

STN	Výbušné atmosféry. Časť 2: Ochrana zariadenia krytom s vnútorným pretlakom „p“.	STN EN 60079-2 33 2320
------------	--	--

Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure "p"

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 07/15

Obsahuje: EN 60079-2:2014, IEC 60079-2:2014

Oznámením tejto normy sa od 25.08.2017 ruší
STN EN 60079-2 (33 2320) zo septembra 2008

STN EN 61241-4 (33 2330) z novembra 2007

121108

EUROPEAN STANDARD

EN 60079-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2014

ICS 29.260.20

Supersedes EN 60079-2:2007, EN 61241-4:2006

English Version

**Explosive atmospheres - Part 2: Equipment protection by
pressurized enclosure "p"
(IEC 60079-2:2014)**

Atmosphères explosives - Partie 2: Protection du matériel
par enveloppe à surpression interne "p"
(IEC 60079-2:2014)

Explosionsgefährdete Bereiche - Teil 2: Geräteschutz durch
Überdruckkapselung "p"
(IEC 60079-2:2014)

This European Standard was approved by CENELEC on 2014-08-25. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

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



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

The text of document 31/1119/FDIS, future edition 6 of IEC 60079-2, prepared by IEC/TC 31 "Equipment for explosive atmospheres" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60079-2:2014.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2015-06-19
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-08-25

This document supersedes EN 60079-2:2007 and EN 61241-4:2006.

The State of the Art is included in Annex ZY "Significant changes between this European Standard and EN 60079-2:2007".

For the significant changes with respect to EN 60079-2:2007, see Annex ZY.

This standard is to be read in conjunction with EN 60079-0.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

Endorsement notice

The text of the International Standard IEC 60079-2:2014 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60051	NOTE	Harmonized in EN 60051 series.
IEC 60079-1	NOTE	Harmonized as EN 60079-1.
IEC 60079-5	NOTE	Harmonized as EN 60079-5.
IEC 60079-6	NOTE	Harmonized as EN 60079-6.

IEC 60079-7	NOTE	Harmonized as EN 60079-7.
IEC 60079-13	NOTE	Harmonized as EN 60079-13.
IEC 60079-18	NOTE	Harmonized as EN 60079-18.
IEC 60079-20-1	NOTE	Harmonized as EN 60079-20-1.
IEC 60079-26	NOTE	Harmonized as EN 60079-26.
IEC 60079-28	NOTE	Harmonized as EN 60079-28.
IEC 61511	NOTE	Harmonized in EN 61511 series.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60034-5	-	Rotating electrical machines - Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) - Classification	EN 60034-5	-
IEC 60050	series	International Electrotechnical Vocabulary	-	-
IEC 60079-0	-	Explosive atmospheres - Part 0: Equipment - General requirements	EN 60079-0	-
IEC 60079-11	-	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"	EN 60079-11	-
IEC 60079-15	-	Explosive atmospheres - Part 15: Equipment protection by type of protection "n"	EN 60079-15	-
IEC 60112	-	Method for the determination of the proof and the comparative tracking indices of solid insulating materials	EN 60112	-
IEC 60127	series	Miniature fuses	EN 60127	series
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	EN 60529	-
IEC 60664-1	-	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests	EN 60664-1	-

Annex ZZ

(informative)

Coverage of Essential Requirements of EU Directives

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers only the following essential requirements out of those given in Annex II of the EU Directive 94/9/EC:

- ER 1.0.1 to ER 1.0.6;
- ER 1.2.1, ER 1.2.2 (partly), ER 1.2.3, ER 1.2.4 (partly), ER 1.2.6 to ER 1.2.8;
- ER 1.3.1, ER 1.3.5;
- ER 1.4.1 (partly);
- ER 1.5.1 to ER 1.5.8;
- ER 1.6.2 (partly), ER 1.6.3 to ER 1.6.5;
- ER 2.0.2.1, ER 2.0.2.2;
- ER 2.2.1, ER 2.2.1.1 to ER 2.2.1.3;
- ER 2.2.2.1 to 2.2.2.4;
- ER 2.3.1, ER 2.3.1.1, ER 2.3.1.2;
- ER 2.3.2.1 to 2.3.2.3.

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directive[s] concerned.

WARNING: Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

Annex ZY (informative)

Significant changes between this European Standard and EN 60079-2:2007

This European Standard supersedes EN 60079-2:2007.

