Guide to Explosive Atmospheres

Area Classification

Standard		Flammable Material	Present Continuously[1]	Present Intermittently	Present Abnormally
IEC / CENELEC	IEC / EN 60079-10-1	Gas / Vapour	Zone 0	Zone 1	Zone 2
	IEC / EN 60079-10-2	Combustible Dust or Ignitable Fibers	Zone 20	Zone 21	Zone 22
ATEX	Directive 99/92/EC	Gas / Vapour	Zone 0	Zone 1	Zone 2
		Combustible Dust or Ignitable Fibers	Zone 20	Zone 21	Zone 22
NEC 501	ANSI/NFPA 70 National Electrical Code Article 501	Gas / Vapour	Class I, Division 1	Class I, Division 1	Class I, Division 2
NEC 505	ANSI/NFPA 70 National Electrical Code Article 505	Gas / Vapour	Class I, Zone 0	Class I, Zone 1	Class I, Zone 2
NEC 502	ANSI/NFPA 70 National Electrical Code Article 502	Combustible Dust or Ignitable Fibers	Class II, Division 1	Class II, Division 1	Class II, Division 2
NEC 506	ANSI/NFPA 70 National Electrical Code Article 506	Combustible Dust or Ignitable Fibers	Zone 20	Zone 21	Zone 22
CEC Sec. 18	CSA C22.1 Canadian Electrical Code Section 18	Gas / Vapour	Class I, Zone 0	Class I, Zone 1	Class I, Zone 2
	CSA C22.1 Canadian Electrical Code Section 18	Combustible Dust or Ignitable Fibers	Class II, Division 1	Class II, Division 1	Class II, Division 2

[1] *Electric motors are not allowed in Zone 0/20 locations;*

Atmosphere Groups

Substance	ATEX IECEx	North America		
	Group	Class	NEC / CEC Division System	NEC / CEC Zone System
Methane (Fire damp)	I	-	Gaseous	Mines [2]
Propane	IIA	I	Group D	IIA
Ethylene	IIB		Group C	IIB
Hydrogen	IIC		Group B	IIC
Acetylene	IIC		Group A	IIC
Fibers and Flyings	IIIA	III	-	IIIA
Grain Dust	IIIB	II	Group G	IIIB
Coal Dust	IIIB		Group F	IIIB
Metal Dust	IIIC		Group E	IIIC

[2] *Not within scope of NEC or CEC. Mining applications under jurisdiction of MSHA (Mine Safety & Health Association).*
[3] *The equipment with marking IIC (gas group), cover the groups IIB and IIA.*
The equipment with marking IIIC (dust group), cover the groups IIIB and IIIA.

Temperature Classes

IEC / CENELEC NEC 505 / CEC SECTION 18	NEC 500 / CEC Annex J	Maximum Surface Temperature
T1	T1	450 °C (842 °F)
T2	T2	300 °C (572 °F)
	T2A	280 °C (536 °F)
	T2B	260 °C (500 °F)
	T2C	230 °C (446 °F)
	T2D	215 °C (419 °F)
T3	T3	200 °C (392 °F)
	T3A	180 °C (356 °F)
	T3B	165 °C (329 °F)
	T3C	160 °C (320 °F)
T4	T4	135 °C (275 °F)
	T4A	120 °C (248 °F)
T5	T5	100 °C (212 °F)
T6	T6	85 °C (185 °F)

