



2EN

renewable energy
services & applications

101-meters Lattice Triangular Tower

Series 2EN-LAT600 & Series 2EN-LAT750/600



Lattice sections – Series 2EN-LAT600

The LAT600 tower sections are built by three columns fixed with circular bars forming a collateral cross section of 600mm long. Each section is 3m long.

Lattice sections – Series 2EN-LAT750/600

The lattice tower sections are built by three columns fixed with circular bars forming a collateral cross section of either 750mm or 600mm long.

Each 750mm and 600mm section is 3m long and weights approximately 66kg and 55kg respectively.

The new aluminum 2EN-LAT750/600 section models are brand new design all from scratch. These new towers feature new heavy duty column profiles with round reinforced geometry and round geometry reinforced bars.

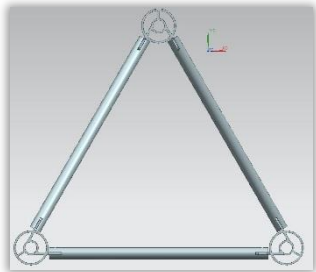
Profiles and machining

The column profiles are made with extrusion molding and is afterwards CNC machined in order to remove all unnecessary geometries that would increase the tower solidity and would affect the wind flow over the construction.

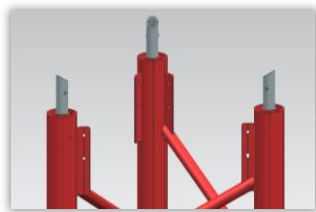
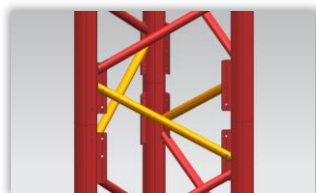
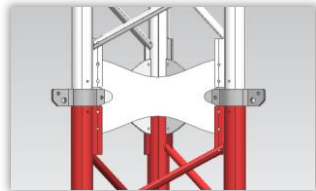
The sections, where a guy wire level is attached, are connected to each other with three aluminium plates (one per side). All the other sections are connected using internal connecting rods, which are used for reinforcing the section connection.

“With this technology there is no need for welding and all the members are assembled using bolts.”

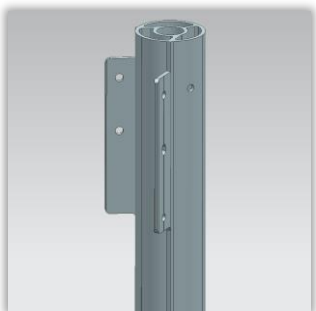
Although all the sections have the same geometry, two of them are different. The one is equipped with the gin pole hinge, which is obviously the one that has to be mounted on the base plate. The other section is equipped with an adaptor for $\Phi 70$ tube and is mounted as the top section.



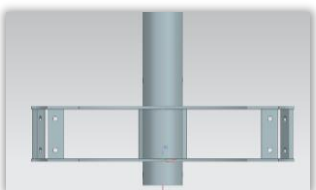
Lattice tower cross section



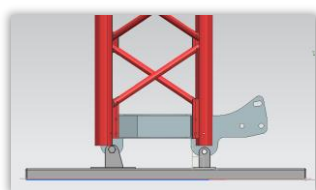
Section connection patterns



Column profile



Top Adaptor



Base Hinge

Base plate

The tower base plate is welded made of st37 steel rectangular profiles 100x50mm with 5mm wall thickness. At the corners of the base plate there are holes for anchoring.

Guy Wires

The guy wires are made of galvanized steel of a cross-section of 8 mm and 10mm and a steel core (type 1X7) of ultimate tensile strength 1770 MPa.

Guy wires are mounted in eight guy wires, so all of them have to share the erection force.

101-meters Lattice Triangular Tower Specifications

Gin pole

The gin pole consists of seven 2EN-LAT600 sections. Each section is either 3.0 meter long depending on the gin pole length. The gin pole is connected to the main mast base hinge using a special adapter attached to its bottom.

Tilt up erection and Anchors layout

The anchors are placed in three concentric circles of 23m, 35m and 45m radius where the center of each circle is the base of the lattice tower.

Adjacent anchors form 120° angle and should not exceed a $\pm 2^\circ$ orientation tolerance.

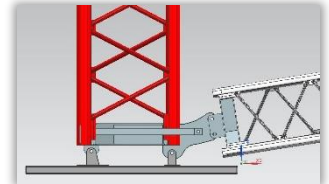
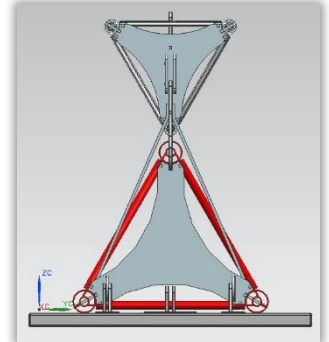
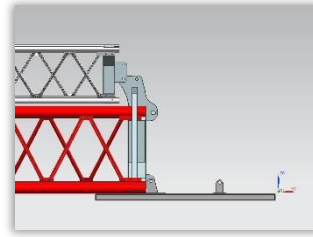
The tower can be erected using a gin pole and handheld tools without the need of a crane or trained climbers.

For the 101m model, the tower erecting winch (or tirror) should have pulling capacity of 6.5 tons, at least more than the tilt up force, which is approximately 8.0 tons.

