

Explosives Regulations 2014

Guidance on Regulations – Wholesale storage of fireworks

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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and in the Approved Code of Practice to the Manufacture and Storage of Explosives Regulations 2005 (L139) which was withdrawn on 1 October 2014.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.

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Introduction

Who is this publication for?

1 This publication is for dutyholders who store larger quantities of Hazard Type 3 (HT3) and Hazard Type 4 (HT4) fireworks for onward distribution to retail premises. It is not intended for use by dutyholders who solely store HT3 and HT4 fireworks in retail premises and similar environments, who should refer to other subsector guidance.

2 It will be particularly relevant to:

- importers of fireworks intended for retail sale (generally comprising fireworks meeting the requirements of categories 1, 2 and 3 under British and European standards);
- wholesalers who distribute fireworks to retail premises; and
- operators of sites whose facilities are used by either of the above.

3 It will also be relevant to businesses storing HT3 and HT4 fireworks who engage in mail-order and internet sales of fireworks and who make up loads of category 1, 2 and 3 fireworks for distribution to end users.

4 It also contains material relevant to 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?

5 This publication provides guidance on the safe storage of larger quantities of fireworks. It also provides guidance on the explosives processing activities that are likely to take place on licensed sites occupied by people distributing fireworks to retail premises (or undertaking mail order and internet sales) such as:

- loading and unloading deliveries;
- picking and making up of consignments for despatch;
- repacking transport cartons of fireworks; and
- making up selection boxes.

6 It also explains why some of the day-to-day precautions are necessary, and supplements the simple guidance available elsewhere.

7 Following this guidance will enable compliance with the safety and security provisions of the Explosives Regulations 2014 (SI 2014/1638) (ER2014) where they relate to the storage of HT3 and HT4 fireworks for onward distribution to retail premises or the end-user.

8 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 safety provisions.

9 This document does not provide guidance on how to undertake manufacturing activities safely.

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

Other guidance that applies to the wholesale storage of fireworks

10 HSE has published detailed guidance on the safety provisions (L150)¹ and security provisions (L151)² of ER 2014. This guidance provides the background to that document and will be useful to those who require a deeper understanding of the precautions required to store fireworks safely (L150) and securely (L151).

11 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.

12 HSE has published a simple summary of the straightforward steps that people storing and selling fireworks in retail premises should follow on a day-to-day basis^{3,4}. This guidance may be relevant to some smaller or less complex fireworks warehousing and distribution operations.

Other legislation that applies to explosives operations

13 There are other general health and safety regulations which apply to the storage of fireworks. 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.

14 The Pyrotechnic Articles (Safety) Regulations 2010 (SI 2010/1554) apply to the supply and distribution of fireworks. These regulations transpose European Directive 2007/23 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 sale; and
- those articles which are only for supply to specialists.

15 The Fireworks Regulations 2004 (SI 2004/1836) apply to anyone selling fireworks or exposing them for sale. If you sell or offer for sale adult fireworks to the public outside certain times of the year, you will need a licence granted under the Fireworks Regulations 2004. This licence is in addition to any licence granted under ER2014 that allows you to store fireworks.

16 Fire safety legislation also applies to premises used for the wholesale storage and distribution of fireworks.

Application and scope of the Regulations

17 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 the safety and security of the wholesale storage of fireworks.

Explosives for work, personal and recreational use

18 ER2014 apply to fireworks whether they are for work or non-work purposes. They therefore apply to anyone storing fireworks for personal recreational use, or to voluntary clubs or societies storing explosives (examples include storage for firework displays, bonfire processions or re-enactment events).

Transport

19 ER2014 *do apply* to the transport of fireworks on site. This includes movement on public roads between different buildings on the same site.

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

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

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

23 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.

Application offshore

24 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).

25 Detailed guidance on the application offshore of the Explosives Regulations 2014 to commercial activities involving pyro articles can be found in the 'Application offshore' section of L150.

Explosives in use

26 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.

Hazard type

The role of hazard type

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

28 Hazard type defines and describes the nature of the hazard arising from a firework in both storage conditions and during processing or manufacturing activities.

