Standards, zone definitions & product markings

World standards & what they mean

In this Section we will outline the different Standards used throughout the world and what it means for products specified for use in explosive atmospheres. The map of the world opposite, illustrates the Standards that are generally used in these regions.

ATEX and IECEx

UL (America) and IECEx

UL (America)

EAC EurAsian community

CSA (Canada) & IECEx

IECEx

InMetro (Brazil)

No standard

The ATEX European Directives 94/9/EC
ATEX requires employers to eliminate or control risks from dangerous substances and to classify areas where explosive atmospheres may occur into zones, as laid down in regulations. ATEX Directives are designed to protect employees, the public and the environment from accidents owing to explosive atmospheres and since July 1st 2006 all existing sites, as well as new sites, must be fully ATEX compliant.

The ATEX directive 2014/34/UE applies to end users. These directives compliment each other, but have different purposes. ATEX 100A covers both electrical and non-electrical products intended for use in hazardous areas, including mechanical equipment.

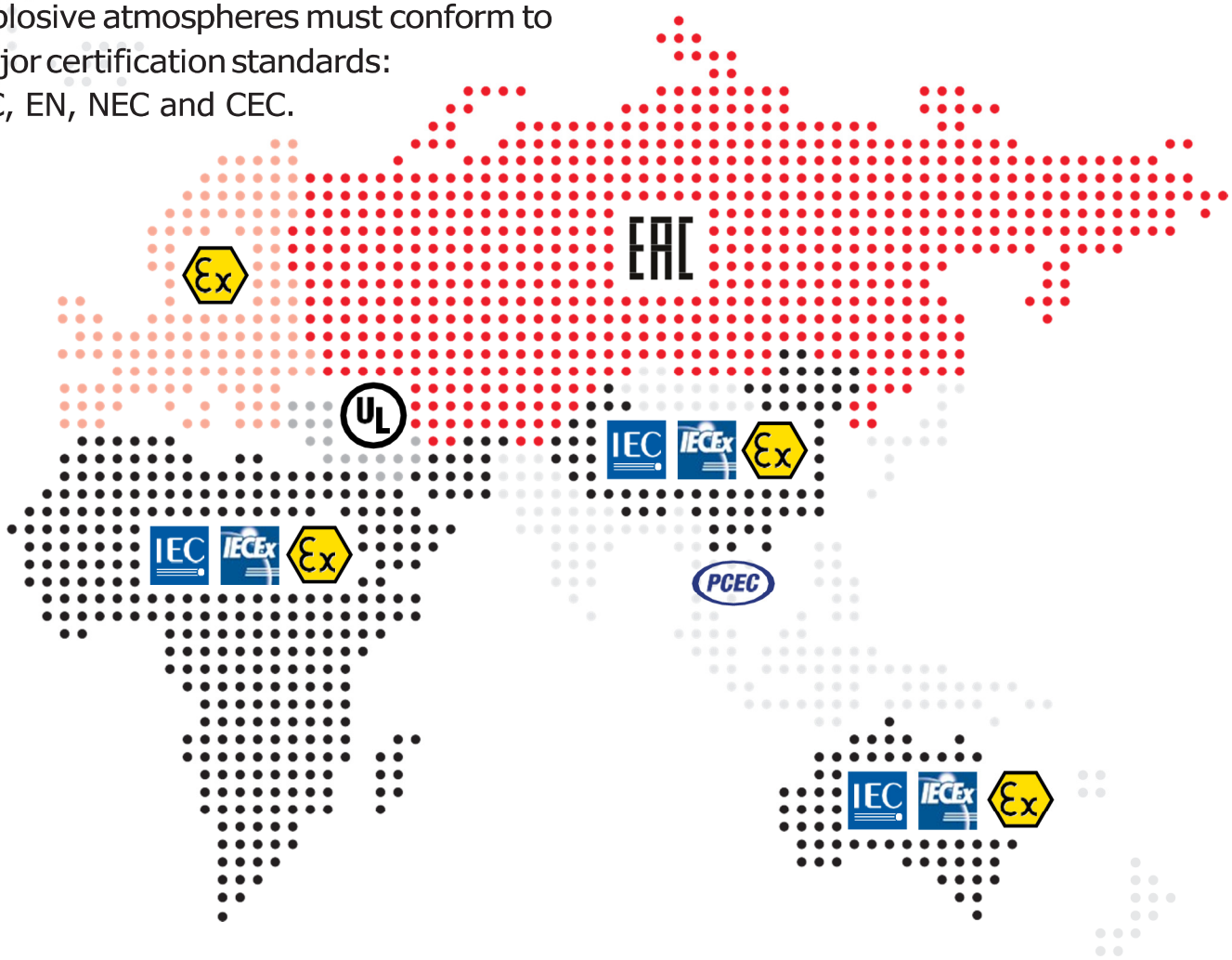
Any product sold within the European Union designed for use in explosive atmospheres must be ATEX certified and bear the ATEX marking in conjunction with CE marking. This obligation is placed upon the manufacturer of the product is aimed at facilitating movement of goods within the EU.

