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Research of diesel fuel pollution during operation of automobile equipment

To determine the actual pollution and flooding of diesel fuel entering the fuel tanks of cars, samples were taken from the tanks of oil depots of agricultural farms in Lviv region, from the distribution cranes of fuel stations of these enterprises and from the distribution cranes of tankers during refueling in the field, and fuel tanks of cars.

The results of studies of diesel fuel pollution by mechanical particles showed that the average content of solid contaminants in the tanks of oil depots immediately after filling is 0,0285% (wt.), and in the process of short-term storage increases and reaches 0.130% (wt.). The average content of solid contaminants in diesel fuel during refueling through fuel dispensers at oil depots is 0.006% (wt.), and when refueling in the field with the help of fuel stations – 0,0033% (wt.). Fuel contamination in the tanks of the diesel power system is on average 0,009% (wt.) immediately after refueling and 0,015% (wt.) during operation of the automobile equipment.

Figure 1 shows a histogram of diesel fuel flooding, based on the results of statistical processing of average fuel samples taken from consumable tanks of oil depots of enterprises, Figure 2 is the same for fuel samples taken from distribution cranes of fuel dispensers and tankers, and Figure 3 – same for fuel samples taken from car tanks.

Analysis of the obtained data allows us to conclude that the fuel contamination is quite large, and the particle size of the contaminants contained in the fuel significantly exceeds the limits allowed by the design of the diesel supply system. This negatively effects on operation of the elements of the fuel supply system of diesel engines and the performances of engines in general.

Accelerated operation of precision parts of fuel equipment of engines is observed, their reliability in work decreases and operating costs increase.

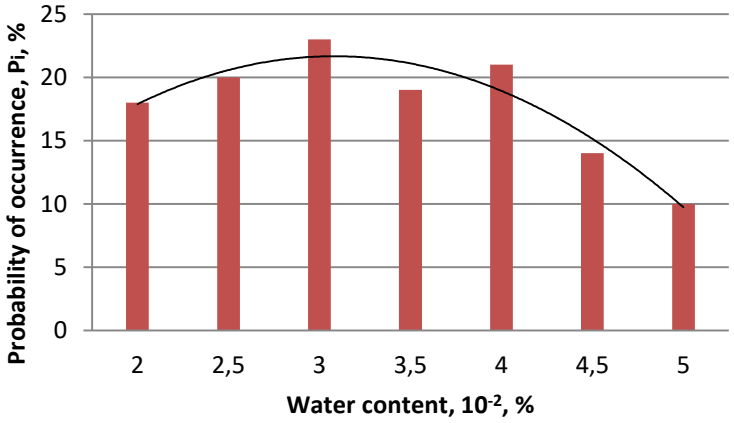

Figure 1 – Flooding of diesel fuel in oil storage tanks

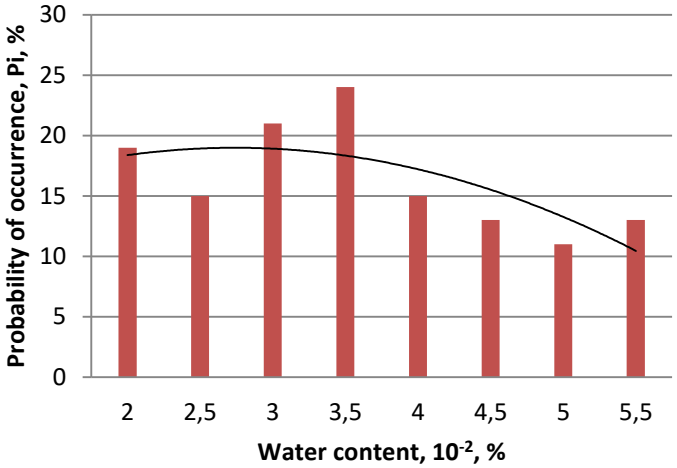

Figure 2 – Flooding of diesel fuel during its issuance for refueling equipment from fuel dispensers of gas stations and automobile fuel stations

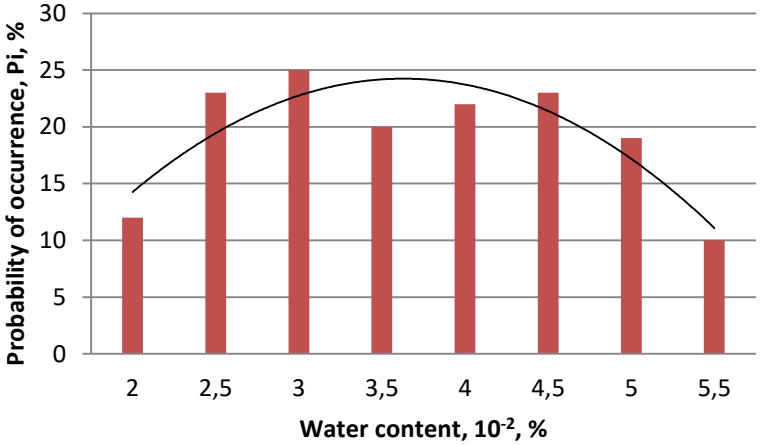

Figure 3 – Flooding of diesel fuel in car tanks

From the graphs presented in Figures 1–3, it can be concluded that the average level of flooding of diesel fuel samples taken from tanks, stationary and mobile refueling facilities is approximately the same and is in the range of 0,02...0,05%, and the most probable the value is 0.03...0.035%.

Testing the hypothesis of the conformity of the distribution of water content in diesel fuel during oil storage and refueling operations with the help of Pearson's test showed that the graphical dependences shown in Figures 1–3 are sufficiently approximated by the normal law.

Дані, отримані під час вивчення фактичного забруднення і обводнення дизельного палива в нафтогосподарствах аграрних господарств Львівської області узгоджуються з результатами, наведеними в дослідженнях інших авторів [1–3]. Це підтверджує зроблені висновки про необхідність розробки ефективних заходів для вдосконалення системи очистки і зневоднення дизельного палива під час експлуатації двигунів автомобільної техніки.

The data obtained during the study of actual pollution and flooding of diesel fuel in oil farms of agricultural enterprises of Lviv region are consistent with the results presented in studies by other authors [1–3]. This confirms the conclusions about the need to develop effective measures to improve the system of cleaning and dehydration of diesel fuel during the operation of automobile engines. It seems promising to use gravity fuel cleaning in the car tank. However, this requires further researches

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