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MEMBER



**NEW HIGHEST TECHNOLOGY
100% VENEZUELAN
UNIQUE IN THE WORLD**

**NATURAL IONIZING SYSTEM OF
ELECTRICAL PROTECTION AND ENERGIES**

**NATURAL IONIZING LIGHTNINGROD IONCA
ACTIVE TRIMETALLIC IONIC ELECTRODE TRIAC
OF GROUNDING**

**Definitive and Total Solution against
"Blackouts" and Breakdowns, Electrical Failures and of Energy
generated by Atmospheric Discharges (LIGHTNING)**

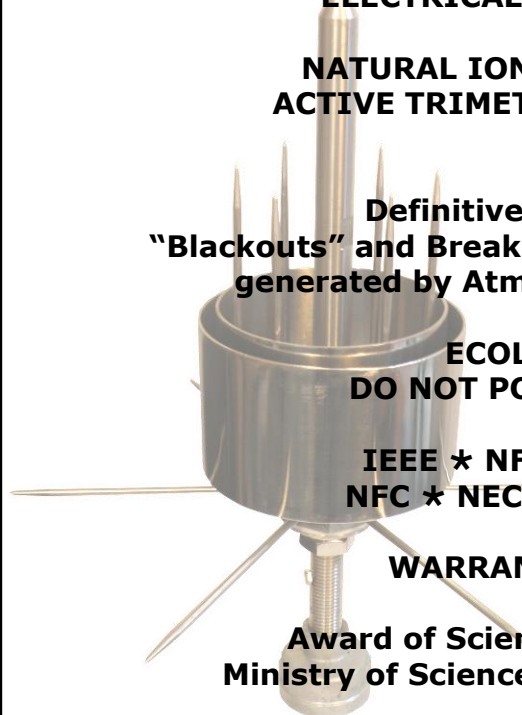
**ECOLOGICAL... NATURAL...
DO NOT POLLUTE THE ENVIRONMENT!**

**IEEE * NFPA * ANSI * BSCP * WMO
NFC * NEC * COVENIN * CODELECTRA**

WARRANTY: TWENTY (20) YEARS

**Award of Science, Technology and Innovation
Ministry of Science and Technology, Venezuela, 2006.**

Zayed Future Energy Prize Nomination, 2013, 2014. Abu Dhabi, United Arab Emirates.



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NOVEMBER 2014

NATURAL IONIZING SYSTEM OF ELECTRICAL PROTECTION AND ENERGIES

**Natural Ionizing Lightningrod Ionca
Active Trimetallic Ionic Electrode Triac of Grounding
Definitive and Total Solution against “Blackouts” and Breakdowns,
Electrical Failures and of Energy
generated by Atmospheric Discharges (Lightning) and Electrical Systems**

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The New Highest Technology: NATURAL IONIZING SYSTEM OF ELECTRICAL PROTECTION AND ENERGIES conformed by Natural Ionizing Lightningrod Ionca and Active Trimetallic Ionic Electrode Triac of Grounding is the Definitive and Total Solution against “BLACKOUTS”, Breakdowns, Electrical Faults and of Energy generated by Atmospheric Discharges (LIGHTNING) and Renewable and Non-Renewable Energy Systems. Ensures Total Protection, Maximum Security and Zero Risk (0) to Power Equipment and Electronic Equipment of High Sensitivity: Petroleum Refineries, Drilling, Tanks and Fuel Supply Station; Electrical Substations and Transmission Lines and Towers, Clinics, Hospitals, Diagnosis Centers (Magnetic Resonators, Tomography, Radiation, Rx) Stations and Radio-telecommunication Towers, Buildings and Industrial and Production Plants, Manufacturing and Assembly of Vehicles and Machinery, Financial Systems and Banking Computerized Institutions, Solar and Wind Plants and others. New Highest Technology, 100% Venezuelan and Unique in the World, Efficient and with CAPACITY to disperse and propagate to the land mass without causing damage, the enormous energy of Atmospheric Discharges (LIGHTNING), whose destructive effects cause damage and loss of thousands of lives and billions of dollars to both, Power Generation Companies as Electric Service users worldwide.

Solution to the Paradigm of Benjamin Franklin!

Keywords: Atmospheric Discharges, Lightning, Active Trimetallic Ionic Electrode of Grounding, Natural Ionizing Lightningrod Ionca, Electrical Substations, Sustainability Energy, Blackouts, Electrical Failures, Energy Failures.

The biggest challenge and the biggest problem that Humanity related to the generation and sustainability of Renewable and Non-Renewable is protection against Atmospheric Discharges

(LIGHTNING), whose destructive effects affect Equipment, Buildings, Industrial Plants, Companies and people, causing **loss of thousands of lives and loss of billions of dollars every year in all countries.**

Since Benjamin Franklin in 1752 discovered and found that the energy of Atmospheric Discharges (LIGHTNING) is an Electric Power and invented his famous Lightningrod Franklin, **IT HAD NOT BEEN INVENTED** a technology or efficient device with sufficient capacity to disperse and propagate to the land mass, causing no damage, **the enormous energy of lightning, whose values are in the order of: 200,000 to 500,000 Amperes, 1,000,000 Megawatts and High Level Transient Voltages 100 million Volts.**

In that sense, the Traditional Systems for protection of the Energy and Buildings currently used worldwide as Copperweld Bars, Grounding Mesh, Liabilities Lightningrod Franklin and Artificial Ionizing Lightningrod with electronic “primers” **ARE INEFFICIENT AND HAVE NO CAPACITY** to capture and disperse to the land mass, causing no damage, the energy of a Lightning.

In that order, the capacity to Dispersive Energy of a Grounding Mesh of a certain size would be in the order of 30,000 to 40,000 Amperes, enough to face a capacity of a LIGHTNING. Furthermore, Grounding Mesh are not designed or calculated to protect against LIGHTNING.

It is now and for eleven years (11) in 2003 and after more than twenty (20) years of research that is invented **NEW HIGHEST TECHNOLOGY: Natural Ionizing System of Electrical Protection and Energies conformed by Natural Ionizing Lightningrod Ionca and Active Trimetallic Ionic Electrode Triac of Grounding (Luis Cabareda, Invention and Patent, ISBN: DL 978-980-12-3386-2. If09120086203764),** whose capacity of dispersion and propagation of energy into the land mass is well over energy values of a LIGHTNING.

Therefore, this New Highest Technology, 100% Venezuelan and unique in the world is the definitive and total solution against “BLACKOUTS”, Breakdowns, Electrical Failures and of Energy generated by Atmospheric Discharges (LIGHTNING) and Electrical Systems.

For the design, calculation and fabrication of these devices, and the materials and substances as well as their spatial dimensions, volume and electromechanical structure, were taking into account all the elements and factors involved when the phenomenon of Thunderstorms with Atmospheric Discharges (LIGHTNING) occurs.

ELECTROPHYSICAL BASIS

The New Highest Technology, 100% Venezuelan and Unique in the World: ***Natural Ionizing System of Electrical Protection and Energies*** conformed by **Natural Ionizing Lightningrod Ionca and Active Trimetallic Ionic Electrode Triac of Grounding**, world standard based its operation and electrophysical basis in phenomena and events scientifically proven and universally accepted as: Atmospheric Discharges (LIGHTNING). Earth and ionized bodies. Electrically charged cloud. Evaporation and condensation of water from rivers, lakes, seas and oceans by solar, ultraviolet and cosmic rays. Physical state of cloud water: liquid, solid and gas. Values of the energy of a lightning. Cosmic Rays (ionic effects in the cloud). Tripolar cloud and/or tripole. Cloud temperature + 10°C, -15°C and -65°C. “Shock Effect” between particles and generation of energy with high ion conductivity. “Corona Effect” (loss of energy) and ion generation. Ionization potential and electron affinity. Deformation of a drop of water in the presence of electromagnetic fields and potentials.

