



Practical information about **ATEX**

Practical information about ATEX

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Definition

- **ATEX = ATmosphères EXplosive.**

An explosion occurs when we have:

1. Combustable fuel.
2. Atmosphere with oxygen.
3. Ignition source.

Examples of combustable substances in air:

GAS	VAPOUR	DUST
Methane	Carbon disulphide	Aluminium
Butane	Ethyl alcohol	Starch
Propane	Ethylene oxide	Cereals
Hydrogen	Acetone	Coal

Hence, the explosion triangle can be understood as:



Examples of ignition sources:

Hot surfaces.
Flames and hot gases.
Mechanically generated sparks.
Electrical apparatus.
Static electricity.
Lightning.

[Source: EN 1127 - 1]

Regulatory framework applicable

Worker Protection Directive 1999 / 92 / EC

- Applicable to user / employer.
- Mandatory under European law to assess workplace for risk of explosion, classify accordingly, and provide warning signs, training.
- Identify hazardous atmosphere and perform risk analysis.
- Specify suitable certified equipment.
- Prepare and maintain documentation.

Products Directive 1994 / 9 / EC

- Applicable to manufactures of ATEX products.
- Products must comply and be certified with CE mark.
- Product ignition risk assessment and classification.

Hazardous areas, and hence risk of explosion may prevail anywhere, in any country, however, in the European Community the ATEX Directives apply.

Other countries may apply differing guidance and legislation etc.

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Obligations

The users / employers responsibility includes:

- Assessment of explosion risks.
- Prevention of hazardous explosive atmosphere.
- Avoidance of ignition source.
- Classification of hazardous places into Zones.
- Identify hazardous areas with warning signs.
- Prepare Explosion Protection Document (EPD).
- Select workplace ATEX equipment according to requirement: Zone, ambient conditions, EPD.

Source: Directive 1999/99/EC,
Guide of good practice.

In response to these obligations

- A product manufacturer is not able to recommend a product for an application.
- Products are only determined by ATEX risk identified by user / employer / competent body.

Refer IEC EN 60079-14 Electrical installations in hazardous areas (other than mines) especially Section 5.

“In order to select the appropriate electrical equipment for hazardous areas, the following information is required:

- Classification of the hazardous area including equipment protection level...
- Where applicable, gas, vapour or dust classification in relation to the group or subgroup of the electrical equipment.
- Temperature class or ignition temperature of the gas or vapour involved.
- Minimum ignition temperature of the dust cloud and minimum ignition temperature of the dust layer.
- Intended application of the equipment.
- External influences and ambient temperature.”

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Fan Markings

The product manufacturer responsibility includes:

- Design and manufacture of equipment according to varying degrees of protection.
- Apply marking and information where applicable to ATEX directive, including:
 - Name of manufacturer.
 - Address of manufacturer.
 - Product reference / serial No.
 - Year of construction.
 - CE mark.
 - Ex mark.
 - Identification of Notified body responsible for approval.

Examples of ATEX labels:

1. For S&P product with S&P motor.

	SOLER Y PALAU					
	17500 Ripoll-SPAIN					
	TCBT/4-400/H EXEII T3					2014
	05SY1614	V	Hz	kW	A	rpm
	IP55	Ins.cl. F	230 Δ	50	0.3	1.4
0163	Ex e IIC T3 Gb	400 Y	50	0.3	0.8	1350
	II 2G $-20^{\circ}\text{C} \leq T_a \leq 55^{\circ}\text{C}$		$I_n/I_w = 2.5$		$t_E = 30 \text{ s}$	
	LOM03ATEX2082X					

2. For S&P product with non S&P motor.

	SOLER Y PALAU					
	17500 Ripoll-SPAIN					
	TGT/2-400-6/22 BLP EXDIIBT4					2014
	V	Exp.N°ATEX 01/2011				
	230/400	Hz	Kw	1.5	W.T.	40°C
	50					II 2G IIB
	Ref	00QH0993				T5

Fan Manufacture

EN 14986 Design of fans working in potentially explosive atmospheres, applies to all fan manufacture for:

Group II G, for explosive groups IIA, IIB, and hydrogen, for categories 1, 2, 3.

