



Subject

- The directive "94/9/EC of the European parliament and the council of 23 March 1994" more commonly referred to as the "ATEX directive".
The name of the Directive comes from the French **AT**mospheres **EX**plosibles.
- Hazard Zone Classification
- Construction standards for zone 20 and 22

ATEX Directive

Objective of the directive

The ATEX Directive has the primary objective of creating a single European market in goods and services and thereby provides producers and consumers economic benefits.

The effect of the Directive has been to introduce identical requirements for the safety of equipment for use in explosive atmospheres in every country within the European Union.

The Directive is of the so called "new method" stating essential safety and health requirements, while the technical requirements are to be found in the relevant standards and these are in general harmonised European standards.

Implementation dates

The Directive came fully into force on 1 March 1996. During the transitional period which ends on 30 June 2003, manufacturers have continued to sell equipment which meets the pre-existing national rules, but from 1 July 2003, all previous national and European legislation are superseded and equipment within the scope of the Directive must carry the CE mark and comply with the directive's requirements.

Scope of the directive

The Directive applies to all equipment, which will or may be used in an explosive atmosphere. Both electrical and mechanical equipment is included. It also applies to protective systems intended to prevent propagation of an explosion.

An explosive atmosphere is defined as a "mixture with air, under atmospheric conditions, of flammable substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture".

The directive specifically does not define atmospheric conditions. However, guidance from the Commission indicates that "a surrounding temperature range of -20°C to 60°C and a range of pressure between 0.8 bar and 1.1 bar may be appropriate as a basis for design and intended use of products".

It's clear from the definition of an explosive atmosphere that the Directive is not intended to apply to locations, which contain flammable or explosive products at concentrations outside their explosive vapour limits. Therefore, the interior or (for instance) storage tanks or reaction vessels would not be covered. However, an explosive atmosphere within the definition given is very likely to be present during the filling or emptying of such vessels, and possibly at other stages in their life cycle (e.g. maintenance, cleaning, etc.). so in fact they will be included even though for most of the time they do not contain an explosive atmosphere.

It has to be noticed that the Directive for the first time applies to non-electrical equipment and to material to be used in an environment where there is a risk of explosion due to dust.

Comparison between old and new approach

Old Approach and Directive 76/117/EEC

Objective

- Harmonisation of the single market within Europe
- Same standards for design, construction and testing

Drawbacks

- Only national standards for the installation
- Possibility for national solos
- Binding standards for design and construction
- Impediment of technical progress and improvement
- Directive on electrical equipment for use in gas atmospheres
- No consideration of non-electrical equipment and dust atmospheres

New Approach and Directive 94/9/EC (ATEX Directive)

Objective

- Removal of obstacles and difficulties related to placing on the market and free movement of products within the European Union
- Ensure high level of explosion protection
- Total harmonisation - Deletion of existing different national and European legislation covering the same subjects
- Laying down of Essential Health and Safety Requirements

Advantages

- Possibility for new, intelligent explosion protection concepts
- Technical expression and details of relevant requirements in harmonised CEN/CENELEC Standards to obtain state of the art regarding essential requirements
- Presumption of conformity to essential health and safety requirements of directive
- No need of national testing and certification
- Harmonised marking of products, CE marking
- Directive on non-electrical equipment and dust atmospheres

Hazard Location Classification

Definition of Groups and Categories of Equipment (new approach and directive 94/9/EC)

Group I (mining)

comprise equipment intended for use in underground parts of mines, endangered by firedamp and/or combustible dust

- **Category M1**
- **Category M2**

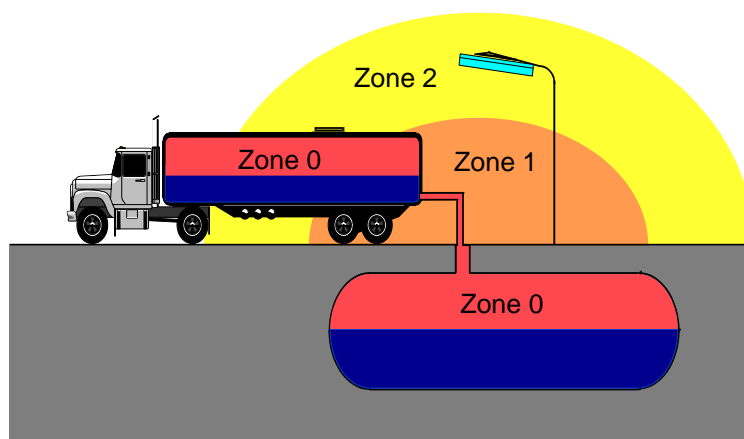
Group II (surface)

comprises equipment intended for use in other places likely to become endangered by explosive atmospheres

