Ex EXPLAINED

A ATEX MARKING

CE 0589	Ex	I	M1 / II	1	GD
CE mark denotes manufacturers' declaration of product compliance to all relevant EU Directives **0589** = Number of Notified Body responsible for EU monitoring of production quality	Specific mark for Explosion Protection	Equipment Group (Mining)	Equipment Category (Mining)	Equipment Group (Industrial)	Equipment Category (Industrial)	Defines suitability of use of Group II equipment in gas and/or dust atmospheres

EQUIPMENT GROUP & EQUIPMENT CATEGORY

	ATEX Equipment Group	ATEX Equipment Category	IEC/EN 60079-0 Equipment Protection Level	Hazard Group	Permissible Area of Use
Mining	I	M1	Very high protection (Ma)	I	Energised in Ex atmosphere
		M2	High protection (Mb)		De-energised in Ex atmosphere
Industrial Gas, Vapour & Mist Hazards	II	1G	Very high protection (Ga)	II	Zones 0,1,2
		2G	High protection (Gb)		Zones 1,2
		3G	Normal protection (Gc)		Zones 2
Industrial Dust Hazards		1D	Very high protection (Da)	III	Zones 20,21,22
		2D	High protection (Db)		Zones 21,22
		3D	Normal protection (Dc)		Zones 22

Equipment Group and Category identify the areas in which equipment may be safely used.

AREA CLASSIFICATION

Area Classification Gases	Area Classification Dusts	Zone Criteria
Zone 0	Zone 20	present continuously, for long periods (>1000hrs per annum) or frequently
Zone 1	Zone 21	likely to occur in normal operation, occasionally (>10hrs, <1000hrs per annum)
Zone 2	Zone 22	unlikely to occur in normal operation, if it does will only be for short periods (<10hrs per annum)

CLASSIFICATION OF HAZARDOUS AREAS To EN/IEC 60079-10
Hazardous areas are classified into zones on the basis of the frequency and duration of the occurrence of an explosive atmosphere. Durations on table are typical.

DIRECTIVES AND SCHEMES

ATEX EQUIPMENT DIRECTIVE

'CE' marking is used within the European Union to identify products that comply with all relevant EC/EU Directives, with the aim of promoting free trade and regulating safety.

Only equipment that is 'CE' marked compliant with the ATEX Equipment Directive may be sold for use in potentially explosive atmospheres within the EU. The Directive scope includes electrical and mechanical equipment for use in mining and industrial applications, both on and offshore and considers risks of ignition from potentially explosive gas, vapour, mist and dust atmospheres. Compliance of products to the ATEX Equipment Directive, through conformity assessment, is generally in two stages: design and production. A common route to product design compliance is by meeting the requirements of all relevant Harmonised EN standards.

The ATEX Directive requires that latest advancements in technical knowledge and 'state-of-the-art' thinking are implemented without delay, so Harmonised EN standards can change regularly.

Manufacturers of equipment for safe use in potentially explosive atmospheres are under a legal responsibility to ensure timely compliance with any such changes affecting their products; in some cases this may result in re-design and re-certification.

Once compliance with the relevant Directives is complete and the manufacturer has issued the EC/EU Declaration of Conformity, the 'CE' mark is applied and the product placed on the market.

ATEX Equipment Directive 94/9/EC was repealed on 19 April 2016, ATEX Directive 2014/34/EU became applicable from 20 April 2016. This is the result of a legislative realignment and had limited relevance to the manufacturer or user, other than requiring the EC/EU Declaration of Conformity to refer to the correct Directive on the relevant date.

IECEx CERTIFICATION SCHEME

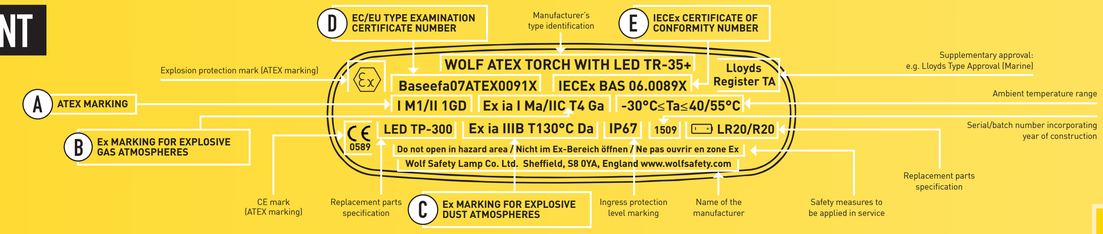
The objective of the IECEx Certification Scheme is to facilitate international trade in equipment for use in explosive atmospheres, while maintaining the required level of safety and international confidence in the product assessment process. Equipment certification is achieved by meeting relevant international IEC standards (mirror standards to those used in ATEX) and results in access to over 30 member countries that accept the Scheme (subject to national deviations). IECEx is a "live" scheme with a database listing all current product certificates published online.

