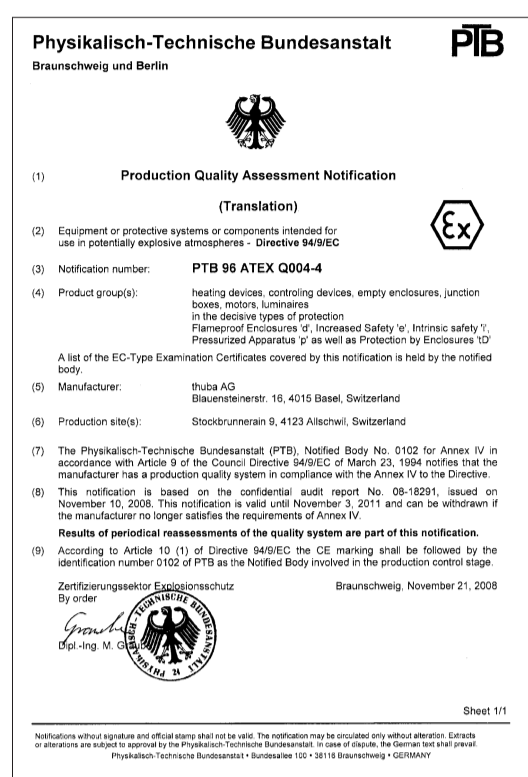


Marking to Directive 94/9/EC (ATEX 95)



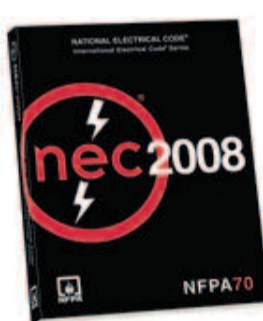
CE 0102 Ex II 2 GD

Number of the notified body (responsible for quality assurance)	Category	Gas (other than mines)	Dust (D)
0102 Physikalisch-Technische Bundesanstalt PTB, Germany	Group II Explosive atmospheres (other than mines)		
0158 DEKRA EXAM GmbH, Germany	Group I Mines susceptible to firedamp		
0632 TÜV CERT GmbH, Germany			
0637 IBEu, Institut für Sicherheitstechnik, Germany			
0344 KEMA Quality B.V., The Netherlands			
0081 LCIE Laboratoire Central des Industries Electriques, France			
0080 INERIS, France			
0600 EECs Electrical Equipment Certification Service, Great Britain			
0518 SCS Sira Certification Services, Great Britain			
0163 LOM, Spain			
0722 CESI, Italy			
0539 UI International DEMKO, Denmark			
0470 NEMKO, Norway			
1258 Electrosuisse SEV, Switzerland			



Categories (Directive 94/9/EC Annex I)

Category 1	Category 1 comprises equipment designed to be capable of functioning in conformity with the operational parameters established by the manufacturer and ensuring a very high level of protection. Equipment in this category is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours or mist or by air/dust mixtures are present continuously, for long periods or frequently. Equipment in this category must ensure the requisite level of protection, even in the event of rare incidents relating to equipment, and is characterized by means of protection such that: <ul style="list-style-type: none"> - either, in the event of failure of one means of protection, at least an independent second means provides the requisite level of protection, - or the requisite level of protection is assured in the event of two faults occurring independently of each other.
Category 2	Category 2 comprises equipment designed to be capable of functioning in conformity with the operational parameters established by the manufacturer and of ensuring a high level of protection. Equipment in this category is intended for use in areas in which explosive atmospheres caused by gases, vapours, mists or air/dust mixtures are likely to occur. The means of protection relating to equipment in this category ensure the requisite level of protection, even in the event of frequently occurring disturbances or equipment faults which normally have to be taken into account.
Category 3	Category 3 comprises equipment designed to be functioning in conformity with the operational parameters established by the manufacturer and ensuring normal level of protection. Equipment in this category is intended for use in areas in which explosive atmospheres caused by gases, vapours, mists, or air/dust mixtures are unlikely to occur or, if they do so only infrequently and for a short period only.



