

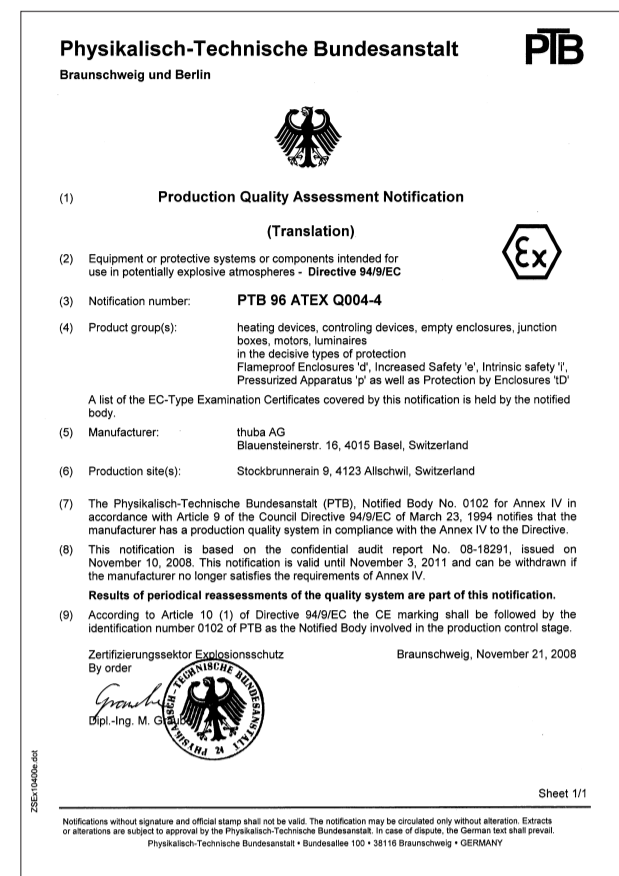
## Marking to Directive 94/9/EC (ATEX 95)



CE 0102 Ex II 2 GD

Number of the notified body (responsible for quality assurance)
0102 Physikalisch-Technische Bundesanstalt PTB, Germany
0158 DEKRA EXAM GmbH, Germany
0032 TÜV CERT GmbH, Germany
0637 IBExU, Institut für Sicherheitstechnik, Germany
0344 Dekra Certification B.V., Netherlands
0081 LCIE Laboratoire Central des Industries Electriques, France
0080 INERIS, France
0600 EECES Electrical Equipment Certification Service, Great Britain
0518 SCS Sira Certification Services, Great Britain
0163 LOM, Spain
0470 NEMKO, Norway
0434 Det Norske Veritas AS, Norway
0539 UI International DEMKO, Denmark
1258 Electrosuisse SEV, Switzerland

**Category** Gas (G) Dust (D)  
**Group II** Explosive atmospheres (other than mines)  
**Group I** Mines susceptible to fire/damp



### 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"> <li>- either, in the event of failure of one means of protection, at least an independent second means provides the requisite level of protection,</li> <li>- or the requisite level of protection is assured in the event of two faults occurring independently of each other.</li> </ul>
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	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 A Acetylene Group B Hydrogen Group C Ethylene Group D Propane
	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	Division1	In which easily ignitable fibers/flyings are handled, manufactured, or used. Fibres
	Division2	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



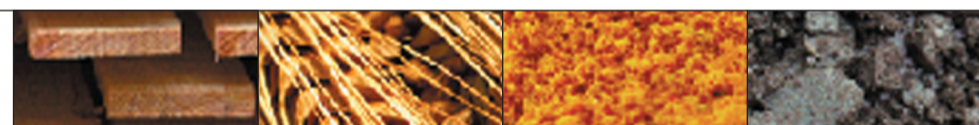
### Electrical apparatus for explosive gas atmospheres (Equipment group II [chemicals])

EPL	Standards IEC/EN	Type of protection
60079-0		General requirements
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
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
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
IIB Ethylene, town gas	T2	> 300 °C	290 °C	1	Gb and Ga
	T3	> 200 °C	195 °C	2	Gc, Gb and Ga
IIC Hydrogen, acetylene	T4	> 135 °C	130 °C		
	T5	> 100 °C	95 °C		
	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
60079-31	ta	Protection by enclosure
60079-11	ia	Protection by intrinsic safety (iaD IEC/EN 61241-11)
60079-18	ma	Protection by encapsulation
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'
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'

Surface temperature max.