Group II D, categories 2, 3.

Hydrogen (H₂) is the only group IIC gas included in EN 14986.

S&P manufacture fans in accordance with EN 14986.

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Defining zones. / 2 - Equipment Category.

IEC Group II Surface Industry - Gas				
Zone Gas	Classification of hazardous places: IEC EN 60079-10-1	Equipment Category	EPL	Motor Protection
0	Place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas or vapour is present continuously or for long periods or frequently.	1G	Ga	No ventilation fan permitted Refer IEC EN 60079-0
1	Place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas or vapour is likely to occur in normal operation occasionally.	2G	Gb	2G Ex d 2G Ex e
2	Place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas or vapour is not likely to occur in normal operation but, if it does occur, will persist for a short period only.	3G	Gc	3G Ex nA or 2G Ex d / 2G Ex e

Source: Directive 1999 / 92 EC

IEC EN 60079-10-1

Refer IEC EN 60079-10-1, IEC EN 60079-14 for guidance

IEC Group II Surface Industry - Dust				
Zone Dust	Classification of hazardous places: IEC EN 60079-10-2	Equipment Category	EPL	Motor Protection
20	Area in which an explosive atmosphere, in the form of a cloud of dust in air is present continuously, or for long periods or frequently.	1D	Da	No ventilation fan permitted Refer IEC EN 60079-0
21	Area in which an explosive atmosphere, in the form of a cloud of dust in air is likely to occur, occasionally, in normal operation.	2D	Db	Non conductive Conductive dust No S&P fan offered
22	Area in which an explosive atmosphere in the form of a cloud of dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.	3D	Dc	Combustable flyings 3D Ex tc IIIA T°C Dc
				Non conductive 3D Ex tc IIIB T°C Dc
				Conductive dust 3D Ex tc IIIC T°C Dc

Source: Directive 1999 / 92 / EC

IEC EN 60079-10.2

Refer IEC EN 60079 - 0

Refer IEC EN 60079-10-2, IEC EN 60079-14 for guidance

Notes :1. IEC EN 60079 - 0:2011 defines Group III subdivisions:- IIIA: combustible flyings. IIIB: non.conductive dust. IIIC: conductive dust.
2. Equipment marked IIIB is suitable for applications requiring IIIA equipment. Equipment marked IIIC is suitable for applications requiring IIIA or IIIB equipment.

Marking

Example, where applicable:

CE 0163 **II 2G Ex e/d II/IIIB T3 Gb**

CE Marking

No. organisation intervening in the control of the manufacture.
Identification of Notified Body responsible for approval

European Union mark for Explosion protection

User / employer ATEX risk analysis determines:

1. Equipment Group. I = Mines. II = Other places, surface industry

2 - 2 - Equipment Category. 2 = suitable for Zone 1 or Zone 21. G = Gas, D = Dust.

3 - Protection type

d = flameproof. e = increased safety.

4 -Exposure groups

5 - Temperature classes

6 - Equipment Protection Level (EPL)

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1 - Equipment Groups. / 4 - Exposure groups. / 5 - Temperature classes.

Typical combustable gas / vapour mixture with air, according to Group and temperature class.

