SECTION 7

MARINE AND CORROSIVE PROTECTION PAINT SYSTEMS

We have established paint application systems to control the painting of our equipment based on ISO 12944.

Our systems can also be used for several parts of NORSOK M501. These systems give good durability with resistance to water, abrasion, chemicals and are flexible.

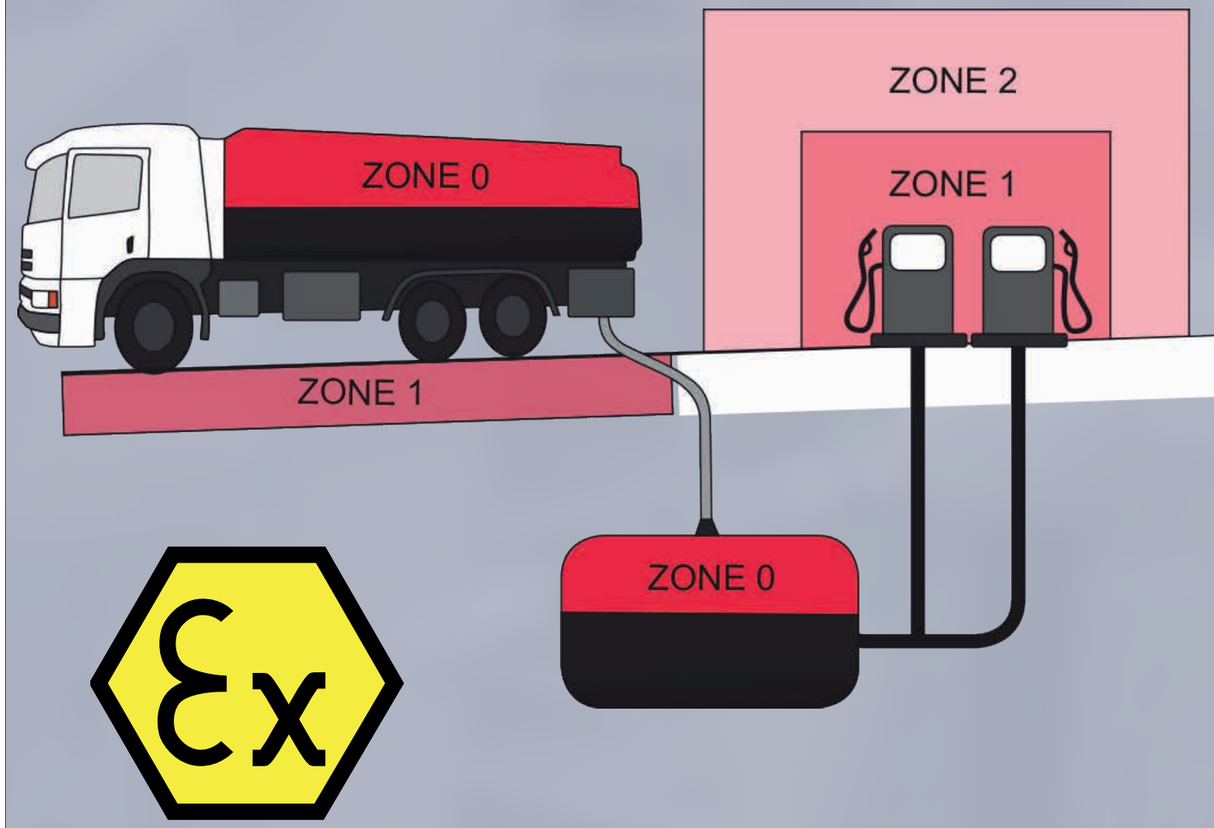
For our C2 and C3 systems we use Jotun paints Penguard FC Epoxy. For the high marine specifications C4 and C5 we use an anti-corrosive primer with a hardtop CA acrylic top coat.

