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IEEE Standard for Test Methods and Preferred Values for Low-Voltage Gas Discharge Tube Surge-Protective Components

IEEE Power and Energy Society

Developed by the
Surge Protective Devices Committee

IEEE Std C62.31™-2020
(Revision of IEEE Std C62.31-2006)

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Approved 24 September 2020

IEEE SA Standards Board

Abstract: This standard applies to low-voltage gas discharge tube (GDT) surge-protective components for application on systems with voltages less than or equal to 1000 V rms or 1500 V dc. These protective components are designed to limit voltage surges on balanced or unbalanced communication circuits and on power circuits operating from dc to 420 Hz. This standard contains a series of standard test criteria for determining the electrical characteristics and ratings of gas discharge tube surge-protective components.

Keywords: arc current, arc voltage, breakdown voltage, discharge current, follow current, gas discharge tube, GDT, glow to arc transition current, glow voltage, holdover voltage, IEEE C62.31™, sparkover voltage

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Participants

At the time this IEEE standard was completed, the Joint 3.6.1 Low Voltage Gap Type Surge Protective Components Working Group had the following membership:

Wolfgang Oertel, *Chair*
Michael J. Maytum, *Vice Chair*
Albert Martin, *Secretary*

Daniel Ashton
Thomas Tran
Bill Travis
Matthew Wakeham

The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

Daniel Ashton
Frank Basciano
Steven Bezner
Neal Dowling
Raymond Hill
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James Kinney
Lawrenc Long
Albert Martin
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Wolfgang Oertel
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Lorraine Padden
Bansi Patel
Thomas Phipps
Ion Radu
Bartien Sayogo
Gary Smullin
John Vergis
Matthew Wakeham
Lanyi Wang

When the IEEE-SA Standards Board approved this standard on 24 September 2020, it had the following membership:

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Introduction

This introduction is not part of IEEE Std C62.31-2020, IEEE Standard for Test Methods and Preferred Values for Low-Voltage Gas Discharge Tube Surge-Protective Components.

The tests in this standard are intended as guidance for design tests for manufacturers and end-users to provide a means of comparison among various gas discharge tube surge-protective components.

Unless otherwise defined, the test circuits and parameters given in this standard should be used for the characterization of low voltage gas discharge surge-protective components.

Contents

IEEE Standard for Test Methods and Preferred Values for Low-Voltage Gas Discharge Tube Surge-Protective Components

1. Overview

1.1 Scope

This standard applies to low voltage gas discharge tube (GDT) surge-protective components for application on systems with voltages less than or equal to 1000 V rms or 1500 V dc. These protective components are designed to limit voltage surges on balanced or unbalanced communication circuits and on power circuits operating from dc to 420 Hz. This standard contains a series of standard test criteria for determining the electrical characteristics and ratings of gas discharge tube surge-protective components.

The tests in this standard are intended as design tests as defined in the *IEEE Standards Dictionary Online* and provide a means of comparison among various gas discharge tube surge-protective components.

Gas discharge tubes are used to provide over-voltage protection in electrical circuits. When the breakdown (sparkover) voltage of the gas discharge tube is exceeded, the normal high-impedance state of the tube changes to a low-impedance state to allow the gas discharge tube to conduct the surge discharge current. After the tube conducts the surge discharge current, it interrupts the flow of power follow current and returns to its high-impedance state.

This standard's test criteria and definitions provide a common engineering language that is beneficial to the user and manufacturer of gas discharge tube surge-protective components.

Due to the voltage and energy levels employed in the majority of tests contained herein, all measurements should be considered hazardous and appropriate caution should be taken in their performance.

1.2 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (shall equals is required to).[1,2]

[1]The use of the word *must* is deprecated and cannot be used when stating mandatory requirements, *must* is used only to describe unavoidable situations.
[2]The use of *will* is deprecated and cannot be used when stating mandatory requirements, *will* is only used in statements of fact.