

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

### EX POSTER



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#### Marking of electrical equipment Gas-explosive endangered areas



Notified body			Conditions in the explosive endangered areas					per EC directive 2014/34/EU	
Notified body	Country	Code No.	Flammable material	Temporary behaviour of the flammable material in Ex zones	Classification of the explosive endangered areas			Equipment group	Equipment category
TÜV NORD	Germany Hannover Essen	0032 0044			IEC/CENELEC	US NEC 506	US NEC 500		
PTB	Germany	0102	Dusts	Are continuously present, for long periods or frequently	Zone 20	Zone 20	Class II/III Division 1	II	1D
DEKRA EXAM	Germany	0158		Are likely to occur	Zone 21	Zone 21	Class II/III Division 2		
FSA	Germany	0588		Are unlikely to occur by whirled dust, if they do, though only rarely or only for a short time	Zone 22	Zone 22		Class II/III Division 2	II
BAM	Germany	0589							
IBExU	Germany	0637							
INERIS	France	0080							
LCIE	France	0081							
KEMA	Netherlands	0344							
SP	Sweden	0402							
LOM	Spain	0163							
BASEEFA	Great-Britain	0600							
SCS	Great-Britain	0518							

  

Equipment groups to IEC/CENELEC		to NEC 506	
<b>Group III*</b>		<b>Class II/III</b>	
Dust explosive atmosphere		Dust explosive atmosphere	
<b>Sub groups</b>		<b>Sub groups</b>	
IIIA flammable fluffs non-conductive dust		Class III Class II Group G	fibers/fluffs non-conductive dust
IIIB non-conductive dust		Class II Group F	carbonaceous dust
IIIC conductive dust		Class II Group E	metal dust

\* IEC (2007) and CENELEC (2009)

  

Equipment group and equipment protection level (EPL)			
To Atex 2014/34/EU	Equipment category	To IEC (2007) and CENELEC (2009)	Sufficient security
<b>Mines susceptible to firedamp</b>			
I M1	Ma		during rare malfunctions until de-energizing of the equipment
I M2	Mb		
<b>Dust explosive atmosphere</b>			
II 1D	Da Zone 20		during rare malfunctions during expected malfunctions in normal operation
II 2D	Db Zone 21		
II 3D	Dc Zone 22		

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Protection methods						
Protection method	Symbol	Marking	Protection concept	Zone	IEC CENELEC FM/UL/ISA/CSA	Application
General Requirements		Ex Ex/AEx AEx Ex	-	20 / 21 / 22 20 / 21 / 22 Class II/III, Div. 1/2	EN 60079-0 IEC 60079-0/US ISA 61241-0 US FM 3600/ CA CSA C22.2 No. 60079-0	All applications
Protection by enclosure	☒	Ex t <sub>g</sub> /t <sub>b</sub> /t <sub>c</sub> Ex t <sub>g</sub> /t <sub>b</sub> /t <sub>c</sub> AEx t <sub>g</sub> /t <sub>b</sub> /t <sub>c</sub> Ex t <sub>g</sub> /t <sub>b</sub> /t <sub>c</sub>	Ex atmosphere is kept apart from ignition source and temperature limitation	20 / 21 / 22 20 / 21 / 22 Zone 20 / 21 / 22	EN 60079-31 IEC 60079-31 US ISA 60079-31 CA CSA C22.2 No. 60079-31	Switching, command and signalling devices, lights, junction and terminal boxes, enclosures
Purged	☒	Ex p <sub>x</sub> /p <sub>y</sub> /p <sub>z</sub> Ex p <sub>x</sub> /p <sub>y</sub> /p <sub>z</sub> (PX) (PY) (PZ) AEx pD	Ex atmosphere is kept apart from ignition source	21 / 22 21 / 22 Class II, Div. 1/2 Zone 21	EN 60079-2 IEC 60079-2 US FM 3620/CA NFPA 496 US ISA 61241-2	Switchgear and control cabinets, motors, measuring and analysis devices, calculators
Intrinsic Safety	☒	Ex i <sub>g</sub> /i <sub>b</sub> /i <sub>c</sub> Ex i <sub>g</sub> /i <sub>b</sub> /i <sub>c</sub> (IS)	Energy limitation of sparks and temperatures	20 / 21 / 22 20 / 21 / 22 Class II, Div. 1 Zone 20/21/22	EN 60079-11 IEC 60079-11 US FM 3610/UL 913 CA CSA C22.2 No. 60079-11 US ISA 60079-11	measuring, control technology and engineering, sensors, actuators, instrumentation
Encapsulation	☒	Ex m <sub>d</sub> /m <sub>b</sub> /m <sub>c</sub> Ex m <sub>d</sub> /m <sub>b</sub> /m <sub>c</sub> AEx m <sub>d</sub> /m <sub>b</sub> /m <sub>c</sub>	Ex atmosphere is kept apart from ignition source	20 / 21 / 22 20 / 21 / 22 Zone 20/21	EN 60079-18 IEC 60079-18 US ISA 60079-18	Coils of relays and motors, electronics, magnetic valves, connecting systems
Non-incendive		(NI)	Avoidance of sparks and high temperatures	Class II, Div. 2	US FM 3611/ISA 12.12.01 CA CSA C22.2 No. 213	
Dust ignition-proof		(DIP)	Transmission of an explosion to the outside is excluded	Class II, Div. 1 Class III, Div. 1/2	US FM 3616 CA CSA C22.2 No. 25 US FM 3611/ISA 12.12.01 CA C22.2 No. 213	

