



CMCE MARINE

*ADVANCED LIGHTNING
PROTECTION SYSTEM*



ADVANCED LIGHTNING PROTECTION

CMCE LIGHTNING SUPPRESSION

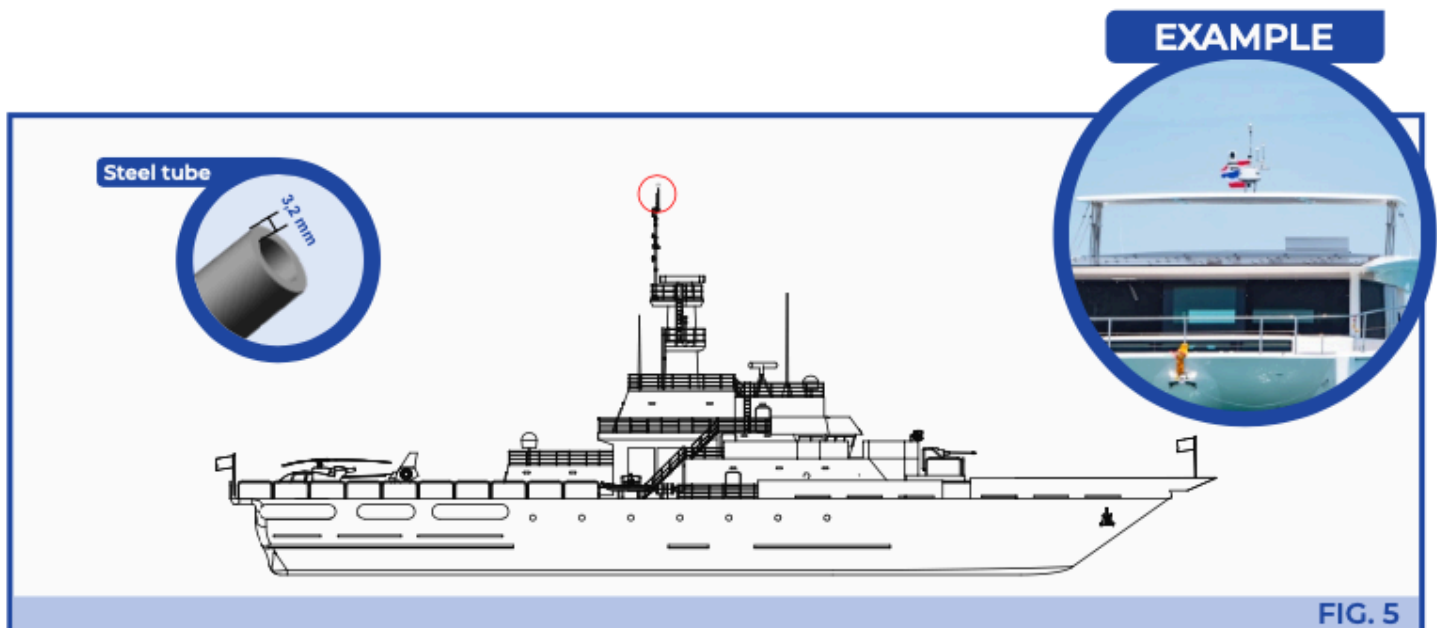
It is composed of a CMCE Marine unit, connected by a mast or support to the mast of the ship itself and to the grounding network, all connected by cables or plates to ensure an equipotential and attached to the electrodes of ZINC or to the chassis of the boat, discharge or the structure itself, the grounding network connected to ground, is made by copper cable with cover.

INSTALLATION

The support will be prepared to adapt to the head of the CMCE Marine device and installed at the highest point of each structure to be protected, protruding 30 cm (measured from the lower plate of the lightning protector) above any existing equipment or antenna. See simulation in photos). To do this, the antennas and other elements will be adapted and reorganized so that they are in a plane less than 30 cm below the lower plate of the CMCE Marine device. In case the antennas or objects that exceed the height of the lightning conductor are made of plastic, covered with fiberglass or insulating material, they do not affect the operation of the lightning conductor since they do not excite the lightning.

