

9m Guyed Tower for LE-300, LE-450 or LE-600

Installation & Operation Guide



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Disclaimer

- All specifications are subject to change without prior notice.
- The information given in this user manual is believed to be accurate and reliable. Leading Edge Turbines Ltd assumes no responsibility for omissions or inaccuracies.
- The user of this information and product assumes full responsibility and risk.
- Wind Turbines are a source of electrical power. They must be installed in accordance with local building and electrical regulations. Consult your local planning (zoning) office for details.
- Wind turbines and associated equipment have moving parts that may cause injury due to poor installation and unsafe operation. Leading Edge Turbines Ltd assumes no responsibility for problems caused by unsafe or unsatisfactory installation or operation.

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Introduction

Please read this manual thoroughly before attempting to assemble and install your Guyed Tower Kit. This will assure optimum performance and safety.

This Tower Kit has been designed for use with the LE-300, LE-450 or LE-600 Turbine from Leading Edge Turbines Ltd. It is possible to use this kit with other turbines that require a 48.3mm diameter tower, however under no circumstances should a turbine with a rotor diameter greater than 1.4m be installed using this Tower. An adaptor can be supplied by Leading Edge Turbines to allow the fitting of the LE600 turbine to this 48.3mm tower top.

It is possible to install the Guyed Tower, with two or three people, in a very short time. No winches or gin-poles are necessary although may prove useful with the heavier LE600 turbine. Concrete may be required depending on soil conditions.

Please read this manual carefully before continuing with the installation of your Guyed Tower.

Please read the LE-300, LE-450 or LE-600 Installation and Operation Guide carefully before operating the turbine.

Safety Precautions

Safety must always be your primary concern during the assembly, installation and operation of your Gued Tower. Always be aware of the risks involved with mechanical and electrical installation work. If in doubt about any issue regarding your tower kit or turbine, please seek further assistance before proceeding.

Mechanical Safety Hazards

- Ensure that the tower and turbine are installed in a suitable position where nobody can approach or interfere with the path of the turbine rotor blades.
- Ensure that the tower is located in a position where it cannot cause any damage to buildings, neighbours' property or utility lines should the tower fall for any reason.
- Never attempt to climb the tower. It is not designed to handle this type of loading and may fail.
- If at any time a component of the tower or turbine works loose, correct it immediately.
- Working with tools of any kind can be dangerous. Your tower and turbine require some basic mechanical assembly with rudimentary hand tools. If you are in any doubt about how to use these tools correctly, please seek advice from a suitably experienced person.
- Always ensure that all personnel in the immediate vicinity are aware of any lifting / hoisting operations that will be occurring. Check there are no loose components or tools likely to fall and cause injury during the lifting operation. Where possible, all assembly work should be completed at ground level.
- Ensure that any system batteries are disconnected during the installation procedure.
- Use a run / stop switch to make the turbine safe before raising the tower.
- Install your turbine and tower kit during a calm day.
- When performing routine inspection or maintenance, always stop the turbine by activating a run / stop switch.
- Ensure protective gloves are worn when handling the guy wires.
- Tower sections can be heavy, ensure protective footwear is used.

Electrical Safety Hazards

- Always refer to the **LE-300, LE-450 or LE-600 Installation and Operation Guide** for advice and instructions on electrical aspects of the turbine installation

Please use common sense when installing and operating your turbine!

Specifications

Product Name: Guyed Tower for LE-300, LE-450 or LE-600 Turbine
Part Number: GA-TWKT-023

Maximum Tower Height: 9000mm
Materials: Heavy Duty Steel (hot dip galvanised)
Guy Wires: 3mm Steel Catenary Wire
Tower Foot Print: 4500mm x 4500mm Squared
Tower Diameter: 48.3mm Outer Diameter Tube (4mm Wall Thickness)

