

AIRCRAFT AIR COMPRESSOR LUBRICATING OIL

Issued 2-15-61
Revised

CANCELLED

1. PURPOSE: For use in preparing purchase specifications for aircraft compressor lubricating oil, for the lubrication of high pressure air compressors with self-contained lubricating systems.
2. SCOPE:
 - 2.1 This ARP covers one grade of lubricating oil for high pressure air compressors for aircraft.
3. REQUIREMENTS:
 - 3.1 Materials: Aircraft air compressor lubricating oil should consist substantially of synthetic base oil and additive materials to impart oxidation stability and corrosion-protective properties. The composition of the lubricant is not limited, but a formulation composed substantially of non-petroleum materials may be required to meet this ARP.
 - 3.1.1 Additives: The corrosion inhibitors employed are not limited to composition, however, they should not be extractable from the oil by hot water, nor should they or their ash significantly lower the ignition temperature of the oil or of carbon.
 - 3.2 Appearance: The lubricant should be transparent, uniform in appearance, and should be free from sediment and suspended matter when examined visually, both before and after centrifuging.
 - 3.3 Corrosion and Oxidation Stability: When tested as specified in paragraph 4.5.5, the material should comply with the following requirements.
 - 3.3.1 Corrosion:
 - 3.3.1.1 Corrosion at 347°F (175°C): The change in weight of steel, silver, aluminum alloy, and magnesium alloy, when subjected to the lubricant for 72 hours at 347°F (175°C), should be not greater than +.2 milligram per square centimeter of surface. The change in weight of the copper should be not greater than +0.4 milligram per square centimeter of surface. There should be no pitting, etching, or visible corrosion on the surface of any of the metals when viewed under a magnification of 20 diameters. Staining of the metals may be permitted.
 - 3.3.1.2 Corrosion: The change in weight of cadmium-plated steel, copper steel, aluminum alloy, and magnesium alloy when subjected to the action of the oil for 168 hours at 250°F should not be greater than 0.2 milligram per square centimeter of surface for each strip. There should be no pitting, etching, or visible corrosion on the surface of any of the metals when viewed under magnification of 20 diameters. Slight discoloration of the surface of the copper may be permitted, but dark brown, gray or black stain should be cause for rejection.

- 2 -

3.3.2 Resistance to Oxidation:

3.3.2.1 Resistance to Oxidation at 347°F (175°C): The total acid number using electrometric titration should not have increased by more than 2.0 when titrated to a pH of 11 over the total acid number of the original sample after oxidation at 347°F (175°C), as outlined in Method 5308 Federal Test Methods Standard 791. Darkening of the lubricant during the test may be permitted.

3.3.2.2 Resistance to Oxidation: The oil should not have changed more than +5 percent from the original viscosity in centistokes at 54.4°C (130°F), after the oxidation corrosion test. The neutralization number increase should not be greater than 0.5 after oxidation. There should be no evidence of separation of insoluble materials or gumming of the oil.

3.4 Protection: Not more than one panel out of five should fail after being covered with a film of lubricating oil and tested as specified in paragraph 4.5.11 for 100 hours. If more than one panel fails, the product should be retested by repeating the test with an additional 10 panels. Not more than 4 panels should fail out of the total of 15 panels (5 on an original test, plus 10 on retest).

3.5 Low Temperature Stability: There should be no gelling or separation of solid or liquid phases in the oil after storage at a temperature not higher than 054°C (-65°F) for 72 hours, as specified in paragraph 4.5.7. The presence of a dense cloud which does not settle out should not be cause for rejection.

3.6 Properties: The properties of the lubricant should conform to the following table:

Viscosity 100°F	11 cs. min.
Viscosity 210°F	3.0 cs. min.
Viscosity -65°F	10,000 cs. min.
Pour Point	-75°F max.
Flash Point	500°F min.
SIT	800°F min.

3.6.1 Viscosity Stability: Viscosity determinations at -65°F (-53.9°C) conducted in accordance with 4.5.4 should meet the requirements listed in 3.6.1.1 and 3.6.1.2.

3.6.1.1 3-Hour Test: Two viscosity determinations should be made at -65°F (-53.9°C); one 35 + minutes after placing the sample in the bath and the second a minimum of 3 hours after completion of the initial viscosity determination. These determinations should not differ by more than 6.0 percent and when reported in centistokes, both should be below 10,000.

3.6.1.2 72-Hour Test: A series of viscosity determinations should be made at -65°F (-53.9°C); one at 35 + minutes after placing the sample in the bath and the other at 3, 6, 8, 24, 32, 48, 56 and 72 hours after completion of the initial viscosity determination. When reported in centistokes, all determinations should be below 13,000.

- 3 -

- 3.7 Swelling of Synthetic Rubbers: Swelling of standard synthetic rubber H by the test lubricant, when tested according to test methods outlined in paragraph 4.5.6, should be within the limits established below:

<u>Rubber</u>	<u>Percent Swell</u>	
	<u>(Min.)</u>	<u>(Max.)</u>
H	12	35

- 3.8 Coking: When tested as specified in paragraph 4.5.8, there should be not more than 25 mg. coke deposited.
- 3.9 Water Extractability of Additive: When the oil is extracted by testing as specified in paragraph 4.5.12, there should be no greater than 10% of the rust inhibitor removed.
- 3.10 Effect of Oil Ash on SIT Carbon: When the ash from the lubricant is tested as specified in paragraph 4.5.13, the ignition temperature of the blend should be depressed to a value not less than the SIT of the oil.
- 3.11 Evaporation: The evaporation loss should not exceed 25 percent by weight when tested at 400°F (204.4°C) for 6-1/2 hours.
- 3.12 Foaming Characteristics: The lubricant should not exceed the following values for the indicated sequence when tested as specified in 4.5.3:
- (a) Sequence 1. 100 ml. maximum foam immediately following the bubbling period and complete foam collapse within 5 minutes.
 - (b) Sequence 2. 25 ml. maximum foam immediately following the bubbling period and complete foam collapse within 3 minutes.
 - (c) Sequence 3. 100 ml. maximum foam immediately following the bubbling period and complete foam collapse within 5 minutes.
- 3.13 Compatibility: The lubricant should be compatible with each of the lubricants approved under this specification.
- 3.14 Compressor Test: The lubricant should not adversely affect the compressor after testing as specified in paragraph 3.5.15. Any malfunction in the operation of the compressor attributable to the lubricant should be cause for rejection.
- 3.14.1 Oil Performance: Any evidence of lacquer, varnish, excessive carbon, or rust should be cause for rejection.
- 3.14.2 Used Oil Control: The right is reserved to subject any sample removed from the compressor test to all the tests of this specification and such additional tests as are considered necessary to assure the serviceability of the material. Significant changes in physical or chemical properties or both, as a result of compressor operation, may be cause for rejection.