Indelec

la foudre apprivoisée

Stormonitor Lightning Warning System

Testing Campaigns Introduction

December 2009

Introduction

Since 1955, INDELEC has been specializing in the Lightning Protection field. It has been developing its range of products and services to suits its customers' requirements and expectations in an increasingly "lightning-sensitive" construction industry (more electronics, high-rise buildings, private industrial and public investment in "mega projects" …):

- Direct Lightning Protection systems that includes all the earthing and conductors accessories besides the acclaimed Prevectron® air terminals (leading ESE air terminal in the world)

- Indirect Lightning Protection Systems with a full range of Power, Telecom, Data, Coaxial and Very Low Voltage SPD

- Lightning warning systems (newly released Stormonitor).

All the products launched by INDELEC are undergoing the extremely stringent test campaigns, using either the own High Voltage Laboratory (one million Volts generator) or the company unique experience of "real lightning testing" since its first campaign in Florida at the beginning of the 90's.

The Stormonitor have been subjected to similar test campaigns before it was officially introduced in France on July 1, 2009. These tests have been conducted by in-house R&D Department and the Stormonitor is the result of seven (7) years of development and testing.

Besides the EMC test in compliance with the EN 61000-4-4 EMC Standard, INDELEC developed its own testing methodology and specifications since no standard for lightning warning system has been published yet (currently under discussion at the CENELEC under reference prEN 50-536).

This document introduces the different test campaigns conducted on the Stormonitor.

Stormonitor testing in High Voltage Laboratory

Since 2003, INDELEC has built and equipped its own testing facilities, in the North of France, 50km from its headquarters. It then became the first and only air terminal manufacturer to own its own laboratory dedicated to lightning research.

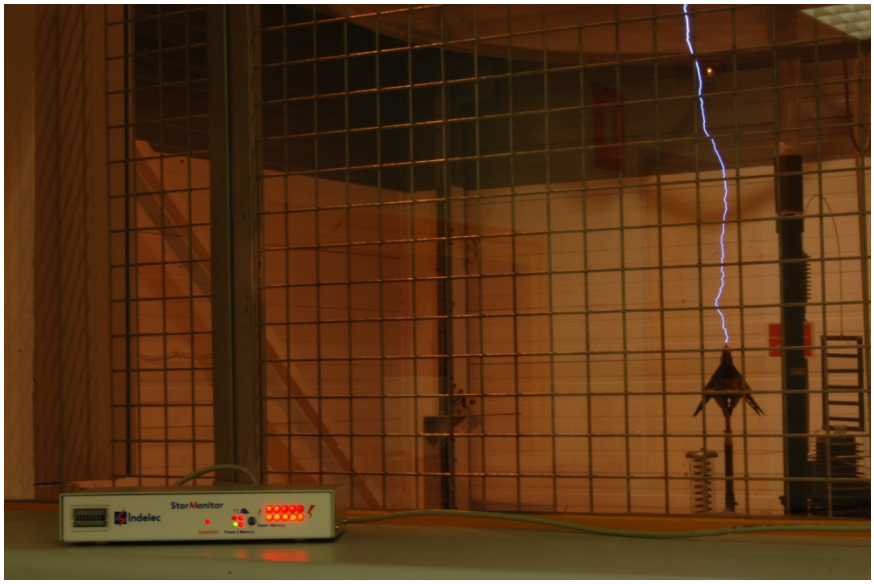
This facility is also the backbone of INDELEC R&D activities and provides a unique tool for testing of existing products as well as development of future products and research on the physics of lightning. Naturally, the first Stormonitor prototypes were tested in this laboratory with the following target:

- Develop the Stormonitor to ensure firstly its reliability: Detection of lightning events, no false warning, etc…

- Ensure that the Stormonitor can be installed easily (Plug & Play) and everywhere without calibration/local settings: INDELEC is represented in more than 60 countries with extremely different climatic, environmental and geographical conditions so each of its products must face a wide range of conditions.

- Besides its reliability and user-friendly capabilities, the Stormonitor must also be robust and must not be affected by … lightning devastating effects (electromagnetic disturbances, surges…) to offer satisfying life duration to the Clients.

The Stormonitor first prototypes have been tested in the High Voltage Laboratory and closely monitored. These campaigns of testing in Laboratory were extremely useful during the development stages to finalize the design and fine-tune the unique "3-stages analogue filtering process" that allows the Stormonitor to separate and identify the lightning signatures in specified wave lengths.



Stormonitor testing in Real Lightning Conditions

Even though the HV Lab tests have been extremely useful for the development of the new Stormonitor, these tests cannot be representative of the real lightning phenomenon. The Laboratory testing campaigns does not allow the R&D team to achieve one more requirement that was fundamental to obtain the Board of Management final decision to market the new Warning Lightning System: ensure its sustained performance in extreme weather conditions.

