



**lightning  
protection  
system**

**$\Omega$ -x OMEGA-x**



**Πiorteh**  
**PIORTEH**

# The OMEGA-x lightning conductor with early leader emission is an essential element of modern lightning protection

The efficiency of lightning protection is determined by location, which is struck by the thunder during an atmospheric discharge. OMEGA-x fully meets this demand.

OMEGA-x, developed by Piorteh and ORW-ELS is an innovative solution based on the latest scientific achievements in lightning protection of people and property. The technology used in this solution is under the protection of international patents.

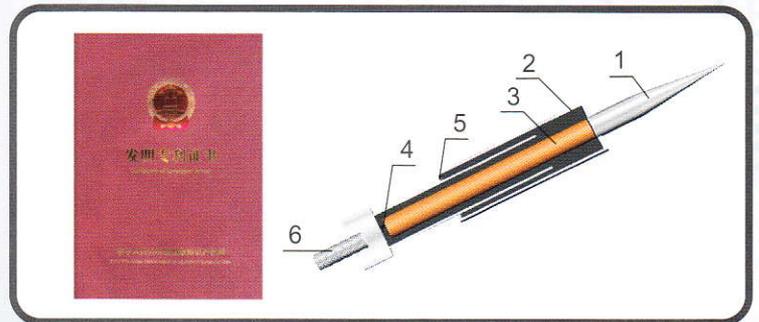
## Key Features:

- does not require external power supply, the device is completely autonomous
- reliable and efficient in all climatic conditions
- resistant to lightning strikes in any part of the device (not only the tip)
- stable, lasting operation efficiency
- easy installation and maintenance
- product meets the standards of ISO 9001.

## Head Structure

(patented solution)

1. Lightning conductor tip
2. Stainless steel outer casing
3. High-voltage system
4. Initiating system
5. External spark gap
6. Connection with mast, M16 thread



## Operating Principle

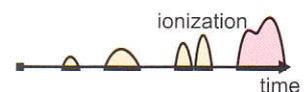
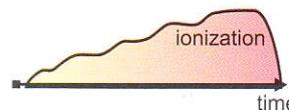
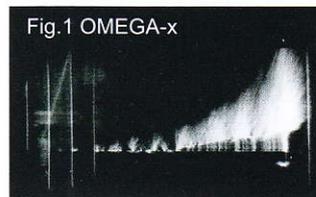
A major increase in electrical field can be observed in storm conditions. The tips of metal and semiconducting elements become sources of upward leaders, which go toward the oncoming atmospheric discharge. The OMEGA-x lightning conductor with early leader emission creates an upward leader earlier than any other elements within the protected area.

### PHASE ONE

As soon as the cloud sends the downward leader towards the ground, a rapid increase in the electrical field occurs, which causes the flow of current through the initiating system, triggering the upward leader. The upward leader is sustained by the high-voltage system and the flow of electric current from the ground as well as from the metal structures combined electrically with the mast. It is carried toward the downward leader of the atmospheric discharge.

(Fig.1)

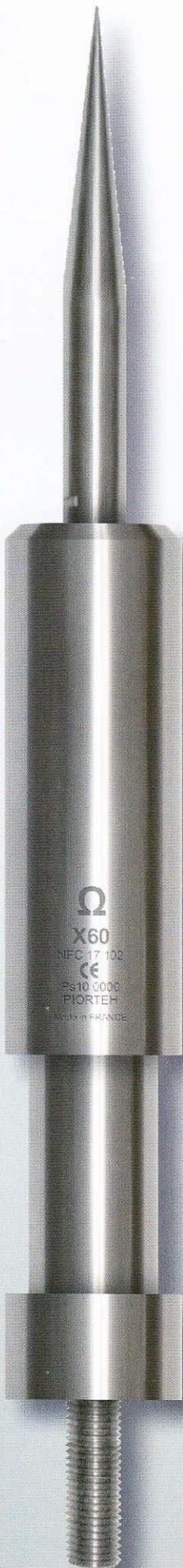
LGE Pau France



In Franklin's traditional faint, the triggering of the upward leader occurs later than in the OMEGA-x. This is caused by a longer than in OMEGA-x initial transient state, during which leaders are generated and instantly fade away as a result of forming of the electrical discharge around the tip (Fig.2).