- **Category 1**
- **Category 2**
- **Category 3**

Examples of zone classification (old approach)

Explosive atmosphere	Continuous presence	Intermittent presence (normal operation conditions)	Occasional presence (abnormal operation)
IEC (international)	Zone 0 (gas) Zone 20 (dust)	Zone 1 (gas) Zone 21 (dust)	Zone 2 (gas) Zone 22 (dust)
Europe	Zone 0 (gas)	Zone 1 (gas)	Zone 2 (gas)
Canada (CEC) USA (NEC)	Cl. I Div. I (gas) Cl. II Div. I (dust) Cl. III Div. I (fibres)	Cl. I Div. II (gas) Cl. II Div. II (dust) Cl. III Div. II (fibres)	Cl. I Div. 2 (gas) Cl. II Div. 2 (dust) Cl. III Div. 2 (fibres)



Classification of Equipment and Components

Group I			
	Category M1		Category M2
Mining	functional in Ex-atmosphere (I M1)		de-energised in Ex-atmosphere (I M2)
Group II			
	Category 1	Category 2	Category 3
Gas-Ex	Zone 0 (II 1 G)	Zone 1 (II 2 G)	Zone 2 (II 3 G)
Dust-Ex	Zone 20 (II 1 D)	Zone 21 (II 2 D)	Zone 22 (II 3 D)

	Presence of Explosive Atmosphere	No Potential Ignition Source at	Necessity for Certification	Equipment Category to Directive 94/9/EC
Zone 0 Zone 20	continuously or for long periods or frequently	normal operation and failure of one means of protection or two independent faults	yes	Category 1
Zone 1 Zone 21	occasionally	Normal operation and frequently occurring disturbances	yes	Category 2
Zone 2 Zone 22	unlikely to occur <u>and</u> for short periods only	normal operation	no (Manufacturer's Declaration)	Category 3

Construction Standards

Category 3 gas equipment (Zone 2)

The harmonised construction standard for zone 2 equipment is

EN 50021: Type of protection " n", reading:

" Type of protection applied to electrical apparatus such that, in **normal operation** and in certain abnormal conditions specified by this standard, it is not capable of igniting a surrounding explosive atmosphere "

Methods of Protection acc. to EN 50 021:

EEx nA	Non-sparking apparatus <ul style="list-style-type: none"> - Terminal box, - Fuses, - Plugs and Sockets - Instruments & Low Power Apparatus, - Cells and Batteries - Transformer
EEx nC	apparatus with protected contacts <ul style="list-style-type: none"> - enclosed-break device - non-incendive component - hermetically-sealed device - sealed device - encapsulated device
EEx nR	restricted breathing enclosure
EEx nL	energy-limited apparatus
EEx nP	simplified pressurisation

Category 1, 2 and 3 dust equipment (Zone 20, 21 and 22)

The harmonised construction standard for zone 20, 21 and 22 equipment is

EN 50281-1-1: Construction and testing

EN 50281-1-2: Selection, installation and maintenance.

This chapter will concentrate above category 3 (zone 22), where the standard reads:

“Equipment in this category is intended for use in areas in which explosive atmospheres caused by air/dust mixtures are unlikely to occur or, if they do occur, are likely to do so only infrequently and for short periods only”.

Category 3 apparatus must be marked II 3 D and are useable in zone 22 as long as the dust is non-conductive and the surface temperatures of the apparatus are reduced to a safe level.

Temperature limitations because of the presence of dust clouds

Maximum temperature of the apparatus:

