

# Special or visual effects involving explosives or pyrotechnics used in film and television productions

## HSE information sheet

## Entertainment Information Sheet No 16 (Revision 1)

### Introduction

In this information sheet, '**must**' denotes a legal obligation. Words such as 'do' and 'should' etc are used to give advice on good practice and are not compulsory.

This information sheet is one of a series produced in consultation with the Joint Advisory Committee for Entertainment (JACE). It gives guidance for those in the film and television industries who intend to use explosives or pyrotechnics.

It does not cover the issues associated with physical effects or organised firework displays. The Association of British Theatre Technicians (ABTT) publishes a Code of Practice for the theatre industry entitled Pyrotechnics and smoke effects which has been adopted as an agreed standard for that industry (see Further reading).

Explosives and flammable materials are used in pyrotechnic work to create the impression of a dramatic event. The aim should be to minimise the quantity of explosive or flammable material used in order to create the desired effect.

### Legislation

The main legal requirements covering health and safety in the use of special and visual effects are the Health and Safety at Work etc Act 1974 and the Management of Health and Safety at Work Regulations 1999 (the Management Regulations).

The Management Regulations require a suitable and sufficient risk assessment to be carried out by employers (or self-employed people) to assess the risk to employees and others who may be affected by their activities and to determine the control measures necessary to avoid risk or reduce it to acceptable levels. An opportunity arises during risk assessment to consider the application of any other relevant health and safety legislation, including the requirement to consider fire precautions and emergency procedures.

You must consult employees on health and safety matters, either directly or through elected safety representatives.

### Responsibilities

Responsibility for health and safety rests with the employer, this normally means the production company. On a day-to-day basis, the overall responsibility for ensuring that the appropriate standards of health and safety are achieved and maintained throughout the production process rests with the producer.

In this information sheet, the term producer is used to represent the employer, organisation or person in overall control of the production activity.

The producer retains overall responsibility for the production and is tasked with ensuring appropriate coordination and control of the overall event, taking into account the risk assessment from the special effects contractor and others. The producer should make sure that:

- the special effects personnel are competent for the work in question;
- special effects personnel are provided with adequate information regarding the production;
- adequate time and resources are allowed, including for rehearsals, for the effect based on advice from the special effects personnel;
- appropriate arrangements have been made for emergencies (such as fire fighting and first aid);
- additional time should be provided for within the schedule for misfires or changes of plan;
- an overall risk assessment for the production is produced;
- adequate arrangements are in place for communicating the risks and safety arrangements to all those involved;
- appropriate facilities are available for the assembly, fusing etc of explosive effects prior to use.

The person in charge of the special effects will remain at all times responsible for advising the producer on the safe planning and execution of the effect. They are responsible for:

- making sure the effect is adequately planned, including conducting a full risk assessment and communicating the significant findings and controls to the producer;
- procurement and specification of all explosives, pyrotechnics and other materials;
- making sure all materials are fit for purpose;
- the safe transportation, storage and use of all explosives, pyrotechnics and other materials used in the effects;
- making sure only competent persons are employed;
- identifying potential emergency measures such as fire-fighting or first aid.

## Competence

The amount of knowledge, skill and experience someone needs to be considered 'competent' will vary for different tasks. A person may be competent for simple tasks but not for more complicated tasks in the same area without supervision from a more experienced (and more competent) person. Competence should therefore be judged in the light of experience, training and the work to be undertaken.

Levels of competency are graded according to knowledge, skill, experience and training, as recommended by the Joint Industry Grading Scheme for Special Effects (JIGSFX). Further information can be found at <http://jigs.org.uk>. JIGSFX publishes a register of grading as follows:

- **supervisors:** capable of planning, supervising and executing effects. For major events, a special effects supervisor would normally advise and, where necessary, supervise the safe execution of the effect;
- **senior technicians:** supervise, control and execute special effects, but would generally need supervision and guidance for major or complex events;
- **technicians:** competent to conduct special effects under the supervision of a special effects supervisor or senior technician;
- **trainees:** can assist other grades in the preparation of effects when adequately supervised.

## Risk assessment

The producer must make sure that there is an overall risk assessment for the production. They should also make sure the arrangements for communicating the

risks and safety arrangements for the effect to all those involved are adequate.

The person in charge of the special effects is responsible for making sure a suitable and sufficient risk assessment is undertaken for all the activities under their control, and that the identified control measures are communicated to the producer. The risk assessment should consider;

- people, equipment and locations under the control of the production, eg crew, stunt performers, artists; and
- other people, locations and equipment which may be affected by the activity.

## Hazards

Typical hazards arising from special effects include:

- premature firing due to mobile phones or other types of radio transmitting equipment;
- weather conditions such as electrical storms;
- flash or radiated heat;
- noise;
- blast effects – pressure waves and associated risks to people or surrounding buildings. These effects can be worse for people and equipment under water or in confined spaces;
- projectiles and other debris;
- unplanned spread of fire;
- toxic effects;
- misfires;
- unsuitable transportation, storage and handling;
- spurious radio signals interfering with firing and control systems;
- flash-over from high-tension electrical lines due to presence of ionised particles in the air following the firing of an effect.