The necessary anchorages will be made to guarantee the mechanical support of the antennas and the mast of the lightning protector, at the mast/lightning conductor junction adapters will be used to guarantee the electrical and mechanical connection of the lightning protector head to 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 for the weight of the deionizing lightning conductor (6.3 kg), sea strikes during navigation and winds over 180 km/h.





ADVANCED LIGHTNING PROTECTION

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RECOMMENDATIONS

Bearing in mind that vessels may differ from one another, an inspection should be carried out prior to the installation of the lightning conductor, in which the following factors should be taken into account:

- Type of vessel
- Materials of which the hull and mast are made
- Type of grounding system used
- Grounding system status
- Verify that the system is equipotentialized
- Dimensions of the vessel
- Mast height
- Distance from the mast tip to the bow and stern

GROUNDING

The grounding conductor of the lightning conductor, the equipotential ring, and all other metallic elements shall be connected to the equipotential ground that links the galvanic anodes.

Once the installation has been performed and the correct ohmic resistance of the galvanic anodes in relation to the water has been assessed, if the resulting value is greater than 10 ohms in the Port, the contact surface of the anodes in relation to the water should be extended, increasing the number of galvanic anodes until the value is stabilized at less than 10 ohms.

OVERVOLTAGE PROTECTIONS

To reduce damage to electrical, electronic, and especially telecommunication equipment, overvoltage protectors will be installed on each element, between phases, between phase and mass, between positive and negative, etc. The antenna cables will be protected with reference to the entrance of the electronic equipment. The network connection to the Earth, will have to have a protector of over-voltages that derive them, that can come from the electrical network of the port.





CMCE MARINE LIGHTNING SUPPRESSION MAINTENANCE, GROUNDING, & GALVANIC ANODES

PREVENTIVE MAINTENANCE

Lightning conductor installations are designed for a specific purpose, the protection of people, animals, and facilities. The technical and operational requirements of each installation make it necessary to locate the lightning conductors at high points and to position them in relation to a good earthing system. Each installation is a different world and implies using different accessories to hold, connect, and carry out the installations to comply with the design. Lightning conductors and cable installations are exposed to different meteorological phenomena and permanent climatic changes during each year. Exposed materials may be subject to unintentional deterioration by the manufacturer, installer, or user, either through contamination or mechanical stress.

For this reason, it is mandatory to carry out a periodic review of the entire installation, to verify its condition and the continuity of the proper functioning of the lightning protection to ensure its operating efficiency. The maintenance protocol shall comply within full and rigorously at each annual inspection; a report of the procedure shall be drawn up by the official installer, in accordance with the manufacturer's documents. Each revision report will be endorsed with the client's signature, and the incidents or breakdowns will be recorded, if any.

MAINTENANCE PROTOCOL

The review period: BIENNIAL.

Maintenance Procedures:

Installation of ground and galvanic anodes:

- Different measurements of the resistance of the grounded assembly of the installation shall be carried out in order to take the appropriate measures for improvement.
- The continuity of the electrical connections and their level of corrosion shall be checked in order to take appropriate corrective measures.

Electrical Conductors:

- The level of corrosion or breakage of the supports or staples of the electrical cables shall be checked and, if necessary, replaced with a new one.
- The continuity and electrical resistance between the grounding point and the lightning conductor shall be checked and corrective or replacement measures taken.
- The measurement of the grounding system shall be verified.
- Check that the lightning conductor drainage is fluctuating.

Mast:

- The mechanical strength of the supports or fixings of the mast supporting the lightning conductor shall be checked and replaced or improved if necessary.
- Corrosion of the supports or fixings shall be checked for cleaning and painting.
- Lightning Conductor: The electrical connections of the grounding cable and the lightning conductor assembly shall be checked for corrosion and any necessary improvements made.
- The mechanical state of the lightning conductor shall be verified. In case of breakage, the manufacturer shall be informed in order to provide for a standard change under warranty.



