ATEX/IECEx Markings Explained

Technical Information Sheet

To comply with ATEX/IECEx regulations, all equipment and protective systems that are used in hazardous areas must be marked legibly and indelibly with a specific set of letters/numbers. Together, these letters/numbers specify the exact criteria that a product meets in relation to those ATEX/IECEx regulations, and so determines the type of environments that they are safe to operate in.

LCM Systems Certificate Markings

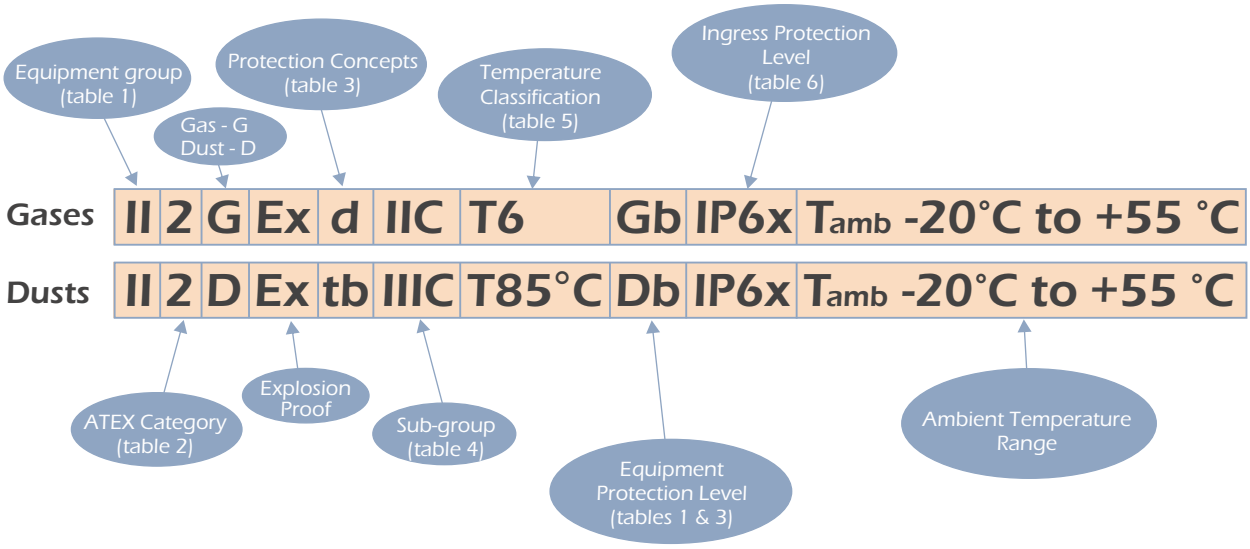

Table 1 - Equipment Groups

There are two equipment groups - Group I, which concerns mines and is very restrictive due to the highly volatile methane gas and dusts present, and Group II, which relates to all other above ground industries.

Equipment Groups

Equipment Group	Equipment Category (ATEX)	Equipment Protection Level		Atmosphere Type	Level of Ignition Protection	Required Protection Performance & Operation
		Gas	Dust			
I	MI	Ma	Ma	Methane & Dust	Very High	Two faults, remain energised & functioning
I	M2	Mb	Mb	Methane & Dust	High	Severe normal operation, de-energise in explosive atmosphere
II	1	Ga	Da	Gas, Vapour, Mist, Dust	Very High	Two faults
II	2	Gb	Db	Gas, Vapour, Mist, Dust	High	One fault
II	3	Gc	Dc	Gas, Vapour, Mist, Dust	Low	Normal operation

Table 2 - ATEX Category

There are three area category types, with Category 1 requiring a very high level of protection and defined as an area having a permanent or prolonged risk of explosions (Zone 0), Category 2 which requires a high level of protection and has a frequent risk of an explosive mix being present in the air (Zone 1), and Category 3, specified as requiring a normal level of protection with a small chance of an explosive mix forming (Zone 2).

Area Classification

Equipment Category	Definition	Zone	
		Gases & Vapours	Dusts
Category 1	An area where an explosive atmosphere is present continuously or for long periods (over 1000 hours per year or >10% of the time)	Zone 0	Zone 20
Category 2	An area where an explosive atmosphere is likely to occur in normal operation (10 - 1000 hours per year or 0.1 to 10% of the time)	Zone 1	Zone 21
Category 3	An area where an explosive atmosphere is not likely to occur in normal operation (under 10 hours per year or 0 to 0.1% of the time)	Zone 2	Zone 22

Note: Category 2 certification also covers the lower category 3

Table 3 - Protection Concepts

Protection concepts refer to the means of ensuring a piece of equipment being used in a hazardous area does not cause an explosion. There are four basic methods utilised to avoid uncontrolled ignitions - exclusion of the flammable substance, prevention of component sparks or hot surfaces, explosion quenching and energy limitation. By applying individually or in combination, the protection concepts listed below are applied to a product in order to achieve this.

