

LIGHTNING CONDUCTOR
IONOSTAR
THE SECOND GENERATION



PARATONNERRES
POUYET

PARATONNERRES POUYET, A LONG STORY...

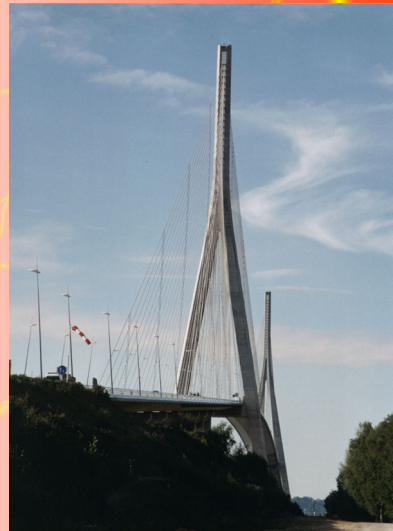
- 1934** HENRI POUYET creates the H.POUYET Company.
- 1936** Creation of a lightning conductor installation activity.



For several decades, H. POUYET is leader on the lightning protection market. In 1986 it starts to manufacture, and thus to produce for prestigious projects such as: Loire valley chateaux, la Maison de la Radio (National radio service building), CNIT at La Défense (exhibition centre) and many tower office block within this area as well as EDF nuclear electricity plants and Le Grand Palais national museum in Paris.

- 1968** Norbert POUYET takes over the management of the H. POUYET & Co.
There are now over 10 000 references giving to H. POUYET undisputed recognition and expertise in the lightning field.
- 1977** Norbert POUYET sells H.POUYET & Co. To ITT.
- 1983** Norbert POUYET purchases the lightning protection activity from ITT and it becomes PARATONNERRES POUYET.
- 1986** PARATONNERRES POUYET starts manufacturing and developing its first E.S.E. lightning conductor, the DIAMANT, in co-operation with the Paris Physics-Chemistry College.
- 1988** The technology of the DIAMANT allows the creation of the IONOSTAR E.S.E. lightning conductor.
- 1991** PARATONNERRES POUYET becomes a Gimelec member (an association of electrical manufacturers) and participates UTE activity (an industry standardization body and trade association). Meanwhile, a new research campaign is launched.

- 1994** Thierry POUYET is appointed Chairman and Managing Director and takes over from Norbert POUYET.
PARATONNERRES POUYET exports on all continents and works on major constructions projects such as The "Grand Arche" - La Défense (major arch shaped office building), the Normandy suspension bridge over the Seine, the Stade de France national football stadium, Telecom of Colombia...



- 1999** Many years of research gave birth to the 2nd generation IONOSTAR. It is in accordance with French standard NFC 17-102.

Paratonnerres Pouyet also means :

Conceptual Studies, Detailed Design, Engineering.
Protection against direct lightning strikes.

Manufacture, Sale, Installation :

Early Streamer Emission Lightning conductors
Faraday cages, Stretched wires.

Removal of Radioactive lightning conductors.

Over voltage protection.

Low voltage surge arresters.
Data & signal surge arresters.

Specific earthing systems.

Layout drawing.

Aerial beacons and markings.

Pylon.

Installation maintenance.



THE LIGHTNING PHENOMENON

Cumulo-nimbus thunderclouds stretch over several kilometers. They are composed of positively charged ice crystals at the top, and of negatively charged droplets at the base. 80 to 90% of lightning strokes in Europe are negative whereas in other regions, the proportion of positively charged strokes is higher. When cumulo-nimbus clouds are created, the ground electrical field rises to values close to 20 kV/m whereas the various high points create natural ionization (cf. figure ①).

Several tracers are produced at the core of the cloud and they travel to the ground by successive steps. When these descending leaders come closer, the ionization of the high points increases and produces ascending tracers (cf figure ②). The meeting of the two tracers creates an ionized path down which the cloud discharges its electric charge (cf figure ③).