CMCE MARINE LIGHTNING SUPPRESSION

SUITABLE FOR ALL TYPES OF VESSELS



Offshore Ships
Cargo Ships



Marine Platforms
Cruise Ships



Fishing Boats
Sailboats



Yachts
Catamarans
And More...





CMCE MARINE LIGHTNING SUPPRESSION

ELECTROMAGNETIC FIELD BALANCE

The CMCE Marine Electromagnetic Field Balancer aims to protect people, animals, and structures in installations on land, air, and water from any electrical phenomenon whose means of transmitted by air.

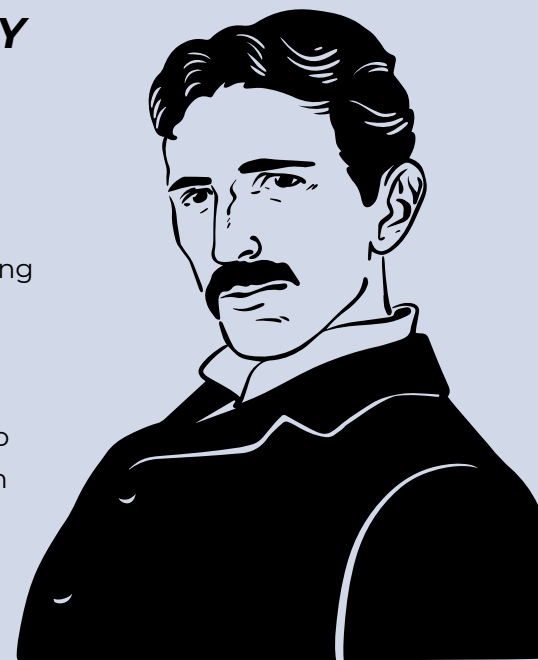
The CMCE Marine Lightning Suppressor is designed to protect using countermeasures that control and compensate for the electro-atmospheric effects produced by climate change, industrial, meteorological, or solar electromagnetic pollution, manifested in the form of electrical storms, electromagnetic pulses, etc. The CMCE Marine is permanently protecting its coverage area to correct the effects of electromagnetic disturbances according to their origin, frequency, voltage, and intensity. Compensating, stabilizing the current of the electric charges in its environment, draining them to ground in harmless milliamperes, minimizing the lightning formation in its protection area.

The CMCE Marine is the result of the discovery of the behavior of electro-atmospheric phenomena that interact in the atmosphere of our planet. The novelty of this technological development is supported by the well-known laws of OHM and Maxwell's equations, on which this new technology is based. Essentially to have at all times the stabilized electric field of the atmosphere referring to the ground in the protection area. The system behaves passively at the level of prevention, based on atmospheric electrical activity to maintain a clean and controlled environment of electrical and magnetic contamination.

NIKOLA TESLA PATENT TECHNOLOGY

In 1916, Nikola Tesla mentioned in his patent No. 1,266,175, the operating principles of a primitive device based on the principles that underpin our developments, explaining the inconveniences caused by the lightning rods, which instead of protecting property and people, attracted the rays increasing the feasibility of electric discharges and consequently the risks that they entailed.

New materials and designs, added to years of experience, have allowed us to improve the experiences of the undisputed scientist Nikola Tesla, evolving in the protection of atmospheric phenomena.

