**Certification tests of insulating components used in direct lightning protection installations for the company *Constructions Tubulaires de l'Artois* (C.T.A.)**

*Douai, January 5, 2024, by Sylvain Fauveaux, LiRi LAB*

LiRi LAB is a High Voltage laboratory dedicated to Research and Development mainly focused on Early Streamer Emission Air Terminals (ESEAT) using proven proprietary technologies or innovative technologies. The main certification test for these ESEATs is also carried out at LiRi LAB, which are the efficiency tests (advance time $\Delta T$) according to the standard NF C 17-102.

However, we can sometimes conduct tests on other types of equipment. In the past, LiRi LAB subjected an electric vehicle charging station to several lightning flashovers using voltage impulses of 1 million Volts under approximately 1000 Amps in arc current:

https://www.indelecmobility.fr/indelec-mobility-propose-les-seules-bornes-de-recharge-pour-vehicules-electriques-a-avoir-passe-avec-succes-des-tests-de-foudroiement-en-laboratoire/

We continue our adventure in testing, off the beaten path of ESEATs with tests on insulating stands designed and produced by the company *Constructions Tubulaires de l'Artois* (C.T.A.) located in Calonne-Ricouart (Pas-de-Calais, France). These stands are used as components of the External Lightning Protection System (ELPS) according to the Technical Specification TS IEC 62561-8:2018. These stands allow the lightning capture conductors of the ELPS to be sufficiently distanced from the building to be protected, in order to avoid flashovers between the ELPS and the building. These flashovers, due to the non-compliance with the separation distance, may cause damage to the building to be protected.

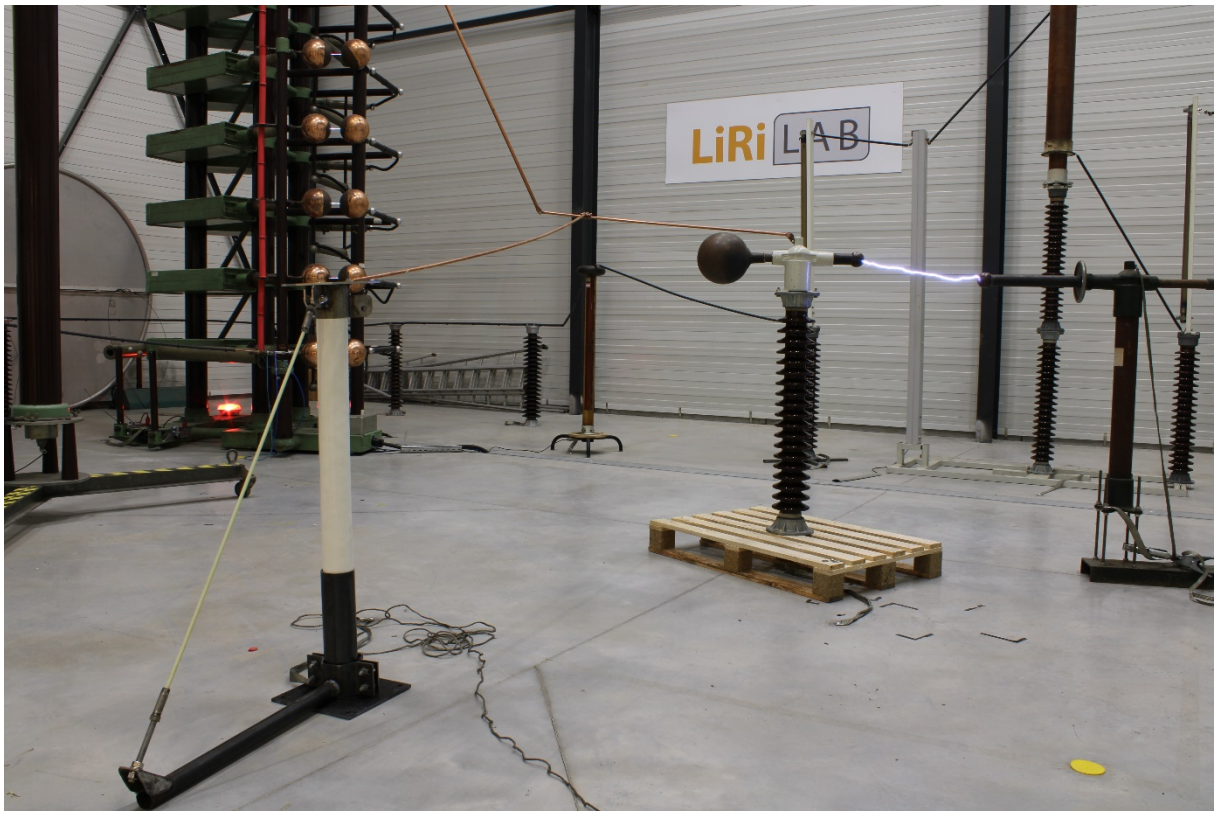
These insulating stands create an equivalent separation (insulation) distance in the air which is described in the IEC reference document. The aim of the tests carried out at LiRi LAB, following the reference procedure, is to be able to quantify this equivalent distance of separation in the air offered by these insulating stands. This data is essential for the design of the ELPS before beginning the installation.

We therefore adapted the laboratory environment to recreate the test setup and therefore be able to determine this parameter called $k_x$. The procedure requires comparing a flashover interval of an air gap corresponding to the $k_x$ value declared by the manufacturer, with the sample under test connected in parallel, using our very high voltage 1.6MV impulse generator ("Marx generator "). If three flashovers take place only at the level of the comparison device (calibrated air interval), then this means that the sample under test (the insulating stand) perfectly complies with the equivalent separation distance in air $k_x$ declared at 0.7.

Two types of stands were subjected to these tests: a self-supporting insulating stand, and this same self-supporting insulating stand equipped with a side brace which is also insulating. The latter stand is used in ELPSs at roof corners where the tensile forces of the capture conductors are perpendicular. The brace counterbalances the force vector thus created by the perpendicularity of the horizontal mechanical forces applied to the insulating stand. This is to limit as much as possible the stresses and mechanical deformations of the stands placed at the corners of the roof of the building to be protected.

This custom-made product was developed for buildings operated by the French Armed Forces but can also be installed on other structures requiring a sufficient separation distance at the level of the capture conductors on the roof.

These tests were very interesting to carry out and broaden the range of our service possibilities for our partners or our customers.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