

Depolluting End-of-Life Vehicles (cars and light goods vehicles) Guidance for Authorised Treatment Facilities

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This guidance document provides advice to Authorised Treatment Facilities (ATFs) on how to depollute passenger cars and light goods vehicles in accordance with the requirements of the End-of-Life Vehicles Regulations (and parallel legislation in Scotland and Northern Ireland), which implement elements of the End-of-Life Vehicles Directive (2000/53/EC). The guide was originally commissioned by DEFRA and DTI (now BIS) from AEA Technology Environment and Universal Vehicle Services. Jema Associates Ltd and David Hulse Consultancy Ltd updated it in December 2005, to reflect latest best practice and to draw upon practical experience gained in the depollution phase of the DTI/CARE shredder trial carried out at GW & G Bridges in June 2005.

This second edition of the guidance incorporates further updates, reflecting the latest available information regarding treatment of airbags and LPG (Liquefied Petroleum Gas) cars. The section on LPG Tanks (4.10) has been expanded.

This guidance does not seek to prescribe how a particular depollution activity should be carried out. There will be safety issues surrounding the carrying out of any depollution activity (see in particular section 1.2 below). Neither Defra nor BIS will accept any liability for death, personal injury or any other damage howsoever arising as a result of undertaking any of the depollution activity covered by this guidance.

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1 Introduction

Between 1.5 and 2 million end-of-life vehicles (ELVs) are generated each year in the UK. These ELVs are classified as hazardous waste, and must be depolluted to certain standards, as a consequence of European and UK legislation, prior to dismantling, crushing, or shredding. All facilities treating ELVs are covered by this legislation.

This brochure contains generic guidance on how to depollute waste passenger cars and light goods vehicles in accordance with the requirements of the End-of-Life Vehicles Regulations. If you carry out the procedures in this guidance, then you should have depolluted an ELV sufficiently for it to be considered to be non-hazardous waste. The same outcome can be achieved even if you do not use these particular guidance methods, provided you have ensured that you can demonstrate the same levels of depollution. Non-destructive methods of removing hazardous components may be carried out, provided that component integrity is not compromised. Additional, model-specific guidance can be found in IDIS, the International Dismantling Information System, published by the Vehicle Manufacturers. (See section 3.2.)

A system for recording the quantity of fluids and other items which have been removed must be in place. The information which is thereby recorded will enable regular reports to be provided to waste regulators and will be needed for the annual reports on ELV recovery and recycling target compliance, as required by the End-of-Life Vehicles (Producer Responsibility) Regulations 2005 and 2010.

This guidance initially briefly covers:

The relevant legislation on ELVs and hazardous waste;
Health and safety considerations;
Equipment and facilities.

The depollution operations which must be conducted to meet the requirements of the legislation are then described.

The depollution procedure is only one stage in the overall process required to treat an ELV. Other operations, such as associated administrative activities, and complying with all existing legislation relating to these activities, still need to be carried out, but are not discussed in this guidance document.

1.1 LEGISLATION

1. The EU End-of-Life Vehicles (ELV) Directive (2000/53/EC), the ELV Regulations 2003, 2005 and 2010 and parallel regulations in Scotland and Northern Ireland
2. The updated versions of both the European Waste Catalogue (EWC) and Hazardous Waste List (HWL) (Commission Decision 2000/532/EC) (the List of Wastes Decision) and its subsequent amendments.

1.2 END-OF-LIFE VEHICLES DIRECTIVE

The ELV Directive introduces measures to promote and increase recycling and to further protect the environment by requiring adequate depollution (e.g. draining of fluids such as engine oil) and sets minimum technical requirements for the treatment of ELVs. Following the introduction of the End-of-Life Vehicles Regulations 2003 (Statutory Instrument 2003, No.2635), ELV treatment facilities carrying out depollution need to be permitted as “authorised treatment facilities” (ATFs) by the Environment Agencies, by holding a permit under the Environmental Permitting (England and Wales) Regulations 2010 or a licence under parallel legislation in Scotland and Northern Ireland. In each case, these pieces of environmental legislation have a wider scope than the ELV Regulations, in that their scope is not restricted to facilities treating only cars and light goods vehicles.

The End-of-Life Vehicles (Producer Responsibility) Regulations 2005 (Statutory Instrument 2005, No.263) implement the producer responsibility, recovery, recycling and associated reporting aspects of the ELV Directive. The two sets of End-of-Life Vehicles Regulations 2010 (Statutory Instruments 2010 No.1094 and 1095) updated the 2003 and 2005 End-of-Life Vehicles Regulations in certain respects.

The depollution requirements of the ELV Directive are given below.

Extract from ANNEX I

Minimum technical requirements for treatment in accordance with Article 6(1) and (3)

3. Treatment operations for depollution of end-of-life vehicles:
 - removal of batteries and liquefied gas tanks,
 - removal or neutralisation of potential explosive components, (e.g. air bags),
 - removal and separate collection and storage of fuel, motor oil, transmission oil, gearbox oil, hydraulic oil, cooling liquids, antifreeze, brake fluids, air-conditioning system fluids and any other fluid contained in the end-of-life vehicle, unless they are necessary for the re-use of the parts concerned,
 - removal, as far as feasible, of all components identified as containing mercury.

The individual hazardous components and materials removed during depollution should be kept separate.

Clearly, ATFs need to remain vigilant for any other hazardous materials or items that might be encountered in the course of their operations.

1.3 LIST OF WASTES DECISION

The European Waste Catalogue (EWC) and Hazardous Waste List (HWL) were first published in 1994. These are used for the classification of all wastes and hazardous wastes, and are designed to form a consistent waste classification system across the EU. They form the basis for all national and international waste reporting obligations, such as those associated with waste licences and permits, and the transport of waste.

