

INTERNATIONAL STANDARD



**Explosive atmospheres –
Part 10-1: Classification of areas – Explosive gas atmospheres**



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IEC 60079-10-1

Edition 3.0 2020-12
COMMENTED VERSION

INTERNATIONAL STANDARD



**Explosive atmospheres –
Part 10-1: Classification of areas – Explosive gas atmospheres**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.260.20

ISBN 978-2-8322-9213-6

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –

Part 10-1: Classification of areas – Explosive gas atmospheres

FOREWORD

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This commented version (CMV) of the official standard IEC 60079-10-1:2020 edition 3.0 allows the user to identify the changes made to the previous IEC 60079-10-1:2015 edition 2.0. Furthermore, comments from IEC SC 31J experts are provided to explain the reasons of the most relevant changes.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

International Standard IEC 60079-10-1 has been prepared by subcommittee 31J: Classification of hazardous areas and installation requirements, of IEC technical committee 31: Equipment for explosive atmospheres.

This third edition of IEC 60079-10-1 cancels and replaces the second edition, published in 2015, and constitutes a technical revision. The significant technical changes with respect to the previous edition are as follows:

Changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Deleting commercial and industrial applications for fuel gas from the Scope exemptions	1			C1
Updating editorial details and notes to the definitions	3		X	
Deletion of the previous edition clause 3.7.3 definition for catastrophic failure (dealt with in clause 4.5)			X	
Introduction of new Subclause 4.4.2 Zone of negligible extent	4.4.2		X	
Introduction of new clause 5.3.2 Fuel gas installations	5.3.2		X	
Renumbering of headings	7	X		
Introduction of Figure 1 – Dilution volume	7		X	
Upgrading Table A.1 with UFL and its column 15 heading with the 'source of data'	A.1	X		
Updating the flow-chart in Figure B.1	B.6		X	
Updating equations for evaporation rate to align with the recent source modifications	B.7.3		X	
Updating the chart in Figure B.2 according to the updated equations for evaporation rate and the ventilation velocity of 0,25 m/s	B.7.3		X	
Restructuring Table C.1	C.3.4		X	
Removal of safety factor k and deleting it from the horizontal axis of the chart in Figure C.1	C.3.5			C2
Revising equations (C.2) and (C.3)	C.5.2			C3
Revising equations (C.4) and (C.5)	C.5.3			C4
Revising the chart in Figure C.6 by changing the label on the horizontal axis	C.5.3			C5
Revising equation (C.6) and deleting equation (C.7)	C.5.4			C6
Removal of safety factor k and deleting it from the horizontal axis of the charts in Figure D.1	D.3			C7
Imposing limitations to the use of the chart in Figure D.1	D.3		X	
Updating and corrections in Annex E	Annex E		X	
Upgrading Annex G on Flammable mists	Annex G		X	
Introducing new items in Table K.1	Annex K		X	
Introducing new items in the Bibliography	Bibliography		X	
NOTE The technical changes referred to include the significance of technical changes in the revised IEC Standard, but they do not form an exhaustive list of all modifications from the previous version.				

Explanations:

A) Definitions

Minor and editorial changes

clarification
decrease of technical requirements
minor technical change
editorial corrections

These are changes which modify requirements in an editorial or a minor technical way. They include changes of the wording to clarify technical requirements without any technical change.

Extension

addition of technical options

These are changes which add new or modify existing technical requirements, in a way that new options are given, but without increasing requirements.

Major technical changes

addition of technical requirements
increase of technical requirements

B) Information about the background of changes

- C1 The previous edition item e) was: “commercial and industrial applications where only low pressure fuel gas is used for appliances e.g. for cooking, water heating and similar uses, where the installation is compliant with relevant gas codes”. Industrial applications of any kind should not be exempted from the scope of this standard. See also new clause 5.3.2.
- C2 The factor k was initially intended to provide for additional safety for uncertainties in determining LFL for flammable substances, particularly gas mixtures. However, this was considered as unnecessary and confusing considering the derivation of the chart.
- C3 The equations are updated to align with BS 5925
- C4 The equations are updated to align with BS 5925
- C5 The chart is revised to match the new equation (C.4)
- C6 The equation is updated to align with BS 5925
- C7 See the explanation under C2

These are changes to technical requirements (addition, increase of the level or removal).

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

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

FDIS	Report on voting
31J/307/FDIS	31J/310/RVD

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

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

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

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

In areas where dangerous quantities and concentrations of flammable gas or vapour may arise, ~~protective~~ measures need to be applied in order to reduce the risk of explosions. This part of IEC 60079 sets out the essential criteria against which the ignition hazards can be assessed and gives guidance on the design and control parameters which can be used in order to reduce such hazards.

