

EUROPEAN STANDARD

EN 62086-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2005

ICS 29.260.20

English version

**Electrical apparatus for explosive gas atmospheres –
Electrical resistance trace heating
Part 1: General and testing requirements
(IEC 62086-1:2001 + corrigendum 2003)**

Matériel électrique pour atmosphères
explosives gazeuses –
Traçage par résistance électrique
Partie 1: Règles générales et d'essais
(CEI 62086-1:2001 + corrigendum 2003)

Elektrische Betriebsmittel für
gasexplosionsgefährdete Bereiche –
Elektrische Widerstands-Begleitheizungen
Teil 1: Allgemeine Anforderungen und
Prüfanforderungen
(IEC 62086-1:2001 + Corrigendum 2003)

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SIST EN 62086-1:2005

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 62086-1:2001 and its corrigendum February 2003, prepared by IEC TC 31, Electrical apparatus for explosive atmospheres, was submitted to the CENELEC Unique Acceptance Procedure and was approved by CENELEC as EN 62086-1 on 2005-02-01 without any modification.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2006-05-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2008-02-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62086-1:2001 and its corrigendum February 2003 was approved by CENELEC as a European Standard without any modification.

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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

NOTE Where 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 60050-151	1978 ¹⁾	International Electrotechnical Vocabulary (IEV) Part 151: Electrical and magnetic devices	-	-
IEC 60050-426	- ²⁾	Chapter 426: Electrical apparatus for explosive atmospheres	-	-
IEC 60079-0	1998 ³⁾	Electrical apparatus for explosive gas atmospheres Part 0: General requirements	-	-
IEC 60364-3 (mod)	- ²⁾	Electrical installations of buildings Part 3: Assessment of general characteristics	HD 384.3 S2	1995 ⁴⁾

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¹⁾ IEC 60050-151:1978 is superseded by IEC 60050-151:2001.

²⁾ Undated reference.

³⁾ IEC 60079-0:1998 is superseded by IEC 60079-0:2004, which is harmonized as EN 60079-0:2005 (mod).

⁴⁾ Valid edition at date of issue.

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NORME
INTERNATIONALE
INTERNATIONAL
STANDARD

CEI
IEC

62086-1

Première édition
First edition
2001-01

Matériel électrique pour atmosphères
explosives gazeuses –
Traçage par résistance électrique –

Partie 1:
Règles générales et d'essais

(standards.iteh.ai)

Electrical apparatus for explosive
gas atmospheres –

Electrical resistance trace heating –

Part 1:
General and testing requirements

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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CONTENTS

	Page
FOREWORD	5
INTRODUCTION	7
Clause	
1 Scope	9
2 Normative references	9
3 Definitions	9
4 General requirements	19
5 Testing	23
6 Marking	45
Bibliography	49
Figure 1 – Flammability test	25
Figure 2 – Impact test	29
Figure 3 – Cold bend test – Type test	31
Figure 4 – Moisture resistance test	33
Figure 5 – Verification of rated output – Type test	37
Figure 6 – Verification of sheath temperature using system approach	41
Figure 7 – Maximum sheath temperature using the product classification approach	43
Table 1 – Test voltages for the dielectric test	23

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES –
ELECTRICAL RESISTANCE TRACE HEATING –****Part 1: General and testing requirements**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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International Standard IEC 62086-1 has been prepared by IEC technical committee 31: Electrical apparatus for explosive atmospheres.

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

FDIS	Report on voting
31/343/FDIS	31/348/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 3.

The committee has decided that the contents of this publication will remain unchanged until 2003. At this date, the publication will be

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

The contents of the corrigendum of February 2003 have been included in this copy.

INTRODUCTION

This part of IEC 62086 is intended to provide a comprehensive overview of the essential requirements and testing appropriate to electric surface heating equipment used in explosive gas atmospheres. The requirements of this standard are considered to be the minimum requirements for zone 1 or zone 2. While some of this work already exists in national standards or international standards, this standard has collated much of this existing work and added considerably to it. This standard should be read in conjunction with IEC 62086-2: Electrical apparatus for explosive gas atmospheres – Electrical resistance trace heating – Part 2: Application guide for design, installation and maintenance*.

