ATEX Certification Definitions

Protection Concepts - Electrical

	Symbol	Typical IEC EPL	Typical Zone(s)	EN/IEC Standard	Basic concept of protection
General requirements			0,1,2	60079-0	
Optical Radiation	Op pr Op sh Op is	Gb Ga Ga	1,2 0,1,2 0,1,2	60079-28 60079-28 60079-28	Protected Optical Radiation Optical System with Interlock Intrinsically Safe Optical Radiation
Increased safety Type 'n' (non sparking)	e nA	Gb Gc	1,2 2	60079-7 60079-15	No arcs, sparks or hot surfaces. Enclosure IP54 or better
Flameproof / Explosion-Proof Type 'n' (enclosed break)	d nC	Gb Gc	1,2 2	60079-1 60079-15	Contain the explosion, quench the flame
Quartz/sand filled	q	Gb	1,2	60079-5	Quench the flame
Intrinsic safety Intrinsic safety Intrinsic safety	ia ib ic	Ga Gb Gc	0,1,2 1,2 2	60079-11 60079-11 60079-11	Limit the energy of sparks and surface temperatures
Pressurised Pressurised Pressurised	px py pz	Gb Gb Gc	1,2 1,2 2	60079-2 60079-2 60079-2	Keep the flammable gas out
Type 'n' (sealing & hermetic sealing) Type 'n' (restricted breathing)	nC nR	Gc Gc	2 2	60079-15	Keep the flammable gas out
Encapsulation Encapsulation Encapsulation	ma mb mc	Ga Gb Gc	0,1,2 1,2 2	60079-18 60079-18 60079-18	Keep flammable gas out
Oil immersion	o	Gb	1,2	60079-6	Keep the flammable gas out

Protection Concepts - Dust (electrical)

	Symbol	Typical IEC EPL	Typical Zone(s)	EN/IEC Standard	Basic concept of protection
Enclosure	ta tb tc		20,21,22	60079-31	Standard protection for dusts, rugged tight enclosure
Intrinsic safety	ia ib ic	Da Db Dc	20,21,22	60079-11	Similar to t, but with some relaxations if circuit inside is intrinsically safe
Encapsulation	ma mb mc		20,21,22	60079-18	Protection by encapsulation of incendive parts
Pressurised	pD	Db Dc	21,22,22	61241-4	Protection by pressurisation of enclosure

Protection Concepts - Non-electrical

	Symbol	Typical IEC EPL	Typical Zone(s)	EN/IEC Standard	Basic concept of protection
General	-	-	0,1,2 20,21,22	13463-1	Low potential energy
Flow restricted enclosure Flameproof / Explosion-proof enclosure	fr d	- -	2,22 1,2,21,22	13463-2 13463-3	Relies on tight seals, closely matched joints and tough enclosures to restrict the breathing of the enclosure
Constructional safety	c	-	0,1,2 20,21,22	13463-5	Ignition hazards eliminated by good engineering methods
Control of ignition sources	b	-	0,1,2 20,21,22	13463-6	Control equipment fitted to detect malfunctions
Pressurisation	p	-	1,2 21,22	60079-2 61241-4	Enclosure is purged and pressurised to prevent ignition sources from arising
Liquid immersion	k	-	0,1,2 20,21,22	13463-8	Enclosure uses liquid to prevent contact with explosive atmosphere

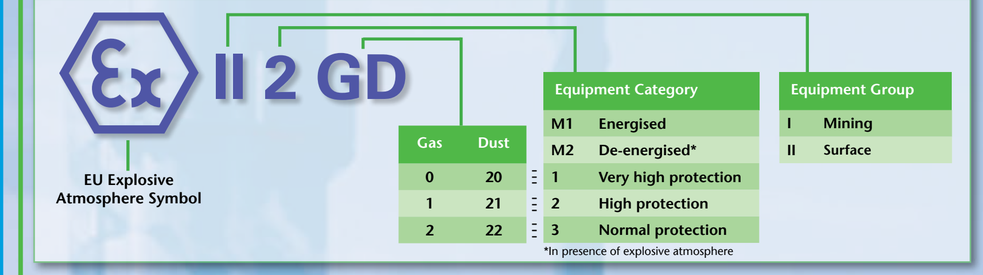
Gas Groups

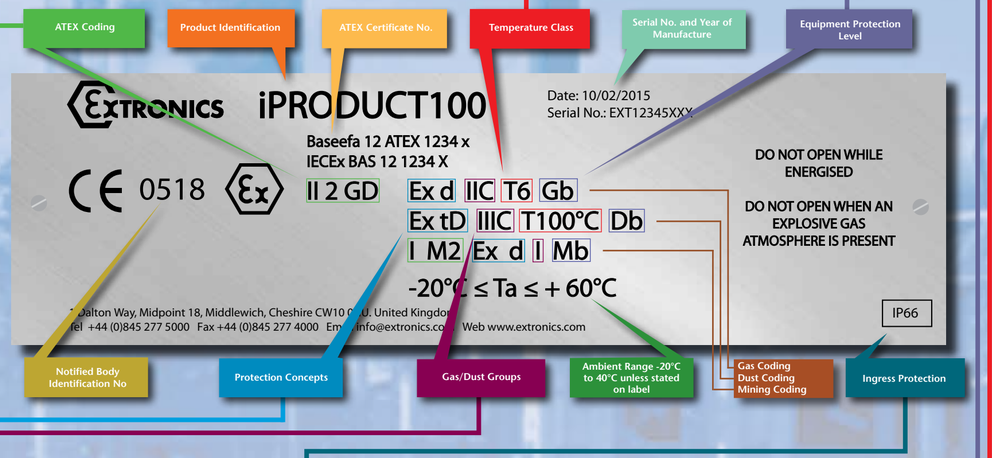
Gas Group	Gas Example
I	Methane (mining only)
IIA	Propane
IIB	Ethylene
IIC	Hydrogen

