

BSI Standards Publication

Explosive atmospheres

Part 14: Electrical installation design, selection and installation of equipment, including initial inspection



This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

National foreword

This British Standard is the UK implementation of EN IEC 60079-14:2024. It is identical to IEC 60079-14:2024. It supersedes BS EN 60079-14:2014, which will be withdrawn on 4 October 2027.

The UK participation in its preparation was entrusted to Technical Committee EXL/31/3, Codes of practice.

A list of organizations represented on this committee can be obtained on request to its committee manager.

BSI, as a member of CENELEC, is obliged to publish EN IEC 60079-14:2024 as a British Standard. However, attention is drawn to the fact that during the development of this European Standard, the UK committee voted against its approval.

The UK committee submitted a negative vote due to its concerns regarding the standard's approach to additional requirements relating to extra-low voltage (ELV) circuits for earthing and equipotential bonding in hazardous areas.

Furthermore, it is the opinion of the UK committee that these terms are not used consistently between this standard and the IEC 60364 (approved by CENELEC as HD 60364) series, to which IEC 60079-14 is supplementary as regards electrical installation requirements (see Introduction), or between this standard and BS 7671.

It is also the opinion of the UK committee that requirements to prevent incendive arcing and sparking (from, for example, EMC phenomena, fault currents, static electricity and lightning), particularly on ELV circuits, have not all been fully addressed in this standard.

The UK committee advises users to consult BS 7671 when applying this standard, and draws users' attention to National Annex NA, which provides further guidance to assist users in the application of this standard.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2026
Published by BSI Standards Limited 2026

ISBN 978 0 539 12072 1

ICS 13.230; 29.260.20

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 August 2026.

Amendments/corrigenda issued since publication

Date	Text affected

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

EUROPÄISCHE NORM

October 2024

ICS 29.260.20

Supersedes EN 60079-14:2014;
EN 60079-14:2014/AC:2016

English Version

Explosive atmospheres - Part 14: Electrical installation design,
selection and installation of equipment, including initial
inspection
(IEC 60079-14:2024)

Atmosphères explosives - Partie 14: Conception des
installations électriques, sélection et installation des
appareils, comprenant l'inspection initiale
(IEC 60079-14:2024)

Explosionsgefährdete Bereiche - Teil 14: Projektierung,
Auswahl und Errichtung elektrischer Anlagen
(IEC 60079-14:2024)

This European Standard was approved by CENELEC on 2024-10-04. 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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

European foreword

The text of document 31J/366/FDIS, future edition 6 of IEC 60079-14, prepared by SC 31J "Classification of hazardous areas and installation requirements" of IEC/TC 31 "Equipment for explosive atmospheres" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60079-14:2024.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2025-07-04 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2027-10-04 document have to be withdrawn

This document supersedes EN 60079-14:2014 and all of its amendments and corrigenda (if any).

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

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60079-14:2024 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 standard indicated:

IEC 60034-1	NOTE Approved as EN 60034-1
IEC 60034-5	NOTE Approved as EN IEC 60034-5
IEC 60064	NOTE Approved as EN 60064
IEC 60079 (series)	NOTE Approved as EN IEC 60079 (series)
IEC 60079-1	NOTE Approved as EN 60079-1
IEC 60079-2	NOTE Approved as EN 60079-2
IEC 60079-5	NOTE Approved as EN 60079-5
IEC 60079-6	NOTE Approved as EN 60079-6
IEC 60079-10-1	NOTE Approved as EN IEC 60079-10-1
IEC 60079-10-2	NOTE Approved as EN 60079-10-2
IEC 60079-13	NOTE Approved as EN 60079-13
IEC 60079-14	NOTE Approved as EN 60079-14
IEC 60079-18	NOTE Approved as EN 60079-18
IEC 60079-26	NOTE Approved as EN IEC 60079-26
IEC 60079-29-2	NOTE Approved as EN 60079-29-2
IEC 60079-29-3	NOTE Approved as EN 60079-29-3

