

ASPECTS OF TECHNOGENIC AND ECOLOGICAL SAFETY OF THE DPF REGENERATION PROCESS

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The aspects of technogenic and ecological safety of physical and chemical processes, which are a essence and accompanied process of regeneration of particulate matter filters (DPF) for internal combustion engines (ICE), they also caused by follow factors. 1) The features of ICE as a source of environmental pollution in general and qualitative and quantitative composition of their exhaust gases (EG) in particular. In diesel EG up to 90 % of EG average toxicity accounted for on nitrogen oxides NO_x and so-called particulate matters (PM). And 20 – 45 % of that parameter accounted for PM. This in turn is because PM contained the polycyclic aromatic hydrocarbons, which include carcinogenic and mutagenic effects on humans or animals. Besides, to the appearance in diesel EG these two types of legislative normalized pollutants caused by antagonistic factors. 2) Model of exploitation of the vehicle, which powered by diesel ICE of certain type and purpose with specific ecological and performance indicators. It has a direct impact on absolute value of the mass emissions of PM in its EG flow. 3) The operating efficiency of DPF that is, a part of removed PM from diesel EG flow and neutralized in it filter element (FE) from the common quantity of their mass emission. Also must be assumed the change of the DPF working characteristics depending of regime, constructive, adjusting and etc. diesel parameters. 4) The features of organization and flow of DPF regeneration process. Also must be assumed the principal difference between processes of DPF regeneration of 1st and 2nd kind. DPF regeneration of 1st kind is a periodic process of FE purification from the oxidisable fractions of PM, which accumulated due to its exploitation. It is a integral part of life cycle of DPF. DPF regeneration of 2nd kind is a non periodic process of FE purification from the inoxidisable fractions of PM and coking products of oxidisable fractions, which accumulated due to its exploitation. It stands out a much greater period between regenerations (or may be generally non-recurrent) and may not enter into the life cycle of DPF. Most often the regeneration process of 1st kind is released by appropriated onboard systems of vehicle by the thermal-catalytic method. In this case oxidation of PM takes place in unsteady mode and may be interrupted and produce the toxic products. Most often the regeneration process of 2nd kind carried out by using out-board systems (manual or automated installations stands), with washing of DPF with water in the opposite direction. The resulting suspension of PM in water must be filtered, the received filtrate must be evaporated or drained, obtained dry concentrate of PM must to be burnt at steady state (e.g., in firebox or mini-boiler or plant for burning solid waste).