Corrosive category and risk	Examples of typical environments in a temperate climate (info only)	
	Exterior	Interior
C1 very low	-	Heated buildings with clean atmospheres, e.g. offices, shops, schools, hotels
C2 low	Atmospheres with low level of pollution. Mostly rural areas	Unheated buildings where condensation may occur, e.g. depots, sports halls
C3 medium	Urban and industrial atmospheres, moderate sulphur dioxide pollution. Coastal area with low salinity	Production rooms with high humidity and some air pollution e.g. food-processing plants, laundries, breweries, dairies
C4 high	Industrial areas and coastal areas with moderate salinity	Chemical plants, swimming pools, coastal, ship and boatyards
C5-1 very high (industrial)	Industrial areas with high humidity and aggressive atmosphere	Buildings or areas with almost permanent condensation and high pollution
C5-M very high (marine)	Coastal and offshore areas with high salinity	Buildings or areas with almost permanent condensation and high pollution

A specialist painting contractor is used when other painting specifications are required. Not all painting systems are suitable for use on our air hoists and trolleys due to the shape and size of the equipment.

SECTION 8

ATEX (ATMOSPHÉRES EXPLOSIBLES)



The RED ROOSTER Spark Resistant Air chain Hoists are very suitable to be used in explosion dangerous areas because air does not generate sparks (on the contrary to electricity). RED ROOSTER Spark Resistant Air chain Hoists are very economical, and supplied at very competitive prices.

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In various industries like (petro) chemical industry, oil/gas industry, offshore, power plants, mining, food industry and many other industries an explosion dangerous atmosphere can arise during processing, transporting or storing, due to gas, vapor or dust.

Explosive atmospheres can be caused by flammable gases, mists or vapours, or by combustible dusts. If there is enough of a substance mixed with air then all it needs is a source of ignition to cause an explosion. Preventing release of dangerous substances and controlling potential sources of ignition are two widely used ways of reducing risk.

WHY DO WE NEED ATEX CERTIFICATION

- If you manufacture a product that is to be used in a potentially explosive environment and you want to sell in the European Union, then you will need to apply the CE and Ex mark on it.
- The ATEX 2014/34/EU Directive (ATEX 95) covers both electrical and mechanical equipment which is split into two categories of equipment, Group I mining & Group II above ground.
- Our lodgement is for mechanical non electrical equipment which are capable of causing their own source of ignition.

[1] See page 8 for new ATEX certification from october 2019

All standard RED ROOSTER pneumatic hoists and trolleys from 250 kg to 100 tonne can be certified for use in **II 3 GD c IIA T4** [1] area and with additional protection built into the hoist they can be certified for **II 2 GD c IIB T4** [1] & **II 2 GD c IIC T4** [1] area. The preparation work required to be carried out on our hoists varies on the protection level requested by the customer. With the information on where the hoist will be operating we prepare the hoist to be suitable for the zone, gas group and temperature rating.

Our lodgement PRJ1110010199/1 filed with Lloyds Register covers the range of ATEX units we manufacture.

The TCR, TNC, TMH & TCS ranges of hoists are heavy duty units with a wide range of uses in a variety of industries all over the world. The ATEX range of hoists are built to stand up to different environments making them safe to use in explosive atmospheres.

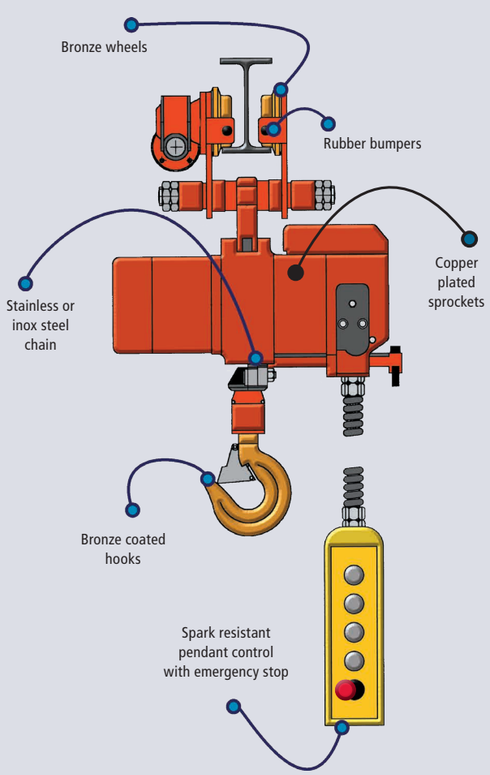
Depending on the classification we can bronze spray hooks, fit stainless steel safety latches, use either zinc plated or stainless steel load chain and fit stainless steel chain collectors.