The significant changes with respect to EN 60079-2:2007 are as listed below.

Table ZY.1

Changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Scope Expanded to include combustible dust	1		X	
Protective Gas Replaced "apparatus" with "equipment"	3			
Protective Gas Revised to show that purging is not required for explosive dust atmospheres	3.16	X		
Level of Protection "pxb" Term and definitions revised to reflect EPL and level of protection	3.21	X		
Level of Protection "pyb" Term and definitions revised to reflect EPL and level of protection	3.22	X		
Level of Protection "pzc" Term and definitions revised to reflect EPL and level of protection	3.23	X		
Lower Flammable Limit Term and definition revised to agree with 60079-0	3.26	X		
Upper Flammable Limit Term and definition revised to agree with 60079-0	3.27	X		
Table 1 – Determination of protection level Revised to use EPL terminology	Table 1	X		
Table 2 – Design Criteria based upon level of protection Revised to use EPL terminology	Table 2	X		
Enclosure Requirements relaxed for specific designs	5.1		X	
Group II and Group III pressurized enclosures Text revised to use EPL terminology	5.3.3	X		
Group II and Group III Level of Protection "pxb" Added that warning also applies for explosive dust atmospheres	5.3.5		X	

Changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Group II and Group III door and cover warning Added that warning also applies for explosive dust atmospheres	5.3.6		X	
Group II and Group III door and cover warning Revised warning from atmosphere “may be present” to “is present”	5.3.6	X		
Mechanical Strength Removed reference to 60079-0 by clause number for “X” condition	5.4	X		
Spark and particle barriers Removed reference to 60079-0 by clause number for “X” condition	5.9	X		
Cells and batteries Added requirements for cells and batteries	5.10			C1
For Level of Protection “pxb” or Level of Protection “pyb” Revised Table to use terminology consistent with EPLs	6.2	X		
Suitability of safety devices for hazardous area Word “explosion” changed to “ignition” to reflect UFL/LFL terms	7.1	X		
Integrity of safety devices Added requirement for detecting fan failure	7.2			C2
Table 3 – Safety devices based upon Level of Protection Revised column labels to use Level of Protection terminology	Table 3	X		
Provider of safety devices Remove reference to 60079-0 by clause number for “X” condition	7.3	X		
Pressurization System evaluated as associated equipment Added requirements for pressurization systems	7.4			C3
Sequence diagram for Level of Protection “pxb” Revised text to use Level of Protection terminology	7.5	X		
Group I and Group II purging automated for Level of Protection “pxb” Revised text to use Level of Protection terminology	7.7	X		
Group I and Group II purging automated for Level of Protection “pxb” Added text specifying that for “pxb”, control must be automated	7.7			C4
Group I or Group II – purging criteria Revised text to use Level of Protection terminology	7.8	X		
Group III – cleaning Added text for cleaning enclosures used in explosive dust atmospheres	7.9		X	
Safety devices to detect minimum overpressure Add word “minimum” to clause title to be consistent with text	7.11	X		

Changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Safety devices to detect minimum overpressure Revised text to use Level of Protection terminology	7.11 d)	X		
Value of minimum overpressure Added word "minimum" to clause title to be consistent with text	7.12	X		
Value of minimum overpressure Revised text to use Level of Protection terminology	7.12	X		
Value of minimum overpressure Added text to reflect a note in Annex C	7.12		X	
Pressurizing multiple enclosures Revised text to use Level of Protection terminology	7.13	X		
Safety devices on doors and covers Revised text to use Level of Protection terminology	7.14	X		
Equipment that may remain energized Revised text to use EPL and level of protection terminology	7.15	X		
Equipment permitted within Level of Protection "pyb" Revised text to use EPL and level of protection terminology	7.16	X		
Group I and Group II Filling procedure Allow filling in a hazardous location if tested as non-hazardous	8.4		X	
Group III Filling Procedure Added static pressurization filling procedure for combustible dust	8.5		X	
Safety devices Revised text to use Level of Protection terminology	8.6			
Equipment that may remain energized Revised text to use EPL terminology	8.7	X		
Overpressure Removed reference to 60079-0 by clause number	8.8	X		
Backup supply Added requirements for a backup supply of protective gas	9.1			C5
Independent supplies Provided requirements for independence of pressurization	9.2			C6
Release Conditions Removed reference to 60079-0 by clause number for "X" condition	11.1.2	X		
Containment system with a limited release Removed reference to 60079-0 by clause number for "X" condition	12.3	X		
13.3.3 Limited release of a gas or vapour Revised text to reflect UFL/LFL terms	13.3.3	X		
Ignition-capable equipment Revised text to use Level of Protection terminology	14	X		
Type verification and tests Edition 5 clauses 16.1 to 16.7 moved to Edition 6 clauses 16.2 to 16.8	16	X		

Changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Determining the maximum overpressure rating Added requirements to determine maximum overpressure	16.1			C7
Maximum overpressure test Moved Maximum overpressure test to 16.2	16.2			C7
Maximum overpressure test Moved Maximum overpressure test to 16.2	16.3.2		X	
Tests for an infallible containment system Clarify the rating used for the test	16.7.1			C8
Tests for an infallible containment system Modified test for infallible containment	16.7.2			C9
Edition 5 – Verifying ability of the pressurized enclosure to limit internal pressure Eliminated test	16.8			C7
Functional test Clarified that applies only to safety devices provided with enclosures	17.1	X		
Tests for an infallible containment system Waived helium leak tests for liquid systems	17.3		X	
Supplementary marking Allowed continued use of type of protection marking	18.3			
Pressurization systems Clarified use of Ex [p] and [Ex p] marking	18.6	X		
Warnings required in other clauses Added table number	18.7	X		
Warnings required in other clauses Added warning from 7.9	18.7		X	
Warnings required in other clauses Added warnings from Annex G and Annex H	18.7			C1
Instructions Added requirements for Group III	19		X	
Edition 5 Annex G – Infallibility test for containment system Deleted and replaced	Annex G	X		
Edition 5 Annex H – Introduction of an alternative risk assessment method encompassing “equipment protection levels” Deleted and replaced	Annex H	X		
Annex G – Internal Cells and Batteries for Level of Protection “pxb” and Level of Protection “pyb” Added requirements for cells and Batteries			X	
Annex H – Internal Cells and Batteries for Level of Protection “pzc” Added requirements for cells and Batteries			X	



INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Explosive atmospheres –
Part 2: Equipment protection by pressurized enclosure "p"**

**Atmosphères explosives –
Partie 2: Protection du matériel par enveloppe à surpression interne "p"**





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2014 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 14 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

More than 55 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 14 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

Plus de 55 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.



INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Explosive atmospheres –
Part 2: Equipment protection by pressurized enclosure "p"**

**Atmosphères explosives –
Partie 2: Protection du matériel par enveloppe à surpression interne "p"**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE **XB**
CODE PRIX

ICS 29.260.20

ISBN 978-2-8322-1746-7

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	7
INTRODUCTION.....	14
1 Scope.....	15
2 Normative references	15
3 Terms and definitions	16
4 Protection levels.....	18
5 Constructional requirements for pressurized enclosures	21
5.1 Enclosure	21
5.2 Materials.....	21
5.3 Doors and covers.....	21
5.3.1 Group I pressurized enclosures	21
5.3.2 Group I pressurized enclosures with static pressurization	21
5.3.3 Group II and Group III pressurized enclosures	21
5.3.4 Group II and Group III pressurized enclosures with static pressurization.....	22
5.3.5 Group II and Group III Level of Protection “pxb”	22
5.3.6 Group II and Group III Door and Cover warning	22
5.4 Mechanical strength.....	22
5.5 Group I and Group II Apertures, partitions, compartments and internal components	22
5.6 Apertures for Static Pressurization.....	23
5.7 Insulating materials for Group I equipment.....	23
5.8 Sealing	23
5.9 Spark and particle barriers	23
5.10 Cells and batteries	24
6 Temperature limits.....	24
6.1 General.....	24
6.2 For Level of Protection “pxb” or Level of Protection “pyb”	24
6.3 For Level of Protection “pzc”	24
7 Safety provisions and safety devices (except for static pressurization)	24
7.1 Suitability of safety devices for hazardous area	24
7.2 Integrity of safety devices	24
7.3 Provider of safety devices	25
7.4 Pressurization System evaluated as associated equipment.....	25
7.4.1 Pressurization systems for Level of Protection “pzc”	25
7.4.2 Pressurization systems for Level of Protection “pyb”	26
7.4.3 Pressurization systems for Level of Protection “pxb”	26
7.5 Sequence diagram for Level of Protection “pxb”	26
7.6 Ratings for safety devices	26
7.7 Group I and Group II Purging automated for Level of Protection “pxb”	26
7.8 Group I or Group II – Purging criteria	27
7.9 Group III – Cleaning.....	27
7.10 Requirements when a minimum flow rate required	27
7.11 Safety devices to detect minimum overpressure.....	27
7.12 Value of minimum overpressure	28
7.13 Pressurizing multiple enclosures	29
7.14 Safety devices on doors and covers.....	29

