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Electrical resistance trace heating systems for industrial and commercial applications - Part 1: General and testing requirements

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Systèmes de traçage par résistance électrique pour applications industrielles et commerciales - Partie 1: Exigences générales et d'essai

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25.180.10	Električne peči	Electric furnaces

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Electrical resistance trace heating systems for industrial and commercial applications - Part 1: General and testing requirements

(IEC 62395-1:2013)

Systèmes de traçage par résistance électrique pour applications industrielles et commerciales - Partie 1: Exigences générales et d'essai (CEI 62395-1:2013)

Elektrische Widerstands-Begleitheizungen für industrielle und gewerbliche Zwecke - Teil 1: Allgemeine Anforderungen und Prüfanforderungen (IEC 62395-1:2013)

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 62395-1:2013 E

Foreword

The text of document 27/926/FDIS, future edition 2 of IEC 62395-1, prepared by IEC/TC 27 "Industrial electroheating and electromagnetic processing" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62395-1:2013.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2014-07-14
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-10-14

This document supersedes EN 62395-1:2006.

EN 62395-1:2013 includes the following significant technical changes with respect to EN 62395-1:2006:

- tests have been added for trace heating on sprinkler systems;
- the flammability test has been changed to align with the latest draft of future IEC/IEEE 60079-30-1 [1)];
- a supplementary test has been added for the verification of sheath temperature using trace heating mounted on a plate fixture.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

Endorsement notice

The text of the International Standard IEC 62395-1:2013 was approved by CENELEC as a European Standard without any modification.

1) Under consideration.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60068-2-5	-	Environmental testing - Part 2-5: Tests - Test Sa: Simulated solar radiation at ground level and guidance for solar radiation testing	EN 60068-2-5	-
IEC 60519-1	-	Safety in electroheating installations - Part 1: General requirements	EN 60519-1	-
IEC 60519-10	-	Safety in electroheating installations - Part 10: Particular requirements for electrical resistance trace heating systems for industrial and commercial applications	EN 60519-10	-
IEC 62395-2	2013	Electrical resistance trace heating systems for industrial and commercial applications - Part 2: Application guide for system design, installation and maintenance	EN 62395-2	2013
ASTM D 5025-05	-	Standard Specification for Laboratory Burner Used for Small-Scale Burning Tests on Plastic Materials		
ASTM D 5207-09	-	Standard Practice for Confirmation of 20-mm (50-W) and 125-mm (500-W) Test Flames for Small-Scale Burning Tests on Plastic Materials		

IEC 62395-1

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Electrical resistance trace heating systems for industrial and commercial applications – Part 1: General and testing requirements

Systèmes de traçage par résistance électrique pour applications industrielles et commerciales – Partie 1: Exigences générales et d'essai

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL RESISTANCE TRACE HEATING SYSTEMS FOR INDUSTRIAL AND COMMERCIAL APPLICATIONS –

Part 1: General and testing requirements

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62395-1 has been prepared by IEC technical committee 27: Industrial electroheating and electromagnetic processing.

This second edition cancels and replaces the previous edition published in 2006 and constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

– Tests have been added for trace heating on sprinkler systems;
– The flammability test has been changed to align with the latest draft of future IEC/IEEE 60079-30-1[1];

[1] Under consideration.

– A supplementary test has been added for the verification of sheath temperature using trace heating mounted on a plate fixture.

The text of this standard is based on the following documents:

FDIS	Report on voting
27/926/FDIS	27/935/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62395 series, published under the general title *Electrical resistance trace heating systems for industrial and commercial applications*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

IEC 62395-1 provides the essential requirements and testing appropriate to electrical resistance trace heating equipment used in industrial and commercial applications. While some of this work already exists in national or international standards, this standard has collated much of this existing work and added considerably to it.

IEC 62395-2 provides detailed recommendations for the system design, installation and maintenance of electric trace heating systems in industrial and commercial applications.

It is the objective of IEC 62395 that, when in normal use, electrical trace heating systems operate safely under their defined conditions of use, by

a) employing heaters of the appropriate construction and meeting the test criteria detailed in IEC 62395-1. The construction includes a metallic sheath, braid, screen or equivalent electrically conductive covering;

b) operating at safe temperatures when designed, installed, and maintained in accordance with IEC 62395-2.

c) having at least the minimum levels of overcurrent and earth-fault protection required in IEC 62395-1 and IEC 62395-2.

ELECTRICAL RESISTANCE TRACE HEATING SYSTEMS FOR INDUSTRIAL AND COMMERCIAL APPLICATIONS –

Part 1: General and testing requirements

1 Scope

This part of IEC 62395 specifies requirements for electrical resistance trace heating systems and includes general test requirements.