IECEx (International Scheme)
The IECEx scheme is an international certificate of conformance for products used in a hazardous area.

This scheme provides:

- A single certification of conformity for manufacturers to comply that includes:
  - Testing and assessment of products to a standard including a full test report.
  - Ongoing surveillance of manufacturers premises.
- A fast-track process for countries where regulations still require the issuing of national Ex certificates or approvals.

Electrical materials for use in potentially explosive atmospheres must conform to major certification standards: IEC, EN, NEC and CEC.



UL (America) & CSA (Canada)
The American and Canadian standards are the only ones to have different classifications and locations. ATEX & IECEx work to Groups and Zones whereas the NEC & CEC works to Classes and Divisions, there is no direct comparison between the two. This means that it is imperative that the two standards are not inter-changed within an area.

EurAsian Conformity Mark (Customs Union)
EurAsian Conformity Mark follows similar rules to that of IECEx as far as the breakdown of the zones and other criteria are concerned.

EurAsian Conformity Mark is the standard for the Customs Union which includes the Russian Federation, Kazakhstan and Belarus.

INMETRO (Brazil)
The National Institute of Metrology, Standardization and Industrial Quality (INMETRO) is the government body responsible for the implementation of measurement, safety and quality standards for electrical and electronic products. It guides the activities of accreditation, inspection, testing and certification bodies in Brazil which issue the products' certificates.

PCEC (China)
Products placed on the Chinese market shall be certified according to the national regulations in force.

PCEC is accredited by CNAS (China National Accreditation Service for Conformity Assessment) for product testing and issuance of certificates of conformity of products used in explosive atmospheres.

