

DHP-VR Medium-voltage Circuit Breaker Vacuum Replacement

Background

As a leading supplier of nuclear safety-related products and services, Westinghouse has developed Class 1E DHP-vacuum replacement (VR) circuit breakers to meet medium-voltage breaker requirements.

Historically, Westinghouse DHP switchgear has proven to be rugged and reliable. Introduced in 1963, the DHP air-magnetic circuit breakers have demonstrated outstanding performance in meeting 4.16 kV to 15 kV breaker application requirements.

Description

The DHP-VR circuit breakers are a new, factory designed and tested direct roll-in replacement for DHP air-magnetic circuit breakers. With vacuum technology, the new breakers require less maintenance, weigh less, have fewer components and have improved reliability over the DHP air-magnetic styles. In addition, the DHP-VR breakers are electrically and mechanically interchangeable with the existing DHP breakers.

The Westinghouse DHP-VR meets nuclear safety-related, medium-voltage breaker requirements. Having originally applied the DHP switchgear and breakers for Class 1E applications, Westinghouse maintains the original qualification under which the installed equipment was originally qualified and supplied.



New DHP-VR breakers are roll-in replacements for the DHP air-magnetic breakers.

Benefits

Direct Roll-in Replacement

The DHP-VR is not a retrofit breaker. It is a qualified direct roll-in replacement for the DHP, thereby minimizing out-of-service time and parts normally required as part of a breaker retrofit service. It is wheel-mounted for easier handling and installation, and rolls in and out of the breaker cell like the DHP model.

Lower Maintenance Costs

Vacuum technology reduces the maintenance associated with the DHP air-magnetic circuit breakers. With the air-magnetic style, arc chutes can weigh up to 450 pounds each and are bulky to handle. With vacuum technology, the bulky arc chutes are eliminated, thereby reducing maintenance efforts and reducing the weight of the breaker by as much as 1,500 pounds. Arc-chute components associated with air-magnetic breakers are subject to cracking, erosion and breakage over the long term and, as such, require periodic inspection and cleaning. In addition to eliminating the arc-chute components, the DHP-VR's state-of-the-art current transfer system and contacts are maintenance free. Lower maintenance costs are also associated with accessing the stored energy mechanism and control components. With the air-magnetic style, access is gained by removing the interphase barrier and three arc chutes, followed by elevating the breaker chassis. With the vacuum style, access is gained by simply removing the front panel.

Fewer Parts — Less Expense

DHP-VR breakers have about 50 percent fewer parts than the DHP air-magnetic design. Bulky arc chutes and their associated mounting hardware have been eliminated. The stationary and moving contact assemblies have been replaced with a single vacuum bottle. As a result, spare-parts inventories are considerably reduced, which is a significant feature since maintaining parts inventories can be expensive.

Also, DHP-VR parts are from current production; therefore, they cost less than the older DHP air-magnetic parts manufactured in limited quantities.

Nuclear Qualification

The new DHP-VR circuit breakers have been seismically tested and qualified in accordance with the requirements set forth in Institute of Electrical and Electronics Engineers (IEEE) 323-1983 and IEEE 344-1987. The seismic test levels to which the DHP-VR breakers were qualified envelop the seismic requirements of the existing DHP switchgear in nuclear-plant applications. The new breakers were tested in both the connected and disconnected positions. As a result of the Westinghouse qualification-test program, qualification certification can be provided for the new DHP-VR breakers installed in the existing DHP switchgear. Also, the original certification of the entire switchgear assembly can be confirmed to remain valid.

Warranty and Documentation

Class 1E DHP-VR breakers are warranted and provided with a Certificate of Conformance to the purchase order requirements and a Certificate of Qualification for safety-related applications.

Options

Westinghouse offers a total solution to meet the customer's medium-voltage breaker requirements. In addition to the new Class 1E DHP-VR, Westinghouse offers a comprehensive package of products and services, including safety-related parts, breakers, breaker refurbishments, equipment qualification, field maintenance and technical support.