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Recovery of Air Conditioning System Fluids from ELVs at Authorised Treatment Facilities and Metal Shredder Sites

Introduction

- Many vehicles contain air conditioning (AC) systems which are filled with special air conditioning system fluids. These can also be referred to as AC gases or refrigerants.
- If air conditioning fluids escape to the environment, they can result in environmental harm.
- The End-of-Life Vehicle Regulations requires that air conditioning system fluids must be transferred from End-of-Life Vehicles into gas cylinders for subsequent appropriate treatment as part of the vehicle's depollution process. This regulation is enforced by Local Authorities.
- Most air conditioning fluids are additionally subject to regulation by the Environmental Protection Agency under the F-Gas Regulation and the ODS Regulation.
- The deliberate release of F-Gas and ODS AC fluids to the environment is illegal.
- This guidance note describes the controls required to properly remove air conditioning system fluids from ELVs and their subsequent management.

Summary of Requirements

- Air conditioning gases must be transferred from End-of-Life Vehicles into specified recovery gas cylinders for subsequent, appropriate treatment as part of the vehicle's depollution process.
- Specialist equipment is required to remove air condition gases from vehicles. The removed gases should be transferred into specified recovery gas cylinders.
- Anybody removing F-Gas AC fluids, such as R134a, from cars (≤ 8 seats) and light vans (≤ 3.5 tonnes) must have a Mobile Air Conditioning (MAC) F-Gas handling certificate. This certificate is also recommended for all other AC fluid removal operations.
- Cylinders of recovered F-Gas and ODS AC fluids must be labelled with specified information.
- The cylinders of recovered air conditioning fluid/gas may either be removed as waste or reused (recycled) to service the air conditioning systems of on-the road vehicles if the quality of the AC fluid remains suitable for this purpose. Because of the high cost of AC Fluids, this reuse can generate income.
- Air conditioning fluids removed from ELVs for reuse (i.e. recycling) or dispatched from site as waste must be recorded and reported annually.

Further details can be found on the following pages.

Further Information on the Recovery of Air Conditioning System Fluids from ELVs

Introduction

The deliberate release of F-Gas or ODS air conditioning fluids/gases to the environment is illegal and they must be removed from vehicles at end-of-life into specified recovery pressure cylinders for subsequent, appropriate treatment. In order to achieve this, the correct equipment and qualifications are required, and the fate of the removed air conditioning fluids/gases must be documented. This guidance aims to provide a summary of requirements for ATFs and metal shredder sites involved in the depollution of end-of-life vehicles (ELVs). The assistance of ELVES (the compliance scheme for ELVs in Ireland), the Limerick and Clare Education and Training Board and SWERLA (Southern Waste Enforcement Regional Lead Authority) in the production of this guidance is gratefully acknowledged.

What are Air Conditioning Fluids?

AC fluids (also called AC gases or refrigerants) are chemical compounds that are used as the heat carrier in AC systems. During the operation of an AC system, they are converted from gas to liquid and then back to gas by means of the AC system's compressor and evaporator in order to provide heating or cooling to the vehicle. An AC fluid will normally convert into gas if it released from the air conditioning system.

Why are Air Conditioning Fluids Subject to Controls?

Modern AC fluids typically are a type of chemical known as Fluorinated Greenhouse Gas. These are powerful greenhouse gases with an effect much greater than carbon dioxide and emissions of these gases have been rising internationally. Thus, the control of F-Gases is required in order to limit global warming and combat climate change.

Older AC fluids are a type of chemical known as an Ozone Depleting Substance (ODS). If released to atmosphere, these chemicals lead to the formation of a hole in ozone layer of the earth' atmosphere. The ozone layer is the Earth's natural sunscreen, filtering out harmful ultraviolet (UV) rays from the sun. UV rays can cause damage to humans and other forms of life. Therefore, ODS are regulated in order to reduce their emissions to atmosphere. They can no longer be installed in vehicle AC systems. However, older vehicles can still contain these substances, particularly the AC fluid known as R12, and thus they must be removed from ELVs for appropriate treatment.