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

IEC 60079-33	NOTE Approved as CLC/TR 60079-33
IEC 60081	NOTE Approved as EN 60081
IEC 60192	NOTE Approved as EN 60192
IEC 60195	NOTE Approved as EN 60195
IEC 60204 (series)	NOTE Approved as EN 60204 (series)
IEC 60332-1-2	NOTE Approved as EN 60332-1-2
IEC 60332-3 (series)	NOTE Approved as EN IEC 60332-3 (series)
IEC 60332-3-22	NOTE Approved as EN IEC 60332-3-22
IEC 60364 (series)	NOTE Approved as HD 60364 (series)
IEC 60364-5-51	NOTE Approved as HD 60364-5-51
IEC 60432-1	NOTE Approved as EN 60432-1
IEC 60432-2	NOTE Approved as EN 60432-2
IEC 60079-14:2024	NOTE Approved as EN IEC 60079-14:2024 (not modified)
IEC 60529	NOTE Approved as EN 60529
IEC 60626-1	NOTE Approved as EN IEC 60626-1
IEC 60654-4	NOTE Approved as EN 60654-4
IEC 60664-1	NOTE Approved as EN IEC 60664-1
IEC 60721-3 (series)	NOTE Approved as EN IEC 60721-3 (series)
IEC 60950 (series)	NOTE Approved as EN 60950 (series)
IEC 61008-1	NOTE Approved as EN 61008-1
IEC 61010-1	NOTE Approved as EN 61010-1
IEC 61439-1	NOTE Approved as EN IEC 61439-1
IEC 61558-2-6	NOTE Approved as EN 61558-2-6
IEC 61285	NOTE Approved as EN 61285
IEC 61914	NOTE Approved as EN IEC 61914
IEC 61936 (series)	NOTE Approved as EN IEC 61936 (series)
IEC 62035	NOTE Approved as EN 62035
IEC 62485-2	NOTE Approved as EN IEC 62485-2
IEC/IEEE 60079-30-1	NOTE Approved as EN 60079-30-1
IEC/IEEE 60079-30-2	NOTE Approved as EN 60079-30-2
ISO/IEC 80079-20-2	NOTE Approved as EN ISO/IEC 80079-20-2
ISO 4892-1	NOTE Approved as EN ISO 4892-1

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 Where 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.cencenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60060-1	-	High-voltage test techniques - Part 1: General definitions and test requirements	EN 60060-1	-
IEC 60079-0	-	Explosive atmospheres - Part 0: Equipment - General requirements	EN IEC 60079-0	-
IEC 60079-1	-	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"	EN 60079-1	-
IEC 60079-7	-	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"	EN 60079-7	-
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 IEC 60079-15	-
IEC 60079-17	-	Explosive atmospheres - Part 17: Electrical installations inspection and maintenance	EN IEC 60079-17	-
IEC 60079-19	-	Explosive atmospheres - Part 19: Equipment repair, overhaul and reclamation	EN IEC 60079-19	-
IEC 60079-25	-	Explosive atmospheres - Part 25: Intrinsically safe electrical systems	EN IEC 60079-25	-
IEC 60079-28	-	Explosive atmospheres - Part 28: Protection of equipment and transmission systems using optical radiation	EN 60079-28	-
IEC 60079-29-1	-	Explosive atmospheres - Part 29-1: Gas detectors - Performance requirements of detectors for flammable gases	EN 60079-29-1	-

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

		detectors - Performance requirements of open path detectors for flammable gases			
IEC 60228	-	Conductors of insulated cables	EN IEC 60228	-	
IEC 60245-4	-	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables	-	-	
IEC 60364-4-41	-	Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock	EN 60364-4-41	-	
IEC 61557-8	-	Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. - Equipment for testing, measuring or monitoring of protective measures - Part 8: Insulation monitoring devices for IT systems	EN 61557-8	-	
IEC 62262	-	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)	EN 62262	-	
IEC 62305-3	-	Protection against lightning - Part 3: Physical damage to structures and life hazard	EN 62305-3	-	
IEC/TS 60079-32-1	-	Explosive atmospheres - Part 32-1: Electrostatic hazards, guidance	CLC/TR 60079-32-1	-	
IEC/TS 60079-47	-	Explosive atmospheres - Part 47: Equipment protection by 2-wire intrinsically safe ethernet concept (2-WISE)	CLC IEC/TS 60079-47-		

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

CONTENTS

FOREWORD.....	10
INTRODUCTION.....	16
1 Scope.....	19
2 Normative references	20
3 Terms and definitions	21
3.1 General.....	21
3.2 Hazardous areas.....	22
3.3 Flameproof enclosure	24
3.4 Increased safety	24
3.5 Intrinsic safety	25
3.6 Intrinsic safety parameters	26
3.7 Pressurization	26
3.8 Type of Protection "n"	26
3.9 Type of Protection "o"	27
3.10 Type of Protection "q"	27
3.11 Type of Protection "m"	27
3.12 Type of Protection "t"	27
3.13 Electrical supply systems	27
3.14 Equipment	28
3.16 Cable(s).....	28
4 General	30
4.1 General requirements	30
4.1.1 Zones and Equipment Protection Levels	30
4.1.2 Requirements for all Ex Equipment.....	31
4.1.3 Electrical ratings.....	31
4.1.4 Conditions of control for exceptional circumstances.....	31
4.2 Conditions of Use	32
4.2.1 General	32
4.2.2 Specific Conditions of Use.....	32
4.2.3 Use of Ex Components	32
4.3 Ignition sources that have an influence on the installation.....	33
4.3.1 General	33
4.3.2 Static electricity	33
4.3.3 Optical radiation	33
4.3.4 Lightning protection	33
4.3.5 Radio frequency received and transmitted in hazardous areas.....	33
4.3.6 RFID tags	34
5 Documentation	34
5.1 General.....	34
5.2 Site information.....	35
5.3 Ex Equipment information	35
5.4 Installation information.....	35
5.5 Personnel competency.....	36
6 Design.....	36
6.1 General.....	36
6.2 Protection from dangerous (incendive) sparking.....	36

