

Test Results of "Claas Agrimot SDX 15w40" Engine Oil on Arion 630c Tractor

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Abstract: The article provides information on the formation of organic contaminants in the form of water and sludge in the oil at low temperatures, and oxidation products at high temperatures, as well as changes in the basic performance of motor oil during its use in engines.

Keywords: viscosity, alkali, zones, pollution, dispersion, sludge, deposits, organic pollution, oxidation, concentration, carbon monoxide, destruction, sulfur

Introduction

The total number of vehicles manufactured by CLAAS in the country is 5,435. In order to determine the service life of CLAAS Agrimot SDX 15w40 motor oil on the ARION 630C tractor manufactured by CLAAS in Uzbekistan, the viscosity and alkalinity of the oil were analyzed. The main purpose of the tests is to determine the service life of these oils in engines used in Uzbekistan [1].

The dynamics of changes in the composition of engine oil, mechanical impurities, water content, alkali content and viscosity are given in the following graphs.

Main part

As can be seen from the graphs in Figure 1, the contamination of the engine oil in different zones is slightly different from each other. The high temperature and dust in the air of Surkhandarya region had a negative impact on the quality of the oil, as a result of which the normal amount of mechanical impurities in the oil in Surkhandarya region increased sharply after an average of 250 motor hours.

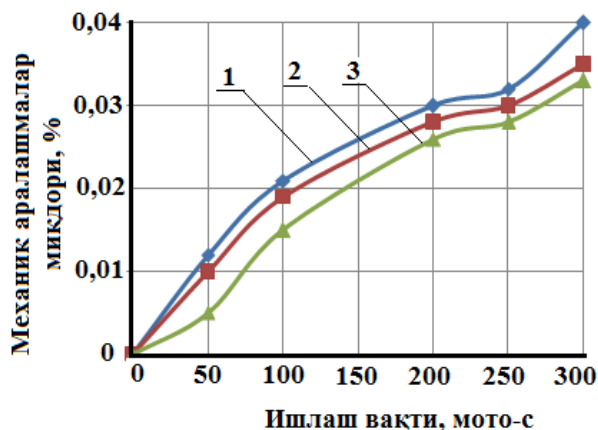


Figure 1. The dynamics of changes in the composition of mechanical mixtures when using Agrimot SDX 15w-40 motor oil in "different climatic conditions". 1-Surkhandarya region; 2-Fergana region; 3-Tashkent region

In Fergana and Tashkent regions, it was found that the normal amount of mechanical impurities in the oil is less than in the hot regions.

ARION 630C tractor engine CLAAS Agrimot SDX 15w40 engine oils must not contain mechanical impurities according to ASTM standard.

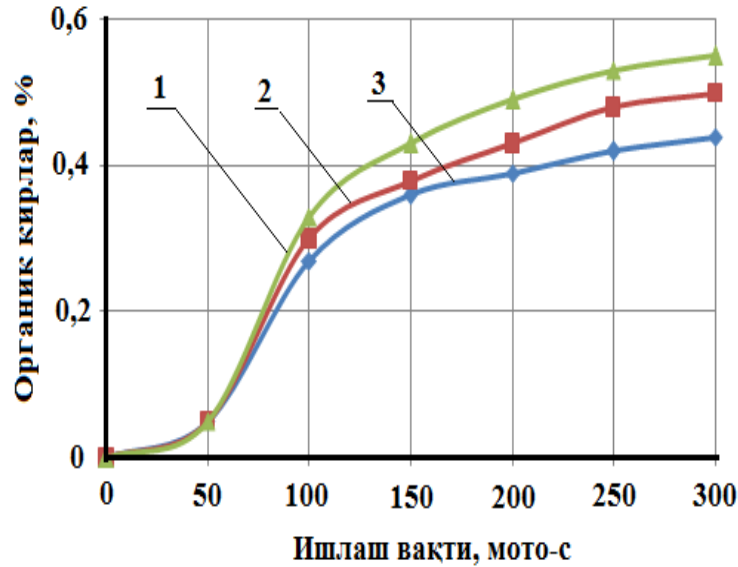


Figure 2. Dynamics of change of organic impurities in oil composition. 1-Surkhandarya region; 2- Fergana region; 3-Tashkent region

The dispersed composition of mechanical mixtures indicates that the main part of the mixtures (72%) consists of particles up to 5 μm , mainly silicon and aluminum, which indicates that the tractor operates in high dust conditions [2].