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

29 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 projectile 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 hazard 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).

30 Hazard division is the classification assigned (along with a four-digit UN Number) by a competent authority for an explosive as packaged for transport according to the requirements of the UN scheme. Hazard types share similar criteria for describing behaviours (blast, fragmentation etc) as hazard divisions, but represent the hazards posed in manufacture and storage rather than when an explosive has been packaged for transport.

Determination of hazard type

31 For those fireworks 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 them on classification for transport, and the hazard type (HT) they should be allocated for storage, ie:

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

32 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 in storage or during manufacturing operations can have a significant effect on the hazard presented.

33 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.

34 Therefore, an assessment must be made of the hazards presented by fireworks and other explosives throughout the course of their storage and handling to ensure that the correct hazard type is used under all conditions.

35 Explosive materials that arise from processing activities involving fireworks should be assessed for the purposes of determining their hazard type. This could include a loose length of fuse, or collected loose compositions, that have leaked from fireworks during packing and repacking operations. These materials may present a different hazard to that of the fireworks from which they originated.

36 Hazard type should also be reassessed when:

- fireworks are removed from packaging which is intended to mitigate the explosives hazards; and
- mixed packages of fireworks are selected for despatch.

37 More information on how to identify and safely store fireworks which are transported in mitigatory packaging can be obtained from suppliers. Your supplier should also provide you with information on how to properly close any packaging once it has been opened.

38 Additional guidance on the factors affecting the hazard types of explosives can be found in L150 under 'Application and scope of the Regulations'.

Terminology

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 (including those involving fireworks) 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 involving fireworks 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 within 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 people 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 explosives-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 mainly 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 When storing and handling fireworks, the primary initiating events that need to be considered are a fire elsewhere on the premises or the accidental initiation 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.

44 The safety measures taken should ensure that:

- the likelihood of an event involving fireworks is minimised;
- an event involving fireworks which are being worked on will not communicate to fireworks or other explosives 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 and off the site 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 explosions;**
- **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.

45 The steps to be taken to ensure the safe storage of fireworks intended for distribution to retail premises (or for distribution by mail order or following an internet sale) are the same as for other types of explosive. Those storing these articles should identify and evaluate hazards and identify the appropriate safety measures to be implemented by carrying out a risk assessment.

46 In deciding if the prevention and mitigation measures in use are appropriate, the primary consideration will be to ensure that employees and other people are protected from harm by fire.

47 The principal objectives of the appropriate measures will be to ensure that sources of ignition are controlled and that people will be able to evacuate before the fireworks (or any other dangerous substances) become involved in any outbreak of fire.

Risk assessment

48 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.

49 Where the site or the activities undertaken are complex, it may be necessary to conduct a more detailed hazard identification and evaluation 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.

- 50 Employers and the self-employed who comply with the risk assessment requirements of:
- the Management of Health and Safety at Work Regulations 1999 (SI 1999/3242) (the Management Regulations);
 - the Dangerous Substances and Explosive Atmospheres Regulations 2002 (SI 2002/2776) (DSEAR);
 - fire safety legislation; and
 - (where appropriate) the Control of Major Accident Hazards Regulations 1999 (SI 1999/743) (COMAH)

will have taken the steps necessary to identify the appropriate measures they are required to take under regulation 26(1) of ER2014.

51 Regulation 3 of 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.

52 Regulation 5 of 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 the other dangerous substances on site. This includes, for example, dangerous substances not in use, or those in storage awaiting use.

53 Regulation 5(3) of the Control of Major Accident Hazards Regulations 1999 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.

54 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 fire safety legislation.

Management arrangements

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

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

- identifying;
- implementing; and
- maintaining

the safety measures.

56 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.

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

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

59 Further information 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.

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

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

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.

61 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 know 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.

62 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, physical ability and behaviours can also affect someone's competence.

63 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.

64 Dutyholders 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.

65 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;
- how to avoid accidental damage to packaged fireworks; and
- what to do in an emergency.

66 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.

67 Further information can be found in L150 under 'Fire and explosion matters: competence'.

Safe systems of work and working practices

Explosives operations and activities involving fireworks are carried out to agreed procedures.

