Guide to Hazardous Locations

ATEX / IEC

Example marking

ATEX certificate number DEKRA 11 ATEX 0244 X

EU type-examination certificate

ID no.	Notified body		Country
0539	UL International Demko A/S	UL	DK
0102	PTB	PTB	DE
0044	TÜV Nord	TUN	DE
0080	INERIS	INE	FR
0344	DEKRA CERTIFICATIONS B.V.	DEK	NL
1180	BASEEFA	BAS	UK

IECEx-certified Ex equipment | Year of certification | ATEX-certified Ex equipment - guidelines of the European Community | Certificate number

Additional conditions

ID	Conditions
X	Suffix denotes special condition of use contained in the certificate.
U	Suffix denotes Ex component approval. The equipment is not suitable for installation without further evaluation.

IECEx certificate number IECEx DEK 11.0084 X

ATEX / IECEx / UKEX Marking

Example marking

Equipment marking UKCA CE 0344 Ex II 2 G Ex db IIC T4 Gb

*Complies with UKCA requirements

Conditions in potentially explosive areas ATEX 2014/34/EU

Explosive Atmosphere	Presence of explosive atmoshere	Zone Classification	Equipment group	Equipment category	EPL / Equipment protection level
Coal Mines	Parts at coal mines endangered by firedamp and / or combustible dust		I	M1	Ma
			I	M2	Mb
Gas Vapor Mist	Continuous, long periods, frequent	Zone 0	II	1G, (1)G	Ga
	Occasional	Zone 1	II	2G, (2)G	Gb
	Normally not, only for a short period	Zone 2	II	3G, (3)G	Gc
Dust Fibers Flyings	Continuous, long periods, frequent	Zone 20	II	1D, (1)D	Da
	Occasional	Zone 21	II	2D, (2)D	Db
	Normally not, only for a short period	Zone 22	II	3D, (3)D	Dc

Use in the defined Ex area	1G category
Associated apparatus. Transmits to or receives signal from Ex area.	(1)G category

M1	Continuous operation in explosive atmosphere
M2	No operation in explosive atmosphere

Gas and dust groups

Typical gas / dust	Identification
Methane	I
Propane	II A
Ethylene	II B
Hydrogen	II C
Combustible flyings	III A
Non-conducting dust	III B
Conducting dust	III C

Ex identification acc. to standard (example)

[Ex ia Ga] IIC	EN/IEC 60079-0	Associated apparatus. Transmits to or receives signal from Ex area.	[ ] Associated equipment
[Ex ia] IIC	EN/IEC 60079-0		
Ex ia IIC T6 Ga	EN/IEC 60079-0	Installation in Ex area	Equipment
Ex ia IIC T6	EN/IEC 60079-0		

Protection types (ATEX / IECEx / UKEx)

Protection Method		Type	Zones	Hazard type	IEC / EN standard	Concept
General requirements			All	All	60079-0	
Intrinsic safety		ia	0, 1, 2	Gas	60079-11	Limiting ignition energy
			20, 21, 22	Dust		
		ib	1, 2	Gas		
			21, 22	Dust		
		ic	2	Gas		
			22	Dust		
Increased safety		eb	1, 2	Gas	60079-7	Prevention of sparks
		ec	2	Gas		
Non-sparking		nA	2	Gas	EN 60079-15	No arcs, sparks or hot surfaces
Flameproof enclosures		da	0, 1, 2	Gas	60079-1	Propogation prevention
		db	1, 2	Gas		
		dc	2	Gas		
Powder filling		q	1, 2	Gas	60079-5	
Restricted breathing		nR	2	Gas	60079-15	Prevents ingress of explosive atmopshere
Sealed device		nC	2	Gas	60079-15	
Pressurization		pxb	1, 2	Gas	60079-2	
		pyb	1, 2	Gas		
			21, 22	Dust		
		pzc	2	Gas		
			22	Dust		
Pressurized room		pb	1, 2	Gas	60079-13	
		pc	2	Gas		
Artificially ventilated		vc	2	Gas		
Encapsulation		ma	0, 1, 2	Gas	60079-18	
			20, 21, 22	Dust		
		mb	1, 2	Gas		
			21, 22	Dust		
		mc	2	Gas		
			22	Dust		
Liquid immersion		ob	1, 2	Gas	60079-6	
		oc	2	Gas		
Protection by enclosure		ta	20, 21, 22	Dust	60079-31	
		tb	21, 22	Dust		
		tc	22	Dust		
Optical radiation		op pr	1, 2	Gas	60079-28	Prevention of optical energy release
			21, 22	Dust		
		op is	0, 1, 2	Gas		Limiting optical energy
			20, 21, 22	Dust		
		op sh	0, 1, 2	Gas		Interlocked with optical breakage
			20, 21, 22	Dust		

