

Abacus[®]

Leaders in Lighting

Part No: INS-EX

Extace Masts

Product Manual

November 2022

**WE STRONGLY RECOMMEND THAT THESE
INSTRUCTIONS ARE READ CAREFULLY BEFORE
ATTEMPTING TO INSTALL, OPERATE AND MAINTAIN
THIS EQUIPMENT**

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1. Safety

WE STRONGLY RECOMMEND THAT THESE REQUIREMENTS ARE READ CAREFULLY BEFORE ATTEMPTING TO INSTALL, ACCESS AND MAINTAIN THIS EQUIPMENT.

THE INSTRUCTIONS THAT FOLLOW ARE FOR THE ASSEMBLY AND INSTALLATION OF A FIXED MAST WITH HEADFRAME AND/OR PLATFORM ATTACHED PRIOR TO ERECTION.

2. Installation

2.1. General

These masts are generally used for stadium lighting applications with mast heights up to 50m. The headframe typically consists of a number of crossarms with an optional access platform positioned at the lower luminaire level. If a platform is provided then, if required, climbing ladders give access from the platform to the higher crossarm levels for aiming and maintenance.

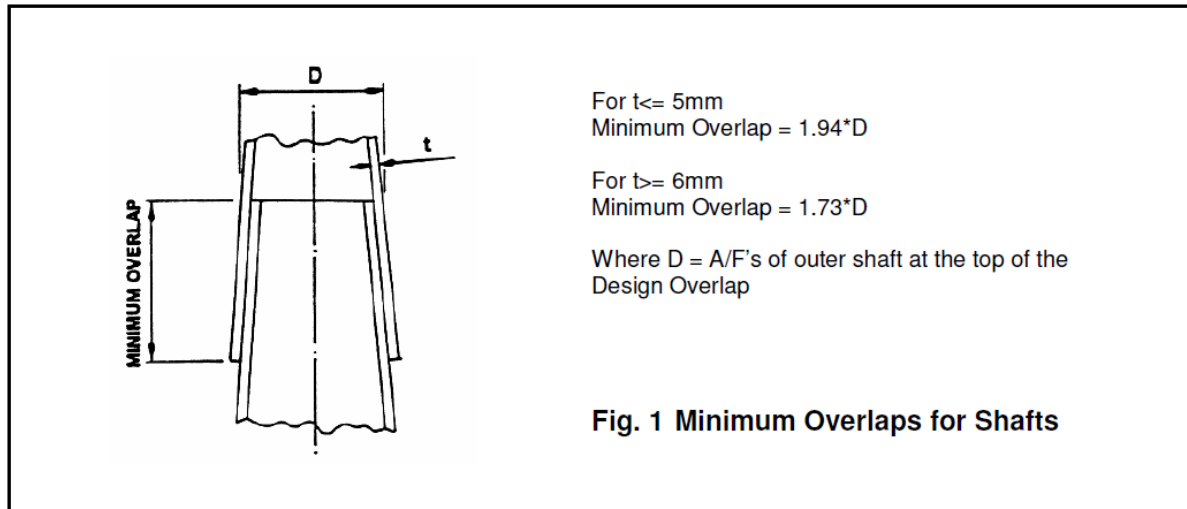
Access from ground level to the headframe may be achieved by means of a ladder, either external or internal. All access ladders are fitted with a fall arrest system for personnel whilst working at height. Headframe access for Extacc masts may also be via an electrically powered external lift ('Manrider') direct to the platform. On occasion no access or platform is provided and all maintenance is carried out using a mobile elevating work platform (cherry picker).

Each mast is supplied in kit form for on-site assembly. The foundation bolts should be cast in to the concrete foundation 3 to 4 weeks prior to erection of the mast to allow time for the concrete to achieve full strength. Foundation block sizes for a variety of 'standard' ground conditions can be supplied on request. Any assumed soil design parameters must be verified by in-situ or laboratory testing prior to foundation installation.

Masts are constructed from steel, generally to EN10025 grade S275 or S355, pressed to form a tapering polygonal shaft. Each shaft is typically up to 12m in length (within the UK lengths may extend to 15m). The shafts are usually slotted together to form the mast and require no on-site welding or bolting. The mast steelwork and foundation bolts are finished galvanised with small fasteners from stainless steel. One or two rings of bolts attach the mast to its foundation via a base flange. Flanges are also used to connect the headframe assembly to the top of the mast.

Electrical cables are supported inside the mast by horizontal rails for trunking, ties, cleats or a series of catenary wires.

Because these masts are designed for specific applications it is essential that reference is made to the engineering drawings during assembly. The drawings will give details of design overlaps. Actual achieved overlaps will vary due to manufacturing tolerances. The minimum permissible shaft overlaps can be determined from Fig. 1.



2.2. Equipment Required (not Abacus supply)

- 2 no. 7 tonne Tirfor c/w 50m wire rope.
- Various wire ropes, soft slings and shackles
- 4 No. 30mm 'D' shackles
- Supply of liquid soap
- Steel beam 2m long with attachment points for 'D' shackles along its length
- Supply of timber supports and packing
- 14lb (6kg) sledge hammer and hard wood packer
- Mobile crane specification to be advised by Abacus Lighting or local specialists
- Torque multiplier and wrench

2.3. Mast Assembly

Reference should be made to the illustrations.

For orders outside the UK the masts will be containerised. If the smaller shafts are fitted inside larger ones, they will need to be carefully unpacked on site to avoid damaging the galvanised finish.