Strength, speed and electrical resistance of the air masses. Positive and negative (water drop) electric charges. Microparticles (ions) in motion. Particles and collisions between air molecules and generation of ions. The air as dielectric cloud-Earth. Current Downloads Spot. Metal and atmospheric ionization. Acceleration and collision of particles, ions and molecules of air as a result of very high electric fields in the atmosphere in conditions of Thunderstorm. Resistance and atmospheric pressure. High-voltage transients. Electrical and Electromagnetic Fields, Potential and transmission of large amounts of ions between the ionosphere and the Earth. Movement and speed of hot and cold air particles. Touch voltage (Ve) and Step Voltage (Vp). Electrical conductivity and resistivity. Resistance Dispersion and Propagation of Energy. Electrolytic Adhesion and Mechanics to the land mass. Improvement of soil resistivity using: high alkalinity, high humidity, and water retention (physical properties of charcoal and volcanic bentonite). Equipotential lines and equipotential System Grounding. Properties of steel, copper and aluminum as good electrical conductors. Electromechanical connection. Crystallization of soil becoming in fulgurite with very high electrical resistance due to the power of lightning. Consequently, the design, calculation and construction of the structure and electrophysical conformation of Natural Ionizing Lightningrod Ionca and Active Trimetallic Ionic Electrode Triac of Grounding were taken into account and all the above factors and elements took advantage.

This New Highest Technology is ECOLOGICAL NATURAL AND DO NOT POLLUTE THE ENVIRONMENT. Complies fully with all Electrical Codes and Standards such as IEEE, NFPA, BSCP, ANSI, WMO, NFC, NEC, COVENIN.

NATURAL IONIZING LIGHTNINGROD IONCA

Bases its operation on its electrophysical structure and the enormous potential differences and electric field in the atmosphere in storm conditions for generating the "corona effect" or "ionizing effect" that produces billions of ions of ultra-high electrical conductivity, because it has electrodes to an atmospheric potential (atmospheric excitatory) and ground potential isolated from each other. This "ionizing effect" is increased by the "shock effect" between the air molecules and particles (ions) accelerated by the enormous electric fields existing in the storm.

This natural ionization generates a timely discharge current (CDP) that is the precursor current of the lightning and along with the staggered currents that arise from the interaction of microparticles in the cloud, point the way and the path for the atmospheric discharge (lightning) which will be conducted through the Natural Ionizing Lightningrod Ionca and Active Trimetallic Ionic Electrode Triac of Grounding to the landmass, dispersing and spreading the enormous energy associated with the phenomenon, without causing damage.

- Electrophysical Characteristics:

Height: 620mm Mast $\varnothing$ 2 1/2"x6m. stainless steel.

Diameter: 470mm.

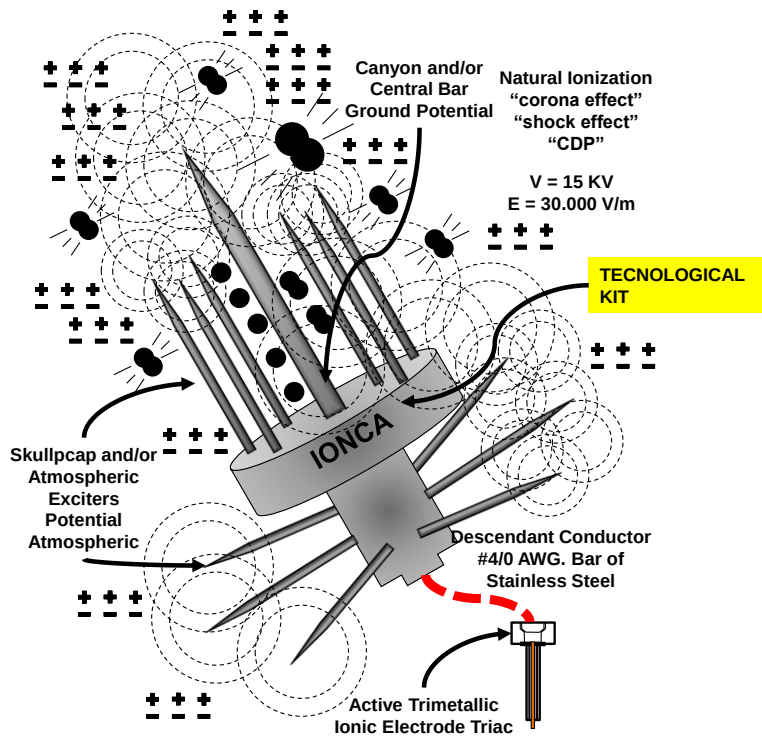
Weight: 6.400Kg.

Technological Kit.

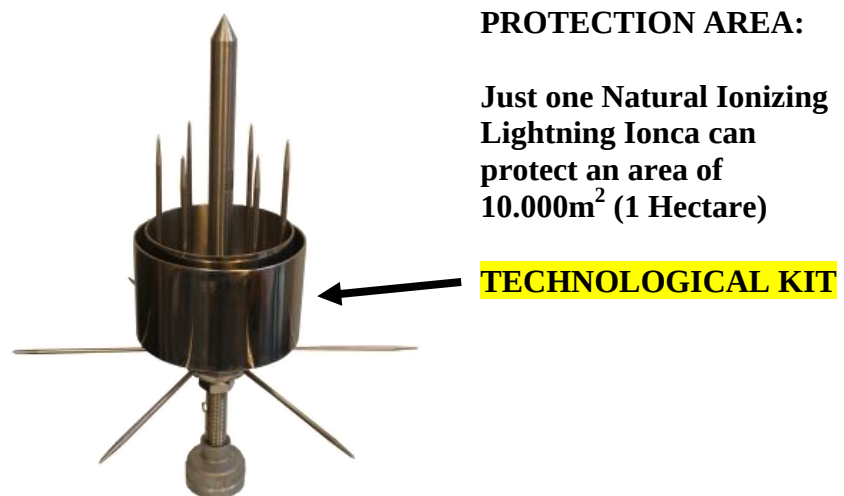
Material: Stainless Steel 304, Polytetrafluoroethylene (600 °C)

Vertical Penetration Index: 50 to 100m.

Warranty: Twenty (20) years.



Picture 1. Natural Ionizing Lightningrod Ionca. Electrophysical Basis.

