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Responsible committee: EXL/31 Equipment for explosive atmospheres

Interested committees:

Title: BS EN IEC 60079-30-1 Explosive atmospheres

Part 30-1: Electrical resistance trace heating - General and testing requirement

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

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- iii) requires additional national guidance or information

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Responsible Committee Secretary: **Mr Christopher Brown (BSI)**Direct tel: **02089967441**E-mail: **christopher.brown@bsigroup.com**

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



31/1691/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:

IEC/IEEE 60079-30-1 ED2

DATE OF CIRCULATION:

2023-03-17

CLOSING DATE FOR COMMENTS:

2023-06-09

SUPERSEDES DOCUMENTS:

31/1613/CD, 31/1622A/CC

IEC TC 31 : EQUIPMENT FOR EXPLOSIVE ATMOSPHERES

SECRETARIAT:

United Kingdom

SECRETARY:

Mr Tom Stack

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:



Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☐ QUALITY ASSURANCE

☐ SAFETY

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Recipients of this document are invited to submit, with their comments, notification of

- any relevant patent rights of which they are aware and to provide supporting documentation,
- any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "in some countries" clauses. See AC/22/2007.

TITLE:

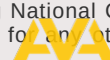
Explosive atmospheres - Part 30-1: Electrical resistance trace heating - General and testing requirements

NOTE FROM TC/SC OFFICERS:

The drafting has undergone several editing phases and a tracked change version was not maintained. To provide a text which includes editing marks (as per the Good Working Practice) the CD text has been compared with the ED1 text and changes are identified on this document. However this document is slightly unwieldy so is being provided as a INF (31/1691/INF) document for reference and the 'clean' new CD text is being used for the CD ballot.

As this is a joint IEC/IEEE Project the document has been reviewed and approved by the IEEE process.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –

**Part 30-1: Electrical resistance trace heating –
General and testing requirements**

FOREWORD

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International Standard IEC/IEEE 60079-30-1 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres, in cooperation with the Petroleum & Chemical Industry Committee of the IEEE Industrial Applications Society under the IEC/IEEE Dual Logo Agreement.

This publication is published as an IEC/IEEE Dual Logo standard.

NOTE A list of IEEE participants can be found at the following URL:

http://standards.ieee.org/downloads/60079/60079-30-1-2015/60079-30-1-2015_wg-participants.pdf.

This second edition of IEC/IEEE 60079-30-1 cancels and replaces the first edition of IEC/IEEE 60079-30-1 published in 2015 and constitutes a technical revision.

This edition includes the following significant changes, apart from the general revision and updating of the first edition of IEC/IEEE 60079-30-1, with respect to the previous edition:

The significance of changes between IEC/IEEE 60079-30-1, Edition 1.0 (2015) and IEC/IEEE 60079-30-1, Edition 2.0 (202x) is as listed below:

		Type		
Changes	Clause	Minor and editorial changes	Extension	Major technical changes
Redefined Maximum withstand temperature as it applies to the performance benchmark test.	3.22	X		
Separated maximum maintain temperature and maximum continuous operating temperature to clarify the meaning of both terms	3.17 and 3.18	X		
Addition of requirements for controllers and high temperature limiters, added specific reference standards to confirm compliance	4.5.3			C1
Rewrite of the requirements for controlled design as it applies to the application of controllers and high temperature limiters as for use in EPL's	4.5.3			C2
Addition of requirement for specifying various temperatures defined by the standard and including them in user documentation	4.1 and 7			C3
The increase of the use of trace heating in applications for frost heave in cryogenic applications.	Annex G		X	

		Type		
Changes	Clause	Minor and editorial changes	Extension	Major technical changes

209 NOTE The technical changes referred to include the significance of technical changes in the revised IEC Standard,
210 but they do not form an exhaustive list of all modifications from the previous version.

211 Explanations:

212 A) Definitions

213 Minor and editorial changes

214 clarification
215 decrease of technical requirements
216 minor technical change
217 editorial corrections

218 These are changes which modify requirements in an editorial or a minor technical way. They
219 include changes of the wording to clarify technical requirements without any technical change,
220 or a reduction in level of existing requirement.

221 Extension addition of technical options

222 These are changes which add new or modify existing technical requirements, in a way that new
223 options are given, but without increasing requirements for equipment that was fully compliant
224 with the previous standard. Therefore, these will not have to be considered for products in
225 conformity with the preceding edition.