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

6.2.1	Equipment (other than Ex Equipment) above hazardous areas	36
6.2.2	Wiring systems traversing a hazardous area	37
6.2.3	Construction materials	37
6.2.4	Danger from live parts	37
6.2.5	Danger from exposed and extraneous-conductive-parts	38
6.2.6	Protective equipotential bonding	39
6.2.7	Cathodically protected metallic parts	40
6.3	Electrical protection	41
6.4	Emergency stop	41
6.5	Electrical isolation	41
6.6	Cables	42
6.6.1	External surface temperature	42
6.6.2	Cables subjected to thermal insulation	42
6.6.3	Overhead wiring	42
6.7	Electrical machines	42
6.7.1	General	42
6.7.2	Electrical machines with Type of Protection "d" – Flameproof enclosures, "p" – Pressurized enclosures and "t" – Protection by enclosures	43
6.7.3	Electrical machines with Level of Protection "eb" – Increased safety	44
6.7.4	Electrical machines with Level of Protection "ec" and Type of Protection "nA"	46
6.7.5	Switching electrical machines above 1 kV AC	47
6.7.6	Prevention of falling bodies	48
6.8	Electric heating systems	48
6.8.1	General	48
6.8.2	Earth fault protection	48
6.8.3	Limiting temperature	49
6.8.4	Temperature safety device	49
6.9	Plugs, socket outlets and couplers	50
6.9.1	Specific requirements for explosive dust atmospheres	50
6.9.2	Location	50
6.10	Cells and batteries	51
6.10.1	Charging of secondary cells and batteries	51
6.10.2	Ventilation	51
6.11	Gas detection systems	51
6.12	Type of Protection "d" – Flameproof enclosures	51
6.13	Type of Protection "e" – Increased safety	51
6.13.1	Maximum dissipated power of junction boxes	51
6.13.2	Maximum number of conductors	52
6.14	Type of Protection "i" – Intrinsic safety	53
6.14.1	General	53
6.14.2	Cables	54
6.14.3	Verification of intrinsically safe circuits	54
6.14.4	Earthing of conducting screens	56
6.14.5	Cable armour bonding	57
6.14.6	Marking of cables	57
6.14.7	Cables carrying more than one intrinsically safe circuit	58
6.14.8	Types of cables carrying more than one intrinsically safe circuit and applicable fault considerations	58

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

6.14.9	Earthing of intrinsically safe circuits	58
6.14.10	Installations to meet the requirements of EPL Ga or EPL Da	60
6.14.11	Simple apparatus	61
6.14.12	Junction boxes	62
6.14.13	Plugs and sockets used for external connections	63
6.14.14	Special application: Combining intrinsically safe and non-intrinsically safe circuits	63
6.15	Type of Protection "m" – Encapsulation	63
6.16	Type of Protection "n"	63
6.16.1	General	63
6.16.2	Type of Protection "nR"	64
6.17	Type of Protection "o" – Liquid immersion (former Oil immersion)	64
6.18	Type of Protection "p"	64
6.18.1	General	64
6.18.2	Ducting	65
6.18.3	Action to be taken on failure of pressurization	65
6.19	Pressurized rooms and artificially ventilated rooms	69
6.20	Analyser houses	69
6.21	Type of Protection "q" – Powder filling	69
7	Selection	69
7.1	General	69
7.2	Assurance of conformity of Ex Equipment	69
7.2.1	Ex Equipment based on IEC standards	69
7.2.2	Ex Equipment not based on IEC standards	69
7.2.3	Selection of used or repaired Ex Equipment	70
7.3	Selection of Ex Equipment	70
7.3.1	Information requirements	70
7.3.2	External influences	70
7.3.3	Selection of radiating equipment	71
7.3.4	Selection of ultrasonic equipment	72
7.3.5	Selection for pollution degree	73
7.3.6	Selection for specific process hazards	73
7.3.7	Selection of Ex Equipment according to EPLs	74
7.3.8	Selection according to equipment grouping	76
7.3.9	Selection according to the ignition temperature of the gas, vapour or dust	77
7.3.10	Selection according to the temperature range	80
7.4	Selection of cables	80
7.4.1	General	80
7.4.2	Wiring systems for installation in areas requiring EPL Ga or EPL Da	81
7.4.3	Cables for direct entries into flameproof enclosures	81
7.4.4	Cables for direct entries into restricted breathing enclosures	81
7.4.5	Resistance to flame propagation or flame spread	81
7.4.6	UV or solar radiation	81
7.4.7	Non-flexible cables for fixed equipment	81
7.4.8	Flexible cables for fixed and transportable equipment (excluding intrinsic safety circuits)	81
7.4.9	Flexible cables for use for portable equipment	82
7.4.10	Cables for intrinsic safety circuits	82

