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° 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: nikolaus.steninger@ec.europa.eu & sebastiaan.bleuanus@tno.nl