conductors and earth wires.

The maximum sag of the conductors and earth wires will be determined under the following hypotheses:

In Zones A, B, C.

a) Wind hypothesis: subjected to the action of their own weight and a wind overload according to Article 16, at a temperature of $+15^{\circ}\text{C}$.

b) Temperature hypothesis: subjected to the action of their own weight at the maximum foreseeable temperature, taking into account the climatic and service conditions of the line. This temperature shall not be lower than 50°C .

c) Ice hypothesis: subjected to the action of their own weight and the ice overload corresponding to the zone according to Article 17, at a temperature of 0°C .



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SUPPORTS (ARTICLE.30)

Safety factor

The safety factors of the supports will vary according to the nature of the calculation hypotheses to which they are to be applied. In this regard, the hypotheses are classified according to the following table:

Types of supports	Normal hypotheses	Abnormal hypotheses
Alignment	1 ^a ,2 ^a	3 ^a ,4 ^a
Angle	1 ^a ,2 ^a	3 ^a ,4 ^a
Anchor	1 ^a ,2 ^a	3 ^a ,4 ^a
End-of-line	1 ^a ,2 ^a	3 ^a ,4 ^a

Calculation hypotheses

The different hypotheses to be considered in the calculation of the supports will be those specified in the accompanying tables, according to the type of support.

SUPPORTS FOR LINES LOCATED IN ZONE A

(Altitude below 500m)

Type of support	1 ^o Hypothesis (wind)	3 ^a Hypothesis Unbalance of tensions	4 ^a Hypothesis Breackage of conductors
Alignment	Permanent load (Art. 15) Wind (Art. 16) Temperature -5°C	Permanent loads (Art. 15) Unbalance of tensions (Appendix 1), Art. 18 Temperature -5°C	Permanent loads (Art. 15) Breakage of conductors (Appendix 1), Art. 19 Temperature -5°C
Angle	Permanent load (Art. 15) Wind (Art. 16) Resultant from angle (Art. 20) Temperature -5°C	Permanent loads (Art. 15) Unbalance of tensions (Appendix 1), Art. 18 Temperature -5°C	Permanent loads (Art. 15) Breakage of conductors (Appendix 1), Art. 19 Temperature -5°C
Anchor	Permanent load (Art. 15) Wind (Art. 16) Temperature -5°C	Permanent loads (Art. 15) Unbalance of tensions (Appendix 1), Art. 18 Temperature -5°C	Permanent loads (Art. 16) Breakage of conductors (Appendix 2), Art. 19 Temperature -5°C
End-of-line	Permanent load (Art. 15) Wind (Art. 16) Temperature -5°C Unbalance of tensions (Appendix 3), Art. 18	Permanent loads (Art. 15) Unbalance of tensions (Appendix 1), Art. 18 Temperature -5°C	Permanent loads (Art. 15) Breakage of conductors (Appendix 1), Art. 19 Temperature -5°C



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SUPPORTS FOR LINES LOCATED IN ZONE B AND C

(Altitude equal to or higher than 500 meters.)

Type of support	1º hypothesis (wind)	2º hypothesis (wind)	3º hypothesis unbalance of tensions	4º hypothesis breakage of conductors
Alignment	Permanent loads (Art. 15) Wind (Art. 16) Temperature -5°C	Permanent loads (Art. 15) Ice according to zone (Art. 17) Temperature according to zone (Ap 1), Art. 27	Permanent loads (Art. 15) Ice according to zone (Art. 17) Unbalance of tensions (Ap1) Art. 18. Temperature according to zone (Ap 1) Art. 27	Permanent loads (Art. 15) Ice according to zone (Art. 17) Breakage of conductors (Ap 1) Art. 19. Temperature according to zone (Ap 1) Art. 27
Angle	Permanent loads (Art. 15) Wind (Art. 16) Temperature -5°C	Permanent loads (Art. 15) Ice according to zone (Art. 17) Resultant from angle (Art. 20) Temperature according to zone (Appendix 1), Art. 27	Permanent loads (Art. 15) Ice according to zone (Art. 17) Unbalance of tensions (Ap 1) Art. 18. Temperature according to zone (Appendix 1) Art. 27	Permanent loads (Art. 15) Ice according to zone (Art. 17) Breakage of conductors (Ap 1) Art. 19. Temperature according to zone (Appendix 1) Art. 27
Anchor	Permanent loads (Art. 15) Wind (Art. 16) Temperature -5°C	Permanent loads (Art. 15) Ice according to zone (Art. 17) Temperature according to zone (Appendix 1), Art. 27	Permanent loads (Art. 15) Ice according to zone (Art. 17) Unbalance of tensions (Ap 2) Art. 18. Temperature according to zone (Appendix 1) Art. 27	Permanent loads (Art. 15) Ice according to zone (Art. 17) Breakage of conductors (Appendix 1) Art. 18. Temperature according to zone (Ap 1) Art. 27
End-of-line	Permanent loads (Art. 15) Wind (Art. 16) Temperature -5°C Unbalance of tensions (Appendix 3) Art. 18	Permanent loads (Art. 15) Ice according to zone (Art. 17) Unbalance of tensions (Ap. 3) Temperature according to zone (Ap. 1), Art. 27		Permanent loads (Art. 15) Ice according to zone (Art. 17) Breakage of conductors (Ap 3) Art. 19. Temperature according to zone (Ap 1) Art. 27