



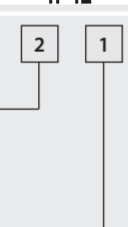


# Explosion Protection an Overview

Electrical equipment marking for gas-explosive areas for ATEX / UKEX


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CML 21 UKEX 3953X  II 2G Ex eb IIC T6 Gb UK 2503  
IBExU 04 ATEX 1004X  II 2G Ex eb IIC T6 Gb CE 0637

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	1G	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, measuring and analysis devices, calculators	Permissive surface temperature Group II	Classes and groups according to NEC 500: Typical gases		Ex zones according to NEC 500													
<b>IP (Ingress Protection) Code Symbols</b>																																
IP 1. digit	Contact	Protection from foreign bodys			IP 2. digit	Protection from moisture															CENELEC/IEC/NEC 505		NEC 500		Class I		Division 1					
0	Non protected	Non protected			0	Non protected															T1 = 450		T1 = 450		Acetylene/group A		Permanent or incidental danger					
1	With large surface body parts (back of the hand)	Protected against solid objects, diameter > 50 mm			1	Protected against vertically dripping water															T2 = 300		T2 = 300		Hydrogen/group B		Division 2					
2	With fingers	Protected against solid objects, diameter > 12 mm			2	Protected against dripping water when tilted up to 15°															T2A = 280		T2B = 260		Ethylene/group C		rare or temporary danger					
3	With tools and wires, diameter > 2,5 mm	Protected against solid objects, diameter > 2,5 mm			3	Protected against spraying water															T2C = 230		T2D = 215		Propane/group D		Mining					
4	With tools and wires, diameter > 1 mm	Protected against solid objects, diameter > 1 mm			4	Protected against splashing water (360°)															T3 = 200		T3 = 200		Methane		Equipment Protection Level (EPL)					
5	Total protection	Dust protected			5	Protected against jetting water (360°)															T3A = 180		T3B = 165		Zone		EPL					
6	Total protection	Dust tight			6	Protected against jetting water (360°)															T3C = 160		T4 = 135		T4 = 135		0		Ga			
Example: IP 21					6			Protected against powerfully jetting water (360°)															T4A = 120		T5 = 100		T5 = 100		1		Gb	
<b>First digit means</b>		Protection against contact with fingers and foreign bodies, which are bigger than 12 mm in diameter.			7			Protected against the temporary effects of immersion															T6 = 85		T6 = 85		2		Gc			
<b>Second digit means</b>		The device is protected against vertically falling water drops.			8			Protected against continuous submersion															T5 = 100		T6 = 85		20		Da			
																							T6 = 85		T6 = 85		21		Db			
																							T6 = 85		T6 = 85		22		Dc			
																							EU		USA		Mining					
																											M1		Ma			
																											M2		Mb			

Electrical equipment marking for dust-explosive areas for ATEX / UKEX

CML 21 UKEX 3953X  II 2D Ex tb IIIC T85°C Db UK 2503  
IBExU 04 ATEX 1004X  II 2D Ex tb IIIC T85°C Db CE 0637

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.			
Dusts	Are present permanently, extended time or often	Zone 20	-	Class II Division 1	II	1D	Protection by enclosure		t	Ex atmosphere is kept apart from ignition source and temperature limitation	20, 21 or 22 20 or 21 Class II, Div 1	EN IEC 60079-31 UL 1203	Switching, command and signaling devices, lights, installation boxes, enclosures	TÜV Hannover/Sachsen-Anhalt e.V.	Germany	0032	III A: flammable fluffs		
	Are likely to occur	Zone 21	-		II	2D or 1D											III B: non-conductive dust		
	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											III C: conductive dust		
Dust	-	Mining	-		I	M2 or M1	Equipment										Classes and groups according to NEC 500: typical dusts, fluffs, fibres		
																		Class II	
																		Metal dust/group E	
																		Coal dust/group F	
																		Grain dust/group G	
																		Class III	
																		Fibres/fluffs	