RED ROOSTER pneumatic trolleys, geared trolleys and push trolleys are fitted with bronze wheels, bronze anti-tip rollers, rubber buffers and air trolleys have ATEX rated air motors, gearboxes and valves. Our trolleys are suitable for a range of beam sizes and profiles, with rack and pinion, beam brake, low headroom and ultra low headroom units available in most capacities.

We also do a range of ATEX pneumatic wire rope hoists built to suit customer requirements. These hoist units have been fully converted to air powered units from ATEX certified parts covered by our risk assessment for the process and parts used in manufacture.

Our Spark Resistant Air chain Hoists are widely used in a.o. the On and Off-shore, (petro) chemical industry, paint spraying, chemical production and -storage, pharmaceutical industry and tank-cleaning.

SPARK RESISTANT AIR CHAIN HOISTS



ATEX

EQUIPMENT GROUPS, CATEGORIES & ZONE CLASSIFICATION

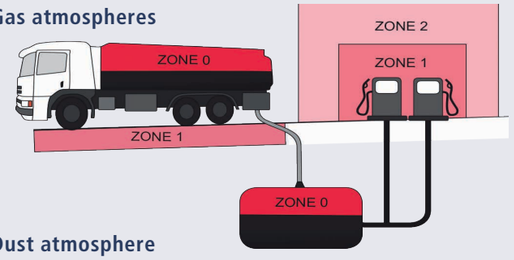
Group	Category	Level of Protection	(Formerly known as risk zone)
		Mechanical equipment - Energised	
I Mining	M(1)	Very high level of protection Equipment must continue to operate in an explosive atmosphere.	0, 1, 2 (Gases) 20, 21, 22 (Dust)
		Mechanical equipment - De-energised	
I Mining	M(2)	**High level of protection** Equipment must shut down if an explosive atmosphere occurs.	1, 2 (Gases) 21, 22 (Dust)
II Non mining	1	**Very high level of protection** Where gas, dust or vapour mixtures are present continuously or for long periods.	0, 1, 2 (Gases) 20, 21, 22 (Dust)
II Non mining	2	**High level of protection** Where gas, dust or vapour mixtures are likely to occur occasionally.	1, 2 (Gases) 21, 22 (Dust)
II Non mining	3	**Normal protection** Where gas, dust or vapour mixtures are unlikely to occur and only for short periods.	2 (Gases) 22 (Dust)

EXPLOSION ZONE CLASSIFICATION

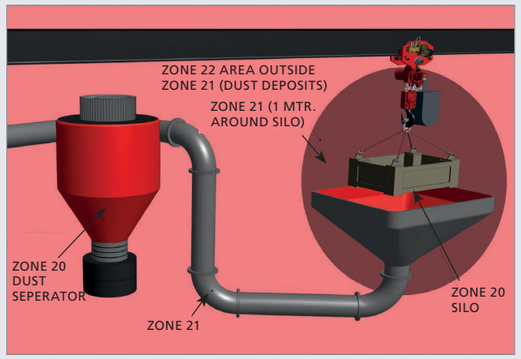
Category	(Formerly known as risk zone)	Description
1G	**ZONE 0 (Gas/vapours)**	An area in which an explosive mixture is continuously present or present for long periods.
2G	**ZONE 1 (Gas/vapours)**	An area in which an explosive mixture is likely to occur in normal operation.
3G	**ZONE 2 (Gas/vapours)**	An area in which an explosive mixture is not likely to occur in normal operation and if it occurs it will exist only for a short time.
1D	**ZONE 20 (Dust)**	An area in which an explosive mixture is continuously present or present for long periods
2D	**ZONE 21 (Dust)**	An area in which an explosive mixture is likely to occur in normal operation.
3D	**ZONE 22 (Dust)**	An area in which an explosive mixture is not likely to occur in normal operation and if it occurs it will exist only for a short time.