Standards, zone definitions & product markings

Zone definitions – Onshore gases & vapours

Zone 0

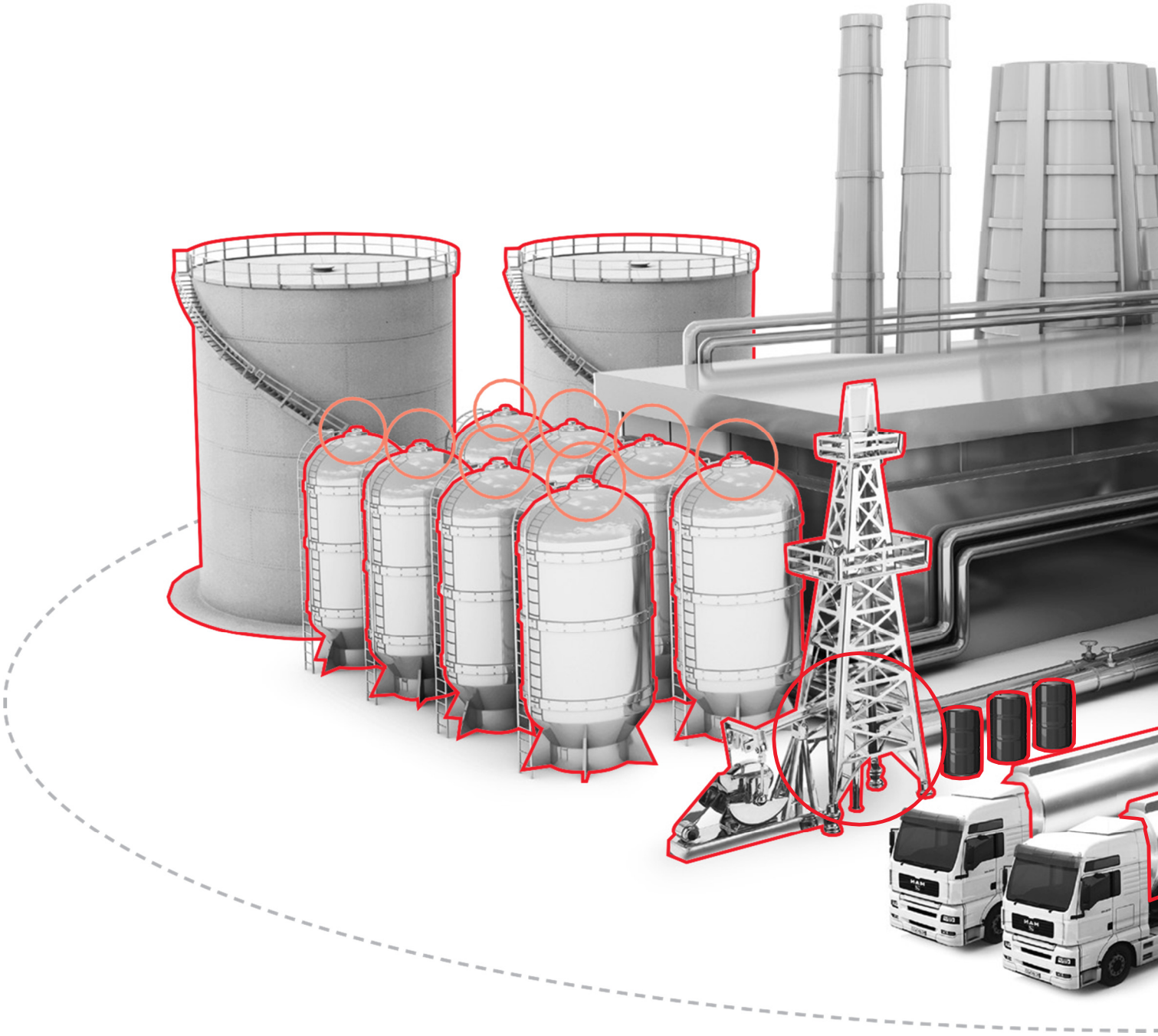
Permanent / Frequent

Place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is present continuously or for long periods, or frequently.

Zone 1

Ocassional

Site where an atmosphere consisting of a mixture of air and inflammable substances in the form of gas, vapour or mist is likely to arise occasionally during normal operation.



