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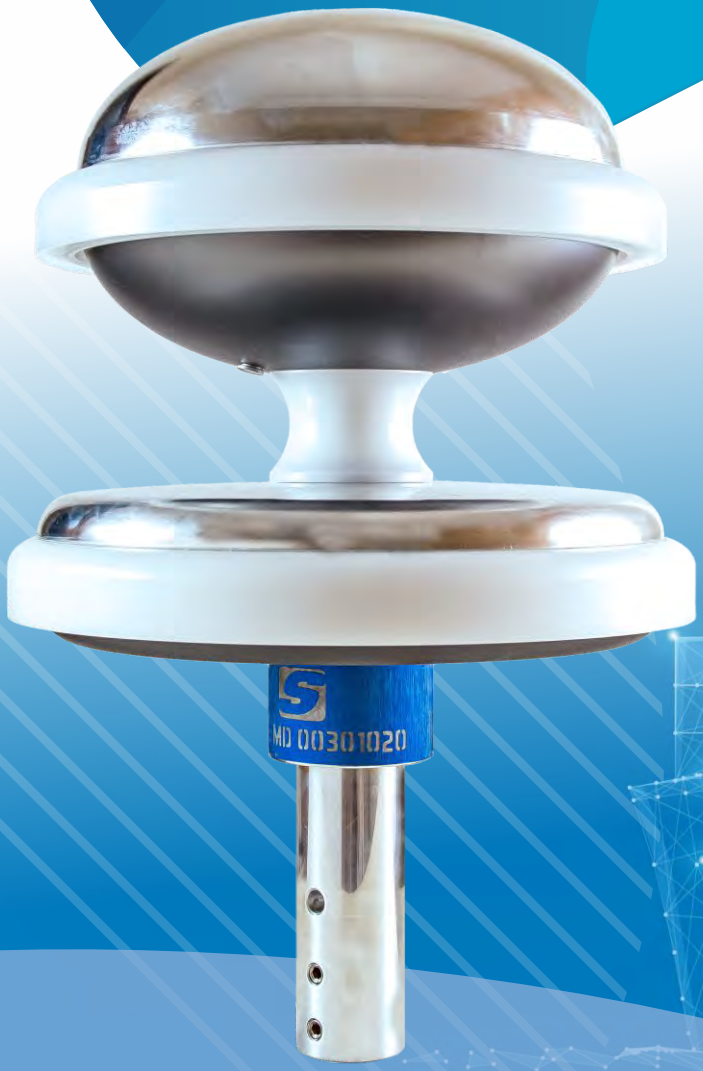
CMCE MARINE

Installation Guide



PDCE-CMCE SERTEC

ELECTRIC FIELD PROTECTOR

DUN & BRADSTREET D-U-N-S® REGISTERED™

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CMCE SERTEC
Electric Field
Protector

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CMCE MARINE

Determination of the Model to be used in the yacht or vessel

To determine the model to be used, the distance from the main mast tip to the bow (df) and stern (dp) must be taken into account, as well as its distance from the base on deck (dh).

If df; dp; dh < 25 CMCE-Marine Gold model is used

If 25 < df; dp; dh < CMCE-Marine Platinum model is used

If 55 < df; dp; dh < 120 CMCE-Marine Diamond model is used

(See Figure 1)

> **There are special cases where it is necessary to oversize the protected zone in order to ensure safety. In this case contact the manufacture**

A support will be prepared to adapt the head of the CMCE MARINE Sertec and install it in the highest point of each structure to be protected, protruding at least 30cm (measured from the lower plate of the CMCE Marine-Graphic backing) above any existing equipment or antenna (See simulation ***Figure 2***). To do this, the antennas and other elements will be adapted and reorganized so that they are placed or located 30cm below the lower plate of the CMCE MARINE Sertec. In exceptional cases where the antennas or objects need to exceed the height of the protector, they can be made of plastic, covered with fiberglass or any other insulating material, these do not affect the operation of the CMCE Marine, if you have an element of conductive material, you proceed to cover it with an insulating material such as heat shrinkable tubes or some insulating material that covers the entire conductive material ***(See Figure 3)***

In order to do so, the necessary anchorages will be made to guarantee the mechanical support of the antennas and the protector mast. In the mast/CMCE union, adapters will be used to guarantee the electrical and mechanical connection of the CMCE Marine head with the mast and the earth, all of which will have to be lubricated with graphite grease. The mechanical set of mast and supports will be calculated to support the weight of CMCE Marine, tidal shocks during navigation, and winds over 180 km / h.

