

AREAS CLASSIFICATION, IN ACCORDANCE WITH DIRECTIVE ATEX AND IECEx

Zone: The zones define the type of explosive atmosphere, as well as the likelihood of an explosive atmosphere.

- 0 - Place in which an explosive atmosphere (mixture of gas and air) is present continuously or for long periods or frequently.
- 1 - Place in which an explosive atmosphere (mixture of gas and air) is likely to occur occasionally during normal operation.
- 2 - Place in which an explosive atmosphere (mixture of gas and air) is not likely to occur occasionally during normal operation but if it does, it is possible to persist only for short periods.
- 20 - Place in which an explosive atmosphere (cloud of combustible dust in the air) is present continuously or for long periods or frequently.
- 21 - Place in which an explosive atmosphere (combustible dust cloud in air) is likely to occur occasionally during normal operation.
- 22 - Place in which an explosive atmosphere (cloud of combustible dust in the air) is not likely to occur occasionally during normal operation but if it does, it is possible to persist only for short periods.

EQUIPMENT PROTECTION LEVELS (EPL)

Group	EPL	Description
Group I (Mining)	EPL Ma	An apparatus for installation in a coal mine with possible presence of firedamp, with a level of protection "very high", which ensures a sufficient safety on the fact that it is not able to become a source of ignition during normal operation, during planned or malfunctions when subject to rare malfunctions even in the case where it is left electrically powered in the presence of a gas leak.
	EPL Mb	An apparatus for installation in a coal mine with possible presence of firedamp, with a security level "high", which ensures a sufficient safety on the fact that it is not able to become a source of ignition during normal operation or during malfunctions envisaged in connection with interval of time that elapses between when there is a release of gas and when the equipment is, as a result of this, interrupted the power supply.
Group II (Gas)	EPL Ga	An apparatus for potentially explosive atmospheres for the presence of gas, with a level of protection "very high", which is not a source of ignition during normal operation, during expected malfunctions or when subject to rare malfunctions.
	EPL Gb	An apparatus for potentially explosive atmospheres for the presence of gas, with a security level "high", which is not a source of ignition during normal operation or during malfunctions provided.
	EPL Gc	An apparatus for potentially explosive atmospheres for the presence of gas, with a level of protection "increased", which is not a source of ignition during normal operation and which presents some additional protective measures to ensure that it remains a source of ignition is not activated in the event of expected events regularly (for example, to the failure of a lamp).
Group III (Dust)	EPL Da	An apparatus for potentially explosive atmospheres for the presence of combustible dust, which presents a protection level "very high", which does not constitute a source of ignition in normal operation, during expected malfunction, or when subject to rare malfunctions.
	EPL Db	An apparatus for potentially explosive atmospheres for the presence of combustible dust, which presents a security level "high", which does not constitute a source of ignition in normal operation or when subject to possible failures.
	EPL Dc	An apparatus for potentially explosive atmospheres for the presence of dust, with a level of protection "increased", which does not constitute a source of ignition during normal operation and which may have additional protections to ensure that it remains a source of ignition inactive in the case of expected events regularly (for example the failure of a lamp).

MAIN CONCEPTS OF ELECTRICAL PROTECTION ACCORDING TO ATEX AND IECEx

Rules of reference IEC/EN	Mode of protection	Zone		Symbol		EPL	Basic function	Scheme
		Gas	Dust	Gas	Dust			
60079-14	Design, selection and installation of electrical systems						Defines the design criteria of the plant explosion-proof	
60079-0	General requirements						Defines the requirements for construction, test and marking of electrical equipment Ex	
60079-1	Flameproof "d"			0 1 2	Ex da Ex db Ex dc	Ga Gb Gc	Non propagation of flame in case of internal explosion	
60079-2	Overpressure "p"			1 1 2	Ex pxb Ex pyb Ex pzc	Gb Gb Gc	No access to the inside of flammable gases	
60079-5	Powder filling "q"			1	Ex q	Gb	Suppression of fire for lack of oxygen inside	
60079-6	Oil immersion "o"			1	Ex o	Gb	No access to the inside of flammable gases	
60079-7	Increased safety "e"			1 2	Ex eb Ex ec	Gb Gc	No arc or sparks or hot surfaces inside. Degree of protection IP 54 minimum	
60079-11	Intrinsic safety "i"			0 1 1 2	Ex ia Ex ib Ex ic	Ga Gb Gc	Limit the energy of sparks and surface temperature	
60079-15	Tightness - Restricted breathing "n"			2	Ex nR Ex nC	Gc	Housing with restrictive breathing (does not allow the entry of flammable gases) Sealed or non-triggered components	
60079-18	Encapsulation "m"			0 1 2	Ex ma Ex mb Ex mc	Ga Gb Gc	Inhibits the ingress of flammable gas (encapsulation)	
60079-31	Dust protection - protection mode "t"				Ex ta Ex tb Ex tc	Da Db Dc	Inhibits the access of combustible dust	