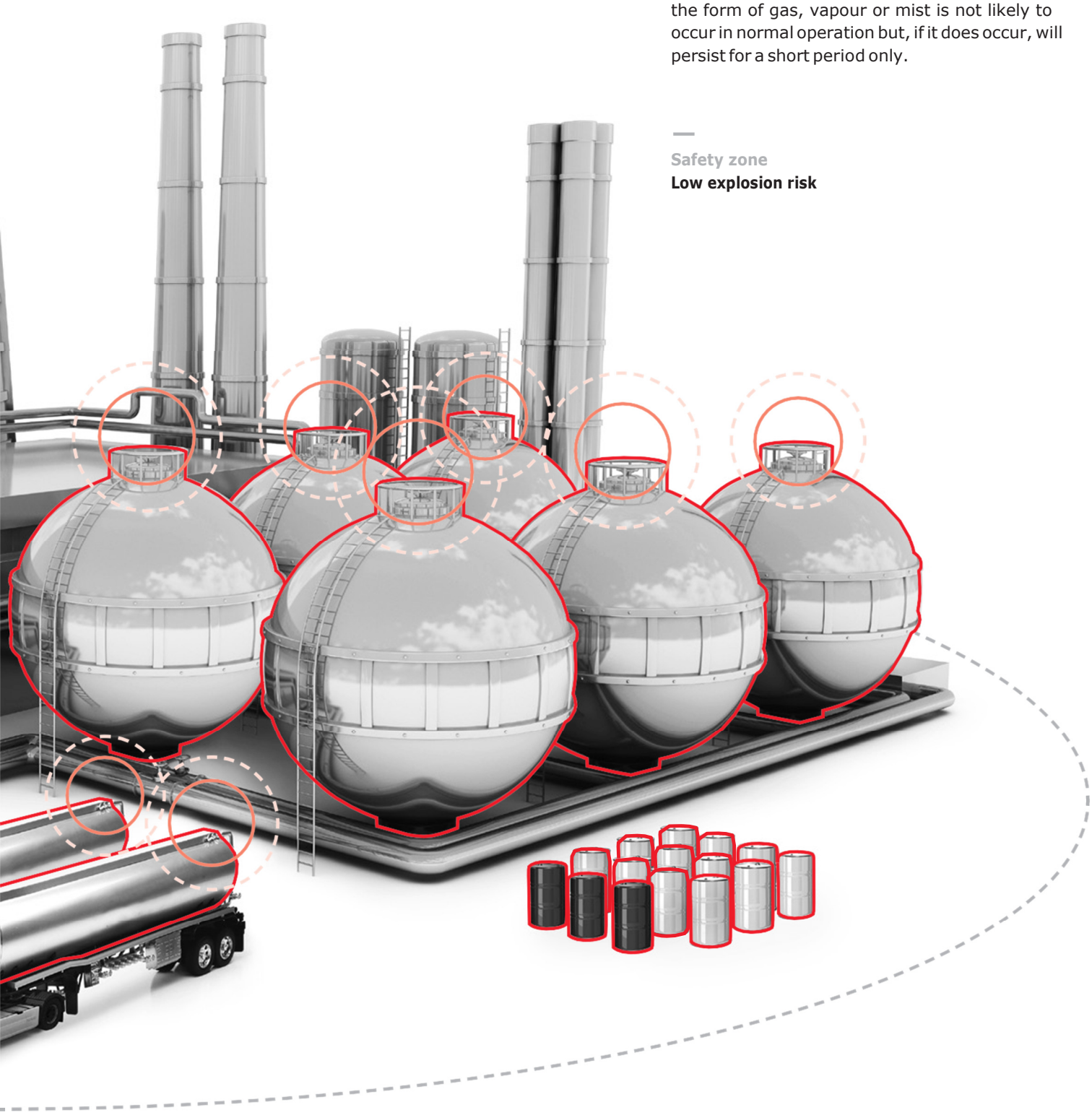
Zone 2

Gas irregular / Short duration

Place in which an explosive atmosphere consisting of a mixture with air of 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.

Safety zone

Low explosion risk



Standards, zone definitions & product markings

Zone definitions – Offshore gases & vapours

Zone 0

Permanent / Frequent

Place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is present continuously or for long periods, or frequently.

Zone 1

Ocassional

Site where an atmosphere consisting of a mixture of air and inflammable substances in the form of gas, vapour or mist is likely to arise occasionally during normal operation.

