

**ANALYSIS OF COMPLEX ENVIRONMENTAL PROTECTION TECHNOLOGIES
AGAINST THE INFLUENCE OF DIESEL RICE OF EMERGENCY AND RESCUE
EQUIPMENT**

**АНАЛІЗ ТЕХНОЛОГІЙ КОМПЛЕКСНОГО ЗАХИСТУ ДОВКІЛЛЯ ВІД
ВПЛИВУ ДИЗЕЛЬНИХ ДВЗ АВАРІНО-ПРЯТУВАЛЬНОЇ ТЕХНІКИ**

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Анотація. Обґрунтовано доцільність розробки комплексної технології захисту навколишнього середовища для захисту компонентів довкілля від впливу енергоустановок з поршневими ДВЗ.

Ключові слова: екологічна безпека, технології захисту навколишнього середовища, поршневі двигуни внутрішнього згорання, енергоустановки, рідинний фільтр твердих частинок.

Annotation. Feasibility of developing a complex environmental protection technology to protect environmental components from the impact of power plants with reciprocating ICE is substantiated.

Keywords: environmental safety, environmental protection technologies, internal combustion reciprocating engines, power plants, liquid particulate matter filter.

Introduction and relevance of the study. Reciprocating internal combustion engines (RICE), in particular diesel engines, are one of the main sources of atmospheric air pollution as a component of the natural environment, i.e., a factor in the level of ecological safety (ES) indicators. In places of accumulation or long-term operation in stationary mode of power plants (PP) with diesel RICE – motor vehicles or special equipment, in particular emergency and rescue vehicles (ERV), which are in operation by units of the State Emergency Service of Ukraine with RICE engines in limited spaces (quarries, mines, test stations, etc.), this problem becomes one of the most important and requires the development of appropriate environmental protection technologies (EPT) and their executive devices, in particular – particulate matter filters (DPF), which remove particulate matters (PM) – dispersed phase from the flow of exhaust gases (EG) of diesel engines (aerosol) [1]. However, according to the classification of environmental hazard factors, the source of which is the diesel engine as part of the PP, developed in [1], no less significant are the emission of nitrogen oxides NO_x , exhaust noise and thermal pollution of the atmospheric air by the EG flow. In this case, an innovative approach will be the development of executive devices of EPT, which are capable of exerting a complex effect on the flow of EG of diesel RICE and bringing the values of several indicators of the ES level at once to the legally established standards – UNECE Regulations. There is a diesel DPF with a liquid working body, the design of which was developed at the A.M.

Pidgorny Institute of Mechanical Engineering Problems of NAS of Ukraine [2], and will be improved and adapted to the needs of the SES of Ukraine when they perform their tasks in wartime and during the period of post-war reconstruction of the country [3].

Presentation of the main research material. From the analysis of literary sources, the results of which are presented in [1], it was established that several methods of EG purification from NO_x are used: oxidation-sorption, non-catalytic reduction, catalytic reduction, denitration of EG using radiation. The analysis of the existing methods of neutralization of nitrogen oxides showed that the methods of catalytic reduction of NO_x to elemental nitrogen became the most widespread. Indeed, this method provides a high degree of purification at high volumetric velocities of the EG being purified. At the same time, there is no need to dispose of the reaction products. However, there are a number of factors that prevent the widespread use of catalytic methods of NO_x neutralization in diesel EG. The method of liquid neutralization of EG in comparison with those listed above is the simplest and most economical method of physico-chemical influence on EG of diesel RICE.

Conclusions. The results of studies on the analysis of literary sources regarding the relevance of creating a complex EPT against the negative impact of PP with diesel RICE, including ERV and special equipment as part of the units of the SES of Ukraine, which will be assigned a wide range of tasks both in wartime and in the period of post-war reconstruction countries, on the basis of improved executive devices, in particular, the DPF with a liquid working body, the following points of conclusions can be highlighted. The choice of the method of neutralization of nitrogen oxides in the EG of diesel RICE significantly depends on the operating conditions and specific requirements for the degree of neutralization of the EG. For diesel RICE operating in stationary conditions, a simple, economical and quite effective method of liquid neutralization can be used. The degree of liquid neutralization of NO_x depends both on the chemical composition of the solution and on the volume velocity of EG in the device. The most promising for diesel RICE operating in stationary conditions is the method of liquid NO_x neutralization using ozone.

ЛІТЕРАТУРА

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