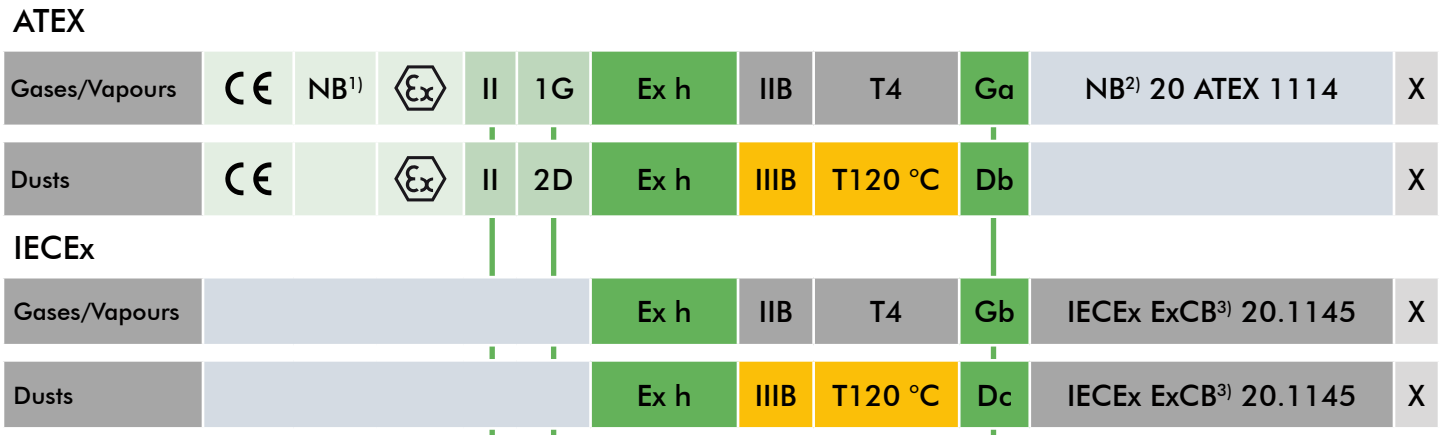
Marking of ATEX/IECEx non-electrical explosion protected equipment



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 toarise 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 directive EN ISO 80079-36 EN IEC 60079-0	**Equipment protect level** (EPL) as defined in EN ISO 80079-36 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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The ATEX certification process is mandatory in the EU. The IECEx-system is a voluntary certification procedure in the EU. For correct application of the ATEX certification procedure, please note the EU Directive 2014/34/EU and the harmonized EN standards.

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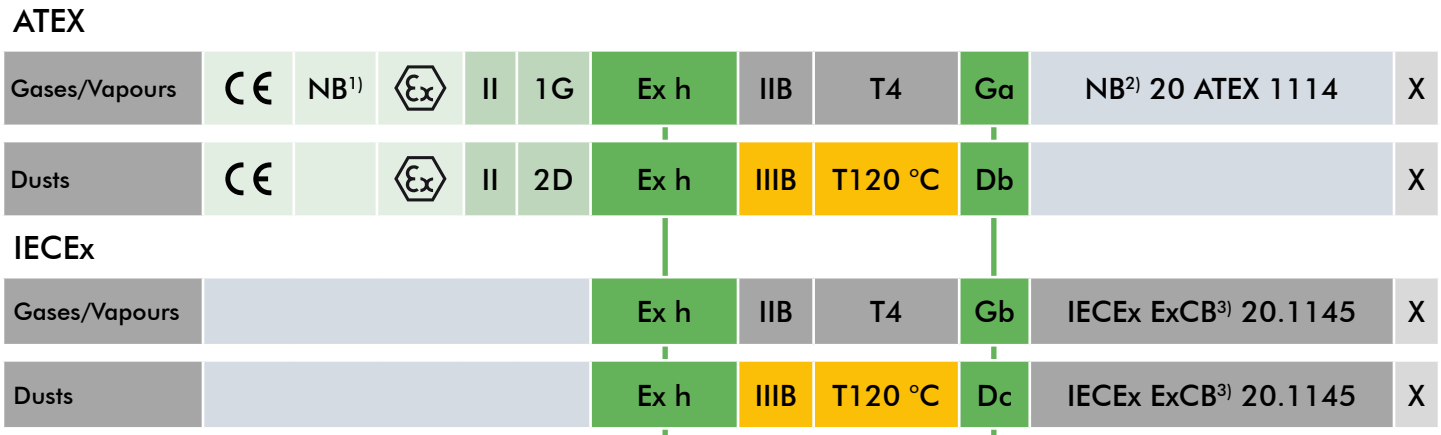

