Hi*Lite® XL Insulator Recommended Cleaning Procedures

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Introduction

Hi*Lite XL transmission line insulators normally require no cleaning, washing, or other routine maintenance. Chalking of the rubber weathershed surfaces that are exposed to sunlight in normal as is darkening of the surfaces that are shaded or sheltered from the sun. Neither condition is indicative of the need for cleaning.

Washing or cleaning may be required if the insulators are installed in areas of severe environmental contamination and, there are indications of abnormal leakage currents or scintillations on the insulator surface in fog, mist or other conditions of light wetting.

In the event that washing or cleaning is required, the procedures outlined in Section IX of the "IEEE GUIDE FOR INSULATOR CLEANING", P957 are generally applicable.

Type of Contaminants

Insulators in service are subject to surface dirt, to some degree, in all operating areas. Most commonly encountered contaminants have little effect on insulator performance as long as the surface is dry. Fog, mist, or light rain can create a condition which results in a conductive surface film on the dirty insulator surface without washing the contaminant from the surface.

Contaminants are generally classified by the source of the airborne impurities. Local agricultural, industrial, and geographic conditions determine which contaminants are present in the atmosphere.

Seven types of contaminants which can affect insulator performance have been identified.

They are:

1. Salt

Substantial salt deposits may result from windblown spray in areas near bodies of salt water and in areas adjacent to highways, particularly elevated roads, where salt is used to remove snow or ice. These deposits dissolve quickly and are normally washed off by heavy rain. It may be necessary to clean insulators in these areas when long, dry periods are followed by intervals of light misty rain or fog.

2. Cement/Lime

Insulators located near cement plants, construction sites, or rock quarries may accumulate deposits of cement or lime. These materials can build up thick, hard, crusty layers on the insulator surface. When these deposits are lightly wetted, leakage currents flowing on the insulator surface may be trapped along the insulator/contaminant interface and the resulting high temperatures may degrade or erode the weathershed surface

3. Dust

The dusts that can be deposited on insulators originate from a wide variety of sources. These dusts include fertilizers and other agricultural dusts and coal dust as well as the soot and fly ash by-products from the industrial burning of coal.

4. Defecation

Insulators located in the vicinity of roosts of large birds of prey are subject to contamination by the defecation of those birds. Eagles, hawks, and other large birds often roost on or hunt from transmission line support structures.

5. Chemical

Atmospheric pollutants from a wide variety of industrial chemical processes and aerial spraying of agricultural and fire fighting chemicals are deposited on insulators. The characteristics of those chemicals vary widely and they may or may not be water soluble.

6. Smog

Automobile emissions and other industrial emissions in urban areas introduce significant amounts of particulate matter into the environment. The characteristics of the resulting insulator contamination will depend upon the combination of pollutants present in the atmosphere.

7. Cooling Tower Effluent

Cooling tower effluent is composed of water vapor and small amounts of dissolved solids which should quickly disperse under normal wind and temperature conditions. Under some conditions, however, the effluent can create localized fog which can moisten dry, dirty insulators to adversely affect insulator performance. The result would depend upon the characteristics of the dry contaminant and its reaction with the chemistry of the effluent fog.

Caution:

Proper safety standards and operating and maintenance procedures must be strictly followed to prevent injury to personnel and damage to equipment. Local work rules should govern. In their absence, other recognized industry standards and codes may be employed. These include ANSI C2 (National Electrical Safety Code) and IEEE P957/D7 (Guide for Cleaning Insulators). Another recommended document is "Application of Insulators in a Contaminated Environment," IEEE Transactions on Power Apparatus and Systems, Vol. PAS-98, September/October 1979, pp. 1676-1695.

Hi*Lite XL polymer insulators can be safely cleaned while energized or deenergized by adhering to proper cleaning procedures.

Deenergized Cleaning

If the insulators can be deenergized for cleaning, they can be hand washed with rags or wiping cloths in detergent water followed by a low pressure flood rinse with clean water to remove any residue. Solvents or harsh abrasives are normally not required to effectively clean the insulator weathersheds. Wetting agents or additives such as Poly-sol can be used to improve the washing action of the cleaning water. Solvents such as Stoddard (Safety) Solvent or Chlorothene may be used with steel wool, if necessary, provided all cleaning residue and metal particles are removed by the final clean water rinse.

Energized Cleaning

Two techniques can be used to clean energized Hi*Lite XL polymer insulators. They are compressed air with dry abrasive and low pressure water washing. Abrasive cleaning is often more effective in removing hard, thick, or caked deposits such as cement or lime.

Compressed Air/Dry Abrasive Cleaning

This procedure involves the use of compressed air and dry, abrasive cleaning media. Equipment required includes an air compressor capable of supplying air at a minimum of 0.052 cubic meters/second (110CFM) at a pressure of 860 kPa (125 psi) along with a pressure blaster, applicator wand, supply hose, and abrasive cleaning media.

An air dryer is often used between the compressor and the pressure blaster to remove moisture from the compressed air.

Commonly used abrasive cleaning compounds consist of ground corn cob mixed with ground walnut or pecan shells. Powdered silica or lime may be either added to the compound or used alone for increased abrasiveness.

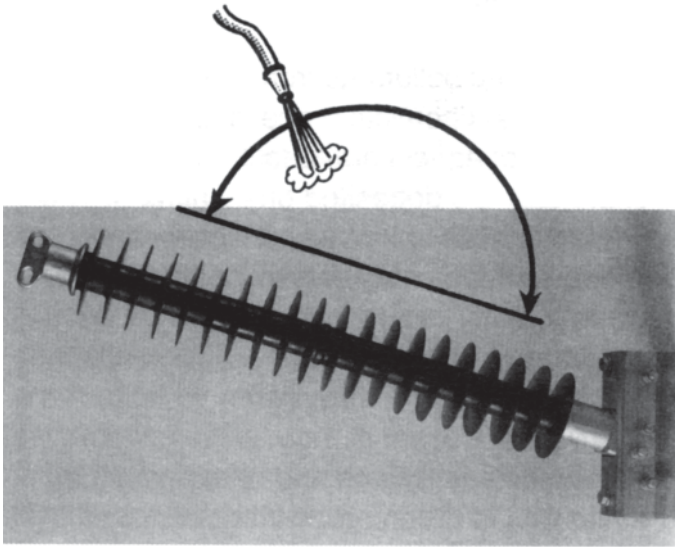
The actual cleaning process is similar to sandblasting in that a pressurized air stream is used to bombard the insulator surfaces with the abrasive media. After cleaning, the contaminant and abrasive residue remaining on the insulator surfaces are blown off with dry, clean, compressed air.

With the proper cleaning media and procedures, virtually any contaminant can be safely removed from the insulator surfaces without the need for area cleanup of the abrasive residue.

Water Cleaning

Any water washing procedure must be confined to flood wash pressure. The acceptable water pump pressure is 1380 kPa (200 psi) at the ground level pump. To prevent possible damage to the insulator, the distance from the spray nozzle or wand to the insulator should not be less than 4.6 meters (15 feet).

The washing procedure is to start from the energized end of the insulator and work toward the grounded end. By removing contaminants from the energized end first, the weathersheds just cleaned will maintain an adequate insulation level.



These represent the acceptable washing angles for Hi*Lite XL post and suspension insulators.