RECOMMENDATION

WP 29 RECOMMENDATION xxx/XX of dd/mm/yyyy on the measurement of particulate number emission of diesel vehicles with a wall flow particulate filter during periodic technical inspections.

WP 29

Having regard to the 97 Agreement Rule 1 emission testing in Periodic Technical Inspection

Whereas:

* Ultra-fine particulates in the air being disadvantageous to the health of citizens.
* Wall flow particulate filters are very effective in trapping ultra-fine particulates from diesel and gasoline cars, they reduce the particulate emissions on average more than 90%.
* Nearly all Euro 5 and Euro- 6 light duty diesel vehicles and Euro VI heavy duty diesel vehicles are equipped with a wall flow particulate filter.
* There is no ban on manipulating and removing wall flow particulate filters for diesel cars, such that there is for AdBlue systems.
* Wall flow particulate filters may fail by structural defects in diesel vehicles[[1]](#footnote-1).
* If maintenance is needed, wall flow particulate filters are regularly removed by vehicle owners to save maintenance costs.
* One vehicle with the filter removed pollutes more than 25 to 100 vehicles with correct working filters.
* The periodic technical inspection should be effective to control vehicle emissions.
* Periodic technical inspections are a means to check the emission performance of vehicles over the whole life cycle.
* The current recommended smoke emission or opacity test as described in 97 Agreement Addendum 1 - Rule No. 1 is not suitable for the detection of defective or removed wall flow particulate filters because it has a lack of sensitivity and it was developed for engines with a high particulate emission (without a wall flow particulate filter)[[2]](#footnote-2).
* Reading of On Board Diagnosis (OBD) as described in the 97 Agreement Addendum 1 - Rule No. 1 is not suitable for the detection of defective or removed wall flow particulate filters because this does not detect cracks in a filter or is usually manipulated if the filter is removed.
* Due to the very low particulate emissions of vehicles with a wall flow particulate filter, more sensitive measuring instruments are needed for detection of defective particulate filters.
* Consideration that it should be possible for alternative equipment reflecting technological progress and innovation to be used, provided that an equivalent high-quality level of testing is ensured.
* Emission tests in the periodic technical inspection must be robust, simple, fast and cost effective.
* Since 2011 a particulate number measurement is part of type approval tests of diesel vehicles on the engine or chassis dynamometer (as described in UN/ECE Regulation 83) and can be marked as the most sensitive particulate measuring technology.
* There is a good correlation between PN measured during NEDC and WLTC cycles and the PTI PN measurement measured at idle speed[[3]](#footnote-3).
* In 2019 The Netherlands published legislation for a new particulate number test procedure for road side inspections and the periodic technical inspection[[4]](#footnote-4). Form July 1, 2022, the measurement of particles in the exhaust gases of diesel cars is mandatory in the Periodic Inspection
* Different solutions for all necessary verifications on the PTI PN equipment such as type approval, initial verification, subsequent verification and routine testing exist.
* The costs of a particulate number test in the periodic technical inspection are expected to be similar or lower as an emission test with an opacimeter.

Recommends:

* Referring to 97 Agreement Rule 1 revision 2 the competent authorities of the Participating Country or the testing centre may carry out the roadworthiness test covering the exhaust emissions of diesel vehicles with a wall flow particulate filter, using a particle number tailpipe test, instead of the recommended exhaust gas opacity test during free acceleration or the equivalent reading of OBD if approved by a competent authority, as the particle number tailpipe test ensures a higher quality level of testing.
* The particle number tailpipe test is executed at low idle speed in the tailpipe of a diesel vehicle with a particle number counter measuring solid particles. The measuring range of the particle counter is 5,000 to 5,000,000 particles per cm3 (#/cm3). The particle number concentration is measured with a minimum measuring frequency of 1 Hz. The average particle emission is determined over a defined measuring time. The recommended particle number limit values are in the range of 250,000 to 1,000,000 #/cm3. If the measurement signal exceeds the limit value by a factor of two, the measurement may be interrupted immediately and the test has not been passed.

1. SAE paper 2019-01-1190 Published 02 Apr 2019, Feasibility Study of a New Test Procedure to Identify High Emitters of Particulate Matter during Periodic Technical Inspection. [↑](#footnote-ref-1)
2. <https://repository.tudelft.nl/view/tno/uuid%3A1f0bc66f-6e40-441e-8793-eb3c20b1f63b> [↑](#footnote-ref-2)
3. Giechaskiel et al., Particle number measurements in the European legislation and future JRC activities, CE-2018-301. DOI:10.19206/CE-2018-301 [↑](#footnote-ref-3)
4. <https://zoek.officielebekendmakingen.nl/stcrt-2019-63953.html> [↑](#footnote-ref-4)