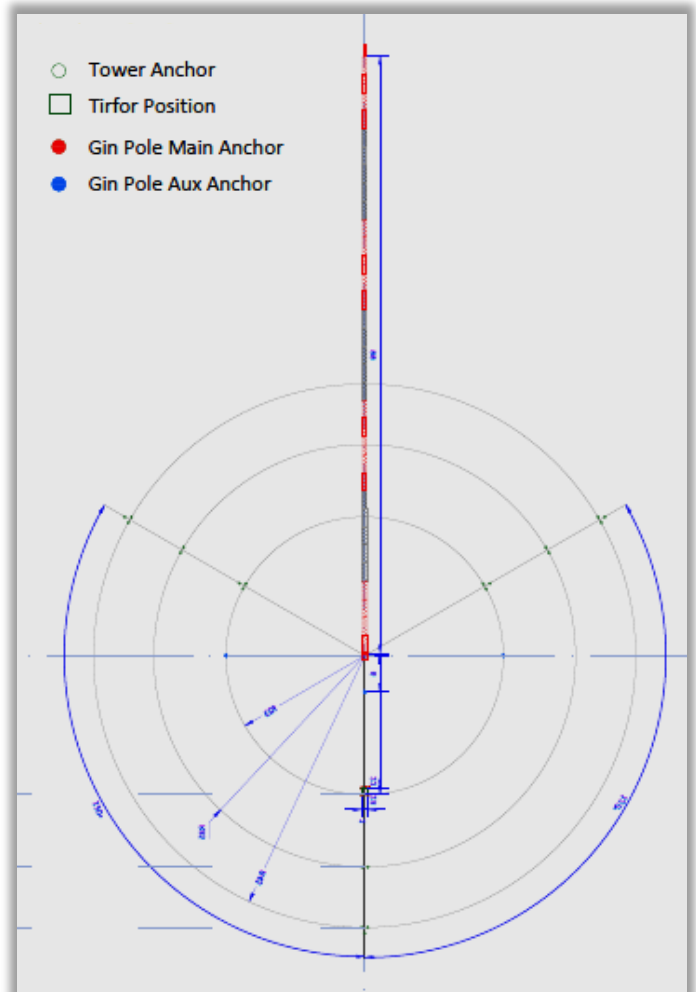
The lift anchors, where the gin pole is mounted, are placed $22\text{m} \pm 0.5\text{m}$ from the tower base, opposite the spread out lattice mast as shown in the schematics.

2EN recommends double anchors per tirror for safety reasons.

All installation components (Eye links, shackles of Ω type, tensioning devices, etc.) must be provided by 2en in order to have the right specifications.



"One of the main characteristic of this tower, due to the lightweight of the aluminum profiles, is the tilt up erection method."



Anchoring layout



Tower certification

The tower construction has been studied and verified using finite element analysis (FEA).

Every part is verified and checked separately and the whole structure has been certified for euro code compliance.

This construction is made to withstand very high winds with 10 minute average higher than 50m/sec which leads to gusts over 80m/sec at the top of the mast.

The tower is certified according to the following standards and their Greek annexes where applicable.

- **Eurocode 1.**

EC1PART1.4En1991-1-4 Wind Actions,
EC1 PART1.3 En 1991-1-3 Snow Loads.

- **Eurocode 3.**

EC3 PART3.1 1993-3-1 Towers and Masts,
EC3 PART3.11 1993-1-11 Design of structures with tension elements.

- **Eurocode 8.**

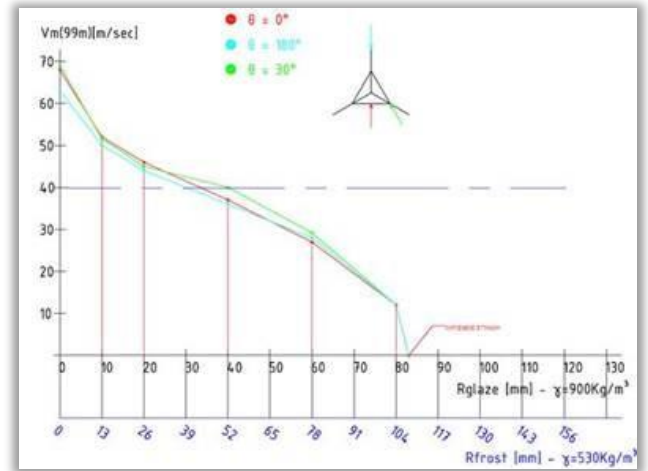
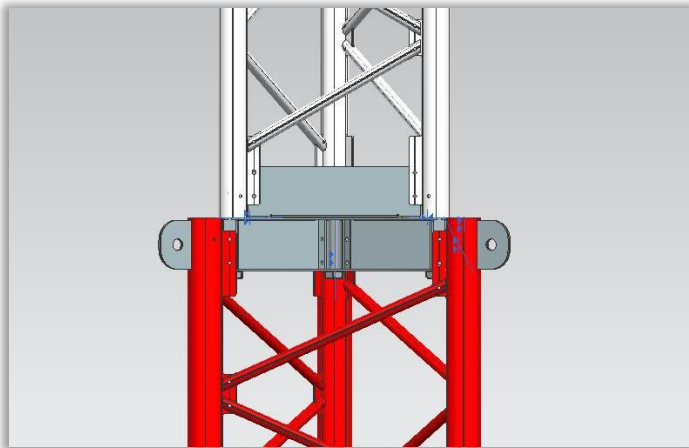
EC8 1998.06 - Design of structures for earthquake resistance - Part 6:

Towers, masts and chimneys.

- **Eurocode 9.**

EC9 Aluminium structures.

- **BS EN 795** - Protection against falls from a height - Anchor devices - Requirements and testing.



Design limits concerning icing vs. wind speed

Available models

Series	3m sections	3m section 600mm incl. adapter for 3m tube (70mm)	Levels of guy wires	Gin pole type	Total structure weight	Schema
2EN-LAT750 /600	08 – Lat750	1	8	21m Lattice (600mm)	3073 Kg	
	24 – Lat600					
2EN-LAT600	32 – Lat600	1	8	21m Lattice (600mm)	2800 Kg	

