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IEEE Guide for the Application of Surge-Protective Components in Surge Protective Devices and Equipment Ports—Part 4: Thermally Activated Current Limiters

IEEE STANDARDS

IEEE Power and Energy Society

Developed by the
Surge Protective Devices Committee

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IEEE

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Abstract: Surge protective components (SPCs) used in power and telecom surge protective devices (SPDs) and equipment ports are covered in the IEEE C62.42 guide series. Positive temperature coefficient (PTC) thermistor components are covered in this part. These SPCs are operated by self-heating and is automatically reset after the end of the overcurrent condition without the need for manual intervention. The two types of body material, polymer and ceramic, are covered in this guide. These components are referred to as follows: a) polymer positive temperature coefficient (PPTC) thermistors and b) ceramic positive temperature coefficient (CPTC) thermistors. Overview, construction, operation, production, ratings, characteristics, and application examples are topics covered in this guide.

Keywords: ceramic, current-limiter, holding, IEEE C62.42.4™, operate time, polymer, positive temperature coefficient (PTC), thermally activated, trip

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Introduction

This introduction is not part of IEEE Std C62.42.4–2020, IEEE Guide for the Application of Surge-Protective Components in Surge Protective Devices and Equipment Ports—Part 4: Thermally Activated Current Limiters.

Unlike fuses and heat coils, which break the circuit, these series connected self-restoring thermally activated overcurrent protectors (OCPs) automatically reset when the electrical event causing the overcurrent stops, without the need for manual intervention.

Self-restoring thermally activated OCP components operate by the increasing in resistance value, which reduces the circuit current when the overcurrent exceeds a given value for a sufficient time. The resistance transition is caused by the component body reaching a critical temperature caused by the I^2R heating of the overcurrent flowing through the component. The generic name for components with this type of action is positive temperature coefficient (PTC) thermistors. Being thermally operated, these PTC thermistors generally do not operate for short duration electrical transients, such as coupled lightning currents, but will operate for longer term ac and dc overcurrents.

There are two types of material used to make PTC thermistors: ceramic and polymer. Many of the component parameters apply to the both types of material. Some parameters are specific to the material used and these differences are explained. This guide describes PTC thermistor construction, operation, production, ratings, characteristics, and gives application examples.

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IEEE Guide for the Application of Surge-Protective Components in Surge Protective Devices and Equipment Ports—Part 4: Thermally Activated Current Limiters

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 covers positive temperature coefficient (PTC) thermistor components These SPCs are operated by self-heating and are automatically reset after the end of the overcurrent condition without the need for manual intervention. This guide covers the two types of body material: polymer and ceramic. These components are referred to as follows:

a) Polymer positive temperature coefficient (PPTC) thermistors

b) Ceramic positive temperature coefficient (CPTC) thermistors

This guide's topics include the following:

— Overview

— Construction

— Operation

— Production

— Ratings

— Characteristics

— Application examples