

## Potentially explosive areas

Conditions and Zone classification			Required marking on the equipment			
Flammable materials	Temporary behaviour of explosive atmosphere	Classification of hazardous areas	Group as defined in 2014/34/EU	Equipment category as defined in 2014/34/EU	Equipment group as defined in EN IEC 60079-0	Equipment protection level (EPL) as defined in EN IEC 60079-0
Gases Vapours	is present continuously or for long periods or frequently	Zone 0	II	1G	II	Ga
	arises in normal operation occasionally	Zone 1	II	2G or 1G	II	Gb or Ga
	is not likely to arise in normal operation, or if it does, will persist for a short time only	Zone 2	II	3G or 2G or 1G	II	Gc or Gb or Ga
Dusts	is present in the form of a cloud continuously, or for long periods or frequently	Zone 20	II	1D	III	Da
	occasionally develops into a cloud during normal operation	Zone 21	II	2D or 1D	III	Db or Da
	is not likely to develop into a cloud during normal operation, or if it does, for a short time only	Zone 22	II	3D or 2D or 1D	III	Dc or Db or Da
Methane / Coal dust	operation where there is a risk of explosion	-	I	M1	I	Ma
	disconnection where there is a risk of explosion	-	I	M2 or M1	I	Mb or Ma

## Protection principle/types of protection

Applications (Examples)	Flammable materials	Protection principle	Type of protection	Very high level of protection	High level of protection	Enhanced level of protection	Standards
All applications	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	Ex da*	Ex db	Ex dc	EN IEC 60079-1
Junction and connection boxes, enclosures, motors, luminaires, terminals	Gases and vapours (G)	Avoidance of arcs, sparks and excessive temperature	Increased safety	-	Ex eb	Ex ec	EN IEC 60079-7
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	Ex ta	Ex tb	Ex tc	EN IEC 60079-31
Measurement + control technology, automation technology, sensors, actuators	Gases, vapours (G) and dusts (D)	Limitation of energy as well as arcs and temperature	Intrinsic safety	Ex ia	Ex ib	Ex ic	EN IEC 60079-11 EN IEC 60079-25
Switch and control stations, motors, analyzers, computers	Gases, vapours (G) and dusts (D)	Explosive atmosphere keep at a distance from the ignition source	Pressurization	-	Ex pxb, Ex pyb	Ex pzc	EN IEC 60079-2
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	Ex ma	Ex mb	Ex mc	EN IEC 60079-18
Transformers, relays, control stations, magnetic contactors	Gases and vapours (G)	Explosive atmosphere keep at a distance from the ignition source	Liquid immersion	-	Ex ob	Ex oc	EN IEC 60079-6
Capacitors, transformers, relays	Gases and vapours (G)	A propagation of an explosion inside to the outside is excluded	Powder filling	-	Ex q	-	EN IEC 60079-5
Applications for zone 2	Gases and vapours (G)	Protection principles adapted for zone 2	Enclosed construction Restricted breathing	-	-	Ex nC Ex nR	EN IEC 60079-15
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	Ex op is	-	-	EN IEC 60079-28
Fibre-optic systems	Gases, vapours (G) and dusts (D)	Ex atmosphere is kept distant from the ignition source	Protected optical radiation	-	Ex op pr	-	EN IEC 60079-28
Fibre-optic systems	Gases, vapours (G) and dusts (D)	Ex atmosphere is kept distant from the ignition source	Optical system with interlocking	-	Ex op sh	-	EN IEC 60079-28

## ATEX

Gases/Vapours	CE 2004 <sup>1)</sup> Ex	II	2G	Ex d b eb	IIC	T6	Gb	EPS <sup>2)</sup> 19 ATEX 1 075	X
Dusts	CE 2004 <sup>1)</sup> Ex	II	2D	Ex tb	IIIC	T120°C	Db	EPS <sup>2)</sup> 19 ATEX 1 075	X

<sup>1)</sup> Identification number of the Notified Body responsible for the surveillance of the manufacturer's quality system  
<sup>2)</sup> Notified Body that has tested and certified the product

## IECEx

Gases/Vapours				Ex d b eb	IIB	T4	Gb	IECEx EPS <sup>3)</sup> 19.0038	X
Dusts				Ex tc	IIIB	T120°C	Dc	IECEx EPS <sup>3)</sup> 19.0038	X

<sup>3)</sup> Certification Body that has tested and certified the product (EPL a, b and c)

## Subdivision of dusts

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

## Maximal permissible surface temperature

lowest outcome of the T <sub>max</sub> - values	Max. permissible surface temperature of the equipment:
T <sub>max</sub> ≤ T <sub>5mm</sub> - 75°C	Temperature limitation because of dust layer T <sub>5mm</sub> : Minimum ignition temperature of 5 mm layer of dust
T <sub>max</sub> < 2/3 T <sub>cl</sub> Marking according to the EPL	Temperature limitation because of dust cloud T <sub>cl</sub> : Minimum ignition temperature of the cloud of dust

## Use of the operating equipment

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

Marking in accordance with the EPL

Applications area (equipment)		
Zone 0 / 20	Zone 1 / 21	Zone 2 / 22
Zone 1 / 21	Zone 2 / 22	
Zone 2 / 22		

## Subdivisions and classification of gases and vapours

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

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

ATEX is in the European Union a mandatory and IECEx a voluntary certification procedure. For the correct application of the certification procedures, please follow the corresponding regulations guidelines and standards.