Permissible surface temperature

Temperature class	Gas	Ignition temperature
T1=450	Ammonia	630°C
T2=300	Methane	595°C
T2A=280	Hydrogen	560°C
T2B=260	Propane	470°C
T2C=230	Ethylene	425°C
T2D=215	Butane	365°C
T3=200	Acetylene	305°C
T3A=180	Cyclohexane	259°C
T3B=165	Diethyl ether	170°C
T3C=160	Carbon disulfide	95°C
T4=135		
T4C=120		
T5=100		
T6=85		
°C		

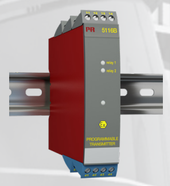
Dust temperature:
Max. surface temperature is shown in full in the markings for dust, e.g. T90°C.

System 9000
9106B - AI HART transparent
9107B - AO HART transparent
9113B - AI temperature converter
9116B - AI universal w/ limit switch
9202B - DI pulse isolator
9203B - DO solenoid/alarm driver

System 7900
7908 - 8 module backplane
7916 - 16 module backplane

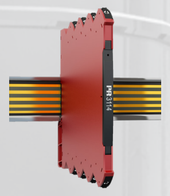
System 7500
7501 - Field mounted HART temperature transmitter

System 5300
5331D - Universal temperature isolated
5333D - RTD - Pt100 / Lin. R
5343B - Level - Lin. R / Potentiometer
5334B - TC isolated
5335D - Universal temperature HART 5
5337D - Universal temperature HART 7
5437D - 2-wire HART 7 temperature transmitter



System 5000
5104B - AI repeater / power supply
5105B - AO isolated driver
5106B - AI HART transparent
5107B - AO HART transparent
5114B - AI universal converter
5115B - AI universal calculator
5116B - AI universal w/ limit switch
5131B - AI universal converter LP
5202B - DI NAMUR/contact input
5203B - DO solenoid/alarm driver
5223B - DI frequency converter

5531B 4-digit LCD
Ex loop-powered display



System 3000 (zone 2 only)
3101 - TC converter
3102 - Pt100 converter
3103 - Isolated repeater
3104 - Isolated converter
3108 - Isolated repeater / splitter
3109 - Isolated converter / splitter
3111 - TC converter - isolated
3112 - Pt100 converter - isolated
3113 - HART 7 temperature converter - isolated
3114 - Isolated universal converter
3117 - Bipolar isolated converter
3118 - Bipolar isolated converter / splitter
3185 - Loop powered isolator
3186 - 2-wire transmitter isolator / current isolator
3225 - Universal frequency converter
3331 - Temperature converter, loop-powered - isolated
3333 - Pt100 converter, loop-powered
3337 - HART 7 temperature converter, loop-powered
3405 - Power connector unit

USA / Canada Marking

Example Zone scheme marking

Zone scheme gas* Zone 0 AEx ia IIC T4 Ga

Zone scheme dust* Zone 0 AEx ta IIIC T90°C Da

Class zone, (NEC505, NEC506)

Conditions in Ex areas

Explosive atmo-sphere	Zone classification	Presence of explosive atmosphere	Equipment protection level
Gas Fog Liquid	Zone 0	Continuous, long periods, frequent	Ga
	Zone 1	Occasional	Gb
	Zone 2	Normally not, only for a short period	Gc
Dust	Zone 20	Continuous, long periods, frequent	Da
	Zone 21	Occasional	Db
	Zone 22	Normally not, only for a short period	Dc

Gas and dust groups

Typical gas / dust	Identification NEC 505	Identification NEC 500
Methane	I	Mining
Propane	II A	Class 1 / GP D
Ethylene	II B	Class 1 / GP C
Hydrogen	II B + H2	Class 1 / GP B
Acetylene	II C	Class 1 / GP A
Fibers and flyings	III A	Class III
Non-conductive dusts	III B	Class II / GP G
Carbonaceous dusts	III B	Class II / GP F
Metal dusts	III C	Class II / GP E

Ex identification acc. to standard (example)

[AEx ia] IIC	ANSI/ISA 60079-0	Associated apparatus. Transmits to or receives signal from Ex area.	[ ] Associated equipment
AEx ia IIC T6	ANSI/ISA 60079-0	Installation in Ex area.	Equipment

*RED text in markings above applies to US only.

Note:
US installations may use the zone or division marking scheme. New installations in Canada must use the zone marking scheme, while existing installations may use either scheme.