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

7.4.11	Single insulated wires (excluding intrinsically safe circuits).....	82
7.4.12	Aluminium conductors.....	82
7.5	Selection of entry devices and other fittings	83
7.5.1	General	83
7.5.2	Cable entry devices	83
7.5.3	Adapters and Blanking Elements	84
7.5.4	Breathing and draining devices	84
7.5.5	Entry devices for fibre optic cables	85
7.5.6	Other entry devices	85
7.5.7	Cable entry device for Type of Protection "d"	85
7.5.8	Cable entry device for Type of Protection "nR"	86
7.6	Conduits	87
7.6.1	Group II	87
7.6.2	Group III	87
7.7	Luminaires and lamps	88
7.7.1	Luminaires	88
7.7.2	Lamps	88
7.8	Rotating electrical machines	88
8	Installation of equipment.....	88
8.1	General.....	88
8.2	Cables and wiring systems.....	88
8.2.1	Avoidance of damage	88
8.2.2	Equipotential bonding connections.....	89
8.2.3	Terminations.....	89
8.2.4	Penetrations in structures	90
8.2.5	Passage and collection of flammables	90
8.2.6	Group III – Accumulation of dust.....	90
8.2.7	Jointing.....	90
8.3	Entry devices and other fittings	90
8.3.1	General	90
8.3.2	Cable entry devices	91
8.3.3	Additional entries.....	93
8.3.4	Unused openings.....	93
8.4	Conduit systems	93
8.4.1	General	93
8.4.2	Group II	94
8.4.3	Group III	94
8.4.4	Additional requirements for flameproof sealing devices for conduit	95
8.5	Electrical heating systems.....	95
8.5.1	General	95
8.5.2	Trace heating system	95
8.6	Protective coating of Ex Equipment.....	95
8.7	Type of Protection "d" – Flameproof enclosures	96
8.7.1	General	96
8.7.2	Solid obstacles	96
8.7.3	Protection of flamepaths	96
8.8	Types of Protection "e" and "nA"	97
8.8.1	Conductor terminations.....	97

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

8.8.2	Combinations of terminals and conductors for general connection and junction boxes	97
8.9	Types of Protection "i" – Intrinsic safety	97
8.9.1	Earthing of conducting screens	97
8.9.2	Cable armour bonding	97
8.9.3	Installation of cables and wiring	98
8.10	Type of Protection "nR"	99
8.11	Type of Protection "o" – Liquid immersion (formerly Oil immersion)	99
9	Initial inspection	99
Annex A (normative) Knowledge, skills and competencies of designers, electricians and technicians		100
A.1	Scope	100
A.2	Knowledge and skills	100
A.2.1	Designers	100
A.2.2	Electricians and technicians	100
A.3	Competencies	101
A.3.1	General	101
A.3.2	Designers	101
A.3.3	Electricians and technicians	101
A.4	Assessment	101
Annex B (informative) Safe work procedure guidelines for explosive gas atmospheres		102
Annex C (normative) Pressure test procedure for cables into Ex "d" enclosures		103
C.1	General	103
C.2	Test apparatus	103
C.3	Test method	103
C.4	Test report	104
Annex D (normative) Potential stator winding discharge hazard assessment – Ignition risk factors		106
Annex E (normative) Verification of intrinsically safe circuits with more than one intrinsically safe power source with linear current/voltage characteristics		107
E.1	General	107
E.2	Intrinsic safety with Level of Protection "ib"	107
E.3	Intrinsic safety with Level of Protection "ic"	107
Annex F (informative) Methods of determining the maximum system voltages and currents in intrinsically safe circuits with more than one intrinsically safe power source with linear current and voltage characteristics		108
F.1	Intrinsically safe circuits with linear current and voltage characteristics	108
F.2	Intrinsically safe circuits with non-linear current or voltage characteristics	109
Annex G (informative) Determination of intrinsic safety cable parameters		110
G.1	Measurements	110
G.2	Cables carrying more than one intrinsically safe circuit	110
G.2.1	General	110
G.2.2	Type A cables	110
G.2.3	Type B cables	111
G.2.4	Type C cables	111
G.3	FISCO	111
Annex H (informative) Hybrid mixtures		112
H.1	General	112
H.2	Concentration limits	112

