## Certifications for explosion protected products – Standards electrical

ce: NFPA70 (N	National Electr	1 ric Code) §500-5	:03 (US)						
ce: CSA C22.1	I Appendix J (C	CA)							
	Hazard cl Defines t substance	lass he type of explo es that may be p	sive or ignita present in the	able e area.					
	Class I	Flammable	apor or gas	Gas/	Dust group				
	Class II Class III	Ignitable fib	edust ers or flying:	s (see gene	Atmosphere grou eral section)	ps in the			
		Class I	Div 1	Groups /	A, B, C, D	T5	Gas		
		Class II	Div 1	Groups I	E, F, G	T5	Dust		
		Class II	Div 1			Î	Fiber		
			$\uparrow$						
Area classifie The divisions	cation s specifies the	e likelihood of fla	ammable cor	ocentrations of	Temperature (see Tempera	classifica ture class	tion ification in the		
the classified	d substances.	able concentrati	ons of hazar	ds can exist	general secti	on)			
Division 1	all/some of	the time under r	normal opera	iting conditions.					
Division 2	Where ignit to exist und	able concentrati er normal opera	ons of hazar ting conditic	ds are not likely ons.					
Stando	urds - No	orth Americ	can mar	king, Divisio	on system				
Type of prot	tection	Country	Permitted	Standard FM III	Definition			Gas	
Type of proc		country	division	CSA C22.2	Definition			Uas	
General requ	uirements	USA CAN	1, 2 1, 2	FM 3600 CSA No 0	Applies to all pr	rotection	concepts, general safety		
Nen incendi		USA	2	FM 3611	No oros or orbitis	-			
Non-Incenal	ve	CAN	2	CSA No 213	ino arcs, sparks	or not su	irraces		
Explosion-pr	roof	USA	1	FM 3615 UL 1203	Contain the exp	olosion an	id quench the flame		
		CAN	1	CSA No 30				_	
Intrinsic safe	ety	USA	1	FM 3610 UL 913	Energy limitatio	n in sparl	ks and hot surfaces		
		CAN	1	CSA 60079-11				_	
		USA	1	FM 3620 NFPA 496					
Pressurized			2		Exclude the flar				
		CAN	1	NFPA 496					
			2						
				Standard					
Type of prot	tection	Country	Permitted division	FM, UL	Definition			Dust	-
General requ	lirements	USA	1, 2	FM 3600	Applies to all p	rotection	concepts		
Seneral requ		CAN	1, 2	CSA No 0 FM 3616	, ipplies to all μι	JUCCION		_	
Dust ignition	n proof	USA	1	UL 1203	-				
		CAN	1	CSA No 25 FM 3611	-				
Dust protected		CAN	2	UL 121201					
		Criti	1	FM 3620	Keep the combi	ustible du	st out		
		USA	1 2	NFPA 496					
December 1			1	NEPA 496					
Pressurized		CAN		111 / 430					
Pressurized		CAN	2						
Pressurized	ety	CAN USA	2	FM 3610 UL 913	Energy limitatio	n in spar	ks and hot surfaces		
Pressurized Intrinsic safe	ety	CAN USA CAN	2 1 1	FM 3610 UL 913 CSA 60079-11	Energy limitatio	n in sparl	ks and hot surfaces		
Pressurized Intrinsic safe	ety	CAN USA CAN	2 1 1	FM 3610 UL 913 CSA 60079-11	Energy limitatio	n in sparl	ks and hot surfaces		0
Pressurized Intrinsic safe	ety tection	CAN USA CAN Country	2 1 1	FM 3610 UL 913 CSA 60079-11 Standard FM, UL	Energy limitatio	n in sparl	ks and hot surfaces	Fiber	0 0
Pressurized Intrinsic safe	ety tection	CAN USA CAN Country	2 1 1 Permitted division	FM 3610 UL 913 CSA 60079-11 Standard FM, UL CSA C22.2	Energy limitatio	n in sparl	ks and hot surfaces	Fiber	0 0 0 0 0
Pressurized Intrinsic safe <b>Type of prot</b> General requ	ety tection uirements	CAN USA CAN CAN CAN CAN CAN CAN CAN CAN CAN CA	2 1 1 Permitted division 1, 2 1, 2	FM 3610 UL 913 CSA 60079-11 Standard FM, UL CSA C22.2 FM 3600 CSA No 0	Energy limitation Definition Applies to all pr	n in sparl	ks and hot surfaces	Fiber	0 0 0 0 0