This standard pertains to trace heating systems that may comprise either factory-fabricated or field-assembled (work-site) units, and which may be series and parallel trace heaters or surface heaters (heater pads and heater panels) that have been assembled and/or terminated in accordance with the manufacturer's instructions.

This standard also includes requirements for termination assemblies and control methods used with trace heating systems.

This standard provides the essential requirements and testing appropriate to electrical resistance trace heating equipment used in industrial and commercial applications. The products certified according to this standard are intended to be installed by persons who are suitably trained in the techniques required and that only trained personnel carry out especially critical work, such as the installation of connections and terminations. Installations are intended to be carried out under the supervision of a qualified person who has undergone supplementary training in electric trace heating systems.

This standard does not include or provide for any applications in potentially explosive atmospheres.

This standard does not cover induction, impedance or skin effect heating.

Trace heating systems can be grouped into different types of applications and the different conditions found during and after installation necessitate different requirements for testing. Trace heating systems are usually certified for a specific type of installation or application. Typical applications for the different types of installation include, but are not limited to:

a) installations of trace heating for surface heating on pipes, vessels and associated equipment – applications include:
   - freeze protection and temperature maintenance;
   - hot water lines;
   - oil and chemical lines;
   - sprinkler system mains and supply piping;
b) outdoor exposed area installations of trace heating – applications include:
   - roof de-icing;
   - gutter and down-spout de-icing;
   - catch basins and drains;
   - rail heating[2];

[2] Further evaluation may be required to address application specific conditions such as fluctuations in impressed voltage and voltage spikes.

c) installation with embedded trace heating – applications include:
   – snow melting;
   – frost heave protection;
   – floor warming;
   – energy storage systems;
   – door frames;

d) installations of trace heating internal to conduit and piping – applications include:
   – snow melting – in conduit;
   – frost heave protection – in conduit;
   – floor warming – in conduit;
   – energy storage systems – in conduit;
   – internal trace heating for freeze protection of potable water lines;
   – enclosed drains and culverts.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-2-5, *Environmental testing – Part 2-5: Tests – Test Sa: Simulated solar radiation at ground level and guidance for solar radiation testing*

IEC 60519-1, *Safety in electroheating installations – Part 1: General requirements*

IEC 60519-10, *Safety in electroheating installations – Part 10: Particular requirements for electrical resistance trace heating systems for industrial and commercial applications*

IEC 62395-2:2013, *Electrical resistance trace heating systems for industrial and commercial applications – Part 2: Application guide for system design, installation and maintenance*

ASTM D 5025-05, *Standard Specification for Laboratory Burner Used for Small-Scale Burning Tests on Plastic Materials*

ASTM D 5207-09, *Standard Practice for Confirmation of 20-mm (50-W) and 125-mm (500-W) Test Flames for Small-Scale Burning Tests on Plastic Materials*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60519-10 and the following apply.

NOTE 1 General definitions are given in the International Electrotechnical Vocabulary, IEC 60050. Terms relating to industrial electroheat are defined in IEC 60050-841.

NOTE 2 The terms defined in this clause are used both in IEC 62395-1 and IEC 62395-2.

3.1
ambient temperature
temperature surrounding the object under consideration

Note 1 to entry: Where trace heaters or surface heaters are enclosed in thermal insulation, the ambient temperature is the temperature exterior to such thermal insulation.

3.1.1
maximum ambient temperature
the highest specified ambient temperature

3.1.2
minimum ambient temperature
the lowest specified ambient temperature

Note 1 to entry: Heat-loss calculations in IEC 62395-2 are based on the minimum ambient temperature.

3.2
branch circuit
portion of the wiring installation between the overcurrent device protecting the circuit and the trace heater(s) or surface heater(s)

3.3
cold lead
electrically insulated conductor or conductors used to connect a trace heater or surface heater to the branch circuit and designed so that it does not produce significant heat

3.4
connection
termination or splice used to attach trace heaters or surface heaters to power wiring or to connect sections of these devices

3.5
dead leg
segment of process piping segregated from the normal flow pattern for the purpose of providing a heat loss reference

3.6
design loading
minimum power that will meet the design requirements, in the worst conditions, after voltage and resistance tolerances and appropriate safety factors have been considered

3.7
electrically conductive covering
metallic sheath, metallic braid, or electrically conductive material

3.8
end termination
termination, which may be heat producing, applied to a trace heater at the end opposite to that where the power is supplied

[SOURCE: IEC 60050-426:2008, 426-20-04]

3.9
factory-fabricated unit
trace heater unit or set or surface heater unit or set, including the necessary terminations and connections, assembled by the manufacturer

3.10
field-assembled unit
trace heaters or surface heaters supplied unterminated with terminating components to be assembled at the work site