Dealing with the ATEX Directive – Negotiating the Maze of National and International Rules and Regulations can Baffle a Product Manager.

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One of the new minefields for a product manager is the mandatory European Community (EC) Harmonised Safety Compliance Directives and Standards, with the most current being ATEX directive 94/9/EC. ATEX stands for "Atmosphere Explosives" (said in French) and it is the law in the EU since July of 2003.

It has become almost impossible to complete product design and secure its timed launching into the marketplace without considering all of the compliance issues necessary for the global marketplace. Clearly, a product should first and foremost be designed to conform to all of the compliance requirements for all the targeted marketplaces, national and international. This may sound obvious, but many large and multi-national firms have lost huge contracts, big orders and even had to scrap designed products because they could not meet ATEX compliance requirements.

In some cases, the instrumentation was perfectly adequate for the task and met nearly every other safety directive; but, because it had not yet been ATEX-certified, it was unacceptable. In general, an instrument that can meet most international safety directives (Figure 1) can probably meet ATEX requirements, but it first must pass the ATEX certification process. The devil is in the details, though. Sometimes changes have to be made to meet ATEX requirements.

Figure 1: If an instrument meets design safety requirements, it can probably pass ATEX. The THZ2 and TDZ2 family of HART Temperature and Signal Transmitters from Moore Industries have acquired ATEX, cFMus (US/Canada), IECEx, CSA, and ANZEx (Australia) approvals for intrinsically-safe, non-incendive, and explosion-proof applications for Zones 0, 1 & 2.

Compliance issues and legislation are becoming increasingly complex and detail-oriented, hence more of a burden to manufacturers. We cannot describe all of the minor differences between ATEX and other requirements in this article, but we will review some of the fundamental differences between North American and European requirements.

Hasardous Area Classifications

The identification of Hazardous 'Classified' Locations in a plant is usually carried out by experts or highly qualified personnel, such as process, industrial or chemical engineers. The possibility of a hazardous atmosphere being present and its condition and duration must be established. If an area is known to not contain hazardous materials or potentially explosive atmospheres, then it is classified as a non-hazardous area or a safe location.

In the United States, the classification of hazardous locations is based on the National Electrical Code (NEC), while in Canada the Canadian Electric Code (CEC) applies. In Europe, Asia and Australia, the tendency is to follow the recommendations of the International Electro-technical Commission (IEC).

In Europe, compliance with ATEX Directive 94/9/EC is mandatory when installing and commissioning electronic or mechanical devices in hazardous locations. Hazardous areas are classified into three zones which are directly related to the predicted occurrence of when, and the duration that, an explosive atmosphere may be present in the area. These zones are:

- ZONE 0: where an explosive atmosphere is continuously present, or present for long periods of time.
- ZONE 1: where an explosive atmosphere is likely to occur in normal operation.
- ZONE 2: where an explosive atmosphere is not likely to occur in normal operation and if it does occur, it will exist only for a short time.

Furthermore, European standards require that apparatus be subdivided into two groups:

I and II. Group I is for apparatus to be used in mines where the danger is represented by methane gas and coal dust. Group II is for apparatus to be used in surface industries where the danger is represented by gas and vapour that has been subdivided into three groups: A, B and C. The following table shows a comparison between the North American and European practices, regarding the classification of hazardous locations.

	Continuous Hazard	*Intermittent Hazard*	*Abnormal-Condition Hazard*
CEC/NEC	*Division 1*	*Division 1*	*Division 2*
IEC/Europe	*Zone 0*	*Zone1*	*Zone 2*

It is important to note that in the table above, Zone 2 (IEC/Europe) and Division 2 (North America) are similar to a great extent but are not identical, while Division 1 includes the corresponding Zones 0 and 1.

Safety Methods

To minimise the risk of explosion, elimination of one or more of the components of the ignition triangle (Figure 2) is necessary. There are three basic methods of protection:

- Explosion Containment: the only method that allows the explosion to occur but confines it to a well defined area, thus avoiding the propagation to the surrounding atmosphere. Explosion/Flame-Proof enclosures are based on this method.
- Segregation: A method that attempts to physically separate or isolate the electrical parts or hot surfaces from the explosive mixture. This method includes several techniques such as pressurisation and encapsulation.
- Prevention: A method that limits energy, both electrical and thermal, to safe levels under both normal operation and fault conditions. Intrinsic Safety is the most representative technique of this method.

