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Testing High Voltage (200kV) DC cable and feed-through designs in rep-rated modes*

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We have constructed a Component Test Stand (CTS) to test various high voltage components to be utilized in near future pulsed-power devices. In addition to cable and oil feed-through design voltage hold off, different types of high voltage switches will be evaluated. The system contains two switches connected in series separated by a ˜50 ns worth of high voltage cable. The configuration is such that triggering the first switch enables the triggering of the second switch. This way we can evaluate the performance of two switches at a time and study the influence of one switch on the other. A software system similar to LabView is designed and built to operate and collect data in a rep-rated mode. The two switches are immersed in transformer oil tanks and pressurized with dry air. The present paper will mainly present a cable-oil feed-through design evaluation as a function of repetition rate. The rep-rate will be adjusted to not affect the cable voltage hold-off as well as switch performance. The rep-rate is necessary in order to obtain component lifetime results in a reasonably short time. Apparently the transformer oil in a high voltage DC environment behaves much differently than in AC. Its behavior is similar to a weak electrolyte, and space charge effects seriously affect the current through it as well as the field distribution.

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