



SAFETY SERVICES ORGANISATION

SAFETY & HAZARD ASSESSMENT

EXPLOSIVES LEGISLATION

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USEFUL DOCUMENTS & RESOURCES

Useful documentation and resources:

- **JSP 333: Services Textbook of Explosives.**
 - Unfortunately, this is currently unavailable – I have used a working/draft copy.
- **DSA02.OME Regulations**
 - Available on gov.uk site:
<https://www.gov.uk/government/publications/dsa03-ome-part-1-ome-acquisition>



WHY LEGISLATE?

Macclesfield Bridge (1874)

- Barge being towed by a steam tug up river, it had a cargo of Sugar, Nuts, a few barrels of Benzol, and five tons of gunpowder...
- As the barge passed under Macclesfield Bridge, it is thought that a naked flame ignited benzol vapour.
- This ignition propagated and initiated the gunpowder. The crew was killed, the bridge was destroyed, and windows were blown out up to a mile away.

‘At that time gunpowder manufacture, storage, transport and use were essentially unregulated and this was thought to be a major contributor to the accident.’ [3]



WHY LEGISLATE?

Halifax Harbour (1917)

- The Mont-Blanc was a French cargo ship laden with High Explosives. In Halifax Harbour (Canada), it collided with an unladen Norwegian vessel at low speed (≈ 1 knot).
- A fire began on the French ship which quickly spread and 20 minutes later its cargo exploded.
- Structures within 800m were destroyed. Approximately 2000 people were killed and an estimated 9000 were injured.

‘The blast wave snapped trees, bent iron rails, demolished buildings, grounded vessels, and scattered fragments of Mont-Blanc for kilometres. Hardly a window in the city proper survived the blast.’ [3]



WHY LEGISLATE?

USS Forrestal (1967)

- On 29 July 1967, the aircraft carrier USS Forrestal was operating off North Vietnam. A 5-inch 'Zuni' rocket loaded in the pod under the wing of an F-4 aircraft on the deck was accidentally fired.
- The warhead crossed the flight deck and punctured the fuel tank of a nearby aircraft and ignited a fire. An older, poorly stored, 1000lb (~450kg) bomb fell to the deck.
- The fire-fighting response team believed they had 10 minutes before the bomb would cook-off and proceeded to attempt to cool the bomb. Unfortunately, it detonated after only 1 minute 36 seconds.
- A further series of fires and explosions ensued causing further damage. 131 people lost their lives with 161 injuries.

'The Forrestal incident was one of several explosive accidents involving US aircraft carriers.' [3]



WHY LEGISLATE?

Enschede (2000)

- A fire occurred at a Fireworks depot in the city of Enschede in May 2000. It started in a work area where approximately 900kg of fireworks were being stored.
- Unfortunately, it spread to two shipping containers that were being used to illegally store more fireworks. The resulting ignition involved ≈ 177 tonnes of fireworks.
- When built in 1977 the depot was outside of the town. In the intervening years however, it had become surrounded by new residential areas.

‘This caused around 400 houses to be destroyed, 15 streets incinerated and a total of 1,500 homes damaged, leaving 1,250 people homeless, essentially obliterating the neighbourhood of Roombeek.’ [9]



WHY LEGISLATE?

Each of these incidences highlights several key points regarding explosive facilities:

- Unintended initiation of explosives can lead to major consequences.
 - Major loss of life and major damage to infrastructure and capability.
- They are, relatively, frequent occurrences. There have been many similar incidents around the globe and they continue to this day (Mari, Cyprus explosion in 2011 and the Beirut explosion in 2020).
- Given their high consequence and frequency, it is evident that explosives represent a high risk.

‘As such there is a need for such activities to be carefully controlled and managed. One of the principle tools to achieve such control is a body of legislation and regulation.’ [3]



WHERE IT ALL BEGAN

Explosive Act (1875)

- Was a direct result of the explosion at Macclesfield Bridge.
- Was extant for over a century.
- Minor amendments were added by the Explosive Act 1923.
- The act set out the following principles:
 - Places where explosives were manufactured, stored and handled must be licensed, constructed and operated in such a way that reduced the risks of explosion.
 - It also introduced the concept of classification of explosives and the prohibition of particularly hazardous materials.
 - Obligations were placed on local authorities and government and it introduced an inspection regime to satisfy that operators were complying with the law.
- Many of the licensing principles laid down in 1875 are still applicable today and are widely applied around the globe.



EXPLOSIVES REGULATIONS 2014

Often referred to as ER2014. It can be accessed on the legislation.gov.uk website [15].

