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IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Industrial Applications

IEEE Industry Applications Society

Sponsored by the
Petroleum and Chemical Industry Committee

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

IEEE Std 515™-2017
(Revision of IEEE Std 515-2011)

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Abstract: Specific testing requirements for qualifying electrical resistance trace heating for use in industrial applications in ordinary locations, as well as a basis for electrical and thermal design, are included in this standard.

Keywords: constant wattage trace heaters, electrical design, heat loss, heat tracing, heater pads, heater panels, heating cables, IEEE 515™, parallel trace heaters, pipelines, self-regulating trace heaters, series trace heaters, surface trace heating devices, thermal design, trace heaters, trace heating, vessel heater

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Introduction

This introduction is not part of IEEE Std 515-2017, IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Industrial Applications.

The scope of this standard includes specific testing requirements for qualifying electrical resistance trace heating for use in industrial applications in ordinary locations, as well as a basis for electrical and thermal design.

This document was first published as a recommended practice in 1983. In 1989, it was elevated to a standard, and Division 1 heating cables were added.

In 1997, this standard was expanded to include American classified zone heaters. A 32-week benchmark test was added to provide a thermal shock cycling test. This test established a minimum performance criteria for new products, offered a system to validate product temperature ratings claimed by manufacturers, and provided a minimum acceptable level of quality/performance by the trace heating devices.

The 2004 revision added a 12-week temperature cycling test as an alternative to the 32-week benchmark test. This revision also aligned the tolerance on sheath temperature for T-rating with the IEC 60079-30 5 K and 10 K tolerances (IEC 60079-30-1:2007 [B9] and IEC 60079-30-2:2007 [B10]).[1]

The 2011 revision included subsequent harmonization with international standards and has expanded the sections on maximum sheath temperature determination and design.

This revision removes hazardous (classified) locations requirements and updates the standard for industrial applications for ordinary (unclassified) locations. The hazardous (classified) locations requirements in IEEE 515-2011 has been superseded by the requirements in IEC/IEEE 60079-30-1 [B9] and −2 [B10]. Several figures, definitions, text and methods have also been revised to align with IEC/IEEE 60079-30-1[B9].

[1]The numbers in brackets correspond to those of the bibliography in Annex A.

Contents

IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Industrial Applications

1. Overview

1.1 Scope

This standard provides requirements for the testing, design, installation, and maintenance of electrical resistance trace heating in general industries as applied to pipelines, vessels, pre-traced and thermally insulated instrument tubing and piping, and mechanical equipment. The electrical resistance trace heating is in the form of series trace heaters, parallel trace heaters, and trace heater pads or panels. The requirements also include test criteria to determine the suitability of these trace heating devices utilized in industrial applications as applied in unclassified (ordinary) locations.

1.2 Purpose

The provisions of this standard should help ensure that process, fluid, or material temperatures are maintained and provide electrical, thermal, and mechanical durability to the trace heating system, such that in normal use, its performance is reliable and poses no danger to the user or surroundings. This standard is to serve as a complementary document to the current version of those national and international standards addressing electrical resistance trace heating.

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.

ANSI Z358.1, American National Standard for Emergency Eyewash and Shower Equipment.[2]

ASTM B193-02, Standard Test Method for Resistivity of Electrical Conductor Materials.[3]

[2]ANSI publications are available from the American National Standards Institute (http://www.ansi.org/)
[3]ASTM publications are available from the American Society for Testing and Materials (http://www.astm.org/).