



European Commission

Enterprise and Industry
Directorate-General

Europe's strategy to limit the impact of GHGs from MACs: The forthcoming directive

Cooling cars with less fuel: Improving the On-Road Performance of
Motor Vehicles

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Agenda

- **EC Type-Approval framework**
- **Current requirements (Dir. 2006/40/EC)**
- **Implementing measures**
- **Leakage test procedure**
- **Further steps**

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EC type approval

- Procedure whereby a Member State certifies that a type of vehicle satisfies the relevant administrative provisions and technical requirements relating to:
 - *active and passive safety,*
 - *protection of the environment,*
 - *performances and other issues*

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EC type approval

- **Objective - to enable vehicles to be placed on the market**
- Benefits:**
- **Approvals can be obtained in any country of the EU**
 - **Once approved – vehicles can be sold everywhere in the EU**

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EC type approval

- **Legislative process:**
- **Codecision**
 - Legislation, prepared by the Commission, is adopted after agreement of the European Parliament with the Council (Dir. 2006/40/EC)
- **Comitology**
 - Technical requirements are adopted through the CATP (Committee for Adaptation to Technical Progress) (Reg. 2006/XX/EC)

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Current requirements (Dir. 2006/40/EC)

Main objectives

- The control of leakage of certain fluorinated greenhouse gases with a global warming potential (GWP) higher than 150 in MACs
- The prohibition of MACs using those gases from a certain date

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Current requirements (Dir. 2006/40/EC)

- **SUBJECT MATTER – (Art. 1)**
 - **Type-approval** of vehicles as regards emissions from, and the safe functioning of, air conditioning systems fitted to vehicles
 - **Retrofitting and refilling** of such systems
- **SCOPE - (Art. 2)**
 - passenger cars - M1
 - commercial vehicles - N1 class I

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Current requirements (Dir. 2006/40/EC)

- **CONTROL OF LEAKAGE – (Art. 5.2 and 5.3)**
 - Leakage rate of F-gases with GWP>150
 - not exceeding 40 grams/year for single evaporator system
 - not exceeding 60 grams/year for dual evaporator system

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Current requirements (Dir. 2006/40/EC)

- **CONTROL OF LEAKAGE – (Art. 5.2 and 5.3)**
 - From 12 months after the test procedure has been adopted (or 1 January 2007) for new types of vehicles
 - From 24 months after the test procedure has been adopted (or 1 January 2008) for all new vehicles

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Current requirements (Dir. 2006/40/EC)

- **PHASE – OUT OF MACs DESIGNED TO USE F-GASES WITH GWP>150 (Art. 5.4 and 5.5)**
 - From 1 January 2011 for new types of vehicles
 - From 1 January 2017 for all new vehicles

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Current requirements (Dir. 2006/40/EC)

- **ADOPTION OF IMPLEMENTING MEASURES (Art. 7)**
 - **When: by 12 months after the date of entry into force of the Directive**
 - **How: comitology procedure**
 - **In particular:**
 - **administrative provisions for the EC type approval**
 - **a harmonised leakage detection test to measure the leakage rate of F-gases with GWP>150 from air conditioning systems**

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Implementing measures (Reg. 2006/XX/EC)

- **The draft proposal introduces measures on:**
 - **Type approval of components**
 - **Type approval of a vehicle with regard to emissions from an air conditioning system**

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Implementing measures (Reg. 2006/XX/EC)

▪ General requirements

- testing of single components, systems or vehicles
- the individual results of the components are added to get the system value
- use of a sealed chamber
- correlation to real driving conditions
- calibration of the enclosure and analyser is necessary

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Implementing measures (Reg. 2006/XX/EC)

▪ The type of leak component is defined

- Manufacturer's trade name or mark
- Main function of the leak component, and in so far they increase the leakage rate:
 - ❖ Material when affecting the leak
 - ❖ List of leak components in case of assemblies

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Implementing measures (Reg. 2006/XX/EC)

