MEGAFAR MAST

N.C.M s.r.l.

LIGHTING POLES AND MASTS

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HIGH MAST
"NCM-MEGAFAR"

TECHNICAL DESCRIPTION

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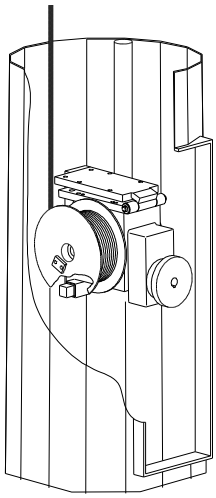
A) POLE STRUCTURE

The pole has a conical shape with a polygonal cross-section. It is made of **Fe 510** sheet metal press-folded and welded longitudinally as per **"EN 288"** standards. It has been certified by the **ITALIAN WELDING INSTITUTE**. The number of sections in the pole depends on its height. Every single element is assembled using a self-locking system. In the base section space is provided for the housing of the winch/hoist. This opening is appropriately ribbed and reinforced in order to maintain the original flexural bending characteristics of the section.



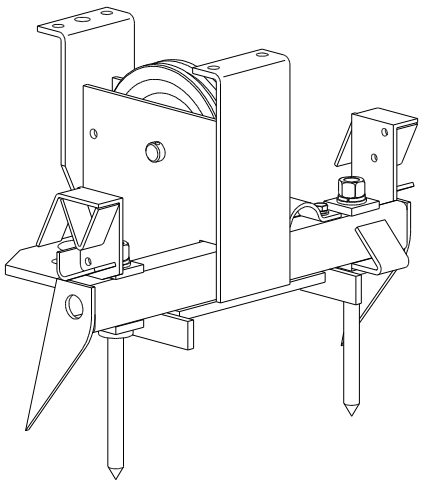
MOTION CONTROL UNIT

B) CROWN GUIDED MOTORIZED MOBILE SYSTEM (Exempted from annual check Art. 194 of D.P.R. 547)

The return pulley for operating the cable is positioned at the top of the pole. The pulley is mounted on self lubricating ball bearings. The pulley dimension is as per **D.P.R. 547** art. 178.

At the upper extremity of the pole the following fixtures are also mounted:

- Hooking device of the mobile platform while it works, suitable to lighten the rope from the weight of the crown and the floodlights
- Antirotation dowel pins (pivots) suitable to oppose the thrust done by the wind on the floodlights
- Electrical Socket/Plug providing a safe and sure contact while maintaining the electrical wires fixed inside the pole.



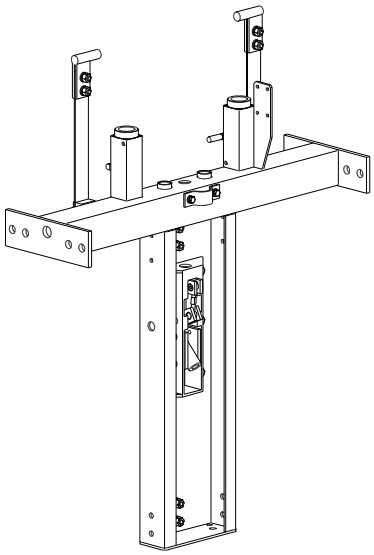
POLE TOP

The **MOBILE CROWN** is made of hot dip galvanized steel sections. This frame supports the illuminating projectors and related electrical equipment. It can be circular or rectangular as a panel.

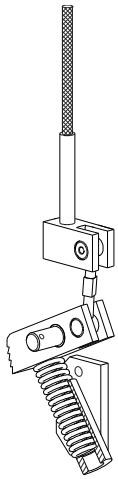
The **GUIDE,** in anticorrosive aluminium, guarantees the precision of movement required during the process of hooking and permits the lowering and raising of the crown in a perfectly regular manner, even in the presence of wind. It also offers a homogeneously smooth plane surface for a proper grip necessary in the motion of the parachute brake.

The **CARRIAGE** is built with hot-galvanized steel sections. The movement in the aluminium guide is by sliding blocks/shoes made of polyamide 6. The hooking is achieved by the use of two laminated steel and relative pivots (pin).

The exclusive "NCM" **PARACHUTE BRAKE** system is positioned at the centre of the carriage, it includes a bloom, where the cable is deposited, a regulation screw and a notched lever which acts as a brake during the operation of the pressure/thrust spring. The braking of the carriage takes place every time the traction rope loosens.



