



Antistatic Technical Sheet

Working safely in potentially explosive areas

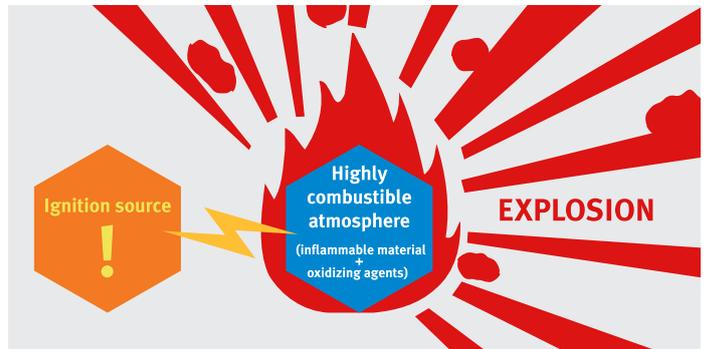


Anyone working in a potentially explosive area must follow strict safety rules and use the correct protective equipment. It doesn't matter whether you are working with combustible gases or easily ignitable dust: in addition to naked flames, incandescent materials and sparks, electrostatic discharge is an ignition hazard that causes serious accidents time and time again.



Potentially explosive atmospheres

Companies operating in such widely differing sectors as the chemical and pharmaceutical industry, the gas supply sector and the varnishing industry use combustible materials that can create potentially explosive atmospheres. These 'explosion protection zones' are classified into various categories depending on the frequency and length of time that the hazard exists.



EX protective zones for gases, vapours and mists	
Zone 0	An area in which a potentially explosive atmosphere, consisting of a mixture of air and flammable substances - in the form of gas, vapour or mist - is present constantly for long periods or is frequently present.
Zone 1	An area in which a potentially explosive atmosphere, consisting of a mixture of air and flammable substances - in the form of gas, vapour or mist - can occur during normal operation.
Zone 2	An area in which a potentially explosive atmosphere, consisting of a mixture of air and flammable substances - in the form of gas, vapour or mist - usually does not occur during normal operation or, if it does occur, only persists for a short period.

EX protective zones for dust	
Zone 20	An area in which a potentially explosive atmosphere, in the form of a cloud of combustible dust in the air, is present constantly for long periods or is frequently present.
Zone 21	An area in which a potentially explosive atmosphere, in the form of a cloud of combustible dust in the air, can occur during normal operation.
Zone 22	An area in which a potentially explosive atmosphere, in the form of a cloud of combustible dust in the air, usually does not occur in normal operation or, if it does occur, only persists for a short period.

Source: Directive 1999/92/EC (ATEX Directive 137)

Combustible gases and vapours are classified into three explosion groups (IIA, IIB and IIC) according to the minimum amount of energy required to ignite them. The most easily ignitable group is class IIC.

Examples of explosion groups

IIA	IIB	IIC
- Acetone	- Ethylene	- Acetylene
- Benzene	- Ethylene oxide	- Hydrogen
- Toluene	- Diethyl ether	- Carbon disulphide

Source: BGR-132

Electrostatic charge and discharge

If a material contains too many electrons (negative charge) or not enough electrons (positive charge), this situation is referred to in terms of physics as an electrostatic charge. In commerce and industry this happens whenever non-conducting or poorly conducting materials are used in processes involving friction or separation.

Here are some examples:

- Removing paper, textile, rubber or plastic tracks from rollers or cylinders
- Passing powdery material through pipes
- Transferring liquids between containers, stirring and decanting liquids
- Walking on an insulating surface

In the case of conductive and discharging («antistatic») materials with a sufficient grounding, the electrostatic charge is so low that no ignitable spark can be created in the event of discharge. However, in the case of non-conducting or poorly conducting materials a «hazardous charge» can be created. This means that in the event of discharge in a potentially explosive environment an ignitable spark can be created, which could trigger an explosion.

TYVEK® and TYCHEM® from DuPont: antistatic and discharging



The principle is simple: the surface of the clothing is coated with an antistatic chemical that attracts moisture from the air, producing a thin, conductive salt layer on the surface of the clothing. The surface coating creates a homogeneous conduction effect, i.e. any locally generated charge (caused by friction, for example) is rapidly discharged to the surrounding uncharged area or to earth if the resistance to earth is sufficiently low. Conduction times are shorter when the surface resistance is lower.

TYVEK® and TYCHEM® protective clothing meets the requirements of the DIN EN-1149-1 standard.

N.B.: The antistatic properties of TYVEK® and TYCHEM® protective clothing depend on taking up moisture from the air. It is therefore essential to ensure that the relative humidity of the environment in which they are used is sufficiently high, as these products do not offer reliable antistatic protection if the relative humidity is below 25%.

Please note that the antistatic treatment only means the clothing material can conduct a charge; the clothing must first be properly earthed for a controlled discharge to take place. This means, that both the clothing and the wearer must be permanently earthed, taking care to ensure that the surface of the clothing which has been given antistatic treatment is earthed.

Use of TYVEK® and TYCHEM® protective clothing in EX zones

DuPont has commissioned the Swiss Safety Institute (Basel) to carry out tests investigating the use of TYVEK® and TYCHEM® protective Clothing in EX zones.

The following table shows the situations in which clothing can safely be used (i.e. when the box is green for both the zone and the explosion group).

	Zone						Explosion group	
	0	1	2	20	21	22	IIA & IIB	IIC
TYVEK®, white	✓	✓	✓	✓	✓	✓	✓	✓
TYCHEM® C, yellow	✓	✓	✓	✓	✓	✓	✓	✓
TYCHEM® F, grey	✓	✓	✓	✓	✓	✓	✓	*

* Ignitable charges cannot be ruled out.

A detailed test report (in German) can be provided on request.

Legal and regulatory aspects at a glance

Useful information about working in potentially explosive zones can be found at:

Directive		Available at
Directive 1994/9/EC (ATEX Directive 95)	Directive on the adjustment of Member State laws concerning equipment and protective systems intended for use in potentially explosive atmospheres	www.europe.osha.eu.int
Directive 1999/92/EC (ATEX Directive 137)	Directive on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres	www.europe.osha.eu.int

Disclaimer

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