- **The list of leak components is specified (1)**
 - **Hose including crimping**
 - **Individual connections (male/female)**
 - **Valves, switches and sensors**
 - **Thermal expansion valves with connections**
 - **Evaporators with external connections**

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Implementing measures (Reg. 2006/XX/EC)

- **The list of leak components is specified (2)**
 - **Compressor with connections**
 - **Condenser with integrated serviceable drier**
 - **Receiver/drier with connections**
 - **Accumulator with connections**

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Leakage test (Reg. 2006/XX/EC)

- **Annex II introduces technical provisions for the determination of leakages. In particular:**
 - **Equipment requirements**
 - **Test conditions**
 - **Test procedure and data requirements**

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Leakage test (Reg. 2006/XX/EC)

- **Equipment requirements**
 - **Sealed enclosure with equipment to ensure a homogeneous concentration of gas**
 - **Analisis based on:**
 - ❖ **Gas chromatography**
 - ❖ **Infrared spectro-photometry**
 - ❖ **Mass spectrometry**
 - ❖ **Infrared photo-acoustic spectroscopy**

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Leakage test (Reg. 2006/XX/EC)

▪ Preconditioning

System part	Option 1	Option 2	
	Time (40°C)[h]	Step 1 Time (50°C)[h]	Step 2 Time (40°C)[h]
Complete system	480	240	24
Compressor	144	72	24
Hose assemblies	480	240	24
All other leak parts	96	48	24

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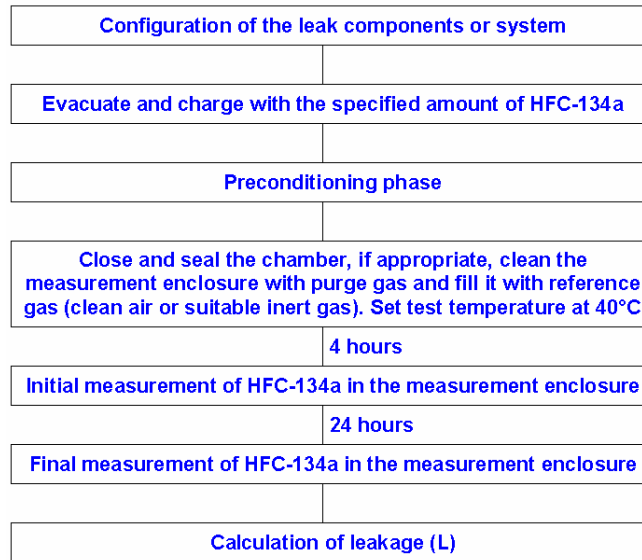
Leakage test (Reg. 2006/XX/EC)

▪ Additional provision for compressors

- For lubrication and seal running-in, compressor may be run, between preconditioning and test during a minimum period of 1 minute at maximum speed of 200 rpm.

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Leakage test (Reg. 2006/XX/EC) Test sequence



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Leakage test (Reg. 2006/XX/EC)

- The leakage flow rate of a component is calculated as a function of:
 - Volume of the enclosure
 - Initial concentration of HFC-134a, P and T
 - Final concentration of HFC-134a, P and T

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Leakage test (Reg. 2006/XX/EC)

- **Overall results of tests**
 - **Final result of the test to refer to real driving conditions**
 - **Taking into account the ARMINES study for ACEA, a correlation factor has been calculated:**
CF = 0.277

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Further steps

- **US STANDARD SAE J2727**
- **Provides a R134a MACs Leakage Chart and defines a system rating based upon the technology used**
- **In principle, it is not intended to measure the refrigerant emissions**

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Further steps

- If harmonisation is sought, SAE standards J2763 and J2764 (introducing a test procedure for determining the leakage rate of HFC-134a from MAC systems and components) could perhaps be considered

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Thank you

Thank you for your attention

http://ec.europa.eu/enterprise/automotive/index_en.htm

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