

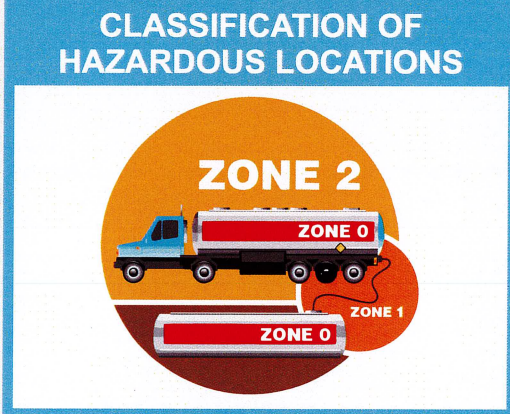


Mining And Surface Certification (Pty) Ltd



SERVICES

- Inspections (mine machines / Installations etc.)
- Ex training / Full spectrum of training and courses
- MASC Markscheme / Quality System Audits
- Test and Certification
- International certification & support (IECEX / ATEX / ANZEx)
- IA Certification
- Batch Testing
- Loop approval / Intrinsic Safety system approvals
- Area Classification / Hazardous Area Classification
- Certification Support / Products and Quality systems



TEMPERATURE CLASSIFICATION

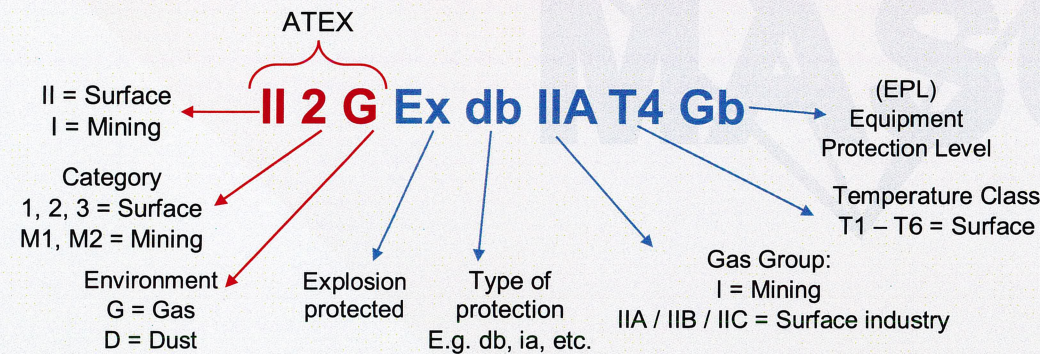
MINING		
Group I	Methane / Firedamp (537°C) Coal Dust (150°C)	
SURFACE INDUSTRY		
Classification	Ignition temperature of GAS / VAPOUR	Maximum applicable surface Temp of certified EQUIPMENT
T1	Ignition Temp. ≤ 450°C	300°C ≤ Surface temperature < 450°C
T2	300°C < Ignition Temp. < 450°C	200°C ≤ Surface temperature < 300°C
T3	200°C < Ignition Temp. < 300°C	135°C ≤ Surface temperature < 200°C
T4	135°C < Ignition Temp. < 200°C	100°C ≤ Surface temperature < 135°C
T5	100°C < Ignition Temp. < 135°C	85°C ≤ Surface temperature < 100°C
T6	85°C < Ignition Temp. < 100°C	Surface temperature < 85°C

GAS GROUPS

AREA	GROUP (GAS / VAPOUR) (SANS / IEC / ATEX)	Minimum Ignition Energy (MIE)	EXAMPLES
SURFACE	IIC	20µJ - 60µJ	Hydrogen, Acetylene
	IIB	60µJ - 180µJ	Ethylene
	IIA	180µJ and higher	Propane
MINING	I	200µJ	Firedamp/Methane and coal dust in mines

GAS GROUPS

AREA	SUBSTANCE	Zones (SANS / IEC / ATEX)	EPL Levels	Rule of Thumb	Examples
SURFACE	GASES AND VAPOURS	0 (ATEX Category 1)	Ga	Gas / Vapours atmosphere continuously present or for long periods in the explosive concentration (1000 Hrs. + per year)	Inside vessels and pipes. (Zone 0 is not found in open air)
		1 (ATEX Category 2)	Gb	Intermittently present during normal operations in the explosive concentration (10 to 1000 hrs. per year)	Typically small volumes around specific point / sources of release. Sample points regularly opened (e.g. once a day) inside enclosed spaces.
		2 (ATEX Category 3)	Gc	Gas / Vapour atmospheres present in the explosive concentration during abnormal circumstances (0.1 to 10 hrs. per year / 0.5 hr. per event)	80% of hazardous locations. Sample points irregularly opened (e.g. once in two weeks)
MINING		Coal Mine hazardous location. Typically 180m from working face, return airways and battery charging rooms.			
		<ul style="list-style-type: none"> Zone 1 area when the gas concentration does not exceed 1.4% methane / firedamp in air. (EPL = Mb) Zone 0 area when the gas concentration exceeds 1.4% methane / firedamp in air. (EPL = Ma) (Often 1.2%) Gas concentration in excess of 0.5% gas (methane / firedamp) in general body of air. (EPL = Mb) 			
		Hard Rock mine hazardous location: in excess of 0.5% gas (methane / firedamp) in general body of air. (EPL = Mb)			
		NB. Gases / vapours other than firedamp / methane that may be present are to be additionally considered.			



