

Explosives Regulations 2014

Guidance on Regulations – Professional firework display operators

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First published 2015

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This guidance has been developed by a sector working group established under the Explosives Legislative Review (www.hse.gov.uk/explosives/explosives-legislative-review.htm). It includes content previously found on HSE's website and in the Approved Code of Practice to the Manufacture and Storage of Explosives Regulations 2005 (L139) which was withdrawn on 1 October 2014.

This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory, unless specifically stated, and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance.

Acknowledgements

HSE would like to thank working groups within the explosives industry for their help in producing this guidance.

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Introduction

Who is this publication for?

1 This publication is for professional firework display operators working on sites licensed under the provisions of the Explosives Regulations 2014 (SI 2014/1638) (ER2014).

2 This publication also contains material that may be relevant to:

- people when they are undertaking the storage of explosives or manufacturing activities at display locations.
- individuals and voluntary clubs or societies preparing, fusing and storing fireworks for use in larger firework displays or bonfire processions.
- enforcing authorities such as local authority trading standards officers, the police, fire and rescue services and other emergency services. This publication may also be of interest to other government or regulatory agencies and waste disposal operators.

What is this publication about?

3 This publication provides guidance on the safe and secure storage of fireworks intended for use by professional firework display operators. It also provides guidance on the explosives manufacturing activities that are likely to take place on licensed sites occupied by professional firework display operators.

4 Following the guidance will enable compliance with the safety and security provisions of the ER2014.

5 This document also provides guidance on some wider areas which are relevant to ER2014. These wider areas are included as they help support compliance with the regulations by professional firework display operators.

Throughout this guidance, you will see statements in boxes. These statements identify successful outcomes of the application of appropriate safety measures to explosives operations. Dutyholders can use the statements to challenge themselves on the effectiveness of the safety precautions they have implemented.

Other guidance that applies to the storage and manufacturing activities undertaken by professional firework display operators

6 HSE has published detailed guidance on the safety provisions (L150)¹ and security provisions (L151)² of ER2014. This guidance provides the background to that document and will be useful to those who require a deeper understanding of the precautions required to safely and securely store fireworks and undertake the other explosives operations expected of a professional fireworks display business. It will also be useful to those people whose activities include the processing of explosives and activities that would be considered to be explosives manufacture.

7 L150 and L151 are referred to throughout this guidance. In each case, we have quoted the relevant section heading to make it easier for you to find the information you need.

Other legislation that applies to explosives operations

8 There are other general health and safety regulations which apply to explosives operations involving fireworks, pyrotechnic articles and other explosives. This publication gives additional

guidance where there are particular issues which need to be considered, for example, in selecting work or personal protective equipment, or in vacating an explosives site.

9 The Pyrotechnic Articles (Safety) Regulations 2015 (SI 2015/1553) apply to fireworks, theatrical pyrotechnics and other pyrotechnic articles. These regulations transpose European Directive 2013/29 on the placing on the market of pyrotechnic articles into UK law. The Regulations deal with the harmonisation of standards and the safety of pyrotechnic articles (including fireworks) placed on the market. They also define:

- those products which are available to the general public and the specific age restrictions on their sale; and
- those articles which are only for supply to specialists.

10 Fire safety legislation also applies to professional display operators' premises.

Application and scope of the Regulations

11 Regulations 2 and 3 of ER2014 identify how the Regulations apply to explosives operations. This section provides information and guidance on how the Regulations apply to safety and security.

Explosives for work, personal and recreational use

12 ER2014 apply to explosives operations whether they are for work or non-work purposes. They therefore apply to anyone storing or undertaking manufacturing operations on fireworks for personal recreational use, or to voluntary clubs or societies storing, processing or fusing fireworks for firework displays or bonfire processions.

Transport

13 ER2014 *do apply* to the transport of explosives on sites where they are manufactured or stored. This includes movement on public roads between different buildings on the same site.

14 ER2014 *do not apply* to explosives which are being transported by road, rail, air or water, provided that the explosives are not kept in one place for longer than 24 hours.

15 Explosives which are being transported will be treated as being in storage when they are, or are to be kept at, any place for more than 24 hours.

16 Dutyholders who keep explosives which are being transported as part of the supply chain should make appropriate arrangements to ensure that any explosives whose onward journey cannot take place are stored safely and lawfully.

17 As a general rule, where explosives are on a stationary vehicle which has arrived at its destination and does not have an onward journey, and have not been unloaded within a reasonable period of time, the explosives should be regarded as being in storage.

18 Fireworks should only be transported with electric igniters fitted if they have been assigned a classification by a competent authority of a contracting party to ADR, for that article with the electric igniter fitted.

Application offshore

19 ER2014 (other than regulations 4, 5, 31 and 32) apply to certain activities in the UK territorial sea adjacent to Great Britain (for example, coastal construction activities which extend into the territorial sea, and the construction, operation and demolition of wind farms).

20 Outside the territorial sea, ER2014 will only apply within:

- areas on the UK Continental Shelf designated by order under section 1(7) of the Continental Shelf Act 1964 (1964 c. 20);
- a 'gas importation and storage zone' designated by section 1(5) of the Energy Act 2008 (2008 c. 32); and
- a 'renewable energy zone' designated by section 84(4) of the Energy Act 2004 (2004 c. 20).

21 Regulations 6, 7, 9, 10, 12–18, 20, 23 and 26–30 do not apply to:

- ships moored within harbour areas (see the Dangerous Substances in Harbour Areas Regulations 1987 (SI 1987/37);
- the master or crew of a ship or the employer of such persons in respect of the normal shipboard activities of a ship's crew which are carried out solely by the crew under the direction of the master; and
- offshore installations as defined by regulation 3 of the Offshore Installations and Pipeline Works (Management and Administration) Regulations 1995 (SI 1995/738).

Explosives in use

22 The safety provisions of ER2014 do not generally apply to explosives which are in use. However, the nature of some activities on sites licensed by the Health and Safety Executive (HSE) and the Office for Nuclear Regulation (ONR) means that there may be constraints on these activities in the licence where they interact with explosives being manufactured or stored. It is unlikely that professional firework display operators' sites will be licensed by ONR. It is expected that the vast majority of licences granted under ER2014 to professional firework display operators will be granted by local authorities or HSE.

23 Normally, all unused explosives must be returned to a suitable store at the end of each day. However, there may be circumstances, such as large fireworks displays, when fireworks are left overnight rigged as part of a display.

24 Similarly, the investigation of a misfire may require fireworks to be left in situ until they can be safely removed or disposed of. The operator should make appropriate arrangements for supervision of the fireworks and any other explosives present to ensure their safety and security.

25 While the operations are continuing, these fireworks would be regarded as being in use. However, were the operations to cease, or be suspended for any length of time, the fireworks could be regarded as no longer in use, and therefore subject to the safety provisions of ER2014. In the final instance, it would be for a court to decide, as a matter of fact, whether in the specific circumstances the explosives were, or were not, in use.

Hazard type

The role of hazard type

26 Hazard type (HT) is central to both the safety theme and the licensing elements of the Regulations.

27 Hazard type defines and describes the nature of the hazard arising from fireworks or other explosives in both storage conditions and during processing or manufacturing activities.

Definition of 'hazard type' and its relationship to hazard division

28 Definitions of the hazard types are given in regulation 2 of ER2014:

- *hazard type 1: ‘...an explosive which, as a result of, or as a result of any effect of, the conditions of its storage or process of manufacture, has a mass explosion hazard’ (a mass explosion can be one in which the entire body of explosives explodes as one; where a substantial proportion of the explosives present could explode in such a way that the practical hazard should be assessed by assuming simultaneous explosion of all the explosives present; or one which is associated with a serious blast hazard);*
- *hazard type 2: ‘...an explosive which, as a result of, or as a result of any effect of, the conditions of its storage or process of manufacture, has a serious projectile hazard but does not have a mass explosion hazard’ (where a fragment hazard arises solely as a consequence of the store where the explosives are being kept breaking up, the explosives would normally be treated as Hazard Type 1);*
- *hazard type 3: ‘...an explosive which, as a result of, or as a result of any effect of, the conditions of its storage or process of manufacture, has a fire hazard and either a minor blast hazard or a minor projection hazard, or both, but does not have a mass explosion hazard’ (ie those explosives which give rise to considerable radiant heat or which burn to produce a minor blast or projection hazard);*
- *hazard type 4: ‘...an explosive which, as a result of, or as a result of any effect of, the conditions of its storage or process of manufacture, has a fire or slight explosion hazard, or both, with only local effect’ (ie those explosives which present only a relatively low explosion hazard in the event of ignition or initiation, where no significant blast or projection of fragments of appreciable size or range is expected).*

29 For those fireworks or other explosive articles being kept as packaged for carriage, and which have been classified, there will generally be a direct correlation between the UN hazard division (HD) assigned to them on classification for transport, and the hazard type (HT) they should be allocated for storage, ie:

- UN HD 1.1 (eg UN 0333) = HT1
- UN HD 1.2 (eg UN 0334) = HT2
- UN HD 1.3 (eg UN 0335) = HT3
- UN HD 1.4 (eg UN 0336 & 0337) = HT4

Determination of hazard type

30 If explosives are kept other than in their classified packaging, it cannot be assumed that the hazard they present remains the same. The nature of packaging (or lack of it), and the quantity and arrangement of explosives in storage or during manufacturing operations can have a significant effect on the hazard presented.

31 For example, some fireworks that would normally attract a 1.3 classification are packaged in such a way that they can be treated as HD 1.4 (and HT4) in their transport packaging. When these fireworks are removed from their packaging, they can be expected to present as HT3.

32 An assessment should be made of the hazards presented by fireworks and other explosives throughout the course of their manufacture, storage and handling to ensure that the correct hazard type is used under all conditions.

33 Explosive materials that arise from fusing or other manufacturing activities involving fireworks should also be assessed for the purposes of determining their hazard type. This could include off-cuts of fuse, black powder from lift charges, or collected loose compositions that have leaked from fireworks. It is possible for these materials to present a different hazard to that of the fireworks from which they originated.