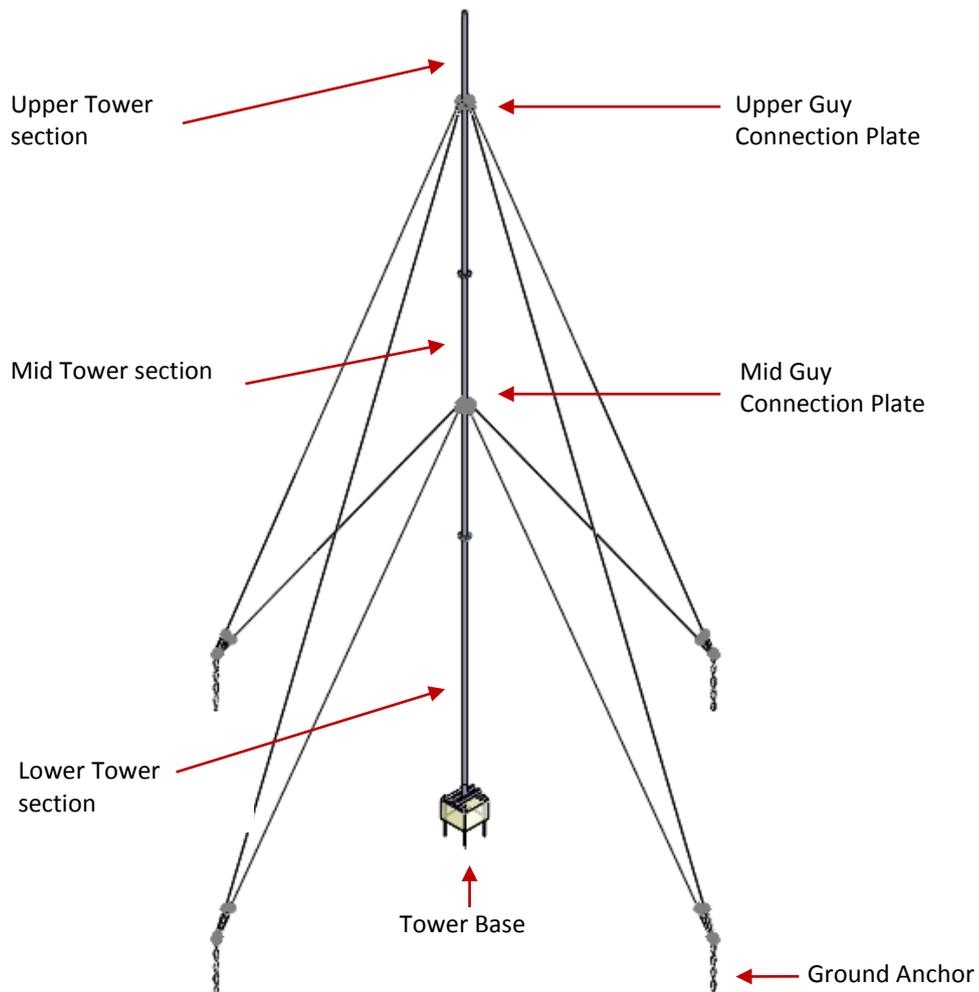
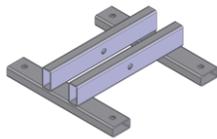


Fig 1: General Guyed Tower Kit Arrangement

Package Contents

Your tower will arrive containing the components shown below. If any of the components are missing or damaged, please contact your dealer immediately.



Tower Base: Qty 1



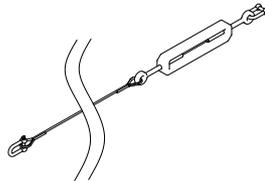
Guy Anchor & Brackets:
Qty 4



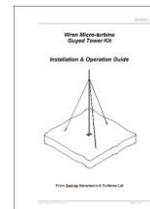
Main Tower Sections:
Qty 3



Base Staple: Qty 4



Guy Wire Rigging
Components: Qty Various



User Manual: Qty 1



Fixings: Qty Various

Tools Required For Assembly

You will require the following tools to assemble your Guyed Tower Kit:

- 19mm A/F spanner or ratchet (two required)
- 8mm A/F spanner or socket
- Power drill
- 6.5mm and 13.00mm dia twist drill bit, suitable for drilling through steel
- Long tape measure or steel rule
- Cement and mixing tools (required for loose or sandy soil conditions)
- Sledge hammer (10Kg)
- Spirit level
- Gloves

