

Hazardous Area Zoning		
	Gas	Dust
Explosive atmosphere present continuously, frequently or for long periods.	Zone 0	Zone 20
Explosive atmosphere likely to be present under normal operational conditions .	Zone 1	Zone 21
Explosive atmosphere unlikely to be present and will persist for only short periods.	Zone 2	Zone 22

Equipment Grouping	
Group I - Mining Equipment	
Category	Description
M1	- Very high degree of protection
	- Tolerant to two faults
	- Two distinct types of protection
M2	- Remains energised during rare events
	- High degree of protection
Group II - Non Mining Equipment	
Category	Description
1G	- Suitable for use in Zone 0, 1 & 2 (gas/vapours)
2G	- Suitable for use in Zone 1 & 2 (gas/vapours)
3G	- Suitable for use 2 (gas/vapours)
1D	- Suitable for use in Zone 20, 21 & 22 (dusts)
2D	- Suitable for use in Zone 21 & 22 (dusts)
3D	- Suitable for use 22 only (dusts)

Temperature Classification	
T Ratings for Group II Gases / Vapours	Maximum Surface Temperature
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85

Group I Gases: 450°C for gases and 150°C for dusts
 Dusts: Maximum temperature as marked on the equipment.
 All equipment T ratings based on ambient temperature of 40°C.

Gas Grouping		
Group I - Mining Applications	Group II - Non Mining Applications	Minimum Ignition Energy (microjoules)
Group	Typical Gas	
I	Methane	280
IIA	Propane	180
IIB	Ethylene	60
IIC	Hydrogen	20

Equipment Selection: Protection Types & Zones											
	d	e	n	ia	ib	ic	o	ma	mb	p	q
Zone 0	x	x	x	✓	x	x	x	✓	x	x	x
Zone 1	✓	✓	x	✓	✓	x	✓	✓	✓	✓	✓
Zone 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

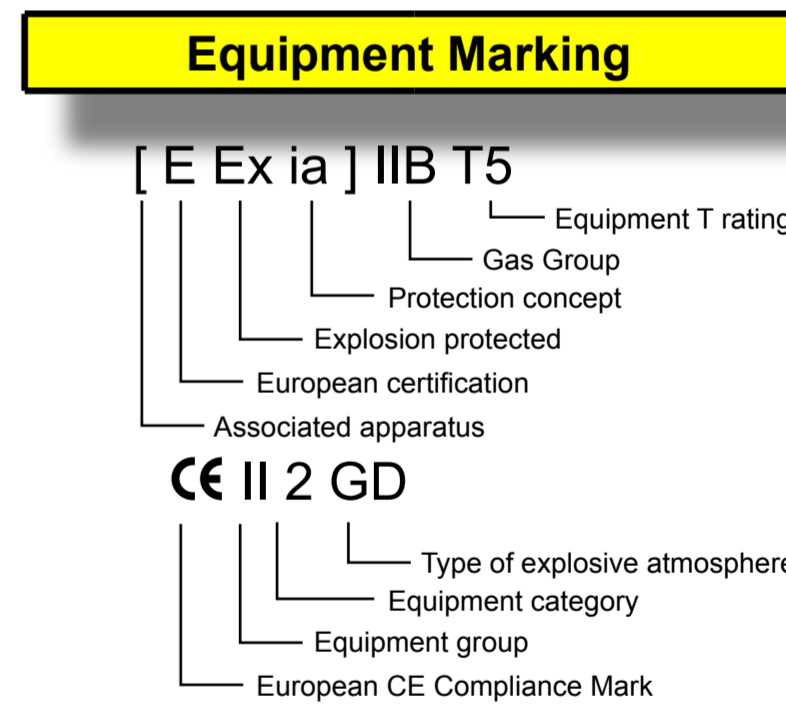
Electrical Apparatus Protection Concepts		
Protection Concept	Description	BSEN 60079
d - Flameproof	Contains explosions, strong and robust, unlikely to ignite external flammable atmospheres, quenches flames and hot gases, allows use of sparking components and hot equipment inside enclosure.	1
e - Increased safety	Prevents ingress of flammable atmospheres, does not allow use of sparking or hot components.	7
n - Increased safety	nA: Non sparking; nC: Enclosed break; nL: Energy limitation; nR: Restricted breathing; nP: Simple pressurisation	15
i - Intrinsic safety	Limits the amount of energy in a circuit to less than that necessary to produce an incendive spark. Only for use in low power circuits, e.g. instrumentation.	11
p - Pressurisation	Prevents ingress of flammable atmospheres by maintaining a positive pressure inside the enclosure. Allows sparking and hot components to be used inside the enclosure.	2
o - Oil immersion	Prevents ingress of flammable atmospheres by immersing ignition-capable components and equipment in a bath of non-flammable oil.	6
q - Powder filled	Prevents ingress of flammable atmospheres by filling the enclosures with quartz or other suitable powder material.	5
m - Encapsulation	Prevents ingress of flammable atmospheres by encapsulating ignition-capable equipment in an epoxy resin.	18
Codes of Practice	Classification of hazardous areas,	10
	Electrical Installations,	14
	Inspection and maintenance,	17
	Repair and overhaul	19

