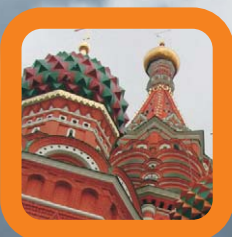


GROMOSTAR PiX/ π X

lightning protection

Qualifoudre
INERIS



π iorteh
PIORTEH



GROMOTECH



The House of Nicolaus Copernicus – museum.



Application

Protection of human beings and property against the effects of direct stroke of lightning

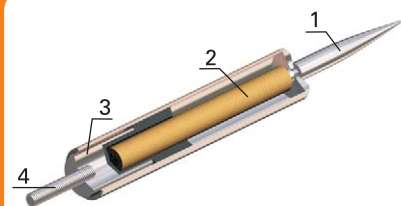
- industrial plants
- public buildings
- sporting facilities
- sacred buildings
- open areas

Installation principles

- Risk analysis in accordance with the PN-EN 62305-2 standard
- Protection zone radii in accordance with the NFC 17-102 standard (second edition, January 2009, the standard is harmonized with the EN 62305-3)
- Drainage of the surge to the ground in accordance with the PN-EN 62305-3 and the NFC 17-102

Structure

1. External shield with a tip.
2. A system that initiates the extension of the leader (an inductive and capacitive system with an inner spark gap).
3. Base external spark gap.
4. Connection with the mast, the M16 thread.



General principle of operation of the lightning conductor with pre-emission of a leader (PDA)

There is a strong increase of electric field in stormy conditions. Tips of semiconductor and metal elements change into sources of bottom-up leaders that develop towards the face of the lightning discharge that is coming down. The purpose of the lightning conductors with pre-emission of a leader (PDA) is to create a bottom-up leader prior to other elements that are present within the area of the protection zone covered by the PDA lightning conductor.

In normal weather conditions this is a passive element having the potential of the earth. In stormy conditions, when the leader of the lightning discharge comes down from the cloud towards the earth, there is a sudden increase of the electric field around the face of the leader. There are electric charges gathering on the external shield and the tip and as a result of this process the electric potential of the shield with regard to the base having the potential of the earth, increases.

FIRST PHASE

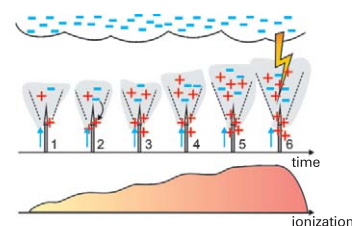
- The spark-over at the inner spark gap causes the flow of electric current having intensity of several A within the initiating system, which originates the bottom-up leader at the tip.
- The bottom-up leader, which is supported by the initiating system and supply of electric charge from the earth and metal structures that have electrical connection with the mast, moves towards the coming down leader of the lightning discharge.

SECOND PHASE

- As the ascending and descending leaders get closer and closer together there is a strong increase of electric current within the initiating system, which causes the spark-over in the external spark gap.
- The short-circuit that occurs between the shield and the base directs the electric current of the lightning discharge towards the earth in such a way that it passes round the system that initiates the development of the leader.

When the lightning discharge is taken over the initiating system may be checked by means of bringing closer together the test apparatus and the head (standard version) or from a distance (testing version).

◀ Trails on head of lightning rod after discharge.



GROMOSTAR(T) PiX(a)

General descriptions

GROMOSTAR(T)/PiX(a) is the GROMOSTAR/PiX lightning conductor that is additionally fitted with a testing system that enables the checking of the technical condition of the lightning conductor without a need to disassemble it. The testing system is placed within the metal base of the lightning conductor and is electrically insulated from the system that initiates the development of the leader. The testing system is activated with the help of an external device called the Test Apparatus only during the test. Owing to the fact that there is such a solution the testing system stays electrically neutral with regard to the system that initiates the development of the leader and it does not disturb the functioning of the lightning conductor.

Principle of operation

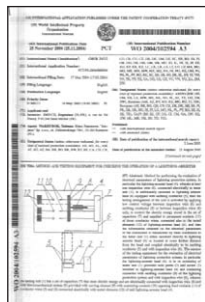
The GROMOSTAR/PiX lightning conductor is fitted with a system that initiates the development of the leader at its tip. The assessment of efficiency of the GROMOSTAR(T)/PiX(a) lightning conductor consists in verification of electric parameters of the system.