CORRELATION OF THE ENCLOSURES DEFINED BY NEMA (TYPES) AND CLASSIFICATION EN / IEC (IP). THIS CORRELATION IS BASED ON THE CONCEPT THAT THE NEMA TYPES MEET OR EXCEED THE REQUIREMENTS OF EN / IEC AND CAN NOT BE USED TO MAKE A CONVERSION FROM EN / IEC NEMA

NEMA 250 enclosure type	Definition according to NEMA 250	Code IP	Definition according to EN 60529 / IEC 60529
1	Indoor environments, access to hazardous parts, ingress of solid objects	IP20	Protected against solid objects greater than 12.5mm and no protection from liquids
2	Indoor environments, access to hazardous parts, ingress of solid objects	IP22	Protected against solid objects greater than 12.5 mm and protected against dripping water up to 15 degrees from the vertical
3/3X	Indoor/outdoor access to hazardous parts, ingress of solid objects and ingress of rain or snow or corrosion (corrosion only 3X)	IP55	Protection against solid objects greater than 1mm, to dust and water jets from all directions
3R/3RX	Indoor/outdoor access to hazardous parts, ingress of rain or snow or corrosive agents (Corrosive only 3RX)	IP24	Protected against solid objects greater than 12.5 mm and protected against splashing water from all directions
3S/3SX	Indoor/outdoor access to hazardous parts, ingress of solid objects and ingress of rain or snow or sleet or corrosive substances (corrosive agents only 3SX)	IP55	Protection against solid objects greater than 1mm, to dust and water jets from all directions
4/4X	Indoor/outdoor access to hazardous parts, ingress of solid objects and ingress of water or rain or snow or corrosion (corrosion only 4X)	IP66	Totally protected against dust and protected against waves and powerful water jets
5	Indoor/outdoor access to hazardous parts, ingress of solid objects and ingress of water	IP53	Protection against solid objects greater than 1mm and water droplets up to 60 degrees from the vertical
6	Indoor/outdoor access to hazardous parts, ingress of solid objects and ingress of water, rain, snow and water ingress (occasional temporary immersion)	IP67	Totally protected against dust and protected by temporary immersion (immersible between 15 cm and 1 m deep for up to 30 minutes, no condensation or infiltration)
6P	Indoor/outdoor access to hazardous parts, ingress of solid objects and ingress of water, rain, snow and water entry (temporary immersion or prolonged occasional)	IP68	Totally protected against dust and protected by permanent immersion in water (immersible at 3 m deep immersion depths and in any case more than one hour, resistant to a pressure of at least 10 bar in all directions)
7	Indoors in hazardous locations classified as Class I, Division 1, Groups A, B, C or D, as defined by NFPA 70	No equivalence	
8	Indoor/outdoor use in hazardous locations classified as Class I, Division 1, Groups A,B,C or D, as defined by NFPA 70	No equivalence	
9	Indoors in hazardous locations classified as Class II, Division 1, Groups E, F or G, as defined by NFPA 70	No equivalence	
10	Constructed so as to meet the requirements of Mine (Safety and Health Administration, 30 CFR, part 18)	No equivalence	
12/12K	Indoor environments, access to hazardous parts, ingress of solid objects and water ingress and infiltration of oils and coolants	IP54	Protection against solid objects greater than 1mm and against water spray from all directions
13	Indoor environments, access to hazardous parts, ingress of solid objects and water ingress and infiltration and splashes and splashes of oils and coolants	IP54	Protection against solid objects greater than 1mm and against water spray from all directions
	No equivalence	IP69	Totally protected against dust and protected by permanent immersion in water and high pressure and high water jets (immersible to at least 5 m deep immersion depths and in any case more than one hour, resistant to pressures between 80 bar and 100 bar in all directions)

