

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Explosive atmospheres –
Part 10-1: Classification of areas – Explosive gas atmospheres
(standards.iteh.ai)

Atmosphères explosives –
Partie 10-1: Classification des emplacements – Atmosphères explosives gazeuses

IEC 60079-10-1:2020
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INTERNATIONAL STANDARD

NORME INTERNATIONALE



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

**Atmosphères explosives –
Partie 10-1: Classification des emplacements – Atmosphères explosives
gazeuses**

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CONTENTS

FOREWORD.....	6
INTRODUCTION.....	10
1 Scope.....	11
2 Normative references	11
3 Terms and definitions	12
4 General	16
4.1 Safety principles	16
4.2 Hazardous area classification objectives.....	17
4.3 Interior of equipment containing flammable materials.....	18
4.4 Explosion risk assessment.....	18
4.4.1 General	18
4.4.2 Zone of negligible extent.....	18
4.5 Catastrophic failures	19
4.6 Competence of personnel	19
5 Hazardous area classification methodology	19
5.1 General.....	19
5.2 Classification by sources of release method.....	20
5.3 Use of industry codes and national standards.....	21
5.3.1 General	21
5.3.2 Fuel gas installations.....	21
5.4 Simplified methods.....	21
5.5 Combination of methods	21
6 Release of flammable substance.....	22
6.1 General.....	22
6.2 Sources of release	22
6.3 Forms of release.....	23
6.3.1 General	23
6.3.2 Gaseous release	24
6.3.3 Liquefied under pressure release.....	24
6.3.4 Liquefied by refrigeration release.....	24
6.3.5 Flammable mists release	25
6.3.6 Vapours release	25
6.3.7 Liquid release.....	25
7 Ventilation (or air movement) and dilution.....	26
7.1 General.....	26
7.2 Main types of ventilation	27
7.2.1 General	27
7.2.2 Natural ventilation.....	27
7.2.3 Artificial ventilation	27
7.2.4 Degree of dilution	29
8 Type of zone	30
8.1 General.....	30
8.2 Influence of grade of the source of release	30
8.3 Influence of dilution.....	30
8.4 Influence of availability of ventilation.....	30
9 Extent of zone	31

10	Documentation	31
10.1	General.....	31
10.2	Drawings, data sheets and tables	32
Annex A	(informative) Suggested presentation of hazardous areas	33
A.1	Hazardous area – Preferred symbols for zones.....	33
A.2	Hazardous area suggested shapes	36
Annex B	(informative) Estimation of sources of release.....	38
B.1	Symbols.....	38
B.2	Examples of grade of release.....	38
B.2.1	General	38
B.2.2	Sources giving a continuous grade of release	39
B.2.3	Sources giving a primary grade of release	39
B.2.4	Sources giving a secondary grade of release.....	39
B.3	Assessment of grades of release	39
B.4	Summation of releases	40
B.5	Hole size and source radius	41
B.6	Forms of release	43
B.7	Release rate	44
B.7.1	General	44
B.7.2	Estimation of release rate	45
B.7.3	Release rate of evaporative pools.....	47
B.8	Release from openings in buildings.....	49
B.8.1	General	49
B.8.2	Openings as possible sources of release	50
B.8.3	Openings classification	50
Annex C	(informative) Ventilation guidance.....	52
C.1	Symbols.....	52
C.2	General.....	53
C.3	Assessment of ventilation and dilution and its influence on hazardous area	53
C.3.1	General	53
C.3.2	Effectiveness of ventilation	54
C.3.3	Criteria for dilution	54
C.3.4	Assessment of ventilation velocity	55
C.3.5	Assessment of the degree of dilution	56
C.3.6	Dilution in a room	58
C.3.7	Criteria for availability of ventilation	59
C.4	Examples of ventilation arrangements and assessments.....	60
C.4.1	Introduction	60
C.4.2	Jet release in a large building	61
C.4.3	Jet release in a small naturally ventilated building	62
C.4.4	Jet release in a small artificially ventilated building	62
C.4.5	Release with low velocity.....	63
C.4.6	Fugitive emissions	63
C.4.7	Local ventilation-extraction	64
C.5	Natural Ventilation in buildings.....	64
C.5.1	General	64
C.5.2	Wind induced ventilation.....	64
C.5.3	Buoyancy induced ventilation.....	65