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

H.3	Electrostatic hazard	112
H.4	Energy/temperature limits	112
H.5	Selection of equipment	112
H.6	Use of flameproof equipment	112
H.7	Installation requirements	112
Annex I (informative)	Transportable, portable and personal equipment	113
I.1	General	113
I.2	Transportable and portable equipment	113
I.3	Personal equipment	114
Annex J (informative)	Electrical machines operated from converters	115
J.1	General	115
J.2	Earthing, bonding and cabling	116
J.2.1	Objectives of earthing	116
J.2.2	Bonding of machines	116
J.2.3	Machine power cables	116
J.2.4	Cable terminations	118
J.2.5	Interruption of the shielded machine supply line	119
Annex K (informative)	Surge protection of an intrinsically safe circuit	120
K.1	General	120
K.2	Installation to be protected	120
K.3	Lightning induced surges	120
K.4	Preventive measures	120
K.5	Supporting documentation	121
K.6	Further protection	121
Annex L (informative)	Adverse environmental conditions	122
L.1	Climate classifications	122
L.2	Cables and cable entry devices	122
L.3	Seals and sealing materials	122
L.4	Storage and transportation	122
L.5	Low temperatures	122
L.5.1	General	122
L.5.2	Electrical machines	123
L.6	High humidity	123
L.7	Solar radiation	123
L.7.1	General	123
L.7.2	Equipment protection	124
L.7.3	Cables and cable entry devices	124
L.8	Atmospheres containing salt and chlorides	124
L.9	Snow conditions	124
L.10	Icing and winterization	125
L.11	Rapid cooling	125
Annex M (informative)	Guidance on the different duty types S1 to S10 of electrical machines	126
Annex N (normative)	High voltage installations with rated voltage up to 245 kV	127
Annex O (informative)	Inspection tables for initial inspections (from IEC 60079-17)	128
Annex P (informative)	Minimum degree of protection (IP Code) in accordance to Type of Protection	135
Annex Q (normative)	Additional requirements for simple apparatus	136

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

Q.1	Temperature classification	136
Q.1.1	Group II	136
Q.1.2	Group III	137
Q.2	Isolation and separation	137
Q.3	Enclosures and cable entry devices	137
Q.4	Assessment and documentation	138
	Bibliography	141
Figure 1	– Correlation between the maximum permissible surface temperature and thickness of dust layers	79
Figure 2	– Selection of cable entry devices	86
Figure C.1	– Example of a low pressure test arrangement	103
Figure F.1	– Series connection – Summation of voltage	108
Figure F.2	– Parallel connection – Summation of currents	109
Figure F.3	– Series and parallel connections – Summations of voltages and summations of currents	109
Figure J.1	– Basic structure of a converter fed drive system	115
Figure J.2	– Examples of shielded machine cables and connections	117
Figure J.3	– Cable shield connection at the machine side	119
Figure K.1	– Surge protection requirements of an instrument loop	121
Figure Q.1	– Assessment process for simple apparatus	138
Table 1	– Table of significant changes	11
Table 2	– Clauses of this document for requirements for special types of equipment	14
Table 3	– Clauses of this document for additional requirements for Types of Protection	14
Table 4	– Equipment Protection Levels (EPLs) where only zones are assigned	30
Table 5	– Radio frequency power thresholds	33
Table 6	– Radio-frequency energy thresholds	34
Table 7	– Requirements for the temperature safety devices	50
Table 8	– Example of defined terminal/conductor arrangement – Maximum number of wires in relation to the cross-section and the permissible continuous current	52
Table 9	– Determination of Type of Protection (with no flammable release within the enclosure)	64
Table 10	– Use of spark and particle barriers	65
Table 11	– Summary of protection requirements for enclosures without an internal source of release	66
Table 12	– Relationship between EPLs and Types of Protection	75
Table 13	– Relationship between gas/vapour or dust subdivision and equipment group	77
Table 14	– Relationship between gas or vapour ignition temperature and temperature class of Ex Equipment	78
Table 15	– Selection of cable entry devices, Type of Protection according to the enclosure Type of Protection	84
Table 16	– Minimum distance of obstruction from the flameproof flange joints related to the gas group of the hazardous area	96
Table C.1	– Example of a test report template	105
Table D.1	– Ignition risk factors	106

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

Table M.1 – Duty types of electrical machines	126
Table O.1 – Initial inspection schedule for Ex "d", Ex "e", Ex "n" and Ex "t"/"tD" installations	128
Table O.2 – Initial inspection schedule for Ex "i" installations.....	130
Table O.3 – Inspection schedule for Ex "p" and "pD" installations	131
Table O.4 – Inspection schedule for Ex "o" installations	132
Table P.1 – Minimum degree of protection (IP Code) in accordance with Type of Protection	135
Table Q.1 – Variation in maximum power dissipation with ambient temperature for Group II	136
Table Q.2 – Variation in maximum power dissipation with ambient temperature for Group III	137
Table Q.3 – Summary of requirements	139
Table Q.4 – Simple apparatus and junction box selection: A practical solution	140

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –**Part 14: Electrical installations design, selection
and installation of equipment, including initial inspection****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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60079-14 has been prepared by subcommittee 31J: Classification of hazardous areas and installation requirements, of IEC technical committee 31: Equipment for explosive atmospheres. It is an International Standard.

This sixth edition cancels and replaces the fifth edition published in 2013. This edition constitutes a technical revision.

Edition 6 is a major restructure and introduces a number of technical changes from the previous edition (2013). Table 1, "Table of significant changes" is provided to highlight the technical and more significant editorial changes from the previous edition. Minor editorial changes are not listed as there are too many changes to include in the "Table of significant changes".