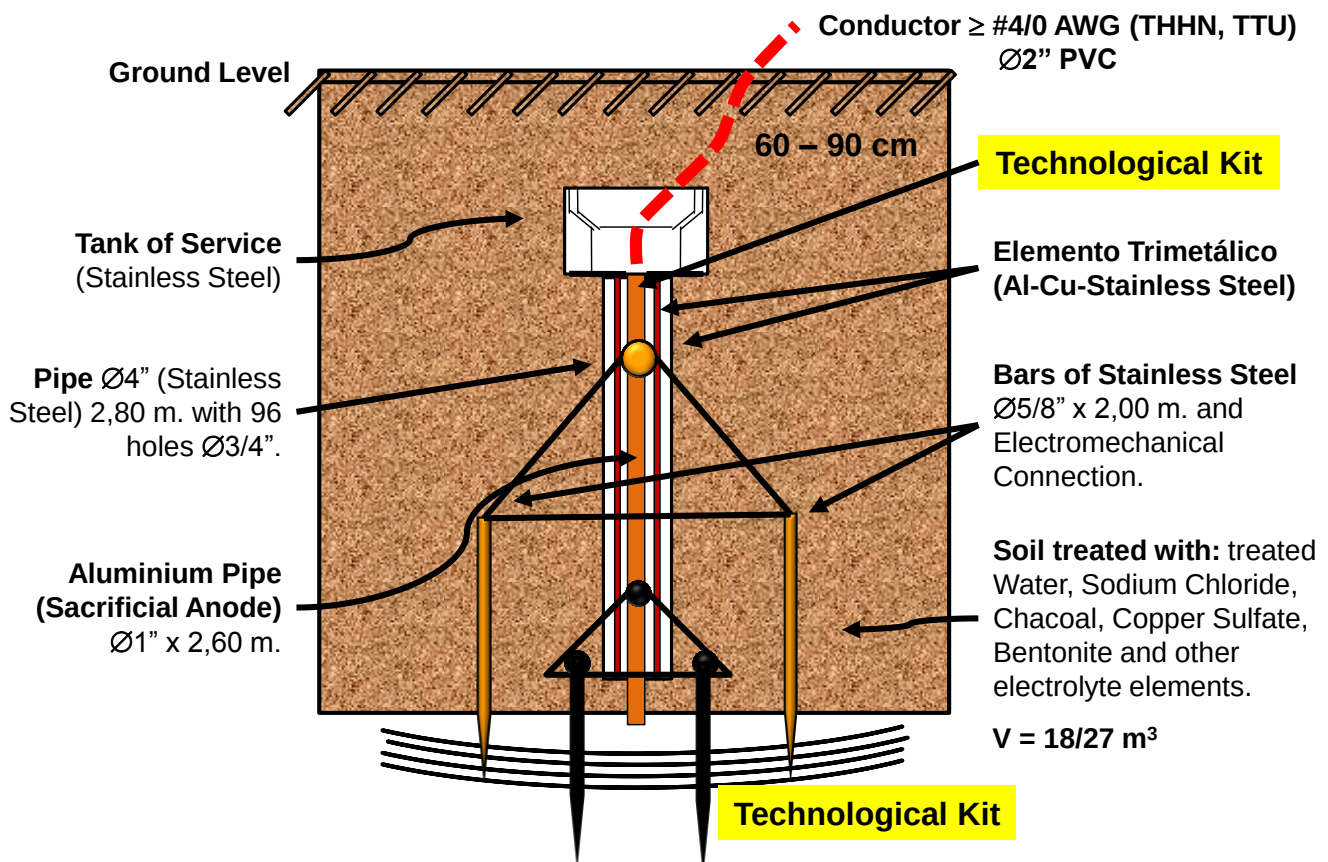


Picture 2. Natural Ionizing Lightningrod Ionca.
MAXIMUM SECURITY, ZERO RISK (0). WARRANTY: TWENTY (20) YEARS.

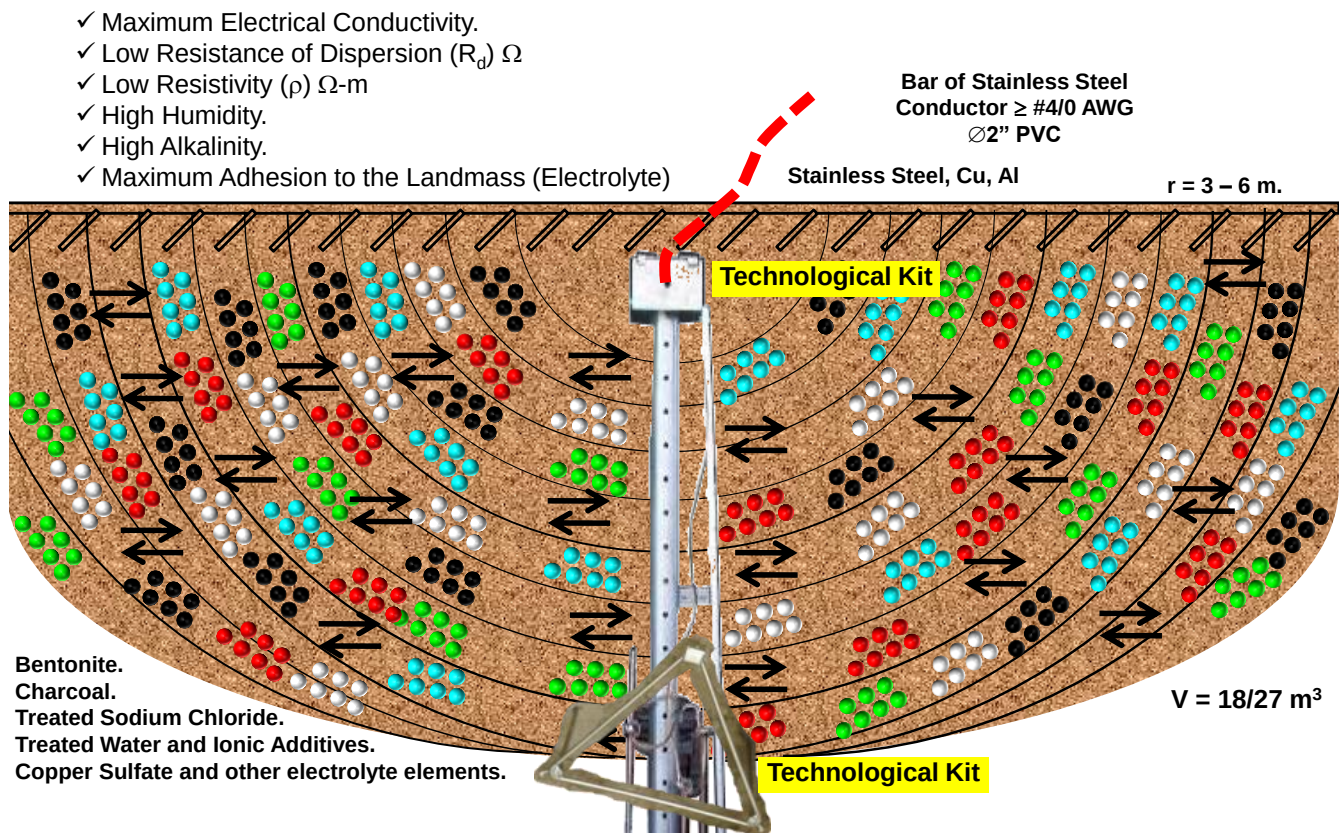
ACTIVE TRIMETALLIC IONIC ELECTRODE TRIAC OF GROUNDING

Bases its operation and high efficiency in its electrophysical characteristics that allow full and complete adherence to the landmass, which land has been chemically treated with high electrical conductivity electrolytes that decrease the greatly resistivity and allow: *water saturation and moisture retention, total adherence to the landmass and high levels of alkalinity*. It has two (02) stimulating technological kits generating ions of high electrical conductivity. The volume of the treated soil is about 18 to 27m³, which joins the surrounding landmass by electrolytic and non-mechanical adhesion facilitating the dispersion and propagation to the land mass, causing no damage, of the high energy associated to atmospheric discharges (lightning) and electrical failures in general.