34 Fusing processes may also change the hazards presented by articles, and the implications for hazard types should be assessed, and compliance with the requirements of the Transport Regulations reviewed. Fusing arrangements should be considered to determine:

- whether or not linked articles could function simultaneously;
- whether or not simultaneous functioning of linked articles would change the hazard presented;
- whether or not the fused articles can be packaged for storage or lawfully transported, and the effects this may have on hazard type; and
- how the hazards associated with the different articles should be aggregated. In the absence of tests or a detailed analysis, it should be assumed that where:
 - HT3 articles are fused together with HT3 articles, they will present an HT3 hazard; or
 - articles are fused with an article that could be expected to present either HT1 behaviour or a significant shock effect, they should be collectively treated as HT1.

35 Hazard type should also be reassessed (and compliance with the requirements of transport regulations reviewed) when:

- fireworks or other explosives are removed from packaging intended to mitigate the explosives hazards;
- mixed packages of fireworks are selected for a display but are not fused together;
- shells are preloaded into mortar tubes; and
- fireworks, especially shot tubes, roman candles or mines, are placed into frames or containers that will provide additional confinement when compared to their normal transport packaging.

36 More information on how to identify and safely manage fireworks which are transported in packaging designed to minimise or mitigate hazards can be obtained from suppliers.

37 Further information on the factors affecting hazard type of explosives can be found in L150 under 'Application and scope of the Regulations'.

Terminology

38 For the purposes of the remainder of this guidance, the term 'fireworks' should be taken to include both fireworks and other explosives, such as igniters and fuses, that professional firework display operators would be expected to use in their undertaking.

39 Further information on various terms used in the Regulations and in this document can be found in the Glossary.

Safety requirements

Explosives operations are subject to robust controls to maintain safety standards.

General principles of safety in explosives operations

40 High standards of safety need to be in place before explosives operations start, and they should remain in place – and be effective – for as long as the explosives operations continue. It is generally difficult or impossible to regain control of an event involving explosives once control has been lost. The effects of an explosive event can often be catastrophic, and can impact those beyond the immediate activity, eg members of the public and the emergency services. The safety provisions of ER2014 provide the regulatory framework for identifying and implementing these standards of safety, and are based on generally recognised principles of safe operation in the sector.

41 Further information on the ten general principles underpinning the safety provisions of ER2014 can be found in L150 under 'General principles of safety in explosives operations'.

Regulatory framework

42 The safety provisions in ER2014 are contained in five Regulations:

- **Regulation 26** requires anyone manufacturing or storing explosives to take appropriate measures:
 - to prevent fire or explosion;
 - to limit the extent of fire or explosion, including measures to prevent the spreading of fires and the communication of explosions from one location to another; and
 - to protect persons from the effects of fire or explosion.
- **Regulation 27** requires people storing explosives to maintain separation distances, identifies the circumstances in which separation distances do not need to be applied, and identifies how separation distances are applied to certain sites which are granted a licence by HSE or ONR.
- **Regulation 28** requires anyone discarding or disposing of explosives, or who is decontaminating explosive-contaminated items, to ensure, so far as reasonably practicable, that they are undertaking those activities safely.
- **Regulation 29** prohibits the manufacture and storage and import of pyrotechnics containing sulphur and/or phosphorus mixed with chlorates without the approval of HSE.
- **Regulation 13** relates to the grant of licences, but also includes safety provisions. It allows:
 - HSE and ONR to prescribe separation distances at most of the sites they license as an alternative to the 'fixed rules' approach required by regulation 27;
 - HSE and ONR to prescribe certain activities that will be subject to the provisions of the licence at most of the sites they license, to take account of potential interactions between those activities and the manufacture and/or storage of explosives that takes place at that site; and

- all licensing authorities to reinforce the requirements of regulation 26 as they relate to the sale of pyrotechnic articles at a site which is licensed for the storage of explosives.

Fire and explosion measures (regulation 26)

During manufacture and storage, appropriate measures are taken to:

- **prevent an unplanned fire or explosion;**
- **limit the extent of fires or explosions;**
- **prevent fires spreading;**
- **stop explosions communicating from one place to another; and**
- **protect people from the effects of a fire or explosion.**

Safety measures

43 The approaches taken for the safe storage, handling, processing and fusing of fireworks by professional firework display operators are the same as those taken to ensure the safety of other types of explosive. Professional firework display operators should identify the safety measures to be taken by carrying out a risk assessment, and should implement the appropriate measures necessary to control the hazards and risks identified.

44 When storing or working on fireworks, the primary initiating events that need to be considered are fire or accidental ignition of the fireworks by other means. The principal hazards that need to be considered are the spread of fire, the propagation of any explosives event, and the potential for people to be struck by fireworks effects.

45 The safety measures taken should ensure that:

- the likelihood of an event involving fireworks is minimised;
- an event involving fireworks being worked on will not communicate to fireworks in storage;
- people present on site will be able to evacuate before the fireworks (or any other dangerous substances) become involved in any outbreak of fire; and
- people both on the site and off are adequately protected from both fire and the potential consequence of any event involving the fireworks or explosives.

Identify safety measures

Safety measures to:

- **prevent unplanned fires and explosion;**
- **prevent the spread of fire and the communication of an explosion; and**
- **protect people from the effects of a fire and explosion**
- **are identified using a structured approach.**

46 To identify and evaluate hazards, assess risks and implement appropriate safety measures, the following should be considered for each stage of the explosives operation:

- how a fire and explosion could occur;

- how to prevent it spreading or communicating; and
- how to protect people.

Risk assessment

47 Employers will generally identify and implement appropriate measures as an outcome of a risk assessment or as part of the implementation of a safety management system.

48 Where the site or the activities undertaken are complex, it may be necessary to conduct a more detailed hazard identification and analysis in support of the risk assessment. Further information can be found in L150 under 'Hazard identification and evaluation and the assessment of explosives risks' and Appendix 1.

49 Regulation 3 of the Management of Health and Safety at Work Regulations 1999 (SI 1999/3242) (the Management Regulations) requires all employers and self-employed people to assess the risks to workers and any other people who may be affected by their work or business. This is to enable them to identify the sensible and proportionate measures they need to take to control the risks.

50 Regulation 5 of the Dangerous Substances and Explosive Atmospheres Regulations 2002 (SI 2002/2776) (DSEAR) requires a risk assessment to be carried out to identify whether dangerous substances are present at the site and the risks they present. DSEAR apply to all hazards arising from both the manufacture and storage of explosives and from any other dangerous substances on site. This includes, for example, substances not in use, or those in storage awaiting use.

51 Regulation 7 of the Control of Major Accident Hazards Regulations 2015 (SI 2015/483) (COMAH) requires operators of COMAH establishments to have a safety management system in place that will identify and evaluate major hazards. It also requires the adoption and implementation of procedures for systematically identifying major hazards arising from normal and abnormal operations, and the assessment of their likelihood and severity.

52 Fire safety legislation requires responsible persons to make a suitable and sufficient assessment of the risks to which 'relevant persons' are exposed. This is to identify the general fire precautions that need to be taken to comply with the requirements and prohibitions imposed by such legislation.

53 Employers and the self-employed who comply with the requirements of the Management Regulations, DSEAR, fire safety legislation and (where appropriate) COMAH will have taken the steps necessary to identify the appropriate measures they are required to take under regulation 26(1) of ER2014.

Management arrangements

Appropriate safety measures are in place. Roles and responsibilities in implementing and maintaining them are specified and understood.

54 Arrangements should be in place to manage explosives operations. These arrangements should address the responsibilities for:

- identifying;
- implementing; and
- maintaining

the safety measures.

55 Employers and the self-employed will generally identify and implement management arrangements as a consequence of their duties under regulation 5 of the Management Regulations.

56 Employers will also have duties as a responsible person under fire safety legislation.

57 Operators of establishments subject to the COMAH Regulations will also have a duty to manage explosives operations as part of their safety management system.

58 Further information on management arrangements for explosives operations can be found in Appendix 2 of L150.

Cross-cutting safety measures

Cross-cutting safety measures (ie measures that address more than one duty) are implemented to ensure the safe manufacture and storage of explosives.

59 Some safety measures are particularly important because they reduce the risk of an explosion being initiated and limit the consequences in the event of an initiation. These safety measures are:

- appropriate competence;
- safe systems of work and working practices;
- high standards of housekeeping;
- effective stock management;
- segregating explosives presenting different likelihoods of initiation (or hazard types);
- segregating explosives operations from other activities;
- safely transporting explosives on site; and
- providing and maintaining appropriate mounds, traverses and barriers.

Competence

People manufacturing or storing explosives are competent to carry out activities under normal conditions. They understand the hazards and risks which may arise and the actions to take in abnormal or emergency situations.

60 Competent people understand how a fire and explosion can occur, and know what to do to prevent it. They understand how it can be stopped from spreading or communicating to other explosives, and what to do to protect people, including themselves. Having an appropriate level of competence allows everyone involved in explosives operations, including directors, managers, workers and contactors, to recognise the hazards and risks in operational activities, and then apply the right safety measures to control and manage those hazards and risks.

61 To be competent, an organisation or individual must have a combination of training, skills, experience and knowledge, and the ability to apply them to perform a task safely. Factors such as attitude and physical ability and behaviours can also affect someone's competence.

62 Competence develops over time. Individuals develop their competence through a mix of initial training, on-the-job learning, instruction, assessment and formal qualification. In the early stages of training and experience, people should be closely supervised. As competence develops, the need for direct supervision can be reduced.

63 Professional firework display operators should have systems in place to assess and identify training and competency needs. They should also follow up where training needs are identified or competency needs to be developed. The extent and formality of these systems depends on factors such as the outcomes of the risk assessment, the complexity of the explosives operation, the size of the organisation, and the rate of turnover of the people involved in the operation. Competence should be reviewed at periodic intervals and when there have been significant changes to:

- people;
- procedures;
- equipment; and
- materials

or when the regulatory framework or recognised industry practice has changed.

64 Training provided to workers should include instructions on:

- storing fireworks well away from flammable liquids and materials that can easily catch fire and burn;
- controlling the quantities being stored, handled, processed or displayed in areas where people work or gather;
- prohibiting smoking anywhere near fireworks;
- ensuring that sources of heat, such as heaters, are kept well away from fireworks;
- keeping fireworks in closed transport packaging whenever it would be practicable to do so;
- storing fireworks away from hazardous substances;
- protecting fireworks from damp;
- ensuring that other chemicals do not contaminate fireworks; and
- how to avoid accidental damage to packaged fireworks.

