Edition 2.0 2015-09

REDLINE VERSION

colour inside

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.260.20

ISBN 978-2-8322-2887-6

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

EXPLOSIVE ATMOSPHERES –

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

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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 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 IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

DISCLAIMER
This Redline version is not an official IEC Standard and is intended only to provide the user with an indication of what changes have been made to the previous version. Only the current version of the standard is to be considered the official document.

This Redline version provides you with a quick and easy way to compare all the changes between this standard and its previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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 second edition of IEC 60079-10-1 cancels and replaces the first edition, published in 2008, and constitutes a technical revision. The significant technical changes with respect to the previous edition are as follows:

		Type		
Changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Complete restructuring and dividing into sections to identify possible methodologies for classifying hazardous areas and to provide further explanation on specific assessment factors	Main body of the text	X	X	X
Introducing new terms and the definitions	3		X	
Introducing clauses for alternative methods of area classification	5		X	X
Updating examples for presentation of hazardous area classification	Annex A		X	X
Updating calculations for release rate	Annex B		X	X
Complete re-write with a new approach based upon the degree of dilution instead of the degree of ventilation	Annex C		X	X
Introduced as a new Annex for zone extents	Annex D		X	
Updated with new examples to explain the methodology set forth in Annexes A, B, C and D	Annex E			X
Update of the flow chart illustrating the area classification procedure by dividing it into four sections	Annex F		X	
Introduced as a new Annex on hydrogen	Annex H		X	
Introduced as a new Annex on hybrid mixtures	Annex I		X	
Introduced as a new Annex with supplementary equations	Annex J		X	
Introduced as a new Annex for reference to national and industry codes with specific examples of hazardous area classification	Annex K		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:

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

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/253/FDIS	31J/256/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 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 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.

A bilingual version of this publication may be issued at a later date.

The contents of the corrigendum of November 2015 have been included in this copy.

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 ~~are~~ 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 ~~or mist~~ hazards ~~(see Notes 1, 2 and 3)~~ may arise and may then be used as a basis to support the proper selection and installation 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 ~~under normal atmospheric conditions (see Note 4)~~, 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 dealt with in this standard (see ~~Note 5~~ 3.7.3 and 3.7.4);

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;

f) domestic premises;

g) ~~areas~~ where a hazard may arise due to the presence of combustible dusts or ~~fibres~~ combustible flyings but the principles may be used in assessment of a hybrid mixture (refer also ~~IEC 61241-10 /~~ IEC 60079-10-2).

~~This standard does not take into account the effects of consequential damage.~~

~~Definitions and explanations of terms are given together with the main principles and procedures relating to hazardous area classification.~~

~~For detailed recommendations regarding the extent of the hazardous areas in specific industries or applications, reference may be made to national or industry codes relating to those applications.~~

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

~~NOTE 1~~ Flammable mists may form or be present at the same time as flammable vapour. ~~Liquids not considered to be hazardous in terms of this standard (due to the flash point), when released under pressure may also generate flammable mists.~~ In such case, the strict application of ~~area classification for gases and vapours~~ the details in this standard may not be appropriate ~~as the basis for selection of equipment~~. 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 standard do not apply. Information on flammable mists is provided in Annex G.

~~NOTE 2 The use of IEC 60079-14 for selection of equipment and installations is not required for mist hazards.~~

~~NOTE 3~~ For the purpose of this standard, an area is a three-dimensional region or space.

~~NOTE 4~~ 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 ~~materials~~ substances.

~~NOTE 5 Catastrophic failure in this context is applied, for example, to the rupture of a process vessel or pipeline and events that are not predictable.~~

~~NOTE 6~~ In any process plant, 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 ~~may be used~~ is applicable with judgement for other ignition sources.

This standard does not take into account the consequences of ignition of an explosive atmosphere.

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 60050-426, *International Electrotechnical Vocabulary (IEV) – Part 426: Equipment for explosive atmospheres*~~

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

~~IEC 60079-4, *Electrical apparatus for explosive gas atmospheres – Part 4: Method of test for ignition temperature*~~

~~IEC 60079-4A, *First supplement to IEC 60079-4 (1966), Electrical apparatus for explosive gas atmospheres – Part 4: Method of test for ignition temperature*~~

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

~~IEC 60079-20, *Electrical apparatus for explosive gas atmospheres – Part 20: Data for flammable gases and vapours, relating to the use of electrical apparatus*~~

Edition 2.0 2015-09

INTERNATIONAL STANDARD

colour inside

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

IEC 60079-10-1:2015-09(en)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

EXPLOSIVE ATMOSPHERES –

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

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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 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 IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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 second edition of IEC 60079-10-1 cancels and replaces the first edition, published in 2008, and constitutes a technical revision. The significant technical changes with respect to the previous edition are as follows:

		Type		
Changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Complete restructuring and dividing into sections to identify possible methodologies for classifying hazardous areas and to provide further explanation on specific assessment factors	Main body of the text	X	X	X
Introducing new terms and the definitions	3		X	
Introducing clauses for alternative methods of area classification	5		X	X
Updating examples for presentation of hazardous area classification	Annex A		X	X
Updating calculations for release rate	Annex B		X	X
Complete re-write with a new approach based upon the degree of dilution instead of the degree of ventilation	Annex C		X	X
Introduced as a new Annex for zone extents	Annex D		X	
Updated with new examples to explain the methodology set forth in Annexes A, B, C and D	Annex E			X
Update of the flow chart illustrating the area classification procedure by dividing it into four sections	Annex F		X	
Introduced as a new Annex on hydrogen	Annex H		X	
Introduced as a new Annex on hybrid mixtures	Annex I		X	
Introduced as a new Annex with supplementary equations	Annex J		X	
Introduced as a new Annex for reference to national and industry codes with specific examples of hazardous area classification	Annex K		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:

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

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/253/FDIS	31J/256/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 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 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.

A bilingual version of this publication may be issued at a later date.

The contents of the corrigendum of November 2015 have been included in this copy.

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 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 dealt with in this standard (see 3.7.3 and 3.7.4);

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;

f) domestic premises;

g) 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 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 standard 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 standard do not apply. Information on flammable mists is provided in Annex G.

For the purpose of this standard, 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, 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.

This standard does not take into account the consequences of ignition of an explosive atmosphere.

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*