



AEROSPACE RECOMMENDED PRACTICE

ARP4249™

REV. A

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Superseding ARP4249

Bearing Corrosion Test Method

RATIONALE

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1. SCOPE:

1.1 This SAE Aerospace Recommended Practice (ARP) is intended to evaluate corrosion inhibiting properties of synthetic gas turbine lubricants and gearbox oils.

1.1.1 This ARP is a modified form of a method developed in the United Kingdom as DERD Test Method/1, Method No. 18, Issue 1 of January 1984. (Reference 2.1.)

1.2 Field of Application:

1.2.1 Primarily to evaluate corrosion inhibiting properties of aircraft engines, gearboxes and propulsion system lubricants.

2. REFERENCES:

2.1 DERD Test Methods/1, Method No. 18, Issue 1 of January 1984

3. TEST REQUIREMENTS:

3.1 Apparatus:

3.1.1 Test Specimens:

3.1.1.1 Bearing Balls: 12.7 mm (0.5 in) diameter

3.1.1.2 Material: Steel SKF Grade 1-Swedish Made (Order No. RB-12.7/111/E212)

3.1.1.3 Finish: Lime polished

3.1.1.4 Suggested Supplier: Naval Air Warfare Center, Aircraft Division, Code PE33, Box 7176, Trenton, NJ 08628

3.1.2 Specimen Support Tray:

- 3.1.2.1 A lucite tray is drilled to provide countersunk ball bearing seats and to permit oil drainage from the seats. The tray is fitted with legs to provide a standard elevation of the test specimens in the humidity chamber and utilizes a drip tray to prevent oil inhibition of the water vapor source. The dimensions of the tray are given in Figure 1.

3.1.3 Humidity Chamber:

- 3.1.3.1 A glass tank with general dimensions of 305 mm (12 in) x 152 mm (6 in) x 229 mm (9 in) fitted with a ground glass lid and a high ledge to provide support for the glass rods which hold the drip control paper. Figure 2.

(The Universal TLC Chromatank produced by Shandon Southern Ltd. in the United Kingdom or equivalent is acceptable.) A tank with the same general dimensions without a ledge for the rods and drip control paper can be considered an alternate replacement.

- 3.1.3.2 The glass lid will have a drilled hole of such size to facilitate the introduction of a long probe-type thermocouple. The access hole should be located where it would allow the thermocouple to be centrally located within the chamber.

3.1.4 Test Specimen Handling Device:

- 3.1.4.1 A locally manufactured tool used for transferring test specimens from the test oils to the specimen tray. A wire loop fashioned of a diameter slightly less than 12.7 mm (0.50 in) with a suitable handle works well.

3.1.5 Drip Control Paper:

- 3.1.5.1 Whatman Number 1 filter paper cut to loosely fit the top dimensions of the humidity chamber. The need for this paper is optional and is to be determined by the type humidity chamber being used.

3.1.6 Glass Rods:

- 3.1.6.1 Rod length and diameter should be determined by the specific humidity chamber that is to be used.

3.1.7 Oven:

- 3.1.7.1 An oven capable of elevating the internal air temperature, of all humidity chambers in use, to 40 °C (104 °F) from 5 °C (41 °F) within 1 h, 40 °C ± 1 °C (104 °F ± 2 °F).