Updated versions of both the European Waste Catalogue and Hazardous Waste List were published as a homogenised list of hazardous and non-hazardous wastes in 2001, and came into force on 1 January 2002. The List of Wastes Decision includes ELVs (Category 16 01) and lists a number of hazardous wastes in this category. It has been implemented by the List of Wastes (England) Regulations 2005 (as amended), the List of Wastes (Wales) Regulations 2005, the List of Wastes Regulations (Northern Ireland) 2005 and, in Scotland, by the Special Waste Regulations 1996 (as amended). This list is more comprehensive than that in the ELV Directive, and also applies to all vehicles. The ELV Directive only applies to a specified range of vehicles, by reference to European Whole Vehicle Type Approval legislation. This means vehicles designated as M1 (passenger vehicles comprising no more than 8 seats, in addition to the drivers seat) and N1 (vehicles used for the carriage of goods, having a technically permissible maximum mass not exceeding 3.5 tonnes).

Although the List of Wastes Decision could be interpreted as implying that, for example, every drop of engine oil must be removed in order to classify an ELV as non-hazardous, the cost for achieving this would be high. More importantly, there is likely to be little additional environmental benefit in removing the very small quantity of oil which is likely to remain in practice. Consequently, this guidance document has been prepared based on practical trials that have been shown to achieve an acceptable level of decontamination, which would meet the requirements of both the ELV Directive and the List of Wastes Decision.

1.4 HEALTH & SAFETY CONSIDERATIONS

Vehicle depollution will involve removing fluids and components which may be either explosive or corrosive. The main legislation covering this area includes:

The Management of Health & Safety at Work Regulations 1999 – these impose a duty on employers (and the self-employed) to make a suitable and sufficient assessment of the risks faced by employees at work and by other persons arising out of the work carried out by the employer, to inform employees of the risks, and to prepare emergency procedures.

The Control of Substances Hazardous to Health Regulations 2002 (COSHH) – these impose a duty on employers (and the self-employed) to prevent employees (or the self-employed) from being exposed to hazardous substances (or where that is not reasonably practicable, to adequately control such exposure) as well as other persons who may be affected by the work carried out by the employer.

The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) – these cover risks of fire and explosion from hazardous substances. They also cover storage.

The Manufacture and Storage of Explosives Regulations 2005 – these require the licensing of storage of certain explosives; appropriate measures to prevent fire or explosion; limiting the extent of any fire or explosion should one occur; and protecting persons in the event of a fire or explosion.

Operators removing or deploying Airbags and other pyrotechnic devices should be properly trained in order to reduce the risk of injury.

From July 4, 2010, operators undertaking the removal of Air Conditioning fluids/gases must be formally qualified under the “F Gas Regulation” (EC No. 307/2008), implemented through the Fluorinated Greenhouse Gases Regulations 2009, which has both safety and environmental implications.

Operators treating LPG powered vehicles should be suitably trained and refer to the guidance in this document.

Hybrid or Electric Vehicles contain a high voltage battery system, which requires special attention to avoid the risk of injury by electrocution. Operators treating these vehicles should be properly qualified and should refer, as a minimum, to the guidance on page 14 of this document, as well as the vehicle manufacturers’ guidance in IDIS.

Further guidance on health and safety considerations can be obtained in the Health & Safety Executive’s leaflets and guides <http://www.hse.gov.uk/waste/dismantling.htm>. Relevant guidance includes: Reducing Ill Health and Accidents in Motor Vehicle Repair (INDG356); Health and Safety in Motor Vehicle Repair and Associated Industries (HSG261); The Safe Recovery of Petrol from End of Life

Vehicles (WASTE10); Safe use of Petrol in Garages (INDG331); A Guide to the Handling and Storage of Airbags and Seat Belt Pre-Tensioners at Garages and Motor Vehicle Repair Workshops (INDG280); Safe Working with Vehicle Air-Conditioning Systems. The Dos and Don'ts (INDG349); Using Electric Storage Batteries Safely (INDG139); and LPG-Fuelled Motor Vehicles (INDG387).

1.5 EQUIPMENT

It is recommended that depollution activities are conducted using equipment which has been specifically designed for carrying out the required depollution operations. The use of such equipment ensures that a high level of depollution (removal, as far as reasonably practicable, of most fluids contained in the ELV) can be achieved in a relatively short time-frame (20-30 minutes per ELV).

ATFs may decide to use alternative methods to achieve the same levels of depollution, but health and safety requirements should never be compromised. An assessment of the risks involved in using alternative methods of depollution must be carried out and measures necessary to comply with relevant health and safety legislation put in place. In addition, if alternative methods are used, these will need to be able to demonstrate that at least the same level of depollution has been achieved.

The majority of commercially available equipment is usually operated pneumatically. Consequently, the compressor used to power this equipment must have sufficient capacity to ensure that the equipment can operate satisfactorily.

1.6 FACILITIES

Sites for ELV treatment and storage (including temporary storage) of end-of-life vehicles prior to their treatment must have:

Sites for Storage

impermeable surfaces for appropriate areas with appropriate spillage collection facilities, decanters and cleanser-degreasers.
equipment for the treatment of water, including rainwater.

Sites for Treatment

impermeable surfaces for appropriate areas with appropriate spillage collection facilities, decanters and cleanser-degreasers.
equipment for the treatment of water, including rainwater.
appropriate storage for dismantled spare parts, including impermeable storage for oil-contaminated spare parts.

appropriate containers for storage of batteries (with electrolyte neutralisation on site or elsewhere), oil filters unless crushed, PCB/PCT containing condensers and any hazardous components identified in IDIS. appropriate storage tanks for the segregated storage of end-of-life vehicle fluids.

appropriate storage for used tyres, including the prevention of fire hazards and excessive stockpiling.

Storage operations are to be carried out avoiding damage to components containing fluids or to recoverable components and spare parts.

DEFRA guidance notes covering this part of the ELV regulations can be found at

<http://www.defra.gov.uk/environment/waste/topics/pdf/elv-guidance.pdf>

The health & safety implications of storing large quantities of hazardous and/or highly flammable materials need to be properly assessed in consultation with the Health & Safety Executive, and the Environment Agencies should be consulted on any environmental implications.