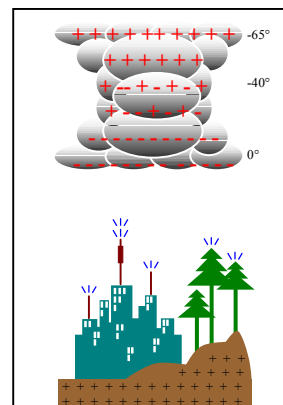


Figure ①

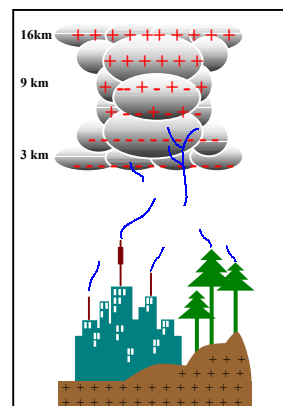


Figure ②

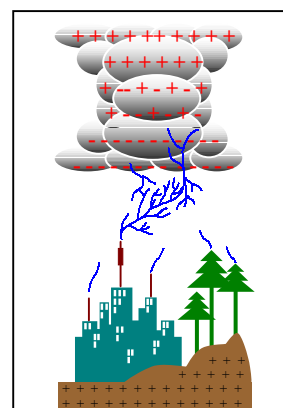
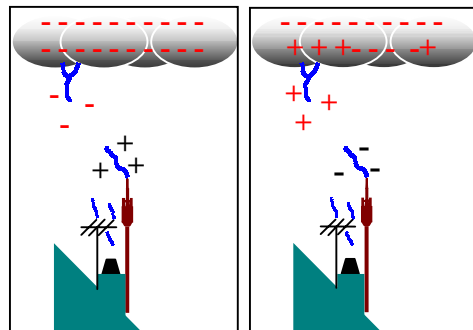


Figure ③

THE LIGHTNING CONDUCTOR IONOSTAR

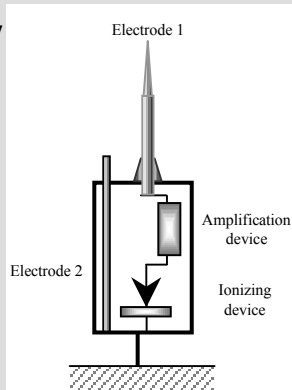
The IONOSTAR Early Streamer Emission (E.S.E.) lightning conductor principle is to artificially create, with an ionizing device, a powerful ascending tracer which neutralizes all other ascending tracers and thus produces a privileged lightning impact point on its tip whatever the thundercloud polarity may be.



IONOSTAR

THE SECOND GENERATION

The patented IONOSTAR (E.S.E.) lightning conductor, like the earlier model, works from the energy of the thundercloud electrical field transmitted via the descending tracers. Its ionizing device captures the ambient electromagnetic field, this powerful rising potential is simultaneously amplified by a device based on spark gaps. The resulting ionization causes a significant advance on the startup time of both and negative discharges.



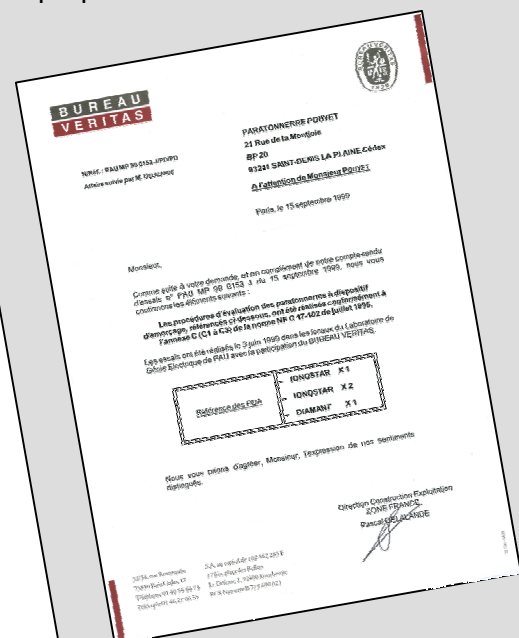
When the lightning stroke reaches the rod, the discharge current is deviated to an electrode directly connected to earth, protecting the ionizing device of the IONOSTAR lightning conductor. The active parts of this device being shunted, it can resist the most powerful strokes.



LABORATORY TESTS

VALIDATED PROCEDURE AND PERFORMANCES

Many years of research and extensive test programmes at the SEDIVER laboratory in Tarbes and at the LGE (Electrical engineering laboratory of PAU UNIVERSITY) have enabled the exceptional capacities of this new lightning conductor to be highlighted. These tests were carried out in accordance with French standard NF C 17-102 under conditions controlled and validated by BUREAU VERITAS. The results are conclusive and indicate unequalled performance. PARATONNERRES POUYET is continuing research and testing, especially in the field, to achieve further improvements to these properties.