What Regulations Apply to the control of AC Fluids?

Air conditioning system fluids must be removed from End-of-Life Vehicles as part of the depollution process outlined in Schedule 2 of the ELV Regulations (S.I. No. 281/2014). This regulation is enforced by Local Authorities.

Air conditioning system fluids are also regulated under the EU Fluorinated Greenhouse Gas (F-Gas) Regulation (EU No 517/2014) and the EU Ozone Depleting Substances (ODS) Regulation (EC No 1005/2009) which are enforced by the Environmental Protection Agency (EPA). The aim of these regulations is to prevent the emission of these AC fluids and protect against environmental harm. These regulations have specific obligations relevant to the depollution of AC fluids from ELVs and their subsequent management.

What Air Conditioning Fluids are Typically Found in ELVs?

Each vehicle air conditioning system should be labelled with the type and quantity of AC fluid present on or adjacent to the vehicle's air conditioning unit. Information on the types of AC fluids used in

particular vehicles can also be found on the International Dismantling Information System (www.idis2.com).

Information on Different AC Fluids Types			
AC Fluid Type	**Type of Vehicles**	**Use in Vehicles**	**Is this gas subject to ODS/ F-Gas regulations?**
R12	All	Used prior to 1994	Yes, as an ODS
R134a	Cars (M1) and light vans (N1) All other vehicle types	Used in cars and vans placed on the EU market prior to 2017 Ongoing	Yes, as an F-Gas
R1234yf	All	In use since around 2008, increasingly used instead of R134a	Yes, as an Annex II F-Gas (reporting requirement only)
R456A	All	From 2022	Yes, as an F-Gas

New types of refrigerants are being developed, particularly for use in electric vehicles.

The quantity of air conditioning gas installed in a car and or a van varies by model but typically ranges from 0.350 to 1.070 kilograms weight for R134a.

What Qualifications for the Removal of AC Fluid from Vehicles Are Required?

Anybody recovering (i.e. removing) the air conditioning fluid R134a, or any other F-Gas AC Fluid, from cars and light vans is required to hold a special certificate for this task in accordance with the F-Gas Regulation. This certificate (also known as an attestation) can be obtained after successful completion of a short training course. The aim of this course is to equip persons handling motor vehicles with the knowledge and skills to correctly remove AC F-gases from their air conditioning systems. The use of AC fluid recovery equipment and pressure cylinders for storage of the recovered AC fluid is covered during this training.

For larger road vehicles, including buses, coaches, lorries and specialist vehicles such as tractors and refrigerated containers (aka reefers), the removal of F-Gas AC fluids shall be carried out by appropriately qualified personnel. While no specific qualifications are mandated in legislation, the same qualification as that required for cars and light vans above is considered appropriate (i.e. F-Gas MAC certificate).

For the removal of ODS AC fluids, such as R12, from ELVs, the F-Gas MAC certificate is recommended.

Summary of Personnel Certification Requirements to remove F-Gas (e.g. R134a) or R12 from ELVs		
Type of vehicle	**Cars and Vans**	**All other vehicle types***
Recovery of F-Gas (e.g. R134a)	F-Gas MAC certificate required	F-Gas MAC certificate recommended
Recovery of all other AC Fluids	F-Gas MAC certificate recommended	F-Gas MAC certificate recommended

* including buses, coaches, lorries and specialist vehicles such as tractors and refrigerated containers (aka reefers)

Where can I get training which leads to an F-Gas Mac Certificate?

This certificate, often known as the F-Gas MAC award or attestation, can be obtained by undertaking a one-day course from an approved training provider. Training includes the operation of the equipment required to remove AC Fluids from vehicular air conditioning systems.

In Ireland, MAC training providers are approved by Quality and Qualifications Ireland (QQI). Upon successful completion of a QQI approved training course, a QQI Level 5 Special Purpose Award in Handling F-gas Mobile Air Conditioning Systems in Certain Motor Vehicles (award code 5S21699) is issued to the trainee. This is commonly called the F-Gas MAC certificate. An earlier version of this QQI award known as the FETAC Special Purpose Award Code 5S0109 is also acceptable.

