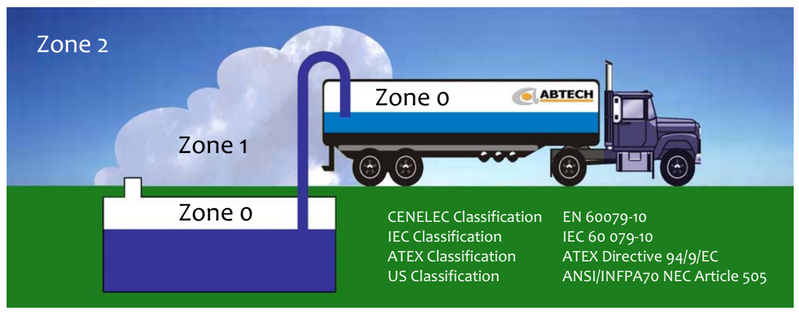
Equipment Certification Guide for Hazardous Areas

ATEX and IEC Ex

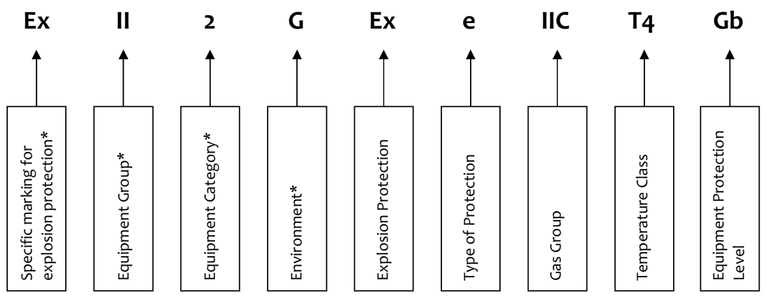


CENELEC Classification	EN 60079-10
IEC Classification	IEC 60 079-10
ATEX Classification	ATEX Directive 94/9/EC
US Classification	ANSI/INFPA70 NEC Article 505

Explosion Protection Concepts

Type of Protection	Symbol	Basic Concept of Protection	Typical Zone(s)	Gas Group	IEC/EN Standard	Typical IEC EPL
Protection of Electrical Equipment for Gases and Vapours - G						
Flameproof	d	Contain the explosion	1,2	II	60079-1	Gb
Enclosed Break	nC		2		60079-15	Gc
Increased Safety	e	No arcs, sparks or hotsurfaces. Enclosure ≥IP54	1, 2	II	60079-7	Gb
Non Sparking	nA		2		60079-15	Gc
Intrinsic Safety	ia	limit circuit energy and hot surfaces	0, 1, 2	II	60079-11	Ga
	ib		1, 2			Gb
	ic		2			Gc
Encapsulation	ma	Exclude fuel	0, 1, 2	II	60079-18	Ga
	mb		1, 2			Gb
	mc		2			Gc
Sealed/Hermetic Sealing	nC		2		60079-15	Gc
Restricted Breathing	nR		2			Gc
Oil Filled	o		1, 2		60079-6	Gb
Pressurised	px		1, 2		60079-2	Gb
	py		1, 2			Gb
	pz		2			Gc
Sand Filled	q	Quench the flame	1, 2	II	60079-5	Gb
Optical Radiation	OP sh	Inherently safe	0, 1, 2	II	60079-28	Ga
	Op is		0, 1, 2			Ga
	Op pr		1, 2			Gb
Protection of Electrical Equipment for Combustible Dusts - D						
Enclosure	ta	Exclude dusts by use of enclosure	20, 21, 22	III	60079-31	Da
	tb		21, 22			Db
	tc		21, 22			Dc
Intrinsic Safety	iaD	Use of enclosure and energy limitation	20, 21, 22	III	61241-11	Da
	ibD		21, 22			Db
	icD		21, 22			Dc
Encapsulation	ma	Exclude dust	20, 21, 22		60079-18	Da
	mb		21, 22			Db
	mc		21, 22			Dc
General requirements	Covers application and testing related to above protection methods					

Typical ATEX and IEC Ex Equipment Marking



For ATEX certified equipment, the CE mark should be shown, along with the relevant Notified Body number, where applicable.
**Required for ATEX only*

Ingress Protection Ratings (EN60529/IEC529)

First Numeral Protection from Solid Bodies		Second Numeral Protection from Liquids		Third Numeral* Protection from Impact	
0	No special protection	0	No special protection	0	No special protection
1	Large foreign bodies, diam. >50mm	1	Water dripping/falling vertically	1	Protected against 0.225J impact
2	Medium-sized foreign bodies, diam. >12mm	2	Water dripping/falling at an angle (up to 15° degrees from the vertical)	2	Protected against 0.375J impact
3	Small foreign bodies, diam. >2.5mm	3	Spray water (any direction up to 60° degrees from the vertical)	3	Protected against 0.5J impact
4	Granular foreign bodies, diam. >1mm	4	Spray/splashing water from all directions, (limited ingress permitted)	4	Protected against 2.0J impact
5	Dust protected; dust deposits are permitted, but their volume must not affect the function of the unit.	5	Low pressure water jets from all directions, (limited ingress permitted)	5	Protected against 6.0J impact
6	Complete protection	6	High pressure jets from all directions	6	Protected against 20.0J impact
		7	Temporary immersion, 1m for 30 minutes		
		8	Permanent Immersion or defined pressure**		

