Guidance on the presence and operation of portable self energised electrical/electronic devices in potentially explosive atmospheres (gas and dust)

EEMUA Publication 241

EEMUA

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GUIDANCE ON THE PRESENCE AND OPERATION OF PORTABLE SELF-ENERGISED ELECTRICAL / ELECTRONIC DEVICES IN POTENTIALLY EXPLOSIVE ATMOSPHERES (GAS AND DUST)

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- Providing the organisation within which networking, information sharing and collaboration among users on non-competitive technical matters can take place.
- Influencing the way written regulations are interpreted and applied in practice.
- Promoting and presenting members' views, and encouraging the application of good sound engineering practices.
- Developing user guides, specifications, training and competency schemes.
- Facilitating members' participation in national and international standards making.
- Influencing relevant national and European legislation and regulation.

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FOREWORD

The purpose of this guidance document is not to provide new technical research, but rather to provide a practical guide for managing the presence and use of portable self-energised electrical and electronic devices within potentially explosive atmospheres.

This publication has been written to provide a structured approach which can be followed by site personnel supervising and managing the presence and use of portable self-energised electrical and electronic devices on a day-to-day basis.

The guidance provides recommendations for safe practices rather than a set of rigid rules, and it is stressed that the specific circumstances should always be taken into account when considering this document. It is not intended that the recommendations of the guidance should be applied rigidly where for a variety of reasons it may not be safe or practicable to comply with them.

Attention is drawn to the fact that in many countries' relevant statutory requirements, standards and guidance exist, and this guidance should be regarded as being complementary to these requirements.

The information contained in this publication is provided as guidance only and while every reasonable care has been taken to ensure the accuracy of its contents, the Energy Institute and EEMUA and the technical representatives listed in the Acknowledgements, cannot accept any responsibility for any action taken, or not taken, on the basis of this information. The Energy Institute and EEMUA shall not be liable to any person for any loss or damage which may arise from the use of any of the information contained in any of its publications.

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1 INTRODUCTION

Potentially explosive atmospheres can be caused by flammable gases, vapours, mists or dusts. If there is a combustible mixture of the substance with air, then a source of ignition can cause an explosion, resulting in fatalities, serious injuries and significant damage to plant and the surrounding environment.

Many workplaces may contain areas with potentially explosive atmospheres such as hydrocarbon extraction, storage and by-product production facilities, gas distribution networks and sites handling fine dusts such as flour or cement.

There are two key ways to reduce the risk associated with these workplaces: firstly, by preventing the creation of an explosive atmosphere and secondly, by preventing sources of ignition from being present within the explosive atmospheres. Ensuring the use of suitable equipment is a key aspect of controlling ignition sources and thereby reducing the risks associated with areas containing potentially explosive atmospheres.

There are existing regulations and standards that deal with these issues, and this document does not aim to provide new technical research. Instead this document aims to pull together a range of existing information into a single guidance document. It is a user guide and further technical information can be found in the EI:

– *Research Report: Investigation of the possible ignition risks arising from the presence and operation of button cell energised devices in potentially flammable atmospheres associated with transport fuels.*
– *Research Report: Investigation of the possible ignition risks arising from the presence and operation of lithium-ion (rechargeable) button cell energised devices in potentially flammable atmospheres associated with transport fuels.*

This document focuses on the management of four key types of portable self-energised electrical and electronic devices:

– Ex certified devices (e.g. a safety torch).
– non-Ex certified devices, but which are below the energy level needed to produce a source of ignition (e.g. a watch powered by a single non-rechargeable button cell).
– non-Ex certified devices which may have sufficient energy to produce a source of ignition but whose use has been assessed as being non-dangerous (e.g. a cardiac pacemaker).
– non-Ex certified devices which have sufficient energy to produce a source of ignition and whose use has been assessed as potentially dangerous (e.g. a rechargeable battery powered drill).

Whilst equipment used in areas with potentially explosive atmospheres should be Ex certified, in recent years there has been an increase in the use of non-certified portable self-energised electrical/electronic devices. These portable self-energised devices include items such as fitness monitors, medical devices, hand-held computers and smart phones. Some of these devices have sufficient energy levels such that they can produce an ignition source.

This ignition source could occur when the device is:

– used normally;
– used abnormally;
– maintained (such as batteries being changed), or
– damaged (such as it being dropped).