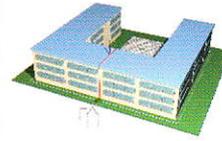
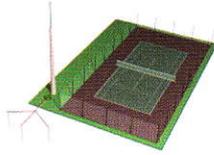
### PHASE TWO

After merging the two leaders, the discharge current flows to the ground through the circuit made between the casing and the base, passing by the internal initiating systems.



## Commercial Offer

A wide variety of lightning conductors with diversified electrical parameters and sizes allows for a proper assortment selection depending on the protected building. Adequate choice will provide an efficient protection and optimize the cost of installation. The selection of adequate lightning conductor should be made by a professional company dealing with installation setup.



### OMEGA x25

**time lead:** 25  $\mu$ s  
**material:** stainless steel 304, 316  
**fixing:** M16x45  
**maximum dimensions:** length 420 mm, diameter 50,8 mm  
**mass:** up to 1,7 kg



### OMEGA x35

**time lead:** 35  $\mu$ s  
**material:** stainless steel 304, 316  
**fixing:** M16x45  
**maximum dimensions:** length 435 mm, diameter=50,8 mm  
**mass:** up to 1,8 kg



### OMEGA x25a

**time lead:** 25  $\mu$ s  
**material:** stainless steel 304, 316  
**fixing:** M16x35  
**maximum dimensions:** length 435 mm, diameter 52 mm  
**mass:** up to 2,6 kg

### OMEGA x35a

**time lead:** 35  $\mu$ s  
**material:** stainless steel 304, 316  
**fixing:** M16x35  
**maximum dimensions:** length 435 mm, diameter=52 mm  
**mass:** up to 2,6 kg



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**Qualifoudre**  
 INERIS

N° 082396093045

OMEGA-x(a) and OMEGA-x meets requirements of the norms: NF C 17-102:2011, EN 62561-1:2012.

## Lightning Conductor with Self-Testing System

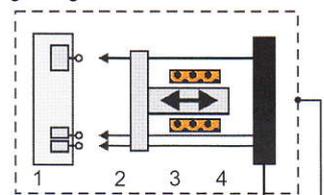
**OMEGA-x(a)** is an enhanced version of **OMEGA-x** lightning conductor, equipped with a self-testing system, which checks the condition of the device without having to dismantle it (patented solution).

The self-testing system is placed inside the metal base of the conductor and is electrically isolated from the initiating system, which triggers the leader. The self-testing system is activated with an external remote control device, called tester, and occurs only during tests. Thanks to this, the testing system remains electrically neutral and does not disturb the operation of the lightning conductor.

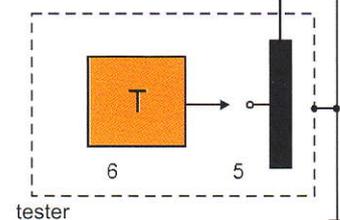
### Diagram

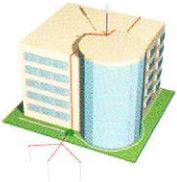
1. initiating system
2. measuring electrodes
3. electromechanical system
4. electrical connection
5. measuring joint
6. test apparatus (TESTER)

### lightning conductor



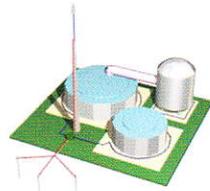
### Patents





## OMEGA x45

**time lead:** 45  $\mu$ s  
**material:**  
 stainless steel 304, 316  
**fixing:** M16x45  
**maximum dimensions:**  
 length 430 mm,  
 diameter 52 mm  
**mass:** up to 1,8 kg



## OMEGA x60

**time lead:** 60  $\mu$ s  
**material:**  
 stainless steel 304, 316  
**fixing:** M16x45  
**maximum dimensions:**  
 length 445 mm,  
 diameter 52 mm  
**mass:** up to 1,9 kg



## OMEGA x45a

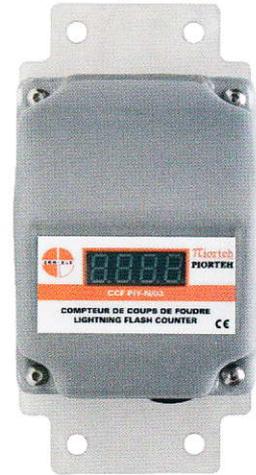
**time lead:** 45  $\mu$ s  
**material:**  
 stainless steel 304, 316  
**fixing:** M16x35  
**maximum dimensions:**  
 length 435 mm,  
 diameter 52 mm  
**mass:** up to 2,6 kg

## OMEGA x60a

**time lead:** 60  $\mu$ s  
**material:**  
 stainless steel 304, 316  
**fixing:** M16x35  
**maximum dimensions:**  
 length 435 mm,  
 diameter 52 mm  
**mass:** up to 2,6 kg

## Real-Time Monitoring of the Discharges

Information of an atmospheric discharge and the condition of the lightning protection equipment is crucial to the functioning of the conductor and the safety of the buildings. A hasty intervention and removal of the anomalies may ward off large losses.



