

**A DYNAMIC TEST METHOD FOR DETERMINING THE DEGREE  
OF CLEANLINESS OF THE DOWNSTREAM SIDE OF FILTER ELEMENTS**

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Revised

**1. SCOPE:**

- 1.1 This test method describes a procedure for determining the insoluble contamination level of the downstream side of filter elements. Results of this procedure are intended to be used only for evaluation of the effectiveness of various cleaning treatments, or cleanliness of element as received from manufacturers. The data obtained by this procedure do not necessarily indicate, qualitatively or quantitatively, the contamination which may be released by a filter element into a fluid during service use. Because of the wide variety of conditions which may exist in service applications, it is recommended that the user design and conduct his own particular service performance test. (See paragraph 10.1).

**2. OUTLINE OF METHOD:**

- 2.1 A representative portion of the contamination in the "as received" filter element under test is removed by subjecting the filter element to a sonic cavitation field while simultaneously passing test fluid through the filter element and into a membrane filter holder containing a membrane filter disc. The contamination is thus transferred onto the membrane filter disc, which is then removed and examined microscopically to determine the amount of contamination in stated size ranges.

**3. EQUIPMENT:**

- 3.1 One reservoir for filtered test fluid.
- 3.2 Two membrane filter holders.
- 3.3 Downstream filter to have 47 mm membrane filter discs with a maximum pore size of 5 microns.
- 3.4 Teflon or glass tubing with I. D. necessary to maintain a minimum fluid velocity of 0.7 ft/sec. (1000 ml per min through 3/8" tubing).
- 3.5 One sonic generator, transducer, and suitable tank.
- 3.6 One graduated vacuum-flask, 2,500 ml. minimum capacity.
- 3.7 One aspirator or vacuum pump, and vacuum regulator.
- 3.8 One special adaptor with nipple designed to fit into outlet of filter element on one end and with hose connected on opposite end.
- 3.9 Forceps with unserrated tips.

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3.10 Plastic Petri Dishes, disposable. (Two required per analysis.)

3.11 Microscope system described in SAE ARP 598.

3.12 Aluminum Foil - Household type (approximately 0.0015 inch thick).

3.13 Beaker.

4. REAGENTS: Any one of the following reagents may be used as the test fluid.

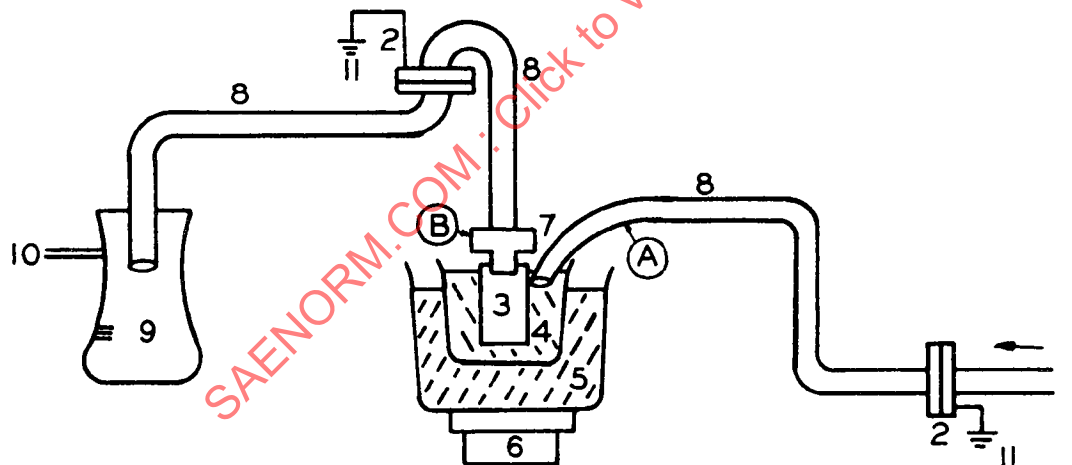
4.1 Petroleum - ether (30 to 60°C boiling range).