65 There are several sector-based approaches that can help professional firework display operators to develop and judge competence. For example:

- professional firework display operators and their employees can undertake accredited training as a way of developing their competence. Accredited training is available from the British Pyrotechnists Association (www.pyro.org.uk);
- professional firework display operators and their employees can also undertake training recognised by insurers as a way of developing their competence. Professional firework display operators should contact their insurers for advice; and
- National Occupational Standards (NOSs) can be used as a tool in determining and assessing an individual's competence for undertaking a task. NOSs are statements of the standards of performance individuals should achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding.

66 Further guidance on competence in the explosives sector can be found in L150 under 'Fire and explosion matters: competence'.

Safe systems of work and working practices

Explosives operations and activities are carried out to agreed procedures.

67 Developing the safety measures for explosives operations undertaken by professional firework display operators will normally include consideration of:

- the activity and where it is to be carried out;
- the sequence of the tasks needed to complete the activity and how they will be done;
- the outcomes of the hazard identification and evaluation and risk assessment;
- the skills and competencies required to deal with the hazards;
- the precautions necessary to prevent a fire and explosion; to stop a fire spreading and an explosion communicating; and to protect people from the effects of a fire or explosion;
- recognised and generally accepted safety procedures covering known hazards;
- how the explosives operation will be segregated from other activities and any controls necessary to maintain that segregation;
- the tools and equipment (including personal protective equipment) to be used; and
- how to minimise both explosives waste and other waste that could act as a source of ignition for explosives, and how that waste will be managed prior to disposal.

68 Procedures would be expected to cover all the explosives operations undertaken and include the following activities where appropriate:

- receipt and unloading of deliveries;
- storage of fireworks;
- selecting fireworks for despatch;
- movement of fireworks on site;
- fusing fireworks and preparing fireworks for a display;
- packing or re-packing of transport cartons and selection boxes;
- storage of loads awaiting despatch;
- loading of vehicles and despatch;
- managing returns; and
- management and disposal of damaged or returned stock.

Housekeeping

High standards of housekeeping are maintained to:

- **provide control over sources of initiation;**
- **prevent fires and explosions;**
- **reduce the likelihood of a fire spreading or an explosion communicating; and**
- **reduce the risks of people becoming trapped or harmed if a fire or explosion occurs.**

69 Areas where fireworks are being stored or worked on should be kept clean and tidy. Only those materials necessary for the explosives operations should be kept in storage or work areas, and particular attention should be paid to preventing the build-up of flammable fines or explosive dusts.

70 Damp fireworks can be dangerous, especially to users. Damp fireworks are also more likely to leak explosive compositions that increase the likelihood of a fire or that can help a fire to spread. It is therefore very important to ensure that appropriate measures are taken to keep fireworks dry.

71 In order to avoid the spillage of explosives, fireworks should only be transferred from one transport package to another when necessary.

Mounds, traverses and barriers

Mounds, traverses and other barriers are used to prevent or limit the spread of fires or the communication of an explosion, and to protect people.

72 Unless explosives are effectively segregated by distance, mounds, traverses and other barriers should be used to:

- protect people;
- prevent or limit the spread of fire; and
- prevent the communication of an explosion involving HT1 or HT2 fireworks which are being worked on or are in storage.

73 The height, thickness, shape and separation from the store and materials used for a mound or a traverse are a function of the explosives operations, amount and hazard type of explosives. Further general guidance on mounds and traverses can be found in L150 under 'Fire and explosion measures: mounds and traverses'.

74 Filled container mounds have often been used with smaller stores containing HT1 and HT2 explosives such as those used by firework display operators. If a filled container mound is used, it must be of sufficient height and thickness to be effective. The following examples describe container mounds appropriate for use with smaller stores:

- store dimensions 0.91 m x 0.76 m x 0.84 m high containing 75 kg of HT1 explosives: a 1 m thick mound; minimum height – the height of the store;
- store dimensions 1.68 m x 1.68 m x 1.52 m high containing 450 kg of HT1 explosives: minimum thickness 1.2 m; minimum height – the height of the store.

These examples assume that the mound is located approximately 1 m from the building's walls, and that the 2 degree and 600 mm rules are met (see glossary).

75 For larger stores, the size of the mound should be increased appropriately.

76 Doors (and other barriers such as mesh screens over windows or mesh, corrugated metal or brick in front of entrances) can often be effective in:

- preventing a minor event escalating;
- preventing a minor explosive event in one building communicating to fireworks in another; and
- protecting people during the initial stages of an explosive event.

77 Doors to storage buildings should be kept closed unless immediate access is required to the buildings' contents.

78 Doors to both stores and process buildings should either be left open when people are present in the building, or should be fitted with a push-bar that allows people to easily open the door in case of emergencies.

79 Where the doors to buildings being used for explosives operations face each other, or are arranged so that an event in one building could communicate to another via the door, the door to only one building should be open at any one time, even when more than one building is in use.

Stock management

Professional firework display operators know the type and quantity of all the explosives present on site, and their locations.

80 Professional firework display operators should have a suitable stock management system in place.

81 In its simplest form, a stock management system will involve:

- knowing what stock is present in a facility;
- rotating stock to ensure that the oldest stock is used first;
- checking the position, height and stability of stacks, condition of packaging etc;
- checking to ensure that the stock is in good condition or remains within any recommended shelf-life; and
- consideration of how to manage damaged stock and/or packaging, or stock that is beyond its recommended shelf-life.

82 These objectives can be achieved by:

- recording all movements of fireworks in and out of the store, so there is always an up-to-date record of the amount and type of fireworks present. It is recommended that duplicate records are kept in a safe place;
- ensuring that the oldest stock of fireworks is easily accessible, and is used first;
- stacking fireworks boxes, packages or other containers in a stable manner, laid flat and with the top side up;

- avoiding over-stacking, as this can result in pressure deformation of packaging, spilling and exposure of the contents, damage to articles and possible deterioration of the fireworks; and
- leaving a sufficient gap between stacks and walls to allow air to circulate freely and any lightning protection to be effective.

83 A suitable stock management system also ensures that appropriate information is available in an emergency, and ensures that the fire and rescue service can be advised of:

- the types and quantities of fireworks that are involved in the fire;
- the types and quantities of fireworks and other explosives that are present elsewhere on site; and
- the hazards that the fireworks and any other explosives present.

A suitable stock management system will also enable dutyholders to ensure that any licence limits (or relevant exceptions) are not breached.

84 The fire and rescue service should also be advised of the presence and location of other dangerous substances.

Segregating explosives presenting different likelihoods of initiation

85 Storage buildings should be separated from production buildings and other areas where fireworks are worked on or processed. Separation should be sufficient to ensure that an explosion which takes place in a production or process area (where the risk of an explosion is greatest) does not rapidly propagate to storage buildings (where the greatest amount of explosive substances or articles is kept, and therefore the hazard is greatest).

86 Igniters should be kept separately from other explosives to prevent fire from accidentally initiated igniters spreading to other explosives. Igniters should only be introduced into a process when they are required, and should only be present in the minimum quantity necessary for safely undertaking the activity.

87 Where it is necessary to keep fireworks in production buildings, they should be kept in boxes or other containers which are designed to withstand the initiation of adjacent explosives or, alternatively, kept in separate, designated storage areas.

88 There are circumstances, such as the packing of a selection of fireworks for use in a display, where it may be necessary to have finished fireworks in a production area. The same basic principles apply in these circumstances: stocks should be planned and managed with the aim of keeping the quantities of fireworks in production areas to that needed for the job in hand. Whenever practicable, the quantity of fireworks present in the production area should be minimised by:

- keeping fireworks which are not being worked on in an expense store;
- returning packages of fireworks to a store when they are no longer required for the task at hand; and
- placing articles that have been worked on into appropriate packaging, and then placing those packages in an appropriate store.

89 Fireworks should only be removed from their transport packaging in an appropriate place. Normally, this will be in a production building, a picking store, or another place where an event involving the fireworks being handled will not communicate directly with fireworks in storage.

90 Damaged fireworks generally present an enhanced likelihood of initiation and should be stored in a designated place segregated from fireworks that are not damaged. Where a damaged

firework has been assessed as being safe to store, this segregation can be achieved by storing it in a separate building or in a separate suitable storage container.

91 Further guidance on managing damaged fireworks can be obtained from suppliers.

Segregating explosives operations from other activities

Explosives operations are segregated from activities that do not include explosives.

92 Fireworks should not be stored anywhere where, in the event of a fire, the fire could quickly spread from or to any other flammable materials (for example, flammable liquids) or materials that can easily catch fire (for example, bulk quantities of paper, cardboard, surplus wooden pallets or display equipment).

93 Fireworks should not be stored with products that might create an additional explosion hazard, including:

- products such as fertilisers containing oxidising agents;
- products containing peroxides such as certain fibreglass hardeners; and
- aerosols and bottled gas canisters.

Safely transporting explosives on site

Particular care is taken when transporting explosives, and only appropriate methods are used.

94 All movements of fireworks around the site should be properly supervised in order to ensure that:

- the fireworks are never left unattended;
- fireworks are not left, however briefly, in places where they could be inadvertently mixed up with other goods, especially flammable products;
- boxes containing fireworks are not inadvertently handled by staff unaware of their contents;
- fireworks leaving the site are loaded immediately before the vehicle is due to depart; and
- fireworks arriving onto the site are unloaded into safe storage as soon as is practicable.

95 Fireworks that are to be worked on should be taken directly from the store to either a suitably located expense store or the process area or production building. Fireworks that have been worked on should be returned to an appropriate store as soon as is practicable. Wherever practicable, fireworks that have been picked or worked on and are ready for use in a display should be transferred to a designated area in a store or to a despatch store set aside for that purpose. In addition:

- the quantity in movement at any one time should be kept to the minimum necessary; and
- stock replenishment should be planned to avoid the fireworks being in movement for an unnecessarily long period of time.

96 Whenever reasonably practicable, stores used for the despatch of loads of fireworks should be located where visiting vehicles will not interact with normal site traffic.

97 Loads awaiting collection should not be left outside buildings.

Preventing fires and explosions

(Regulation 26(1)(a))

Safety measures are in place to prevent the accidental initiation of explosives.

