

**GUIDANCE ON THE APPLICATION OF THE DANGEROUS SUBSTANCES
AND EXPLOSIVE ATMOSPHERES REGULATIONS (DSEAR) 2002 TO
MOTOR VEHICLE REPAIR (MVR)**

INTRODUCTION

1 Fires and explosions are one of the main causes of deaths and property damage in MVR (see [Appendix 2](#)). Usually, they involve the mishandling of petrol eg when draining fuel tanks and lines, but incidents have also occurred during 'hot work' repairs on vehicle diesel tanks and waste oil storage tanks, during the inappropriate use of paints/thinners/waste petrol to light rubbish fires, and the collection and use of waste engine oil in space heaters.

2 This Information Document draws together relevant guidance and provides practical advice for employers and the self-employed on the protection of workers from fire and explosion risks related to dangerous substances and potentially explosive atmospheres used or present in MVR. Paras 11 & 12 and [Appendix 1](#) contain some useful 'DOs and DON'Ts' and further advice can be found on the HSE [MVR website](#).

3 DSEAR¹ came into force in December 2002, updating or replacing existing legislation eg Highly Flammable Liquids Regulations 1972 (HFL). Most of the requirements are not new and there should be little extra work for businesses who were complying with previous legislation.

4 The main change is the requirement to carry out a risk assessment. Other supporting changes include -

- hazardous areas (zones) where explosive atmospheres may occur must be classified and marked
- equipment used in places where explosive atmospheres may occur must comply with the EPS² Regulations, unless it was already in use before July 2003 and a risk assessment concludes its continued use is safe
- storage of petrol, except for dispensing into vehicles, and petroleum products in a workplace no longer requires a licence from the Petroleum Licensing Authority. The safe storage of all dangerous substances is covered by DSEAR. (See paras 22 – 24).

5 New MVR workplaces or ones modified after 30 June 2003 must meet all the DSEAR requirements from the time they come into use. Those in use before that date have until July 2006 to meet the requirements of Regulation 7 ie zoning, marking and compliance with EPS².

DANGEROUS SUBSTANCES AND EXPLOSIVE ATMOSPHERES

6 Typical examples of a **Dangerous substance** in MVR include -

- Petrol storage/handling in drums/cans eg from draining fuel tanks/lines, and when working on vehicles
- Waste engine oil (eg contaminated with petrol) storage in drums/tanks and/or use in space heaters
- Other flammable liquids storage/use of paints, solvents, cleaning materials,
- Flammable gases welding/cutting equipment, LPG heaters, battery charging, LPG-fuelled vehicles, some aerosols
- Explosive dusts sanding organic fillers eg fibre-glass
- Other explosive materials air bags, seat belt pre-tensioners (see also [INDG280](#) in Further Reading for the Registration of stores for these devices)
- Flammable materials in special circumstances welding/cutting of diesel tanks, or near to brake lines etc

An **Explosive atmosphere** is an accumulation of gas, mist, dust or vapour which, when mixed with air, has the potential to catch fire or explode.

MAIN REQUIREMENTS OF DSEAR

7 Employers and the self-employed must –

- have carried out a risk assessment for all activities involving dangerous substances which should be reviewed before any changes or new processes are introduced
- provide measures to eliminate or reduce risks, as far as is reasonably practicable
- classify and mark places where explosive atmospheres may occur
- provide equipment which is suitable for use in explosive atmospheres
- provide equipment and procedures for accidents and emergencies
- provide information and training to employees

RISK ASSESSMENT

8 The risk assessment should determine whether existing measures are sufficient or if any additional controls or precautions are necessary and take account of –

- the hazardous properties of the substances eg flammable, highly/extremely flammable, explosive, oxidising
- how and where they are used
- the quantities present
- the possibility of a hazardous explosive atmosphere occurring
- all potential ignition sources eg from welding, burning or other 'hot work'; process/equipment which may produce a spark or flame or other electrical/mechanical risk including vehicle batteries and hand lamps; static discharges

9 Where there are five or more employees, the significant findings of the risk assessment must be recorded eg

- measures taken to eliminate or reduce the risk
- sufficient information to show that the workplace and work equipment will be safe from risk of fire and explosion during use and maintenance
- details of any areas classified as hazardous
- in shared workplaces, any special measures to ensure coordination of safety requirements to protect workers.

