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Working group for the development of a real driving emissions test procedure for light-duty vehicles (RDE-LDV): scope mandate

(DRAFT !)

1. BACKGROUND

At the workshop on the "future approach to automotive emissions" of 23 November 2010 the Commission (JRC) and some Member States have presented data demonstrating that Euro 5 vehicles currently being on the market do not comply with regulatory emissions limits under real driving conditions. These Euro 5 data confirm similar data collected previously on Euro 3 and Euro 4 vehicles, which show that e.g. real driving NOx emissions of light duty diesel vehicles did not change much, if at all, over the last decade, despite ever more stringent regulatory limit values.

As a consequence Article 14(3) of the Euro 5/6 Regulation 715/2007/EC requires the Commission to adapt type approval procedures such that they reflect real driving emissions of regulated pollutants (currently CO, HC, NOx, PM/PN). In this context Recital (15) makes explicit reference to the use of "portable emission measurement systems" (PEMS) and "not-to-exceed" regulatory concepts.

The development of procedures specifically assessing the real driving emissions of regulated pollutants has been excluded from phase 1 of the World Light duty Test Procedure (WLTP) at UNECE in June 2009. Basically real driving emissions could be addressed in phase 2 of this process, which runs from 2014 – 2022 (still to be confirmed by contracting parties). Given the massive air quality problems in the European Union and the regulatory provisions of Euro 5/6 Regulation 715/207/EC, supported by the Communication on the application and future development of Community legislation concerning vehicle emissions from light-duty vehicles (...) (2008/C 182/08) of 19 July 2008, it is obvious that such a time frame is not acceptable from a European perspective.

Therefore the development of a "RDE-LDV" procedure, which should assess real driving emissions of light duty vehicles in a robust manner with a view to its regulatory implementation at the mandatory Euro 6 dates, is launched at a European level. It should be emphasised that at the current stage no final decision about the method-

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ology of his procedure has been taken, e.g. whether a "PEMS-like" test or other tests should be used.

The Commission will of course support the consideration of the developed European RDE-LDV for a respective globally harmonised procedure in phase 2 of the WLTP process.

2. MANDATE OF THE RDE-LDV GROUP

The RDE-LDV working group is open to stakeholder experts and should accompany the development of a RDE-LDV test procedure by the JRC. In particular, the group should provide technical advice and a platform for the exchange of information and contributions of stakeholders that will be discussed and agreed during the process.

The group should focus on technical issues of the RDE-LDV test procedure. Political elements, e.g. the question of legal implementation for Euro 6 vehicles, will have to be decided elsewhere.

3. ORGANISATIONAL MATTERS

RDE-LDV working group will meet regularly, according to demand, either face-to-face or via audio/web or video conferences. A web-based extranet (Circa) will be established for the exchange of documents.

Stakeholders will have to provide their own travel costs if they do not receive an explicit promise of the Commission for coverage of these costs in exceptional cases.

JRC Scientific and Technical Reports

Analyzing on-road emissions of light-duty vehicles with Portable Emission Measurement Systems (PEMS)

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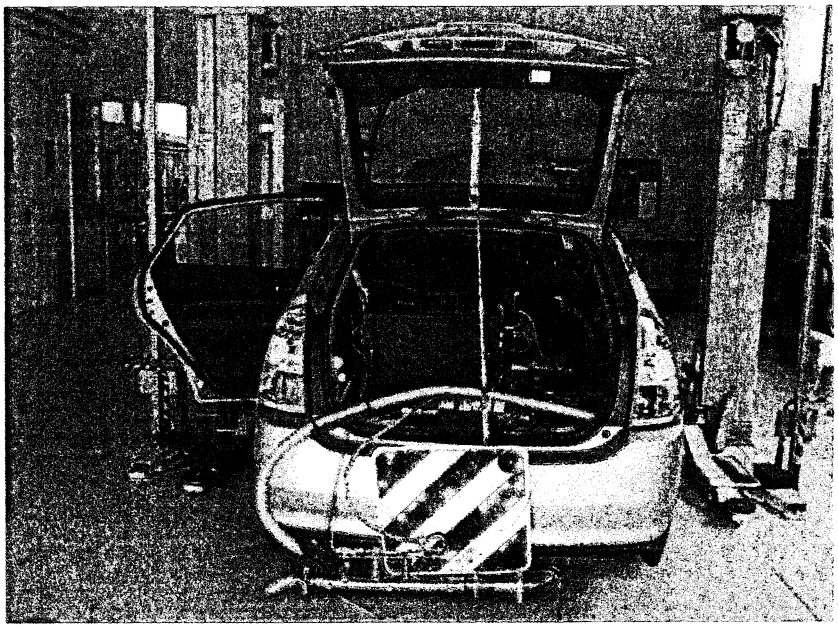

