



<b>AEROSPACE STANDARD</b>	<b>AS5780™</b>	<b>REV. D</b>
	Issued 2000-09 Revised 2018-03	
Superseding AS5780C		
Specification for Aero and Aero-Derived Gas Turbine Engine Lubricants		

**RATIONALE**

At the 2017 Fall meeting SAE committee E-34 decided that the Def Stan 05-50 (Part 61) method 9 oxidative stability test is out of control due to a shift in results compared with previously accepted data and should therefore be moved from table 3 to Appendix A while the reasons for this are investigated. This draft implements that decision.

**1. SCOPE**

This specification defines basic physical, chemical, and performance limits for 5 cSt grades of gas turbine engine lubricating oils used in aero and aero-derived marine and industrial applications, along with standard test methods and requirements for laboratories performing them. It also defines the quality control requirements to assure batch conformance and materials traceability, and the procedures to manage and communicate changes in oil formulation and brand. This specification invokes the Performance Review Institute (PRI) product qualification process. Requests for submittal information may be made to the PRI at the address in Appendix D Section D.2, referencing this specification. Products qualified to this specification are listed on a Qualified Products List (QPL) managed by the PRI. Additional tests and evaluations may be required by individual equipment builders before an oil is approved for use in their equipment. Approval and/or certification for use of a specific gas turbine oil in aero and aero-derived marine and industrial applications is the responsibility of the individual equipment builders and/or governmental authorities and is not implied by compliance with or qualification to this specification.

**2. REFERENCES**

**2.1 Applicable Documents**

The publications referred to in this specification are listed in Appendix D, Section D.1. Reference in this specification to any related document means the edition and all amendments current at the date of use of that document. In the event of a conflict between the text of this document and references cited herein, the text of this document shall take precedence.

**2.2 Other Applicable References**

Other applicable references are listed in Appendix D, Section D.2 for information purposes only.

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### 2.3 Definitions

STANDARD PERFORMANCE CAPABILITY CLASS (SPC): Lubricant intended for normal service.

HIGH PERFORMANCE CAPABILITY CLASS (HPC): Lubricant intended for more demanding service in which engine operating conditions and/or service durations require higher thermal capability.

BATCH: The volume of basestock, additive or finished lubricant receiving final certification analysis and testing.

PERFORMANCE REVIEW INSTITUTE (PRI): An SAE affiliate with the objectives of providing global, unbiased, independent manufacturing process and product assessments and certification services.

QUALIFIED PRODUCTS GROUP (QPG): A mandated body designated by the PRI Qualified Product Management Council (QPMC) in accordance with PRI PD2000. This body is responsible for assessing whether a manufacturer's products comply with the relevant standards. The Mandated Body is known as a Qualified Products Group (QPG) and is composed of members from the Original Equipment Manufacturers (OEMs) and Government Agencies. The QPMC has mandated a QPG for Aerospace Gas Turbine Oils.

QUALIFIED PRODUCTS LIST (QPL): A list of products qualified by the QPG to this specification and issued by the PRI.

QUALIFICATION REFERENCE NUMBER (QRN): A unique reference number assigned by the QPG to each formulation qualified to this specification.

### 3. COMPOSITION

The composition of gas turbine oils used in aero and aero-derived marine and industrial applications shall be based on polyol ester base-stock chemistry. Other base-stock chemistries may be considered for qualification at the discretion of the QPG.

Additives containing barium or organic compounds of titanium, and known or suspected carcinogens, are prohibited. If a tricresyl phosphate (TCP) additive is used, the TCP additive shall contain less than 0.20% by weight in total of mono, di and tri-ortho cresyl isomers of tricresyl phosphate.

All chemical ingredients contained in aviation turbine lubricants must comply with all legal, environmental, toxicological and regulatory requirements of the countries in which the products are manufactured and sold. A Safety Data Sheet (SDS) or other equivalent document shall be available to cover these regulatory requirements.