NOTE: If pyrotechnics, e.g. airbags, are removed and stored, an explosives licence and suitable storage facilities will be required. Refer to HSE booklet HSG184 for guidance.

Employers are encouraged to seek specific training, as necessary, for each depollution process and general health and safety. Site managers should also be aware of the requirement to put in place a suitable Health & Safety policy and carry out the risk assessments required.

2 Example of the depollution process

In order to depollute an ELV, a number of operations have to be conducted. An example sequence is shown in Table 1 and the Process Flow Diagram. This was developed from practical trials using one make of proprietary equipment. As a different sequence of operations may be more suitable for other types of equipment, treatment facilities can develop an alternative sequence. However, if a different sequence of operations is developed, this alternative sequence should recognise that it can typically take up to 20 minutes within the sequence for gravity draining of the engine oil.

Table 1 indicates whether an individual operation is best conducted from either above or below the ELV.

Table 1 - Possible depollution sequence

Above / Below (A/B) vehicle	Operation
A	Remove battery
A	Remove fuel filler cap and oil filler cap
A	Set heater to maximum
A	Remove wheels and tyres and separate balance weights
A	Remove any parts identified as containing mercury
Put vehicle onto depollution frame or lifting device	
B	Drain engine oil and remove oil filter for crushing or disposal
B	Drain transmission oil, including rear differential if applicable
A	De-gas air conditioning unit (if fitted)
B	Drain coolant
B	Drain brake fluid
B	Remove catalyst (if fitted)
A	Drain washer bottle
A	Drain brake/clutch reservoir(s)
A	Drain power steering reservoir (if fitted)
B	Drain fuel tank
B	Drain shock absorbers or remove suspension fluid
B	Replace drain plugs/fit plastic stoppers
Remove vehicle from depollution frame or lifting device	
A	Deploy airbags and other pyrotechnics in-situ (if fitted and able to conduct this operation)
A	Remove air bags and other pyrotechnics (if fitted, and can not be deployed in-situ)

Although a number of the below-vehicle operations can be conducted in parallel, the sequence of operations shown in Table 1 maximises the time for gravity draining of the engine oil.

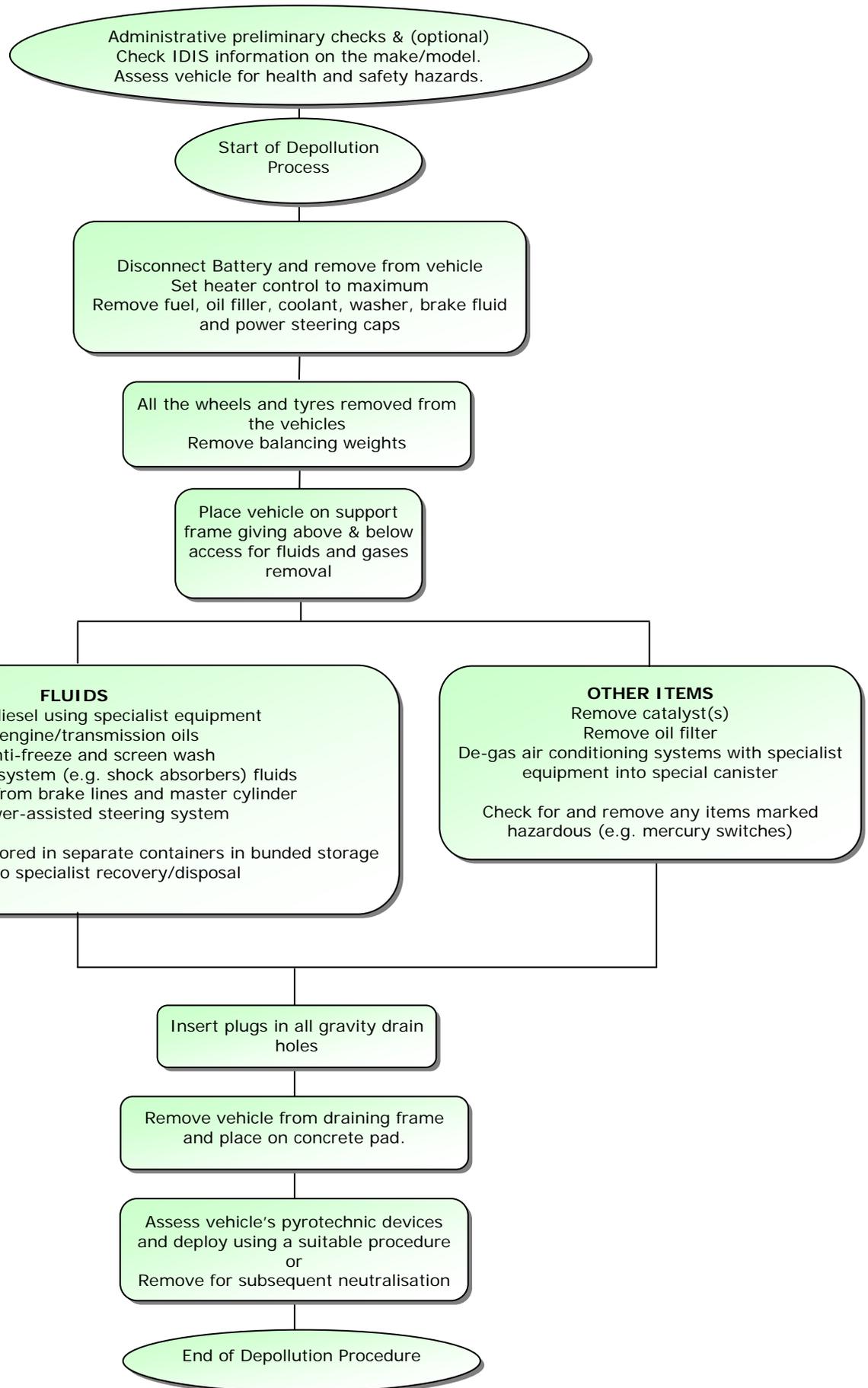
Removal of the wheels/tyres is not a depollution requirement (but removal of lead balancing weights is required). However, removal of the wheels will allow better access for draining of the shock absorbers; depending on the type of equipment being used, it may be easier to perform the above-vehicle depollution activities (such as removal of screen washer fluid) at ground level before the wheels are removed. Tyre removal depends on the individual shredder receiving the depolluted ELV hulks. Only if the shredder can guarantee the removal of tyre material by post shredder technology can tyres be left on the rims – since there has been a ban on the landfilling of shredded tyres since July 2006. Otherwise, tyres must be removed. Of course, tyres can provide a useful contribution of around 3% towards the 85% reuse, recycling and recovery target requirement, set down in the 2005 ELV Regulations.