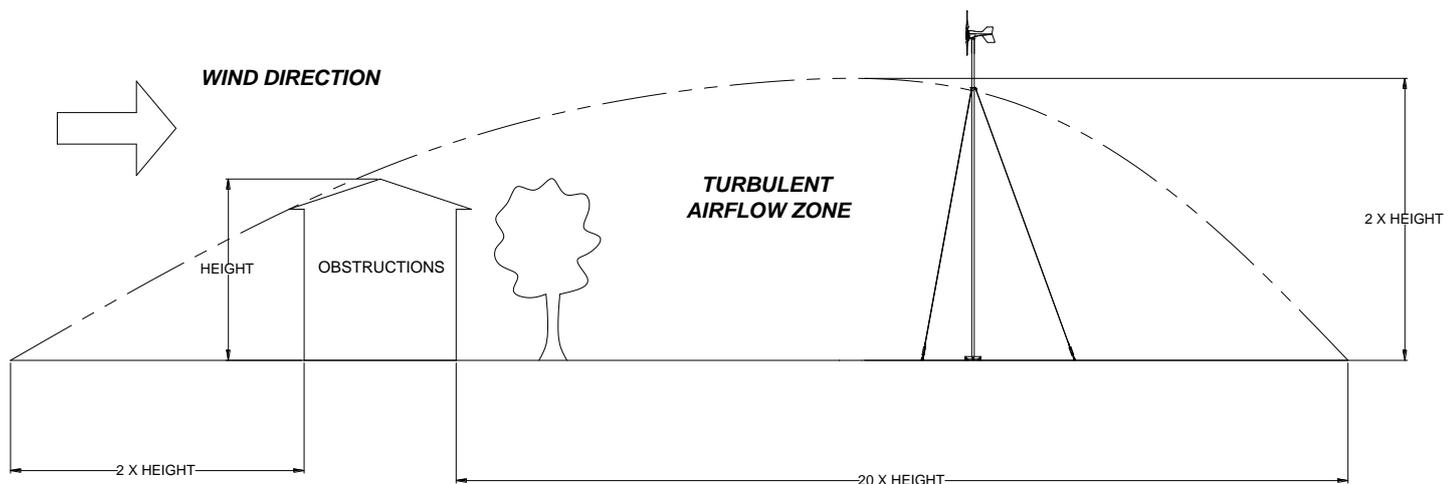
Turbine Site Selection

The turbine location is a very important factor in the overall performance of your small wind turbine system. Good site selection will maximise the power that your turbine will be able to deliver. Installing a wind turbine in a bad position is similar to installing a solar panel system in the shade – it will not maximise the performance of your investment.

The total amount of energy available in the wind increases drastically with small increases in wind speed. Therefore it is very important that you site your turbine in the best possible location.

The proposed installation site for your wind turbine must have a good average wind speed of a minimum of 4.0m/s (9mph) and low wind turbulence. Wind turbulence is caused by obstructions to the wind such as trees and buildings. Excessive turbulence will hamper the performance of your turbine. Small wind turbines operate best in steady airflows. Free flowing airstreams are more consistent in direction and wind speed which results in more overall power being generated by the wind turbine system. Gusty conditions often result in a turbine ‘hunting’ the wind reducing the amount of overall power generated. Gusty and turbulent conditions also exert fluctuating forces upon the turbine that can reduce the reliability and lifespan of the system.

Wind shadowing and barriers: Wind barriers are simply obstacles that impede the flow of the wind (such as trees and buildings). A large ‘wake’ of turbulent airflow will occur for a long distance downwind of a barrier. It is not desirable to locate a turbine in this zone.



Topography: For areas of undulating ground, the turbine should be installed in the highest possible position avoiding wind barriers and turbulence. For areas that are generally flat, the turbine can be installed in any position. Remember that the LE300 has a low voltage output, so it is important to keep the cable run to the batteries / inverter as short as possible.

Surface roughness of the ground: Long grass, crops or bushes will have the effect of slowing the wind down (even at the height of the tower). Try to install your turbine where the ground is smooth to increase the overall power production of the system.