### 4. TEST REQUIREMENTS

The test requirements in this section are mandatory requirements for the initial qualification of turbine engine oils to this specification. These requirements are primarily aimed at civil aero and aero-derived marine and industrial applications, but that does not preclude their use for military applications where considered desirable. All tests must be conducted by laboratories approved for the purpose in accordance with Section 5. The tests are grouped into the following property categories:

- Physical Properties
- Chemical Properties
- Stability Properties
- Deposition Properties
- Tribological Properties

AIR6056, "Gas Turbine Engine Lubricant Specifications: Current Technical Review and Future Direction" provides useful information to the background of these properties and tests and the reasons for their inclusion in AS5780.

**Table 1 - Physical properties**

Property	Test Method	Limits
		SPC and HPC
Viscosity, mm <sup>2</sup> /s @:		
100 °C	ASTM D445/IP71	4.9 to 5.4
40 °C	ASTM D445/IP71	23.0 min
-40 °C	ASTM D445/IP71 or ASTM D2532	13000 max
Viscosity Stability, 72 hours @ -40 °C, % Change	ASTM D2532	6 max
Pour Point, °C	ASTM D97/IP15 or ASTM D5950	-54 max
Flash Point, °C	ASTM D92/IP36	246 min
Evaporation, 6.5 hours @ 204 °C, wt %	ASTM D972	10 max
Foaming Tendency, Sequence I, II, III, mL	ASTM D892/IP146	25/0 max (1)
Shear Stability, % Viscosity change @ 40 °C	ASTM D2603 (2)	4 max

## NOTES:

1. Volume after aeration/Volume after 1 minute settling.
2. ASTM D2603 should be conducted with the following modifications:

Calibrate the instrument to achieve 11.5% ± 0.5% viscosity loss to a 30 mL sample of ASTM Reference Fluid A when irradiated for 5 minutes. Using the same power setting, irradiate a 30 mL sample of the turbine lubricant for 30 minutes.

**Table 2 - Chemical properties**

Property	Test Method	Limits	
		SPC	HPC
TAN, mg KOH/g	ARP5088	1.0 max	1.0 max
Sediment/Ash, mg/L	FED-STD-791, Method 3010	Sed: 10 max Ash: 1 max (1) No undissolved water	Sed: 10 max Ash: 1 max (1) No undissolved water
Lubricant Compatibility: Sediment, mg/L Turbidity	FED STAN 791, Method 3403 Mod (2) / Def Stan 05-50 (Part 61) Method 24 See Note (3)	10 max None	10 max None
Elastomer Compatibility, AMS3217/4, 72 hours at 204 °C, % swell	FED-STD-791, Method 3604	5 min 25 max	5 min 25 max
Elastomer Compatibility (5), % weight change after 24/120 hours: Fluorocarbon @ 200 °C LCS Fluorocarbon @ 200 °C Nitrile @ 130 °C Silicone @ 175 °C Perfluoroelastomer (6) @ 200 °C	Def Stan 05-50 (Part 61) Method 22	10 / 15 max 10 / 20 max 19.5 / 22 max 16.5 / 16.0 max N/A	11 / 15 max 12 / 20 max 19 / 19.5 max 14.5 / 14.5 max 2 / 2 max
Trace Metals, mg/L	See Note (4)	Al, 2 max Fe, 2 max Cr, 2 max Ag, 1 max Cu, 1 max Sn, 4 max Mg, 2 max Ni, 2 max Ti, 2 max Si, 10 max Pb, 2 max Mo, 3 max Zn, 2 max	Al, 2 max Fe, 2 max Cr, 2 max Ag, 1 max Cu, 1 max Sn, 4 max Mg, 2 max Ni, 2 max Ti, 2 max Si, 10 max Pb, 2 max Mo, 3 max Zn, 2 max

## NOTES:

1. If the total sediment does not exceed 1 mg/L, the ash content requirement shall be waived.
2. FED STAN 791, Method 3403 shall be modified in accordance with Appendix C.
3. The E34 Qualified Products Group (QPG) should be contacted for the current list of required reference oil brands
4. A spectrometric technique able to determine the listed metals at the limits stated in Table 2 shall be used. Methods ASTM D5185 and ASTM D6595 have been found to be suitable. Appropriate spectrometric calibration standards, covering the concentration ranges of interest shall be utilized.
5. Embrittlement shall be determined as a Report only item in Appendix A.
6. The perfluoroelastomer used shall comply with the requirements of AMS7257.