The depollution sequence shown in Figure 1 and Table 1 can be represented as 3 stages:

- Preliminary activities
- Removal of fluids and other items
- Removal or deployment of air bags

The procedures required to complete each stage are described in the remaining sections of the manual.

After each depollution operation has been conducted, the fluid or item which is removed must be transferred to a suitable storage facility as soon as possible.



3 Preliminary activities

These activities prepare the ELV for the next stage of the process (removal of fluids and other items). The activities which need to be conducted are:

- 3.1 Assess vehicle for health and safety hazards
- 3.2 Use IDIS or other manufacturer guidance to obtain depollution information on the ELV, if required
- 3.3 Determine if ELV has airbags
- 3.4 Remove battery
- 3.5 Remove fuel, oil, and other filler caps
- 3.6 Set heater control to maximum
- 3.7 Remove wheels/tyres
- 3.8 Remove balance weights from wheels
- 3.9 Prepare Electric/Hybrid Vehicles for treatment

All of these activities need to be conducted before the ELV is placed on a support frame or lifting device to enable the below-vehicle activities to be conducted.

All required administrative procedures should be completed before any of the preliminary activities are conducted.

3.1 CHECK FOR HAZARDS

Inspect the vehicle for presence of hazardous items such as glass, hypodermic needles and other biological contamination or fire damage, which might affect the way in which its treatment should be handled. Check for and remove any foreign material such as gas cylinders.

3.2 USE OF IDIS

IDIS (the International Dismantling Information System) has been developed by vehicle manufacturers and provides information on both the depollution and dismantling of ELVs. IDIS should be consulted to obtain information on any specific depollution procedures which may be required, and to obtain information on procedures for removal or in situ deployment of air bags.

The information provided in IDIS is regularly updated. Treatment facilities must ensure that they are using the latest version. (Check IDIS web site: www.idis2.com)

Note: IDIS is one method of obtaining depollution information but is not the only method. Appropriate information should be sought from wherever suitable.

3.3 DETERMINE BY INSPECTION IF THE ELV CONTAINS AIRBAGS

The number of air bags in an ELV can range from 1 (in the steering wheel) to more than 10. Some of these may have already been deployed if the vehicle has been classified as an ELV as a result of damage sustained during an accident.

If a visual inspection identifies that the ELV does contain one or more airbags, and these have not been deployed, then these will have to be either removed for subsequent detonation/disposal or deployed in situ.

It is recommended that, where possible, air bags are deployed in situ using suitable equipment and that all persons deploying airbags attend a suitable training course.

The removal and deployment of airbags are described in Section 5 of this guidance document.

3.4 REMOVE BATTERY

The SLI (starting, lighting, ignition) battery must be removed, for health and safety reasons (prevention of possible electrical discharge igniting fuel), before the fuel tank is depolluted. The battery is easily removed with standard tools.

IMPORTANT NOTE: If the vehicle is Electric Powered or a Hybrid, please refer to the additional guidance on page 13 and the manufacturer's instructions where available.

3.5 REMOVE OR OPEN FILLER CAPS

The fuel, oil filler and other caps should be either removed or opened. This enables the fuel, oil and other fluids to be drained more easily.

3.6 HEATER CONTROLS

In order to ensure that coolant in the heater unit can be drained, the heater controls must be set at the position which would provide the maximum amount of heat.

As there may be health and safety concerns regarding sitting in the vehicle to conduct this operation, it should be done by reaching into the vehicle.

3.7 REMOVE WHEELS AND TYRES

Removing the wheels and tyres will improve access to brakes and shock absorbers for depollution. When removing tyres from rims, the operatives' exposure to dust may be reduced by deflating the tyre first, either by removing the valve, or by piercing the sidewall with a suitable tool if the tyre is not intended for reuse or retreading.

3.8 REMOVE WHEEL BALANCING WEIGHTS

For all wheels, including the spare wheel, any balancing weights must be removed from the wheels and placed in a suitable storage container for recycling. There is a prohibition on the new fitment of lead weights, but there will continue to be a mixture of lead and other materials on wheels for some time as this provision works through, and they will be more easily sorted once removed.

3.9 ELECTRIC/HYBRID VEHICLES

These vehicles contain a High Voltage Electrical System and have particular dismantling requirements for the treatment of the high voltage system before the vehicle can be treated as a regular ELV. It is important to recognize and understand the High Voltage Electrical System and its specifications for safe handling of the ELV.

HYBRID components that have not been dismantled may present a significant risk of injury to people due to their highly energetic properties and because of the potentially hazardous materials they contain. They may also constitute an environmental hazard if their contents are accidentally released. When dismantling any HYBRID components from the vehicle it is essential to use utmost care and to comply with the important safety warnings listed in this document and in IDIS.

Identifying a Hybrid Vehicle

Each manufacturer has their specific identification method for Hybrid Vehicles. Please refer to the manufacturer specific information for further information where available.

