

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 ⁽³⁾	Class	NEC / CEC Division System	NEC / CEC Zone System ⁽³⁾
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⁾ Equipment with Gas Group marking IIC, covers also the Groups IIA and IIB.

Equipment with Dust Group marking IIIC, covers also the Groups IIIA and IIIB.

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)
T3	T2A	280 °C (536 °F)
	T2B	260 °C (500 °F)
	T2C	230 °C (446 °F)
T4	T2D	215 °C (419 °F)
	T3	200 °C (392 °F)
	T3A	180 °C (356 °F)
T5	T3B	165 °C (329 °F)
	T3C	160 °C (320 °F)
	T4	135 °C (275 °F)
T6	T4A	120 °C (248 °F)
	T5	100 °C (212 °F)
T6	T6	85 °C (185 °F)

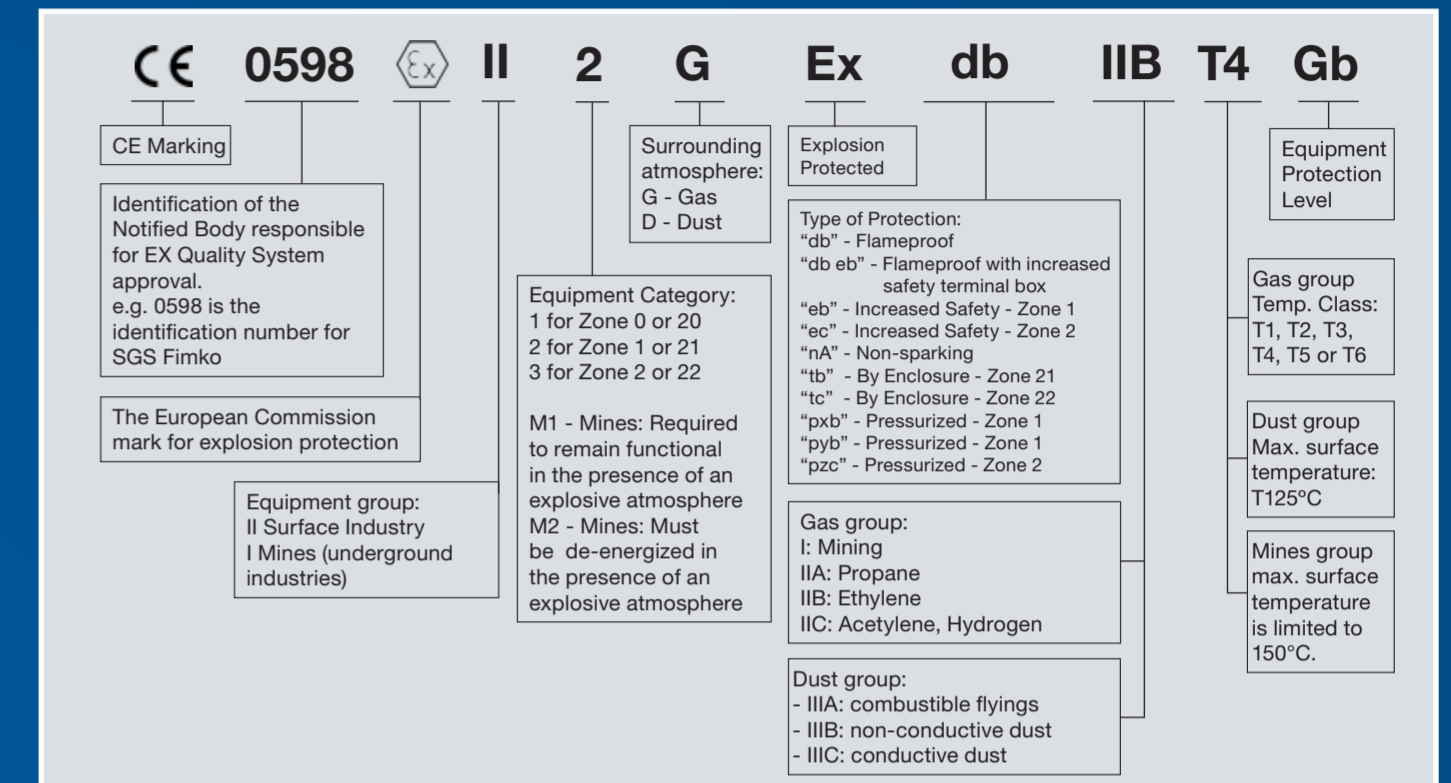
Protection Concepts

Type of Protection	Code / Symbol	Division / Zone	Market	Standard	Concept of Protection
Electrical Equipment for Flammable Gas, Vapours and Mist					
Flameproof Level of Protection "db"	Ex db	Zone 1	IECEX / ATEX	IEC / EN 60079-1	Contain the explosion and prevent flame propagation
	Ex db	Zone 1	Canada	CAN/CSA-C22.2 No. 60079-1	
	AEx db	Class I, Zone 1	US	ANSI / UL 60079-1	
Explosion Proof	(XP)	Class I, Division 1	Canada	CSA-C22.2 No. 145 / No. 30	No arcs, sparks or hot surfaces
	(XP)	Class I, Division 1	US	UL 674 / UL 1203	
	Ex eb	Zone 1	IECEX / ATEX	IEC / EN 60079-7	
Increased Safety Level of Protection "eb"	Ex eb	Zone 1	Canada	CAN/CSA-C22.2 No. 60079-7	No arcs, sparks or hot surfaces
	AEx eb	Class I, Zone 1	US	ANSI / UL 60079-7	
	Ex ec	Zone 2	IECEX / ATEX	IEC / EN 60079-7	
Increased Safety Level of Protection "ec"	Ex ec	Zone 2	Canada	CAN/CSA-C22.2 No. 60079-7:16	No arcs, sparks or hot surfaces
	AEx ec	Class I, Zone 2	US	ANSI / UL 60079-7	
	Ex nA	Zone 2	Canada	CAN/CSA-C22.2 No. 60079-15	
Non-sparking "nA"	AEx nA	Class I, Zone 2	US	ANSI / UL 60079-15	No arcs, sparks or hot surfaces