ATEX WORKPLACE DIRECTIVE & DSEAR

The 99/92/EC ATEX Workplace Directive is a legal framework providing protection for property and workers in potentially explosive gas, vapour, mist and dust atmospheres within the EU. It lists a set of obligations and safety measures for employers, requiring the adoption of a coherent risk assessment based strategy for the prevention of explosions.

In the UK the ATEX Workplace Directive has been implemented as an element of The Dangerous Substances and Explosive Atmospheres Regulation 2002 (DSEAR).

Ex EQUIPMENT



GAS ZONE

B Ex MARKING FOR EXPLOSIVE GAS ATMOSPHERES to EN60079

Ex	ia	I	Ma /	IIC	T4	Ga	-30≤Ta≤40/55°C
Explosion Protected Equipment	Protection Concept	Gas Group	Equipment Protection Level	Gas Group	Temperature Classification	Equipment Protection Level	Ambient Temperature Range

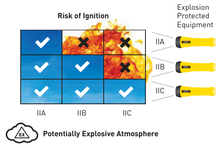
Note: 'Ex' and Protection Concepts are not marked if a 'Technical File' from first principles is applied.

GAS GROUPS

	Group	Typical Hazard	Maximum Safe Sparking Energy Intrinsic Safety Ex ia/ib	Maximum Safe Gap Flameproof Ex d	Applicable Concepts
Mining	I	Methane	MORE	WIDE	All concepts
Industrial	IIA	Propane	ENERGY REQUIRED TO IGNITE GAS	FLAMEPROOF GAP SIZE	Ex d, Ex i
	IIB	Ethylene			
	IIC	Hydrogen/ Acetylene	LESS	NARROW	All concepts

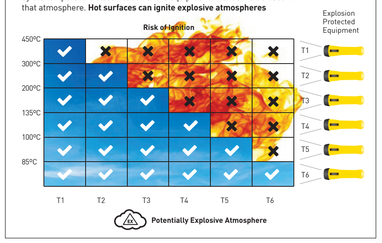
GROUP II GAS SUBDIVISION

Equipment sub-grouping segregates gases according to ease of ignitability by sparks or flames in a gas/air mixture. These apply to flameproof Ex d and intrinsically safe Ex ia/ib/ic equipment only.



TEMPERATURE CLASS

Temperature class relates to the hot surface ignition temperature of a particular explosive gas, vapour or mist atmosphere. It must not be exceeded by the temperature classification of the equipment intended to be used in that atmosphere. **Hot surfaces can ignite explosive atmospheres**



APPARATUS GROUPS AND TEMPERATURE CLASSES FOR COMMON EXPLOSIVE GASES AND VAPOURS

Gas/Vapour Temperature	Gas Group	Temperature Class	Gas/Vapour Temperature	Gas Group	Temperature Class
Acetic acid	IIA	T1	Hydrogen	IIC	T1
Acetone	IIA	T1	Kerosene	IIA	T3
Acetylene	IIC	T2	Methane (industrial)	IIA	T1
Ammonia	IIA	T1	Methanol	IIA	T2
Benzene	IIA	T1	Petrol	-	T3
Butane	IIA	T2	Petroleum	IIA	T1
Carbon Monoxide	IIB	T1	Propane	IIA	T2
Cychlohexane	IIA	T3	Toluene	IIA	T1
Ethanol (ethyl alcohol)	IIB	T2	Turpentine	IIA	T3
Ethylene	IIB	T2	Xylene	IIA	T1