98 Keep sources of ignition away from the fireworks and other flammable materials on site. The presence of fireworks (and explosive vapours and dusts) should be controlled, especially in areas of activity (for example, places where work is done or where people or other traffic move around regularly).

99 The following sections give guidance on how the main sources of ignition can be controlled, and the general principles that can be followed to prevent fire and explosion.

General precautions

Explosives operations only occur in an appropriate place, using appropriate tools and equipment, and following an appropriate process.

100 Explosives operations should only be undertaken in a suitable place and within the scope of any licence or other permission. The suitability of the location will depend on the quantity and type of explosives and the planned activity.

101 The precautions are covered in detail in paragraphs 105–129. In summary, they include ensuring that any place of manufacture, processing facility, store, storage area, container or cupboard is:

- suitably weatherproof;
- designed to ensure that fireworks do not come into contact with substances with which they are incompatible;
- protected by a lightning conductor, where appropriate;
- not used for other activities at the same time that fireworks and explosives are being manufactured, processed or kept, eg a store should only be used to keep explosives and the tools or implements necessary for the safe keeping of those explosives; and
- kept clean, with steps taken to prevent grit becoming mixed with unpackaged fireworks or entering unpackaged explosives.

102 Tools and equipment should be suitable for the particular conditions of the explosives operation and authorised for use in that operation.

103 Equipment and processes should be designed or chosen to prevent ignition, and should:

- follow a hierarchy of controls, ie elimination, substitution, reduction, engineering and, finally, personal protection;
- use controls which fail to safety wherever reasonably practicable;
- take into account both normal and abnormal operating conditions, including machinery breakdown or failure, maintenance and decontamination;

- ensure that while equipment is suitable for use in explosives work, it does not aggravate other risks or hazards; and
- ensure that any equipment can be thoroughly cleaned, avoiding the uncontrolled build-up of waste explosives and ensuring that there is minimal possibility of material remaining in corners and crevices.

104 Appendix 1 includes further guidance on the precautions that should be taken during the fusing of fireworks. This guidance may, depending on the circumstances, also be applicable to other activities where fireworks are processed. Its applicability to other activities should be assessed by a competent person.

Protecting explosives from sources of ignition

Explosives are protected from those sources of ignition that could cause them to initiate, and are kept in a suitable closed container or in suitable packaging whenever it would be reasonably practicable to do so.

105 Transport packages should not be left opened in storage areas, and should normally only be opened when access to the fireworks is needed. After opening, it is important to close the packaging securely if fireworks remain in the package. This can be achieved by taping box flaps down, interleaving the flaps, or securing them in some other way.

106 Professional firework display operators often compile a display by removing a few of each type of firework from boxes held in stock. The outcome is that they will store part-filled and previously opened boxes of fireworks. Repeated opening and resealing can lead to wear or damage to flaps, resulting in a box that will not properly close.

107 Where boxes are likely to become damaged because of repeated opening and resealing, alternative measures to resealing the box should be used. These include:

- placing a suitably sized wooden sheet over the flaps;
- keeping part-boxes of fireworks in a picking store in:
 - open transit cartons that have been covered with a suitably-sized wooden sheet;
 - lidded wooden bins; or
 - wooden cubby holes.

Naked lights and flames

Robust systems are in place to prevent the introduction of naked lights and flames into explosives areas.

108 Generally, any equipment or article that could introduce a naked light or flame should not be brought into an explosives area. This means that matches, lighters and smokers' materials should be forbidden from explosives areas.

Heat and temperature

Potential sources of heat energy and high temperature are identified and kept to the minimum necessary for the safe operation of an explosives area.

109 Ensure that fireworks which are sensitive to heat do not come into unintentional contact with hot surfaces, or are exposed to direct sunlight and other strong sources of illumination.

110 Heating devices with exposed elements such as electric fan heaters and gas-powered or other similar convection heaters should not be used in explosives areas. Oil- or water-filled electrically powered portable radiators can be used where fixed heating systems that use, for example, hot water or steam are not available.

111 Site (or guard) radiators and pipes to prevent physical contact with explosives. The maximum temperature of all radiators and heating pipes should be limited either by specification or by the use of suitable thermal cut-outs. It is also recommended that heating units are fitted with tamper-proof controls and an indication to show when they are energised. Radiators sited in dusty areas should be cleaned regularly.

112 Further information on maximum surface temperatures for heating systems and manual handling equipment can be found in Sections 13 and 14 of the CBI-EIG publication *Guidance for electrical installation and equipment within explosives manufacturing and storage facilities including fireworks*.³

Electrical, electrostatic and electromagnetic energy

Sources of electrical energy are identified and should be kept to the minimum necessary for the safe operation of an explosives area.
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113 Electrical equipment and installations within any explosives area should be confined to that equipment which is essential to the operation of the facility. Where it is necessary to install electrical equipment, it should conform to relevant standards and should be designed and constructed to prevent it becoming a source of ignition.

114 Suitable lightning protection should be installed in fireworks stores except where the store:

- is temporary (for example, for no more than a few weeks on a seasonal basis) and holding Hazard Type 4 fireworks;
- is used to keep less than 75 kg of HT4 fireworks;
- is used to keep less than 25 kg of HT3 fireworks;
- is used to keep no more than 100 g of HT1 or HT2 fireworks;
- is made by excavation and is thereby inherently protected from lightning; or
- is exempted under the terms of a licence issued by HSE or ONR.

115 Suitable lightning protection should be installed in manufacturing and processing facilities that cannot be emptied of fireworks upon the approach of a thunderstorm. Buildings or other areas used for process activities, such as the fusing or finishing of fireworks, will not require lightning protection when effective arrangements are in place for the removal of fireworks to a suitable store when there is a significant risk of a lightning strike, or upon the approach of a thunderstorm.

116 Lightning protection should be based on the requirements set out in an appropriate relevant standard.

117 Steel-framed structures with metallic cladding may be regarded as self-protecting, provided the requirements of paragraph 32 of Appendix 3 of L150 are met.

118 Steel ISO or similar containers used for the storage of explosives can be regarded as self-protecting, provided that:

- the walls are lined with wood (or other appropriate lining), or the explosives are kept at least 150 mm away from the container's walls;

- the panels and doors are electrically bonded with straps of a cross-section of at least 50 mm²;
- two earthing points connected to earth rods are provided at opposite corners; and
- resistance from the top of the container to earth is less than 10 ohms.

119 Further guidance on protecting fireworks and other explosives from electrical, electrostatic and electromagnetic energy can be found in Appendix 3 of L150.

Mechanical sparks

Potential sources of mechanical sparks, including those that could arise from equipment failure, are identified and kept to the minimum necessary for the safe operation of an explosives area.

120 Controlling sources of mechanical sparks is particularly important when fireworks are exposed, and where they are being processed. Particular care should be taken where loose composition has leaked from fireworks.

121 Where reasonably practicable, metal and other surfaces in explosives areas which have the potential to generate mechanical sparks should be replaced with, or covered by, a durable and chemically compatible non-metallic material such as paint. When selecting the material, consideration needs to be given to both the electrostatic precautions required for the application, and the material's durability and flammability.

122 Explosives should only be manipulated with tools that do not create sparks. Activities that could create sparks include cutting plastic igniter cord with scissors. Non-sparking materials include bronze, wood, bone and plastics, as well as some ceramics and steel alloys.

123 Ferrous and other hand tools capable of producing mechanical sparks should only be used where they do not present a significant risk of initiation, and precautions have been taken to avoid metal-to-metal contact – for example, the use of a steel blade to cut plastic igniter cord on a wooden (rather than a metal) surface.

124 Where it is necessary to use tools and equipment such as angle grinders or other power tools in an explosives area, for example during maintenance activity, any explosives should be removed from the area, or precautions should be taken to completely segregate the explosives or any other flammable materials from any sparks that the tools and equipment may produce, so that the equipment cannot act as a source of ignition.

Impact and friction

Potential sources of impact and friction are identified and kept to the minimum necessary for the safe operation of an explosives area.

125 Systems to prevent grit, dirt and foreign matter being carried on shoes into explosives buildings and areas should be used where such contamination is likely to increase the risk of accidental initiation.

126 When fireworks are moved (including when they are moved in their transit packaging), they should be lifted and carefully placed. They should not be dropped, slid or dragged.

Pressure

Sources of pressure are identified and kept to the minimum necessary for the safe operation of an explosives area.

127 In most circumstances, the preventative measures used to protect fireworks from impact and friction will protect them from the effects of excessive pressure.

Chemical incompatibility

Chemicals and materials incompatible with the explosives or with each other should be identified and either kept to the minimum necessary for the safe operation of the explosives facility, or completely segregated from the explosives.

128 As well as presenting a risk from fire, certain chemicals may be chemically incompatible with fireworks or present an additional explosion hazard. These chemicals should therefore be stored far enough away from fireworks so that there is no risk of contamination, and so that they cannot aggravate a fire or explosion.

129 Examples of products that could be incompatible with fireworks include:

- products containing corrosive or caustic substances (acids or alkalis) such as drain cleaners and paint strippers;
- products including certain wood preservatives which might have chemical incompatibility;
- products such as fertilisers containing oxidising agents;
- products containing peroxides such as certain fibreglass hardeners; and
- aerosols and bottled gas canisters.

Maintenance systems

The safety measures are properly maintained.

130 Maintenance should include suitable arrangements for:

- identifying the safety measures and any safety-critical systems (including procedures and management arrangements), plant and equipment;
- record keeping;
- planning and prioritisation of maintenance work;
- either planned preventative maintenance or risk-based inspection and maintenance;
- inspection of the safety measures by a competent person at regular specified intervals; and
- reporting and acting on faults with systems, plant, equipment and relevant site infrastructure.

131 The maintenance regime should include a system of periodic inspections of explosives areas. Inspections should include checking safety-critical factors such as:

- the condition of the roof and walls or other built structures to ensure that they remain stable and provide adequate weather protection;
- the condition of any earthing systems and arrangements to avoid static build-up;

- the condition of the floor, in particular to see that slip or trip hazards are avoided, that there are no cracks where explosives could accumulate, and that conducting floors are effective;
- the condition of the internal surfaces, particularly to ensure there are no areas of exposed iron, steel, rust, detachable grit etc which could present a source of ignition;
- standards of housekeeping are appropriate;
- vegetation and other flammable materials within the explosives area or which could affect it are subject to appropriate control; and
- the ongoing effectiveness of mounds, traverses and other barriers.

