OICA comments for the PMP meeting 7/8 Oct 2007

It is becoming increasingly difficult to comment on the detail of the regulations and the associated calibration / accumulation of errors document as OICA members do not have fully integrated PMP PN measurement systems available and commissioned to date. A significant number of OICA members are anticipating installation and commissioning of the PN measurements systems during Q1 2008, with the rest following in Q2. Accordingly, members are planning various test programmes and an internal round robin to evaluate the equipment, variability and calibration procedures starting Q3 2008 (anticipated). Whilst a few members have PMP-like systems, the particle experts agreed that it is not appropriate to run the round robin on the PMP-like systems since it will not be known what variability is due to the differences in measurement systems (since they can not be run in parallel) and which are the differences due to the equipment being operated slightly differently. It may be, that as an outcome of the industry test programmes, OICA will propose modifications / enhancements to the calibration procedures and to the ECE-83 particle number test procedure through the UN-ECE GRPE meetings. We hope that these will be discussed and incorporated at the appropriate time.

Specifications:
CPC +/= 5% error (strongly preferred over the current +/- 10% error). Note: error quoted for CPC supplied to one VM is approx 4% at 1000 # /cm3 and 1.7% at 10 000 # /cm3

ECE-83 PMP

- CPC +/= 5% error (strongly preferred over the current +/- 10% error). Note: error quoted for CPC supplied to one VM is approx 4% at 1000 # /cm3 and 1.7% at 10 000 # /cm3
- Concentration Reduction Factor – the regulatory text must explain how to use the Concentration Reduction Factor to compensate for the losses
- Minimum Dilution Factor for PND1 should be revised – it should be allowed to be lower than 10 since as long as the particle number concentration to the CPC inlet is less than 10,000 #/cm3 and the 99% C40 material reduction is achieved.
- Higher dilution ratios – the error will be more than 10%
- Should the maximum dilution be limited according to the errors ? Needs to be evaluated. Note: a dilution ratio of approx 1000:1 enables measurement of diesels without DPF.

Calibration – general comments

- Difficult to comment further in detail comments until we have the opportunity to test and validate the procedures. Industry planning internal round-robin for 2008.
- Procedure still contains many unknowns.

Particle number calibration document:

- Not possible to include below 1000 # /cm3 in primary calibration – still assumed linear (software bugs can not be ruled out).
- Primary calibration methods with electrometer/SMPS inadequately documented
- Material for calibration – IAST paper at Zurich ETH conference showed oil has the steepest efficiency curve, NaCl is flatter. Impacts D_{50} point i.e. 23 nm, and of less concern re D_{90} (i.e. 41 nm). Therefore important to specific precisely the calibration material.

- Validation: linearity check should be deleted from validation procedures but remain in the calibration procedures. The linearity check is very time consuming and requires use of the stable particle source. OICA does not believe this is useful to repeat at the monthly validation checks.
- Particle generation sources over 10,000 #/km can fluctuate – it would be interesting for OICA to see how this is managed by other parties especially at high dilution.

Volatile Particle Remover calibration document:

- Validation section needs to be slimmer with faster procedures than the full calibration procedures
    - allow validation of dilution using the gas check – in this case would need the gas dilution factors from the manufacturers. OICA notes that whilst gas and particle dilution factors may be different, this is sufficient for a validation check since it is to check that the dilution efficiency hasn't changed.
- Higher dilution ratios – the error will be more than 10%
- Concentration reduction factor: 50nm +/- 20% (seems too wide)
- Concentration reduction factor of VPR should be limited by upper values in order to suppress the solid particle loss of VPR. Upper limits of concentration reduction factor (fr or fr(100)) should be defined.
- Should the maximum dilution be limited according to the errors ? Needs to be evaluated. Note: a dilution ratio of approx 1000:1 enables measurement of diesels without DPF.
- What does a concentration reduction factor curve look like ? (will it cover interim points ?)
- Aerosol generator (p10) needs 10 minutes stabilisation and a tighter spec. Procedure as written will induce unnecessary errors.
- No overall specification for concentration reduction factor for VPR – could this lead to any issues ?
- Minimum Dilution Factor for PND1 should be revised – it should be allowed to be lower than 10 since as long as the particle number concentration to the CPC inlet is less than 10,000 #/cm3 and the 99% C40 material reduction is achieved.

OICA
05 Oct 2007