A more comprehensive list of gases and vapours is provided in IEC 60079-20-1

PROTECTION CONCEPTS FOR ELECTRICAL APPARATUS

Concept	Symbol Gas	Symbol Dust	Icon	Description	Zone Gas	Zone Dust	IEC/EN Standard
General Requirements	+	+		General electrical safety requirements for construction, testing and marking of electrical equipment and components used in Ex atmospheres	0 1 2	20 21 22	IEC/EN 60079-0
Flameproof	Ex da Ex db Ex dc			Ignition within the apparatus enclosure is contained and will not ignite surrounding explosive atmosphere	0 1 2		IEC/EN 60079-1
Pressurised	Ex pxb Ex pyb Ex pzc	Ex pxp Ex pyb Ex pzc		Explosive atmosphere excluded by surrounding ignition source with pressurised inert gas	1 1 2	21 21 22	IEC/EN 60079-2
Powder filled	Ex q			Explosive gas excluded by immersing ignition source in sand	1		IEC/EN 60079-5
Oil immersion	Ex ob Ex oc			Explosive gas excluded by immersing ignition source in oil	1 2		IEC/EN 60079-6
Increased safety	Ex eb Ex ec			Design excludes the possibility of incendive arcs, sparks or hot surfaces	1 2		IEC/EN 60079-7
Intrinsic safety	Ex ia Ex ib Ex ic	Ex ia Ex ib Ex ic		Energy in circuit and temperature on components reduced to a safe level	0 1 2	20 21 22	IEC/EN 60079-11
Non-incendive: nA: Non sparking nR: Restricted breathing nC: Enclosed break	Ex nA Ex nR Ex nC			Will not ignite explosive gas in normal operation, faults unlikely to occur	2		IEC/EN 60079-15
Encapsulation	Ex ma Ex mb Ex mc	Ex ma Ex mb Ex mc		Flammable atmosphere excluded by encapsulating the ignition source in resin	0 1 2	20 21 22	IEC/EN 60079-18
Optical radiation protection: is: Inherently safe pr: Mechanically protected sh: Interlock / shutdown	Ex op is Ex op pr Ex op sh	Ex op is Ex op pr Ex op sh		Protection of equipment and transmission systems using optical radiation	0 1 1 / 2	20 21 21 / 22	IEC/EN 60079-28
Dust ignition protection by enclosure		Ex ta Ex tb Ex tc		Design excludes the ingress of explosive dusts		20 21 22	IEC/EN 60079-31
Special protection	Ex sa Ex sb Ex sc	Ex sa Ex sb Ex sc	"S"	Equipment protection by special protection "s"	0 1 2	20 21 22	IEC 60079-33

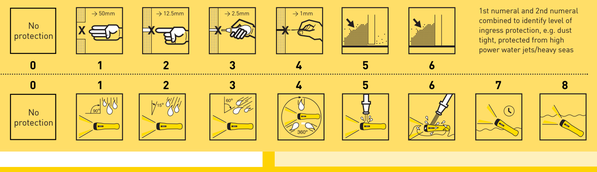
Protection concept identifies the means by which explosion protection is achieved.

AMBIENT TEMPERATURE

Ex equipment has a temperature class based on use in an ambient of -20°C to +40°C unless otherwise stated e.g. -30°C≤Ta≤40/55°C

INGRESS PROTECTION (IP) CODE to IEC/EN 60529

Ex equipment selection for use in gases, vapours, mists or dusts must take into consideration the environmental conditions of the area in which it is to be used. Apparatus resistance to ingress of both solid bodies and water is identified by use of an 'IP rating'.



1st numeral and 2nd numeral combined to identify level of ingress protection, e.g. dust tight, protected from high power water jets/heavy seas

C Ex MARKING FOR EXPLOSIVE DUST ATMOSPHERES to EN60079-0

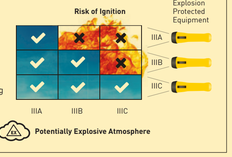
Ex	ia	IIIB	T130°C	Da	IP67
Explosion Protected Equipment	Protection Concept	Dust Group	Maximum Surface Temperature	Equipment Protection Level	Ingress Protection Level Marking

DUST GROUPS

	Group	Typical Hazard
Industrial	IIIA	Combustible Flyings
	IIIB	Non-conductive Dusts
	IIIC	Conductive Dusts

GROUP III DUST SUBDIVISION

Group III electrical equipment is intended for use in explosive dust atmospheres other than mines, with subdivision according to the nature of the dust.



MAXIMUM SURFACE TEMPERATURE

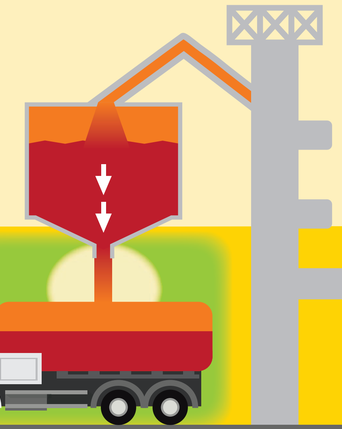
Group III electrical equipment is marked with a temperature with 'T' prefix detailing the actual maximum temperature that may be found on any surface accessible by a potentially explosive dust atmosphere. Ignition temperature of a specific dust hazard must be higher than maximum surface temperature displayed on electrical equipment.