DESCRIPTION OF EX TECHNIQUES

NAME / STANDARDS (PRINCIPLE)	SYMBOL	ZONE	EXAMPLE	DESCRIPTION (TYPICAL)
FLAMEPROOF IEC/SANS 60079-0/1 (Containment)	d, db da	1, 2 0, 1, 2	Protection of switchgear motors, control electronics etc.	A robust enclosure with specifically designed joints to prevent the internal ignition transmitting to the outside gas / vapour
Increased Safety IEC/SANS 60079-0/7 (No sparking / limitation of hot surface temp.)	e, eb	1, 2	Luminaries, junction Boxes, connection facilities of motors and switches etc.	A technique with strict requirements for construction and limitation of surface temperature.
NON SPARKING IEC/SANS 60079-15 (No sparking / limitation of hot surface temp.)	N, n, nA, nC, etc.	2	Luminaries, junction boxes motors, electronics etc.	A technique with strict requirements for construction and limitation of surface temperature.
INTRINSIC SAFETY IEC/SANS 60079-0/11 (Energy limited sparking and limitation of surface temp)	ia ib ic	0, 1, 2 1, 2 2	Process control instrumentation, handheld equipment e.g. gas sensors, multi-meters etc.	A technique restricting the level of energy in circuits to below the ignition energy of the gas. It achieves this under defined faults in the electronics. Surface temperatures of components considered.
PRESSURIZATION IEC/SANS 60079-0/2 (Exclusion of gas from incandive components)	p, pX, pY, pZ	1, 2	Analyser houses Analyser panels	Gas / vapour excluded from enclosure when flammable gas surrounds enclosure. OR Continuous dilution of internal release of flammable gas / vapour to below LEL.
ENCAPSULATION IEC/SANS 60079-0/18 (Exclusion of gas from incandive components)	m ma mb mc	1, 2 0, 1, 2 1, 2 2	Mostly Electronic circuits e.g. Ballasts in luminaries, power supplies etc.	Exclusion of gas / vapour from ignition source.
SAND FILLING IEC/SANS 60079-0/5 (Exclusion of gas from incandive components restricting explosion)	q	1, 2	Mostly Electronic circuits e.g. Ballasts in luminaries fuses etc.	A technique with typically no internal free space separating the atmosphere and the ignition source.
Double Protection IEC/SANS 60079-0/26 (Surface) EN 50303 (Mining)	e.g. Ex db I / Ex qb eb [ia] I	0, 1, 2	Sand filled power supply with increased safety connections located in a flameproof box. Output energy intrinsically safe.	The use of multiple (two) techniques (or two fault tolerant)

SELECTION OF EQUIPMENT

SURFACE INDUSTRY		AREA CLASSIFICATION
Zones	Allowed Equipment	
Zones	**a" equipment (e.g. "ia", "ma", "da") and double protected	Zone 0
	Zone 0 equipment **b" equipment (e.g. "ib", "mb", "db") d, e, m, p, q (previous marking)	Zone 1
	Any equipment with multiple certification of above techniques. e.g. Ex de OR Ex db eb	
Gas Groups	Zone 1 equipment **c" equipment (e.g. "ic", "mc", "dc") n (e.g. nA, nR, nC, nL, nZ, etc.) (previous marking)	Zone 2
	I	Not for surface application
Temperature classes	IIA, IIB, IIC	IIA
	IIB, IIC	IIB
	IIC	IIC
	T1, T2, T3, T4, T5, T6	T1
Ambient Temperature	T2, T3, T4, T5, T6	T2
	T3, T4, T5, T6	T3
	T4, T5, T6	T4
	T5, T6	T5
	T6	T6
	If no ambient temperature is indicated on the equipment, it may be used in -20°C to 40°C (default) ambient.	Limiting ambient temperature as defined in area classification documents.
	Alternative ambient temperature marked on equipment. See marking / certificate of equipment.	