226 Major technical changes

227 addition of technical requirements
228 increase of technical requirements

229 These are changes to technical requirements (addition, increase of the level or removal) made
230 in a way that a product in conformity with the preceding edition will not always be able to fulfil

the requirements given in the later edition. These changes have to be considered for products in conformity with the preceding edition. For these changes additional information is provided in clause B) below.

NOTE These changes represent current technological knowledge. However, these changes should not normally have an influence on equipment already placed on the market.

B) Information about the background of 'Major Technical Changes'

C1 There are no additional requirements for temperature controllers and high temperature limiters beyond those of the general industrial standards

C2 The application of temperature controllers and high temperature limiters shall be as specified.

C3 The documentation shall include the various temperatures specified in the standard

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

FDIS	Report on voting

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

International standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

This standard is intended to be used in conjunction with IEC/IEEE 60079-30-2, *Explosive atmospheres – Part 30-2: Electrical resistance trace heating – Application guide for design, installation and maintenance*.

A list of all parts of IEC 60079 series, under the general title *Explosive atmospheres*, can be found on the IEC website.

The IEC Technical Committee and IEEE Technical Committee have decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

265

INTRODUCTION

266 IEC/IEEE 60079-30-1 is intended to provide a comprehensive overview of the essential
267 requirements and testing appropriate to electric surface heating equipment used in explosive
268 atmospheres. The requirements of this part of IEC 60079 are considered to be the minimum
269 requirements for equipment protection levels Gb, Gc, Db, and Dc in explosive atmospheres for
270 gases, dusts, and fibres/flyings. While some of this work already exists in national standards or
271 international standards, this standard has collated much of this existing work and added to it.
272 This standard also contains the minimum requirements for users applying the Division method
273 of area classification.

274

EXPLOSIVE ATMOSPHERES –

Part 30-1: Electrical resistance trace heating – General and testing requirements

1 Scope

This part of IEC 60079 specifies general and testing requirements for electrical resistance trace heaters for application in explosive atmospheres with the exclusion of those for EPL Ga and Da. This standard covers trace heaters that comprise either factory or field (work-site) assembled units, and which can be series trace heaters, parallel trace heaters, trace heater pads, or trace 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. The explosive atmospheres referred to in this standard are those defined in IEC 60079-10-1 and IEC 60079-10-2.

Annexes E and F outline the application of this standard for those users applying the Division method of area classification.

This standard supplements and modifies the general requirements of IEC 60079-0, except as indicated in Table 1. Where a requirement of this standard conflicts with a requirement of IEC 60079-0, the requirement of this standard takes precedence.

Table 1 – Application or exclusion of specific clauses of IEC 60079-0

IEC 60079-0		Electrical resistance trace heaters and integral components		Terminations as separate components
Ed. 7.0 (2017) (informative)	Clause / Subclause title (normative)	Group I and Group II	Group III	
1	Scope	Applies	Applies	Applies
2	Normative references	Applies	Applies	Applies
3	Terms and definitions	Applies, except ambient temperature, see 3.1	Applies, except ambient temperature, see 3.1	Applies, except ambient temperature, see 3.1
4	Equipment grouping			
4.1	General	Applies	Applies	Applies
4.2	Group I	Excluded	Excluded	Excluded
4.3	Group II	Applies	Excluded	Applies, outside of thermal insulation only
4.4	Group III	Excluded	Applies	Applies
4.5	Equipment for a particular explosive gas atmosphere	Applies	Excluded	Applies
5	Temperatures			
5.1	Environmental influences	Applies	Applies	Applies

