



**Urban Transport Related Air Pollution Group (UTRAP)  
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This paper, prepared by the Road Safety Authority, for the Urban Transport Related Air Pollution Group, discusses the subject of **'Changes to EU Legislation with respect to more accurate measurement of vehicle emissions'**

**Background:**

During 2007, EU legislation entered into force that prohibited the use of 'defeat devices', namely Regulation (EC) 715/2007<sup>1</sup>. Regulation (EC) 715/2007 outlines the type approval requirements of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6). In this regulation 'Defeat Device' has been defined as:

*"any element of design which senses temperature, vehicle speed, engine speed (RPM), transmission gear, manifold vacuum or any other parameter for the purpose of activating, modulating, delaying or deactivating the operation of any part of the emission control system, that reduces the effectiveness of the emission control system under conditions which may reasonably be expected to be encountered in normal vehicle operation and use;"*

According to the 'dieselgate' Briefing Paper by the European Court of Auditors, the emissions crisis, widely known as 'dieselgate', broke in September 2015, when the United States Environmental Protection Agency (US EPA) formally reported that Volkswagen (VW) violated US emissions standards. On September 18th, 2015, the US EPA reported that VW had installed illegal "defeat devices" in hundreds of thousands of engines in the United States since 2009.

In TDI diesel vehicles, software allowed emissions control to activate during laboratory testing which caused the NOx output to meet the required standards during type approval testing, but real driving emissions were found to be up to 40 times the amount measured in the laboratory. The vehicles had engine control units that could switch from good fuel economy with high NOx Emissions to low-emission compliant mode when the vehicles system detected an emission test was being undertaken. This particularly affected the EA 189 engine.

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<sup>1</sup> Regulation (EC) No 715/2007 of the European Parliament and of the Council of 20 June 2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information.

The software, (affecting Volkswagen, Porsche, Audi, Seat and Skoda brands) was reported to be deployed in approximately 11 million diesel vehicles worldwide, between 2009 and 2015.

#### *Changes to the EU Test Process:*

The 'New European Driving Cycle' (NEDC) has been used up to that point in measuring emissions. This was replaced with the Worldwide Harmonised Light Vehicle Test Procedure (WLTP) in September 2017. New cars are now type approved under WLTP, which is a more rigorous test for measuring pollutant levels from cars. WLTP introduced much stricter measurement conditions, including higher speeds and more representative driving behaviour.

#### *PEMS test Equipment:*

According to a Joint Research Centre (JRC) Scientific and Policy Report titled '*A complementary emissions test for light-duty vehicles: Assessing the technical feasibility of candidate procedures*', light-duty diesel vehicles emit substantially more nitrogen oxides (NOx) than permitted by regulatory emission standards. This was demonstrated by means of on-road emissions tests conducted by the JRC with portable emission measurement systems (PEMS) equipment<sup>2</sup>.

To address this concern, in 2011, the European Commission set up the Real-Driving Emissions - Light-Duty Vehicles (RDE-LDV) working group with the aim of developing a complementary emissions test procedure for light-duty vehicles. Following an assessment, the European Commission and Member States concluded that the RDE-LDV test procedure should contain an element of PEMS on-road testing.

Under Real Driving Emissions (RDE), PEMS are attached to a vehicle to check that the emission levels of NOx and particle numbers (PN) under real driving conditions.

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<sup>2</sup> Rubino, L., Bonnel, P., Hummel, R., Krasenbrink, A., Manfredi, U., de Santi, G., Perotti, M., Bomba, G. (2007): *PEMS light-duty vehicles application: experiences in downtown Milan*. SAE International. Technical Papers 2007-24-0113.  
Rubino, L., Bonnel, P., Hummel, R., Krasenbrink, A., Manfredi, U., de Santi, G. (2009): *Onroad emissions and fuel economy of light-duty vehicles using PEMS: chase-testing experiment*. SAE International Journal of Fuels and Lubricants 1(1), 1454-1468.



