

## EARTH MEASUREMENT ON PYLONS WITH PROTECTIVE EARTH CABLE

The electricity transmission lines which supply our energy require appropriate maintenance. One important point involves checking that all the pylons and associated transformer stations are correctly earthed. The earth connection of each pylon must then be tested individually.

Usually, you either have to remove the pylon earth wire (protective cable) or disconnect the earth connection located at the foot of each pylon (cf. Fig.2).

In both cases, this takes time and involves the risk of climbing the pylon, as well as the possibility of obtaining incorrect measurement results.

When the earthing strips are disconnected, there is still a connection with the pylon footing, which represents a parallel path to the earth resistance. Classic resistivity testers do not allow verification of earthing systems in the event of a lightning strike, i.e. in the frequency range above 128 Hz.

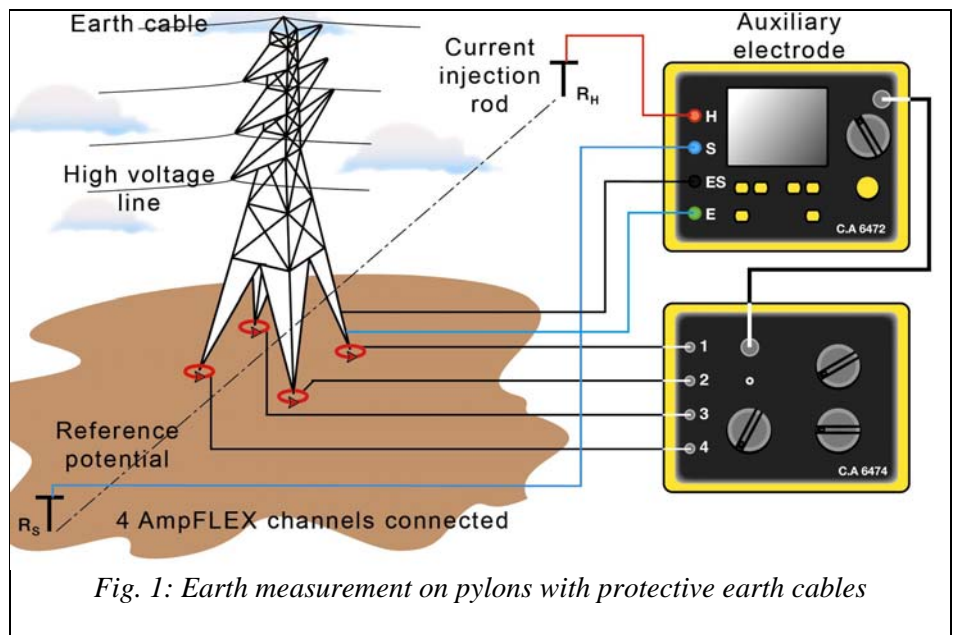
*The C.A 6272 & C.A 6474 set up together*



### C.A 6472 Earth & Resistivity Tester & C.A 6474 Adapter for pylons

When **coupled with the C.A 6474** vectorial processing unit, the **C.A 6472** can be used to measure the earth resistance of a pylon, even if it is part of a parallel earthing network, by **selective measurement of the pylon in question**. The major new feature of this product is its extensive bandwidth from 41 Hz to 5 kHz, which is necessary to characterize the behaviour of an earthing system in the event of a lightning strike.

With 4 AmpFLEX™ flexible sensors positioned around the pylon's footings and frequency scanning up to **5,078 Hz**, precise, selective measurement of the pylon's earth impedance is possible. Furthermore, the use of flexible sensors means that this concept can be adapted to deal with any pylon geometry.



*Fig. 1: Earth measurement on pylons with protective earth cables*

A single measurement (Fig.1) is sufficient to obtain all the main quantities:

- overall impedance of the line,
- earth resistance of the pylon considered,
- resistance of each pylon footing,
- quality of the protective earth cable connection.

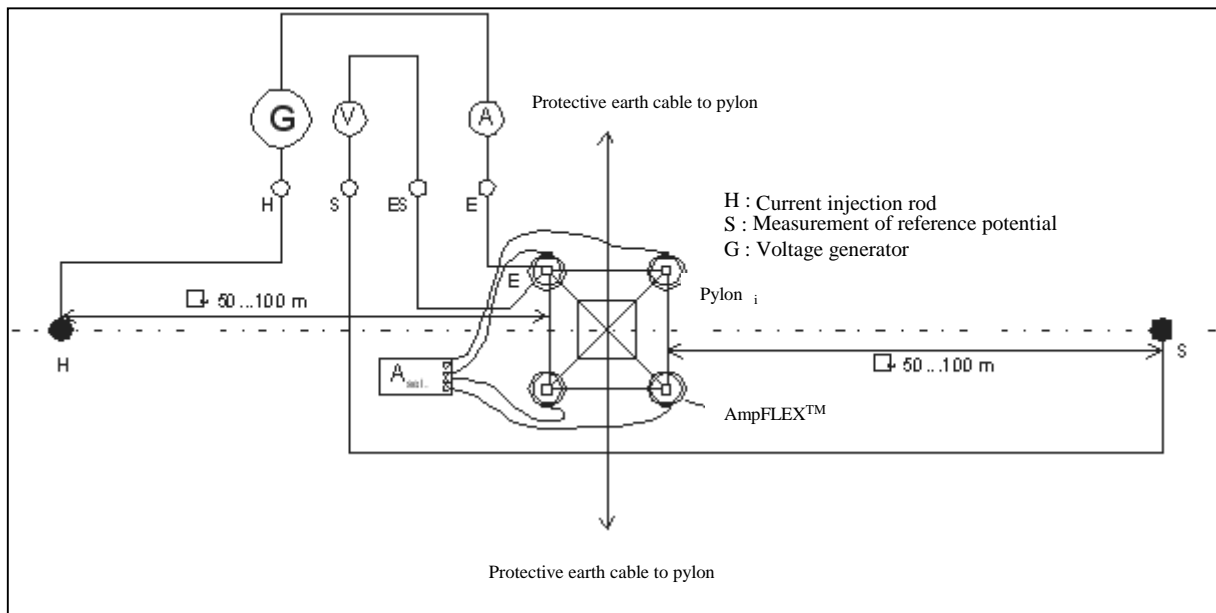


Fig. 2: Diagram of measurement without disconnecting the earth wire or the earthing strips

The diagram above (Fig. 2) shows the C.A 6472's generator (G) which injects the current into the pylon via terminal "E". During this operation, part of the current passes through the earth wire and the pylon earthing systems connected to it. The current loop is connected to the earth and to the auxiliary earthing system (H). The sum of the residual currents in the earthing system is measured by the C.A 6474 (A<sub>sel.</sub>) with AmpFLEX™ flexible sensors connected to the four pylon footings. The C.A 6474 is connected to the C.A 6472 tester. The voltage (V) is measured between the "ES" terminal on the pylon and the probe "S". The current and voltage measured in this way can then be used to calculate the earth impedance.

### Greater accuracy...

The AmpFLEX™ sensors connected to the 4 pylon footings measure the total current in the earthing system.

The coils on each footing must have the same number of turns with the same winding direction.

The number of coil turns, the amplification and the input channel can be selected directly on the C.A 6474.



AmpFLEX™ cable positioned around the pylon footing