132 Maintenance activities often introduce sources of ignition into explosives buildings and areas, so should generally be subject to a high level of control, for example through a 'permit-to-work' system.

133 Further information on developing a maintenance regime and controlling maintenance activities can be found in L150 under 'Protecting explosives from sources of ignition'.

Measures to limit the extent of fire or explosion

(Regulation 26(1)(b))

Appropriate steps are taken to:

- **limit the size of an explosion or fire that may occur;**
- **stop fires spreading; and**
- **limit the size of an explosive event and the area the event affects.**

134 A fire involving fireworks is likely to spread very quickly as burning projectiles are thrown around. This means that fireworks should:

- only be worked on in the quantities necessary for the task at hand; and
- be kept in storage, worked on or processed in a place used exclusively for that purpose.

135 Further information on the measures that can be taken to limit the extent of a fire or explosion can be found in L150 under 'Fire and explosion measures'.

Protecting people from the effects of fire or explosion

(Regulation 24(1)(c))

Measures are in place to protect people in the event of a fire or explosion.

136 Steps to protect people in the event of a fire or explosion will generally require:

- the number of people in explosives areas to be controlled and limited to those necessary to undertake, manage and monitor the explosives operation;
- reasonably practicable engineering controls to be implemented where they will protect people from the effects of a fire or explosion;

- providing personal protective equipment where it would be appropriate to do so; and
- establishing emergency procedures and implementing process and general fire precautions.

137 Some engineering controls will be delivered or maintained by implementing the relevant preventative and protective measures identified in 'Cross-cutting safety precautions' (paragraphs 59–97).

Limiting the numbers of people in explosives areas

The number of people in explosives areas is kept to the minimum needed to safely carry out and support explosives operations.

138 Ensure that the number of people present in an explosives area is controlled and that explosives operations are segregated from non-explosives operations. Depending on the nature of the explosives activity, degree of hazard and the potential risks to people, controls might include:

- physical controls that only allow access to explosives areas to authorised people;
- providing instructions to people engaged in the explosives operations and visitors;
- supervising people engaged in the explosives operations and visitors;
- placing signs and notices on doors or at other appropriate places, indicating who is authorised to be present and the maximum number of people permitted in the area at any one time;
- minimising the number of visitors at any one time in an explosives building or explosives area; and
- ceasing operations when visitors or unauthorised persons are present.

Engineering controls

Engineering controls intended to protect people from the effects of a fire or explosion are identified on a case-by-case basis.

139 The reasonably practicable engineering controls that can be implemented to protect people from the effects of a fire or explosion will depend on the hazard and risks presented by the fireworks present on site, the activities being undertaken, and where people are required to be present to safely and effectively undertake the explosives operations. In many instances, this means that controls will need to be identified on a case-by-case basis. Depending on the nature of the activity being undertaken with the fireworks, engineering controls could include:

- mounds, traverses and barriers;
- containment structures that will either completely or partially contain the effects of an explosive event;
- fitting vent panels to plant, equipment and buildings that allow an explosive event to vent to a safe place and/or which reduce the likelihood of a fire transitioning to a deflagration or detonation; and
- safety screens on equipment or at individual work stations.

140 Where engineering controls are implemented, they should be subject to appropriate inspections to ensure that they will remain effective when called upon.

141 For very small quantities of explosives, it is possible to completely contain the effects of a fire or explosion within the work area. Where larger quantities of explosives are involved, it may not be practicable to contain the effects to the immediate work area. In such cases, the building itself, and the areas around it, will need to be designed and constructed with the aim of controlling the direction of blast, flame, debris etc away from people, other buildings, roads etc.

142 In buildings and other places where fireworks are processed, the spread of any fire is likely to be rapid, and travel distances to a place of reasonable safety should be very short, and should not exceed the distances in Table 1 (which references the hazards expected in fire safety guidance). Fireworks should not be kept anywhere where, in the event of a fire, they might endanger those using the exits from a building or other place where fireworks are being processed.

Table 1 Recommended escape route distances

Buildings, rooms and areas where explosives are processed or stored	More than one escape route	Dead ends where exit is substantially in one direction
Process areas for fireworks, pyrotechnic substances and pyrotechnic articles with exposed composition <i>(No equivalent fire safety legislation category)</i>	6 m	4 m No explosive should be present between person and exit
Packaging of fireworks and the storage of explosive articles not in their transport packaging <i>(Higher fire risk area – industrial)</i>	25 m	12 m No explosive should be present between person and exit
Stores <i>(Normal fire risk area – industrial)</i>	45 m	25 m

Provision of personal protective equipment

Personal protective equipment is used as a last line of protection. It is not solely relied upon when people can be protected by engineering controls.

143 Personal protective equipment can protect individuals by supplementing engineering controls, or by supplementing procedural controls where engineering controls are not reasonably practicable. Further information on the regulatory framework surrounding the selection and use of personal protective equipment can be found in Personal protective equipment at work. *Personal Protective Equipment at Work Regulations 1992 (as amended). Guidance on Regulations L25⁴*.

144 The hazards presented by explosives often mean that the effectiveness of personal protective equipment can only be identified as a consequence of:

- a systematic identification of the hazards;
- a systematic identification of the parts of the body likely to be affected by those hazards;
- realistic testing and/or robust modelling based around the circumstances of the explosives operation; and
- an assessment of the effect any personal protective equipment identified would have on the likelihood of an explosive event occurring.

145 People working in stores containing packaged fireworks and moving boxed stock should as a minimum wear safety footwear and outer clothing made from natural fibres rather than more

flammable man-made materials. Clothing manufactured from man-made fabrics can also present an increased likelihood of initiation because it can accumulate an electrostatic charge.

146 People working on fireworks and picking fireworks for displays should as a minimum wear fire-retardant outer clothing, eye protection, and substantial closed footwear. Where people face a significant risk of burns, they should wear suitable fire-resistant protective clothing, including gloves, which may need to be of a higher specification.

147 The type of eye protection used should take account of the activities being undertaken, ie:

- safety glasses will only be suitable where the risk is confined to minor deflagrations, and where protection against dust is not required;
- goggles should be used to protect against low- and medium-energy impact, and for protection against dust; and
- face shields should be used when both eye and face protection are required.

148 Eye protection designed for use in general industry may not be designed to withstand the forces which could be generated by an explosion or other event involving fireworks. Suitable checks should be made to determine that the equipment is suitable for use in the explosives context where it will be worn.

149 Hot gases and radiated heat and light may also be significant hazards to be taken into account in the selection of eye protection.

150 Any visitors to an explosives area or an explosives operation should be appropriately dressed and provided with appropriate personal protective equipment.

Emergency procedures

Emergency procedures are in place.

151 Emergency procedures must clearly set out what dutyholders, employees and others should do and should not do in an emergency. The procedures should normally be written down to allow them to be communicated to others consistently. Information on the procedures must be provided to all employees and to others involved in the site's activities.

152 Emergency procedures should cover:

- what constitutes an emergency;
- what to do in the event of an emergency;
- fire precautions relevant to the emergency procedures;
- fire detection and warning systems;
- means of escape and evacuation;
- providing information to the emergency services;
- what to do when the emergency is over; and
- how the recovery phase will be managed.

153 Further information on emergency procedures can be found in L150, under 'Protecting people from the effects of fire and explosion' and Appendix 4.

Separation distances

(Regulations 27 & 13(6))

Separation distances are met.

Application

154 The separation distances required to be maintained by regulation 27 and Schedule 5 of ER2014 or by any licence granted by HSE or ONR must be complied with.

155 Where more than one type of explosive is kept, the limit for the most energetic explosive will apply, and will be used to determine the separation distance. For example, if HT1 explosives are kept with HT4, then HT1 distances will apply. The quantity will be determined by adding the net mass of the HT1 explosives to the net mass of the HT4 explosives. This process is called aggregation. For example:

0.1 kg HT1 + 50 kg HT4 = 50.1 kg HT1

50 kg HT1 + 300 kg HT3 = 350 kg HT1

500 kg HT3 + 1000 kg HT4 = 1500 kg HT3

1000 kg HT1 + 50 kg HT2 + 10 000 kg HT3 + 20 000 kg HT4 = 31 050 kg HT1

156 Further information on the application of separation distances can be found in L150, under 'Separation distances' and Appendix 5.

Buildings which are not normally occupied

157 There are no requirements to maintain separation distances between stores and uninhabited buildings. However, people storing explosives should bear in mind that such buildings could be reoccupied or redeveloped in the future, at which point the relevant requirements would apply and the applicable separation distances be reviewed.

158 Certain buildings which could endanger an explosives building (for example, a high-voltage electrical generating plant) will not normally be inhabited. The requirements of regulation 26 mean that dutyholders will need to take account of the risks posed by such buildings in deciding where it might be appropriate to locate their stores.

Further information on the types of building that HSE would generally consider to be unoccupied can be found at <http://www.hse.gov.uk/explosives/licensing/separation/index.htm>

Mounds and traverses

159 Schedule 5 to ER2014 uses the terms 'mounded' and 'unmounded' stores. It also defines 'mounded' as meaning surrounded by suitable mounds. Further information on what comprises a suitable mound can be found at paragraphs 72-79 of this guidance.

Application of separation distances and regulation 13(6)

160 Where the quantity of explosives stored is greater than 2000 kg, where local authority assent is required (or would not be required because regulation 13(4)(b) to (g) applies), HSE or ONR may grant a licence that includes conditions specifying the separation distances to be met.

161 Regulation 13(6) also allows HSE and ONR to apply separation distances to licences they grant which relate to the manufacture of explosives.

162 When they grant licences, HSE and ONR will normally follow the distances given in Schedule 5 of ER2014.

163 HSE and ONR would normally follow the same approach to the aggregation hazard types and quantities of explosives required by Schedule 5 of ER2014. HSE and ONR may, however, follow an alternative approach where it has been shown to provide an appropriate level of safety.

Discarding, disposal and decontamination

(Regulation 28)

Explosives and explosives-contaminated items are disposed of or discarded safely.

Explosives-contaminated items are safely decontaminated.

Discarding and disposal of explosives

Explosives are not discarded as general or household waste.

