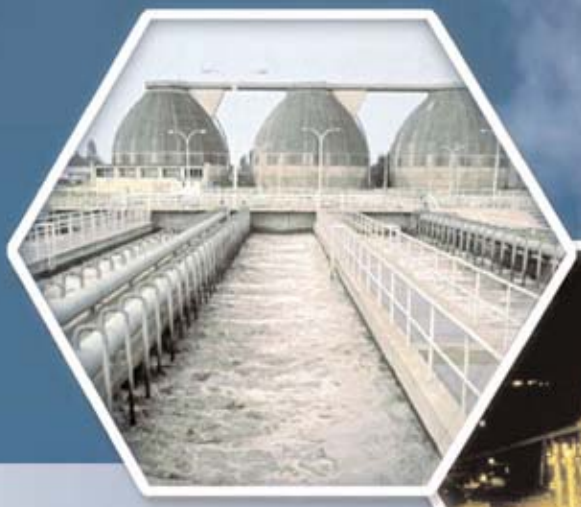

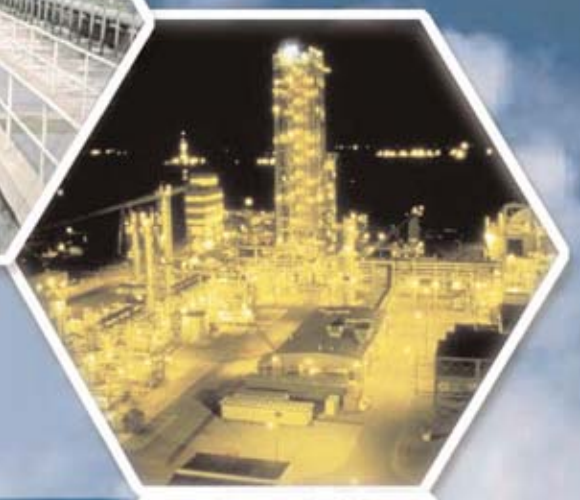

ATEX
Jargon Buster

An instrumentation users' guide

ABB

ATEX Jargon Buster

ABB's ATEX jargon buster explains the terminology users are likely to encounter when purchasing equipment for hazardous areas. If you have a specific ATEX question, please send an email to doug.lincoln@gb.abb.com.

ABB's *ATEX Jargon Buster* uses hyperlinks for quick navigation. A click on any underlined word takes you straight to the relevant entry. Alternatively, use the Quick Navigation Tool below to select a relevant section.

Quick navigation tool

A B C D E F G H I J K L M N O P Q R S T U V W Z

A

Apparatus Group

There are two apparatus groups for gas/vapour environments:
Group I covers the use of equipment in underground mining environments where methane is present.

Group II covers all other environments

Group II is further divided into subgroup IIA, IIB or IIC:

- IIA - propane (least incendiary)
- IIB - ethylene (more incendiary)
- IIC - hydrogen and acetylene (most incendiary)

Apparatus Groups are sometimes referred to, erroneously, as 'Gas Groups'.

Approval

Equipment is approved for use in hazardous areas by accredited testing laboratories known as Notified Bodies or by the manufacturers. To qualify for ATEX approval, manufacturers must show that their products incorporate measures to prevent the ignition of unavoidable explosive atmospheres.

Area classification

The process by which sources of leak of flammable gas, liquid, mist or combustible dust are identified, the frequency and duration of those leaks determined and the extent to which those leaks will travel before they become non-flammable. The area (strictly a volume) is then marked on a drawing showing the Zones and their extents.

AS2380.9:1991

Australian standard, equivalent to Zone 2 in ATEX terminology.

ATEX

ATEX is an acronym of the French *Atmospheriques Explosives*. This European Directive amends and adds safety requirements for hazardous areas in the relevant national legislation in the member states of the European Union, bringing in a common standard. The purpose is to enable the sale of equipment across the European Union, without manufacturers having to satisfy different requirements for each national market.

Where equipment is to be used in potentially explosive atmospheres containing gas or combustible dust, it must comply with the ATEX directive.

Compliance with the ATEX Directive means reinforced safety aspects – safer design, more demanding testing procedures, and specific quality assurance measures for the design as well as the manufacturing process. It requires employers to protect both staff and local communities from the risk of an explosive atmosphere.

ATEX consists of two parts: ATEX 95, which concentrates on the duties of the manufacturers; and ATEX 137, which focuses on the end users' obligations.

The ATEX 95 Directive is implemented into UK Law by the The Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 1996 (EPS Regulations) making compliance with the ATEX directive mandatory from July 1st 2003.

The ATEX system depends on three key elements: Harmonised technical standards; Audits of the manufacturing facilities; and notification by the European Commission to recognise bodies and test laboratories known as Notified Bodies.
See also http://www.dti.gov.uk/strd/atex.htm.

ATEX 95

The product directive 94/9/EC, known as the ATEX 95 Directive, concentrates on the manufacturer's duties, giving the safety requirements to be fulfilled by all equipment, both electrical and non-electrical, installed in hazardous areas within the European Union. It describes the Essential Healthy and Safety Requirements (EHSRs) of the products regarding their design, manufacturing process, testing, documentation and maintainability.

The requirements are divided into three categories: Technical requirements from harmonised European standards; health and safety aspects; and production quality requirements.