Tower Kit Assembly Procedure

1. **Unpacking** - Inspect the contents of the box and ensure that all items are present and free from damage. If any of the components are missing or damaged, please contact your dealer immediately.
2. **Assess the installation area** - The tower kit must be installed on a reasonably level area of ground. If the turbine is to be installed on ground that is slightly inclined, ensure that the pivot action of the tower base is orientated so that the tower is raised in line with the hill. This will allow the tower to be set vertical, regardless of the hill angle.
3. **Assess the soil conditions** - Follow the table below to decide on the best anchoring system for your tower kit. Your tower kit is supplied with 4 tower base staples and 3 guy anchors. Different fixings may be required depending on the soil conditions. These are readily available at most hardware stores. For permanent installations, it is recommended that all ground fixings are set into concrete.

Soil Condition	Tower Base Fixing	Guy Anchor Fixing
Hard Solid Rock	M12 Std Expansion Bolt	M12 Expansion Bolt with Eye
Soft Solid Rock	Long M12 Expansion Bolt	Long M12 Expansion Bolt with Eye
Loose Sand	400mm X 400mm x 200mm deep cast concrete with M12 'J' bolts or M12 Expansion Bolt.	Helical Earth Anchor (supplied) fixed into cast concrete.
Loose Gravel	400mm X 400mm x 200mm deep cast concrete with M12 'J' bolts or M12 Expansion Bolt.	Helical Earth Anchor (supplied) fixed into cast concrete.
Rocky Soil	400mm X 400mm x 200mm deep cast concrete with M12 'J' bolts or M12 Expansion Bolt.	Helical Earth Anchor (supplied) fixed into cast concrete.
'Grassy' Soil / Loam	Tower Base Staple (supplied) direct into earth	Helical Earth Anchor (supplied) direct into earth.

Note: We recommend that a general purpose 'Rawlbolt' (part number 44-165) should be used for fixing the tower base into concrete / rock. There are many different kinds of expansion bolt available – if in doubt, seek the advice of a fixing hardware supplier..

4. **Mark out the tower anchor positions** - Begin by selecting an appropriate position for the tower base. Remember that the guy wires will radiate out from the centre of the tower, so you will need to ensure that enough room is available. A footprint of 4.5 meters square is required for the tower guy wires. See fig 2 for the positions of the anchors. Measure and mark these positions starting from the position of the tower base. One of the guy anchors must be in-line with the tilting action of the tower to allow easy final erection.

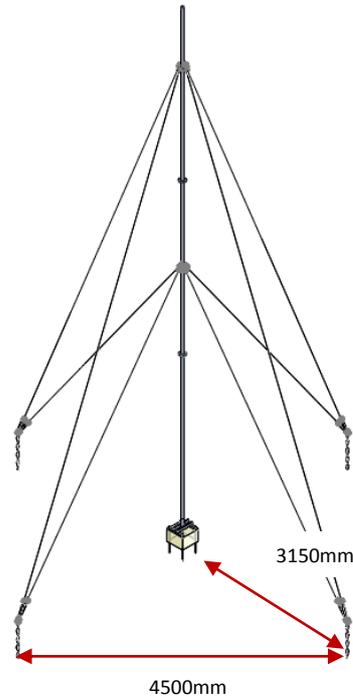


Fig 2: Anchor positions

5. **Fix the tower base** - Once you have selected the appropriate type of ground anchor technique from the table above, begin by positioning and fixing the tower base - see fig 3. If a cast concrete raft (foundation) is required, dig and cast the raft according to the dimensions shown in the above table. The concrete raft should be made from 80 Newton concrete. Do not shutter or backfill.