68 Developing the safety measures for undertaking an explosives operation with HT3 and HT4 fireworks 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 analysis;
- 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 firework-related activities 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 fireworks waste and other waste that could act as a source of ignition for the fireworks, and how that waste will be managed prior to disposal.

69 Procedures would be expected to include the following activities:

- receipt and unloading of deliveries;
- storage of fireworks;
- removing fireworks from transit packaging;
- movement of fireworks on site;
- finishing fireworks;
- packing or re-packing of transport cartons and selection boxes;
- selecting fireworks for despatch;
- storage of loads awaiting despatch;
- loading of vehicles and their despatch;
- managing returns from customers and to suppliers; and
- management and disposal of damaged stock.

70 Procedures should also be in place for any other explosives operations that are undertaken such as testing. Additional guidance on procedures for explosives operations can be found in L150 and in relevant subsector guidance.

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.**

71 Areas where fireworks are being stored should be kept clean and tidy. Only those materials necessary for the storage operations should be kept in the storage area, and particular attention should be paid to preventing the build-up of flammable fines (small particles of flammable materials).

72 Damp fireworks can be dangerous, especially to users. Damp fireworks are also more likely to leak explosive compositions which increase the likelihood of a fire or can help a fire to spread. Therefore, appropriate measures should be taken to keep fireworks dry.

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

Barriers

Barriers are used, where appropriate, to prevent or limit the spread of fires or the communication of an explosion, and to protect people.

74 Barriers are physical structures that will prevent or delay the spread of fire, and that will intercept fragments and debris caused by an explosive event in a building or store.

75 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 explosives in another; and
- protecting people during the initial stages of an explosive event.

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

77 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.

78 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.

79 Further general guidance on barriers, including mounds and traverses, can be found in L150. Further guidance on the use of mounds to control the hazards arising from HT1 and HT2 fireworks can be found in relevant subsector guidance.

Stock management

Dutyholders know the type and quantity of all explosives present on site and their locations.
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80 Dutyholders 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 which 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, the spilling and exposure of the contents, damage to articles and the possible deterioration of the explosive; 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 and other explosives 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.

84 The fire and rescue service should also be told whether any other dangerous substances are present on the site, their quantities and where they are.

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

86 Stocks should be managed to identify any potential deterioration in packaging and to avoid the need to repack fireworks. Some of the empty transport packages should be retained and safely stored so that any fireworks in significantly deteriorated cartons can be repacked in their original, authorised UN transport packaging for either continued storage on site or transport elsewhere. There are legal requirements on the packaging of fireworks for transport, and advice from the supplier or

other competent person (such as a dangerous goods safety adviser) should be sought before articles are repackaged for transport.

87 Any empty transport cartons should be opened out and stored flattened so that they cannot be mistaken for full cartons in an emergency.

Segregating explosives presenting different likelihoods of initiation

Explosives that have significantly different likelihoods of initiation are segregated from one another.
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88 Storage buildings should be separated from production buildings and other areas where fireworks are worked on. Separation should be sufficient to ensure that an explosion which takes place in a production 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).

89 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.

90 There are circumstances, such as the packing of selection boxes of fireworks, 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 explosive 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 articles which are not being worked on in an expense store;
- returning packages of explosives to a store when those articles are no longer required for the task at hand; and
- placing articles which have been worked on into appropriate packaging, and then placing those packages in an appropriate store.

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

92 Damaged fireworks (other than those where the damage is simply cosmetic) 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 them within an appropriately labelled, authorised UN transport carton kept in a separate suitable storage cabinet.

93 Further guidance on managing damaged fireworks should be available from the supplier of the firework.

Segregating explosives operations from other activities

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

94 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).

95 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 on site, and only appropriate methods are used.

96 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.

97 Fireworks which are to be worked on should be taken directly from the store to either a suitably located expense store or the production building. Fireworks which have been worked on should be returned to an appropriate store as soon as practicable. Wherever practicable, fireworks which have been picked or built into a load ready for despatch 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 timed to avoid the fireworks being in movement for an unnecessarily long period of time.

98 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.

99 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.