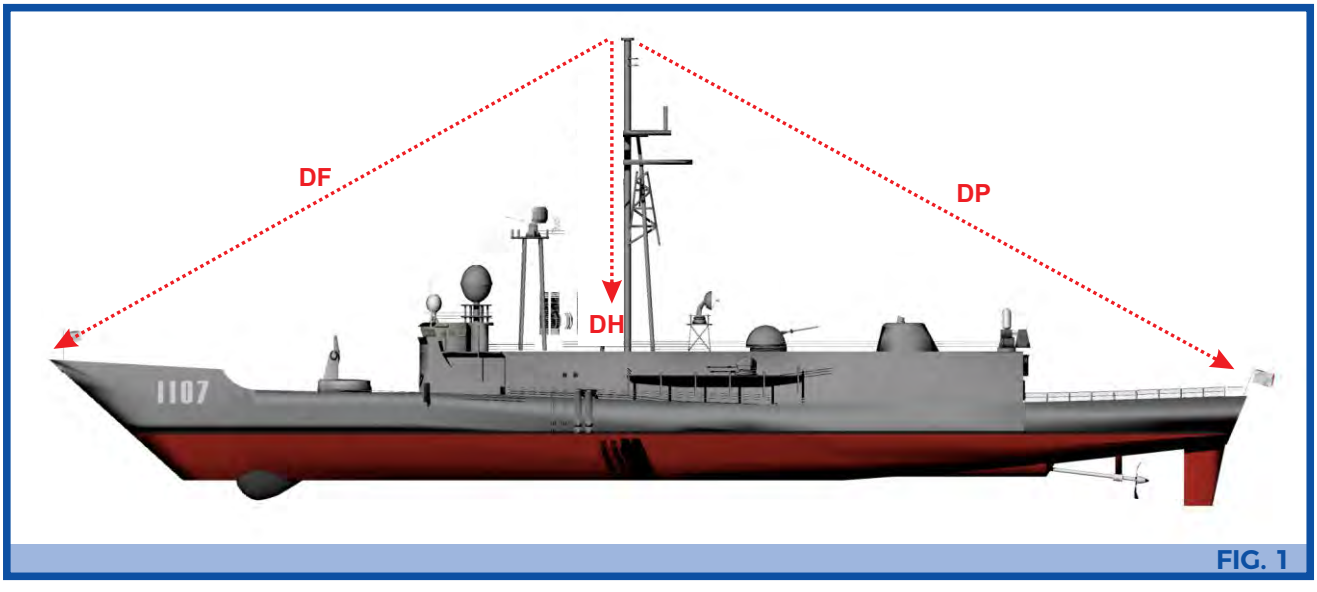

FIG. 1

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1

CMCE MARINE

Determination of the Model to be used in the vessel

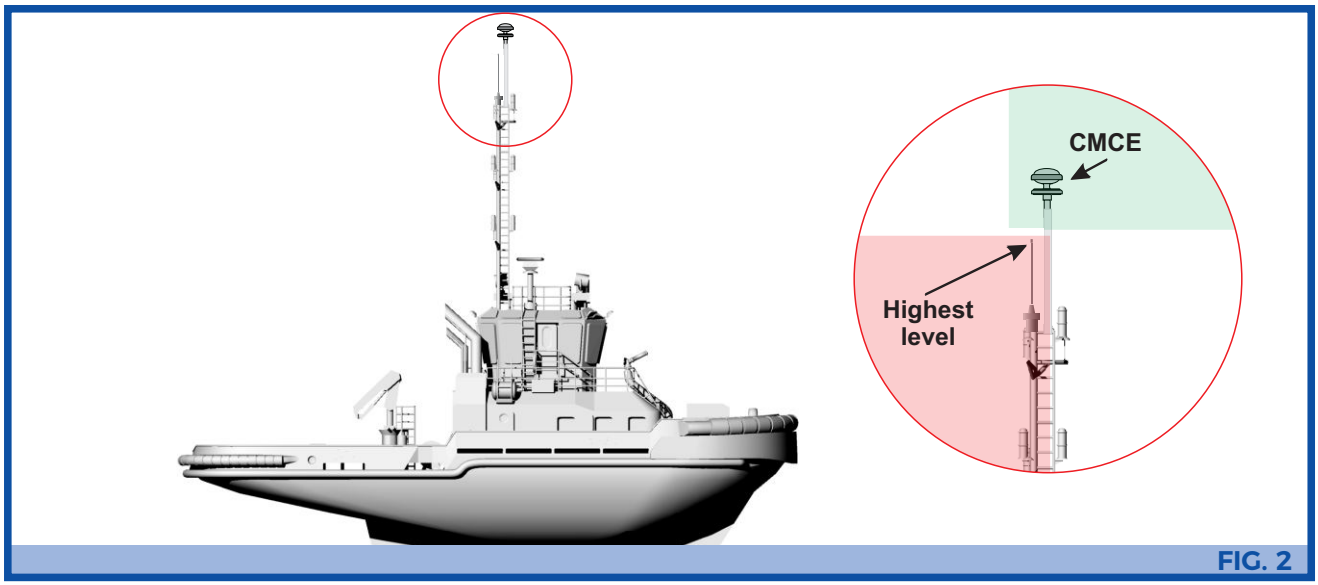

FIG. 2

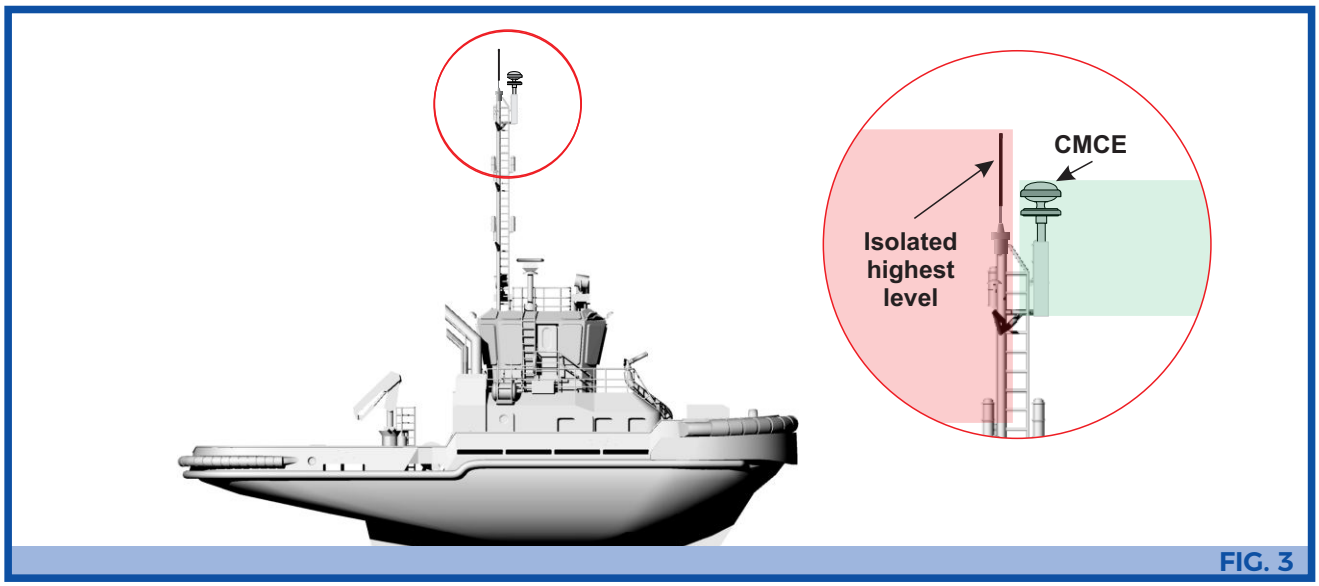

FIG. 3

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MOUNTING OF THE CMCE

To the mast or to the structure of the vessel

CASES

Manufactured Support:
A support can be manufactured according to need that would be attached to the end of the main mast, the CMCE-Marine must exceed the highest point, for fixing should be used stainless steel bolts, the support to be manufactured can be stainless steel, fiberglass, aluminum, if you want to suggest a material of greater mechanical strength consult the manufacturer.

