

The risk assessment should also identify any confined spaces, such as vehicle inspection pits, where there is a risk of serious injury from asphyxiation or fire or explosion. The Confined Spaces Regulations 1997 place restrictions on entry into such places.

The Control of Substances Hazardous to Health Regulations 1999 (COSHH) require employers to consider the risks to health to employees from each hazardous substance, for example R12, R134a and phosgene, and to take suitable precautions.

Proposed new legislation under the Dangerous Substances and Explosives Atmospheres Regulations (DSEAR) will deal with the risks of fire and explosion from hazardous substances. These will replace existing requirements on highly flammable substances, for example the Highly Flammable Liquids and Liquefied Gases Regulations 1972.

Environmental protection measures

Under the Environmental Protection Act 1990, the deliberate release of refrigerant into the atmosphere is illegal. The use of R12 is now banned in the UK.

Part II of the Act 1990 requires all sites which recover scrap vehicles to have a waste management licence or be exempted under the Waste Management Licensing Regulations 1994. Conditions may be attached to the licence that stipulate specific standards or requirements for 'de-gassing' of air-conditioning systems.

A 'waste transfer note' is required when waste refrigerants are passed on for recovery or disposal. The producer of the waste must ensure that the person collecting it is a registered waste carrier and that the refrigerants are destined for storage, disposal or recovery at a suitably licensed or registered exempt site. Refrigerants are not generally considered to be 'special waste' but under proposed new legislation it is likely that they will be treated as such and therefore subject to more stringent disposal arrangements. The Environment Agency can provide advice on recovery or disposal.

Information on recycling and recovering waste from electrical and electronic equipment, as well as the disposing of scrap motor vehicles ('end of vehicle life'), is available from the DTI.

Where can I find further information?

Health and Safety Executive

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For information about health and safety ring HSE's Infoline Tel: 08701 545500, Fax: 02920 859260, e-mail: hseinformationsservices@natbrit.com or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG. You can also visit HSE's website: www.hse.gov.uk

Department of Environment, Food and Rural Affairs (DEFRA) Tel: 020 7238 6000, Website: www.defra.gov.uk/environment/index.htm

Environment Agency (EA) Call the local EA office or, where this is not known, the general enquiry line Tel: 08459 333111 or Website: www.environment-agency.gov.uk

Scottish Environmental Protection Agency (SEPA) Tel: 01786 457700, Website: www.sepa.org.uk

Department of Trade and Industry (DTI) Tel: 020 7215 5000, Website: www.dti.gov.uk

Envirowise Tel: 0800 585 794, Website: www.envirowise.gov.uk

This leaflet 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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safe working with

vehicle air-conditioning systems



Guidance for employers, self-employed people, and supervisors

What is this guidance about?

This leaflet tells you about the main health and safety risks associated with work on air-conditioning systems in motor vehicles containing refrigerant chemicals R12 ('Freon') or R134a ('Tetrafluoroethane'). It includes information on how workers can be harmed, and the precautions that should be taken. The use of alternative refrigerants, for example during a retro-fit, may require additional precautions.

The guidance is aimed at employers, self-employed people, and supervisors in the vehicle repair, recovery, breaking and recycling industries. It applies to anyone who is likely to work on or close to air-conditioning systems, eg those carrying out vehicle servicing, maintenance, repairs or recycling.

What are air-conditioning systems?

Air-conditioning systems are common on modern motor vehicles. Over half of new vehicles are fitted with them as standard and this proportion is on the increase.

They work in much the same way as a refrigerator. An evaporator converts the refrigerant from a liquid into a gas and there is a condenser for reversing the process. The evaporator is normally located just behind the dashboard so that it can absorb heat from the interior of the vehicle, while the condenser is at the front, to ensure a free flow of air over it to help cool it down.

These effects are used to cool down the interior of a vehicle. The system is entirely enclosed and nobody should be exposed to the refrigerant chemical during normal operation.

Refrigerant R12 is a chlorinated fluorocarbon (CFC), an ozone-depleting chemical harmful to the environment which was phased out worldwide from 1994. A total ban on its use came into force in the UK on 1 January 2001. The ban extends to its use for the maintenance of existing

equipment, so when a system containing R12 requires maintenance or repair, it will be necessary to carry out a conversion, for example to R134a. Otherwise, it is acceptable for R12 to remain in use in an air-conditioning system until the end of its service life.

The only refrigerant currently approved by equipment and motor manufacturers for use in air-conditioning systems is R134a, although other replacement chemicals, some flammable, are becoming more common.

What are the dangers?

The main risks to health and safety associated with R12 or R134a occur if they are released into the atmosphere. The risks include:

- **FROSTBITE** - caused by skin or eye contact with the refrigerant liquid or gas;
- **ASPHYXIATION** - if the heavier-than-air gas escapes in sufficient quantities into a vehicle inspection pit or similar confined space where someone is working;
- **HARMFUL GASES** - resulting from thermal decomposition of the refrigerant in contact with a naked flame or exposure to high temperatures, for example the highly toxic gas phosgene from R12.

There is also a risk of explosion if hot work, such as welding or burning, is carried out on or near air-conditioning systems, as high temperatures could cause the system pressure to increase significantly.

Though the deliberate release of R12 and R134a into the atmosphere has been prohibited since 1991 some activities could cause accidental release. These include:

- **servicing and maintenance** of air-conditioning systems. Recovery of old refrigerant and recharging with fresh is a routine servicing activity. Also, it is often necessary to remove refrigerant from the system before carrying out any maintenance or repair work on it;
- **repairing** damaged systems without first ensuring that all refrigerant has been completely removed;
- **causing accidental damage** to the system during major mechanical repair work in the vehicle;
- **perforating** full or partially full refrigerant containers;
- **recovering crashed vehicles** where the air-conditioning system may have been damaged (the condenser, at the front of the vehicle, is particularly vulnerable in the event of a collision);
- **breaking up vehicles** with refrigerant systems.