If these devices are brought into a hazardous area containing a potentially explosive atmosphere (either from gas, vapour, mist or dust), there is a risk that they could provide an ignition source leading to an explosion.

This document has been written based on the legislative and regulatory frameworks applicable to the UK, and if the guidance is to be used elsewhere the applicable standards and regulatory regimes should be complied with.

In addition to this guidance document, a short two-page summary document has been developed to be used as a quick reference guide by users in the field.

2 SCOPE

This document aims to provide guidance in relation to the electrical ignition risks within areas with potentially explosive atmospheres. It therefore includes:

– vapours and mists – such as petroleum products;
– gases – such as hydrogen, and
– combustible dusts – such as food products and cement.

The guidance only covers electrical ignition risks from self-energised devices (including those powered by extra-low voltage), and therefore mechanical sources of ignition and devices powered by mains electricity are not covered. However, some of the guidance within this document (such as section 12) may have some useful guidance which can be applied to the use of equipment powered by mains electricity.

The guidance only covers portable devices, and as such does not cover any fixed equipment within the plant (such as lighting), or isolatable equipment which is fixed to vehicles (such as reversing cameras). Therefore, taking a vehicle-mounted hand-held computer as an example, the dock which is mounted in the vehicle cab would not be included within this guidance, but the portable hand-held computer would be included.

The guidance does not cover portable generators.

This document only considers industrial facilities and does not aim to provide guidance on the use of portable self-energised electrical and electronic devices in public areas such as service stations or transportation on public roads.

3 APPLICATION

There is a wide range of facilities where potentially explosive atmospheres within a localised area can be present. This document has been written to provide guidance in relation to:

– facilities for the storage of dangerous substances;
– vehicle loading facilities for dangerous substances;
– gas and fuel distribution networks;
– offshore and onshore drilling facilities;
– offshore and onshore process and storage facilities, and
– processing plants that may contain hazardous areas (including power plants, chemical plants, refineries, cement plants, food mills and factories).

This guidance aims to provide targeted guidance for responsible persons and site personnel managing and supervising the use of portable electrical and electronic devices within hazardous areas. It is not aimed at technical specialists where other more technical guidance is available.

However, in addition to the personnel listed here, the guidance may also be useful to:

– contractors operating in the facilities listed here;
– manufacturers and suppliers of portable equipment to be used in hazardous areas;
– emergency services, and
– enforcing authorities.

This is not an exhaustive list of facilities or personnel, and the principles set out in this guidance can be adopted in other relevant situations.

4 OVERVIEW

Section 5 highlights the key pieces of legislation applicable to the presence and use of portable self-energised electrical and electronic devices in potentially explosive atmospheres.

Section 6 provides a brief background regarding areas with a potentially explosive atmosphere.

Section 7 provides some guidance on the range of self-energised portable electrical and electronic devices along with some of the ignition hazards and potential causes.

Section 8 sets out guidance for the process of risk assessment and the selection of devices based on this assessment.

Section 9 provides guidance on categories and types of Ex certified equipment and the hazardous zones that they are suitable for.

Section 10 sets out guidance for the use of low energy devices which fall below the requirements of IEC 60079-14.

Section 11 sets out guidance for the use of higher energy devices, such as implanted medical devices.

Section 12 provides guidance on the use of safe systems of work to manage the risks associated with the use of portable self-energised electrical and electronic devices in potentially explosive atmospheres.

Section 13 highlights the need to manage competence for all personnel involved with the management of portable self-energised electrical and electronic devices in potentially explosive atmospheres.

Section 14 introduces the issue of human failures and human factors and how these can impact the use and presence of portable self-energised electrical and electronic devices in potentially explosive atmospheres.

Section 15 highlights the importance of supervision and monitoring in managing the safe use of portable self-energised electrical and electronic devices in potentially explosive atmospheres.

Section 16 highlights the importance of inspection and maintenance in managing the safe use of portable self-energised electrical and electronic devices in potentially explosive atmospheres.

Section 17 introduces the issue of management of change (MoC) and how this can impact the use and presence of portable self-energised electrical and electronic devices in potentially explosive atmospheres.

Section 18 provides guidance on use and presence of portable self-energised electrical and electronic devices during an emergency.