## Learn more at www.axis.com

UL 60079-11

CSA 60079-11

The standards listed in the tables regarding North America deal with Hazardous Locations (HazLoc) approvals only.

North American approvals require both HazLoc and Ordinary Locations (OrdLoc) approvals before certification is complete.

Energy limitation in sparks and hot surfaces

USA

CAN

Intrinsic safety

Notice!

1

orth A	americo vstem	an ma	rking			
erence: NFPA erence: CSA C	70 (National Ele 22.1 §18 (CA)	ectric Code) §50:	5-506 (US)			
					AEx	ар
	Hazard class				Ex	ар
	Defines the ty substances th	vpe of explosive at may be prese	or ignitable ent in the are	ea.		— т (
	Class I F	Flammable vapo	or or gas			(
	Class II (	Combustible due	or flyings	_		(
			or rightings	-		y
	Cla	ss I Zo	ne 1	AEx	db	I
	Cla	ss II Zo	ne 21	AEx	tb	П
			1			
	Area classifica	ation	1		Tempera	ture
	Hazardous are upon the freq	eas are classifie uency of the oc	d into zones currence and dust atmosp	based d	(see Tem in the ge	pera nera
	(see Zone system of the general set	tem (IECEx/ATE) ection)	X/Canada & l	JS) in	Equipme (see Star	nt p ndar
_						
Stan	dards - N	Iorth Ame	rican m	arking, 2	Zone s	yst
Type of	protection	Symbol	EPL	Country	Permitte zone	ed