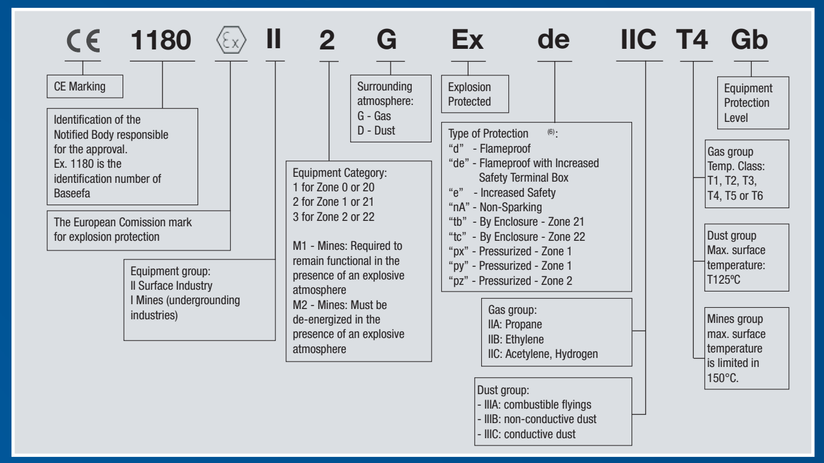
Protection Concepts

Type of Protection	Code / Symbol	Division / Zone	Market	Standard	Concept of Protection
Electrical Equipment for Flammable Gas, Vapours and Mist					
Flameproof	Ex d	Zone 1	IECEx / ATEX	IEC / EN 60079-1	Contain the explosion and prevent flame propagation
	Ex d	Class I, Zone 1	Canada	CAN/CSA-C22.2 No. 60079-1	
	AEx d	Class I, Zone 1	US	ANSI / UL 60079-1	
Explosion Proof	(XP)	Class I, Division 1	Canada	CSA-C22.2 No. 145 / No. 30	
	(XP)	Class I, Division 1	US	UL 674 / UL 1203	
Increased Safety	Ex e	Zone 1	IECEx / ATEX	IEC / EN 60079-7	No arcs, sparks or hot surfaces
	Ex e	Class I, Zone 1	Canada	CAN/CSA-C22.2 No. 60079-7	
	AEx e	Class I, Zone 1	US	ANSI / UL 60079-7	
Non-sparking	Ex nA	Zone 2	IECEx / ATEX	IEC / EN 60079-15	
	Ex nA	Class I, Zone 2	Canada	CAN/CSA-C22.2 No. 60079-15	
	AEx nA	Class I, Zone 2	US	ANSI / UL 60079-15	
Nonincendive	(NI)	Class I, Division 2	Canada	CSA-C22.2 No. 0 / No. 213	
	(NI)	Class I, Division 2	US	UL 674 / ISA 12.12.01	
Pressurized	Ex px	Zone 1	IECEx / ATEX	IEC / EN 60079-2	Keep flammable gas out
	Ex px	Zone 1	Canada	CAN/CSA-C22.2 No. 60079-2	
	AEx px	Class I, Zone 1	US	ANSI / UL 60079-2	
	Ex py	Zone 1	IECEx / ATEX	IEC / EN 60079-2	
	Ex py	Zone 1	Canada	CAN/CSA-C22.2 No. 60079-2	
	AEx py	Class I, Zone 1	US	ANSI / UL 60079-2	
	Ex pz	Zone 2	IECEx / ATEX	IEC / EN 60079-2	
	Ex pz	Zone 2	Canada	CAN/CSA-C22.2 No. 60079-2	
	AEx pz	Class I, Zone 2	US	ANSI /UL 60079-2	
	Type X	Class I, Division 1	Canada / US	NFPA 496	
	Type Y	Class I, Division 1	Canada / US	NFPA 496	
	Type Z	Class I, Division 2	Canada / US	NFPA 496	
Electrical Equipment for Combustible Dusts					
Protection by Enclosure	Ex tb	Zone 21	IECEx / ATEX	IEC / EN 60079-31	Keep combustible dust out
	Ex tb	Class II, Zone 21	Canada	CAN/CSA-C22.2 No. 60079-31	
	AEx tb	Class II, Zone 21	US	ANSI/UL 60079-31	
	Ex tc	Zone 22	IECEx / ATEX	IEC / EN 60079-31	
	Ex tc	Class II, Zone 22	Canada	CAN/CSA-C22.2 No. 60079-31	
	AEx tc	Class II, Zone 22	US	ANSI/UL 60079-31	
Dust Ignition Proof	(DIP)	Class II, Division 1	Canada	CSA-C22.2 No. 25	
	(DIP)	Class II, Division 1	US	UL 1203	
Pressurized / Protection by Pressurization	Ex pD	Zone 21	IECEx / ATEX	IEC / EN 61241-4	
	AEx pD	Zone 21	US	ANSI/ISA 61241-2	
	(PX)	Class II, Division 1	Canada / US	NFPA 496	
	(PY)	Class II, Division 1	Canada / US	NFPA 496	
	(PZ)	Class II, Division 2	Canada / US	NFPA 496	
	Ex pD	Zone 22	IECEx / ATEX	IEC / EN 61241-4	

