

# Guide to Explosive Atmospheres



## Area Classification

Standard		Flammable Material	Present Continuously <sup>(1)</sup>	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

<sup>(1)</sup> 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 <sup>(2)</sup>	
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

<sup>(2)</sup> Not within scope of NEC or CEC. Mining applications under jurisdiction of MSHA (Mine Safety & Health Association).

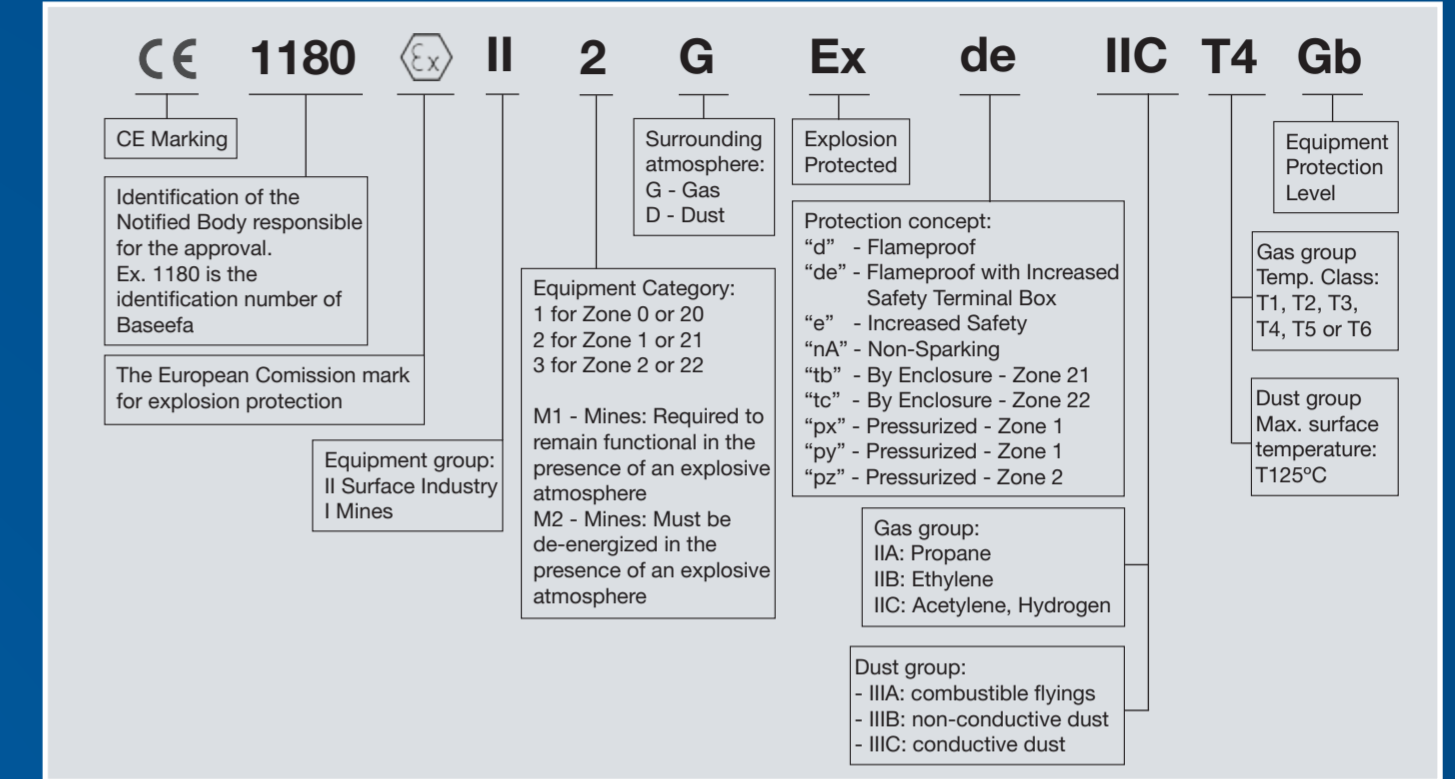
## Temperature Classes

IEC / CENELEC NEC / CEC 505 & 506	NEC / CEC 500	Maximum Surface Temperature
T1	T1	450 °C (842 °F)
T2	T2	300 °C (572 °F)
	T2A	280 °C (536 °F)
T3	T2B	260 °C (500 °F)
	T2C	230 °C (446 °F)
	T2D	215 °C (419 °F)
	T3	200 °C (392 °F)
T4	T3A	180 °C (356 °F)
	T3B	165 °C (329 °F)
T5	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)

