



METRIC AEROSPACE INSERT DOCUMENT TYPE

MAP749™

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Superseding MAP749B

(R) Aircraft Turbine Engine Fuel
System Component Endurance Test Procedure
(Room Temperature Contaminated Fuel)

RATIONALE

This document has been revised to: (1) Update and clarify the references. (2) Clarify that the test system schematics depict pumps as the test components, although other components may be tested by locating them downstream of a test system pump. (3) Replace NAS 1638 by the more contemporary AS4059 for fluid cleanliness levels (Table I of AS4059 is the same as the NAS 1638 cleanliness levels). (4) Update Figures 1 and 2 to conform to modern hydraulic circuit symbols and to be consistent. (5) Replace the facility filter specification MIL-F-27656 by MIL-PRF-81836 specification. (6) Delete 3.7.2, referencing gravimetric analysis of samples from the pump by-pass loop, since it is out of context in this location. (7) Clarify sampling for gravimetric analysis in 10.3. (8) Editorial changes for clarity.

MAP749C has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

- 1.1 This SAE Aerospace Recommended Practice describes a method for conducting room temperature, contaminated fuel, endurance testing when the applicable specification requires nonrecirculation of the contaminants. The objective of the test is to determine the resistance of engine fuel system components to wear or damage caused by contaminated fuel operation. It is not intended as a test for verification of the component's filter performance and service life. ARP1827 is recommended for filter performance evaluation.
- 1.2 The method described herein calls for nonrecirculation of the contaminants and is intended to provide a uniform distribution of the contaminant at the fuel system inlet. Two systems for contamination addition are included, the conveyer and the slurry injection system.

2. REFERENCES

2.1 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Aerospace Technical Report.

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Documents

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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.

ARP492	Aircraft Engine Fuel Pump Cavitation Endurance Test
ARP785	Aerospace - Procedure for the Determination of Particulate Contamination in Hydraulic Fluids by the Control Filter Gravimetric Procedure
ARP1827	Measuring Aircraft Gas Turbine Engine Fine Fuel Filter Element Performance
AIR4023	Aircraft Turbine Fuel Contamination History and Endurance Test Requirements
AS4059	Aerospace Fluid Power - Contamination Classification for Hydraulic Fluids
AIR4246	Contaminants for Aircraft Turbine Engine Fuel System Component Testing

2.1.2 Military Publications

Available from DLA Document Services, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6396, <http://quicksearch.dla.mil/>.

MIL-E-5007 ¹	Engines, Aircraft, Turbojet and Turbofan, General Specification for
MIL-E-8593 ²	Engines Aircraft, Turboshift and Turboprop General Specification for
MIL-PRF-7024	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-DTL-5624U	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-DTL-83133E	Turbine Fuels, Aviation, Kerosene Types, Nato F-34 (JP-8), Nato F-35, And JP-8 + 100
MIL-PRF-81836	Filter and Disposable Element, Fluid Pressure, Hydraulic 3 Micron Absolute, General Specification For
JSSG - 2009	Air Vehicle Subsystems

2.1.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D971	Interfacial Tension of Oil Against Water by the Ring Method
ASTM D1094	Test for water reaction of Aviation Fuels
ASTM D1655	Standard Specification for Aviation Turbine Fuels
ASTM D3240	Standard Test Method for Undissolved Water in Aviation Turbine Fuels

¹ MIL-E-5007 is inactive for new design as of January, 1997.

² MIL-E-8593A is inactive for new design and is no longer used, except for replacement purposes, effective October 15, 1975.

2.1.4 U. K. Military Specifications

Available from Defence Equipment and Support, U. K. Defence Standardization, Kentigern House, 65 Brown Street, Glasgow G2 8EX, United Kingdom, Tel: +0141 224 2531/2, Fax: +0141 224 2503, <http://www.dstan.mod.uk>

Defence Standard 91-91, Issue 6 Turbine Fuel, Aviation Kerosine Type, Jet A-1, NATO Code: F-35, Joint Service Designation: AVTUR.

3. TEST SETUP

Typical arrangements for the conveyor system and the slurry injection system are shown in Figures 1 and 2, respectively. These arrangements depict a fuel pump being tested. However, for testing other fuel system components, those components should be placed immediately downstream of a test system pump.

3.1 General Requirements

3.1.1 Test Fluid

Fluid conforming to the applicable component specification. (The system primary fuel is recommended.)

