BARTEC

Marking of electrical equipment for use in potentially explosive atmospheres

Conditions and subdivisions

Conditions and subdivisions			Required marking on the usable operating equipment			
Flammable materials	**Temporary behaviour** of explosive atmosphere	**Classification** of hazardous areas	**Group** as defined in directive 2014/34/EU	**Equipment category** as defined in directive 2014/34/EU	**Equipment group** as defined in EN 60079-0	**Equipment protection level** (EPL) as defined in EN 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 toarise 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 or1D	III	Dc or Db or Da
methane carbon 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

Subdivisions of gases and vapours

Gases and vapours			Assignment of gases and vapours accordance to the ignition temperature	Temperature class	Maximum surface temperature of equipment	Permissible temperature classes of 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

Explosion groups		
IIA	IIB	IIC
Permissible equipment groups		
IIA, IIB, IIC	IIB, IIC	IIC

Gas CE NB[1)] Ex II 2G Ex db eb IIC T6 Gb NB[1)] 16 ATEX 1234 X

Dust CE NB[1)] Ex II 2D Ex tb IIIC T120 °C Db NB[1)] 16 ATEX 1234 X

Protection principle/types of protection

Applications	Flammable materials	Protection principle	Type of protection	Symbol	Marking in accordance with the equipment protection level			Norm
					a = very high level of protection	b = high level of protection	c = enhanced level of protection	
all applications	gases, vapours (G) and dusts (D)	–	general requirements	–	+	+	+	EN 60079-0
control stations, motors, fuses, switchgear, power electronics	gases and vapours (G)	propagation of an explosion inside to the outside is excluded	flameproof enclosure		Ex da	Ex db	Ex dc	EN 60079-1
junction and connection boxes, enclosures, motors, lights, terminals	gases and vapours (G)	avoidance of arcs, sparks and excessive temperature	increased safety		–	Ex eb	Ex ec	EN 60079-7
junction and connection boxes, enclosures, motors, lights, switch and control cabinets, plugs	dusts (D)	explosive dust atmosphere keep at a distance from the ignition source	protection by enclosure	IPXX	Ex ta	Ex tb	Ex tc	EN 60079-31
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		Ex ia	Ex ib	Ex ic	EN 60079-11 EN 60079-25 EN 60079-27
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 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 60079-18
transformers, relays, control stations, magnetic contactors	gases and vapours (G)	explosive atmosphere keep at a distance from the ignition source	oil immersion		–	Ex ob	Ex oc	EN 60079-6
capacitors, transformers, relays	gases and vapours (G)	an propagation of an explosion inside to the outside is excluded	powder filling		–	Ex qb	–	EN 60079-5
all applications for zone 2	gases and vapours (G)	all protection principles for zone 2	"n" type of protection	–	–	–	Ex nC Ex nR	EN 60079-15
Optical devices, laser scanners, light barriers, LED lamps, fibre-optic cables	gases, vapours (G) and dusts (D)	Energy restriction of ignition sparks and temperature	Inherent safe optical radiation		Ex op is	–	–	EN 60079-28
Optical fibres, fibre-optic cables	gases, vapours (G) and dusts (D)	Ex atmosphere is kept distant from the ignition source	Protected optical radiation		–	Ex op pr	–	EN 60079-28
Optical fibres, fibre-optic cables	gases, vapours (G) and dusts (D)	Ex atmosphere is kept distant from the ignition source	Optical system with interlocking		–	Ex op sh	–	EN 60079-28

Application in hazardous area		
Zone 0/20 Zone 1/21 Zone 2/22	Zone 1/21 Zone 2/22	Zone 2/22

Use of the operating equipment

Marking	Conditions
without	operating equipment can be used without restriction
X	special conditions of use
U	operating equipment with partial certificate, CE-conformity is certified when it is installed into a complete item of operating apparatus

Ignition temperature of dust

permissible temperature of the **layer**	$T_{adm.\ C} = T_{5\ mm\ C} - 75\ K$
permissible temperature of the **cloud**	$T_{adm.\ nuage} = 2/3\ T_{nuage}$
max. permissible **surface temperature of the equipment**	$T_{adm.\ C} \geq T_{adm.} \leq T_{adm.\ nuage}$

Groups of dust

Marking	Dusts	Permissible equipment group
IIIA	combustible flyings	IIIA, IIIB, IIIC
IIIB	non-conductive dust	IIIB, IIIC
IIIC	conductive dust	IIIC

Marking according directive 2014/34/EU

according norm EN 60079-0 ff

1) **N**otified **B**odies' identification number
e.g. BAM 0589 (Germany), DEKRA EXAM 0158 (Germany), EECS (BASEEFA) 0600 (Great Britain), IBExU 0637 (Germany), KEMA 0344 (Netherlands), LCIE 0081 (France), PTB 0102 (Germany), SIRA 0518 (Great Britain), TÜV 0044 (Germany), who – where required – have certified the QA system or inspected the products (for Categories 1 and 2)

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