Equipment Group	Exposure Gas Group		Temperature class									
	II 2G Ex e	II 2G Ex d	T1		T2		T3		T4		T5	T6
Group I Mines	No fan available		Methane (firedamp)									
			CAS N°	Name	CAS N°	Name	CAS N°	Name	CAS N°	Name		
Group II Explosive gas atmosphere other than mines.	II	IIA	62-53-3	Benzenamine	67-56-1	Methanol	75-08-1	Ethanethiol	75-07-0	Ethanal		
			64-18-6	Formic acid	67-63-0	Propanol	108-91-8	Cyclohexylamine	75-50-3	Trimethylamine		
			64-19-7	Acetic acid	71-36-3	Butanol	108-93-0	Cyclohexanol	100-52-7	Benzaldehyde		
			67-64-1	Propanone	71-41-0	Pentanol	109-65-9	Bromobutane	112-58-3	Oxybishexane		
			71-43-2	Benzene	74-89-5	Methylamine	109-66-0	Pentane	124-13-0	Octanal		
			74-82-8	Methane	74-93-1	Methanethiol	110-82-7	Cyclohexane				
			74-84-0	Ethane	74-98-6	Propane	110-83-8	Cyclohexene				
			74-87-3	Methyl chloride	75-01-4	Chloroethene	110-91-8	Morpholine				
			74-96-4	Bromoethane	75-04-7	Ethylamine	111-70-6	Heptanol				
			79-09-4	Propionic acid	78-92-2	Butanol	111-84-2	Nonane				
	91-20-3	Napthalene	106-97-8	Butane	111-87-5	Octanal						
	108-88-3	Methyl benzene	108-24-7	Acetic anhydride	123-72-8	Butanal						
	108-95-2	Phenol	108-94-1	Cyclohexanone	8006-64-2	Turpentine oil						
	7664-41-7	Ammonia	110-02-1	Thiophene	8008-20-6	Kerosene						
	74-90-8	Hydrocyanic acid	50-00-0	Formaldehyde	109-87-5	Dimethoxymethane	123-38-6	Propanal				
	107-13-1	Propenenitrile	64-17-5	Ethanol	109-99-9	Tetrahydrofuran	540-67-0	Ethyl methyl ether				
				71-23-8	Propanol	111-27-3	Hexanol					
				74-85-1	Ethene	115-10-6	Oxybismethane					
				74-99-7	Propyne	4170-30-3	Butenal					
				110-00-9	Furan	7783-06-4	Hydrogen sulfide					
	IIC	1333-74-0	Hydrogen	74-86-2	Ethine							

Refer IEC EN 60079-20-1 for specific guidance

• Notes:

- Note 1: CAS registry number has been included from IEC EN 60079-20-1. These are unique numerical identifiers assigned by Chemical Abstracts Services to every chemical substance described in open scientific literature. Thus reducing risk of confusion in translation of substance name.
- Note 2: Equipment Group I Mines susceptible to firedamp - No fan available.
- Note 3: Equipment Group II Explosive gas atmosphere, not Mines. Subdivided into IIA, IIB, IIC, for Ex d equipment. Equipment Group IIC is highest protection, thus can be used for applications requiring IIA and IIB.
- Note 4: Temperature class T6 is highest protection (lowest temperature) thus equipment rated T4 can be used for applications requiring T4 - T1.
- Note 5: Data for other substances and CAS numbers may be found on appropriate database, example IFA GESTIS - database

3. Motor protection type

- **flameproof enclosure “d”**: type of protection in which the parts capable of igniting an explosive gas atmosphere are provided with an enclosure which can withstand the pressure developed during an internal explosion of an explosive mixture, and which prevents the transmission of the explosion to the explosive gas atmosphere surrounding the enclosure.
Refer IEC EN 60079 - 1, IEC EN 60079 - 14.

- **increased safety “e”**: type of protection applied to electrical equipment so as to give increased security against possibility of excessive temperatures and of the occurrence of arcs or sparks in normal service or under specified abnormal conditions.
Refer IEC EN 60079 - 7, IEC EN 60079 - 14.

- **dust ignition protection by enclosure “t”**: type of protection whereby all electrical equipment is protected by an enclosure to avoid ignition of a dust layer or cloud.
Refer IEC EN 60079 - 31, IEC EN 60079 - 14.

5. Temperature class

Temperatures for gas atmospheres

- Electrical apparatus are classified into 6 classes, T1 to T6, according to the maximum surface temperature when operating.
- **Example:** electrical apparatus with a maximum surface temperature of 105°C, when operating in maximum nameplate temperature of +40°C, is classified as T4. The user is responsible to ensure the self ignition temperature of any substance or mixture in atmosphere is higher than 135°C (T4 - T1).