Classifications of Locations (NEC 500.5)

Locations shall be classified depending on the properties of the flammable gas, flammable liquid-produced vapor, combustible-liquid produced vapors, combustible dusts, or fibers/flyings that may be present, and the likelihood that a flammable or combustible concentration or quantity is present. Each room, section, or area shall be considered individually in determining its classification.

Class	Division	Description	Group
Class I	Division 1	In which ignitable concentrations of such flammable gases, flammable liquid-produced vapors, or combustible liquid-produced vapors can exist under normal operating conditions.	Group A Acetylene Group B Hydrogen Group C Ethylene Group D Propane
	Division 2	In which volatile flammable gases, flammable liquid-produced vapors, or combustible liquid-produced vapors are handled, processed, or used, but in which the liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems or in case of abnormal operation of equipment.	
Class II	Division 1	In which combustible dust is in the air under normal operating conditions in quantities sufficient to produce explosive or ignitable mixtures.	Group E Metal Dust Group F Coal Dust Group G Grain Dust
	Division 2	In which combustible dust due to abnormal operations may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.	
Class III	Division 1	In which easily ignitable fibers/flyings are handled, manufactured, or used.	Fibres
	Division 2	In which easily ignitable fibers/flyings are stored or handled other than in the process of manufacture.	

Marking to Standard IEC/EN 60079-0

Gas			
Electrical apparatus for explosive gas atmospheres (Equipment group II [chemicals])			
EPL	Standards IEC/EN	Type of protection	
	60079-0	General requirements	
Ga	60079-11	ia	Intrinsic safety
	60079-18	ma	Encapsulation
	60079-26		Equipment with equipment protection level (EPL) Ga
	60079-28	op is	Protection of equipment and transmission systems using optical radiation
Gb	60079-1	d	Flameproof enclosures
	60079-2	p, px, py	Pressurized enclosures
	60079-5	q	Powder filling
	60079-6	o	Oil immersion
	60079-7	e	Increased safety
	60079-11	ib	Intrinsic safety
	60079-18	mb	Encapsulation
Gc	60079-25		Intrinsically safe systems
	60079-27		Fieldbus intrinsically safe concept (FISCO)
	60079-28	op is op pr op sh	Protection of equipment and transmission systems using optical radiation
	60079-11	ic	Intrinsic safety
	60079-18	mc	Encapsulation
	60079-15	nA	Non sparking
	60079-15	nR	Restricted breathing enclosure
	60079-15	nL	Limited energy (only old edition)
	60079-15	nC	Equipment producing operational sparks
	60079-2	pz	Pressurized enclosures
60079-28	op is op pr op sh	Protection of equipment and transmission systems using optical radiation	

Ex de IIC T5 Gb

Equipment groups (Gas)	Temperature class	Ignition temperature of gas or vapour	Maximum admissible surface temperature for permanently hot surfaces	Zone	Equipment Protection Level (EPL)
IIA Aceton, ethane, Benzene, petrol, butane, propane, methane	T1	> 450 °C	440 °C	0	Ga
	T2	> 300 °C	290 °C	1	Gb and Ga
	T3	> 200 °C	195 °C	2	Gc, Gb and Ga
IIB Ethylene, town gas	T4	> 135 °C	130 °C		
	T5	> 100 °C	95 °C		
IIC Hydrogen, acetylene	T6	> 85 °C	80 °C		

Dust

Electrical equipment for use in areas with combustible dust (Equipment group III)			
EPL	Standards IEC/EN	Type of protection	
	60079-0	General requirements	
Da	60079-31	ta	Protection by enclosure
	60079-11	ia	Protection by intrinsic safety (iaD IEC/EN 61241-11)
	60079-18	ma	Protection by encapsulation
Db	60079-31	tb	Protection by enclosure
	60079-11	ib	Protection by intrinsic safety (ibD IEC/EN 61241-11)
	60079-18	mb	Protection by encapsulation
	61241-4	pD	Type of protection 'pD'
Dc	60079-31	tc	Protection by enclosure
	60079-11	ic	Protection by intrinsic safety
	60079-18	mc	Protection by encapsulation
61241-4	pD	Type of protection 'pD'	