	(NI)	Class I, Division 2	Canada	CSA-C22.2 No. 0 / No. 213	
Nonincendive (Div.2)	(NI)	Class I, Division 2	US	UL 674 / ISA 12.12.01	No arcs, sparks or hot surfaces
	Ex pxb	Zone 1	IECEX / ATEX	IEC / EN 60079-2	
Pressurized Level of Protection "pxb"	Ex pxb	Zone 1	Canada	CAN/CSA-C22.2 No. 60079-2	Keep flammable gas out
	AEx pxb	Class I, Zone 1	US	ANSI / UL 60079-2	
	Ex pyb	Zone 1	IECEX / ATEX	IEC / EN 60079-2	
Pressurized Level of Protection "pyb"	Ex pyb	Zone 1	Canada	CAN/CSA-C22.2 No. 60079-2	Keep flammable gas out
	AEx pyb	Class I, Zone 1	US	ANSI / UL 60079-2	
	Ex pzc	Zone 2	IECEX / ATEX	IEC / EN 60079-2	
Pressurized Level of Protection "pzc"	Ex pzc	Zone 2	Canada	CAN/CSA-C22.2 No. 60079-2	Keep flammable gas out
	AEx pzc	Class I, Zone 2	US	ANSI / UL 60079-2	
	Type X	Class I, Division 1	Canada / US	NFPA 496	
Pressurized	Type Y	Class I, Division 1	Canada / US	NFPA 496	Keep flammable gas out
	Type Z	Class I, Division 2	Canada / US	NFPA 496	
	Electrical Equipment for Combustible Dusts				
Protection by Enclosure Level of Protection "tb"	Ex tb	Zone 21	IECEX / ATEX	IEC / EN 60079-31	Keep combustible dust out
	Ex tb	Zone 21	Canada	CAN/CSA-C22.2 No. 60079-31	
	AEx tb	Zone 21	US	ANSI/UL 60079-31	
Protection by Enclosure Level of Protection "tc"	Ex tc	Zone 22	IECEX / ATEX	IEC / EN 60079-31	Keep combustible dust out
	Ex tc	Zone 22	Canada	CAN/CSA-C22.2 No. 60079-31	
	AEx tc	Zone 22	US	ANSI/UL 60079-31	
Dust Ignition Proof	(DIP)	Class II, Division 1	Canada	CSA-C22.2 No. 25	Keep combustible dust out
	(DIP)	Class II, Division 1	US	UL 1203	
Dust Protected	(NI)	Class II, Division 2	Canada	CSA-C22.2 No. 25	Keep combustible dust out
	(NI)	Class II, Division 2	US	ANSI/UL 1604	
Pressurized	(PX)	Class II, Division 1	Canada / US	NFPA 496	Keep combustible dust out
	(PZ)	Class II, Division 2	Canada / US	NFPA 496	