## CE 0158 Ex II 2G Ex db eb IIC T6 Gb BVS 16 ATEX E113 X

Notified body			Conditions in the explosive endangered areas					per EC directive 2014/34/EU		Protection methods						Classification per CENELEC/IEC/NEC 505, Explosion sub-group gases and vapours						Additional conditions											
Notified body	Country	Code No.	Flammable material	Temporary behaviour of the flammable material in Ex zones	Classification of the explosive endangered areas			Equipment group	Equipment category	Protection method	Symbol	Marking	Protection concept	Zone	CENELEC IEC FM/UL/ISA/CSA	Application	T1	T2	T3	T4	T5	T6	Conditions	Marking									
TÜV NORD	Germany Hannover Essen	0032 0044			IEC/CENELEC	US NEC 505	US NEC 500																		Zone								
PTB	Germany	0102	Gases, vapours	Are present permanently, long time or often	Zone 0	Class I Zone 0	Class I Division 1	II	1G	Increased safety	☒	Ex eb/ec Ex eb/ec AEx e Ex e	Avoidance of sparks and temperatures	1 / 2 1 / 2 Class I, Zone 1 Class I, Zone 1	EN 60079-7 IEC 60079-7 US UL 60079-7/ISA 60079-7 CA CSA C22.2 No. 60079-7	Junction and terminal boxes, enclosures, motors, lights, terminals	II A	Methane	Ethyl alcohol Cyclohexane n-Butane n-Hexane	Fuel in general Aircraft fuel Fuel oil	Acetaldehyde	-	-	Equipment applicable without restriction	-								
DEKRA EXAM	Germany	0158		Are likely to occur	Zone 1	Class I Zone 1	II																			2G or 1G	II B	Lighting gas Acrylonitrile	Ethylene Ethylene oxide	Ethylene glycol Hydrogene sulphide	Ethyl ether	-	-
FSA	Germany	0588		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																								
BAM	Germany	0589								Flameproof enclosure	☒	Ex d <sub>g</sub> /d <sub>b</sub> /d <sub>c</sub> Ex d <sub>g</sub> /d <sub>b</sub> /d <sub>c</sub> AEx d Ex d	Transmission of an explosion to the outside is excluded	0 / 1 / 2 0 / 1 / 2 Class I Zone 1 Class I Zone 1	EN 60079-1 IEC 60079-1 US FM 3610/ISA 60079-1 CA CSA C22.2 No. 60079-1	Switchgear, control units, motors command and signalling devices, power electronics	II C	Hydrogene	Ethine (Acetylene)	-	-	Coal disulphide	CE conformity will be certified through assembly in a complete equipment	u									
IBExU	Germany	0637																							Intrinsic Safety	☒	Ex i <sub>g</sub> /i <sub>b</sub> /i <sub>c</sub> Ex i <sub>g</sub> /i <sub>b</sub> /i <sub>c</sub> (IS) AEx i <sub>g</sub> /i <sub>b</sub> Ex i <sub>g</sub> /i <sub>b</sub>	Energy limitation of sparks and temperatures	0 / 1 / 2 0 / 1 / 2 Class I, Div. 1 Class I, Zone 0/1/2 Class I, Zone 0/1/2	EN 60079-11 IEC 60079-11 US FM 3610/CA CSA C22.2 No. 60079-11 US FM 3610/ISA 60079-11 CA CSA C22.2 No. 60079-11	Measuring, control technology and engineering, sensors, actuators, instrumentation	II C	Hydrogene
INERIS	France	0080								Pressurized	☒	Ex p <sub>x</sub> /p <sub>y</sub> /p <sub>z</sub> Ex p <sub>x</sub> /p <sub>y</sub> /p <sub>z</sub> AEx p <sub>x</sub> /p <sub>y</sub> /p <sub>z</sub> Ex p <sub>x</sub> /p <sub>y</sub> /p <sub>z</sub>	Ex atmosphere is kept apart from ignition source	1 / 2 1 / 2 Class I, Zone 1/2 Class I, Zone 1/2	EN 60079-2 IEC 60079-2 US ISA 60079-2 CA CSA C22.2 No. 60079-2	Switchgear and control , cabinets, motors, measuring and analysis devices, calculators	II C	Hydrogene	Ethine (Acetylene)	-	-	Coal disulphide	CE conformity will be certified through assembly in a complete equipment	u									