Protection types - Zone Scheme

Protection Method	Type	Zones	Hazard type	Standard ISA/UL/CSA	Concept
General requirements		All	All	60079-0	
Intrinsic safety	ia	0, 1, 2	Gas	60079-11	Limiting ignition energy
		20, 21, 22	Dust		
	ib	1, 2	Gas		
		21, 22	Dust		
	ic	2	Gas		
		22	Dust		
Increased safety	eb	1, 2	Gas	60079-7	Prevention of sparks
	ec	2	Gas		
Flameproof enclosures	da	0, 1, 2	Gas	60079-1	Propogation prevention
	db	1, 2	Gas		
	dc	2	Gas		
Powder filling	q	1, 2	Gas	60079-5	
Restricted breathing	nR	2	Gas	60079-15	Prevents ingress of explosive atmopshere
Sealed device	nC	2	Gas	60079-15	
Pressurization	pxb	1, 2	Gas	60079-2	
	pyb	1, 2	Gas		
		21, 22	Dust		
	pzc	2	Gas		
		22	Dust		
Pressurized room	pb	1, 2	Gas	60079-13	
	pc	2	Gas		
	vc	2	Gas		
Encapsulation	ma	0, 1, 2	Gas	60079-18	
		20, 21, 22	Dust		
	mb	1, 2	Gas		
		21, 22	Dust		
	mc	2	Gas		
		22	Dust		
Liquid immersion	ob	1, 2	Gas	60079-6	
	oc	2	Gas		
Protection by enclosure	ta	20, 21, 22	Dust	60079-31	
	tb	21, 22	Dust		
	tc	22	Dust		
Optical radiation	op pr	1, 2	Gas	60079-28	Prevention of optical energy release
		21, 22	Dust		
	op is	0, 1, 2	Gas		Limiting optical energy
		20, 21, 22	Dust		
	op sh	0, 1, 2	Gas		Interlocked with optical breakage
		20, 21, 22	Dust		

Example Division scheme marking

Class I Division 1 Group A,B,C,D T6

Class division (NEC500)

Conditions in potentially explosive areas

Explosive Atmosphere	Class	Division	Group	Eqv. Zone	Presence of explosive atmosphere
Gas Vapor Liquid	Class I	1	A, B, C, D	0 or 1	Continuous, long periods, frequent
					Occasional
		2	A, B, C, D	2	Normally not, only for short periods
Dust	Class II	1	E, F, G	20 or 21	Continuous, long periods, frequent
					Occasional
		2	F, G	22	Normally not, only for short periods
Fibers	Class III	1		20 or 21	Constant
					Occasional
		2		22	Normally not, only for short periods

Environmental protection code / class

IP protection codes (IEC 60529)

First numeral: Protection against solids		Second numeral: Protection against water	
0	No protection	0	No protection
1	Greater than 50 mm	1	Vertical dripping
2	Greater than 12.5 mm	2	Angled dripping (15°)
3	Greater than 2.5	3	Spraying water
4	Greater than 1 mm	4	Splashing water
5	Dust protected	5	Water jets
6	Dust tight	6	Powerful water jets
		7	Immersion up to 1 m
		8	Immersion beyond 1 m

NEMA types (NEMA 250)

Type	Application	Protection against	Equivalent guideline IP rating
1	Indoor	General purpose	10
2	Indoor	Dripping water, falling dust	11
3, 3R, 3S	Outdoor	Rain, snow, windblown dust	54
4, 4X	Indoor / outdoor	Hose-directed water, corrosion (X)	55, 56
5	Indoor	Angled dripping water, settling dust	52
6	Indoor /outdoor	Temporary submersion	67
6P	Indoor / outdoor	Prolonged submersion	67
7	Indoor	Hazardous Location Class I	
8	Indoor / outdoor	Hazardous Location Class I	
9	Indoor	Hazardous Location Class II	
12, 12K	Indoor	Dripping non-corrosive liquid, dust	52
13	Indoor	Water, oil, dust, seepage	54

Protection Types - Division system

General requirements		Gas	Dust	FM / UL (NEC 500)	Canada (CEC) CSA
Intrinsic safety	IS	Class I, Div 1	Class II, Div 1		C22.2 No.157
			Class II, Div 2	UL913 / FM3610	
		Class I, Div 2	Class III, Div 1	UL698	
			Class III, Div 2		
Explosion proof / Dust Ignition proof	XP	Class I, Div 1	Class II, Div 1	UL1203	C22.2 No.30
		Class I, Div 2	Class II, Div 2	FM3615	
Non-incendive	NI	Class I, Div 2	Class II, Div 2		
			Class III, Div 1		
			Class III, Div 2		
Pressurized / Purged	Type X	Class I , Div 1	Class II, Div 1	FM3620	C22.2 No, 60079-2
	Type Y	Class I, Div 1	Class II, Div 1		
	Type Z	Class I , Div 2	Class II, Div 2		

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