The following SOLAS craft apprentice awards also have the MAC F-Gas certificate embedded since 2014: agricultural mechanic, construction plant fitting and motor mechanic.

An equivalent F-Gas MAC certificate issued in another European Union Member State is also recognised in Ireland.

What Equipment is Required for the Recovery of AC Gas from Vehicles?

It is recommended that a MAC refrigerant recovery rig is employed for efficiency and ease of operation reasons. The following elements, which may be stand-alone or combined into a MAC refrigerant recovery rig, are required.

- A specialist vacuum pump which removes the AC fluid/gas from the vehicle's AC system and transfers it into a recovery cylinder. If the recovered AC gas is to be recycled (i.e. reused in another vehicle), the vacuum pump must have an embedded filter for cleaning the gas.

- A pressurised cylinder into which the recovered gas is transferred. Different types of AC Gases must not be mixed together. Therefore, you should have a separate recovery cylinder for each type of gas recovered. Please be aware that these cylinders, as they are pressurised containers, have for safety purposes an expiry date which is stamped on each cylinder. Gas should not be filled into or stored within cylinders beyond the expiry date.

- A means of recording the weight of the recovered gas. This may simply involve placing the gas recovery cylinder on a small weighing device and recording the weight of the cylinder before (that is when empty) and then again after filling with gas. Subtract the empty cylinder weight from the filled cylinder weight to determine the net weight of the gas contained in the cylinder.

The practical use of AC fluid recovery equipment and pressure cylinders for storage of the recovered AC fluid is covered during MAC certificate training.

Examples of Vacuum Pump and Recovery Cylinders

Example of Recovery Rig

How are Cylinders of AC Fluid to be Labelled?

When F-Gas or ODS AC gas is removed (recovered) from an ELV, it should be transferred into a recovery cylinder. Each cylinder must be then be labelled with specific information. The following table lists the requirements for R134a and R12. The same format can be used for other air conditioning gases. A cylinder's label must remain legible as long as there is AC Fluid is stored within it.

Cylinder Labelling Text		
Notes	**F-Gas (e.g.R134a) Cylinder Label**	**ODS (e.g. R12) Cylinder Label**
Required text	This cylinder contains fluorinated greenhouse gas	This cylinder contains Ozone Depleting Substances
List the Gas Type	R134a	R12
List the net weight of the gas in kilograms*	10.4 kg	10.2 kg
List the intended destination of the recovered gas	Choose one of the following: • "for reclamation" • "for destruction" • "for recycling"	"for destruction"
If for recycling, you must also add	Recycling Facility = the name and address of the ATF/Shredder Site	Not applicable as cannot be recycled

* record the weights of the empty cylinder (1) and again after filling with AC Fluid (2) to determine the net weight of the AC Fluid contained in the cylinder (2-1= net weight of AC Fluid)

What are the Options for AC Fluids Once Removed from Vehicles?

Following recovery (i.e. once the AC gas has been removed from an ELV and transferred into a recovery cylinder), there are three options for the management of the recovered AC fluid, depending on the AC Fluid type and its quality (which determines whether it is feasible to recycle or reclaim it):

a) Destruction: Send as waste for destruction to an authorised waste facility; or,

b) Reclamation: Send as waste to a specialist plant that can re-process the waste AC Fluid to create "reclaimed refrigerant" which is identical to new, "virgin" AC Fluid; or,

c) Recycling: Following a basic cleaning process as the AC Fluid is removed from a vehicle (this can be done automatically, if an appropriate refrigerant vacuum pump/MAC refrigerant

recovery rig is used), the ATF may then itself re-use this AC Fluid to top-up vehicle AC systems (this process is known as Recycling) or supply it to third parties for this purpose (for example a garage that services vehicle AC systems). However, **recycled refrigerant must always be used with care as it may be contaminated or may be of different composition to that stated on the vehicle's label**.