Voluntary since 1994, the requirements of the Directive will be mandatory from 1 July 2003. The Directive covers any electrical or mechanical product that contains or constitutes a potential ignition source and which requires a special design or installation procedure to prevent an explosion. Regulated equipment includes control and communication devices, monitoring and detection equipment. It also includes safety or control devices installed outside hazardous areas that have an explosion protection function, such as pressure-relief panels and fast-acting shutoff valves.

ATEX 100a

See ATEX 95. ATEX 100 originally covered the product directive until it was re-classified as ATEX 95 by the Treaty of Amsterdam.

ATEX 137

The “worker protection directive” 1999/92/EC, ATEX 137, describes the “minimum requirements” for improving the health and safety of workers potentially at risk. It classifies the environment into zones and outlines which category of equipment can be used in each zone.

The directive focuses on the analysis and description of the risks, the zone definitions, and the maintenance practices in relation to site safety. The safety of an installation in a hazardous area is the result of co-operation between the equipment manufacturer, the installer and the end user.

ATEX 137 concentrates on the duties of the end user. Workers should be trained on hazardous area issues by the employer. Authorisation should be given to each employee working in a hazardous area. Explosion protection measures should be taken and an explosion protection document (EPD) can be established (an EPD is not specifically required by the DSEAR Regulations, though verification of the explosion safety of an area is required before first use and sufficient documentation to show area classification, required equipment for safe working, and aims of co-ordination of measures to protect employees) . When equipment is repaired, the end user has the responsibility to select an appropriate repair shop (see Baseefa Certification Limited).

The Employers’ obligations in relation to ATEX include assessing the site’s Sources of Hazard and likely sources of ignition, classification of the area into zones and marking all points of entry, as well as producing and maintaining documentation. The main obligations relating to employers are:

- Preparing an explosion protection document (EPD)
- Classifying the workplace into Zones where applicable
- Selecting ATEX 95 products according to Zone
- Using warning signs to identify places where explosive atmospheres may occur

Essentially, the employer is required to take all reasonable measures to prevent the formation of an explosive atmosphere in the workplace. Where this is not possible, measures must be taken to avoid the ignition of any potentially explosive atmosphere. In addition, the effects of any explosion must be minimised in such a way that workers are not put at risk.

Atmosphere

For ATEX purposes, atmospheres are categorised into two classifications: “G” for explosive gas and “D” for combustible dust. A product certified for both gas and dust is marked G-D.

Audit

A new feature of the ATEX Directive is that the manufacturer now also needs a quality system in place that must be checked by the Notified Body. The audit of the

manufacturing facility responsible for delivering Ex equipment is one of the three key elements in the ATEX system. The other two are the harmonised standards for equipment; and notification by the European Commission to recognise bodies and test laboratories as Notified Bodies.

Authorised body

North American terminology. Electrical equipment used in hazardous locations, classified according to North American rules, must be approved by an authorised body or the manufacturer.

B

BASEEFA (2001)

UK based testing institute. Notified Body.

Baseefa Certification Limited

Baseefa Certification operates a repair licensing scheme to assist users in selecting a competent repairer. Compliance with IEC 60079-19 or the mining equivalent, the use of competent staff and a clear management commitment are pre-requisites to obtaining a licence.

C

Canadian Electric (CE Code)

The general description of hazardous areas and protection types in Canada are presented in Canadian Electric (CE Code) published by CSA. More specific requirements can be found e.g. from several IEEE and UL publications. Electrical equipment used in hazardous locations, classified according to North American rules, must be approved by an authorised body or the manufacturer. The equipment for Division 1, Zone 0 or Zone 1 areas must always be approved by an authorised body e.g. UL, CSA or FM.

Category

Hazardous area equipment is allocated a Category depending on its degree of protection, indicating where the item can be used.

Category 1

Equipment designed for very high level of safety. Requires two independent means of protection or safe operation with two separate faults. Used where explosive atmospheres are present continuously or for lengthy periods, typically Zone 0 and Zone 20.

Category 2

Equipment designed for a high level of safety. Requires the design to be safe with frequently occurring disturbances or with one operating fault. Used where explosive atmospheres are likely to occur, typically Zone 1 and Zone 21.

Category 3

Equipment designed for a normal level of safety. Used where explosive atmospheres are likely to occur infrequently and to be of short duration, typically Zone 2 and Zone 22.

CE Code

See Canadian Electric.

CE Marking

The CE-Marking affixed to the product is a manufacturer's statement that the product complies with all relevant Directives. The CE mark shows that the product has been manufactured according to a certain design and procedure and acts like a passport that allows a product to be installed anywhere in the EU. It provides reassurance for buyers both inside and outside the EU that the equipment conforms to the latest standards. For ATEX compliance, the CE Marking must appear prominently on each item of equipment or each protective system.

In principal there only should be one CE mark on an item which shows compliance with all relevant Regulations. Compliance for Machinery is required under the Supply of Machines (Safety) Regulations 1992. (See Declaration of conformity).

CEN - European Committee for Standardization

One of the European Standards Bodies. Produces harmonised standards in all fields except the electrotechnical field and telecommunications, giving the technical means to achieve the objectives of the Essential Health and Safety Requirements stated in the ATEX Directive.

CENELEC - European Committee for Electro-technical Standardization

One of the European Standards Bodies. Produces harmonised standards to cover the electrotechnical field and gives the technical means to achieve the objectives of the Essential Health and Safety Requirements stated in ATEX Directives.

Certificates

See Declaration of Conformity.

CESI

Testing institute based in Italy. Notified Body.