FIG. 4

Sailing cabin (Bridge):
You can use the support mentioned above and add a tube if you need to gain height to surpass the highest point, the tube must be stainless steel, fiberglass, galvanized steel with epoxy paint treatment, must be hollow with walls of a minimum thickness of 3. 2 mm and to this the CMCE must be fixed by a passing bolt with a self-braking nut at the end, the fixing of the pipe with the manufactured support may be with flanges, galvanized or stainless steel clamps, if both parts are made of steel they can be welded or by a fixing system suggested and approved by the factory. When the pipe exceeds the support by 1.5 meters, steel cable tensioners with a maximum opening of 60° and a minimum of 30° shall be used, measured from the line of the pipe axis to the tensioner.

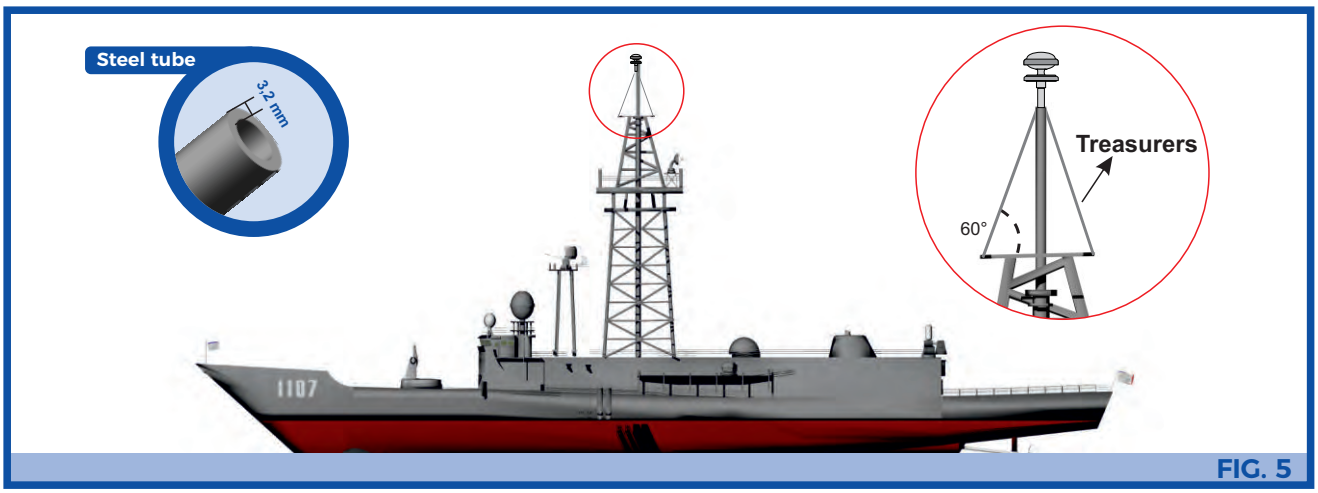

FIG. 5

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MOUNTING OF THE CMCE

To the mast or to the structure of the vessel

Chimney:
Same consideration as in the cabin, but taking into account the average working temperature and the peak temperature, if these temperatures exceed 160°C, a special CMCE AT Marine model disigned for high temperatures moust be installed. The equipment should be fixed opposite to the flow of gases in the normal direction of navigation

