

The rapid approach of ATEX – gas warning instruments affected on two counts

The ATEX directives form the basis for tougher, standardized laws throughout Europe, relating both to the approval and use of all devices (not only electrical devices) in potentially explosive atmospheres. The objective of these directives in the context of potentially explosive atmospheres is, on the one hand, to remove barriers to trade in the European common market by introducing harmonized minimum product standards, and on the other hand to guarantee the occupational safety and health of workers by specifying minimum requirements. With regard to the transposition of EC Directives into national law, this article deals primarily with German regulations; in the majority of cases the names of the German ordinances will not be translated into English.

Though European Directives – with very few exceptions – are generally addressed to the member states of the EU, they have binding legal force only once they have been transposed into national law. As a result of the transposition into national law of both ATEX Directives 94/9/EC and 1999/92/EC (see above table), essential changes have come into force in the field of technical legislation, affecting both manufacturers and users of explosion-proof equipment.

Rethinking safety technology – ElexV, VbF and AcetV no longer in force

In Germany, the Occupational Safety Ordinance (BetrSichV) came into force on 2 October 2002. This represented the transposition into German law of several European Directives at once, among them 1999/92/EC. As a result, a number of familiar ordinances of the German Equipment Safety Act, such as ElexV, VbF¹ and

Directive	94/9/EG	1999/92/EG
Working title *)	ATEX 100a or ATEX 95	ATEX 118a or ATEX 137
Transposed into national law by	Explosion Protection Ordinance (11. GSGV, ExVO)	Occupational Safety Ordinance (BetrSichV)
Targets the	Manufacturer	Operator
Requirements relate to	Product quality and properties	Operational safety
As a precondition for	Placing on the market and putting into service	Supply and use
With the objective of	Removing barriers to trade	Protecting workers

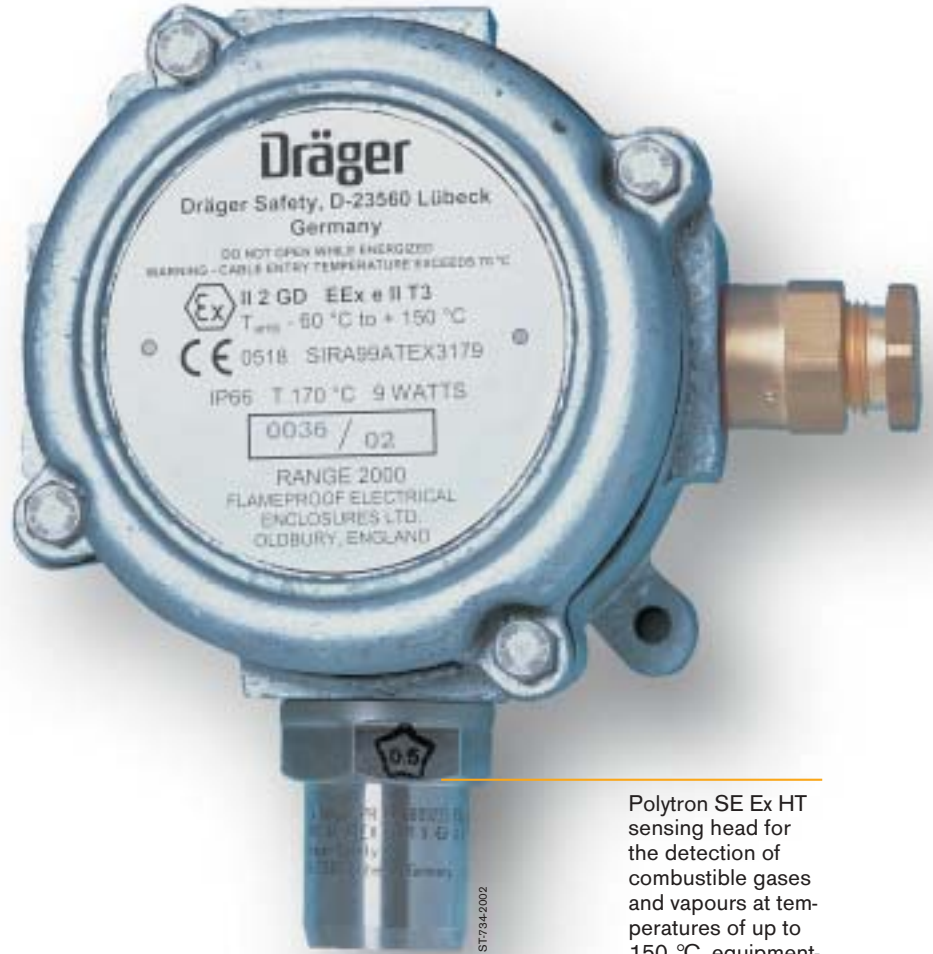
*) ATEX = “Atmosphères Explosives” (French). The numbers refer to the relevant article in the EC Contract as the legal basis. These article numbers changed following consolidation of the EC Contract on 10 November 1997. The name ATEX also appears in the certification number of the testing authorities, e.g. “DMT 02 ATEX E188 X”