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Executive summary

Emissions testing in the laboratory forms an essential part of the European type approval procedure for light-duty vehicles. The approach yields reproducible and comparable emissions data and provides clear design criteria for vehicles that have to comply with applicable emission limits. Although emission limits have become increasingly stringent in the past decade, road transport remains the most important source of urban air pollution in Europe with respect to NO_X (nitrogen oxides) and CO (carbon monoxide). Several studies have indicated that in particular on-road NO_X emissions of light-duty diesel vehicles might substantially exceed emission levels as identified during emissions testing in the laboratory. Still, a comprehensive analysis of on-road emissions of light-duty diesel and gasoline vehicles is unavailable to date.

This report addresses the existing knowledge gaps by using Portable Emission Measurement Systems (PEMS) to analyze the on-road emissions of 12 light-duty diesel and gasoline vehicles that comply with Euro 3-5 emission limits and comprise small and midsize passenger cars, two transporters, and a minivan. The selected vehicles where tested on four test routes, representing rural, urban, uphill/downhill, and motorway driving.

The PEMS results indicate that average NO_X emissions of diesel vehicles (0.93 ± 0.39 g/km), including Euro 5 diesel vehicles (0.62 ± 0.19 g/km), substantially exceed respective Euro 3-5 emission limits. The observed deviations range from a factor of 4-7 for average NO_X emissions over entire test routes up to a factor of 14 for NO_X emissions of individual averaging windows. By comparison, on-road NO_X emissions of gasoline vehicles as well as CO and THC (total hydrocarbon) emissions of both diesel and gasoline vehicles generally stay within Euro 3-5 emission limits. The share of NO_2 (nitrogen dioxide) in the total NO_X emissions reaches 60% for diesel vehicles but is substantially lower for gasoline vehicles (0-30%). The tested light-duty diesel and gasoline vehicles emit during on-road testing on average 189 ± 51 g CO_2/km (grams carbon dioxide per kilometre) and 162 ± 29 g CO_2/km, respectively, thereby exceeding the CO_2 emissions as specified during laboratory testing by on average 21 ± 9%. The magnitude of on-road emissions varies depending on vehicle type, operation mode, route characteristics, and ambient conditions. Cold-start emissions of both diesel and gasoline vehicles span over a wide value range; NO_X emissions exceed Euro 3-5 emission limits by a factor 2-14, CO emissions often exceed emission limits, and THC emissions are both below and above Euro 3-5 emission limits.

The PEMS equipment is reliable and provides accurate emission measurements. PEMS are able to verify the proper operation of emission control technologies under a wide variety of normal operating conditions and suitable for testing emissions of novel fuel/engine/after-treatment/powertrain technologies (e.g., parallel/serial (plug-in) hybrid vehicles. PEMS analyses, including the presented results, may also be useful for updating current transport emission models and inventories. The PEMS procedure for light-duty vehicles is, however, relatively new and requires further refinement before being applied at large scale. Future PEMS applications may particularly focus on polluting driving modes such as cold start at very low temperatures and driving at very high speed as it occurs on the German Autobahn.

The findings of this report indicate that the current laboratory emissions testing fails to capture the wide range of potential on-road emissions. A promising remedy for this problem may be attained by supplementing laboratory emissions testing with complementary test procedures such as PEMS on-road emissions testing. This report provides a first step into that direction, thereby contributing to a more comprehensive EU policy that assures compliance of light-duty vehicles with emission limits under normal conditions of use.

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