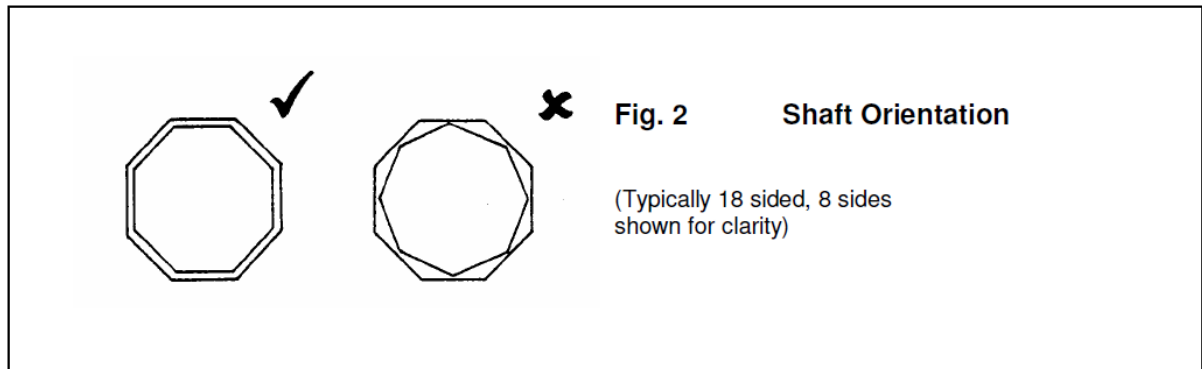
It is intended that the shafts and headframe are assembled together prior to the mast being erected onto its foundation.

The shafts should be laid out on open ground to facilitate correct identification and their ends examined for signs of damage. The orientation of the seam welds relative to each other is not important.

Base sections with circular flanges should be supported on timbers and chocked to prevent rolling. Mark the base with both design and minimum overlaps as determined from Fig. 1 and the project drawings. Pack the upper end of the base section so that its longitudinal axis lays horizontally. Position the supports at least 1.5m from the open end to allow plenty of room for the next shaft to overlap. Check the overlap area for any damage, excess zinc, or weld which may impede fitting of the shafts together and rectify if necessary.

Note that the headframe will be assembled to the mast with the luminaires facing the ground. Ensure at this stage therefore that the orientation of the base is correct with respect to the door opening, lifting lugs etc.

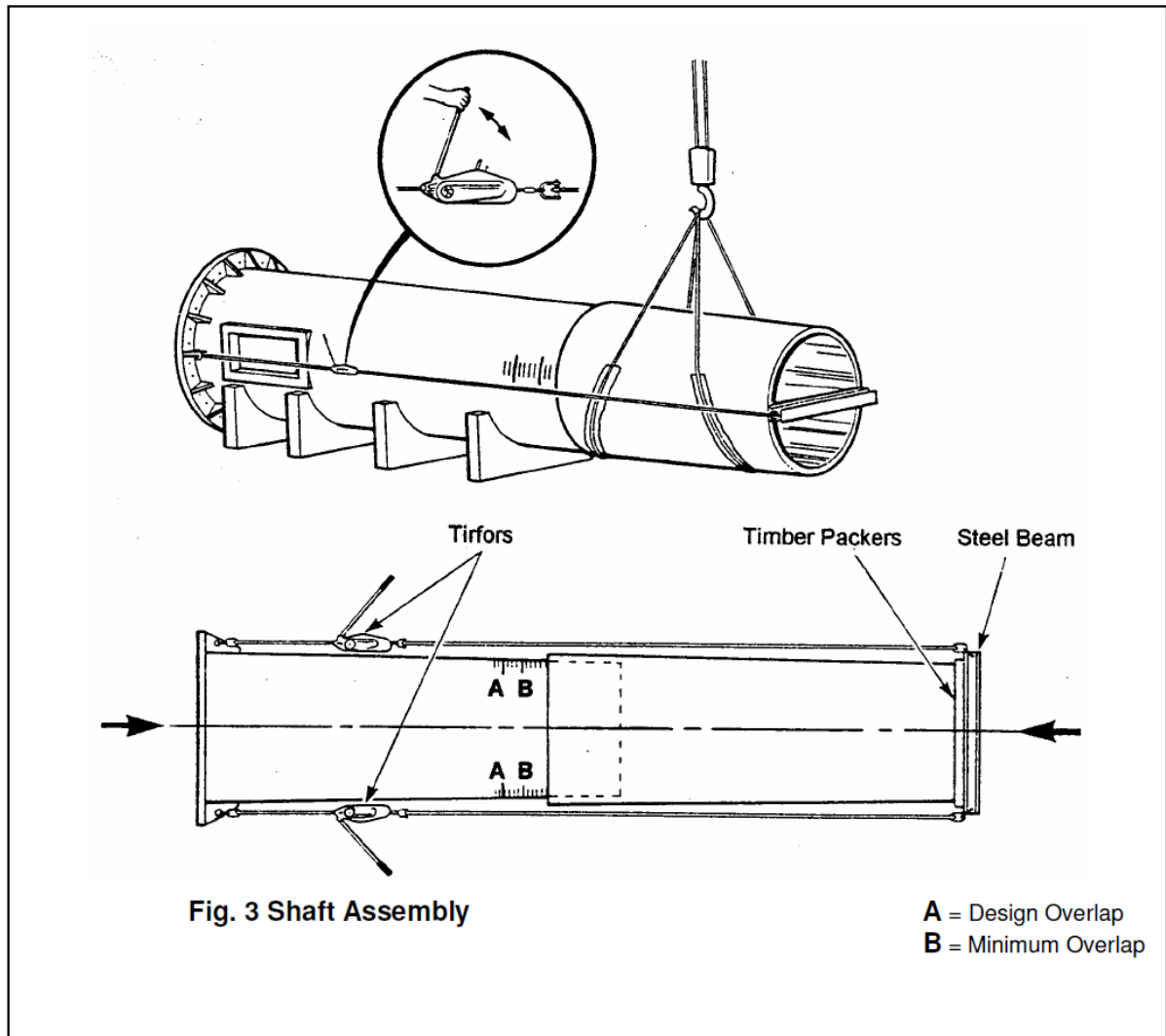
Smear liquid soap over the outside of the base for the length of the overlap and offer up the next shaft into position. Any mountings for ladders or cables must be in alignment. Ensure the flats are rotationally aligned relative to each other since a shaft wedged with a corner to a flat will be very difficult to separate. See Fig. 2.