IEC 60079-0		Electrical resistance trace heaters and integral components		Terminations as separate components
Ed. 7.0 (2017) (informative)	Clause / Subclause title (normative)	Group I and Group II	Group III	
5.1.1	Ambient temperature	Replaced by 4.5 and 6.1e)	Replaced by 4.5 and 6.1e)	Applies, see 3.1
5.1.2	External source of heating or cooling	Applies	Applies	Applies
5.2	Service temperature	Modified	Modified	Applies
5.3	Maximum surface temperature			
5.3.1	Determination of maximum surface temperature	Replaced by 4.5 in conjunction with 5.1.13	Replaced by 4.5 in conjunction with 5.1.13 only when tested in accordance with 5.1.13.3.	Applies
5.3.2	Limitation of maximum surface temperature			
5.3.2.1	Group I electrical equipment	Applies	Excluded	Applies
5.3.2.2	Group II electrical equipment	Applies	Excluded	Applies
5.3.2.3	Group III electrical equipment			
5.3.2.3.1	Maximum surface temperature for EPL Da	Excluded	Excluded	
5.3.2.3.2	Maximum surface temperature for EPL Db	Excluded	Applies, where the maximum sheath temperature is determined only for those surfaces that are specified to be exposed to layers of combustible dust. Does not apply for trace heaters specified to be covered by thermal insulation.	Applies
5.3.2.3.3	Maximum surface temperature for EPL Dc	Excluded	Applies, where the maximum sheath temperature is determined only for those surfaces that are specified to be exposed to layers of combustible dust. Does not apply for trace heaters specified to be covered by thermal insulation.	Applies
5.3.3	Small component temperature for Group I and Group II electrical equipment	Excluded	Excluded	Applies
5.3.4	Component temperature of smooth surfaces for Group I or Group II electrical equipment	Excluded	Excluded	Applies
6	Requirements for all equipment			
6.1	General	Applies	Applies	Applies
6.2	Mechanical strength of equipment	Replaced by 4.2	Replaced by 4.2	When in direct contact with the trace heater, may be substituted by 4.2

IEC 60079-0		Electrical resistance trace heaters and integral components		Terminations as separate components
Ed. 7.0 (2017) (informative)	Clause / Subclause title (normative)	Group I and Group II	Group III	
6.3	Opening times	Excluded	Excluded	Applies
6.4	Circulating currents in enclosures (e.g. of large electrical machines)	Excluded	Excluded	Excluded
6.5	Gasket retention	Excluded	Excluded	Applies
6.6	Electromagnetic and ultrasonic radiating equipment	Excluded	Excluded	Applies
7	Non-metallic enclosures and non-metallic parts of enclosures			
7.1	General			
7.1.1	Applicability	Replaced by the last paragraph of 4.1	Replaced by the last paragraph of 4.1	Applies
7.1.2	Specification of materials			
7.1.2.1	General	Replaced by the last paragraph of 4.1	Replaced by the last paragraph of 4.1	Applies
7.1.2.2	Plastic materials	Replaced by the last paragraph of 4.1	Replaced by the last paragraph of 4.1	Applies
7.1.2.3	Elastomers	Replaced by the last paragraph of 4.1	Replaced by the last paragraph of 4.1	Applies
7.1.2.4	Materials used for cementing	Replaced by the last paragraph of 4.1	Replaced by the last paragraph of 4.1	Applies
7.2	Thermal endurance	Replaced by requirements and tests of this standard	Replaced by requirements and tests of this standard	Applies
7.3	Resistance to light	Replaced by 5.1.16 for trace heaters and integral components specified for outdoor exposure	Replaced by 5.1.16 for trace heaters and integral components specified for outdoor exposure	Applies
7.4	Electrostatic charges on external non-metallic materials	Excluded	Excluded	Applies
7.5	Attached external conductive parts	Excluded	Excluded	Applies
8	Metallic enclosures and metallic parts of enclosures			
8.1	Material composition	Applies to trace heaters and integral components with metallic outer sheath or overjacket.	Applies to trace heaters and integral components with metallic outer sheath or overjacket.	Applies
8.2	Group I	Excluded	Excluded	Applies
8.3	Group II	Applies to trace heaters and integral components with metallic outer sheath or overjacket.	Excluded	Applies
8.4	Group III	Excluded	Applies to trace heaters and integral components with metallic outer sheath or overjacket.	Applies
8.5	Copper Alloys	Applies to trace heaters and integral components with metallic outer sheath or overjacket.	Applies to trace heaters and integral components with metallic outer sheath or overjacket.	Applies