* Third numeral 'impact' is optional and need not be shown.
** Second numeral '8' is defined as 'submersion at a depth and length of time to be agreed between manufacturer and user'

Gas/Atmosphere Groups IEC Ex and ATEX

Group	Environment	Typical Location	Typical Gas/Substance
I	Gases And Vapours	Underground Mining	Underground Methane (Firedamp)
IIA		Above Ground	Acetone, Methane, propane
IIB			Ethylene, Hydrogen Sulphide
IIC			Hydrogen, Acetylene, Carbon Disulphide
IIIA	Combustible Dusts	Above Ground	Combustible fibres & flyings
IIIB			Combustible dusts – non conductive
IIIC			Combustible dusts - conductive

Equipment Categories/Levels of Protection ATEX & IEC Ex

Equipment Category ATEX 94/9/EC	Category	Equipment Protection Level	Zone of Use
Category 1	1G	Ga	Suitable for use in Zone 0, 1, 2
	1D	Da	Suitable for use in Zone 20, 21, 22
Category 2	2G	Gb	Suitable for use in Zone 1, 2
	2D	Db	Suitable for use in Zone 21, 22
Category 3	3G	Gc	Suitable for use in Zone 2
	3D	Dc	Suitable for use in Zone 22

Comparison

Classification of Zones and Divisions

Type of Area	NEC	ATEX and IEC	Definition
Continuous hazard	Division 1	Zone 0 / Zone 20	explosive atmosphere is continually present
Intermittent hazard	Division 1	Zone 1 / Zone 21	explosive atmosphere is likely to occur in normal operation
Hazard under abnormal conditions	Division 2	Zone 2 / Zone 22	explosive atmosphere is unlikely to occur but if it does, will exist only for a short period

Equipment intended for use in zone 1 areas cannot be used in Division 1 areas as this covers zone 0 rated areas also.

Comparison of IP and NEMA Enclosure Ratings

Enclosure Type	IP23	IP30	IP32	IP55	IP64	IP65	IP66	IP67
1	●							
2		●						
3				●				
4							●	
4X							●	
6								●
12				●		●		
13						●		

This comparison is for guidance only. It is the responsibility of the user to ensure the enclosure rating is suitable for the given application.

Temperature Classification

Max Surface Temperature	ATEX/IEC*	NEC 505	NEC 500	Max Surface Temperature
450°C	T1	T1	T1	450°C
300°C	T2	T2	T2	300°C
			T2A	280 °C
			T2B	260 °C
			T2C	230 °C
			T2D	215 °C
200°C	T3	T3	T3	200°C
			T3A	180 °C
			T3B	165 °C
			T3C	160 °C
135°C	T4	T4	T4	135°C
			T4A	120 °C
100°C	T5	T5	T5	100°C
85°	T6	T6	T6	85°

*For ATEX/IEC applications applies to Group II gases only. Group 1 applications have different classifications

About Abtech

Abtech is a leading manufacturer of enclosures, electrical connection products, lighting and associated equipment.

Our product range consists of;

- Hazardous Area enclosures and junction boxes manufactured from stainless and mild Steel, GRP and die-cast aluminium.
- High voltage junction boxes up to 35kV.
- Cable glands and adaptors.
- The Ablux range of hazardous area lighting.

Contact us for further details...

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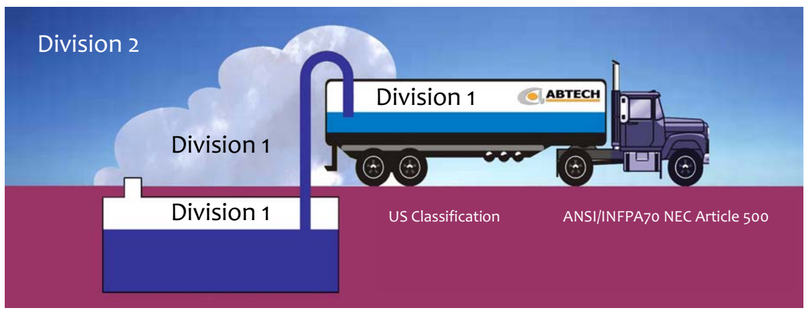
Approvals

