

The aim of this presentation:

• To give a better understanding of ATEX and what it means to Woods Air Movement



What we will be going through:

- What is ATEX?
- Why do we need ATEX?
- What does ATEX mean to the employer/end-user and what are their responsibilities?
- The ATEX form
- Zone, Category, Gas Group & Temperature Class....What does it all mean?
- What does ATEX mean to us as a manufacturer and what are our responsibilities?
- Our ATEX products and special features

What is ATEX?





What is ATEX?





- Directive 99/92/EC (also known as 'ATEX 153' or the 'ATEX Worker Protection Directive' (formerly ATEX 137 - Workers Protection Directive)
- Directive 2014/34/EU (also known as 'ATEX 114' or 'ATEX Equipment Directive' (formerly ATEX 95 – Equipment Directive)

ATmosphère EXplosible

ATF



- The purpose of the ATEX 153 legislation is to improve the conditions and safety for workers throughout the EU, this will give an even set of conditions for similar industries in different countries
- The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) place duties on employers to eliminate or control the risks from explosive atmospheres in the workplace (HSE UK)
- There are a number of safety driven documents that employers must comply with, the COSHH regulations being another example (Control of Substances Hazardous to Health)



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ATEX RISK – SOURCES OF HEAT



Even simple installations will have heat generation.

We are advised to unplug our appliances and perhaps in a hazardous environment the consequences could be significant.

That is why almost every type of electrical equipment can be provided in Ex rated for safety



ATEX RISK – SOURCES OF HEAT







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Petrol Station Risk – One from the past?

A static spark can be caused if you are charged and you touch something that is earthed or if you are earthed and you touch something that is charged.

Pumps are now not fitted with the switch to keep pumping without hand pressure, and exhaust fumes.





Explosion Mechanisms - Remove Any 1 to Avoid





Diagram by GEXCON



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BOSLEY MILL, CHESHIRE, UK, JULY 2015 Wood Processing Plant – 4 Killed



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END USERS MUST CARRY OUT A RISK ASSESMENT OF THEIR PLANT



SAFETY IS A CONTINUOUS PROCESS

THIS IS WHY WE HAVE TO HAVE THE ATEX FORM - END USER RESPONSIBILITY

SAFETY IS NOT

JUST A ONE OFF



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Hazardous Area Details

		Inside Fan Casing	Outside Fan Casing]
Zone Classification	Zone 0		N/A	1
	Zone 1 or 21			1
	Zone 2 or 22			1
Category *	Category 1D or 1G			1
	Category 2D or 2G			1
	Category 3D or 3G			1
Temperature Class (ga	s only) eg. T3, T4 T6			1
Max allowable surface	Temp. of equipment (°C) ***			1
Ignition Temp. of dust (°C) if applicable				1
Operation Details				-
Gas or Dust Group e.g.	Gas Group IIB (mixture of air			7
and 5% Ethylene) For external dust, hazard is dust combustable flying or non conductive or conductive layer (Group IIIA, IIIB or IIIC respectively)		Group		
How is the fan installed e.g. ducted inlet/open outlet, horizontal or vertical mounting etc.?				←
Description of fan operation e.g. use with Inverter Drive				
Any extreme environmental conditions e.g. ambient temperatures above or below standard motor conditions of -20°C to +40°C, corrosive or dirty environment which may cause build up etc.				

For dual certification gas AND dust please give information on both gas and dust groups

 If unknown, we will use the relation between Zone and Category from the UK HSE Guidelines www.hse.gov.uk/fireandexplosion/zoning.pdf

In zone	Applicable category	If designed for
0	1G	gas/air mixture or vapour/air mixture or mist/air mixture
1	1G or 2G	gas/air mixture or vapour/air mixture or mist/air mixture
2	1G or 2G or 3G	gas/air mixture or vapour/air mixture or mist/air mixture
20	1D	dust/air mixture
21	1D or 2D	dust/air mixture
22	1D or 2D or 3D	dust/air mixture

** For ducted inlet and outlet fans, only one category difference between internal and external is allowed unless gas tight tested construction is used. For a ducted fan in an unventilated room, the same category shall be applied for inside and outside the fan case.

*** If unknown, we will use the relation of Temp. Class and Max Surface Temp. in EN13463-1; Table 1, Section 6



Hazardous Area Details

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	in zone	Applicable category		If designed for
\sim	0	16		gas/air mixture or vapour/air mixture or mist/air mixture
	1	1G or 2G		gas/air mixture or vapour/air mixture or mist/air mixture
	2	1G or 2G or 3G		gas/air mixture or vapour/air mixture or mist/air mixture
	-20	1D	\Box	dust/air mixture
	21	1D or 2D		dust/air mixture
	22	1D or 2D or 3D		dust/air mixture

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Zone, Category, Gas Group, Temperature Class......What does it all mean?

