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FIREWORKS – STORAGE AND SALES

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RISK ASSESSMENT – FIREWORKS

(MANUFACTURE AND STORAGE OF EXPLOSIVES REGULATIONS (MSER) 2005)

Before storing any fireworks you need to carry out a survey to ascertain if there is sufficient and suitable space for the fireworks to be stored and displayed.

Once you have decided your premises is satisfactory and you have obtained your Licence / Registration (obtainable from your Local Authority) then this Risk Assessment should be used in conjunction with or as an addition to your Workplace Risk Assessment.

It is important to recognise that under MSER 2005, fireworks are quantified by their net explosive content (nec) and not by their gross weight as was the case under the previous Explosives Act 1875.

Note: Reference is made to the associated paragraphs in the Approved Code of Practice (ACOP) where applicable and additional guidance can be found in The Manufacture and Storage Regulations 2005.

1. Sources of Fuel

Fireworks can contribute to a fire and need to be treated as a fuel. The key areas in this section are the safe storage of them in the store and shop, keeping the minimum amount necessary and only trained personnel handle them.

1.1 How are you storing your fireworks?

Storage – General

- ▶ The storage place (other than for quantities <12.5 kg net explosive content (nec)) should be of a sufficient size for the fireworks to be neatly stacked to aid access, selection and stock checking.
- ▶ The method of storage will depend on four important factors: -
 - ▶ the total quantity of fireworks to be held in stock on the site:
 - in excess of 250kg (nec) you will need a licence granted by the local authority.
 - under 250kg (nec) of HT4 fireworks (or no more than 100kg (nec) of HT3 fireworks you will need to be registered with the local authority.
 - ▶ the hazard type (see Appendix A)
 - ▶ the movement of fireworks from the place of storage to the point of sale:
 - the distance from the store and the point of sale should be kept to a minimum
 - the quantity of firework in movement, at any one time, between the store and the point of sale should be kept to the minimum necessary and should not exceed 12.5kg (nec)
 - ▶ the arrangements for customers to purchase the fireworks
 - keep the stock in secure or supervised display cases or cabinets that
 - hold no more than 12.5kg (nec)
- ▶ The store should be located on the ground floor and the distance from the store to point of sale should be kept to a minimum.
- ▶ Fireworks should **not** be stored in a cellar or basement.
- ▶ The store should **not** prejudice the escape from the premises
- ▶ Loose pyrotechnic articles in metal dustbins should be avoided as there is a danger that the articles will become mixed up or damaged, with loose compound collecting at the bottom of the dustbin
- ▶ Entry to the room or store used for storage of the fireworks should:
 - ▶ be restricted to authorised staff only – **no** members of the public
 - ▶ protected from unauthorised access
 - ▶ Keep clean and dispose of carefully, any loose powder and any unwanted empty packaging stock)

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- All combustible waste materials should be removed straight away when they are no longer required
- No smoking permitted sign and enforced
- Keep the store dry – damp pyrotechnic articles can be dangerous.
- Manage stocks to avoid the need to repack fireworks
- When fireworks are no longer being sold then they should be removed from the shop floor and dependant on the time period between selling periods consideration should be given to removing them from the premises. Before returning them you should contact the supplier on how unsold articles should be returned.
- Any holding areas (areas between main store and display area) should be located where other goods do not present a risk/hazard to the fireworks and it is recommended that the fireworks be kept in metal-caged trolleys and do not exceed 12.5(nec)

Warehouse containing the store

There should be separation between the store (or warehouse containing the store) & sales area. If this is not achievable then the total amount of fireworks that can be stored will be based on the floor area of the store. The type of separation/segregation that may be acceptable would be:

- A fire-resisting separation (for example, a breeze block, stud partition or other suitably constructed wall capable of resisting fire for at least half an hour
- For single storey retail outlet a wire mesh compound may be suitable if the other goods stored are (with the exception of packaging) noncombustible. This example would involve the fireworks (in excess of 12.5 kg [nec]) being kept in their (closed) transport cartons and the building being protected by an automatic fire detection system or an automatic sprinkler system.