C.5.4	Combination of the natural ventilation induced by wind and buoyancy	67
Annex D (informative)	Estimation of hazardous areas	69
D.1	General.....	69
D.2	Estimating types of the zones	69
D.3	Estimating the extent of the hazardous area	70
Annex E (informative)	Examples of hazardous area classification	72
E.1	General.....	72
E.2	Examples	72
E.3	Example case study for hazardous area classification.....	86
Annex F (informative)	Schematic approach to classification of hazardous areas	96
F.1	Schematic approach to classification of hazardous areas.....	96
F.2	Schematic approach to classification of hazardous areas.....	97
F.3	Schematic approach to classification of hazardous areas.....	98
F.4	Schematic approach to classification of hazardous areas.....	99
Annex G (informative)	Flammable mists.....	100
Annex H (informative)	Hydrogen	103
Annex I (informative)	Hybrid mixtures	105
I.1	General.....	105
I.2	Use of ventilation	105
I.3	Concentration limits	105
I.4	Chemical reactions	105
I.5	Energy/temperature limits	105
I.6	Zoning requirements	105
Annex J (informative)	Useful equations in support to hazardous area classification	106
J.1	General.....	106
J.2	Dilution with air of a flammable substance release	106
J.3	Estimate of the time required to dilute a flammable substance release.....	106
Annex K (informative)	Industry codes and national standards	108
K.1	General.....	108
Bibliography	112
Figure 1 – Dilution Volume.....		29
Figure A.1 – Preferred symbols for zones		33
Figure A.2 – Gas or vapour at low pressure (or at high pressure in case of unpredictable release direction)		36
Figure A.3 – Gas or vapour at high pressure.....		36
Figure A.4 – Liquefied gas		37
Figure A.5 – Flammable liquid (non boiling evaporative pool).....		37
Figure B.1 – Forms of release.....		43
Figure B.2 – Specific volumetric evaporation rate of liquids		49
Figure C.1 – Chart for assessing the degree of dilution.....		57
Figure C.2 – Self diffusion of an unimpeded high velocity jet release		61
Figure C.3 – Supply only ventilation.....		62
Figure C.4 – Supply and extraction ventilation		63
Figure C.5 – Local extraction ventilation		64
Figure C.6 – Specific volumetric flow rate of fresh air of equivalent effective opening area ..		67

Figure C.7 – Example of opposing ventilation driving forces.....	68
Figure D.1 – Chart for estimating hazardous area distances	71
Figure E.1 – Degree of dilution (Example No. 1)	73
Figure E.2 – Hazardous distance (Example No. 1)	74
Figure E.3 – Zone classification (Example No. 1)	74
Figure E.4 – Degree of dilution (Example No. 2)	76
Figure E.5 – Degree of dilution (Example No. 3)	78
Figure E.6 – Hazardous distance (Example No. 3)	79
Figure E.7 – Zones classification (Example No. 3)	79
Figure E.8 – Degree of dilution (Example No. 4)	81
Figure E.9 – Hazardous distance (Example No. 4)	82
Figure E.10 – Zones classification (Example No. 4)	83
Figure E.11 – Degree of dilution (Example No. 5)	85
Figure E.12 – Hazardous distance (Example No. 5)	86
Figure E.13 – Enclosed compressor handling natural gas	88
Figure E.14 – Example of hazardous area classification for a compressor facility handling natural gas (elevation)	94
Figure E.15 – Example of hazardous area classification for a compressor facility handling natural gas (plan)	95
Figure F.1 – Schematic approach to classification.....	96
Figure F.2 – Schematic approach to classification for continuous grade releases.....	97
Figure F.3 – Schematic approach to classification for primary grade releases.....	98
Figure F.4 – Schematic approach to classification for secondary grade releases	99
Table A.1 – Hazardous area classification data sheet – Part I: Flammable substance list and characteristics	34
Table A.2 – Hazardous area classification data sheet – Part II: List of sources of release	35
Table B.1 – Suggested hole cross sections for secondary grade of releases.....	42
Table B.2 – Effect of zones on openings as possible sources of release	51
Table C.1 – Indicative outdoor ventilation velocities (u_w)	56
Table D.1 – Zones for grade of release and effectiveness of ventilation	69
Table E.1 – Compressor facility handling natural gas	88
Table E.2 – Hazardous area classification data sheet – Part I: Flammable substance list and characteristics	91
Table E.3 – Hazardous area classification data sheet – Part II: List of sources of release	92
Table K.1 – Examples of codes and standards.....	109