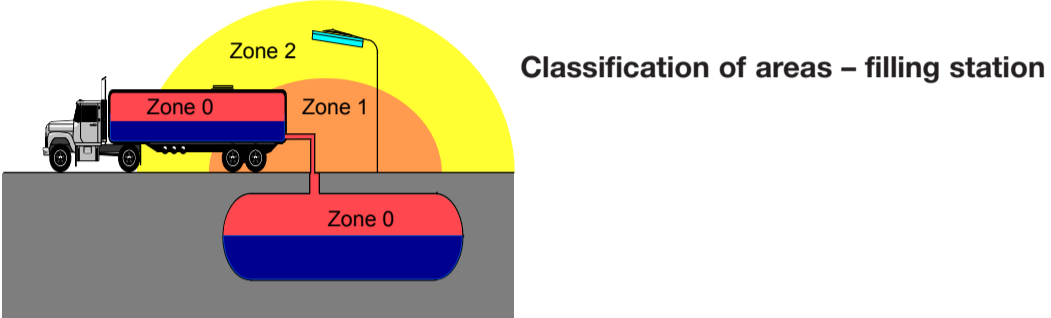
Ex tb IIC T95°C Db
Ex tb IIC T95°C

Equipment groups (Dust)	Zone	Equipment Protection Level (EPL)
IIA fibres	20	Da
IIB non-conductive dust	21	Db and Da
IIC conductive dust	22	Dc, Db and Da

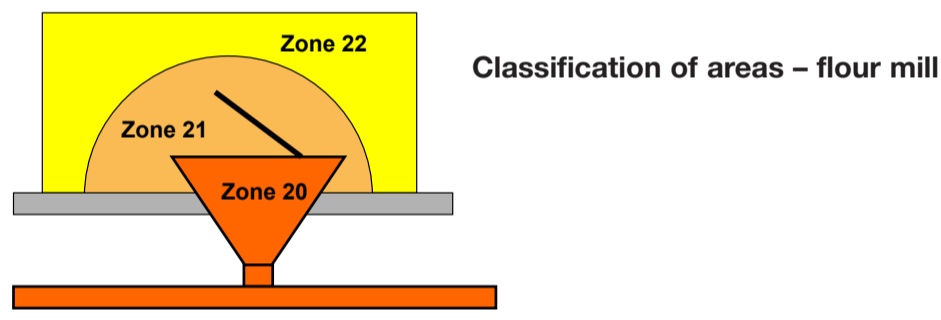
Zone Classification, Installation, Inspection, Maintenance, Repair and Overhaul

IEC/EN	
60079-10-1	Classification of areas – Explosive gas atmospheres
60079-10-2	Classification of areas – Combustible dust atmospheres
60079-14	Electrical installations design, selection and erection
60079-17	Electrical installations inspection and maintenance
60079-19	Equipment repair, overhaul and reclamation

Gas	
Zone 0	A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is present continuously or for long periods or frequently.
Zone 1	A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally.
Zone 2	A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is not likely to occur in normal operation, but if it does occur, will persist for a short period only (usually no longer than 2 hours).



Dust	
Zone 20	Area in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously or for long periods or frequently.
Zone 21	Area in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur, occasionally, in normal operation.
Zone 22	Area in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation, but if it does occur, will persist for a short period only.



Directive 1999/92/EC	IEC/EN	NEC 505	NEC 500
Zone 0	Zone 0	Zone 0	Division 1
Zone 1	Zone 1	Zone 1	
Zone 2	Zone 2	Zone 2	Division 2

thuba Ltd. CH-4015 Basel Switzerland

CE 0102 Ex II (2) G

[Ex ib Gb] IIC

PTB 08 ATEX 2016

Type IF 05

Number 2122.2009

Associated apparatus
must not be installed in potentially explosive atmospheres (no temperature class!)