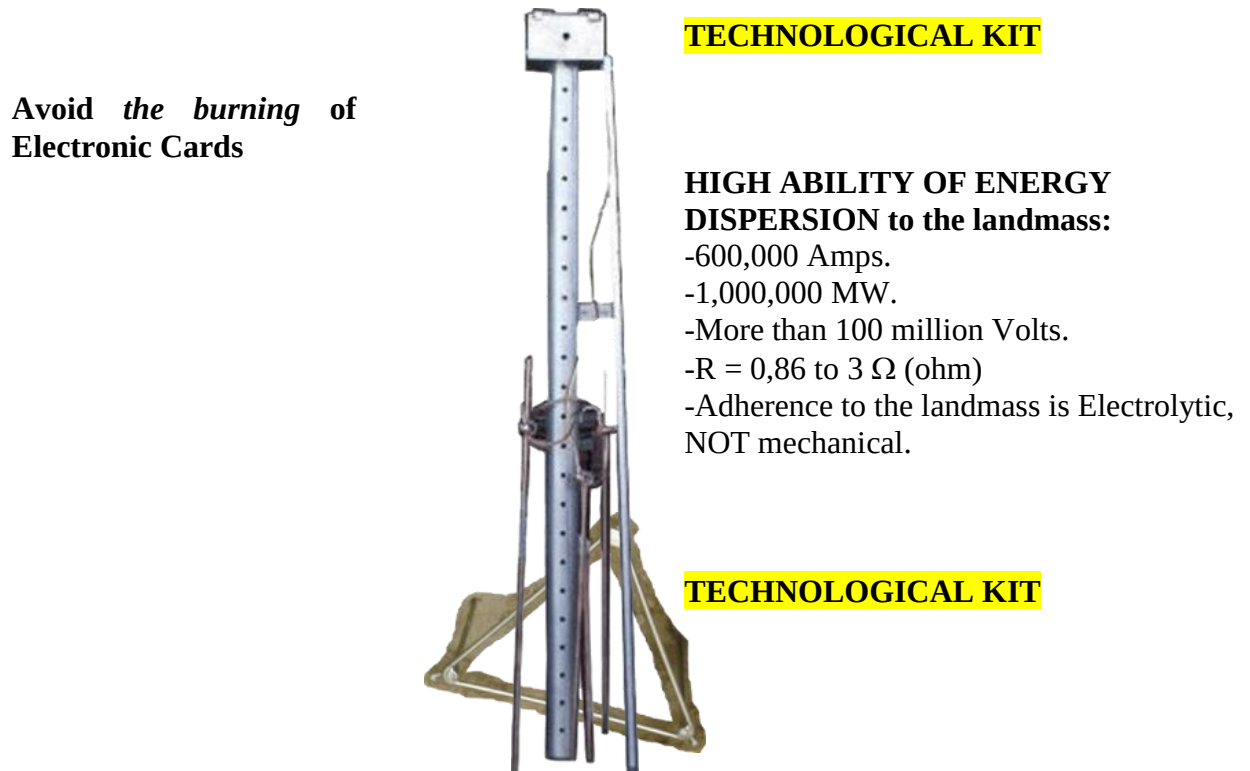
- **Ability to Disperse the Energy to the Landmass:** 600,000 Amps, 1,000,000 MW, more than 100 million Volts, Extremely Low Electrical Resistance $R = 0.86$ to 3Ω (ohms)
- **Ground Features:** Extremely Low Soil Resistivity. Porosity and Compaction. High Humidity, Temperature, Season, Electrolytes, PH.
- **Adherence to the landmass is Electrolytic, not mechanical, so its high electrical conductivity.**
- **Electrophysical Features:** Stainless steel, Cu and Al. Treated Sodium Chloride, Copper Sulfate, Charcoal, Bentonite, Electrolytes (base): TTFX, TFX, FFX, Treated Water and Ionic Additives of high electrical conductivity, **Two (02) Technological Kits.** # 4/0 AWG. $V = 18$ to 27m^3 .



Picture 3. Active Trimetallic Ionic Electrode Triac of Grounding. Transverse View.

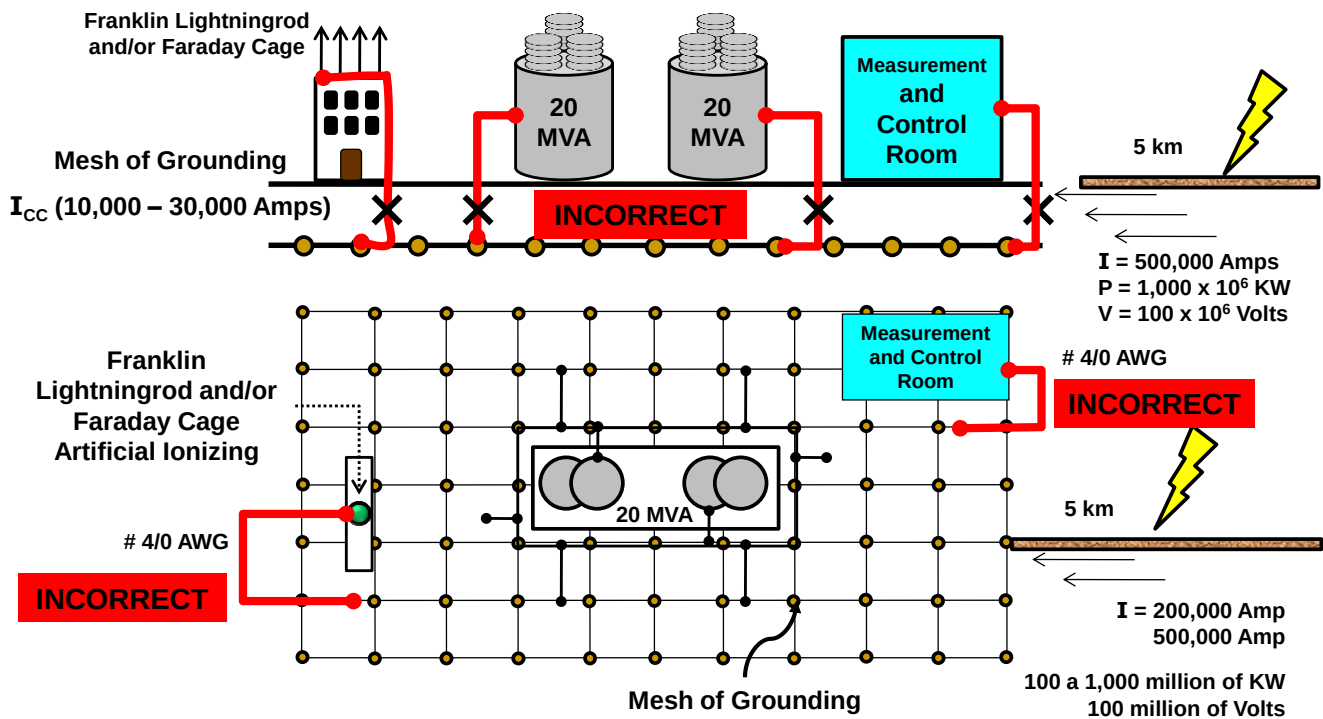


Picture 4. Active Trimetallic Ionic Electrode Triac of Grounding. Electrophysical Basis.



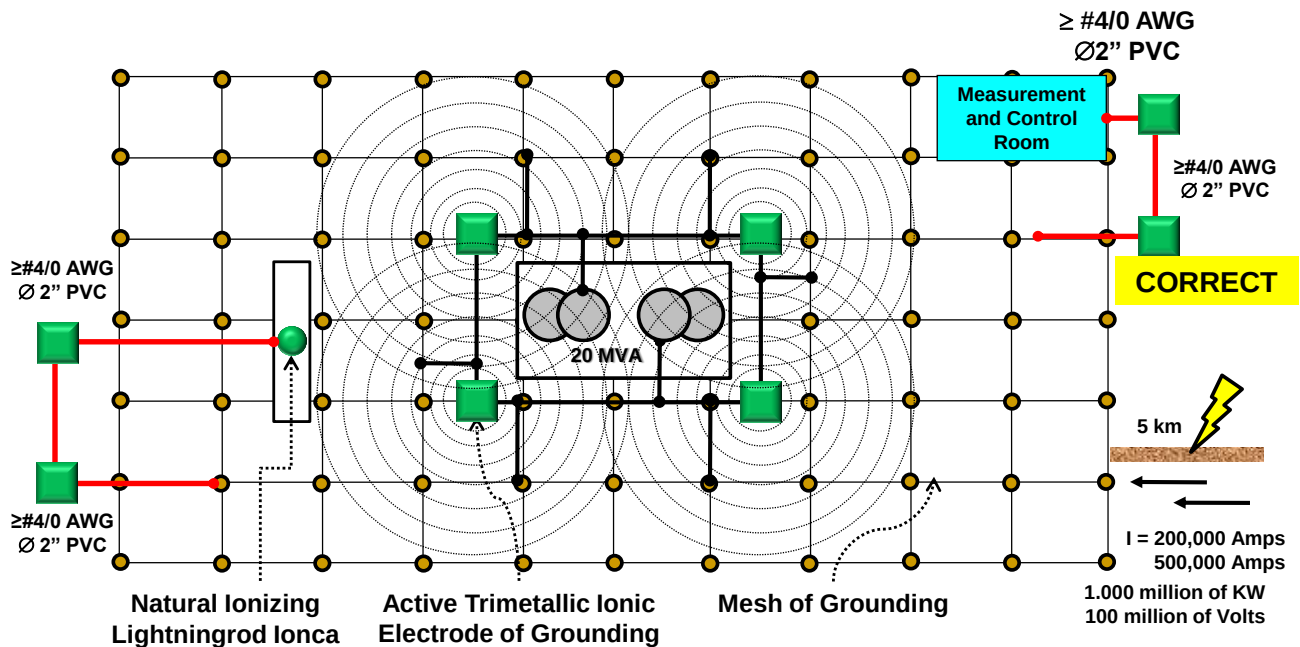
Picture 5. Active Trimetallic Ionic Electrode Triac of Grounding.
MAXIMUM SECURITY, ZERO RISK (0) WARRANTY: TWENTY (20) YEARS.