Temperature class required by area classification	Ignition temperature of gas or vapour °C	Allowable temperature classes of equipment
T1	>450	T1 - T6
T2	>300	T2 - T6
T3	>200	T3 - T6
T4	>135	T4 - T6
T5	>100	T5 - T6
T6	>85	T6

Source: IEC EN 60079 - 0, IEC EN 60079 - 14
Refer IEC EN 60079-10-1 or 60079-10-2 for guidance

Typical Dust classification.

Material	Clouds (C°)	Layer (C°)	Maximum equipment surface temperature (T max) for dust layer < 5mm C°
	T cl	T 5mm (thickness)	
	C°	C°	
Wheat	350	270	195
Barley, corn	380	280	205
Sugar	350	430	233
Wood	330	280	205
Charcoal	520	230	195
Hard coal	460	240	165
PVC	450	330	255
Synth. rubber	470	220	145
Sulfur	240	250	160

Source BIA-report 13 / 97 HVBG

Refer IEC EN 60079 - 14, Section 5

IEC EN 60079 - 14 Section 5 refers to safety margin calculation for:
5.6.3.2. Dust cloud $T_{max} \leq 2/3 T_{CL}$
5.6.3.3. Dust layer $T_{max} \leq T_{5mm} - 75^{\circ}C$

Variable Speed Drive (VSD) via frequency inverter:

If application requires variable duty, then an **Ex d** motor, suitable for variable speed via VSD PWM frequency inverter, can be provided. (**Ex e** Motors are only suitable for speed control if tested and approved with a matched speed control device, installed outside the hazardous area)

Ex d motors must include three factory fitted **PTC** temperature sensors connected in series, for thermal protection, one in each winding, and connected to control relay, by others, to isolate motor in event of any over temperature event, since the use of VSD speed control may increase motor surface temperature compared to direct mains supply. Any VSD would be installed outside the hazardous area, and may limit minimum motor speed to 20 Hz supply. Manufacturer may also limit minimum switching frequency. Refer IEC EN 60079-14

Note: motor operation and minimum speed limited by any overheating to motor.

Contact S&P for provision of ATEX motors with PTC temperature sensors.

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User Considerations:

Safe selection:

Fan selection based on Users application risk assessment, and thus must meet, or exceed this.

Fan selection also requires Users; electrical supply, air duty, and any other relevant data example if speed control

Guidance on ventilation rates may be found in IEC EN 60079, especially 60079-10-1.

All data applicable to ambient temperature -20°C to +40°C unless stated otherwise, refer IEC EN 60079.

Safe ventilation:

If ventilation must always be available, consider:

A: Run / standby fans, offering 100% standby.

B: Share duty between more than one fan, offering %age security.

This may offer security for maintenance, service, cleaning, breakdown, to minimise production downtime.

C: Is motor with overheat protection desirable, or not?

This is used with some motors for security, example when using VSD speed control.

Safe operation:

Ex e motored fan products:-

Temperature rise limits under normal operating and during short circuit under accidental stall conditions.

To prevent temperature rise exceeding the maximum limit, protection devices must trip:

1) if maximum temperature achieved.

2) within specified time (tE) if short circuit or short circuit current to rated current ratio achieved (IA / IN) This data is found on Ex e product labels.

Refer IEC EN 60079 - 7, IEC EN 60079 - 14

Safe installation:

To avoid risk of foreign objects, debris being drawn into, or falling into fan impeller.

To allow safe access to fan for inspection, maintenance, cleaning / housekeeping, especially for dust hazards.

To ensure safe transport of hazardous substance without leakage to non-hazardous areas, especially via duct connections..

Safe commissioning:

The User is responsible for initial inspection of workplace ATEX system before it is set to work. Refer IEC EN 60079 - 14.

