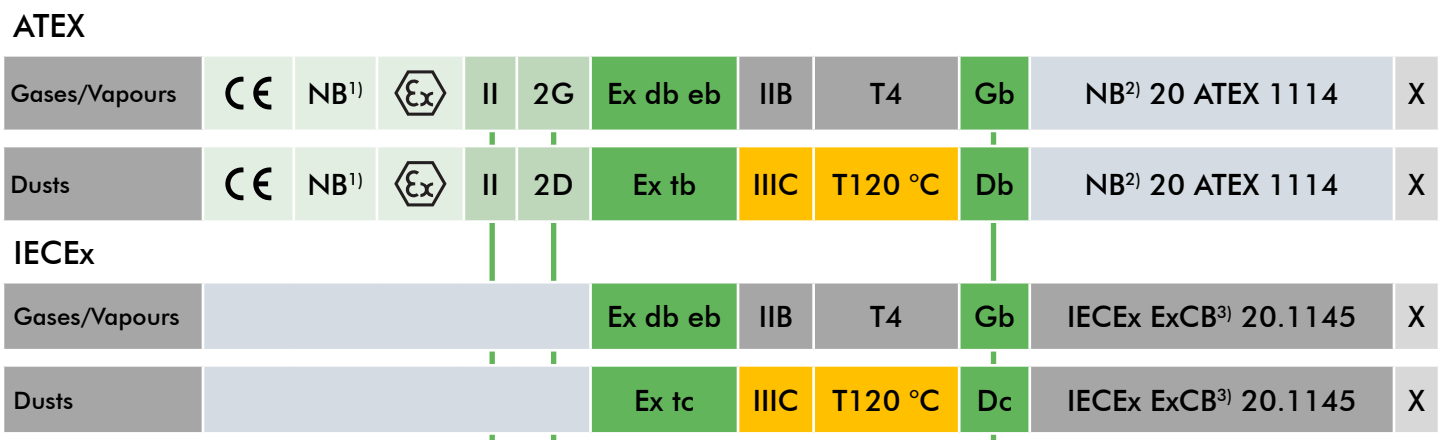
ARBAconsult

Marking of ATEX/IECEx electrical explosion protected equipment



Potentially explosive areas

Conditions and Zone classification

Flammable materials	**Temporary behaviour** of explosive atmosphere	**Classification** of hazardous areas
Gases Vapours	is present continuously or for long periods or frequently	Zone 0
	arises in normal operation occasionally	Zone 1
	is not likely to arise in normal operation, or if it does, will persist for a short time only	Zone 2
Dusts	is present in the form of a cloud continuously, or for long periods or frequently	Zone 20
	occasionally develops into a cloud during normal operation	Zone 21
	is not likely to develop into a cloud during normal operation, or if it does, for a short time only	Zone 22
Methane and Carbon dust	operation where there is a risk of explosion	-
	disconnection where there is a risk of explosion	-

Required marking on the equipment

Group as defined in directive 2014/34/EU	**Equipment category** as defined in directive 2014/34/EU	**Equipment group** as defined in EN IEC 60079-0	**Equipment protection level** (EPL) as defined in EN IEC 60079-0
II	1G	II	Ga
II	2G or 1G	II	Gb or Ga
II	3G or 2G or 1G	II	Gc or Gb or Ga
II	1D	III	Da
II	2D or 1D	III	Db or Da
II	3D or 2D or 1D	III	Dc or Db or Da
I	M1	I	Ma
I	M2 or M1	I	Mb or Ma

