

On-road emissions of passenger cars beyond Real-Driving Emissions test

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RDE test procedure using Portable Emissions Measurement Systems (PEMS) has been recently introduced in the EU [EU 1151/2017]. The procedure accounts for a large variety of real-world driving situations covering a 'normal driving' testing space. Regulated RDE tests do however exclude some less frequent driving situations by setting boundary conditions, which define driving situations invalidating an RDE test (e.g., dynamic driving, excessive positive elevation gain, altitude and temperature ranges, etc.). Moreover, current EU RDE only includes emissions of NO_x and PN.

In order to investigate the performance of a series of gasoline and diesel vehicles outside the EU RDE boundary conditions, we have compared their NO_x, NO₂, CO and PN emissions during RDE compliant tests to the emissions obtained during tests that do not fulfill the boundary conditions in terms of dynamicity (too dynamic driving), share of operation (too long urban and/or motorway shares), and altitude gain (too much altitude gain), among others.

Following the introduction of the RDE legislation in EU, the after-treatment systems used in diesel and gasoline passenger cars have undergone though a series of developments to meet NO_x and PN emission requirements. In order to reduce NO_x emissions from the diesel vehicles, the SCR systems are now more intensively used. Other manufactures have opted for combination of LNT and SCR systems to reduce NO_x emissions from their diesel vehicles. On the gasoline side, GPFs are now widely used to reduce PN emissions from GDIs. These new approaches and technologies may lead to, or increase, the emissions of compounds that are not regulated at the moment, or only regulated for the laboratory tests, such as NH₃ and N₂O. For that reason, we installed a portable FTIR along with a PEMS system to measure the emissions of regulated and non-regulated pollutants during on-road operation of modern vehicles.