

North America



EXAMPLES OF NORTH AMERICAN MARKING

Division System	
Class I, Division 1, Groups A, B, C, D T4	
Class I	Hazard class
Division 1	Area classification
Groups A, B, C, D	Gas group
T4	Temperature classification
Class II, Division 1, Groups E, F, G	
Class II	Hazard class
Division 1	Area classification
Groups E, F, G	Dust group

Zone System	
Class I, Zone 0, AEx ia IIC T4	
Class I	Hazard class
Zone 0	Area classification
AEx	Approved to US standards (Ex - Canadian standards)
ia	Protection concept (example is intrinsic safety)
IIC	Gas group
T4	Temperature classification

STANDARDS ELECTRICAL

Division System, Class I (Gas, Vapour & Mists)

Type of Protection	Code	Country	Permitted Division	Standard FM, UL, CSA C22.2	Definition
General Requirements	USA	1, 2	FM 3600	Applies to all protection concepts, general safety	
	CAN	1, 2	CSA No 0		
Non-Incendive	NI	USA	2	UL 121201 FM 3611	No arcs, sparks or hot surfaces
	NI	CAN	2	CSA No 213	
Explosion-proof	XP	USA	1	UL 1203 FM 3615	Contain the explosion and quench the flame
	XP	CAN	1	CSA No 30	
Intrinsic Safety	IS	USA	1	UL 913 FM 3610	Energy limitation in sparks and hot surfaces
	IS	CAN	1	CSA 60079-11	
Pressurized	Type X	USA	1	FM 3620 NFPA 496	Exclude the flammable gas
	Type Y	USA	2		
Pressurized	Type X	CAN	1	NFPA 496	Exclude the flammable gas
	Type Y	CAN	2		

Note: The standards listed above deal with Hazardous Locations (HazLoc) approvals only. North American approvals require both HazLoc and Ordinary Locations (OrdLoc) approvals before certification is complete.

Division System, Class II (Dusts)

Type of Protection	Code	Country	Permitted Division	Standard FM, UL, CSA C22.2	Definition
General Requirements	USA	1, 2	FM 3600	Applies to all protection concepts	
	CAN	1, 2	CSA No 0		
Dust Ignition Proof	—	USA	1	UL 1203 FM 3616	Keep the combustible dust out
	—	CAN	1	CSA No 25	
Dust Protected	—	USA	2	UL 121201 FM 3611	Keep the combustible dust out
	—	CAN	2	CSA No 213	
Pressurized	PX	USA	1	FM 3620 NFPA 496	Keep the combustible dust out
	PY	USA	2		
Pressurized	PX	CAN	1	NFPA 496	Keep the combustible dust out
	PY	CAN	2		
Intrinsic Safety	IS	USA	1	UL 913 FM 3610	Energy limitation in sparks and hot surfaces
	IS	CAN	1	CSA 60079-11	

Note: The standards listed above deal with Hazardous Locations (HazLoc) approvals only. North American approvals require both HazLoc and Ordinary Locations (OrdLoc) approvals before certification is complete.

Division System, Class III (Fibres & Flyings)

Type of Protection	Code	Country	Permitted Division	Standard FM, UL, CSA C22.2	Definition
General Requirements	—	USA	1, 2	FM 3600	Applies to all protection concepts
	—	CAN	1, 2	CSA No 0	
Fibre & Flying Protection	—	USA	1, 2	UL 121201	Keep the ignitable fibres & flyings out
	—	CAN	1, 2	CSA No 213	
Intrinsic Safety	IS	USA	1	UL 60079-11	Energy limitation in sparks and hot surfaces
	IS	CAN	1	CSA 60079-11	

Note: The standards listed above deal with Hazardous Locations (HazLoc) approvals only. North American approvals require both HazLoc and Ordinary Locations (OrdLoc) approvals before certification is complete.