It revoked the 1875 act and several other pieces of legislation that had entered into force in the intervening years such as:

- Explosives Act 1923
- Control of Explosives Regulations 1991 (COER)
- Manufacture and Storage of Explosives Regulations 2005 (MSER)

‘One of the key aims of that review was to consolidate, modernise, and, where practicable, simplify the legislative arrangements.’ [13]



EXPLOSIVES REGULATIONS 2014

The act included a number of changes to the regulatory framework (which can be viewed at [13]).

It also came with a suite of overarching guidance and subsector guidance including:

- L150 focuses on safety provisions [17]
- L151 covers security provisions

Obviously, L150 is of particular interest to us...



EXPLOSIVES REGULATIONS 2014

L150 offers extensive guidance, however the 10 key principles it expounds are worth reiterating:

1. People undertaking explosives operations should be competent to carry out their particular roles.
2. The particular hazards associated with the explosives should be understood.
3. The sources of energy that could cause the explosives to initiate should be identified.
4. Appropriate safety measures should be part of a planned and proportionate system of work to control all sources of energy that could cause an initiation.
5. Particular care should be taken where an activity involves the application of energy to an explosive to ensure that this is controlled.



EXPLOSIVES REGULATIONS 2014

L150 offers extensive guidance, however the 10 key principles it expounds are worth reiterating:

6. So far as reasonably practicable, the quantity of explosives, extent and duration of exposure to the hazard should be minimised.
7. The number of people exposed to the hazard should be limited to the minimum necessary for the activity in hand.
8. Precautions should be in place to prevent an explosives event from escalating if an initiation does take place.
9. Precautions should be in place to protect people if an initiation does occur.
10. Robust systems should be in place to make sure that the necessary precautions are in place and remain effective.



AMENDMENT REGULATIONS 2016

The Explosives Regulations 2014 (Amendment) Regulations 2016 (ERAR2016)

Primarily implemented an EU directive on the civil use of explosives. It must be read in conjunction with ER2014.

In particular it changed rules on how explosives were put onto market. The full list of changes can be found in [14].

BREXIT Update:

- There have been numerous amendments due to BREXIT through The Product Safety and Metrology etc Act.
- These ensure ER2014 & ERAR2016 apply only to GB, apply through the BREXIT transition period, and the change from CE to UK Conformity Assessment markings.



COMAH15



COMAH15

The Control of Major Accident Hazards Regulations 2015 (COMAH 15)

“The purpose of the COMAH Regulations is to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any accidents which do occur.”

Is placed upon establishments that hold dangerous substances above the qualifying limits given in tonnes (1000 kg). It applies to dangerous substances, including explosives, but also other substances including toxic, flammable & oxidising liquids and gasses.

There are two tiers, each with their own thresholds and subsequent responsibilities. The explosives thresholds are:

- Lower Tier – 10 Tonne (50 Tonne for Division 1.4 only)
- Upper Tier – 50 Tonne (200 Tonne for Division 1.4 only)



COMAH – GENERAL DUTIES

General duties for all operators – both lower and upper tier:

- “Every operator must take all measures necessary to prevent major accidents and to limit their consequences for human health and the environment”
 - ALARP Principle
- Operators must be able to **demonstrate** to the competent authority that they have taken all measures necessary.
- Operators must notify the competent authority ‘in advance’.
- Operators must produce and retain a Major Accident Prevention Policy (MAPP).



COMAH – MAPP

- Generally a short, simple document which sets out what is to be achieved and indicates how.
 - The detail will generally be in other documents such as operating procedures, training records, job descriptions and audit reports.
- It must specifically address major accident hazards relating to the protection of people and environment.
- Policies in the MAPP should be implemented through a Safety Management System (SMS)
 - Key areas the SMS must cover:
 - organisation and personnel
 - identification and evaluation of major hazards
 - operational control
 - management of change
 - planning for emergencies
 - monitoring, audit and review



COMAH – UPPER TIER DUTIES

As well as the general duties, upper tier operators must:

- Prepare a written emergency plan, and then review and test them.
 - Both internal and external emergency plans.
 - These plans should aim to:
 - contain and control incidents so as to minimise the consequences, and to limit damage to human health, the environment and property;
 - implement the necessary measures to protect human health and the environment from the consequences of major accidents;
 - communicating the necessary information to the public and to the services or authorities concerned in the area;
 - provide for the restoration and clean-up of the environment following a major accident.
- Provide additional information to the public and establishments in the surrounding area with regards to safety measures and requisite behaviour in the event of a major accident.
- Operators must prepare a Safety Report.