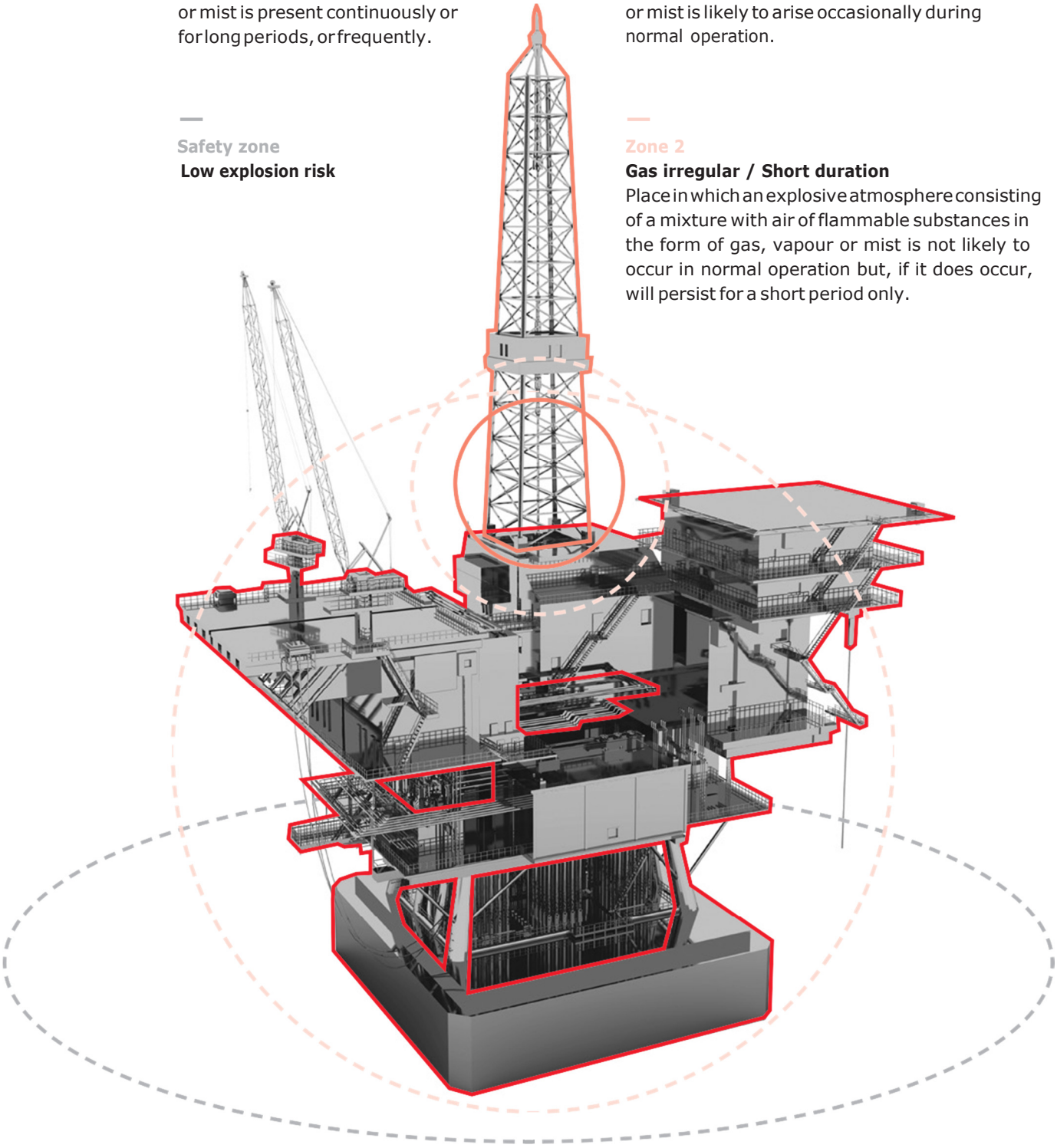
Safety zone

Low explosion risk

Zone 2

Gas irregular / Short duration

Place in which an explosive atmosphere consisting of a mixture with air of 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.