What precautions should be taken?

Do not work on or close to an air-conditioning system unless a suitable and sufficient assessment of the risks has been carried out. The assessment should identify the precautions needed to minimise any identified risks, including those associated with the refrigerants, flushing solutions and system lubricants.

As the precautions will depend on the properties of all the chemicals in the system, their correct identification is an essential first step to any assessment.

Assume the system contains refrigerant gas unless proved otherwise, particularly where a vehicle has been in an accident. A positive pressure on a system pressure gauge could indicate the presence of refrigerant.

Consider the following additional precautions:

Servicing and maintenance

- **Use suitable equipment** for recovery, recycling, evacuation and charging when maintaining or servicing air-conditioning systems;
- **Train employees** in the use of such equipment and supervise them where necessary;
- **Train all staff** involved in the emergency action for dealing with a spillage or release of gas, particularly how to treat frostbite;
- **Do not overfill** containers of refrigerant and do store them in a safe place away from direct heat;
- **Never mix** R12 and R134a when recharging the system;
- **Do not deliberately release** R12 or R134a to atmosphere;
- **Do not allow** hot work or smoking in areas near the refrigerant. The refrigerant must not be allowed to come into contact with a hot surface;
- **Wear** appropriate personal protective equipment (PPE) at all times, including eye protection and gloves. Consult the refrigerant supplier to ensure that the PPE will provide adequate protection;
- **Make suitable arrangements** for the safe recovery and disposal of old or waste refrigerant and any unwanted receptacle or equipment containing it.

Vehicle recovery (as well as the above)

- **Where a vehicle** has been involved in an accident, especially a front-on collision, the condenser may be

damaged. Before carrying out any roadside activities, check to determine whether refrigerant has leaked out;

- **Do not attempt** to repair the air-conditioning system at the roadside unless trained personnel and suitable equipment are available.

Breakers' yards (as well as the above)

- Before removing air-conditioning systems from vehicles for scrapping or recycling ensure that all the refrigerant has been recovered.

Refrigerant recovery and recycling equipment

Equipment for servicing and maintaining air-conditioning systems normally performs the following functions:

- **RECOVERY** - recovers refrigerant without allowing it to escape to atmosphere;
- **RECYCLING** - passes refrigerant fluid through a filter to remove contaminants (mainly moisture);
- **EVACUATION** - removes air and moisture from the system;
- **RECHARGING** - refills the air-conditioning system with the correct amount of refrigerant.

Work involving any of these activities should only be done with approved equipment and by people adequately trained in its correct use. Training and instruction is often provided by the equipment suppliers. Ensure all legal requirements have been met.

Refinishing of vehicles

Some vehicle manufacturers may recommend that the refrigerant is removed from air-conditioning systems before refinishing/respraying work is done in a spraybake oven. Guidance should always be sought from the manufacturer beforehand.

What are the legal requirements?

Health and safety at work

The Management of Health and Safety at Work Regulations 1999 (MHSW) require employers and self-employed people to carry out an assessment of the risks involved and to identify the measures needed to comply with relevant health and safety legislation. Employees should be informed of the results of the assessment and where five or more people are employed, the significant findings should be recorded. The preparation of emergency procedures in the event of serious danger to anyone is also required.

- DO** follow the instructions of the air-conditioning system's manufacturer and the refrigerant supplier
- DO** identify the refrigerant in the system correctly before carrying out any work
- DO** use approved equipment when maintaining or servicing the system
- DO** ensure that everyone using the equipment or working on the system has been properly trained and is adequately supervised
- DO** store containers of refrigerant chemicals in a safe place away from direct heat
- DO** wear appropriate eye protection, gloves and other protective equipment when handling the refrigerant or working on the system to protect against the effects of refrigerant liquid or gas
- DO** train staff in the emergency actions to be taken in the case of spillage of liquid or release of gas
- DO** find out from vehicle manufacturers whether the refrigerant should be removed from the system before you carry out refinishing/respraying work in a spraybake oven
- DO** make adequate arrangements for the safe recovery and disposal of old or waste refrigerant, including any contained in scrap receptacles or equipment
- DO** check that all the refrigerant has been recovered before removing the air-conditioning system from a vehicle to be scrapped or recycled
- DON'T** work on or near an air-conditioning system unless the risks and precautions to be taken have been identified
- DON'T** assume that the system is free from refrigerant gases until proved otherwise (for example with a system pressure gauge) particularly where the vehicle has been involved in an accident
- DON'T** overfill refrigerant containers
- DON'T** mix refrigerants R12 and R134a when recharging the system. Check with manufacturers before blending alternative chemicals
- DON'T** deliberately discharge refrigerants R12 and R134a into the atmosphere
- DON'T** carry out any work on a system containing refrigerants R12 and R134a over or close to a vehicle inspection pit or similar confined space as people working there could suffocate
- DON'T** allow smoking, welding, burning or other hot work in areas where refrigerants R12 and R134a may be present as this could produce harmful gases. If the refrigerant comes into contact with a hot surface, this can also produce harmful gases
- DON'T** carry out welding, soldering, burning or other hot work on or near air-conditioning systems as this could raise the pressure inside the system and cause an explosion
- DON'T** carry out any roadside work on vehicles involved in accidents until the air-conditioning system has been checked for possible leaks or other damage
- DON'T** attempt roadside repairs to air-conditioning systems unless trained mechanics and approved equipment are available