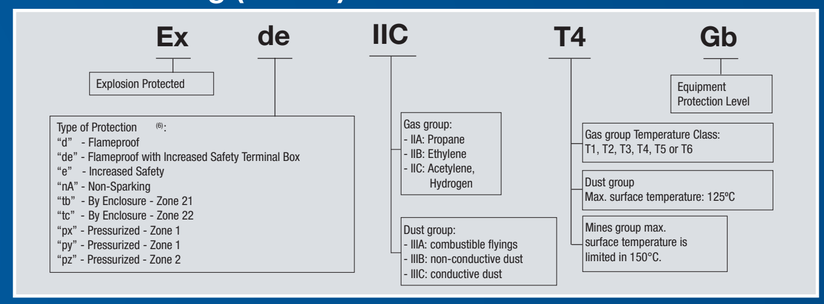
Equipment Protection Level (EPL)

Equipment Group	ATEX Directive 2014/34/EU Equipment Category	Zone	Equipment Protection Level	Atmosphere	Protection Level	Use
I (Mines)	M1	-	Ma	Methane (Fire damp)	Very High	Operable in Ex atmosphere
	M2	-	Mb		High	De-energised in Ex atmosphere
II (All other)	1	0	Ga	G - Gas, Vapours D - Dust	Very High	Zones 0, 1 and 2
		20	Da			Zones 20, 21 and 22
	2	1	Gb		High	Zones 1 and 2
		21	Db			Zones 21 and 22
	3	2	Gc		Enhanced	Zone 2
		22	Dc			Zone 22

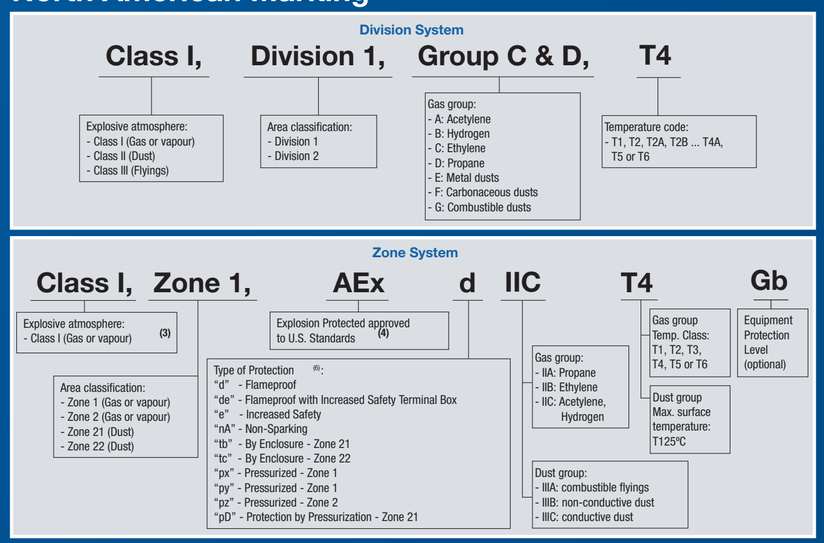
ATEX Marking (European)



IECEx Marking (Global)



North American Marking



[4] *For Dust environments (Zone 21 or 22) the Class of the hazard (Class II) shall not be mentioned in the marking e.g. Z one 21, AEx tb IIIC T125ºC Db*
[5] *For Canadian Standards letter "A" shall not be mentioned in the marking e.g. Class I, Zone I, Ex d IIC T4 Gb*
[6] *Certificates emitted according the new standards versions require the EPL marking close to protection type. E.g. Ex db eb (Old: Ex de)*

Cod: 50042119 | Rev: 06 | Date (m/y): 02/2017