IEC 60079-0		Electrical resistance trace heaters and integral components		Terminations as separate components
Ed. 7.0 (2017) (informative)	Clause / Subclause title (normative)	Group I and Group II	Group III	
9	Fasteners	Excluded	Excluded	Applies
10	Interlocking devices	Excluded	Excluded	Applies
11	Bushings	Excluded	Excluded	Applies
12	(Reserved for future use)			
13	Ex Components	Applies	Applies	Applies
14	Connection facilities and termination compartments	Covered by the requirements of this standard	Covered by the requirements of this standard	Applies
15	Connection facilities for earthing and bonding conductors	Replaced by 5.1.15	Replaced by 5.1.15	Applies
16	Entries into enclosures	Excluded	Excluded	Applies
17	Supplementary requirements for rotating electrical machines	Excluded	Excluded	Excluded
18	Supplementary requirements for switchgear	Excluded	Excluded	Excluded
19	(Reserved for future use)			
20	Supplementary requirements for external plugs, socket outlets and connectors for field wiring connection	Excluded	Excluded	Applies
21	Supplementary requirements for luminaires	Excluded	Excluded	Excluded
22	Supplementary requirements for caplights and handlights	Excluded	Excluded	Excluded
23	Equipment incorporating cells and batteries	Excluded	Excluded	Applies
24	Documentation	Applies	Applies	Applies
25	Compliance of prototype or sample with documents	Applies	Applies	Applies
26.1	General	Applies	Applies	Applies
26.2	Test configuration	Applies	Applies	Applies
26.3	Tests in explosive test mixtures	Excluded	Excluded	Applies
26.4	Tests of enclosures			
26.4.1	Order of tests	Excluded	Excluded	Applies
26.4.2	Resistance to impact	Excluded	Excluded	Applies
26.4.3	Drop test	Excluded	Excluded	Excluded
26.4.4	Acceptance criteria	Excluded	Excluded	Applies

IEC 60079-0		Electrical resistance trace heaters and integral components		Terminations as separate components
Ed. 7.0 (2017) (informative)	Clause / Subclause title (normative)	Group I and Group II	Group III	
26.4.5	Degree of protection by enclosure	Excluded	Excluded	Applies
26.5	Thermal tests			
26.5.1	Temperature measurement	Replaced by 5.1.13	Replaced by 5.1.13	Applies
26.5.2	Thermal shock test	Excluded	Excluded	Applies
26.5.3	Small component ignition test	Excluded	Excluded	Applies
26.6	Torque test for bushings	Excluded	Excluded	Applies
26.7	Non-metallic enclosures or non-metallic parts of enclosures	Excluded	Excluded	Applies
26.8	Thermal endurance to heat	Replaced by 5.1.11	Replaced by 5.1.11	Applies
26.9	Thermal endurance to cold	Replaced by 5.1.7	Replaced by 5.1.7	Applies
26.10	Resistance to light	Replaced by 5.1.16 for trace heaters and integral components specified for outdoor exposure	Replaced by 5.1.16 for trace heaters and integral components specified for outdoor exposure	Applies
26.11	Resistance to chemical agents for Group I electrical equipment	Applies for Group I	Excluded	Applies
26.12	Earth continuity	Excluded	Excluded	Applies
26.13	Surface resistance test of parts of enclosures of non-metallic materials	Excluded	Excluded	Applies
26.14	Measurement of capacitance	Excluded	Excluded	Applies
26.15	Verification of ratings of ventilating fans	Excluded	Excluded	Excluded
26.16	Alternative qualification of elastomeric sealing O-rings	Excluded	Excluded	Applies
27	Routine tests	Applies	Applies	Applies
28	Manufacturers responsibility	Applies	Applies	Applies
29	Marking			
29.1	Applicability	Applies	Applies	Applies
29.2	Location	Applies	Applies	Applies
29.3	General	Applies in principle	Applies in principle	Applies
29.4	Ex marking for explosive gas atmospheres	Applies	Applies	Applies
29.5	Ex marking for explosive dust atmospheres	Applies	Applies	Applies
29.6	Combined types (or levels) of protection	Applies for complete trace heating systems	Applies for complete trace heating systems	Applies
29.7	Multiple types of protection	Applies for complete trace heating systems	Applies for complete trace heating systems	Applies