100 Keep sources of ignition away from the fireworks or 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.

101 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.
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102 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 fireworks and the planned activity.

103 The precautions are covered in detail in paragraphs 106-131. 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 explosives 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 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 entering unpackaged explosives.

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

105 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.

Protecting explosives from sources of ignition

Fireworks 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.

106 Transport packages should not be left opened in storage areas, and should 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.

107 Where selection boxes are being assembled from individual items, dutyholders may have to store part-filled and previously opened boxes of fireworks. Repeated opening and resealing can lead to damage to a box's flaps, resulting in a box that will not properly close.

108 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; and
- keeping part-boxes of fireworks in a picking store in:
 - open transit cartons which 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.

109 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.

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

111 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.

112 Site (or guard) radiators and pipes to prevent physical contact with containers holding fireworks. 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.

113 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*⁵.

Electrical, electrostatic and electromagnetic energy

Sources of electrical energy are identified and kept to the minimum necessary for the safe operation of an explosives area.
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114 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 the relevant standards and must be designed and constructed to prevent it becoming a source of ignition.

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

- is temporary (for example, for use during legally specified sales periods or 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 made by excavation and is thereby inherently protected from lightning; or
- is exempted under the terms of a licence issued by HSE or ONR.

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 fireworks can be regarded as self-protecting, provided that:

- the walls are lined with wood (or other appropriate lining) or the fireworks 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 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 it would be reasonably practicable to do so, the metal and other surfaces in explosives areas that have the potential to generate mechanical sparks should be replaced with, or covered by, a durable 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, including fireworks, should only be manipulated with tools that do not create sparks. Non-sparking materials include bronze, wood, bone and plastics, as well as some steel alloys.

123 Ferrous and other hand tools capable of producing mechanical sparks (eg staple guns) 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.

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 a 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. This is to prevent the equipment acting 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 Cartons containing fireworks should be stacked so that stacks are stable and packaging will not become crushed or otherwise damaged by the height of the stack. Suppliers should be able to advise the maximum height of stack for each type of product.

127 Where fireworks are kept outside their transport packaging (eg during the preparation of selection boxes), the fireworks should be laid out in an orderly fashion so that they will not be knocked, dropped, crushed or otherwise damaged.

128 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.

129 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 used, or with each other, are identified and either kept to the minimum necessary for the safe operation of the explosives facility, or completely segregated from the explosives.

130 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.

131 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.

132 Maintenance systems should include:

- Identification of 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.

133 The maintenance regime should include periodic inspections of the safety measures to ensure that they are in place and remain effective.

134 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;
- 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 barriers.

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

136 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 a 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 that the event affects.**

137 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 or worked on in a place that is used exclusively for that purpose.

138 Further information can be found in L150 under 'Fire and explosion measures: measures to limit the extent of a fire or explosion'.

Protecting people from the effects of fire or explosion

(Regulation 26(1)(c))

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

139 The steps necessary 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.

140 Some engineering controls will be delivered or maintained by implementing the relevant preventative and protective measures identified in 'Cross-cutting safety precautions' (paragraphs 60-99).

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 the explosives operations.

141 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 authorised people access to explosives areas;
- providing instructions to people engaged in explosives operations and to visitors;
- supervising people engaged in 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 to protect people from the effects of a fire or explosion are identified on a case-by-case basis.

142 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 and other explosives present on a site, the activities that are 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:

- 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.

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

144 For very small quantities of explosives (eg where fireworks are being finished, prepared for testing or where damaged stock is inspected), it is possible to completely contain the effects of a fire or explosion within the work area. Where larger quantities of explosives are involved (eg where selection boxes are being packed), 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 and debris away from people, other buildings, roads etc.

145 In buildings and other places where fireworks are to be 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 and other explosives 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 (no equivalent fire safety legislation category)	6 m	4 m No explosive should be present between person and exit
Packaging of fireworks (Higher fire risk area – industrial)	25 m	12 m No explosive should be present between person and exit
Stores (Normal fire risk area – industrial)	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.

146 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 L25* ⁶.

147 The hazards presented by explosives often mean that the effectiveness of personal protective equipment can only be identified by:

- 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.

