



Ambor Standard Tower Assembly Manual



Introduction and Safety Guidelines

Important!

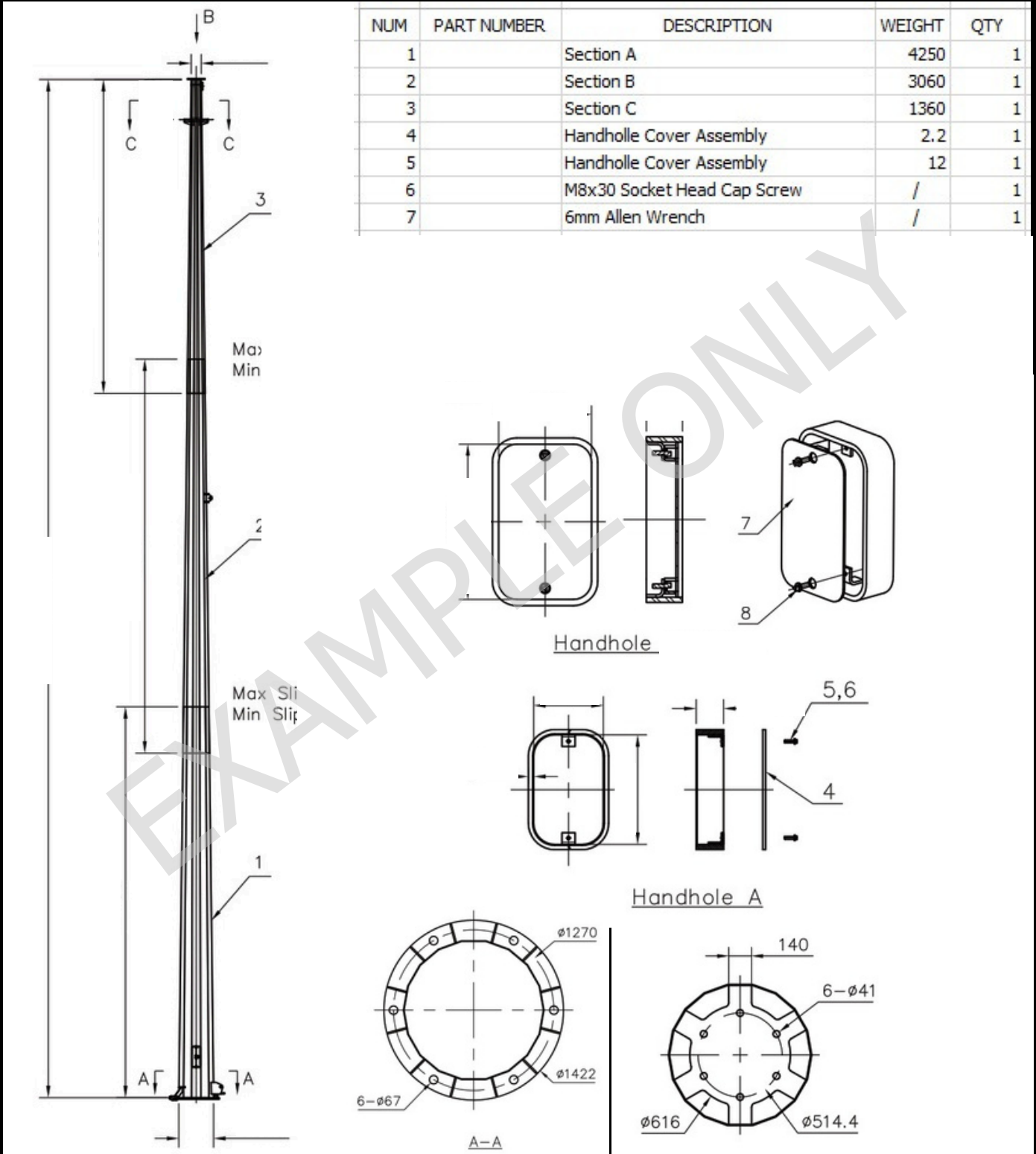
- Read through the manual in its entirety prior to assembly and installation of the motorized tower raising system.
- **WARNING:** Improper use may cause property damage, serious injury or death; therefore, it is highly recommended that trained professionals are installing the towers and operating the raising/lowering system.