Chemical Agents Directive (CAD)

Under the Chemical Agents Directive (Directive 98/24/EC), employers have an obligation to ensure the health and safety of workers and others who may be at risk from exposure to dangerous chemical substances that can cause fire, explosions or similar energy releasing events, including runaway chemical reactions.

Classification societies

Organisations that verify the technical standards of ships. Requirements on instrumentation equipment may vary from one classification society to the next.

Combustible dust

Combustible dust can be in cloud form as a dust/air mixture with a cloud ignition temperature, or as a layer of dust of a specified thickness with a layer ignition temperature. The ignition temperature for various types of dust is available from commercially available tables.

Conductive dust

If the atmosphere contains conductive dust, only electrical equipment approved by a Notified Body may be installed. If the dust is not conductive and the area is classified Zone 22, electrical equipment approved by the manufacturer for use in dust atmospheres can be installed.

Co-operation

Co-operation is a cornerstone of ATEX 137. The safety of an installation in a hazardous area is the result of a co-operation of the equipment manufacturer, the installer and the end user.

CSA

The Canadian Standards Association.

D

D

D on the nameplate indicates that the marking relates to dust. A product certified for both gas and dust is marked G-D.

Dangerous Substances and Explosive Atmospheres Regulations

See DSEAR

Declaration of Conformity

The EC Declaration of Conformity is the only document that has to be supplied with each delivery. With this document, the manufacturer takes responsibility for the product's compliance with the ATEX directive. It provides information about the product quality assessment notification and the EC type examination certificate, with reference numbers. To ensure that an item of equipment is approved to the appropriate Directive, users need to check the directive number, which appears in the CE Declaration of Conformity delivered with it. Depending on the zone where the product is used, the number of the Notified Body can be stamped after the CE mark (mandatory for use in Zone 0, Zone 1, Zone 20 and Zone 21). This document replaces the previous old certificates.

Note equipment for inclusion in a "machine" can be supplied with a "Declaration of Incorporation", this requires that the manufacturer of the complete machine shows overall compliance with the regulations.

DEMKO

Testing institute based in Denmark. Notified Body.

DIP

See Dust ignition proof

Directive 1999/92/EC

See ATEX 137

Directive 1994/9/EC

See ATEX 95

Directive 94/9/EC

See ATEX 95

Directive 99/92/EC

See ATEX 137

Division system

An old U.S. system, which defines areas according to the so-called Division system (NEC 500). It will soon be replaced by the new NEC 505 standard, similar to the IEC standard.

Dresden Agreement

In 1996, IEC and CENELEC reached a co-ordination agreement to develop new standards, called the 'Dresden Agreement'. It means that since September 1996 the same document is submitted to IEC and CENELEC simultaneously and the

standards are published at the same time and are identical. This work stopped between 1998-2000 due to differences in the IEC and CENELEC definitions of some of the dust zones. The procedure was re-introduced in 2001, which means that the IEC standards will be updated over the coming years in accordance with the EHSRs of the ATEX Directive.

DSEAR

The Dangerous Substances and Explosive Atmospheres Regulations is the UK implementation of the European ATEX 137 Directive and parts of the Chemical Agents Directive (CAD). It comes into force in July 2003 and lays down strict new guidelines governing potentially explosive atmospheres in plants throughout the UK. It incorporates both the flammable/explosive elements of both the Chemical Agents and ATEX Directives. The essence of DSEAR is to ensure the safety of employees and public from dangerous substances that can cause explosions or fires.

The DSEAR regulations deal with explosions and fires caused by dangerous substances, whether the explosive atmosphere is generated by gases, vapours or dusts. The new 17 part regulations replaces certain older UK safety legislation e.g. The Highly Flammable Liquids & Petroleum Gases Regulations of 1972.

DSEAR applies to all industrial and commercial premises where a dangerous substance is present or is likely to be present during the working day. Offshore facilities and domestic dwellings are excluded from the regulations.

Dust

With ATEX, combustible dust is for the first time included specifically in the regulations governing hazardous atmospheres. Typical applications include handling of grain, coal, sugar, wood and some chemical substances such as sulphur.

Dust cloud

The risk of explosion in a hazardous area with combustible dust is either caused by a *cloud* of dust or a *layer* of dust. It is the responsibility of the user to stage maintenance periods so that the dust layer on equipment does not build up above 5mm. The ignition temperatures for various types of dust are available from commercially available reference tables.

Dust ignition temperature

The ignition temperature for various types of dust can be obtained from commercially available tables. See Temperature class.

E

EECS

UK based testing institute. HSE closed EECS in 2002. Most of the work is now undertaken by BASEEFA (2001). Notified Body.

EEx

Designation showing that the equipment has been designed to safeguard against the risk of explosion. This designation will be expanded to include details of the Types of Protection incorporated. The marking will also indicate the type of potentially explosive atmosphere in which the equipment may be used (see Apparatus Group) and the maximum safe operating temperature for different applications (see Temperature Class).

EExd

Flameproof, for Zone 1. The enclosure of this type of equipment will prevent an internal explosion, or flame, from being transmitted to the explosive atmosphere surrounding the machine, hence the name flameproof. The enclosure must withstand any pressure levels caused by such an internal explosion. The designation under ATEX for this type of equipment is EExd, which supersedes the earlier designation Exd.

EExi

Equipment carrying this mark is certified intrinsically safe in accordance with standard EN 50020.

EExia

This category of equipment can be used in Zone 0, Zone 1 and Zone 2 hazardous areas.

