IEC 60079-10-1

Edition 3.0 2020-12
COMMENTED VERSION

INTERNATIONAL STANDARD

colour inside

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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. Futhermore, 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:

		Type		
Changes	**Clause**	**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.

The contents of the corrigendum of March 2021 have been included in this copy.

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.

IEC 60079-10-1

Edition 3.0 2020-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

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

IEC 60079-10-1:2020-12(en-fr)

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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ATMOSPHÈRES EXPLOSIVES –

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

AVANT-PROPOS

1) La Commission Électrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
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La Norme internationale IEC 60079-10-1 a été établie par le sous-comité 31J: Classification des emplacements dangereux et règles d'installation, du comité d'études 31 de l'IEC: Équipements pour atmosphères explosives.

Cette troisième édition de l'IEC 60079-10-1 annule et remplace la deuxième édition parue en 2015. Cette édition constitue une révision technique. Les modifications techniques majeures par rapport à l'édition précédente sont les suivantes:

		Type		
Modifications	**Article**	**Modifications mineures et rédactionnelles**	**Extension**	**Modifications techniques majeures**
Suppression des applications commerciales et industrielles du gaz combustible des exemptions du Domaine d'application	1			C1
Mise à jour de détails éditoriaux et de notes dans les définitions	3		X	
Suppression de la définition 3.7.3 de l'édition antérieure portant sur les défaillances catastrophiques (traitées au 4.5)			X	
Introduction d'un nouveau **4.4.2 Zone d'étendue négligeable**	4.4.2		X	
Introduction d'un nouveau **5.3.2 Installations au gaz combustible**	5.3.2		X	
Nouvelle numérotation des titres	7	X		
Introduction de la **Figure 1 – Volume de dilution**	7		X	
Mise à niveau du **Tableau A.1** avec la limite supérieure d'inflammabilité (LSI) et l'en-tête de sa colonne 15 avec la "source de données"	A.1	X		
Mise à jour du schéma de la **Figure B.1**	B.6		X	
Mise à jour des équations de la vitesse d'évaporation de façon à sd'alignerr les récentes modifications des sources	B.7.3		X	
Mise à jour du graphique de la **Figure B.2** selon les équations mises à jour de la vitesse d'évaporation et de la vitesse de ventilation de 0,25 m/s	B.7.3		X	
Restructuration du **Tableau C.1**	C.3.4		X	
Suppression du facteur de sécurité ***k*** et en le supprimant de l'axe horizontal du graphique de la **Figure C.1**	C.3.5			C2
Révision des équations (C.2) et (C.3)	C.5.2			C3
Révision des équations (C.4) et (C.5)	C.5.3			C4
Révision du graphique de la **Figure C.6**: modification de l'étiquette de l'axe horizontal	C.5.3			C5
Révision de !'équation (C.6) et suppression de l'équation (C.7)	C.5.4			C6
Suppression du facteur de sécurité ***k*** et et en le supprimant de l'axe horizontal des graphiques de la **Figure D.1**	D.3			C7
Imposition de limitations à l'utilisation du graphique de la **Figure D.1**	D.3		X	
Mise à jour et corrections dans l'**Annexe E**	Annexe E		X	
Mise à niveau de l'**Annexe G** relative aux brouillards inflammables	Annexe G		X	
Introduction de nouveaux points dans le **Tableau K.1**	Annexe K		X	
Introduction de nouveaux points dans la Bibliographie	Bibliographie		X	
NOTE Les modifications techniques dont il est fait mention comprennent les modifications techniques majeures contenues dans la version révisée de la norme IEC, mais elles ne constituent pas une liste exhaustive de toutes les modifications par rapport à la version précédente.				

Explications:

A) Définitions

Modifications mineures et rédactionnelles	clarification réduction des exigences techniques modifications techniques mineures corrections d'ordre rédactionnel

Ces modifications portent sur les exigences et sont de nature rédactionnelle ou technique mineure. Elles comprennent des modifications de formulations destinées à clarifier les exigences techniques sans apporter de modification technique.

Extension	ajout d'options techniques

Ces modifications ajoutent de nouvelles exigences techniques ou modifient les exigences techniques existantes, de manière à fournir de nouvelles options sans toutefois augmenter les niveaux d'exigences.

Modifications techniques majeures	ajout d'exigences techniques augmentation du niveau d'exigences techniques

B) Information sur le contexte des modifications

C1 Le point e) de l'édition antérieure énoncait: "applications commerciales et industrielles dans lesquelles seul du gaz combustible basse pression est utilisé, par exemple, pour cuisiner, chauffer l'eau, etc., l'installation satisfaisant aux codes de gaz correspondants. Il convient que les applications industrielles ne soient, en aucune façon, exclues du champ d'application de la présente norme. Se reporter également au nouveau 5.3.2.

