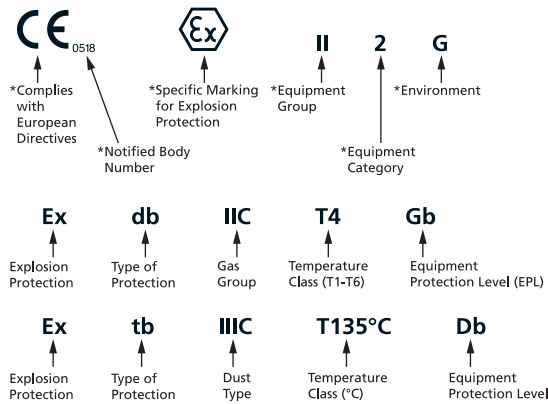


Appendix A: Equipment Certification Requirements for Hazardous Locations

ATEX & IECEx

Typical ATEX & IECEx Marking [*ATEX only]



Protection Concepts

Type of Protection	Symbol	Typical IEC EPL	Typical Zone(s)	IEC Standard	Basic Concept of Protection
Electrical Equipment for Gases, Vapours and Mists (G)					
General Requirements	-	-	-	IEC 60079-0	-
Optical Radiation	Op pr Op sh Op is	Gb Ga Ga	1, 2 0, 1, 2 0, 1, 2	IEC 60079-28	Protection against ignitions from optical radiation
Increased Safety	eb ec	Gb Gc	1, 2 2	IEC 60079-7	No arcs, sparks or hot surfaces. Enclosure IP54 or better
Type 'n' (non-sparking)	nA	Gc	2	IEC 60079-15	-
Flameproof	da db dc	Ga Gb Gc	0, 1, 2 1, 2 2	IEC 60079-1	Contain the explosion, quench the flame
Type 'n' (enclosed break)	nC	Gc	2	IEC 60079-15	-
Quartz / Sand Filled	q	Gb	1, 2	IEC 60079-5	Quench the flame
Intrinsic Safety	ia ib ic	Ga Gb Gc	0, 1, 2 1, 2 2	IEC 60079-11	Limit the energy of sparks and surface temperatures
Type 'n' (sealing & hermetic sealing)	nC	Gc	2	IEC 60079-15	-
Type 'n' (restricted breathing)	nR	Gc	2	IEC 60079-15	Keep the flammable gas out
Encapsulation	ma mb mc	Ga Gb Gc	0, 1, 2 1, 2 2	IEC 60079-18	-
Electrical Equipment for Combustible Dusts (D)					
General Requirements	-	-	-	IEC 60079-0	-
Optical Radiation	Op pr Op sh Op is	Db Da Da	21, 22 20, 21, 22 20, 21, 22	IEC 60079-28	Protection against ignitions from optical radiation
Enclosure	ta tb tc	Da Db Dc	20, 21, 22 21, 22 22	IEC 60079-31	Standard protection for dusts, rugged tight enclosure
Intrinsic Safety	ia ib ic	Da Db Dc	20, 21, 22 21, 22 22	IEC 60079-11	Limit the energy of sparks and surface temperatures
Encapsulation	ma mb mc	Da Db Dc	20, 21, 22 21, 22 22	IEC 60079-18	Protection by encapsulation of incandescent parts
Electrical Equipment for Combustible Dusts (D)					
General Requirements	-	-	-	EN 13463-1	-
Flow Restricted Enclosure	fr	-	-	IEC 80079-36	Low potential energy
Flameproof Enclosure	d	-	-	EN 13463-2	Relies on tight seals, closely matched joints and tough enclosures to restrict the breathing of the enclosure
Constructional Safety	c	-	0, 1, 2 20, 21, 22	EN 13463-5	Ignition hazards eliminated by good engineering methods
	h	Ga, Gb, Gc Da, Db, Dc	0, 1, 2 20, 21, 22	IEC 80079-37	-
Control of Ignition Source	b	-	-	EN 13463-6	Control equipment fitted to detect malfunctions
	h	Ga, Gb, Gc Da, Db, Dc	0, 1, 2 20, 21, 22	IEC 80079-37	-

cCS Aus

Typical North American Marking (CSA)

