



## ATEX 114 - Product Directive

From April 20, 2016 on, all explosion proof products which are being placed on the European market must comply to the new Directive 2014/34/EU. This new EU Directive belongs to the New Legislation Framework (NLF) and is mandatory being implemented in the National Legislation of Member States in the European Union. In the Netherlands this is "Warenwetbesluit Explosieveilig Materieel 2016", in the UK implementation by Statutory Instrument. Five of the most important changes, comparing to the old Directive 94/9/EC are:

1. Requirements to importers of products which have been produced outside the EU.
2. More strict accreditation requirements to the Notified Bodies.
3. More emphasis on the monitoring of compliance by Market Surveillance Authorities.
4. The EU Declaration of Conformity replaces the EC Declaration of Conformity.
5. The EU-Type Examination Certificate replaces the EC-Type Examination Certificate.

Due to the fact that for Manufacturers, the Essential Health and Safety Requirements (EHSRs) don't change, there is no need for re-certification. The so-called 'State of the Art' will be followed by the use of Standards which are listed in the 'Official Journal' belonging to Directive 2014/34/EU to prove 'Presumption of Conformity'. For the most recent 'OJ' you can follow the link on [www.bartec.nl](http://www.bartec.nl) to the European Union online. After the transition date, the existing EC-Type Examination Certificates remain valid; only after a re-issue, - because of a change or extension -, there will be a change from EC to EU-Type Examination Certificate. The mandatory use of Equipment Groups and Product Categories remains unchanged as well. The Product Categories are related to the international well-known Equipment Protection Levels (EPL). For an overview and application of the correct level of protection; see Table 1.




## ATEX 153 - Social Directive



The content of Directive 1999/92/EG remains unchanged. Only the numbering of what was known in the market as ATEX 137, changes in to ATEX 153. The reason for this change is the change in the clauses of the Treaty of Lisbon, where clause 153 deals with European Occupational Health and Safety. This Directive describes the minimum health and safety requirements for workers in hazardous areas. In the Netherlands this Directive has been implemented in the National Legislation by 'ARBO Besluit'. In the UK by DSEAR, which is Dangerous Substances and Explosive Atmospheres Regulations. Employers must draft and maintain a so-called 'Explosion Protection Document' (EPD). Important aspects are in this matter:

1. Basic Methodology, with a list of possible ignition sources, according EN 1127-1.
  2. Zoning, according EN-IEC 60079-10-1 (gas) and 60079-10-2 (dust). For the Netherlands there are additional guidance documents 'Nederlandse Praktijk Richtlijnen' which are available in NPR 7910-1 (gas) and 7910-2 (dust).
  3. Design, selection and installation of electrical equipment, according EN-IEC 60079-14. Important is the identification of 'Personnel Competency' and new; the 'Initial Inspection'.
  4. Inspection and Maintenance of electrical equipment, according EN-IEC 60079-17.
  5. Repair and Overhaul of electrical equipment, according EN-IEC 60079-19.
- In these listed aspects is the so-called 'Life Cycle Approach' for products visibly applied.


## Marking

Equipment must according Directive 2014/34/EU being marked with at least the **CE** marking. With a **CE** marking, the manufacturer identifies the product being produced in compliance with all relevant European Directives. For this reason, it may be seen as a 'passport' for access to the EU market. Installers and users are allowed to install and put into service **CE** marked equipment only! For category 1 and 2, the **CE** marking will be followed by the number of the Notified Body (e.g. 0344 for DEKRA) which is in charge of the assessments for the Production Quality Assurance Notification. After that, the European Explosion Protection Mark () right away followed by the Equipment Group II (for surface industry) and category 1, 2 or 3 with additional G (for gas) or D (for dust). For an overview see Table 1. Equipment Group I (for mining industry) exists as well. In such situations there is category M1 or M2 applicable. In the Netherlands we deal with surface industry of Group II only. After this mandatory marking according the Directive, the marking according the standard(s) will follow, when the manufacturer applies the standard(s) to prove Presumption of Conformity to the Essential Safety Requirements of the Directive.

The applied Type of Protection will be marked with Ex, followed by the character which belongs to the specific Type of Protection, then the gas- or dust group, the temperature class (gas) or maximum surface temperature in °C (dust). The markings will be addressed on the equipment according clause 29 of the General Requirements standard; EN-IEC 60079-0. In the last editions of this standard, the international Equipment Protection Level, being G (gas) or D (dust), followed by either a, b, or c is required to be marked as well. For an overview; see Table 1. The manufacturer is mandatory to identify the company by name and address on the type label of the product. Track- and Traceability is a priority of the new Directive; products must contain at least either a batch number or an unique production number. The year of production is mandatory too. To the delivery shall be an Installation Instruction and the EU Declaration of Conformity mandatory being supplied.