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

Table 1 – Table of significant changes

Changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
List of possible ignition sources completed	Introduction	x		
Additional standard mentioned (IEC 60204 series for electrical safety of machinery)	Introduction	x		
Introduction of a new title "Electrical installation design, selection and installation of equipment, including initial inspection"	Scope			C1
New definition: certificates	3.1.4		x	
New definition: Ex Equipment	3.1.5		x	
New definition: Ex Equipment Certificates	3.1.6		x	
New definition: Equipment Protection Level	3.2.13	x		
definition: associated apparatus	3.5.2	x		
Modification definition: liquid immersion (formerly oil immersion)	3.9.1	x		
Definition equipment, portable	3.14.3	x		
Definition equipment, personal	3.14.4	x		
New definition: cables	3.16		x	
Zones and Equipment Protection Levels	4.1.1		x	
Requirements for all Ex Equipment	4.1.2		x	
Electrical ratings	4.1.3		x	
Use of Ex Components	4.1.4		x	
Static electricity (Reference to IEC TS 60079-32-1)	4.3.2	x		
RFID tags	4.3.6		B1	
Installation information (additional bullet points c) and e)	5.4		x	
TN type of system earthing	6.2.5.2	x		
Cathodically protected metallic parts	6.2.7		x	
Cables subjected to thermal insulation	6.6.2		x	
Overhead wiring	6.6.3		x	
Electrical machines with converter supply	6.7.3.4 b)		B2	
Electric heating systems	6.8		x	
Plugs, socket outlets and couplers	6.9	x		
Type of protection "e" – Increased safety	6.13	x		
Intrinsically safe circuits with only one source of power with linear characteristic	6.14.3.3	A1		
Earthing of conducting screens – Special cases	6.14.4	x		
Simple apparatus	6.14.11 Annex Q			C2
Junction boxes	6.14.12	x		
Junction boxes with non-intrinsically safe and intrinsically safe circuits	6.14.12.2	x		
Pressurized rooms	6.19	x		
Analyser houses	6.20	x		
Selection of pollution degree	7.3.5		x	
Selection of specific process hazards	7.3.6		x	

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

			Type		
	Changes	Clause	Minor and editorial changes	Extension	Major technical changes
	Selection of cables	7.4	A2		
	Cables for direct entries into flameproof enclosures	7.4.3		x	
	Cables for direct entries into restricted breathing enclosures	7.4.4		x	
	UV or solar radiation	7.4.6		x	
	Cables for intrinsic safety circuits	7.4.10		x	
	Breathing and draining devices	7.5.4		x	
	Entry devices for fibre optic cables	7.5.5		x	
	Other entry devices	7.5.6		x	
	New Flowchart: Selection of cable entry devices	7.5.7			C3
	Conduits	7.6	x		
	Luminaires	7.7.1	x		
	Rotating electric machines	7.8	x		
	New clause "General" in 8 "Installation of equipment"	8.1		x	
	Equipotential bonding connections	8.2.2	x		
	Penetration in structures	8.2.4	x		
	Jointing	8.2.7		x	
	Entry devices and other fittings	8.3	A3		
	Cable entry devices	8.3.2	x		
	Conduit systems	8.4	x		
	Electric heating systems	8.5		x	
	Protective coating of Ex Equipment	8.6		x	
	Unused cores in cables	8.9.3.4	x		
	Initial inspection	9		x	
	Knowledge, skills and competencies of designers, electricians and technicians	Annex A	x		
	New normative Annex: Pressure test for cables – test procedure	Annex C			C4
	New informative Annex: Transportable, portable and personal equipment	Annex I		x	
	New informative Annex: Electrical machines operated from converters	Annex J		x	
	New informative Annex: Surge protection of an intrinsically safe circuit	Annex K		x	
	New informative Annex: Guidance on the different duty types S1 to S10 of motors	Annex M		x	
	New informative Annex: Inspection tables for initial inspections (from IEC 60079-17)	Annex O			C5
	New informative Annex: Degree of protection (IP Code) in accordance to Type of Protection	Annex P		x	
	New normative Annex: Simple apparatus	Annex Q			C2

NOTE 1 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 edition. More guidance can be found by referring to the Redline Version of the standard.

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 the design, selection and installation of existing installations that were fully compliant with the previous standard. Therefore, these will not have to be considered for existing installations in conformity with the preceding edition.

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 an existing installation in conformity with the preceding edition will not always be able to fulfil the requirements given in the later edition.

B) Information about the background of changes

- A1 Clarification of the application of the 1 % rule to make users aware that the application of permissible pairs is considered first and when not available, the 1 % rule is to be applied.
- A2 The cable requirements from IEC 60079-14:2013, 9.3.2 have been changed to only include the minimum aspects removing any product requirement in this installation standard.
- A3 The application of adapters and reducers have been changed to align with product standard requirements.
- B1 The manufacturer of the RFID tag has to demonstrate and document that there is no explosion hazard.
- B2 Additionally to the use of a certified combination of an electrical machine in Type of Protection "eb" together with the converter, an electrical machine in the Type of Protection "eb" (type tested for converter supply) can be operated with an unspecified type of converter.
- C1 The title is changed to "Electrical installation design, selection and installation of equipment, including initial inspection" to ensure that all areas, including initial inspection, are mentioned in the title. The term "Installation of equipment" is replacing the word "Erection" in the title as more common wording.
- C2 The requirements for simple apparatus have been aligned with IEC 60079-11.
- C3 The flowchart is revised to include consideration of equipment groups, cable lengths and enclosures with a volume $\leq 2\,000\text{ cm}^3$. (Additional information can be found in the supporting document SC 31J SD 001.)