There are several common ways for manufacturers to indicate a Hybrid Vehicle model:

- Vehicle Identification Number (VIN). This number is given by the manufacturer and may indicate model specifications such as the use of a High Voltage Electrical System. You must refer to manufacturer specific information to locate and read the information contained in the VIN;
- Logos/ trademarks located on the exterior or engine compartment of the vehicle indicating use of Hybrid Technology. Specific to each manufacturer;
- Instrument cluster (power meter/battery surveillance device) located in the dash.

3.9.1 General Safety Instructions for Dismantling of HYBRID Components

HYBRID components should only be disassembled by suitably qualified personnel who must follow appropriate procedures defined by the manufacturer, which may be found in IDIS. Care must be taken to ensure that the HYBRID components identified by the vehicle manufacturer are dismantled and recovered.

Vehicle dismantlers must ensure that all employees handling HYBRID components familiarise themselves with this generic guidance and any additional information that may be provided in the manufacturer specific documents. All relevant health and safety regulations together with the vehicle manufacturers' instructions for the handling and safe treatment of the vehicle itself and the HYBRID components must be observed.

High voltage electricity is contained in a battery pack (commonly referred to as an HV battery pack) and generally powers an electric motor, generator, electric inverter compressor (for air conditioner) and inverter, in today's hybrid electric vehicles. The voltage of the battery pack will vary according to the manufacturer. Current models may have up to several hundred volts. There is also a normal 12 volt car battery, which is used to power other low voltage electrical devices such as the radio, horn, headlamps, and instrument cluster gauges.

3.9.2 Turn off the vehicle

Hybrid Vehicles must be turned off in three separate steps:

- a) Turn off the engine.
- b) Disconnect the cables from the conventional 12V car battery.

c) Isolate the High Voltage Electrical System by removing the service plug or turning off the isolation switch (manufacturer specific). If the service plug/switch is not accessible or visible, please see manufacturer specific information or IDIS.

By waiting for 10 minutes after removing the service plug or turning off the switch, the high voltage system is shut off or discharged so there is no high voltage outside the battery pack. However, the battery itself located inside the battery pack still keeps its voltage. After removing the HV battery, do not reinstall the service plug.

3.9.3 Disconnection and Removal of the High Voltage Battery Pack

Before disconnecting the high voltage cable terminals, make sure that the voltage between the terminals is at 0 Volts with a voltmeter.

- a) Disconnect the HV battery connection cables from the HV battery.
- b) Insulate the vehicle HV battery connection cables using electrical insulation tape (to prevent short circuiting).
- c) Consult the manufacturer specific information in IDIS for removal of the battery pack.

Once the battery pack has been removed, the vehicle can be dismantled in the normal way.

3.9.4 High Voltage Battery Storage

- a) Store the Battery Pack where the batteries are kept dry and are not exposed to high temperatures
- b) Protect batteries from being damaged (punctured or crushed).
- c) Batteries should be stored by battery type (e.g. NiMH), according to national legislation (not mixed with lead acid batteries).

3.9.5 Recycling of Batteries

Waste propulsion batteries in Hybrid Vehicles are classified as "industrial" under the Waste Batteries and Accumulators Regulations 2009, which prohibit their disposal by landfilling or incineration, and require their recycling via Approved Battery Treatment Operators or Approved Battery Exporters. Details of the UK "producer responsibility" regime for industrial, and other types of batteries can be found on the BIS website at www.bis.gov.uk.

4 Removal of fluids and other items

The activities which need to be conducted are:

Fluids	Other items
Drain engine oil and remove oil filter	Remove catalyst (if fitted)
Drain transmission oils	Drain air conditioning refrigerant (if fitted)
Drain coolant	Remove LPG tank (if fitted)
Drain hydraulic oils	Identify and remove items containing mercury
Drain screen-washing fluid	Identify and remove other hazardous items
Drain fuel tank	
Drain suspension system/shock absorbers	

All fluids of differing types (e.g oils, water-based etc.) which are removed will need to be stored in separate containers in a bunded storage area prior to specialist recovery or disposal. As a minimum, separate containers will be required for fuels (petrol and diesel separate); oils (lubricating, transmission, power steering and shock absorber oils together); brake fluid (separate); and water based (coolant and screenwash together). (The Waste Oils Directive seeks to promote the regeneration of oils, and any mixing of other fluids with oils may restrict this possibility.)

The ELV will need to be placed on a support frame or lifting device, to allow easy access below the vehicle, before a number of these operations can be conducted. It is preferable that the device should be adjustable to suit the height of the operator. Although access to the underneath of a vehicle could be provided by placing it above a pit, there are health and safety issues with this approach, particularly with regard to possible build-up of fuel vapour in the pit (and hence risk of explosion/fire) during the depollution procedure. Consequently, the vehicle must be placed on a support frame which enables easy access to the underside of the vehicle at ground level. Care should also be taken to avoid any vapour build up in floor mounted drip trays.

The first activity to be conducted is to start draining of the engine oil. Other activities can be conducted in parallel, but the engine oil can typically take 20 minutes to reach the point where no further draining is visible.

It is recommended that depollution activities are conducted using equipment which has been specifically designed for carrying out the required depollution operations. The use of such equipment, while not essential, ensures that a high level of depollution can be achieved in a relatively short time frame (20-30 minutes per ELV).

The guidance presented in this section of the document describes the procedures which need to be conducted in order to achieve the required level of depollution. The instructions provided with any commercial equipment being used must also be followed in order to ensure that this level of depollution is achieved.

After depollution, all gravity-drained holes must be plugged, either with their own drain plug or a suitable plastic bung, to prevent any residual leakage.

4.1 ENGINE OIL

This is gravity-drained by removing the drain plug at the bottom of the sump and collecting the oil. If commercially available equipment for collecting the oil is not used, the oil should be collected in a suitable container which has a minimum volume of 10 litres.

The oil must be allowed to drain for a minimum of 20 minutes from the engine, or until such time as no visible further draining of oil is occurring.