Type of protection	Symbol	EPL	Country	Permitted zone	Standard UL CSA C22.2	Definition	Gas	
	AEx	Ga, Gb, Gc	USA	0, 1, 2	UL 60079-0	Applies to all protection concepts,		
General requirements	Ex	Ga, Gb, Gc	CAN	0, 1, 2	CSA 60079-0	general safety		
	AEx eb	Gb		1	111 60079-7			
Increased safety	AEx ec	Gc	USA	2	01 0007 5-7			
mercused survey	Ex eb	Gb	CAN	1	CSA 60079-7	No arcs, sparks or hot surfaces.		
	Ex ec	Gc		2		Enclosure IP 54 or better		
Non-sparking	AEx nA	Gc	USA	2	UL 60079-15			
1 5	Ex nA	Gc	CAN	2	CSA 60079-15			
	AEx da	Ga*	115.4	0*				
	AEx db	Gb	USA	1	UL 60079-1			
Flameproof	AEX dC	GC Go*		2				
	Ex da	Gh	CAN	1	CSA 60079_1	Contain the explosion and		
	Ex do	Gc		2	CJA 000/9-1	quench the flame		
	AEx nC	Gc	USA	2	UL 60079-15	*applies to catalytic sensors only		
Enclosed break	Ex nC	Gc	CAN	2	CSA 60079-15	TT TO TE TELEVISE CENSORS ONLY		
	AEx q	Gb	USA	1	UL 60079-5			
Powder filled	Ex q	Gb	CAN	1	CSA 60079-5			
	AEx ia	Ga		0				
	AEx ib	Gb	USA	1	UL 60079-11			
Intrinsic safety	AEx ic	Gc		2		Energy limitation in sparks and		
intensic salety	Ex ia	Ga		0		hot surfaces		
	Ex ib	Gb	CAN	1	CSA 60079-11			
	Ex ic	Gc		2				
	AEx pxb	Gb		1				
	AEx pyb	Gb	USA	1	UL 60079-2			
Pressurized	AEX pZC	GC		2				
	Ex px0	Gb CAN	CAN	1				
	Ex pyo	Gc	CAN	2	CSA 00073-2			
	AEx ma	Ga		0				
	AEx mb	Gb	USA	1	UL 60079-18			
Enconculation	AEx mc	Gc		2		Keen the flowmaking and		
Encapsulation	Ex ma	Ga		0		keep the hanmable gas out		
	Ex mb	Gb	CAN	1	CSA 60079-18			
	Ex mc	Gc		2				
	AEx ob	Gb	USA	1	UL 60079-6			
Liquid immersion	AEx oc	Gc		2				
	EX OD	60	CAN	1 2	CSA 60079-6			
	AFx nR	Ge	1154	2	UL 60079-15			
Restricted breathing	Ex nR	Gc	CAN	2	CSA 60079-15			
	AEx op is	Ga, Gb. Gc		0. 1. 2				
	AEx op pr	Gb, Gc	USA	1, 2	UL 60079-28			
Ontion undisting	AEx op sh	Ga, Gb, Gc		0, 1, 2		To prove the state of the state		
optical radiation	Ex op is	Ga, Gb, Gc		0, 1, 2		photochemical or plasma means		
	Ex op pr	Gb, Gc	CAN	1, 2	CSA 60079-28	r en er prositio monto		
	Ex op sh	Ga, Gb, Gc		0, 1, 2				
Type of protection	Symbol	EPL	Country	Permitted zone	Standard UL CSA C22.2	Definition	Dust	
	ΔFv	Da Dh Dc	1154	20 21 22				0
General requirements	Fy	Da, Do, De	CAN	20, 21, 22		Applies to all protection concepts		
	AFx ta	Da, Do, DC	CAN	20, 21, 22	00079-0			
	AEx th	Db	USA	21	UL 60079-31			
	AEx to	Dc		22				
				6 6 C				

Type of protection	Symbol	EPL	Country	Permitted zone	Standard UL CSA C22.2	Definition	
Company in a second	AEx	Da, Db, Dc	USA	20, 21, 22	UL 60079-0		
General requirements	Ex	Da, Db, Dc	CAN	20, 21, 22	CSA 60079-0	Applies to all protection concept	
	AEx ta	Da		20			
	AEx tb	Db	USA	21	UL 60079-31		
De la climation de la climation	AEx tc	Dc		22			
Protection by enclosure	Ex ta	Da		20			
	Ex tb	Db	CAN	21	CSA 60079-31		
	Ex tc	Dc		22			
	AEx ma	Da		20			
	AEx mb	Db	USA	21	UL 60079-18		
Freenoulation	AEx mc	Dc		22		Keen eenhustikle dust out	
Encapsulation	Ex ma	Da		20		keep compustible dust out	
	Ex mb	Db	CAN	21	CSA 60079-18		
	Ex mc	Dc		22			
	AEx pxb	Db		21			
	AEx pyb	Db	USA	21	UL 60079-2		
Processization	AEx pzc	Dc		22			
rressunzation	Ex pxb	Db		21			
	Ex pyb	Db	CAN	21	CSA 60079-2		
	Ex pzc	Dc		22			
	AEx ia	Da		20			
	AEx ib	Db	USA	21	UL 60079-11		
Intrinsic safety	AEx ic	Dc		22		Energy limitation in sparks and	
munisic sarcty	Ex ia	Da		20		hot surfaces	
	Ex ib	Db	CAN	21	CSA 60079-11		
	Ex ic	Dc		22			
	AEx op is	Da, Db, Dc		20, 21, 22			
	AEx op pr	Db, Dc	USA	21, 22	UL 60079-28		
Ontical radiation	AEx op sh	Da, Db, Dc		20, 21, 22		To prevent ignition by thermal	
	Ex op is	Da, Db, Dc		20, 21, 22		photochemical or plasma means	
	Ex op pr	Db, Dc	CAN	21, 22	CSA 60079-28		
	Ex op sh	Da, Db, Dc		20, 21, 22			

The standards listed in the tables regarding North America deal with Hazardous Locations (HazLoc) approvals only. North American approvals require both HazLoc and Ordinary Locations (OrdLoc) approvals before certification is complete.



