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An American National Standard

Standard Guide for Reporting Friction and Wear Test Results of Manufactured Carbon and Graphite Bearing and Seal Materials[1]

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ε[1] NOTE—Updated titles of the tables editorially in May 2010.

1. Scope

1.1 This guide covers the following areas for reporting friction and wear test results of manufactured carbon and graphite bearing and seal materials:

1.1.1 Description of test device and techniques (Table 1 and Table 2.)

1.1.2 Description of carbon and graphite material test specimen (Table 3).

1.1.3 Description of mating member test specimen (Table 4).

1.1.4 Report of friction and wear test results (Table 5).

1.2 Many types of equipment and techniques will yield consistent data characterizing the friction and wear of carbon and graphite materials. However, the ranking of the materials by the various test methods used is not necessarily the same. This guide is an initial effort to promote more complete description of the test methods, whatever they may be. It is the eventual intent to identify one or more specific standard test methods when sufficient information becomes available.

2. Significance and Use

2.1 The purpose of this guide is twofold. First, it is a research tool that will aid in the analysis and correlation of test results obtained on various test devices by different investigators. Second, it serves to identify important considerations that must be made in testing to make the results easily understood and comparable with the results of other investigators.

3. Keywords

3.1 carbon; friction; graphite; reporting; wear

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TABLE 1 Description of Test Device and Techniques

DATE _____

1. DESCRIPTION OF TEST DEVICE

1.1 *Preferred Designation, Manufacturer, and Modifications* _____

1.2 *Orientation of Carbon Specimen Test Surface:*
1.2.1 Horizontal ☐
1.2.2 Vertical ☐
1.2.3 Other (describe) _____

1.3 *Description of Sliding:*
1.3.1 Linear ☐
1.3.2 Rotational ☐
1.3.3 Discontinuous motion ☐ Describe _____
1.3.4 Continuous motion ☐ Describe _____
1.3.5 Discontinuous contact ☐ Describe _____
1.3.6 Continuous contact ☐ Describe _____
1.3.7 Approximate duration of test _____ minutes, _____ hours, _____ days

1.4 *Description of Loading System:*
1.4.1 Maximum capacity _____ N (_____ lbf)
1.4.2 Type of measuring element _____
1.4.3 Type of recording device _____
1.4.4 Estimate of error _____
1.4.5 Calibration procedure and frequency _____

1.5 *Description of Speed-Measuring System:*
1.5.1 Maximum capacity _____ m/s (_____ ft/s), _____ rev/min, other _____
1.5.2 Type of measuring element _____
1.5.3 Type of recording device _____
1.5.4 Estimate of error _____
1.5.5 Calibration procedure and frequency _____

1.6 *Description of Temperature-Measuring System:*
1.6.1 Location (describe):
1.6.1.1 Carbon test specimen _____
1.6.1.2 Mating member test specimen _____
1.6.1.3 Fluid (for example, upstream and downstream of test specimens and test cavity) _____

1.6.2 Maximum value:
1.6.2.1 Carbon test specimen _____ K (_____ °F)
1.6.2.2 Mating member test specimen _____ K (_____ °F)
1.6.2.3 Fluid _____ K (_____ °F)
1.6.3 Type of measuring element:
1.6.3.1 Carbon test specimen _____
1.6.3.2 Mating member test specimen _____
1.6.3.3 Fluid _____
1.6.4 Type of recording device: _____
1.6.4.1 Carbon test specimen _____
1.6.4.2 Mating member test specimen _____
1.6.4.3 Fluid _____
1.6.5 Estimate of error:
1.6.5.1 Carbon test specimen _____
1.6.5.2 Mating member test specimen _____
1.6.5.3 Fluid _____
1.6.6 Calibration procedure and frequency:
1.6.6.1 Carbon test specimen _____
1.6.6.2 Mating member test specimen _____
1.6.6.3 Fluid _____

1.7 *Description of Pressure-Measuring System Across Test Specimens:*
1.7.1 Maximum value:
1.7.1.1 Upstream _____ Pa absolute (_____ psia)
1.7.1.2 Downstream _____ Pa absolute (_____ psia)
1.7.1.3 Differential _____ Pa differential (_____ psid)
1.7.2 Type of measuring element:
1.7.2.1 Upstream _____
1.7.2.2 Downstream _____
1.7.2.3 Differential _____
1.7.3 Type of recording device:
1.7.3.1 Upstream _____
1.7.3.2 Downstream _____
1.7.3.3 Differential _____
1.7.4 Estimate of error:
1.7.4.1 Upstream _____
1.7.4.2 Downstream _____
1.7.4.3 Differential _____
1.7.5 Calibration procedure and frequency: _____
1.7.5.1 Upstream _____

