

Safety requirement VV 16 Working and staying Atex-zones	 Bales/Pelt
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1 PURPOSE

Describe the conditions that employees must meet in order to carry out work or to stay in ATEX zones

2 SCOPE

The requirements of this safety regulation apply to Nyrstar Belgium's premises.

3 DEFINITIONS

TRA: Task Risk Analysis

LEL: Lower Explosive Limit

ATEX: ATmosphères Explosibles

Marked area: Area containing one or more installations surrounded by a zoned area ([explanation § 7.2](#))

Zoned area: Zone around an installation within which an explosive atmosphere may occur. Size and class of the zone are determined based on the requirements of [ATEX 153](#). ([explanation § 7.2](#))

4 INTRODUCTION

Within the various departments of Nyrstar Balen and Pelt there is a risk of gas explosion and dust explosion as a result of the presence or formation of explosive gas mixtures or dust mixtures. In accordance with the requirements of the European Directive 1999/92/EEC (ATEX 153), Nyrstar Balen and Pelt has taken measures to control the gas and dust explosion hazard. [As for the equipment present, this should comply with Directive 2014/34/EU \(ATEX 114\)](#).

5 CLASSIFICATION OF THE DIFFERENT ATEX ZONES

5.1 Gas explosion hazard:

Zone 0

An area where an explosive atmosphere consisting of a mixture of flammable substances in the form of gas, vapor or mist with air is present continuously, for long periods or repeatedly.

Zone 1

A space in which an explosive atmosphere consisting of a mixture of flammable substances in the form of gas, vapor or mist with air is likely to be present occasionally under normal operation.

Zone 2

A space in which the presence of an explosive atmosphere consisting of a mixture of flammable substances in the form of gas, vapor or mist with air is not likely to occur in normal operation and where, if it does occur, the phenomenon is short-lived.

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5.2 Dust explosion hazard:

With the dust explosion we are talking about the same hazard sources as with the gas explosion only the zonings in this case are:

Zone 20

An area where an explosive atmosphere consisting of a cloud of combustible dust in air is present continuously, for long periods or repeatedly.

Zone 21

A space in which an explosive atmosphere, in the form of a cloud of combustible dust in air, may be present occasionally in normal operation.

Zone 22

A space in which the presence of an explosive atmosphere in the form of a cloud of combustible dust in air is not likely in normal operation and, if it does occur, the phenomenon is short-lived.

A dust explosion will only take place if a number of factors coincide, i.e.:

- An explosion hazardous mixture of dust and air
- An effective source of ignition
- Sufficient confinement to build up pressure

Fine dust, for example zinc dust in the Purification – Logerij, licorice drop and gelatin in the Zinkhallen and Sulphur in the Roosterij can possibly cause a dust explosion hazard

6 GENERAL EVACUATION ALARM:

At the Leaching department, a general hydrogen evacuation alarm applies to the Purification department. This alarm is based on the measurement of the formation of hydrogen gas at certain places in the Purification. If this alarm goes off, one must leave the department immediately and report to the leaching control room. Continuation of the work is not permitted. The general hydrogen evacuation alarm overruled the reading of the personal explosion meter or of the continuous measurement during work

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7 PRESCRIPTION

7.1 Marked area designation

The location in which the zoned areas are located are provided with EX pictograms. (see example below). These icons are present in the most obvious places where one enters the marked area. These areas are also fenced by walls, fencing, chains or yellow lines where this pictogram is always found.



For marked areas where an Explosion Meter is mandatory, an additional sign is hung (e.g. below).

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The zone layout per equipment within the yellow marked area is clearly mapped in the control room. (for an additional explanation of the marked areas and the zoning see section 8.)