148 People working in stores containing packaged fireworks and moving boxed stock should wear 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.

149 People working on lower-hazard fireworks or packing selection boxes should wear fire-retardant outer clothing, eye protection, appropriate gloves and substantial closed footwear. Where people are undertaking activities where they face a significant risk of burns (eg preparing damaged stock for disposal), they should wear suitable fire-resistant protective clothing which may need to be of a higher specification.

150 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 is required.

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

152 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 whether the equipment is suitable for use in the explosives context where it will be worn.

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

Emergency procedures

Effective emergency procedures are in place.

154 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.

155 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.

156 Fireworks should not be kept anywhere where, in the event of a fire, they might endanger the safety of those using escape routes from the building or other place where fireworks are being processed.

157 Further information can be found in L150, under 'Measures to limit the extent of a fire or explosion' and in Appendix 4.

Separation distances

(Regulations 27 and 13(6))

Separation distances are met.

Application

158 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.

159 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

160 Further information on the application of separation distances can be found at paragraphs 174 to 189 and Appendix 5 of L150.

Buildings which are not normally occupied

161 There are no requirements to maintain separation distances between stores and uninhabited buildings. However, people storing fireworks 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.

162 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.

163 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

164 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 in L150 and in subsector guidance.

165 The separation distances for stores used for the storage of HT3 and HT4 fireworks will not normally be subject to the mounding requirements of schedule 5, although mounds which are present should be properly kept and maintained, even when those mounds are not relevant to the separation distance requirements.

Application of separation distances and regulation 13(6)

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

167 When granting licences, HSE will normally follow the distances given in Schedule 5 of ER2014.

168 HSE and ONR would normally follow the same approach to the aggregation hazard types and quantities of explosives required by Schedule 5. 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.

169 People who store larger quantities of fireworks for onward distribution to retail premises will generally be required to dispose of explosives. Waste can arise from stock that has been damaged prior to or following its arrival on site, or from defective stock returned from customers.

170 The discard, disposal and destruction of explosives including fireworks is a high-hazard activity. Failure to dispose of or discard explosives safely is one of the main causes of 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 the properties and behaviour of explosives under certain conditions (explosives that have been discarded or require disposal may be unusually sensitive); and
- ill-considered systems of work or no basic safety precautions, often arising out of a failure to identify and evaluate the hazards or a failure to follow prescribed procedures.

171 The disposal of fireworks and other explosives 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 explosives safe to transport and use as is?
Would the explosives be safe to transport and use if reworked?
- If disposal is being considered because the explosives have failed to meet a prescribed quality standard, can the explosives be used legally 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 explosive such that particular specialist competence and/or equipment will be required for the safe disposal of the explosives, and is this competence and/or equipment available?
- Has the manufacturer produced instructions on how the explosives can be disposed of?

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

173 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.

174 Where a site which 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.

175 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, it will then be sufficient to sweep out process areas and wash them down with water.

Prohibitions concerning manufacture, storage and importation of certain explosives

(Regulation 29)

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

176 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.

177 Anyone wishing to manufacture, import or store any pyrotechnic article or pyrotechnic substance containing these mixtures must apply to HSE for the article or substance to be approved.

178 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.

179 In making its determination, it will take account of 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.

180 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 its Explosives Inspectorate: explosive.enquiries@hse.gsi.gov.uk.

Prohibitions concerning the acquisition and supply of fireworks

(Regulation 9)

Large quantities of fireworks are only acquired by and supplied to people with a licence to store them.

181 Regulation 9 prohibits anyone without a licence from acquiring more than 50 kg net mass of fireworks in a single transaction. It also prohibits the sale or transfer of more than 50 kg net mass of fireworks in a single transaction unless the person to whom the fireworks are being sold or transferred shows a valid licence.

182 Carriers who transport fireworks do not need to have a licence. See paragraph 19 of this guidance for further information. However, the person selling or transferring the fireworks must have been shown a valid licence for the person receiving the delivery. This will involve the recipient showing or sending the supplier a copy of the licence in advance of the delivery.