Zones System Class I (Gas, Vapour & Mists)

Type of Protection	Code	Country	Permitted Zone	Standard UL, CSA C22.2	Definition
General Requirements	AEx	USA	0, 1, 2	UL 60079-0	Applies to all protection concepts, general safety
	Ex	CAN	0, 1, 2	CSA 60079-0	
Increased Safety	AEx mb	USA	1	UL 60079-7	No arcs, sparks or hot surfaces. Enclosure IP 54 or better
	AEx mc	USA	2	CSA 60079-7	
Non-sparking	AEx nA	USA	2	UL 60079-15	No arcs, sparks or hot surfaces. Enclosure IP 54 or better
	Ex nA	CAN	2	CSA 60079-15	
Flameproof	AEx da	USA	0*	UL 60079-1	Contain the explosion and quench the flame.
	AEx db	USA	1		
Flameproof	AEx dc	USA	2	UL 60079-1	Contain the explosion and quench the flame.
	AEx dd	USA	0*		
Enclosed Break	AEx nC	USA	2	UL 60079-15	*Applies to catalytic sensors only
	Ex nC	CAN	2	CSA 60079-15	
Powder Filled	AEx q	USA	1	UL 60079-5	Energy limitation in sparks and hot surfaces
	Ex q	CAN	1	CSA 60079-5	
Intrinsic Safety	AEx ia	USA	0	UL 60079-11	Energy limitation in sparks and hot surfaces
	AEx ib	USA	1	UL 60079-11	
Intrinsic Safety	Ex ia	CAN	0	CSA 60079-11	Energy limitation in sparks and hot surfaces
	Ex ib	CAN	1		
Pressurized	AEx pzb	USA	1	UL 60079-2	Keep the flammable gas out
	AEx pyb	USA	2	UL 60079-2	
Pressurized	Ex pzb	CAN	1	CSA 60079-2	Keep the flammable gas out
	Ex pyb	CAN	2	CSA 60079-2	
Encapsulation	AEx mb	USA	0	UL 60079-18	Keep the flammable gas out
	AEx mc	USA	1	UL 60079-18	
Encapsulation	Ex mb	CAN	0	CSA 60079-18	Keep the flammable gas out
	Ex mc	CAN	1	CSA 60079-18	
Oil Immersion	AEx ob	USA	1	ISA 60079-6	Energy limitation in sparks and hot surfaces
	AEx oc	USA	2	ISA 60079-6	
Oil Immersion	Ex ob	CAN	1	CSA 60079-6	Energy limitation in sparks and hot surfaces
	Ex oc	CAN	2	CSA 60079-6	
Restricted Breathing	AEx nR	USA	2	UL 60079-15	To prevent ignition by thermal, photochemical or plasma means
	Ex nR	CAN	2	CSA 60079-15	
Optical Radiation	AEx op ia	USA	0, 1, 2	UL 60079-28	To prevent ignition by thermal, photochemical or plasma means
	AEx op ib	USA	1, 2		
Optical Radiation	Ex op ia	CAN	0, 1, 2	CSA 60079-28	To prevent ignition by thermal, photochemical or plasma means
	Ex op ib	CAN	1, 2		

Equipment suitable for use in a Zone 0 is permitted in a Zone 1 or 2

Equipment suitable for use in a Zone 1 is permitted in a Zone 2, but not in a Zone 0

Equipment suitable for use in a Zone 2 is not permitted in either a Zone 0 or Zone 1

Note: The standards listed above deal with Hazardous Locations (HazLoc) approvals only. North American approvals require both HazLoc and Ordinary Locations (OrdLoc) approvals before certification is complete.

Zones System Class II (Dusts)

