




**FRANCE**  
**PAR TONNERRES**

OUR RELIABILITY IS YOUR FIRST INSURANCE

**IONIFLASHMACH<sup>®</sup>**

Early Streamer Emission Air Terminal

 International patent, French technology and production



## 40 years of experience for advising you

in your projects of prevention and protection against lightning and electrical damages



### THE QUALITY OF THE CONTACT AND THE REACTIVITY OF A TEAM LISTENING TO YOU

- A technical support dedicated to our customers
- Reliable and reactive answers given within 24 to 48 hours
- Shipment of the material within 24 to 48 hours

### AN ECO-RESPONSIBLE COMPANY

- Carbon impact results

PERIMETER	Results IONIFLASH MACH (T eq CO <sub>2</sub> )	Results IONIFLASH MACH + accessories (T eq CO <sub>2</sub> )
Restricted	99.2	115.2
Life cycle	93.6	109.6
Global	151.2	167.2

- Results per ESE air terminal

PERIMETER	Results IONIFLASH MACH (kg eq CO <sub>2</sub> /unit)	Results IONIFLASH MACH + accessories (kg eq CO <sub>2</sub> /unit)
Restricted	33	38
Life cycle	31	37
Global	50	58

Data collected within the framework of the Carbon Assessment 2008/2009 of France Paratonnerres

# EARLY STREAMER EMISSION



MACH NG15

MACH NG25

## RELIABILITY OF THE IONIFLASH MACH<sup>®</sup>

### Five solutions adapted to all your projects

- Higher efficiency demonstrated (High Voltage Laboratories results on request)
- Double security thanks to the two spark gaps dimensioned to have an operating range adapted to the frequential spectrum of the lightning (0 to 10 MHz)
- Electrical and physical continuity from the IONIFLASH tip to the earth
- Reliable and autonomous device even in extreme climatic conditions
- Support tools for study and installation (software IONEXPERT 3000<sup>®</sup>, operational tests devices IONICHECK<sup>®</sup>, IONICOUNT<sup>®</sup> impulse counter)
- **10 years guarantee. Lifetime of 35 years: all material in stainless steel 316L, protective fairing**
- Lowest carbon impact 33 kg eq. Co2 / unit
- Tested in accordance to the Standards NFC 17-102 Edition 2011, EN 50164-1, IEC 60060-1, UNE 21186, production conformed to NF EN ISO 9001 : 2008 Standard [Certification N° FR003277-2]

For working steps of the IONIFLASH MACH<sup>®</sup>, see technical data sheet.



MACH NG30

MACH NG45

MACH NG60

## France Paratonnerres is a world-wide company recognized for its expertise,

and the quality of its products since more than 40 years. Inventor and producer of a technology of the latest generation, the Early Streamer Emission Air Terminal IONIFLASH MACH®.

### POLE of RESEARCH

- Applied research
- In situ tests
- Incident expertise

### RESEARCH DEPARTMENT

- Lightning Risk Analysis
- Lightning Technical Studies
- Checkings of lightning installations
- Training sessions (governmental authorization)

### POLE of DEVELOPMENT

- Member of the Standard Committees (AFNOR-UTE/CENELEC/CEI)
- Actor in the scientific research world
- International conferences, workshops, scientific reviews
- Partnerships with Laboratories

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### PRODUCTION and TECHNICAL DEPARTMENT

- Studies and production of specific solutions adapted to complex problems
- Removal, dismantling, storage of radioactive early streamer emission air terminals

### COMMERCIAL DEPARTMENT

- Trilingual team
- Rigour, reliability of service
- Reactivity

### QUALITY

- ISO 9001 version 2008
- Qualifoudre (Level C) N° 1223131658121
- French Nuclear Safety Authority (ASN)
- Oseo Excellence

### INTERNATIONAL REPRESENTATION

- in more than 50 countries



# LABORATORIES TESTS

## MAIN TESTS

The first ESE air terminal which presents the double performance of conformity to all the tests of the NFC 17-102 Edition 2011 Standard and IEC tests.

- The NFC 17-102 Edition 2011 is the European Standard used as the reference for the prescription and installation of the ESE air terminals.
- The appendix C of the NFC 17-102 Standard requires a complete sequence of consecutive tests carried out with the same ESE air terminal, in conformity in particular with the Standards EN 50164, EN 62305.
- The electrical Standard IEC 60060-1 prescribes the test of insulation in rain conditions, applied to high voltage equipments.

These tests were defined out of France Paratonnerres company, in independent, governmental or accredited COFRAC Laboratories.



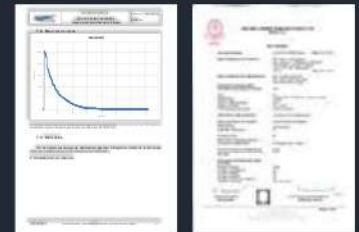
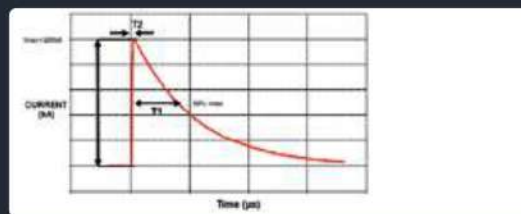
## TESTS SEQUENCE

According to NFC 17-102 Edition 2011 (Appendix C)

