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IEEE Guide for On-Site Acceptance Tests of Electrical Equipment and System Commissioning of 1000 kV AC and Above

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Abstract: On-site acceptance tests of ultra-high-voltage power equipment are subject to this guide. Criteria and requirements for test items, conditions, methods, and results are established. The stated specifications and requirements, both technical and for testing, are universally needed for acceptance tests on-site and commissioning of ultra-high-voltage power equipment, including power transformers, reactors, capacitive voltage transformers, bushing-type current transformers, gas-insulated switchgear, air insulated grounding switches, air insulated disconnecting switches, bushings, metal-oxide surge arresters, suspension insulators, post insulators, and insulating oil, etc. It will be sufficient for most installations.

Keywords: air-insulated disconnecting switch, air-insulated grounding switch, bushing, bushing-type current transformer, capacitive voltage transformer, factory test, gas-insulated switchgear, IEEE 1861™, insulating oil, system commissioning, metal-oxide surge arrester, on-site acceptance test, post insulator, power transformer, reactor, suspension insulator, ultra-high voltage.

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Introduction

This introduction is not part of IEEE Std 1861™-2014, IEEE Guide for On-Site Acceptance Tests of Electrical Equipment and System Commissioning of 1000 kV AC and Above.

With the increase in voltage levels, the reliability and safety of high-voltage electric equipment is facing new challenges. There is a need to have consensus on a series of technical criteria and requirements for on-site acceptance tests for ultra-high-voltage (UHV) electric equipment to detect the damages or abnormal conditions that may occur during the transportation and installation processes and to determine whether equipment can be put into operation reliably and safely for power systems.

AC transmission systems of 1000 kV or greater have been established and operated with full-voltage in China and are also currently in various stages of development in other countries. However, there is a lack of suitable UHV transmission system commissioning procedures and technical information. To detect it is necessary to formulate a series of consensus technical requirements and criteria so as to facilitate the development of UHV systems and help ensure their successful commissioning.

This guide proposes on-site acceptance tests, relevant test items, test methods, and evaluation criteria for power transformers, reactors, capacitive voltage transformers (CVTs), bushing-type current transformers (CTs), gas-insulated switchgear, air-insulated grounding switches, air-insulated disconnecting switches, bushings, metal-oxide surge arresters (MOSAs), suspension insulators, post insulators, and insulating oil.

System commissioning consists of two parts. The first part is the preparation work before commissioning, including simulation and making commissioning schemes, testing schemes, and implementation schedules. The second part is the commissioning of projects with detailed explanation of conditions and contents.

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IEEE Guide for On-Site Acceptance Tests of Electrical Equipment and System Commissioning of 1000 kV AC and Above

1. Overview

1.1 Scope

This guide applies to on-site acceptance tests of electrical equipment and system commissioning of 1000-kV ac and above. It identifies criteria and recommendations for test items, conditions, methods, and results.

The stated recommendations, both technical and for testing, are universally needed for on-site acceptance tests and commissioning of 1000 kV ac and above ultra-high-voltage (UHV) power equipment, including power transformers, reactors, capacitive voltage transformers (CVTs), bushing-type current transformers (CTs), gas-insulated switchgear, air insulated grounding switches, air insulated disconnecting switches, bushings, metal-oxide surge arresters (MOSAs), suspension insulators, post insulators, and insulating oil.

1.2 Purpose

The intent of this guide is to identify on-site acceptance tests of 1000-kV ac and above electrical equipment. This guide also promotes the application and development of on-site acceptance test methodology.