FORMULATION OF THE IP CODE, ACCORDING TO EN 60529 AND IEC 60529

IP	X	X	X	X
1 st digit	0	1	2	3
2 nd digit	A	B	C	D
3 rd digit	a	b	c	d
4 th digit	h	m	s	w

Degree of protection (Ingress Protection)

DIFFERENT STANDARDS FROM IEC / EN / NEC / CEC

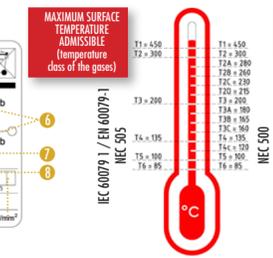
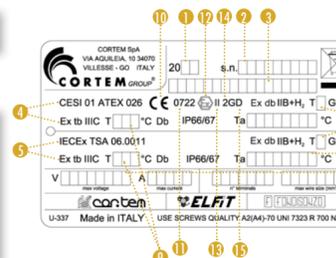
There are, in addition to legislation cited in this folding, the reference standards that must be applied in various countries such as:

- Russia, Belarus and Kazakhstan: EAC (Eurasian Conformity Mark);
- Brazil: INMETRO; UL BR; ANATEL
- Korea: MSIP Mark
- Australia: UxxxxxxEA; C-Tick; RCM; A-Tick
- India: ISI Mark; WPC Approval
- China: CCC Mark; SRRC Approval; CEL
- Saudi Arabia: CCS; CITC
- UAE: TRA; ECAS

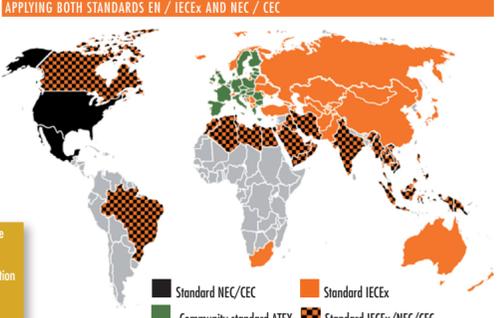
Note: Depending on the EU country of destination, the third and fourth digits may have specific functions for which reference is made to nationally transposed legislation. These digits are applicable only in those countries.

CLARIFICATIONS (Edition 03/2022)

The information in this poster is intended to give a guideline and refer to current regulations and the ATEX directive 2014/34/EU. For any changes in the rules, reference should be made to the latest updates of the standards mentioned.



GEOGRAPHICAL SPREAD OF CONSTRUCTION STANDARDS WITH EVIDENCE OF COUNTRIES APPLYING BOTH STANDARDS EN / IECEx AND NEC / CEC



AREAS CLASSIFICATION, IN ACCORDANCE WITH THE STANDARDS OF NORTH AMERICA (USA AND CANADA)

CLASS: Define the type of explosive atmosphere

- I - A location made hazardous by the presence of flammable gas or vapor that may be present in the air in quantities sufficient to produce an explosive or ignitable mixture.
- II - A location made hazardous by the presence of combustible or electrically conductive dust.
- III - A location made hazardous by the presence of easily ignitable fibers or flyings in the air, but not likely to be in suspension in quantities sufficient to produce ignitable mixtures.

DIVISIONS: Define the likelihood of an explosive atmosphere being present.

- 1 - Continuously or probable during normal operations.
- 2 - With little probability during normal operations and for short periods.

ATEX Groups	ATEX Categories	ATEX/IECEx Classification Zone	EPL level	Class/Zone US/CA (NEC 505)	Class/Division US/CA (NEC 500)
I	M1	N/A	Ma	N/A	Mining
	M2	N/A	Mb	N/A	Mining
(Gas) II	1G	Zone 0	Ga	Class I, Zone 0	Class I, Division 1
	2G	Zone 1	Gb	Class I, Zone 1	Class I, Division 1
	3G	Zone 2	Gc	Class I, Zone 2	Class I, Division 2
(Dust) III	1D	Zone 20	Da	Class II, Zone 20	Class II, Division 1
	2D	Zone 21	Db	Class II, Zone 21	Class II, Division 1
	3D	Zone 22	Dc	Class II, Zone 22	Class II, Division 2, Class III

M1 Equipment of this category is intended for use in underground mines and their surface plants exposed to risk of the release of firedamp and / or combustible dust. Equipment of this category must remain operative in an explosive atmosphere, even in the event of rare incidents.

M2 Equipment of this category is intended for use in underground mines and their surface plants exposed to risk of the release of firedamp and / or combustible dust. In the presence of an explosive atmosphere, the energy supply of these devices must be able to be interrupted.

