Results of the PEMS PM Pre-Pilot program

To support the PEMS PM Pilot Program, DG JRC conducted a Pre-Pilot Program with the collaboration of one of the ACEA's members (IVECO), and PM instrument manufacturers. The aim of the activity was to look into all the logistical necessary to mount both the PEMS PM and PEMS gaseous equipment in a HDV, and to verify the good functioning of the system. One gaseous PEMS and four candidate PEMS PM instruments were operated together on the same vehicle and the experience was shared with all the participants on the PEMS PM Pilot program.

The Pre-Pilot program was run at the JRC Vela 7 and on the roads around the JRC-flops site. It also constitutes part of the work performed to complete the research on the introduction of PEMS PM measurement in the PEMS Procedure for Euro VI. This program was run after the successful completion of the laboratory evaluation program with the identifications and recommendations of the candidate principles [1-3], and within the validation program (PEMS PM Pilot Program[4]).

**VELA 7 testing:**

The vehicle was equipped with 4 different PEMS PM instruments available:

- AVL MOV EPM (AVL MOV/AVL PM)
- Control System PEMS PM (CS-PSM)
- Horiba TPM (HOR/DEG) – Not available for VELA 7 testing
- Semtech Ecostar (ECO) – Not available for VELA 7 testing
- SIMTECH DS

A detailed description of the PEMS PM instruments can be found in the JRC report on [1-3].

VELA 7 reference instrument: A PMF compliance instrument is used to measure particle number (AVL APC-485) + CVS

**On-road testing:**

Total # of on-road tests: 7

Comparison PM results (g/h and g/kWh)

Conclusions:

1. In general terms, correlation between PEMS PM instruments with VELA PM reference system was acceptable. All tests were performed at IVECO, and the four PEMS PM instruments (HOR/DEG). A good correlation between the VELA 7 and the CS PS was also found (r2>0.9), while for the case of the correlation between VELA 7 and the MISS is not as satisfactory (r2>0.6). It must be noted that the correlation factor (r2) between the real time signal from CS PS and the AVL MOV (MSS) for all the hot WHVC tests is larger than 0.7, while in the case of the correlation (r2) between the real time signal from VELA 7 and the CS PS is larger than 0.8.7.

2. The relationship between the conformity factors for on-road test show a bigger spread in relation to results shown in Figure 7, but still in good agreement with each other. This is probably caused by the fact that the AVL MOV (MSS) signal introduces some additional variance which is reflected in the calculation of the CF (work-based window with a length equal to the ETC reference value). The CFVs standard deviation on averaged values along the on-road tests is 10%.

**References:**

3. M Forri, S Alessandrini, F Mognato, H Demircioglu, B Ghieischeku EU-PEMS PM evaluation program - Third report: further study on post DPF/PM/PM evaluation 2011, Joint Research Centre, EUR 248838EN

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