HK-VR Medium-voltage Circuit Breaker Vacuum Replacement

Background

As a leading supplier of nuclear safety-related products and services, Westinghouse has developed Class 1E HK-vacuum replacement (VR) circuit breakers. The breakers are replacements for ITE 5 and 15 kV HK air-magnetic circuit breakers.

Description

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

The HK-VR circuit breaker is seismically qualified for nuclear safety-related applications. Westinghouse has performed extensive cycle testing to end-of-life of the HK-VR prior to performing seismic-qualification testing.

Nuclear Qualification

The new HK-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 new HK-VR breakers are roll-in replacements for the HK air-magnetic breakers.

The seismic test levels to which the HK-VR breakers were qualified envelop the majority of seismic requirements of the existing HK 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 HK-VR breakers installed in the existing ITE-HK switchgear.

Warranty and Documentation

Class 1E HK-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.

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Benefits

Direct Roll-in Replacement

The HK-VR is not a retrofit breaker. It is a qualified roll-in replacement for the HK, 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 HK model.

Lower Maintenance Costs

Vacuum technology reduces the maintenance associated with the HK 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 require periodic inspection and cleaning. In addition to eliminating the arc chute components, the HK-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.

Fewer Parts – Less Expense

HK-VR breakers have about 50 percent fewer parts than the HK 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.

HK-VR parts are from current production and, therefore, cost less than the older HK air-magnetic parts manufactured in limited quantities.

Options

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