Referring to Fig. 3, attach 2 Tirfors between the flange and steel beam as illustrated. The steel beam must have timber packing placed between it and the edges of the shaft to prevent deformation. With the shaft supported by a crane, lift and feed it onto the end of the base. It is essential that the Tirfors are operated simultaneously when pulling the shaft into position. Agitate the shaft up and down to aid bedding of the shaft into position. Striking the beam across the ends of the shaft with a sledgehammer will also ease the assembly.

As sliding takes place, periodically sight down the assembly to check for straightness. Do not stop pulling if the minimum overlap is reached. It is important that the shafts are as tight as possible to avoid excessive settlement on erection. Remove the steel bar in readiness for pulling the next shaft into position. Remove any surplus soap from the base section.

Repeat the procedure for all remaining shafts. If internal or external ladders are provided these should then be fitted, as should the fall arrest system in accordance with the manufacturer's instructions.



The ladder attached to the upper shaft is rigidly mounted, with all others being secured by a clamp. These sliding clamps should be left loose until the mast shaft has been erected to allow for any settlement. Fit the fall arrest system to the ladder in accordance with the manufacturer's instructions.

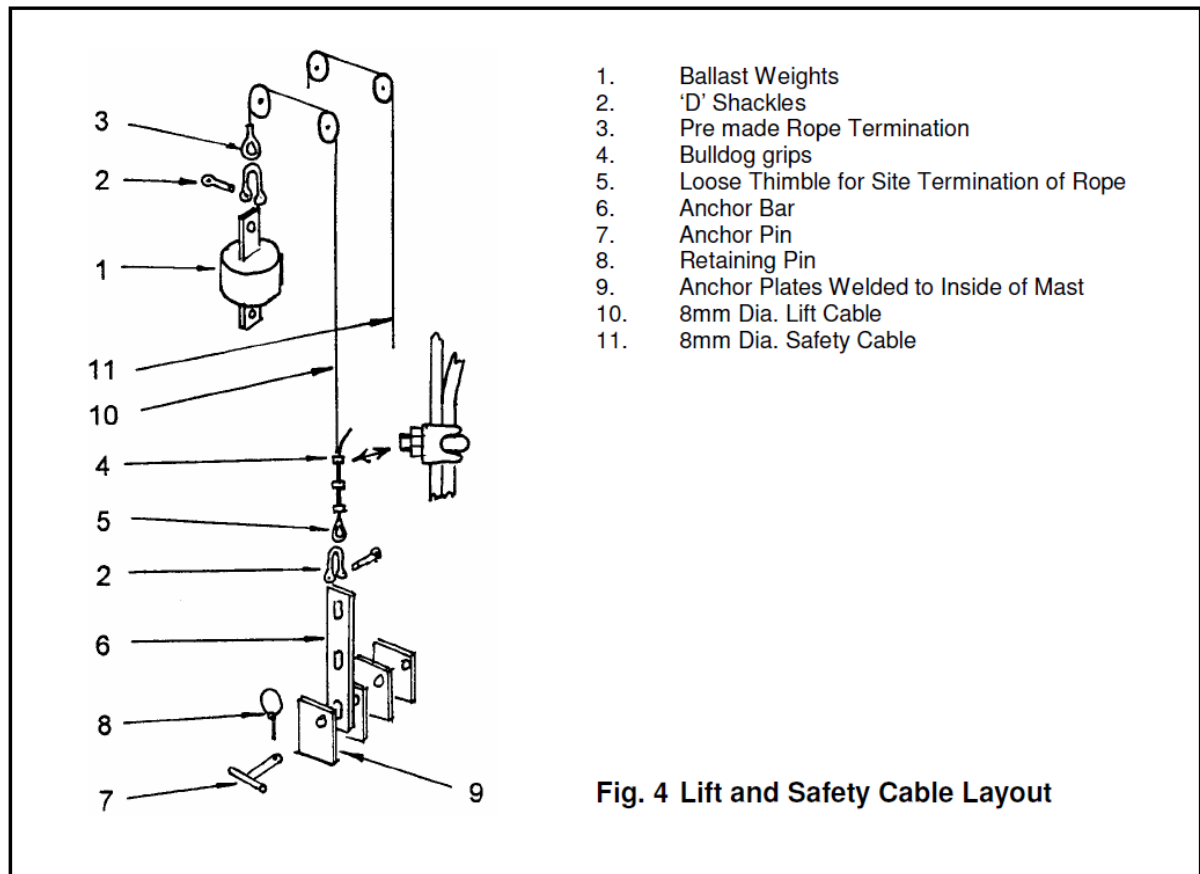
If the headframe access is by an external lift it will be necessary to install the lift and safety cables. Referring to Fig. 4, thread each wire through the pulleys at the top of the mast and then down the inside of the mast. Ensure the cables are not crossed or twisted. Fit the anchor pin to the anchor plate and secure the wires using thimbles and bulldog grips as shown. At this stage only lightly tighten the grips, as the final adjustment will be made when the mast is erected. Fit the ballast weights to the end of each wire.

Assemble the headframe platform including beams, floorplates and handrailing as per the engineering drawings. The completed assembly should then be attached to the flange on the top shaft. When attaching the platform to the shaft ensure that the removable rear handrail is uppermost.

Assemble the headframe with the door aperture uppermost. Fit all cross arms and ladders as shown on the engineering drawings. Install the fall arrest system to the ladders.

It is recommended that the fitting and wiring of luminaires is carried out whilst the headframe is at ground level. The electric cable from each luminaire should be threaded along the cross arm and through the glands in the shaft wall, then down the headframe tube and out through the door aperture. Sufficient cable to reach the power distribution board at ground level must be temporarily coiled on the headframe. Tie each bundle of cables to their respective cross arm mounting on the headframe tube.