The Stormonitor is dedicated to extreme weather condition and there is only one option to confirm it can sustain these conditions: outdoor real lightning testing, with severe climatic but also all types of "frequency pollution" (interferences).

The Stormonitor has been installed on several sites that are currently under survey by INDELEC R&D Department for the installation of the future LRS (Lightning Rocket System) Launch Pad (cf hereunder the picture of the Launch Pad previously installed in Brazil):

Prior to the installation of such facilities, the R&D Department in cooperation with local scientific and university partners, is conducting a "site condition survey" during several "lightning seasons" e.g. several years. These surveys are following an extremely detailed and complex protocol.

Amongst the multiple data to be monitored on site, there are real-time lightning activity recordings. These data are obtained thanks to a complex Electromagnetic Field Recorder using Atmospheric Field Mills.

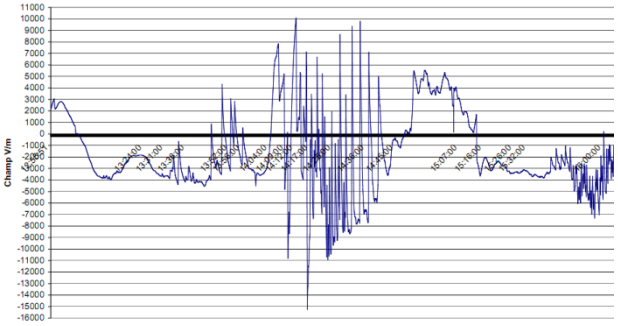
Taking advantage of these equipments installed in several locations in the world, the R&D Team also installed the Stormonitor prototypes in order to:

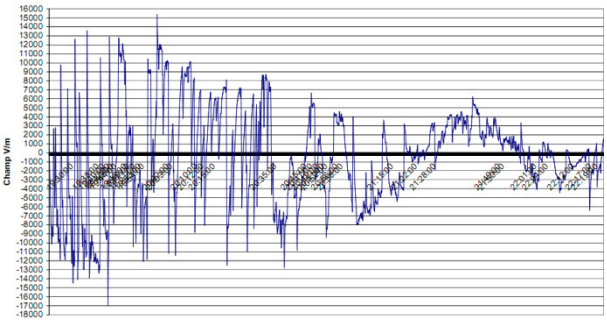
- Assess the unit and the antenna sustainability in severe weather conditions,

- Control the reliability of the Stormonitor, comparing its "alerts" to the Electromagnetic Field values collected on site, to ensure that the Stormonitor has always been proceeding to ALERT when the EMF was reaching critical values.

- Since the site data recordings are conducted on site for several years, it was also a perfect opportunity to let the Stormonitor on site for several seasons with a wide range of climatic conditions (humidity, temperature, wind, lightning etc…) and to assess its ability to maintain its performances on long term.

Example of instrumentation and lightning data collected on site:





Test Procedure:

The site is equipped with several type of lightning measurement and recordings: Electro-Magnetic Field (EMF Mill connected to a powerful central unit specially designed by INDELEC in cooperation with the CEA for "Lightning Rocket" research), optical recording instrumentation and video recordings based on the same technology already used and proven in Nadachi – Japan (special optical and mechanical twin-shutter camera allows the lightning to be photographed very quickly. The 35 mm film used contains 700 exposures, giving autonomy of approximately 3 months. The films are time-stamped using a GPS satellite signal).

Besides, a Stormonitor is installed on site as per the "Installation & Commissioning Manual" e.g. similar to the installation specifications on Client premises (location of the antenna, standard 25m of cable length…).

On site engineers then compare the lightning data recorded with the scientific data recordings instrumentation (timing, evolution of the E Field in v/m, polarity, but also actual Cloud to Ground lightning discharges and type of discharges) thanks to the video recordings) to the Stormonitor alerts.

Conclusion:

The Stormonitor has demonstrated during these on-site testing campaigns:

- its perfect reliability with a full correlation between the lightning data collected on site and the alerts triggered by the Stormonitor;

- its sustainability under extreme weather conditions in remote and hilly locations (great day/night temperature variations, high keraunic level, low quality of power supply…)

Conclusion

A huge amount of time has been spent on testing various prototypes of Stomonitor before finalizing of the products and obtaining the green light of INDELEC Board of Management to release this new product.

Besides its ISO 9001 commitment, this large R&D investment also proceeds with the company values: providing our Clients with fully tested and proven safety equipments, yet financially affordable and technically easy to install.

The Stormonitor went through these different stages and we are very confident that it meets all the Clients requirements of:

- Reliability
- Sustainability
- User friendly technology
- Cost efficiency
- Calibration and Maintenance free

In addition, once the IEC standard for Lightning Warning System will be released, INDELEC will study the Standard testing requirements and proceed to these tests accordingly.