EExib

Equipment in this category can only be used in Zone 1 and Zone 2 hazardous areas.

EExn

Equipment designated EExn to EN 50021 can only be used in Zone 2.

EExp

See Pressurised Enclosure.

EHSR

See Essential Health and Safety Requirements.

Employers' obligations

See ATEX 137. Also PUWER.

EN 1127-1: 1997

Harmonised standard CEN EN 1127-1: 1997 covers explosion prevention and protection.

EN 13463-1:2001

This standard sets out the basic methods and requirements for non-electrical equipment for use in potentially explosive atmospheres.

EN 50014: 1998

Harmonised standard CENELEC EN 50014: 1998 covers the general requirements for electrical apparatus for potentially explosive atmospheres.

EN 50018: 2000

Harmonised standard CENELEC EN 50018: 2000 covers the requirements for flameproof enclosure, 'd'.

EN 50020

This standard sets down guidelines for the construction and testing of intrinsically safe apparatus intended for use in potentially explosive atmospheres of gas, vapour or mist, and for associated apparatus (located outside the hazardous area or protected by another type of protection listed in EN 50014:1998) which is intended for connection to intrinsically safe circuits which enter such atmospheres.

The standard identifies which clauses of EN 50014 are applicable to intrinsically safe equipment, and to associated equipment.

EN 50021

Harmonised standard CENELEC EN 50021 covers the requirements of EExn apparatus for use in Zone 2.

EN 50281-2-1: 1998

Harmonised standard CENELEC EN 500281-2-1: 1998 covers the test methods for determining the minimum ignition temperatures of dust.

EN - European Norm

A unified set of standards has been developed in the European Union. The goal is to have standards, which are accepted, and adopted, by all European countries. These European standards are commonly referred to as the European Norm (EN). The European standards bodies provide the leadership for the development of these standards.

End user

The duties of the end user company are outlined by the ATEX 137 directive.

EPD

See explosion protection document.

Equipment category

See Category.

EPS - The Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 1996

EPS applies to the supply of equipment and protective systems intended for use in potentially explosive atmospheres. The Regulations cover both electrical and non-electrical equipment. EPS came into force in 1996 with a transition period for compliance which ends on 30 June 2003.

EPS implements the requirements of EU Directive 94/9/EC on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres (ATEX). EU Directive 99/92/EC on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres (Explosive Atmospheres Directive (ATEX 137)) has been implemented by the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR).

EPS requires that, after 30 June 2003, the responsible person (usually a manufacturer or their authorised representative) who places equipment on the market or puts equipment into service, has ensured that the essential health and safety requirements for the equipment have been satisfied. This includes carrying out the relevant conformity assessment procedure and application of the CE mark. EPS does not affect equipment that is already in use on offshore installations on 30 June 2003.

EPS applies to fixed offshore installations but not to seagoing vessels and mobile offshore units together with equipment on board such vessels or units. EPS therefore excludes FPSOs and floating production platforms (FPPs), as well as MODUs, flotels and other mobile units.

Essential Health and Safety Requirements (EHSR)

The ATEX 95 Directive defines the “essential health and safety requirements” (EHSRs) of equipment for each Category. Different types of protection can be used to respect the EHSRs of ATEX Directive according to the Zones where the equipment is installed. The goal is to prevent the creation of a source that can create an explosion. The ATEX 137 Directive directly concerns the health and safety requirements that are to be respected in different working places. The safety of an installation in a hazardous area is the result of a co-operation of the equipment manufacturer, the installer and the end user. See also New approach directives.

European standards

The European standards for ATEX are issued by the European Standards Bodies: CEN - European Committee for Standardization; and CENELEC - European Committee for Electro technical Standardization. These bodies produce harmonised standards to cover the electrical and mechanical fields and give the technical means

to achieve the objectives of EHSRs stated in the ATEX Directives. In 1996, IEC and CENELEC made a co-ordination agreement to develop new standards called the 'Dresden agreement'. It means that since September 1996 the same document is submitted to IEC and CENELEC simultaneously and the standards are published at same time and are identical.

European Standards Bodies

National standards are generally drawn up by private national standards organisations. These are in charge of standardization in their respective country.

These bodies meet within three European organizations, which are also private: CEN, the European Committee for Standardization, working in all fields except the electrotechnical field and telecommunications; CENELEC, the European Committee for Electrotechnical Standardization, and ETSI, the European Telecommunications Standards Institute.

The prime task of these organizations is the establishment and promotion of European standards, recognized by all member countries. This leads to the production of genuine European standards, which help to abolish technical barriers ensuring that, when a standard is used, the same standards are applied in all the member countries.

Ex

See EEx.

Ex d

See EExd.

Ex i

See EExi.

Ex ia

See EExia.

Ex ib

See EExib.

Ex mark

The Ex mark is the European Commission mark for products approved for hazardous areas.

Ex n

See EExn

Ex Notified Body Group (ExNBG)

Hazardous area products are approved by the Notified Bodies, known collectively as the Ex Notified Body Group (ExNBG). These are test laboratories approved, or 'notified', by the European Commission. Under the old directives, these were referred to as 'Heads of Test Laboratories' (HOTL).

Examination certificate

The Notified Body examines and tests the product to confirm it meets the standard and issues an EC-type examination certificate to the manufacturer, entitling him to display the CE mark on the product as proof of compliance.

Exd

See EExd.

Exi

See EExi.

Exia

See EExia.