7.15	Equipment that may remain energized	29
7.16	Equipment permitted within Level of Protection “pyb”	29
8	Safety provisions and safety devices for static pressurization	30
8.1	Suitability of safety devices for hazardous area	30
8.2	Protective gas	30
8.3	Internal sources of release	30
8.4	Group I and Group II Filling procedure	30
8.5	Group III Filling Procedure	30
8.6	Safety devices	30
8.7	Equipment that may remain energized	30
8.8	Overpressure	30
9	Supply of protective gas	31
9.1	Backup supply	31
9.2	Independent supplies	31
9.3	Type of gas	31
9.4	Temperature	31
10	Pressurized equipment with an internal source of release	31
11	Release conditions	31
11.1	No release	31
11.2	Limited release of a gas or vapour	32
11.3	Limited release of a liquid	32
12	Design requirements for the containment system	32
12.1	General design requirements	32
12.2	Infallible containment system	32
12.3	Containment system with a limited release	33
13	Protective gas and pressurizing techniques when there is an internal source of release	33
13.1	General	33
13.2	Pressurization with leakage compensation	34
13.2.1	No release	34
13.2.2	Limited release of a gas or liquid	34
13.3	Pressurization with dilution	34
13.3.1	General	34
13.3.2	No release	34
13.3.3	Limited release of a gas or vapour	35
13.3.4	Limited release of a liquid	35
14	Ignition-capable equipment	35
15	Internal hot surfaces	35
16	Type verification and tests	36
16.1	Determining the maximum overpressure rating	36
16.2	Maximum overpressure test	36
16.3	Leakage test	36
16.3.1	Other than static pressurization	36
16.3.2	Static pressurization	36
16.4	Purging test for pressurized enclosures with no internal source of release and filling procedure test for static pressurization	37
16.4.1	General	37
16.4.2	Pressurized enclosure where the protective gas is air	37

16.4.3	Pressurized enclosure where the protective gas is inert.....	37
16.4.4	Pressurized enclosure where the protective gas may be either air or an inert gas with a density equal to air ± 10 %.....	37
16.4.5	Filling procedure test for a pressurized enclosure protected by static pressurization.....	37
16.5	Purging and dilution tests for a pressurized enclosure with an internal source of release.....	37
16.5.1	Test gas.....	37
16.5.2	Pressurized enclosure where the flammable substance has less than 2 % (V/V) oxygen and the protective gas is inert.....	38
16.5.3	Pressurized enclosure with pressurization by continuous flow, containment system with less than 21 % (V/V) oxygen and the protective gas is inert.....	38
16.5.4	Pressurized enclosure where the flammable substance is not a liquid, pressurization by continuous flow and the protective gas is air.....	39
16.6	Verification of minimum overpressure.....	39
16.7	Tests for an infallible containment system.....	40
16.7.1	Overpressure test.....	40
16.7.2	Infallibility test.....	40
16.8	Overpressure test for a containment system with a limited release.....	40
17	Routine tests.....	40
17.1	Functional test.....	40
17.2	Leakage test.....	40
17.3	Tests for an infallible containment system.....	40
17.4	Test for a containment system with a limited release.....	40
18	Marking.....	40
18.1	General.....	40
18.2	Identifying as pressurized.....	41
18.3	Supplementary marking.....	41
18.4	Internal source of release.....	41
18.5	Static pressurization.....	41
18.6	Pressurization systems.....	41
18.7	Warnings required in other clauses.....	42
18.8	Overpressure limited by user.....	42
18.9	Inert gas.....	42
19	Instructions.....	43
Annex A (normative)	Purging and dilution tests.....	44
A.1	General.....	44
A.2	Criteria for compliance where the protective gas is air.....	44
A.3	Criteria for compliance where the protective gas is inert.....	44
Annex B (informative)	Examples of functional sequence diagram.....	45
Annex C (informative)	Examples of the changes in pressure in ducts and enclosures.....	47
Annex D (informative)	Information to be provided to the user.....	52
D.1	General.....	52
D.2	Ducting of protective gas.....	52
D.2.1	Location of inlet.....	52
D.2.2	Ducting between pressurized enclosure and inlet.....	52
D.2.3	Outlets for protective gas.....	52
D.2.4	Additional purge time to account for ducting.....	53