4.2 Trichloroethylene - Federal Specifications OT-634A.

4.3 Trifluorotrchloroethane (b.p. 47.6°C).

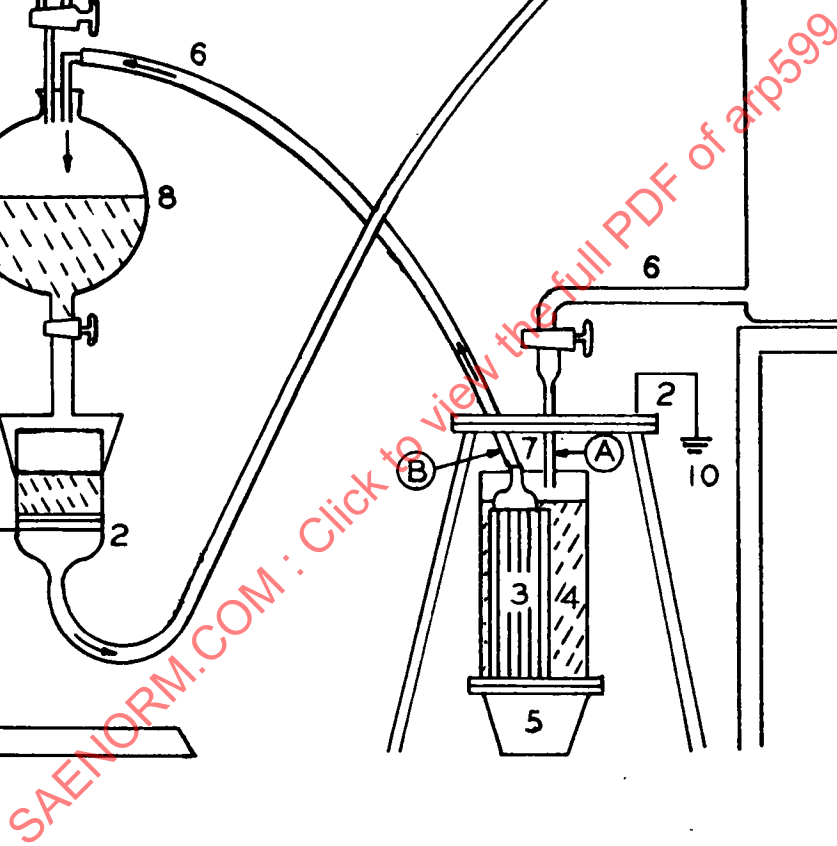
5. TYPICAL ANALYSIS APPARATUS:

5.1 Type (A)



- (1) From filtered test fluid reservoir
- (2) Membrane filter holder with membrane installed
- (3) Filter element to be analyzed
- (4) Test fluid in a beaker
- (5) Water in sonic field as transfer medium

- (6) Sonic transducer
- (7) Special adaptor
- (8) Teflon or glass tubing
- (9) Graduated vacuum flask
- (10) Vacuum
- (11) Electrical ground



- (1) Test fluid reservoir
- (2) Membrane filter holders with membrane installed
- (3) Filter element to be analyzed
- (4) Test fluid in sonic field
- (5) Sonic transducer
- (6) Teflon or glass tubing
- (7) Special adapter
- (8) Collecting reservoir
- (9) Vacuum
- (10) Electrical ground

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**6. PROCEDURE FOR BLANK:**

- 6.1 Flush membrane filter disc with a minimum of 50 ml test fluid from apparatus (filtered test fluid reservoir) and install in membrane filter holder downstream of the filter element.
- 6.2 Attach point (A) to (B) (see drawings, Par. 5.1 and 5.2). Pass 2,500 ml of test fluid through the apparatus into the graduated vacuum flask.
- 6.3 Remove the membrane filter disc from the filter holder downstream of the adapter using forceps, transfer to a petri-dish, cover and mark the petri-dish.
- 6.4 Count all particles larger than 25 microns on the entire effective filtering area of the membrane disc in accordance with the microscopic procedure of ARP 598.
- 6.5 The contamination count of the blank should not exceed 100 particles over 25 microns, and should be recorded.
- 6.6 Should the blank value be high, the set-up of Par. 6.2 should be flushed until the count obtained in Par. 6.5 is acceptable.

**7. DETERMINATION OF LEVEL OF CLEANLINESS:**

- 7.1 The filter element to be analyzed should not be removed from its sealed bag in a dirty area, or prior to the beginning of the analysis. The bag should be opened by cutting rather than by tearing. The filter element should be handled so as to avoid extraneous contamination.
- 7.2 Install filter on adapter B (see 3.8 and 5.1 & 2.) and place end of hose A into beaker. Do not allow level of test fluid to go below the top of the filter media or above bottom of adapter B. Use seal on element or adapter, which is compatible with the test fluid.
- 7.3 Turn on sonic field within one minute after immersing of the element in the test fluid. The sonic field should be tuned to maximum intensity.
- 7.4 Wait one minute, apply vacuum and draw 500 ml of fluid through the filter being analyzed. Repeat at the end of 4 minutes, 7 minutes, and approximately 9 minutes. The last 500 ml should be terminated simultaneously with the completion of the ten minute period. The temperature of the test fluid should not exceed 90°F.
- 7.5 Turn off sonic field ten minutes after step 7.3.
- 7.6 Draw an additional 500 ml of test fluid through the filter element.
- 7.7 Repeat step 6.3.