ATEX and IECEx directive marking Zone system Reference: ATEX Directive 2014/34/EU Equipment category
 Level of protection is assured in Equipment group 1 the event of two faults occurring independently of each other mining 2 the event of one equipment fault II surface industry 3 normal operation Specific marking for explosion protection Type of flammable atmosphere Mining applications ATEX G Gas M1 equipment remains energised Notified body auditing D Dust specific M2 de-energised the quality system Ex db IIC T5 Gb (Ex) Gas ll 2G E 2804 Dust II 2D Ex tb IIIC T100°C Db The product complies with all the relevant European Directives Explosion protection Equipment protection Symbol for type of protection level (EPL) (see Standards) (see Standards) Gas/Dust group Temperature classification (see Atmosphere groups in the (see Temperature classification general section) in the general section)

Standards - ATEX and	d IECEx c	directive	marking	, Zone sy	ystem		
Type of protection	Symbol	IECEx EPL	ATEX category	Permitted zone	Standard EN – ATEX IEC – IECEx	Definition	
		Ga	1	0			
General requirements	N/A	Gb	2	1	60079-0	Applies to all protection concepts	
		Gc	3	2			
	eb	Gb	2	1			
Increased safety	ec	Gc	3	2	60079-7	No arcs, sparks or hot surfaces.	
Tuna n (non charking)	۳Å	Ga	2	2	60070 15		
Type n (non-sparking)	nA	GC	3	2	60079-15		
	da*	Ga*	1*	0*		Contain the explosion and	
Flameproof	db	Gb	2	1	60079-1	contain the explosion and quench the flame	
	dc	Gc	3	2		*applies to establis sensors only	
Tune n (analoged breek)	<b>"</b> C	Ga	2	2	C0070_1F	applies to catalytic sensors only	
Type n (enclosed oreak)	nc	GC Ch	3	2	60079-15		
Quartz/Sand filled	q	Go	2	2	60079-5	Quench the flame	
	ia	Go	1	2			
Intrinsic safety	ib	Gh	2	1	60079 11	Energy limitation in sparks and hot surfaces	
intinisic sarcty	ic	Gc	2	2	00075-11		
	nxh	Gb	2	1			
Pressurized	nyh	Gb	2	1	60079-2		
	pyc	Gc	3	2	00070 2		
	ma	Ga	1	0			
Encapsulation	mb	Gb	2	1	60079-18		
	mc	Gc	3	2		Keep the flammable gas out	
	ob	Gb	2	1			
Liquid immersion	oc	Gc	3	2	60079-6		
Type n (sealing & hermetic sealing)	nC	Gc	3	2	60079-15		
Type n (restricted breathing)	nR	Gc	3	2	60079-15	1	
	Op is	Ga	1	0			
Optical radiation	Op sh	Ga	1	0	60079-28	To prevent ignition by thermal,	
	Op pr	Gb	2	1		photochemical or plasma means	

Type of protection	Symbol	IECEx EPL	ATEX category	Permitted zone	Standard EN – ATEX IEC – IECEx	Definition	
		Da	1	20			
General requirements	N/A	Db	2	21	60079-0	Applies to all protection concepts	
		Dc	3	22			
	ta	Da	1	20			
Enclosure	tb	Db	2	21	60079-31		
	tc	Dc	3	22			
	pxb	Db	2	21		Drevents dust coming into contact	
Pressurized	руб	Db	2	21	60079-2	with electrical parts	
	pzc	Dc	3	22		with electrical parts	
	ma	Ga	1	20			
Encapsulation	mb	Gb	2	21	60079-18		
	mc	Gc	3	22			
	ia	Da	1	20		Energy limitation in energy and	
Intrinsic safety	ib	Db	2	21	60079-11	hot surfaces	
	ic	Dc	3	22		not surfaces	
	Op is	Da	1	20		-	
Optical radiation	Op sh	Da	1	20	60079-28	To prevent ignition by thermal,	
		DI DI				photochemical or plasma means	