D.2.5	Temperature of protective gas at the inlet.....	53
D.3	Power for protective gas supply	53
D.4	Static pressurization	53
D.5	Enclosures with a containment system.....	53
D.6	Enclosure maximum overpressure	53
Annex E (normative)	Classification of the type of release within enclosures	54
E.1	General.....	54
E.2	No normal release, no abnormal release.....	54
E.3	No normal release, limited abnormal release.....	54
E.4	Limited normal release.....	54
Annex F (informative)	Examples for the use of the dilution area concept.....	55
Annex G (normative)	Internal Cells and Batteries for Level of Protection “pxb” and Level of Protection “pyb”.....	57
G.1	General Requirements	57
G.1.1	General	57
G.1.2	Accepted Electrochemical Systems	57
G.1.3	Secondary cells and secondary batteries.....	57
G.1.4	Mechanical Protection	57
G.2	Electrical Protection by energy limiting circuits.....	58
G.2.1	Assessing as energy limited	58
G.2.2	Protective Components.....	58
G.2.3	Preventing excessive gas pressure.....	58
G.3	Additional requirements for Primary batteries.....	59
G.3.1	Prevention of reverse charging.	59
G.3.2	Prevention of accidental charging of primary batteries	59
G.4	Additional requirements for secondary batteries.....	60
G.4.1	Charging of secondary batteries inside the pressurized housing	60
G.5	Specific requirements for Inherently Safe (IhS) cells and batteries	60
G.6	Equipment located inside a pressurized enclosure connected to a battery which is also located inside the pressurized enclosure and not disconnected in the event of loss of pressurization	61
G.6.1	General	61
G.6.2	Circuit Isolation.....	61
G.6.3	Intrinsically safe battery or inherently safe battery used with “Ex” equipment.....	61
G.6.4	Intrinsically Safe or Inherently Safe battery with non-“Ex” equipment.....	61
G.7	Supplementary marking and constructional requirements for pressurized enclosures containing one or more cells or batteries	63
G.7.1	General	63
G.7.2	Battery removal warning	63
G.7.3	Batteries requiring routine maintenance.....	63
G.8	Type tests	63
G.8.1	Voltage	63
G.8.2	Short circuit test for an Inherently Safe Cell or Battery.....	63
G.8.3	Full load test for other than Inherently safe batteries	63
Annex H (normative)	Internal Cells and Batteries for Level of Protection “pzc”	64
H.1	General Requirements	64
H.1.1	General	64
H.1.2	Accepted Electrochemical Systems	64

H.1.3	Secondary cells and secondary batteries	64
H.1.4	Mechanical Protection	64
H.2	Equipment located inside a pressurized enclosure connected to a battery which is also located inside the pressurized enclosure and is not disconnected when power is removed from the enclosure	65
H.3	Supplementary marking and constructional requirements for pressurized enclosures containing one or more cells or batteries	65
H.3.1	General	65
H.3.2	Battery removal warning	65
H.3.3	Batteries requiring routine maintenance.....	65
	Bibliography.....	66
	Figure B.1 – State diagram of a leakage-compensation purge control system	45
	Figure C.1 – Protective gas outlet.....	48
	Figure C.2 – Pressurized enclosures with leakage compensation, enclosures without moving parts	49
	Figure C.3 – Pressurized enclosures with leakage compensation, rotating electrical machine with an internal cooling fan	50
	Figure C.4 – Pressurized enclosure with a leakage compensation, rotating electrical machine with an external cooling fan	51
	Figure F.1 – Diagram showing the use of the dilution area concept to simplify the purge and dilution test requirements	55
	Figure F.2 – Diagram showing the use of the infallible containment system concept to simplify the purging and dilution requirements around ICE.....	56
	Figure F.3 – Diagram showing the use of internal partitions around the potential source of release to simplify the purging and dilution requirements around ICE located outside the partitions.....	56
	Figure G.1 – Reverse charging protection	59
	Figure G.2 – Accidental charging protection.....	59
	Table 1 – Determination of protection level	19
	Table 2 – Design criteria based upon level of protection	20
	Table 3 – Safety devices based upon Level of Protection.....	25
	Table 4 – Protective gas requirements for a pressurized enclosure with a containment system.....	34
	Table 5 – Equipment Protection Levels permitted within the dilution area based upon the Level of Protection of the pressurized enclosure	35
	Table 6 – Text of warning markings	42
	Table B.1 – Truth table of a leakage-compensation purge control system	45

