Ex EXPLAINED

A ATEX/UKEX MARKING

Ex	I	M1 /	II	1	GD
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	IEC/EN 60079-0 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		Zone Criteria
Gases	Dusts	
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 in the table are typical.

DIRECTIVES AND SCHEMES

ATEX EQUIPMENT DIRECTIVE 2014/34/EU

'CE' marking is used within the European Union to identify products that comply with all relevant 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 for an EU Notified Body to assess that a product has met the requirements of all relevant Harmonised EN standards and, accordingly, issue an EU Type Examination Certificate to the ATEX Equipment Directive.

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 EU Declaration of Conformity, the 'CE' mark is applied. The product should then be added to a Quality Assurance Notification (QAN), issued by an EU Notified Body, to confirm the production quality systems have met the requirements of ISO/IEC 80079-34. The product can then be placed on the market.

'UKEX' UK STATUTORY INSTRUMENT

'The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016' (UKSI) 2016:1107, was originally introduced as a means of adopting the 2014 ATEX Directive into UK law. As Brexit approached it was amended in preparation for the UK leaving the EU to create a UK direct substitute to ATEX. It has rapidly became known as 'UKEX'.

'UKEX' is used to permit trade within the Great Britain. Equipment approval mirrors ATEX, sharing the same Harmonised EN standards, renamed Designated standards. Therefore, a UK-Type Examination Certificate can typically be issued using the ATEX product assessment, permitting the 'UKCA' mark to be applied to a product and a UK Declaration of Conformity to be written. The 'UKCA' mark on the product demonstrates equipment is compliant to all relevant UK Statutory Instruments and may be sold for use in potentially explosive atmospheres within Great Britain.

EXPLOSIVE ATMOSPHERES IN GREAT BRITAIN AND NORTHERN IRELAND

The UK government, having originally planned to move completely to recognising only 'UKCA' marked products for sale in Great Britain by 2023/2024, is now intending to continue to also recognise EU requirements, including 'CE' marking, for a range of product regulations. This includes ATEX.

Therefore Ex product end users based in Great Britain will have the flexibility to purchase and put into service either 'UKCA' or 'CE' marked products in their workplace. End users in Northern Ireland can continue to purchase and use 'CE' marked products for their Ex work activities.

A further change to UK legislation in 2024 has meant that manufacturers can now apply 'UKCA' marking to their product and draw up the UK declaration of conformity based on ATEX legislation and the EU Type Examination Certificate, without the need to have a UKEX UK Type Examination Certificate from a UK approval body.

IECEx CERTIFICATION SCHEME

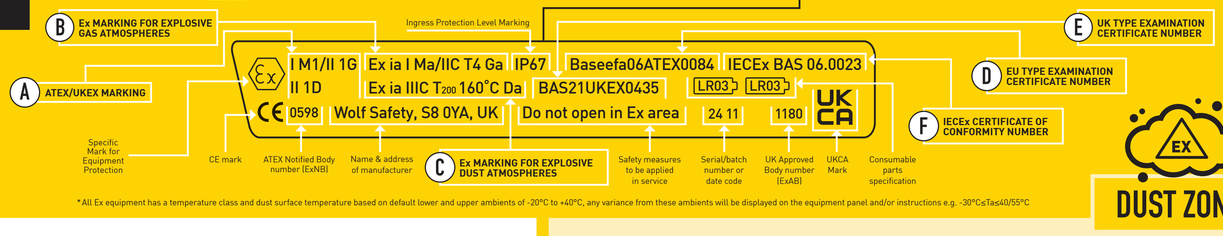
The objective of the IECEx Certification Scheme is to facilitate international trade in equipment for use in explosive atmospheres, while maintaining the required level of safety and international confidence in the product assessment process. Equipment certification is achieved by meeting relevant international IEC standards (mirror standards to those used in ATEX) and results in access to over 20 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.

The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) UKSI 2002:2776 is the legal framework under the Health and Safety at work Act 1974 to provide protection for property and workers in Great Britain from potentially explosive gas, vapour, mist and dust atmospheres. It still enforces the above 99/92/EC ATEX Workplace Directive as part of its minimum requirements. In Northern Ireland this regulation is mirrored as NISR 2003:152.

