



# Ex Guide



A Phoenix Mecano Company

TYPES OF PROTECTION FOR ELECTRICAL APPARATUS IN HAZARDOUS AREAS						
Protection Method	Symbol		Zone	Schutzprinzip	Standards	
	Standard	Alternative			IEC Norm	CENELEC Norm
				General Requirements	IEC 60079-0	EN 60079-0
Increased safety	e	eb	1	No arcs, sparks or hot surfaces	IEC 60079-7	EN 60079-7
Flameproof enclosure	d	db	1	Parts that can ignite a hazardous atmosphere are installed in flameproof enclosures which prevent the transmission of an explosion to the ambient atmosphere	IEC 60079-1	EN 60079-1
Intrinsic safety	ia	ia	0	Energy limitation of sparks and temperatures	IEC 60079-11	EN 60079-11
	ib	ib	1			
	ic	ic	2			
Type of protection n	nA	nAc	2	non-sparking	IEC 60079-15	EN 60079-15
	nC	nCc	2	hermetically sealed	IEC 60079-15	EN 60079-15
	nR	nRc	2	restricted breathing	IEC 60079-15	EN 60079-15
Encapsulation	ma	ma	0	Keep flammable gas away from any hot surfaces and ignition capable equipment	IEC 60079-18	EN 60079-18
	mb	mb	1			
	mc	mc	2			
Pressurized enclosure	p	pb	1	Keep flammable gas away from any hot surfaces and ignition capable equipment	IEC 60079-2	EN 60079-2
Powder filling	q	qb	1	Keep flammable gas away from any hot surfaces and ignition capable equipment	IEC 60079-5	EN 60079-5
Optical radiation	op	opa	0	Limit, avoid etc. transmission of optical radiation op is = inherently safe optical radiation op pr = protected optical radiation op sh = optical radiation interlock	IEC 60079-28	EN 60079-28
	op	opb	1			
	op	ope	2			

Gas Group	TEMPERATURE CLASSIFICATION						
	T1 450 °C	T2 300 °C	T3 200 °C	T4 135 °C	T5 100 °C	T6 85 °C	
IIA	Ammonia 630 °C	1,2-Dichlorethane 440 °C	Benzene 220-300 °C	Acetaldehyde 140 °C			
	Carbon Monoxide 605 °C	Ethylbenzene 431 °C	Diesel Fuel 220-300 °C	Triethylamine 190 °C			
	Phenol 595 °C	Ethanol 400 °C	Fuel Oil 220-300 °C				
	Methane 595 °C	Nitromethane 415 °C	Jetfoil 220-300 °C				
	Benzol 555 °C	Trichlorethylene 410 °C	Naphthalene 540 °C				
	Acetone 535 °C	Methylamine 408 °C	Petroleum 288 °C				
	Toluene 535 °C	n-Propanoll 385 °C	Pentane 288 °C				
	Ethane 515 °C	Ethylene-Diamin 385 °C	Turpentine 254 °C				
	Acetic Acid 485 °C	i-Amyl Acetat 380 °C	n-Hexane 230 °C				
	Propan 470 °C	n-Butane 365 °C	Heptane 215 °C				
	Xylene 464 °C	1-Butanol 340 °C	Octane 205 °C				
	Ethylacetate 470 °C	Pentanol 300 °C	Nonane 205 °C				
	Methanol 440 °C						
	IIB	City Gas ca. 560 °C	Ethylene Oxide 435 °C	Hydrosulphide 270 °C	Dibutylæther 185 °C		
		Hydrogen-Cynaid 538 °C	Ethylene 440 °C	Ethylenglycol 235 °C	Ethylæther 175 °C		
IIC		Formaldehyde 424 °C	Tetrahydrofuran 224 °C	Dipropylæther 170 °C			
	Hydrogene 560 °C	Acetylene 305 °C				Carbon Disulphide 95 °C	

Symbol IIA, IIB or IIC for electrical apparatus in hazardous gas areas

Equipment group	Equipment category according to ATEX-Directive 94/9/EG	EPL (Equipment Protection Level)	Zone	Type of danger
I: Mining	1 G	Ga	0	Continuous, long, frequent
	2 G	Gb	1	Occasional
	3 G	Gc	2	Not usually present, short periods only
II: other hazardous areas	1 D	Da	20	Continuous, long, frequent
	2 D	Db	21	Occasional
	3 D	Dc	22	Not usually present, short periods only
Mining	M1	Ma		Continuous, long, frequent
	M2	Mb		Occasional

**Ex II 2 G**

Marking in accordance to ATEX guideline 94/9/EG (ATEX 95)

Marking in areas with flammable gases

**Ex ia IIC T6 Gb**

Marking in accordance to IEC 60079-0/ EN 60079-0

**Ex II 2 D**

Marking in areas with combustible dust

**Ex tb IIC T85°C Db**

TYPES OF PROTECTION FOR ELECTRICAL APPARATUS IN AREAS WITH COMBUSTIBLE DUST						
Protection Method	Symbol		Zone	Protection concept	Standards	
	Standard	Alternative			IEC Norm	CENELEC
Protection by enclosure	ta	ta	20	Ex atmosphere is kept apart from ignition source and temperature limitation old marking: tD A21 = under procedure A for Zone 21 tD B21 = under procedure B for Zone 22	IEC 60079-31	EN 60079-31
	tb	tb	21			
	tc	tc	22			
Pressurized enclosure	p	pb	20	Ex atmosphere is kept apart from ignition source and temperature limitation	IEC 61241-4	EN 61241-4
	p	pc	21			
Intrinsic safety	ia	ia	20	Energy limitation of sparks and high temperatures	IEC 60079-11	EN 60079-11
	ib	ib	21			
	ic	ic	22			
Encapsulation	ma	ma	20	Ex atmosphere is kept apart from ignition source	IEC 60079-18	EN 60079-18
	mb	mb	21			
	mc	mc	22			

Symbol IIIA, IIIB or IIIC for electrical apparatus in area with combustible dust

MAXIMUM ALLOWED SURFACE TEMPERATURE		
Dusts	IGNITION TEMPERATURES FOR COMBUSTIBLE DUSTS	
	Typical IgnitionTemp. (°C)	
	Cloud	Layer
Aluminium	590	1 D
Coal dust (lignite)	380	1 D or 2 D
Flour	490	
Grain dust	510	
Methyl cellulose	420	
Phenolic resin	530	
Polythene	420	
PVC	700	
Soot	810	
Starch	460	
Sugar	490	1 D, 2 D or 3 D

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