Standards, zone definitions & product markings

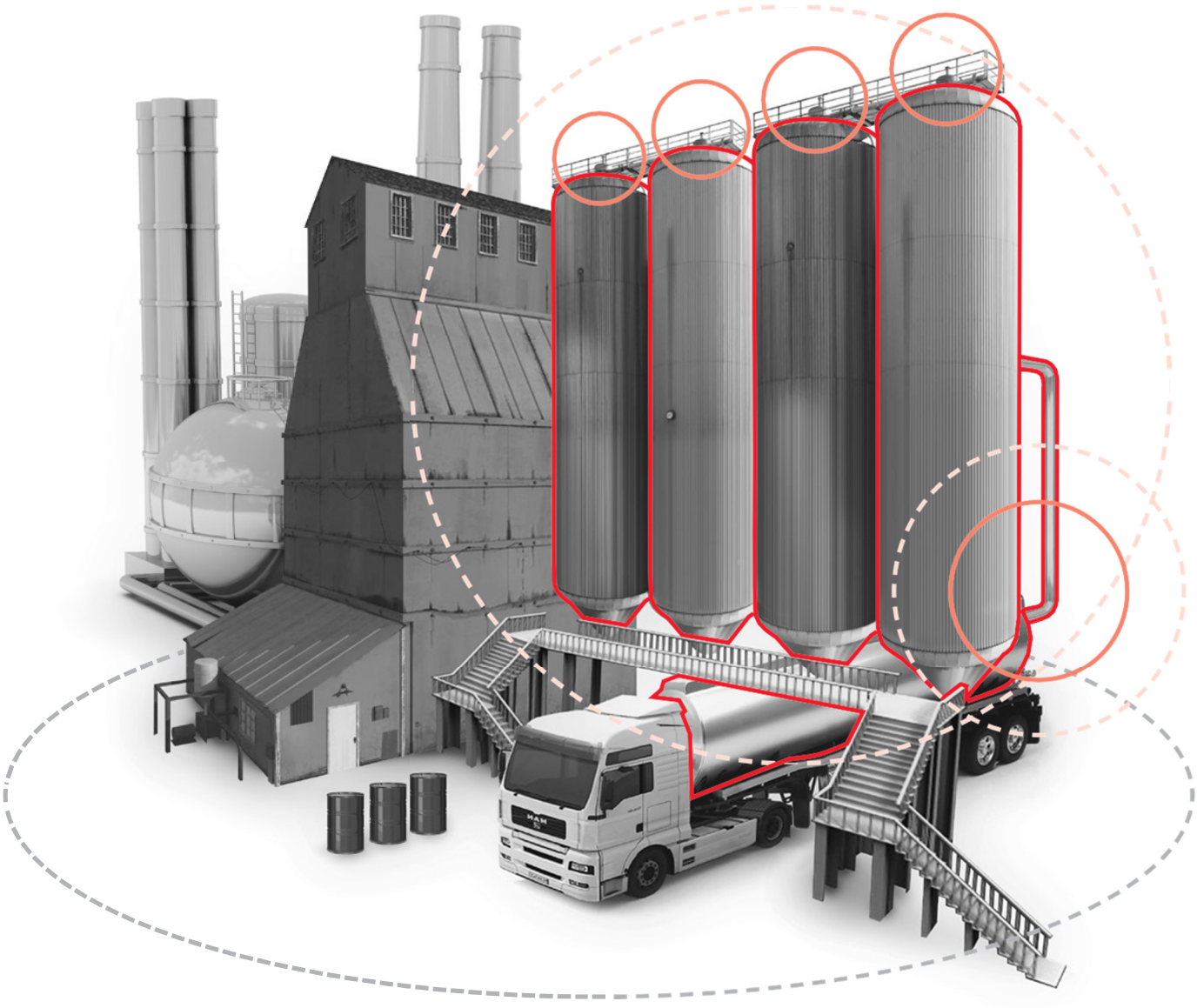
Zone definitions – Dust

Zone 20
Permanent / Frequent
Area in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods, or frequently.