Safety

- Motorized Tower Raising Systems should be operated by personnel with proper training or knowledge.
- All planning should take place prior to installation to determine the required clearance and ensure proper space for raising and lowering the tower.
- The work area should be kept clean and free from trip hazards.
- Products should be inspected for damage prior to use. If any damage is noted, parts must be replaced or repaired immediately, per manufacturer's recommendation.
- When construction or erection of free-standing objects is planned, it must be in compliance with local ordinances and local design specifications (i.e. wind speed requirements)
- Tower grounding must follow local ordinances. If no local ordinance is given, you may refer to the Ambor Pole Grounding Manual.
- During tower installation, all operators must wear head protection and take adequate safety precaution. Never leave the motorized screw jack unattended while in operation.
- **NEVER** stand or walk beneath a tower in the middle of the installation. Operators must remain a minimum of two meters from the pole when operating the equipment.
- During installation, the operator must take note of any unusual sounds, vibrations or unnatural system behavior during operation. If anything is observed, operation should **STOP IMMEDIATELY** and the system must be assessed. Contact Ambor for assistance with any pole-related concerns. Your seller/manufacturer can be contacted for assistance with concerns about the foundation, hydraulic RAM cylinders, or other installed components.
- Installation and/or assembly during severe weather conditions must be avoided, especially electrical storm activity (lightning).
- Maximum allowable wind speed during installation or maintenance is 17m/s (38mph).
- **SAFETY FIRST!** Caution and common sense must be used when installing/using this product.

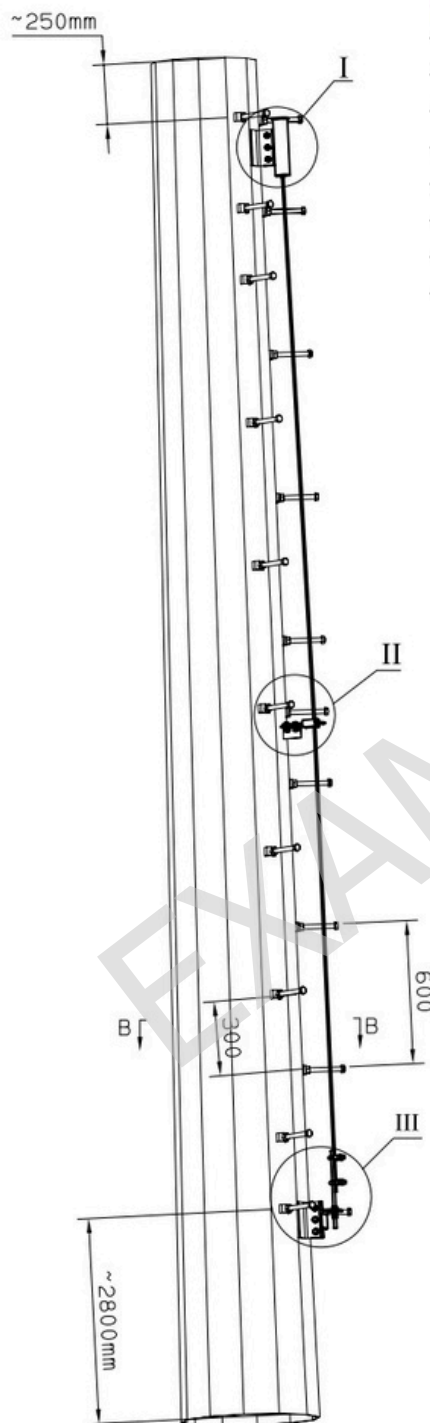
Standard Tower BOM

Detailed information and BOM for each order should be provided shortly after the order is shipped. Please contact your representative for detailed BOM for your tower.

