

Submitted by the IWG on PMP



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agenda item 7

GRPE 71ST SESSION

PMP INFORMAL GROUP PROGRESS REPORT TO GRPE

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Joint
Research
Centre

PMP recent meetings

4/5-March-2015: PMP 35th F2F

11-May-2015: PMP 36th telco

Next planned meeting:

37th Meeting – f2f in Brussels

7th / 8th October 2015



Non-exhaust particle emissions

(Particles generated as a result of brake wear and tyre/road interaction)

Background

Following the GRPE-69-23 Document (5-6 June 2014) the PMP informal Group has focused its work on 4 working items (WI):

- WI-1: Investigation of typical driving patterns and in particular of typical accelerations/decelerations
- WI-2: Compilation and monitoring of on-going research projects on non-exhaust traffic related particle emissions
- WI-3: Networking and exchange of information with experts in the field of non-exhaust traffic related particle emissions
- WI-4: Development of a set of recommended measurement techniques and sampling procedures

WI 1 - INVESTIGATION OF “TYPICAL” DRIVING PATTERNS

- In order to harmonize future studies and improve the comparability of results “typical” driving patterns will be investigated
- List of parameters to be investigated defined. Information on these parameters available on the UNECE website
- Analysis of WLTP database on-going – results to be presented at the next f2f meeting
- Other activity data being collected from different sources (EU funded projects, in-house testing, GPS acquired data) in order to gain information about additional parameters
- The results will be compared with the existing industrial standards for braking and tyre assessment



WI 2 - COMPILATION AND MONITORING OF ON-GOING RESEARCH PROJECTS

- Several research projects on-going, either funded by EU or by single companies/industrial associations
- Objectives and preliminary results are being presented at the PMP meetings
- Information on these projects available on the UNECE website, PMP section

WI 3 - NETWORKING AND EXCHANGE OF INFORMATION WITH EXPERTS IN THE FIELD

- In order to properly address non-exhaust particle emissions there is a need to involve relevant experts
- Several experts from the industry and some from research institutes and universities have been already contacted and have agreed to follow the activities and contribute with their knowledge to the work done by the PMP group
- A list of experts has been created in order to enable and facilitate the communication between them and the PMP members. The list is available on the UNECE website

WI 4 - DEVELOPMENT OF A SET OF RECOMMENDED MEASUREMENT TECHNIQUES AND SAMPLING PROCEDURES

- In order to harmonize future studies and improve the comparability of results, the development of a set of recommended methodologies for particle generation and sampling, as well as of recommended measurement techniques is considered necessary
- A draft document with a brief description of all the proposed/employed methods has been created
- A comprehensive study of the suitability, advantages and limitations of most promising methods will follow with the objective of make recommendations on their use

NEXT STEPS

- Investigation of typical driving condition relevant for non-exhaust particle generation to be completed by the end of the year
- Collection of data and information on on-going projects will continue
- Scope of the activity in PMP has to be better defined
 - ✓ So far the activity has mainly been focused on collecting data and information on both relevance for human health and sampling/measurement techniques for research purposes – currently no plan in PMP for the development of standardized methodologies for regulatory purpose

CURRENT SITUATION AND TREND

Brake wear emissions:

- ✓ Industry (OEMs and instrument manufacturers) actively working on the development of brake dyno rigs to assess particle emissions from brake systems
- ✓ It is likely that in the near future data and experience acquired in these activities may represent a good basis for the development, in case this is considered necessary, of a standardised measurement procedure based on the brake dyno concept
- ✓ Other options (i.e. measuring emissions from whole vehicles on a chassis dyno or on road) has to be considered in parallel to get a better understanding of the real driving emissions produced by brakes

CURRENT SITUATION AND TREND

Tyre and road wear particle emissions:

- ✓ Much more challenging situation - Particles mainly belonging to the coarse fraction and difficult to separate tyre and road contribution.
- ✓ A standardized methodology (ISO TS) for measuring the contribution of TRWP on air pollution for research purposes is under development
- ✓ No clear pathway for the development of a standardized methodology for the direct measurement of particle emissions of TRWP (e.g. particle mass and/or particle number)

Exhaust particle emissions

(Solid particles generated by the combustion process in internal combustion engines)

Regeneration

- Presentation on potential issues related to the measurement of PN during regeneration (30th)
- Summary of potential areas of investigation (30th)
 - *Euro 6 vehicles, robustness of PMP, emission levels*
 - *Preliminary tests at JRC confirm robustness of PMP*
- Proposal of experimental plan at JRC (31st)
 - *Need of Euro 6 vehicles with regeneration indications*

Calibration of PN systems

- Review of open issues (30th)
- Presentation of key areas for improving the calibration procedure (33rd)
- JRC prepared a questionnaire for optimizing procedures and minimizing areas of future investigation.
- Based on the answers some decisions were taken. A few open points remain:
 - CPC calibration material
 - VPR volatile removal efficiency check
 - WLTP new requirements (penetration, poly. check)

Sub23nm measurements

Is there a need?

- *There are particles <23nm - Sometimes they are an artifact*
- *“Real solid particles” are on average 30-40% over a test cycle*
- Monitoring of newer technologies goes on (at JRC)
 - *3 DPF, 15 gasoline (9 Euro 6), 10 2-wheelers*
 - *No alarming high ratio of sub-23 nm particles*

Sub23nm measurements

Can we measure <23nm?

- *Artifacts were confirmed - Existing systems with small modification can measure below 23nm (from 10 nm at least with 100x10 PCRf) - Below 10 nm the measurements will have high uncertainty*
- *From 10 nm some areas need investigation (e.g. PCRf definition, catalytic stripper specs, need of new calibration procedure)*
- *Catalytic stripper technologies are investigated with engine exhaust (2 DPF, 7 gasoline, 6 2-wheelers)*
- *For >10nm measurements small differences can exist (e.g. at cold start)*

PN Counting from Raw Exhaust via Fixed Dilution

- Interest in this approach confirmed by some engine manufacturers and some instrument manufacturers
- 01 Series of amendments to Reg. 132 already includes such possibility but the procedure is not defined
- First analysis of potential issues presented during the last phone conference – Correlation with other methods (CVS and partial flow system) and advantages/disadvantages to be checked – Additional data required