EXISTING ELECTRICAL SUBSTATION



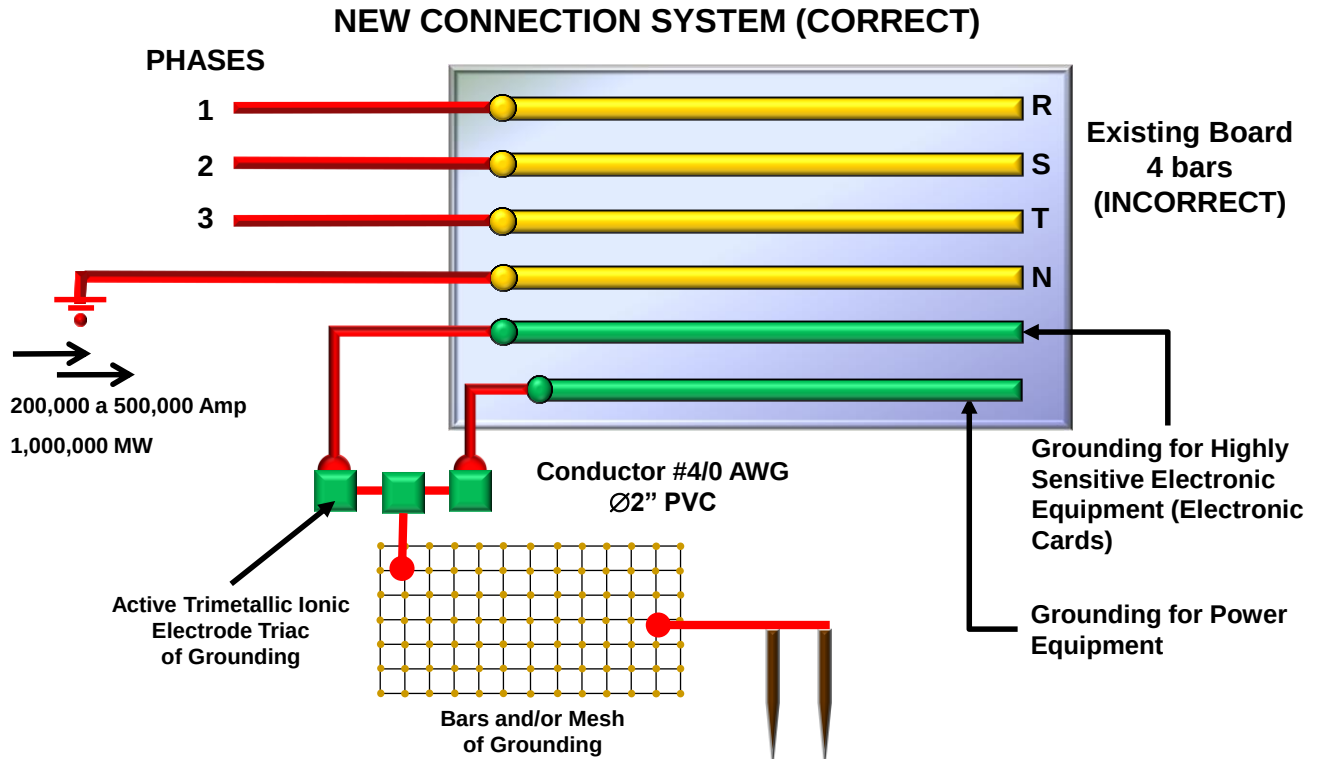
Picture 6. Existing and Traditional System of Grounding in Electrical Substations (**INCORRECT**)

ELECTRICAL SUBSTATION: NEW HIGHEST TECHNOLOGY



Picture 7. Natural Ionizing System of Electrical Protection and Energies.
New Concept, Design and Calculation of Engineering in Electrical Substations
(**CORRECT**)

ELECTRIC BOARD



Picture 8. Electric Board, New Connection System (**CORRECT**)

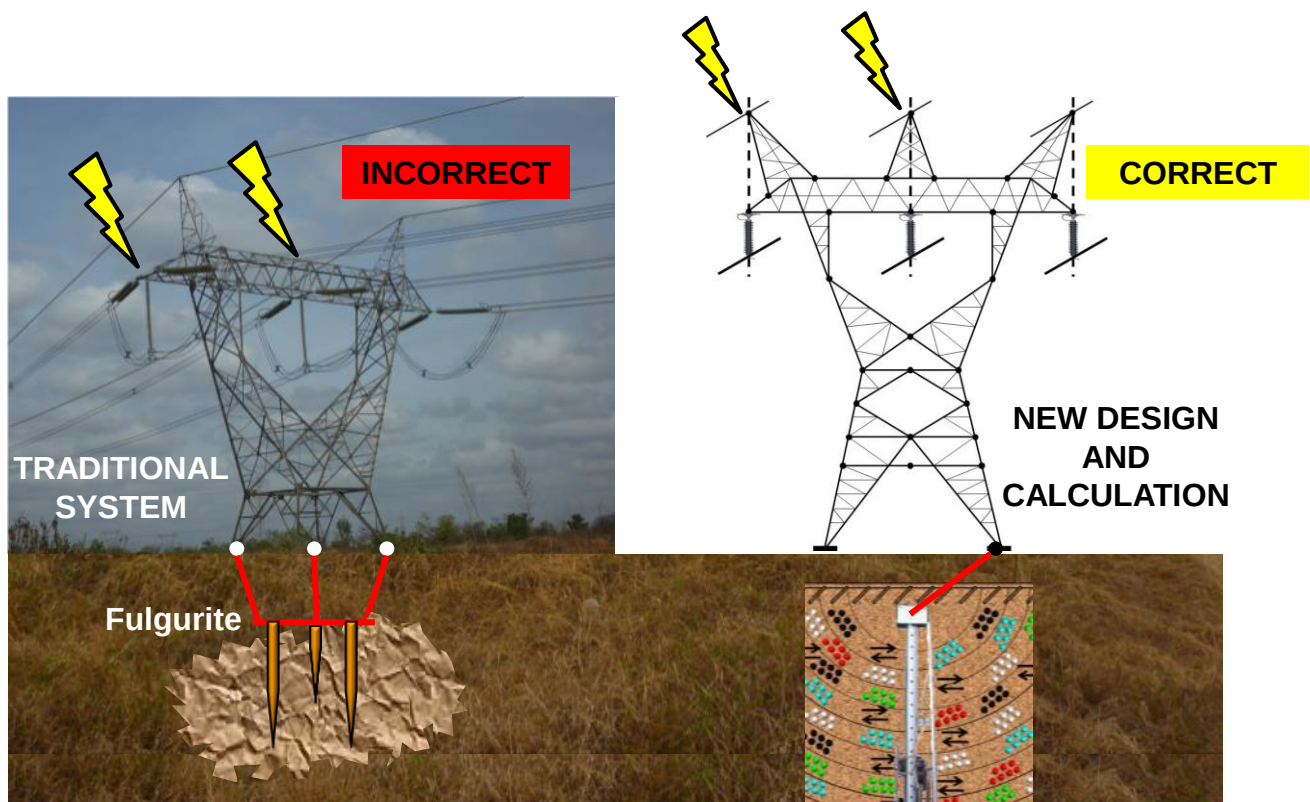
GUARD BANDS IN DIFFERENT TYPES OF TOWERS AND TRANSMISSION LINES. DESIGNED, CALCULATED AND CONSTRUCTED MISTAKENLY

Exposed to outputs by Atmospheric Discharges (Lightning)

1. Direct or Shielding.
2. Retroactive or Reverse.
3. Induction.



Picture 9. Guard Bands in different types of Towers and Transmission Lines.