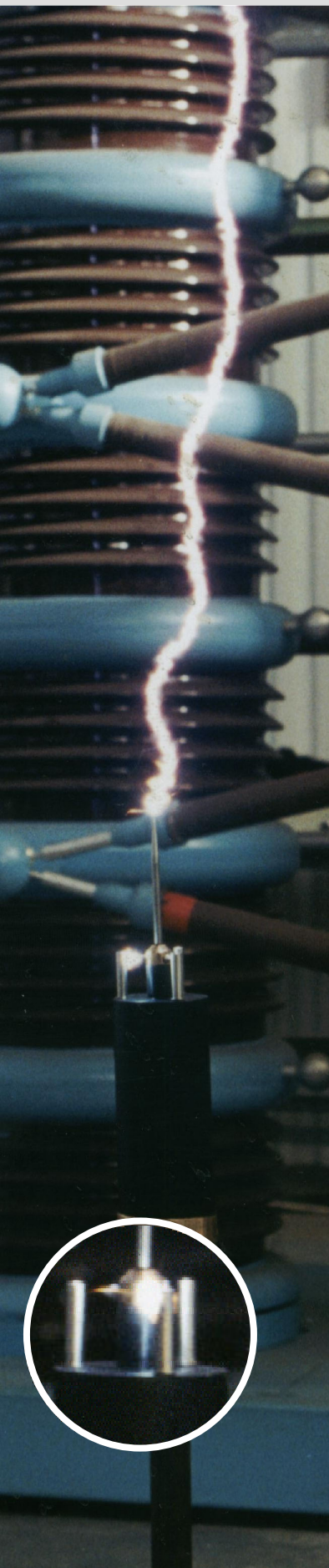
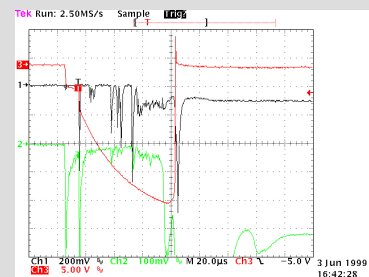


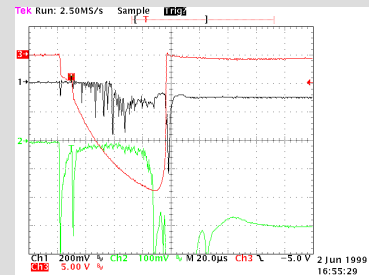
Image converter picture of a Franklin rod positive upward discharge



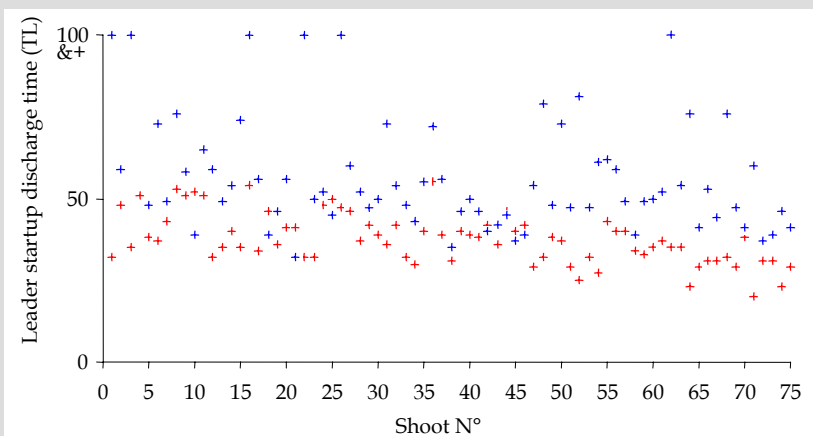
Image converter picture of an IONOSTAR positive upward discharge



Oscilloscope curve of a Franklin rod positive upward discharge



Oscilloscope curve of an IONOSTAR positive upward discharge



LGE - Pau Test results, Jun. 03.99

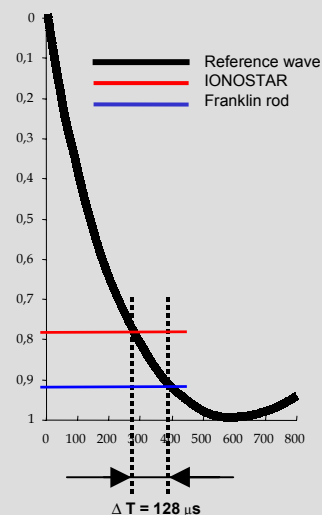
+ TL IONOSTAR

+ TL FRANKLIN

RELIABILITY AND REPEATABILITY TWO MAIN PROPERTIES

The latest test campaign underlined the main qualities of IONOSTAR which make it a highly reliable unit :