## Correlation between EPL, ATEX category, and zones

Op pr Db 2 21

EPL	Category	Zone		
Ga	1G	0		
Gb	2G	1	Gas	
Gc	3G	2		
Da	1 D	20		
Db	2D	21	Dust	
Dc	3D	22		
Ma	M 1	Mining Application (Equipment can remain energised in the presence of flammable atmosphere – firedamp)	Mining	
Mb M2		Mining Application (Equipment to be de-energised when flammable atmosphere is detected – firedamp)	Mining	

Higher tiers cover lower tiers. E.g., equipment suitable for EPL Ga is also permitted for Gb and Gc.

Gas



## General



Zone system (IECEx/ATEX/Canada and US)						
Zone		Hazardous areas are classified into zones based upon the frequency of the occurrence and duration of				
Gas	Dust	an explosive gas/dust atmosphere, as follows:				
0	20	A potentially flammable atmosphere is present continuously or for long periods or frequently.				
1	21	A potentially flammable atmosphere is likely to occur in normal operation occasionally.				
2	22	A potentially flammable atmosphere is not likely to occur in normal operation but, if it does occur, will persist for a short period only.				

Higher tiers cover lower tiers, e.g., equipment suitable for use in Zone 0 is also permitted in Zone 1 and 2.

Correlation between divisions and zones							
Type of area	Division	Zo	ne	Definition			
Type of area	DIVISION	Gas	Dust	Definition			
Continuous hazard	1	0	20	A place in which a potentially flammable atmosphere is continuously present. Division 1 >10h/year Zone 0, 20 >1000h/year			
Intermittent hazard	1	1	21	A place in which a potentially flammable atmosphere is likely to occur in normal operation. Division 1 >10h/year Zone 1, 21 >10h/year			
Abnormal hazard	2	2	22	A place in which a potentially flammable atmosphere is not likely to occur in normal operation, but may occur for short periods. Division 2 <10h/year Zone 2, 22 <10h/year			

Higher tiers cover lower tiers. E.g., equipment suitable for use in Division 1 is also permitted in Division 2.

Atmosphere groups			
Substance	Hazard class	Division groups	Zone groups
Acetylene		Group A	IIC
Hydrogen	Close	Group B	IIC or IIB + H2*
Ethylene	flammable gases	Group C	IIB
Propane	numnuole guses	Group D	IIA
Methane		Group D	IIA**
Combustible metal dusts		Group E***	IIIC
Combustible carbonaceous dusts	Class II	Group F	IIIB
Combustible dusts not in Group E or F (flour, grain, wood, plastics, chemicals)	combustible dusts	Group G	IIIB
Combustible fibers and flyings	Class III fibers and flyings	Not applicable	IIIA

\* Hydrogen is a group IIC gas but a test for H2 can be added in the IIB approval.

\*\* Methane is a group IIA gas for non mining applications. \*\*\* Group E is applicable to Class II Divison 1 only.

Temperature classification						
Maximum surface temperature (°C)	Division system	Zone system				
450	T1	T1				
300	T2					
280	T2A					
260	T2B	T2				
230	T2C					
215	T2D					
200	T3					
180	T3A	Тэ				
165	T3B	15				
160	T3C					
135	T4	T4				
120	T4A	14				
100	T5	T5				
85	T6	Τ6				

Higher tiers cover lower tiers, e.g., equipment suitable for use in temperature classification T6 is permitted in all temperature classifications.