Protection Concepts - Electrical Equipment for gases, vapours & mists (G)

Type of Protection	Symbol	Equipment Protection Level	Indicative Zones	Standard (EN/IEC)	Basic Concept of Protection
Optical radiation	Op pr Op sh OP is	Gb Ga Ga	1, 2 0, 1, 2 0, 1, 2	60079-28 60079-28 60029-78	Protected by shutdown, enclosure or inherently safe
Increased safety type 'n' (non-sparking)	e nA	Gb Gc	1, 2 2	60079-7 60079-15	No sparking parts or hot surfaces
Flameproof	d	Gb	1, 2	60079-1	Contains the pressure, quench the flame
Type 'n' (enclosed break)	nC	Gc	2	60079-15	Contains the pressure, quench the flame
Quartz/ Sand filled	q	Gb	1, 2	60079-5	Quench ignition

Table 3 - Protection Concepts (continued)

Type of Protection	Symbol	Equipment Protection Level	Indicative Zones	Standard (EN/IEC)	Basic Concept of Protection
Intrinsic safety	ia ib ic	Ga Gb Gc	0, 1, 2 1, 2 2	60079-11	Limit the potential ignition energy and surface temperatures
Pressurised	px py pz	Gb Gb Gc	1, 2 1, 2 2	60079-2	Keeps the flammable gas out
Type 'n' (sealing & hermetic sealing) Type 'n' (restricted breathing)	nC nR	Gc Gc	2 2	60079-15	
Encapsulation	ma mb mc	Ga Gb Gc	0, 1, 2 1, 2 2	60079-18	
Oil immersion	o	Gb	1, 2	60079-6	

Protection Concepts - Electrical Equipment for dusts (D)

Type of Protection	Symbol	Equipment Protection Level	Indicative Zones	Standard (EN/IEC)	Basic Concept of Protection
Enclosure	ta tb tc	Da Db Dc	20 21 22	60079-31	Dust tight enclosure, limited surface temperature
Intrinsic safety	ia ib ic	Da Db Dc	20 21 22	60079-11	Limit the potential ignition energy and surface temperatures. May add ingress requirements
Encapsulation	ma mb mc	Da Db Dc	20 21 22	60079-18	Keep the flammable dust out
Pressurised	pD	Db Dc	21 22	60079-4	Protection by pressurisation of enclosure

Note: tb (Zone 21) certification also covers the lower tc classification (Zone 22)

Table 4 - Gas Sub-divisions

The ATEX standard also has a classification for explosive gases and dusts, with Group I referring to methane gases and coal dust (mining), while Group IIA to IIC gases and Group IIIA and IIIC dusts (above ground industries) have been categorised according to their different igniting power, with IIA/IIIA being the least dangerous and having the highest ignition temperature and IIC/IIIC the most dangerous with the lowest ignition temperature.

Group Sub Divisions

Gas Sub Groups	Representative Gas	Dust Sub Groups	Dust Type
Group 1	Methane	Group 1	Coal Dust
Group IIA	Propane	Group IIIA	Flyings
Group IIB	Ethylene	Group IIIB	Non-conductive
Group IIC	Hydrogen/Acetylene	Group IIIC	Conductive

Note: Group IIC/Group IIIC certification is the highest possible, so also covers the groups above

Table 5 - Temperature Classification

Different substances may combust at different temperatures. The lower the combustion temperature is, the more dangerous the substance is. Therefore, each piece of equipment used in an explosive environment is classified according to the maximum surface temperature it generates. The maximum surface temperature of the equipment should always be well below the ignition temperature of the gases present.

Temperature Classification

Temperature class	Max Surface Temperature of Equipment °C	Ignition Temperatures of Flammable Substance °C
T1	450	>450
T2	300	>300 ≤450
	280	>280 ≤300
	260	>260 ≤280
	230	>230 ≤260
	215	>215 ≤230
T3	200	>200 ≤215
	180	>180 ≤200
	165	>165 ≤180
	160	>160 ≤165
T4	135	>135 ≤160
	120	>120 ≤135
T5	100	>100 ≤120
T6	85	>85 ≤100

Note: Temperature class 85°C certification is the highest possible, so also covers the classes above

Table 6 - Ingress Protection

This rating system (or IP code) is defined by the letters IP followed by two 'characteristic' numbers. The first number identifies the degree of protection against solid foreign objects and the second number refers to its protection against liquids.

Ingress Protection

Level	Protected Against	Solid Particle Ingress Protection (First Digit of Code)
0	-	No protection against contact and ingress of objects
1	>50 mm	Any large surface of the body, such as the back of a hand, but no protection against deliberate contact with a body part
2	>12.5 mm	Fingers or similar objects
3	>2.5 mm	Tools, thick wires etc.
4	> 1mm	Most wires, screws etc.
5	Dust protected	Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the safe operation of the equipment; complete protection against contact
6	Dust tight	No ingress of dust; complete protection against contact

Level	Protected Against	Liquid Ingress Protection (Second Digit of Code)
0	Not protected	Not necessary
1	Dripping water	Dripping water (vertically falling drops) shall have no harmful effect
2	Dripping water when tilted up to 15°C	Vertically dripping water shall have no harmful effect when the enclosure is tilted at an angle up to 15°C from its normal position
3	Spraying water	Water falling as a vertical spray at any angle up to 60°C from the vertical shall have no harmful effect
4	Splashing water	Water splashing against the enclosure from any direction shall have no harmful effect
5	Water jets	Water projected by a nozzle (6.3mm) against enclosure from any direction shall have no harmful effects
6	Powerful water jets	Water projected in powerful jets (12.5mm nozzle) against the enclosure from any direction shall have no harmful effects
7	Immersion up to 1 mtr	Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time (up to 1 metre of submersion)
8	Immersion beyond 1 mtr	The equipment is suitable for continuous immersion in water under condition which shall be specified by the manufacturer

Note: IP67 is the standard protection offered by LCM System, however, lower and higher protection is available

LCM Systems Ltd
Unit 15, Newport Business Park
Barry Way, Newport
Isle of Wight PO30 5GY UK
Tel: +44 (0)1983 249264
Fax: +44 (0)1983 249266
sales@lcmsystems.com
www.atexloadcell.com