Apply sealant to the headframe tube blanking plate and bolt to the headframe tube. Fit the lightning arrester spike and obstruction lights if provided.



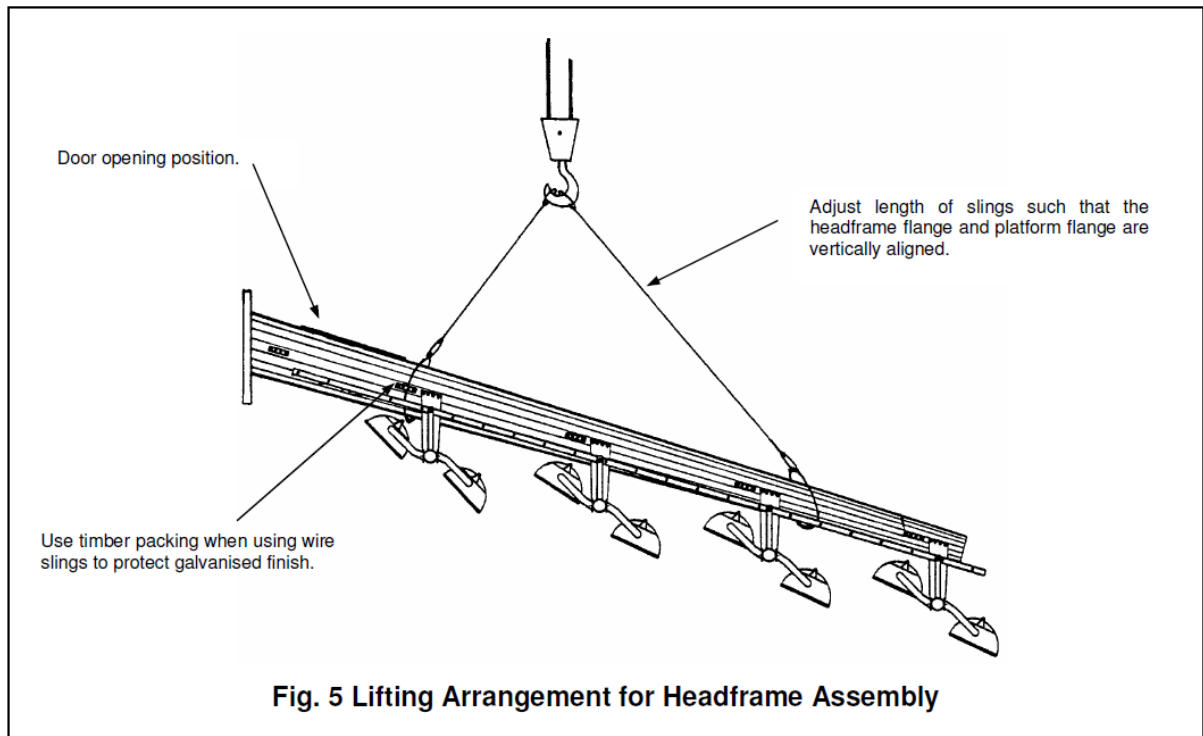
2.4. Mast Installation

Prior to lifting the headframe into place, its orientation relative to the final position of the mast should be considered.

It is recommended that a corresponding hole in both the headframe and platform flange is clearly marked to facilitate alignment. Lift the headframe into position as shown in Fig. 5. Ensure that mastic sealant has been applied to the flanges and that the marked holes align correctly. Fit the fixing bolts and tighten to the specified torque setting (see section 2.5).

Remove the electric cables from their temporary stowed position on the headframe and carefully thread down the inside of the mast. For INTACC masts horizontal rails are provided for securing electric cables at approximately 3m centres. Electric cables in EXTACC masts are usually secured to a catenary wire in bundles of 7 which in turn is secured to either a suspension wire support

plate or clamp plate welded inside the headframe tube. See Fig. 7 for details. On masts with external lifts it will be necessary to position the electrical cables away from the internal lift wires.

