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The potentials of close coupled SCR system and novel PNA for future diesel passenger cars emission legislations

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ABSTRACT

The future emission legislations for diesel passenger cars are likely to include more dynamic test cycles than we have today. From 2017 the emission limits will be measured on the World harmonized Light duty Testing Protocol (WLTP) and Real Driving Emissions (RDE) cycles to give results under more realistic driving conditions.

The current Exhaust Gas AfterTreatment Systems (EGATS) in production to meet EU6c mainly consist of Diesel Oxidation Catalyst (DOC) and close coupled Diesel Particulate Filter (DPF) with an underfloor SCR (ufSCR). Alternatively, a DOC with a close coupled combined DPF filter and SCR on the same substrate -SCRonDPF (cc SCR) can be used. In both configurations, the SCR system provides sufficient NOx reduction over the current test cycle New European Driving Cycle (NEDC) to meet EU6c level, with the ammonia tailpipe slip within the given threshold. The ccSCR is more efficient than ufSCR and provides the potential for fuel consumption reduction at the same ammonia usage. However, for the WLTP or RDE the ccSCR may be unable to meet EU6c emission due to lower volume compared to ufSCR. To mitigate this, additional SCR volume either in a close coupled or under floor position is needed.

The experimental results from a D segment vehicle using three different SCR configurations: ufSCR, ccSCR and ccSCR with the additional ufSCR are presented and potential and limitations of each of configuration are discussed.

The use of innovative passive NOx absorber technology (PNA) in a combination with the above SCR configurations are experimentally tested and results obtained show very high potential in meeting future emission legislations.