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Challenges in Seismic Qualification of Substation Equipment

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Abstract

Earthquake shock waves cause vigorous ground shaking. These waves are three dimensional in nature. Earthquake records have revealed that electrical equipment are vulnerable to seismic forces, this lead to an increased focus on the earthquake performance evaluation of substation equipment. Ensuring functionality of equipment during and after seismic event is the major challenge in seismic qualification of electrical equipment. Substation equipment are unique in nature when compared to civil structures. In addition to conventional approach of computing stress, strain and deflection, evaluating functional capability of substation equipment is paramount. Interconnection of substation equipment and mounting methodology shall also be engineered based on site specific seismic loading. High voltage substation equipment like instrument transformer, surge arrestor, trans-former bushings are highly vulnerable to earthquake. Seismic qualification ensures reliability of equipment in the event of earthquake, resulting in uninterrupted power supply. Uninterrupted and secure power supply is the most important requirement for rescue operation after earthquakes. Codal recommendations, challenges in seismic qualification of substation equipment and seismic qualification of equipment by shake table test are discussed in this paper.

Keywords: Seismic qualification, Damping, Natural frequency, Substation equipment