Type of Protection	Code	Country	Permitted Zone	Standard UL, CSA C22.2	Definition
General Requirements	AEx	USA	20, 21, 22	UL 60079-0	Applies to all protection concepts
	Ex	CAN	20, 21, 22	CSA 60079-0	
Protection by Enclosure	AEx ta	USA	20	UL 60079-31	Keep combustible dust out
	AEx tb	USA	21	UL 60079-31	
Protection by Enclosure	Ex ta	CAN	20	CSA 60079-31	Keep combustible dust out
	Ex tb	CAN	21	CSA 60079-31	
Encapsulation	AEx ma	USA	20	UL 60079-18	Keep combustible dust out
	AEx mb	USA	21	UL 60079-18	
Encapsulation	Ex ma	CAN	20	CSA 60079-18	Keep combustible dust out
	Ex mb	CAN	21	CSA 60079-18	
Pressurization	AEx pzb	USA	21	UL 60079-2	Energy limitation in sparks and hot surfaces
	AEx pyb	USA	21	UL 60079-2	
Pressurization	Ex pzb	CAN	21	CSA 60079-2	Energy limitation in sparks and hot surfaces
	Ex pyb	CAN	21	CSA 60079-2	
Intrinsic Safety	AEx ia	USA	20	UL 60079-11	Energy limitation in sparks and hot surfaces
	AEx ib	USA	21	UL 60079-11	
Intrinsic Safety	Ex ia	CAN	20	CSA 60079-11	Energy limitation in sparks and hot surfaces
	Ex ib	CAN	21	CSA 60079-11	
Optical Radiation	AEx op ia	USA	20, 21, 22	UL 60079-28	To prevent ignition by thermal, photochemical or plasma means
	AEx op ib	USA	21, 22	UL 60079-28	
Optical Radiation	Ex op ia	CAN	20, 21, 22	CSA 60079-28	To prevent ignition by thermal, photochemical or plasma means
	Ex op ib	CAN	21, 22	CSA 60079-28	

Equipment suitable for use in a Zone 20 is permitted in a Zone 21 or 22

Equipment suitable for use in a Zone 21 is permitted in a Zone 22, but not in a Zone 20

Equipment suitable for use in a Zone 22 is not permitted in either a Zone 20 or Zone 21

Note: The standards listed above deal with Hazardous Locations (HazLoc) approvals only. North American approvals require both HazLoc and Ordinary Locations (OrdLoc) approvals before certification is complete.

General

AREA CLASSIFICATION

Class & Divisions System (Canada & US Only)	
Class I	Flammable gases, vapours or liquids *
Class II	Combustible dusts *
Class III	Ignitable fibres and flyings *

Division 1	Where ignitable concentrations of * can exist all of the time or some of the time under normal operating conditions.
Division 2	Where ignitable concentrations of * are not likely to exist under normal operating conditions.

Groups		
CLASS I	CLASS II	CLASS III
A - Acetylene	E - Metal Dust	None Specified
B - Hydrogen	F - Coal Dust	
C - Ethylene	G - Grain Dust	
D - Propane		

MATERIAL GROUPINGS

Division System		Zone System	
Material	Class/Group	Material	Group
Acetylene	Class I, Group A	Acetylene	IIC
Hydrogen	Class I, Group B	Hydrogen	IIB
Ethylene	Class I, Group C	Ethylene	IIB
Propane	Class I, Group D	Propane	IIA
Methane (Mines)	N/A (see note 1)	Methane (Mines)	I
Metal Dusts	Class II, Group E	Conductive Dusts	IIIC
Coal Dusts	Class II, Group F	Non-Conductive Dusts	IIIB
Grain Dusts	Class II, Group G	Non-Conductive Dusts	IIIB
Fibers/Flyings	Class III	Combustible Flyings	IIIA

Note: Mixes are not within the scope of the Division system (Canada & US)

Material Ex Classifications

Gas	Ignition Temp (°C)	Apparatus Group	Temperature Class
Ammonia	630	IIA	T1
Hydrogen	560	IIC	T1
Methane	537	IIA	T1
Propane	450	IIA	T2
Ethylene	425	IIB	T2
Butane	372	IIA	T2
Acetylene	305	IIC	T2
Cyclohexane	259	IIA	T3
Kerosene	210	IIA	T3
Di-ethyl Ether	160	IIB	T4
Carbon Disulphide	90	IIC	T6

Material Ex Classifications

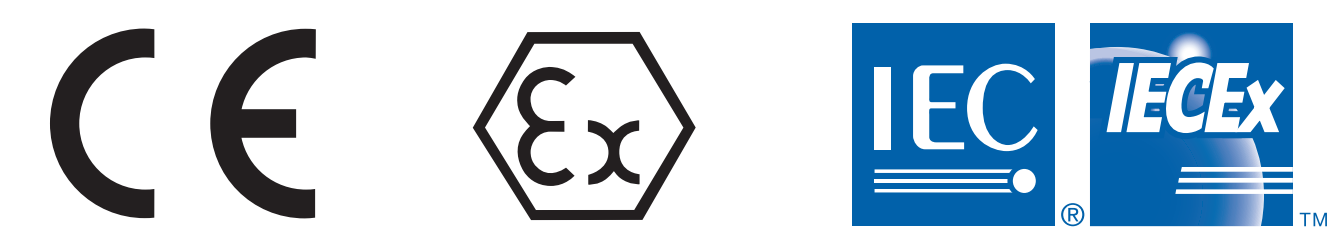
Dust Typical Ignition Temperatures		
Dust	Cloud (°C)	Layer (°C)
Aluminium	590	>450
Coal dust (ignites)	380	225
Flour	490	340
Grain dust	510	300
Methyl cellulose	420	320
Phenolic resin	530	>450
Polythene	420	(melts)
PVC	700	>450
Soot	810	570
Starch	460	435
Sugar	490	460

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ATEX & IECEx



Examples of ATEX Directive Marking	
CE	Denotes that a product complies with all the relevant European Directives
0518	Notified Body Number (Sira Certification Service)
Ex	Specific marking for explosion protection
II	Equipment group (Could be for mining or for surface industry)
2	Equipment category (Could be 1, 2, 3 depending upon Zone of Intended use)
G	Type of flammable atmosphere (G = Gas, D = Dust)
M1	Mining applications (M1 = equipment remains energised, M2 = de-energised)

STANDARDS ELECTRICAL

ATEX & IECEx

Type of Protection	Symbol	IECEx EPL	ATEX Category	Permitted Zone	Standard EN-ATEX IEC-IECEx	Definition
General Requirements	N/A	Ga	1	0	60079-0	Applies to all protection concepts
Increased Safety	eb ec	Gb Gc	2	1	60079-7	No arcs, sparks or hot surfaces. Enclosure IP 54 or better
Type n (non-sparking)	nA	Gc	3	2	60079-15	No arcs, sparks or hot surfaces. Enclosure IP 54 or better
Flameproof	da* db dc	Ga* Gb Gc	1*	0*	60079-1	Contain the explosion and quench the flame.
Type n (enclosed break)	nC	Gc	3	2	60079-15	*Applies to catalytic sensors only
Quartz/Sand Filled	q	Gb Gc	2	1	60079-5	Quench the flame
Intrinsic Safety	ia ib ic	Ga Gb Gc	1	0	60079-11	Energy limitation in sparks and hot surfaces.
Pressurised	pzb pyb pzc	Gb Gc	2	1	60079-2	Enclosure filled with liquid to prevent contact with explosive atmosphere
Encapsulation	ma mb mc	Ga Gb Gc	3	2	60079-18	Enclosure filled with liquid to prevent contact with explosive atmosphere
Oil Immersion	ob oc	Gb Gc	2	1	60079-6	Keep the flammable gas out.
Type n (sealed & hermetic sealing)	nC	Gc	3	2	60079-15	To prevent ignition by thermal, photochemical or plasma means
Type n (restricted breathing)	nR	Gc	3	2	60079-15	To prevent ignition by thermal, photochemical or plasma means
Optical Radiation	Op ia Op ib Op pr	Ga Gb Gc	1	0	60079-28	To prevent ignition by thermal, photochemical or plasma means

Equipment suitable for use in a Zone 0 is permitted in a Zone 1 or 2

Equipment suitable for use in a Zone 1 is permitted in a Zone 2, but not in a Zone 0

Equipment suitable for use in a Zone 2 is not permitted in either a Zone 0 or Zone 1

ATEX & IECEx

Type of Protection	Symbol	IECEx EPL	ATEX Category	Permitted Zone	Standard EN-ATEX IEC-IECEx	Definition
General Requirements	N/A	Da Db Dc	1	20	60079-0	Applies to all protection concepts
Enclosure	ta tb tc	Da Db Dc	2	20	60079-31	Prevents dust coming into contact with electrical parts
Pressurised	pzb pyb pzc	Db Dc	2	21	60079-2	Prevents dust coming into contact with electrical parts
Encapsulation	ma mb mc	Ga Gb Gc	3	22	60079-18	Enclosure filled with liquid to prevent contact with explosive atmosphere
Intrinsic Safety	ia ib ic	Da Db Dc	1	20	60079-11	Energy limitation in sparks and hot surfaces.
Optical Radiation	Op ia Op					