Picture 10. Guard Bands in Towers and Transmission Lines. Traditional System (**INCORRECT**), New Design and Calculation (**CORRECT**)

NEW HIGHEST TECHNOLOGY. GROUND CONNECTION

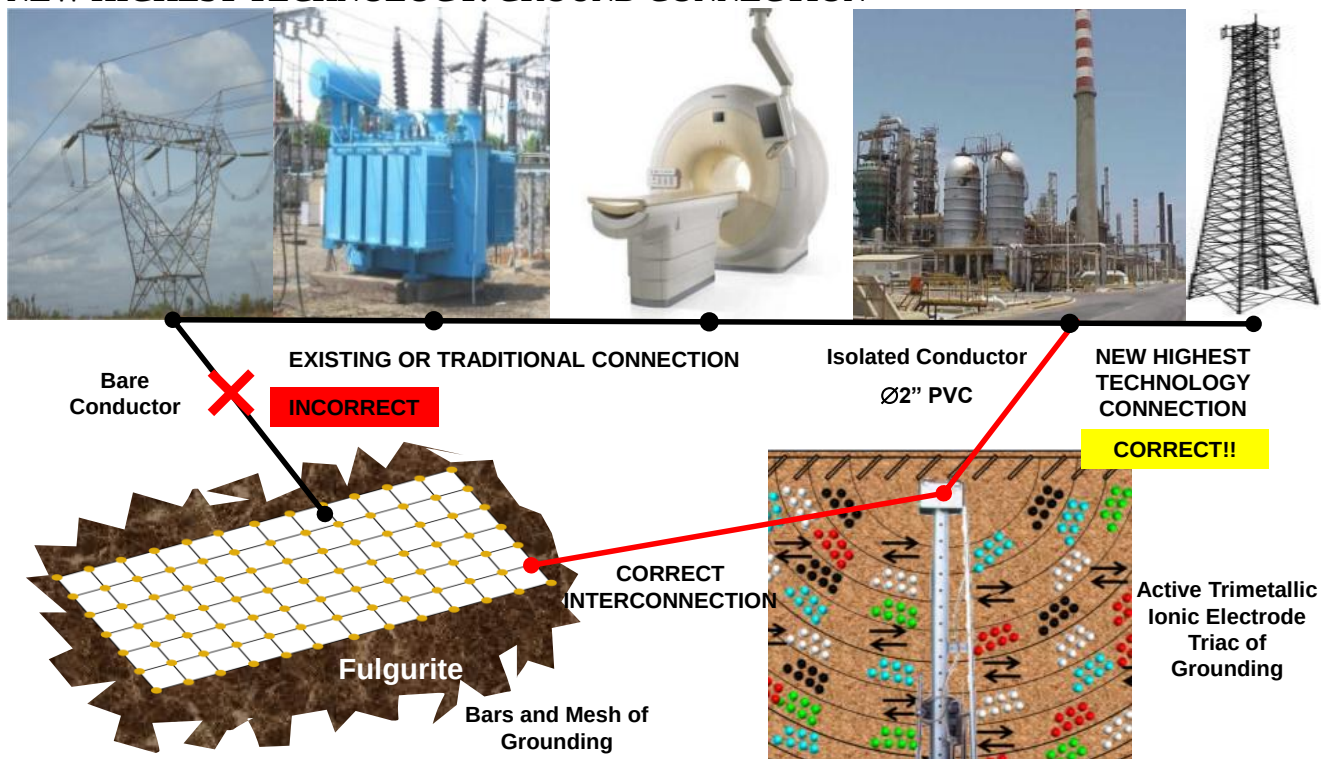


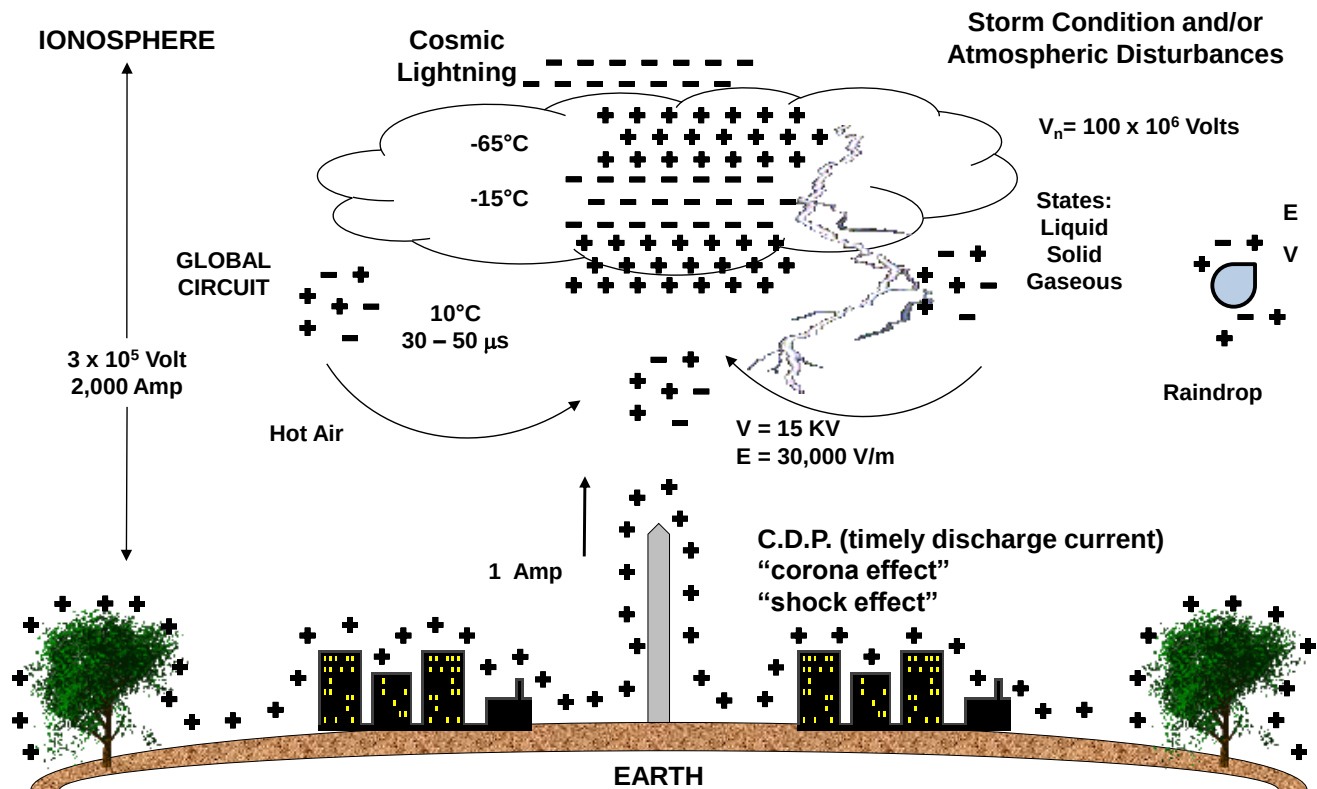
Figura 11. Ground Connection, Power Equipment and Highly Sensitive Electronic Equipment.

WHAT'S LIGHTNING?

It is an interaction and/or transmission of high electrical charges between the Atmosphere and the Earth in storm conditions or atmospheric disturbances.

On Earth occur:

- 4,000 storms per day.
- 9,000,000 lightning per day.



Picture 12. How is Lightning?