In the ARION 630C tractor engine lubrication system, the motor oil works in conjunction with high temperature voltage, high specific pressure, various metals, air and fuel combustion products. When operating at low temperatures, water and sludge (oily sediments) may form in the oil, and oxidation products may form at high temperatures. The operation of the oil under conditions of water and air as well as mechanical mixtures, in turn, accelerates the oxidation process. Lebedev O.V., Morozov G.A., Nikiforov A.N., Kovalenko V.P., Sharipov Q.A. and many other scientists believe that when any engine is running, its oil content changes in quality and quantity.

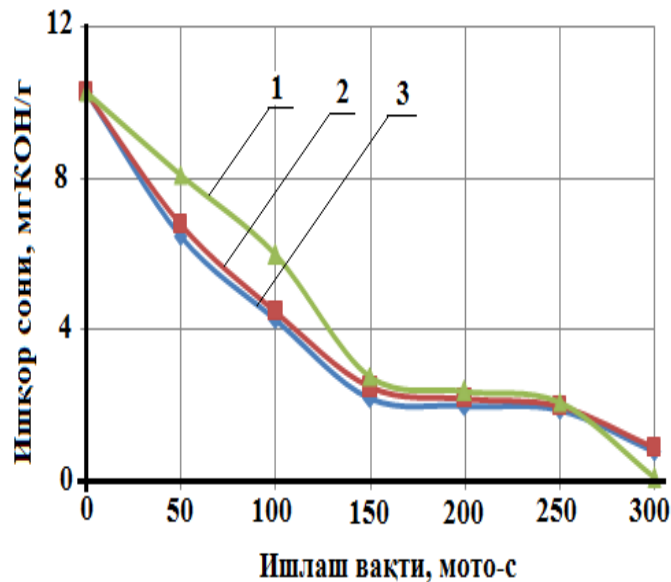


Figure 3. Dynamics of change of oil alkali number depending on the service life. 1-Surkhandarya region; 2-Fergana region; 3-Tashkent region.

The reason for the change in quantity is the loss of oil during processing due to ugar (15-20%) [3]. Changes in oil quality are also affected by various physical and chemical processes that take place in the engine.

Figure 2 shows the dynamics of the change of organic impurities in the engine oil of the ARION 630C tractor engine.

Analysis of the dynamics of the accumulation of organic contaminants in the oil shows that in the conditions of high temperature and dust in Surkhandarya region the amount of organic contaminants is 7-9% higher than in Fergana region and 16-18% higher than in Tashkent region.

The bulk of organic impurities are high molecular weight resins, asphaltenes, carbenes and carboids. One of the main reasons for this is that the temperature at the top of the combustion chamber is higher than 1000oS, where there is partial combustion of fuel, and in the cooling system of the piston is 120-180oS, this temperature change accelerates the oxidation process [4].

Oil vapor generated by intensive spraying in the engine crankcase mixes with air at an average temperature of 120oC to form water vapor condensate. It is known that the content of sulfur in diesel fuel produced in the country is 0.5-0.7%, which in turn is one of the main factors of oil oxidation. This situation is clearly seen in Figure 2, i.e. the first

It oxidizes intensively in 80-100 hours and slows down the process in the remaining periods. Analysis of the dispersed composition of organic impurities in the oil shows that the bulk of them are impurities around 0.5 ... 3 microns in size, accounting for 60 ... 70% of the total oil volume. Such particles form sediments at the bottom of the oil by their own weight [5]. The oil change period is often measured by its alkalinity, ie if the alkali number changes by 25 ... 30% of the initial value, it must be replaced, which also applies to the viscosity of the oil.

For ARION 630C tractor engine, the alkali number should be at least 2.0 mg KOH / g and the viscosity at 100oS should be at least 7.5 sSt. Figure 3 shows the dynamics of the change in the alkaline number of the oil. As can be seen from this picture, the limited alkali number of the oil exceeds the allowable limit after 220 ... 250 moto-hours of operation. This means that in the climatic conditions of Uzbekistan, CLAAS Agrimot SDX 15w40 oil can almost completely expire. Empirical equations were obtained exponentially as a result of approximating the results of studies on the change in the number of alkalis depending on the service life of the oil. Thus, based on the above research, it is recommended to clean the oil from mechanical impurities and partially water after the engine has run for an average of 250 moto-hours during operation. This in turn increases not only the service life of the oil, but also the service life of the engine.

Conclusion

1. Analyzes show that the sulfur content in the fuel should not exceed 0.1% for foreign-made vehicles, which means that the oil change time in such fuel should be 250 moto-hours.
2. Hence, in our conditions, along with the high amount of dust and high air temperature, the amount of sulfur in the fuel also accelerates the aging process of the oil.

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