Exib

See EExib.

ExNB

See Notified Bodies.

Explosion Protection Document (EPD)

The employer must carry out an assessment of risks arising specifically from explosive atmospheres. Verification of the explosion safety of an area is required before first use and sufficient documentation must be produced to show area classification, required equipment for safe working, and aims of co-ordination of measures to protect employees. This documentation can be used to compile an Explosion Protection Document (EPD) that demonstrates that explosion risks have been assessed. This should be at most 3 to 4 pages in length and contain the references to the whereabouts and mapping interpretation of the DSEAR requirements to the existing current safety management system documentation.

The Explosion Protection Document must be compiled before work commences on the site. Any major changes made to the workplace, equipment or working procedures will require the EPD to be updated. If documentation already exists to cover these changes, then this may be used instead to avoid duplication.

Workplaces which comprise areas where explosive atmospheres may form must be verified prior to being put into operation. Sites must be verified by a person or

persons competent in explosion protection. Anyone claiming competence must be able to produce evidence in the form of experience and/or professional training.

Explosive atmosphere

An explosive atmosphere can be one in the form of gases, vapours, mists or dusts, which can ignite under certain operating conditions. Potentially explosive atmospheres are found in many areas of industry, from mines and the chemical, oil and gas, and pharmaceuticals industries, to plants handling cereal, animal feed, paper, wood and coal. All these have the potential to produce gas, dust or fumes which can be ignited by a spark or flame.

The classification of the potentially explosive atmosphere depends on the frequency with which potentially explosive atmospheres may exist and the capability of the gas or dust to create an explosion.

Explosive gas and dust is classified according to its likelihood to be ignited, according to its characteristics: Minimum ignition energy; Minimum ignition temperature; Ignition temperature; and Cloud & Layer ignition temperature for dusts.

F

Flameproof

The common name for protection type EExd. This is equipment of Category 2; used in Zone 1 and Zone 2. The enclosure of this type of equipment will prevent an internal explosion, or flame, from being transmitted to the explosive atmosphere surrounding the machine, hence the name flameproof. No dangerous hot surface or sparks may be present on the outside of the enclosure at rated operation. The enclosure must withstand any pressure levels caused by such an internal explosion.

FM

Stands for Factory Mutual Research, a US based, non-profit scientific research and testing organisation.

G

G-D

A product certified for both gas and dust is marked G-D. If the equipment is to be installed in an environment that contains gas and dust, it needs to fulfil the requirements for both.

Gas Group

See Apparatus Group.

Global ATEX system

The term 'Global ATEX system' refers to the three key elements necessary for ATEX compliance: Harmonised standards, covering the EHSRs of ATEX Directive; Audits at the manufacturing facility responsible for delivering the Ex-equipment, conducted by an expert for quality Ex-system approved by the European Commission; and a notification by the European Commission to recognise bodies and test laboratories known as the Ex Notified Body Group (ExNBG).

Group

Under the ATEX Directive, equipment is designated by the type of potentially explosive atmosphere in which the equipment may be used – Group 1 for underground mines and Group 2 for surface industries. (See Apparatus Group)

H

Harmonised standard

Harmonised standards are listed in the Official Journal of the European Communities to offer guidance to conformity with a particular Directive. See European Standards Bodies and New approach directives.

Hazardous area

A location with an explosive atmosphere is referred to as a "Hazardous area" in IEC countries and "HAZLOC" in North America.

Hazardous Area Classification Drawings

See Zone drawings.

HAZLOC

Explosive atmosphere is referred to as "Hazardous area" in IEC countries and "HAZLOC" in North America.

Heads of Test Laboratories (HOTL)

See Ex Notified Body Group (ExNBG).

Health and Safety at Work Act

Any incident in relation to hazardous areas, which involves injury or damage, would fall within the scope of legislation such as The Health and Safety at Work Act. This provides for much higher penalties than incidents under the more familiar Machinery Safety Regulations.

Health and Safety requirements

See Essential Health and Safety Requirements (EHSRs).

Highly Flammable Liquids & Petroleum Gases Regulations 1972

Part of older UK legislation, replaced by the new 17 part regulations under DSEAR. This will deal with explosions and fires that are caused by dangerous substances that generate explosive atmospheres whether they are gases, vapours or dusts.

I

IEC 60079-10: 2002-6

The standard for Area Classification of explosive gas atmospheres. This standard is identical to EN 60079-10.

IEC 60079-17

IEC 60079-17 specifically covers the factors directly related to the inspection and maintenance of electrical apparatus in hazardous areas other than mines.

It is essential that such apparatus has an initial inspection and either:

- regular periodic inspections thereafter; or
- continuous supervision by skilled personnel and, when necessary, maintenance

The standard also sets out general requirements as to area classification, suitable records and documentation, qualifications of personnel, initial and periodic inspections, periods between inspections, grades of inspection (detailed, close or visual) isolation of apparatus and appropriateness of apparatus to area classification (BS EN 60079-14). Additional inspection requirements are also laid down for particular types of protection ("d", "e", "i", "p" and apparatus used in zone 2).

IEC 60079-19

IEC 60079-19 sets down standards for the repair and overhaul for apparatus used in explosive gas atmospheres (other than mines or explosives)

IEC 61241-3: 1997-05

The IEC standard for Area Classification of locations where combustible dust is present.

