



Diesel efficiency improvement with Particulates and emission Reduction

EUROPEAN COMMISSION  
Horizon 2020

GA No. 723976



<b>Deliverable No.</b>	dieper D3.2	
<b>Deliverable Title</b>	Quantification method for vehicle sub 23nm emissions	
<b>Deliverable Type</b>	REPORT	
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<b>Status</b>	Final	2018-03-06
<b>Checked by</b>	Daxid Xuereb	2018-02-13
<b>Submitted to Executive Board</b>	All WP-Leader	2018-02-16
<b>Approved by Executive Board (EB)</b>	Approved and accepted by all members of WPL Board	2018-02-26
H2020-GV-2016-INEA -		

## Diesel efficiency improvement with Particulates and emission Reduction

**Acknowledgement:**

The author(s) would like to thank the partners in the project for their valuable comments on previous drafts and for performing the review.

**Project partners:**

- 1 - AVL - AVL List GmbH - AT
- 2 - REN - Renault SAS - FR
- 3 – IFP – Energies nouvelles – IFPEN – FR
- 4 - CMT - Universitat Politecnica de Valencia – ES
- 5 - JM - Johnson Matthey Plc - UK
- 6 – CONTI – Continental Automotive France SAS – FR
- 7 – BOSCH – Robert Bosch GmbH - DE
- 8 – IM-CNR - Consiglio Nazionale delle Ricerche – IT
- 9 – FMF - FPT Motorenforschung AG – CH
- 10 – IVECO – IVECO S.p.A. - IT
- 11 - RCD - Ricardo Plc – UK
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- 13 – SIE - SIEMENS INDUSTEY SOFTWARE SAS – FR
- 14 - VIF – Kompetenzzentrum – Das Virtuelle Fahrzeug, Forschungsgesellschaft mbH - AT
- 15 - UNR - Uniresearch BV - NL
- 16 - CRF – Centro Ricerche SCPA - IT

**Disclaimer:**

*This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723976.*



## Publishable Executive summary

One objective of Work Package 3 of the dieper programme is the development of an advanced diesel particulate filter (DPF) technology capable of effectively removing particulates, including nanoparticles >10 nm, as opposed to the current >23nm legislation, and achieve 80% lower particle number emissions than the Euro 6 limit.

The measurement of the number of particles >23nm in diameter is well established and encompassed in legislation. EU programmes such as DownToTen [3] are researching and developing equipment capable of measuring down to 10nm. However, this equipment is not yet available and other techniques need to be applied to measure sub 23nm particles to meet the dieper objectives for aftertreatment development.

In this report a Cambustion DMS500 particle analyser is compared to a conventional Horiba SPCS for the measurement of >23nm particles. Using the DMS500 >10nm particle emissions are analysed and their significance and the impact of their inclusion in the total PN numbers is reviewed.

A reasonable correlation between the SPCS and DMS500 analysers is achieved, except at the start of the test, where the DMS500 analyser measures higher emissions. A post-processing technique to resolve the accumulation (solid) from the nucleation mode particles to try and improve the correlation is investigated, but only improves the agreement slightly. The inclusion of 10-23nm particles adds to the total PN and the bulk of the emissions seem to occur at the start of the test when a catalysed diesel particulate filter is used as part of the exhaust aftertreatment system. The difference between the SPCS and measurements became greater with increasing soot filter loading, corresponding to lower tail pipe PN emissions. The proportion of the 10-23nm particulates also increases, but not the total quantity, as tail pipe PN emissions reduce.