183 It is not necessary for a supplier who has already seen a copy of a licence to see a further copy for deliveries made within the period that the licence is valid.

184 In order to demonstrate compliance with this duty, anyone selling or transferring more than 50 kg net mass of fireworks in a single transaction should keep a record of whom they have sold or transferred the fireworks to (including the reference number of the licence), or alternatively keep a copy of their licence.

Security and preventing unauthorised access to fireworks

(Regulation 30)

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

185 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 other explosives operations 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.

186 Entry to a store used for storage of 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.

187 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.

188 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.

189 Fireworks which are not kept in a store or other secure facility should be subject to continuous supervision.

190 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.

191 Dutyholders engaged in the wholesale distribution of fireworks are often reliant on temporary and casual employees during seasonal peaks in demand. Employers (or any agency they retain) should make appropriate pre-employment checks before employing temporary or casual workers to ensure that those employees do not present a risk to the security of the fireworks stored on site. In general, an employer will not have to make any additional checks beyond the pre-employment checks that would normally be expected of permanent employees, ie:

- verifying the applicant's identity;
- ensuring that the applicant is eligible to work in the United Kingdom;
- taking up references and speaking to previous employers;
- asking an applicant to disclose unspent convictions; and
- asking the applicant to provide a Basic Disclosure from either the Disclosure and Barring Service, Disclosure Scotland or Access Northern Ireland, as appropriate.

192 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.

Glossary

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).

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 that have been prepared or packaged for a display are kept prior to leaving site. Despatch stores keep explosives 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 explosive 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 includes explosive articles (including fireworks), explosive substances and desensitised explosives. Explosives are defined according to their properties and by the criteria in the United Nations Recommendations on the Transport of Dangerous Goods as revised or reissued from time to time. Pyrotechnic substances are considered to be explosives for the purposes of the Regulations, along with pyrotechnic articles that would, if classified for transport, fall within UN Class 1 or be too dangerous to transport because of their explosive properties. However, this does not mean that a substance or an article has to have been subjected to formal classification procedures before it is considered to be an explosive.

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 that 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 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.

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 which 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).

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 explosives articles; and
- using explosives articles as components to make a product which is not classified as an explosive (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 requirements set out in regulations 26 to 29.

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; or
- a 'renewable energy zone' designated by section 84(4) of the Energy Act 2004.

ONR the Office for Nuclear Regulation. The ONR is the licensing authority under ER2014 for all ONR-regulated sites. ONR-regulated sites are those sites which are or which include:

- a GB nuclear site as defined in section 68 of the Energy Act 2013 (2013 c. 32);

- an authorised defence site as defined in regulation 2(1) of the Health and Safety (Enforcing Authority) Regulations 1998 (SI 1998/494); or
- a new nuclear build site as defined in regulation 2A of the Health and Safety (Enforcing Authority) Regulations 1998.

More information on the location of ONR-regulated sites can be found at www.onr.org.uk.

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 guide⁷:

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 guide⁷:

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.

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 such articles that have been characterised as such by a notified body under the provisions of Directive 2007/23/EC, 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 Directive 2009/48/EC. Pyrotechnic articles will also include those articles that have identified as such by Directive 2004/57/EC.

pyrotechnic substance an explosive substance of a kind designed to produce heat, light, sound, gas or smoke, or a combination of any of these, as a result of non-detonative, self-sustaining, exothermic chemical reactions.

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 means 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.

site ‘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 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 that 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 *Storing and selling fireworks safely: Advice for anyone selling fireworks* HSE 2014
www.hse.gov.uk/pubns/indg407.pdf
- 4 *Fireworks in shops: Retailers' risk assessment checklist* HSE 2014
www.hse.gov.uk/pubns/indg407ch.pdf
- 5 *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
- 6 *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
7. *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

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 references:

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 for employers* 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 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

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

Planning for emergencies

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

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

Further information on the safe disposal of explosives and explosives-contaminated items 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 2010

Further information on the Pyrotechnic Articles (Safety) Regulations 2010 can be found at www.gov.uk/government/publications/guidance-on-the-pyrotechnic-articles-safety-regulations-2010

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/eig2007/?p=271

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).

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