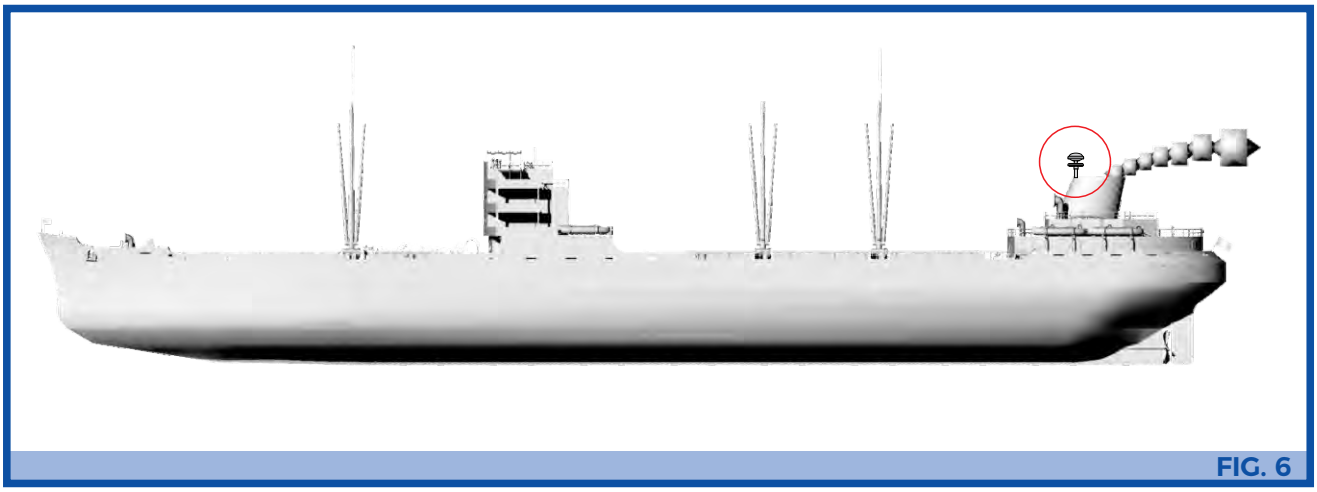

FIG. 6

Two or more masts of equal height:
The equipment should be placed on the mast where the best coverage is obtained, in this particular case the height of the masts should be exceeded by at least 50 cm, in case of a distance between masts greater than 10 meters, it will be necessary to exceed the mast by 1 meter.

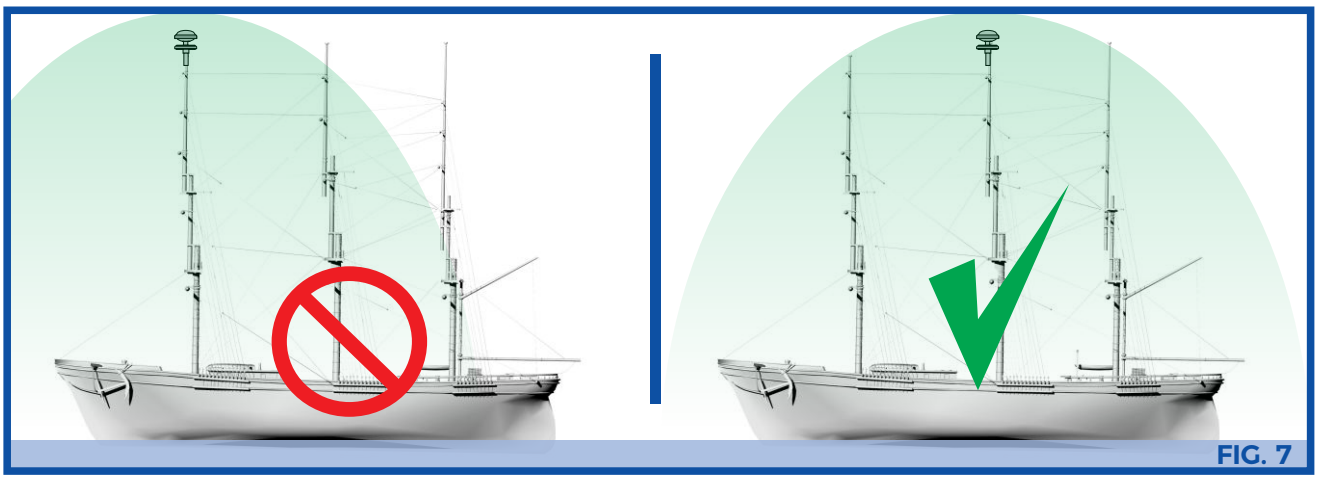

FIG. 7

THE DESIGN AND SIZING

The layout of the conductors and fixings of the grounding plates will be determined from the dimensions of the vessel and the availability of space.