164 Firework display operators will generally be required to dispose of explosives, either as waste arising from fusing and other similar activities, or as misfired or partially functioned fireworks from displays.

165 The discard, disposal and destruction of explosives represents a high-hazard activity. A failure to dispose of or discard explosives (including fireworks) safely is one of the main causes of undesirable events and injuries in explosives work. Explosives events can happen because of:

- a failure to recognise that explosives requiring disposal are accumulating in manufacturing, process or storage areas;
- casual attitudes when dealing with the discard or disposal of explosives, often arising out of a lack of competence or a failure to properly supervise, inspect or audit the activity;
- people not appreciating that the properties and behaviour of explosives requiring disposal may be different from those that would be expected from the article or substance's description or original specification; and
- ill-considered systems of work or no basic safety precautions, often arising out of a failure to undertake as appropriate identification and evaluation of the hazards, or a failure to follow prescribed procedures.

166 The disposal of fireworks will usually be a high-risk activity. This means that any person planning to dispose of fireworks and other associated explosives such as loose compositions should consider the following and determine whether there are safe, reasonably practicable alternatives to destroying the explosives.

- Are the fireworks safe to transport and use as is?
- Would the fireworks be safe to transport and use if reworked?
- If disposal is being considered because the fireworks have failed to meet a prescribed quality standard, can the fireworks be used lawfully in an environment where that failure to meet the quality standard will not have a materially detrimental impact on safety, health or the environment?
- Is the nature of the explosives such that particular specialist competence and/or equipment will be required for their safe disposal, and is this competence and/or equipment available?
- Has the manufacturer produced instructions on how the explosives can be disposed of?

167 Waste fireworks should be disposed of in a designated area and with facilities appropriate to the type and quantity of fireworks to be destroyed. A safe system of work should be in place, and the people involved in disposal of fireworks should be competent in the roles they will undertake.

168 Further information on the different techniques that can be used for the disposal of explosives, the approaches that should be taken to the decontamination of equipment, and the identification and evaluation of explosives hazards during the disposal of explosives can be found in L150 under 'Discarding, disposal and decontamination'.

Vacating an explosives site

Vacated explosives sites are left in a safe state.

169 Where a site that has been used for the storage of fireworks is to be vacated, it will generally be sufficient for the dutyholder to remove all the fireworks from the site and then sweep out and wash down storage areas with water.

170 Process areas and disposal areas should be inspected and appropriate measures should be taken to identify, remove and dispose of any explosive articles or substances present. Particular attention should be paid to nooks, crannies and cracks where explosive substances can accumulate. Generally, the types of manufacturing and other processing activities undertaken by professional firework display operators will mean that it will then be sufficient to sweep out manufacturing and process areas and wash them down with water.

Prohibitions concerning manufacture, storage and importation of certain explosives

(Regulation 29)

Only approved pyrotechnic substances and articles containing sulphur and/or phosphorus mixed with chlorates are manufactured, stored and imported.

171 Pyrotechnic mixtures of sulphur and/or phosphorus with chlorates are not only liable to spontaneous ignition, but also tend to become exceedingly sensitive to ignition by friction or impact over time. These behaviours generally result from the presence of acidic and/or potentially acidic species in the sulphur and phosphorus, and can be controlled by the use of appropriate stabilisers.

172 Anyone wishing to manufacture, import or store any firework containing these mixtures would need to apply to HSE for the article or substance to be approved.

173 HSE will make its decision on whether or not to approve a firework containing a mixture of sulphur and/or phosphorus with chlorates on a case-by-case basis.

174 In making its decision, it will take account of the evidence provided by the dutyholder that shows that:

- the likelihood of the mixture spontaneously combusting and the hazards presented by the pyrotechnic substance or article are tolerable; and
- the potential for the mixture to become sensitive to ignition by friction or impact over time is subject to appropriate controls.

175 For further details of the information HSE would expect to see in support of an application for the approval of a firework containing a mixture of sulphur and/or phosphorus and chlorate, please contact the HSE Explosives Inspectorate: explosive.enquiries@hse.gsi.gov.uk.

Security

Preventing unauthorised access to fireworks

(Regulation 30)

People who manufacture, keep or store explosives ensure that those explosives are secure. Unauthorised access is prevented.

176 To maintain a secure operation, dutyholders should have suitable arrangements in place which:

- restrict who has access to the fireworks, the explosive stores or places where manufacture and other activities take place, such as production buildings and process areas;
- raise the alarm should an unauthorised person gain, or in certain circumstances, attempt to gain access to these places; and
- will enable the removal of any unauthorised person from that area if they refuse to leave when requested to do so by the licensee.

177 Entry to a store used for storage of the fireworks or a room or place used for other explosives operations should be restricted to those members of staff or other people who need to be there.

178 Stores should be kept locked unless access is required to the fireworks they contain. Doors should be secured by at least one multi-lever mortice deadlock. New or replacement locks should have at least five levers.

179 Where the entrance to a store is secured by a padlock, the padlock should be of the heavy-duty, close shackle type and the lock mechanism should have at least five levers. The hasp of the padlock should be covered by a metal shroud that will protect the hasp from attack, and the shroud should be firmly fixed to the door. When the store is located in a building that has either:

- staff present all the time; or
- external doors that are secured by multi-lever mortice deadlocks

any padlock will not need to be covered by a metal shroud.

180 Fireworks which are not kept in a store should be subject to continuous supervision.

181 Where a site is located in a high crime area, has been targeted by intruders or repeatedly been subjected to theft, higher standards of security should be applied. For example:

- hinge bolts should be fitted to the hinges of ISO containers;
- visible alarming systems should be fitted as a deterrent; and
- the security standards applicable to relevant explosives should be considered and applied appropriately.

182 Further information on the security of explosives in general and the standards to be applied to relevant explosives can be found in L151 *Guidance on Regulations – Security provisions*².

Explosive certificates

(Regulations 4 and 5)

183 An explosive certificate certifies that the person to whom it is issued is a fit person to:

- acquire relevant explosives; or
- acquire and keep relevant explosives

in accordance with the terms of the explosives certificate.

184 An explosives certificate is not required for the acquisition or keeping of:

- fireworks;
- most other pyrotechnic articles; or
- the explosives listed in Schedule 2 to the Regulations.

185 Where a display operator repairs fireworks, they may acquire pyrotechnic substances such as black powder from propelling charges or flashpowder from burst charges. Both of these substances are relevant explosives and will require the display operator to have an explosives certificate.

186 Explosives certificates are granted by the police, and it is an offence for a person to acquire and/or keep relevant explosives unless they have a valid explosives certificate.

187 Firework display operators who expect to acquire pyrotechnic substances as part of their undertaking should contact their police explosives liaison officer, who will be able to provide them with advice on the application process for an explosives certificate and any additional security measures they may be required to put in place. The police explosives liaison officer will also be able to provide advice on how to apply for a licence to store explosives at a site where relevant explosives are acquired or kept.

188 Further information on the additional duties associated with relevant explosives, including the keeping of records, the reporting of losses and the controls the regulations place on prohibited persons, can be found in L151 *Guidance on Regulations – Security provisions*².

Licence requirements for fusing

189 Fireworks display operators who store less than 2000 kg of explosives will normally be licensed by their local authority.

190 Under the provisions of regulation 6(2)(e) of ER2014, firework display operators who have a licence to store explosives from their local authority will not need a licence to manufacture explosives where they are preparing, assembling and fusing fireworks for use in a display they will be giving, providing that:

- no more than 10 kg of fireworks are being prepared, assembled and fused; and
- the activity would not result in a breach of the conditions of the licence.

191 Fireworks display operators should discuss any fusing or similar manufacturing activities that they intend to undertake with their licensing authority so that appropriate places for the activity can be identified, any requirements for a licence to manufacture explosives considered, and the fitness of the site for such activities reviewed.

192 Fusing activities should be undertaken in accordance with the guidance in Appendix 1.

193 Firework display operators who have a licence from HSE or ONR will not be able to take advantage of this exemption because HSE or ONR will have identified the activities that can take place on the site in the terms of the licence in accordance with regulation 13(6).

Appendix 1 Precautions to be taken during firework fusing

1 Firework fusing on a licensed site should be subject to the appropriate measures listed below.

(a) Fusing should take place in a building or area (which may be outside) which has been effectively segregated by distance and/or appropriate barriers from storage or manufacturing areas and:

- buildings used for fusing should generally be considered to be segregated when they are separated from any stores or manufacturing areas by the Class G distance from the store or manufacturing area or 12 m, whichever is greater; and
- outside areas should be segregated by greater distances or by barriers that will be effective in preventing the rapid communication of any event to a store or other place where explosives are being kept or manufactured.

(b) Each fusing operation should be covered by an appropriate method statement developed from a suitable and sufficient risk assessment. This should include instructions (or support other arrangements) which ensure that the appropriate measures listed below are taken:

- no other activity (for example, the construction of the frames onto which display set pieces are attached) or the storage of fireworks should take place in a building or area used for fusing while it is being used for fusing;
- the numbers of employees or other people in the fusing area at any one time should be kept to the minimum who can safely evacuate in an emergency. Where there is only one exit, there should be no more than two people in the area at any one time;
- fuses should only be cut in the manner advised by the manufacturer or supplier of the fuse;
- cutting tools should be sharp and either made from non-sparking materials, or blades should cut against a non-sparking surface;
- fuse material must not be torn apart;
- black powder and pyrotechnic composition exposed through cutting, baring back or dismantling should be left exposed for the minimum amount of time compatible with the safe undertaking of the fusing operation;
- there should be no repair or breakdown of fireworks other than repairs to the fusing system;
- there should be no flammable or readily combustible materials in the area other than those necessary for the work in hand;
- the quantities of fireworks and other explosive or pyrotechnic materials (eg quickmatch, tapematch, igniter cord, igniters and fuseheads) exposed or stored in the fusing area should be restricted to the amount needed for the piece being worked on;
- fused articles and completed set pieces should be put into an appropriate store as they are finished, and not kept in the fusing area;

- care should be taken when inserting or removing fuseheads from fuses and fireworks (fuseheads can be easily ignited by friction, crushing or cutting);
 - fuseheads with protective covers should be used whenever it would be appropriate to do so;
 - where a protective cover is fitted, it should not be removed from a fusehead or igniter prior to the insertion of the igniter or fusehead into a fuse or firework;
 - care should be taken when joining different types of fuse to avoid bringing incompatible materials into intimate contact, for example sulphur with chlorate;
 - fuses should not be stapled directly into place. Staple guns should only be used to attach cable ties or similar items which are then used to secure the fuse; and
 - all joins should be made so as to leave no exposed composition. Joins should also be strong enough to withstand the stresses they will experience, and should be taped if necessary.
- (c) People involved in fusing activities should be competent for the tasks they are undertaking, and be made aware of the safety precautions which have to be taken.