ENERGY OF LIGHTNING

The Energy of Lightning is in the order of: **200,000 to 500,000 Amps, 1,000 million kilowatts, 100 million volts.**

The energy generated by the largest hydroelectric dams in the world only reach *10% of the energy of a single lightning.*

- Hydro Québec (Canada)	36.810 MW	- Three Georges (China):	22.500 MW
- Guri (Venezuela):	10.000 MW	- Hoover (USA):	2.080 MW
- Macagua (Venezuela):	3.140 MW	- Tehri (India):	2.400 MW
- Caruachi (Venezuela):	2.160 MW	- Aswan (Egypt):	2.100 MW
- Tocoma (Venezuela):	2.160 MW	- Inguri (Georgia):	1.300 MW
- Itaipú (Brazil-Paraguay):	14.000 MW	- Grand Dixence (Switzerland):	2.000 MW
		- Nurek (Tajikistan):	4.000 MW

CONSEQUENCES OF ATMOSPHERIC DISCHARGES (LIGHTNING)

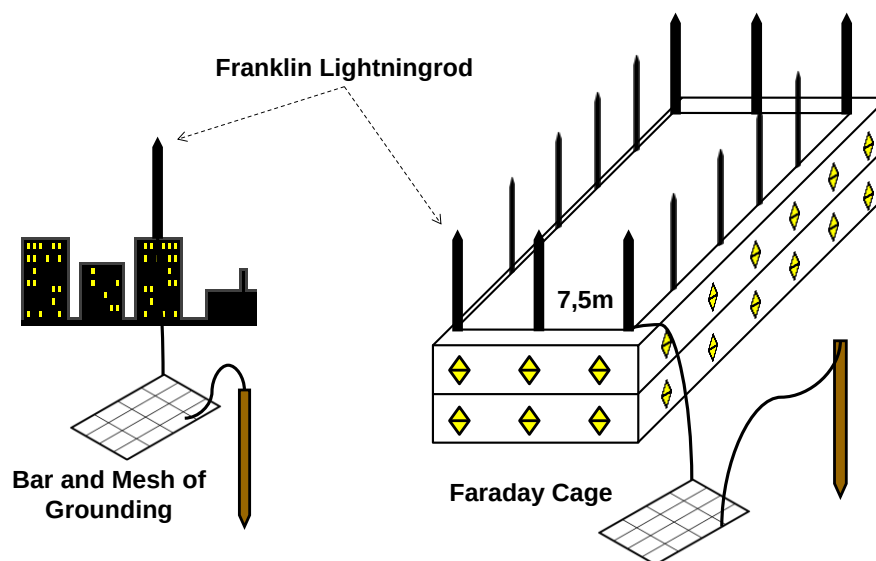
- **“BLACKOUTS”, Breakdowns and Electrical Failures and of Energy.**
- **Damage to Buildings and Electrical Equipment, Electronics, Communication, Computers and Cybernetics, in general:** Inductive and conductive effects that produce Transient Overvoltages of very high level (100 million Volts)
- **Damage to Persons:** Cardiac arrest and/or respiratory arrest, brain damage, skin burns, ruptured eardrum, lung and bone Injury, posttraumatic stress.
- **Loss of billions of dollars** to both, the Generators and Users of Electricity in the world.

CHARACTERISTICS OF ATMOSPHERIC DISCHARGES (LIGHTNING)

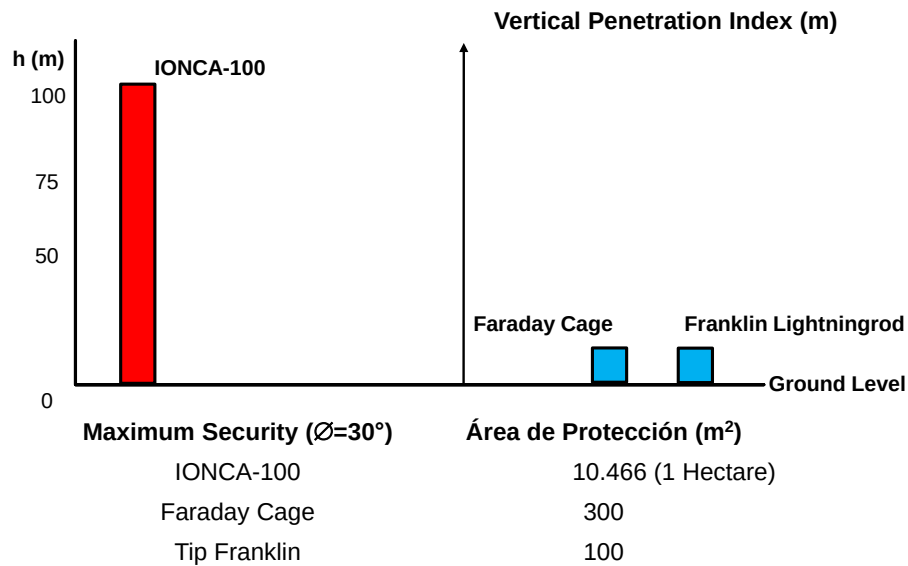
- 200,000 to 500,000 Amps.
- 100 to 1,000 million of Kilowatts.
- 30 to 100 million of Volts.
- Electric Field: 30,000 Volt/m.
- Potential Gradient: 15KV.
- Air Impedance: 5K Ω .
- Atmospheric Pressure: 100 atm.
- Duration: 10 – 30 μ seg.
- Power: 3×10^9 J/m.
- Temperature: 15.000 a 30.000°C.
- Acoustic Energy: 25% (thunder)
- Heat Energy: 75% (electric discharge)

THE LIGHTNINGROD

The Lightningrod is a device composed of one or several metal rods or pins with certain geometric arrangement attached to a grounding electrode via a descendant conductor, which facilitates the lightning path from the cloud to the ground, allowing the dispersion and propagation of the enormous energy associated, without causing damage to people and/or equipment.



Picture 13. Franklin Lightningrod and Faraday Cage.

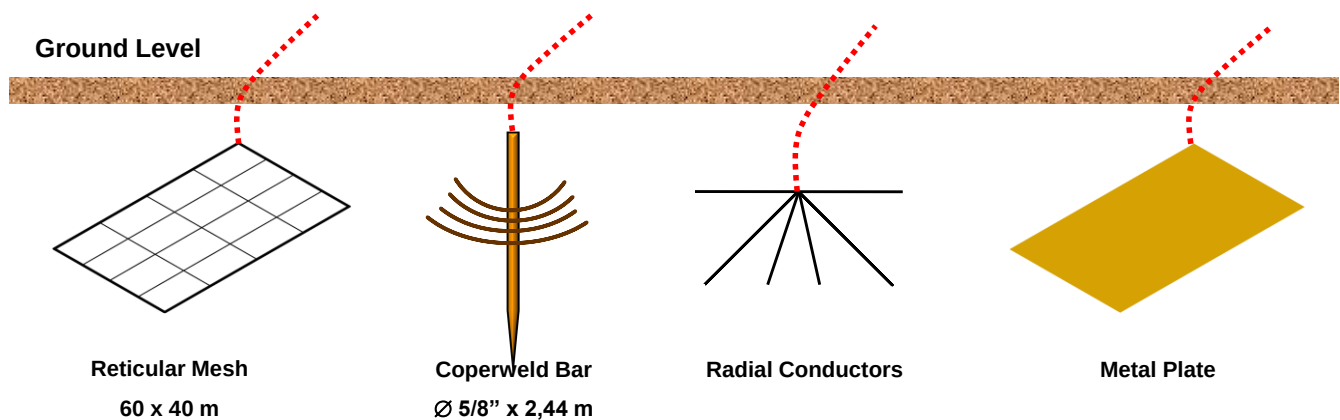


Picture 14. Comparison between Traditional Lightningrod and Natural Ionizing Lightningrod Ionca.