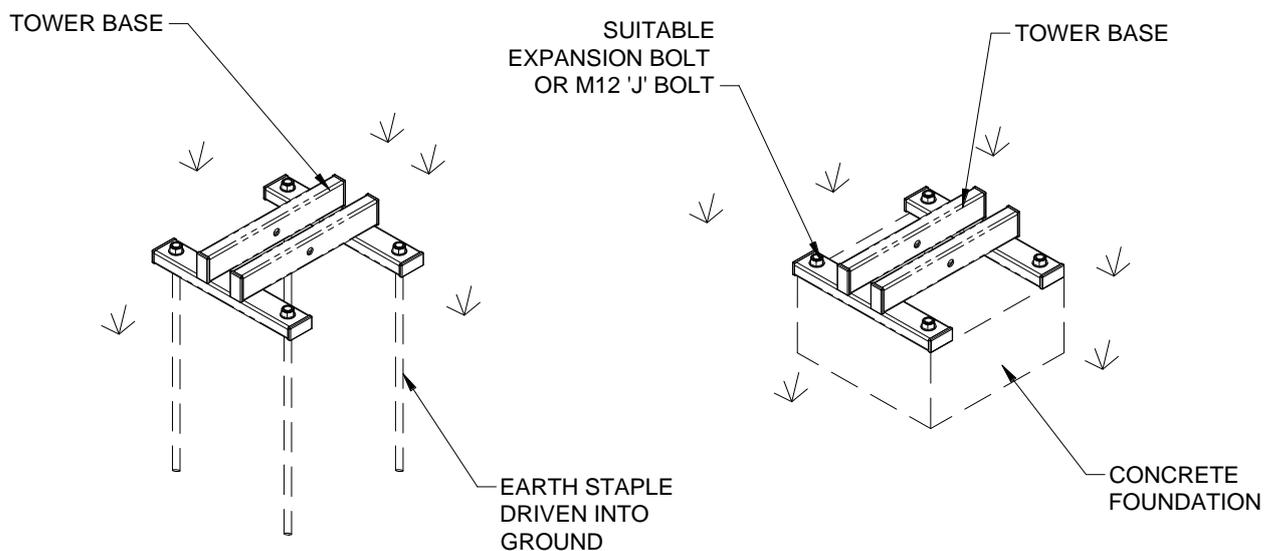


Fig 3: Tower Base Fixing

6. **Fix the guy anchors** - Using the positions marked out in step 4, secure the guy anchors into the ground. Concrete the guy anchor into position if required. If the guy anchor is being driven directly into the soil, ensure that the guy anchor is driven into the earth vertically or at an angle pointing away from the tower - see fig 4.