Glossary

2 degree rule a generally accepted approach to the design of mounds and traverses intended to prevent the sympathetic initiation of explosives elsewhere by high-velocity fragments. The 'rule' requires the subtended angle between a stack of explosives and the top of a mound or traverse to exceed 2 degrees. More information can be found in chapter 7 of JSP 482⁵.

600 mm rule a generally accepted approach to the design of mounds and traverses intended to prevent the sympathetic initiation of explosives elsewhere by high-velocity fragments. The 'rule' requires the top of the mound or traverse to be at least 600 mm above the height of the stack of explosives. More information can be found in chapter 7 of JSP 482⁵.

communication the process of an ignition, burn, deflagration, detonation or other explosive event progressing to adjacent or nearby explosives.

competent authority an authority or other body designated as such in member states that are contracting parties to the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR). A list of competent authorities can be found on the United Nations website (www.unece.org).

Competent authorities classify fireworks for transport. If fireworks are modified, attached to frames, inserted into tubes or fused together, their classification status may change. The competent authority may need to reclassify the new or modified items before they are transported.

cross-cutting safety precaution an appropriate measure that addresses more than one duty.

deflagration exothermic chemical decomposition of a material in which the reaction front advances into the unreacted material at less than the speed of sound.

despatch store a store or area within a store where fireworks which have been prepared or packaged for a display are kept before leaving site. Despatch stores keep fireworks which have been worked on or which have been selected for a display separate from other stock. They can reduce the likelihood of an incident communicating when explosives present different likelihoods of initiation, and reduce the likelihood that materials intended for a display become mixed with other stock.

detonation a chemical reaction that progresses through an explosive at a rate exceeding the speed of sound in the reaction zone.

expense store generally a small store containing a limited quantity of explosives awaiting processing, located a short distance from where the processing activity will take place. Their smaller holdings of explosives generally mean that separation distance requirements can be met more easily, and the safety and efficiency of processing activities can be improved.

explosion a violent reaction of an explosives substance or article with the potential to cause harm or damage to its surroundings by either shock, overpressure, thermal effects or projected effects and fragments.

explosive substance an explosive substance can be a single substance or a mixture of substances. The definition contains two important qualifications:

- the definition of explosive substance excludes gases and mixtures of gases; and
- the explosion effect must be created by a reaction in the substance or preparation in itself (or, in the case of a pyrotechnic effect, by a self-sustaining reaction).

This does not, therefore, include a secondary reaction which involves substances or preparations which were not part of the original explosive substance.

explosives area any area, which may be outdoors or within a building, where explosives are stored, manufactured, disposed of or otherwise processed.

explosives building any building in which explosives are stored, manufactured or otherwise processed.

explosives operations any activity involving explosives which is subject to the requirements of the Regulations. It will include manufacture, storage, disposal, discard and decontamination, and may include explosives processing that does not constitute manufacture and, on certain sites, use.

finishing explosives operations that are not generally manufacturing operations but which 'finish' a manufactured firework. Finishing includes the attaching and removal of labels, the addition of protective caps, or attaching fireworks to stakes or frames. Connecting different fireworks to a common fuse is not finishing but is fusing, and is an act of manufacture. Similarly, adding or replacing rocket sticks is a processing activity that would be considered to be manufacture.

fire safety legislation the Regulatory Reform (Fire Safety) Order 2005 SI 2005/1541 and its equivalent in Scotland, the Fire (Scotland) Act 2005 (asp 5) and the legislation made under it.

firework an explosive article producing a pyrotechnic effect designed for entertainment and classified for transport as UN 0333, UN 0334, UN 0335, UN 0336 and UN 0337.

flammable fines small particles of flammable materials. They are generally much easier to ignite than the bulk material because they have a much higher specific surface area. Flammable fines can be generated when packaging materials, such as wood or cardboard, are moved into or out of buildings and rub against walls, doors or equipment.

fusing the assembly and preparation of firework set pieces by firework display operators from single fireworks. It can also involve the attaching of a fuse to a single unfused firework or the alteration of the fuse by, for example, the addition of plastic igniter cord as a delay element to piped quickmatch. Some fireworks are supplied to the display operator without a fusing system or with an incomplete fusing system. The display operator may link several such fireworks together by fusing to make a combination with just one point of ignition, and in which the individual fireworks go off in a predetermined sequence. Fusing may take place without a licence to manufacture explosives at the site where the fireworks are to be fired (display site), or at a site licensed for the storage of explosives under the relevant provisions of ER2014, where that activity would not result in a breach of the conditions of the licence. Firework display operators must ensure that any fireworks that have been fused can be safely and lawfully transported before they are consigned for carriage.

HSE the Health and Safety Executive.

initiation the act of causing an explosive material to ignite, burn, deflagrate, detonate or otherwise explode.

ISO container a steel freight container specially designed to facilitate the transport of goods, designed and constructed to a relevant standard, and used for the storage of explosives.

manufacture the interpretation in the Regulations specifies certain activities that are regarded as manufacture. However, manufacture is not limited to these activities, but would include any activity where the process undertaken changes the nature of the substance or article. This includes processes where explosive substances or explosives are made or assembled, or unmade or disassembled (for example, manufacture of gunpowder, filling or fusing of fireworks, assembling fireworks displays from components).

The activities covered by ER2014 include the manufacture of explosives and intermediate products for on-site mixing and storage.

There are a number of processes that are not considered to be 'manufacture' for the purposes of the Regulations. These can include:

- packing or repacking explosives or explosive articles;
- breaking down explosives stored in bulk into smaller storage containers;
- labelling explosives or explosive articles;

- testing and proofing explosives or explosive articles; and
- using explosive articles (for example, the preparation of an explosive actuator into a fire drencher system, fitting air bags to vehicles, fitting ejector seats and other pyrotechnic articles to aircraft).

Where these activities alone are undertaken, there is no requirement to hold a licence under regulation 6. However, such activities fall within the scope of the Regulations as a whole, and of the safety and security requirements of the regulations.

net mass the terms 'net explosive content' and 'net explosive quantity' are commonly used in the industry to refer to the weight of the explosive contained within an article (ie less packaging, casings etc). Although these terms are commonly understood to refer to mass, there is scope for differing interpretations of 'content' and 'quantity' in that these could be taken to refer to volume. The term 'net mass' is used for the sole reason of avoiding any scope for confusion or misinterpretation.

offshore the belt of sea over which the UK exercises sovereign jurisdiction, and any area designated under:

- section 1(7) of the Continental Shelf Act 1964;
- section 1(5) of the Energy Act 2008; and
- a 'renewable energy zone' designated by section 84(4) of the Energy Act 2004.

ONR the Office for Nuclear Regulation.

person the term 'person' is used in a number of the Regulations. 'Person' can be an individual and it includes a body of persons corporate or unincorporated.

picking store a store where part-boxes of particular products commonly used in displays are kept. Picking stores are generally stores holding smaller quantities of different types of fireworks, and limit the hazards associated with picking items that may not be required in units of a complete transit carton.

place of reasonable safety in a non-explosives building, the meaning of 'place of reasonable safety' is the definition in the fire safety legislation guide⁶:

a place within a building or structure where, for a limited period of time, people will have some protection from the effects of fire and smoke. This place, usually a corridor or stairway, will normally have a minimum of 30 minutes' fire resistance and allow people to continue their escape to a place of total safety.

For buildings containing explosives, it should be either an exit from a building (including its mound, where present) or a place within the building where, for a limited period of time, people will have some protection from the effects of fire, smoke and radiated heat. This place must have suitable fire resistance to allow people to continue their escape to a place of total safety.

place of total safety in a non-explosives building, the meaning of 'place of total safety' is the definition in the fire safety legislation guide⁶:

a place, away from the premises, in which people are at no immediate danger from the effects of the fire.

For buildings containing explosives, in addition to the above, it includes a place away from the building in which people are at no immediate danger from the effects of the fire or potential explosion.

For explosive sites, the place of total safety is not the same as the 'minimum hazard zones' identified within the operational guidance for the fire and rescue service.

professional firework display operator will generally be a person who designs and undertakes fireworks displays as part of a business or for a commercial reward. The displays will often include the

use of category 4 fireworks or other pyrotechnic articles which are only generally available to persons of specialist knowledge (as defined by the Pyrotechnic Articles (Safety) Regulations 2015).

propagation the process of burning, deflagration, detonation or other explosive effect progressing through the mass of material in a container or stack.

pyrotechnic articles articles that contain explosives substances or an explosive mixture of substances designed to produce heat, light, sound, gas or smoke or a combination of such effects through self-sustained exothermic chemical reactions. They include fireworks plus other items such as flares, smoke signals and flash cartridges. Pyrotechnic articles will also include:

- all articles described as such by a notified body under the provisions of Directive 2013/29/EU;
- pyrotechnic articles that are equipment falling within the scope of Directive 96/98/EC; and
- percussion caps intended specifically for toys falling within the scope of Council Directive 2009/48/EC

reasonably practicable this means balancing the level of risk against the measures needed to control the real risk in terms of money, time or trouble. However, you do not need to take action if it would be grossly disproportionate to the level of risk. See www.hse.gov.uk/risk/expert.htm.

relevant explosive an explosive for which an 'explosives certificate' is required under regulation 5 of ER2014 for acquiring or keeping that explosive, or would be required if it were not being acquired or kept by a person or organisation exempted by regulation 3(7). In relation to regulations 35 (records) and 37 (reporting loss) of ER2014, it also includes:

- ammunition, the acquisition of which is regulated or prohibited by virtue of the Firearms Act 1968 to 1997; and
- smokeless powder

even though, and to the extent that (in the case of smokeless powder), an explosives certificate is not required for their acquisition or keeping.

Explosives listed in Schedule 2 (other than smokeless powder, as noted above) and pyrotechnic articles (apart from those listed in Schedule 3) are not relevant explosives.