## Control measures

The control measures may be detailed in the form of a method statement. The information needs to be provided in good time to the producer. Control measures may include:

- exclusion zone from mobile or other radio transmitting equipment;
- determination of safe distances;
- controls against flash or radiated heat;
- noise control;
- blast control;
- control of fragmentation particles and other debris;
- control of unplanned spread of fire;
- control of toxic effects;
- cueing arrangements;
- personal protective equipment (PPE);

- emergency arrangements for dealing with effects that do not go according to plan;
- other specialist advice or support used, eg engineering advice about structural integrity or specialist dive contractor for work involving underwater explosions;
- misfires;
- specific responsibilities of special effects team and others directly involved in managing and coordinating the effect;
- risks to others (eg public, crew, divers, stunt coordinators, artists).

The producer should use this information to complete the risk assessment for the whole production:

- considering the effect, timing and compatibility of each activity on all those involved;
- making all involved aware of the significant risks;
- considering whether new risks occur as a result of the combined method statements and systems of work;
- complying with the relevant Regulations.

If there are any significant changes to the production activity, the SFX and production risk assessments must be reviewed to determine if they are still valid and to ensure the controls are still adequate. Any significant changes in the risks and controls should be communicated and where appropriate, rehearsed.

## **Communication**

All involved should be thoroughly briefed about the effect, the risks and required controls prior to any rehearsal. There should be effective means to warn and exclude people from any danger area. The producer, in consultation with the special effects personnel, is responsible for making sure adequate arrangements for managing and policing the controls, for example any exclusion zone. The risk assessment should clearly identify those arrangements and also those responsible for enforcing and monitoring the exclusion zone. Any persons nominated should have adequate authority to ensure full compliance and should be dedicated to the task for the duration of the effect.

There should be agreed systems or code words to stop the effect immediately.

## **Cooperation**

All parties should make sure that adequate information is exchanged. Special effects contractors should liaise with other contractors involved in the production. Special consideration should be given to the procedures for misfires.

## **Materials**

Nominated SFX personnel are responsible for;

- the procurement and specification of the explosives, pyrotechnics and other materials to be used in the effect;
- making sure all materials are fit for purpose and for the safe transportation;
- storage and use of all explosives, pyrotechnics and other materials; and
- ensuring adherence to specific legislation which applies to the storage and handling of explosives and pyrotechnics.

## **Cueing**

There should be an agreed system for cueing an effect that is clear and unambiguous, (this may need to incorporate both sound and vision). The special effects person responsible for setting off any explosive, pyrotechnic or fire effect should have a clear line of sight to it. The cueing arrangements should be rehearsed in situ before the effect is performed.

## **Rehearsal**

Safety can be improved by rehearsing the action. Only essential personnel should be in the area. To ensure safety, there should be a thorough rehearsal of the action. All those involved in the sequence should be present at rehearsal or re-rehearsal and should be made fully aware of the action intended, the risks, control measures and emergency arrangements.

## **Execution**

The special effects person in control of an explosive, pyrotechnic or fire effect should have absolute authority over the safety arrangements during the execution of the effect.

Before commencing any effect, checks should be made by the producer, supported by the special effects personnel, to ensure exclusion zones are in place, emergency plans are in place and that all appropriate PPE is worn. The person supervising the effect should have unambiguous confirmation that danger areas are clear, for example that there is a line of sight, and they should be in direct communication with all key players.

Firing circuits should not be connected or armed until the last possible moment to minimise the risks of accidental firing.

## Misfires

In the event of a misfire, no one should approach the area until an adequate time has passed. This is determined by the SFX person in control. SFX personnel should be responsible for making the area safe. The required procedures for misfires will be determined at the risk assessment stage but should include details of:

- pyrotechnics and/or explosives;
- PPE required;
- exclusion zones required;
- steps to make the effect safe; and
- steps for disposing of explosives.

## Diving and explosives in water

A specialist dive contractor and extraordinary controls will be required for all work involving underwater explosions or where, in the event of a misfire, explosives could finish under water.

## Further reading

*Control of substances hazardous to health (Fifth edition). The Control of Substances Hazardous to Health Regulations 2002 (as amended). Approved Code of Practice and guidance L5 (Fifth edition) HSE Books 2005 ISBN 978 0 7176 2981 7 www.hse.gov.uk/pubns/books/l5.htm*

*Management of health and safety at work. Management of Health and Safety at Work Regulations 1999. Approved Code of Practice and guidance L21 (Second edition) HSE Books 2000 ISBN 978 0 7176 2488 1 www.hse.gov.uk/pubns/books/l21.htm*

*Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972 SI 1972/917 The Stationery Office*

*Carriage of Dangerous Goods by Road (Driver Training) Regulations 1996 SI 1996/2094 The Stationery Office*

*Packaging of Explosives for Carriage Regulations 1991 SI 1999/2097 The Stationery Office*

*Carriage of Dangerous Goods by Road Regulations 1996 SI 1996/2095 The Stationery Office*

*Code of practice for pyrotechnics and smoke effects*  
Association of British Theatre Technicians 1999  
[www.abtt.org.uk](http://www.abtt.org.uk)

[www.bectusfx.org.uk](http://www.bectusfx.org.uk)

## Further information

For information about health and safety, or to report inconsistencies or inaccuracies in this guidance, visit [www.hse.gov.uk/](http://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

The Stationery Office publications are available from The Stationery Office, PO Box 29, Norwich NR3 1GN Tel: 0870 600 5522 Fax: 0870 600 5533 email: [customer.services@tso.co.uk](mailto:customer.services@tso.co.uk) Website: [www.tsoshop.co.uk/](http://www.tsoshop.co.uk/) (They are also available from bookshops.) Statutory Instruments can be viewed free of charge at [www.legislation.gov.uk/](http://www.legislation.gov.uk/).

**This document contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.**

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