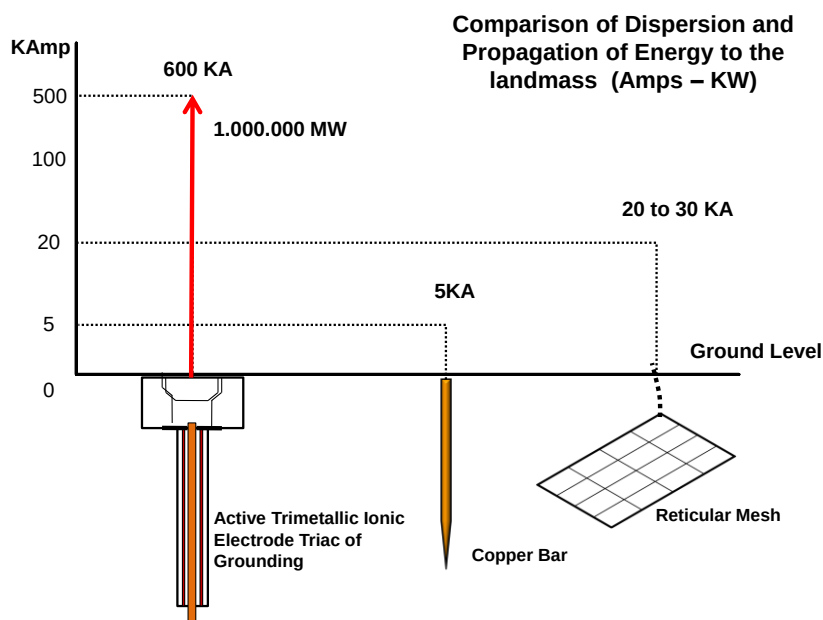
GROUNDING SYSTEMS

It is a set of direct buried metallic elements that allow and facilitate the spread and dispersion to the landmass the energy associated with lightning and electrical failures, without causing damage. Adherence to the landmass of Traditional Grounding Systems like Bars and Meshes is Mechanical. Adherence to the landmass with the Active Trimetallic Ionic Electrode of Grounding Triac is Electrolytic.

- Protect people and/or equipment (electrical, electronic, communication, computer)
- Protects against: Lightning, Transient Overvoltages of High and Low Level, Accidental Contact with Lines with High Voltage (HV) and Low Voltage (LV)
- Stabilizes the normal operating voltage.
- Facilitates the operation of switches.
- Equipotential: Touch Voltage and Step Voltage.
- Allows the propagation and dispersion to Earth of the energy associated with electrical failures, leakage currents and atmospheric discharges (lightning)



Picture 15. Traditional Grounding Systems.



Picture 16. Comparison between Traditional Grounding Systems and Active Trimetallic Ionic Electrode Triac of Grounding.

CERTIFICATION AND RECOGNITION

- Inventions and Patents. ISBN: 978-980-12-3386-2. DL: lf09120086203764.
- IEEE, The Institute of Electrical and Electronics Engineers. Latinamerican and The Caribbean Region.
- Award of Science, Technology and Innovation, FUNDACITE, Ministry of Science and Technology of Venezuela, 2006.
- Published in JOURNAL OF ENERGY AND POWER ENGINEERING. USA-China. July 2012. A monthly Professional Academic Journal (www.davidpublishing.org), Database: EBSCO, Massachusetts, USA. Cambridge Science Abstracts (CSA), USA. Chinese Database of CEPS, American Federal Computer Library Center (OCLC), USA. Ulrich's Periodicals Directory. Summon Serials Solution. Chinese Scientific Journals Database, VIP Corporation, Chongqing, China. Chemical Abstracts Service (CAS)
- ZAYED FUTURE ENERGY PRIZE Nomination. Abu Dhabi. United Arab Emirates. 2011, 2012, 2013 and 2014.
- Paper of New Highest Technology published in: *The International Energy Technology Data Exchange* (www.etde.org); US Department of Energy Office of Scientific and Technical Information, OSTI, Library and Archives Canada y Scientific Libraries Worldwide.
- World Renewable Energy Congress, WREC 2011. Sweden. Author and Speaker. Representative of Venezuela.
- XXI World Energy Congress, WEC 2010. Canada. Author and Speaker. Representative of Venezuela.
- IEEE, XV International Congress of Electrical, Electronic and Systems Engineering. INTERCON 2008, Peru. Author and Speaker. Representative of Venezuela.
- Universidad Nacional Experimental Politécnica "Antonio José de Sucre" (UNEXPO), University Arbitrated, Venezuela. Universidad Privada Antenor Orrego (UPAO), Peru.
- General Department of Research Science and Technology, Ministry of Science and Technology of Venezuela.

- National Center for Technology Innovation (CENIT) in Venezuela.
- Public and Private National and International Companies.

Building Projects completed:

- Church La Chiquinquirá. Maracaibo, Zulia state. Venezuela.
- Centro de Especialidades Médicas de Maturín (CEMCA) – Medical Clinic
- Clínica Chilemex de Puerto Ordaz – Medical Clinic.
- Corporación 80.000, C.A., VENRUS (Russians)
- CVG ALCASA (Aluminum)
- CVG CARBONORCA (Anode Plant)
- CVG Ferrominera Orinoco (Iron Plant)
- CVG Las Cristinas (Gold Plant)
- CVG MINERVEN (Gold Mining)
- CVG VENALUM (Aluminum)
- CVG VENORCA (Gold Plant)
- Edificio Toyomaya (TOYOTA of Venezuela)
- FIOR de Venezuela (Briquetted Iron Plant)
- Grupo AGAPOV (Russians) – Gold Mining.
- Liquid Carbonic (Gas Plant)
- Promotora Minera Guayana (PMG), VENRUS (Russians)
- Servicios Panamericanos (Security Company)
- TV Guayana (TV Station)

Prospective Projects:

- MASISA Plant. Fibranova and Oxinova (Industrial Wood)
- Clínica La Floresta, Centro Médico Maracay – Medical Clinic.
- Universidad Nacional de Panamá. Smart University (15.000 Students)
- RECVCA (Kaolin Mining - Russians)
- HIDROBOLÍVAR, Pump Station.
- Petróleos de Venezuela (PDVSA): PDVSA Boquerón, PDVSA Orocuá.
- Enelbar (Electrical Substations: Bárbula, Morón, Valle Seco, Chivacoa, Nirgüa, Yaritagüa)
- CADAFE (Electrical Substations: Tucupita, Temblador)
- Fuerza Armada Nacional de Venezuela (FAN), SICODENA, CRT - Piedra Azul, Fuerte Tiuna (National Armed Force)
- Fuerza Aérea Nacional de Venezuela (FAV), Building General Aviation Command Generalissimo “Francisco de Miranda”, Air Base, Caracas. (National Air Force)
- Telefónica. Movistar, Radio-telecommunication Center CRT MARACAY, Aragua state. Venezuela.

CONCLUSION

This New Highest Technology, 100% Venezuelan and Unique in the World, is the Definitive and Total Solution against Failures and Interruptions generated by Atmospheric Discharges (lightning) and affecting Electrical Substations, Power Equipment and Highly Sensitive Electronic Equipment, Equipment of Petroleum Exploration, Drilling, Oil Refineries, Fuel Supply Stations, Towers and Transmission Lines. Also, avoid “burning” of Electronic Cards in Highly Sensitive Electronic Equipment (Rx, Scanners, MRI scanners). It is also the mechanism for ending the so-called “Blackout” that much damage and losses occur in the world.

It is scientifically proven and accepted worldwide that the Electrical Protection Systems currently existing as Mesh of Grounding and Coperweld Bars limited ability to disperse and spread to the landmass the enormous energies associated with Atmospheric Discharges (lightning) whose values are in order: 200,000 to 500,000 Amps, 100 to 1,000 million Kilowatts and Transient Overvoltages of very high level of 100 million Volts, enormous energies that cannot be dispersed by a Mesh of Grounding which only have a maximum capacity of 20,000 30,000 Amps. This is the cause of major Blackouts and Electrical Failures worldwide.

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- 0081P-1983 IEEE. *Guide for Measuring Earth Resistivity, Ground Impedance; and Earth Surface Potentials of Ground System*, ANSI/IEEE Std. 81-1983.