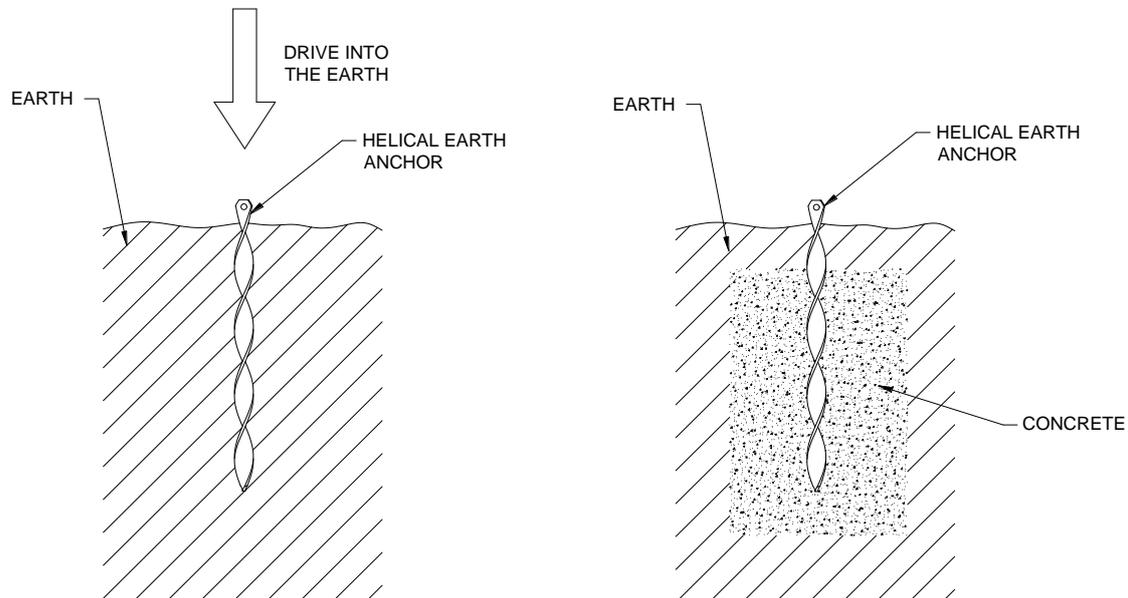


Fig 4: Guy Anchor Fixing

7. **Drill the Main Tower Section** - The upper and lower tower sections will require 6.5mm holes to be drilled in the top end to allow attachment of the LE300 or LE600 turbine and a 13mm hole to be drilled at the lower end to act as the pivot point for the tower. Although these holes be pre-drilled, it is recommended that the holes are re-drilled to allow any excess galvanisation material to be removed. Using a power drill and suitable drill bit, drill both of these holes in the 48.3mm diameter tube. Temporarily fit the yaw pivot of the LE300 or LE600 turbine to check or mark the mounting hole positions for drilling.
8. **Assemble the Main Tower Sections** - Use the M10 x 35 set screws, washers and nylock nuts to assemble the tower sections together. Ensure that any excess build up of galvanizing zinc is removed from the connection flanges before assembly so that the flanges connect squarely together. Ensure that all of the fixings are secure before continuing to the next stage.
9. **Attach the Main Tower Section** - With the main tower section assembled, and the tower base firmly fixed in position, mate the two items together. Move the main tower section over to the tower base. Insert the end of the tube with the 13mm hole into the base and secure it with the M12 X 140 long bolt. Use 19mm A/F spanners to firmly tighten the bolt - see fig 5. The main tower section can now be pivoted to rest upon the ground to carry out the remaining assembly stages. It is recommended that the top end of the main tower section is lifted slightly above the ground by placing it on the tower kit packaging (this will make the next assembly stages easier to complete)

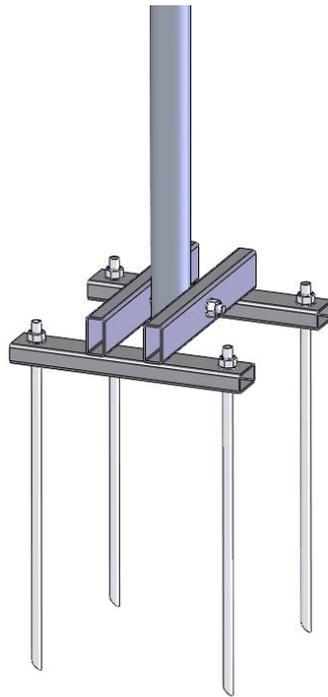


Fig 5: Attached the main tower section to the tower base

10. **Attach the Guy Wires to the connection plates** – Arrange and fit the guy wires to the upper guy connection plate. Follow the fitting arrangement depicted in fig 6. The crimped end of the guy wire should be attached to the tower using a D-shackle leaving the uncrimped end to be adjusted to length to suite the anchor position. Repeat this for all of the remaining guys to the upper and mid guy connection plates.

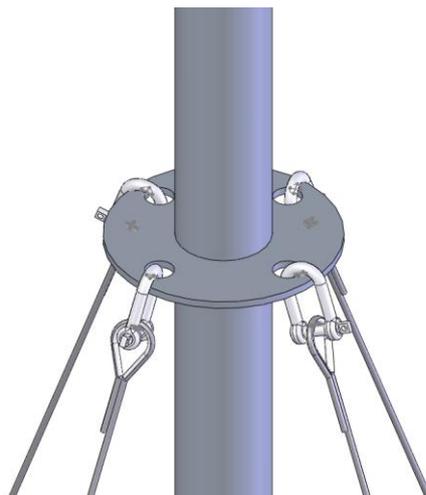


Fig 6: Attach the guy wires to the connection plate

11. **Make ready the guy wire fixings for the earth anchors** - Prepare the fittings on the earth anchor side of the guy wires. Follow the arrangement shown in Fig 7. Allow a minimum 300mm overlap and always use at least two wire rope grips at each looped end of the wire.