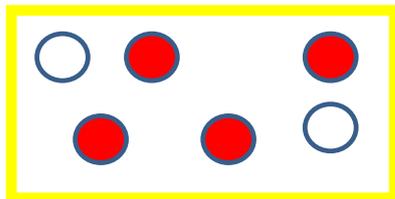
Explanation of marked area and zoning



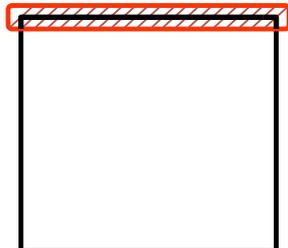
Marked area: yellow continuous stripe, 10cm



Department containing 1 marked area within which there is one EX zone. The red circle shows the ex-zone



Department containing several EX zones Here it has been decided to mark the entire zone



Example of an EX zone; The red shaded area is the area where explosive gas can lead to an explosion. The size of the shaded area depends on the following factors i.e. type of gas, leakage flow, nature and form of obstacles and relative vapour density of the gas

7.2 Equipment requirements in zoned areas

Equipment in zoned areas must meet certain requirements. Devices that may be used in zoned are recognizable by the Ex logo that is depicted on it.



The requirements for explosion-proof equipment are complex and depend, among other things, on the zone in which one works and the properties of the explosive substance. Employees in charge of the maintenance or installation of equipment have received additional training for this purpose.

Details of the requirements are set out in 10 the Annex.

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8 WORK / STAY IN GAS-ZONED AREAS:

8.1 Stay within the marked areas (gas explosion)

The location in which the zoned areas are located are marked as described in section 5.1.

If in the areas where an explosion meter is to be worn, the measurement indicates that the ambient atmosphere contains more than 10% LEL, one must leave the area and report this in the Control Room.

In the areas where there is a risk of dust explosion, wearing these personal explosion meters is not in force. Here the requirement is that the area may not be entered or must be abandoned if dense dust clouds are observed.

8.2 Work within the gas-zoned areas

For carrying out work in gas-zoned areas, the following requirements apply if the installation has not been made gas-free:

- During work within the zones, a continuous measurement must be carried out at all times. For work within a marked area but outside the zone, a release measurement is sufficient.
- In the zoned areas, fire-hazardous work is not permitted. In such cases, section 6.3 is in force and parts or the entire department will have to be made gas-free.
- In the event of fire-hazardous work in the area marked but outside the zoned area, a Task Risk Analysis (TRA) must be carried out. In this TRA, all risks that occur during the work must be identified and estimated according to the Nyrstar methodology. In particular, attention should be paid to the probability of spark spreading to the zoned area. The control measures and PPE should also be named and described. After the TRA has been carried out, it should be discussed with all parties involved.
- For work in zone 0, the same rules apply as above, but must always be worked with explosion-proof tools.
- Scaffolding in zone 1 and zone 2 is permitted provided that a continuous measurement takes place. It is important that the measurement takes place in the immediate vicinity of the zoned area. In this case, the continuous measurement can be replaced by the personal H₂ sampler. Scaffolding in zone 0 is only permitted if explosion-proof tools and explosion-free scaffolding material are used. Overview of permitted activities in zoned areas (gas explosion).

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Activity	Zone 0	Zone 1	Zone 2	Gas-free installation
Fire hazard work (risk of spark spreading) such as welding, grinding, cutting and drilling, ..	X	X	X	TRA CLEL
Sparking tools without spark dispersion, electro sleeves	X	Clel	Clel	SLAP
Scaffolding with non-explosion safe scaffolding material or tinkering with non-explosion-proof material	X	Clel	Clel	SLAP
Working with <u>explosion-proof</u> equipment only (see requirements section 5.2) and non-sparking tools	SLAP	SLAP	SLAP	SLAP

X = not permitted; TRA = taak risk analysis; LEL = toetane after LEL release measurement; CLEL = continuous LEL measurement

8.3 Making gas-free

In order to make certain activities, for example fire-hazardous work, possible, the department or parts of the department can be made gas-free. This means that by taking measures such as stopping reactions, shutting down processes and rinsing or inerting vessels/reactors, the conditions under which gas can be released are removed. This type of work / actions must be preceded by a TRA.

Part of making the department gas-free is always measuring the concentration of explosive gas before the start of work. If it cannot be ruled out that gases are still formed by after-reaction, then continuous gas must be measured at strategically chosen points.

In the event of fire-hazardous work, always continue to carry out continuous gas measurement.

