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

EX POSTER

01.26.04450 / 118 00 71 / 04.2012 / 1000 wd

CE 0158 (Ex) II 2D Ex tb IIIC T80°C Db IP67

Protection class
Equipment protection level (EPL)
Maximum allowed surface temperature
Equipment sub group dust
Ex-mark

Notified body

Notified body	Country	Code No.
TÜV NORD	Germany Hannover	0032
	Essen	0044
PTB	Germany	0102
DEKRA EXAM	Germany	0158
FSA	Germany	0588
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

Conditions in the explosive endangered areas

Flammable material	Temporary behaviour of the flammable material in Ex zones	Classification of the explosive endangered areas			per EC directive 94/9/EG	
		IEC/ CENELEC	US NEC 506	US NEC 500	Equipment group	Equipment category
Dusts	Are continuously present, for long periods or frequently	Zone 20	Zone 20	Class II/III Division 1	II	1D
	Are likely to occur	Zone 21	Zone 21		II	2D or 1D
	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	3D or 2D or 1D

Equipment groups to IEC/CENELEC to NEC 506

Group III*	Class II/III
Dust explosive atmosphere	Dust explosive atmosphere
Sub groups	Sub groups
IIIA flamable fluffs IIIB non-conductive dust IIIC conductive dust	Class III fibers/fluffs Class II Group G non-conductive dust Class II Group F carbonaceous dust Class II Group E metal dust

* IEC (2007) and CENELEC (2009)

Equipment group and equipment protection level (EPL)

To Atex 94/9/EG		To IEC (2007) and CENELEC (2009)		
Group	Equipment category	EPL		Sufficient security
Mines susceptible to firedamp				
I	M1	Ma		during rare malfunctions
I	M2	Mb		until de-energizing of the equipment
Dust explosive atmosphere				
II	1D	Da	Zone 20	during rare malfunctions
II	2D	Db	Zone 21	during expected malfunctions
II	3D	Dc	Zone 22	in normal operation

Protection methods

Protection method	Symbol	Marking	Protection concept	Zone	IEC CENELEC FM/UL/ISA/CSA	Application
General Requirements		Ex Ex/AEx	–	20, 21, 22 20, 21, 22 Class II/III, Div. 1/2	EN 60079-0 IEC 60079-0/US ISA 61241-0 US ISA 12.12.01/FM 3600 CA CSA C22.2 No. 0	All applications
Protection by enclosure		Ex $t_a/t_b/t_c$ Ex $t_a/t_b/t_c$ AEx tD DIP A21/A22	Ex atmosphere is kept apart from ignition source and temperature limitation Class II, Div. 1/2	20, 21 or 22 20, 21 or 22 Class II, Div. 1 Zone 21	EN 60079-31 IEC 60079-31 US UL 1203 US ISA 61241-1 CA CSA E 61241-1-1	Switching, command and signalling devices, lights, junction and terminal boxes, enclosures
Purged		Ex p Ex p (PX) (PY) (PZ) AEx pD	Ex atmosphere is kept apart from ignition source	21 or 22 21 or 22 Class II, Div. 1/2 Zone 21	EN 60079-4 IEC 60079-4 US NFPA 496/FM 3620 US ISA 61241-2	Switchgear and control cabinets, motors, measuring and analysis devices, calculators
Intrinsic Safety		Ex $i_a/i_b/i_c$ Ex $i_a/i_b/i_c$ (iS) AEx i_aD/i_bD	Energy limitation of sparks and temperatures	20, 21 or 22 20, 21 or 22 Class II, Div. 1 Zone 20/21	EN 60079-11 IEC 60079-11 US FM 3610/UL 913 CA CSA C22.2 No. 157 US ISA 61241-11	Measuring, control technology and engineering, sensors, actuators, instrumentation
Encapsulation		Ex $m_a/m_b/m_c$ Ex $m_a/m_b/m_c$ AEx m_a/m_b	Ex atmosphere is kept apart from ignition source	20, 21 or 22 20, 21 or 22 Zone 20/21	EN 60079-18 IEC 60079-18 US ISA 61241-18	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. 25	
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/US UL 1203 CA CSA C22.2 No. 25 US FM 3611/CA CSA C22.1	

