CASE STUDY 04

Pic de Gomà Telecommunications Tower

Study Period: January 5, 2015 – December 31, 2016

Introduction

The tower is owned by the Basque Government and is managed by the ITELAZPI company, located in the area of the VIZCAYA (BASQUE COUNTRY, SPAIN). This tower houses the Meteorological Radar service of AEMET (Spanish State Meteorological Agency) of the Basque Country and is located in an area with a high incidence of lightning (area with a ray density level (Ng) of 5).

Before installing the technology, ITELAZPI informs us that there have been direct impacts on the tower with significant electrical damage.

Conclusion

- In the period from May 1, 2015 to December 31, 2016, when there was an installation of a lightning conductor type DDCE100, there was NO direct lightning impact on the tower, nor within 100 m radius of coverage (Table 1)
- In 1 year and 7 months of study (01/05/2015 - 12/31/2016) 504 lightning impacts have been recorded in 3 km around the tower
- The closest impact has been more than 300 meters (recorded last day 07/31/2015 at 5:46:08 pm of 30.8 KA (Positive). All impacts have occurred more than 100 meters tower By distance segments the results tell us that 0.39% of impacts occur at distances between 100 m and less than 300 m from the tower, 1.78% of impacts occur at distances between 300 m and less than 500 m , 7.14% of impacts occur at distances between 500 m and 900 m and 90.07% of impacts occur at distances greater than 900 m (table 1)
- It can be seen that although the average intensity of negative rays is over 10 KA and that of positive rays is over 20 KA, there are several impacts of significant intensities, such as that recorded on June 7, 2015 at 17:04:23 h 109,100 A (Negative) at 2.4 km from the tower and on July 12, 2016 at 19:21:30 h from 53,300 A (Positive) at 2.7 km from the tower. This makes us think that an electrical installation should be protected with potential lightning impacts of these intensities

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- It is demonstrated that the device compensates the variable electric field in its environment, preventing the formation of the ascending tracer and, therefore, a direct lightning strike. The real data prove that the risk of lightning impact increases as the storm moves away from the point where the device is placed, which is logical, since the device will compensate the electric field in its environment and it will increase again as that moves away from the device
- Therefore, the effectiveness of the device in this study (Torre PIC DE GOMÀ) of 1 year and 7 months, in a zone with a high incidence of lightning (Ng = 7.5), is 100% on the impact of direct rays on the structure that protects and 100% on impacts within the area of its coverage radius of 100 meters
- The device only has influence on the electric field that appears in its surroundings. It has NO influence on what happens in the cloud, nor on the number of storms that appear in the area nor the time in it, as is logical

Concept	Test Period Data	Impact Probability
Impacts 2 km around the tower	504	
Days with lightning impacts	52	
Ground to cloud lightning	23	
Cloud to ground lightning	138	
Cloud to cloud lightning	332	
Direct strikes to tower	0	0%
Impacts < 100 m from tower	0	0%
Impacts within 100 m and < 500 m	2	3.6%
Impacts within 300 m < 500 m	9	2.91%
Impacts within 500 m and < 900 m	39	18.24%
Impacts > 900 m from tower	454 (up to the limit of 2 km)	81.55%
Maximum intensity negative beam	109.1 KA 2.4 km from tower	
Maximum intensity positive beam	53.3 KA 2.7 km from tower	

Table 1