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IEEE Guide to Understanding, Diagnosing, and Mitigating Stray and Contact Voltage

IEEE Power and Energy Society

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IEEE Std 1695™-2016

IEEE Guide to Understanding, Diagnosing, and Mitigating Stray and Contact Voltage

Transmission and Distribution Committee
of the
IEEE Power and Energy Society

Approved 29 January 2016

IEEE-SA Standards Board

Abstract: Voltage conditions that may arise at publicly and privately accessible locations as a result of the delivery and use of electrical energy are addressed in this guide. This guide is not intended for use as a statement of cause and effect. It focuses primarily on the presence of power frequency related voltage conditions and discusses definitions, sources, testing techniques, and strategies that may be available to help reduce those conditions.

Keywords: contact voltage, IEEE 1695™, stray voltage

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA

PDF: ISBN 978-1-5044-0829-5 STD20882
Print: ISBN 978-1-5044-0830-1 STDPD20882

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Introduction

This introduction is not part of IEEE Std 1695-2016™, IEEE Guide to Understanding, Diagnosing, and Mitigating Stray and Contact Voltage.

For many years the term stray voltage had been primarily used to discuss the power frequency voltages present at animal contact locations in and around animal confinement facilities. With the widespread availability of inexpensive and user friendly voltage measurement and recording devices, there has been a growing awareness that the general public and their pets are also regularly exposed to these voltages at many publicly and privately accessible locations. Until recently there has been little recognition of the important difference between the presence of small voltages related to normal electrical system operation (customer and utility) and the presence of potentially harmful and even lethal voltages related to un-cleared electrical faults. This guide has been created because there are few easy to understand public documents that describe the phenomena, their causes and effects, and actions that may help identify and reduce potentially dangerous voltage conditions.

This guide does not reflect the views of any one contributor or source and is not intended for use to advance a specific scientific, public health, security, environmental, or legal position attributed to, or propounded by, any user or third party. While it is impossible to give recognition to all those who have contributed to the content of this guide, the assistance of past and present members of the IEEE PES T&D Stray and Contact Voltage Working Group should certainly be acknowledged. The efforts of the Electric Power Research Institute (EPRI) and the National Electric Energy Testing Research and Applications Center (NEETRAC) should also be acknowledged. Much of the work these organizations have performed on this important topic is reflected in this guide.

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1. Overview

1.1 Scope

This guide addresses voltages that exist at publicly and privately accessible locations as a result of the delivery and use of electrical energy. This guide is not intended for use as a statement of cause and effect. It focuses primarily on the presence of power frequency related voltages and discusses definitions, sources, testing techniques, and mitigation strategies.

1.2 Purpose

While some jurisdictions have implemented local rules concerning stray and contact voltage, there is presently no industry-wide guide or standard that describes the variety of publicly and privately accessible voltages resulting from the delivery and use of electrical energy. The purpose of this guide is to provide information regarding the potential for risk and recommend actions taken in respect to the presence of either stray or contact voltage. This guide is also intended to help dispel misinformation surrounding this topic and enhance public safety.