



EXPLOSION PREVENTION TECHNIQUES : GASSES & VAPOURS

TECHNIQUE	EX CODE	BASIC CONCEPT OF PROTECTION	EPL	TYPICAL ZONES
Flameproof IEC/SANS 60079-1	Ex da Ex db Ex dc	Contains the explosion, quench flame	Ga or Ma Gb or Mb Gc	0, 1 & 2 1 & 2 2
Increased Safety IEC/SANS 60079-7	Ex eb Ex ec	No arcs, sparks or hot surfaces	Gb or Mb and Gc	1 & 2
Intrinsically Safe IEC/SANS 60079-11	Ex ia Ex ib Ex ic	Limit the energy of sparks and the surface temperature	Ga or Ma Gb or Mb and Gc	0, 1 & 2 1 & 2 2
Encapsulation IEC/SANS 60079-18	Ex ma Ex mb Ex mc	Keep the flammable gas out	Ga or Ma Gb or Mb and Gc	0, 1 & 2 1 & 2 2
Non-sparking (Ex nA, Ex nC, Ex nL* and Ex nR) *Incorporated into other standards IEC/SANS 60079-15	Ex "n"	No arcs, sparks or hot surfaces	Gc	2
Pressurisation IEC/SANS 60079-2	Ex pvb Ex pxb Ex pyb Ex pzc	Keep the flammable gas out	Gb or Gc Gb or Mb Gb Gc	1 & 2 1 & 2 1 & 2 2
Powder filling IEC/SANS 60079-5	Ex q	Quench the flame	Gb or Mb	1 & 2
Oil Immersion IEC/SANS 60079-6	Ex o	Keep the flammable gas out	Gb	1 & 2

EXPLOSION PREVENTION TECHNIQUES : DUSTS

TECHNIQUE	EX CODE	BASIC CONCEPT OF PROTECTION	EPL	TYPICAL ZONES
Enclosure IEC/SANS 60079-31	Ex ta Ex tb Ex tc	Standard protection for dusts, rugged tight enclosure	Da Db Dc	20 21 22

TRAINING AT EXPLOLABS

Explolabs offers a wide range of training courses in the field of explosion protection. The courses are aimed at staff from plants and mining industry, as well as at companies involved in the design, manufacture, and repair of explosion-protected apparatus.

Some of the courses offered includes:

- Introduction to Explosion Prevention
- Intrinsically Safe Design
- Hazardous Area Classifications
- Ex motors
- Explosion Prevention for Plant Staff
- Diesel engines & machines
- Intrinsically Loops
- Ex apparatus & assemblies

One of Explolabs' strengths are that courses can be customized to suit specific customer needs. Our courses are normally presented at our laboratory, however on-site training can be arranged for companies with a group of 5 or more. Virtual training can also be arranged.

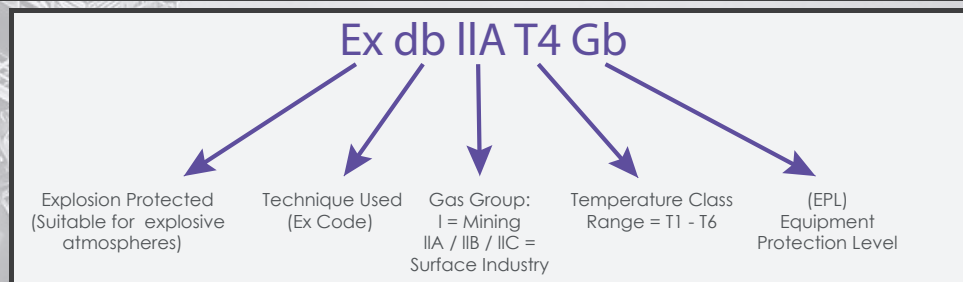
ENCLOSURE PROTECTION (FOR EQUIPMENT)

FIRST CHARACTERISTIC NUMERAL									
IP RATING	IP1X	IP2X	IP3X	IP4X	IP5X	IP6X			
DESCRIPTION	Objects ≥ 50mm	Objects ≥ 12.5mm	Objects ≥ 2.5mm	Objects ≥ 1.0mm	Dust test: Slight entry of dust	Dust test: No entry of dust			
SECOND CHARACTERISTIC NUMERAL									
IP RATING	IPX1	IPX2	IPX3	IPX4	IPX5	IPX6	IPX7	IPX8	IPX9
DESCRIPTION	Drip Box 1mm/min	Drip Box 3mm/min	Oscillating tube 60°	Oscillating tube 180°	Water jet 6.3mm nozzle	Water jet 12.5mm nozzle	Immersion tank	Immersion tank	Fan jet