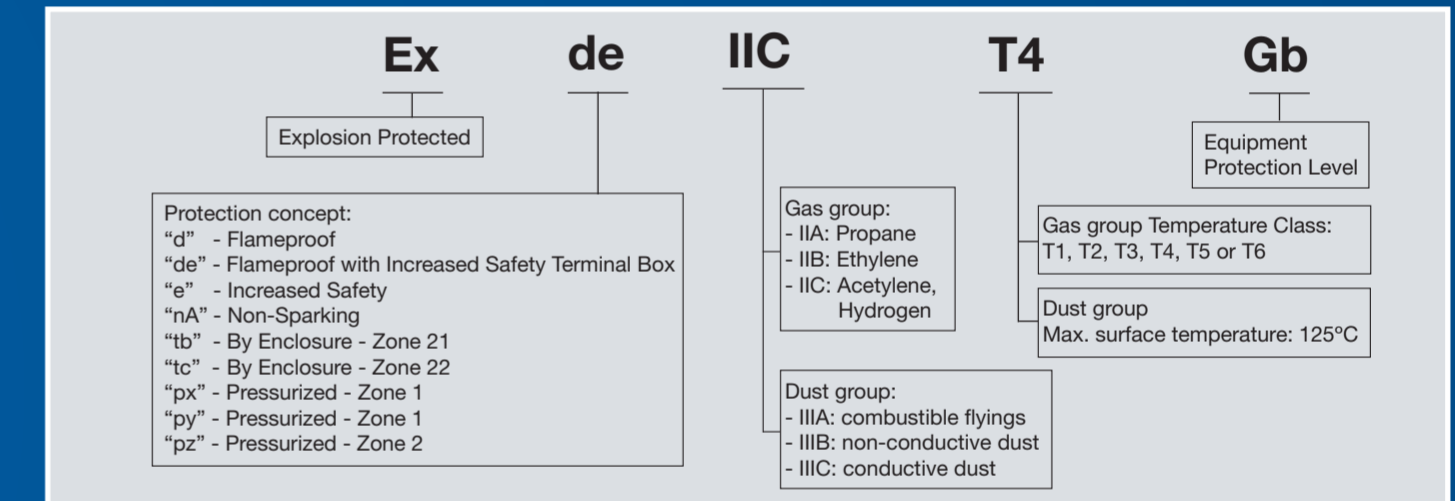
## Protection Concepts

Type of Protection	Code / Symbol	Division / Zone	Market	Standard	Concept of Protection
Electrical Equipment for Flammable Gas, Vapours and Mist					
Flameproof	Ex d(e)	Zone 1	IECEX / ATEX	IEC / EN 60079-1	Contain the explosion and prevent flame propagation
	Ex d(e)	Class I, Zone 1	Canada	CAN/CSA-C22.2 No. 60079-1	
Explosion Proof	AEx d(e)	Class I, Zone 1	US	ANSI / UL 60079-1	
	(XP)	Class I, Division 1	Canada	CSA-C22.2 No. 145 / No. 30	
Increased Safety	(XP)	Class I, Division 1	US	UL 674 / UL 1203	
	Ex e	Zone 1	IECEX / ATEX	IEC / EN 60079-7	
Non-sparking	Ex e	Class I, Zone 1	Canada	CAN/CSA-C22.2 No. 60079-7	No arcs, sparks or hot surfaces
	AEx e	Class I, Zone 1	US	ANSI / UL 60079-7	
Nonincendive	Ex nA	Zone 2	IECEX / ATEX	IEC / EN 60079-15	
	Ex nA	Class I, Zone 2	Canada	CAN/CSA-C22.2 No. 60079-15	
Pressurized	(NI)	Class I, Division 2	Canada	CSA-C22.2 No. 0 / No. 213	Keep flammable gas out
	(NI)	Class I, Division 2	US	UL 674 / ISA 12.12.01	
Pressurized	Ex px	Zone 1	IECEX / ATEX	IEC / EN 60079-2	
	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	

