



AEROSPACE RECOMMENDED PRACTICE	ARP4285™	REV. A
	Issued 2001-03 Revised 2018-08 Reaffirmed 2025-01	
	Superseding ARP4285	
(R) Aerospace - Evaluation of Particulate Contamination in Hydraulic Fluid - Membrane Procedure		

RATIONALE

This document has been updated to incorporate technical and editorial changes as a result of the Five-Year review.

ARP4285A has been reaffirmed to comply with the SAE Five-Year Review policy.

FOREWORD

Membrane evaluation using standard membranes, described in this document, is an alternative technique to particle counting with either an optical microscope (AS598) or an automatic particle counter (ISO 11500). The latter particle counting procedures are considered more precise.

This procedure shall not be used as an alternative to particle counting unless agreed to by the customer since the results by this procedure may differ from those by particle counting, even though the standard membrane correlates to a specific particle count.

A particular feature of this method is the membrane preparation to achieve an even particulate distribution on the membrane suitable for other applications.

TABLE OF CONTENTS

1.	SCOPE	3
2.	REFERENCES	3
2.1	Applicable Documents	3
2.1.1	SAE Publications	3
2.1.2	U.S. Government Publications	3
2.1.3	ISO Publications	3
2.2	Definitions	4
2.2.1	Membrane	4
2.2.2	Membrane Method-	4
2.2.3	Standard Membrane	4
3.	MEMBRANE PREPARATION	4
3.1	Membrane Preparation Workroom	4
3.1.1	Workstation	4
3.2	Equipment	4
3.2.1	General	4
3.2.2	Filter Membranes	4

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Documents

Standard, visit Sharing Hub

3.2.3	Filter Holder.....	5
3.2.4	Vacuum Filtering Flask.....	5
3.2.5	Graduate Cylinder.....	5
3.2.6	Wash Bottle.....	5
3.2.7	Filter Mounts.....	6
3.2.8	Forceps.....	6
3.2.9	Waste Funnel and Drum.....	6
3.2.10	Solvent Supply Drum and Stand.....	6
3.2.11	Reading Card.....	6
3.2.12	Inspection Lens.....	6
3.2.13	Additional Equipment.....	6
3.3	Consumable Materials.....	6
3.3.1	Solvent.....	6
3.3.2	Additional Consumable Materials.....	6
3.4	Pressure Tank and Spray Gun.....	7
3.5	Bottle Cleaning Procedure.....	8
3.6	Standard Membranes.....	8
4.	MEMBRANE MAKING PROCEDURE.....	8
4.1	Precautions.....	8
4.2	Sample Taking.....	8
4.3	Solvent Dispenser.....	8
4.3.1	Operation.....	8
4.4	Filter Change.....	9
4.5	Making a Blank Membrane.....	9
4.6	Making a Membrane from Fluid Sample.....	9
5.	MEMBRANE EVALUATIONS USING STANDARD MEMBRANES.....	11
5.1	Particle Scan.....	11
5.2	Color Comparison (Small Particulate).....	12
5.3	Metal Particles.....	12
5.4	Water.....	13
5.5	Extra Large Particles.....	13
5.6	Evaluation Summary.....	13
5.7	Membrane Bank.....	13
6.	CLEANING OF EQUIPMENT.....	13
7.	NOTES.....	14
7.1	Revision Indicator.....	14
Figure 1	Membrane holder and vacuum filtering flask assembly.....	5
Figure 2	Pressurized system for bottle cleaning and membrane-preparation.....	7

1. SCOPE

This SAE Aerospace Recommended Practice (ARP) establishes a method for evaluating the particulate matter extracted from the working fluid of a hydraulic system or component using a membrane. The amount of particulate matter deposited on the membrane due to filtering a given quantity of fluid is visually compared against a standard membrane in order to provide an indication of the cleanliness level of the fluid.

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 International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

ARP5376	Methods, Locations and Criteria for System Sampling and Measuring the Solid Particle Contamination of Hydraulic Fluids
AS598	Aerospace Microscopic Sizing and Counting of Particulate Contamination for Fluid Power Systems
AS1241	Fire Resistant Phosphate Ester Hydraulic Fluid for Aircraft
AS4059	Aerospace Fluid Power – Contamination Classification for Hydraulic Fluids

2.1.2 U.S. Government Publications

Copies of these documents are available online at <http://quicksearch.dla.mil>.

MIL-PRF-680	Degreasing Solvent
MIL-PRF-5606	Hydraulic Fluid, Petroleum Base; Aircraft; Missile and Ordnance
MIL-PRF-6083	Hydraulic Fluid, Petroleum Base, for Preservation and Operation
MIL-PRF-83282	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Number H-537
MIL-PRF-87257	Hydraulic Fluid, Fire Resistant; Low Temperature, Synthetic Hydrocarbon Base, Aircraft and Missile

2.1.3 ISO Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ISO 11500	Hydraulic Fluid Power - Determination of Particulate Contamination by Automatic Counting using Light Extinction Principle.
ISO 14644-1	Cleanrooms and Associated Controlled Environments - Classification of Air Cleanliness by Particle Concentration

2.2 Definitions

2.2.1 MEMBRANE

A commercially available filter membrane through a volume of compatible fluid has been filtered using a specified procedure to deposit particulate contamination from the fluid onto a controlled area of the membrane surface.

2.2.2 MEMBRANE METHOD

A general term identifying a procedure that produces a membrane used to assess the cleanliness of aerospace fluids such as hydraulic fluid.