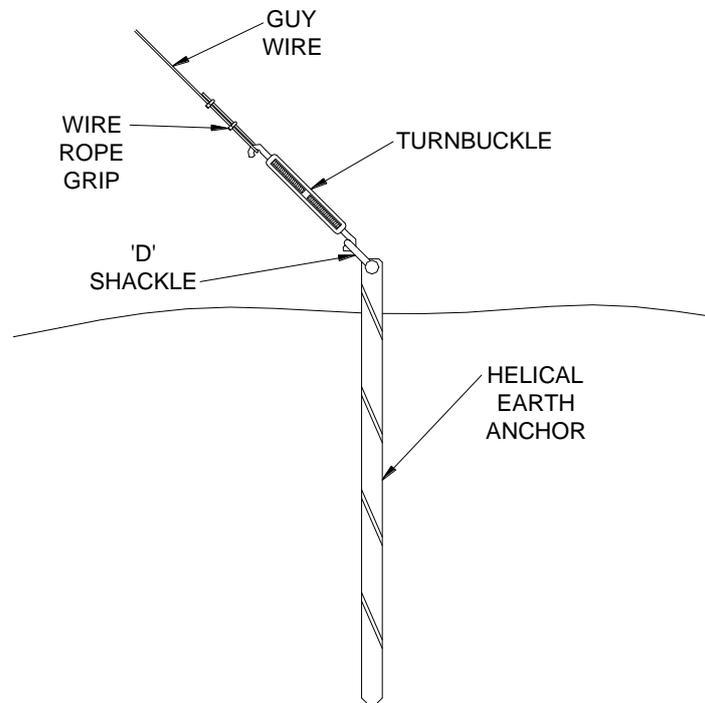


Fig 7: Prepare the guy fittings on the ground end of the guy wires

12. **Connect three of the upper guy wires to the guy wire anchors and hoist the tower** - Select three of the guy wires, leaving a single guy wire that works in line with the tilt-up direction. Using the 'D' shackles, attach these three guy wires to a corresponding guy anchor. The fourth guy wire is now used to hoist the tower **without the turbine installed**. Two people may be required. One person should pull the guy wire, whilst the other lifts the tower from the other side. Ensure that safety is your first priority during the hoisting operation. Use the 'D' shackle to attach the fourth guy wire to the guy anchor - see fig 8. The mid position guy wires can also be connected to the ground anchors in the same fashion.