1G/1D Equipment of this category is intended for environments that are present continuously, frequently or for long periods, explosive atmospheres caused by mixtures of air and gases, vapors, mists or mixtures of air and dust.

2G/2D Equipment of this category is intended for environments where there is likelihood of explosive atmospheres caused by gases, vapors, mists or mixtures of air and dust.

3G/3D Equipment of this category is intended for environments where there is little likely to occur, and then only briefly, explosive atmospheres caused by gases, vapors, mists or mixtures of air and dust.

GROUPS OF EQUIPMENT	EU (IEC / EN) US (NEC 505) CA (CEC Section 18)	US (NEC 500) CA (CEC Annex J)	Ignition temperature °C
Gas and dust (typical)			
Acetylene	Group IIC	Class I / Group A	305
Hydrogen	Group IIB + H2	Class I / Group B	560
Ethylene	Group IIB	Class I / Group C	425
Propane	Group IIA	Class I / Group D	470
Methane	Group I	Mining	595
Conductive powders	Group IIIC	Class II / Group E	450 - 570
Non conductive powders	Group IIIB	Class II / Group F	225 - 570
Volatiles fuels	Group IIIA	Class III	380 - 810

MAIN CONCEPTS OF ELECTRICAL PROTECTION (NEC / CEC)

Reference Rule	Class	Division	Zone	Symbol			
				Gas		Dust	
Gas	Dust	Gas	Dust	US	CA	US	CA
FM 3600							
ISA 60079-0	I	II, III	1 & 2			Aex	Ex
CSA 60079-0	I	II, III	1, 2, 20, 21 & 22			Aex	Ex
ISA 60079-1	I	1, 2	0, 1, 2			Aex da-db-dc	Ex da-db-dc
CSA 60079-1	I	1, 2	0, 1, 2				Ex da-db-dc
UL 1203 / C22.2	I	1				XP	
NFPA 496 (FM 3620)	I	1				X, Y	
ISA 60079-2	I	1				AEx px	Ex px
CSA 60079-2	I	1				AEx py	Ex py
ISA 60079-5	I	1				AEx pz	Ex pz
CSA 60079-5	I	1				AEx q	Ex q
ISA 60079-6	I	1				AEx o	Ex o
CSA 60079-6	I	1				AEx eb-ec	Ex eb-ec
ISA 60079-7	I	1, 2					NI
CSA 60079-7	I	1, 2					IS
ISA 12.12/FM3611/C22.2	I	2					
FM 3610 / C22.2	I	1					
ISA 60079-11	I	1				Aex ia	Ex ia
CSA 60079-11	I	1				Aex ib	Ex ib
ISA 60079-15	I	2				Aex ic	Ex ic
CSA 60079-15	I	2				Aex nC	Ex nC
ISA 60079-18	I	1				Aex nR	Ex nR
CSA 60079-18	I	1				AEx ma	Ex ma-mb-mc
ISA 60079-18	I	1				AEx mb	
CSA 60079-18	I	1				AEx mc	
* At present, the zones 20-22 are not included in the CEC (Canadian Electrical Code)	II	1		91			AEx tD ta & tb
ISA 60079-31	II	1		??			AEx tc
CSA E61241-1-1	II	1					DIP A20 o A21*
	II	2					DIP B20 o B21*
	II	2					DIP A22 o B22*

EXAMPLES OF MARKINGS FOR US / CA CERTIFICATIONS

US (NEC 500) and CA (CEC Annex J)				US (NEC 505)			
Explosionproof for	Class	Division	Group A, B, C, D	T6	Class I	Zone 1	AEx db
(optional, except for I.S.)							(ia)
Type of protection	Type of Class	Type of protection (optional, except for Division 2)	Type of Group	Temperature Class (T5 and T6 optional)	Type of Class	Type of Zone	National standards America explosion protected
							Type of protection
							Intrinsic Safety execution (S.I.)
							Gas Group
							Temperature Class
							Level of protection (EPL) (optional)

1 Year of construction	9 Maximum surface temperature
2 Serial number	10 CE marking
3 Definition product code	11 Supervisor body
4 Identification of ATEX certificate	12 Marking of Community protection
5 Identification of IECEx certificate	13 Group
6 Temperature Class	14 Category
7 Ambient temperature	15 G (gas) D (dust)
8 Electrical data	