

KES

Testing Method for Insoluble in Used Lubricating Oil

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1. Scope of application

This standard shall be applied to the method how to measure insolubles of pentane or benzene for used lubricating oil.

2. Significance

(1) Method A

This is measuring method of n-pentane insolubles without using coagulant. This shall be applied to the materials, which easily separate mixture of oil and solvent with centrifugal machine.

(2) Method B

This is measuring method of n-pentane or benzene insolubles with coagulant in the oil that includes purifier. This shall be applied to the suspension material except of material, which are separated by method A, too.

3. Summary of method

(1) Method A

Mix sample of used oil in the n-pentane and separate with centrifugal machine.

After separating deposit and solution, wash deposit 2 times with n-pentane and weigh after drying. Regard it as n-pentane insoluble.

For benzene insoluble, wash deposit, which is acquired from centrifugal machine after mixed with n-pentane, 2 times with n-pentane. Wash this with benzene-alcohol solution and with benzene. Dry insoluble and measure the weight. Regard it as benzene insoluble.

(2) Method B

Mix sample of used oil in the n-pentane-coagulant solution and separate with centrifugal machine.

After separating deposit and solution, wash deposit 2 times with n-pentane and weigh after drying. Regard it as n-pentane insoluble.

For coagulated benzene insoluble, wash deposit, which is acquired from centrifugal machine after mixed with n-pentane-coagulant, 2 times with n-pentane. Wash this with benzene-alcohol solution and with benzene. Dry insoluble and measure the weight. Regard it as benzene insoluble.

4. Definition

(1) Used oil

Deteriorated materials and discharged oil from the lubricating system during/after operation, or circulating oil in the lubricating system during operation.

Exclude attached material in the system or large particles separated from oil in the system.

(2) n-pentane insoluble

This indicates insoluble after separating the oil dissolved in n-pentane with centrifugal machine. These include oil insolubles and some oil-soluble resinoid made from the decomposition of oil and annex.

(3) Benzene insoluble

This indicates benzene-insoluble material among n-pentane insolubles. These include externally deteriorated fuel, carbon or high carbonated material made from decomposition of fuel annex, engine abrasive and corrosive materials.

(4) Coagulated n-pentane insolubles

This includes n-pentane insolubles and scattered materials in the suspension due to oil purity.

(5) Coagulated n-pentane insoluble material

This is coagulated n-pentane insolubles that are not dissolved in the benzene.

(6) Insoluble resin

This is parts of n-pentane insolubles dissolved in benzene, and this can be calculated by subtracting benzene insolubles from n-pentane insolubles according to method A or method B.

5. Device

(1) Examiner for centrifugal machine

This shall have shape and dimension shown in Fig. 1.

The examiner should have clear scale and the inlet should not be dissolved in the oil. Allowable error of scale is shown and dimension is given in Table 1. Compensate with water in 20 °C air.

(2) Centrifugal machine

The both ends of examiner should be able to revolve at 6000 ~ 7000 rpm and the rotational speed should be adjustable. This machine should hold two or more examiner. Revolving head, trunnion ring, trunnion cups and rubber buffer should be made strong enough to endure maximum centrifugal force.

Trunnion cups and buffer should support examiners solidly during operation of centrifugal machine.

To avoid danger in accident due to damage of the machine, the surface should be strong metal.

(3) Dryer

This should be broad and keep temperature 105 ± 3 °C .