



## STADIUM MASTS

### GENERAL SPECIFICATION

The stadium mast shall comprise of a duo-decagon (20 sided) monopole structure of continuous taper sections. The structure shall be designed to withstand a windspeed in accordance with CP3 Chapter V. The structure shall also comply with the international high mast code as published by the Institution of Lighting Professionals Technical Report No. 7. Mast sections shall be in 5.5m lengths so that each 11m section for assembly has at least one peripheral transverse welded joint. This joint has a double thickness of material over the joint length, which acts as a stiffening diaphragm and provides additional support to the section during delivery. After assembly, each site joint also acts as a diaphragm of substantial length as every site joint is greater than one and a half times the diameter. The completed mast, therefore, has diaphragms at approximately 5.5m spacing which provides additional support against distortion of the cross section, and thereby, also provides greater resistance to buckling. Although difficult to quantify, the closer the spacing of such diaphragm, the greater the resistance to section collapse and the formation of a plastic hinge.

The mast shall be fabricated from steel manufactured to BS EN 10025, graded as required and hot dip galvanised to BS EN ISO 1461. The fixed headframe shall incline at an angle of 10° and shall comprise of one or more working platforms. The platforms shall be fully protected by guard rails. Provision shall be made to mount the floodlights in rows of 4, 6 or 8 depending on the total number on each mast. Care shall be taken to enable full axial azimuth adjustment to be carried out. Care shall also be taken to ensure rear access to the luminaires for relamping.

The working platforms shall be linked with 2 or 4 no. service ladders, each ladder shall be fitted with a 'Railok' safety system (if required), 2 no. 'Railok' units shall be supplied with the contract together with 2 no. safety belts. Access to the working platform shall be by a mobile 2-man cage permanently attached to each mast and docked under the lower platform when not in use. The cage shall be certified under the Lifting Regulations 1971.

The cage shall be operated by a double drum winch housed in the mast base compartment and the cage lifting ropes shall be stainless steel with a solid core at least 8mm diameter. The winch shall be driven by a portable electric multispeed power tool fitted with a torque limiter, remote lead and switch. The mast shall be mounted on a flangeplate welded to the shaft and drilled to accept the medium high tensile foundation bolts. Provision shall be made inside the mast for mounting the installing contractor's power cables by catenary suspension wires.

### PARTICULAR SPECIFICATION

The mast shall provide a mounting height to the underside of the platform to suit the lighting design requirements. It shall be of welded steel construction, unstayed and of continuously tapered form. Dimensions shall comply with ILP Technical Report No. 7. It shall be designed for a 3 second gust wind speed with a return period of 25 years, of 45m/sec or required wind speed for location measured at a height of 10 metres above ground level, giving a dynamic wind pressure of 1240N/m sq. and have a design life of at least 25 years.

Allowance for seismic effects shall be made, if required, by means of the equation:-

$$V = CW$$

V = Nominal Seismic Force

C = Seismic Co-efficient assumed to be 0.05, and

W = Total Vertical Load

For a limit state design, the nominal seismic force shall be multiplied by partial load factors of 1.00 for the serviceability limit state and 1.40 for the ultimate limit state to obtain the design seismic forces. The design seismic force shall be applied successively longitudinally and transversely at the baseplate level. Each mast shall have a uniform steel flangeplate for bolting to the foundations together with a set of high tensile foundation bolts, a lower steel anchorplate and a removable steel template. The contractor shall be responsible for levelling the flangeplate on the prepared foundations and correctly aligning the mast. Exposed bolts and nuts shall be protected with 'Denso' tape or equal and approved, after lubrication with graphite filled silicon grease.

Welding shall comply with the appropriate British Standards as listed in BS499. Details of the welding procedure shall be submitted in accordance with BS EN 1011.

A copy of the calculations for the design of the masts showing clearly the grade of steel to be used shall be submitted for the approval of the engineer. Calculations shall take into account the weakening effect of the doorways.

A base compartment shall be provided of adequate size to contain the winch mechanism equipment. The compartment shall have a vandal resistant, weatherproof access door with heavy-duty vandal resistant locks, suitable for identical pattern keys. A number of keys can be provided if required. A 16mm diameter corrosion resistant earth stud shall be fitted within the compartment. Adequate working space shall be available for operating the hoisting equipment at the foot of the mast.

#### PROTECTION OF STEELWORK AGAINST CORROSION

Protection of surfaces shall be hot dipped galvanised to BS EN ISO 1461 for both internal and external faces. Painting of the mast is not required.

#### WINCHING MECHANISM

The maintenance cage shall be raised and lowered by a self-sustaining worm geared winch suitable for both manual and power driven operation and located at the foot of the mast. The winch shall be of double drum type which provides two completely separate suspension systems. The power tool shall be a four speed reversible tool incorporating a pre-set torque limiting device. Remote control switch shall be incorporated to allow the equipment to be operated from a distance of 5m. Arrangements shall be provided to support the power tool accurately and securely during operation.

The winch and all hoisting equipment shall be adequate to allow for attaching hoist ropes to a maintenance cage or cradle which shall sustain a working load of 250 kgs. The hoisting mechanism shall comply with all appropriate safety regulations.

The twin hoisting ropes shall be of stainless steel stranded wire running from the winch to the cage over pulleys made from non-corrodible metal at the top of the mast. The selection, provision and installation of the rope shall be in accordance with BSMA29. The pulley grooves shall be suitably protected against moisture, dirt and rust and fitted with close fitting guards to prevent derailment of the hoist rope. Self-lubricating pulley bearings shall be used. All vital parts of the hoisting mechanism shall be of stainless steel or other non-corrodible material to the approval of the engineer. Thimble type connections shall be used for ropes, wherever possible, alternatively, bulldog grips shall be used. Particular care shall be taken to ensure that the wire rope cannot abrade against any component.



When the cage is in fully lowered position, at least to within 1.3m of the base line, at least 4 turns of the hoisting rope shall be left on the winch drum to ensure that the securing arrangement on the drum does not take the full load when hoisting.

The rope shall be as clearly visible as practicable during the hoisting operation. There shall be a clear indication near the winch to show when the cage has reached the design operating height. Details relating to lubrication shall be given on an engraved label fixed to, or adjacent to, the winch in a visible position.

#### FLOODLIGHT PLATFORM

The floodlight platform shall be attached to the upper shaft by a bolted connection; no welding shall be permitted during site assembly. The headframe shall be inclined at an angle of 10° to facilitate floodlight aiming.

Floodlights shall be in rows of 4, 6 or 8 to allow relamping from ladders in pairs; access ladders shall, if required, have a 'Railok' safety track to comply with BS5062/1973. The headframe shall be complete with guard rails for safe working.

#### MAINTENANCE CAGE

A maintenance cage shall be provided of sufficient size and strength to raise two men together with maintenance equipment, total weight 250kgs to the top of the mast. The maintenance cage shall be raised and lowered by the mast winch and wire ropes. Suitable arrangements shall be provided to prevent damage to the protective systems of the mast during raising and lowering. The cage shall be hot dipped galvanised after manufacture. The safe working load shall be prominently displayed in a permanent position on the maintenance cage.