

“Welcome to the K Controls e-training course designed to deliver useful “Pneumatic Valve Actuation” application information in small instalments.”

To unsubscribe or to register a colleague to receive these documents [Click here](#)

Electrostatic discharge sparks

Electrostatic discharge sparks need to be avoided in hazardous areas because they can provide the ignition energy required to cause an explosion.



So what causes these sparks? Going right back to basics, all matter consists of atoms that are inherently electrically neutral. They have an equal number of positively charged protons and negatively charged electrons that balance each other out. The electrons in different materials can be exchanged when the two materials make contact with one another. If an electron is missing a positive ion is formed and when an electron is added a negative ion is formed. Ions are atoms with either more or fewer electrons. This is known as the triboelectric effect.

When the two materials become separated they are no longer electrically neutral as they have become either positively or negatively charged with an extra electron. When this imbalance occurs it is called “static”. It is also possible for materials to become charged without making direct contact. This happens when an object passes through the charged electrostatic field surrounding another object. This is known as inductive charging.

At the moment of separation the charge on the objects surface is stationary hence the term “static”. Usually the charge that is created is gradually dissipated; however, if the differential charge between the objects is high enough, the rate at which the excess charge is neutralized will increase. More and more electrons suddenly move across the gap between the two objects and as they do so they can, under the right conditions, heat up the air so much that it glows momentarily. This is a spark.

Charge differential between objects can be greater in dry conditions; making electrostatic discharge sparks more likely. In damp conditions conductive water molecules on the surface of objects can help gradually dissipate electrical charges. This is the reason for the warning sometimes seen on plastic enclosures “Do not wipe with a dry cloth”.

Every day experiences of static discharge include the shock felt when a metal door handle is touched having walked over a nylon carpet or when removing clothes from a clothes dryer. (For a discharge to be felt, seen or heard the voltage has to exceed approximately 3,500 volts).

Lightening is the most dramatic static discharge and is usually caused when tiny pieces of ice collide within a thunder cloud generating static electricity that is eventually discharged. Volcanic lightening is even more spectacular as conventional lightening caused by the cooling of a volcanic cloud high in the atmosphere is joined by the lightening caused by the static electricity generated from the collision of volcanic rock and ash particles.



E-training

K Controls designs and manufactures valve networking monitoring and control products:

Switchboxes
Control Monitors
Position Transmitters
Corrosion resistant
ATEX certified – gas + dust
High and low temperatures
IP68 for submersion
Low powered solenoids
Remote I/O compatible
AS-interface®
DeviceNet™
PROFIBUS® PA
FOUNDATION™ FIELDBUS
4-20mA + HART®
Wireless solutions
Linear or rotary adaptation

K Controls can also supply your positioner requirements

If you have any questions or comments, would like a colleague to receive this information or you would like the latest list of training documents, please use the contact details below:

K Controls Ltd

2 Crown Way
Crown Business Centre
Horton Road
West Drayton UB7 8HZ
United Kingdom

Phone:
+44 (0)1895 449601

Fax:
+44 (0)207 990 8111

E-mail:
sales@k-controls.co.uk

Web:
www.k-controls.co.uk

Blog:
www.k-controls.info

Visit us:
View a map

In addition to sparks, static charge differentials can cause objects to be attracted to one another (if there are opposite charges) or repelled from one another (if there are like charges).

The issue of electrostatic discharge is dealt with in Part 0 of EN 60079-0:2006 Electrical apparatus for explosive gas atmospheres

Clause 7.3 deals with electrostatic charges on external non-metallic materials of enclosures and clause 7.3.2 addresses the avoidance of build-up of electrostatic charge.

Electrostatic charges on the external non-metallic materials of enclosures can be avoided be either by selection of a material with a surface resistance which does not exceed 1G Ohm (at 23°C +/-2°C and 50% +/-5% relative humidity) i.e. carbon loaded, or by limitation of the surface area.

For Group IIC gases in Zones 1 and 2 the maximum allowable surface area of non-metallic parts of enclosures is 20 cm². Note: 20 cm² is equivalent to the surface area of a 5cm diameter disc.

For Group IIB and IIA gases in Zones 1 and 2 the maximum allowable surface area of non-metallic parts of enclosures increases to 100 cm²

Above the 20 cm² and 100 cm² limits special conditions for safe use will apply. This is designated with the suffix 'X' on the certification number marked on the product.

For example the end user must be warned that static charge will build when wiping clean with a dry cloth or if the enclosure is placed in the path of a forced draught. E.g. In the flow path of an extractor fan. A warning label is therefore attached to the product. The standard states that "Care should be taken when selecting the use of a warning label for static risk control. In many industrial applications it is highly likely that warning labels will become illegible through the deposition of dust. If this is the case, it is possible that the act of cleaning the label may cause a static discharge."

IMPORTANT: For full details please refer to EN 60079-0

Trademarks K Controls has used all reasonable resources and efforts to indicate and supply information regarding trademarks used in this document. The absence of a trademark identifier is not a representation that a particular word or technology is not a trademark. All trademarks are property of their respective owners. If we have failed to properly show a trademark, please e-mail us and we will attempt to correct it. The ownership of all trademarks referred to in this document is acknowledged.

Legal Disclaimer This document is written by K Controls for use by its clients. Although we make every reasonable attempt to verify the accuracy of the technical information and advice provided, we can take no responsibility for loss or damage resulting from its interpretation or application. K Controls is not in any way responsible, and has no legal liability, in respect of the contents of any other web site accessed via this document, nor for information provided via that site. All information accessed via links in this document is protected by international copyright laws and may not be reproduced in any form without the explicit written permission of the author. This E-mail and any files transmitted with it are confidential and may be legally privileged. It is intended solely for clients of K Controls Ltd. Any unauthorized recipient should advise K Controls immediately of the error.

Copyright K Controls Ltd 2010 - All rights reserved.