Measures to eliminate or reduce risks

(i) Substitution

10 In MVR there is no scope for substituting petrol or other vehicle fuel. It may be possible, however, to replace paints, solvents or cleaning materials classified as dangerous with ones that are less hazardous eg using a higher-flashpoint solvent or water-based materials. Where risk cannot be entirely eliminated, appropriate control and mitigation measures must be put in place.

(ii) Control Measures

11 In order of priority, the following control measures should be adopted where reasonably practicable –

Reduce the quantity of dangerous substance to a minimum	DO keep stored quantities of petrol, and flammable paints, thinners and solvents, including wastes, as low as possible
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	DO keep numbers of gas cylinders to a minimum
Avoid or minimise releases	DO use fuel retrievers for draining petrol tanks/lines DO use safety containers for flammable substances. Keep tops/lids on all containers and dispose contaminated cloths/rags safely DO use a proprietary paint mixing system DON'T spray flammable paints outside a ventilated booth/enclosure/ controlled spray space.
Control releases at source	DO use tools with built in extraction or local exhaust equipment when sanding organic body fillers DO ensure that the booth/enclosure extraction is switched on before spraying
Prevent the formation of an explosive atmosphere	DO potentially dangerous work in safe and well ventilated areas eg in the open air DON'T drain petrol tanks/lines over or close to an inspection pit, drain or other opening in the ground DON'T carry out welding or other hot work on petrol or diesel tanks, unless they've been adequately cleaned and gas freed; nor near to brake lines. Never attempt to repair an LPG fuel tank – seek specialist advice
Collect, contain and remove any releases to a safe place	DO maintain extraction/filtration equipment. Ensure it is capable of removing dangerous concentrations
Avoid ignition sources	DON'T smoke or carry out any hot work while draining petrol or where flammable vapours could be present - DO ensure that equipment provided for inspection pits, spray booths and other zoned areas is suitable for use in explosive atmospheres ²
Avoid adverse conditions which could lead to danger	DO ensure that temperature controls on drying/ curing ovens are properly maintained DON'T charge batteries at charging rates in excess of manufacturers' recommendations DO keep airbags in properly secured containers
Keep incompatible substances apart	DON'T store oxygen and flammable gas cylinders together

(iii) Mitigation Measures

12 Reasonably practicable mitigation measures to reduce the effects of any fire, explosion or similar event should be considered, including –

Preventing fires and explosions from spreading to other parts of the workplace	DO store petrol, paints, solvents, gas cylinders in safe places in the open air if possible, or in storerooms which are in safe positions or are fire-resisting structures DO provide at least half-hour fire resistant isolation for spray booths and any storage area inside occupied buildings
Reducing to a minimum the numbers of employees/ other	DON'T allow unauthorised persons into zoned areas eg spray booths/enclosures/

persons who may be at risk	spaces; inspection pits DO provide adequate and safe means of escape in case of fire eg from spray booths/enclosures using flammable substances
Providing plant and equipment that can safely contain or suppress an explosion, or vent it to a safe place	DO provide and maintain explosion relief panels where required eg on those direct-fired drying/curing ovens working at temperatures over 80°C and on some in which air is recirculated; and on dust collection plants

Hazardous area classification

13 The Hazardous area classification of MVR premises is not simple. However, whilst transient activities involving flammable substances eg use of aerosols can take place anywhere on site, the following are examples of places that would normally be considered to be **hazardous** include-

- areas for storing, mixing or for spraying flammable liquids
- body preparation areas where organic body fillers are sanded
- battery charging areas
- vehicle inspection pits

14 The special precautions that apply to hazardous places are –

- area classification (Zoning)
- selection of equipment (protection from sources of ignition)
- marking of entry points into zones
- provision of anti-static clothing, if deemed necessary by the Risk Assessment
- verification of the safety of plant, processes and equipment before being brought into use

(i) Area classification (Zoning)

15 **Hazardous** places are classified in terms of zones on the basis of the likelihood and duration of an explosive atmosphere eg

Zone 0 / 20 - present continuously; or for long periods; or frequently
eg inside of petrol tanks or containers

Zone 1 / 21 - likely to occur in normal operation but only occasionally
eg spray booth, paint mixing

Zone 2 / 22 - not likely to occur normally; or for short periods only
eg vehicle inspection pit

(0,1 & 2 apply to gases, vapours and mists; 20 21 & 22 to dusts)

(ii) Selection of equipment (protection from sources of ignition)

16 Equipment, both electrical and mechanical, used in the zones must meet the requirements of EPS² though, if in use before July 2003 can continue to be used provided the risk assessment shows it is safe to do so and it is maintained in good condition. The following equipment categories apply to the above zones -

Zone 0 / 20 - Category 1 equipment

Zone 1 / 21 - Category 1 or 2 equipment

Zone 2 / 22 - Category 1, 2 or 3 equipment

Examples of equipment in MVR which might need protection include lighting (fixed and portable, even 12volt), hand-held drills, grinders, polishers, paint spray equipment, drying lamps.