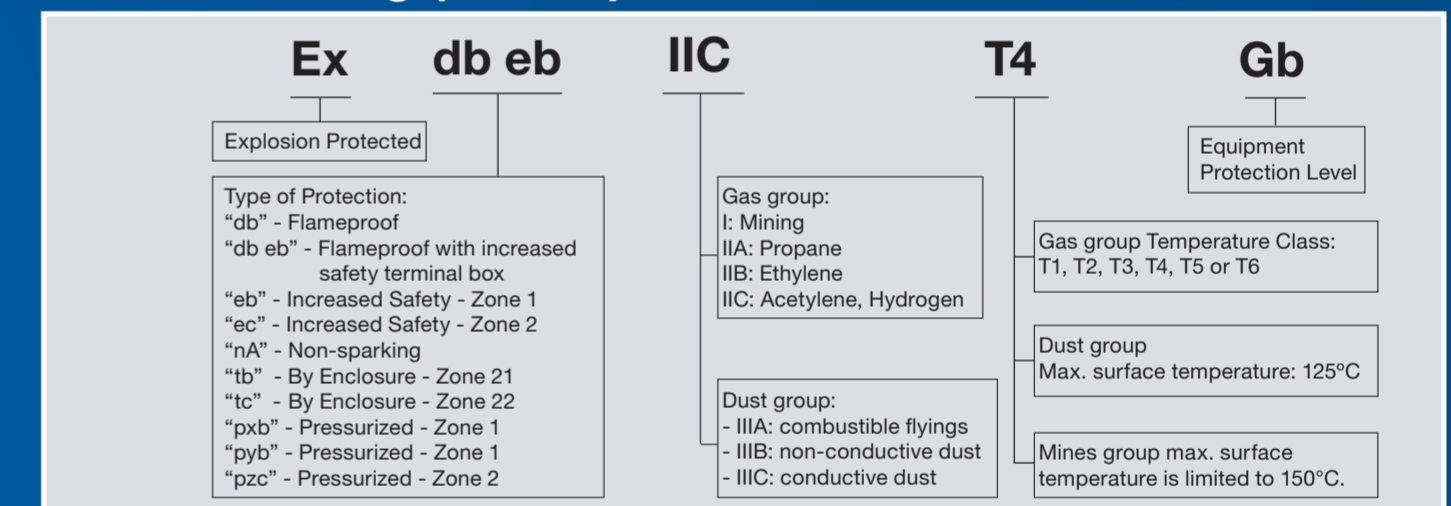
Equipment Group, Category, Zone and Protection Level (EPL)

Equipment Group	Equipment Category (acc. ATEX Directive 2014/34/EU)	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		High	Zones 20, 21 and 22
	1	Gb	High		Zones 1 and 2	
	21	Db	High		Zones 21 and 22	
	2	Gc	Enhanced		Zone 2	
3	22	Dc	Enhanced	Zone 22		