It is worth noting that reclaimed and recycled F-Gases R134a, R456A and R1234yf have a monetary value.

Recovered Gas Management Options for Common Air Conditioning Gases	
R134a, R456A and R1234yf	Can be recycled, reclaimed or destroyed.
R12	Can only be sent as hazardous waste for destruction.

What can I do with recovered F-Gas R134a/R1234yf/R456A suitable for recycling?

The ATF/metal shredder site can re-use "recycled AC Fluid" to top-up vehicle AC systems (a task which, in the case of cars and vans, only a certified person can do) or supply it to third parties for this purpose. If recovered R134a is supplied to a third-party who will reuse it in cars and vans, then the third-party must employ at least one person who holds the F-Gas MAC award. The supply of Recycled F-Gas AC Fluids to third parties must be recorded as discussed latter.

What can I do with recovered AC Fluid destined for destruction or reclamation?

Waste AC Fluids are classed as hazardous wastes.

Recovered AC Fluid destined for destruction or reclamation (either because the AC Fluid is not suitable for recycling or because you choose not to pursue this option) must be sent to a waste facility authorised to accept this waste type. Waste AC Fluids are usually returned to a refrigerant producer who also holds a waste licence as they have the facilities to test if a waste refrigerant can be reclaimed, the equipment to reclaim it where feasible and the means of distributing/selling the reclaimed refrigerants. As reclaimed AC Fluid has a value, there may be a reduced cost or even a financial gain from this process.

However, as there are currently no facilities in Ireland which can either dispose of or reclaim recovered AC Fluids, this process can involve several steps, perhaps including temporary storage at one or more appropriately authorised waste facilities in Ireland. Also, in order to be shipped abroad for treatment, the waste AC Fluid will require Transfrontier Waste Shipment notification to the National TFS Office.

Whilst the transfer of the recovered AC Fluid destined for destruction or reclamation to a waste facility abroad can be directly arranged by the ATF or Shredder site, typically a specialist hazardous waste management company is engaged. Alternatively, there are specialist refrigerant distributors who may arrange the return of waste refrigerants to refrigerant producers. These refrigerant distributors can also supply recovery cylinders and equipment. A non-exhaustive list of these facilities is maintained by the EPA and can be viewed at Waste ODS & F-gases: Prior Annual Notifications | Environmental Protection Agency (epa.ie).

How can I transport waste AC Fluids?

The ATF or shredder site, as the producer of the waste, can transport this waste themselves to an authorised waste facility in Ireland, such as a refrigerant distributor who holds an appropriate waste facility authorisation.

Alternatively, a third-party may be engaged to collect and transport waste AC Fluids. However, they must be authorised under waste legislation to do so. Authorisation can be either:

- A valid Waste Collection Permit issued by the National Waste Collection Permit Office Home (nwcpo.ie) for the area(s) in which collections are taking place and for the waste types that cover waste ODS and F-Gases; or,
- A Prior Annual Notification (PAN) which has been submitted to and has been acknowledged by the Environmental Protection Agency. For more information, refer to Prior Annual Notifications (www.epa.ie)

Other transport controls apply. Refer to the Health and Safety Authority's Carriage of Dangerous Goods by Road A Guide For Business (hsa.ie).

What Records must I Maintain?

Records concerning the amount of F-Gas and ODS AC fluids removed annually from ELVs, the amount recycled, the amount dispatched as waste for reclamation/disposal as well as the balance in storage as waste at the end of each calendar year are either required or recommended as listed below, to demonstrate that the recovered AC fluids have been managed legally.