Safe maintenance:

The User is responsible for effective housekeeping, maintenance etc, especially where dust may form inside the fan. Refer IEC EN 60079 - 17

Safe documentation:

The User is responsible for a "verification dossier" to show compliance of electrical equipment and installations. Refer IEC EN 60079 - 14

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S&P fans for ATEX explosive atmosphere

Fan	Equipment Group II surface industry							
	Category 2 Gas						Category 3 Dust	
	Flameproof				Increased safety		II 3D Ex tc IIIB T125 °C IP55	
	II 2G Ex d IIB (H ₂) T4		II 2G Ex d IIB T4		II 2G Ex e II T3			
Plate mounted Axial Flow Fan	HCBT		HCBT		HCBT		HCBT	
	HDT		HDT				HDB/HDT	
Cylindrical Cased Axial Flow Fans	TGT		TGT		TGT		TGT	
	TCBT		TCBT		TCBT		TCBT	
	TTT-N		TTT-N		TTT-N		TTT-N	
Roof Fans	HCTT		HCTT		HCTT		HCTT	
	TCDH EXD		TCDH EXD		TH ATEX			
Centrifugal Direct Drive Fans	CMT		CMT		CMT		CMT	
	CMPT (1)		CMPT (1)		CMPT (1)			
	CMPT ATEX		CMPT ATEX					
	CBT-N		CBT-N		CBT-N		CBT-N	
	CBTR		CBTR		CBTR		CBTR	
	CRT		CRT		CRT		CRT	
Acoustic Cabinet Fans	CVTT		CVTT		CVTT			
	CGT		CGT		CGT		CGT	
In-line Duct Fans					ILT-ATEX			
					TD-ATEX			
Industrial Centrifugal, Direct drive or Belt drive fans	CBTR		CBTR		CBTR		CBTR	
	CK Series		CK Series		CK Series		CKCT, CKHT, CKLT, CKMT, CKNT, CKST	
	CM Series		CM Series		CM Series		CMRT	
	CR Series		CR Series		CR Series		CRT, CRPT	

Refer latest fan data for specific guidance
 Other S&P fan versions may be available on request.
 Example: II 3D Ex tc IIIC T125°C IP65
 EN 14986 Design of fans working in potentially explosive atmospheres, applies to all fan manufacture for:
 Group II G, for explosion groups IIA, IIB, and hydrogen, for categories 1, 2, 3.
 Group II D, categories 2, 3.
 Hydrogen (H₂) is the only group IIC gas included in EN 14986.
 S&P manufacture fans in accordance with EN 14986.

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User evaluation of ATEX hazard									
User input				Fan 1		Fan 2		Fan 3	
1	Hazardous Area Ex II Surface Industry:								
	Zone	Category	EPL	inside fan	outside fan	inside fan	outside fan	inside fan	outside fan
GAS									
G2	0	1G	Ga	No fan permitted		No fan permitted		No fan permitted	
	1	2G	Gb						
	2	3G	Gc						
G3	Gas								
G4	Gas Group II, IIA, IIB, IIC								
G5	Gas Temperature class T1-6								
G6	Ex d or Ex e or Ex n								
DUST									
D2	20	1D	Da	No fan permitted		No fan permitted		No fan permitted	
	21	2D	Db	No S&P fan		No S&P fan		No S&P fan	
	22	3D	Dc						
D3	Dust								
D4	Dust subdivision: IIIA, IIIB - Non-conductive = IP55								
	IIIC - Conductive = IP65								
D5	Cloud ignition temperature T CL								
D6	Layer ignition temperature T5mm								
Calculate	IEC EN 60079-14: 5.6.3.2. Dust cloud T max ≤ 2/3 T CL								
	IEC EN 60078-14: 5.6.3.3. Dust layer T max ≤ T5mm - 75°C								
D7	Equipment temperature = lowest T max								
10	Operation detail								
11	Installation								
12	Environmental conditions								
13	Ambient air temperature								
14	inlet ducted temperature if different								
15	Speed control								
16	Duty	Airflow	m³/h						
17		Pressure	Pa static						
18	Electrical supply: example 400v / 3Ph / 50Hz								
19	Preferred type: ducted, plate, roof, axial, centrifugal								