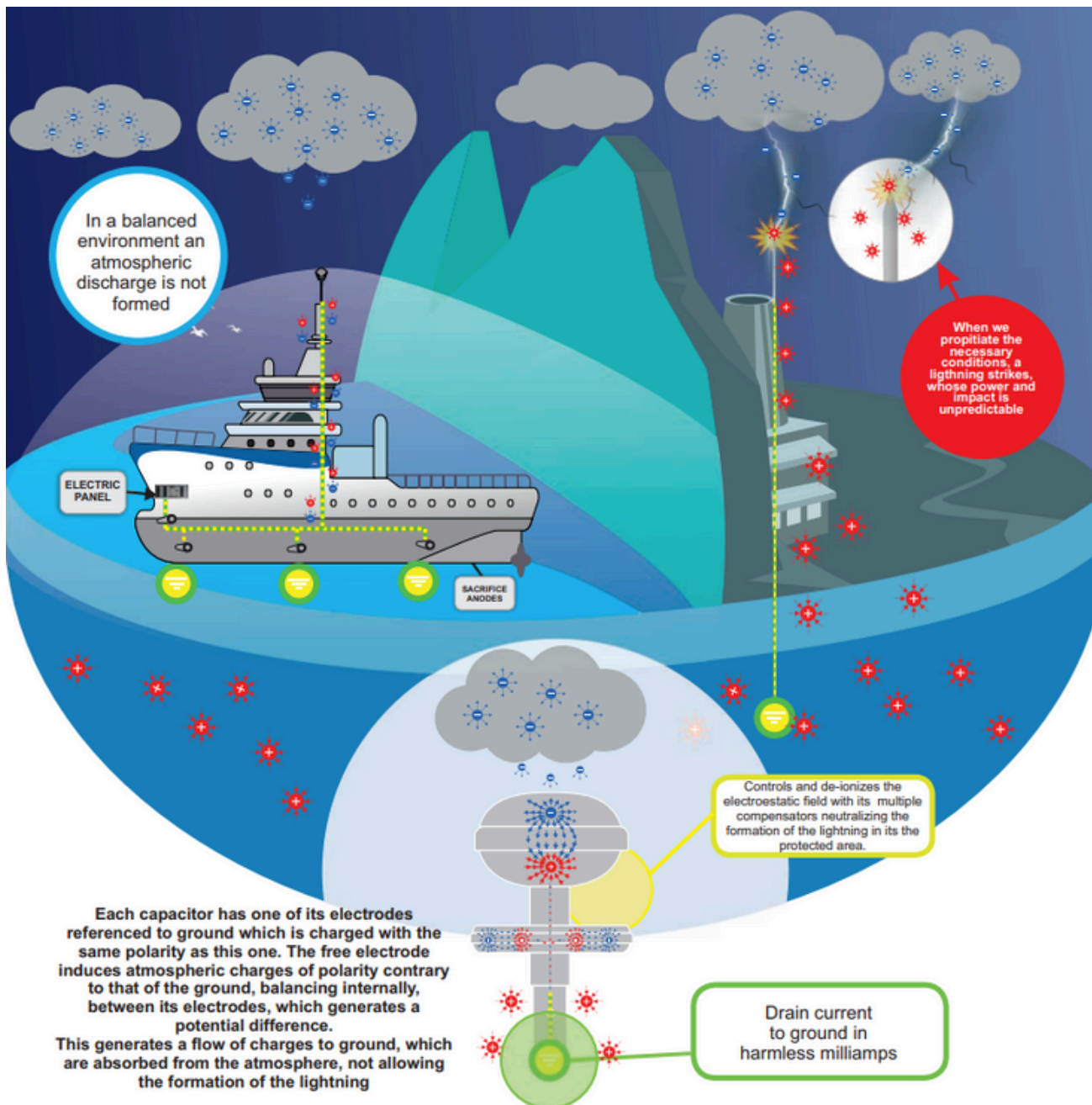




CMCE MARINE LIGHTNING SUPPRESSION

OPERATING PRINCIPLE

Is a passive sensor system designed to balance and deionize the effects of atmospheric phenomena through multiple compensators, generating a protective shield in its coverage area, its operating principle is based on compensating, stabilizing the existing electric field in its environment, in this way it cancels the formation of the ascending tracer neutralizing the lightning draining the electric charges to earth, in harmless milliamperes.





CLIMATE CHANGE

CURRENT SITUATION

The current climate change is generated by air pollution, deforestation, and greenhouse gases. To all this we would have to add the solar eruptions that when they reach our atmosphere, generate meteorological phenomena producing electrification of the severe atmosphere for hours, creating large nuclei of thunderstorms with a lot of lightning activity, where the positive polarity predominates (ascending ray), although there is also the negative polarity (downward beam).

