

**Elektrilised trass-takistuskuumutussüsteemid  
tööstuslikeks ja kaubanduslikeks rakendusteks. Osa 1:  
Üld- ja katsetusnõuded**

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

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN 62395-1:2013 sisaldab Euroopa standardi EN 62395-1:2013 inglisekeelset teksti.	This Estonian standard EVS-EN 62395-1:2013 consists of the English text of the European standard EN 62395-1:2013.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 06.12.2013.	Date of Availability of the European standard is 06.12.2013.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

ICS 25.180.10

### Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:  
Aru 10, 10317 Tallinn, Eesti; [www.evs.ee](http://www.evs.ee); telefon 605 5050; e-post [info@evs.ee](mailto:info@evs.ee)

### The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:  
Aru 10, 10317 Tallinn, Estonia; [www.evs.ee](http://www.evs.ee); phone 605 5050; e-mail [info@evs.ee](mailto:info@evs.ee)

**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)

This European Standard was approved by CENELEC on 2013-10-14. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

**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**

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

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<sup>1)</sup>;
- 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.

---

<sup>1)</sup> 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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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		

## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references .....	8
3 Terms and definitions .....	8
4 General requirements .....	13
4.1 General.....	13
4.2 Electrically conductive covering.....	13
4.3 Electrical circuit protection requirements for branch circuits .....	13
4.4 Temperature requirements .....	14
4.4.1 General .....	14
4.4.2 Stabilized design .....	14
4.4.3 Controlled design .....	14
5 Testing .....	14
5.1 Type tests – General .....	14
5.2 Type tests – All applications .....	14
5.2.1 Dielectric test .....	14
5.2.2 Electrical insulation resistance test.....	15
5.2.3 Flammability test .....	16
5.2.4 Room temperature impact test.....	17
5.2.5 Minimum temperature impact test.....	19
5.2.6 Deformation test.....	20
5.2.7 Cold bend test.....	21
5.2.8 Water resistance test.....	22
5.2.9 Integral components resistance to water test .....	22
5.2.10 Verification of rated output.....	23
5.2.11 Thermal stability of electrical insulating material .....	25
5.2.12 Thermal performance test for parallel trace heaters .....	26
5.2.13 Determination of maximum sheath temperature .....	27
5.2.14 Verification of start-up current .....	34
5.2.15 Verification of the electrical resistance of the electrically conductive covering .....	34
5.2.16 Strain relief test for connections (terminations).....	34
5.3 Type tests – Additional tests for outdoor exposed surface heating installations without thermal insulation .....	35
5.3.1 Verification of rated output.....	35
5.3.2 Determination of maximum sheath temperature .....	35
5.3.3 Increased moisture resistance test .....	35
5.3.4 UV test .....	35
5.3.5 Resistance to cutting test .....	35
5.3.6 Abrasion test .....	35
5.3.7 Tension test.....	36
5.3.8 Rail system voltage spike test .....	36
5.3.9 Rail system over-voltage test.....	37
5.4 Type tests – Additional tests and test modifications for embedded heating applications.....	37
5.4.1 Verification of rated output.....	37

5.4.2	Determination of maximum sheath temperature .....	37
5.4.3	Resistance to cutting test .....	37
5.4.4	Flammability test .....	37
5.5	Type tests – Additional tests for applications of trace heating internal to conduit and piping .....	37
5.5.1	Verification of rated output.....	37
5.5.2	Determination of maximum sheath temperature .....	37
5.5.3	Increased moisture resistance test .....	37
5.5.4	Pull-strength test .....	38
5.6	Type tests – Additional requirements for sprinkler systems.....	38
5.6.1	Normal and abnormal operation test .....	38
5.6.2	Normal operation test .....	38
5.6.3	Abnormal operation test.....	41
5.7	Routine tests .....	41
5.7.1	Dielectric test .....	41
5.7.2	Verification of rated output.....	41
6	Marking .....	41
6.1	General .....	41
6.2	Product markings .....	42
7	Installation instructions .....	42
	Bibliography.....	44
	Figure 1 – Flammability test.....	17
	Figure 2 – Room temperature impact test .....	18
	Figure 3 – Example of room temperature impact test apparatus .....	19
	Figure 4 – Example of minimum temperature impact test apparatus .....	20
	Figure 5 – Cold bend test.....	22
	Figure 6 – Moisture resistance test .....	23
	Figure 7 – Verification of rated output .....	25
	Figure 8 – Pipe fixture.....	29
	Figure 9 – Plate fixture.....	30
	Figure 10 – Plate fixture when trace heaters are allowed to touch.....	31
	Figure 11 – Maximum sheath temperature using the product approach .....	34
	Figure 12 – Abrasion test.....	36
	Figure 13 – Sprinkler system temperature control test – branch line arrangement .....	39
	Figure 14 – Sprinkler system temperature control test – branch line – alternative arrangement .....	40
	Figure 15 – Sprinkler system temperature control test – supply pipe arrangement .....	40
	Table 1 – Test voltages for the dielectric test .....	15
	Table 2 – Product marking .....	42

## 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<sup>2</sup>;

---

<sup>2</sup> 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