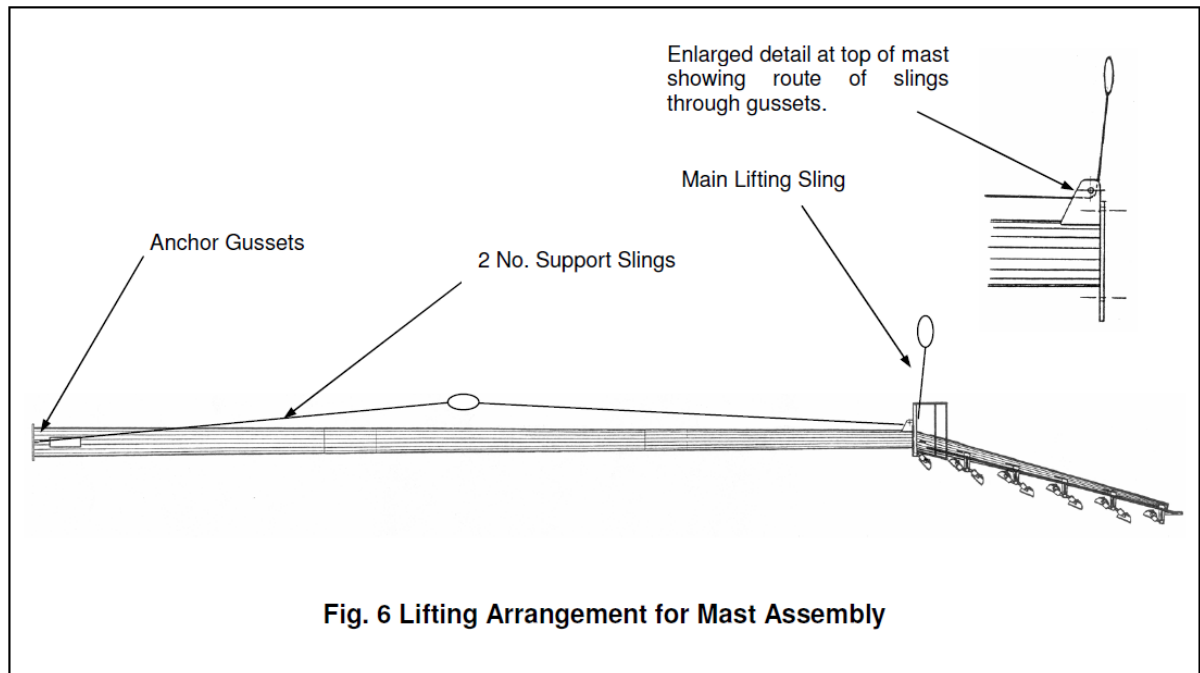


Prior to lifting the mast its orientation relative to the foundation bolts must be considered. It is recommended that a holding down bolt and its corresponding flange hole be clearly marked to facilitate alignment.

To facilitate erection of the mast, lifting lugs are provided at points on the flange and top shaft. A lifting sling should be attached to the lugs positioned either side of the mast at flange level. These slings should be connected to a third sling or rope of sufficient length to pass through and out of the lifting lugs located on the top shaft. This arrangement will provide a lifting point for the mast and additionally, prevent the shafts from separating during the lifting operation. Erectors must ensure that the ropes and slings used during erection of the mast are of sufficient capacity to support the weight of mast during lifting.

If external ladders are fitted ensure the slings are positioned so that the ladder will not be damaged during the lift. It should be noted that the platform is fitted with a removable rear handrail to provide clearance for the lifting slings during erection. Each holding down bolt is each fitted with two nuts and washers, the upper nut and washer should be removed. The threads should be examined for any damage and rectified using a die nut if necessary. The lower nuts should be positioned low enough to allow for the thickness of the flange plate and upper nut and washer to be installed above, with no more than 60mm between the concrete and the underside of the flange plate. They should then be set in a level plane using a steel bar and spirit level across each opposing pair of nuts.

Referring to Fig. 6 lift the mast, align the previously marked bolt and hole, and carefully lower the mast onto the foundation bolts. Secure the mast with the upper set of retaining nuts and washers. Remove the lifting slings and tie wires.



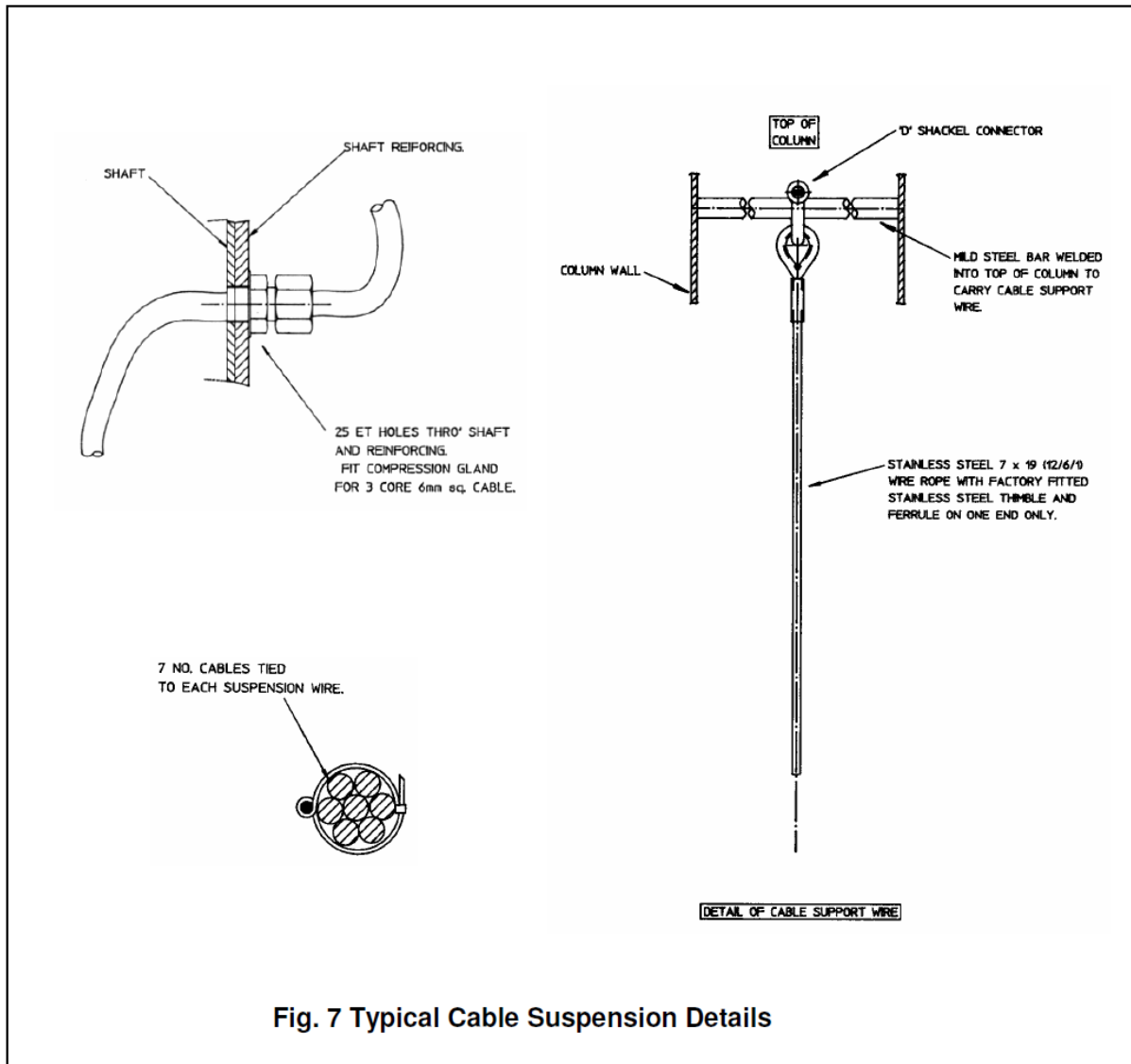
Check the mast for vertical alignment, taking due account of the shaft taper, which will be given on the engineering drawings. The vertical alignment can be adjusted using the lower nuts as necessary. Once the alignment is satisfactory all upper nuts should be tightened to the specified torque setting. It is advised that the nut positions are indelibly marked - see section 4.2 for details.