ALUMINUM LIFE CYCLE

The high durability of aluminum and its 100% recycling, without loss of quality, has established its reputation as the green metal. Its remarkable strength and low maintenance characteristics make it the definitive construction material of an industry that is constantly searching for more resistant, lightweight, durable, and ecological alternatives.

Recycling a ton of aluminum saves about 4 tons of bauxite, its main raw material, and 95% of the energy needed to produce primary aluminum. This, in turn, saves 9 tons of CO₂ emissions. The recycling of aluminum scrap today saves around 80 million tons of greenhouse gas emissions every year. This is equivalent to the elimination of 15 million cars from the world's roads.



ENVIRONMENTAL RESPONSIBILITY

SERTEC S.R.L demonstrates its commitment to the environment by developing a production system that is also effective, friendly, and sustainable.

A high percentage of the materials used for the production of the CMCE Lightning Suppressor are recycled, in this way, we seek to collaborate with a more sustainable and above all more secure environment.



CMCE MARINE LIGHTNING SUPPRESSOR

TECHNOLOGICAL CHANGE

A legacy of one of the most brilliant minds: Nikola Tesla

The CMCE Marine Lightning Suppressor ensures a 99% reduction of lightning impacts in almost all types of buildings and structures through the deionization of electrostatic charge.

Our device guarantees the reliability of computer systems and data during storms, optimizes production by increasing competitiveness and improves staff safety, among other positive aspects.

TECHNOLOGICAL DIFFERENCES BETWEEN THE CMCE AND CONVENTIONAL LIGHTNING ROD

	 CMCE SERTEC MARINE	 Conventional Lightning Rod
	 It does not excite or capture the lightning, since it does not generate ascending tracers.	 Excites and captures the lightning, generating upward tracers.
	 Protects all types of structures and environments with risk of fire or explosion.(ATEX)	 Increases the risk of fire or explosion.
	 It does not generate overvoltages.	 Generates overvoltages.
	 Avoids electrical risks.	 Creates high voltage electrical hazards.
	 Complies with the basic principles of occupational risk prevention.	 Does not comply with the basic principles of occupational risk prevention
	 Does not generate Electromagnetic Compatibility effects.	 Generates effects of Electromagnetic Compatibility, since it attracts the ray.
	 Ground connection is compatible with low voltage electrical ground connections according to the REBT.	 Ground connection is NOT compatible with the low voltage electrical earth electrodes according to the REBT.
	 It is not radioactive and is manufactured according to the RoHS regulations.	 Some are radioactive.
	 Environmentally friendly.	 Indirectly generates electromagnetic pollution.
	 Price is very competitive in relation to safety.	 Price is NOT competitive in relation to safety.
	 Offers guaranteed protection.	 Does not offer guaranteed protection.

RISKS, COSTS, & EFFECTIVENESS ANALYSIS

	Electrical Risk	Accident Risk	Security-Cost Ratio	Efficiency of the System	Return on Investment
CMCE SERTEC MARINE 	 LOW	 LOW	 LOW	 HIGH · 99% No Lightning	 HIGH · 99% No Lightning
Conventional 	 HIGH	 HIGH	 HIGH	 LOW · 99% Lightning	 LOW



EVOLUTION OF LIGHTNING PROTECTION

BENJAMIN FRANKLIN & NIKOLA TESLA

Benjamin Franklin, published in London in his famous almanac (Poor Richard's Almanack), an article here where he proposed the idea of using pointed steel rods, on roofs, to protect themselves from falling lightning. His theory was tested in England and France before he even executed his famous comet experiment in 1752. One would say that he invented the lightning rod and presented the so-called single fluid theory to explain the two types of atmosphere electricity, the positive and negative.

