

TECHNICAL LETTER N°5



IN SITU TESTS FOR THE EARLY STREAMER EMISSION AIR TERMINAL IONIFLASH®

■ Introduction

To evaluate the behavior over time and performance of the Early Streamer Emission (ESE) Air Terminal IONIFLASH, France PARATONNERRES set up several in situ tests in France and worldwide.

Those in situ tests allow comparison of modern technology ESE facing the classic technology (simple rod).

In addition, a severe climate test environment enables France PARATONNERRES to validate the correct operation of the IONIFLASH technology.

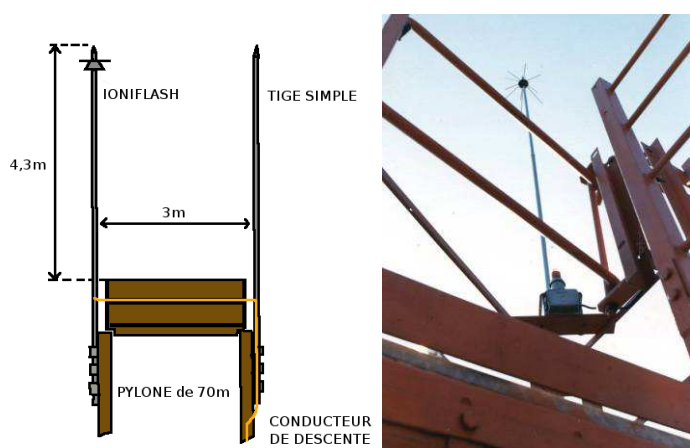
■ Telecommunication Tower Comparative test in France – June 1987 to June 1988

The target: Comparison between a simple rod and the ESE IONIFLASH.

The tests were performed on a microwave tower of France Telecom (French telephone networks), 70m high and located near Puybeaubier at Royère Vassivière (Department of Creuse).

Each year, this tower was hit by violent lightning impacts.

This site was very interesting to establish comparative testing between the two technologies and to test the resistance of the ESE IONIFLASH in front of very high intensity strikes.



The two lightning rods were placed precisely at the same height. The distance between the two lightning conductors was 3 meters.

Both lightning rods are connected to the same earth system with down conductors in round tinned copper 8mm.

Results:

IONIFLASH = 3 impacts at least
CONVENTIONAL ROD = 0 impact

This test was published in Electric General Review.

■ In Situ Test (in progress) – Church of Satu Mare (Romania) – June 2011

The target: To observe the early streamer emission facing to a simple rod both installed in the same conditions.



In June 2011, an in situ test is designed on the church of SATU MARE in order to compare the effectiveness of the Early Streamer Emission Air-Terminal (ESEAT) face to a Simple Rod (SR).

The main objective of this test is to observe the advance time of an Early Streamer Emission face to a Simple Rod installed under identical conditions.

Located near the Hungarian and Ukrainian borders, SATU MARE is an important economic and cultural center. This city is located in north-western Romania, at an average altitude of 129 m.

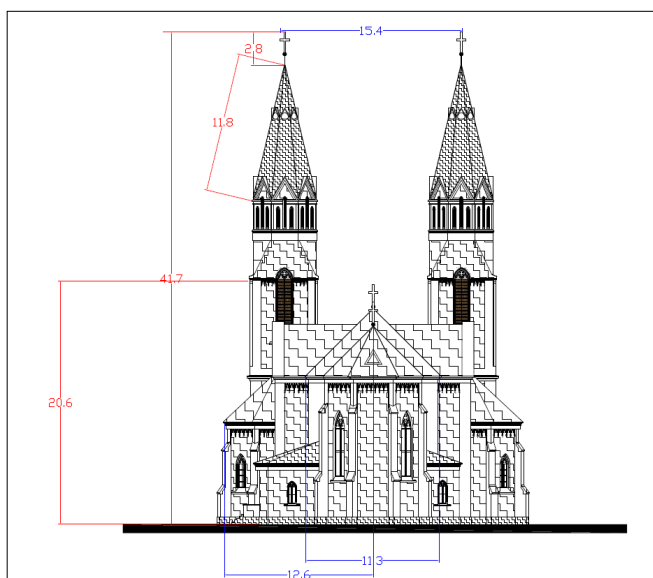
The average keraunic of this zone is 2.5 lightning impacts / year / km².



The Church of SATU MARE has a length of 38 meters and a width of 22 meters, this religious building consists of two bell towers.

Those two bell towers are about 40 meters at its highest point.

Its GPS coordinates are: 47 ° 47 '38" North 22 ° 52' 39" East



The lightning risk analysis according to the standard IEC 62305-2 Protection against lightning - Part 2 "Risk Assessment" provides **a level of protection IV** for this church.

