



Global Reference Guide for Potentially Explosive Atmospheres and Hazardous Locations



ATEX / IEC Reference

94/9/EC Product Markings					Typical IEC/CENELEC Product Markings									
ATEX Required Markings					GAS					Dust				
II 2 G / D					Ex	d	e	IIC	T6	Gb <sup>1)</sup>	/	Ex	t	IIIC T80°C Db <sup>1)</sup>
Explosion Protection Marking														
Equipment Group														
Equipment Category														
Explosive Atmosphere Suitability (G – Gas, vapor or mist)														
Explosive Atmosphere Suitability (D – Dust)														
Explosion Marking														
Type of protection (Gas)														
Explosion Group (Gas)														
Temperature Class (Gas)														
Equipment Protection Level (EPL-Gas)														
Explosion Protection Marking														
Type of protection (Dust)														
Explosion Group (Dust)														
Max. Surface Temperature (Dust)														
Equipment Protection Level (EPL-Dust)														

1) Standard marking - alternate marking possible e.g.: **Ex db eb IIC T6 / Ex tb IIIC T80°C**

ATEX (**A**tmosphères **E**xplosibles) - The Directive 94/9/EC (ATEX) regulates within its scope for the European Market the Essential Health and Safety Requirements for apparatus for use in hazardous areas and conformity assessment procedures which must be applied to equipment.

Zone Classification / Equipment Protection Level

Hazardous mixture	Period of presence of the flammable substances	Zone Classification	Necessary Marking for the Equipment				Protection Level
			According 94/9/EC		According IEC 60079-0		
			Equipment Group	Category	Protection Group	Equipment Protection Level EPL	
Gas Mist Vapor	Continuously for long periods or frequently	Zone 0	II	1 G	II	Ga	very high
	Occasional occurrence	Zone 1	II	2 G	II	Gb	high
	Not likely, but if it does occur only rarely and for a short period	Zone 2	II	3 G	II	Gc	increased
Dust	Continuously for long periods or frequently	Zone 20	III	1 D	III	Da	very high
	Occasional occurrence	Zone 21	III	2 D	III	Db	high
	Not likely, but if it does occur only rarely and for a short period	Zone 22	III	3 D	III	Dc	increased
Methane Coal dust	Mining	Mining	I	M1	I	Ma	very high
		Mining	I	M2	I	Mb	high

Explosion Groups

Explosive Atmospheres:	Typical Hazardous Material	Explosion Group
Gases and Vapors	Acetylene Hydrogen Ethylene Propane	IIC IIC or IIB+H2 IIB IIA
Dusts	Metal dust Coal dust Grain dust	IIIC IIIC IIB
Fibres & Flyings	Wood, paper, or cotton processing	IIIA

