



Informal document No. **GRPE-61-20**  
(61<sup>st</sup> GRPE, 10-14 January 2011,  
Agenda item 6(e))

European Commission

Enterprise and Industry  
Directorate General

# **Mobile Air-conditioning (MAC): Development of an Emission test procedure**

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# MAC test procedure: why?

- *Communication of the Commission on the review of the Community Strategy to reduce CO2 emissions from passenger cars and light-commercial vehicles of 2 February 2007 =>*
- Euro 5/6 Regulation 715/2007: pollutant emissions to be limited under normal conditions of use (e.g. use of MAC in “real driving” conditions) =>
- **Commission has to prepare a regulatory proposal for the reduction of emissions from the use of MAC systems**
- Basis of this proposal is a MAC test procedure

# MAC test procedure: objectives

- Cost-efficient
- **Should incentivise reduction of emissions resulting from MAC use in real driving:**
  - No “academic” exercise trying to provide the best possible accuracy for environmental impact of MAC use
  - **But designed such that technical measures reducing/not-reducing “MAC emissions” established by the test procedure reduce/do-not-reduce “MAC emissions” in real driving => proper “ranking” of MACs**
  - Encourages “good and appropriate” technology
- **Suitability for “virtual testing”, which may be developed in parallel or at a latter stage (i.e. availability of virtual testing is no condition for future legislation!)**
- Assessment of the whole vehicle, including the impact of non-MAC components such as glazing or insulation

# MAC test procedure: state of play

- Consortium of contractors led by TNO, including partners like TUG and the JRC, together with stakeholders has developed test procedure, report is available on UNECE website
- **Achievements:**
  - **Compares MAC on/off fuel consumption**
  - **Can be run on “normal” chassis dyno**
  - **High reproducibility/repeatability**
- **Main characteristics:**
  - **No NEDC but constant speed cycle (e.g. idling, 50, 100 km/h)**
  - **Ambient temperature < 30° C**
  - **Solar load calculated based on glazing parameters and simulated by variation of interior temperature or MAC mass flow**
  - **Results mathematically corrected for “small” variations of actual test parameters (vehicle speed, ambient temperature/humidity, ...)**

# MAC test procedure: next steps

- Open test issues (a selection):
  - Outlet vent or cabin temperature as test target?
  - Pre-conditioning (e.g. NEDC provisions)?
  - Test tolerances?
  - Number of tests?
  - => Pilot test phase
- Other issues:
  - Future “electric” MAC: SOC of battery,...
  - Credit for “low ambient temperature” (e.g.  $< 15^{\circ} \text{C}$ ) MAC management?
  - How to present results to the consumer ?

# MAC test procedure: pilot phase

- **Multi-lab pilot phase:**
    - Assessment of feasibility, repeatability, reproducibility
    - Define open issues
    - Assessment of “proper” MAC ranking capability (?)
  - **Participation:**
    - Industry (e.g. vehicle manufacturers, suppliers)
    - Technical services
    - Research institutes
    - European
    - International
- => Test protocol to be made available on UNECE website, for participation please contact European Commission & contractor:**  
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