If the gap below the flange is to be grouted it is essential that adequate provision is made for ventilation and drainage of any water collecting inside the mast from condensation.

With the mast installed ensure that any internal or external fittings such as ladders, cable guides etc. are secured. Re-connect the rear platform handrail and secure in position.

Where fitted, check the internal lifting and safety cables for tension. With the lower end still secured to the anchor bracket pull each cable to move the ballast weight at the top of the mast. There should be about 50mm of free movement in each cable before the ballast weight touches the pulley at the top. Adjust as necessary before finally tightening the bulldog grips. Please note that the bulldog grips should be re-tightened when the wires have been preloaded as detailed in the operating instructions.

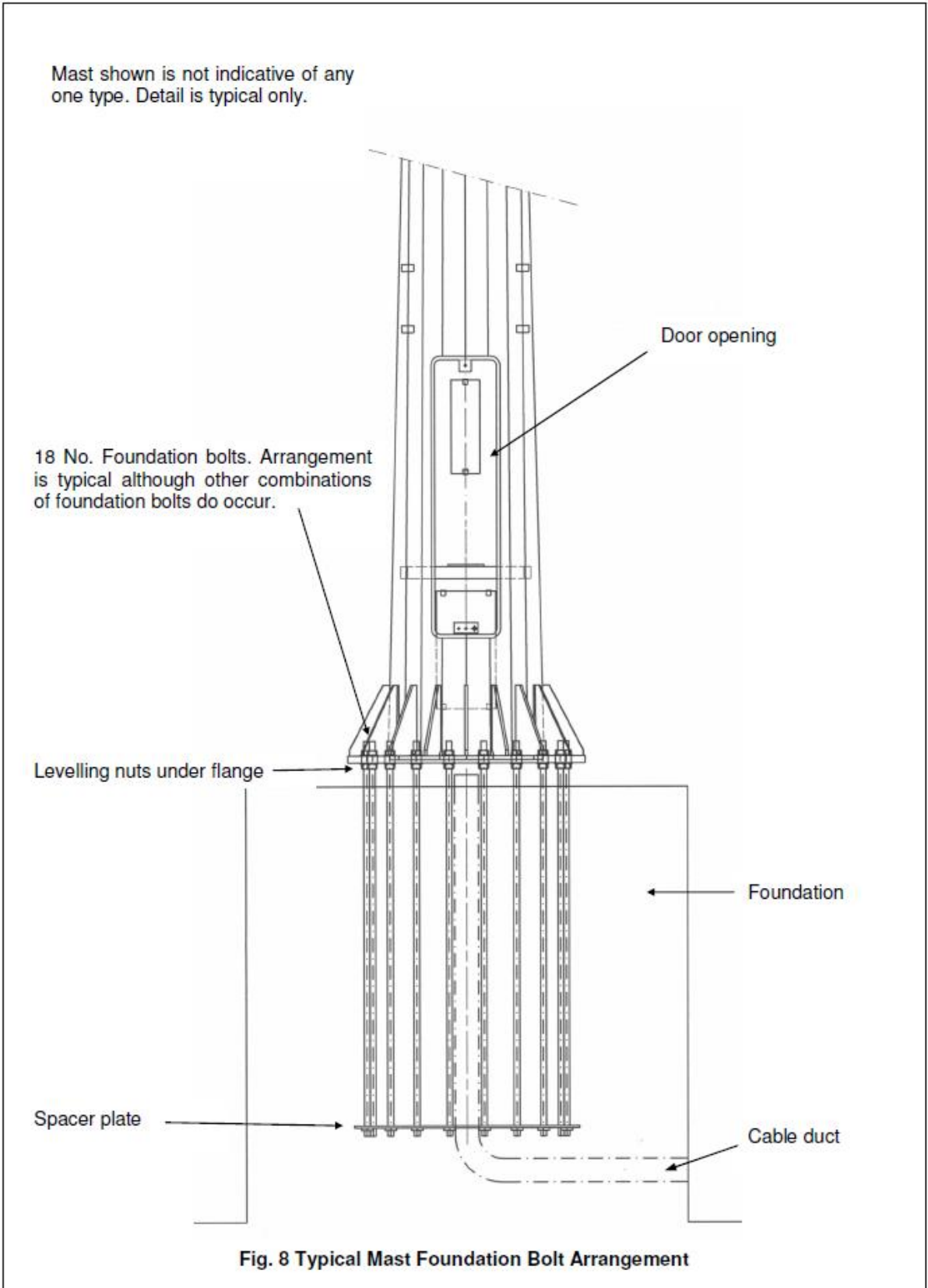
Installers should be aware that if they choose to deviate from the suggested installation method described in the previous sections, then it is their responsibility to produce a method statement which will ensure that the mast is installed in a safe manner.



2.5. Bolt Torque Settings

The torque settings in the table below apply to galvanised fasteners installed in clean dry conditions. For other situations please contact the Abacus Engineering department.

Bolt Size	Torque Setting (Nm)	
	Grade 4.6	Grade 8.8
M20	50	250
M24	160	425
M30	310	850
M36	550	1450
M42	875	2350
M48	1300	3500



3. Operation

WE STRONGLY RECOMMEND THAT THESE INSTRUCTIONS ARE READ CAREFULLY BEFORE ATTEMPTING TO WORK ON THE MAST.