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GROUNDING

The following specifications are required for the CMCE-Marine grounding system:

- Copper conductors must be at least 95 percent pure to ensure electrical conductivity and a minimum of 25 mm2. (4 AWG) ***(See Figure 8)***
  It is recommended that copper conductors should have a galvanic tin coating.
- Conductive materials other than copper can be used, such as aluminum, stainless steel and zinc, as long as they meet the Copper equivalency
- The materials used in the installation of the lightning protection system must be resistant to corrosion in a marine environment.
- Grounding electrodes should be installed on the non-metallic hull of a vessel in order to provide multiple paths for the drainage of charges to be dissipated in the water.
- Each grounding electrode must be connected either directly to a main conductor or to a distribution plate of at least 929.03 cm2.
- Grounding electrodes must consist of a solid, immersed conductor with a water contact area of at least 0.09 m2 (1 ft2), a thickness of not less than 5mm (3⁄16 in.) and a width of at least 19 mm.
- No main conductor should pass within 6" (150 mm) of the waterline without heeling, except when it ends at a grounding electrode within 24" (600 mm).
- The total area of a main grounding electrode should be at least 929.05 cm2, (ex: L=29.72cm; a=14.86; e=0.5cm).
- A main grounding electrode must be submerged during normal vessel operation.

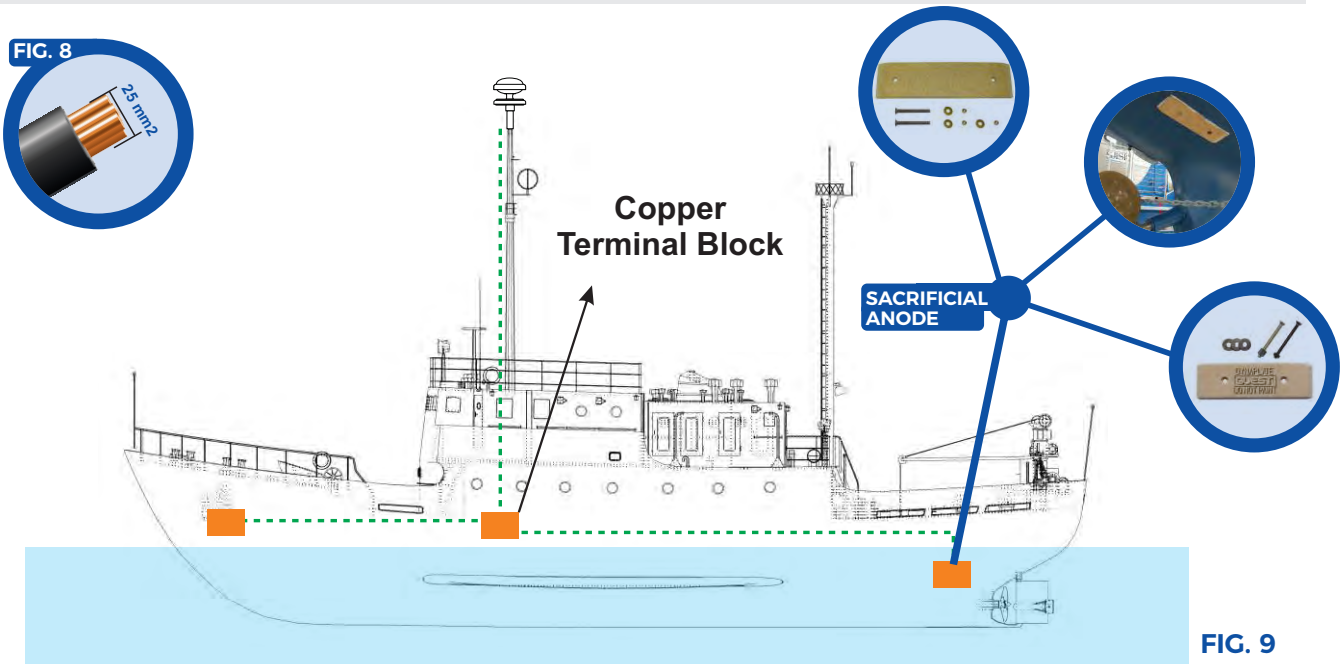

FIG. 9

3

GROUNDING

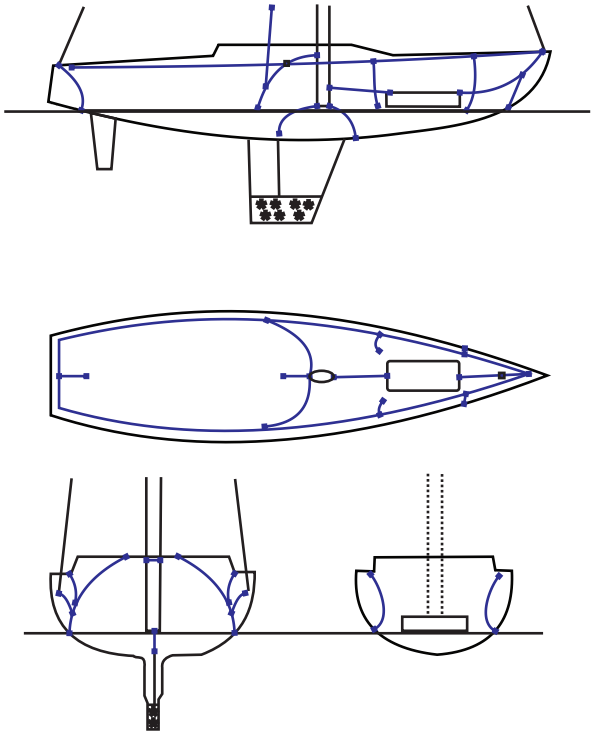

FIG. 10

From the down conductor a grounding bar is used to interconnect each branch that is connected to the grounding plates, this distribution and sizing is done in relation to the type of vessel.
In general, at least two secondary conductors must be routed from the copper bar, one on the port side in a forward direction and the other on the starboard side in a stern direction. These secondary conductors must be connected to the grounding plates, one of which is submerged and the other on the waterline. To this must be added the interconnection of the existing bars of the boat.
Boats with metal hulls. When there is an electrical connection between a metal hull and a CMCE-Marine of sufficient height to obtain the protection zone, no more than one connection to an earthing plate should be necessary, the one above the waterline.

In case of a different scenario or not mentioned above, please consult the manufacturer.