In 1753, the Russian Georg Wilhelm Richmann followed Franklin's investigations to verify the protective effect, but in his investigation, a lightning strike struck him when he was excited and attracted by the lightning rod, and he received a deadly electric shock when manipulating part of the installation of the lightning rod.

The foundation of an ESE (Early Streamer Emission) terminal as it is known generates impulses of controlled magnitude and frequency at the tip of the terminal during high static fields before a lightning strike. This allows the creation of an uplink leader from the terminal that propagates into the downlink leader from the cloud.

A lightning conductor creates an electric field distribution with field lines concentrated at its tip, thus facilitating the current of ionized particles, which is a lightning bolt. This applies to any lightning rod when trying to facilitate the path of charges and therefore says that it "attracts lightning."

In 1916, Nikola Tesla mentioned in his patent No. 1,266,175, the principles of operation of a primitive device based on the principles that sustain our product, the protector of electro-atmospheric field CMCE, explaining the disadvantages that already at that time produced the point lightning conductors that instead of protecting the structure and people, attracted the rays increasing the feasibility of lightning strikes and consequently the risks for the structures and people.

...It is popularly believed that by allowing a leak into the air, the needle-shaped lightning rod fulfills two functions: one, to drain the ground of its negative electricity, the other to neutralize the positive of the clouds. To a certain extent, it performs both functions. But a systematic study of electrical disturbances on earth has made it palpably evident that the action of the Franklin conductor, as commonly interpreted, is largely illusory. The actual measurement proves that the amount of electricity escaping from numerous points is entirely insignificant when compared with that induced within a considerable terrestrial area, and unimportant in the dissipation process. But it is true that the negatively charged air in the vicinity of lightning rods, which has been converted into a conductor through the influence of lightning, facilitates the passage of lightning. This increases the probability of lightning strikes in the immediate vicinity. The fundamental facts behind this type of lightning conductor are: First, it attracts lightning, so that it will be struck by one more often than if it were not; second, it makes most, but not all, discharges it receives become harmless; third, by turning the air into a conductor, and for other reasons, it is sometimes the cause of damage to objects in the vicinity; and fourth, in general, its power to prevent damage predominates, more or less, over the risks it summons..... **(condensed translation Nikola Tesla patent No. 1,266,175)**



CMCE MARINE MODELS

TECHNICAL SPECIFICATIONS



CMCE-GOLD

PRICE: \$6,450

USAGE: Vessels under 50 feet

MEASUREMENTS: 4.9 x 8.5 inches

WEIGHT: 2.3 lbs

COVERAGE RADIUS: 25 meters
(20,000 sq. ft total coverage)

CIRCUMFERENCE: 157.08 meters (180.45 ft)

DIAMETER: 50 meters (164.04 ft)

MATERIALS: Galvanized metallic material



CMCE-PLATINUM

PRICE: \$8,450

USAGE: 50 to 80-foot vessels

MEASUREMENTS: 6.4 x 10 inches

WEIGHT: 6 lbs

COVERAGE RADIUS: 55 meters
(100,000 sq. ft total coverage)

CIRCUMFERENCE: 345.58 meters (1133.8 ft)

DIAMETER: 110 meters (360.89 ft)

MATERIALS: Galvanized metallic material



CMCE-DIAMOND

PRICE: \$19,950

USAGE: Vessels over 81 feet

MEASUREMENTS: 9.8 x 14.9 inches

WEIGHT: 13.6 lbs

COVERAGE RADIUS: 120 meters
(500,000 sq. ft total coverage)

CIRCUMFERENCE: 753.98 meters (2,473.68 ft)

DIAMETER: 240 meters (787.40 ft)

MATERIALS: Galvanized metallic material

MAST CONNECTION SYSTEM:

It incorporates in its axis the connection system to the mast. The CMCE needs an internal measuring mast of 42mm Ø and an external of 49 mm Ø with a through hole of 8mm Ø 32 mm from the edge of the mast (It can vary according to the model. For more detailed information see the manual).

MATERIALS THAT ARE COMPOSED:

Recycled Aluminum, Insulation: Polyacetal, also called polyoxymethylene (POM); o Depending on the model, consult the manual.