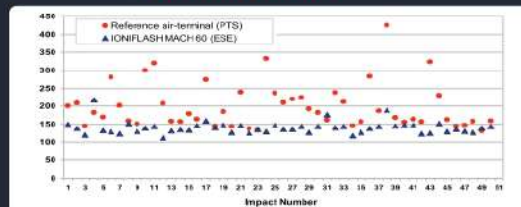


## RESULTS AND TEST REPORTS

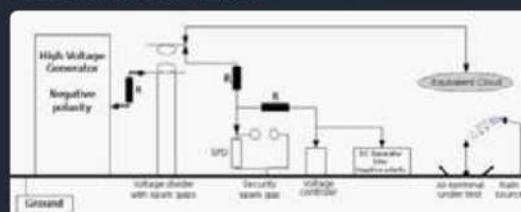
Test according to EN 50164-1, prescribed by NFC 17-102 ed.2011 High current test 100 kA (waveform 10/350)



Early streamer emission test according to EN 61180-1, prescribed by NFC 17-102 ed. 2011



Insulation test according to IEC 60060-1



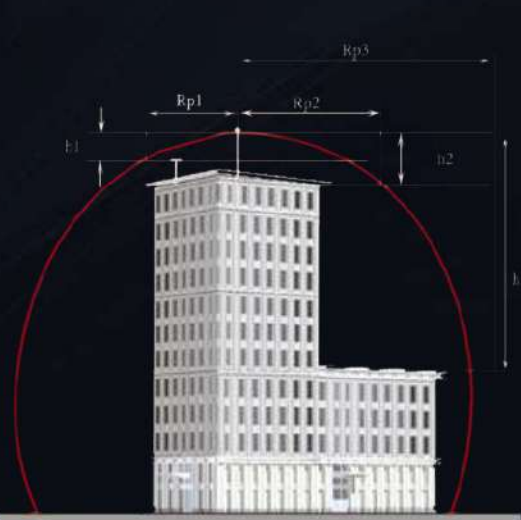
# INSTALLATION STANDARDS

## PROTECTION RADIUS IONIFLASHMACH®

The protection radius (Rp) of a ESE air terminal depends of the height of its installation in relation to the surface to be protected, its early streamer emission ( $\Delta t$ ) and the level of protection chosen.

Height in meters		2	3	4	5	6	10	15	20	30	45	60
Level I	<b>MODELS</b>											
	IONIFLASH MACH NG15	13	19	25	32	32	34	35	35	34	24	
	IONIFLASH MACH NG25	17	25	34	42	43	44	45	45	44	37	21
	IONIFLASH MACH NG30	19	29	38	48	48	49	50	50	49	43	30
	IONIFLASH MACH NG45	25	38	51	63	63	64	65	65	64	60	51
IONIFLASH MACH NG60	31	47	63	79	79	79	80	80	80	79	76	69
Level II	<b>MODELS</b>											
	IONIFLASH MACH NG15	15	22	30	37	38	40	42	44	45	42	34
	IONIFLASH MACH NG25	20	29	39	49	49	51	53	54	55	53	46
	IONIFLASH MACH NG30	22	33	44	55	55	57	58	59	60	58	52
	IONIFLASH MACH NG45	28	42	57	71	71	72	73	74	75	73	69
IONIFLASH MACH NG60	35	52	69	86	87	88	89	89	89	90	89	85
Level III	<b>MODELS</b>											
	IONIFLASH MACH NG15	18	27	36	45	46	49	52	55	58	60	58
	IONIFLASH MACH NG25	23	34	46	57	58	61	63	65	68	70	68
	IONIFLASH MACH NG30	25	38	51	63	64	66	69	71	73	75	73
	IONIFLASH MACH NG45	32	48	64	81	81	83	85	86	89	90	89
IONIFLASH MACH NG60	39	58	78	97	97	99	101	102	104	105	104	
Level IV	<b>MODELS</b>											
	IONIFLASH MACH NG15	20	31	41	51	52	56	60	63	69	73	75
	IONIFLASH MACH NG25	26	39	52	65	66	69	72	75	80	84	85
	IONIFLASH MACH NG30	28	43	57	71	72	75	78	81	85	89	90
	IONIFLASH MACH NG45	36	54	72	89	90	92	95	97	101	104	105
IONIFLASH MACH NG60	43	64	85	107	107	109	111	113	116	119	120	

The level of protection is given using the NFC 17-102 Edition 2011, EN 62305-2 or UTE 17-108 guide. If the site presents a risk for the environment, the protection radius must be reduced of 40%.



For  $2m \leq h \leq 5m$

$$R_p(h) = h \times \frac{R_p(5)}{5}$$

For  $h \geq 5m$

$$R_p(h) = \sqrt{h(2r - h) + \Delta(2r + \Delta)}$$

where :

$R_p(h)$  (m) corresponds to the protection radius for a stated height (h). h (m) corresponds to the height of the tip of the ESE air terminal in relation to the horizontal point passing through the top of the element to be protected.

- $r$  (m) = 20m for protection level I
- 30m for protection level II
- 45m for protection level III
- 60m for protection level IV

The experience shows that  $\Delta$  is equal to the efficiency obtained during the evaluation tests of the ESE air terminal.

$$\Delta (m) = \Delta T(\mu s) \times 10^6$$

$\Delta T$  = Early streamer emission time of the ESE air terminal obtained with laboratories tests.

### IONEXPERT 3000® SOFTWARE

The IONEXPERT 3000® software developed by France Paratonnerres enables you to carry out the lightning risk analysis and the installation of protection devices.