Zone 21
Occasional
Area in which an explosive atmosphere, in the form of a cloud of combustible dust in air is likely to occur, occasionally, in normal operation, ocassionally.

Zone 22
Dust Irregular / Short Duration
Area 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.

Safety Zone
No Explosion Risk



Standards, zone definitions & product markings
Product marking guide

Classifications of hazardous areas

Classifications of hazardous areas		Descriptions	ATEX Group	ATEX Category	EPL	Equipment usage
Mining	Energised	Persistant risk of methane gas and other dusts	I	M1	**Ma**	-
	De-energised		I	M2	**Mb**	-
Gas environments	**Zone 0**	Persistant and continuous presence of gas for frequent or long periods	II	1G	**Ga**	ATEX Equipment Category **1G**, Equipment Protection Level **Ga**
	Zone 1	Likely occurence of gas presence in normal operation	II	2G	**Gb**	ATEX Equipment Category **2G or higher**, Equipment Protection Level **Gb or higher**
	Zone 2	Unlikely occurence of gas presence in normal operation, short term persistence if any	II	3G	**Gc**	ATEX Equipment Category **3G**, Equipment Protection Level **Gc or higher**
Dust environments	**Zone 20**	Persistant and continuous presence of dust for frequent or long periods	II	1D	**Da**	ATEX Equipment Category **1D**, Equipment Protection Level **Da**
	Zone 21	Likely occurence of dust presence in normal operation	II	2D	**Db**	ATEX Equipment Category **2D or higher**, Equipment Protection Level **Db or higher**
	Zone 22	Unlikely occurence of dust presence in normal operation, short term persistence if any	II	3D	**Dc**	ATEX Equipment Category **3D or higher**, Equipment Protection Level **Dc or higher**

Gas & dust groups

Group		Typical	Examples
Mining	I	Methane (Mining only)	
Gases	**IIA**	Propane	Ammonia, Methane Gasoline, Butane
	IIB	Ethylene	Town gas, Acrylonitril
	IIB+H2	Ethylene	Town gas, Acrylonitril
	IIC	Hydrogen, Acetylene	Carbon disulphide
Dust environments	**IIIA**	Combustable flyings	Wood shaving
	IIIB	Non-conductive dust	Saw dust, flour
	IIIC	Conductive dust	Metal dust

Temperature classification

Class*	Surface temperature
T1	450oC
T2	300oC
T3	200oC
T4	135oC
T5	100oC
T6	85oC

* Temperature classification is based on the maximum surface temperature of the equipment in normal use.

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Protection concepts

Protection concepts	Primary	Type of protection	EN/IEC Standard	Sub concept	Gas zones	Dust zones
By enclosure	**Ex d**	Flameproof	60079-1	Ex db	1	–
				Ex dc	2	
	Ex t	Dust proof	60079-31	Ex ta	–	20
				Ex tb		21
				Ex tc		22
By exclusion	**Ex p**	Pressurisation	60079-2	Ex pxb	1	21/22
				Ex pyb	1	
				Ex pzc	2	
	Ex m	Encapsulation	60079-18	Ex ma	0	20
				Ex mb	1	21
				Ex mc	2	22
	Ex o	Oil immersion	60079-6	Exob	1	–
	Ex q	Powder filling	60079-5	Exqb	1	–
By equipment	**Ex i**	Intrinsically safe	60079-11	Ex ia	0	20
				Ex ib	1	21
				Ex ic	2	22
	Ex op	Optical radiation	60079-28	Ex op is	0/1/2	20/21/22
				Ex op pr	1/2	21/22
				Ex op sh	0/1/2	20/21/22
	Ex e	Increased safety	60079-7	Ex eb	1	–
				Ex ec	2	
	Ex n	Non sparking	60079-15	Ex nA	2	–
		Limited energy		Ex nL		
		Restricted breathing		Ex nR		
		Enclosed breaking		Ex nC		