COMAH – UPPER TIER SAFETY REPORT

Upper tier operators must prepare a Safety Report:

- It will show that the arrangements are in place to control, and to limit the consequences of major accident hazards.
- The safety report should contain the MAPP and a clear link to the SMS elements previously described.
- The safety report must be reviewed at least every 5 years, but also when any changes are required.
- The safety report must identify all major accident hazards and present all reasonably foreseeable major accident scenarios. Reference should be made to hazard identification and risk assessment techniques used.



COMAH – UPPER TIER SAFETY REPORT

The safety report should include:

- A description of the environment of the establishment including geography, the establishment itself, and neighbouring establishments.
- A description of the main activities, processes and dangerous substances.
- Risk analysis including HAZID, Hazard Analysis and Risk Assessment.
- A review of past accidents and incidents and subsequent lessons learnt.
- Preventative Safety Measures
 - Prevent the hazard being realised
- Protective Safety Measures
 - Limit the consequences of a hazard once realised



EXPLOSIVE ATMOSPHERE - DSEAR



EXPLOSIVE ATMOSPHERE - DSEAR

The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR)

Applies to most workplaces where a potentially explosive atmosphere may occur.

“an explosive atmosphere is defined as a mixture of dangerous substances with air, under atmospheric conditions, in the form of gases, vapours, mist or dust in which, after ignition has occurred, combustion spreads to the entire unburned mixture.”

Two main ways of controlling the risks:

- Preventing releases of dangerous substances that can create explosive atmospheres
- Preventing sources of ignition

May apply to explosive processing buildings where explosive powder could be present in the atmosphere. Also applies to other industries however, e.g. flour mills and vehicle paint spraying.

Fundamentally, DSEAR requires employers to eliminate or control the risks (ALARP Principle) from dangerous substances.



EXPLOSIVE ATMOSPHERE - DSEAR

DSEAR requires the classification of areas where explosive atmospheres may occur into zones.

	Continuous Presence	Occasional Presence	Unlikely & Short-lived Presence
Gases, Vapours & Mists	Zone 0 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is present continuously or for long periods or frequently.	Zone 1 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally.	Zone 2 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.
Dusts	Zone 20 - A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods or frequently.	Zone 21 - A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally.	Zone 22 - A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.
Resulting Equipment Category	Cat 1 Equipment	Cat 2 Equipment	Cat 3 Equipment

Zoned areas must be protected from sources of ignition:

- Only suitable equipment is to be used.
- Anti-static precautions may be required depending upon the risk.
- Zones may need to be marked.



EXPLOSIVE ATMOSPHERE - ATEX

ATEX is the name commonly given to the two European Directives for controlling explosive atmospheres:

- 1) Directive 99/92/EC (also known as 'ATEX 137' or the 'ATEX Workplace Directive') on minimum requirements for improving the health and safety protection of workers potentially at risk from explosive atmospheres.
- 2) Directive 2014/34/EU (also known as 'ATEX 114' or 'the ATEX Equipment Directive') on the approximation of the laws of Members States concerning equipment and protective systems intended for use in potentially explosive atmospheres.

Note: changes may be incoming due to BREXIT



ATEX VS DSEAR

- 1) Directive 99/92/EC (also known as 'ATEX 137' or the 'ATEX Workplace Directive') on minimum requirements for improving the health and safety protection of workers potentially at risk from explosive atmospheres.

In Great Britain the requirements of Directive 99/92/EC were put into effect through regulations 7 and 11 of the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR).



ATEX EQUIPMENT – EPS 2016

- 2) Directive 2014/34/EU (also known as 'ATEX 114' or 'the ATEX Equipment Directive') on the approximation of the laws of Members States concerning equipment and protective systems intended for use in potentially explosive atmospheres.

The EPS 2016 implemented Directive 2014/34/EU on equipment and protective systems intended for use in potentially explosive atmospheres.

The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 (EPS)

It gives requirements applicable to equipment in Categories 1, 2 and 3 as mentioned in the DSEAR slide. It also gives requirements for conformity marking (pending BREXIT changes).



ATEX EQUIPMENT – EPS 2016

	Continuous Presence	Occasional Presence	Unlikely & Short-lived Presence
Gases, Vapours & Mists	Zone 0 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is present continuously or for long periods or frequently.	Zone 1 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally.	Zone 2 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.
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Resulting Equipment Category	Cat 1 Equipment	Cat 2 Equipment	Cat 3 Equipment

OTHER OME REGULATIONS

Whilst not legislation as such, it is worth mentioning MOD regulations:

- DSA 02.OME – Defence OME Regulations
- Supported by Defence Codes of Practice & Guidance Material in DSA 03.OME
 - Part 1 – OME Acquisition
 - Part 2 – In-Service & Operational Safety Management of OME
 - Part 3 – Ranges
 - Part 4 – MACR (the MOD's equivalent to COMAH)
 - Part 5 – Lasers
- There are still some extant and pertinent Joint Service Publications (JSP), e.g. JSP 762: Defence Ordnance, Munitions and Explosives Through-Life Management.
- In addition there are Defence Standards (Def Stans), e.g. Def Stan 07-085 - Design Requirements for Weapons and Associated Systems.
- There are also NATO STANAGs, e.g. STANAG 4297 Guidance on the Assessment of the Safety and Suitability for Service of Non-nuclear Munitions for NATO Armed Forces.