Electrical equipment that has been assessed, tested, and found to be in compliance with the ATEX Directive and the relevant European Harmonised Standards must be marked showing that it is:

- In compliance with the relevant and applicable safety standard/directive.
- Intended for use in hazardous or explosive atmospheres.
- Approved for certain gas groupings.
- Operational in a specific ambient temperature range.
- Assigned a certain temperature coding.

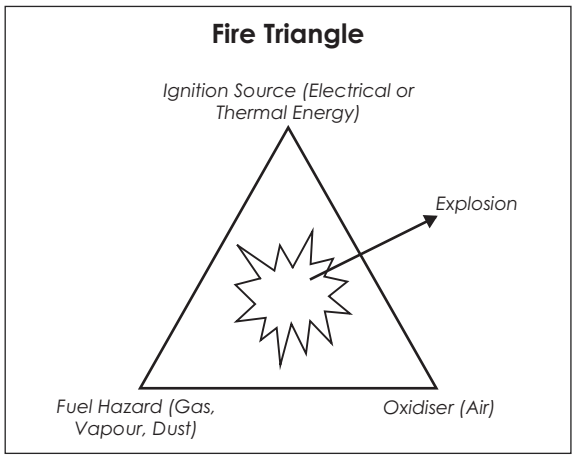

Figure 2. An explosion is any uncontrolled propagation of a combustion wave. To create an explosion there has to be fuel (i.e., an explosive gas such as hydrogen), an oxidiser (such as the oxygen in air) and a source of ignition energy (i.e., a hot surface or an electrical spark). Once the mechanism to mix the fuel and the oxidiser exists, the resulting explosion is commonly represented in 'the fire triangle' shown here.

Meeting all the Directives

As a result of the combination of company installation policies, public legislation and safety requirements, many manufacturers and end-users must deal with issues with which they are somewhat unfamiliar. New directives and amended directives in the European Union can be introduced at any time. It is the manufacturer's sole responsibility to identify the mandatory directives and qualify their applicable products for full compliance.

The degree of expertise and specialised equipment required to meet all the various directives and requirements is beyond the reach of most companies. Indeed, it is often not cost effective to hire and retain a full-time in-house specialist to handle a task or a function that may be only called on several times a year. Moore Industries, which builds instrumentation for use worldwide, has such a full-time specialist because of the multitude of products it makes and the markets it serves.

Companies may prefer to concentrate on their core business rather than having to deal with the constantly changing legislative world of compliance, approvals and certifications. Instead, they outsource their compliance requirements.

A third party is an independent certification agency neutral to both the consumer/end-user and the manufacturer. Some of the well-known and reputable testing approval agencies for ATEX compliance include

ISSeP (Belgium), SIRA (UK), LCIE (France), KEMA (Holland) and Factory Mutual (USA & UK). Product safety certification is the process of assessing the design to the specification set down in an applicable Standard or Directive.

The Changing International Scene

Many countries publish their own National Standards concerning hazardous and electrical apparatus. Some of these standards still exist and others have become superseded.

There are differences from country to country in the way in which the standards and certification procedures are implemented. Within Europe, the Committee for Electro-technical Standardisation (CENELEC) produced a series of Standards aimed at harmonising the technical approach of its member countries. On the other hand, North American approval agencies adhere to the guidelines and constraints stated by both the National Electric Code (USA) and the Canadian Electric Code (Canada).

In Australia, the Standards Association of Australia (SAA) produces National Standards, and offers a certification/approval service with its main requirements are very similar to the European Standards. Also, there exist reciprocal arrangements assuring the acceptance of test results between European bodies and North America and Australia.

ATEX is required in Europe, of course, but because many countries follow Europe's standards, ATEX is being increasingly required across Asia and other regions.

Clearly, the field of industrial safety is broad and very detail-oriented. Manufacturers are forced to adhere to numerous standards, regulations and directives in order to compete in the global marketplace and avoid liability and monetary losses caused by faulty designs and unsafe products.

Products designed and intended for installation and commissioning in hazardous locations in the European Community and many other regions must be tested and certified in accordance with the mandated ATEX Directive 94/9/EC, else they cannot be sold to the European marketplace. It is that simple: use ATEX-certified products for hazardous locations, else you'll break the law in the EU.