June 14, 2019

Comments on the update to the heavy-duty vehicles rule on emissions type approval testing: Euro VI, Step E

Dr. Felipe Rodríguez

The International Council on Clean Transportation (ICCT) comments on the draft “amending Regulation (EU) No 582/2011 as regards Auxiliary Emission Strategies (AES), access to vehicle OBD information and vehicle repair and maintenance information, measurement of emissions during cold engine start periods and use of portable emissions measurement systems (PEMS) to measure particle numbers, with respect to heavy duty vehicles.”

The ICCT welcomes the Euro VI, Step E proposal as it brings two crucial elements to the Euro VI PEMS framework: Cold-start emissions and PN requirements. Still, the proposal does not guarantee the Commission’s intent in addressing cold start emissions.

**Cold start evaluation methodology**

As proposed, the data evaluation only starts once the coolant has reached 30°C. The rationale being to align with the cold-start definition on the engine dynamometer, as per UN R49. While the ICCT recognizes that alignment with existing definitions of cold-start is an important aspect, we argue that the current Euro VI-E proposal does not achieve that.

UN R49 establishes heat to be naturally or forcibly removed from the engine and aftertreatment; that is, the engine is allowed to go from a warm state to a colder one. Furthermore, UN R49 establishes a 20 – 30°C range for not just the coolant, but also for the aftertreatment. The Euro VI-E proposal is not in-line with UN R49 as it does not set requirements for the aftertreatment temperature, thereby allowing heat to unevenly build-up in the aftertreatment instead of requiring its removal.

The LDV RDE regulation defines a vehicle conditioning before cold-start. The vehicle must be driven for at least 30 minutes, and then cold soaked between 6 and 56 hours at ambient conditions. The cold-start data evaluation begins at ‘test start’, defined as the first ignition of the engine or movement of the vehicle. The Euro VI-E proposal is not in-line with the LDV Regulation, as the data evaluation does not begin at ‘test start’ and does not require a preconditioning or a cold soak.

---

Although artificial warming up of the emission control systems is prohibited by the proposal, this is not unambiguously defined. By the time the coolant temperature reaches 30°C in a test at -7°C ambient temperature, the aftertreatment warms up close to the activation temperature of 200°C. This is no longer a cold-start and it is not clear if this would constitute an “artificial warming up.”

To align the cold-start definition with existing regulations, the ICCT suggests extending the cold-start temperature requirements to also include the emission control system; and to start the data evaluation at test start.

**Amendment suggestion**

"2.5.5 Vehicle conditioning
Before testing, the vehicle shall be driven for at least 30 min, and then soaked between 6 and 56 hours at ambient conditions"

“2.6.1. Test start
For the purposes of the test procedure, 'test start' shall mean the first ignition of the internal combustion engine or the first movement of the vehicle with speed greater than 1 km/h.

…
The coolant, lubricant and emissions control system temperatures shall not exceed the ambient temperature by more than 2°C nor shall them exceed 30°C at test start. The data evaluation shall start at test start."

**Implementation Timeline**

In the proposal, the implementation of the regulation for gas engines is 24 months later than the implementation for diesel engines. The ICCT is cognizant of the different nature of particulate emissions of gas engines compared to diesel, and of the challenges in piston and ring-pack design to minimize oil combustion and wear. Yet, we disagree about the technical barriers for the applicability of particle filters in gas engines. A 14-year-old field-trial in the US already found that adding an off-the-shelf filter to the aftertreatment of a CNG HD engine (transit bus) reduced the PN emissions without adverse effects. The ICCT acknowledges that the soot and ash cake formation will be different compared to diesel exhaust. Yet, there are lubricant and filter design parameters available to tailor the filtration characteristics. For example, low-ash oil formulations are already available for CNG engines and filter manufacturers have different materials, geometries, and pore characteristics, to satisfy OEMs’ requirements.

The ICCT recommends reducing the difference in implementation between gas and diesel from the currently proposed 24 months to the originally proposed 12 months.