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –**Part 2: Equipment protection by pressurized enclosure "p"**

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 60079-2 has been prepared by technical committee 31: Explosive atmospheres.

This sixth edition cancels and replaces the fifth edition published in 2007. This sixth edition cancels and replaces the first edition of IEC 61241-4 published in 2001. This sixth edition constitutes a technical revision.

The significance of changes between IEC 60079-2, Edition 6.0, 2014 and IEC 60079-2, Edition 5.0, 2007 are as listed below:

Changes	Clause	Type		
		Minor and Editorial Changes	Extension	Major Technical Changes
Scope Expanded to include combustible dust	1		X	
Protective Gas Replaced "apparatus" with "equipment"	3			
Protective Gas Revised to show that purging is not required for explosive dust atmospheres	3.16	X		
Level of Protection "pxb" Term and definitions revised to reflect EPL and level of protection	3.21	X		
Level of Protection "pyb" Term and definitions revised to reflect EPL and level of protection	3.22	X		
Level of Protection "pzc" Term and definitions revised to reflect EPL and level of protection	3.23	X		
Lower Flammable Limit Term and definition revised to agree with 60079-0	3.26	X		
Upper Flammable Limit Term and definition revised to agree with 60079-0	3.27	X		
Table 1 – Determination of protection level Revised to use EPL terminology	Table 1	X		
Table 2 – Design Criteria based upon level of protection Revised to use EPL terminology	Table 2	X		
Enclosure Requirements relaxed for specific designs	5.1		X	
Group II and Group III pressurized enclosures Text revised to use EPL terminology	5.3.3	X		
Group II and Group III Level of Protection "pxb" Added that warning also applies for explosive dust atmospheres	5.3.5		X	
Group II and Group III door and cover warning Added that warning also applies for explosive dust atmospheres	5.3.6		X	
Group II and Group III door and cover warning Revised warning from atmosphere "may be present" to "is present"	5.3.6	X		
Mechanical Strength Removed reference to 60079-0 by clause number for "X" condition	5.4	X		
Spark and particle barriers Removed reference to 60079-0 by clause number for "X" condition	5.9	X		
Cells and batteries Added requirements for cells and batteries	5.10			C1
For Level of Protection "pxb" or Level of Protection "pyb" Revised Table to use terminology consistent with EPLs	6.2	X		

Changes	Clause	Type		
		Minor and Editorial Changes	Extension	Major Technical Changes
Suitability of safety devices for hazardous area Word “explosion” changed to “ignition” to reflect UFL/LFL terms	7.1	X		
Integrity of safety devices Added requirement for detecting fan failure	7.2			C2
Table 3 – Safety devices based upon Level of Protection Revised column labels to use Level of Protection terminology	Table 3	X		
Provider of safety devices Remove reference to 60079-0 by clause number for “X” condition	7.3	X		
Pressurization System evaluated as associated equipment Added requirements for pressurization systems	7.4			C3
Sequence diagram for Level of Protection “pxb” Revised text to use Level of Protection terminology	7.5	X		
Group I and Group II purging automated for Level of Protection “pxb” Revised text to use Level of Protection terminology	7.7	X		
Group I and Group II purging automated for Level of Protection “pxb” Added text specifying that for “pxb”, control must be automated	7.7			C4
Group I or Group II – purging criteria Revised text to use Level of Protection terminology	7.8	X		
Group III – cleaning Added text for cleaning enclosures used in explosive dust atmospheres	7.9		X	
Safety devices to detect minimum overpressure Add word “minimum” to clause title to be consistent with text	7.11	X		
Safety devices to detect minimum overpressure Revised text to use Level of Protection terminology	7.11 d)	X		
Value of minimum overpressure Added word “minimum” to clause title to be consistent with text	7.12	X		
Value of minimum overpressure Revised text to use Level of Protection terminology	7.12	X		
Value of minimum overpressure Added text to reflect a note in Annex C	7.12		X	
Pressurizing multiple enclosures Revised text to use Level of Protection terminology	7.13	X		
Safety devices on doors and covers Revised text to use Level of Protection terminology	7.14	X		
Equipment that may remain energized Revised text to use EPL and level of protection terminology	7.15	X		
Equipment permitted within Level of Protection “pyb” Revised text to use EPL and level of protection terminology	7.16	X		
Group I and Group II Filling procedure Allow filling in a hazardous location if tested as non-hazardous	8.4		X	