HAZARDOUS AREAS

Gas atmospheres



Dust atmosphere



Categorie	Gas	Dust
Categorie 1 = zone	**0**	**20**
Categorie 2 = zone	**1**	**21**
Categorie 3 = zone	**2**	**22**

The above diagrams are simple examples of explosive atmopheres within industry. Each site may differ.

ATMOSPHÉRES EXPLOSIBLES

ATEX comes from the French words "**AT**mosphéres **EX**plosibles" which is the name commonly given to the two European Directives for controlling explosive atmospheres. The aim of the directive 2014/34/EU is to allow free trade of ATEX equipment within the EU. Some other parts of the world do not have regulations on non electrical equipment in explosive areas and have also adopted the ATEX directive.

- **Directive 2014/34/EU (ATEX 95)** is for the manufacturers of equipment used in explosive atmospheres.
- **Directive 99/92/EC (ATEX 137)** is for the health and safety protection of workers and manufacturers of installations within a potentially explosive atmosphere.

The Directive 99/92/EC applies to most workplaces where an explosion may occur, so employers must carry out risk assessments to classify different groups to ensure that the correct equipment can be selected for that specific area. These risk assessments should be kept on file and the classification for that area passed on to manufacturers or suppliers when selecting the correct equipment. This equipment should be of the same or higher classification.

EXPLOSIVE ATMOSPHERES

ATMOSPHERIC CONDITIONS

An explosive atmosphere is defined as a mixture of dangerous substances with air, under atmospheric conditions, in the form of gases, vapours, mist or dust in which after ignition has occurred, combustion spreads to the entire unburned mixture.

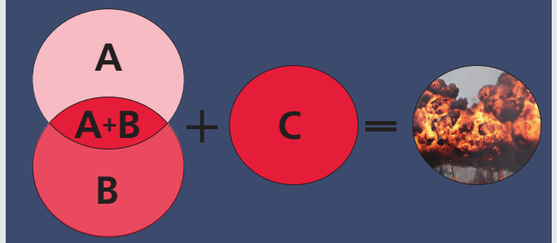
Dangerous gases, dusts, mists and vapours are produced in many workplaces such as agriculture, waste disposal, recycling, wood processing, metal processing, paint shops, food industry, pharmaceuticals, refineries, power generation, chemical industry, mining and in the exploration and production of oil and gas. Even in non hazardous production process gas may leak from cylinders or leaking pipes.

An explosion can only take place when the following 3 factors coincide

A Combustable Substance: gas, dust, vapour, mist

B Oxidizing Agent: oxygen in the air

C Ignition Source: spark, hot surface, flame, static



EXPLOSION PROTECTION

Explosion protection can mean to generally prevent the occurrence of an explosive mixture. Explosion protection can also be achieved by eliminating potential ignition sources in advance, e.g. high temperatures and sparking by designing components accordingly and by permanent monitoring of operation, or by using a flame-proof enclosure for the source of ignition to protect the surrounding area against possible effects of an internal explosion.

PRIMARY EXPLOSION PROTECTION

Prevent the formation of explosive atmospheres.

SECONDARY EXPLOSION PROTECTION

Prevent the ignition of potentially explosive atmospheres.

TERTIARY EXPLOSION PROTECTION

Restricts the effects of an explosion.

DUST EXPLOSION PROTECTION

Powder or dust like products are the by product of many farming, mining and industrial processes. This hazardous dust can be produced by grain, wood, paper, metals and coal in industries such as plastic, chemical and many others. Many of these powders and dusts are inflammable but under certain circumstances they can explode. Dust explosions can be far more dangerous than gas explosions as the initial dust explosion can move more dust into the air creating further explosions and can cause destruction over a large area. A dust layer of less than 1 mm is enough, when stirred up and mixed with oxygen, to create an explosion.

