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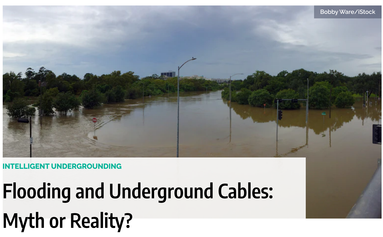

INTELLIGENT UNDERGROUNDING

Flooding and Underground Cables: Myth or Reality?

PDi2 takes on myths impacting infrastructure decisions.

OCT 23, 2018

From Superstorm Sandy to Hurricanes Harvey, Irma, Maria, Florence and Michael – the volume of rain and storm surge has and can cause unprecedented flooding. Flooding negatively impacts power systems – but not for the reasons you might think. Power Delivery Intelligence Initiative (PDi²) is taking on the myth that flooding compromises underground cables.

Medium- and high-voltage cables are designed to be direct buried, often in areas where they will be below the water table and permanently in a wet environment. Under normal weather conditions, manholes and vaults are often full of water and need to be pumped out for even routine inspections. Outer jackets for these cables, made of polymeric materials, resist moisture permeation to prevent water incursion into the cable over the life of the system. In the rare instances that water permeates a cable jacket, certain insulations, including tree-retardant crosslinked polyethylene, are designed to resist growth of water trees that could cause premature cable failure. In addition, cable also can be manufactured using moisture-blocked conductor, water-swellable tapes and powders and corrugated sheath to make them more moisture impervious.

Underground cables are expected to meet rigorous standards specifically addressing operation under adverse weather conditions like flooding. These standards take into consideration both moisture and chemical resistance as there can be significant differences between rain and flood water. ICEA, ANSI and AEIC require adherence to a variety of test procedures that address moisture barriers, water-blocking components, water-resistance tests and other sealing components and technologies.

Cables are rarely at fault for failures related to flooding. The biggest concern for flooded underground systems are the open-air terminations at ground level where external or internal contamination has occurred due to poor sealing. However, technology is improving here as well. Certain elbow and T-bodies are typically submersible and have not shown any significant negative impact after flooding. Joints and other accessories like link boxes are used in manholes and vaults and can be designed and installed in such a way that they can operate submerged in water without compromising cable insulation integrity. Areas known for periodic flooding can take additional measures for outer protection of joints like metal housings molded with epoxy coatings or fiberglass boxes filled with water sealants. These designs are typically electrically screened with electrical fields that are fully contained within the solid insulation of the cable.

Myth 1 – flooding and underground cables – busted. Cables are made to resist water under both normal and extreme operating conditions. As long as water does not extend to the exposed terminations, there is little risk of failure due to flooding. Where terminations are at ground level, technology and products exist to mitigate the chance of failure. These solutions should be part of storm hardening efforts and decisions regarding choices for new and rehabilitated power infrastructure.

For more information, visit the Web site.

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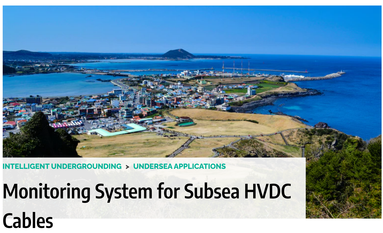

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Monitoring System for Subsea HVDC Cables

KEPCO applies on-line and off-line fault location technologies to an HVDC cable connecting South Korea's Jeju Island.

Chae-Kyun Jung
MAR 02, 2021

High-voltage dc cable is a core technology for long-distance power transmission and has made it possible to interconnect power systems over long distances between countries and land masses separated by water. Unlike ac underground cables, dc cables are not affected by capacitive charging current, dielectric loss or sheath loss, thus enabling long-distance and high-capacity transmission of electric power. Moreover, the conductor resistance is low, leading to low transmission loss. With the ease of power flow and load control, utilization of the line can be maximized.

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