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

C4 The previous informative Annex C to improve details relevant to testing cables and alignment to the selection requirements in 7.5.7. (see also C3)

C5 The previous normative tables in the section "Initial inspection" are included in the informative Annex O. This allows checklists to be customized for specific installations.

All Ex Equipment and their wiring in hazardous areas are designed, selected and installed in accordance with:

- Clause 6 for design; and
- Clause 7 for selection; and
- Clause 8 for installation; and
- Subclauses given in Table 2 for specific types of equipment; and
- Subclauses given in Table 3 for additional requirements for Type of Protections.

Table 2 – Clauses of this document for requirements for special types of equipment

Type of equipment	Design	Selection	Installation
Cables and wiring systems	6.6	7.4	8.2
Conduits			8.4
Entry devices and other fittings		7.5	8.2.7
Luminaires and lamps		7.7	
Electrical machines	6.7	7.8	
Electrical heating systems	6.8		
Plugs and socket outlets	6.9		
RFID tags	4.3.6		
Cells and batteries	6.10		
Gas detectors and related systems	6.11		
Transportable, portable and personal equipment	Annex I		

Table 3 – Clauses of this document for additional requirements for Types of Protection

Type of Protection	Design	Selection	Installation
"d" – Flameproof Enclosure	6.12		8.7
"e" – Increased Safety	6.13		8.8
"i" – Intrinsic Safety	6.14		8.9
"m" – Encapsulation	6.15		
"n" – Type of Protection "n"	6.16		8.8 and 8.10
"o" – Liquid Immersion (former: oil)	6.17		8.11
"op" – Optical Radiation			
"p" – Pressurization	6.18		
Pressurized Rooms	6.19		
Analyser Houses	6.20		
"q" – Powder Filling	6.21		
"t" – Dust Protection by Enclosure			
"s" – Special Protection			

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

NOTE 2 Empty cells mean that additional requirements are not detailed in this document and would be included as part of manufacturer's instructions or certification documents.

The text of this International Standard is based on the following documents:

Draft	Report on voting
31J/366/FDIS	31J/367/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60079 series, published 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

Preventive measures to reduce explosions of flammable materials are based on three principles, which are normally applied in the following order:

- 1) substitution;
- 2) control; and
- 3) mitigation.

Substitution involves, for example, replacing a flammable material by one which is either not flammable or one that is less flammable.

Control involves, for example:

- a) reducing the quantity of flammables;
- b) avoiding or minimising releases;
- c) controlling the release;
- d) preventing the formation of an explosive atmosphere;
- e) collecting and containing releases; and
- f) avoiding ignition sources.

NOTE 1 With the exception of item f), all of the above is part of the process of hazardous area classification.

Mitigation involves, for example:

- a) reducing the number of people exposed;
- b) providing measures to avoid the propagation of an explosion;
- c) providing explosion pressure relief;
- d) providing explosion pressure suppression; and
- e) providing suitable personal protective equipment.

NOTE 2 The above items are part of consequence management when considering hazards.

Once the principles of substitution and control (items a) to e)) have been applied, the remaining hazardous areas should be classified into zones according to the likelihood of an explosive atmosphere being present (see IEC 60079-10-1 or IEC 60079-10-2). Such classification, which may be used in conjunction with an assessment of the consequences of an ignition, allows Equipment Protection Levels (EPL) to be determined and hence appropriate Types of Protection to be specified for each location.

For an explosion to occur, an explosive atmosphere and a source of ignition such as an electrical fault, high process temperature or open flames need to co-exist. This document only deals with the recommended protective measures required to reduce to an acceptable level, the likelihood that the electrical installation could become a source of ignition. By careful design of the electrical installation, it is frequently possible to locate much of the equipment in less hazardous or non-hazardous areas.

When Ex Equipment is installed in areas where explosive concentrations and quantities of flammable gases, vapours or dusts could be present in the atmosphere, protective measures are applied to reduce the likelihood of explosion due to ignition either in normal operation or under specified fault conditions.

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

In general, possible ignition sources are:

- Hot surfaces;
- Flames and hot gases (including hot particles);
- Mechanically generated impact, friction and abrasion;
- Electrical equipment and components;
- Stray electric currents, cathodic corrosion protection;
- Static electricity;
- Lightning;
- Radio frequency (RF) electromagnetic waves from 10^4 Hz to 3×10^{11} Hz;
- Electromagnetic waves from 3×10^{11} Hz to 3×10^{15} Hz (optical radiation);
- Ionizing radiation;
- Ultrasonic waves;
- Adiabatic compression and shock; and
- Exothermic reactions, including self-ignition of dust.