Ex EQUIPMENT MARKING



* All Ex equipment has a temperature class and dust surface temperature based on default lower and upper ambients of -20°C to +40°C, any variance from these ambients will be displayed on the equipment panel and/or instructions e.g. -30°C≤Ta≤40/55°C

GAS ZONE

DUST ZONE

B Ex MARKING FOR EXPLOSIVE GAS ATMOSPHERES to EN60079-0

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*

C Ex MARKING FOR EXPLOSIVE DUST ATMOSPHERES to EN60079-0

Ex	ia	IIIC	T_{200}160°C	Da
Explosion Protected Equipment	Protection Concept	Dust Group	Maximum Surface Temperature (under 200mm of Dust)	Equipment Protection Level

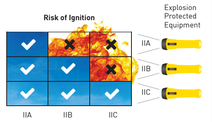
GAS GROUPS

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

KEY: Potentially Explosive Atmosphere | Flameproof flange gap on Ex d equipment | Spark

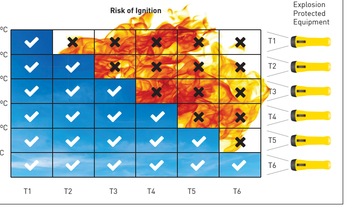
GROUP II GAS SUBDIVISION

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 (Firedamp)	I	T1
Ammonia	IIA	T1	Methane (Industrial)	IIA	T1
Benzene	IIA	T1	Methanol	IIA	T2
Butane	IIA	T2	Petrol	-	T3
Carbon Monoxide	IIB	T1	Propane	IIA	T2
Cyclohexane	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 ISO/IEC 80079-20-1

PROTECTION CONCEPTS FOR ELECTRICAL APPARATUS

Concept	Symbol Gas	Symbol Dust	Icon	Description	EPL Gas	EPL Dust	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	Ga Gb Gc		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	Ga Gb Gc		0 1 2		IEC/EN 60079-1
Pressurised	Ex pxb Ex pyb Ex pzc	Ex pxb Ex pyb Ex pzc		Explosive atmosphere excluded by surrounding ignition source with pressurised inert gas	Gb Gb Gc	Db Db Dc	1 1 2	21 21 22	IEC/EN 60079-2
Powder filled	Ex qb Ex qc			Explosive gas excluded by immersing ignition source in sand	Gb Gc		1 2		IEC/EN 60079-5
Oil immersion	Ex ob Ex oc			Explosive gas excluded by immersing ignition source in oil	Gb Gc		1 2		IEC/EN 60079-6
Increased safety	Ex eb Ex ec			Design excludes the possibility of incendive arcs, sparks or hot surfaces	Gb Gc		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	Ga Gb Gc	Da Db Dc	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	Gc Gc Gc		2 2 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	Ga Gb Gc	Da Db Dc	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	Ga Gb Gc	Da Db Dc	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		Da Db Dc		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"	Ga Gb Gc	Da Db Dc	0 1 2	20 21 22	IEC 60079-33

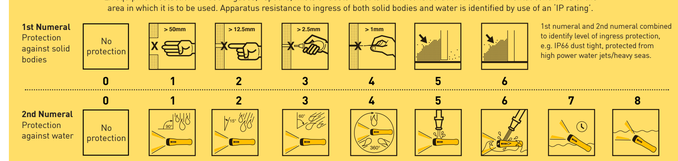
KEY: Potentially Explosive Atmosphere | Spark | Ignition | Protection concept identifies the means by which explosion protection is achieved. More than one Protection concept may be required to achieve protection.

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'.



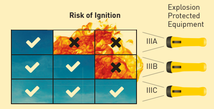
1st numeral and 2nd numeral combined to identify level of ingress protection, e.g. IP66 dust tight, protected from high power water jets/heavy seas.

DUST GROUPS

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

Category 1 equipment in dust 'Da' will have the subscript 200 or more after the 'T' i.e. T_{200}; this signifies the depth of the dust in mm the maximum surface temperature was determined. In some instances this may also appear on Category 2, Db Equipment.

IGNITION TEMPERATURES FOR COMMON COMBUSTIBLE DUSTS

Dust Type	Median Particle size	Dust Group	Dust Layer (5mm) – minimum ignition temperature (°C)	Dust Cloud – minimum ignition temperature (°C)
Aluminium	23µm	IIIC	450	560
Blasting Dust (Paint Shreds)	10µm	IIIB	270	390
Coal	<10µm	IIIB	380	560
Flour (Wheat)	57µm	IIIB	450	430
Grain	160µm	IIIA	290	490
Iron Powder	32µm	IIIC	450	520
Paper Fibre	16µm	IIIA	335	570
PVC	142µm	IIIB	440	680
Resin (Epoxy)	<10µm	IIIB	240	532
Rubber	140µm	IIIB	450	470
Soot	25µm	IIIB	450	720
Starch (Maize)	11µm	IIIB	490	430
Sugar	34µm	IIIB		360
Wood (Flour)	60µm	IIIB	305	470

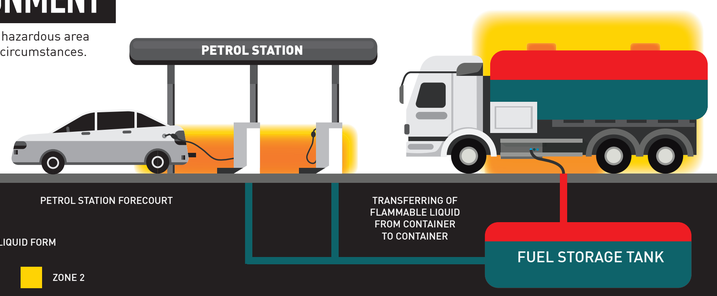
Check the GESTIS-DUST EX database of 'Combustion and Explosion Characteristics of Dusts' for more details at https://www.dguv.de/ifa/gestis/gestis-staub-ex/index-2.jsp.

