

ATEX Guide for electric, instrumentation and non-electric Equipments

If your plant, company or factory processes and/or stores any flammable substances and/or combustible dusts there is a high possibility to occur an explosion. Do you know that it is a legal obligation to comply with the ATEX Directives? We make it for you.

- We do your Explosion Protection Document (ATEX 99/92/EC);
- We have senior ATEX consultants;
- We inspect all the equipment installed in your hazardous areas (ATEX2014/34/EU);
- We have a team of experienced ATEX inspectors trained in the IEC 60079-17 standard;
- Our digital work is done on the UNO platform, developed by us;

- We use ATEX certified tablets;
- We can quickly identify the equipment using tagging (QR Code or NFC), what the action plan is, the re-inspection, and everything related to it;
- We have created the ATEX Digital Global service, which includes 3-year contracts (minimum) to ensure full legal compliance of your installation;
- We carry out the explosivity analysis on dust that is not characterized in your installation;
- We train your team in the ATEX legal compliance;

We are Kiwa

Leading Progress

Ethics

Building Trust

Innovative

Competent

Responsive

Credible

ATEX guide for electrical and instrumentation equipment

Typical Equipment Marking for Gas Atmospheres



Typical Equipment Marking for Dust Atmospheres



Suitable for Zone 0, 1 & 2

ATEX Group & Category: II 1G
IECEx Equipment Protection Level: Ga
Types of protection (electrical): ia, da, ma, op is
Types of protection (non-electrical, ATEX): c, b, k
Types of protection (non-electrical, IECEx): h

Suitable for Zone 1 & 2

ATEX Group & Category: II 2G
IECEx Equipment Protection Level: Gb
Types of protection (electrical): db, eb, ib, mb, ob, pxb, pyb, qb, op is, op pr, op sh
Types of protection (non-electrical, ATEX): d, c, b, p, k, h
Types of protection (non-electrical, IECEx): d, p, h

Suitable for Zone 2 only

ATEX Group & Category: II 3G
IECEx Equipment Protection Level: Gc
Types of protection (electrical): dc, ec, ic, mc, nA, nC, nR, oC, pzc, qc
Types of protection (non-electrical, ATEX): fr, d, c, b, p, k, h
Types of protection (non-electrical, IECEx): fr, d, p, h

Suitable for Zone 20, 21 & 22:

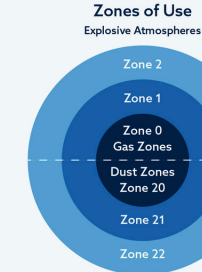
ATEX Group & Category: II 1D
IECEx Equipment Protection Level: Da
Types of protection (electrical): ta, la
Types of protection (non-electrical, ATEX): c, b, k, h
Types of protection (non-electrical, IECEx): fr, d, p, h

Suitable for Zone 21 & 22:

ATEX Group & Category: II 2D
IECEx Equipment Protection Level: Db
Types of protection (electrical): tb, lb, mb
Types of protection (non-electrical, ATEX): d, c, b, p, k, h
Types of protection (non-electrical, IECEx): d, h

Suitable for Zone 22 only:

ATEX Group & Category: II 2D
IECEx Equipment Protection Level: Dc
Types of protection (electrical): tc, ic, mc
Types of protection (non-electrical, ATEX): fr, d, c, b, p, k, h
Types of protection (non-electrical, IECEx): h



Equipment Groups

Equipment Group	Definition
Group I	Electrical equipment intended for use in mines susceptible to fire damp
Group II	Electrical equipment intended for use in explosive gas atmospheres
Group III	Electrical equipment intended for use in explosive dust atmospheres

Protection Concept - Electrical - Gas

Type of Protection (electrical - gas)	Reference
General Requirements	EN/IEC 60079-0
Flameproof - Ex d / da / db / dc	EN/IEC 60079-1
Purge/Pressurised - Ex p / pxb / pyb / pzc	IEC 60079-2
Quartz/Sand Filled - Ex q / qb / qc	EN/IEC 60079-5
Oil Immersion - Ex o / ob / oc	EN/IEC 60079-6
Increased Safety - Ex e / eb / ec	EN/IEC 60079-7
Intrinsic Safety - Ex i / ia / ib / ic	EN/IEC 60079-11
Non Sparking - Ex nA / nC / nL	EN/IEC 60079-15
Encapsulation - Ex m / ma / mb / mc	EN/IEC 60079-18
Optical Radiation - Ex op / op sh / op pr	EN/IEC 60079-28
Trace Heating Systems - Ex e / Ex 60079-30-1	EN/IEC 60079-30-1
Special Protection Ex-s	EN/IEC 60079-33
Caplights	EN/IEC 60079-35-1
Controlled Spark Duration Power-i	TS 60079-39
Process Sealing	TS 60079-40
Flame Arresters	EN 16852
Diesel Engines	EN 1834-1,2,3

Dust Groups

Dust Groups	Dusts are classified by the types of material that make up the dust
IIIA	Combustible Fibres and Flyings
IIIB	Group IIIA dusts plus, Non-Conductive Dusts
IIIC	Group IIIA and IIIB dusts plus, Conductive Dusts