4.1.1 Oil filter

The oil filter must be removed. This should be done by using a suitable spanner/tool which does not puncture the oil filter during removal.

The oil filter must be treated to remove residual oil. This can be achieved by crushing the filter and recovering the oil. Commercial equipment which performs this function is available. Alternatively, the oil filters can be sent to a suitable treatment facility using leakproof transit packaging.

4.2 TRANSMISSION OILS

Transmission oil is contained in both manual and automatic gearboxes, and in the rear axle differential of rear wheel drive vehicles.

4.2.1 Manual gearbox

If the gearbox has a drain plug, it can be gravity-drained by removing the drain plug and collecting the oil in a suitable container which has a minimum volume of 5 litres.

The oil must be allowed to drain for a minimum of 10 minutes with no visible further draining occurring.

Gearboxes which do not have a drain plug must be drained by drilling or piercing a suitably sized hole in the bottom of the gearbox. Commercial equipment includes a suitable drill or punch, provides suction to assist in draining the gearbox, and collects the oil without the need for a container underneath the gearbox.

Such commercial equipment can also be used to drain gearboxes that do have a drain plug.

4.2.2 Automatic gearbox

Oil has to be drained from both the gearbox and the torque converter. These may be combined in a single unit, but the torque converter on some types of gearboxes is separate from the main gearbox unit.

The procedure for draining these is the same as for a manual gearbox.

4.2.3 Rear differential

Most modern cars are front wheel drive and so do not have a rear differential unit. However, many small commercial vans and some larger cars have rear wheel drive.

The procedure for draining these is the same as for a manual gearbox. Those that do not have a drain plug may be drilled or, alternatively, the differential flange may be loosened and prised open to allow the oil to drain.

4.2.4 Power steering oil

If the ELV has power steering, fluid has to be extracted from both the reservoir and the connecting hose. Equipment similar to that used to extract brake fluid from the brake reservoir (see below) can be used to extract fluid from the power steering oil reservoir. Fluid is then removed by piercing the hose and sucking out the fluid or cutting it at the lowest point and allowing the fluid to gravity drain.

4.3 HYDRAULIC OILS

All ELVs contain brake fluid. A small number of older vehicles may also have a hydraulic clutch.

4.3.1 Brake fluid

Commercial equipment uses pressure and suction on both the reservoir and the brake pipes and cylinders (fluid is sucked from the bleed nipples) to remove the fluid. Brake fluid could also be removed from an ELV by opening the brake bleed nipples and then pumping the brake pedal until

the reservoir is emptied (the fluid would be discharged through the open nipples). However, there are health and safety concerns relating to an operative sitting in an ELV, and this approach removes a lower percentage of brake fluid than commercially-available equipment. Consequently, in order to achieve the required percentage of removal, brake fluid should be removed using equipment which uses suction and/or pressure on both the reservoir and the brake pipes and cylinders.

Drainage time of 10 minutes, no visible fluid left in the reservoir and with no visible further drainage following removal of suction equipment.

4.3.2 Clutch fluid

Virtually all modern cars have cable clutches and so do not contain any hydraulic clutch fluid. Some older cars may have hydraulic clutches, and equipment similar to that used to extract brake fluid from the brake reservoir can be used to extract fluid from the clutch reservoir and slave cylinder.

4.4 COOLANT (ANTIFREEZE)

Coolant can be gravity drained by removing the bottom hose from the radiator and collecting the liquid in a suitable container with a minimum volume of 10 litres. Commercial equipment enables the operator to make a hole in the bottom hose and suck the coolant out through this hole into a container. Either method can be used, but will only be able to achieve a high level of removal if the heater valve is set to maximum as part of the preliminary activities and the filler cap is removed.

Drainage time of 10 minutes, with no visible further drainage occurring.

4.5 SCREEN WASHING FLUID

This is removed by sucking fluid from the reservoir. The pipe placed in the reservoir has to be long enough to reach the bottom of the reservoir. Some models have fluid reservoirs with bent filler pipes in which it may be difficult to place a suction pipe to the required depth. In these cases, it may be preferable to drain them from below by removing the pump or piercing the reservoir.

Either commercially-available equipment or a simple pump can be used. If a simple pump is used, the reservoir must be inspected to determine that it has been completely emptied.

Most cars have one reservoir container that supplies fluid to both the front and rear windows, but some cars may have a separate container (in the

boot) for the rear window. If a vehicle has more than one reservoir, then all reservoirs must be drained.

End point – no visible amounts of fluid in the reservoir/s.

4.6 FUEL TANK (NOT LPG – SEE SECTION 4.10)

Fuel can be removed by suction or siphoning it from the tank with a tube entering the tank through the fuel filling pipe, but this procedure is unlikely to achieve the required level of depollution.

In order to ensure that the required level of depollution is achieved, a hole should be pierced or drilled into the lowest point of the fuel tank and suction is used to remove fuel. This ensures that no vapour is released during extraction.

The health and safety issues associated with fuel extraction mean that the drill or piercing tool should be made of suitable non-sparking material and be pneumatically powered, and an earthing connection must be made between the vehicle and the extraction equipment. Commercially available equipment should meet both these requirements.

The design of the tank (for example a saddle shaped tank will have two low points), may require more than one hole to be drilled or pierced in order to extract all of the fuel.

End-point – no visible further removal of fluid observed in the (see-through) extraction tubing.

There is no requirement to remove any residual fuel from the injector/carburettor inlet pipe in the engine compartment.

4.7 SUSPENSION SYSTEM

The suspension system on most vehicles is provided by 4 independent shock absorbers (one for each wheel). However, alternative systems are used in some vehicles.

4.7.1 Shock absorbers

The recommended approach is to drain the fluid from the shock absorber without removing it from the ELV. Shock absorbers contain fluid, usually oil, in both an inner and an outer cylinder. Consequently, in order to achieve the required level of depollution, fluid/oil needs to be removed from both the inner and the outer cylinder.

