



# Protection Concepts

For Europe: CENELEC / ATEX Directive

Typical material	Apparatus group	Max. surface temperature	T- Class	Gas Group Temperature Classification ATEX	CE Marking Directive	Basic requirements
Methane	I Mining (M1/M2)	450°C	T1			
Propane	IIA	300°C	T2		<a href="#">Low Voltage Directive</a>	Electrical safety of equipment, voltage ranges 50-1000AC, 75-1500 DC
Ethylene	IIB Surface	200°C	T3		<a href="#">EMC Directive</a>	Electromagnetic emissions and immunity
Hydrogen	IC Applications	135°C	T4		<a href="#">Machinery Directive</a>	Mechanical and electrical safety
Acetylene	IIC	100°C	T5			
All Gases	II	85°C	T6		<a href="#">Atex Directive</a>	Hazardous Area Equipment (mandatory form 1st July 2003) Currently accepted

**EEx ed IIB T4**

**CE Ex II 1 G**

\*\*\*\* 4 Digit body number

**Category**

<b>Protection Concepts</b>	<b>Symbol</b>	<b>Zone</b>	<b>Standard</b>	<b>How it works</b>	
<b>Increased Safety</b>	Ex e	1 & 2	EN 50019	No arcs, sparks or hot surfaces	<b>2</b>
<b>Non-sparking</b>	Ex nA	2	EN 50021		<b>3</b>
<b>Flameproof</b>	Ex d	1 & 2	EN 50018		<b>2</b>
<b>Enclosed Break</b>	Ex nW	2	EN 50021	Contain the explosion and quench flame	<b>3</b>
<b>Quartz/Sand Filled</b>	Ex q	1 & 2	EN 50017		<b>2</b>
<b>Intrinsic Safety</b>	Ex ia	0,1 & 2	EN 50020	Limit energy of sparks; limit the temperature	<b>1</b>
	Ex ib	1 & 2	EN 50039		<b>2</b>
<b>Energy Limitation</b>	Ex nL	2	EN 50021		<b>3</b>
					<b>2</b>
<b>Pressurised</b>	Ex p	1 & 2	EN 50016		<b>2</b>
<b>Simplified Pressurisation</b>	Ex nP	2	EN 50021	Keep the flammable gas away from any hot surfaces and ignition Capable equipment	<b>3</b>
<b>Encapsulation</b>	Ex m	1 & 2	EN 50028		<b>2</b>
<b>Oil Immersion</b>	Ex o	1 & 2	EN 50015		<b>2</b>
<b>Restricted breathing</b>	Ex nR	2	EN 50021		<b>3</b>
<b>Special</b>	Ex s	0*,1&2	EHSR (ATEX)	Any Proven Method	<b>1, 2 &amp; 3</b>

\* Label must indicate Zone 0

Classification	Criteria For Zone	ATEX Marking	
Zone 0	Flammable material always present or for long periods (e.g.1000 hours or more per year)	<b>G</b>	Category 1
Zone 20		<b>D</b>	<b>Equipment</b>
Zone 1	Flammable material present in normal operation (e.g. 10-1000 hours/year)	<b>G</b>	Category 2
Zone 21		<b>D</b>	<b>Equipment</b>
Zone 2	Flammable material present for short periods only (e.g. less than 10 hours/year)	<b>G</b>	Category 3
Zone 22		<b>D</b>	<b>Equipment</b>

## For North America

### PROTECTION METHODS

**INTRINSICALLY SAFE**  
**Ex ia IIC T4**  
(Method of protection)

**Class I, Division 1**  
(Area Classification)

**Groups A, B, C and D**  
(Gas Grouping)

**T4**  
(Temperature Code)

North America		North America, CENELEC (Europe) and IEC (International)		
Method of Protection	Division	Method of Protection	Zone	Code Letter CENELEC/IEC
Intrinsic Safety	1 or 2	Intrinsic Safety	0, 1 or 2	ia
Explosion-Proof	1 or 2		1 or 2	ib
Pressurization	1 or 2	Flame-Proof	1 or 2	d
Non-Incendive Circuits	2	Pressurization	1 or 2	p
*Specifically Assessed Equipment		Increased Safety	1 or 2	e

(\*No excessive Heat Generating Devices or Ignition-capable Arcing / Sparking Devices)

### AREA CLASSIFICATION

	CONTINUOUS HAZARD	INTERMITTENT HAZARD	HAZARD UNDER ABNORMAL CONDITIONS
NORTH AMERICA (CEC/NEC)	Division 1		Division 2 or Zone 2
	Zone 0	Zone 1	
CENELEC/IEC	Zone 0	Zone 1	Zone 2

### HAZARDOUS LOCATIONS GAS GROUPS

TYPICAL GAS HAZARD	NORTH AMERICA CEC SECTION 18, NEC ARTICLE 500	CENELEC/IEC CENELEC, EN 50014, IEC 79-0
ACETYLENE	A or IIC	IIC
HYDROGEN	B or IIC	IIC
ETHYLENE	C or IIB	IIB
PROPANE	D or IIA	IIA
METHANE	Group D (gaseous mines) or I	I

### TEMPERATURE CODE/CLASS

MAXIMUM SURFACE TEMPERATURE (°C)	450	300	280	260	230	215	200	180	165	160	135	120	100	85
NORTH AMERICA Temp Code	T1	T2	T2A	T2B	T2C	T2D	T3	T3A	T3B	T3C	T4	T4A	T5	T6
CENELEC/IEC Temp Class	T1	T2			T3			T4		T5	T6			