Shipping containers (or similar metal storage units)

- Keep in an area away from public access
- When parked in an area of a car park measures should be taken to prevent arson or some other malicious attack
- Cars and other vehicles must **not** be permitted to park within **three** metres of the container
- Locate in suitable place to reduce the risk of it being hit by vehicles
- No smoking sign and enforced in vicinity of container

[For further information see paragraphs 285 – 287 in the ACOP]

Store exclusive for fireworks

Where only fireworks are being stored transport packaging alone may be considered to provide sufficient protection providing that the following safety measures are adhered to:

- ▶ The transport packages must not be left opened in the storage area
- ▶ The packages should normally only be opened when needed (or if the contents are to be transferred to a storage cupboard or cabinet).
- ▶ After opening, it is important to close the flaps securely if pyrotechnic articles remain in the package (for example, by taping the flaps down; interleaving the flaps; or securing them in some other way to ensure that the flaps do not open).
- ▶ It is also important to avoid transferring pyrotechnic articles from one transport package to another in order to avoid the spillage of explosives.

Residential Accommodation

If more than 75 kg net of Hazard Type 4 pyrotechnic articles (normally equates to 1.4 on packaging) are kept in a store within, or adjoining, a building containing residential accommodation, suitable steps must be taken to protect residents of those premises in the event of a fire. The following specific precautions **must** be taken:

- ▶ A fire detection system must be installed
- ▶ The residential parts of the building **must** have access/exit routes that are separate to those used for the pyrotechnic store
- ▶ There **must** be suitable fire separation between the pyrotechnic store and the residential accommodation is required (for example, doors and floors/ceilings offering 30 minutes fire resistance)
- ▶ The store **must** be closed off and secured from the residential part of the property in order to both prevent unauthorised access (including by children connected with the residential accommodation) and also to help prevent the accidental introduction of sources of ignition
[For further information see paragraphs 260, 267 – 284, 313 in the ACOP]
- ▶ The store should be:
 - ▶ of suitable construction – well built so that it does not fall apart during its working life and prevents
 - ▶ suitably located - well away from flammable or hazardous substances so that they do not increase the risk of fire/explosion
 - ▶ compliant with the separation distances (licensed stores only)

1.2 What Control Measures are in place to ensure that fireworks are displayed safely in the sales area?

Suggested Control Measures:

- › Ensure display cases are made of wood or metal or other substantial material that does not readily catch fire
- › No live fireworks to be used for displays in shop windows in side shop. Only inert or non-explosive samples of fireworks are to be used
- › Avoid mixing live articles and dummies
- › Ensure the display case is not used for the display or storage of other articles (except any instruction leaflets/safety literature)

1.3 What Control Measures do you have in place to limit the amount of fireworks you have on display

The total amount of fireworks that can be kept on the shop floor is limited by the floor area but no more than 12.5 kg net mass (50 kg gross) is allowed in each cabinet.

Floor area of sales area (m ²)	Quantity of explosives (kg)	Floor area of sales area (m ²)	Quantity of explosives (kg)
not exceeding 20	12.5	not exceeding 250	45
not exceeding 40	15	not exceeding 300	50
not exceeding 60	20	not exceeding 350	55
not exceeding 80	25	not exceeding 400	60
not exceeding 100	30	not exceeding 450	65
not exceeding 150	35	not exceeding 499	70
not exceeding 200	40	equal to or exceeding 500	75

The minimum amount of fireworks should be moved at any one time and for the minimum amount of time.

- › Fireworks must not be left unattended

1.4 What Control Measures are in place for the safe handling of fireworks?

- › Members of staff not trained in the handling of fireworks should not handle them
- › Members of the public should not handle unpackaged fireworks
- › When live samples are removed from a display case, they must be kept under the supervision of a member of staff until sold
- › Appropriate steps must be taken to prevent unauthorised access to display cases. Normally, this would mean using lockable cases that are locked when unattended

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- ▶ Never leave fireworks unattended
 - ▶ Never leave them where they can get mixed up with other hazardous substances
 - ▶ Keep quantity in movement to a minimum amount and for a minimum amount of time
- [For further information see paragraphs 288 - 292, 301 - 310 in the ACOP]