Protection principle/types of protection

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 ISO 80079-36 EN IEC 60079-0 EN 13463-1	+	+	+
Coupling, belt drive, agitator, ventilator, mill	Gases, vapours (G) and dusts (D)	This protection principle ensures that a source of ignition cannot occur.	Constructional safety	EN ISO 80079-37 EN 13463-5	Ex h c	Ex h c	Ex h c
Plain bearing, pump, agitator, vacuum pump, centrifuges	Gases, vapours (G) and dusts (D)	This protection principle prevents a source of ignition from becoming effective.	Control of ignition sources	EN ISO 80079-37 EN 13463-6	Ex h b	Ex h b	Ex h b
Gear	Gases, vapours (G) and dusts (D)	This protection principle prevents the hazardous atmosphere reaching the source of ignition.	Liquid immersion	EN ISO 80079-37 EN 13463-8	Ex h k	Ex h k	Ex h k
Centrifuge, compressor, geared motor, complex assembly group	Gases, vapours (G) and dusts (D)	This protection principle prevents the hazardous atmosphere reaching the source of ignition.	Pressurised enclosure	EN ISO 80079-36 EN IEC 60079-2 EN 13463-8	– – –	Ex ib Ex pxb, pyb p	Ex h Ex pzc –
Centrifuge, compressor, geared motor, complex assembly group	Gases and vapours (G)	This protection principle prevents the hazardous atmosphere reaching the source of ignition.	Protection by flow restricting enclosure	EN 13463-2	–	–	fr
Mill, geared motor, complex assembly group	Dusts (D)	This protection principle prevents the hazardous atmosphere reaching the source of ignition.	Protection by enclosure	EN ISO 80079-36 EN IEC 60079-31	Ex h Ex ta	Ex h Ex tb	Ex h Ex tc
Brakes	Gases and vapours (G)	This protection principle prevents flame propagation through an enclosure.	Flame-proof enclosure	EN ISO 80079-36 EN IEC 60079-1 EN 13463-3	– – –	Ex h Ex db d	Ex h Ex dc –

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ATEX

Gases/Vapours	CE	NB[1]	Ex	II	1G	Ex h	IIB	T4	Ga	NB[2] 20 ATEX 1114	X
Dusts	CE		Ex	II	2D	Ex h	IIIB	T120 °C	Db		X

IECEx

Gases/Vapours						Ex h	IIB	T4	Gb	IECEx ExCB[3] 20.1145	X
Dusts						Ex h	IIIB	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	Temperature class
Ammonia, methane, ethane, propane	Town gas, acrylnitril	Hydrogen	>450 °C	T1
Ethyl alcohol, cyclohexane, n-butane	Ethylene, ethylene oxide	Ethine, acetylene	>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 class
450 °C	T1 to T6
300 °C	T2 to T6
200 °C	T3 to T6
135 °C	T4 to T6
100 °C	T5 to T6
85 °C	T6

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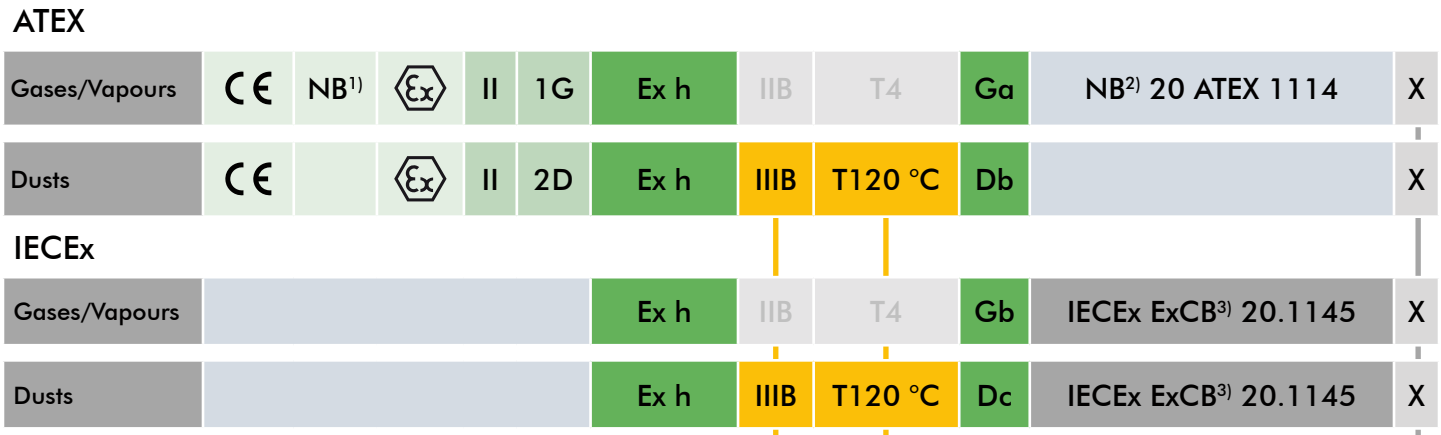

Subdivision of dusts

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	Bedingungen
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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