



Cracked-insulator acoustic probe (CIAP)

CIAP

Cracked-Insulator Acoustic Probe

Constant exposure of pedestal post insulators to harsh weather causes cement growth at the metal-porcelain interface, creating stress that may ultimately crack the porcelain. If cracks occur in the insulator shed, they may lead to significant damage and possible loss of service.

Cracks are very difficult to see from the ground or without de-energizing the line, which is often costly. To overcome this problem, Hydro-Québec has developed a vibro-acoustic device "called the cracked-insulator acoustic probe" (CIAP).

Live-line inspection

The harsh weather to which insulators are exposed (freeze-thaw cycles, moisture, air pollution, salt air, etc.) causes them to slowly deteriorate over a 15 to 30 year period, and sometimes leads to sudden cracking of the porcelain and weakening of the metal-porcelain interface.

Conventional insulator inspection methods fail to detect all but the largest visible cracks or those where the insulator has lost a chunk of porcelain. Cracks can now be detected using a remotely operated measuring instrument, the CIAP, which can be used at voltages of up to 120 kV.

Simple, reliable detection method

The CIAP is made up of a hot-stick-mounted probe and a radio remote with a touch screen display. The probe has a proximity sensor, a small hammer and a miniature microphone to pick up sound samples. A microprocessor digitizes and processes the sound, and transmits a diagnostic to the remote, which displays it on the touch screen. Three samples taken at different points on the shed are enough to obtain a diagnostic for the insulator.

The probe comes with two pairs of plastic feelers adapted for the type of insulator (12 to 69 kV or 120 kV). The probe and remote are powered by two AA batteries. The entire kit (probe, feelers, remote and batteries) comes in a watertight plastic box.



CIAP feelers probing the shed of a 120-kV insulator

Key advantages

- > Checks insulator condition on live lines with no interruption of service.
- > Helps target faulty insulators to be replaced by focussing tests on areas most affected by cement growth.
- > Can be used before switching operations to diagnose the condition of insulators that support busbars and disconnects.
- > Tracks deterioration of pedestal post insulators to facilitate replacement planning.

Specifications

Rated voltage:	12 to 120 kV phase-to-phase
Probe weight:	300 g (including batteries)
Power supply:	4 Ni-MH AA batteries (2 for the probe and 2 for the remote)
Battery life:	Over 7 hours of continuous use
Radio transmission:	Complies with IEEE 802.15.4
Diagnostic reliability:	Detects over 90% of radial cracks
Operating temperature:	-20°C to +45°C

For information:

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Probe and touch screen remote