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ATEX Gas Groups





Explosive Risk, LEL (Lower Explosive Limit) – UEL (Upper Explosive Limit)

- The table shows the Lower Explosive Limit LEL and the Upper Explosive Limit UEL for a number of common gases.
- Between the levels of concentration in Air is the ignition risk range.
- Hydrogen by example is often ventilated at a concentration maximum of 1%, that is 25% of the LEL.
- Designers of systems need to consider the buoyancy of the gas when considering ventilation. Good systems need careful design.

Common C	ombustible G	as LEL's	and UEL's
		LEL	UEL
Acetone	(CH3)2CO	2.15%	13.0%
Acetylene	C2H2	2.5%	100%
Benzene	C6H6	1.2%	8.0%
Butadiene	C4H6	1.1%	12.5%
Ethane	C2H6	3.0%	15.5%
Ethyl Alcohol	CH2H5OH	3.3%	19.0%
Ethyl Ether	(C2H5)2O	1.7%	36.0%
Ethylene	C2H4	2.7%	36.0%
Hexane	C6H14	1.1%	7.5%
Hydrogen	H2	4.0%	75.6
IsoButane	C4H10	1.8%	8.5%
Isopropyl Alcohol (IPA)	(CH3)2CHOH	2.0%	12.7%
Methane	CH4	5.0%	<mark>15.0%</mark>
Methanol	CH3OH	<mark>6.0%</mark>	36.0%
Pentane	C5H12	1.5%	7.8%
Propylene	C3H6	2.0%	11.1%
Toluene	C7H8	1.2%	7.0%



Zone, Category, Gas Group, Temperature Class......What does it all mean?



ATEX Dust Groups

IEC designation for Gas and flammable vapours	IEC designation for Combustible dusts and fibres
Group II A - Propane	Group III A - Ignitable Fibres
Group II B - Ethylene	Group III B - Non-conductive dust
Group II C - Acetylene/Hydrogen	Group III C - Conductive dust



Zone, Category, Gas Group, Temperature Class......What does it all mean?

Temperature Class (Gas)





Zone, Category, Gas Group, Temperature Class......What does it all mean?

GR	OUPS	T1 (450°C)	T2 (300°C)	T3 (200°C)	T4 (135°C)	T5 (100°C)	T6 (85°C)
1	MINES	methane					
IIA	EXPLOSIVE ATMOSPHERES OTHER THAN	acetic acid acetone ally chloride ammonia aniline benzene benzyl chloride bromoethane chlorobenzene chlorobenzene chlorobenzene chlorobenzene chloroethylene chloroethane chloropropane cresol diacetone alcohol dichloropropane ethyl acetate ethyl acetate ethyl acetate ethyl acetate methane (industrial) methyl ketone methane nitrobenzene phenol propylene propylene propylene propylene toluene toluene toluene toluene toluene timethylkenzene xylene	acetylacetone acetyl chloride amyl acetate butanol butyl acetate butylacetate butylacetate chloroethanol cyclohexanone cyclohexanone dichloroethane dichloroethane dichloroethane dichloroethylene dichloroethylene dimethylamine dimethylamine ethylbenzene ethyl formate formdimethylamide methylamine nitromethane porpanol propylamine	bromobutane butyldigol butyraldehyde coal tar naphtha cyclohexane cyclohexylamine decahydronaphthalene ethyl mercaptan hexane heptane kerosene methyl acetoacetate methylcyclohexanol naphtha nonane paraldehyde pentane turpentine	acetaldehyde benzaldehyde diamyl ether dihexyl ether trimethylamine		
ΙΙΒ	M I N E S	acrylonitrile carbon monoxide cyclopropane	butadiene butene dioxane epoxypropane ethylene oxide oxydeformaldehyde nitroptopane paraformaldehyde trioxane	ethoxyethanol hydrogen sulphide methoxyethanol tetrahydrofuran tetrahydrofurfuryl alcohol	dibutyl ether diethyl ether ethyl methyl ether isopropylnitrate	carbon disulphide	ethyl nitrate
IIC		Blue water gas hydrogen		and a second			

Our standard fans are suitable for:

II 2G Ex h IIB T4

- Zone: 1
- Category: 2G
- Gas Group: IIB
- Temperature Class: T4
- Ambient Temp. Range: -20°C to +40°C



Examples of Fan ATEX Coding:





Examples of Fan ATEX Coding:





BS EN 14986:2017

- This is the 2nd version of the standard.
- Aligns with the updated ATEX standards
- Considers both Mechanical and Electrical Standards that influence Fans potentially, OVER 90 !!
- Designed for fan in the range -20 to +60c, pressure range 0.8 to 1.1 Bar, less than 21% Oxygen or Aerodynamic energy release less than 25kJ/Kg (30 Kpa) outside this range needs special design consideration.