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –

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

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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.

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INTRODUCTION

In areas where dangerous quantities and concentrations of flammable gas or vapour may arise, 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.

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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 design, construction, operation and maintenance 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 normality dealt with in this standard (see 3.7.3 and 4.5);
- d) rooms used for medical purposes;
- 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).

IEC 60079-10-1:2020

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 site, 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.

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).

2 Normative references

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 which, after ignition, permits self-sustaining propagation

[SOURCE: IEC 60079-0:2017, 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 60079-0:2017, 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 can be expected to be present, in quantities such that special precautions for the construction, installation and use of equipment are required

3.3.2

non-hazardous area <on account of explosive gas atmospheres>

area in which an explosive gas atmosphere is not expected to be present in quantities such that special precautions for the construction, installation and use of equipment are required

3.3.3

zone

hazardous area classification based on the frequency of the occurrence and duration of the explosive atmosphere

3.3.4

Zone 0

area in which an explosive gas atmosphere is present continuously, or for long periods, or frequently

Note 1 to entry: Both “long” and “frequently” are the terms which are intended to describe a very high likelihood of a potentially explosive atmosphere in the area. In that respect, those terms do not necessarily need to be quantified.

3.3.5

Zone 1

area in which an explosive gas atmosphere is likely to occur occasionally in normal operation

3.3.6

Zone 2

area in which an explosive gas atmosphere is not likely to occur in normal operation, but, if it does occur, will exist for a short period only

Note 1 to entry: Indications of the frequency of the occurrence and duration of the explosive atmosphere can be taken from codes or standards relating to specific industries or applications.

[SOURCE: IEC 60050-426:2020, 426-03-05]

3.3.7

extent of zone

distance in any direction from the source of release to where a gas/air mixture will be diluted by air to a concentration below the lower flammable limit

3.3.8

Zone NE

zone of negligible extent such that if ignition did occur it would have negligible consequences

Note 1 to entry: Zones of negligible extent could be Zone 0 NE, Zone 1 NE or Zone 2 NE.

3.4

releases

[IEC 60079-10-1:2020](https://standards.iteh.ai/catalog/standards/sist/af6cc470-e0ad-45c2-84e5-7a7928102416/iec-60079-10-1-2020)

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3.4.1

source of release

point or location from which a flammable gas, vapour, mist or liquid may be released into the atmosphere so that an explosive gas atmosphere could be formed

[SOURCE: IEC 60050-426:2020, 426-03-06]

3.4.2

continuous grade of release

release which is continuous or is expected to occur frequently or for long periods

Note 1 to entry: Both “frequently” and “long” are the terms which are intended to describe a very high likelihood of a potential release. In that respect, those terms do not necessarily need to be quantified.

3.4.3

primary grade of release

release which can be expected to occur periodically or occasionally during normal operation

3.4.4

secondary grade of release

release which is not expected to occur in normal operation and, if it does occur, is likely to do so only infrequently and for short periods

3.4.5

release rate

quantity of flammable gas, liquid, vapour or mist emitted per unit time from the source of release