Survey on ESE lightning conductors

Several member constructors of Gimélec\textsuperscript{1} using ESE lightning conductor technology wished to gain feedback and asked \textit{OP Marketing}, to conduct an in-depth survey of users of ESE lightning conductors under the ethical control of Gimélec\textsuperscript{2}.

This survey has shown that:

- Of 200 sites with 1580 ESE lightning conductors installed, 320 received lightning strikes with no capture failures.
- Reliability and efficacy are two of the strong points of ESE lightning conductors. Their high protection levels are a significant benefit, a point of view which is shared by current clients. This runs contrary to certain unwarranted controversies.
- The attractive price of ESE lightning conductors, while well-known by most customers, is deemed less important than their effectiveness.
- The fact that many customers are unaware of ESE lightning conductor technology means that it is often only installed when mandatory.

\textsuperscript{1} Gimélec unites some 200 companies that supply electrical and automation solutions for the energy, construction, industry, data center and infrastructure sectors. Gimélec companies employ some 70,000 people in France and generate an annual turnover of around 12.7 billion Euros, 60\% of which comes from the export market. To meet the ambitious energy-saving and CO2 emissions reduction targets set for Europe and France, the member companies of Gimélec have implemented an ecological sustainability policy.

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Lighting causes considerable losses each year throughout the entire world. No place is spared, however, the probability of occurrence varies significantly depending on the location, and especially proximity to the equator. Over eight million lightning ground strikes per day have been counted, or more than 100 every second. However, effective protection methods have been developed to combat the worst effects. The best known of these is the lightning conductor. A single mast can capture lightning threatening a location. This will be connected to a suitable earth spike by a cable which conducts very high currents to the ground. This technique has been proven to effectively reduce the nefarious effects of this natural phenomenon. A more recent technology, in use for over 20 years now, requires the installation of an active device which anticipates the creation of the upward leader preceding the discharge. These devices are called ESE (Early Streamer Emission) lightning conductors and improve safety by covering a wider area than a simple metal mast.

Constructors using ESE lightning conductor technology wished to gain feedback and have asked OP Marketing, to conduct an in-depth survey of users of ESE lightning conductors under the ethical control of Gimélec. A total of 1580 ESE lightning conductors at 200 sites were surveyed. The survey also measured user satisfaction and determined the perception people have of them and their advantages, it was also used to identify areas for improvement of the offer.

Two basic methods are used to collect the data. The first involves interviewing a panel of site managers by phone (direct contact) and in the second, information is collected by means of a digitally-generated multi-lingual questionnaire. It includes twenty two questions about the installation, including the number of strikes recorded, the reliability of the protection system and awareness about the technology.

Of the 204 sites surveyed, 7 stated that ESE lightning conductors were not installed. They had been taken down before 2010. These sites were therefore not included in the survey, bringing the number of surveyed sites to 197. A survey of the makes of ESE lighting conductor in use reveals that there are four manufacturers which supply them.

In general we only find products from a single manufacturer at one site. Only in 5% of cases did users state that they had several makes of equipment installed at a single site. It is interesting to note that the four manufacturers each make a roughly equal number of lightning conductors (around fifty each).

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>NB</th>
<th>% obs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer 1</td>
<td>40</td>
<td>20%</td>
</tr>
<tr>
<td>Manufacturer 2</td>
<td>53</td>
<td>27%</td>
</tr>
<tr>
<td>Manufacturer 3</td>
<td>54</td>
<td>27%</td>
</tr>
<tr>
<td>Manufacturer 4</td>
<td>54</td>
<td>27%</td>
</tr>
<tr>
<td>Other manufacturers</td>
<td>6</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>197</strong></td>
<td></td>
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</tbody>
</table>

The installations surveyed are fairly recent, 64% within the last five years.

Most sites are equipped with several ESE lightning conductors. An average of eight are installed at each site.

ABB France, France Paratonnerres, Franklin France and Indelec
There is a large disparity between the sites, 42% are only equipped with a single ESE lightning conductor. One manufacturer has equipped two major installations with an average of 19.

Lightning strikes at sites:

Of the sites surveyed, forty had suffered lightning strikes\(^4\), or around 20%. Further analysis reveals that 320 ESE lightning conductors received strikes. In the majority of cases these were unique events in the context of an ESE Lightning conductor and a building, which is representative of the sites surveyed. Having identified the number of lightning strikes we then asked about damage to the installations. The survey distinguishes between material losses, loss of earnings and no consequences.

The results show that **88% of lightning strikes have no consequences whatsoever. No loss of earnings is reported.** Five sites suffered material losses associated with strikes on the ESE lightning conductors protecting buildings and their surrounding areas against the direct effects of lightning. At two sites the lightning struck areas outside of the area protected by lightning conductors and at the other three sites the damaged materials were not protected by surge arresters (additional protection measures against the indirect effects of lightning strikes are essential).

\(^4\) According to declarations made by site managers.
it is important to gain the opinions of users over a significant period of usage (36% of installations are over 5 years old).

Overall, the perceptions surrounding ESE lightning conductors are very positive. The level of satisfaction was 93%.

**Levels of satisfaction by manufacturer:**
Measurements of satisfaction levels by manufacturer show small differences in perception for the four main manufacturers. Customers are very satisfied in between 44 and 53% of cases.

**Perceived protection:**
Perceptions of protection levels are highly subjective. This indicates the level of confidence that the user has in their system, as well as the effectiveness of communications designed to explain the details of this type of technology. The perceived protection level for ESE lightning conductors is high. The average figure is 82%. Over three quarters of users consider that the level of efficacy is over 80%.

**The image of ESE lightning conductors:**
ESE lightning conductors have a positive image, with some reservations. Firstly, lightning conductors are generally installed because of obligatory regulations and not voluntarily (80% of users). The financial aspect obviously influences customers and orients them towards an ESE solution, even though 24% do not see it like that.

**It is the reliability of the solution which comprises the main advantage for 95% of users.**

The reputation of this technology shows that many are unaware of the latest developments in systems protecting against the direct effects of lightning. 50% are unaware of the real benefits even though they have confidence in them.

**The respondents were then asked to express their opinions concerning possible improvements and expectations.**
Customer suggestions:
Several subjects were broached by site managers:

- They want advice about regulatory aspects and need information concerning obligatory modifications to these installations.
- They want to be able to test equipment on-site.
- Installations times are judged to be too long.
- They want international standards to be harmonised.