

Polyethylene versus Porcelain Insulators



Snohomish PUD makes the switch to Hendrix Molded Polyethylene Insulators and never looks back

Many years have passed since Gordon Hayslip initially engaged in a comprehensive evaluation of Hendrix Vise Top Insulators for use with overhead distribution conductors up to 336.4 kcmil AAC. As Principal Standards Engineer at Snohomish County Public Utility District (PUD) No. 1, Gordon was responsible for exploring the pros and cons of converting from “old school” porcelain to the “new” kid on the block – polyethylene. As part of the necessary due diligence, Hayslip took it upon himself to go through an extensive and exhaustive research effort to determine the challenges and benefits of utilizing [Hendrix Molded Polyethylene](#) insulators.

At the time, Hendrix had over 40 years of proven in-service reliability, yet there were no utilities in greater Washington State that had made the switch to polymer insulators. So the general impression with Gordon and his peers was that it was still “new” technology that had to be researched and vetted to justify and mitigate whatever perceived risk there might be in making the switch.



Polyethylene versus Porcelain



Snohomish started to really look at polyethylene insulators for 15kV applications, not only for the multiple technological advantages that the Hendrix molded insulators had over porcelain, but primarily because of the potential cost savings related to installation, as compared to the practice of hand-tying porcelain pin insulators. The Hendrix Vise Top Insulator is equipped with two nylon bolts with hot-stick eyes that are designed to shear off at approximately 80 inch-pounds torque, making installation significantly easier and much less time-consuming. After the eye is sheared off, the bolts have a 7/8" hex head for removal with a hot-stick mounted socket (replacement shear bolts are available).

HISTORY

Where it all began

Early in the development of the Hendrix Spacer Cable System, Hendrix discovered that porcelain insulators were unsuitable as supports for insulated conductors because the difference in dielectric constants between porcelain and polyethylene will eventually lead to electrical erosion of the polyethylene cable insulation. To solve this problem, Hendrix developed and introduced a line of distribution insulators manufactured from high-density polyethylene that is compatible with polyethylene-insulated wire.

Although originally developed for spacer cable, Hendrix polyethylene insulators have multiple advantages over porcelain insulators. Because of these advantages, many utilities have switched from porcelain insulators to Hendrix polyethylene insulators for bare overhead wire.

Benefits of Hendrix Polyethylene Over Porcelain

- Longer leakage distance
- UV and tracking resistant (50+ years field installed)
- Lighter weight
- Bullet & impact resistant (reduced breakage)
- Hydrophobic (self-cleaning)
- Faster & safer installation (even on energized structures, since Hendrix Vise Top Insulators eliminate wire ties)
- Compatible with all conductor types: bare and covered
- Environmentally friendly: 100% recyclable

LONGEVITY

It's a long service life

As the legacy product that had its inception back in the early days of the electric utility industry decades ago, porcelain insulators have an established track record of long-term reliability. So, a utility doesn't consider replacing these tried and true products on a whim. Barring damage from misuse, vandalism or poor quality control, porcelain insulators can have an expected service life of 50 years or longer. That said, however, Hendrix insulators do have a longer expected service life, especially when considering locations of high airborne contaminants and locations subject to gunfire vandalism.

RELIABILITY

It's second to none

Hendrix introduced its polyethylene pin insulators (HPI) in the mid-1960s and the HPI Vise Top Insulator in the mid-1970s. Since then, millions of these insulators have been placed into service. As part of his research, Hayslip interviewed personnel at Northeast Utilities, Arizona Public Service (APS) and Southern California Edison (SCE) to find that they have all used Hendrix HPI Insulators (collectively, for decades), with minimal failure rates across all three organizations.

Given the success and reliability of the product, Hendrix has even taken the initiative to guarantee its core insulator products with a ["Guaranteed for Life"](#) (GFL) program, essentially providing a 100 percent replacement guarantee if, for whatever reason, insulators fail in the field – showing the utmost confidence in its products.

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INSTALLATION

Saving time and money

Hayslip knew that part of his research had to explore the realistic ease of installation for the Hendrix insulators, since one of the primary drivers for even considering a switch to polyethylene was the potential dollars saved in installation costs. And what he found is that conductor installation with Hendrix Vise Top insulators are as advertised: it is not complicated and very simple.

The process is really as simple as this: the upper torque bolt is removed, and the lower bolt is loosened. A phase wire is placed between the insulator jaws, and the lower bolt is tightened until the eye shears off. The upper bolt is then installed and tightened until it shears. No wire ties are required, and the entire operation can be accomplished safely with hot sticks – even on energized structures.

Both APS and SCE specify Hendrix Vise Top Insulators because of labor savings compared to tie top insulators and wire ties. Hendrix also manufactures a stringing tool specifically designed to be used with its Vise Top insulators. This tool eliminates the need for a separate stringing block and allows the entire conductor installation to be performed in one operation with hot sticks.



DISTRICT TRIAL INSTALLATION

In the field

During the research process of exploring the benefits of the Hendrix insulators, Snohomish decided to undertake several trial installations. The feedback it received from other utilities was certainly very positive, but having some of its own line workers experience the Hendrix insulators first hand was a step that Gordon felt they had to take.

The Snohomish trial installations consisted of two re-conductor projects for a total of 16 conductor spans and a single in-place pole replacement. In lieu of metal stringing blocks, Snohomish used the Hendrix VTST-1 stringing tool.

The feedback that Snohomish received from its own line foreman in the field confirmed what it had been hearing from other utilities – that Hendrix Vise Top Polyethylene Insulators were in fact easier to install than the porcelain equivalent. The process did save installation time, as well as money required for support teams to assist with the actual installation process. Those labor savings easily offset the additional cost of Hendrix Vise Top Insulators compared to porcelain insulators. Field personnel also felt that the process of securing the conductor with the Vise Top screw clamps was safer than hand ties.

UPGRADE

Making the switch

After the extensive research to explore the pros and cons of switching to Hendrix Polyethylene Insulators, Gordon Hayslip made a formal recommendation to the Snohomish team to make the switch on all distribution wire applications. As a result of that recommendation, Snohomish County PUD has been using Hendrix insulators on all distribution wire up to 795 AAC conductor size since 2008.

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