Temperature Class - Dusts

Conditions and Zone classification	Required marking on the equipment
Flammable materials	Classification of explosive atmosphere
Gas atmospheres	Zone 0, 1, 2
Dusts	Zone 20, 21, 22
Maximum surface temperature (T _{ms})	Temperature class (T ₁ to T ₆)
Minimum ignition temperature (T _{min})	Temperature class (T ₁ to T ₆)

Subdivisions and Classification of Gases and Vapours

Gas and vapours	Assignment of zone and vapour group (see EN 60079-10)	Temperature class	Maximum surface temperature (T _{ms})	Minimum ignition temperature (T _{min})
Acetylene, ethylene, propylene, butadiene, isobutylene, n-butane, isopentane	Hydrogen	T1	450 °C	T1 to T4
Ethyl alcohol, ethyl acetate, ethyl ether, ethyl formate, ethyl methyl ketone, n-butane, isopentane	Hydrocarbon (other than hydrogen)	T2	300 °C	T2 to T4
Acetaldehyde	Hydrocarbon (other than hydrogen)	T3	200 °C	T3 to T4
Acetaldehyde	Ethyl ether	T4	150 °C	T4 to T6
Acetaldehyde	Ethyl ether	T5	100 °C	T5 to T6
Acetaldehyde	Ethyl ether	T6	85 °C	T6

Gas group	II	IC
Permitted equipment	IIA, IIB, IIC	IIC

Protection Concept - Electrical - Dust

Type of Protection (electrical - dust)	Reference
General Requirements	EN/IEC 60079-0
Enclosure - ta / tb / tc	EN/IEC 60079-31
Purge/Pressurised - Ex p / pxb / pyb / pzc	EN/IEC 60079-2
Intrinsic Safety - Ex i / ia / ib / ic	EN/IEC 60079-11
Encapsulation - Ex m / ma / mb / mc	EN/IEC 60079-18

Gas Groups

Gas Groups	Gases are classified according to the ignitability of the gas/air mixture as defined in EN/IEC 60079-10-1
IIA	Acetic Acid, Acetone, Ammonia, Butane, Cyclohexane, Propane, Gasoline (petrol), Methane (natural gas, non-mining), Toluene, Xylene, Methanol (methyl alcohol), Propane-2-ol (iso-propyl alcohol)
IIB	Group IIA gases plus, Di-ethyl ether, Ethylene, Ethanol Methyl ethyl ketone (MEK), Propane-1-ol (n-propyl alcohol)
IIC	Group IIA and IIB gases plus, Acetylene, Hydrogen

Temperature Class (T Class)

Temperature Class (T Class)	Highest temperature achieved under the most adverse equipment rating and heating conditions. (Flashpoint temperature of some gases)
T1: 450°C	Ammonia (630°C), Hydrogen (560°C), Methane (537°C), Propane (470°C)
T2: 300°C	Ethylene (425°C), Butane (372°C), Acetylene (305°C)
T3: 200°C	Cyclohexane (259°C), Kerosene (210°C)
T4: 135°C	Di-ethyl Ether (160°C)
T5: 100°C	
T6: 85°C	Carbon Disulphate (95°C)

(*) values taken from dust explosivity tests

ATEX guide for non- electrical Protection Principle / Types of Protectionequipment

Conditions and Zone classification	Flammable materials	Protection principle	Protection principle	Marking in accordance with the equipment protection level	Standards
All applications	Gases, vapours (G) and dusts (D)	-	General requirements	Very high level of protection	EN ISO 60079-0
Constructional safety	Gases, vapours (G) and dusts (D)	Ensures that a source of ignition cannot occur	Constructional safety	High level of protection	EN ISO 60079-1
Control of ignition sources	Gases, vapours (G) and dusts (D)	Presents a source of ignition from becoming effective	Control of ignition sources	Medium level of protection	EN ISO 60079-2
Liquid immersion	Gases, vapours (G) and dusts (D)	Presents the hazardous atmosphere reaching the source of ignition	Liquid immersion	Low level of protection	EN ISO 60079-3
Pressurised enclosure	Gases, vapours (G) and dusts (D)	Presents the hazardous atmosphere reaching the source of ignition	Pressurised enclosure	Very high level of protection	EN ISO 60079-4
Protection by flame restricting barrier	Gases and vapours (G)	Presents the hazardous atmosphere reaching the source of ignition	Protection by flame restricting barrier	High level of protection	EN ISO 60079-5
Protection by enclosure	Dusts (D)	Presents the hazardous atmosphere reaching the source of ignition	Protection by enclosure	Medium level of protection	EN ISO 60079-6
Flame proof enclosure	Gases and vapours (G)	Presents flame propagated through an enclosure	Flame proof enclosure	Low level of protection	EN ISO 60079-7

Use of the Operating Equipment	Marking	Conditions
Without X or U	Equipment can be operated without restrictions	Specific conditions of use of the equipment
With X	Component certificate	Component certificate
With U	Component certificate	Component certificate