Changes	Clause	Type		
		Minor and Editorial Changes	Extension	Major Technical Changes
Group III Filling Procedure Added static pressurization filling procedure for combustible dust	8.5		X	
Safety devices Revised text to use Level of Protection terminology	8.6	X		
Equipment that may remain energized Revised text to use EPL terminology	8.7	X		
Overpressure Removed reference to 60079-0 by clause number	8.8	X		
Backup supply Added requirements for a backup supply of protective gas	9.1			C5
Independent supplies Provided requirements for independence of pressurization	9.2		X	C6
Release Conditions Removed reference to 60079-0 by clause number for "X" condition	11.1.2	X		
Containment system with a limited release Removed reference to 60079-0 by clause number for "X" condition	12.3	X		
13.3.3 Limited release of a gas or vapour Revised text to reflect UFL/LFL terms	13.3.3	X		
Ignition-capable equipment Revised text to use Level of Protection terminology	14	X		
Type verification and tests Edition 5 clauses 16.1 to 16.7 moved to Edition 6 clauses 16.2 to 16.8	16	X		
Determining the maximum overpressure rating Added requirements to determine maximum overpressure	16.1			C7
Maximum overpressure test Moved Maximum overpressure test to 16.2	16.2			C7
Leakage test Clarify the acceptance criteria for the test	16.3.2		X	
Tests for an infallible containment system Clarify the rating used for the test	16.7.1			C8
Tests for an infallible containment system Modified test for infallible containment	16.7.2			C9
Edition 5 – Verifying ability of the pressurized enclosure to limit internal pressure Eliminated test	16.8			C7
Functional test Clarified that applies only to safety devices provided with enclosures	17.1	X		
Tests for an infallible containment system Waived helium leak tests for liquid systems	17.3		X	

Changes	Clause	Type		
		Minor and Editorial Changes	Extension	Major Technical Changes
Supplementary marking Allowed continued use of type of protection marking	18.3			
Pressurization systems Clarified use of Ex [p] and [Ex p] marking	18.6	X		
Warnings required in other clauses Added table number	18.7	X		
Warnings required in other clauses Added warning from 7.9	18.7		X	
Warnings required in other clauses Added warnings from Annex G and Annex H	18.7			C1
Instructions Added requirements for Group III	19		X	
Edition 5 Annex G – Infallibility test for containment system Deleted and replaced	Annex G	X		
Edition 5 Annex H – Introduction of an alternative risk assessment method encompassing “equipment protection levels” Deleted and replaced	Annex H	X		
Annex G – Internal Cells and Batteries for Level of Protection “pxb” and Level of Protection “pyb” Added requirements for cells and Batteries			X	
Annex H – Internal Cells and Batteries for Level of Protection “pzc” Added requirements for cells and Batteries			X	

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, or a reduction in level of existing requirement.

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 for equipment that was fully compliant with the previous standard. Therefore, these will not have to be considered for products in conformity with the preceding edition. 5.

Major technical changes addition of technical requirements increase of technical requirements

These are changes to technical requirements (addition, increase of the level or removal) made in a way that a product in conformity with the preceding edition will not always be able to fulfill the requirements given in the later edition. These changes have to be considered for products in conformity with the preceding edition. For these changes additional information is provided in clause B) below

B) Information about the background of ‘Major Technical Changes’

C1 – Added annexes with requirements for using cells and batteries.

C2 – Added requirement that fan failure cannot be based upon loss of power to the fan.