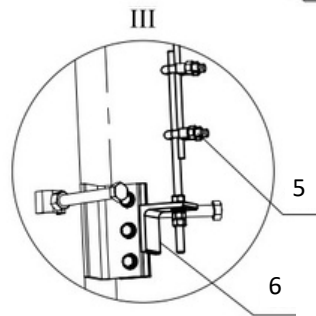
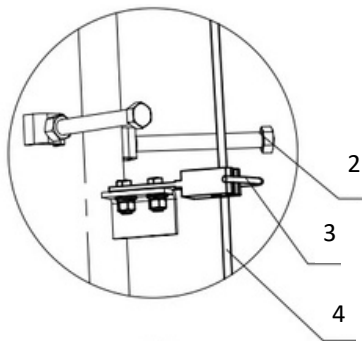
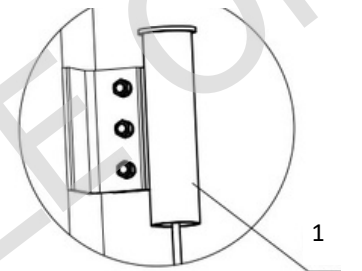


Climbing System—Climbing Pegs BOM

Climbing Peg and Ladder System BOM are provided. Check for details specific to your order on BOM document provided to you by your sales representative.



NUM	PART NUMBER	DESCRIPTION	WEIGHT	QTY
1	C500068	Top Safety Bracket		1
2		Step Bolts		var.
3	DS-6100035	Cable Guide		var.
4	DS-6110000	Steel Cable D9.3		1
5	DS-6100710	Bottom Cable Attachment		1
6	DS-6100035	Bottom Bracket		1
7		M12x50 1N1SW		var.



Climbing System—Ladder BOM

Climbing Peg and Ladder System BOM are provided. Check for details specific to your order on BOM document provided to you by your sales representative.

NUM	PART NUMBER	DESCRIPTION	WEIGHT	QTY
1	C500068	Top Safety Bracket		1
2		Ladder Connection Bracket		var.
3	DS-6100035	Cable Guide		var.
4	DS-6110000	Steel Cable D9.3		1
5		Ladder Fixing Bracket		var.
6		M16x50 1N1SW		var.
7		Ladder Bracket		var.
8		U-style Ladder Clamp		var.
9		Ladder Section A		1
10		Ladder Section B		2
11		Ladder Section C		1
12		Ladder Section D		1
13	DS-6100710	Bottom Cable Assembly		1
14	DS-6100035	Bottom Bracket		1
15		M12x50 1N1SW		var.

~250mm

I

II

III

IV

V

~2500mm

15

1

15

II

2

(C905008)

L Shape Bracket

III

3

15

5

IV

8

15

7

9, 10, 11, 12

4

V

V

13

13

14

Prior to Tower Assembly:

1. Check shipment and verify there are no missing items.
2. Discuss picking options with your Crane Operating Engineer. Make sure to discuss and plan out the proper pick points and complete tower erection.
3. Measure the bolts from the concrete and set each of the leveling nuts to 120mm above the concrete. Adjust each of the leveling nuts to create a level surface for the tower.



4. Place a washer on each of the leveling nuts.

Joining Tower Sections

1. Arrange tower sections in order with the male and female ends aligned. Make sure each section is propped up off the ground to prevent damage to the tower shaft. Align the sections on the weld seams.

2. Measure and mark all slip distances. This is to make sure the tower meets the minimum slip distance and does not exceed the maximum.

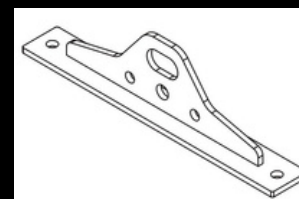
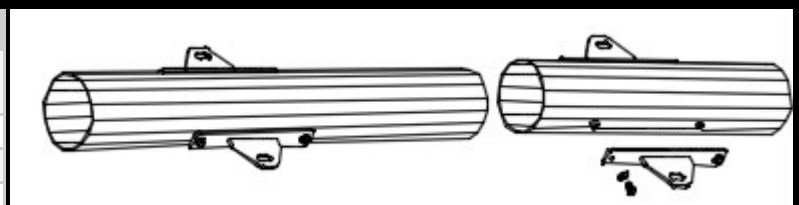
3. Located near the top and bottom of each section are M24 nuts that have been welded onto the tower. Attach the all four jacking brackets or step bolt brackets to each side of the tower using the hardware provided with the jacking bracket sets. These will be used to assist in joining the sections.



4. Once all Jacking Brackets are in place, attach device to jacking bracket and pull sections together. It is up to the installer to determine the appropriate tool for achieving the pull force requirement specified below (i.e., ratchet chain hoist, ratchet binder, cable hoist, etc.).