TABLE 2 Description of Test Device and Techniques *Continued*

1.7.5.2 Downstream _____
1.7.5.3 Differential _____
1.8 *Description of Fluid Flow Rate Measuring Systems:*
1.8.1 Maximum value:
1.8.1.1 Across test specimens _____
1.8.1.2 Through test cavity _____
1.8.2 Type of measuring element:
1.8.2.1 Across test specimens _____
1.8.2.2 Through test cavity _____
1.8.3 Type of recording device:
1.8.3.1 Across test specimens _____
1.8.3.2 Through test cavity _____
1.8.4 Estimate of error:
1.8.4.1 Across test specimens _____
1.8.4.2 Through test cavity _____
1.8.5 Calibration procedure and frequency:
1.8.5.1 Across test specimens _____
1.8.5.2 Through test cavity _____

1.9 *Description of Friction-Measuring System:*
1.9.1 Maximum capacity _____ N (_____ lbf), _____ N·m (_____ lbf·ft), other _____
1.9.2 Type of measuring element _____
1.9.3 Type of recording device _____
1.9.4 Estimate of error _____
1.9.5 Calibration procedure and frequency _____

2. METHOD OF FIXTURING CARBON TEST SPECIMEN

2.1 *Rigid* ☐
2.2 *Pivot* (1-D rotational freedom) ☐
2.3 *Swivel, Universal* (2-D rotational freedom) ☐
2.4 *Hydraulic* ☐
2.5 *Pneumatic* ☐
2.6 *Misalignment* _____ radians, other _____
2.7 *Installed Eccentricity* (TIR) _____ m (_____ in.)
2.8 *Axial Runout* (TIR) _____ m (_____ in.)
2.9 *Radial Runout* (TIR) _____ m (_____ in.)

3. METHOD OF FIXTURING MATING MEMBER

3.1 *Rigid* ☐
3.2 *Pivot* (1-D rotational freedom) ☐
3.3 *Swivel, Universal* (2-D rotational freedom) ☐
3.4 *Hydraulic* ☐
3.5 *Pneumatic* ☐
3.6 *Misalignment* _____ radians, other _____
3.7 *Installed Eccentricity* (TIR) _____ m (_____ in.)
3.8 *Axial Runout* (TIR) _____ m (_____ in.)
3.9 *Radial Runout* (TIR) _____ m (_____ in.)

4. ENVIRONMENTAL CONDITIONS

4.1 *Carbon Test Specimen Conditioning Environment:*
4.1.1 Fluid medium: air ☐ (specify moisture content _____), distilled water ☐, deionized water ☐, other (specify composition quantitatively) _____
4.1.2 Temperature _____ K (_____ °F)
4.1.3 Pressure: ambient ☐, other _____
4.1.4 Time at these conditions _____ minutes, _____ hours, _____ days

4.2 *Mating Member Test Specimen Conditioning Environment:*
4.2.1 Fluid medium: air☐ (specify moisture content _____), distilled water ☐, deionized water ☐, other (specify composition quantitatively) _____
4.2.2 Temperature _____ K (_____ °F)
4.2.3 Pressure: ambient ☐, other _____
4.2.4 Time at these conditions _____ minutes, _____ hours, _____ days

4.3 *Test Environment:*
4.3.1 Fluid medium:
4.3.1.1 Before test condition: air ☐ (specify moisture content _____), distilled water ☐, deionized water ☐, other (specify composition quantitatively) _____
4.3.1.2 During test condition (specify how monitored and controlled, including limits) _____
4.3.1.3 After test condition (describe quantitatively, if possible, the change in composition or quality) _____
4.3.2 Substance other than fluid medium initially applied at test specimens interface (for example, lubricating oil) _____
4.3.3 Fluid temperature:
4.3.3.1 Upstream _____ K (_____ °F)
4.3.3.2 Downstream _____ K (_____ °F)
4.3.4 Fluid pressure:
4.3.4.1 Upstream _____ Pa absolute (_____ psia)
4.3.4.2 Downstream _____ Pa absolute (_____ psia)
4.3.4.3 Differential _____ Pa differential (_____ psid)
4.3.5 Fluid flow through test cavity _____
4.3.6 Time to reach test conditions _____ minutes, _____ hours
4.3.7 Time at test conditions prior to test _____ minutes, _____ hours