IEC 60079-0		Electrical resistance trace heaters and integral components		Terminations as separate components
Ed. 7.0 (2017) (informative)	Clause / Subclause title (normative)	Group I and Group II	Group III	
29.8	Ga equipment using two independent Gb types (or levels) of protection	Excluded	Excluded	Excluded
29.9	Boundary wall	Excluded	Excluded	Excluded
29.10	Ex Components	Applies	Applies	Applies
29.11	Small Ex Equipment and small Ex Components	Applies	Applies	Applies
29.12	Extremely small Ex Equipment and extremely small Ex Components	Applies	Applies	Applies
29.13	Warning markings	Applies for complete trace heating systems	Applies for complete trace heating systems	Applies
29.14	Cells and batteries	Excluded	Excluded	Applies
29.15	Electric machines operated with a converter	Excluded	Excluded	Excluded
29.16	Examples of marking	Applies	Applies	Applies
30	Instructions	Replaced	Replaced	Applies
Annex A	Supplementary requirements for Ex cable glands	Excluded for integral components	Excluded for integral components	Applies also to cable glands that are integral part of: - Enclosures; - enclosure support devices with trace heater or cable entries; - connection-, splice-, and/or end termination kits.
Annex B	Requirements for Ex components	Applies with above mentioned modifications	Applies with above mentioned modifications	Applies
Annex C	Example of rig for resistance to impact test	Replaced by Error! Reference source not found.	Replaced by Error! Reference source not found.	Applies
Annex D	Electric machines connected to converters	Excluded	Excluded	Excluded
Annex E	Temperature evaluation of electric machines	Excluded	Excluded	Excluded
Annex F	Guideline flowchart for tests of non-metallic enclosures or non-metallic parts of enclosures (26.4)	Excluded	Excluded	Applies
Annex G	Guidance flowchart for tests of cable glands	Excluded for integral components	Excluded for integral components	Applies also to cable glands that are integral part of: - Enclosures; - enclosure support devices with

IEC 60079-0		Electrical resistance trace heaters and integral components		Terminations as separate components
Ed. 7.0 (2017) (informative)	Clause / Subclause title (normative)	Group I and Group II	Group III	
				trace heater or cable entries; - connection-, splice-, and/or end termination kits.
Annex H	Shaft voltages resulting in motor bearing or shaft brush sparking Discharge energy calculation	Excluded	Excluded	Excluded
NOTE 1 Clause numbers in the three right-hand columns of this table refer to IEC/IEEE 60079-30-1 NOTE 2 The clause number in the above table is shown for information only. The applicable requirements of IEC 60079-0 are identified by the clause title which is normative. Applies: this requirement of IEC 60079-0 is applied without change. Excluded: this requirement of IEC 60079-0 does not apply. Modified: this requirement of IEC 60079-0 is modified as detailed in this standard.				

298

299 2 Normative references

300 For the purposes of this document, the terms and definitions given in IEC60079-0 and the
301 following apply.

302 ISO and IEC maintain terminology databases for use in standardization at the following
303 addresses:

- 304 • IEC Electropedia: available at <https://www.electropedia.org/>
- 305 • ISO Online browsing platform: available at <https://www.iso.org/obp>

306 IEC 60050-151, *International Electrotechnical Vocabulary – Part 151: Electrical and magnetic*
307 *devices*

308 IEC 60050-426, *International Electrotechnical Vocabulary – Part 426: Equipment for explosive*
309 *atmospheres*

310 IEC 60079-0, *Explosive atmospheres – Part 0: Equipment – General requirements*

311 IEC 60695-11-3, *Fire hazard testing – Part 11-3: Test flames – 500 W flames – Apparatus and*
312 *conformational test methods*

313 ISO 4892-1, *Plastics – Methods of exposure to laboratory light sources – Part 1: General*
314 *guidance*

315 ISO 4892-2, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc*
316 *lamps*

317 ASTM D5025, *Standard specification for laboratory burner used for small-scale burning tests*
318 *on plastic materials*

319 ASTM G155, *Standard practice for operating xenon arc light apparatus for exposure of non-*
320 *metallic materials*

321 NFPA 70, *National Electrical Code® (NEC®)*

322 CSA C22.1, *Canadian Electrical Code, Part 1*

323

324

325 **3 Terms and definitions**

326 For the purposes of this document, the terms and definitions given in IEC 60079-0, IEC 60079-
327 7, and IEC 60050-151 (except as modified by this clause) as well as the following apply.

328 **3.1**

329 **ambient temperature**

330 <trace heating>

331 temperature surrounding the object under consideration

332 NOTE Where a trace heater or surface heater is enclosed in thermal insulation, the ambient temperature is the
333 temperature external to the thermal insulation.