AcetV, finally ceased to be in force as of 1 January 2003. Since 1996, ElexV and VbF had only existed as operating regulations anyway, no longer containing the so-called product quality requirements for equipment. These requirements had already been reformulated in December 1996 when European Directive 94/9/EC was transposed into German law in the form of the 11th Ordinance of the Equipment Safety Act (11. GSGV, also known as the Explosion Protection Ordinance, or ExVO). Like Directive 94/9/EC, ExVO is directed at manufacturers of explosion-proof equipment, prohibiting by 1 July 2003 at

¹This means an end both to the viscosity clause and the differentiation in the water solubility of combustible fluids, which can have significant consequences for the storage of solvents.

²According to paragraph 3.2 of the ATEX guidelines, putting into service means the first use of a product, and under certain conditions is therefore equivalent to placing on the market.

the latest the placing on the market and putting into service² of products not conforming to the minimum requirements of Directive 94/9/EC. These minimum requirements take on a more concrete form thanks to harmonized standards - if the requirements are met it can be assumed that the objectives of the Directive have been achieved (“assumption of conformity”). Referring to standards as a minimum requirement makes it easy to adapt more quickly to technical advances, which is why the EC type-examination certificate issued by a Notified Body contains the statement: “The essential health and safety requirements have been assured by compliance with...” (the relevant standard references then being quoted). This aspect is also reflected by the quality of the respective instructions for use, which according to 94/9/EC now also form part of the type examination. This is intended to ensure that the operator is provided with all the relevant information concerning the safe and proper use of the device or protection system in question in potentially explosive atmospheres.



Polytron SE Ex HT sensing head for the detection of combustible gases and vapours at temperatures of up to 150 °C, equipment-category II 2G (use in zones 1 and 2).

Category	Criteria	Zone	
		G (Gas)	D (Dust)
II 1G or II 1D	Equipment for use in areas in which explosive atmospheres are present continuously, for long periods or frequently. Very high level of protection: the requisite level of protection must be assured in the event of two faults occurring independently of each other.	Zone 0 Zone 1 Zone 2	Zone 20 Zone 21 Zone 22
II 2G or II 2D	Equipment for use in areas in which explosive atmospheres are likely to occur. High level of protection: the requisite level of protection must be assured in the event of frequently occurring disturbances.	Zone 1 Zone 2	Zone 21 Zone 22
II 3G or II 3D	Equipment for use in areas in which explosive atmospheres are unlikely to occur or, if they do occur, are likely to do so only infrequently and for a short period only. Normal level of protection: the requisite level of protection must be assured during normal operation.	Zone 2	Zone 22
I M1	The requisite level of protection is assured in the event of two faults occurring independently of each other. The equipment remains functional with an explosive atmosphere present.	Mining	
I M2	The requisite level of protection is assured in the case of more severe operating conditions; the equipment must be de-energized in the event of an explosive atmosphere.	Mining	

Graduated safety requirements: equipment-categories

Product labelling must now include not only the type of protection but also the “equipment-category”. This allows users of the product to determine beyond any doubt whether the product is suitable for use in an Ex zone of their designation. In equipment-group II (general explosion protection, excluding mining) there are three distinct categories with graduated safety requirements, classified according to the cause of the potentially explosive atmosphere as “G” (gas, vapour or mist) or “D” (dust).

Equipment-category II 2G, therefore, states that this product can be used in Zone 1. For use in Zone 21, the product must be labelled as II 2D. Discussions as to whether an intrinsically safe product with protection type “ia” can be used in Zone 0 are now a thing of the past, as only equipment labelled II 1G can be used there. Only two categories, I M1 and I M2 (M stands for mining), exist for equipment for use in underground parts of mines as well as those parts of surface installations of such mines endangered by firedamp and/or combustible dust.

Note the distinction between zone and equipment-category now introduced as a result of the manufacturer- and user-specific Directives.

