



Your Safety — Our Reality

STAHL

Electrical equipment						
ATEX		II (1)2 G	Ex	d [ia Ga]	IIC	T4 Gb*
IEC/CENELEC			Ex	d [ia Ga]	IIC	T4 Gb*
NEC 505		Class I, Zone 1	AEx	d [ia]	IIC	T4
IEC/CENELEC (old)			Ex	d [ia]	IIC	T4
IEC/CENELEC (alternate)			Ex	db [ia]	IIC	T4
IEC/CENELEC (dust)			Ex	tb	IIIC	T90°C Db*
NEC 500		Class I, Division 1			Group C,D	T4

* When using the alternate symbols, the EPL can be left out.

Non-electrical equipment						
ATEX		II 2 G			ck	IIC T6

Types of protection for electrical equipment in explosive gas atmospheres

Type of protection	Symbol standard	Symbol alternate	Zone	Diagram	Main application	Standard
increased safety	e	eb	1		junction boxes, control stations for installing Ex-components (with a different type of protection), squirrel-cage motors, light fittings	IEC 60079-7 EN 60079-7 ISA 60079-7
flameproof enclosures	d	db	1		switchgears, control stations, indicating equipment, control systems, motors, transformers, heating equipment, light fittings	IEC 60079-1 EN 60079-1 ISA 60079-1
pressurized enclosures	px	pxb	1		switchgear and control cabinets, analysers, large motors	IEC 60079-2 EN 60079-2 ISA 60079-2
	py pz	pyb pzc	2			
intrinsic safety	ia	ia	0		instrumentation technology, fieldbus technology, sensors, actuators [Ex ib] = associated electrical apparatus – installation in the safe area	IEC 60079-11 EN 60079-11 ISA 60079-11
	ib	ib	1			
	ic	ic	2			
					intrinsically safe systems	IEC 60079-25 EN 60079-25
					FISCO: fieldbus intrinsically-safe concept	IEC 60079-27 EN 60079-27 ISA 60079-27
oil immersion	o	ob	1		transformers, starting resistors	IEC 60079-6 EN 60079-6 ISA 60079-6
powder filling	q	qb	1		sensors, display units, electronic ballasts, transmitters	IEC 60079-5 EN 60079-5 ISA 60079-5
encapsulation	ma	ma	0		switchgear with small capacity, control and signalling units, display units, sensors	IEC 60079-18 EN 60079-18 ISA 60079-18
	mb	mb	1			
	mc	mc	2			
type of protection "n"	nA	nAc	2		all electrical equipment for Zone 2 nA = non-sparking device nC = sparking devices and components nR = restricted breathing enclosures	IEC 60079-15 EN 60079-15 ISA 60079-15
	nC	nCc	2			
	nR	nRc	2			
optical radiation	op_	op_a	0		op is = inherently safe optical radiation op pr = protected optical radiation op sh = optical radiation interlock	IEC 60079-28 EN 60079-28
	op_	op_b	1			
	op_	op_c	2			

Types of protection for electrical equipment in explosive dust atmospheres

protection by enclosures	ta	ta	20		switchgear, control stations, junction boxes, control boxes, motors, light fittings	IEC 60079-31 EN 60079-31
	tb	tb	21			
	tc	tc	22			
					old identification: tD A21 = under procedure A for Zone 21 tD B21 = under procedure B for Zone 21	IEC 61241-1 EN 61241-1 ISA 61241-1
pressurization	p	pb	21		switchgear and control cabinets, motors	IEC 61241-4 EN 61241-4 ISA 61241-2
		pc	22			
					old identification: pD21, pD22	
intrinsic safety	ia	ia	20		instrumentation technology, fieldbus technology, sensors, actuators [Ex ib] = associated electrical apparatus – installation in the safe area	IEC 60079-11 EN 60079-11
	ib	ib	21			
	ic	ic	22			
					old identification: iaD = for use in Zone 20, 21, 22 ibD = for use in Zone 21, 22	IEC 61241-11 EN 61241-11 ISA 61241-11
encapsulation	ma	ma	20		switchgear with small capacity, control and signalling units, display units, sensors	IEC 60079-18 EN 60079-18 ISA 61241-18
	mb	mb	21			
	mc	mc	22			
					old identification: maD = for use in Zone 20, 21, 22 mbD = for use in Zone 21, 22	

Equipment category and Equipment protection level (EPL)

acc. to EU-directive 94/9/EG (ATEX)		acc. to IEC and CENELEC		Sufficient security	
Group	Equipment category	EPL			
Mines susceptible to firedamp					
I	M1	Ma			during rare malfunctions
I	M2	Mb			until de-energizing of the equipment
Explosive gas 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
Explosive dust 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

(1)G associated apparatus – installation in non-hazardous area

Zones

Dangerous explosive atmosphere		Continuously, longterm or frequently	Occasionally	Not likely to occur and for short period only
Gas	CENELEC/IEC/NEC 505	Zone 0	Zone 1	Zone 2
	NEC 500 (Class I)	Division 1		Division 2
Dust	CENELEC/IEC/NEC 506	Zone 20	Zone 21	Zone 22
	NEC 500 (Class II, III)	Division 1		Division 2

Types of protection for non-electrical equipment in gas and dust atmospheres

Type of protection	Diagram	Main application	Standard
constructional safety		couplings, pumps, gear drives, chain drives, belt drives	EN 13463-5
flameproof enclosures		brakes, couplings	EN 13463-3
pressurisation pumps		pumps	EN 60079-2
control of ignition sources		pumps, belt drives	EN 13463-6
liquid immersion		submerged pumps, gears	EN 13463-8
flow restricting enclosure		equipment only for Zone 2 or Zone 22	EN 13463-2

Groups

IEC/CENELEC/NEC 505		NEC 500	
Group I	Mines susceptible to firedamp		—
	Methane		
Group II	Explosive gas atmosphere		Class I
Subdivisions	Typical gas		Subdivisions
IIA	Propane	Propane	Class I Group D
IIB	Ethylene	Ethylene	Class I Group C
IIC	Hydrogen	Hydrogen	Class I Group B
	Acetylene	Acetylene	Class I Group A
Group III*	Explosive dust atmosphere		Class II/III
Subdivisions	Typical dust		Subdivisions
IIIA	combustible flyings	fibers/flyings	Class III
IIIB	non-conductive dust	non-conductive dust	Class II Group G
IIIC	conductive dust	carbonaceous dust	Class II Group F
		combustible metal dust	Class II Group E

* acc. to IEC (2007) and CENELEC (2009)

Temperature classification

Maximum surface temperature	Gas Temperature Classes		Maximum surface temperature	Gas Temperature Classes	
	Equipment marking NEC 500	CENELEC/IEC/NEC 505		Equipment marking NEC 500	CENELEC/IEC/NEC 505
450°C	T1	T1	200°C	T3	T3
300°C	T2	T2	180°C	T3A	
280°C	T2A		165°C	T3B	
260°C	T2B		160°C	T3C	
230°C	T2C		135°C	T4	T4
215°C	T2D		120°C	T4A	
Dust: indication of the max. surface temperature in °C			100°C	T5	T5
			85°C	T6	T6

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