2. Sources of Ignition

2.1 What Control Measures are in place to exclude possible sources of ignition from the fireworks?

- Having identified the sources of ignition in your premises you need to ensure that they are either excluded from the firework store or the firework container/cupboard excludes them
- Amend your Arson policy
- Additional considerations:
 - ‘No smoking’ notices must be displayed – Smoking must not be allowed anywhere where fireworks are stored or sold
 - Display cases and storage cabinets must be designed to protect against sparks or other sources of ignition
 - Lights or other electrical fittings are not to be used in ‘live’ display cabinets
 - No space heaters in store or near fireworks (Space heaters are fixed or portable heaters and include open gas fires, portable gas fires (LPG heaters), electric fires and heaters and oil and paraffin heaters).
 - Leave clear space between fireworks and light fittings
 - Does your store need lightning protection? Lightning protection needs to be installed in your stores except when the store is:
 - is temporary (for example, for
 - no more than a few weeks on a seasonal basis), holding Hazard Type 4 pyrotechnic articles
 - is licensed to keep less than 75kg of explosives
 - contains only Hazard Type 4 small arms ammunition

2.2 What Control Measures are in place to reduce or eliminate any hazards that could interact with the fireworks to create a fire or explosion?

In addition to the flammable substances that have previously identified you will need to consider:

- The spread of fires from neighbouring properties and buildings – i.e. are there openings into the store or shop that flames could pass,
- Keeping the fireworks away from other hazardous goods (for example flammable liquids, solids, reactive substances, other chemicals, etc
- Where significant quantities of highly flammable liquids or other highly flammable articles are likely to be present and cannot be removed or reduced, then the amount that is to be stored will need to be reduced to take into account the additional fire loading from these substances

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- ▶ There are no hard and fast rules on how to determine the amount that it should be reduced by; this can only be done as part of your risk assessment taking into consideration any compensating factors such as automated sprinkler systems etc.
- ▶ Examples of products that could present a contamination hazard include:
 - ▶ caustic substances (acids or alkalis) such as drain cleaners and paint strippers
 - ▶ certain wood preservatives which might have chemical incompatibility
 - ▶ fertilisers containing oxidising agents
 - ▶ peroxides such as certain fibreglass hardeners
 - ▶ chemically incompatible substances (including, for example, bare rusted metal)
- ▶ Protecting the fireworks from damp
- ▶ Materials that can easily catch fire (for example, bulk quantities of paper, cardboard, surplus wooden pallets, video tapes, tights or stockings)
- ▶ Aerosols and bottled gas canisters can have devastating effects if involved in a fire

[For further information see paragraphs 87 – 88, 90 -105, 261 – 262, 293 - 300 in the ACOP]

3. Identifying People at Risk

3.1 What Control Measures are in place to make people aware of the dangers from the fireworks?

Storage – General

- Have your staff been trained?
- Notices with workplace rules in place:
 - Workplace rules set out the safety policies and procedures of the company and the content will depend on the risk assessment at the workplace i.e policies on such things as smoking, alcohol, drug, use of mobile phones, pagers, lighters, restrictions on any other articles (wearing of jewellery, eating) etc.
- Emergency crews - fire, police and ambulance crews - have emergency plans been amended?

4. Firefighting and Fire Detection

4.1 What additional firefighting equipment will you require because of the fireworks?

- › Do you have sufficient fire fighting equipment
 - › Do you have suitable fire fighting equipment
- [For further information see paragraphs 229 - 233 in the ACOP]

4.2 What additional measures are required for giving warning including the use of automatic detection systems because of the fireworks?

Suggested Fire Protection Measure:

- › Are the detectors suitable for the risk
 - › Are their sufficient detectors to cover the increased risk
- [For further information see paragraphs 205 - 207 in the ACOP]

4.3 What additional information needs to be included in your Emergency Plan?

- › Have you updated your Emergency Plan
- [For further information see paragraphs 199 - 202, 221 - 228, 239 in the ACOP]

5. Firefighting and Fire Detection

5.1 What Control Measures are in place to prevent fireworks endangering the escape routes from the premises

- › Fireworks should not be stored where they might endanger the safety of those using escape routes from the building
- › Are the existing means of escape adequate
- › Do the fireworks impede their exit routes
- › Travel distances may have to be reduced or compensating features added i.e. automatic fire detection

5.2 What additional measures are in place to ensure that everyone can safely escape from the premises?

Since fireworks could increase the risk in the premises are there any additional Control Measures that need to be in place

[For further information see paragraphs 208 - 218 in the ACOP]