- Very significant startup discharge advance,
- Very constant operation(cf. "Test results"),
- No recorded alteration at the end of the test, after several series of 100 strokes, operation and performance proved regular,
- A completely self-sustaining unit requiring no particular maintenance.

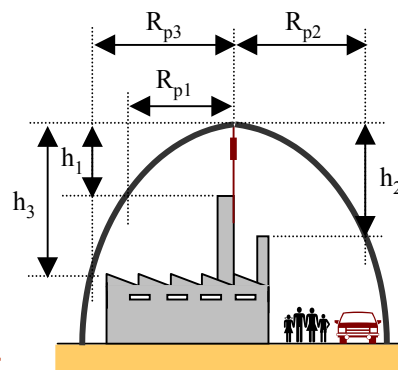


Reference wave

PROTECTION RADIUS

h_n : Height between the IONOSTAR tip and the protected area.
 R_{pn} : IONOSTAR protection radius according to height.
D : According to the French standard NFC 17-102 :
 20 m at level 1 45 m at level 2 60 m at level 3
 ΔT : Advance at the start of the discharge.
 $V(m/\mu s)$: Tracers speed.

$$R_p = \sqrt{(h(2D-h) + \Delta L(2D + \Delta L))} \text{ with } h \geq 5m. \quad \Delta L = V(m/\mu s) \cdot \Delta T (\mu s) = 10^6 \cdot \Delta T$$



			h(m)	2	3	4	5	7	10	20	30	60
	IONOSTAR	Reference	ΔL	Protection Radius $R_p(m)$								
LEVEL 3	IONOSTAR	64 P31064	60	43	64	85	107	108	109	113	116	120
	IONOSTAR	45 P31045	45	36	54	72	89	91	92	97	101	105
	IONOSTAR	32 P31032	32	29	44	59	74	75	77	83	87	92
LEVEL 2	IONOSTAR	64 P31064	60	39	58	78	97	98	99	102	104	-
	IONOSTAR	45 P31045	45	32	48	64	81	82	83	86	89	-
	IONOSTAR	32 P31032	32	26	39	53	66	67	69	73	76	-
LEVEL 1	IONOSTAR	64 P31064	60	31	47	63	79	79	79	80	-	-
	IONOSTAR	45 P31045	45	25	38	51	63	64	64	65	-	-
	IONOSTAR	32 P31032	32	20	30	40	50	51	51	52	-	-

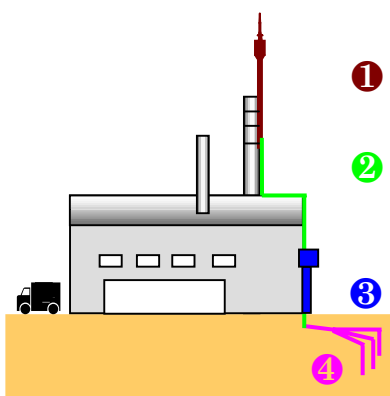
In accordance to the NF C 17-102-002 dated 12/01 the startup discharge advance (Δt) is limited to 60 μs .

According to the NF C 17-102-001 dated 12/01, for installations in France, a 40% safety coefficient must be applied on the protection radius for installations classified for the environment protection.



IONOSTAR LIGHTNING CONDUCTOR GENERAL CHARACTERISTICS:

Net Weight : 5.0 Kg. Gross Weight : 6.4 Kg Height : 2.0 m Material : Stainless steel and resin.



PROTECTION AGAINST LIGHTNING IS A WHOLE

According to the site protection level required, the installation consists of one or several IONOSTAR lightning conductors heightened or not by masts ① (refer to h value in the table). Each lightning conductor is connected to one or several down-conductors ② with, on the lower section, a surge counter, a test connection and a protection tube ③ connected to a specific earthing system ④. Metallic masses in the vicinity as well as the main earth connection network must be connected to the protection system to ensure the equipotentiality of the whole.



PARATONNERRES POUYET

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