IEC

International Electrotechnical Commission. International standards for all electrical, electronic and related technology are issued by IEC. It is made up of more than 60 participating countries, with the major goals being defining the requirements for making the global market more efficient; improving efficiency in industrial processes; improving health and safety; and protecting the environment. An IEC Ex-scheme is in progress to harmonise the international testing and certification requirements for hazardous applications.

IEEE

The IEEE (pronounced *Eye-triple-E*) is a non-profit, technical professional association of more than 377,000 individual members in 150 countries. The full name is the Institute of Electrical and Electronics Engineers, Inc. Based in the United States; it is involved in technical publishing, conferences and consensus-based standards activities.

Ignition

The relevant parameters to characterise the potentially explosive atmosphere are:

- Frequency with which potentially explosive atmospheres may exist
- Minimum ignition energy
- Minimum ignition temperature
- Ignition temperature
- Cloud & layer ignition temperatures for combustible dust

INERIS

European Notified Body, based in France.

Inspection

The IEC standard for inspection of electrical equipment in explosive gas atmospheres is IEC 60079-17.

International standards

Equipment for explosive atmosphere is designed, installed, operated and maintained according to international standards and local regulations dedicated to this area. See IEC: International Electrotechnical Commission; EN: European Norm; and NEC: National Electrical Code for North America

Intrinsically safe

Electrical equipment is said to be intrinsically safe where its circuits are designed to limit the energy in any spark or thermal effect which can cause ignition in any of the explosive atmospheres of subgroup IIA, IIB or IIC (see Apparatus Group).

Marking EExi in accordance with standard EN 50020 indicates that the equipment is certified as intrinsically safe.

ISSeP

European Notified Body, based in Belgium.

J

July 1st 2003

1st of July 2003 is the implementation date for ATEX. Some aspects of ATEX have a further transitional period of 3 years (i.e. up to June 30th 2006). As from July 1st 2003, any equipment put on the market and intended to be used in a hazardous area in Europe must be ATEX certified. This deadline includes protective systems, components or devices that fall under the ATEX Directive.

Spare parts can be used and manufacturers can continue to manufacture spare parts without the need to have them re-assessed under ATEX. The manufacturer may supply a somewhat different version and if the function of the repaired product is not materially changed then again ATEX does not apply.

Equipment which has already been placed on the market, including that in the supply chain, may be used indefinitely providing the risk assessment under ATEX 137 permits it.

K

KEMA

European Notified Body, based in the Netherlands.

L

Layer ignition temperature

The risk of explosion in a hazardous area with combustible dust is either caused by a layer of dust or a cloud of dust.

The ignition temperature of a 5mm layer of dust must be 75°C above the marking temperature of the apparatus. For instance, if the ignition temperature is 200°C, the marking temperature must be 125°C or lower. It is the responsibility of the user to stage maintenance periods so that the dust layer does not build up above 5mm. The ignition temperatures for various types of dust are available from commercially available reference tables. Apparatus marked under American test regimes need special consideration as the apparatus surface temperature is determined with a 12.5mm layer of dust on the apparatus – European testing is carried out dust-free.

The ignition temperature for a cloud of dust must be at least 50% above the apparatus' marking temperature; or, put differently, the marking temperature must not exceed two-thirds of the ignition temperature of the dust. For instance, if the ignition temperature of the dust is 210°C, the apparatus' marking temperature must be lower than 140°C.

LCIE

European Notified Body, based in France.

LEAC – List of Equipment for Area Classification

A list (see IEC 60079-10: 2002-6) of sources of release used to determine and record the zone type and extent.

Local regulations

Equipment for explosive atmospheres is designed, installed, operated and maintained according to international standards and local regulations dedicated to this area.

UK regulations implementing the flammable/explosive elements of both the Chemical Agents Directive and the ATEX Directive came into force during 2002 and will underpin the July 2003 ATEX Directive enforcement date. The essence of DSEAR is to protect the safety of employees and others from those dangerous substances that can cause explosions or fires during the working day. The DSEAR regulations deal with explosions and fires that are caused by dangerous substances that generate explosive atmospheres whether they are gases, vapours or dusts. The 17 part regulations replace certain older UK safety legislation in the process e.g. The Highly Flammable Liquids & Petroleum Gases Regulations 1972
See also national regulations.

LOM

European Notified Body, based in Spain.

M

Maintenance

The IEC standard for maintenance of electrical equipment in explosive gas atmospheres is IEC 60079-17.

Marking

Products that meet the requirements of the ATEX Directive are marked by the manufacturer with the CE mark and the Ex mark. The following information is also required: name and address of manufacturer; designation of series or type; serial number, if any; and the year of manufacture. The CE mark should be followed by the identity of the Notified Body involved at the quality surveillance, the EX symbol, the equipment group, category and for equipment Group II, the letters G and/or D for type of atmosphere (gases, vapours, mists and dusts).

Equipment conforming to one of the recognised types of protection will be marked with EEx followed by the Type of Protection, the Apparatus Group and the Temperature class or the maximum surface temperature, or both. The identity of the Notified Body involved at the certification stage and the certificate number will be marked if appropriate.

N

National Electrical Code (NEC)

The general description of hazardous areas and protection types in the United States are presented in the National Electric Code (NEC) published by the National Fire Protection Association (NFPA). More specific requirements can be found in publications from e.g. IEEE and UL. Electrical equipment used in hazardous locations, classified according to North American rules, must be approved by an authorised body or the manufacturer. The equipment for Division 1, Zone 0 or Zone 1 areas must always be approved by an authorised body e.g. UL, CSA or FM.

