



AEROSPACE RECOMMENDED PRACTICE

ARP6223™

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Oil Carbon Particulate Test

RATIONALE

This SAE Aerospace Recommended Practice (ARP) is intended to provide acceptable procedure for qualification purposes to determine the tendency of aircraft lubricating oils to oxidatively degrade at elevated temperatures and pressures into products that form suspended fine carbon particles under engine conditions. Properties of such particles may cause filters and other fine passages in the lubricant system to clog.

1. SCOPE

An oil sample is placed into an open top glass vial which is then inserted into a stainless steel pressure vessel. The vessel is then sealed, pressurized, and placed into a heated aluminum block bath for 18 hours. At the end of the 18 hour time period, the vessel is removed from the heat source and allowed to cool to room temperature at which time the contents of the vial are filtered and the total sediment is reported as milligrams of sediment per 20 mL of oil.

2. REFERENCES

There are no referenced publications specified herein.

3. WARNING

This document may involve hazardous materials, operations, and equipment. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.

4. APPARATUS AND INSTRUMENTATION

4.1 Pressure Cylinder and Cover (Test Vessel)

The cylinder is solid stainless steel, approximately 10.75 inches (27 cm) tall, approximately 2 inches (5 cm) outside diameter. It has an inside chamber that is 9.5 inches (24 cm) deep and a diameter of about 1 inch (2.5 cm). The cover holds the pressure gage, a pressure relief device, and the pressurizing connections. The vessel and cap assemblies are numbered and must remain together. Danko Precision Tool Co. in Aurora, Illinois, manufactures these vessels. A drawing of the vessel assembly is in Appendix A of this procedure should an equivalent vessel need to be manufactured. The insertion depth of the assembled vessel in the aluminum block bath must be 10 inches $\pm$ 1/8 inch (25.4 cm $\pm$ 0.3 cm). Spacers should be made from a heat resistant material to accommodate apparatus that have hole depths greater than this.

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4.2 Aluminum Block Bath

Koehler K35000 corrosiveness and oxidation stability bath (or equivalent), multiple positions, capable of maintaining 625 °F (330 °C) to within 2 degrees. The bath is fitted with an independent over-temperature control unit and is placed into a Class 1 hood.

4.3 Oven

A gravity convection oven that is capable of maintaining 212 °F (100 °C) to within 1 degree for the purpose of drying the filter membranes.

4.4 Analytical Balance

An analytical balance that is capable of measuring objects to a precision of 0.01 mg.

4.5 Dry Air Supply

Capable of providing 125 psi (0.862 MPa) with regulator, gage and quick connect fittings to match those on the pressure vessel.

4.6 Graduated Cylinder

50 mL graduated cylinder marked in 1 mL increments.

5. REAGENTS AND/OR MATERIALS

5.1 Pyrex culture test tubes, 150 mm x 25 mm with screw cap, p/n Pyrex 9825-25.

5.2 Acetone - technical and reagent grades.

5.3 Filter papers, millipore 47 mm diameter, 0.50 micron, part number FHLP 047 00.

5.4 Brushes of sufficient size to clean the vessels and tubing.

5.5 Detergent (Alconox or similar) for cleaning the graduated cylinders and filtration apparatus as needed.

5.6 Anti-seize lubricant to ease vessel disassembly.

5.7 Snoop leak detector to check the assembly for air leaks.

6. PROCEDURE

6.1 Preheat the aluminum block bath to 625 °F $\pm$ 2 °F (330 °C $\pm$ 1 °C).

6.2 Pre-clean the vessel body, cap, and attached plumbing with technical grade acetone and a brush until the surfaces are clean and all rinse solvent is clean. Rinse the test tube with technical grade acetone. Dry the test tube, vessel, cap, and attached plumbing with compressed air.

6.3 Fill the cleaned test tube with 20 mL $\pm$ 2 mL of oil sample to be tested, use a 50 mL graduated cylinder or graduated syringe to measure the oil. The screw cap is not used inside the vessel, retain for use at the end of the test. Record the sample ID and vessel position.

6.4 Lightly apply a very thin coat of anti-seize lubricant to the threads on the vessel body using the brush provided in the can or a similar small brush.

6.5 Carefully lower test tube with the sample into vessel body.