MAXIMUM WORKING VOLTAGE OF THE CMCE WITHOUT LIGHTNING STRIKES

640,000 volts to one meter, according to high voltage laboratory tests.

MAXIMUM PERMISSIBLE SHORT CIRCUIT CURRENT

Tests carried out according to IEC-10/350 Q energy curves of 100,000 Amps, specified in IEC-62305 standards, show that the equipment supports 7 continuous discharges of 89,906KA; 89.62KA; 88.53KA; 89.3KA; 90.44KA; 96,656KA; 89,688KA; without suffering material breakage or deterioration or perforation marks.

PROTECTION EFFECTIVENESS

99% reduction in direct lightning impact on the protected structure. In case of direct impact of lightning (1%) or indirect effects due to external induced surges in the protected structure, the CMCE behaves like a thermal fuse, absorbing part of the energy of the lightning in heat by melting its components, minimizing (between 60% - 90%) electromagnetic effects.

It does not contain radioactive or electronic components. No heavy metals.



CMCE LIGHTNING SUPPRESSOR

CERTIFICATIONS / REGULATIONS



ISO 9001-2015 certified by STAREGISTER

ISO 9001 is the internationally recognized standard for quality management systems (SGC).

ISO 14001-2015 certified by STAREGISTER

The ISO 14001 standard is the international standard for environmental management systems (EMS), which helps your organization identify, prioritize and manage environmental risks, as part of your usual business practices.



INTN Product Certificate (National Institute of Technology and Standardization and Metrology).



High Voltage Comparative Tests in the INTI according to NFC-17100, where the comparative difference is that there are no lightning discharges.

ENAC; ILAC-MRA

A.1. General tests (Section C.3.1 UNE 21186: 2011 // NF C17-102: 2011)

- Test: Documentation, information and identification (C.3.1.1)
- Test: Marking (C.3.1.2)

A.2. Mechanical tests (Section c.3.2 UNE 21186: 2011 // NF C17-102: 2011)

- Test: Mechanical tests (C.3.2)

A.3. Environmental tests (Section c.3.3 UNE 21186: 2011 // NF C17-102: 2011)

- Test: Salt spray test (C.3.3.1)

A.4. Current test (Section c.3.4 UNE 21186: 2011 // NF C17-102: 2011)

- Test: Current test (C.3.4)

TO 5. Priming advance tests (Section c.3.5 UNE 21186: 2011 // NF C17-102: 2011)

- Test: Determination of the progress in the PDC priming (C.3.5.3 UNE 21186: / C.3.5.2.4 NF C17-102: 2011)



SERTEC S.R.L is approved within the NATO Cataloging System (NOC) with the NCAGE code SFKU3 for the CMCE Lightning Suppressors.



DUNS REGISTER Number 955067967



CMCE LIGHTNING SUPPRESSOR

CERTIFICATIONS / REGULATIONS



The CMCE Lightning Suppressor is the only lightning protection system approved by RINA.



GREEN RECYCLING SEAL

The Green Seal delivered by SERTEC S.R.L. in its products it allows the user to be informed that we are a company responsible for the life cycle. By choosing this product you are collaborating with the environment since we use recycled materials.

Environment solid waste management Complies with the requirements of law No. 3956/09 on solid waste management in the Republic of Paraguay, the SEAM Environment Secretariat, is the enforcement authority, whose regulatory content and practical use should generate the reduction of the same, to the minimum. Topic addressed: the SUMMIT OF THE EARTH at the 1972 Stockholm Convention held by the United Nations for the preservation of natural resources. Environmental Action Program to address global warming, generating agreements such as the Kyoto Protocol.

PRODUCT WARRANTY

Manufactured by SERTEC S.R.L. in Asunción, Paraguay

MAINTENANCE:

Annual mandatory, carried out and certified by the official installer.

PRODUCT WARRANTY:

10 years warranty for manufacturing defect, proving annual maintenance.