3.1.2 Test Fuel Temperature

Control is not necessary unless required by the applicable component specification. The construction of the test facility and instrumentation should be reviewed to assure that it is compatible with the fluid, pressures, and temperatures required in the test. For example, standard system cleanup filters may not be designed for operation above 49 °C (120 °F).

3.1.3 Ambient Temperature

Control is not required.

3.1.4 Component Inlet Pressure

0 to 170 kPa (0 to 25 psig) or as otherwise specified by the test specification. Facility pumps may be utilized to achieve this pressure providing they do not interfere with the flow and distribution of the contaminants.

3.1.5 Mounting

Each component shall be mounted in its normal, level flight attitude by its mounting pad. Actual system installation plumbing should be used when possible for connection of test components if two or more components are tested together; where actual installation plumbing is not available, system installation line sizes, lengths, and bends shall be duplicated as closely as possible.

3.1.6 Supply Tank

The size of the supply tank is optional. However, it is recommended that the size of the tank be kept small and have the capability to be checked inside to assure there is no buildup of contaminant and water (see Figure 3).

3.1.7 Receiving Tank

The use of a receiving tank is optional. The receiving tank should also be kept small and have the capability of being checked inside to assure there is no buildup of contaminant and water. (The supply tank and the receiving tank may be combined.)

