



# Explosion Protection an Overview

Electrical equipment marking for gas-explosive areas

**IBExU 09 ATEX 1047X Ex II 2G Ex e IIC T6 Gb CE0637**

Additional conditions		Conditions in explosive areas				Protection methods						Classification according to CENELEC/IEC/NEC 505, Explosion sub-group gases and vapours											
Conditions	Marking	Flammable material	Temporary behaviour of the flammable material in Ex zones	Classification of explosive areas			Required marking of suitable electrical equipment per CENELEC		Protection method	Symbol	Marking	Protection concept	Zone	CENELEC IEC FM/UL	Application	T1	T2	T3	T4	T5	T6		
Equipment applicable without restriction	-			CENELEC/IEC	US NEC 505	US NEC 500	Equipment group	Equipment category	General requirements			-	all all all	EN IEC 60079-0 FM 3600/UL 2279	All applications	I	Methane	-	-	-	-	-	
Observe special application conditions	x	Gases, vapours	Are present permanently, extended time or often	Zone 0	Class I Zone 0	Class I Division 1	II	IG	Flameproof enclosure		Ex d AEx d	External transmission of an explosion is prevented	1 or 2 1 or 2 -	EN IEC 60079-1 FM 3615/UL 2279	Switchgear, control units, motors command and signaling devices, power electronics	II A	Ammonia Methane Ethane Propane	Ethyl alcohol Cyclohexane n-Butane n-Hexane	Fuel in general Aircraft fuel Fuel oil	Acetaldehyde	-	-	
Ex device with system certificate cannot be used alone; CE conformity will be certified through assembly of complete equipment	u		Are likely to occur	Zone 1	Class I Zone 1		II	2G or 1G	Increased safety		Ex e AEx e	Avoidance of sparks and temperatures	1 or 2 1 or 2 Class I, Zone 1	EN IEC 60079-7 FM 3600/UL 2279	Installation boxes, enclosures, motors, lights, terminals	II B (incl. II A)	Acrylonitrile	Ethylene Ethylene oxide	Ethylene glycol Hydrogen sulphide	Ethyl ether	-	-	
			Occur only rarely or for a short time	Zone 2	Class I Zone 2	Class I Division 2	II	3G or 2G or 1G	Intrinsic safety		Ex i (IS)	Energy limitation of sparks and temperatures	0, 1 or 2*** 0, 1 or 2*** Class I, Div. 1	EN IEC 60079-11 FM 3610/UL 2279	Measuring, control technology and engineering, sensors, actuators, instrumentation	II C (incl. II B)	Hydrogen	Ethine (Acetylene)	-	-	-	-	Coal disulphide
		Methane	-	Mining	-	Mining	I	M1	Pressurized		Ex p	Ex atmosphere is kept apart from ignition source	1 or 2 1 or 2 Class I, Div. 1/2	EN IEC 60079-2 FM 3620/NFPA 496	Switchgear and control cabinets, motors, enclosures, motors, measuring and signaling devices, calculators	Permissive surface temperature Group II							
									Encapsulation		Ex m AEx m	Ex atmosphere is kept apart from ignition source	1 or 2 1 or 2 Class I, Zone 1	EN IEC 60079-18 FM 3600/UL 2279	Coils of relays and motors, electronics, magnetic valves, connecting systems	CENELEC/IEC/NEC 505	NEC 500	Classes and groups according to NEC 500: Typical gases	Ex zones according to NEC 500				
								Oil immersion		Ex o AEx o	Ex atmosphere is kept apart from ignition source	1 or 2 1 or 2 Class I, Zone 1	EN IEC 60079-6 FM 3600/UL 2279	Transformers, relays, start-up control units, switchgear	T1 = 450	T1 = 450	Class I	Division 1					
								Sand encapsulation		Ex q AEx q	External transmission of an explosion is prevented	1 or 2 1 or 2 Class I, Zone 1	EN IEC 60079-5 FM 3600/UL 2279	Transformers, relays, capacitors	T2 = 300	T2 = 300	Hydrogen/group B	Division 2					
								Protection method n/n		Ex n AEx n	Different protection concepts for zone 2	2 2 Class I, Zone 1	EN IEC 60079-15 FM 3600	Only applications zone 2	T3 = 200	T3 = 200	Ethylene/group C						
								Non-incendive	(IN)		Avoidance of sparks and temperatures	- - Class I, Div. 1	- - FM 3611/UL 1604		T4 = 135	T4 = 135	Propane/group D						
								Explosion-proof	(XP)		External transmission of an explosion is prevented	- - Class I, Div. 1	- - FM 3615/UL 1203		T5 = 100	T5 = 100	Mining						
								Optical radiation		AEx op Ex op	Limit, avoid etc. transmission of optical radiation	1 or 2 1 or 2 -	EN IEC 60079-28	Optoelectronic devices, e.g. with fibreoptics	T6 = 85	T6 = 85	Methane						
										Ex...	Optional e, d, m, b	1 or 2	EN/EC 60079-30-1	Electrical heat tracing and accessories	EU	USA	Equipment Protection Level (EPL)						
																	Zone	EPL					
																	0	Ga					
																	1	Gb					
																	2	Gc					
																	20	Da					
																	21	Db					
																	22	Dc					
																	Mining						
																	M1	Ma					
																	M2	Mb					

Electrical equipment marking for dust-explosive areas

**IBExU 09 ATEX 1047X Ex II 2D Ex tb IIIC T85°C Db CE0637**

Conditions in explosive areas				Protection methods						Quality control (examples)			Classes and groups according to CENELEC/IEC: typical dusts, fluffs, fibres				
Flammable material	Temporary behaviour of the flammable material in Ex zones	Classification of explosive areas		Required marking of suitable electrical equipment per CENELEC		Protection method	Symbol	Marking	Protection concept	Zone	CENELEC IEC FM/UL	Application	Notified body	Country	Code No.	III A: flammable fluffs	III B: non-conductive dust
		CENELEC/IEC	US NEC 505	US NEC 500	Equipment group	Equipment category			-	-	all Class II, Div 1/2	All applications	TOV Hannover/ Sachsen-Anhalt e.V.	Germany	0032		
									-	-	20, 21 or 22 20 or 21 Class II, Div 1	Switching, command and signaling devices, lights, installation boxes, enclosures	PTB	Germany	0102		
Dusts	Are present permanently, extended time or often	Zone 20	-	Class II Division 1	II	1D		t	Ex atmosphere is kept apart from ignition source and temperature limitation		EN IEC 60079-31 UL 1203		DOQS	Germany	0297		
	Are likely to occur	Zone 21	-		II	2D or 1D							IBExU	Germany	0637		Classes and groups according to NEC 500: typical dusts, fluffs, fibres
	Are unlikely to occur through whirled dust, if they do though only rarely or only for a short time	Zone 22	-	Class II Division 2	II	3D or 2D or 1D							LCIE	France	0081		III C: conductive dust
Dust	-	Mining	-		I	M2 or M1							Dekra (KEMA)	Netherlands	0344		Class II
													Demko	Denmark	0539		Metal dust/group E
													Nemko	Norway	0470		Coal dust/group F
													Sira	Great Britain	0518		Grain dust/group G
													EECS (BASEEFA)	Great Britain	0600		Class III
																	Fibres/fluffs