Dust Groups

Dust Group	Dust Example
IIIA	Combustible flyings
IIIB	Non-conductive dust
IIIC	Conductive dust

ATEX Coding





Ingress Protection

1st Numerical Protection against Solid Bodies		2nd Numerical Protection against Liquid	
0	No protection	0	No protection
1	Objects > 50mm	1	Vertically dripping water
2	Objects > 12mm	2	Drops of liquid (75° to 90°)
3	Objects > 2.5mm	3	Sprayed water
4	Objects > 1mm	4	Splashed water
5	Dust protected	5	Water jets
6	Dust-tight	6	Heavy seas
		7	Effects of immersion
		8	Indefinite immersion

Equipment Protection Level

Level	Zone
Ga	0
Gb	1
Gc	2
Da	20
Db	21
Dc	22
Ma	Energised*
Mb	De-energised*

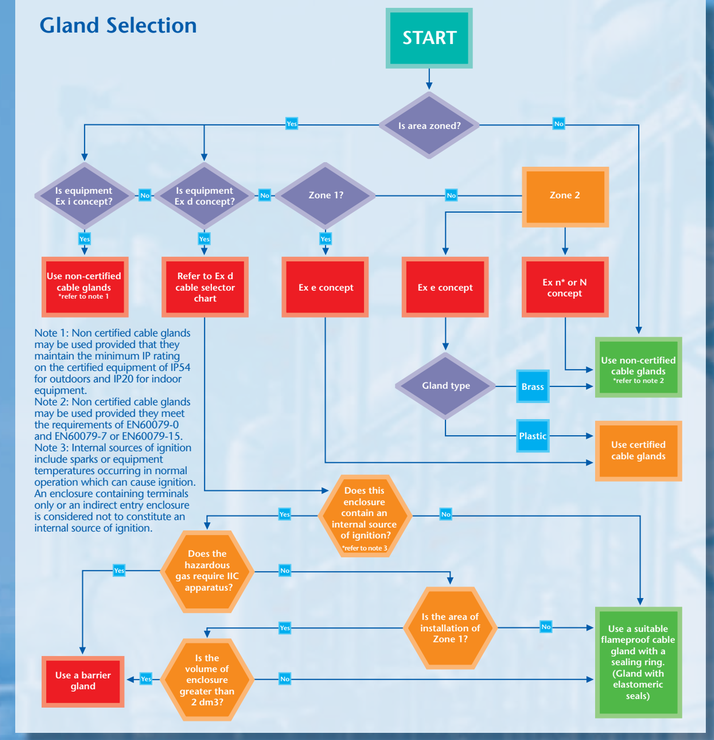
G = Gas D = Dust M = Mining
*In presence of explosive atmosphere

Temperature Class

T Class	Maximum Surface Temperature
T1	450°C
T2	300°C
T3	200°C
T4	135°C
T5	100°C
T6	85°C

Note: For Group I (CENELEC/IEC) applications, electrical apparatus has fixed temperature imits i.e., 150°C and 450°C

Gland Selection

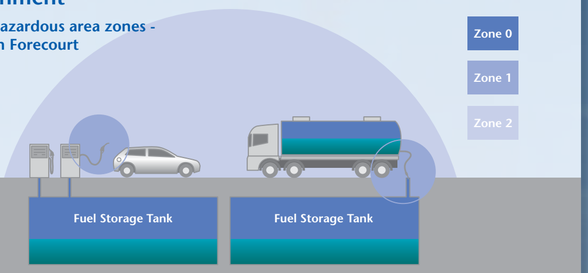


Zoning Definitions

Zones Gas	Zones Dust	Definitions
IEC 60079-10 0	IEC 60079-10 20	A place in which an explosive atmosphere is continually present
1	21	A place in which an explosive atmosphere is likely to occur in normal operation occasionally (10≤ x <1000)
2	22	A place in which an explosive atmosphere is not likely to occur in normal operation, but if it does only occurs for short periods (10>x)

Ex Environment

Example of hazardous area zones - Petrol Station Forecourt



Radio Frequency Sources

The threshold power of radio frequency (9kHz to 60GHz) for continuous transmissions and for pulsed transmissions whose pulse durations exceed the thermal initiation time shall not exceed the values shown in Table 4. Programmable or software control intended for setting by the user shall not be permitted.
For pulsed radar and other transmissions where the pulses are short compared with the thermal initiation time, the threshold energy values Z_{th} shall not exceed those given in Table 5.

Table 4 from EN 60079-0:2012 Radio Frequency Power Thresholds

Equipment for	Threshold Power (W)	Thermal Initiation Time (averaging period) (µS)
Group I	6.0	200
Group IIA	6.0	100
Group IIB	3.5	80
Group IIC	2.0	20
Group III	6.0	200

Table 5 from EN 60079-0:2012 Radio-frequency Energy Thresholds

Equipment for	Threshold Energy Z_{th} (µJ)
Group I	1500
Group IIA	950
Group IIB	250
Group IIC	50
Group III	1500

EXTRONICS

Wireless Vision Engineering Tracking

www.extronics.com

1 Dalton Way, Midpoint 18, Middlewich, Cheshire CW10 0HU. United Kingdom
Tel +44 (0)845 277 5000 Fax +44 (0)845 277 4000 Email info@extronics.com