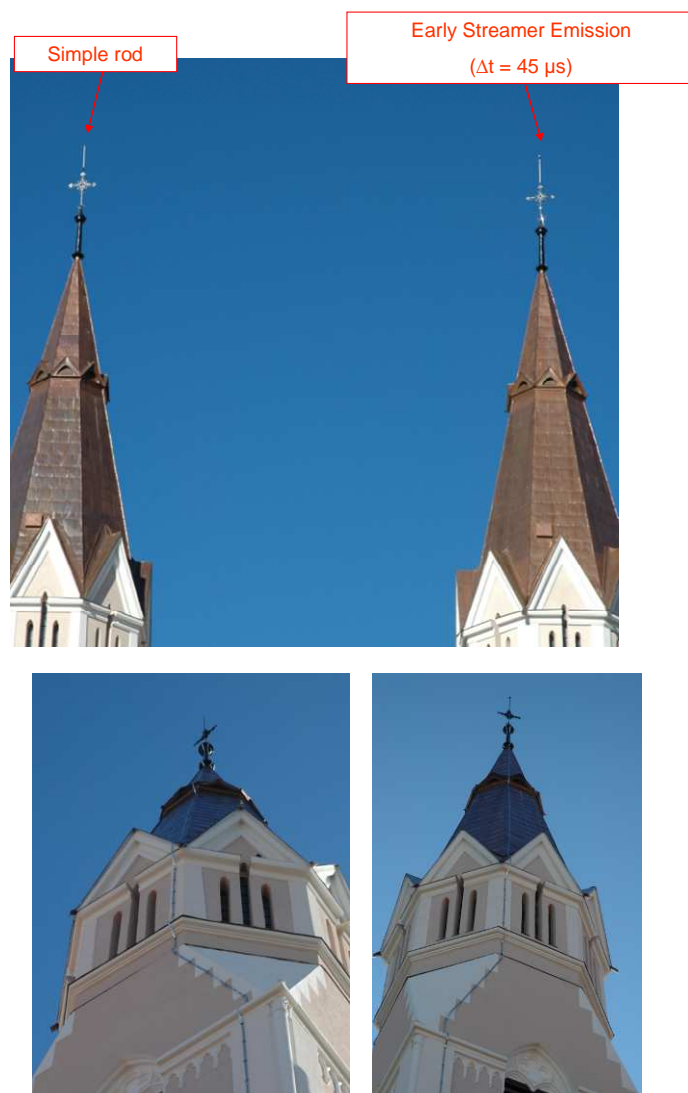
The two bell towers are protected against lightning with two equipment.

- ☑ One is equipped with an ESE IONIFLASH MACH 45 with an advance time of 45 μ s
 - ☑ The other is equipped with a lightning rod in 316 L stainless steel in accordance with EN 50164-2.
- A third PTS is located on the nave of the church.

The ESE is installed symmetrically opposite with the SR (as defined in the NFC 17-102 standard in September 2011). These two protections devices have two lightning down-conductors in tinned copper strip 30x2 mm.

These two protections against lightning are connected to two earth systems of type A «crow's feet».

The earth electrodes are interconnected by an equipotential bonding round of 50 mm². The electrical ground of the church is also connected to the lightning earthing system conductor in copper round 50 mm².



For each Air-terminal installed:

The bottom part of the down conductor connected the most directly to the earthing system is equipped with a lightning strike counter IONICOUNT® which records the lightning events. Those lightning strike counters are in sealed boxes.

A monthly check is performed. During this audit, the impact of lightning meters are read and all ground connections are measured.

This test in in progress.

▪ In Situ Test (in progress)/ High Mountain resort – Alt. 1804m – April 2009

The target: to validate the performance of the material used, as well as the behaviour of the IONIFLASH MACH in extreme climatic conditions

The IONIFLASH MACH is installed on a communication pylon in very hard climatic conditions (15m high).

The IONIFLASH MACH has to face extreme climatic conditions such as:

- Snow, winds (more than 150 km/hour), freeze (minus 35°celsius)
- Sun, hot and cold temperatures and of course lightning.



The bottom part of the down conductor connected the most directly to the earthing system is equipped with a lightning strike counter IONICOUNT® witch records the lightning events.

The lightning protection system is checked every three months by technical correspondents

Results:

The ESE IONIFLASH MACH has undergone two lightning impacts since its inception. No damage was observed on this lightning protection system. So, the behaviour of the IONIFLASH MACH is good in extreme climatic conditions and permits an optimal lightning protection of this site.