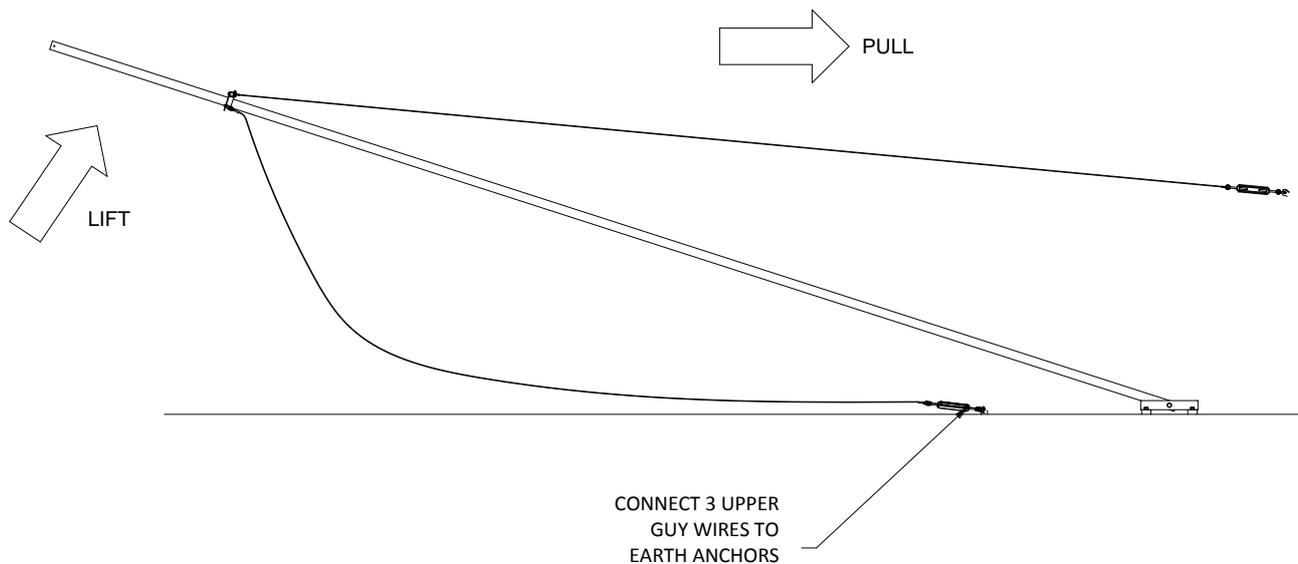


Fig 8: Connect three upper guy wires and hoist the tower

13. **Adjust the guy wire tension to ensure tower is vertical** - Use a spirit level to ensure that the tower is vertical. Slowly tighten each turnbuckle to achieve a good tension on each guy wire. The tower must be securely fixed in a vertical position with no movement from side to side. Adjust individual turnbuckles to ensure the main tower section is vertical. If required, slacken the wire rope grips and take up excess wire before re-tightening the wire rope grips. **The turnbuckles should not be over or under extended!** Repeat the process for all of the guy wires.
14. **Bring down the tower in order to install the turbine** - Reverse the procedure described in step 12 above to lower the tower to ground level. The turbine can now be installed upon the tower. Follow the installation instructions provided with the turbine. Follow step 12 once again to re-erect the tower complete with turbine.

Installation of the Guyed Tower Kit is complete.

Please now refer to the LE-300, LE-450 or LE-600 Installation and Operation Guide.

Maintenance

Please follow the preventive maintenance program listed below. This will ensure that the Guyed Tower operates safely.

Always shut down the turbine before attempting to carry out maintenance on any part of the system.

Monthly Checks:

- Ensure that all foundations and earth anchors are sound and secure.
- Check that the tower pivot pin is secure and has not worked loose. Adjust if required.
- Ensure that all guy wire-rigging fixings are secure and have not worked loose.
- Check guy wire tension. Adjust if necessary.
- Ensure that the tower is vertical. Adjust if necessary.

Spares

The following components may need to be replaced during the service life of your Guyed Tower. Please contact your nearest Leading Edge Turbines Ltd Dealer and quote the part numbers listed below.

Guy Wire Rigging Set (qty 1):	DP-TWKT-249
Helical Earth Anchor (qty 1):	OS-042

Warranty

Your Guyed Tower carries a two-year warranty from the original purchase date.

During the warranty period, any component found to be defective in material or workmanship will, at the discretion of Leading Edge Turbines Ltd, be replaced or repaired at no charge.

For minor component failures, replacements may be sent directly to the customer / dealer for replacement. For more serious defects we may suggest a 'return-to-base' arrangement for replacement or repair. In all cases *Leading Edge Turbines* will take reasonable action to ensure customer satisfaction. You will always receive a warm, courteous service in or out of your warranty period.

Your Guyed Tower Kit must be installed and operated in accordance with this guide and local codes. Failure to do so will result in this warranty becoming null and void. Any unauthorised modifications to the design will void the warranty and may compromise the safety of the mount.

What is not covered by your warranty:

If your Guyed Tower is commissioned by Leading Edge Turbines Ltd, the following are excluded from the warranty

- Damage caused by the neglect of periodic maintenance in the manner recommended.
- Damage caused by repair or maintenance performed using methods not specified by Leading Edge Turbines Ltd or by non-authorized dealers of Leading Edge Turbines Ltd products.
- Damaged caused by the use of non-genuine parts.
- Damage caused by operating in conditions outside of those specified in the Owners Guide.
- Damage caused by modifications to the mount not approved by Leading Edge Turbines Ltd.
- Damage caused to the mount by improper storage or transport.
- Damage caused by lightning strikes
- Damage due to extremely high winds and storm conditions (60mph+)
- Damage caused by flying debris.
- Aesthetic phenomena that do not affect performance.

If your Guyed Tower was not commissioned by Leading Edge Turbines Ltd, the following are additional Warranty exclusions.

- Damage caused by unsatisfactory installation.
- Damage caused by unsatisfactory mount support structure.
- Damage caused by failure to observe current regulations concerning connection to external electrical networks, equipment or any other devices.

If you should experience a problem with your Guyed Tower, your first 'port-of-call' should be the reseller or installer from whom you purchased the product. They will be able to resolve the problem quickly and efficiently. If you are unable to contact the original reseller, then please contact us directly.