4 SQUARE ENGINEERING CONSULTANCY LIMITED

Specialist Safety Engineering Services

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 - Remains energised during rare events
M2	- High degree of protection - Equipment de-energised during rare events

Group II -Non Mining Equipment

Category	Description
1	- Suitable for use in Zone 0, 1 & 2 and 20, 21 & 22
2	- Suitable for use in Zone 1 & 2 and 21 & 22
3	- Suitable for use 2 and 22 only

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℃ for gases and 150℃ for dusts

Dusts: Maximum temperature as marked on the equipment.

All equipment T ratings based on ambient temperature of 40℃.

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

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

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

ATEX / DSEAR Compliance Services

- DSEAR Gap Analysis
- Hazardous Area Classification
- DSEAR Risk Assessments
- Ignition Hazard Assessments
- Ex Equipment Inspection
- Training

We have extensive experience of assisting our clients achieve compliance with the requirements of the DSEAR regulations. Our client list include small businesses and mutli-nationals; representing our ability to tailor our services to the needs of each client. 4 Square can provide 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.

Safety Engineering Services

- HAZOP / HAZID Studies
- SIL Assessment (61508/61511)
- Project Health & Safety Reviews
- Machinery Safety Audits
- Portable Appliance Testing (PAT)
- Workplace Safety Audits

Our safety engineering services covers two main areas:
i) Process safety studies and assessments using the latest process safety assessment software package. We can also provide follow-up design consultancy services.
ii) Workplace equipment and operational safety audits. In addition to machinery and functional safety audits we also provide PAT testing and Ex equipment inspection services.

Electrical Apparatus Protection Concepts

Protection Concept	Description	Zone of Use	EN Standard
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, 2 21, 22	EN50018 EN60079-1
e - Increased safety	Prevents ingress of flammable atmospheres, does not allow use of sparking or hot components.	1, 2 21, 22	EN500019 EN60079-7
n - Increased safety	nA: Non sparking; nC: Enclosed break; nL: Energy limitation; nR: Restricted breathing; nP: Simple pressurisation	2 22	EN50021 EN60079-15
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.	0, 1, 2 20, 21, 22	EN50020 / EN50039 EN60079-11
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.	1, 2 21, 22	EN50016 EN60079-2
o - Oil immersion	Prevents ingress of flammable atmospheres by immersing ignition-capable components and equipment in a bath of non-flammable oil.	1, 2 21, 22	EN50015 EN60079-6
q - Powder filled	Prevents ingress of flammable atmospheres by filling the enclosures with quartz or other suitable powder material.	1, 2 21, 22	EN50017 EN60079-5
m - Ecapsulation	Prevents ingress of flammable atmospheres by encapsulating ignition-capable equipment in an epoxy resin.	1, 2 21,22	EN50028 EN60079-18

Explosive atmospheres warning sign

www.4sq.co.uk
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EU Ex equipment hexagon symbol

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
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"

Equipment Marking

[E Ex ia] IIB T5

- Equipment T rating
- Gas Group
- Protection concept
- Explosion protected
- European certification
- Associated apparatus

CE II 2 GD

- Type of explosive atmosphere
- Equipment category
- Equipment group
- European CE Compliance Mark

ATEX Equipment Certificate Marking

ABC 03 ATEX 1234 X

- Special Conditions
- Certificate reference
- Certified using ATEX Conformity process
- Year of certification
- Notified body designation

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