Commercially-available equipment can achieve the required level of depollution, but the time required for this operation will depend on the design of the equipment. The instructions provided by the manufacturer must be followed.

Shock absorber fluid/oil could be removed from an ELV by removing the shock absorbers, but the time required to conduct this operation may be considerable, and the shock absorbers would be classified as hazardous waste after they were removed from the ELV.

4.7.2 Gas shock absorbers

The equipment designed for fluid/oil based shock absorbers may be suitable for safely removing the gas from gas suspension systems. This must be confirmed with the manufacturer of the equipment before it is used for this purpose, and any additional safety requirements or other instructions provided by the manufacturer must be followed.

4.7.3 Sealed suspension systems

Equipment is available for both removing and recharging these, and thus can be used to drain them. An alternative approach is to fit a tyre valve adaptor to the filling/draining valve; this then enables the liquid to be gravity-drained in about 20-25 minutes. Care should be taken when attaching the adaptor to prevent the pressurised fluid causing injury to the operator.

Note that the unique hydrolastic suspension fluid used in MG Rover Metro/100 models is a water based fluid containing methanol, and should therefore be stored together with coolant and screenwash, rather than with the oils.

No visible further draining of fluids should occur after the above procedures.

4.8 CATALYST

Older ELVs may not possess a catalyst, but nearly all modern vehicles, particularly those registered since 1993, both petrol and diesel, will have a catalytic conversion unit in the exhaust system. The catalyst can be identified by visual inspection of the exhaust system.

Note: although not strictly a depollution activity, this is a preparation for recycling activity, the financial benefits of which can generally be exploited to offset the costs of depollution.

The catalyst unit can easily be removed by cutting through the exhaust pipe, both in front of, and behind, the catalyst unit. The use of the correct

cutting equipment reduces the time which is required for this operation. Some vehicles may have more than one catalyst unit.

4.9 AIR CONDITIONING REFRIGERANT

The two types of refrigerant that are used in vehicle air conditioning systems are R12 and R134a. The type of refrigerant is marked on the vehicle.

The refrigerant must be removed using specialist equipment, and two collection cylinders are required; one for R12 (a CFC) and one for R134a (an HFC). The equipment is attached to the air conditioning filler valve, and takes about 10-12 minutes (the time depends on the system and the ambient air temperature) to remove all the fluid and transfer it to the collection cylinder.

ATFs should note that new EU Regulations (EC 307/2008) concerning qualifications for persons dealing with "F Gases" such as vehicle air conditioning systems came into force in April 2008. These require relevant operatives to be formally trained and in possession of a duly accredited certificate of competence.

4.10 LPG TANK

Identifying an LPG Vehicle. An LPG vehicle may or may not have identification badges, but can often be recognised by the presence of an additional filler connection valve, adjacent to the normal petrol filler. The absence of a spare wheel, or anywhere to put one, is another clue. In the engine compartment, there will normally be additional pipework and wiring from the control modules that handle the switching between petrol and LPG. If feasible, it is best to run the engine to empty as much fuel as possible from the tank before commencing removal, as this will reduce the weight of the tank and the risk of vapour loss. NOTE: Even after running to empty, the tank will still contain some residual gas vapour, and the full removal procedure must still be followed.

IMPORTANT NOTE: LPG, which is mainly used in some cars and light goods vehicles, should not be confused with Compressed Natural Gas (CNG), which has been used as original equipment in some commercial vehicle and PSV applications. CNG is equally hazardous, but is stored at a much higher pressure. Only fully qualified technicians should deal with CNG vehicles in accordance with the vehicle manufacturer's instructions.

Currently, very few ELVs in the UK have LPG tanks, but the number is expected to increase in the future. The usual procedure for removing these is to:

- 1. Turn off the isolating valve**
- 2. Cut through or disconnect the connecting pipes**
- 3. Cut through or remove the retaining clamps or straps**
- 4. Remove the tank to safe storage**

Given that there are health & safety issues involved with removal, handling and storage of LPG tanks, ATFs are recommended to check with the Health & Safety Executive (HSE) on current guidance. Only suitably trained personnel should be allowed to work on LPG vehicles before the LPG tank is removed. Some further generic guidance is now included in IDIS.

LPG liquid is a gas under pressure, which expands rapidly as it emerges causing a severe temperature drop in the vicinity of its release. Anyone attempting to disconnect the tank connections should therefore be equipped with hand and eye protection to avoid freezing.

The gas itself is highly inflammable and heavier than air, so can build up to dangerous levels in low places such as pits or drains, hence the requirement to treat the vehicle in the open air, where the gas can dissipate safely.

The vehicle should be quarantined in an open area, so that the tank can be isolated and removed for emptying, purging and separate disposal by suitably qualified personnel. The vehicle should be checked for gas leaks using proprietary detection equipment, especially in the vicinity of the tank connections and in the spare wheel well. If the battery is situated close to the LPG tank, for example in the boot, it should not be disconnected until it is certain there are no gas leaks to eliminate the risk of an electrical spark igniting the gas.

If there is a gas leak, this must be dealt with as a priority. If there are no qualified personnel on site, the urgent assistance of a local LPG installation company should be sought.

Under no circumstances should an LPG equipped vehicle be baled and/or sent to the shredder with the LPG tank still installed or intact, even if thought to be empty, as any residual gas in it would still be explosive. Neither should the tank, which is pressurised, be drilled or pierced to remove the LPG.

After the tank has been removed, the remainder of the vehicle can be processed as a normal ELV. The LPG injection equipment in the engine compartment and the pipes leading to it do not have to be removed. The tanks themselves are heavy and should be handled using appropriate lifting tools or supporting frames to avoid injury to personnel.

Information on the treatment of removed LPG tanks should be sought from authoritative sources (e.g. the LPG tank supplier or conversion company, the LPG Association, CARE Group etc.). ATFs may decide that subsequent emptying, purging and destruction of LPG tanks should be carried out by specialist third party decommissioners. Removed tanks should be stored in the open air in appropriate racks/cages until they can be collected or treated by the qualified disposal agents.