CE 0158 (Ex) II 2G Ex deb IIC T6 Gb BVS 10 ATEX E053 X

EC type test certificate
Equipment protection level (EPL)
Ex-mark

Notified body

Notified body	Country	Code No.
TÜV NORD	Germany Hannover	0032
	Essen	0044
PTB	Germany	0102
DEKRA EXAM	Germany	0158
FSA	Germany	0588
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

Conditions in the explosive endangered areas

Flammable material	Temporary behaviour of the flammable material in Ex zones	Classification of the explosive endangered areas			per EC directive 94/9/EC	
		IEC/ CENELEC	US NEC 505	US NEC 500	Equipment group	Equipment category
Gases, vapours	Are present permanently, long time 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 I	M1 M2 or M1

Equipment groups to IEC/CENELEC to NEC 505

Group I	Group II		Class I	
Mines susceptible to firedamp	Gas explosive atmosphere		Gas explosive atmosphere	
	Sub groups		Sub groups	
Methane	IIA IIB IIC	Propane Ethylene Hydrogene Acetylene	Group D Group C Group B Group A	Propane Ethylene Hydrogene Acetylene

Equipment group and equipment protection level (EPL)

To Atex 94/9/EG		To IEC (2007) and CENELEC (2009)		
Group	Equipment category	EPL		Sufficient security
Mines susceptible to firedamp				
I	M1	Ma		during rare malfunctions
I	M2	Mb		until de-energizing of the equipment
Gas explosive atmosphere				
II	1G	Ga	Zone 0	during rare malfunctions
II	2G	Gb	Zone 1	during expected malfunctions
II	3G	Gc	Zone 2	in normal operation