Refer: IEC EN 60079 - 0: Equipment - General requirements
 IEC EN 60079 - 10 - 1: Classification of areas - Explosive gas atmospheres
 IEC EN 60079 - 10 - 2: Classification of areas - Combustable dust atmospheres
 IEC EN 60079 - 14: Electrical installations in hazardous areas (other than mines)
 IEC EN 60079 - 17: Electrical installations inspection and maintenance
 IEC EN 60079 - 19: Equipment repair, overhaul and reclamation
 IEC EN 60079 - 20 - 1: Material characteristics for gas and vapour classification - Test methods and data
 IEC EN 60079 - 20 - 2: Dust classification - Test methods and data.

When published.

Location Gas / vapour or Dust subdivision	Permitted equipment group
IIA	II, IIA, IIB, IIC
IIB	II, IIB, IIC
IIC	II, IIC
IIIA	IIIA, IIIB, IIIC
IIIB	IIIB, IIIC
IIIC	IIIC

Refer: IEC EN 60079-14 Table 3

Date _____
 Company _____
 Reference _____
 Contact _____
 Telephone _____
 Fax _____
 E mail _____
 Name - Signature _____

User evaluation of ATEX hazard
 User input
 Soler & Palau data, staff and representatives are not able to advise on equipment for an ATEX application.
 Fan equipment is determined by the Users ATEX risk assessment. Refer IEC EN 60079 - 14.
 Fans to match, or exceed the Users assessment are offered.
 All data subject to Soler & Palau standard Terms and Conditions.

Further sources of guidance:

Directive 1999 / 92 / EC. ...protection of workers at risk from explosive atmospheres...
Guide of good practice for Directive 1999 / 92 EC
Directive 1994 / 9 / EC. ...equipment... for use in potentially explosive atmospheres
Guidelines on application of Directive 94 / 9 EC

Typical Standards:

IEC EN 14986: Design of fans working in potentially explosive atmospheres.
IEC EN 60079 - 0: Equipment - General requirements
IEC EN 60079 - 1: Equipment protection by flameproof enclosure "d"
IEC EN 60079 - 7: Equipment protection by increased safety "e"
IEC EN 60079 - 10 - 1: Classification of areas - Explosive gas atmospheres
IEC EN 60079 - 10 - 2: Classification of areas - Combustible dust atmospheres
IEC EN 60079 - 14: Electrical installations in hazardous areas (other than mines)
IEC EN 60079 - 17: Electrical installations inspection and maintenance
IEC EN 60079 - 19: Equipment repair, overhaul and reclamation
IEC EN 60079 - 20 - 1: Material characteristics for gas and vapour classification - Test methods and data
IEC EN 60079 - 20 - 2: Dust classification - Test methods and data. When published.
IEC EN 60079 - 31: Equipment dust ignition protection by enclosure "t"

Typical National resource for ATEX information:

<https://www.gov.uk/european-commission-product-directives>
<http://www.hse.gov.uk/fireandexplosion/dsear.htm>

Typical substance database:

<http://www.dguv.de/ifa/Gefahrstoffdatenbanken/GESTIS-Stoffdatenbank/index-2.jsp>

Typical data source:

BIA Report 13 / 97 HVBG - Combustion and explosion characteristics of dusts.

Soler & Palau data, staff and representatives are not able to advise on equipment for an ATEX application. Fan equipment is determined by the Users ATEX risk assessment. Refer IEC EN 60079 - 14. Fans to match, or exceed the Users assessment are offered.

This data refers to ATEX fans for ventilation, further data may apply to industrial process equipment.

All data subject to Solar & Palau standard Terms and Conditions.



S&P SISTEMAS DE VENTILACIÓN S.L.U.

Headquarters

C. Llevant, 4
Polígono Industrial Llevant
08150 Parets del Vallès
Barcelona - Spain

www.solerpalau.com

Soler&Palau 
Ventilation Group