(iii) Marking of entry points into zones

17 'EX' warning signs should be displayed at the entrances to places which are used exclusively for an activity involving a flammable substance eg flammable paint/solvent stores, spray booths, body preparation grinding areas, and because of their unique hazard, inspection pits.

At other locations where the use of materials containing dangerous substances is transient eg aerosols, activities should be covered by risk assessment, appropriate control measures and strict adherence to procedures. Some businesses have decided to activate visual/audible warnings when potentially hazardous activities are taking place. Whatever measures are adopted, they must be fully understood by everyone in or entering the workshop.

(iv) Provision of anti-static clothing

18 Employees who work in zoned areas should be provided with clothing, especially footwear, which minimises the risk of an electrostatic discharge igniting the explosive atmosphere.

(v) Verification of safety before coming into use

19 All areas where hazardous explosive atmospheres may be present and coming into use for the first time after 30 June 2003, must be confirmed as being safe (verified). The person carrying out the verification must be competent to consider the particular risks at the workplace and the adequacy of control and other measures put in place.

Emergency arrangements

20 Emergency arrangements, proportionate to the level of risk, should be prepared where the risk assessment concludes that an accident, incident or emergency could arise, eg a fire or significant spillage, because of the quantity of dangerous substance present. For example -

- suitable warning (including visual and audible alarms) and communication systems
- escape facilities
- emergency procedures
- equipment and clothing for essential personnel dealing with the incident
- practice drills

Information on emergency procedures should be given to employees and the emergency services advised that the information is available.

Information, instruction and training for employees and others

21 In addition to information on emergency procedures (see para 20), employees and other persons who may be at risk should be provided with suitable information, instruction and training on the precautions and actions they need to take to safeguard themselves including –

- names of substances in use and the risk
- relevant safety data sheets
- any legislation applying to the hazardous properties of the substances
- significant findings of the risk assessment

Much of this information is already required by existing health and safety legislation. Notices restricting entry by non-employees and others should be prominently displayed at the entrances to hazardous areas.

ENFORCEMENT ALLOCATION FOR PETROLEUM SPIRIT

22 DSEAR introduces new arrangements for the regulation of petroleum spirit. It removes licensing controls under the Petroleum Consolidation Act (PCA) 1928, except for any activity relating to fuelling of motor vehicles (and other specified vessels) with petroleum spirit, including the associated bulk storage. For activities relating to the fuelling of motor vehicles, DSEAR applies as well as PCA and Petroleum Licensing Authorities (PLAs) will enforce DSEAR in relation to such dispensing and bulk storage.

23 Regulation of the storage and dispensing of petrol which is not associated with the fuelling of vehicles, including storage in cans and drums, dispensing into (approved) containers or an engine test bed or the fuel tank of a generator etc, now come under DSEAR and enforcement responsibility has been allocated to HSE/Local Authority (LA) Environmental Health Departments.

24 The appropriate standards for drum or bulk storage of petroleum spirit which is not part of a licensed activity, are those currently applicable to the storage of highly flammable liquids in general in HSGs 51 or 176. However, for existing stores built to the Home Office Code there should normally be no need to provide explosion relief in accordance with HSG51.

FURTHER READING

1 DSEAR - *The Dangerous Substances and Explosive Atmospheres Regulations 2002* (SI 2002/2776)

2 EPS - *The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996* (SI 1996/192)

HSE free leaflets

[Fire and explosion - how safe is your workplace](#) - INDG370 (2002)

[Safe use of petrol in garages](#) INDG331 (2001) and ([poster - available from HSE Books only](#))

[Safe working with flammable substances](#) INDG227 (1996)

[Safe working with LPG fuelled motor vehicles](#) - INDG387 (2003) and [poster](#)

[Safety in gas welding, cutting and similar processes](#) INDG297 (1999)

[Hot work on small tanks and drums](#) INDG314 (2000)