334 **3.1.1**

335 **maximum ambient temperature**

336 highest specified ambient temperature

337 **3.1.2**

338 **minimum ambient temperature**

339 <trace heating>

340 lowest ambient temperature specified at which trace heating is operable and performs according
341 to specified requirements (and on which heat-loss calculations are based)

342 [SOURCE: IEC 60050-426:2020, 426-20-20]

343 **3.2**

344 **branch circuit**

345 portion of the wiring installation between the overcurrent device protecting the circuit and the
346 trace heater unit(s)

347 [SOURCE: IEC 60050-426:2020, 426-20-02]

348 **3.3**

349 **connection (termination)**

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

352 **3.3.1**

353 **cold lead**

354 electrically insulated conductor or conductors that do not produce significant heat and are used
355 to connect a trace heater to a branch circuit

356 [SOURCE: IEC 60050-426:2020, 426-20-03]

3.3.2

end termination

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

[SOURCE: IEC 60050-426:2020, 426-20-04]

3.3.3

power termination

termination applied to the end of a trace heater at which the power is supplied

[SOURCE: IEC 60050-426:2020, 426-20-05]

3.3.4

tee

electrical connection of trace heaters, in series or in parallel, to accommodate a branch of a trace heater.

[SOURCE: IEC 60050-426:2020, 426-20-06, modified ("tee or branch" replaced by "branch or a branch circuit")]

3.4

controlled design

design where the applicable temperature controller and/or high temperature limiter is used in establishing/limiting the maximum sheath temperature

3.5

dead leg

<trace heating>

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

[SOURCE: IEC 60050-426:2008, 426-20-07]

3.6

design loading

minimum power that meets the design requirements, in the specified adverse conditions (minimum ambient and maximum wind velocity), after voltage and resistance tolerances and appropriate safety factors have been considered

[SOURCE: IEC 60050-426:2020, 426-20-08]

3.7

electrically conductive covering

metallic braid, metallic sheath, or alternative covering with sufficient conductivity so that, when bonded to ground, it will allow a ground fault protective device to operate under a fault condition

3.8

factory fabricated

<trace heating>

trace heater unit or set, including the necessary terminations and connections, assembled by the manufacturer

[SOURCE: IEC 60050-426:2020, 426-20-09]

3.9

**field assembled
<trace heating>**

trace heaters supplied unterminated with terminating components to be assembled at the work site[SOURCE: IEC 60050-426:2008, 426-20-10]

3.10

heat loss

energy flow from a workpiece, pipe, or vessel or equipment to its surroundings

[SOURCE: IEC 60050-426:2020, 426-20-11]

3.11

heat sink

part that conducts and dissipates heat away from a workpiece

Note 1 to entry: Typical heat sinks are pipe shoes, pipe supports and items of large mass such as valve actuators or pump bodies.

[SOURCE: IEC 60050-426:2020, 426-20-12]

3.12

heat transfer aid

thermally conductive material, such as metallic foil or heat transfer compound used to increase the heat transfer efficiency from trace heaters to the workpiece

3.13 [SOURCE: IEC 60050-426:2020, 426-20-13]

high limit temperature

maximum allowable temperature of the system, including piping, fluid and trace heating system

[SOURCE: IEC 60050-426:2020, 426-20-16, modified (addition of "trace")]

3.14

high temperature limiter

safety device, or combination of safety devices, incorporating a means of sensing temperature and a means of switching power to the trace heater before the maximum surface temperature is exceeded

3.15

integral components

component such as a heat shrink termination, a cold lead connection, a molded end seal, or a splice, which conforms to the general shape of the trace heater and is exposed to the same environment as the trace heater, which can be factory fabricated or field assembled, and is not intended to be re-used in the event of a repair or modification

3.16

maximum continuous exposure temperature (trace heater de-energized)

highest allowable continuous temperature to which the trace heating system can be exposed as declared by the manufacturer

3.17

maximum maintain temperature

specified maximum workpiece or process temperature the trace heater can maintain as declared by the manufacturer

3.18

maximum continuous operating temperature

specified maximum workpiece temperature, the trace heater, can operate continuously when energized as declared by the manufacturer

3.19

maximum intermittent exposure temperature

highest allowable intermittent temperature to which a trace heater can be exposed, as declared by the manufacturer

3.20

maintain temperature

specified temperature of a workpiece or process that the trace heaters shall be able to maintain