FIREARMS LEGISLATION



FIREARMS LEGISLATION

The Principal Act – Firearms Act 1968

There have been numerous amendments however:

- Firearms (Amendment) Act 1988 - extended the class of prohibited weapons.
- Firearms (Amendment) Act 1997 and the Firearms (Amendment) (No. 2) Act 1997 - which in effect banned almost all handguns.

A firearm is defined, in law, as:

‘Firearm’ means a lethal barrelled weapon of any description from which any shot, bullet or other missile with kinetic energy of more than one joule at the muzzle of the weapon, can be discharged.



FIREARMS LEGISLATION

The key principle:

GB firearms policy is based on the fact that firearms are dangerous weapons and the State has a duty to protect the public from their misuse. Gun ownership is a privilege, not a right.

Firearms control in GB is among the toughest in the world
and, as a result, firearms offences continue to make up a small proportion of
recorded crime



FIREARMS CERTIFICATE

Some firearms can be held by members of the public through either a firearms or a shotgun certificate.

Both certificates are issued by the local police force rather than a central authority – police will use local information in their judgement.

“Permission to possess, purchase or acquire a firearm will only be granted to an individual who is assessed by the licensing authority, the police, as not posing a threat to public safety and having good reason to own the firearm.”

Generally ‘good reason’ is for work, sport or leisure.

There are rules certificate holders must comply with, particularly around police notification and storage of firearms.



REGISTERED FIREARMS DEALER

There are separate rules and registration for firearms dealers. A dealer is:

“A dealer is defined... as a person or a corporate body who, by way of trade or business: manufactures, sells, transfers, repairs, tests or proves firearms or ammunition to which section 1 of that Act applies, or shot guns; or sells or transfers air weapons. Firearms dealers are not authorised to trade in prohibited weapons without the Secretary of State’s or Scottish Minister’s authority...”

The police are required to keep a register of firearms dealers, dealers must then apply to be registered and subsequently receive a certificate of registration.

“it is an offence for a person who is not a registered firearms dealer or their servant to manufacture or possess for sale, by way of trade or business, a component part of a firearm”

A section 5 authority allows dealers to possess, purchase or acquire, manufacture, sell or transfer prohibited weapons and prohibited ammunition as defined by section 5 of the 1968 Act. Issued by the Secretary of State or Scottish Minister’s authority as mentioned above.



PROHIBITED WEAPONS



[25,26,27,28]

EXPLOSIVES LEGISLATION



PROHIBITED WEAPONS

“Sections 5(1) and 5(1A) of the 1968 Act, make it unlawful to purchase, acquire or possess, without the authority of the Secretary of State [or Scottish Minister], any prohibited weapon or Ammunition”

Some examples of Prohibited Weapons include (for the full, extensive list see the Act):

- Any firearm which is so designed or adapted that two or more missiles can be successively discharged without repeated pressure on the trigger – e.g. machine guns and burst fire weapons.
- Any self-loading or pump-action rifled gun (except those chambered for .22 rim-fire).
- Any firearm which either has a barrel less than 30 centimetres in length or is less than 60 centimetres in length overall (there are some minor exceptions such as air weapons or signalling apparatus) – e.g. most pistols.
- Self-loading or pump-action smooth bore guns than a certain length (barrel less than 24 inches or 40 inches overall) – e.g. sawn-off shotguns.
- Any rocket launcher, or any mortar, for projecting a stabilised missile (except some signalling apparatus).



GENERIC LEGISLATION

Be aware that in addition to Explosives Legislation, generic H&S legislation also applies (all as amended):

- The Health and Safety at Work Act 1974
- The Occupiers Liability Act 1984
- The Control of Substances Hazardous to Health 2002 (COSHH)
- The Workplace (Health Safety and Welfare) Regulations 1992
- The Provision and Use of Work Equipment Regulations 1998 (PUWER)
- The Health and Safety (Miscellaneous Amendments) Regulations 2002
- The Regulatory Reform (Fire Safety) Order 2005
- The Management of Health and Safety at Work Regulations 1999
- The Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)
- The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR)



NEXT STEPS...

That concludes the taught phase of the module.



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THANK YOU FOR LISTENING

ANY QUESTIONS?



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