During the test, which lasts about 10 s, the test apparatus:

- feeds the electromechanical system, which moves the measuring electrodes in order to ensure the electric connection between the system that initiates the development of the leader and the test apparatus,
- measures the electric parameters of the initiating system.

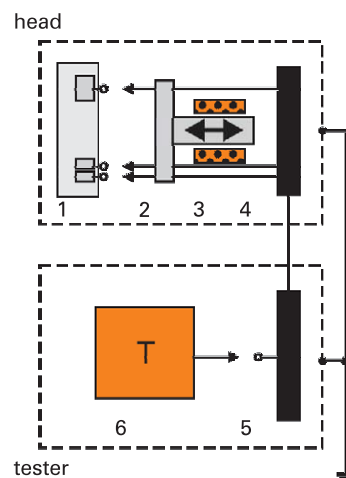
The testing and measuring electric connection between the test apparatus and the lightning conductor has two wires in it.

Patents

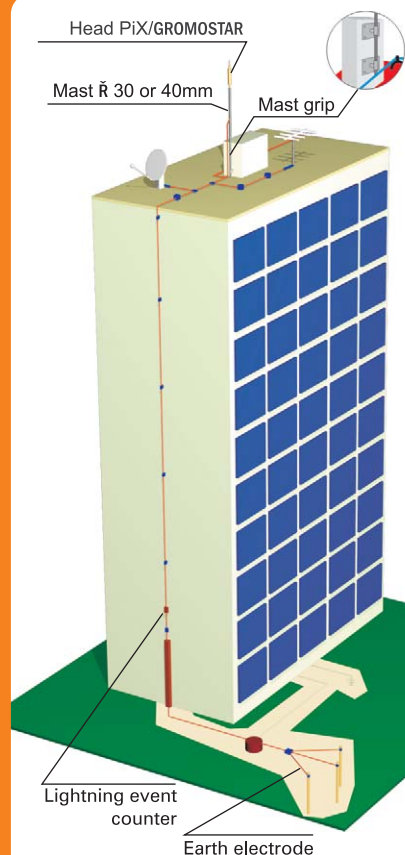


Diagram

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



Typical draft of lightning protection with PDA PiX/GROMOSTAR



Heads - characteristic and technical data

The testing system that is build-in in the base of the head does not impact the electric field distribution around the lightning conductor. Time leads in both versions are the same.



PiX2/GROMOSTAR2

as a standard it is fitted with a testing system, that is resistant to aggressive atmospheric conditions (high humidity, air contamination and salinity)

most often used in:
industrial buildings
of big cubic capacity

time lead: 60 (90*) μ s

material: stainless steel 304, 316

maximum dimensions:

length 555 mm, DIAMETER 70 mm

mass: 4,1 kg

fixing: M16x45

*standard value limitation (NFC 17-102) up to 60 μ s



PiX3(a)/GROMOSTAR(T)

it is available both with the testing system and without the testing system

depending on the version

most often used in:

public buildings,
industrial buildings,
individual buildings
manufactured in four versions

time lead: 60, 45, 35, 25 μ s

material: stainless steel, copper

maximum dimensions:

length 479 mm, DIAMETER=50 mm

mass: up to 2,1 kg

fixing: M16x45

PiX3 A380(a)/GROMOSTAR3(T)

it is available both with the testing system and without the testing system

most often used in:

aviation infrastructure

time lead: 60 lub 35 μ s

material: stainless steel 304, 316

maximum dimensions:

length 518 mm, DIAMETER 60 mm

mass: up to 2,0 kg

fixing: M16x45



PiX1(a)/GROMOSTAR1(T)

it is available both with the testing system and without the testing system

most often used in:

it is popular to apply it in order to protect historic and sacral buildings

time lead: 60 lub 35 μ s

material: resin,
chrome-nickel or copper

plated coating

stainless steel point

maximum dimensions:

length 335 mm, DIAMETER 65 mm

mass: up to 2,0 kg

fixing: M16x45

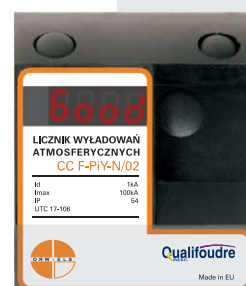


Discharge counter

Its purpose is to register lightning discharges that hit into the Lightning Protection System of the protected building. The counter information contains: the date and hour of the discharge, an estimated value of the amplitude of the atmospheric discharge electric current. It is fitted with a teletransmission output.