- C3 – Added requirements for equipment evaluated as a pressurization system to provide uniformity in the testing of such equipment.
- C4 – Although, in Edition 5, the title of clause 7.6 stated automated purging, the word automated was not in the requirement. It is intended that all “pxb” equipment have an automated purging system to prevent energizing of ignition capable circuits until the purge cycle has been properly completed. This requires verifying that the flow is at least the minimum required for the purge time as well as verifying that the minimum overpressure exists within the enclosure.
- C5 – If a backup supply of protective gas is provided, then both the primary and the backup supply needs to be capable of maintaining the required pressurization.
- C6 – If a pressurized enclosure is used within a larger pressurized enclosure the protective gas supplies need to be independent.
- C7 – The previous text in 16.1 of Edition 5, assumed that the enclosures had a maximum overpressure rating, but this is rarely the case. Some test houses relied upon the test in 16.8 to determine the maximum overpressure. Various methods were used to simulate regulator failure such as removing the regulator, but this also removed the orifices that would limit the flow. Based upon test house experience, the danger of flying fragments from the enclosure is acceptably small as either the enclosure or the gaskets will deform to relieve the internal pressure. A decision was taken to eliminate the overpressure test based upon the failed regulator. In addition, the definition of maximum overpressure is now based upon the value obtained when the pressurized enclosure is operated within its ratings. This maximum overpressure will generally occur when the equipment is in rapid purge mode with the maximum rated pressure applied to the inlet of the regulator. The Edition 5 text of 16.1 was modified and moved to 16.2.
- C8 – The term overpressure in most cases implies operation outside of the normal ratings. Text was clarified to use the term “maximum operating pressure” rather than maximum internal overpressure. Test was 16.6.1 in Edition 5.
- C9 – The test was modified to use helium leak detection rather than rely on maintaining a vacuum since this would depend upon the capability of the vacuum system. Test was 16.6.2 in Edition 5.

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

FDIS	Report on voting
31/1119/FDIS	31/1131/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 standard is to be read in conjunction with IEC 60079-0, *Explosive atmospheres – Part 0: Equipment – General requirements*.

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

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

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the new edition.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site 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.

INTRODUCTION

This part of IEC 60079 gives requirements for the design, construction, testing and marking of electrical equipment for use in explosive atmospheres in which

- a) a protective gas maintained at a pressure above that of the external atmosphere is used to guard against the formation of an explosive gas atmosphere within enclosures which do not contain an internal source of release of flammable gas or vapour;
- b) a protective gas maintained at a pressure above that of the external atmosphere is used to guard against the formation of an explosive gas atmosphere within enclosures and is supplied to an enclosure containing one or more internal sources of release in order to guard against the formation of an explosive gas atmosphere; or
- c) a protective gas maintained at a pressure above that of the external atmosphere, is used to prevent the entry of combustible dust which might otherwise lead to the formation of an explosive dust atmosphere within enclosures, but only where there is no internal source of release of combustible dust.

This standard includes requirements for the equipment and its associated equipment including the inlet and exhaust ducts, and also for the auxiliary control equipment necessary to ensure that pressurization and/or dilution is established and maintained.

EXPLOSIVE ATMOSPHERES –

Part 2: Equipment protection by pressurized enclosure "p"

1 Scope

This part of IEC 60079 contains the specific requirements for the construction and testing of electrical equipment with pressurized enclosures, of type of protection "p", intended for use in explosive gas atmospheres or explosive dust atmospheres. It also includes the requirements for pressurized enclosures containing a limited release of a flammable substance.

This standard supplements and modifies the general requirements of IEC 60079-0. Where a requirement of this standard conflicts with a requirement of IEC 60079-0, the requirements of this standard take precedence.

This standard does not include the requirements for:

- pressurized enclosures where the containment system may release
 - a) air with an oxygen content greater than normal, or
 - b) oxygen in combination with inert gas where the oxygen is in a proportion greater than 21 %.
- pressurized rooms or analyser houses; see IEC 60079-13;
- pressurized enclosures used where "explosives" or pyrotechnics are present;
- pressurized enclosures used where hybrid mixtures of gas/vapour and combustible dust are present;
- pressurized enclosures used where pyrophoric substances such as explosives or propellants containing their own oxidizers are present
- pressurized enclosures with an internal source of release of combustible dust.

NOTE When the user acts in the role of the manufacturer, it is typically the user's responsibility to ensure that all relevant parts of this standard are applied to the manufacturing and testing of the equipment.

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 60034-5, *Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification*

IEC 60050 (all parts), *International Electrotechnical Vocabulary*

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

IEC 60079-11, *Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"*

IEC 60079-15, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"*

IEC 60112, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60127, (All parts) *Miniature fuses*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60664-1, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN