UL HAZARDOUS LOCATIONS SERVICES

EXPLOSIVE GAS ATMOSPHERES CLASS I DIVISION S

Includes flammable gases, flammable liquid-produced vapors, and combust

Area Classification

Division 1:
Where ignitable concentrations of flammable gases, vapors or liquids **can exist all of the time or some of the time** under normal operating conditions.

Zone 0:
Where ignitable concentrations of flammable gases, vapors or liquids **are present continuously or for long periods of time** under normal operating conditions.

Zone 1:
Where ignitable concentrations of flammable gases, vapors or liquids **are likely to exist** under normal operating conditions.

Division 2:
Where ignitable concentrations of flammable gases, vapors or liquids **are not likely to exist** under normal operating conditions.

Zone 2:
Where ignitable concentrations of flammable gases, vapors or liquids **are not likely to exist** under normal operating conditions.

Groups

Division 1 and 2:		Zone 0, 1 and 2:	
A	acetylene	**IIC**	acetylene & hydrogen
B	hydrogen	**IIB+H2**	hydrogen
C	ethylene	**IIB**	ethylene
D	propane	**IIA**	propane

Temperature Classifications

Division 1 and 2:		Zone 0, 1 and 2:	
T1	≤450°C	**T1**	≤450°C
T2	≤300°C	**T2**	≤300°C
T2A	≤280°C		—
T2B	≤260°C		—
T2C	≤230°C		—
T2D	≤215°C		—
T3	≤200°C	**T3**	≤200°C
T3A	≤180°C		—
T3B	≤165°C		—
T3C	≤160°C		—
T4	≤135°C	**T4**	≤135°C
T4A	≤120°C		—
T5	≤100°C	**T5**	≤100°C
T6	≤ 85°C	**T6**	≤ 85°C

Division System Electrical Equipment Protection Techniques

		Applicable Certification Documents	
Area	**Protection Techniques**	**USA**	**Canada**
Div. 1	• Intrinsic safety	UL 913	CSA 157
	• Explosionproof	UL 1203	CSA 30
	• Purged/pressurized (Type X or Y)	NFPA 496	NFPA 496
	• Any Class I, Zone 0 technique	See Zone 0 techniques	See Zone 0 techniques
Div. 2	• Hermetically-sealed	ISA 12.12.01	CSA 213
	• Nonincendive	ISA 12.12.01	CSA 213
	• Non-sparking	ISA 12.12.01	CSA 213
	• Purged/pressurized (Type Z)	NFPA 496	NFPA 496
	• Sealed	ISA 12.12.01	CSA 213
	• Any Class I, Division 1 technique	See above	See above
	• Any Class I, Zone 0, 1 or 2 technique	See Zone techniques	See Zone techniques

Note: Class I, Division 1 intrinsically safe system requirements are contained in UL 913 (USA) and CSA 157 (Canada).

SYSTEM
ible liquid-produced vapors

Zone System Electrical Equipment Protection Techniques (Equipment Protection Levels)

Area	Protection Techniques (Equipment Protection Levels)	Applicable Certification Documents			
		USA (UL Mark)	Canada (cUL Mark)	IECEx System	Europe (ATEX)
Zone 0	• Flameproof, “da” (Ga)	—	—	IEC 60079-1	EN 60079-1
	• Intrinsic safety, “ia” (Ga)	UL 60079-11	CSA 60079-11	IEC 60079-11	EN 60079-11
	• Encapsulation, “ma” (Ga)	UL 60079-18	CSA 60079-18	IEC 60079-18	EN 60079-18
	• Class I, Div 1 intrinsic safety	UL 913	CSA 157	—	—
Zone 1	• Flameproof, “db” (Gb)	UL 60079-1	CSA 60079-1	IEC 60079-1	EN 60079-1
	• Pressurization, “pxb”/“pyb” (Gb)	UL 60079-2	CSA 60079-2	IEC 60079-2	EN 60079-2
	• Powder filling, “q” (Gb)	UL 60079-5	CSA 60079-5	IEC 60079-5	EN 60079-5
	• Oil immersion, “o” (Gb)	UL 60079-6	CSA 60079-6	IEC 60079-6	EN 60079-6
	• Increased safety, “e” (Gb)	UL 60079-7	CSA 60079-7	IEC 60079-7	EN 60079-7
	• Intrinsic safety, “ib” (Gb)	UL 60079-11	CSA 60079-11	IEC 60079-11	EN 60079-11
	• Encapsulation, “mb” (Gb)	UL 60079-18	CSA 60079-18	IEC 60079-18	EN 60079-18
	• Any Zone 0 technique	See above	See above	See above	See above
	• Any Class I, Div 1 technique	See CID1 techniques	See CID1 techniques	—	—
Zone 2	• Flameproof, “dc” (Gc)	—	—	IEC 60079-1	EN 60079-1
	• Pressurization, “pzc” (Gc)	UL 60079-2	CSA 60079-2	IEC 60079-2	EN 60079-2
	• Intrinsic safety, “ic” (Gc)	UL 60079-11	CSA 60079-11	IEC 60079-11	EN 60079-11
	• Encapsulated, “nC” (Gc)	—	CSA 60079-15	—	—
	• Enclosed-break, “nC” (Gc)	UL 60079-15	CSA 60079-15	IEC 60079-15	EN 60079-15
	• Energy-limited, “nL” (Gc)	—	CSA 60079-15	—	—
	• Hermetically-sealed, “nC” (Gc)	UL 60079-15	CSA 60079-15	IEC 60079-15	EN 60079-15
	• Nonincendive, “nC” (Gc)	UL 60079-15	CSA 60079-15	IEC 60079-15	EN 60079-15
	• Non-sparking, “nA” (Gc)	UL 60079-15	CSA 60079-15	IEC 60079-15	EN 60079-15
	• Restricted breathing, “nR” (Gc)	UL 60079-15	CSA 60079-15	IEC 60079-15	EN 60079-15
	• Sealed, “nC” (Gc)	UL 60079-15	CSA 60079-15	IEC 60079-15	EN 60079-15
	• Encapsulation, “mc” (Gc)	UL 60079-18	CSA 60079-18	IEC 60079-18	EN 60079-18
	• Any Zone 0 or 1 technique	See above	See above	See above	See above
	• Any Class I, Div 1 or 2 technique	See Class I techniques	See Class I techniques	—	—

Note 1: Zone 0, 1 and 2 general requirements are contained in UL 60079-0 (USA), CSA 60079-0 (Canada) and IEC/EN 60079-0 (IECEx System & Europe).

Note 2: Zone 0, 1 and 2 intrinsically safe system requirements are contained in ISA 60079-25 (USA), CSA 60079-25 (Canada) and IEC/EN 60079-25 (IECEx System & Europe).

Note 3: Special requirements for certain equipment installations in Zone 0 (Ga) areas are contained in ISA 60079-26 (USA) and IEC/EN 60079-26 (IECEx System & Europe).

Note 4: Equipment Protection Levels (EPLs) are used to provide additional details regarding the level of protection against ignition in explosive atmospheres. EPLs are designated by a letter “G” for Gas, “D” for Dust or “M” for Mining, followed by a letter “a” for “very high”, “b” for “high” or “c” for “enhanced” level of protection.

Note 5: Under the ATEX Directive (94/9/EC and 2014/34/EU), the marking of Categories is additionally required. ATEX Categories are similar to EPLs in function and designation as follows, ATEX Category 1G, 2G, 3G, 1D, 2D, 3D, M1, M2 = EPL Ga, Gb, Gc, Da, Db, Dc, Ma, Mb respectively.

Note 6: INMETRO certification requirements are determined by Portaria 179 as of 18 May 2010, with the associated Brazilian NBR Ex standards harmonized with the comparable IEC Ex standards noted above.

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EXPLOSIVE GAS ATMOSPHERES
CLASS I DIVISION SYSTEM
Includes flammable gases, flammable liquid-produced vapors, and combustible liquid-produced vapors

CONTINUED

Zone System Non-Electrical Equipment Protection Techniques (Equipment Protection Levels)

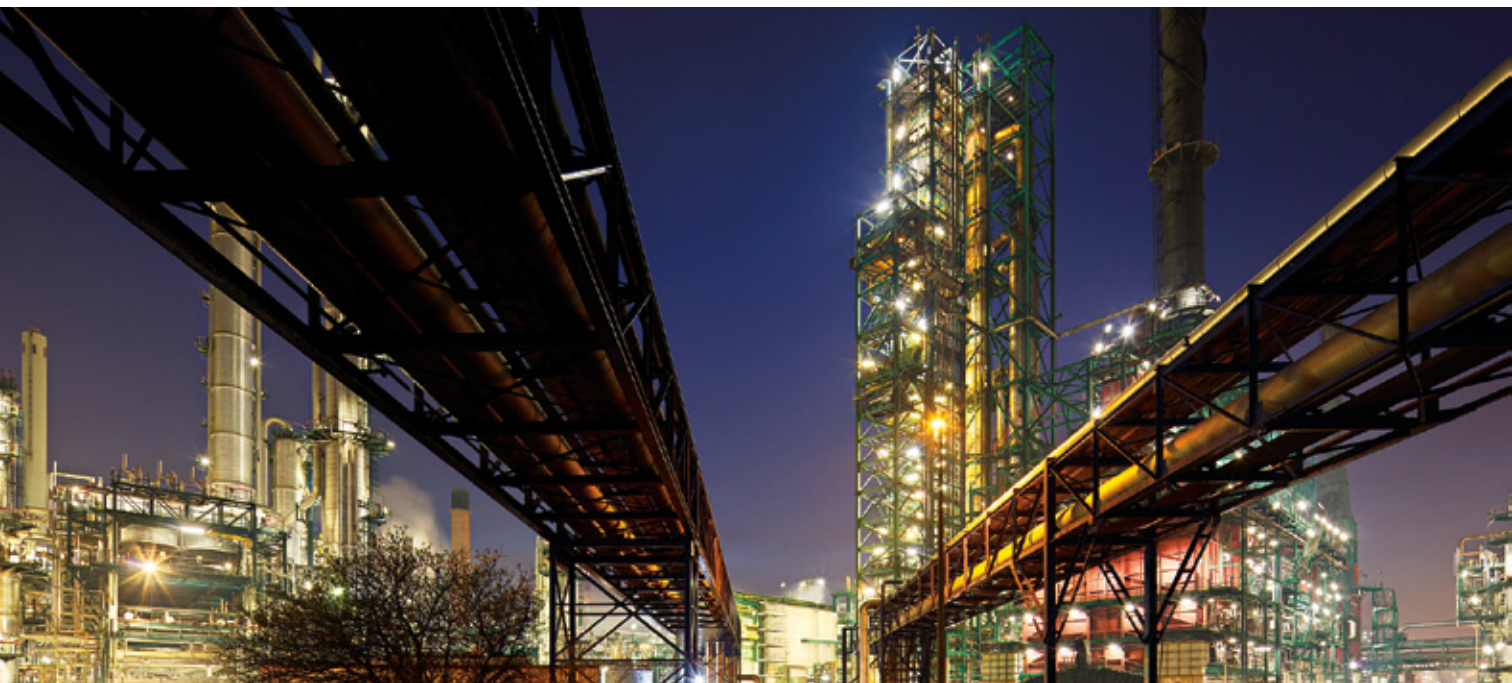
		Applicable Certification Documents			
Area	**Protection Techniques**	**USA (UL Mark)**	**Canada (cUL Mark)**	**IECEx System**	**Europe (ATEX)**
Zone 0	• Constructional safety, “c” (Ga)	—	—	ISO pr80079-37	EN 13463-5
	• Control of ignition source, “b” (Ga)	—	—	ISO pr80079-37	EN 13463-6
	• Liquid immersion, “k” (Ga)	—	—	ISO pr80079-37	EN 13463-8
Zone 1	• Flameproof, “d” (Gb)	—	—	IEC 60079-1	EN 13463-3
	• Constructional safety, “c” (Gb)	—	—	ISO pr80079-37	EN 13463-5
	• Control of ignition source, “b” (Gb)	—	—	ISO pr80079-37	EN 13463-6
	• Liquid immersion, “k” (Gb)	—	—	ISO pr80079-37	EN 13463-8
	• Pressurization, “px”/“py” (Gb)	—	—	IEC 60079-2	EN 60079-2
	• Any Zone 0 technique	—	—	See above	See above
Zone 2	• Flow restricting enclosure, “fr”	—	—	—	EN 13463-2
	• Constructional safety, “c” (Gc)	—	—	ISO pr80079-37	EN 13463-5
	• Control of ignition source, “b” (Gc)	—	—	ISO pr80079-37	EN 13463-6
	• Liquid immersion, “k” (Gc)	—	—	ISO pr80079-37	EN 13463-8
	• Pressurization, “pz” (Gc)	—	—	IEC 60079-2	EN 60079-2
	• Any Zone 0 or 1 technique	—	—	See above	See above

Note 1: The ISO pr80079 series standards are to be published by Q3 of 2015, with an included reference to IEC 60079-0.

Note 2: Zone 0, 1 and 2 general requirements are contained in ISO/IEC pr80079-36 (IECEx System) and EN 13463-1 (Europe).

Note 3: Equipment Protection Levels (EPLs) are used to provide additional details regarding the level of protection against ignition in explosive atmospheres. EPLs are designated by a letter “G” for Gas, “D” for Dust or “M” for Mining, followed by a letter “a” for “very high”, “b” for “high” or “c” for “enhanced” level of protection.

Note 4: Under the ATEX Directive (94/9/EC and 2014/34/EU), the marking of Categories is additionally required. ATEX Categories are similar to EPLs in function and designation as follows, ATEX Category 1G, 2G, 3G, 1D, 2D, 3D, M1, M2 = EPL Ga, Gb, Gc, Da, Db, Dc, Ma, Mb respectively.



EXPLOSIVE DUST ATMOSPHERES CLASS II & III

Includes combustible dusts and ignitable fibers/flyings

Area Classification

Class II, Division 1:
Where ignitable concentrations of combustible dust **can exist all of the time or some of the time** under normal operating conditions.

Zone 20:
Where ignitable concentrations of combustible dust or ignitable fibers/flyings **are present continuously or for long periods of time** under normal operating conditions.

Zone 21:
Where ignitable concentrations of combustible dust or ignitable fibers/flyings **are likely to exist** under normal operating conditions.

Class II, Division 2:
Where ignitable concentrations of combustible dust **are not likely to exist** under normal operating conditions.

Zone 22:
Where ignitable concentrations of combustible dust or ignitable fibers/flyings **are not likely to exist** under normal operating conditions.

Class III, Division 1:
Where easily ignitable fibers or materials producing combustible flyings **are handled, manufactured or used**.

Class III, Division 2:
Where easily ignitable fibers **are stored or handled.**

Groups

Class II, Division 1 and 2:

E	metal dust — Div. 1 only
F	carbonaceous dust
G	non-conductive dust
—	

Zone 20, 21 and 22:

IIIC	conductive dust
IIIB	non-conductive dust
IIIB	non-conductive dust
IIIA	combustible flyings

Class III, Division 1 and 2: None.

Temperature Classifications

Class II, Division 1 and 2:

T1	≤450°C	**T2D**	≤215°C	**T4**	≤135°C
T2	≤300°C	**T3**	≤200°C	**T4A**	≤120°C
T2A	≤280°C	**T3A**	≤180°C	**T5**	≤100°C
T2B	≤260°C	**T3B**	≤165°C	**T6**	≤ 85°C
T2C	≤230°C	**T3C**	≤160°C		

Zone 20, 21 and 22: None.

Note: For Zone 20, 21 and 22, equipment shall be marked to show the maximum surface temperature

Class III, Division 1 and 2: None.

Note: Article 503 of the NEC limits the maximum surface temperature for Class III equipment to 165°C for equipment not subject to overloading and to 120°C for equipment that may be overloaded.

DIVISION SYSTEM

Division System Electrical Equipment Protection Techniques

		Applicable Certification Documents	
Area	**Protection Techniques**	**USA**	**Canada**
Div. 1	• Intrinsic safety (Class II & III)	UL 913	CSA 157
	• Dust-ignitionproof (Class II)	UL 1203	CSA 25
	• Pressurized (Class II)	NFPA 496	NFPA 496
	• Dusttight (Class III)	ISA 12.12.01	CSA 157
	• Hermetically-sealed (Class III)	ISA 12.12.01	—
	• Nonincendive (Class III)	ISA 12.12.01	—
	• Sealed (Class III)	ISA 12.12.01	—
	• Any Zone 20 technique (Class II & III)	See Zone 20 techniques	See Zone 20 techniques
Div. 2	• Dusttight (Class II)	ISA 12.12.01	CSA 157
	• Hermetically-sealed (Class II)	ISA 12.12.01	—
	• Nonincendive (Class II)	ISA 12.12.01	—
	• Sealed (Class II)	ISA 12.12.01	—
	• Pressurized (Class II)	NFPA 496	NFPA 496
	• Any CIID1 or CIIID1 technique	See above	See above
	• Any Zone 20, 21, 22 tech (Class II & III)	See Zone techniques	See Zone techniques

Note: Class II and Class III, Division 1 intrinsically safe system requirements are contained in UL 913 (USA) and CSA 157 (Canada)

Zone System Electrical Equipment Protection Techniques (Equipment Protection Levels)

		Applicable Certification Documents			
Area	**Protection Techniques (Equipment Protection Levels)**	**USA (UL Mark)**	**Canada (cUL Mark)**	**IECEx System**	**Europe (ATEX)**
Zone 20	• Enclosure, “ta” (Da)	ISA 60079-31	CSA 60079-31	IEC 60079-31	EN 60079-31
	• Intrinsic safety, “ia” (Da)	UL 60079-11	CSA 60079-11	IEC 60079-11	EN 60079-11
	• Encapsulation, “ma” (Da)	UL 60079-18	CSA 60079-18	IEC 60079-18	EN 60079-18
	• Any CIID1 technique	See CIID1 techniques	See CIID1 techniques	—	—
Zone 21	• Enclosure, “tb” (Db)	ISA 60079-31	CSA 60079-31	IEC 60079-31	EN 60079-31
	• Pressurization, “p” (Db)	ISA 61241-2	CSA 61241-4	IEC 60079-2	EN 60079-2
	• Intrinsic safety, “ib” (Db)	UL 60079-11	CSA 60079-11	IEC 60079-11	EN 60079-11
	• Encapsulation, “mb” (Db)	UL 60079-18	CSA 60079-18	IEC 60079-18	EN 60079-18
	• Any Zone 20 technique	See above	See above	See above	See above
	• Any CIID1 technique	See CIID1 techniques	See CIID1 techniques	—	—
Zone 22	• Enclosure, “tc” (Dc)	ISA 60079-31	CSA 60079-31	IEC 60079-31	EN 60079-31
	• Pressurization, “p” (Dc)	ISA 61241-2	CSA 61241-4	IEC 60079-2	EN 60079-2
	• Intrinsic safety, “ic” (Dc)	UL 60079-11	CSA 60079-11	IEC 60079-11	EN 60079-11
	• Encapsulation, “mc” (Dc)	UL 60079-18	CSA 60079-18	IEC 60079-18	EN 60079-18
	• Any Zone 20, 21 technique	See above	See above	See above	See above
	• Any CIID1, CIID2 technique	See Class II techniques	See Class II techniques	—	—

Note 1: Zone 20, 21 and 22 general requirements are contained in UL 60079-0 or ISA 61241-0 (USA), CSA 60079-0 (Canada) and IEC/EN 60079-0 (IECEx System & Europe).

Note 2: Zone 20, 21 and 22 intrinsically safe system requirements are contained in ISA 60079-25 (USA), CSA 60079-25 (Canada) and IEC/EN 60079-25 (IECEx System & Europe).

Note 3: Equipment Protection Levels (EPLs) are used to provide additional details regarding the level of protection against ignition in explosive atmospheres. EPLs are designated by a letter “G” for Gas, “D” for Dust or “M” for Mining, followed by a letter “a” for “very high”, “b” for “high” or “c” for “enhanced” level of protection.

Note 4: Under the ATEX Directive (94/9/EC and 2014/34/EU), the marking of Categories is additionally required. ATEX Categories are similar to EPLs in function and designation as follows, ATEX Category 1G, 2G, 3G, 1D, 2D, 3D, M1, M2 = EPL Ga, Gb, Gc, Da, Db, Dc, Ma, Mb respectively.

Note 5: INMETRO certification requirements are determined by Portaria 179 as of 18 May 2010, with the associated Brazilian NBR Ex standards harmonized with the comparable IEC Ex standards noted above.

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EXPLOSIVE DUST ATMOSPHERES
CLASS II & III DIVISION SYSTEM
Includes combustible dusts and ignitable fibers/flyings

CONTINUED

Zone System Non-Electrical Equipment Protection Techniques (Equipment Protection Levels)

		Applicable Certification Documents			
Area	**Protection Techniques**	**USA (UL Mark)**	**Canada (cUL Mark)**	**IECEx System**	**Europe (ATEX)**
Zone 20	• Constructional safety, “c” (Da)	—	—	ISO pr80079-37	EN 13463-5
	• Control of ignition source, “b” (Da)	—	—	ISO pr80079-37	EN 13463-6
	• Liquid immersion, “k” (Da)	—	—	ISO pr80079-37	EN 13463-8
	• Enclosure, “ta” (Da)	—	—	IEC 60079-31	EN 60079-31
Zone 21	• Constructional safety, “c” (Db)	—	—	ISO pr80079-37	EN 13463-5
	• Control of ignition source, “b” (Db)	—	—	ISO pr80079-37	EN 13463-6
	• Liquid immersion, “k” (Db)	—	—	ISO pr80079-37	EN 13463-8
	• Flameproof, “d” (Db)	—	—	IEC 60079-1	EN 13463-3
	• Pressurization, “px”/“py” (Db)	—	—	IEC 60079-2	EN 60079-2
	• Enclosure, “tb” (Db)	—	—	IEC 60079-31	EN 60079-31
	• Any Zone 20 technique	—	—	See above	See above
Zone 22	• Flow restricting enclosure, “fr”	—	—	—	EN 13463-2
	• Constructional safety, “c” (Dc)	—	—	ISO pr80079-37	EN 13463-5
	• Control of ignition source, “b” (Dc)	—	—	ISO pr80079-37	EN 13463-6
	• Liquid immersion, “k” (Dc)	—	—	ISO pr80079-37	EN 13463-8
	• Pressurization, “pz” (Dc)	—	—	IEC 60079-2	EN 60079-2
	• Enclosure, “tc” (Dc)	—	—	IEC 60079-31	EN 60079-31
	• Any Zone 20 or 21 technique	—	—	See above	See above

Note 1: The ISO pr80079 series standards are to be published by Q3 of 2015, with an included reference to IEC 60079-0.

Note 2: Zone 20, 21 and 22 general requirements are contained in ISO/IEC pr80079-36 (IECEx System) and EN 13463-1 (Europe).

Note 3: Equipment Protection Levels (EPLs) are used to provide additional details regarding the level of protection against ignition in explosive atmospheres. EPLs are designated by a letter “G” for Gas, “D” for Dust or “M” for Mining, followed by a letter “a” for “very high”, “b” for “high” or “c” for “enhanced” level of protection.

Note 4: Under the ATEX Directive (94/9/EC and 2014/34/EU), the marking of Categories is additionally required. ATEX Categories are similar to EPLs in function and designation as follows, ATEX Category 1G, 2G, 3G, 1D, 2D, 3D, M1, M2 = EPL Ga, Gb, Gc, Da, Db, Dc, Ma, Mb respectively.

MARKINGS

Class I, II, and III, Division 1 & 2 (USA & Canada)

This marking would include:
Class(es), Division(s), Gas/Dust Group(s), Temperature Classification

Example: Class I, Division 1, Groups C & D; Class II, Division 1, Groups E, F and G; Class III, Division 1,T4A

Class I, Zone 0, 1, & 2 (USA)

The marking would include:
For Zone Listings based on USA 60079 series standards: Class, Zone, AEx, Protection Technique(s), Gas Group, Temperature Classification

Example: Class I, Zone 1, AEx de IIB T4

For Zone Listings based on USA Division standards: Class, Zone, Gas Group, Temperature Classification

Example: Class I, Zone 1, Group IIB T4

Zone 20, 21, & 22 (USA)

The marking would include:
For Zone Listings based on USA 60079 or 61241 series standards: Zone, AEx, Protection Technique(s), Dust Group, Temperature Classification

Example: Zone 21, AEx tb IIIB T135°C

For Zone Listings based on USA Division Standards: Zone, Dust Group, Temperature Classification

Example: Zone 21, IIIB T135°C

Zone 0, 1 & 2 (Canada) Zone 20, 21 & 22 (Canada)

This marking would include:
For Zone 0, 1 & 2 Listings: Ex, Protection Technique(s), Gas Group, Temperature Classification, Equipment Protection Level (EPL)

Example: Ex de IIB T4 Gb

For Zone 20, 21 & 22 Listings: Ex, Protection Technique(s), Dust Group, Temperature Classification, Equipment Protection Level (EPL)

Example: Ex tb IIIB T135°C Db

Zone 0, 1, & 2 (Europe)

This marking would include:
Electrical Equipment: Ex, Protection Technique(s), Gas Group, Temperature Classification, Equipment Protection Level (EPL)

Example: Ex de IIB T4 Gb

Non-Electrical Equipment: Gas Group, Protection Technique(s), Temperature Classification

Example: IIB ck T4

Zone 20, 21, & 22 (Europe)

This marking would include:
Electrical Equipment: Ex, Protection Technique(s), Dust Group, Temperature Classification, Equipment Protection Level (EPL)

Example: Ex tb IIIB T135°C Db

Non-Electrical Equipment: Protection Technique(s), Temperature Classification

Example: ck T135°C

ATEX Directive (Europe)

In addition to the European Ex marking strings noted to the left, this marking would include:
Non-mining: CE, NB Identifier, Ex, Equipment Group & Category, G (gas)/D (dust), Date Code

Example (for DEMKO): CE 0539 Ex II 2 G 2013

Mining: CE, NB Identifier, Ex, Equipment Group & Category, Date Code

Example (for DEMKO): CE 0539 Ex I M2 2013

Zone 0, 1, & 2 (IECEx System)

This marking would include:

Electrical Equipment: Ex, Protection Technique(s), Gas Group, Temperature Classification, Equipment Protection Level (EPL)

Example: Ex de IIB T4 Gb

Non-Electrical Equipment: Ex, Protection Technique, Gas Group, Temperature Classification, Equipment Protection Level (EPL)

Example: Ex h IIB T4 Gb

Zone 20, 21, & 22 (IECEx System)

This marking would include:
Electrical Equipment: Ex, Protection Technique(s), Dust Group, Temperature Classification, Equipment Protection Level (EPL)

Example: Ex tb IIIB T135°C Db

Non-Electrical Equipment: Ex, Protection Technique(s), Dust Group, Temperature Classification, Equipment Protection Level (EPL)

Example: Ex h IIIB T135°C Db

INMETRO Mark (Brazil)

This marking would include:
INMETRO/UL-BR Mark, Ex, Protection Technique(s), Gas Group, Temperature Classification, Equipment Protection Level (EPL)

Example: INMETRO UL Ex de IIB T4 Gb