3.21

maximum sheath temperature

maximum temperature of the outermost continuous covering of a trace heater

3.22

maximum withstand temperature

maximum continuous exposure temperature or the maximum intermittent exposure temperature (energized or de-energized) whichever is higher, as declared by the manufacturer

[SOURCE: IEC 60050-426:2020, 426-20-18]

3.23

minimum installation temperature

minimum temperature at which the trace heating system can be handled and installed

3.24

MI trace heater

mineral insulated metal sheathed trace heater typically containing one or more heating conductors

3.25

operating voltage

actual voltage applied to the trace heater when in service

[SOURCE: IEC 60050-426:2020, 426-20-21]

3.26

outdoor exposure

exposure to outdoor conditions of ultraviolet light and moisture

3.27

overjacket

continuous layer of non-metallic material applied outside the metallic sheath or screen to protect against corrosion

3.28

parallel trace heater(s)

heating elements that are electrically connected in parallel, either continuously or in zones, so that the power output per lineal length is maintained, irrespective of any change in length for the continuous type or for any number of discrete zones

3.29**rated output**

total power or power per unit length or unit surface area of a trace heater, at rated voltage, temperature and length or area

[SOURCE: IEC 60050-426:2020, 426-20-24, modified (removal of "which is normally expressed in watts, watts per metre or watts per square metre")]

3.30**rated voltage**

<trace heating>

rated value of the voltage assigned by the manufacturer to which operating and performance characteristics of trace heaters are referred

[SOURCE: IEC 60050-426:2020, 426-20-25, modified (addition of "assigned by the manufacturer")]

3.31**routine test**

test that is carried out by the manufacturer of the trace heater on all trace heaters during or after the production process

3.32**series trace heater(s)**

heating elements electrically connected in series with a single current path and with a specific resistance at a given temperature for a given length

[SOURCE: IEC 60050-426:2020, 426-20-26]

3.33**sheath**

<trace heating>

uniform and continuous metallic or non-metallic outer covering enclosing the trace heater used to provide protection against influence from the surroundings (corrosion, moisture, abrasion etc)

Note: See overjacket (3.27)

3.34**sheath temperature**

<trace heating>

temperature of the outermost continuous covering (braid, sheath, or overjacket) that can be exposed to the surrounding atmosphere

[SOURCE: IEC 60050-426:2008, 426-20-28]

3.35**stabilized design**

design where the temperature of the trace heater, by design and use, stabilizes below the high limit temperature, under the most unfavourable conditions

[SOURCE: IEC 60050-426:2020, 426-20-29]

3.36**start-up current**

current response of a trace heater following energization

525 [SOURCE: IEC 60050-426:2020, 426-20-30, modified ("immediately upon energizing"
526 replaced by "following energization")]

527 **3.37**

528 **surface heater**

529 trace heater pad or trace heater panel

530 **3.38**

531 **system documentation**

532 **<trace heating>**

533 information prepared by the manufacturer to allow satisfactory understanding, installation and
534 safe use of the trace heating system

535 [SOURCE: IEC 60050-426:2020, 426-20-31]

536 **3.39**

537 **temperature controller**

538 device or combination of devices incorporating a means of sensing temperature and of
539 controlling the energy to the trace heater

540 [SOURCE: IEC 60050-426:2020, 426-20-34]

541 **3.40**

542 **temperature sensor**

543 **(temperature sensing element)**

544 device designed to respond to temperature providing an electrical signal or mechanical
545 operation

546 **3.41**

547 **thermal insulation**

548 material having air- or gas-filled pockets, voids, or heat reflecting surfaces that, when properly
549 applied, retards the transfer of heat

550 [SOURCE: IEC 60050-426:2020, 426-20-36]

551 **3.42**

552 **trace heater**

553 device of linear geometry designed for the purpose of producing heat on the principle of
554 electrical resistance and typically composed of one or more metallic conductors and/or an
555 electrically conductive material, suitably electrically insulated and protected

556 [SOURCE: IEC 60050-426:2020, 426-20-37]

557 **3.43**

558 **trace heater pad**

559 trace heater comprising series or parallel connected elements having sufficient flexibility to
560 conform to the shape of the surface to be heated

561 **3.44**

562 **trace heater panel**

563 non-flexible trace heater comprising series or parallel connected elements fabricated to conform
564 to the general shape of the surface to be heated