

# ATEX REFERENCE GUIDE



A Pentair Company

This Hoffman ATEX Reference Guide explains European hazardous location protection methods and markings.

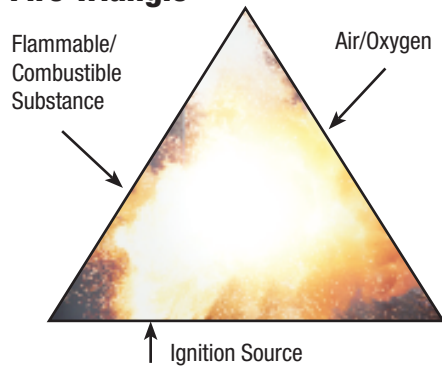
PROTECTION METHODS		
Protection Method	IEC	
Intrinsic Safety	ia	60079-11
Intrinsic Safety	ib	60079-11
Flameproof	d	60079-1
Pressurization	p	60079-2
Increased Safety	e	60079-7
Encapsulation	m	60079-18
Oil Immersion	o	60079-6
Powder Filling	q	60079-5
Non-sparking	n	60079-15
General Requirement		60079-0
Inspection & Maintenance		60079-17

PROTECTION CONCEPTS			
Protection Concepts	Symbol	How it Works	Category
Increased Safety	Ex e	No arcs, sparks or hot surfaces	2 & 3
Non-sparking	Ex nA		3
Flameproof Enclosed Break*	Ex d Ex nW	Contain the explosion and quench flame	2 & 3 3
Quartz/Sand Filled	Ex q		2 & 3
Intrinsic Safety	Ex ia Ex ib Ex nL	Limit energy of sparks; limit the temperature	1, 2 & 3 2 & 3 3
Energy Limitation			
Pressurized Simplified Pressurization	Ex p Ex nP	Keep the flammable gas away from any hot surfaces and ignition capable equipment	2 & 3 3
Encapsulation	Ex m		2 & 3
Oil Immersion Restricted Breathing	Ex o Ex nR		2 & 3 3
Special	Ex s	Any proven method	1, 2 & 3

TEMPERATURE CLASSES		
Max. Surface Temperature	Fahrenheit	T-Class
450° C	(842° F)	T1
300° C	(572° F)	T2
200° C	(392° F)	T3
135° C	(275° F)	T4
100° C	(212° F)	T5
85° C	(185° F)	T6*

\*Enclosed Break can also be noted as Ex nC

## Fire Triangle



All three elements of the fire triangle must be present for ignition to occur.

**ATEX MARKING DIRECTIVE (94/9/EC)**

**EX II 2 G D**

- EX: EUROPEAN EXPLOSIVE ATMOSPHERE SYMBOL
- II: EQUIPMENT GROUP
- 2: EQUIPMENT CATEGORY
- G: GAS GROUP
- D: DUST

**EEx e II T6**

- EEx: EUROPEAN EXPLOSIVE ATMOSPHERE PROTECTION CONCEPT
- e: PROTECTION METHOD
- II: GAS GROUP
- T6: TEMPERATURE CLASS

**ATEX**

MODULES [ATEX (94/9/EC)]				
[ANNEX I (1)] Classification of Equipment Groups into Categories				
Equipment shall be classified into the following categories				
Equipment Group:	Equipment Category:	Atmosphere:	Protection Level:	Required Protection Performance & Operation:
I (Mines)	M1	Methane & Dust	Very High	Two faults, remain energized and functioning
I (Mines)	M2	Methane & Dust	High	Severe normal operation, De-energize in exp. atm.
II (Above Ground)	1	Gas, Vapor, Mist, Dust	Very High	Two faults
II (Above Ground)	2	Gas, Vapor, Mist, Dust	High	One fault
II (Above Ground)	3	Gas, Vapor, Mist, Dust	Low	Normal operation

GAS GROUPS	
Typical Material	
Methane	I
Propane	IIA
Ethylene	IIB
Hydrogen	IIC
Acetylene	IIC
All Gases	II

Highlighted items represent protection provided by Hoffman ZonEX™ Enclosures, certified to meet ATEX Directive 94/9/EC, EX II 2 G D, EEx e II, IP66  
 \*Applies to component populated Hoffman ZonEX™ Enclosures only.

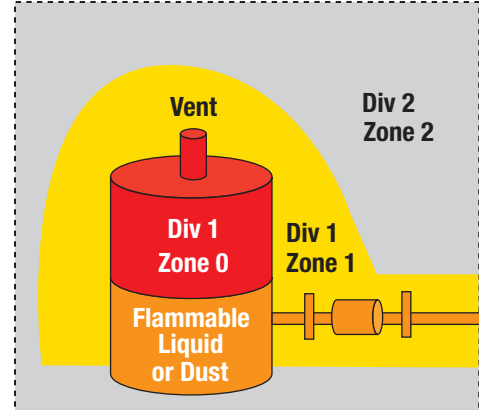
### COMPARING DIVISIONS, ZONES, & CATEGORIES

Frequency of Occurrence	CEC, NEC Editions Division System	Zone System Class I, CEC, NEC	Category System ATEX
Continuous		Zone 0, 20	Category 1
Intermittent	Class I, Division 1	Zone 1, 21	Category 2
Periodically	Class II, Division 1		
Abnormal	Class I, Division 2	Zone 2, 22	Category 3
Condition	Class II, Division 2		

### INGRESS PROTECTION (IP) CODES

First Number <sup>1</sup>		Second Number <sup>1</sup>	
0	No Protection	0	No Protection
1	Objects Greater than 50mm	1	Vertically Dripping Water
2	Objects Greater than 12mm	2	75° to 90° F Dripping Water
3	Objects Greater than 2.5mm	3	Sprayed Water
4	Objects Greater than 1mm	4	Splashed Water
5	Dust Protected	5	Water Jets
6	Dust Tight	6	Powerful Water Jets
		7	Effects of Immersion
		8	Indefinite Immersion

### Zones and Divisions



### Enclosure Types

Enclosure Type <sup>2,3</sup>	Intended Use
1	Indoor use, limited amounts of falling dirt
2	Indoor use, limited amounts of falling water and dirt
3	Outdoor use, rain, sleet, wind blown dust, external formation of ice
3R	Outdoor use, rain, sleet, external formation of ice
3S	Outdoor use, rain, sleet, wind blown dust, external mechanisms operable when ice laden
4	Indoor or outdoor use, wind blown dust and rain, splashing water, hose directed water, external formation of ice
4X	Indoor or outdoor use, wind blown dust and rain, splashing water, hose directed water, corrosion, external formation of ice
5	Indoor use, settling airborne dust, falling dirt, non-corrosive liquids
6	Indoor or outdoor use, hose directed water, temporary submersion, external formation of ice
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 use, Class I, Division 1, Groups A, B, C, and D hazardous locations, oil-immersed equipment
9	Indoor use, Class II, 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
12K	Indoor use, circulating dust, falling dirt, dripping noncorrosive liquids, provided with knockouts
13	Indoor use, lint, dust, spraying of water, oil, and noncorrosive coolant

Note: <sup>1</sup>Numbers can be replaced by 'X' when the characteristic number is not required

<sup>2</sup>Enclosure Types for US only

<sup>3</sup>Enclosure Type can be converted to IP code rating; however, IP classified enclosures cannot be converted to Enclosure Type

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