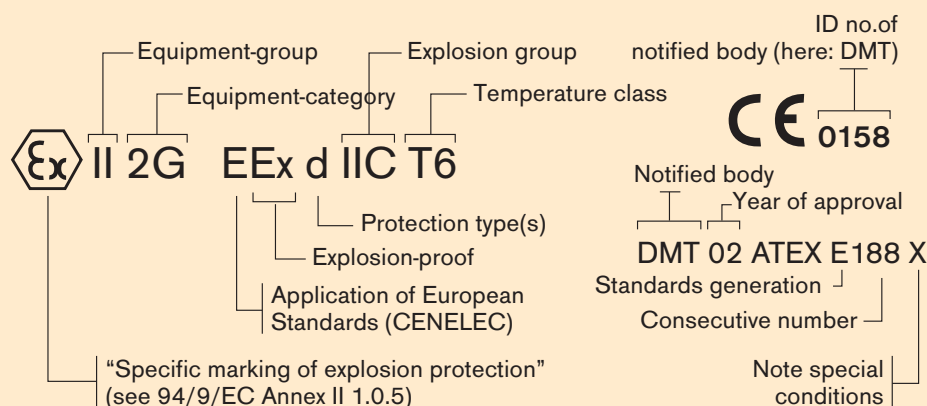
Conformity assessment

The EC type-examination certificate, however, is only part of the conformity assessment procedure (comprising different modules for the different equipment-categories). For equipment-categories 1 and 2, for example, assessment, certification and regular auditing of the manufacturer’s quality system by the Notified Body is a prerequisite for successful completion of the conformity assessment procedure.

For category 3 equipment (for use in Zone 2 or Zone 22), type examination does not necessarily have to be performed. In this case, the manufacturer himself can confirm conformity by following the procedure for “internal control of production”, though this places a high level of responsibility on the manufacturer: he has a duty to prove compliance with the Directive’s objectives, e.g. by applying the relevant standards, and must retain the relevant documentation for a period of at least ten years following disconti-



Polytron SE Ex LC sensing head for the detection of combustible gases and vapours in the 0 to 10% of LEL range, equipment-category II 2G (use in zones 1 and 2).



Continuation of production as evidence should this be required at a later date. The former regulation, allowing a manufacturer's declaration to be issued in accordance with VDE 0165 for Zone 2 or Zone 11³ (previously the dust explosion zone), is no longer valid.

Once the requirements of Directive 94/9/EC have been met, the manufacturer issues a declaration of conformity and affixes the CE mark, followed by the identification (ID) number of the Notified Body, to the product. This also applies to equipment-category 3, though the ID number does not have to be included in the case of internal control of production.

The CE mark and declaration of conformity are necessary conditions for products to be placed on the market within Europe. Products not compliant with Directive 94/9/EC will no longer be available in Europe⁴ from 1 July 2003. For new sales, the previous certificates of conformity will no longer be valid, not to mention national approvals such as test certificates from the PTB (Germany's national metrology institute) relating to gas sensing heads with protection type Ex sd 3n G5. However much a customer may wish to purchase a

transmitter of the old type, this will not be available, neither as an upgrade nor as a replacement device. Spare parts, on the other hand, are not affected by the Directive because they are protected as products already sold.

Gas warning instruments

One aspect that has been common practice in Germany for years is now to come into force Europe-wide: in Annex II, paragraphs 1.5.5 to 1.5.7 of Directive 94/9/EC, "Requirements in respect of devices with a measuring function for explosion protection" are detailed which are applicable if an (explosion-proof) gas warning instrument monitors the concentration of a combustible gas or vapour, takes automatic or organizational measures if an alarm threshold is violated (e.g. by switching on a ventilation system), and is used in this context as an essential integral part of a safety concept. Although this constitutes a procedural or organizational safety measure (which would normally be subject to Directive 1999/92/EC), in this case a product quality requirement is laid down which can be proven and certified by the Notified Body by, for example, meeting the requirements of the standards in

the EN 50054 ff series ("Aptitude testing"). This series of standards, which in the foreseeable future will be superseded by EN 61779 (Parts 1 to 5), is "harmonized within the Directive 94/9/EC" together with many other standards. In other words, the central component of a gas warning system, even though it is not itself installed in a potentially explosive atmosphere, is subject to the requirements of 94/9/EC whenever it is used for preventive explosion protection in accordance with Article 3 of 1999/92/EC, and this is also the case for oxygen measurement in inertization applications (EN 50104).