IGNITION TEMPERATURES FOR COMMON COMBUSTIBLE DUSTS

Dust Type	Dust Group	Dust Layer (5mm) – minimum ignition temperature (°C)	Dust Cloud – minimum ignition temperature (°C)
Aluminium	IIIC	450	560
Blasting Dust (Paint Shreds)	IIIB	270	390
Coal	IIIB	380	560
Flour (Wheat)	IIIB	450	430
Grain	IIIA	290	490
Iron Powder	IIIC	450	520
Paper Fibre	IIIA	335	470
PVC	IIIB	440	680
Resin (Epoxy)	IIIB	240	532
Rubber	IIIB	450	470
Soot	IIIB	450	720
Starch (Maize)	IIIB	490	430
Sugar	IIIB	460	360
Wood (Flour)	IIIB	305	470

Check the GESTIS-DUST EX database of 'Combustion and Explosion Characteristics of Dusts' for more details at http://www.dguv.de/ifa/GESTIS/GESTIS-STAUB-EX/index.jsp.

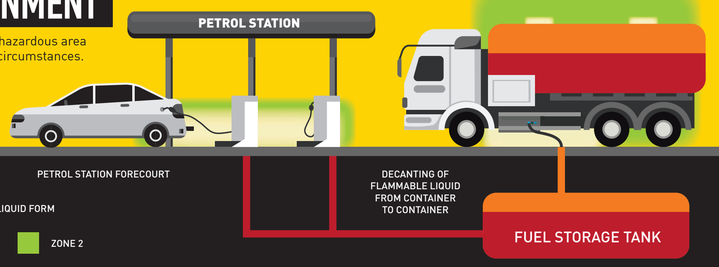
Ignition temperatures will vary dependent on the exact characteristics of the dust and the environment it is in.



Ex ENVIRONMENT

These diagrams show how hazardous area zones may occur in typical circumstances.

EXPLOSIVE GAS ATMOSPHERES



EXPLOSIVE DUST ATMOSPHERES

DECANTING OF COMBUSTIBLE MATERIAL FROM CONTAINER TO CONTAINER

KEY

- Explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist, or a cloud of combustible dust in air.
- Spark
- Ignition
- Flameproof flange gap on Ex d equipment

D EC/EU TYPE EXAMINATION CERTIFICATE NUMBER

Ex	Baseefa	07	ATEX	0091	X
	Notified body responsible for EC/EU-Type Examination (Test House)	Year Certificate Issued	ATEX Certificate	Serial Number	Certificate Number Suffix

X Suffix denotes special conditions of certification – refer to certificate. **U** Suffix denotes Ex component approval.

E IECEx CERTIFICATE OF CONFORMITY NUMBER

IECEx	BAS	06	0089	X
IECEx Certificate	ExCB – IECEx Certification Body	Year Certificate Issued	Serial Number	Certificate Number Suffix

X Suffix denotes special conditions of certification – refer to certificate. **U** Suffix denotes Ex component approval.

NOTIFIED BODIES

ATEX Notified Body

Notified Bodies are appointed by governments of individual EU countries as responsible to carry out functions specified in the ATEX Equipment Directive, such as EU type examination of equipment and quality assurance assessment of equipment production.

IECEx Certification Body (ExCB)

Organisations successfully completing the IECEx assessment process are approved to operate within the IECEx Certified Equipment Scheme and to issue IECEx Test Reports (ExTRs), IECEx Quality Assessment Reports (QARs) and the Online Certificate of Conformity.

SGS Baseefa is responsible for the quality assurance assessment of equipment manufactured by the Wolf Safety Lamp Company and, under ATEX, is identified by the notified body number (0589) below the CE mark on Wolf products.

RESOURCES AND STANDARDS

ADDITIONAL RESOURCES

The 2014/34/EU ATEX Equipment Directive may be found on the following website:
http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0034&from=EN

The 99/92/EC ATEX Workplace Directive may be found on the following website:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2000:023:0057:0064:EN:PDF

A copy of the DSEAR regulations is available at: **http://www.hmso.gov.uk/si/si2002/20022776.htm**

A guide to DSEAR, published by the Health and Safety Executive can be downloaded at:
http://www.hse.gov.uk/fireandexplosion/dsear.htm

IECEx System website: **www.iecex.com**

ASSOCIATED STANDARDS

Explosive Atmospheres. Explosion prevention & protection

Basic concepts and methodology	EN 1127-1

Electrical equipment for use in potentially explosive atmospheres

Classification of areas – Explosive Gas Atmospheres	IEC/EN 60079-10-1
Classification of areas – Explosive Dust Atmospheres	IEC/EN 60079-10-2
Electrical installations	IEC/EN 60079-14
Inspection and maintenance of electrical installations	IEC/EN 60079-17
Material characteristics, gases and vapours, test methods and data	IEC/EN 60079-20-1

Standards available from: British Standards Institution, 389 Chiswick High Road, London W4 4AL
www.bsigroup.com

www.wolfsafety.com

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