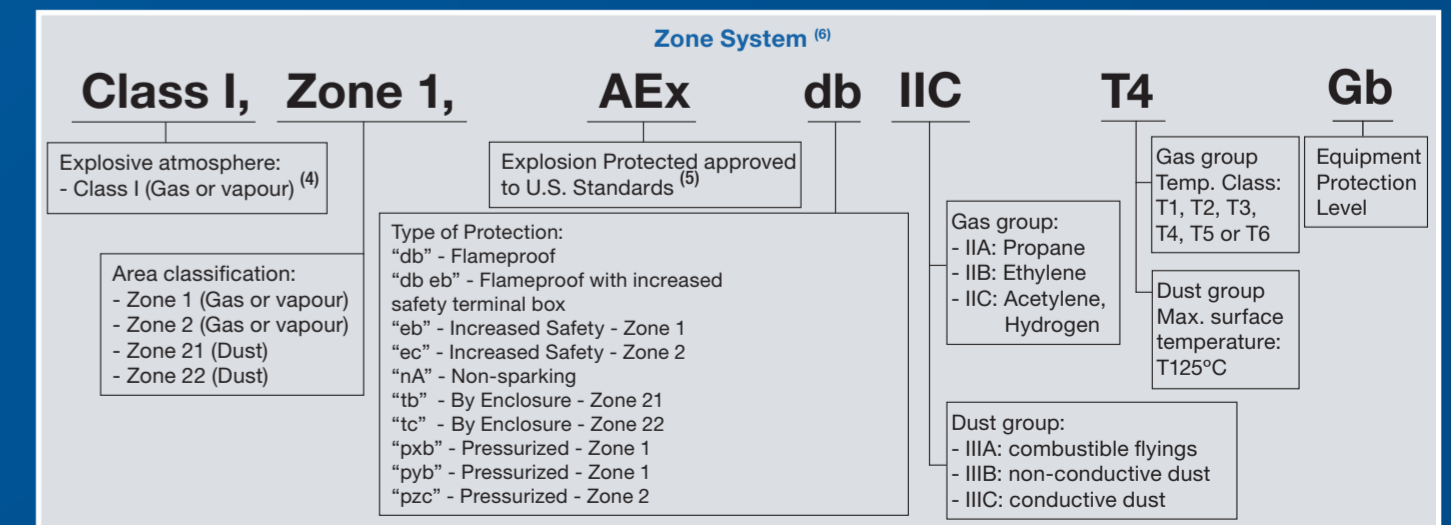
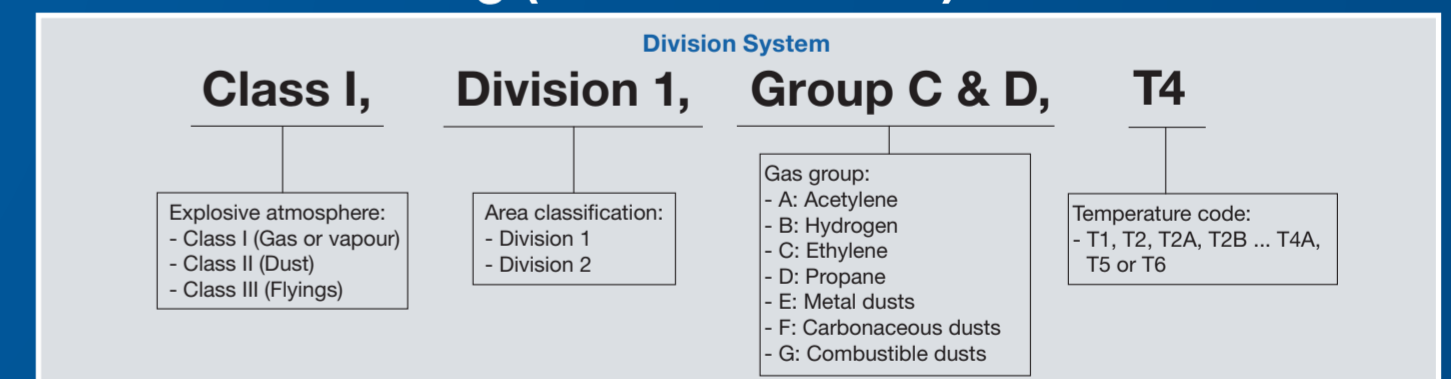
ATEX Marking (European)



IECEX Marking (Global)



NEC/CEC Marking (North American)



⁽⁴⁾ For Dust environments (Zone 21 or 22) the Class of the hazard (Class II) shall not be mentioned in the marking e.g. Zone 21, AEx tb IIC T125°C Db

⁽⁵⁾ For Canadian Standards letter "A" shall not be mentioned in the marking e.g. Class I, Zone 1, Ex db IIC T4 Gb

⁽⁶⁾ Zone System is recommended for new installations in Canada. For United States, the installation, Zone System is optional.

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