Typical Nameplate Marking

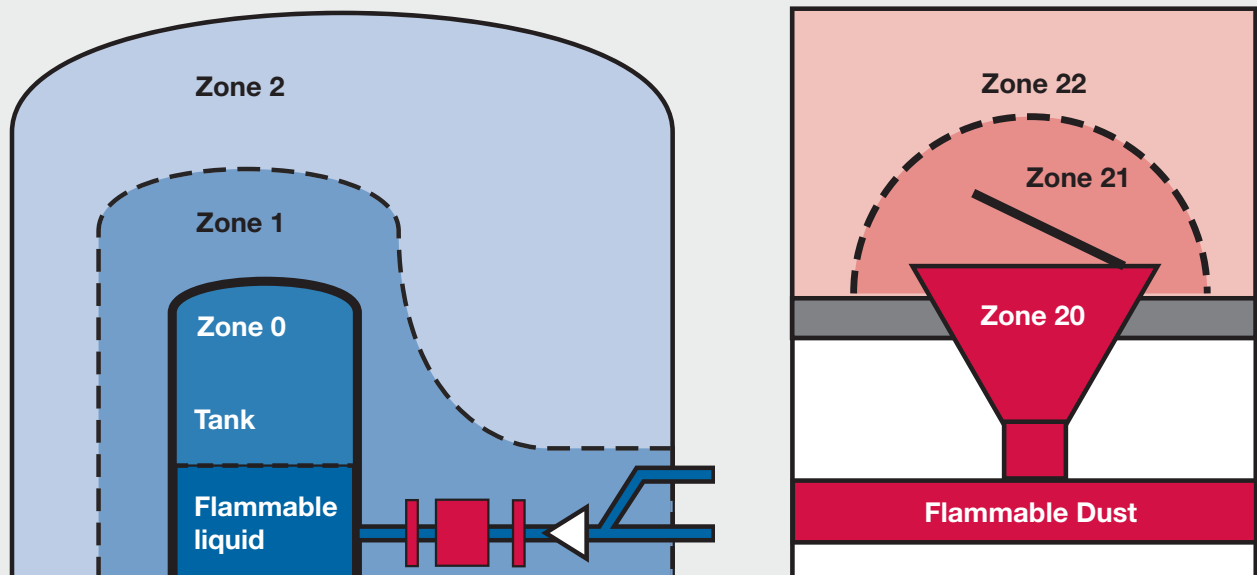
Name and address of manufacturer	Serial number including year of manufacture	Equipment name/type
Certificate number May end with U – Component cert. May end with X – Special conditions for safe use	Additional certificate (optional)	CE marking and number of Notified Body responsible for the monitoring of the Quality System (0102 – PTB Germany)
Explosion protection marking (ATEX): Equipment Group (I) and Category (2) Type of explosive atmosphere G – gas, vapor or mist / D – dust	Marking accord. IEC/CENELEC	Electrical parameters Ambient temperature -25°C to +55°C (if -20°C to +40°C, marking is not required - Standard for all equipment) Other essential information required by the used Standards

Ingress Protection (IP) Codes and NEMA Enclosure Types

Ingress Protection Codes IP .. according IEC 60079		NEMA Enclosure Types	
FIRST NUMERAL Protection against solid bodies	SECOND NUMERAL Protection against liquid	Enclosure Type	Intended Use
0 - NO PROTECTION	0 - NO PROTECTION	1	Indoor use, limited amounts of falling dirt
1 - OBJECTS EQUAL TO OR GREATER THAN 50 mm	1 - VERTICALLY DRIPPING WATER	3	Outdoor use, rain, sleet, windblown dust, external formation of ice
2 - OBJECTS EQUAL TO OR GREATER THAN 12.5 mm	2 - 75 TO 105°-ANGLED DRIPPING WATER	3R	Outdoor use, rain, sleet, external formation of ice
3 - OBJECTS EQUAL TO OR GREATER THAN 2.5 mm	3 - SPRAYING WATER	3S	Outdoor use, rain, sleet, windblown dust, external mechanisms operable when ice laden
4 - OBJECTS EQUAL TO OR GREATER THAN 1.0 mm	4 - SPLASHING WATER	4	Indoor or outdoor use, windblown dust and rain, splashing water, hose directed water, external formation of ice
5 - DUST-PROTECTED	5 - WATER JETS	4X	Indoor or outdoor use, windblown dust and rain, splashing water, hose directed water, corrosion, external formation of ice
6 - DUST-TIGHT	6 - HEAVY SEAS, POWERFUL WATER JETS	5	Indoor use, settling airborne dust, falling dirt, non-corrosive liquids
	7 - EFFECTS OF IMMERSION	6	Indoor or outdoor use, hose directed water, temporary submersion, external formation of ice
	8 - INDEFINITE IMMERSION	6P	Indoor or outdoor use, hose directed water, prolonged submersion, external formation of ice
		7**	Indoor use, Class I, Division 1, Groups A, B, C, and D hazardous locations, air-break equipment
		8**	Indoor or outdoor use, Class I, Division 1, Groups A, B, C, and D hazardous locations, oil-immersed equipment
		9**	Indoor use, Class I, Division 1, Groups E, F, and G hazardous locations, air-break equipment
		10**	Mining applications
		12	Indoor use, circulating dust, falling dirt, dripping noncorrosive liquids
		13K	Indoor use, circulating dust, falling dirt, dripping noncorrosive liquids, provided with knockouts
		13	Indoor use, lint, dust, spraying of water, oil and noncorrosive coolant