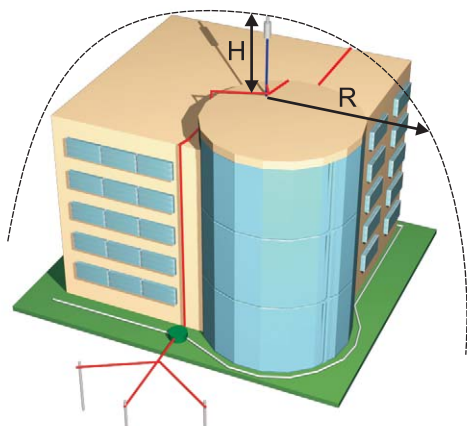
Technical data

Minimal registered electric current	Id	1kA
Maximal registered electric current	Imax	100kA
Tightness	IP	54
Operational temperature range	-40°C	+85°C
Feeding	battery, replacement every 3 y.	
Conformity with the UTC 17-106		



GROMOSTAR PiX

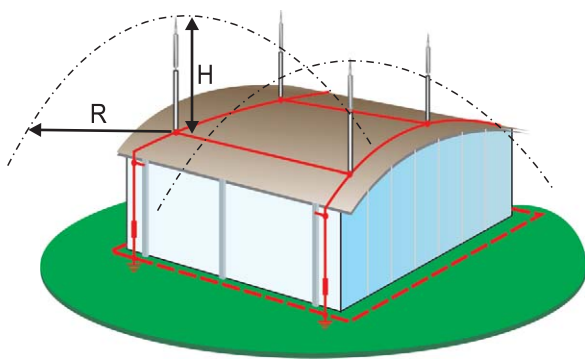
Protection zone radii



The „Wratislavia Center” office building

Protection level		Protection radius R [m] for the height of H=						
Δt		2m	3m	4m	5m	7m	10m	20m
60	I*	31	47	63	79	79	79	80
45		26	39	51	63	63	64	65
35		23	30	36	49	50	51	52
25		17	25	34	42	43	44	45
60	II*	35	53	70	88	88	88	90
45		30	44	58	72	72	73	75
35		25	35	44	57	58	58	62
25		20	29	40	50	50	52	55
60	III*	39	58	78	97	98	99	102
45		33	49	65	80	81	83	86
35		27	40	52	65	67	68	73
25		23	34	46	57	58	63	65
60	IV*	43	64	85	107	108	109	113
45		36	54	71	89	90	92	97
35		30	47	64	73	75	77	82
25		26	39	52	65	66	69	75

* concerns buildings that require protection at the 1++ level, and buildings that are hazardous to the environment (danger coefficient $h=20$, EN 62305-2) or the ones that may cause environmental contamination (danger coefficient $h=50$, EN 62305-2) protection radius must be reduce 40%.



Hangar for Airbus A380 aeroplane

Certificates, reports



Origins

The group that encompasses the Piorteh company (France) and ORW-ELS company (Poland) was created on the basis of the research conducted in research and development centres of the Wrocław University of Technology (Poland) and the French School (ESPCL in Paris).

Modern solutions and manufacturing

The original solutions that were used at the PiX/ GROMOSTAR lightning conductors are protected by patents in many countries of the world. All processes concerning the activity of the company are subject to rigorous control with regard to their conformity with the ISO 9001 standard and the Qualifoudre INERIS guidelines.

Products

Lightning protection: the PDA lightning conductors, mainstream lightning conductors and accessories

Fire protection: fire hazards detection and signalling system

Services

- Risk analysis
- Planning
- Installations
- Maintenance

Example references

Aviation infrastructure:

Air France Industries, France; AIRBUS A380 Hangar; Roissy Charles de Gaulle, ORLY airports in Paris, France

Industrial buildings:

YOPLAIT/Le Mans France; MICHELIN/Valenciennes France

Historic, sacral buildings:

Pantheon/Paris, France; Folk Buildings Museum in Kolbuszowa; Open-air ethnographic museum in Sanok; Mikołaj Kopernik's House, the museum in Toruń; Churches and bell towers within the area of Poland

Other:

The Fire Department objects in Pabianice and Piotrków Trybunalski; the KRYWAŃ Polska Network of Hotels

The GROMOSTAR lightning conductors' presence on the world markets:

Russia, Lithuania, Latvia, Romania, France, Poland, China...



Commercial Group

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