BS EN 14986:2017



Design of fans working in potentially explosive atmospheres



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What does ATEX mean to us as a manufacturer and what are our responsibilities?

- We have to supply an ATEX compliant product.
- The product must be compliant with ATEX Directive 153 The ATEX Equipment Directive. and all relevant fan standards and regulations.
- The fan must include ATEX compliant components (where applicable).
- A technical file for Woods Air Movement products is lodged with a Notified Body to confirm compliance. The technical file details how the product is manufactured to meet BS EN 14986:2017.
- Product is manufactured in the factory under the audited controlled processes of ISO 9001
- Notified Body is Sira (NB 0518).
- Any permanent changes to our products have to be lodged with Sira (kept for 10 years).
- The product must be suitable for the environment and details specified on the ATEX form.



We offer ATEX compliant JM fans suitable for:

- Product Group II (Surface). We do not offer fans for Product Group I (Mines).
- Zones 1 & 2. We do not offer products for Zone 0.
- Category 2G & 3G for Gas Category 2D (special) & 3D for Dust. We do not offer products for Category 1G or 1D.
- Gas Groups IIA, IIB & IIC. IIC would require a higher spec. motor than our standard.
- Dust Groups IIIB & IIIC. <u>IIIC would require IP65 (conductive dust).</u>
- Temperature Class T1 to T6. <u>T5 & T6 require a higher spec., larger frame and more expensive motor.</u>



Our ATEX products and special features



Tip Gap

Track

The integration of ATEX approved components into the Axial fan product means that there is a change in the geometry of the fan assembly compared to the standard machine.

There are 2 principle influencers

- Increased tip gap, this is required to avoid any premature failure and is dictated to by the dimensions in the code. It is a well documented effect and the reduction in pressure capability has to be allowed for in the performance capability of the fan
- Terminal Box interference, ATEX motors. Due to the need to have safety under potentially explosive conditions, Terminal boxes have become larger than standard and no flying lead options can be fitted







ATEX Motors

New Line Name	Current Marking Examples	New Marking Examples
W/22Xac	ATEX: II 3G Ex nA IIC T3 Gc	ATEX: II 3G Ex ec IIC T3 Gc
VV22//ec	IECEX: EX nA IIC T3 Gc	IECEx: Ex ec IIC T3 Gc
W/22Xab	ATEX: II 2G Ex e IIC T3 Gb	ATEX: II 2G Ex eb IIC T3 Gb
vv22Aeb	IECEX: EX e IIC T3 Gb	IECEx: Ex eb IIC T3 Gb
W/22Vdb	ATEX: II 2G Ex d IIB T4 Gb	ATEX: II 2G Ex db IIB T4 Gb
VVZZAUD	IECEx: Ex d IIB T4 Gb	IECEx: Ex db IIB T4 Gb





ATEX Motors



Flameproof - Ex d / Ex de* (EPL Gb): type of protection in which the parts that may cause the ignition of an explosive atmosphere are confined in an enclosure capable of withstanding the pressure developed during an internal explosion of an explosive mixture without allowing propagation to the external environment. Standard: IEC 60079-1 - Explosive Atmospheres - Part 1: Equipment Protection by Flameproof Enclosures "d".

* Motors Ex d with terminal box and terminals Ex e.



Non-Sparking - Ex nA (EPL Gc): type of

protection applied to electrical equipment that, under normal operation and certain specific abnormal conditions, cannot ignite the explosive atmosphere.

Standard: IEC 60079-15 - Explosive Atmospheres -Part 15: Equipment Protection by Type of Protection "n".



ATEX Key Points for FlaktWoods

- ATEX 153 Mandates examination of the work environment for Hazardous Risk and the then Zoning of the workplace that reflects the Hazardous Risk.
- This risk analysis should identify the key requirements to be completed in the ATEX Form, a legal requirement, This has to be completed by the end user and cannot be completed by FlaktWoods.
- ATEX 114 Categorises equipment to be supplied into the Hazardous Zones.
- FlaktWoods Axial products have been designed recognising the product requirements of BS EN 14986:2017 and the standard products can be supplied into Zone 1, 2 & 22 and designed for 1.2.
- Increased clearances and airway obstructions mean that compared to the standard fan, pressure and efficiency capability is reduced.
- With correct data in the completed form, the new selection software will allow fan selection of the right product for the correct Zone



FlaktWoods ATEX Axial Fans





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Thank you

