



AEROSPACE RECOMMENDED PRACTICE

ARP599™**REV. D**

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Superseding ARP599C

Aerospace - Dynamic Test Method for Determining
the Relative Degree of Cleanliness
of the Downstream Side of Filter Elements

RATIONALE

ARP599D has been reaffirmed to comply with the SAE five-year review policy.

NONCURRENT NOTICE

This specification has been declared "NONCURRENT" as of June 2008. It is recommended, therefore, that this document not be specified for new designs.

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Documents

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1. SCOPE:

This SAE Aerospace Recommended Practice (ARP) describes a procedure for determining the insoluble contamination level of the downstream side of filter elements. Results of this procedure represent the particulate released from the tested filter element under the prevailing conditions of the test. The results may be used for comparative evaluation of the effectiveness of various cleaning methods or the cleanliness of elements after cleaning or as received from manufacturers.

1.1 Outline of Method:

A representative portion of the contamination on the downstream side of the filter element under test is removed by placing the filter element in an ultrasonic bath for a set period of time and then withdrawing a sample through the filter under test into a vacuum flask. The sample is then filtered per ARP598. The insoluble contamination is thus transferred onto the surface of the membrane filter disk where it can be examined microscopically to determine the amount of contamination released from the filter element.

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

ARP598	The Determination of Particulate Contamination in Liquids by the Particle Count Method
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2.1.2 U.S. Government Publications: Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

FED-STD-209	Airborne Particulate Cleanliness Classes in Clean Rooms and Clean Zones
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2.1.3 ANSI Publications: Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ANSI T2.9.11	Hydraulic fluid power - Method for determining the particulate count of an oil sample from a system using automatic particle counters
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3. APPLICABILITY:

This procedure shall only be used on filters that can withstand the ultrasonic cavitation energy of the test equipment to be used. Consideration must be given that the filter may be exposed to many hours of ultrasonic cavitation during its life.

Because the amount of contamination released by this procedure is large in comparison to other cleanliness test methods, it is recommended to be specified for use primarily for filters to be used in applications with strict cleanliness requirements by the system designer or user.

The data obtained from this procedure are comparable only to data previously obtained from the same system under the same conditions. "Same Conditions" is defined as nominally equal in (1) operation of the procedure described herein, (2) results of the foil erosion test of 10.2, and (3) the operating conditions as listed in 10.4. Because of the wide variations in frequency and operating characteristics of various ultrasonic systems and because of the variations in cavitation characteristics of various liquids at different temperatures, it is normal to expect variances in results between different testing agencies. Section 12 suggests one method of correlating the expected variations in results.

This procedure may be used for filters larger than a package volume of 300 ml but as a general rule, it will not produce representative results because of the lowered flow dynamics in the area of the filter media when withdrawing the sample.

4. EQUIPMENT:

- 4.1 Beaker, glass or stainless steel, to hold the test liquid in the ultrasonic bath.
- 4.2 Filter with a filtration rating finer than the filter under test to clean test liquid entering the container of 4.1.
- 4.3 Flask, vacuum, 1000 ml capacity, graduated at 500 ml, to collect the sample from the filter under test.
- 4.4 Tubing, stainless steel (or equivalent), 300 series, with internal diameter adequate to maintain a minimum liquid velocity of 21 cm/s (0.7 ft/s) during sample withdrawal.

NOTE: This would be approximately 900 ml/min through 10 mm (or 3/8 in) tubing.

- 4.5 One ultrasonic generator, transducer, and suitable tank. Transducer shall provide at least 0.5 W of power per square centimeter (3 W/in²) of tank bottom or the same for the transducer surface of an immersible transducer if used.
- 4.6 Stopper of low sloughing material to fit 4.3 and to accept 4.4.
- 4.7 Vacuum source, gauge, and regulator capable of maintaining 500 mm of mercury (20 in of mercury or 67 kPa) vacuum minimum during the sample withdrawal period.