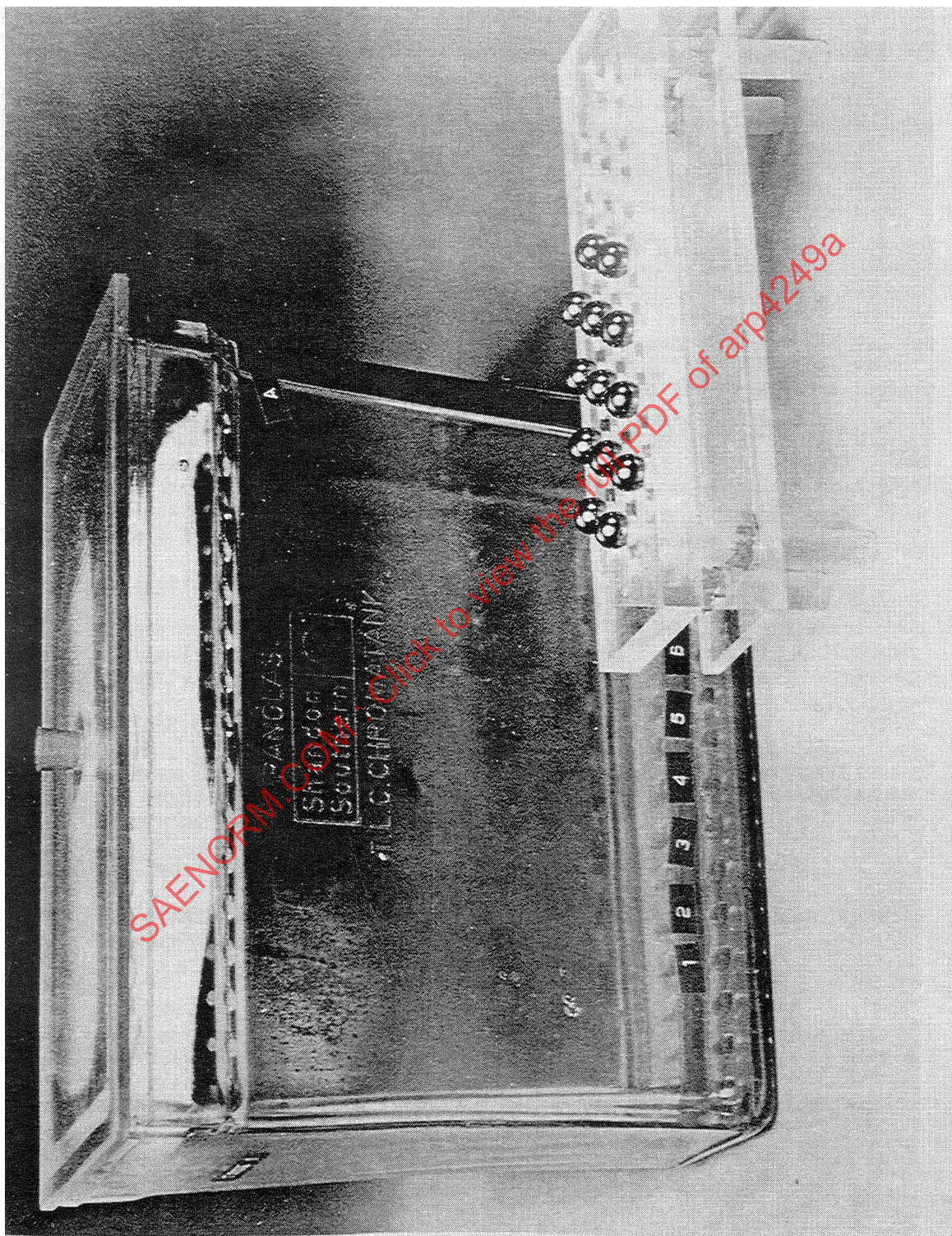


FIGURE 2

3.1.8 Refrigerator:

- 3.1.8.1 A unit capable of reducing the internal air temperatures of all the chambers in use to 5 °C (41 °F) from 40 °C (104 °F) within 3 h and of maintaining a constant temperature of 5 °C ± 1 °C (41 °F ± 2 °F).

3.1.9 Temperature Monitor:

- 3.1.9.1 Thermocouple and recorder for monitoring the internal air temperature of the humidity chamber. A glass thermometer and corresponding hourly log sheet may also be used for this purpose.

3.1.10 Microscope:

- 3.1.10.1 A unit that provides 10X magnification for the inspection of the test specimens.

3.2 Materials:

- 3.2.1 Laboratory Reagent Grade Mineral Spirits with a boiling point range of 90 to 120 °C (194 to 248 °F).

3.2.2 Laboratory Reagent Grade Acetone

3.2.3 Reference Oils:

- 3.2.3.1 Supplier: Naval Air Warfare Center, Aircraft Division, Code PE33, Box 7176, Trenton, NJ 08628.

3.2.4 Test Oils

3.2.5 Demineralized Water

3.3 Precautions:

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

3.4 Procedure:

- 3.4.1 All steps of the preparation and implementation of the procedures should be completed within 2 h.

Exception: The test specimens may be degreased earlier provided they are kept in a dessicator until ready for use. (See 3.4.5.5.)

- 3.4.2 Rinse the humidity chamber, lid and test specimen handling device in mineral spirits followed by acetone to remove residual water and oils from the previous test. Allow apparatus to air dry.

- 3.4.3 Rinse the specimen support tray in mineral spirits - DO NOT USE ACETONE. Residual water should first be removed by wiping with tissue. Allow the tray to air dry.
- 3.4.4 Add demineralized water to the humidity chamber to a depth of 19 mm (0.75 in).
- 3.4.5 Degrease the test specimens by washing as follows:
 - 3.4.5.1 30 min in boiling mineral spirits
 - 3.4.5.2 30 min in boiling acetone
 - 3.4.5.3 Air dry on clean, lint free tissues
 - 3.4.5.4 Visually inspect the test specimens to be used, for signs of rust, staining or surface damage, and reject any that are imperfect. (Magnification is not required for this inspection.)
 - 3.4.5.5 Place the cleaned test specimens in a dessicator until ready for use. It is recommended that only a number of specimens that will be readily consumed should be cleaned. Specimens stored in a dessicator over 30 days should be re-inspected prior to use.
- 3.4.6 Use four test specimens for each of the reference oils used in the test. Both the pass and fail oils should be used as controls in each test assembly prepared.
- 3.4.7 Place the test specimens into labeled beakers and into each beaker add enough test oil or reference oil to completely cover the specimens. Soak for 30 min at a temperature of 40 °C (104 °F). (A minimum of ten test specimens should be used for each test oil.)
- 3.4.8 Remove the test specimens individually from the oils using the test specimen handling device. Remove the excess oil by touching the specimen to the rim of the beaker and then to a piece of lint-free tissue.
- 3.4.9 Place each prepared specimen in a seat of the support tray and record its position. (Clean the handling device in mineral spirits between use in different fluids.)
- 3.4.10 Stand the specimen support tray in the bottom of the humidity chamber.
- 3.4.11 Place the condensation drip control paper, if used, above the support tray at the ledge of the chamber, supported by the ledge and by glass rods placed across the width of the tank.
- 3.4.12 Smear silicone stop cock grease around the rim of the chamber and install the lid, ensuring that the grease completely seals the tank.