North America

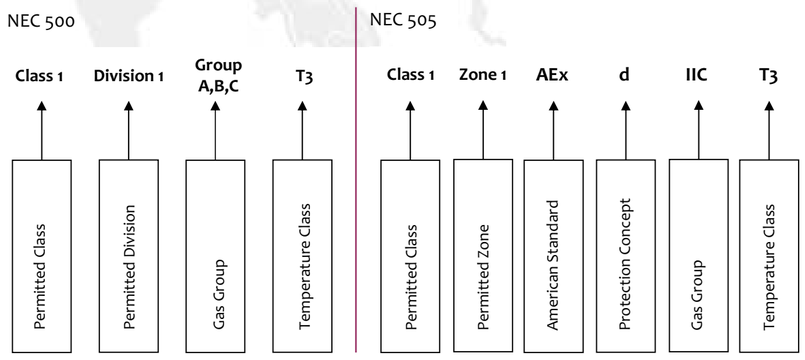


US Classification	ANSI/INFPA70 NEC Article 500

Explosion Protection Concepts

Type of Protection	Code	Basic concept of protection	Class	Typical Division / Zone	Applicable Standard
Protection of Electrical Equipment for Gases and Vapours – Class I					
Flameproof	AEx d	Contain the explosion	Class 1	Zone 1, 2	ISA 60079-1
Explosion proof	XP		Class 1	Division 1	UL1203
Enclosed Break	AEx nC		Class 1	Zone 2	ISA 60079-15
Increased Safety	AEx e	No arcs, sparks or hot surfaces	Class 1	Zone 1, 2	ISA 60079-7
Non Sparking	AEx nA		Class 1	Zone 2	ISA 60079-15
Non Incendive	NI		Class 1	Division 2	ISA 12.12.01 / FM3611
Sand Filled	AEx q	Quench the flame	Class 1	Zone 1, 2	ISA 60079-5
Intrinsic Safety	AEx ia	Limit circuit energy and hot surfaces	Class 1	Zone 0, 1, 2	ISA 60079-11
	AEx ib		Class 1	Zone 1, 2	
	IS		Class 1	Division 1	UL913 / FM3610
Limited Energy	AEx nC		Class 1	Zone 2	ISA 60079-15
Encapsulation	AEx m	Exclude fuel	Class 1	Zone 1, 2	ISA 60079-18
	AEx ma		Class 1	Zone 0, 1, 2	
	AEx mb		Class 1	Zone 1, 2	
Oil Filled	AEx o		Class 1	Zone 1, 2	ISA 60079-6
Pressurised	Type X		Class 1	Division 1	NFPA 496 / FM3620
	Type Y		Class 1	Division 1	
	Type Z		Class 1	Division 2	
	AEx px		Class 1	Zone 1	ISA 60079-2
	AEx px		Class 1	Zone 1	
	AEx px		Class 1	Zone 2	
Restricted Breathing	AEx nR		Class 1	Zone 2	ISA 60079-15
Protection of Electrical Equipment for Combustible Dust – Class II & III					
Dust Ignition Proof	DIP	Exclude combustible dust	Class II	Division 1 & 2	UL1203
Dust Protected	NI		Class II	Division 2	ISA 12.12.01 / FM3611
Protection by Enclosure	AEx tD		Class II	Zone 2	ISA 60079-31
Encapsulation	AEx maD			Zone 20, 21, 22	ISA 61241-18
	AEx mbD			Zone 21, 22	
Intrinsic Safety	AEx iaD	Limit circuit energy and hot surfaces		Zone 20, 21, 22	ISA 61241-11
	AEX ibD			Zone 21, 22	
	IS		Class II	Division 1	UL 913 / FM3610
	IS		Class III	Division 1	

Typical NEC Equipment Marking



NEMA Enclosure Type Ratings

Type	Area of Use	Description
1	Indoor	**General Purpose**
2	Indoor	Drip Proof -Protection against falling water and dirt
3	Indoor/Outdoor	Dust & Rain Tight –Protection against windblown dust, rain, and sleet & damage from formation of ice
3R	Outdoor	**Rain Proof & Ice/Sleet Proof** - protection against falling rain & damage from formation of ice
3S	Outdoor	**Dust Tight, Rain Tight, & Ice/Sleet Proof –** Protection against sleet and damage from formation of ice
4	Indoors/Outdoors	**Water Tight & Dust Tight –**
4X	Indoors/Outdoors	**Water Tight, Dust Tight, & Corrosion Resistant** - Protection from corrosion, hose directed water and damage from formation of ice
5	Indoor	**Dust Tight & Drip Tight** - protection against dust, fibres, falling dirt, and dripping non-corrosive liquids
6	Indoors/Outdoors	**Temporary Submersion –** protection against falling dirt, dust, fibres, hose directed water and temporary submersion in water.
6P	Indoors/Outdoors	**Prolonged Submersion –** protection against falling dirt, dust, fibres, hose directed water and prolonged submersion in water.
12	Indoor	**Dust Tight & Drip Tight** - protection against dust, fibres, falling dirt, and dripping non-corrosive liquids (enclosure without knockouts)
12K	Indoor	**Dust Tight & Drip Tight** - protection against dust, fibres, falling dirt, and dripping non-corrosive liquids (enclosure with knockouts)
13	Indoor	**Dust Tight & Oil Tight** - protection against dust, spraying of water, oil, and noncorrosive coolant.

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