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IEEE Recommended Practice for the Design of Buswork Located in Seismically Active Areas

IEEE Power and Energy Society

Sponsored by the
Substations Committee

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USA

IEEE Std 1527™-2018
(Revision of
IEEE Std 1527-2006)

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Abstract: Recommended practices for the engineering and design of flexible and rigid bus connections for bus and equipment in electric power substations located in seismically active areas are provided in this document.

Keywords: bus, buswork, conductor, connections, earthquakes, electrical equipment, flexible bus, flexible buswork, IEEE 1527™, interconnected equipment, interconnection, rigid bus, rigid buswork, seismic, seismic design, slack, substations

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Introduction

This introduction is not part of IEEE Std 1527-2018, IEEE Recommended Practice for the Design of Buswork Located in Seismically Active Areas.

During an earthquake, buswork conductors may transfer significant forces at their equipment terminals, due to the dynamic effects induced by their motion when adjacent interconnected equipment items push and pull on them. The use of suitably designed and installed buswork connections, either flexible or rigid, must be considered when seismically hardening a substation. Installation of buswork is a factor that may greatly affect the seismic performance of the installed equipment. If the buswork is not properly designed, equipment that would otherwise survive may fail. The use of seismically designed buswork increases the probability that a facility will still be operational after an earthquake. This document provides recommended practices to give guidance to the substation engineer regarding seismic considerations in the engineering and design of connections, and to provide engineers and equipment manufacturers with the knowledge of the dynamic effects of connections on interconnected equipment during seismic events. It also provides methods to account for the effects of connections in the seismic qualification of substation equipment. These effects are not accounted for in detail in any other standard.

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1. Overview

The use of suitably designed and installed buswork connections, either flexible or rigid, must be considered when seismically hardening a substation. Installation of buswork is a factor that may greatly affect the seismic performance of the installed equipment. If the buswork is not properly designed, equipment that would otherwise survive may fail. The use of seismically designed buswork increases the probability that a facility will still be operational after an earthquake.

1.1 Scope

This document provides recommended practices for the engineering and design of flexible and rigid bus connections for bus and equipment in electric power substations located in seismically active areas. It covers the design of buswork connections in the seismic qualification of equipment covered within the scope of IEEE Std 693™.[1]

1.2 Purpose

This document provides recommended practices to give guidance to the substation engineer regarding seismic considerations in the engineering and design of buswork, and to provide engineers and equipment manufacturers with the knowledge of the dynamic effects of connections on interconnected equipment during seismic events.

1.3 Application

This document is meant for primary connections to equipment terminal(s) only and is not applicable to internal equipment connections, sensing lines, or ground connections. It reflects the practice for the design of buswork in conventional substations. Flexible alternating current transmission system (FACTS) and high voltage direct current (HVDC) substations are specialized and may have exceptional elements that are beyond the scope of the present document. Even though a known solution, telescopic buses are also beyond the scope of the present document. Those elements identified as being exceptional should have a buswork analysis developed that is consistent with the objectives of IEEE Std 1527™ and approved by the user.

[1]Information on references can be found in Clause 2.