LCIE	France	0081																							Encapsulation	☒	Ex m <sub>d</sub> /m <sub>b</sub> /m <sub>c</sub> Ex m <sub>d</sub> /m <sub>b</sub> /m <sub>c</sub> AEx m <sub>d</sub> /m <sub>b</sub> /m <sub>c</sub> AEx m <sub>d</sub> /m <sub>b</sub> /m <sub>c</sub>	Ex atmosphere is kept apart from ignition source	0, 1 / 2 0, 1 / 2 Class I, Zone 0/1/2 Class I, Zone 0/1/2	EN 60079-18 IEC 60079-18 US ISA 60079-18 CA CSA C22.2 No. 60079-18	Coils of relays and motors, electronics, magnetic valves, connecting systems	II C	Hydrogene
KEMA	Netherlands	0344								Oil immersion	☒	Ex o <sub>g</sub> /o <sub>c</sub> Ex o AEx o Ex o	Ex atmosphere is kept apart from ignition source	1 / 2 1 / 2 Class I, Zone 1	EN 60079-6 IEC 60079-6 US ISA 60079-6 CA CSA C22.2 No. 60079-6	Transformers, relays, start-up control units, switchgear	II C	Hydrogene	Ethine (Acetylene)	-	-	Coal disulphide	CE conformity will be certified through assembly in a complete equipment	u									
SP	Sweden	0402																							Sand encapsulation	☒	Ex q <sub>b</sub> Ex q AEx q Ex q	Transmission of an explosion to the outside is excluded	1 / 2 1 / 2 Class I, Zone 1 Class I, Zone 1	EN 60079-5 IEC 60079-5 US ISA 60079-5/UL 60079-5 CA CSA C22.2 No. 60079-5	Transformers, relays, capacitors	II C	Hydrogene
LOM	Spain	0163								Protection method «»	☒	Ex nA,nC,nR Ex nA/nC/nL/nR AEx nA,nC,nR Ex nA/nC/nL/nR	Different protection concepts for zone 2	2 2 Class I, Zone 2 Class I, Zone 2	EN 60079-15 IEC 60079-15 US ISA 60079-15 CA CSA C22.2 No. 60079-15	Only applications zone 2	II C	Hydrogene	Ethine (Acetylene)	-	-	Coal disulphide	CE conformity will be certified through assembly in a complete equipment	u									
BASEEFA	Great-Britain	0600																							Optical radiation	☒	Ex op Ex op	Limit, avoid etc. transmission of optical radiation	1 / 2 1 / 2 Class I, Zone 1 Class I, Zone 1	EN 60079-28 IEC 60079-28	Optoelectronic devices, e.g. with fibreoptics	II C	Hydrogene
SCS	Great-Britain	0518								Non-incendive		(NI)	Avoidance of sparks and temperatures	Class I, Div. 2	US FM 3611/ISA 12.12.01 CA CSA C22.2 No.213		II C	Hydrogene	Ethine (Acetylene)	-	-	Coal disulphide	CE conformity will be certified through assembly in a complete equipment	u									
			<b>Equipment groups to IEC/CENELEC to NEC 505</b>																						<b>Equipment group and equipment protection level (EPL)</b>								
			<b>Group I</b>		<b>Group II</b>		<b>Class I</b>																										
			Mines susceptible to firedamp		Gas explosive atmosphere		Gas explosive atmosphere																										
			I M1		Ma		Mb																										
			I M2																														
			<b>Gas explosive atmosphere</b>																														
			II 1G		Ga		Zone 0																										
			II 2G		Gb		Zone 1																										
			II 3G		Gc		Zone 2																										