Ex tb IIC T95°C Db  
 Ex tb IIC T95°C

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

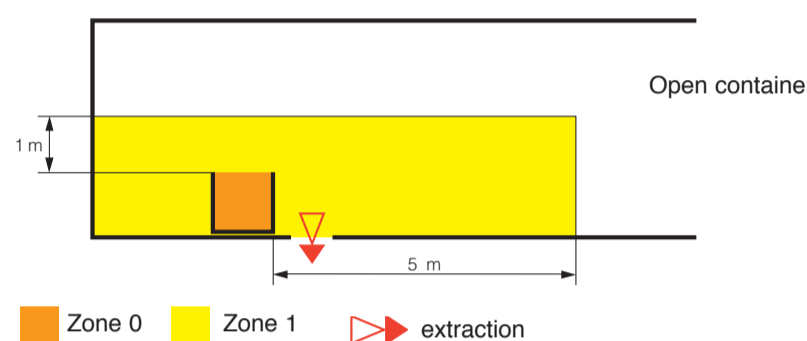
## Zone Classification, Installation, Inspection, Maintenance, Repair and Overhaul

IEC/EN	Description
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	Description
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).

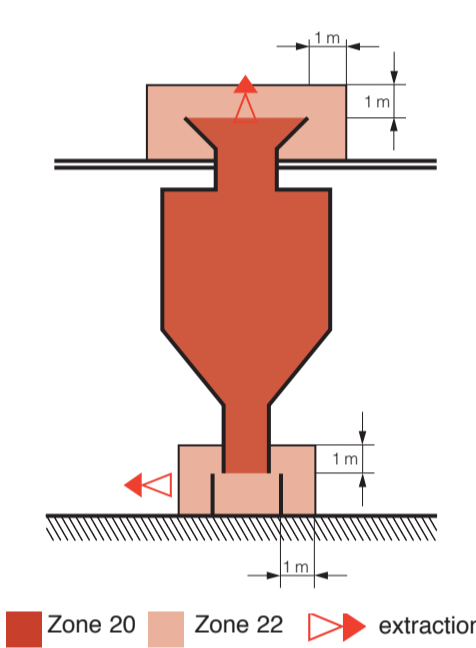
### Classification of areas

Filling (e.g. filling station, transfer by pumping)  
 Mixing installation (e.g. stirring, mixing)



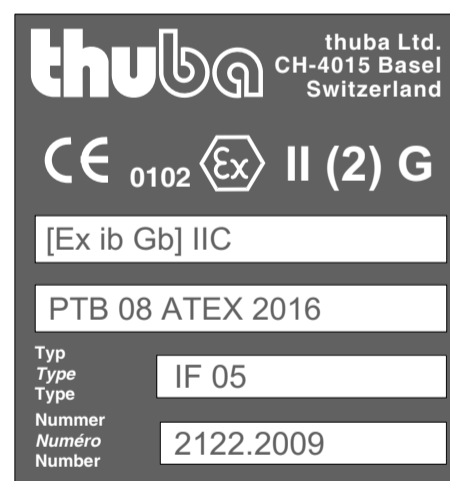
### Classification of areas

Filling (e.g. filling openings) and emptying (e.g. bagging stations) without deposits



Dust	Description
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



### 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	p	Protection by control of ignition source
EN 13463-7	b	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:

- 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)
- 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 < 10<sup>9</sup> 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 m* 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 m* marked with the symbol 'X') - Light-transmitting parts without guards (sight glasses, displays, operator panels, monitor screens, protective covers)
0.2 m*	(0.1 m* 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
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