APPENDIX 'A'

(Courtesy of Allen Webb of the Health & Safety Executive)

Guidance to Local Authority Inspectors on the Hazard Types relating to Fireworks

1. The quantity of explosives allowed in local authority registered and licensed premises and the safety distances applicable depend on the Hazard Type (HT) of the explosives. It is a matter for the duty holder to ensure that the HT of the explosives held is appropriate for the capacity and location of the store. The purpose of this guidance is assist local authority inspectors in assessing whether duty holders storing fireworks are applying appropriate HTs.
2. Paragraph 9 and Annex 1 of the Approved Code of Practice (ACOP) and guidance to the Manufacture and Storage of Explosives Regulations, 2005 (MSER) give guidance on the meaning of HTs and how they are determined. As a general rule the HT is considered to read directly across from United Nations hazard divisions assigned to the explosives as part of the process of classification. There is a presumption in this that the fire works are in the form as classified, i.e. in complete transport packs, and the guidance given to duty holders (paragraphs 267, 272 and 275) encourages the use of unopened and sealed boxes. Where fireworks have been removed from transport packs then there will not be an applicable classification and the duty holder will be expected to provide a good technical justification to demonstrate that the HT used is appropriate (see paragraph 7).
3. There are a number of sources of information on the classification of fireworks:
 - i. Information provided by the firework importer/manufacturer in the possession of the duty holder;
 - ii. The List of Classified Explosives and Fireworks (LOCEF). This is held on the internet as a searchable data base (<http://www.locef.org.uk>).
 - iii. The Explosives Inspectorate Regulatory Contact Officer (RCO) and the classification section.
4. The vast majority of fireworks have been classified in accord with the HSE default scheme for classification. The appended table, based on this scheme, provides an indication of the HT which will apply in most cases and can be used as an inspection tool to help assess HTs claimed. Where a duty holder claims a HT less than given in the table then he should be asked to provide a good technical justification to demonstrate that the HT used is appropriate (see paragraph 7).

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5. Three general points should be understood:

- ▶ explosives classified as 1.4S are treated as being HT4;
- ▶ It is unlikely that fireworks listed as HT4 in the table will present a hazard greater than HT4 under normal storage conditions;
- ▶ where a mixture of hazard types are stored together then the hazard type for the combination should be taken to be that of the most hazardous fireworks present, e.g.

HT 3 + HT4 becomes HT3

HT3 + HT4 + HT1 becomes HT1

6. There is no benefit in attempting to equate BS 7114 categories to hazard types because the assignment to categories may be based on performance criteria, such as fuse times, which bear no relation to the hazard presented.

7. The hazard type will depend on a number of factors such as:

- The type of composition in the firework.** Flash composition in fireworks, for example, is likely to present a hazard type 1.
- The proportion of explosive composition in the firework** compared to inert materials such as cardboard and clay. Low hazard fireworks such as small combinations or batteries can have as low as 10% Nett Explosive Quantity (NEQ) whereas large shells and mines will contain a significantly higher proportion of composition.
- The method of packing of the fireworks.** This can affect the composition density in the package, the degree of confinement and the ease of propagation of explosion, all of which can affect the HT.
- The method of stowage in the store.** Accident and test data on steel freight containers containing mixtures of fireworks have shown that flash rockets, depending on how they are stowed, can tear the container apart.
- Where the fireworks have been unpacked**, such as is often found at storage used by display operators, the way they are stored will affect the HT. A bin full of 30 125 mm shells is likely to have a larger explosives density and greater confinement than packaged shells and as a result could present a HT1 rather than the HT3 indicated by the default list.

8. In the case of the storage of loose fireworks, as a rule of thumb:

- ▶ loose HT1 fireworks (based on appended table) remain HT1
- ▶ loose HT3 fireworks (based on appended table) remain HT3 unless there is confinement in which case they may be HT1
- ▶ loose HT4 fireworks (based on appended table) remain HT4 unless there is severe confinement (such as in metal containers) in which case they may be HT3