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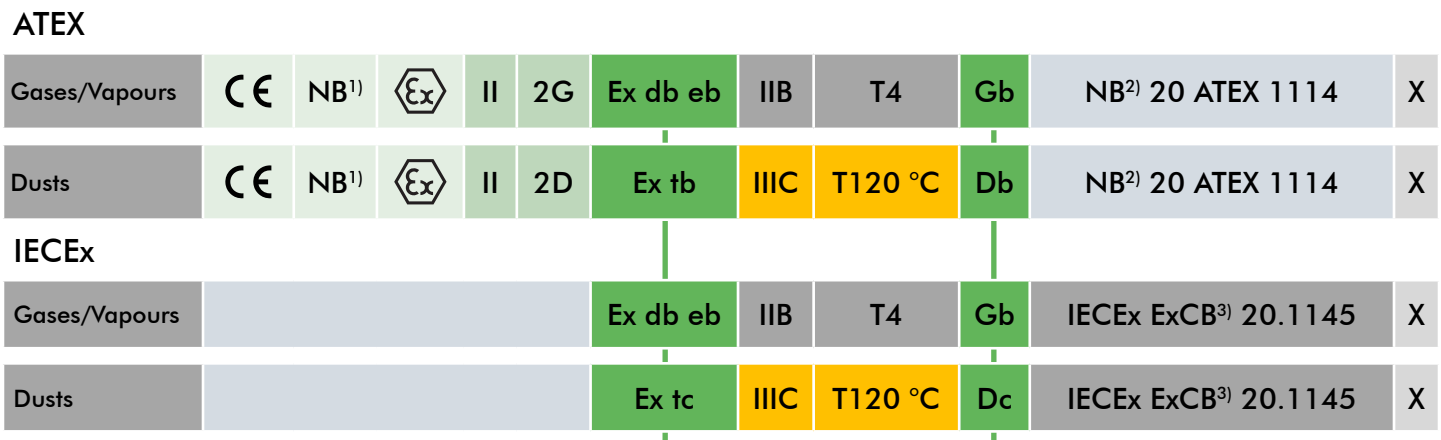

Protection principle/types of protection

Applications	Flammable materials	Protection principle	Type of protection	Standards	**Marking** in accordance with the equipment protection level		
					very high level of protection	high level of protection	enhanced level of protection
All	Gases, vapours (G) and dusts (D)	–	General requirements	EN IEC 60079-0	+	+	+
Control stations, motors, fuses, switchgear, power electronics, *catalytic gas detectors only	Gases and vapours (G)	Propagation of an explosion inside to the outside is excluded	Flameproof enclosure	EN IEC 60079-1	Ex da*	Ex db	Ex dc
Junction and connection boxes, enclosures, motors, luminaires, terminals	Gases and vapours (G)	Avoidance of arcs, sparks and excessive temperature	Increased safety	EN IEC 60079-7	–	Ex eb	Ex ec
Junction and connection boxes, enclosures, motors, luminaires, switch and control cabinets, plugs	Dusts (D)	Explosive dust atmosphere keep at a distance from the ignition source	Protection by enclosure	EN IEC 60079-31	Ex ta	Ex tb	Ex tc
Measurement and control technology, automation technology, sensors, actuators	Gases, vapours (G) and dusts (D)	Limitation of energy as well as arcs and temperature	Intrinsic safety	EN IEC 60079-11 EN IEC 60079-25	Ex ia	Ex ib	Ex ic
Switch and control stations, motors, analyzers, computers	Gases, vapours (G) and dusts (D)	Explosive atmosphere keep at a distance from the ignition source	Pressurization	EN IEC 60079-2	–	Ex pxb, Ex pyb	Ex pzc
Coils of motors or relays, solenoid valves, connection systems	Gases, vapours (G) and dusts (D)	Explosive atmosphere keep at a distance from the ignition source	Encapsulation	EN IEC 60079-18	Ex ma	Ex mb	Ex mc
Transformers, relays, control stations, magnetic contactors	Gases and vapours (G)	Explosive atmosphere keep at a distance from the ignition source	Liquid immersion	EN IEC 60079-6	–	Ex ob	Ex oc
Capacitors, transformers, relays	Gases and vapours (G)	A propagation of an explosion inside to the outside is excluded	Powder filling	EN IEC 60079-5	–	Ex q	–
Applications for zone 2	Gases and vapours (G)	Protection principles adapted for zone 2	Enclosed construction Restricted breathing	EN IEC 60079-15	–	–	Ex nC Ex nR
Optical devices, laser scanners, light barriers, fibre-optic systems	Gases, vapours (G) and dusts (D)	Limitation of optical energy radiating in the explosive atmosphere	Inherent safe optical radiation	EN IEC 60079-28	Ex op is	–	–
Fibre-optic systems	Gases, vapours (G) and dusts (D)	Ex atmosphere is kept distant from the ignition source	Protected optical radiation	EN IEC 60079-28	–	Ex op pr	–
Fibre-optic systems	Gases, vapours (G) and dusts (D)	Ex atmosphere is kept distant from the ignition source	Optical system with interlocking	EN IEC 60079-28	–	Ex op sh	–