National Fire Protection Association (NFPA)

US based, non-profit organisation aiming to reduce the burden of fire and other hazards and advocating scientifically-based consensus codes and standards, research, training and education. Its membership totals more than 75,000 individuals from around the world and more than 80 national trade and professional organizations

National regulations

Each country has its own regulations, which may differ. National requirements might be needed for final approval of installations e.g. in Russia, Brazil, Australia or Japan but generally relate to one of the main international standards. See also Local regulations.

NEC 500

In the U.S., the 'old' standard under the reference NEC 500 is still in existence; defining the area according to the Division system. It will soon be replaced by the new NEC 505 standard, similar to the IEC standard.

NEC

See National Electrical Code.

NEMA

National Electrical Manufacturers Association, the leading US trade association representing the interests of electrical industry manufacturers. Sets standards relating to electrically powered instrumentation equipment.

NEMKO (NO)

European Notified Body, based in Norway.

New approach directives

“New approach” directives set out essential requirements (for safety, for instance), written in general terms which must be met before products may be sold in the European Union. European standards fill in the details and are the main way for

business to meet the essential requirements. The Directives also say how manufacturers are to show that products meet the essential requirements. Products meeting the requirements are to carry CE marking, which should mean they can be sold anywhere in the European Union.

Non-electrical equipment

Non-electrical equipment is also covered by the ATEX directive. It covers any equipment that may cause ignition of explosive atmospheres by hot surfaces, friction sparks, electrostatic discharges or other means.

Non-electrical equipment risk assessment

During the three year transitional period (up to June 30th 2006) under ATEX 137, the employer should review the assessment required by regulation 5(1) to ensure that it takes account of risks from explosive atmospheres, and identify where further action is necessary to comply with regulations 7 and 11. The timing of the review should be such that it allows sufficient time to introduce any necessary changes by 30th June 2006. The assessment should be reviewed again when the changes have been made to ensure that the requirements of regulations 7 and 11 have been fully met. The record of the assessment should be updated to show the information requirement of regulation 5(4).

Non-hazardous area

An area in which an explosive gas atmosphere is not expected to be present in quantities such as to require special precautions for the construction, installation and use of apparatus. All types of standard products can be used. Hazardous area equipment is, however, also frequently used in non-hazardous areas, for instance in severe environments, corrosive atmospheres or anywhere else where reinforced protection is required.

Non-sparking (EExn)

The lowest level of Ex protection for electrical apparatus is non-sparking, so called because its design aims to prevent an internal malfunction from creating hot surfaces or sparks in normal operation. This level of protection provides an economical compromise between high safety requirements and normal industrial standards. They are for use in Zone 2 only, i.e. for areas where explosive atmospheres occur occasionally, but not during normal duty.

Norsok

Standard used in the oil and gas sector.

North American regulations

The general description of hazardous areas and protection types are presented in the National Electric Code (NEC) published by National Fire Protection Association (NFPA) and in Canadian Electric (CE Code) published by CSA. More specific requirements can be found e.g. from several IEEE and UL publications. An authorised body or the manufacturer must approve electrical equipment used in hazardous locations, classified according to North American regulations. An

authorised body e.g. UL, CSA or FM must always approve the equipment for Division 1, Zone 0 or Zone 1 areas.

Notified Bodies

Approval of design and manufacture is issued by Notified Bodies. These are independent testing laboratories recognised to perform tests, audit quality systems and issue reports and certificates of conformity.

If a product is designed for use in Zone 0 and Zone 1 or Zone 20 and Zone 21, the manufacturer must use a European Notified Body for testing and certification, usually a company that specialises in testing industrial equipment.

The notified body examines and tests the product to confirm it meets the standard and issues an EC-type examination certificate to the manufacturer, entitling him to display the CE Mark on the product as proof of compliance. A new feature of the ATEX Directive is that the manufacturer now also needs a quality system in place that must be checked by a Notified Body which may or may not be the body carrying out the EC-type examination.

To ensure that equipment is approved to the appropriate Directive, users need only to check the directive number, which appears in the CE Declaration of Conformity delivered with the product. Depending on the zone where the product is used, the number of the notified body can be stamped after the CE mark (mandatory for use in Zones 0, 1, 20 and Zone 21).

See also http://europa.eu.int/comm/enterprise/atex/nb/nblist.htm.

P

PFEER - Prevention of Fire & Explosion & Emergency Response Regulations 1995

Legislation relating to offshore installations which covers the area excluded by DSEAR. The regulations state that the person or company responsible for an installation is also responsible for protecting persons on the installation from fire and explosion and securing effective emergency response. Under the regulations, operators are required to "identify and designate areas in which there is a risk of a flammable or explosive atmosphere occurring" and control the "placing or use in such areas of electrical fixtures or other sources of ignition".

Pressurised enclosure (EExp)

An enclosure that is flushed and pressurised by a protective gas. No dangerous hot surface or sparks is permitted on the outside of the enclosure at rated operation

Product Directive 94/9/EC

See ATEX 95.

PTB (DE)

European Notified Body, based in Germany.

PUWER

PUWER replaces the Provision and Use of Work Equipment Regulations 1992. Under PUWER, employers are required to prevent or control risks to their employees' health and safety posed by workplace equipment. This includes not only equipment provided by the employer, but also any equipment brought into the workplace by the employee which they use in the course of their employment.