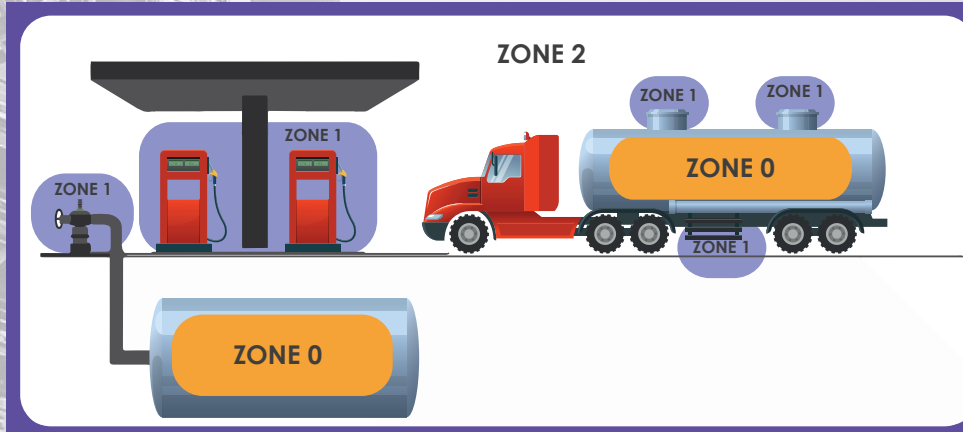
MATERIAL GROUPS / SUB GROUPS

ENVIRONMENT	GAS, VAPOUR OR DUST (SUB) DIVISION	PERMITTED EQUIPMENT GROUP
Underground Mines	I	I
Gas and Vapour, Surface	IIA	II, IIA, IIB, or IIC
	IIB	II, IIB, or IIC
	IIC	II or IIC
Dust, Surface	IIIA	IIIA, IIIB or IIIC
	IIIB	IIIB or IIIC
	IIIC	IIIC

EX RATINGS



CLASSIFICATION OF HAZARDOUS LOCATIONS



REGULATIONS

ARP 0108	Regulatory requirement for explosion protected apparatus
SANS 10108	Classification of hazardous areas and selection of equipment
SANS 10086-1 & -2	Use, inspection and maintenance of Ex equipment
SANS 10086-3	Repair of Ex equipment

EQUIPMENT PROTECTION LEVEL (EPL)

ENVIRONMENT CODE		LEVEL CODE		ZONE (TYPICAL)
Underground Mining	M	Very High Protection	a	Zone 0 / Zone 20
Gasses / Vapours	G	High Protection	b	Zone 1 / Zone 21
Surface Dusts	D	Normal Protection	c	Zone 2 / Zone 22

TEMPERATURE CLASS

UNDERGROUND COAL MINES (GROUP I)

≤150°C (T4) where gas and dust occur or 450°C where dust is removed regularly (such as on some mobile machines)

GASSES / VAPOURS (GROUP II)

TEMPERATURE CLASS REQUIRED BY THE AREA CLASSIFICATION	IGNITION TEMPERATURE OF GAS OR VAPOUR (°C)	MAXIMUM SURFACE TEMPERATURE OF EQUIPMENT (°C)	SUITABLE EQUIPMENT TEMPERATURE CLASS
T1	>450	≤450	T1 – T6
T2	>300	≤300	T2 – T6
T3	>200	≤200	T3 – T6
T4	>135	≤135	T4 – T6
T5	>100	≤100	T5 – T6
T6	>85	≤85	T6

DUSTS (GROUP III)

Ex tD PRACTICE A EX Id / Ex pD / Ex mD	SAFETY MARGIN	Ex tD PRACTICE B	SAFETY MARGIN
Dust clouds	Tmax ≤ 2/3 TCL	Dust clouds	Tmax ≤ 2/3 TCL
Dust Layers ≤5mm	Tmax ≤ 15 mm – 75 °C	Dust Layers ≤12mm	Tmax ≤ 12mm – 25 °C
Dust Layers >5-50mm	Tmax ≤ 15 mm – 75+ °C		
Dust Layers >50mm	Tmax ≤ TL – 75+ °C	Dust Layers >50mm	Tmax ≤ TL – 75+ °C

LOCAL INSPECTION AUTHORITY NUMBERS (I.A. CERTIFICATE NUMBERS)

EXAMPLE : MS-XPL/17.01234 X (OR U)

MS -	Mining and / or Surface use
XPL /	Laboratory Code
17.	Year of Certification
01234	Unique Number
X	Specific Condition of Use
U	Certified Component Only



South African Institute of Occupational Safety and Health
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