Max. Permissible Surface Temperature of the Equipment	Conditions
T _{ms} < T _{min} - 25°C	Temperature limitation because of dust layer
T _{ms} < T _{min} - 25°C	Temperature limitation because of dust cloud
T _{ms} < T _{min} - 25°C	Temperature limitation because of dust cloud

Subdivision of Dust Groups	Subdivisions
IIA, IIB, IIC	IIA, IIB, IIC
IIA, IIB, IIC	IIA, IIB, IIC
IIA, IIB, IIC	IIA, IIB, IIC

ATEX - Combustible Dusts

If your company or factory processes and/or stores any of these combustible products or materials, there is a possibility of an explosion in the form of "combustible dust"



Agricultural products

Egg white
Milk, powdered Milk,
nonfat, dry Soy flour
Starch, corn Starch, rice
Starch, wheat Sugar
Sugar, milk
Sugar, beet
Tapioca Whey
Wood flour
**Agricultural
Dusts**
Alfalfa Apple
Beet root
Carrageen
Carrot
Cocoa bean dust Cocoa
powder Coconutshelldust
Coffee dust
Corn meal
Cornstarch
Cotton

Cottonseed Garlic
powder Gluten
Grass dust Green
coffee Hops (malting)
Lemon peel dust
Lemon pulp Linseed
Locust bean gum Malt

Oat flour
Oat grain dust
Olive pellets
Onion powder
Parsley (dehydrated) Peach
Peanut meal and skins Peat
Potato
Potato flour
Potato starch
Raw yucca seed dust Rice dust
Rice
flour
Rice
starch
Rye flour
Semolin

Soybean dust Spice
dust Spice powder
Sugar (10x) Sunflower
Sunflower seed dust Tea
Tobacco blend Tomato
Walnut dust Wheat flour
Wheat grain dust Wheat
starch Xanthan gum

Carbonaceous Dusts

Charcoal, activated Charcoal,
wood Coal, bituminous Coke,
petroleum Lampblack
Lignite
Peat, 22%H₂O
Soot, pine Cellulose
Cellulose pulp Cork
Corn

Chemical Dusts

Adipic acid Anthraquinone
Ascorbic acid Calcium acetate
Calcium stearate
Carboxy-methylcellulose Dextrin
Lactose
Lead stearate Methyl-cellulose
Paraformaldehyde Sodium
ascorbate Sodium stearate
Sulfur

Metal Dusts

Aluminum Bronze
Iron carbonyl Magnesium Zinc

Plastic Dusts (poly)

Acrylamide (poly) Acrylonitrile
(poly) Ethylene (low-pressure
process)

Epoxy resin Melamine resin
Melamine, molded
(phenol-cellulose)
Melamine, molded (wood flour and
mineral filled phenol-
formaldehyde)
(poly) Methyl acrylate (poly) Methyl
acrylate, emulsion polymer
Phenolic resin (poly)
Propylene
Terpene-phenol resin
Urea-formaldehyde/ cellulose, molded
(poly) Vinyl acetate/ ethylene copolymer
(poly) Vinyl alcohol (poly) Vinyl butyral
(poly) Vinyl chloride/ ethylene/vinyl
acetylene suspension copolymer
(poly) Vinyl chloride/ vinyl acetylene
emulsion copolymer

Dust Control Measures

The dust-containing systems (ducts and dust collectors) are designed in a manner (i.e., no leaking) that fugitive dusts are not allowed to accumulate in the work area.

The facility has a housekeeping program with regular cleaning frequencies established for floors and horizontal surfaces, such as ducts, pipes, hoods, ledges, and beams, to minimize dust accumulations within operating areas of the facility.

The working surfaces are designed in a manner to minimize

Ignition Control

Electrically-powered cleaning devices such as vacuum cleaners, and electrical equipment are approved for the hazard classification for Class II locations.

The facility has an ignition control program, such as grounding and bonding and other methods, for dissipating any electrostatic charge that could be generated while transporting the dust through the ductwork.

The facility has a Hot Work permit program.

Areas where smoking is prohibited are posted with "No Smoking" signs.

Duct systems, dust collectors, and dust-producing machinery are bonded and grounded to minimize accumulation of static electrical charge.

‡ The facility selects and uses industrial trucks that are approved for the combustible dust locations.

Prevention Measures

The facility has separator devices to remove foreign materials capable of igniting combustible dusts.

MSDSs for the chemicals which could become combustible dust under normal operations are available to employees.

Employees are trained on the explosion hazards of combustible dusts.

Protection Measures

The facility has an emergency action plan.

Dust collectors are not located inside of buildings. (Some exceptions) Rooms, buildings, or other enclosures (dust collectors) have explosion relief venting distributed over the exterior wall of buildings and enclosures.

Explosion venting is directed to a safe location away from employees.

The facility has isolation devices to prevent deflagration propagation between pieces of equipment connected by ductwork.

The dust collector systems have spark detection and explosion/ deflagration suppression systems.

Emergency exit routes are maintained properly.

Did you know that kiwa works in partnership with an accredited laboratory to carry out the necessary explosivity tests to characterize your dust?

If you don't know these characteristics, you could be in danger. **Contact us.**

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