The Regulations require that equipment provided by employers for use at work is:

- Suitable for the intended use
- Safe for use and is maintained in a safe condition, including the need for inspections in certain situations
- Used only by people who have received adequate information, instruction and training
- Accompanied by suitable safety measures, such as protective devices, markings or warnings

Q

Quality assurance

Specific quality assurance is required for the design and the manufacturing process relating to hazardous area equipment. See audit.

R

Recognized test organisations

See notified bodies.

Repair

When a piece of hazardous area equipment has to be repaired, the end user has the responsibility to select an appropriate repair shop. See ATEX 137, Baseefa Certification Limited

Risk Assessment

ATEX 137 requires the employer to assess the risks specifically arising from explosive atmospheres. The risk assessment must cover the following:

- The probability of an explosive atmosphere occurring
- The probability of potential ignition sources being present
- A description of the intended process, installation, substances used and any possible contact between them
- The magnitude of the anticipated effects

The results of the risk assessment are used to guide the contents of the Explosion Protection Document.

S

Self-certification

For equipment that will be used only in Zone 2 or Zone 22 environments and non-electrical equipment (except combustion engines) that will be used in Zone 1 or Zone 21 environments where the requirements are less stringent, the ATEX Directive allows manufacturers to self-certify products, although third-party certification is often preferred.

Shell

Standard used by the oil and gas sector.

Sources of Hazard

The Employers' obligations in relation to ATEX include assessing the site's Sources of Hazard and likelihood of sources of ignition, classification of the area into zones and marking all points of entry, as well as producing and maintaining documentation. See ATEX 137.

T

Temperature class

Temperature class, gas	Temperature °C
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85

An Ex product should be marked with the corresponding temperature class. The temperature class corresponds to the maximum surface temperature of the product. According to the type of protection used, the temperature corresponds either to the maximum temperature of the external surface or to the maximum temperature inside. In every case, the temperature should be below the minimum ignition temperature of the explosive atmosphere where the apparatus is installed.

Temperature class, dust

Substance	Wheat	Barley	Charcoal	Corn	Sugar	Sulphur	PVC
Tcl (cloud)	420	450	500…600	400	350	240	530
T° l (5mm)	200	205	180	250	220	250	340
Max allow. Surf. Temp. for	125	130	105	175	145	175	265

Surf. Temp. for 5mm							
Temp class, dust	T125	T130	T105	T175	T145	T175	T265
Corresponding temp class, gas	T5	T5	T5	T4	T4	T4	T3

Test organisation

See Notified bodies.

Testing laboratories

See Notified bodies.

Transitional period

Although the ATEX directive was adopted in 1994, manufacturers and end users have until now been able to choose whether to follow national or European legislation. This transition period will end on June 30 2003, except for some specific clauses in the Worker Protection Directive ATEX 137 and DSEAR.

TÜV

European Notified Body, based in Germany and Austria.

Type of Protection

There are a number of different methods of protection for which standards have been or are being produced. These are as follows:

Electrical:

- ‘d’ – Flameproof
- ‘e’ – Increased Safety
- ‘i’ – Intrinsic Safety
- ‘m’ – Encapsulation
- ‘n’ – Zone 2 apparatus
- ‘o’ – Oil filled
- ‘p’ – pressurisation & continuous dilution
- ‘q’ – Sand filled

Non-electrical:

- ‘b’ – Control of ignition sources
- ‘c’ – Constructional safety
- ‘fr’ – Flow restricting enclosure
- ‘g’ – Inherent safety
- ‘k’ – Liquid immersion
- plus ‘d’ and ‘p’

U

UL

Underwriters Laboratories Inc. (UL) is an independent, not-for-profit product safety testing and certification organization, based in the United States.

V

VIK

Standard used by companies in the oil and gas sector.

VTT

European Notified Body, based in Finland.

W

Workers Potentially at Risk Directive

See ATEX 137.

Z

Zone

The ATEX 137 Directive divides hazardous environment into zones and states which categories of equipment can be used in each zone.

Atmospheres are classified into zones. Zones 0, 1 and 2 refer to gas, while Zones 20, 21 and 22 refer to dust.

Zone 0

A place in which an explosive atmosphere consisting of a mixture of air and flammable substances in the form of gas, vapour or mist is present continuously or for long periods or on a frequent basis. A zone 0 application is typically one where an explosive atmosphere exists for more than 1,000 hours per year.

Zone 1

A place in which an explosive atmosphere consisting of a mixture of air and flammable substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally. In a zone 1 application, an explosive atmosphere typically exists for between 10 and 1,000 hours per year.

Zone 2

A place in which an explosive atmosphere consisting of a mixture of air and flammable substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only. Explosive atmospheres in a zone 2 application typically, do not exist for more than 10 hours per year.

Zone 20

A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, for long periods or on a frequent basis.

Zone 21

A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally.

Zone 22

A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

Zone drawings

The requirements for hazardous area classification, zoning and labelling will come into force on July 1st 2003. Sites that were in existence prior to June 30th 2003 do not need to comply until after 30th June 2006.

Zoning

The division of a hazardous area into zones depending on the frequency with which an explosive atmosphere occurs and its duration. The overall aim is to ensure that the employees and the public are protected from fires and explosion.

It involves identifying and assessing the fire and explosion risks of dangerous substances within the operating plant. Properties of materials are to be agreed and documented. Safety measures to eliminate or reduce the risks of these substances are put in place.

Once no further improvements can be made to the operation, the plant can be put forward for risk assessment and an area classification can be carried out.