Such gas warning instruments, therefore, are accorded special status: they not only have to have an explosion-proof design, but are also able to measure the concentration of combustible gases and vapours (and oxygen), and as such can be used for concentration limitation: in other words, they are subject to the ATEX Directive on two counts. This is also reflected in the number of standards harmonized within the scope of ATEX 100a – of the 29 standards currently (Sept. 2002) in existence, 8 contain requirements in respect of gas warning instruments.

³ The previous two dust explosion zones 10 and 11 have been redefined and are now divided into three zones; the frequently made claim that Zone 10 is Zone 20, Zone 11 is Zone 21 is incorrect.

⁴ To be more precise: in the 15 states of the European Union, plus Norway, Iceland and Liechtenstein (EEA states). Switzerland has also harmonized its legislation – with the exception of CE marking – to the ATEX Directives.

Marking

Marking of ATEX compliant equipment contains the approval number (including the word ATEX), the explosion-proof ID and the equipment-category, and the CE mark with the Notified Body's ID number.

Obligations of the operator

The entry into force of ATEX 118a and the German Occupational Safety Ordinance gives operators significant responsibility for their employees. They must adapt their systems to meet the essential safety requirements of the Directive, and take graduated measures (first avoiding ignitable atmospheres, then avoiding ignition sources and, finally, limiting the impact of any explosion) to ensure that hazardous situations do not occur in the first place. In Germany, this is essentially nothing new, since the Accident Prevention Regulations and Explosion Protection Regulations already contain such requirements. What is new, however, is the fact that the operator, as the person responsible for the safety of the installation, is required to prove conformity with the Directives by issuing a comprehensive explosion protection document.

This document must demonstrate

- that the explosion risks have been determined and assessed, and that adequate precautionary measures have been taken,
- that the installation has been assessed with respect to the likelihood of an explosive atmosphere occurring and that the appropriate zones have been identified,
- that the installation is designed, operated and maintained with due regard for safety,
- that organizational measures, such as the training of workers, have been taken.

The scope of this explosion protection document, which must be kept up to date at all times, does not depend on the size of the plant, and must be compiled even if just one person is affected.

In compiling this explosion protection document, the guidelines to the ATEX 118a are helpful, as are the Explosion Protection Regulations (BGR 104, edition 07/2000, section E6). Seminars on this subject are also already on offer.

Conclusion

Within the framework of European harmonization, the essential safety and health requirements in potentially explosive atmospheres must be met, and the operator must be provided with appropriately designed, ATEX marked equipment for safe and proper use.

Once the transitional periods expire and the two ATEX Directives are transposed into German law, a comprehensive set of harmonized laws will come into force which will place considerable responsibility on the operator with regard to operational safety and on the manufacturer with regard to the product's characteristics, properties and quality. ■

References:

ATEX 100a = ATEX 95 = 94/9/EG Directive on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres (1994, Official Journal of the European Communities L 100 (19.4.1994) p. 1)

Guidelines on the application of Directive 94/9/EC (May 2000), 133 pages

ATEX 118a = ATEX 137 = 1999/92/EG Directive on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres (1999, Official Journal of the European Communities L 23 (28.1.2000) p. 57)

Non-binding guidelines for proven procedures in respect of implementation of Directive 1999/92/EC, at the order of the European Commission, Draft (October 2002), 68 pages

BetrSichV

Verordnung zur Rechtsvereinfachung im Bereich der Sicherheit und des Gesundheitsschutzes bei der Bereitstellung von Arbeitsmitteln und deren

Benutzung bei der Arbeit, der Sicherheit beim Betrieb überwachungsbedürftiger Anlagen und der Organisation des betrieblichen Arbeitsschutzes (2002, BGBl. I S. 3777)

ElexV

Verordnung über elektrische Anlagen in explosionsgefährdeten Bereichen (1996, BGBl. I S. 1931)

VbF

Verordnung über Anlagen zur Lagerung, Abfüllung und Beförderung brennbarer Flüssigkeiten zu Lande (1996, BGBl. I S. 1937)

AcetV

Acetylenverordnung (2001, BGBl. I S. 2785)

Ex-RL= BGR 104

Explosionsschutz-Regeln, Regeln für das Vermeiden der Gefahren durch explosionsfähige Atmosphäre mit Beispielsammlung

EN 50 054 bis EN 50 058

Electrical apparatus for the detection and measurement of combustible gases - General requirements and test methods, and performance requirements

EN 61779

Electrical apparatus for the detection and measurement of flammable gases (July 2001), 5 parts

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