The focus of this document is the electrical installation, which is designed to reduce potential ignition sources from causing a fire or explosion including, for example, electrical arcs and sparks, static electricity, effects of lightning and hot surfaces caused by transformation of electrical energy to heat energy or caused by friction of moving parts of electrical equipment.

Many types of dust that are generated, processed, handled and stored, are combustible. When ignited they can burn rapidly and with considerable explosive force if mixed with air in the appropriate proportions. It is often necessary to use Ex Equipment in locations where such materials are present, and suitable precautions should therefore be taken to ensure that all such equipment is adequately protected so as to reduce the likelihood of ignition of the external explosive atmosphere.

Combustible dust can be ignited by equipment in ways including, but not limited to, the following:

- by surfaces of the equipment that are above the minimum ignition temperature of the dust concerned. The temperature at which a type of dust ignites is a function of the properties of the dust, whether the dust is in a cloud or layer, the thickness of the layer and the geometry of the heat source; or
- by arcing or sparking of electrical parts such as switches, contacts, commutators, brushes, or the like; or
- by discharge of an accumulated electrostatic charge; or
- by radiated energy (for example electromagnetic radiation); or
- by mechanical sparking or frictional sparking associated with the equipment.

In order to avoid dust ignition hazards it is important that:

- the temperature of surfaces on which dust can be deposited, or which would be in contact with a dust cloud, is kept below the temperature limitation specified in this document; and
- any electrical sparking parts, or parts having a temperature above the temperature limit specified in this document:
 - i) are contained in an enclosure which adequately prevents the ingress of dust, or
 - ii) the energy of electrical circuits is limited so as to avoid arcs, sparks or temperatures capable of igniting dust; and
- any other ignition sources are avoided.

This is a preview of BS EN IEC 60079-14:2024. [Click here to purchase the full version from the ANSI store.](#)

Several Types of Protection are available for Ex Equipment in hazardous areas (see IEC 60079-0). This document provides the specific requirements for the design of electrical systems, selection, installation and the required initial inspection of electrical Ex Equipment in hazardous areas including requirements for documentation and personnel competency. This document is also based on manufacturer's instructions being followed. On-going inspection, maintenance and repair aspects also play an important role in control of hazardous area installations and the user's attention is drawn to IEC 60079-17, IEC 60079-19 and manufacturer's instructions for further information concerning these aspects.

This part of IEC 60079 is supplementary to other relevant IEC standards, for example the IEC 60364 series as regards electrical installation requirements or IEC 60204 series for electrical safety of machinery. This part also refers to IEC 60079-0 and its associated standards for the construction, testing and marking requirements of suitable electrical Ex Equipment.

In any industrial installation, there can be numerous sources of ignition apart from those associated with electrical Ex Equipment. Precautions are necessary to ensure safety from other possible ignition sources, but guidance on this aspect is outside the scope of this document.

EXPLOSIVE ATMOSPHERES –

Part 14: Electrical installations design, selection and installation of equipment, including initial inspection

1 Scope

This part of IEC 60079 contains the specific requirements for the design of electrical systems, selection, installation and the required initial inspection of electrical installations of Ex Equipment in, or associated with, explosive atmospheres including requirements for documentation and personnel competency.

These requirements are in addition to the requirements for installations in non-hazardous areas.

NOTE 1 For voltages up to 1 000 V AC or 1 500 V DC requirements of this document are based on installation requirements in the IEC 60364 series and for higher voltages in the IEC 61936 series, but other relevant national requirements can apply. For offshore, the IEC 61892 series is applicable.

NOTE 2 Maximum voltages are limited by specific Types of Protection according to other parts of the IEC 60079 series and will be given in the documentation for the Ex Equipment.

This document applies to all electrical Ex Equipment including fixed, transportable, portable and personal, and installations, permanent or temporary.

NOTE 3 Guidance on transportable, portable or personal equipment can be found in Annex I and IEC TS 60079-48.

This document does not apply to:

- electrical installations in mines susceptible to firedamp;

NOTE 4 This document might apply to electrical installations in mines where explosive gas atmospheres other than firedamp can be formed and to electrical installations in the surface installation of mines.

- inherently explosive situations and dust from explosives or pyrophoric substances (for example explosives manufacturing and processing);
- rooms used for medical purposes;
- electrical installations in areas where the hazard is due to flammable mist; and
- installation of non-electrical Ex Equipment (unless being part of an equipment assembly according IEC TS 60079-46).

NOTE 5 Additional guidance on the requirements for hazards due to hybrid mixtures of dust or flyings and flammable gas or vapour is provided in Annex H.

NOTE 6 The use of portable tools having an Ex Equipment certificate might introduce an ignition source which is beyond the scope of this document, for example: a drill which could create a high temperature at the work piece.

No account is taken in this document of the toxic hazards that are associated with flammable gases, liquids and dusts in concentrations that are usually very much less than the lower flammable limit. In locations where personnel could be exposed to potentially toxic concentrations of flammable material, appropriate precautions are necessary. Such precautions are outside the scope of this document.