

Electrical Data / Hazardous Area Classifications

ATEX Directive 94/9/EC

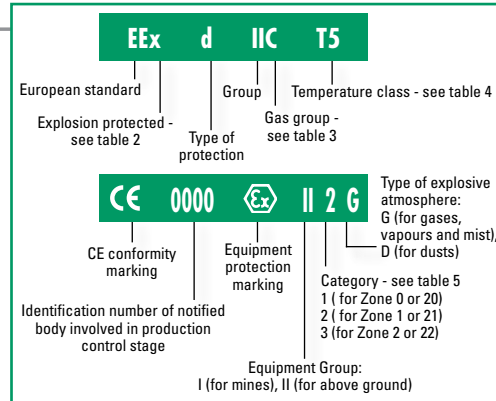
Since 1st July 2003 the ATEX Directive 94/9/EC has required equipment and protective systems that are for use in potentially explosive atmospheres, to conform to specific safety standards. The directive is applicable to all countries within the EU.

Equipment Marking

The following is a guide only to the identification markings on ATEX marked equipment and protective systems.

Determining the suitability of ATEX marked equipment and safety systems is the responsibility of the user.

EU Directive 94/9/EC from July 1, 2003 — Table 1



National Electrical Code (NEC) Hazardous Area Classifications

CLASS I: Areas where flammable gases or vapors may be present in the air in sufficient quantities to be explosive

- Group A:** Atmospheres containing acetylene
- Group B:** Atmospheres such as butadiene, ethylene oxide, propylene oxide, acrolein, or hydrogen (or gases or vapors equivalent in hazard to hydrogen, such as manufactured gas)
- Group C:** Atmospheres such as cyclopropane, ethyl ether, or ethylene (or gas or vapors of equivalent hazard)
- Group D:** Atmospheres such as acetone, alcohol, ammonia, benzene, benzol, butane, gasoline, hexane, lacquer solvent vapors, naphtha, natural gas, propane, or gas or vapors of equivalent hazard

CLASS II: Areas made hazardous by the presence of combustible dust

- Group E:** Atmospheres containing combustible
 - 1) metal dusts, regardless of resistivity
 - 2) dust of similarly hazardous characteristics having a resistivity less than 100 kΩ-cm
 - 3) electrically conductive dusts
- Group F:** Atmospheres containing combustible
 - 1) carbon black, charcoal, or coke dusts having more than 8% total volatile material
 - 2) dusts so sensitized that they present an explosion hazard, and dusts having a resistivity greater than 100 Ω-cm but less than or equal to 1 x 10⁸ Ω-cm

- Group G:** Atmospheres containing combustible
 - 1) dust having resistivity equal to or greater than 100 kΩ-cm
 - 2) electrically nonconductive dusts

CLASS III: Areas made hazardous by the presence of easily ignitable fibers or dust, but which are not likely to be suspended in the air in sufficient quantities to ignite

Division 1: Atmospheres where hazardous concentrations exist continuously, intermittently, or periodically under normal operating conditions

Division 2: Atmospheres where hazardous concentrations exist only in case of accidental rupture or breakdown of equipment

EXPLOSION-PROOF: Enclosures or housings are designed to withstand internal explosions and prevent the spread of fire to the outside.

INTRINSICALLY SAFE: Systems in which electrical energy in the circuits is not present at levels that would ignite a flammable mixture of a gas and air.

Methods of Protection — Table 2

Method of protection	Marking	Protection principle
Electrical equipment for gases, vapours and mists according to CENELEC		
Flameproof enclosure	EEx d	Contain the explosion and prevent flame propagation
Increased safety	EEx e	No arcs, sparks, or hot surfaces
Nonsparking	EEx n	No arcs, sparks, or hot surfaces
Intrinsic safety	EEx i	Limit the energy of the spark and surface temperature
Oil immersion	EEx o	Keep the ignition source constantly immersed in oil
Pressurised enclosure	EEx p	A protective gas contains the ignition source
Sand filling	EEx q	Fine ground filling surrounds the ignition source and therefore, an arc from inside of the housing cannot ignite the surrounding combustible atmosphere

Classification of Gases and Dusts per CENELEC/IEC — Table 3

Gas group	Temperature class					
	T1	T2	T3	T4	T5	T6
I	Methane	—	—	—	—	—
IIA	Acetone Methane Ethane Propane	Ethyl alcohol Cyclohexane n-butane n-butyl alcohol	Diesel fuel Aircraft fuel Fuel oil n-hexane Heptane	Acetaldehyde	—	—
IIB	Coal (lighting) gas Acrylonitrile	Ethylene Ethylene oxide	Ethylene glycol Hydrogen sulphide	Ethyl methyl ether	—	—
IIC	Hydrogen	Ethine (Acetylene)	—	—	—	Carbon disulfide

Temperature Classification — Table 4

CENELEC/IEC (Group II) Class	Max surface temperature	Comments
T1	450°C (842°F)	Temperature relates to all parts of equipment that can come into contact with the potentially explosive atmosphere
T2	300°C (572°F)	
T3	200°C (392°F)	
T4	135°C (275°F)	
T5	100°C (212°F)	
T6	85°C (185°F)	
Tx	Maximum surface temperature not defined	Assessment of equipment temperature class is the responsibility of the user

Example equipment marking:



ATEX Category 2 (gas) equipment designated for installation in Zone 1. Protection by flameproof enclosure, suitable for hydrogen atmosphere with maximum equipment surface temperature of 100°C.

Equipment Groups I and II: Categories M1, M2, 1, 2, and 3 — Table 5

Group I Mines: methane and/or combustible dusts		Group II Above ground: potentially explosive atmospheres or gas/air or dust/air mixtures, mist or vapours					
Category M		Category 1		Category 2		Category 3	
1	2	G (Gas) (Zone 0)	D (Dust) (Zone 20)	G (Gas) (Zone 1)	D (Dust) (Zone 21)	G (Gas) (Zone 2)	D (Dust) (Zone 22)
Equipment which guarantees a very high degree of safety. Operation guaranteed in case of errors.	Equipment which guarantees a very high degree of safety. Switching off possible if potentially explosive atmosphere occurs.	For equipment which guarantees a very high degree of safety. Intended for cases where potentially explosive atmospheres are often or constantly to be expected.		For equipment which guarantees a high degree of safety. Intended for cases where a potentially explosive atmosphere is to be expected.		For equipment which guarantees a standard degree of safety. Intended for cases where a potentially explosive atmosphere can be expected only rarely, and then, only for a short time.	
Very high protection level	High protection level	Very high protection level		High protection level		Normal	