1. Copies of the MAC F-Gas certificates of the trained personnel used by the ATF/metal shredder site to recover R134a and R456A from cars and vans should be maintained on file.
2. The total net weight of each type of AC fluid removed during a calendar year from all ELVs should be recorded (kilograms).
3. The management of recovered AC fluids/gases dispatched as waste for reclamation or disposal should be documented until the gas is reclaimed or destroyed. These records should include dockets/receipts/transfrontier shipment notes for each batch of waste AC fluids/gases dispatched.
4. Records of the direct reuse by the ATF/metal shredder site of Recycled F-Gas (e.g. R134a, R456A) in vehicles (i.e. the recovered AC fluid is injected into non-ELV vehicles at the ATF site) should be maintained, if applicable. Invoices for this service in addition to the quantity in kilograms of each type of AC fluid reused (i.e. recycled) in this manner annually would suffice.
5. The ATF/metal shredder site must establish, and maintain for at least five years, records which contain the following information for each batch of recovered AC fluid supplied to third parties for recycling, such as garages, for reuse in cars and vans:
    a) The name and address of the purchaser;
    b) The name of the MAC certificate holder employed by the purchaser, the certificate awarding body and the certificate number (a photocopy of the certificate would suffice). It is important to note that you may only sell the recovered AC fluid to a person who holds the MAC certificate or to a company, such as a garage, that employs a MAC certificate holder;
    c) The date of the sale; and,
    d) The net weight of R134a in kilograms.

It is recommended that similar records, other than item b), are maintained for gas supplied to third parties for reuse in all other vehicle types.

These records can also be used to generate the annual report. Required records should be maintained for at least five years and be available for inspection by Local Authority/WERLA/EPA staff. If a third party is used by the ATF to recover gas from ELVs on its behalf, the ATF must still maintain these records.

How do I make returns for ATFs in the Annual Report for AC Fluids removed from ELVs?

Data for AC Fluids removed from ELVs must be recorded either as recycled AC Fluids or waste AC Fluids in the Annual Report as described below.

1. Recycled AC Fluids

Annual data on recycled gas, whether reused onsite or sold to third parties for reuse, shall be reported using the following Part Names:

- **AC Fluid -** R134a (net weight in kilograms)
- **AC Fluid -** R1234yf (net weight in kilograms)
- **AC Fluid -** R456A (net weight in kilograms)

Notes

- AC Fluid = air conditioning fluid/ gas.
- Net weight of AC Fluid to be reported (i.e. do not include the weight of the cylinder itself) in kilograms (kg) or tonnes (1kg = 0.001 tonnes).
- Only F-gas AC Fluids can be recycled. ODS AC Fluids such as R12 cannot be recycled

2. Waste AC Fluids

Any waste AC fluids removed from ELVs shall be reported under Waste Out or Waste Stored On-Site. Each waste AC Fluid type should be reported using a List of Waste Code.

The preferred List of Waste code is 16 01 21* *hazardous components other than those mentioned in 16 01 07 to 16 01 11 and 16 01 13 and 16 01 14*. When you select this code when entering data for the Annual Report, you will then be prompted to select one of the following to declare which particular waste AC Fluid you are referring to:

- 16 01 21* - AC Fluid R134a
- 16 01 21* - AC Fluid R1234yf
- 16 01 21* - AC Fluid R456A
- 16 01 21* - AC Fluid R12
- 16 01 21* - other *(Note: Use this option for items other than the four waste AC Fluids listed above.)*

Alternative List of Waste Codes that may be used are:

- 16 05 04* *gases in pressure containers (including halons) containing hazardous substances*
- 14 06 01* *chlorofluorocarbons, HCFC, HFC*

Procedure

It is strongly recommended that a procedure is developed that details when, how and by whom, using the equipment available, AC gas is to be removed from vehicles and recycled or dispatched for reclamation/destruction. The labelling of recovery cylinders should be described. The procedure should also outline record generation and storage (what information is required, how/when/by whom is this information generated, where it is stored once collected, etc.) and the annual reporting requirement.

Enforcement

Local Authorities may undertake compliance inspections in relation to the ATF permit. The EPA may undertake compliance inspections in relation to the ODS and F-Gas Regulations.

Key Regulations

- End-of-Life Vehicles Regulations 2014 (S.I. No. 281/2014)
- European Union F-Gas Regulations 2014 (No 517/2014)
- European Union ODS Regulation (EC) No 1005/2009

Disclosure

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