

# Explosion Endangered Areas – Gases: Marking Of Electrical Equipment According To EC Directive 94/9 - ATEX



**1** **CE** conformity with EC directives

**4** **E** per directive 94/9/EG (ATEX)

**2** **0102** Notified body

**5** **Ex** explosion protected device

Notified body	Country	Code No.
TÜV-A	Austria	0408
PTB	Germany	0102
EXAM	Germany	0158

**3** **II2G** Conditions in explosion endangered areas

Flammable material	Temporary behaviour of the flammable material in Ex zones	Classification of the explosive endangered areas			Required marking of the suitable electrical equipment per CENELEC	
		CENELEC / IEC	US NEC 505	US NEC 500	Equipment group	Equipment category
Gases, vapours	are present permanently, long term or often	Zone 0	Class I Zone 0	Class I Division 1	II	1G
	are likely to occur	Zone 1	Class I Zone 1		II	2G (or 1G)
	are unlikely to occur, if occur though only rarely or for a short time	Zone 2	Class I Zone 2	Class I Division 2	II	3G (or 2G or 1G)
Methane	---	Mining Mining	---	Mining	I	M1 M2 (or M1)


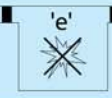
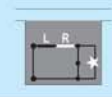

**8** **T6** Temperature classes and maximum permissive surface temperatures of electrical equipment per CENELEC/IEC/NEC 505 and NEC 500

450°C	T 1					
300°C		T 2				
200°C			T 3			
135°C				T 4		
100°C					T 5	
85°C						T 6
0°C						
CENELEC						
IEC	T 1	T 2	T 3	T 4	T 5	T 6
NEC 505						

**Classes and groups per NEC 500: typical gases**

Class I	Mining
Acetylene/group A	Methane
Hydrogene/group B	
Ethylene/group C	
Propane/group D	

## 6 de Protection methods

Protection method	Symbol	Marking	Protection concept	Zone	CENELEC IEC FM/UL	Application
General requirements				all	EN 60079-0 IEC 60079-0 FM 3600/UL 2279	all applications
Flameproof enclosure		Eex d Ex d AEx d	Transmission of an explosion to the outside is excluded	1 or 2 1 or 2 ---	EN 50018 IEC 60079-1 FM 3615/UL 2279	switchgear, control units, motors command and signaling devices, power electronics
Increased safety		EEx e Ex e AEx e	Avoidance of sparks and temperatures	1 or 2 1 or 2 Class 1, Zone 1	EN 50019 IEC 60079-7 FM 3600/UL 2279	installation boxes, enclosures, motors, lights, terminals
Intrinsic safety		EEx i Ex i [IS]	Energy limitation of sparks and temperatures	0, 1 or 2 0, 1 or 2 Class I, Div. 1	EN 50020, EN 50039 IEC 60079-11 FM 3610/UL 2279	measuring, control technology and engineering, sensors, actuators, instrumentation
Pressurized		EEx p Ex p	Ex atmosphere is kept apart from ignition source	1 or 2 1 or 2 Class I, Div. 1/2	EN 50016 IEC 60079-2 FM 3620/NFPA 496	switchgear and control cabinets, motors, measuring and analysis devices, calculators
Encapsulation		EEx m Ex m AEx m	Ex atmosphere is kept apart from ignition source	1 or 2 1 or 2 Class I, Zone 1	EN 50028 IEC 60079-18 FM 3600/UL 2279	coils of relays and motors, electronics, magnetic valves, connecting systems
Oil immersion		EEx o Ex o AEx o	Ex atmosphere is kept apart from ignition source	1 or 2 1 or 2 Class I, Zone 1	EN 50015 IEC 60079-6 FM 3600/UL 2279	transformers, relays, start-up control units, switchgear
Sand encapsulation		EEx q Ex q AEx q	Transmission of an explosion to the outside is excluded	1 or 2 1 or 2 Class I, Zone 1	EN 50017 IEC 60079-5 FM 3600/UL 2279	transformers, relays, capacitors
Protection method "n"		EEx n Ex n AEx n	miscellaneous protection principles for zone 2	2 2 Class I, Zone 2	EN 50021 IEC 60079-15 FM 3600	only applications zone 2
Non-incendive		[NI]	Avoidance of sparks and temperatures	-- -- Class I, Div. 1	-- -- FM 3611/UL 1604	
Explosion-proof		[XP]	Transmission of an explosion to the outside is excluded	-- -- Class I, Div. 1	-- -- FM 3615/UL 1203	
optical radiation		Eex op Ex op	Limit, avoid etc. transmission of optical radiation	1 or 2 1 or 2	EN 60079-28 IEC 60079-28	optoelectronic devices, e.g. with fibreoptics

## 7 IIC Classification per CENELEC/IEC/NEC 505, Explosion sub-group gases and vapours

	T1	T2	T3	T4	T5	T6
I	Methane	--	--	--	--	--
IIA	Ammoniac Methane Ethane Propane	Ethyl alcohol Cyclohexane n-Butane n-Hexane	Fuel in general Aircraft fuel Fuel oil	Acetaldehyde	--	--
IIB	Lighting gas Acrylonitrile	Ethylene Ethylene oxide	Ethylene-glycol Hydrogene sulphide	Ethyl ether	--	--
IIC	Hydrogene	Ethine (Acetylene)	--	--	--	Coal disulphide