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## **Lubricating Oil Specification for GE Aircraft Derivative Gas Turbines**

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This document provides the requirements and application guidelines for selection of lubricating oils which can be satisfactorily utilized in GE Marine and Industrial Aeroderivative Applications. It is recommended that the lubricating oil selected be reviewed with GE prior to its use.

### **1.0 Oil Specifications**

Oils conforming to the US Department of Defense (DoD) Specifications shown in paragraph 2.1 are acceptable for use in GE Aircraft Derivative gas turbines, provided they are listed on the Qualified Product List (QPL) for the specific Specification.

#### **1.1 Commercial Specifications**

Commercially available synthetic based lubricating oils, per the Supplier's Specification, are acceptable for use in GE Aircraft Derivative gas turbines, provided they are listed in Section 4 of this document. Such oils largely conform to the primary requirements of the oils in Section 1.0, but certain variations have been approved. Such oils have been qualified by the Supplier to meet the requirements of this document.

### **2.0 Applicable Documents**

The following documents shall form a part of this document to the extent specified herein. Unless a particular issue is specified, the latest revision shall apply.

#### **2.1 US DoD Specifications**

MIL-PRF-23699 Lubricating Oil, Aircraft Turbine Engines, Synthetic Base

MIL-L-7808 Lubricating Oil, Aircraft Turbine Engines, Synthetic Base, Type 1

#### **2.2 American Society of Testing and Materials.**

The following documents are available from American Society for Testing and Materials, Customer Service, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959:

ASTM D2532 Low Temperature Viscosity

ASTM D97 Pour Point

ASTM D445 Kinetic Viscosity

### **3.0 Requirements**

The lubricating oil shall conform to the requirements of MIL-PRF -23699, however, exceptions to the following requirements will be considered:

- Low temperature Viscosity when tested per ASTM D2532.
- Pour Point when tested per ASTM D97.
- Viscosity at 40°C and 100°C when tested per ASTM D445
- Base Stock Composition

The specific variations to MIL-PRF-23699 shall be provided by the oil supplier, along with performance difference impacts, for review by GE.

### **3.1 Material Compatibility**

The lubricating oil shall be compatible with the same elastomer seal and metallic materials as the MIL-PRF-23699 compliant lubricating oils are.

The lubricating oil shall be mixable with MIL-PRF-23699 or MIL-L-7808 compliant oil in a ratio of up to 5% of either oil, without adversely affecting the property integrity of the majority, or operating, oil. Mixing of oils is not intended, but will result due to engine location changes.

### **4.0 Qualification**

Lubricating oil shall be considered qualified and acceptable for use in GE Aircraft Derivative gas turbines demonstrating conformance to the requirements and after being listed in paragraph 4.4. The qualification program shall be carried out by the oil supplier in conjunction with a sponsoring gas turbine owner/operator. GE's participation will be limited to technical consultation, review and final approval only.

### **4.1 Performance Tests**

The oil supplier shall conduct tests in accordance with the requirements of MIL-PRF-23699 and compare the results with the requirements stated therein. All results, and specifically the variations to MIL-PRF-23699 requirements, shall be reviewed with GE prior to initiation of Service Evaluation Testing. Specifically, the material presented for review shall include, as minimum, the following:

- Physical/Chemical Properties and variations to MIL-PRF-23699
- Expected impact to operating systems due to Property variations
- Material Compatibility Lists & Test results
- Oil Coking Test Results

## **4.2 Service Evaluation Tests**

The oil shall undergo service evaluation testing in a LM Series gas turbine application(s). The sponsoring operator will accept total responsibility for all results related to operating with the candidate lubricating oil. The service evaluation engine shall have a known hardware condition baseline, based on depot inspection or new delivery, immediately prior to the service evaluation test.

Service evaluation testing shall be conducted on a minimum of three LM series gas turbines, each accumulating at least 8,000 operating hours, at a baseload operating site, prior to inspection. During operation, periodic oil samples shall be tested and trended for physical and chemical property changes. Inspection shall be performed at an authorized depot, and shall be in accordance with the applicable repair manual.

Inspection shall be focused on the oil wetted parts, including the bearings, gears, elastomer seals, sump oil seals, actuators, and lube/hydraulic pumps. GE will be permitted to witness any of the inspections, at the discretion of GE.

## **4.3 Qualification Report**

The oil supplier, and/or operator, shall prepare and submit a Final Qualification Report to GE. The report shall include, as a minimum, the following:

- Oil Brand Description including the complete formulation
- Certified physical, chemical and performance test results
- Material Safety Data Sheets
- Service evaluation test history including all significant operational and maintenance events
- Service evaluation oil sample trending results
- Final depot engine inspection results

Upon final review and approval of the Final Qualification Report by GE, the candidate oil will be included on the approved oils list.

Formulation changes affecting any approved performance characteristics must be reviewed with GE for impact on qualification results.

## **4.4 Approved Lubricating Oils**

In addition to the oils listed on QPL-23699 and QPL-7808, (Qualified Products List), the following lubricating oils are approved for use in GE Aero Derivative gas turbines and gas generators:

1. None at this time.