EXPLOSIVE ATMOSPHERES –

Part 10-1: Classification of areas – Explosive gas atmospheres

1 Scope

This part of IEC 60079 is concerned with the classification of areas where flammable gas or vapour hazards may arise and may then be used as a basis to support the proper ~~selection and installation~~ design, construction, operation and maintenance **1** of equipment for use in hazardous areas.

It is intended to be applied where there may be an ignition hazard due to the presence of flammable gas or vapour, mixed with air, but it does not apply to:

- a) mines susceptible to firedamp;
- b) the processing and manufacture of explosives;
- c) catastrophic failures or rare malfunctions which are beyond the concept of ~~abnormality~~ **normality** dealt with in this standard (see 3.7.3 and ~~3.7.4~~ 4.5);
- d) rooms used for medical purposes;
- ~~e) commercial and industrial applications where only low pressure fuel gas is used for appliances e.g. for cooking, water heating and similar uses, where the installation is compliant with relevant gas codes; **2**~~
- e) domestic premises;
- f) where a hazard may arise due to the presence of combustible dusts or combustible flyings but the principles may be used in assessment of a hybrid mixture (refer also to IEC 60079-10-2).

NOTE Additional guidance on hybrid mixtures is provided in Annex I.

Flammable mists may form or be present at the same time as flammable vapour. In such case the strict application of the details in this document may not be appropriate. Flammable mists may also form when liquids not considered to be a hazard due to the high flash point are released under pressure. In these cases the classifications and details given in this document do not apply. Information on flammable mists is provided in Annex G.

For the purpose of this document, an area is a three-dimensional region or space.

Atmospheric conditions include variations above and below reference levels of 101,3 kPa (1 013 mbar) and 20 °C (293 K), provided that the variations have a negligible effect on the explosion properties of the flammable substances.

In any ~~process plant~~ site **3**, irrespective of size, there may be numerous sources of ignition apart from those associated with equipment. Appropriate precautions will be necessary to ensure safety in this context. This standard is applicable with judgement for other ignition sources but in some applications other safeguards may also need to be considered. E.g. larger distances may apply for naked flames when considering hot work permits. **4**

This document does not take into account the consequences of ignition of an explosive atmosphere except where a zone is so small that if ignition did occur it would have negligible consequences (see 3.3.8 and 4.4.2). **5**

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 60079-0, Explosive atmospheres – Part 0: Equipment – General requirements~~

~~IEC 60079-14, Explosive atmospheres – Part 14: Electrical installations design, selection and erection~~

This document contains no normative references.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60079-0 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

NOTE Additional definitions applicable to explosive atmospheres can be found in IEC 60050-426.

3.1

explosive atmosphere

mixture with air, under atmospheric conditions, of flammable substances in the form of gas, vapour, or dust, ~~fibres, or flyings~~, which, after ignition, permits self-sustaining ~~flame~~ propagation

[SOURCE: IEC 60079-0:20132017, ~~3.30~~ 3.38]

3.2

explosive gas atmosphere

mixture with air, under atmospheric conditions, of flammable substances in the form of gas or vapour, which, after ignition, permits self-sustaining flame propagation

Note 1 to entry: Although a mixture which has a concentration above the upper flammable limit (UFL) is not an explosive gas atmosphere, it can readily become so and, generally for **hazardous** area classification purposes, it is advisable to consider it as an explosive gas atmosphere.

Note 2 to entry: There are some gases and vapours which are explosive with the concentration of 100 % (e.g. acetylene, CAS no. 74-86-2, C_2H_2 ; monovinyl acetylene, CAS no. 689-97-4, C_4H_4 ; 1-propyl nitrate (vapour), CAS no. 627-13-4, $CH_3(CH_2)_2NO_3$; isopropyl nitrate (vapour), CAS no. 1712-64-7, $(CH_3)_2CHONO_2$; ethylene oxide (vapour), CAS no. 75-21-8, $(CH_2)_2O$; hydrazine (vapour), CAS no. 302-01-2, H_4N_2).

[SOURCE: IEC 60079-0:20132017, ~~3.32~~ 3.40, modified (addition of Notes to entry)]

3.3

hazardous areas and zones

3.3.1

hazardous area <on account of explosive gas atmospheres>

area in which an explosive gas atmosphere is **present** or ~~may~~ **can** be expected to be present, in quantities such ~~as to require~~ **that** special precautions for the construction, installation and use of equipment **are required**