Class I, Division 1, Groups A,B,C,D T4



Class II, Division 1, Groups E,F,G



Class I, Zone 0, AEx ia IIC T4



Protection Concepts

Type of Protection	Code	Country	Class	Division / Zone	Standard	Basic Concept of Protection
Electrical Equipment for Flammable Gas, Vapors and Mists - Class I						
General Requirements	AEx Ex	US CA	Class I Class I	Division 1 & 2 Zone 1 & 2	FM 3600 - ISA 60079-0 CSA 60079-0	-
Increased Safety	AEx e Ex e	US CA	Class I Class I	Zone 1 Zone 1	ISA 60079-7 CSA C22.2 No. 60079-7	-
Non-Incendive	(NI) (NI)	US CA	Class I Class I	Division 2 Division 2	ISA 12.12.01 / FM 3611 C22.2 No. 213	No arcs, sparks or hot surfaces
Non-Sparking	AEx nA Ex nA	US CA	Class I Class I	Zone 2 Zone 2	ISA 60079-15 CSA C22.2 No. 60079-15	-
Explosion Proof	(XP) (XP)	US CA	Class I Class I	Division 1 Division 1	UL 1203 / FM 3615 C22.2 No. 30	-
Flameproof	AEx d Ex d	US CA	Class I Class I	Zone 1 Zone 1	ISA 60079-1 UL 1203 / FM 3615 CSA 60079-1	Contain the explosion and extinguish the flame
Enclosed Break	AEx nC Ex nC	US CA	Class I Class I	Zone 2 Zone 2	ISA 60079-15 CSA C22.2 No. 60079-15	-
Intrinsic Safety	(IS) (IS)	US CA	Class I Class I	Division 1 Division 1	UL 913 / FM 3610 C22.2 No. 157	-
	AEx ia Ex ia	US CA	Class I Class I	Zone 0 Zone 0	ISA 60079-11 / FM 3610 ISA 60079-11 / FM 3610	Limit energy of sparks and surface temperature
	AEx ib Ex ib	US CA	Class I Class I	Zone 1 Zone 1	CSA C22.2 No. 60079-11 CSA C22.2 No. 60079-11	-
	AEx nC Ex nC	US CA	Class I Class I	Zone 2 Zone 2	ISA 60079-15 CSA C22.2 No. 60079-15	-
Limited Energy	AEx nR Ex nR	US CA	Class I Class I	Zone 2 Zone 2	ISA 60079-15 CSA C22.2 No. 60079-15	-
Restricted Breathing	AEx ma Ex ma	US CA	Class I Class I	Zone 0 Zone 1	ISA 60079-18 ISA 60079-18	Keep flammable gas out
Encapsulated	AEx mb Ex mb	US CA	Class I Class I	Zone 1 Zone 1	CSA C22.2 No. 60079-18 ISA 60079-18	-
Electrical Equipment for Flammable Gas, Vapors and Mists - Class I						
General Requirements	Ex	US CA US CA US	Class II Class II Class III Class III -	Division 1 & 2 Division 1 & 2 Division 1 & 2 Zone 20, 21, 22	FM 3600 CSA C22.2 No.0 FM 3600 CSA C22.2 No.0 ISA 60079-0	-
Dust Ignition Proof	-	US CA	Class II Class II	Division 1 Division 1	UL 1203 / FM 3616 CSA C22.2 No. 25	-
Dust Protected	-	US CA	Class II Class II	Division 2 Division 2	ISA 12.12.01 / FM 3611 CSA C22.2 No. 25	-
Protection by Enclosure	AEx ta Ex ta	US CA	Class II Class II	Zone 20 Zone 20	ISA 60079-31 ISA 60079-31	Keep combustible dust out
	AEx tb Ex tb	US CA	Class II Class II	Zone 21 Zone 21	ISA 60079-31 CSA C22.2 No. 60079-31	
	AEx tc Ex tc	US CA	Class II Class II	Zone 22 Zone 22	ISA 60079-31 CSA C22.2 No. 60079-31	
	AEx mbD Ex mbD	US CA	Class II Class II	Zone 20 Zone 21	ISA 60079-18 ISA 60079-18	
Intrinsic Safety	(IS) (IS)	US CA	Class II Class II	Division 1 Division 1	UL 913 / FM 3610 CSA C22.2 No. 157	Limit energy of sparks and surface temperature
	AEx iaD Ex iaD	US CA	Class II Class II	Zone 20 Zone 21	ISA 60079-11 ISA 60079-11	
	(IS) (IS)	US CA	Class III Class III	Division 1 Division 1	UL 913 / FM 3610 CSA C22.2 No. 157	
	(IS) (IS)	US CA	Class III Class III	Division 1 Division 1	UL 913 / FM 3610 CSA C22.2 No. 157	