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SIST EN 62086-1:2005

<https://standards.iteh.ai/catalog/standards/sist/377f5ee7-8573-40ab-a323-c85aa0806001/sist-en-62086-1-2005>

* To be published.

ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES – ELECTRICAL RESISTANCE TRACE HEATING –

Part 1: General and testing requirements

1 Scope

This part of IEC 62086 specifies general and testing requirements for electrical resistance trace heaters for application in explosive gas atmospheres. The standard covers trace heaters that may comprise either factory- or field- (work-site) assembled units, and which may be series heating cables, parallel heating cables or heating pads and heating 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. The hazardous areas referred to by this standard are those defined in IEC 60079-10.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 62086. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 62086 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050(151):1978, *International Electrotechnical Vocabulary (IEV) – Chapter 151: Electrical and magnetic devices*

IEC 60050(426), *International Electrotechnical Vocabulary (IEV) – Chapter 426: Electrical apparatus for explosive atmospheres*

IEC 60079-0:1998, *Electrical apparatus for explosive gas atmospheres – Part 0: General requirements*

IEC 60364-3, *Electrical installations of buildings – Part 3: Assessment of general characteristics*

3 Definitions

For the purpose of this part of IEC 62086, the following definitions as well as the definitions given in IEC 60050(426) and IEC 60079-0 apply.

3.1

ambient temperature

temperature surrounding the object under consideration. Where electrical trace heaters are enclosed in thermal insulation, the ambient temperature is the temperature exterior to such thermal insulation

3.2

branch circuit

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

3.3

connections

(terminations)

3.3.1

cold lead

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

3.3.2

end termination

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

3.3.3

power termination

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

3.4

tee

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

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

factory fabricated

trace heating cable, tape or device, including the necessary terminations and connections, assembled into units or sets

3.8

field-assembled

trace heaters supplied in bulk with terminating components to be assembled at the work site

3.9

heat loss

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

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3.10**heat sink**

part that conducts and dissipates heat away from a workpiece

NOTE Typical heat sinks are pipe shoes, pipe supports and items of large mass such as valve actuators or pump bodies.

3.11**heat-transfer aids**

thermally conductive materials, such as metallic foils or heat-transfer compounds used to increase the heat-transfer efficiency from trace heaters to the workpiece

3.12**heating pad**

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

3.13**heating panel**

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

3.14**high-limit temperature**

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

3.15**maximum ambient temperature**

highest ambient temperature at which the trace heating is operable and should perform according to specified requirements

3.16**maximum withstand temperature**

maximum operating or exposure temperature that will not adversely effect the thermal stability of the heater and its component parts

3.17**metallic covering**

metal sheath or braid used to provide physical protection for a trace heater, and/or an electrical earth path

3.18**minimum ambient temperature**

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

3.19**operating voltage**

actual voltage applied to the trace heater when in service

3.20**overjacket**

continuous layer of insulating material applied outside the metallic sheath, screen or armouring to protect against corrosion

3.21**power density**

power output in watts per linear metre for trace heater cables and cable units, and in watts per square metre for trace heater pads and panels and trace heater pad and panel units

3.22**rated output**

total power or power per unit length of heating cable or trace heater, at rated voltage, temperature and length, which is normally expressed in watts per metre or watts per square metre

3.23**rated voltage**

voltage to which operating and performance characteristics of trace heaters are referred

3.24**routine test**

test to which each individual device is subjected during or after manufacture to ascertain whether it complies with certain criteria
[IEV 151-04-16]

3.25**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

3.26**sheath**

uniform and continuous metallic or non-metallic outer covering enclosing the heating tape or cable used to provide protection for the cable against influence from the surroundings (corrosion, moisture etc.). See overjacket, 3.20

3.27**sheath temperature**

temperature of the outermost continuous covering that may be exposed to the surrounding atmosphere

3.28**stabilized design**

concept where the temperature of the trace heater will, by design and use, stabilize below the limiting temperature, under the most unfavourable conditions, without the need for a protective system to limit the temperature

3.29**start-up current**

current of a trace heater immediately upon energizing

3.30**system documentation**

information provided by the supplier to allow satisfactory understanding, installation and safe use of the trace heating system