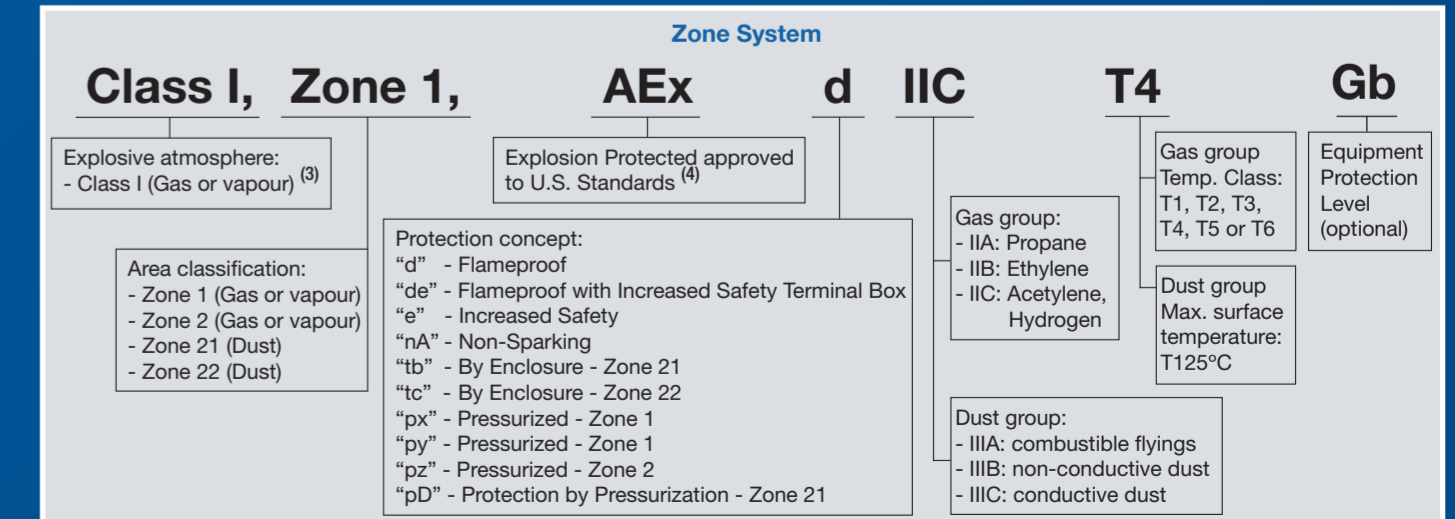
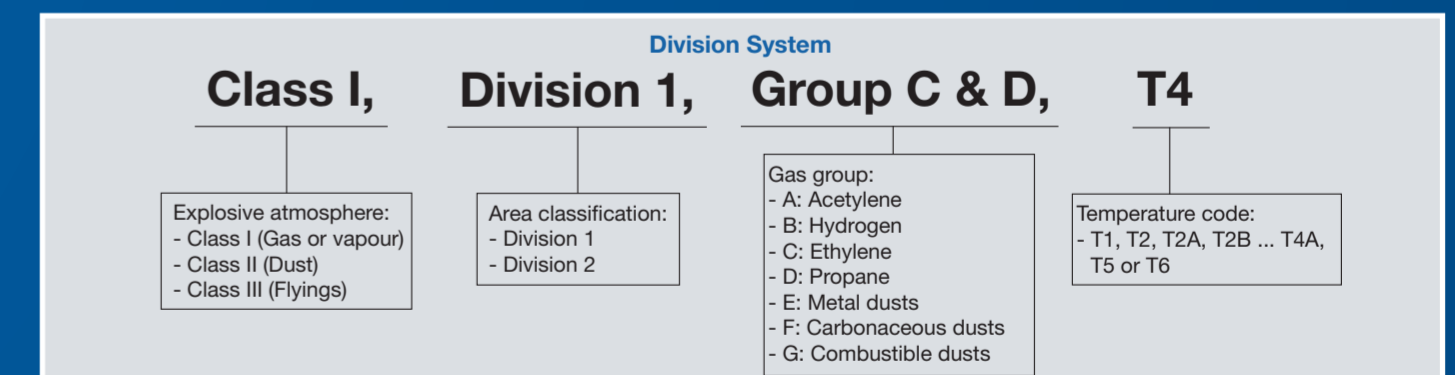
## ATEX Marking



## IECEX Marking



## North American Marking



<sup>(3)</sup> 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

<sup>(4)</sup> For Canadian Standards letter "A" shall not be mentioned in the marking e.g. Class I, Zone I, Ex d IIC T4 Gb

## 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	Methane (Fire damp)	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

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