5. For towers with more than two sections, repeat steps 2-4.

PULL FORCE REQUIREMENT	
Inner diameter (flat to flat) of the female end (mm)	Minimum Pull Force "A" Per side (kN)
<300	20
300-500	30
500-700	40
700-900	50
900-1200	60
1200-1400	80
1400-1600	100
1600-1800	120
1800-2000	150
>2000	200



Assembly Instructions

Installing climbing hardware:

1. After the sections are nested together, loosely assemble climbing hardware. This could include: ladder brackets, ladder connections, step bolts, cable guides, Top Safety brackets, etc.)

NOTE: when lifting the sections separately with the crane, only assemble safety cable at the top safety brackets. Cable should be attached to cable guides and bottom bracket once all tower sections are fully joined.

2. Install ladder sections, but do not tighten. There will be adjustments once all sections are together.

Installing Accessories:

1. In many cases there are accessories such as platforms or wind turbines to mount onto the tower. Most of the time these can be installed while the tower is still on the ground.

2. To install wind turbine/platform, prop up the end on a taller pallet.

Note: When ready to install with crane, make sure rigging is done with points that can support the weight. (i.e., outside platform members may not be rated to support weight of full tower. Attach straps to the tower)



Assembly Instructions

1. Before lifting, double check that all leveling nuts are level.



2. Work with the Crane Operator to lift the tower into place.



3. Once the baseplate is close to the correct position, slowly lower tower on to anchor bolts. Guide by hand onto the anchor bolts.



Assembly Instructions

1. Fasten all anchor bolts down with the washer and nuts.
2. After all anchor bolt nuts are in place, tighten each to meet recommended bolt torque specifications found on last page of this manual.



Recommended Bolt Torque

Recommended Bolt Torque for Grade 8.8 Connection Bolts						
Bolt Size (mm)	Width Across Flats (mm)	Net Area (mm ²)	Yield Stress (Mpa)	Tension Force (N)	Recommended Torque N*m	Pretension Force (N)
10	16	58	640 (8.8)	37120	37 (27 lb.ft.)	18560
12	18	84	641 (8.8)	53952	65 (48 lb.ft.)	26976
16	24	157	642 (8.8)	100480	161 (119 lb.ft.)	50240
20	30	245	643 (8.8)	156672	313 (231 lb.ft.)	78336
24	36	353	644 (8.8)	225600	541 (400 lb.ft.)	112800
27	41	459	645 (8.8)	294016	794 (586 lb.ft.)	147008
30	46	561	646 (8.8)	358784	1076 (795 lb.ft.)	1179392
33	50	694	647 (8.8)	444160	1466 (1083 lb.ft.)	222080
36	55	817	648 (8.8)	522688	1882 (1390 lb.ft.)	261344
42	65	1121	649 (8.8)	717440	3013 (2225 lb.ft.)	358720
48	75	1473	650 (8.8)	942720	4525 (3342 lb.ft.)	471360
56	85	2030	651 (8.8)	1299200	7276 (5373 lb.ft.)	469600
Recommended Bolt Torque for Anchor Bolts						
Bolt Size (mm)	Width Across Flats (mm)	Net Area (mm ²)	Yield Stress (Mpa)	Tension Force (N)	Recommended Torque (N*m)	Pretension Force (N)
20	30	245	355 (45#)	86904	174 (128 lb.ft.)	43452
24	36	353	356 (45#)	125138	300 (222 lb.ft.)	62569
27	41	459	357 (45#)	163087	440 (325 lb.ft.)	81544
30	46	561	358 (45#)	199013	597 (441 lb.ft.)	99507
33	50	694	380 (GR55)	263720	870 (643 lb.ft.)	131860
36	55	817	358 (45#)	289929	1044 (777 lb.ft.)	144964
42	65	1121	359 (45#)	397955	1671 (1234 lb.ft.)	198978
48	75	1473	360 (45#)	522915	2510 (1854 lb.ft.)	261458
56	85	2030	361 (45#)	720650	4036 (2981 lb.ft.)	360325

Notes:

1. In our experience, we would prefer to apply 50% of maximum tension of the bolt as pretension force.

2. Pretension Torque: $T_c = k \cdot D \cdot P_c$

$K=0.2$ (According to the Machine Design Handbook)

D -Bolt Diameter

P_c -Pretension force