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REMARKS

- One or more main conductors are divided into several grounding branches.
- The main conductors are preferably routed outside the indoor areas.
- Each grounding branch ends at a grounding terminal.
- Multiple grounding paths increase the level of protection around the hull against side rays.
- Risk of side lightning from an in-water mounting is reduced in the vicinity of any ground terminal.
- In fresh water it is highly likely that there will be a side discharge at any conductive fittings below the water line and all chainplates (iron straps). The design should use many electrodes close to the risks of lateral flash and be distributed over the hull surface.
- In salt water, side discharges are much less likely, as conductive fittings closer to the hull and chain plates are more at risk. Additional electrodes are recommended under all chain plates and near hull mounted fittings below the waterline.
- The design and type of conductor to be used and the locations of the connection points must consider the following:
- The perimeter conductive ring should be as outboard as possible and above the waterline.
- The connecting wires must be oriented parallel to the water surface.
- The main conductors must be oriented perpendicular to the water surface.
- As many grounding branches as possible should be evenly distributed around the hull perimeter, with each branch comprising a main conductor terminated at a grounding terminal.
- The connections should be located in a copper bar to minimize the curves in the main conductors.
- Substantial submerged accessories, such as non-encapsulated ballast and propeller struts, can be used as submerged grounding terminals.
- It is prohibited to combine materials that cause galvanic pairs when they are likely to be in contact with water.

Verification of Transient Suppressors

Check if the components of the vessel are equipped with these and the state in which they are, these must be a minimum voltage of 600V and maximum of 15 KV, to ensure the protection of sensitive equipment

Measurement of the grounding system/drainage measurement

This process is carried out using a multi-function clamp which is capable of measuring grounding resistance (Ω) and drainage current (mA). This measurement must be taken at the grounding point of the CMCE-Marine.
If it is a pre-installation measurement of the CMCE-Marine it can be performed on the main board of the vessel.

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