IF RELEVANT, REFERENCE SHOULD ALSO BE MADE TO THE EXTERNAL POWERED LIFT MANUFACTURERS OPERATING AND MAINTENANCE INSTRUCTIONS BEFORE USE.

3.1. Working at Height

Any personnel working at height should be appropriately trained in safe methods of work cognisant of any local regulations in place.

All operations should be have a full risk assessed method statement in place before work commences.

3.2. Ladder Access

For Extacc and Intacc masts using ladders a Railok (or similar) fall arrest system is employed. This comprises of an aluminium rail bolted to the ladder rungs. The operative is provided with a safety harness and Railok 'truck' which is attached to the rail prior to climbing the mast. The truck is detached from the rail when the climb is completed and re attached prior to descent.

Anybody using personal fall arrest equipment must be trained and familiar with the use of the particular system installed.

3.3. External Powered Lift

Where an external lift is provided this must first be attached to the primary lift and safety wires stowed inside the mast.

Refer to the manufacturer's operating instructions when fitting the suspension wires to the lift. Position the lift below the ballast weights suspended at the mast head and secure the lift clamp frame around the mast. Tighten the frame against the mast as detailed in the manufacturer's instructions using the 2 winches and elasticated cables provided for this purpose. Fit the extension ladder to the top of the lift frame. The ladder in the lift and the extension frame should be in line with each other. Attach a polypropylene rope of length not less than the height from ground level to the headframe flange, plus 3m, to one of the steel wires stowed inside the mast, which corresponds to the safety wire on the lift. Taking the weight of the ballast onto the polyprop rope, release the anchor pin and lower until the ballast weight is in line with the top of the lift. Detach the ballast weight and attach the wire to the safety wire on the lift. Pull the nylon rope and haul the lift's safety wire to the top of the mast. Attach the mast's safety wire to its anchorage inside the mast. Fit the polyprop rope to the remaining wire in the mast and lower the ballast weight to the top of the lift. Detach the ballast weight and attach the wire to the winch lift wire. Fit the limit switch activating disc, to the winch lift wire 590mm from the thimble bearing face. See Fig. 9 for details. Haul the lift wire to the top of the mast and secure to the anchorage inside the mast.

Refer to the lift operating instructions and thread both safety and lift wires through the winch and emergency brake mechanism.

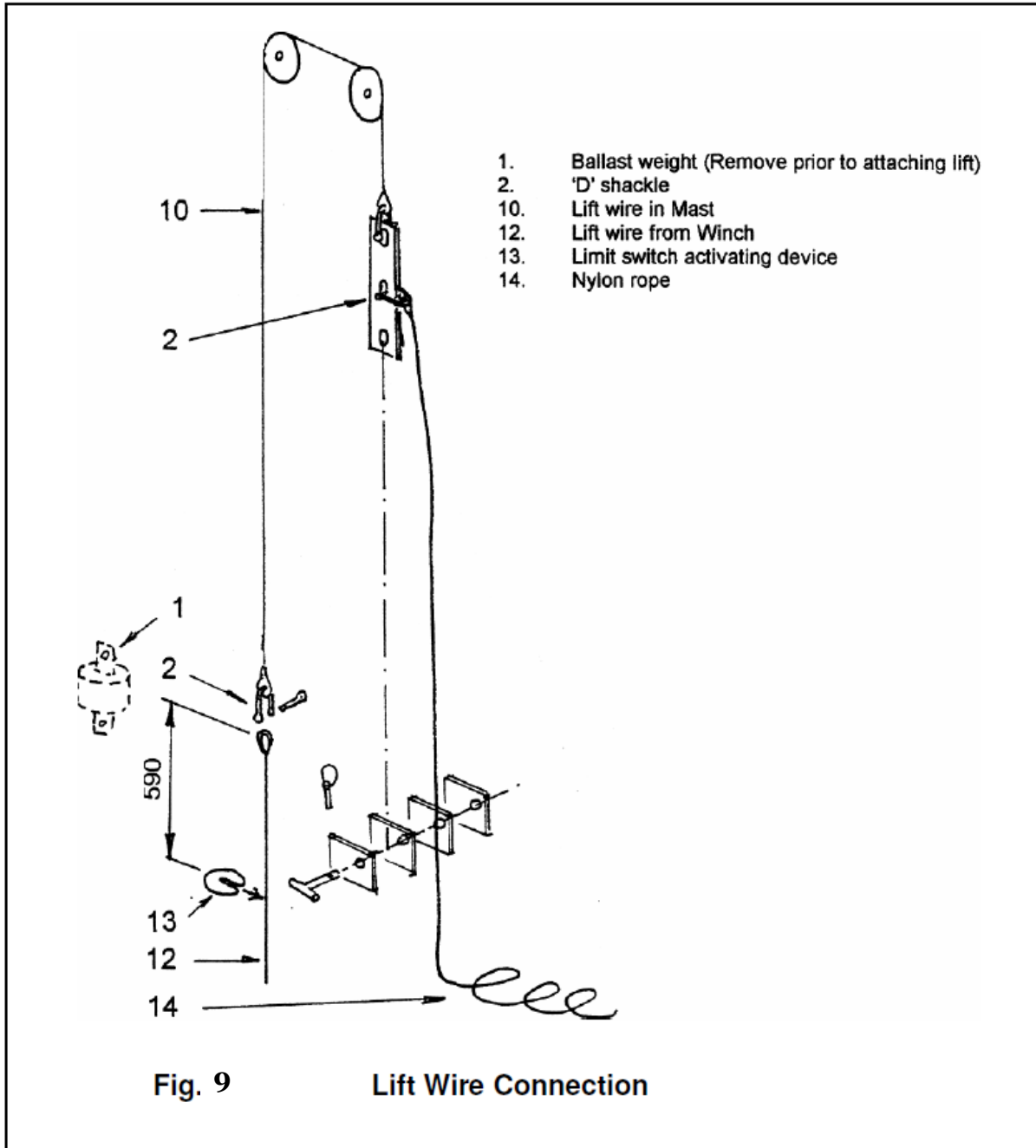
If the wires in the mast are being used for the first time; load the lift with ballast to its working capacity and operate the lift to raise it about 0.5m off the ground. Check the safety mechanism

function so that that both winch and safety wire have been subject to their working load. Lower the lift to ground level and re-tighten the bulldog grips at the wire rope connections inside the mast base, to compensate for any bedding in of the wire strands which may have occurred as a result of loading.