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- ▶ loose HT4 fireworks (based on appended table) remain HT4 unless there is severe confinement (such as in metal containers) in which case they may be HT3
9. If you encounter a situation such as a storage place where there is potential for confinement, where a lower HT is claimed compared to the table below or the HSE classification, or where loose fireworks are being stored, you should seek to obtain information from the duty holder to show that the HT claimed is justified. The issues to be probed being:
- i. Where the product is in packages and the HT claimed is lower than implied by the default table or the classification, what mitigation is being used? e.g. by the method of stowage in the store. Has testing been undertaken to justify the HT?
 - ii. Where the fireworks are not in packages, what testing has been done to prove the HT in the method of stowage adopted? What other information do they have to support their claim?
10. Should you need advice on technical aspects of specific situations, you should contact the **HSE Explosives Inspectorate Regulatory Contact Officer** Mrs D. Thomas.
e-mail: diane.thomas@gsi.gov.uk
Tel: 0151 951 3259
Fax: 0151 951 3891

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Type	Calibre /Weight	Hazard Type
Report shell (maroon, titanium salute)	All report shells	1
Star shell	Colour shell: $\geq 200\text{mm}$	1
	Colour shell: $< 200\text{mm}$ with $> 25\%$ flash composition, as loose powder and /or report effects	1
	Colour shell: $< 200\text{mm}$ with $\leq 25\%$ flash composition, as loose powder and/ or report effects	3
	Colour shell: $\leq 50\text{mm}$ or $\leq 60\text{g}$ pyrotechnic composition with $< 2\%$ flash composition as report effects	3
	Colour shell: $< 50\text{mm}$ or $< 60\text{g}$ pyrotechnic composition with $\leq 2\%$ flash composition as report effects	4
Shell in mortar	All report shells	1
	Colour shell: $\geq 200\text{mm}$	1
	Colour shell: $< 200\text{mm}$	2
Roman candle containing only flash composition \leq	$> 45\text{mm}$ inner diameter	1
	$> 30\text{mm}$ and $\leq 45\text{mm}$ inner diameter	3
	$\leq 30\text{mm}$ inner diameter	4
Roman candle of other types	$> 60\text{mm}$ inner diameter	1
	$> 30\text{mm}$ and $\leq 60\text{mm}$ inner diameter	3
	$\leq 30\text{mm}$ inner diameter	4
Report rocket	All rockets without sticks	1
	40g flash composition as loose powder and/or report effects, with sticks	1
	$> 6\text{g}$ and $< 40\text{g}$ flash composition as loose powder and/or report effects, with sticks	3
	$\leq 6\text{g}$ flash composition as loose powder and/or report effects, with sticks	4

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Type	Calibre /Weight	Hazard Type
Rocket	> 100mm maximum external diameter of payload device	1
	≤ 100mm maximum external diameter of payload device and > 40g flash composition as loose powder and/or report effects	1
	≤ 100mm maximum external diameter of payload device and > 10g, < 40g flash composition as loose powder and/or report effects	3
	≤ 100mm maximum external diameter of payload device and ≤ 10g flash composition as loose powder and/or report effects	4
Mine	> 100mm in diameter	3
Fountain	≤ 100mm in diameter	4
	≥ 1kg pyrotechnic composition	3
	< 1kg pyrotechnic composition	4
Lancework on frames		4
Sparklers		4
Low hazard fireworks and novelties		4
Wheel	No report effect, each whistle (if any) ≤ 5g, ≥ 1kg total pyrotechnic composition	3
	No report effect, each whistle (if any) ≤ 5g, < 1kg total pyrotechnic composition	4
Aerial wheel	No report effect, each whistle (if any) ≤ 5g, ≥ 60g pyrotechnic composition per driver or > 200g total pyrotechnic composition	3
	No report effect, each whistle (if any) ≤ 5g, 60g ≤ pyrotechnic composition per driver and ≤ 200g total pyrotechnic composition	4

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Type	Calibre /Weight	Hazard Type
BS 7114: Category 2 & 3 fireworks (other than those listed above)		4
Lancework with only lances		4
Lancework with effects	Hazard type will depend on effects, e.g. lancework battles with Roman Candles < 30mm would be HT 4. Lancework with gerb > 1kg would be HT3.	
Selection pack	The most hazardous firework type determines the hazard type i.e. 1>2>3>4	
Combination	The most hazardous firework type determines the classification type i.e. 1>2>3>4	
BS 7114: Category 4 fireworks (other than in those listed above)	The hazard type will depend on the HSE classification and the duty holder should be a position to provide this information.	