**Figure 1** The installation of PEMS equipment on vehicles<sup>3</sup>

*Changes to EU Legislation during 2016:*

Regulation (EU) 2016/646 entered into force on 10 May 2016 and amended existing EU legislation on emissions from new light passenger and commercial vehicles (Euro 5 and Euro 6). Regulation (EU) 2016/646 established requirements for Real Driving Emissions (RDE) testing and supported the introduction of portable emissions measurement systems (PEMS) for use in RDE.

Conformity factors were introduced through Regulation (EU) 2016/646, and this has been the source of some debate since. The first step conformity factor of 2.1 applied 4 years after the mandatory application of the Euro 6 standards. The second step conformity factor of 1 + the uncertainty margin followed 1 year and 4 months after the first step. According to Recital 10 of Regulation (EU) 2016/646, this was to allow manufacturers to gradually adapt to the RDE rules.

Regulation (EU) 2016/646 is a non-legislative act. Non-legislative acts are decisions that are adopted, generally by the European Commission, in this case following delegation. The delegated act may enter into force only if no objection has been expressed by the European Parliament or the Council within a deadline set by the legislative act.

*European Court of Justice:*

According to Press Release No 198/18 from the General Court of the European Union (General Court) on 13 December 2018, in Regulation (EU) 2016/646 the Commission defined the not-to-exceed (NTE) emission limits for NOx during the new RDE tests to which car manufacturers must subject light passenger and commercial vehicles, in particular in the context of approving new vehicle types.'

<sup>3</sup> Source JRC VELA lab (left), Sensors Inc. (right)

According to the press release from the General Court, RDE tests seek to address the finding that laboratory tests do not reflect the true level of pollutants during real driving and to thwart any use of ‘rigged software’. The Commission set limits on the basis of the limits defined for the Euro 6 standard to which it applied correction coefficients in order to take account of, in its view, statistical and technical uncertainties.

An action for annulment before the General Court was brought by the cities of Paris, Brussels and Madrid, disputing the emission limits adopted by the Commission. They submit that the Commission was not entitled to adopt the nitrogen oxide (NOx) emission values selected because they are less demanding than the limits set by the applicable Euro 6 standard.

On 13 December 2018 the General Court upheld the actions brought by the cities of Paris, Brussels and Madrid and annulled in part the Commission’s regulation setting NOx emission limits for the tests for new light passenger and commercial vehicles.

The General Court concluded that the Commission had no power to amend those limits for the RDE tests by applying conformity factors. The General Court ruled that the Commission did not have the power to amend the Euro 6 emission limits for the new RDE tests. The ECJ ruled that the introduction of conformity factors through a delegated act was not legally permissible as it was amending an essential element of the Regulation 715/2007, i.e. artificially increasing the NOx emission limits by introducing a conformity factor.

The General Court justified maintaining the effects of the annulled provision in relation to the past and for a reasonable period in order to enable the relevant legislation to be amended, limited to twelve months from the expiry of the period for bringing an appeal against the present judgment or, if an appeal is brought, from the date on which it is dismissed.

*Draft EU Legislation under consideration:*

The European Commission has developed a new proposal which empowers the Commission to review the conformity factor and again introduces conformity factors into Regulation (EC) 715/2007.

The JRC has been engaged to validate the conformity factor (uncertainty margin) that would realistically account for measurement uncertainties. According to the ‘*Real driving emissions: 2017 assessment of Portable Emissions Measurement Systems (PEMS) measurement uncertainty*’ report published by the Joint Research Centre (JRC), a NOx measurement uncertainty margin of 0.24 to 0.43



was calculated. This uncertainty margin served as the basis of the conformity factor (a multiplier that takes measurement uncertainties into consideration).

*Recent Update:*

The Committee on the Internal Market and Consumer Protection (IMCO) has provided an opinion on the Commission's proposed amendment to Regulation 715/2007.

The ENVI Committee on the Environment, Public Health and Food Safety have yet to provide an opinion on the proposal.

The JRC has recently produced a report to confirm their opinion on the appropriate value for a conformity factor.

This subject will be discussed in detail at the upcoming UTRAP meeting, including a discussion on next steps at EU level.