[A guide to handling and storage of airbags and seatbelt pretensioners at garages and motor vehicle repair shops](#) INDG280 (1998)

[Hot work on vehicle wheels EIS1](#) (2002)

[Electric storage batteries](#) INDG139 (1993)

[The safe use of gas cylinders](#) INDG308(rev1) (2002)

Reducing ill health and accidents in motor vehicle repair: [leaflet](#) INDG356 (2002) [checklist](#)

HSE priced publications

The Dangerous Substances and Explosive Atmospheres Regulations: Approved Code of Practice and Guidance L138 (2003) (£15.50)
Storage of Dangerous Substances: Approved Code of Practice and Guidance L135 (2003) (£9.50)
Safe maintenance, repair and cleaning procedures L137 (2003) (£9.50)
The storage and use of flammable liquids in containers HSG51 (1998) (£9.50)
The safe use and handling of flammable liquids HSG140 (1996) (£8.50)
The storage of flammable liquids in tanks HSG176 (1998) (£9.50)
Health and safety in motor vehicle repair HSG67 (1991) (£5.50)

HSE priced and free publications are available by mail order from HSE Books, PO Box 1999, Sudbury, Suffolk, and CO10 2WA. Tel: 01787-881165 Fax: 01787-313995. Website: www.hsebooks.co.uk

For information about health & safety ring HSE's Infoline Tel: 08701-545500, Fax:02920-859260, e-mail: hseinformationservices@natbrit.com or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG. You can also visit HSE's MVR website: www.hse.gov.uk/mvr where HSE's free leaflets can be downloaded.

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

APPENDIX 1

DOs and DONT's TO PREVENT FIRES AND EXPLOSIONS IN MVR

Storage of flammable liquids (including petrol)

The storage and use of flammable liquids in containers HSG51 (1998) (£9.50)

DO store all HFLs, including waste solvents and petrol/diesel mixtures from mis-fuellings, in suitable containers, fitted with lids/tops and kept either

- in a safe position in the open air; or
- in a storeroom which is in a safe position or a fire-resisting structure; or
- in workrooms, in the minimum amount needed, in suitably placed fire-resisting cupboards or bins.

DO use a proprietary safety container for storage/use of flammable substances where appropriate

DO dispose contaminated cloths/rags safely

Handling of petrol

Safe use of petrol in garages INDG331 (2001) and (**poster - available from HSE Books only**)

DON'T drain petrol over or close to a vehicle inspection pit

DO use a proprietary fuel retriever/adaptor when draining petrol and petrol mixtures from tanks and lines

DON'T smoke, weld or carry out any hot work while removing petrol

DON'T use petrol (or any other flammable liquid) to light fires/burn rubbish

Vehicle inspection pits

DO ensure that existing (before July 2003) fixed lighting, where it is recessed into the pit wall, is fitted at least 1m from the pit floor; sealed behind toughened plastic or glass; protected against physical damage and is maintained

DO check that existing portable tools, including hand lamps, are either air-powered or explosion protected and are still safe to be used

DO provide equipment, both mechanical and electrical, which meets the requirements of the EPS² for pits constructed or modified after June 2003

Hot work (including welding, burning, infra-red heating or any other process which generates flames, sparks or heat)

Safety in gas welding, cutting and similar processes INDG297 (1999)

Hot work on small tanks and drums INDG314 (2000)

DON'T carry out any hot work on diesel tanks unless they have been adequately cleaned and gas freed

DON'T carry out any hot work near to fuel tanks/lines, or close to brake lines or inflated tyres

DO use cold cutting methods to repair or cut up drums/tanks which contain/may have contained flammable substances

DO take care when using a lighted blowpipe on vehicles near to carpets, upholstery or other flammable materials

Gas cylinders containing flammable gas

The safe use of gas cylinders INDG308(rev1) (2002)

DO ensure that cylinders when in store or use are properly restrained and protected from damage from vehicles, fork-lift trucks etc

DO store cylinders in a safe place either in the open air (protected from the weather) or in an adequately ventilated building or part of a building

Body preparation

DO keep dust to a minimum.