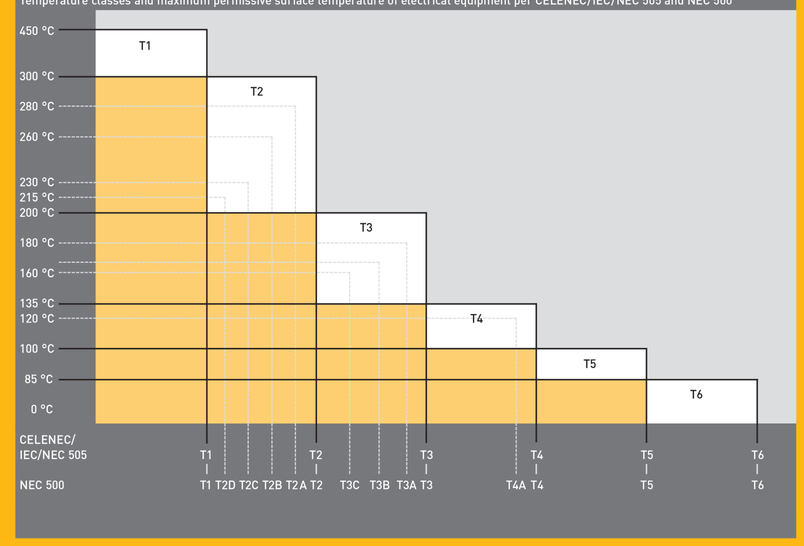
Protection methods

Protection method	Symbol	Marking	Protection concept	Zone	CENELEC IEC FM/UL/ISA/CSA	Application
General requirements		Ex Ex/AEx Ex	–	20, 21, 22 20, 21, 22 Class I, Div. 1/2	EN 60079-0 IEC 60079-0/UL 60079-0/US ISA 60079-0 US FM 3600/CA CSA C22.2 No. 0 CA CSA E 60079-0	All applications
Increased safety		Ex e Ex e AEx e Ex e	Avoidance of sparks and temperatures	1 or 2 1 or 2 Class I, Zone 1 Class I, Zone 1	EN 60079-7 IEC 60079-7 US UL 60079-7/US ISA 60079-7 CA CSA 60079-7	Junction and terminal boxes, enclosures, motors, lights, terminals
Flameproof enclosure		Ex d Ex d AEx d Ex d	Transmission of an explosion to the outside is excluded	1 or 2 1 or 2 Class I Zone 1 Class I Zone 1	EN 60079-1 IEC 60079-1 US ISA 60079-1 CA CSA 60079-1	Switchgear, control units, motors command and signalling devices, power electronics
Intrinsic Safety		Ex$i_a/i_b/i_c$i Ex $i_a/i_b/i_c$ (IS) AEx i_a/i_b Ex i_a/i_b	Energy limitation of sparks and temperatures	0, 1 or 2 0, 1 or 2 Class I, Div. 1 Class I, Zone 0/1 Class I, Zone 0/1	EN 60079-11 IEC 60079-11 US FM 3610/CA CSA C22.2 No. 157 US FM 3610 CA CSA E 60079-11	Measuring, control technology and engineering, sensors, actuators, instrumentation
Pressurized		Ex px/py[pz] Ex px/py[pz] AEx px/py[pz] Ex px/py[pz]	Ex atmosphere is kept apart from ignition source	1 or 2, (3) 1 or 2, (3) Class I, Zone 1 (2) Class I, Zone 1(2)	EN 60079-2 IEC 60079-2 US ISA E 60079-2 CA CSA E 60079-2	Switchgear and control , cabinets, motors, measuring and analysis devices, calculators
Encapsulation		Ex $m_a/m_b/m_c$/ Ex $m_a/m_b/m_c$ AEx $m_a/m_b/m_c$/	Ex atmosphere is kept apart from ignition source	0, 1 or 2 0, 1 or 2 Class I, Zone 0/1/2	EN 60079-18 IEC 60079-18 US ISA 60079-15	Coils of relays and motors, electronics, magnetic valves, connecting systems
Oil immersion		Ex o Ex o AEx o Ex o	Ex atmosphere is kept apart from ignition source	1 or 2 1 or 2 Class I, Zone 1	EN 60079-6 IEC 60079-6 US ISA 60079-6 CA CSA E 60079-6	Transformers, relays, start-up control units, switchgear
Sand encapsulation		Ex q Ex q AEx q Ex q	Transmission of an explosion to the outside is excluded	1 or 2 1 or 2 Class I, Zone 1 Class I, Zone 1	EN 60079-5 IEC 60079-5 US ISA 60079-5/UL 60079-5 CA CSA E 60079-5	Transformers, relays, capacitors
Protection method »n«		Ex nA,nC,nL,nR Ex nA,nC,nL,nR AEx nA,nC,nL,nR Ex n	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 E 60079-15	Only applications zone 2
Optical radiation		Ex 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
Non-incendive		(NI)	Avoidance of sparks and temperatures	Class I, Div. 2	US FM 3611/US ISA 12.12.01/ CA CSA C22.2 No.213	
Explosion-proof		(XP)	Transmission of an explosion to the outside is excl.	Class I, Div. 1	US FM 3615/US UL 1203/ CA CSA C22.2 No.30	

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

	T1	T2	T3	T4	T5	T6
I	Methane	–	–	–	–	–
II A	Ammoniac Methane Ethane Propane	Ethyl alcohol Cyclohexane n-Buthane n-Hexane	Fuel in general Aorcraft fuel Fuel oil	Acetaldehyde	–	–
II B	Lighting gas Acrylonitrile	Ethylene Ethylene oxide	Ethylene glycol Hydrogene sulphide	Ethyl ether	–	–
II C	Hydrogene	Ethine (Acetylene)	–	–	–	Coal disulphide

Additional conditions

Conditions	Marking
Equipment applicable without restriction	-
Observe special application conditions	x
Ex device with part certificate cannot be used alone; CE conformity will be certified through assembly in a complete equipment	u

Temperature classes and maximum permissive surface temperature of electrical equipment per CELENEC/IEC/NEC 505 and NEC 500