

Department for Environment, Food and Rural Affairs

# Guidance for Mobile Air Conditioning (MAC) Sectors

## Guidance: F Gas and Ozone Regulations

### Information Sheet MAC 2: Usage

April 2012

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This Information Sheet provides background information about the use of refrigerants in mobile air conditioning (MAC) systems. We provide a description of the F gas refrigerant used and discuss sources of emissions and options for reducing emissions through improved containment or use of alternative refrigerants.

## 1 Use of Refrigerants by MAC Sector

All new MAC systems use HFC 134a. Leakage is common during use, and emissions often occur during servicing and towards the end of the vehicle's life. HFC 134a is a powerful greenhouse gas with a global warming potential (GWP) 1,300 times greater than carbon dioxide (CO<sub>2</sub>).

Ozone depleting substances (ODS) refrigerants, such as CFC 12 have not been used in the manufacture of new MAC systems since 1995. Hydrochlorofluorocarbons (HCFCs), which are another type of ODS, have not been used in car air-conditioning equipment at all. However, they may be found in refrigerated vehicles or the air-conditioning of imported vehicles. Rules on ODS do not differentiate between types of equipment (e.g. mobile and stationary). If the equipment you service contains HCFCs please see Information Sheet RAC 3 Section 5 or RAC 8 for details of the requirements affecting the use of these refrigerants in mobile equipment.

## 2 Sources of F Gas Emissions

For MAC systems there are four main sources of F gas emissions. These are:

- a) **Gradual leakage during normal operation.** There are many potential leak locations, such as flexible hoses and compressor shaft seals. If leakage is slow it can go unnoticed for long periods and result in direct emissions of F gas and poor cooling performance.
- b) **Catastrophic leakage during an accident.** If a car undergoes a major front-end collision then it is possible that the refrigerant circuit of the MAC will be damaged and the entire refrigerant charge lost.
- c) **Emission during equipment maintenance.** If a component needs to be replaced during servicing it will be necessary to remove all or some of the refrigerant from the system. Some years ago refrigerant was simply vented to the atmosphere. This is now illegal. To minimise refrigerant loss during maintenance it is vital that personnel have suitable recovery equipment and are properly trained in accordance with the requirements set out in the relevant EU and GB Regulations.
- d) **Emissions at end of vehicle life.** It is vital to properly recover refrigerant from vehicles during dismantling using recovery equipment and appropriately trained personnel.

### 3 Options for Reducing F Gas Emissions

Complying with the EU F gas Regulation will help reduce greenhouse gas emissions which contribute to global warming. Refrigerant leakage is extremely damaging in environmental terms and leads to loss of cooling in the vehicle. It makes sense to address leakages. There is also a key obligation in the MAC Directive to address abnormally high leakage.

#### 3.1 Leakage prevention through improved MAC system design

The best way that MAC system leakage can be reduced is through better MAC systems design. The MAC Directive addresses this opportunity by placing certain obligations on vehicle manufacturers. The 2 key options to reduce emissions at the design stage are:

- a) To reduce the gradual leakage by use of better components such as hoses and seals.
- b) To use a refrigerant that does less damage to the environment if it leaks. This is the only way of overcoming the emission of a powerful greenhouse gas during a car accident.

#### 3.2 Leakage prevention through improved servicing and disposal

To achieve the lowest possible loss of refrigerant to the environment a service company or vehicle dismantler should ensure that all HFC refrigerants are recovered by appropriately qualified personnel using a well maintained recovery set during servicing or dismantling. The recovery set will enable the refrigerant to be recycled.

See Information Sheet MAC 5 about qualifications and certification.

It is important to ensure that the MAC system has no leaks following servicing.

### 4 Alternative Refrigerants for MAC Systems

The ideal way of reducing F gas emissions to zero is to use an alternative refrigerant with a zero or low GWP. Under the MAC Directive, HFC 134a will be phased out from use in the MAC sector. Only refrigerants with a GWP below 150 will be allowed in new vehicle types.

In the development of a new refrigerant in car air-conditioning there has been significant interest in the use of carbon dioxide (CO<sub>2</sub>) and other low GWP refrigerants. At the time of writing it appears that car manufacturers have opted to move to an alternative fluorocarbon refrigerant that has very similar characteristics to HFC 134a called HFO1234yf and has a GWP of 4. Primarily this new refrigerant is being designed for new MAC systems. It is possible in the long-term that new refrigerants that are "drop-in" replacements for HFC 134a may be available.

The information in this document is intended as guidance and must not be taken as formal legal advice or as a definitive statement of the law. Ultimately only the courts can decide on legal questions and matters of legal interpretation. If you have continuing concerns you should seek legal advice from your own lawyers.

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