3.1.8 The entire test system should be electrically grounded.

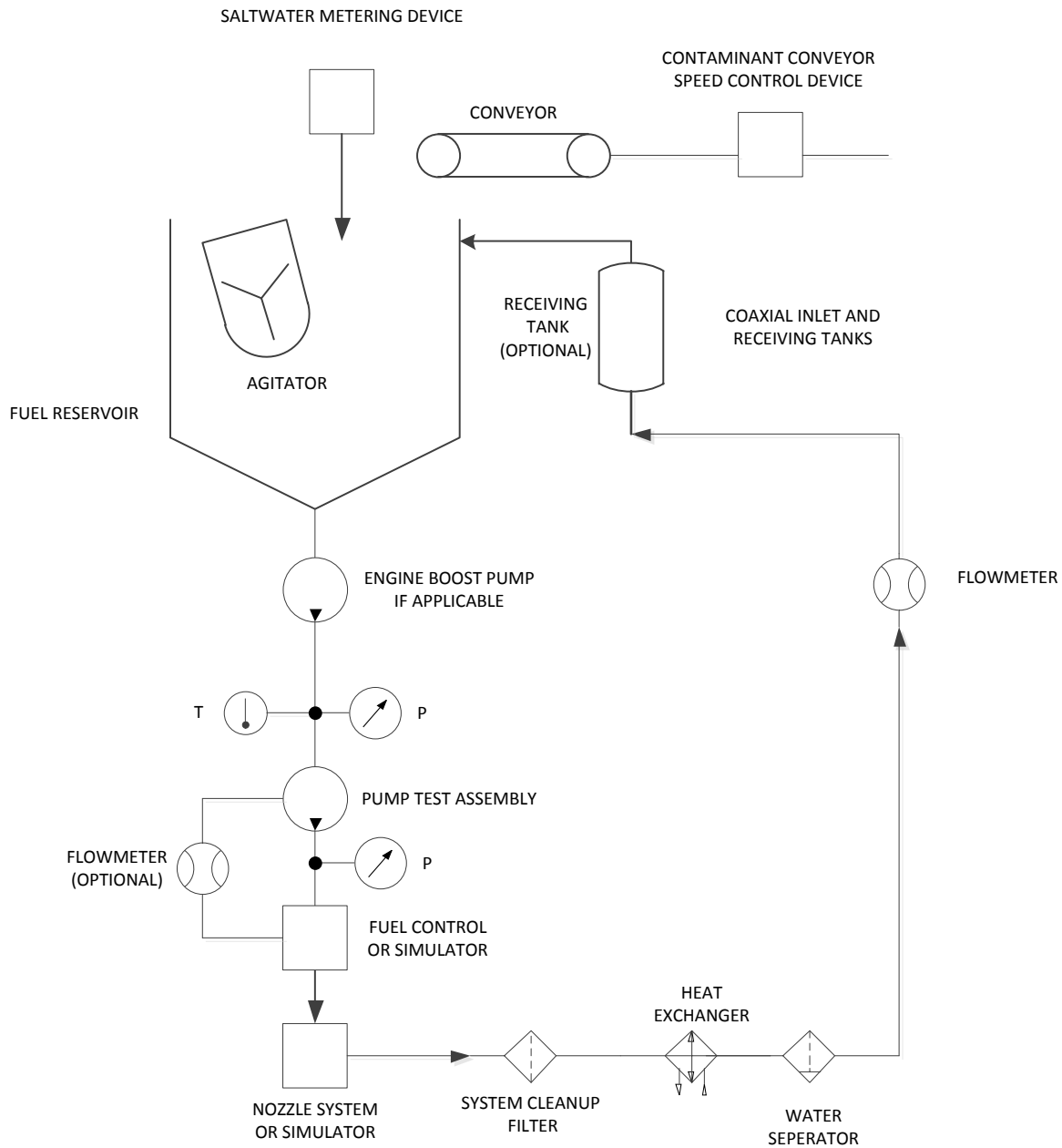


Figure 1 - Conveyor test setup

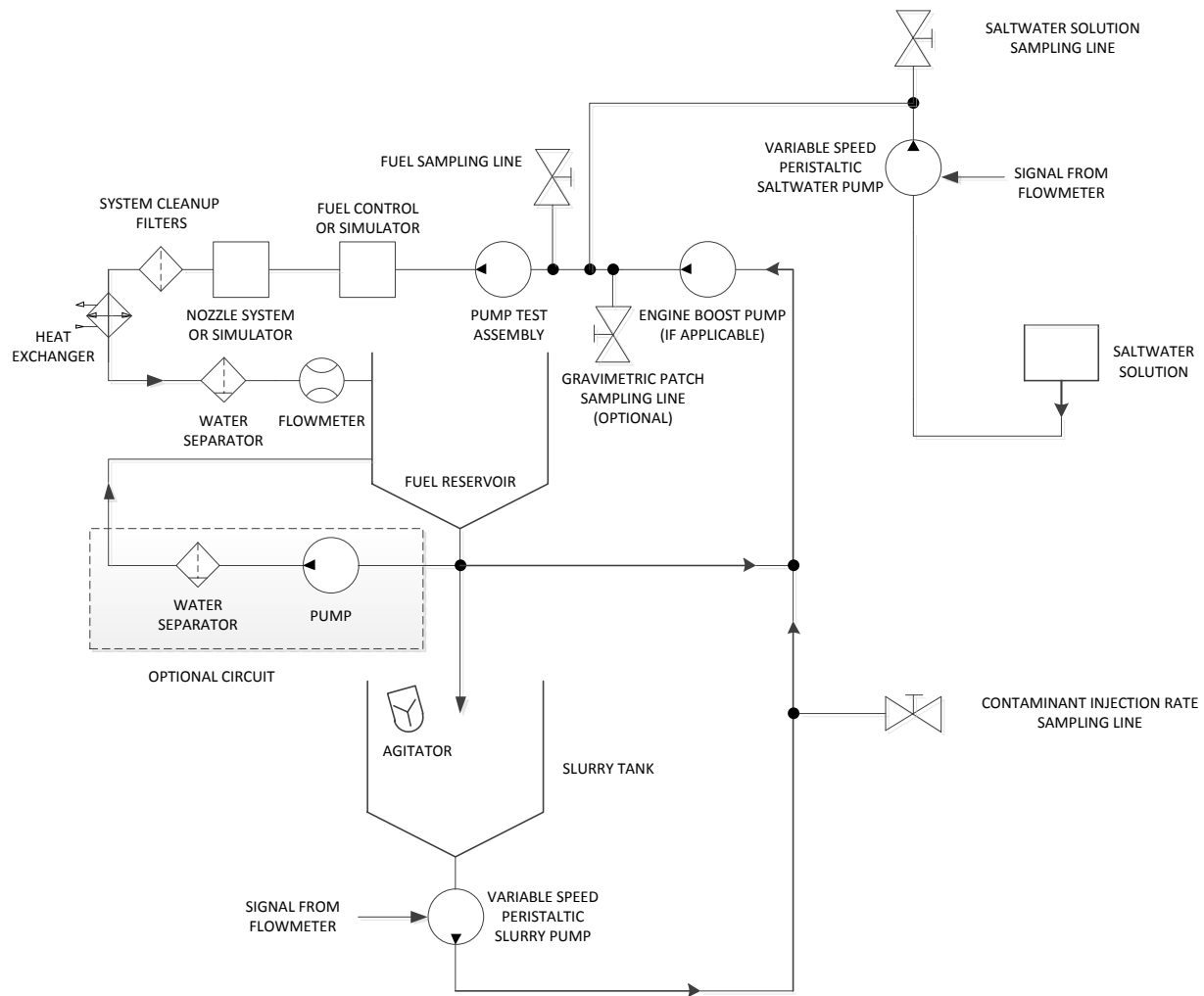


