

MARKING OF ELECTRICAL EQUIPMENT FOR DUST AND GAS EXPLOSIVE-ENDANGERED AREAS

EX POSTER



Marking of electrical equipment Dust-explosive endangered areas

CE₀₁₅₈
Ex
II
2D
tD
T80°C

Maximum allowed surface temperature

Notified body			Conditions in the explosive endangered areas						
Notified body	Country	Code No.	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
TÜV Hannover/Sachsen-Anhalt e.V.	Germany	0032							
PTB	Germany	0102	Dusts	Are continuously present, for long periods or frequently	Zone 20	-	Class II Division 1	II	1D
EXAM	Germany	0158		Are likely to occur	Zone 21	-		II	2D or 1D
DQS	Germany	0297		Are unlikely to occur by 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
FSA	Germany	0588							
BAM	Germany	0589							
IBExU	Germany	0637							
INERIS	France	0080							
LCIE	France	0081							
KEMA	Netherlands	0344	Dust	-	Mining	-	Mining	I	M1
SP	Sweden	0402							M2 or M1
LOM	Spain	0163							
EECS (BASEEFA)	Great-Britain	0600							
SCS	Great-Britain	0518							

Classes and groups per NEC 500: typical dust, fluffs, fibres	
Class II	Class III
Metal dust/group E	fibres/fluffs
Coal dust/group F	
Grain dust/group G	

Protection methods						
Protection method	Symbol	Marking	Protection concept	Zone	CENELEC IEC FM/UL	Application
General Requirements			-	- all Class II, Div. 1/2	- IEC 61241-0 UL 1604	All applications
Protection by enclosure	⊕	tD	Ex atmosphere is kept apart from ignition source and temperature limitation	20, 21 or 22 Class II, Div. 1	IEC 61241-1-1 EN 50281-1-1 UL 1203	Switching, command- and signalling devices, lights, installation boxes, enclosures
Purged	⊕	pD	Ex atmosphere is kept apart from ignition source	21 or 22 Class II, Div. 1/2	IEC 61241-2 EN 50281-4 NFPA 496	Switchgear a. control cabinets, motors, measuring and analysis devices, calculators
Intrinsic Safety	⊕	iD	Energy limitation of sparks and temperatures	20, 21 or 22 Class II, Div. 1	IEC 61241-11 EN 50281-5 FM 3610/UL 913	measuring, control technology a. engineering, sensors, actuators, instrumentation
Encapsulation	⊕	mD	Ex atmosphere is kept apart from ignition source	20, 21 or 22	IEC 61241-18 EN 50281-6	Coils of relays a. motors, electronics, magnetic valves, connecting systems
Non-incendive		(NI)	Avoidance of sparks and high temperatures	- Class II, Div. 1	- FM 3611/UL 1604	
Dust tight			Transmission of an explosion to the outside is excluded	- Class II, Div. 2	- FM 3611/UL 1604	

Examples for international markings	
According to IEC	Ex tD T80°C
According to NEC 500 (USA)	NI, Class II, Division I, Groups E,F,G, T6

Marking of electrical equipment Gas-explosive endangered areas

CE₀₁₅₈
Ex
II
2G
E Ex
de
IIC
T6
BVS 04 ATEX E126 X

Ex-mark

Per Directive 94/9/EC (ATEX) Explosive protected device

EC type test certificate

Notified body			Conditions in the explosive endangered areas						
Notified body	Country	Code No.	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
TÜV Hannover/Sachsen-Anhalt e.V.	Germany	0032							
PTB	Germany	0102	Gases, vapours	Are present permanently, long time or often	Zone 0	Class I Zone 0	Class I Division 1	II	1G
EXAM	Germany	0158		Are likely to occur	Zone 1	Class I Zone 1		II	2G or 1G
DQS	Germany	0297		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
FSA	Germany	0588							
BAM	Germany	0589							
IBExU	Germany	0637							
INERIS	France	0080							
LCIE	France	0081	Methane	-	Mining	-	Mining	I	M1
KEMA	Netherlands	0344							M2 or M1
SP	Sweden	0402							
LOM	Spain	0163							
EECS (BASEEFA)	Great-Britain	0600							
SCS	Great-Britain	0518							

Classes and groups per NEC 500: typical gases	
Class I	Mining
Acetylene/group A	Methane
Hydrogen/group B	
Ethylene/group C	
Propane/group D	

Examples for international markings	
According to IEC	Ex de IIC T6
According to NEC 505 (USA)	Class I, Zone 1, AEx de IIC T6
According to NEC 500 (USA)	XP, Class I, Division 1, Groups A,B,C,D, T6

Protection methods						
Protection method	Symbol	Marking	Protection concept	Zone	CENELEC IEC FM/UL	Application
General requirements			-	all all 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 signalling devices, power electronics
Increased safety	⊕	EEx e Ex e AEx e	Avoidance of sparks and temperatures	1 or 2 1 or 2 Class I, 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*** 1 or 2 Class I, Div. 1	EN 50020/EN 50039** IEC 60079-11 FM 3610/UL 2279	Measuring, control technology a. 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 a. 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 a. 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	Different protection concepts 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

Classification per CENELEC/IEC/NEC 505, Explosion sub-group gases and vapours							Additional conditions	
	T1	T2	T3	T4	T5	T6	Conditions	Marking
I	Methane	-	-	-	-	-	Equipment applicable without restriction	-
II A	Ammoniac Methane Ethane Propane	Ethyl alcohol Cyclohexane n-Butane n-Hexane	Fuel in general Aircraft fuel Fuel oil	Acetaldehyde	-	-	Observe special application conditions	x
II B	Lighting gas Acrylonitrile	Ethylene Ethylene oxide	Ethylene glycol Hydrogene sulphide	Ethyl ether	-	-	Ex device with part certificate cannot be used alone; CE conformity will be certified through assembly in a complete equipment	u
II C	Hydrogene	Ethine (Acetylene)	-	-	-	Coal disulphide		

Temperature classes and maximum permissible surface temperature of electrical equipment per CENELEC/IEC/NEC 505 and NEC 500						
Temperature (°C)	T1	T2	T3	T4	T5	T6
450 °C						
300 °C						
280 °C						
260 °C						
230 °C						
215 °C						
200 °C						
180 °C						
160 °C						
135 °C						
120 °C						
100 °C						
85 °C						
0 °C						