Equipment IP Ratings	
1st Digit - Solid Objects	2nd Digit - Liquids
0 - No protection	0 - No protection
1 - Objects > 50mm	1 - Protected from vertical drips
2 - Objects > 12mm	2 - Angled drips (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

Non-Electrical Equipment Standards	
EN13463-1	Basic requirements/COP
EN13463-2	Flow restricting "fr"
EN13463-3	Flameproof "d"
EN13463-4	Inherent safety "g"
EN13463-5	Constructional safety "c"
EN13463-6	Controlled ignition sources "b"
EN13463-7	Pressurisation "p"
EN13463-8	Liquid immersion "k"



ATEX / DSEAR Compliance Services	
<ul style="list-style-type: none"> - DSEAR Gap Analysis - Hazardous Area Classification - DSEAR Risk Assessments - Ignition Hazard Assessments - Ex Equipment Inspection - Training 	<p>We have extensive experience of assisting our clients achieve compliance with the requirements of DSEAR. Our client list includes small businesses and multi-nationals; representing our ability to tailor our services to the needs of each client. 4 Square provides a full compliance service including all necessary studies, assessments, inspections and documentation. We also provide a range of specialist training courses which can be tailored to each client's requirements.</p>
Safety Engineering Services	
<ul style="list-style-type: none"> - HAZOP / HAZID Studies - SIL Assessment (61508/61511) - Project Health & Safety Reviews - Machinery Safety Audits - Workplace Safety Audits - Human Factors / Behavioural Safety Audits 	<p>Our safety engineering services covers three main areas:</p> <ol style="list-style-type: none"> Process safety studies and assessments using the latest process safety assessment software package. We can also provide follow-up design consultancy services. Workplace equipment and operational safety audits. In addition to machinery and functional safety audits we also provide and Ex equipment inspection services. Provision of human factors / behavioural safety audits, analysis and risk reduction strategies / policies and on-going monitoring.



ATEX 100a: Equipment directive 94/9/EC
 Implemented in UK as EPS: SI192:1996

ATEX 137: Use directive 99/92/EC
 Implemented in UK as DSEAR: SI2776:2002

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Equipment Selection: Temperature Ratings						
	T1 Gas Hazard	T2 Gas Hazard	T3 Gas Hazard	T4 Gas Hazard	T5 Gas Hazard	T6 Gas Hazard
T1 Equipment	✓	x	x	x	x	x
T2 Equipment	✓	✓	x	x	x	x
T3 Equipment	✓	✓	✓	x	x	x
T4 Equipment	✓	✓	✓	✓	x	x
T5 Equipment	✓	✓	✓	✓	✓	x
T6 Equipment	✓	✓	✓	✓	✓	✓

Equipment Selection: Gas Groups			
	IIC Gas Hazard	IIB Gas Hazard	IIA Gas Hazard
IIC Equipment	✓	✓	✓
IIB Equipment	x	✓	✓
IIA Equipment	x	x	✓