C2 Le facteur ***k*** était initialement destiné à prévoir une sécurité supplémentaire concernant les incertitudes liées à la détermination de la LII pour les substances inflammables, en particulier les mélanges gazeux. Toutefois, celui-ci a été jugé inutile et prêtant à confusion compte tenu de l'origine du graphique.

C3 Les équations ont été mises à jour de façon à s'aligner sur la BS 5925

C4 Les équations ont été mises à jour de façon à s'aligner sur la BS 5925

C5 Le graphique est révisé pour prendre en compte la nouvelle équation (C.4)

C6 L'équation a été mise à jour de façon à s'aligner sur la BS 5925

C7 Se reporter aux explications figurant sous C2

Ces modifications sont apportées aux exigences techniques (ajout, augmentation de leur niveau ou suppression).

NOTE Ces modifications reflètent le niveau de maîtrise technologique actuel. Cependant, en règle générale, il convient que ces modifications n'aient pas une incidence sur les matériels déjà mis sur le marché.

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
31J/307/FDIS	31J/310/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 60079, publiées sous le titre général *Atmosphères explosives*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "http://webstore.iec.ch" dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

IMPORTANT – Le logo "colour inside" qui se trouve sur la page de couverture de cette publication indique qu'elle contient des couleurs qui sont considérées comme utiles à une bonne compréhension de son contenu. Les utilisateurs devraient, par conséquent, imprimer ce document en utilisant une imprimante couleur.

INTRODUCTION

Dans les emplacements où des quantités et concentrations dangereuses de gaz ou vapeurs inflammables peuvent apparaître, il est nécessaire d'appliquer des mesures pour réduire le risque d'explosions. La présente partie de l'IEC 60079 expose les critères essentiels en fonction desquels les dangers d'inflammation peuvent être évalués et donne des recommandations relatives aux paramètres de conception et d'exploitation qui peuvent être appliquées pour réduire ces dangers.

ATMOSPHÈRES EXPLOSIVES –

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

1 Domaine d'application

La présente partie de l'IEC 60079 concerne la classification des emplacements dans lesquels des phénomènes dangereux dus à des gaz ou vapeurs inflammables peuvent apparaître, et peut ainsi constituer une base pour la conception, l'exploitation et la maintenance correctes du matériel utilisé dans de tels emplacements.

Elle est destinée à être appliquée là où il peut exister un danger d'inflammation du fait de la présence de gaz ou vapeurs inflammables, en mélange avec l'air, mais elle ne s'applique pas:

a) aux mines grisouteuses;

b) au traitement et à la fabrication des explosifs;

c) aux défaillances catastrophiques ou rares dysfonctionnements, qui dépassent le concept de normalité traité dans la présente norme (voir 3.7.3 et 4.5);

d) aux locaux utilisés à des fins médicales;

e) aux locaux à usage domestique;

f) lorsqu'un danger peut apparaître compte tenu de la présence de poussières combustibles ou de particules combustibles en suspension dans l'air, mais les principes définis peuvent toutefois être appliqués dans l'évaluation d'un mélange hybride (se reporter également à l'IEC 60079-10-2).

NOTE Des recommandations supplémentaires relatives aux mélanges hybrides sont fournies dans l'Annexe I.

Des brouillards inflammables peuvent se former ou être présents en même temps que les vapeurs inflammables. Dans ce type de cas, l'application stricte des détails du présent document peut ne pas être appropriée. Les brouillards inflammables peuvent également se former lorsque les liquides qui ne sont pas considérés comme dangereux en raison du point d'éclair élevé sortent sous pression. Dans ces cas, les classifications et détails donnés dans le présent document ne s'appliquent pas. Des informations relatives aux brouillards inflammables sont données à l'Annexe G.

Pour les besoins du présent document, un emplacement est une région ou un espace tridimensionnel.

Les conditions atmosphériques englobent les écarts au-dessus et au-dessous des niveaux de référence de 101,3 kPa (1 013 mbar) et 20 °C (293 K) à condition que cela ait un effet négligeable sur les propriétés explosives des substances inflammables.

Dans tout site quelle que soit son importance, il peut y avoir de nombreuses sources d'inflammation en dehors de celles qui sont associées au matériel. Il est nécessaire dès lors de prendre les précautions appropriées pour garantir la sécurité. La présente norme est applicable avec prudence pour ces autres sources d'inflammation mais d'autres applications peuvent nécessiter de prendre en considération d'autres mesures de protection. Par exemple, de plus grandes distances peuvent s'appliquer aux flammes nues lorsqu'il s'agit de permis de travaux à chaud.

Le présent document ne tient pas compte des conséquences de l'inflammation d'une atmosphère explosive, sauf dans une zone si petite que si une inflammation se produit, ses conséquences sont négligeables (voir 3.3.8 et 4.4.2).

2 Références normatives

Ce document ne contient aucune référence normative.