a		0344	<b>BARTEC</b>	BOLEWERF 25 NL 2987 VD RIDDERKERK <a href="http://www.bartec.nl">www.bartec.nl</a>	
b		BARTEC C-ASSEMBLY			
c		II 2(1)G Ex de [Ia Ga] IIC T6 Gb		IP66 2015	f
d		DEKRA 13 ATEX 0209		24VDC	g
e		SERIAL Nr.: 3xxxxxx-yy-zz		-20°C < Ta < +40°C	h
		SEE INSTALLATION INSTRUCTION DOCUMENT			

### Explanation of the markings:

- a. The **CE** marking and the number of the Notified Body assessing the Production Location of the Manufacturer (0344 = DEKRA Certification in Arnhem)
  - b. Type identification of the product
  - c.  identification for explosion proof product
    - 1 for surface industry
    - 2 category 2, completed with G, is suitable for Zone 1

(1) category 1, however between brackets because of so-called 'associated apparatus' in this application apparently to the 2G construction included (e.g. a transmitter power supply (1)G [Ex ia Ga] IIC, which may feed a transmitter up to Zone 0

G for Gas hazardous areas

Ex explosion proof according EN-IEC 60079 series of standards
  - d. flameproof encapsulation in combination with
  - e. increased safe termination enclosure (erhöhte Sicherheit)
- [...] an associated apparatus is applicable
- ia intrinsic safe circuit with level of protection 'a' additionally marked
- Ga Equipment Protection Level G (gas) level of protection 'a' = very high
- IIC suitable for gas group IIC
- T6 temperature class T6
- Gb Equipment Protection Level of this final product: G (gas), level of protection 'b' = high
- d. The EC- or EU-Type Examination Certificate applicable after proto type examination.
  - e. The serial- or unique production number (e.g. xxxxxxx = ordernumber, yy = position number, zz = optional serial number)
  - f. IP rating (IP 66) (= dust tight at 20mbar under-pressure and hose water tight) and year of production
  - g. Power supply ratings as an important indication to the installer
  - h. The ambient temperature range in which the product operates safely

### Remark:

- When you find an 'U' behind the certificate number, you're dealing with a so-called 'component' certified product; these products may not being putted into service without any further evaluation. Additional evaluation or examination with an equipment certificate is required. Such products are also recognizable by having no **CE** marking and no temperature class nor maximum surface temperature indication.
- An 'X' behind the certificate number, indicates that the installer/user must be aware of 'specific conditions of use'. You can find these conditions both in the installation instruction (manual) as well as in the examination certificate belonging to the product. Such a product is already 'equipment' certified and does not need any additional evaluation or examination, but fulfilling the 'X' conditions!



Relation between ATEX 153 (former ATEX 137) and ATEX 114 (former ATEX 95)									
Classification according NPR 7910		 ATEX 153 zone		Classification according the product standards		 ATEX 114 category		EPL (Equipment Protection Level)	
Percentage of the operating time	Source of Release	Level of Protection		Gas		Dust			
		Gas	Dust	Gas	Dust	Gas	Dust		
>10%	Continuous	0	20	very high	1G	1D	Ga	Da	
0,1 – 10%	Primary	1	21	high	2G	2D	Gb	Db	
<0,1%	Secondary	2	22	normal	3G	3D	Gc	Dc	

Table 1

Gas groups, temperature classes and their relation						
Group	T1 (450°C)	T2 (300°C)	T3 (200°C)	T4 (135°C)	T5 (100°C)	T6 (85°C)
I	Methane					
	Acetone	Butane	Petroleum	Acetaldehyde		
	Ammonia		Diesel oil			
	Ethane		Kerosene			
	Ethylacetate		Oil fuel			
	Methanol		Hexane			
IIA	Propane					
	Styrene					
	Toluene					
	Coal gas	Ethylene	Sulphuretted-hydrogen	Ethylether		
	Carbon-monoxide	Propylene-oxide				
IIB	Hydrogen	Acetylene				
	Carbon-disulphide					

Table 2

Gas- and dust groups			
Environment	Gas/Dust subdivision	Permissible equipment group	Representative substance
Underground	I	I	Methane (Mining)
	IIA	IIA, IIB or IIC	Propane, Butane
	IIB	IIB or IIC	Ethylene, Coal gas
Gas, surface	IIC	IIC	Hydrogen, Acetylene
	IIIA	IIIA, IIIB or IIIC	Tobacco, coarse sawdust
	IIIB	IIIB or IIIC	Milk powder
Dust, surface	IIIC	IIIC	Graphite powder (Toner)

Table 3

Determination of max. allowable surface temperature for dusts		
EN-IEC 60079-14	Safety margin	Example "Lignite"
$T_{max}$ for dust 'X'	$T_{max} = 2/3 \times T_{ignition\ dust\ cloud\ 'X'}$	$T_{max} = 2/3 \times 380^{\circ}C = 254^{\circ}C$
$T_{max}$ for dust 'X'	$T_{max} = T_{smouldering\ 5\ mm\ dust\ layer\ 'X'} - 75^{\circ}C$	$T_{max} = 225^{\circ}C - 75^{\circ}C = 150^{\circ}C$
The lowest result for $T_{max}$ is leading!		