EXPLOSIVE ATMOSPHERES

DUST GROUPS

Group III - For dust in locations other than mines

IIIA: For atmospheres containing combustable filings
IIIB: For atmospheres containing combustable filings and nonconductive dust
IIIC: For atmospheres containing combustable filings, nonconductive dust and conductive dust

Dust group of the explosive dust atmosphere	Equipment with the same or higher dust group marking can be used in the area
IIIA	IIIA, IIIB, IIIC
IIIB	IIIB, IIIC
IIIC	IIIC

GAS GROUPS

Gases are divided into three groups:

Group I - For mines susceptible to Methane.
Group II - For gases in locations other than mines, which are divided into three sub groups:

IIA: For atmospheres containing propane or gases of an equivalent hazard.
IIB: For atmospheres containing ethylene or gases of an equivalent hazard.
IIC: For atmospheres containing hydrogen or gases of an equivalent hazard.

Gas group of the explosive atmosphere	Equipment with the same or higher gas group marking can be used in the area
IIA	IIA
IIB	IIA, IIB
IIC	IIA, IIB, IIC

TEMPERATURE CLASSES

The auto ignition temperature is the temperature in °C at which a gas will spontaneously ignite without another source of ignition.

Equipment marked T4 covers T1. T2, T3. T4 temperature classes. Equipment marked T6 can be used in all temperature classes.

Temperature Classes	Max Surface Temperature	Ignition Temperature range of mixture
T1	450°C	> 450°C
T2	300°C	>300 to 450°C
T3	200°C	>200 to 300°C
T4	135°C	>135 to 200°C
T5	100°C	>100 to 135°C
T6	85°C	>85 to 100°C

SECTION 8

EXPLOSIVE ATMOSPHERES

CLASSIFICATION OF COMBUSTIBLE GASES, VAPOURS AND MISTS

Explosion groups and temperature classes of a selection of gases and vapours

Ex Group	Temperature Classes					
	T1	T2	T3	T4	T5	T6
	Ignition temperature range of the mixture					
	>450°C	>300 ≤450°C	>200 ≤300°C	>135 ≤200°C	>100 ≤135°C	>85 ≤100°C
	Permissable max, surface temperature of the equipment					
	450°C	300°C	200°C	135°C	100°C	85°C
IIA	Acetone	Ethanol	Petrol (general)	Acetaldehyde		
	Ammonium	i-Amyl Acetate	Diesel fuels			
	Benzene (pure)	n-Butane	Aircraft fuels			
	Acetic Acid	n-Butanol	Fuel oil DIN 51603			
	Ethane	Cyclohexan	n-Hexane			
	Ethyl Acetate	Acetic Anhydride	Heptane			
	Ethyl Chloride		Kerosane			
	Carbon Monoxide					
	Methane					
	Methanol					
	Methyl Chloride					
	Napthalene					
	Phenol					
	Propane					
	Toluene					
IIB	City Gas	Ethylene	Ethylene Glycol	Ethyl Ether		
		Ethylene Oxide	Hydrogen			
IIC	Hydrogen	Acetylene				Carbon Disulphide

ATEX MARKING

GAS	CE	Ex	II	2G	Ex h	IIB	T4	Gb
DUST	CE	Ex	II	2D	Ex h	IIIB	135°C	Db
	CE - MARK permitted by the European Committee for the technical Standardisation	**IDENTIFICATION** for protection against explosions	**EQUIPMENT GROUP** I - Mining application II - Non-mining application	**EQUIPMENT CATEGORY & EXPLOSIVE ATMOSPHERE** M 1 M 2 1 D 2 D 3 D 1 G 2 G 3 G	**PROTECTION TYPE** Ex h covers types c = construction safety b = control of ignition sources k = liquid immersion	**GAS GROUP** IIA - propane IIB - ethylene IIC - hydrogen Dust Group IIIA - combustable filings IIIB - nonconductive dust IIIC - conductive dust	**TEMPERATURE CLASS TEMPERATURE LIMIT** GAS DUST T1 - max. 450°C T2 - max. 300°C T3 - max. 200°C T4 - max. 135°C T5 - max. 100°Cb T6 - max. 85°C	**EQUIPMENT PROTECTION LEVEL** GAS Ga Gb Gc DUST Db Dc MINING Ma Mb