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# IEEE Guide for the Application of Surge-Protective Components in Surge Protective Devices and Equipment Ports—Part 1: Gas Discharge Tubes (GDTs)

IEEE Power and Energy Society

Sponsored by the
Surge Protective Devices Committee

IEEE
3 Park Avenue
New York, NY 10016-5997
USA

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**Abstract:** Covered in the IEEE C62.42 guide series are surge protective components (SPCs) used in power and telecom surge protective devices (SPDs) and equipment ports. Covered in this standard on gas discharge tube (GDT) technology SPCs are the following: component construction, characteristics, ratings, and application examples. The application examples are given in two informative annexes covering: basic circuits and protection circuits specific to communications, local area networks, high frequency feeds, and industrial services.

**Keywords:** arc region, back-up air-gap device, breakdown, capacitance, discharge, follow current, gas discharge tube, GDT, glow region, holdover voltage, IEEE C62.42.1™, insulation resistance, sparkover, three-electrode, two-electrode

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



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**William Travis,** *Vice Chair*

Tim Ardley
Robert Ashton
Nisar Chaudhry
Leonard Drewes
Ernie Gallo
Albert Martin
Wolfgang Oertel

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

Robert Ashton
Frank Basciano
William Bloethe
William Bush
Suresh Channarasappa
Chuanyou Dai
Gary Donner
Douglas Dorr
Randall Dotson
Doaa Galal
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Daidi Zhong

*Member Emeritus

## Introduction

This introduction is not part of IEEE Std C62.42.1–2016, IEEE Guide for the Application of Surge-Protective Components in Surge Protective Devices and Equipment Ports—Part 1: Gas Discharge Tubes (GDTs).

Gas discharge tubes consist of two or more metal electrodes separated by a small gap and held by a ceramic or glass cylinder. The cylinder is filled with a noble gas mixture, which sparks over into a glow discharge and finally an arc condition when sufficient surge current is available. Because of their switching action and rugged construction, gas tubes exceed other voltage limiting surge protective components in current-carrying capability. Many gas tubes intended for telecommunication applications can easily carry surge currents as high as 10 kA, 8/20; further, depending on design and size of the gas tube, surge current values of > 100 kA, 8/20 can be achieved. The construction of gas discharge tubes is such that they have very low capacitance, generally less than 2 pF. This low capacitance means that GDTs are extensively used in modern broadband communication systems.

This standard describes GDT construction, their voltage-current characteristics, characteristic properties, ratings, and circuit examples. Figures and circuit performance values reprinted in Annex C are with permission from Phoenix Contact GmbH and Co. KG, Catalog 6: Surface Protection and Power Supply Units 2013/2014, © 2013.

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# IEEE Guide for the Application of Surge-Protective Components in Surge Protective Devices and Equipment Ports—Part 1: Gas Discharge Tubes (GDTs)



## 1. Overview

### 1.1 Scope

The IEEE C62.42 guide series covers surge protective components (SPCs) used in power and telecom surge protective devices (SPDs) and equipment ports. This part on gas discharge tube (GDT) technology SPCs covers:

- Component construction
- Characteristics
- Ratings
- Application examples

## 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