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IEEE Guide for Fault-Locating Techniques on Shielded Power Cable Systems

IEEE Power and Energy Society

Developed by the
Insulated Conductors Committee

IEEE
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USA

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Abstract: Test and measurements, which are performed on shielded power cables to identify the location of a fault, are described. Whenever possible, the limitations of a particular test and measurement to locate a fault are provided and recommendations are made regarding specialized fault-locating techniques. A fault characterization chart is included as an aid to select a fault-locating technique.

Keywords: arc reflection, cable fault locating, cable testing, grounding, IEEE 1234, safety, sectionalizing, thumping, time domain reflectometry, (TDR)

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Introduction

This introduction is not part of IEEE Std 1234-2019, IEEE Guide for Fault-Locating Techniques on Shielded Power Cable Systems.

Many fault locators are experienced in locating short and open circuits on shielded power cables. Proper locating of high resistance or intermittent cable faults, which are the majority of the faults on cables with extruded dielectric insulation, is considered tedious, inconsistent, and time consuming. Therefore, reclosing, re-fusing, burning, and thumping at unnecessarily high voltage and energy levels, in order to generate an open or short circuit, are frequently used without consideration of cable and equipment properties. The danger of activating dormant faults, generating new faults, or damaging utility and customer equipment by improper locating methods is not always recognized.

By establishing cable fault-locating guidelines and training programs which incorporate recommended cable fault-locating measurements and techniques, cable owners can realize substantial savings in labor, cable and equipment replacement, and avoid unnecessary losses from customer outages.

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1. Overview

1.1 General

This document has been developed as a guide for cable fault locating on shielded power cable systems. It is intended to emphasize those fault-locating techniques which maintain cable integrity, reduce customer outage time, and consider customer equipment sensitivity. This guide applies to all voltage levels of insulated, shielded power cable systems.

1.2 Scope

During the lifecycle of shielded cable systems, failures may occur. In most situations, the system operator locates the failure in order to effect repairs and return the system to operation. Cable fault-locating methods should be chosen to maximize the effectiveness of the fault-locating procedure while minimizing any additional damage to the insulation of the cable system.

This guide is intended to be applied to all voltage classes of insulated, shielded power cable systems.

1.3 Purpose

This guide is intended to provide troubleshooting and testing personnel with guidance to safely and quickly localize a faulted cable section or locate a cable system fault with minimum risk of further damaging serviceable cables, accessories, and equipment.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

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