Refer to the lift manufacturer's instructions for operation of the unit.

Removal of the lift from the mast is the reversal of fitting.

ENSURE THAT THE BALLAST WEIGHTS ARE ATTACHED TO THE WINCH AND SAFETY WIRES BEFORE PULLING THEM UP THE MAST HEAD FOR STOWAGE PURPOSES.



4. Maintenance

WE STRONGLY RECOMMEND THAT THESE INSTRUCTIONS ARE READ CAREFULLY BEFORE ATTEMPTING ANY MAINTENANCE ON THE MAST.

The masts are of hot dipped galvanised steel construction with tapering slip joint type multisided shafts. Maintenance requirements are minimal but the following checks are recommended at the intervals stated.

Reference should be made, where appropriate, to the manufacturer's maintenance instructions for the ladder fall arrest system and external power lift.

4.1. Every Time The Mast Is Climbed

- Check that the ladder fall arrest system components are present, undamaged and working correctly. If maintenance work is required on the system then alternative fall arrest measures (such as double lanyard working) must be used while the work is undertaken.
- Ensure the safety harness to be used is complete, undamaged and its expiry date has not passed.
- Check that the external lift functions correctly and that its components are undamaged.

DO NOT ATTEMPT TO ASCEND THE MAST IF THERE IS ANY DOUBT AS TO THE ADEQUACY OF THE SAFETY SYSTEMS INSTALLED

4.2. Every 12 Months

- Carry out safety inspections of the climbing devices as recommended in the manufacturer's instructions.
- Check that the door cover is secure and that the locking screw functions satisfactorily. Lightly grease the screw threads.
- Check that the foundation and headframe bolts have not worked loose. The torque settings for the bolts are as shown in section 2.5. The nuts should be indelibly marked using Ambersil marker or similar as shown in the adjacent photo as a visual indicator that the nuts have not slackened from their torque setting.
- Clear any debris from around the foundation bolts and inside the base of the mast and ensure all areas are free draining of water.



4.3. As Required

Paint the shafts and headframe to protect against corrosion. Aesthetically the galvanised finish will typically last at least 5 - 7 years before painting is required. In polluted or saline environments this may be shorter and in mild climates considerably longer.

5. EN 1090 Certificate of Conformity

Certificate of Conformity of the Factory Production Control GB14/91485

In compliance with the Construction Products Regulation 2011 (retained EU law EUR 2011/305) as amended by the Construction Products (Amendment etc.) (EU Exit) Regulations 2019 and the Construction Products (Amendment etc.) (EU Exit) Regulations 2020, this certificate applies to the construction product(s)

Execution of steel structures and aluminium structures.

placed on the market under the name or trademark of

Abacus Lighting Ltd

Oddicroft Lane Sutton in Ashfield Nottinghamshire NG17 5FT United Kingdom

and produced in the manufacturing plant(s)

Abacus Lighting Ltd

Oddicroft Lane Sutton in Ashfield Nottinghamshire NG17 5FT United Kingdom

has been assessed and certified as meeting the requirements of

EN 1090-1:2009+A1:2011

This certificate attests that all provisions concerning the assessment and verification of constancy of performance described in Annex ZA of the standard(s) under system 2+ for the performances set out above are applied and that the factory production control fulfils all the prescribed requirements for these performances.

This certificate is valid from 01 August 2022 until 01 August 2025 and will remain valid as long as the test methods and/or factory production control requirements included in the designated standard, used to assess the performances of the declared essential characteristics, do not change, and the construction product and the manufacturing conditions in the plant are not modified significantly, unless suspended or withdrawn by the factory production control certification body.

Issue 6. Certified since 06 June 2014.

Authorised by



H. Crick – UK Business Manager

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Certificate of Conformity of the Factory Production Control
GB14/91485, continued

Abacus Lighting Ltd

EN 1090-1:2009+A1:2011


Issue 6	
Description	Execution of steel structures and aluminium structures.
Steel Type	Steel in grades: S235, S275, S355
Complementary designated Standard of Technical Requirements	EN 1090-2:2018
Execution Class	EXC2
Method of Declaration acc. to table A.1 of EN 1090-1	Method 2, 3b
Welding Process	111, 131, 141
Durability	No performance declared



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6. CE Marking

 0120	
Abacus Lighting, Oddicroft Lane, Sutton-in-Ashfield, Nottinghamshire, NG17 5FT, UK 14 GB14/91485, GB14/91821, GB14/91819	
EN 1090-1:2009+A1:2011 Fixed Masts	
Tolerances:	EN1090-1
Weldability:	S275 & S355
Fracture toughness:	27J at 0°C
Reaction to fire:	Class A1
Release of cadmium:	NPD
Emission of radioactivity:	NPD
Durability:	Galvanised
<u>Structural characteristics:</u>	
Standards:	ILP PLG07
Load bearing capacity:	See calculations
Deformation at SLS:	See calculations
Fatigue strength:	NPD
Resistance to fire:	NPD
Calculation reference:	FIXED-RANGE
Manufacturing:	EN1090-2: EXC2

7. Equipment Classification

The electrically operated lifting cage ('Manrider') is classed as lifting equipment and must be inspected and maintained in accordance with the Lifting Operations and Lifting Equipment Regulations (LOLER) 1998 or any local equivalent laws.

The design of the lifting cage is in accordance with EN 14492-1 and EN 1808.