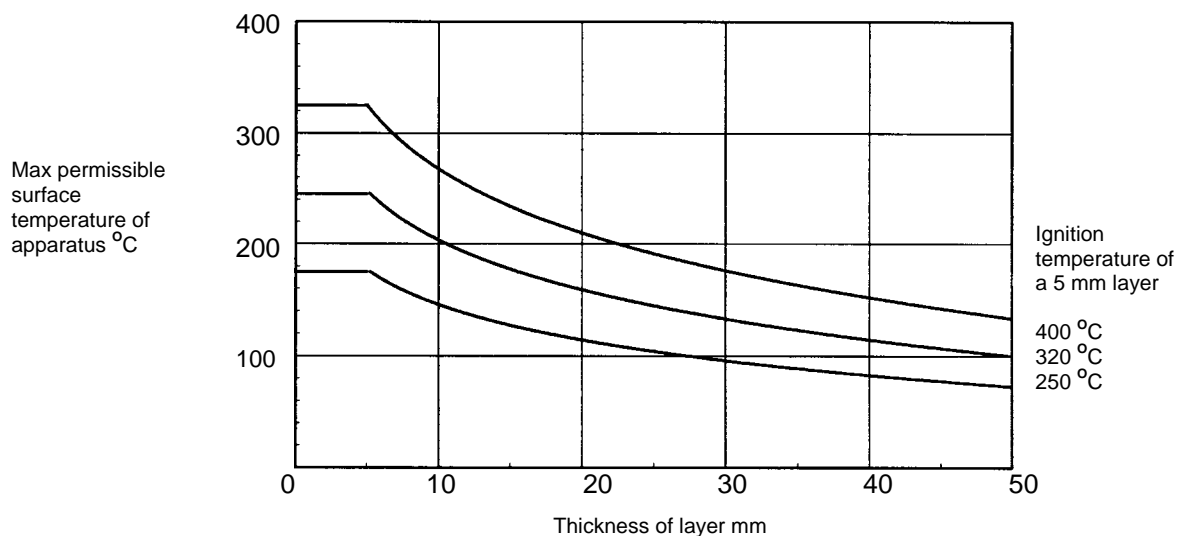
$T_{MAX} = 2/3 T_{CI}$, where T_{CI} is the ignition temperature of the cloud of dust

Temperature limitations because of the presence of dust layers

Maximum temperature of the apparatus:

$T_{MAX} = T_{5mm} - 75^{\circ}K$, where T_{5mm} is the ignition temperature of the layer of dust

Dust layers between 5 and 50 mm

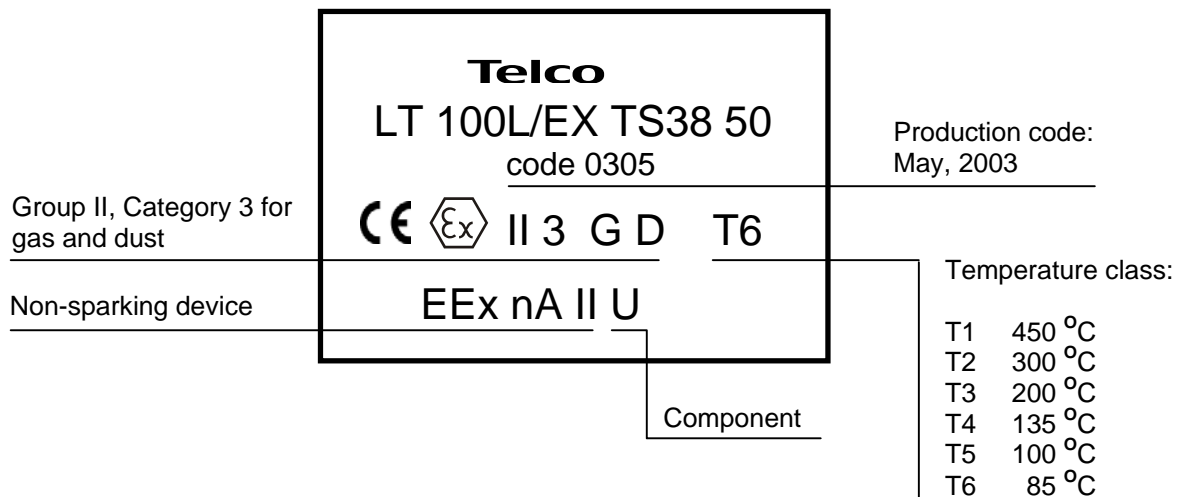


Marking

Example of marking for:

Component, Group II, Category 3 for gas and dust

Temperature class T6, non-sparking device



Documentation

- Declaration of conformity
- Translation of instruction manuals for putting into service into all languages of country where used by manufacturer or authorised representative
- Maintenance instructions for use by specialist personnel in a single Community language
- Sales literature not in contradiction to the instructions with regard to safety aspects

Present Telco Possibilities

Remote sensors

Some remote sensors with cable connection (as e.g. LT / LR 100 AP38 15) will be available in ex-versions, marked II 3 G, D for use in zone 2 and zone 22. The sensors are considered as components and must only be used in connection with the appropriate controller units, which have to be placed outside the hazardous area or in approved enclosures. The sensors diverge from standard units in marking, user manuals (must be in the local language), declaration of conformity and excessive quality control and documentation in the manufacturing process.

Self-contained sensors

Some sensors will be available in cable connection types, e.g. from series SM 6000 and SM 8000 in dc power supply versions. They will be marked II 3 G, D for use in zone 2 and zone 22. . The sensors diverge from standard units in marking, user manuals (must be in the national language), declaration of conformity and excessive quality control and documentation in the manufacturing process.

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