Figure 2 - Slurry injection system - test setup

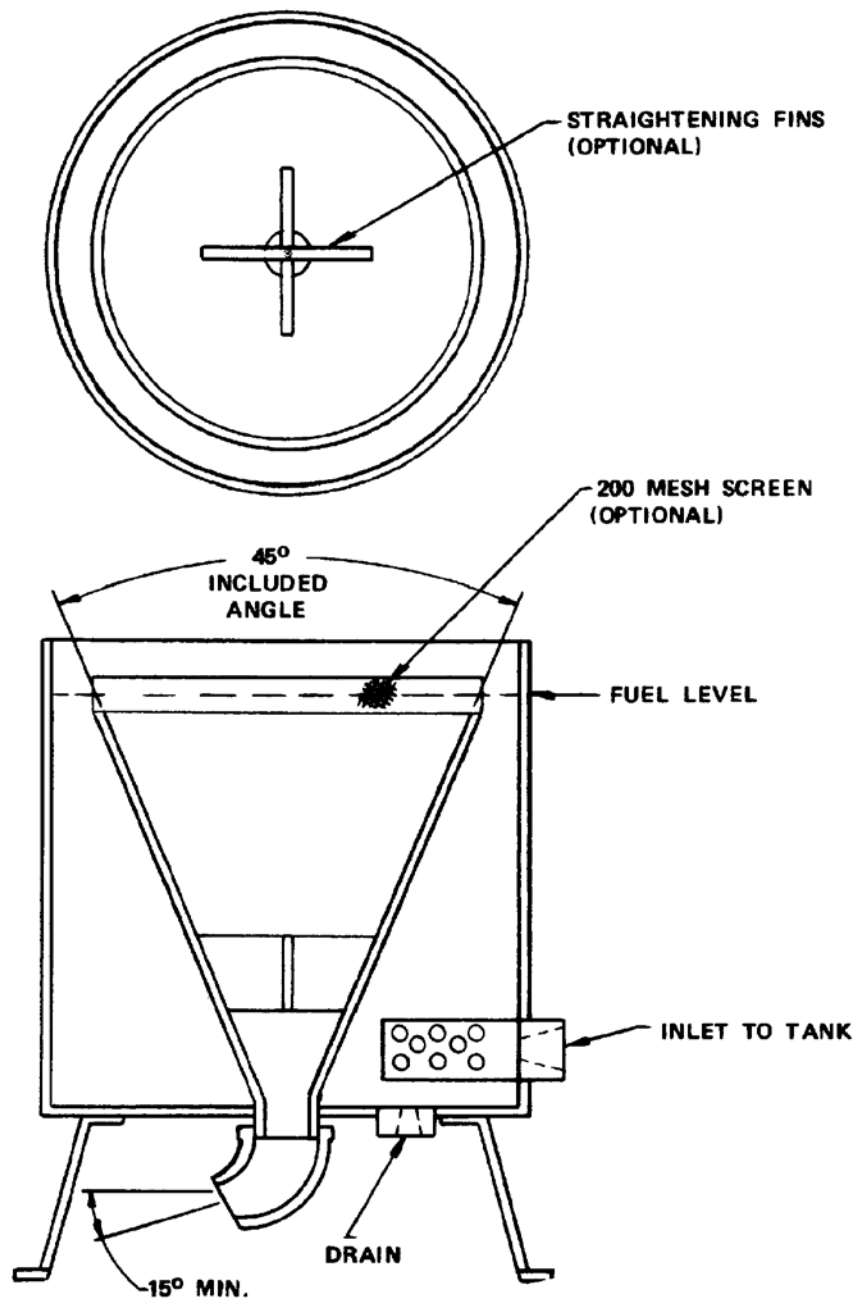


Figure 3 - Aircraft turbine engine fuel system component endurance test (contaminated fuel) supply tank