DO use sanding tools with built-in extraction or local exhaust ventilation if possible

Paint mixing

DO locate the paint mixing area in a well-ventilated, fire-resistant room separate from other work activities

DO use a proprietary mixing system with built-in extraction where possible

DO exclude sources of ignition within 2m of the mixing point. Check that existing equipment is still safe to use and for post June 2003 new and modified installations, equipment must be to EPS standard²

DON'T leave lids/tops off containers

DO use trays to contain spillages and have materials ready to soak up spilled substances. **DO** provide a lidded metal bin for waste rags and materials

Paint spraying

The spraying of flammable liquids HSG178 (1998) (£9.50)

DO spray paints only in booths, enclosures or controlled spray spaces

DON'T spray unless the extraction/ventilation is switched on and is adequate

DO ensure that equipment is suitable for use in explosive atmospheres

Drying and curing ovens

DO check if explosion relief is required and, if provided, is properly maintained and the panels can be easily lifted eg by hand pressure

DO ensure that the temperature controls are properly maintained

DO remember that ventilation equipment and explosion relief panels are not designed to cover risks from fuel (petrol, diesel and LPG) in vehicle tanks and lines. If tanks have not been emptied or removed, ensure they are reasonably empty and that there are no leaks/loose joints

Battery charging

Electric storage batteries INDG139 (1993)

DON'T charge batteries at rates higher than manufacturer's recommendations
DO take care when dis/connecting charger to battery terminals, especially when the battery is gassing. **DO** switch off charger before dis/connecting the clips.

Vehicle valeting

Safe working with flammable substances INDG227 (1996)

DO dispense only small quantities of cleaning fluid at a time. **DO** use safety containers where possible

DO ensure the working area is well ventilated. Consider using local exhaust ventilation

When working inside vehicles **DO** leave all doors and sun-roof (if fitted) open

DO keep the valeting area free from sources of ignition; disconnect the battery

LPG fuelled vehicles

Safe working with LPG fuelled motor vehicles - INDG387 (2003) and poster

DO identify vehicles fuelled with LPG and provide safe places for parking and working on them eg away from drains, pits and other openings in the ground, and all sources of ignition

DON'T do any work which could affect the LPG system without first considering isolating, physically protecting, emptying and gas-freeing or completely removing the system

Airbags and seatbelt pretensioners

A guide to handling and storage of airbags and seatbelt pretensioners at garages and motor vehicle repair shops INDG280 (1998)

DO store in cabinets to required standard ie no exposed steel, easy to clean and can be closed and locked. Secure to wall or floor, if possible, and keep dry. Keep the container away from sources of ignition and all flammable materials. (See INDG280 for Registration of stores for these devices.) When temporarily removed from vehicles, **DO** keep in the cabinet or in a strong cage or similar, again secured to the wall or floor.

APPENDIX 2

FIRES & EXPLOSIONS IN MVR - SUMMARIES OF INVESTIGATED INCIDENTS

Fires and explosions due to mis-handling of petrol

- A motor mechanic removed the fuel gauge sender unit from the fuel tank and started to drain the petrol into a bucket. There was more petrol in the tank than he thought and it spilled onto the floor and caught fire. The mechanic sustained severe burns to hands, arms and legs and the workshop was completely destroyed.
- Deceased was working in a vehicle inspection pit draining petrol from the fuel tank into a plastic bucket. The petrol vapours were ignited, possibly by a broken inspection lamp. There were several customers in the vicinity at the time.
- Self-employed car mechanic was siphoning petrol from one car and transferring it into the fuel tank of another when the vapours were ignited, possibly by a space heater at the rear of the workshop. There was an explosion then fire that completely destroyed the garage. The mechanic was seriously burned and died from his injuries.
- The proprietor of a garage suffered about 50% burns to his body when petrol vapours ignited. At the time, he was draining petrol from a fuel tank over a vehicle pit using a hose to transfer the petrol from the tank into 5 litre fuel cans.

Repair of diesel tanks

- An HGV diesel tank had split along the seams and it was decided to repair it by brazing. The tank was emptied using a hand-pump but not cleaned or gas-freed. The person carrying out the repair suffered the full force of the explosion and the fire-ball resulted in extensive burns.
- A welder received serious burn injuries when patch-welding a diesel tank from a bus. The tank was emptied using a fuel retriever and then drained. Although the outside of the tank was washed with a hot water pressure-washer, the inside was neither cleaned nor gas-freed.

Fires/explosions during the burning of rubbish/waste materials

Recently there have been several incidents at MVR premises in which employees have been seriously burned when waste thinners, petrol or other flammable liquid was used to start fires. The materials being burned were mostly cardboard, paper, litter or other wastes.