## Counter/Recorder

- CCF N03T

It records atmospheric discharges striking the lightning protection of the protected building; it also serves as an automated tester that allows for testing the conductor immediately after the strike (applies for models equipped with a self-testing system). The device records the date of the discharge and its amplitude as well as the result of an automated test of the OMEGA-x(a) lightning conductor.

**Conformity with the:** EN 62561-6:2011

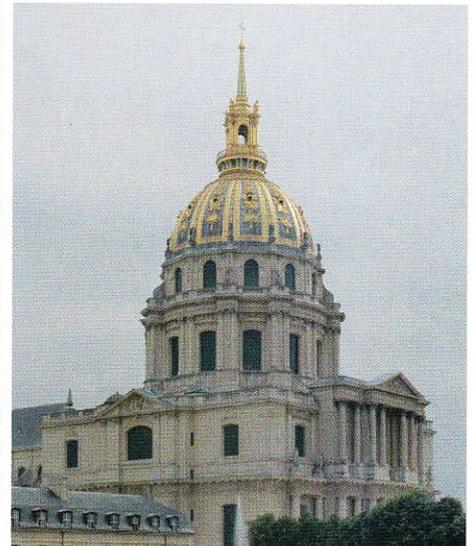
**Maximum dimensions:** 60x80x160 mm

**Mass:** 0,3 kg

**Available colour of case:** blue, grey



Photograph of lightning strikes on ORW-ELS & Piorteh's ESEAT protecting the Millau Viaduct in France (06/08/2013).



Paris, France

# PIORTEH & ORW-ELS, a creative group!

## Research

PIORTEH and ORW-ELS group, whose earliest structures were formed in the late '80s, arose on the basis of research conducted in two research facilities:

- Technical University in Wroclaw, Poland
- ESPCI - Supérieur de Physique et de Chimie Industrielle de la Ville de Paris, France (Physics and Industrial Chemistry College in Paris), where, a hundred years ago, Maria Skłodowska-Curie discovered the elements of radium and polonium.

## First Products

The first products in the branch of persons and property protection, based on original patented solutions invented in the research, were introduced to the French market in 1988.

## Development

Thanks to perpetual research and systematic patent protection, PIORTEH and ORW-ELS group became a leading company in lightning protection and fire protection. At present, PIORTEH & ORW-ELS products are widely used for the protection of aeronautic, petrochemical and public facilities on numerous markets worldwide.

## New Solutions

Our flagship product is the OMEGA-x lightning conductor with early leader emission, characterized by high efficiency, reliability of operation and resistance to lightning strikes. The system generating early leaders, an original patented solution, does not require any photosensitive components. A lightning conductor with a self-testing system, allowing for verifications of its operation without having to dismantle it is another original invention.

## Research Programs

PIORTEH & ORW-ELS group actively participates in theoretical works, scientific publications, conference events and research programs in laboratory conditions and in real-life conditions.

## Warranty

PIORTEH & ORW-ELS products meet the standards of ISO 9001. The group is certified with a "Qualifoudre" certificate, issued by INERIS (French Ministry of Environmental Protection Institute).

## Trade

PIORTEH & ORW-ELS products can be found in over 30 countries.

## Location

PIORTEH & ORW-ELS design offices and production plants are located in France and in Poland.

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## Experimental Demonstration of the Effectiveness of an Early Streamer Emission Air Terminal Versus a Franklin Rod

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ABSTRACT

This paper is devoted to a detailed presentation

experimental technique to prove the effectiveness

of an early streamer emission (ESE) air terminal

versus a Franklin rod for the protection of a

structure. The results of the experimental work

show that the ESE air terminal is more effective

than a Franklin rod. The experimental work

is supported by numerical simulations of the

electric field and the streamer discharge

process. A comparison of the experimental results