\* NEMA Enclosure Type can be converted to IP Code rating, but IP Codes cannot be converted to NEMA Enclosure Type (Ref. NEMA 250)  
\*\* Enclosure Types for U.S. only (Ref. NEMA 250)

Localisation of Gas and Dust Ex-Zones



Temperature Classification

Maximum Surface Temperature	IEC NEC 505	NEC 500 - Table 500.8(C)
450°C (842°F)	T1	T1
300°C (572°F)	T2	T2
280°C (536°F)		T2A
260°C (500°F)		T2B
230°C (446°F)		T2C
215°C (419°F)		T2D
200°C (392°F)		T3
180°C (356°F)	T3	T3A
165°C (329°F)		T3B
160°C (320°F)		T3C
135°C (275°F)	T4	T4
120°C (248°F)		T4A
100°C (212°F)	T5	T5
85°C (185°F)	T6	T6

Typical NEC/CEC Product Markings

NEC 500				NEC 505/ CEC 18					
Class I Division 1		Groups A, B, C & D T6		Class I	Zone 1	AEx	e	IIC	T6
Hazard Category									
Area Classification									
Hazardous Atmosphere Category (Gas or Dust Grouping)									
Temperature Classification									
Hazard Category									
Area Classification									
Explosion Protection Standard (EX-IEC/ATEX/CEC, AEx-NEC)									
Method of Explosion Protection									
Hazardous Atmosphere Category (Gas or Dust Grouping)									
Temperature Classification									

Method of Explosion Protection

Type of Protection	Description of Protection	United States NEC 500 Division	Permitted for use in NEC 505 Zone	Canada CEC 18 Division	Protection Concept
e n	Increased Safety Non-Incendive	- 2	1, 2 2	- 2 2	No arcs, sparks or hot surfaces
d - q	Flameproof Explosionproof Powder Filled	- 1, 2 -	1, 2 -	1, 2 -	Contain the explosion, prevent the flame propagation
ia ib	Intrinsic Safety Intrinsic Safety	1, 2 -	0, 1, 2 1, 2	1, 2 -	Limit the energy of the spark and the surface temperature
p m o	Pressurized (Purged) Encapsulation Oil Immersion	1, 2 - 2	1, 2 1, 2	1, 2 1, 2	Keep the flammable gas out

CENELEC (European Committee for Electro-technical Standardization) publishes standards covering the electrotechnical field for countries in Europe.

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC) global organization that prepares and publishes international standards for electrical, electronic and related technologies.

NEMA (National Electrical Manufacturers Association) NEMA 250 series standards for enclosure types covers both hazardous areas (potentially explosive atmospheres) and non-hazardous areas.

NEC – National Electrical Code (USA)  
CEC – Canadian Electrical Code (Canada)

Hazardous Atmosphere Category (Gas or Dust Grouping)

Explosive Atmosphere	Typical Hazard Material	North America NEC 500-503 / CEC 18 Hazard Category	NEC 505/CEC 18 Gas Grouping
Gases and Vapors	Acetylene	Class I	Group A
	Hydrogen	Class I	Group B
	Ethylene	Class I	Group C
	Propane	Class I	Group D
Dusts	Metal dust	Class II	Group E
	Coal dust	Class II	Group F
	Grain dust	Class II	Group G
Fibres & Flyings	Wood, paper, or cotton processing	Class III	-

\* NEC 505 covers explosive gases and vapors only.

Area Classification

	Continuous Hazard	Intermittent Hazard	Hazard under Abnormal Conditions
North America/ NEC 500-503/CEC 18	Division 1	Division 1	Division 2
NEC 505-506/CEC 18	Zone 0 (Zone 20 dust)	Zone 1 (Zone 21 dust)	Zone 2 (Zone 22 dust)

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