2.2.3 STANDARD MEMBRANE

A membrane made in an identical manner to other test membranes and specially selected by the contracting parties as representing the contamination limit for that component. It is recommended that the standard membrane correlate to a recognized classification system such as AS4059 or equivalent. It may be an actual single membrane preserved for use between glass slides, or a photograph of an actual membrane and capable of reproduction as agreed by the contracting parties.

3. MEMBRANE PREPARATION

3.1 Membrane Preparation Workroom

The workroom shall be in a clean, draft free area remote from contaminant-generating operations such as testing, grinding, machining, etc., and shared only by similar laboratory-type operations. A clean room or understood environment of ISO 14644-1 Class 8 is recommended.

3.1.1 Workstation

The workstation used to prepare the membrane shall have a hard, continuous surface which can be readily wiped down and may be equipped with compartments and drawers for the various pieces of membrane-making equipment. It may be equipped with a vacuum source capable of 25 in Hg. Alternatively, a manual pump may be used which is vented by detaching the inlet.

3.2 Equipment

3.2.1 General

The Membrane Test Assembly contains components for processing and analyzing hydraulic fluid samples and are described below:

3.2.2 Filter Membranes

These filters consist of a cellulose ester material (or other equivalent material) having a mean pore size of 5 μm or specified by contracting agency. The filter membranes are 47 mm in diameter and are used to filter hydraulic fluid samples. Phosphate Ester fluid per AS1241 requires the use of polytetrafluoroethylene (PTFE) type membranes material (or other equivalent material). Filter membranes having a 3 μm pore size and 25 mm diameter are used to filter the solvent.

WARNING: Filter membranes are highly flammable. Personnel are to take every precaution to preclude flames and sparks from coming in contact with the membranes.

3.2.3 Filter Holder

A test sample, a 47 mm filter holder comprising a filter base and funnel assembly shall be used which consists of a 300 mL Pyrex® receiving funnel and a base with a coarse fritted glass support for the filter, a spring clamp and neoprene stopper (see Figure 1).

3.2.4 Vacuum Filtering Flask

A 1 L filtering flask is used to mount the filter base and funnel assembly. Vacuum is applied to the flask to draw the sample fluid through the filter (see Figure 1).

3.2.5 Graduate Cylinder

A 100 mL graduate is used to measure the volume of sample fluid and solvent to be filtered.

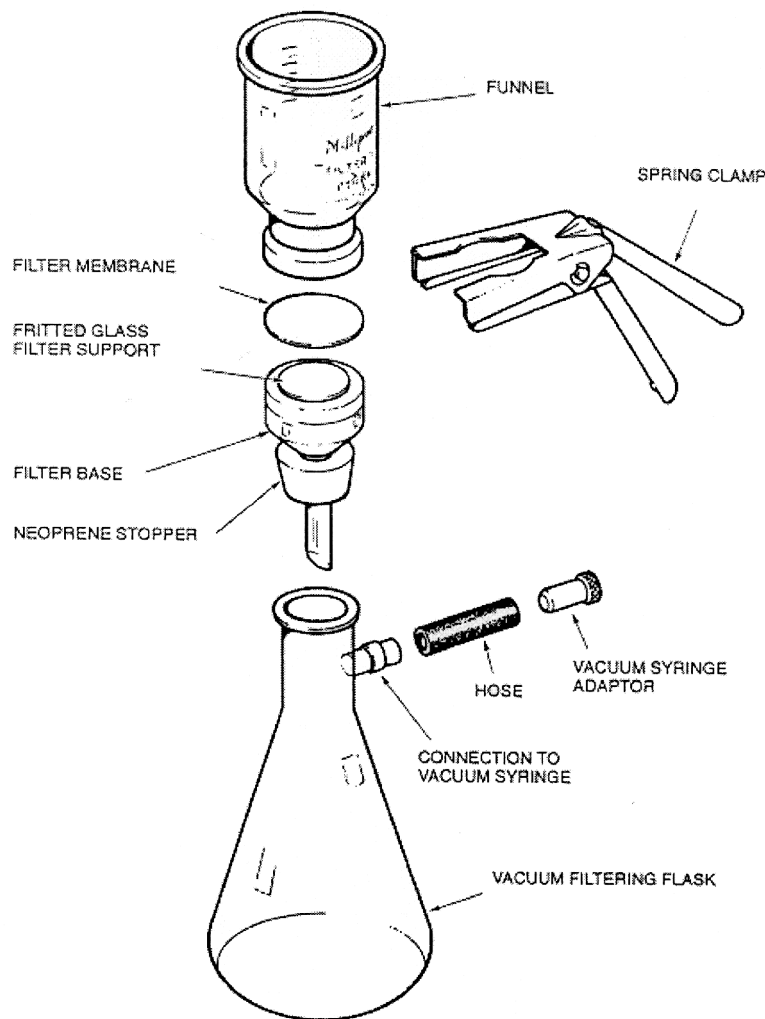


Figure 1 - Membrane holder and vacuum filtering flask assembly

3.2.6 Wash Bottle

A solvent filtering dispenser (wash bottle), fitted with a dispensing tube and spout, is used to dispense solvent required in the membrane making process. The wash bottle is fitted with a 25 mm filter holder, to accept a 25 mm (or 24 mm) filter (3 µm), to ensure proper cleanliness of the solvent used during membrane making.