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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 20082-2006

**Hydraulic fluid power -- Fluid contamination -- Determination of
particulate contamination by the counting method using an
optical microscope
(English Translation)**

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Foreword

This Standard is identical to the international standard ISO 4407:2002

"Hydraulic fluid power - Fluid contamination - Determination of particulate contamination by the counting method using an optical microscope" (English edition).

For ease of use, this Standard makes the following modifications to ISO 4407:2002:

- ADD a view to Figure 1 and re-arrange the key;
- CHANGE Figure 3 to Table 2 and the "Note" of Figure 3 to the table note of Table 2;
- For reference standards, replace international standards with corresponding national standards.

This Standard was proposed by China Machinery Industry Federation.

This Standard shall be under the jurisdiction of National Technical Committee 3 on Hydraulic Pneumatics of Standardization Administration of China (SAC/TC 3).

Drafting organization of this Standard: China Aviation Industry Granularity Measurement and Test Station.

Main drafters of this Standard: Lu Hong, Zhang Sufang, Guo Guixia, Wang Yan.

This Standard is first issued.

Hydraulic fluid power - Fluid contamination -

Determination of particulate contamination by the counting method using an optical microscope

WARNING: The use of this Standard may involve hazardous materials, operations and equipment. This Standard does not purport to address all the safety problems associated with its use. It is the responsibility of the user of this Standard to establish appropriate safety and health practices and determine the applicability of regulative limitations prior to use.

1 Scope

This Standard specifies methods for determining the level of particulate contamination in liquids used in hydraulic systems by counting the number of particles deposited on the surface of a membrane filter using an optical microscope. It includes particle counting by two manual methods and image analysis, using either transmitted or incident lighting systems.

Particle sizes $\geq 2 \mu\text{m}$ can be sized and counted by this method, but the resolution and accuracy of the results will depend upon the optical system used and the capabilities of the operator.

All hydraulic fluids with a wide range of contamination levels can be analysed according to this Standard. However, the counting uncertainty at the larger particle sizes increases if the volume filtered is reduced to allow smaller sized particles to be counted, where a fine precipitate or a high particle concentration

is present.

2 Normative references

The following documents contain provisions which, through reference in this Standard, constitute provisions of this Standard. For the dated references, their subsequent amendments (excluding corrections) or revisions do not apply to this Standard. However, the parties who enter into agreement based on this Standard are encouraged to investigate whether the latest editions of these documents are applicable. For undated reference documents, the latest editions apply to this Standard.

GB/T 12804 Laboratory glassware - Graduated measuring cylinders (GB/T 12804-1991, eqv ISO 4788:1980)

8.2.4 Unclamp, carefully remove the membrane filter from the base and measure the diameter [effective filtration diameter (EFD)] of the stain in at least two planes to within 0.1 mm. Average the at least two measurement results and calculate the effective filtration area (EFA). Mark the funnel with a suitable code and record the result in a suitable calibration recording system.

9.1.1 After noting all sample identification details, remove any tied-up or loosely attached labels ensuring that sample identity is retained. Thoroughly clean the outside of the sample bottle, particularly around the cap, by washing with filtered solvent.

9.1.2 If the sample has been standing for a period of time, particle settlement, and hence agglomeration, will occur. It is essential that the agglomerates are broken up, and the contaminant particles are re-dispersed evenly within the contents of the sample before analysis.

9.1.3 Redistribute the contaminants within the contents of the bottle by either hand shaking the sample vigorously for at least 1 min, or by using an acceptable method of mixing such as a three-axis paint shaker for at least 5 min. The

method chosen should not alter the original distribution of the contaminant

9.1.4 If ultrasonic is used to break up any agglomerates, stand the sample

container so that the level of the liquid in the bath is either just below the fluid level in the sample bottle, or 3/4 up the side of the container, whichever is least.

The period of immersion shall not exceed 1 min. Hand shake for 30 s afterwards.

9.2.1 A blank analysis should be performed before each sample analysis,

unless it can be demonstrated that acceptable blanks can be consistently obtained. If so, a blank analysis should be performed before starting a counting programme and at least once during it.

9.2.2 Proceed as in 9.3, using solvent instead of sample liquid. Dispense a 100

mL volume of filtered solvent into the vacuum apparatus fitted with the selected membrane filter, vacuum filter and aspirate to dryness.

9.2.3 Perform size analysis as specified in 10.3 at $\geq 5 \mu\text{m}$. If the count at ≥ 5

μm exceeds the count levels given in the note below, this indicates insufficient cleaning. Clean the apparatus again and repeat 9.2.2 to 9.2.3.

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