REVIEW OF CURRENT EMISSION STANDARDS FOR HEAVY DUTY COMPRESSION IGNITION ENGINES AND FURTHER PROSPECTS FOR THEIR DEVELOPMENT

Rebrov O.Yu., Kalchenko B.I., Rebrova O.M., Chernyatynskyi I.P.
National Technical University
"Kharkiv Polytechnic Institute"

Currently, the EU has Euro VI standards in force, which regulate emissions of harmful substances at levels that should not exceed: NOx – 0.46 g/(kWh), particulate matter by mass – 10 mg/(kWh) and by number – $6 \cdot 10^{11}$ particles/(kWh) and a size of more than 23 nm. From 2028, a gradual transition will take place until May 2029 to the Euro VII standard, which provides for more stringent emission requirements: NOx – 0.20 g/(kWh), particulate matter by mass – 8 mg/(kWh) and by number – $6 \cdot 10^{11}$ particles/(kWh) and a size of more than 10 nm.

In the USA*, federal standards from 2007 are in force with emission standards: NOx – 0.20 g/(bhp·hr), particulate matter by mass – 10 mg/(bhp·hr). At the same time, the state of California has its own standards, according to which, starting from 2024, emissions should not exceed: NOx – 0.05 g/(bhp·hr), particulate matter by mass – 5 mg/(bhp·hr). From 2027, the standards will be agreed at the emission level: NOx – 0.035 g/(bhp·hr), particulate matter by mass – 5 mg/(bhp·hr).

Japan currently has a 2016 standard in place, which provides for emission standards: NOx – 0.40 g/(kWh), particulate matter by mass – 10 mg/(kWh) and by number – 6·1011 particles/(kWh) and a size of more than 23 nm. Further stricter emission standards are not planned to be introduced yet.

China has a CHINA VI standard in place, which fully complies with Euro VI: NOx – 0.46 g/(kWh), particulate matter by mass – 10 mg/(kWh) and a size of more than 23 nm. From 2028, China will implement the CHINA VII standard, which requires emissions of: NOx – 0.46 g/(kWh), particulate matter by mass – 10 mg/(kWh) and by number – $6 \cdot 10^{11}$ particles/(kWh) and a size of more than 10 nm, which is very close to Euro VII.

In South Korea, the standard is at the Euro VI emission level: NOx – 0.46 g/(kWh), particulate matter by mass – 10 mg/(kWh) and by number – $6 \cdot 10^{11}$ particles/(kWh) and a size of more than 23 nm. There are no plans to revise the emission standards for harmful substances in South Korea in the near future.

India in 2020 introduced the Bharat VI standard, which corresponds to Euro VI: NOx - 0.46 g/(kWh), particulate matter by mass - 10 mg/(kWh) and by quantity - $6 \cdot 10^{11}$ particles/(kWh) the particle size is not specified.

In Australia, the Euro VI standard has been implemented since 01.11.2024 for new models and from 01.11.2025 for new registrations. In Brazil, the Euro VI standard has been in effect since 01.01.2022. In Canada, the standard fully complies with the US federal standard. In Ukraine, the Euro VI standard has been introduced since 01.01.2025. Therefore, from January 1, 2025, the registration and first registration of new cars manufactured in Ukraine and imported into the territory is allowed only if they comply with Euro VI standards.

* – in the USA and California, emission standards are specified in British horsepower (~745 W).