Examples
- Transmitter power pack
- Disconnect amplifiers
- Zener barriers

Non-electrical equipment for use in potentially explosive atmospheres		
Europe	Code	Type of protection
EN 13463-1		Basic method and requirements
EN 13463-2	fr	Protection by flow restricting enclosure
EN 13463-3	d	Protection by flameproof enclosure
EN 13463-5	c	Protection by constructional safety
EN 13463-6	b	Protection by control of ignition source
EN 13463-7	p	Protection by pressurized enclosure
EN 13463-8	k	Protection by liquid immersion

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Electrostatic Charges

Gas (extract IEC/EN 60079-0)

The requirements regarding electrostatic charges must be met with one of the following measures:
a) by suitable selection of the material to keep the surface resistance of the enclosure from exceeding 1 GΩ (tested according IEC/EN 60079-0, part 26.13)
b) by limitation of the surface area of enclosures and enclosure parts of plastics (projected in any direction), the layer thickness of plastic sheets, and the width or diameter of long insulating parts.

Category	EPL	Surfaces [mm²]		
		IIA	IIB	IIC
1 G	Ga	5000	2500	400
2 G	Gb	10000	10000	2000
3 G	Gc	10000	10000	2000

Table 1: Limitation of the surfaces

Category	EPL	Layer thickness [mm]		
		IIA	IIB	IIC
1 G	Ga	2	2	0.2
2 G	Gb	2	2	0.2
3 G	Gc	2	2	0.2

Table 2: Maximum admissible layer thicknesses

Category	EPL	Width or diameter [mm]		
		IIA	IIB	IIC
1 G	Ga	3	3	1
2 G	Gb	30	30	20
3 G	Gc	30	30	20

Table 3: Maximum admissible width or diameter of long insulating parts

Dust (extract IEC/EN 60079-0)

Electrostatic charging of enclosures or enclosure parts of plastics must be limited. Equipment must be designed so that, under normal operating conditions, the danger of ignition as a result of brush discharges will be avoided.

- This can be achieved by using plastics that have at least one of the following characteristics:
- Surface resistance < 10⁹ Ohm (resistance to electrostatic discharge to earth through an insulating material or along its surface; tested according IEC/EN 60079-0, part 26.13)
 - Breakdown voltage ≤ 4 kV (measured through the thickness of the insulating material with the method described in IEC/EN 60243-1)
 - Layer thickness of external insulation on metal parts ≥ 8 mm. (External plastic layers of 8 mm or more on metal parts such as measurement probes or the like make propagating brush discharges unlikely to occur. Expected wear under normal usage should be taken into account in assessing the minimum layer thickness of the insulation.)

Resistance to impact

IEC/EN 60079-0 (does not apply to mines)

0.7 m*	(0.4 m² marked with the symbol 'X') - guards, protective covers, ventilator hoods, cable entries - enclosures (metal or plastic, e.g. terminal boxes, control boxes, membrane keyboards)
0.4 m*	(0.2 m² marked with the symbol 'X') - Light-transmitting parts without guards (sight glasses, displays, operator panels, monitor screens, protective covers)
0.2 m*	(0.1 m² marked with the symbol 'X') - Light-transmitting parts with guards (sight glasses, displays, operator panels, monitor screens, protective covers) Guard having individual openings from 625 mm² to 2500 mm² (tested without guard).

* drop height h with a mass of 1 kg

The test must be carried out at an ambient temperature of (20±5) °C, except where the material data indicate a reduction of the impact strength at lower temperatures within the prescribed ambient temperature range. In this case the test must be carried out between 5 K and 10 K below the lowest temperature of the prescribed range.

IP Degree of Protection

IEC/EN 60529

	First numeral (against penetration of solid foreign objects / prevention of access to hazardous parts)	Second numeral (against penetration of water with harmful effects)
0	not protected	not protected
1	≥ 50.0 mm diameter / back of hand	vertically falling water drops
2	≥ 12.5 mm diameter / finger	water drops (enclosure tilted 15°)
3	≥ 2.5 mm diameter / tool	spraying water
4	≥ 1.0 mm diameter / wire	splashing water
5	dust-protected / wire	water jets
6	dust-tight / wire	powerful water jets
7		temporary immersion in water
8		continuous immersion in water

Example: IP 54 dust-protected / protected against splashing water