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ATEX

Gases/Vapours	CE	NB[1]	Ex	II	2G	Ex db eb	IIB	T4	Gb	NB[2] 20 ATEX 1114	X
Dusts	CE	NB[1]	Ex	II	2D	Ex tb	IIIC	T120 °C	Db	NB[2] 20 ATEX 1114	X

IECEx

Gases/Vapours	Ex db eb	IIB	T4	Gb	IECEx ExCB[3] 20.1145	X
Dusts	Ex tc	IIIC	T120 °C	Dc	IECEx ExCB[3] 20.1145	X

Subdivisions and classification of gases and vapours

Gases and vapours			Assignment of gases and vapours accordance to the ignition temperature	Tempe-rature class
Ammonia, methane, ethane, propane	Town gas, acrylnitril	Hydrogen	>450 °C	T1
Ethyl alcohol, cyclohexane, n-butane	Ethylene, ethylene oxide	Ethine, acetylena	>300 °C ... < 450 °C	T2
Gasoline, n-hexane	Ethylene glycol, hydrogen sulphide		>200 °C ... < 300 °C	T3
Acetaldehyde	Ethyl ether		>135 °C ... < 200 °C	T4
			>100 °C ... < 135 °C	T5
		Sulphide of carbon	>85 °C ... < 100 °C	T6

Gas groups		
IIA	IIB	IIC

Permitted Equipment groups		
IIA, IIB, IIC	IIB, IIC	IIC

Equipment

Maximum surface temperature	Permitted Temperature classes
450 °C	T1 or T6
300 °C	T2 or T6
200 °C	T3 or T6
135 °C	T4 or T6
100 °C	T5 or T6
85 °C	T6

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Dusts	CE	NB[1]	Ex	II	2D	Ex tb	IIIC	T120 °C	Db	NB[2] 20 ATEX 1114	X

IECEx

Gases/Vapours						Ex db eb	IIB	T4	Gb	IECEx ExCB[3] 20.1145	X
Dusts						Ex tc	IIIC	T120 °C	Dc	IECEx ExCB[3] 20.1145	X

Subdivision of dusts

Permitted Equipment groups	Dust groups	Dusts
IIIA, IIIB, IIIC	IIIA	combustible flyings
IIIB, IIIC	IIIB	non-conductive
IIIC	IIIC	conductive

Use of the operating equipment

Marking	Conditions
without X or U	Equipment can be operated without restrictions
with X	Specific conditions of use of the equipment
with U	Component certificate (uncompleted), conformity is certified when used in an overall equipment

Max. permissible surface temperature of the equipment

Temperature limitation because of dust layer T5 mm: Minimum ignition temperature of 5 mm layer of dust	$T_{max.} < T_{5\ mm} - 75°C$
Temperature limitation because of dust cloud TCL: Minimum ignition temperature of the cloud of dust	$T_{max.} < 2/3\ T_{CL}$
Max. permissible surface temperature of the equipment:	lowest outcome of the Tmax. - values

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