4.11 SWITCHES CONTAINING MERCURY

Some switches, such as tilt-based switches, may contain mercury. The ELV Directive requires switches which contain mercury to be removed. It would be a long (and hence costly) process to remove all switches in case they contain mercury.

An acceptable level of depollution will be achieved if any switches which are clearly marked as containing mercury are removed. A visual inspection of areas which contain this type of switch must be made during the depollution procedure, but only switches which are clearly identified as containing mercury need to be removed.

4.12 OTHER HAZARDOUS ITEMS

Some older ELVs may contain asbestos (e.g. certain brake pad linings). Regulations require the location of any components that may contain asbestos to be identified on the vehicle. A visual inspection of the vehicle must be made during the depollution procedure to identify if the ELV contains any notices indicating parts that contain asbestos. If any asbestos containing components are identified during this procedure, they must be removed. The procedure used to remove the asbestos containing components must follow all health and safety guidelines relating to asbestos.

ELVs also contain other hazardous items, such as the liquid crystal displays (LCDs) used in instrument panels in newer vehicles. There is currently no requirement to remove any of these items, but further guidance may be provided in due course.

5 Removal or deployment of air bags

The ELV Directive requires all pyrotechnic devices, such as airbags or pyrotechnic seat belt pre-tensioners, to be either removed or deployed because they are classed as explosive components. Pyrotechnic devices are deployed either mechanically or electrically depending on vehicle type and year. It is therefore necessary to assess every vehicle for airbag type and quantity, and any other pyrotechnic devices that may be present in order to adopt a safe procedure. Manufacturers' advice should be sought if not provided in IDIS.

Anyone attempting deployment of pyrotechnics needs to be aware of:

The different types of airbags and pyrotechnic devices contained in a vehicle;
Method of deployment, mechanical or electrical;
Health and safety issues regarding deployment, removal and disposal.

Only appropriately trained personnel should carry out airbag deployment or removal. The CARE website lists a suitable airbag deployment training course, see www.caregroup.org.uk.

The majority of airbags are electrically deployed, either from a single direct connector or a Deployment Control Unit. Before any work is carried out on electrically deployed airbags they should be disabled by disconnecting the battery. Following battery disconnection, a minimum period of 30 minutes must be allowed before any work is carried out on airbags to allow any residual charge left in the system to dissipate. In some instances, a supplementary battery back-up system can be found, which will normally be indicated by a flashing LED on the steering wheel, which indicates the airbag circuit is still active. Check IDIS for details.

It is possible for undeployed air bags to be removed and stored. However, as they are classed as explosive devices, the storage facility would have to meet all relevant regulations and requirements for storage of explosive materials, including those relating to health and safety. Many modern cars contain at least two airbags, and some luxury cars may well have more than 10 air bags. Removal of all airbags would be a time consuming process. Consequently, the recommended procedure is to deploy the airbags within the vehicle where possible. If it is not possible to deploy the airbag within the vehicle, remove the airbag and deploy it immediately.

Commercial equipment for the deployment of all electrical pyrotechnics is available but, as different air bags use different connections, a number of adapters will be required. Manufacturers' advice should be sought, if not provided in IDIS.

Airbag deployment should be conducted outside in a secure non-hazardous area.

If air bags are deployed *in situ*, measures must be implemented to ensure that neither the operator of the equipment, nor any other person, is within 10 metres of the vehicle when the air bags are detonated.

The level of noise produced during the deployment of air bags must be assessed, and may need to be discussed with the local authority, particularly if the treatment facility is close to a residential area.

Gases and particulates are generated during deployment of pyrotechnic devices. Once all devices have been deployed, doors should be opened to thoroughly ventilate the vehicle before re-entering the vehicle for any removal operations. Once deployed, pyrotechnic devices are neutralised and can be left within the vehicle.

The explosives used within airbags (before deployment) are toxic and are hazardous to health. As they are sealed into the generator in manufacture, exposure to these chemicals during normal handling is highly unlikely; however if a generator is split open extreme care is needed; see Health and Safety guidelines, HSG184.

Although this guidance describes the general procedures, ATFs should ensure that risks have been assessed and any specific guidelines provided by vehicle manufacturers or tooling manufacturers are followed.

5.1 SEATBELT PRE-TENSIONERS

ELVs that contain air bags may also contain seatbelt pre-tensioners. These are designed to pull the seat belt tight at the same time as the airbags are deployed, to clamp the seat belt wearer to the seat preventing them from gaining too much acceleration or twisting before they hit the airbag. Pre-tensioners may contain explosive or have stored mechanical energy (large spring) that is deployed mechanically or electrically. If they contain explosive devices, they need to be deployed as part of the depollution procedure. Manufacturers' guidance on the identification, removal and deployment of seat belt pre-tensioners should be sought, if not in IDIS.

The use of a procedure that enables electrically deployed air bags to be detonated in-situ via the common connector will also detonate electrical seat belt pre-tensioners. Consequently, in-situ detonation at the same time as air bags is the recommended approach for these items, where possible.

6 End of depollution procedure

When all of the depollution activities described in this guidance document have been conducted, the ELV is classified as non-hazardous waste. The ELV can then be recycled.

All fluids and other items which have been removed (apart from any air bags which have been deployed) will still be classified as hazardous waste. These will need to be stored in suitable storage facilities, which meet all regulations, until they are either treated or sent for recycling or disposal through a suitably licensed waste management contractor.

A system for recording the quantity of fluids and other items which have been removed should be in place. The information which is recorded will enable regular reports to be provided to waste regulators, and inform annual ELV target performance returns. A proforma table can be found on the BIS website at:

<http://www.bis.gov.uk/policies/business-sectors/environmental-and-technical-regulations/environmental-regulations/end-of-life-vehicles>

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