Table 4

Dutch Practice Guidances and list of applicable standards		
EN-IEC	Type	Description – Standard header title: "Explosive atmospheres"
60079-0	-	Equipment – general requirements
60079-1	Ex d	Equipment protection by flame proof encapsulation 'd'
60079-2	Ex p	Equipment protection by pressurized enclosure 'p' px = reduction of EPL Gb to industrial py = reduction of EPL Gb to EPL Gc pz = reduction of EPL Gc to industrial
60079-5	Ex q	Equipment protection by powder filling 'q'
60079-7	Ex e	Equipment protection by increased safety 'e'
60079-10-1	-	Classification of areas: explosive gas atmospheres
60079-10-2	-	Classification of areas: combustible dust atmospheres
60079-11	Ex i	Equipment protection by intrinsic safety 'i'
60079-13	Ex p	Equipment protection by pressurized room 'p' or artificial ventilation 'v'
60079-14	-	Design, selection and erection of electrical installations
60079-15	Ex n	Equipment protection by type of protection 'n' nA = non Arcing, nC = enclosed construction, nR = restricted breathing
60079-17	-	Inspection and maintenance of electrical installations
60079-18	Ex m	Equipment protection by encapsulation 'm'
60079-19	-	Equipment Repair, overhaul and reclamation
60079-28	Ex op	Protection of equipment and transmission systems using optical radiation op is = inherent safe, op pr = protected, op sh = with interlock protection
60079-30-1	-	Electrical resistance trace heating – General and testing requirements
60079-30-2	-	Electrical resistance trace heating – Application guide for design, installation & maintenance
60079-31	Ex t	Equipment dust ignition protection by enclosure 't'
ISO/IEC 80079-34	-	Application of quality systems for Ex product manufacture
ISO/IEC 80079-36	h	Non-electrical equipment – Basic concepts and requirements
ISO/IEC 80079-37	c, b, k	Non-electrical type of protection – constructional safety 'c', Control of ignition source 'b' and liquid immersion 'k'
NPR 7910-1		Classification of gas hazardous areas
NPR 7910-2		Classification of dust hazardous areas
EN 1127-1		Explosion prevention and protection: basic concepts and methodology
EN 13463		Non-electrical equipment for use in explosive atmospheres (be replaced by 80079-36 & 37)

Table 5



For more information regarding explosion safety:

[www.bartec.nl/exinfo](http://www.bartec.nl/exinfo)

## The five most common types of protection

### Ex d



Type of protection **Ex d** consists of a flame proof enclosure which may contain general purpose electrical components, which may have, under normal operation, hot spots and sparking elements. A flameproof enclosure is not pressure tight, however a breathing construction. When an explosive atmosphere inside the enclosure may ignite, the construction is strong enough to keep the dynamic explosion inside. The pressure- and temperature rise will be released over the length and width of the standardized flame proof joints (being the threads or flat flanges). These joints are critical parts which ensure that the surrounding atmosphere can't be ignited. (examples: switches, motors, control and distribution panels etc.)

### Ex e



Type of protection **Ex e** being an increased safe construction and applicable to equipment which is, - under normal operation -, not able to spark. Electrical connections like terminals, do need to have an increased safe construction to make sure that conductors remain clamped in the terminal even when a force being applied on the wire. Very important are also the minimum creepages and clearances. For this reason an Ex e enclosure for non-insulated conductors must maintain a minimum degree of IP 54 and must have sufficient impact strength. Eventually occurring high temperatures (hot spots) will be recorded within the temperature class of the equipment. Applicable for gas explosion safety only. (examples: junction boxes, shorted cage motors)

### Ex i



In type of protection **Ex i** the electrical energy in an electrical circuit is too small for being able to ignite the explosive atmosphere. Limitation of the energy takes place by limiting the voltage and the current by the use of zener diodes and resistors in so-called safety barriers or galvanic isolators. Ex i circuits normally are recognizable being marked in clear blue colour. Applicable for either gas or dust explosion proof applications. (examples: transmitters, NAMUR proximity sensors)

### Ex p



Type of protection **Ex p** is a method for equipment, which under normal operation can spark or have hot spot temperatures, being placed in an enclosure with a little overpressure. Hazardous (atmospheric) gas-or dust mixtures can't enter the enclosure. For gas application the entire enclosure must five times being purged with a protective gas (clean, dry air or inert gas) before powering the internal equipment. For dust application a purge time is not applicable; a visible clean internal enclosure may be closed and powered. In applications with Ex p the ignition source and the explosive atmosphere are always separated. (examples: analyse equipment, switch panels with powerful variable speed drives)

### Ex t



Type of protection **Ex t** offers 'protection by enclosure' with a sufficient tight (ingress protection rating) against dust; it is for dust explosion safety applicable only. In basis the enclosure must maintain a sufficient minimum IP degree. An Ex t enclosure may under normal operation contain sparking or hot spot creating equipment. The internal heat dissipation is important when determining the maximum applicable surface temperature of the total equipment. The manufacturer must mark this maximum surface temperature as an absolute value in degrees Celcius on the type label of the Ex t enclosure. (examples: control panels, junction boxes)



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