Method for Assessing the Cleanliness Level of New Hydraulic Fluid -SAE J1277 MAY82

SAE Recommended Practice
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PREPRINT

METHOD FOR ASSESSING THE CLEANLINESS LEVEL OF NEW HYDRAULIC FLUID—SAE J1277 MAY82

SAE Recommended Practice

Report of the Off-Road Machinery Technical Committee, approved May 1982.

Introduction—The cleanliness level of new hydraulic fluid must not exceed the contaminant tolerance level of components comprising the system. To guard against premature failures, no oil should be exposed to a system unless it exhibits a satisfactory cleanliness level.

1. Purpose—To establish a quality control procedure suitable for both users and producers by which the cleanliness level of *new* hydraulic fluid can be quantified, certified, and specified.

2. Scope—The method is applicable to new mineral and synthetic hydraulic fluids—regardless of packaging. This recommended practice is not intended as a procedure for operating equipment.

3. Materials and Apparatus

3.1 Use an appropriate means of agitating the fluid in its normal storage container (for example, a paint shaker for small containers, a drum rocker for large shipping containers, and a high volume circulating system for bulk storage vessels).

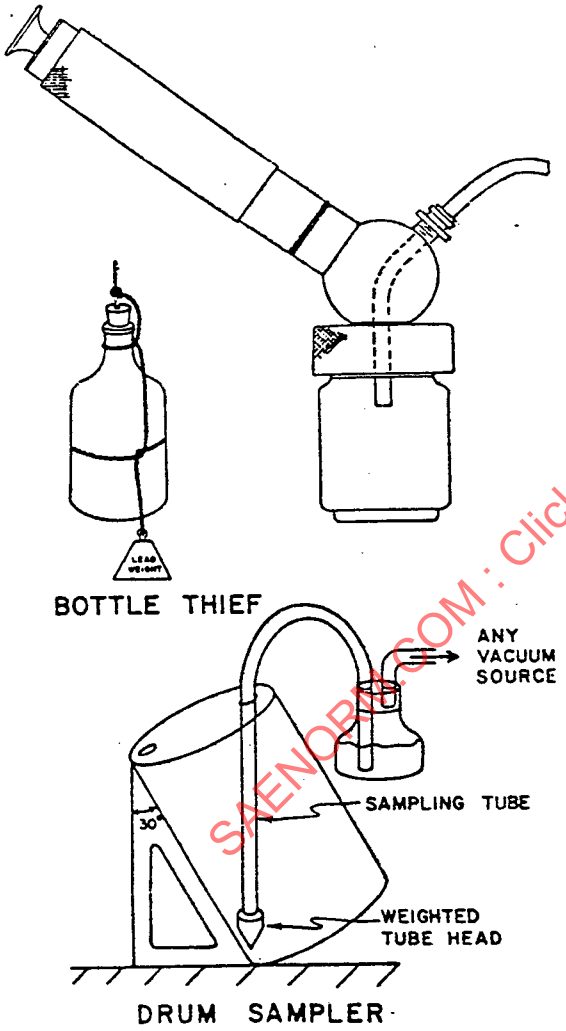

FIG. 1

3.2 Use a device to facilitate the withdrawal of a fluid specimen at the prescribed level in the container. Examples of such devices are illustrated in Fig. 1—a bottle thief (ASTM D270) for tanks, a drum sampler and a crankcase sample for cans.

3.3 Use a clean opener to provide an access hole in small containers. In larger vessels, appropriate openings usually exist.

3.4 Use 250 mL sample bottles containing less than 15 particles/mL of bottle volume greater than 5 μm in size as qualified per ISO Standard 3722 (ANSI Standard B93.20-1972).

3.5 Use an automatic particle counter calibrated per ISO Standard 4402 (ANSI Standard B93.28-1973).

4. Sampling Procedure

4.1 Agitate the fluid in the container using an appropriate means such as suggested in paragraph 3.1, if it is possible.

4.2 Clean the area around location for the access hole with a lint-free cloth which is visibly free of dirt.

4.3 Open the container and insert the sampling appendage where its fluid entrance is well below the surface and extract a volume of fluid equal to at least five times, preferably ten times, the total sampling apparatus volume for the purpose of flushing the wetted surfaces. This hydraulic fluid may be discarded or returned to the container. Care should be taken to keep the external surfaces of the sampling device that is inserted into the container free from contaminant prior to and during sampling.

4.4 After the flushing volume has been removed, insert the sampling appendage to within 5% from the bottom of the vessel and withdraw and deposit a maximum of 200 mL of fluid in a 250 mL sample container.

NOTE: Where appropriate, the sample should be taken with the container tilted approximately 30 deg from the vertical such that the opening through which the sample is taken is on a vertical line passing through the lowest point of the vessel.

NOTE: When using the bottle thief, the cork should not be opened for at least 30 s to allow particles on external surfaces to settle past the bottle.

5. Sample Analysis

5.1 Using an automatic particle counter calibrated as specified in paragraph 3.5, count and record the number of particles in at least 10 mL of fluid in the following size ranges—numbers greater than 5, 10, 20, 30, and 40 μm. Repeat at least three times.

5.2 The average of three different counts on the sample should be reported.

6. Presentation of Results

6.1 A plot of all 5 points, the cumulative particle count data for the sample on a log-log[2] chart constitutes the official means of presenting the results.

6.2 Using the 5 μm count and the interpolated value for the 15 μm count, assign an ISO Solid Contaminant Cleanliness Code value to the distribution per SAE J1165 or ISO Standard 4406.

6.3 Calculate the water detection ratio by dividing the number of particles greater than 10 μm/mL by the number of particles greater than 40 μm/mL.

NOTE: DATA CAN BE PRESENTED BY THE USE OF PARAGRAPHS 6.1, 6.2, OR 6.3.

7. Interpretation of Results

7.1 The ISO range number for the population of 5 μm particles reflects the *"silt levels"* of the fluid.

7.2 The ISO range for the concentration of 15 μm particles provides a good indication of the presence of large particles in the fluid.

7.3 *"The value of the water detection ratio is one indication of the presence of free water in the fluid sample. A value of 10 or less should be cause for alarm and can be verified by using one of the established water-in-oil analysis techniques* (ASTM D95 *and* D1744 *for total water and* ASTM D96 *for free water*)."