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Frequency of Field Hipot Testing

When discussing field DC Hipot testing of medium voltage EPR and XLPE insulated cables, two questions that always come up are:

(1) Does the test degrade the cable's insulation?
(2) How many times can I apply the test?

DC field Hipot testing has been the preferred field test method for many years due to the ease of performing the test and the ability to attain high test voltages with portable equipment. The best method would be an AC field Hipot test, but since typical circuit lengths of medium voltage cables consume large amounts of charging current, the AC test equipment that would be required becomes logistically difficult to employ, thus the popularity of DC testing.

The two insulation types: EPR and XLPE (and its alternate TR-XLPE) react very differently in the presence of a high potential DC field.

XLPE (and TR-XLPE) — XLPE compounds are comprised of a material that is crystalline in nature and as such demonstrates very low leakage (or loss). This characteristic makes them very good candidates for a capacitor, but unfortunately poor candidates for medium voltage cable insulation.

The low loss tendency also enables the XLPE insulation to hold a charge. This charge, also referred to as "trapped space charge", has been directly connected to the treeing phenomenon. It both initiates and exacerbates it. Thus for this type cable, industry standards (such as ICEA S-94-649 & S-97-682) now caution against applying a DC potential, in any form, to XLPE cables as it is detrimental to the insulation and to cable life.

Okoguard (EPR) — As for Okonite's medium voltage EPR insulation, known as "Okoguard", the above does not apply. Since Okoguard is amorphous, (a mixture of various compound ingredients) with certain ingredients acting to bleed off the charge, this way eliminating the ability to hold a space charge and virtually eliminating any possibility of treeing. Therefore, Okoguard is not affected by the application of a DC potential at factory testing and subsequent tests prior to energizing or after many years of operation. In fact, it is customary in industrial installations to DC Hipot an Okoguard cable including:

- When first received at the installation site,
- Prior to pulling the cable,
- After pulling the cable,
- After splicing and final terminating the cable,
- As a final system test prior to turning it over to the end user.

Thus, it is acceptable to apply a DC Hipot to Okoguard insulated cables as many times as needed without the consequence of damaging the insulation.

VLF (Very Low Frequency) and field partial discharge tests have been developed over recent years to provide an option to DC Hipot testing for XLPE cables. Both may also be applied to Okoguard insulated cables.

Joe Zimnoch, Jr.
Sr. Staff Electrical Engineer