9 WORK IN ZONED AREAS (DUST EXPLOSION)

In areas where there is a dust explosion hazard, the wearing of a personal explosimeter is not in effect. Here the requirement is not to enter or leave the area if dense dust clouds are observed.

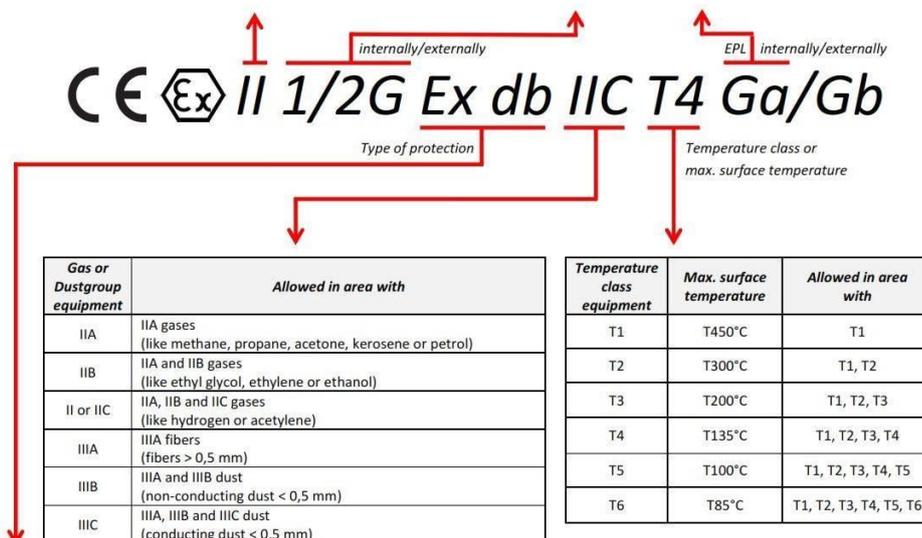
When working in an area where a dust explosion can occur, a golden rule of thumb is: visibility less than 1 meter = explosive dust cloud. Activities such as unloading trucks, blowing pipes, sending zinc dust, etc. must be stopped immediately. If work or a combination of activities (concurrency) has to be carried out in which there is a high risk of heavy dust formation, a TRA must be carried out before the start.

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10 ATTACHMENT

Equipment purchased and suitable for use in explosion-prone areas has a marking as below. The most important parameters for assessing suitability in a particular zone are indicated

Application	Equipment group acc. to ATEX 114	Environment	Group acc. to EN 60079-0	Equipment category	Equipment Protection Level	Allowed in zone
Mining	I	Gas and dust	I	M1	Ma	-
				M2	Mb	-
Industry	II	Gas, vapour and mist	IIA, IIB or IIC	1G	Ga	0, 1 and 2
				2G	Gb	1 and 2
				3G	Gc	2
		Combustible Dust	IIIA, IIIB or IIIC	1D	Da	20, 21 and 22
				2D	Db	21 and 22
				3D	Dc	22



Type of explosion protection					
Gas (electrical)		Dust (electrical)		Gas or Dust (non-electrical)	
Ex d*	Flameproof	Ex t* of tD A2x	Protection by enclosure	b	Control of ignition source
Ex e*	Increased safety	Ex p of pD	Overpressure	c	Constructional safety
Ex i*	Intrinsic safety	Ex i* of iD	Intrinsic safety	k	Liquid immersion
Ex m*	Encapsulation	Ex m* of mD	Encapsulation	Ex h	Mechanical protected with b, c or k
Ex p	Overpressure			d	Flameproof
Ex q	Powder filling				
Ex o	Liquid immersion				
Ex nA, nR, nC	Non-arcing, restricted breathing, enclosed construction				
Ex op is	Optical radiation				

* Protection methods can be supplemented with the EPL, eg Ex ia for use in Zone 0, or Ex ib and Ex db in Zone 1, or Ex mc and Ex dc for use in zone 2.

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 owportrait. The main parameters for the assessment of suitability in a given zone are indicated here.

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