Fireworks are not relevant explosives.

relevant standard a code of practice or other standard linked to legislation (CEN, BS EN, ANSI, BS, IEC, ISO) or a published and commonly known industry-produced standard of performance, providing specific standards relevant to an explosives operation, activity or facility.

A relevant standard will be a document established by consensus and approved by a recognised body that provides for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.

A relevant standard will be based on consolidated results of science, technology and experience.

separation zone area around a site which falls within a separation distance.

site is defined as 'the whole area under the control of the same person'. In most instances, it will be the same as the area of the establishment or 'explosives site' at which the explosives operations take place although, in some cases, the extent of the area under control of that person will be much greater than the area within which the explosives operations take place. See www.hse.gov.uk for more detailed guidance on the application of the Regulations to sites which are shared by different people, and between a parent company and its subsidiaries (or between subsidiaries).

storage includes all possession, keeping or holding, other than when the explosives are actually undergoing manufacture or are in use.

storage area any area where explosives are stored either on a short- or long-term basis.

References and further reading

References

- 1 *Explosives Regulations 2014. Guidance on Regulations – Safety provisions* L150 HSE Books 2014 ISBN 978 0 7176 6551 8
- 2 *Explosives Regulations 2014. Guidance on Regulations – Security provisions* L151 HSE Books 2014 ISBN 978 0 7176 6638 6
- 3 *Guidance for electrical installation and equipment within explosives manufacturing and storage facilities including fireworks* Confederation of British Industry 2009
www.eig.org.uk/eig2007/wp-content/uploads/30777%20BAE%20Systems%20CBI%20GuideV2.pdf
- 4 *Personal protective equipment at work (Second edition). Personal Protective Equipment at Work Regulations 1992 (as amended). Guidance on Regulations L25* (Second edition) HSE Books 2005 ISBN 978 0 7176 6139 8 www.hse.gov.uk/pubns/books/l25.htm
- 5 *Ministry of Defence explosives regulations* JSP 482 MOD 2013
www.gov.uk/government/publications/jsp-482-mod-explosives-regulations
- 6 Fire safety legislation guide www.gov.uk/government/collections/fire-safety-law-and-guidance-documents-for-business

Further reading

Hazard identification and evaluation and the assessment of risk

General information on risk assessment can be found at www.hse.gov.uk/risk/index.htm

More information describing approaches to the identification and evaluation of explosives hazards and the assessment of risks associated with explosives operations can be found in:

Risk assessment for explosives including fireworks: A practical approach to risk assessment which is relevant to small companies including wholesale and retail organizations involved in the storage, distribution and supply of explosives including fireworks Confederation of British Industry 2012
www.eig.org.uk/eig2007/wp-content/uploads/Guide-on-Risk-Assessment-.pdf

Fireworks in shops: Retailers' risk assessment checklist HSE 2015
www.hse.gov.uk/pubns/indg407ch.pdf

Protective measures: A guide on measures other than personal protective equipment to protect people in explosives working areas Confederation of British Industry 2003 ISBN 0 85201 572 0
www.eig.org.uk/eig2007/wp-content/uploads/PROTECTIVE_MEASURES.pdf

Managing safety

More information on establishing effective management arrangements can be found in the following sources:

See the *Health and safety made simple* website for basic information for businesses
www.hse.gov.uk/Simple-health-safety/index.htm

See the *Health and safety toolbox* website for more information on multi-occupancy workplaces
www.hse.gov.uk/toolbox/index.htm

The health and safety toolbox: How to control risks at work HSG268 HSE Books 2014 ISBN 978 0 7176 6587 7 www.hse.gov.uk/pubns/books/hsg268.htm

Managing for health and safety website www.hse.gov.uk/managing/

Managing for health and safety HSG65 (Third edition) HSE Books 2013 ISBN 978 0 7176 6456 6
www.hse.gov.uk/pubns/books/hsg65.htm

Worker involvement

See the *Worker involvement* website for more information on consulting employees
www.hse.gov.uk/involvement

Leadership

Leadership is particularly important in organisations that manage major hazards such as explosives. More information on leadership in health and safety can be found at www.hse.gov.uk/leadership

Training and competence

For general advice on health and safety training, see *Health and safety training: A brief guide* Leaflet INDG345(rev1) HSE Books 2012 ISBN 978 0 7176 6466 5 www.hse.gov.uk/pubns/indg345.htm

To find competence-related guidance for a specific industry, task or working environment including National Occupational Standards and Sector Skills Councils, see www.hse.gov.uk/competence/industry-specific-competence.htm

For detailed information on assessing the effectiveness of competence in major hazards industries, see *Inspection of competence management systems at COMAH establishments* (Operational Delivery Guide) COMAH Competent Authority www.hse.gov.uk/comah/guidance/inspection-competence-management-systems.pdf

Controlling maintenance and permits to work

Further information on controlling maintenance activities and permits to work can be found at:

Isolation and permits to work www.hse.gov.uk/safemaintenance/permits.htm

Guidance on permit-to-work systems: A guide for the petroleum, chemical and allied industries HSG250 HSE Books 2005 ISBN 978 0 7176 2943 5 www.hse.gov.uk/pubns/books/hsg250.htm

Managing contractors

Using contractors: A brief guide Leaflet INDG368(rev1) HSE Books 2013 ISBN 978 0 7176 6467 2
www.hse.gov.uk/pubns/indg368.htm

Managing contractors: A guide for employers HSG159 (Second edition) HSE Books 2011 ISBN 978 0 7176 6436 8 www.hse.gov.uk/pubns/books/hsg159.htm

Topic-based guidance

Further information on undertaking explosives operations as part of a professional firework display business can be found at www.pyro.org.uk/

Further information on a wide range of explosives safety-related topics can be found at www.eig.org.uk

Further information on the control of electrical, electrostatic and electromagnetic hazards and the hazards arising out of surface temperatures of equipment can be found in *Guidance for electrical installation and equipment within explosives manufacturing and storage facilities including fireworks* Confederation of British Industry 2009 ISBN 978 0 85201 722 7 www.eig.org.uk/eig2007/wp-content/uploads/30777%20BAE%20Systems%20CBI%20GuideV2.pdf

Further information on protecting people from the effects of explosive events can be found in *Protective measures: A guide on measures other than personal protective equipment to protect people in explosives working areas* Confederation of British Industry 2003 ISBN 0 85201 572 0
www.eig.org.uk/eig2007/wp-content/uploads/PROTECTIVE_MEASURES.pdf

Requirements for remote explosives manufacturing facilities Confederation of British Industry 2005
www.eig.org.uk

PPE

For guidance on the effectiveness, selection and use of personal protective equipment for use in explosives operations, see:

Review of standards for thermal protection PPE in the explosives industry 2013 RR1002 HSE Books 2014
www.hse.gov.uk/research/rrhtm/rr1002.htm

Guidance on personal protective equipment (PPE) for explosives operations Confederation of British Industry 2014
www.eig.org.uk/?p=583

Fire safety

Fire safety www.hse.gov.uk/toolbox/fire.htm

Guidance on fire precautions at explosives sites licensed by the Health & Safety Executive: Fire precautions at licensed explosives sites Confederation of British Industry 2013
www.eig.org.uk/eig2007/wp-content/uploads/EIF-Fire-Precautions-Guide-20131.pdf

Planning for emergencies

Emergency procedures www.hse.gov.uk/toolbox/managing/emergency.htm

Dangerous substances and explosive atmospheres: Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L138 (Second edition) HSE Books 2013 ISBN 978 0 7176 6616 4
www.hse.gov.uk/pubns/priced/l138.pdf

Emergency planning for major accidents: Control of Major Accident Hazards Regulations 1999 HSG191 HSE Books 1999 ISBN 978 0 7176 1695 4
www.hse.gov.uk/pubns/books/hsg191.htm

Separation distances

For further information on how HSE applies separation distances to the sites it licenses, see:

Use of structural justification to underpin an HSE explosives licence Specialised Industry Report Confederation of British Industry 2011
www.eig.org.uk/eig2007/wp-content/uploads/structuraljustification.pdf

Guidance on occupied buildings on licensed explosives sites Confederation of British Industry 2013
www.eig.org.uk/?p=426

Disposal including managing damaged fireworks

Further information on the safe disposal of explosives and explosives-contaminated items and the management of damaged fireworks can be found in:

Guidance for the safe management of the disposal of explosives Confederation of British Industry 2007
www.eig.org.uk/eig2007/wp-content/uploads/disposal_guide.pdf

The safe disposal of damaged fireworks Fireworks Enforcement Liaison Group, Chief Fire Officers Association 2009
www.cfoa.org.uk/11893

Decontamination and vacating an explosives site

Management guidance for the safe decommissioning of explosives sites: A guide to the safe decommissioning of explosives sites, the relevant legislation, and the techniques used for decontamination Confederation of British Industry 2003
www.eig.org.uk/eig2007/wp-content/uploads/disposal_guide.pdf

Pyrotechnic Articles (Safety) Regulations 2015

Further information on the Pyrotechnic Articles (Safety) Regulations 2015 can be found at http://www.legislation.gov.uk/ukxi/2015/1553/pdfs/ukxi_20151553_en.pdf

Shipping dangerous goods including fireworks

General information on shipping dangerous goods can be found at www.gov.uk/shipping-dangerous-goods/overview

Further information on the carriage of dangerous goods by road and rail can be found at www.hse.gov.uk/cdg/

Further information on the carriage of explosives by road can be found in Industry *Code of Practice for Carriage of Explosives by Road Regulations* Confederation of British Industry www.eig.org.uk/

Further information on sending dangerous goods by post can be found at www.royalmail.com/sites/default/files/DangerousGoods_BusinessCustomerBooklet_July2013_0.pdf..unpublished

Further information

For information about health and safety, visit www.hse.gov.uk/. You can view HSE guidance online and order priced publications from the website. HSE priced publications are also available from bookshops.

You can report inconsistencies or inaccuracies in this guidance by sending an email to the Explosives Legislative Review team (ELR@hse.gsi.gov.uk). Reports of inconsistencies or inaccuracies will be considered by the Explosives Industry Forum (webcommunities.hse.gov.uk/connect.ti/explosives/grouphome).

Published by the Health and Safety Executive 04/16