CARRIAGE

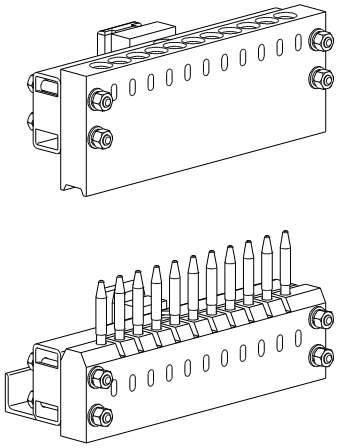


PARACHUTE BRAKE

The **CABLE** is made in high resistance galvanized steel. A safety factor of 6 for the cable was adopted as per **D.P.R. 547, art. 179.**

The **MOTION CONTROL UNIT** is constituted by an irreversible reduction gear consisting of worm gear with a ratio of reduction of 1/60 a pre-torque to spur gears. The worm gear with a ratio 1/60 has a lead angle of 3° 41' which guarantees irreversibility. The pre-torquing consists of a gear and pinion. Both the pinion and the gear are made of material **16 C N 4** casehardened, tempered and grinded. The carter of reduction unit is a highly ribbed structure guaranteeing a high resistance. The portable control motor is connected to the entry shaft while the grooved drum to wind the steel cable is mounted on the exit shaft. The ratio between the drum diameter and the diameter of the cable is higher than 25 as required by the **D.P.R. 547**. The reduction unit is mounted on a balance platform to permit the constant verification of tension of the steel cable.

The activation of the reducing gear is effected via a **PORTABLE ELECTRIC MOTOR** –power **kw 0,33 ÷1,1 – 3 ph – Hz 50 – 4 poles,** alimented by **380 V;** it is equipped with an electric control board and safety devices, with floating pushbuttons which operatesat low tension with power cables of 5m to operate from a safe distance during the hooking phase. The pushbutton panel is provided with controls to stop the line supply, to raise and lower. Therefore, it is possible to check at a distance the various phases of the work and in particular the hooking at the top that takes place automatically when it has reached the end of the run. The motor is fed by the line power of the projectors. This system, simple and cheap, permits the operation of many masts and the maintenance of the projectors simultaneously on several masts.



PLUG – SOCKET BLOCK

ELECTRICAL ACCESSORIES: The power line of the mast can be devided in sections inside the mast by the use of terminal blocks fitted with fuses. The power for the lamps is obtained with a fixed cable located inside the mast which runs from the base and is fixed at the top on the socket. The socket is built to carry 64 Amperes and is protected by a device which impedes electrical connections taking place in the presence of tension.

PROTECTION COVER: The electrical and hooking devices at the top are protected by a cover made of glass fibre.

C) DIMENSIONS OF THE STRUCTURE : STANDARDS AND METHOD OF CALCULATION ADOPTED

For the dimensioning of the steel structure of the pole in polygonal section the following Standards were adopted:
- Standards for the discipline of work in C.A and in metallic structures Rule n° 1086 of 5 november 1971

- Steel constructions: calculating instructions, execution and maintainance-CNR UNI 10011

-Cold-stamped profiles-instructions for the use in constructions-CNR UNI 10022

-Technical Standards for the execution of work in reinforced concrete normal, precompressed and for metallic structures-D.M. 9.1.96

-Criteria for the verification of safety of constructions and loads and overloads-D.M. 16.1.96

In the valuation of internal actions of each structural element the calculations were carried out according to ordinary criteria of the Science of the Constructions, with particular attention to the continuity of the elements to the relative to the multi grades of fixed joints. The structures in their complexity and in single components do not present any peculiarities that would require particular investigatiions from the point of view of calculation.

In particular: The pole is considered as an isostatic structure (bracket) having the following loads applied:
A – Axial Vertical Load:
Dead weight of the single sections
Dead weight of the projectors, supports and various accessories.

B - Horizontal Actions:
Wind distributed along the length of the pole
Wind concentrated at the top of the pole, due to the complex surface of the projectors and various supports.

C - Additional Bending Actions:
Due to the eccentricity of the vertical loads (dead weights) during maximum elastic deformation of the pole.

The analytical verifications are performed considering the contributions due to the wind, by rule, of static character (static analysis).
In the case under study, the wind produces also dynamic phenomena due to the period T of the firs mode of vibration of the structure (dynamic analysis).
The calculated stresses in the most significant sections are compared with the relative maximum permissible stresses of the material.
The result is a function of the diameter and the thickness of the section under study, in addition to the yielding strength of the basic material.

The projectors are located on the periheral edge beam of the mobile platform. As the centre of suspension does not coincide with the centre of gravity, provision is made for a lateral ballast using the electrical accessories present.

The horizontal structure of the platform is, therefore, designed to accommodate the following loads acting on it:

- weight of the projectors
- wind pressures
- ballast (electrical accessories)

in addition to the weight of the carpentry.

The vertical structure of the platform has the function of supporting the sliding shoes. In the case of the failure of the steel cable, the time of free fall has been calculated as a function of the elasticity of the brake spring (extension and relative average force exercised). Having thus determined the time the calculation of the velocity of the fall and the relative braking distance is easily made.

Finally, the braking force which manifests during the stopping of the platform is calculated. The vertical arms, the sliding shoe housing, are designed to account for the effects of the braking force.

The sliding shoe in polyamide 6 have a safety factor greater than 1.5, obtained by comparison between maximum working stress and the breaking strength of the base material.
The aluminium guides, of the housing of the sliding shoe, are designed considering the simultaneous effects of wind and braking during free fall of the platform.