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

TRANSFERRING OF COMBUSTIBLE MATERIAL FROM CONTAINER TO CONTAINER

D EU TYPE EXAMINATION CERTIFICATE NUMBER

Baseefa	06	ATEX	0084
Notified body responsible for EC/EU-Type Examination	Year Certificate Issued	ATEX Certificate	Serial Number

The Certificate number may have a "X" or "U" suffix applied i.e. Baseefa07ATEX0091X
X Suffix denotes special conditions of certification – refer to certificate. **U** Suffix denotes Ex component approval.

E UK TYPE EXAMINATION CERTIFICATE NUMBER

BAS	21	UKEX	0435
Approved body responsible for UK-Type Examination	Year Certificate Issued	UKEX Number	Serial Number

The Certificate number may have a "X" or "U" suffix applied i.e. BAS21UKEX0431X
X Suffix denotes special conditions of certification – refer to certificate. **U** Suffix denotes Ex component approval.

F IECEx CERTIFICATE OF CONFORMITY NUMBER

IECEx	BAS	06	0023
IECEx Certificate	ExCB – IECEx Certification Body	Year Certificate Issued	Serial Number

The Certificate number may have a "X" or "U" suffix applied i.e. IECEx BAS 06.0089X
X Suffix denotes special conditions of certification – refer to certificate. **U** Suffix denotes Ex component approval.

CONFORMITY SCHEME MARKING

CE 0598 — CE mark denotes manufacturers' declaration of product compliance to all relevant EU Directives
0598 = Number of notified body

UK CA 1180 — UKCA mark denotes manufacturers' declaration of product compliance to all relevance UK Statutory Instruments
1180 = Number of approved body (if applicable)

NOTIFIED BODIES

ATEX Notified Body (ExNB)
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.

UK Approved Body (ExAB)
All UK based EU Notified Bodies lost their status as the UK left the EU. The UK government automatically appointed these organisations as UK Approved Bodies, responsible for identical functions under the UKSI explosive atmospheres legislation, such as UK 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 Fimko Oy is responsible for the quality assurance assessment of equipment manufactured by the Wolf Safety Lamp Company under ATEX, it is identified by the Notified Body number (0598) below the 'CE' mark on Wolf products.

SGS United Kingdom Limited (formally Baseefa) is responsible for the quality assurance assessment of Wolf equipment manufactured under both 'UKCA' and IECEx. For products with a 'UKEX' UK Type Examination Certificate within the UKCA scheme, SGS UK is identified by the Approved Body number (1180) below the 'UKCA' 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

UK Statutory Instrument 2016:1107 "The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres" maybe found on the following website: **https://www.legislation.gov.uk/uksi/2016/1107**

A copy of the DSEAR regulations is available at: **https://www.legislation.gov.uk/uksi/2002/2776**

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
Explosive Atmospheres	
Material characteristics for gas and vapour classification, test methods and data	ISO/IEC 80079-20-1
Material characteristics Combustible dusts test methods	ISO/IEC 80079-20-2
Application of Quality Systems for Ex product Manufacture	ISO/IEC 80079-34

EN Standards available from:
British Standards Institution
369 Chiswick High Road, London W4 4AL
https://knowledge.bsigroup.com/

IEC Standards available from:
IEC Secretariat
3 rue de Varembé, PO Box 131, CH-1211,
Geneva, Switzerland
https://webstore.iec.ch

This guide is provided to aid in the selection of Wolf lighting products for use in potentially explosive atmospheres. Information given is based on practice within the EU & UK, as specified in the requirements of the 2014/34/EU ATEX (Equipment) Directive, UK Statutory Instrument 2016:1107 "The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres", 99/92/EC ATEX (Workplace) Directive, Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) with further practice outlined for international use within the IECEx Scheme. It is the user's responsibility to ascertain if a particular product is safe and without risk to health and safety by virtue of its location in a hazardous area, i.e. classification of zones, gas groups, ignition temperatures, etc. Both the specifier and user should be thoroughly familiar with the standards mentioned in this guide. Whilst every care has been taken in the compilation of this document, the Company regrets that it cannot accept responsibility for any errors or omissions contained herein. Readers should not rely upon the information contained in this document without seeking specific safety advice and ensuring that their own particular circumstances are in accordance with the matters set out.

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EX EXPLAINED

Wolf

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