Designation: D 1264 – 03ε1

An American National Standard

Standard Test Method for Determining the Water Washout Characteristics of Lubricating Greases[1]

This standard is issued under the fixed designation D 1264; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

ε[1] NOTE—Updated adjunct information and deleted apparatus footnote editorially in November 2003.

1. Scope*

1.1 This test method covers the evaluation of the resistance of a lubricating grease to washout by water from a bearing, when tested at 38 and 79°C (100 and 175°F) under the prescribed laboratory conditions. It is not to be considered the equivalent of service evaluation tests. This test method may not be suitable for some greases containing highly volatile components.

1.2 The values state in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific warning statements, see 6.3.

2. Referenced Documents

2.1 *ASTM Adjuncts:*

ADJD3336 Standard Ball Bearing[2]

ADJD6300 D2PP, Version 4.43, Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products[3]

3. Summary of Test Method

3.1 The grease is packed into a ball bearing, the bearing is then inserted in a housing with specified clearances, and rotated at 600 ± 30 rpm. Water, controlled at the specified test temperature, impinges on the bearing housing at a rate of 5 ± 0.5 mL/s. The amount of grease washed out in 60 ± 1 min is a measure of the resistance of the grease to water washout.

4. Significance and Use

4.1 This test method estimates the resistance of greases to water washout from ball bearings under conditions of the test. No correlation with field service has been established.

5. Apparatus

5.1 *Ball Bearing*, ASTM test bearing size 6204 (see ADJD3336).[4]

5.2 *Bearing Housing and Shield* with dimensions as shown in Fig. 1.

5.3 *Reservoir, Bearing-Housing Mount, Circulating Pump, and Drive Motor*, similar or equivalent to those shown in Fig. 1. Table 1 provides the metric equivalents.

5.4 *Heating Source*, to maintain the water temperature at 79 ± 1.7°C (175 ± 3°F).

NOTE 1—Suitable temperature control may be obtained by the use of immersion heaters, steam coils, or infrared heat lamps, in conjunction with transformers or thermostats.

5.5 *Thermometer or Thermocouple*, to determine the temperature of the water reservoir.

6. Materials and Reagents

6.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the committee on Analytical Reagents of the American Chemical Society, where such specifications are available.[5] Other grades may be

[1] This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.G0 on Lubricating Grease.

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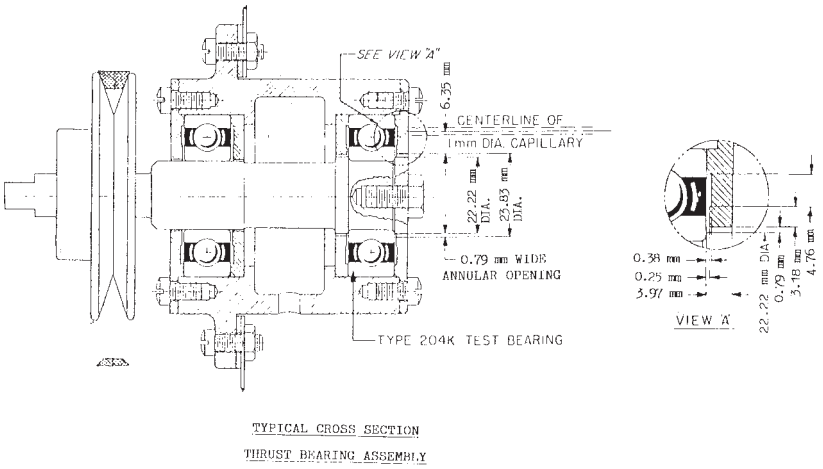
[2] The ball bearing has been standardized by Committee D02. Available from ASTM International Headquarters. Order Adjunct No. ADJD3336.

[3] Available from ASTM International Headquarters. Order Adjunct No. ADJD6300.

[4] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR: D02-1272.

[5] *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Annual Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.

***A Summary of Changes section appears at the end of this standard.**



TYPICAL CROSS SECTION
THRUST BEARING ASSEMBLY

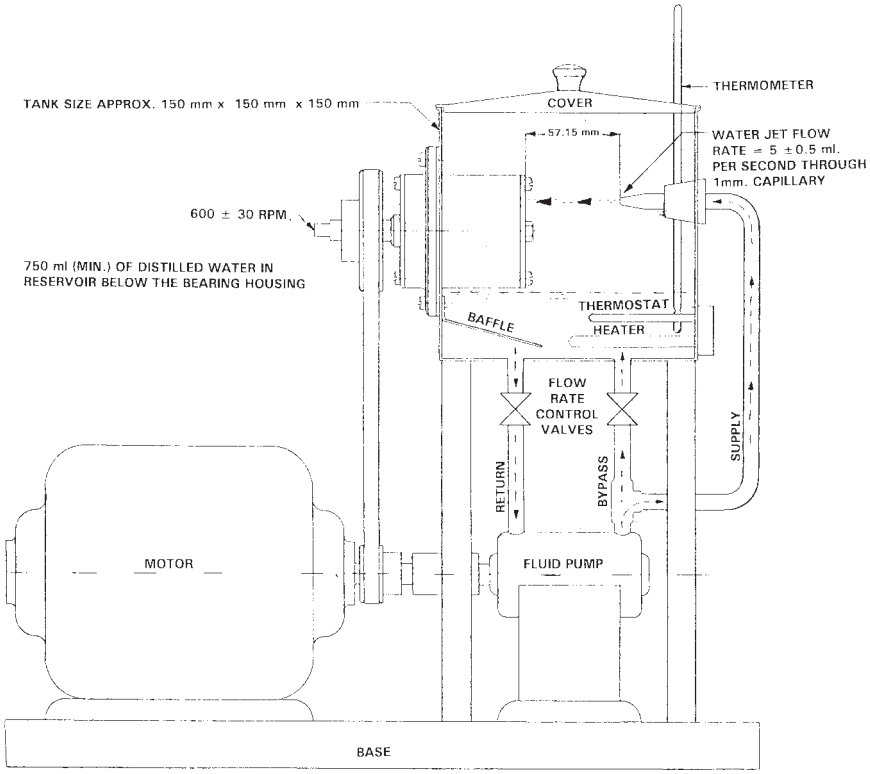


FIG. 1 Water Washout Characteristics of Lubricating Grease Apparatus

TABLE 1 Metric Equivalents for Fig. 1

in.	mm	in.	mm	°F	°C
0.010	0.25	0.875	22.22	100 ± 5	37.8 ± 3
0.015	0.38	0.938	23.81	175 ± 3	79.4 ± 2
0.031	0.79	2¼	57.1		
⅛	3.18	6	152		
5/32	3.97				
3/16	4.76				
¼	6.35				

used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

6.2 *Distilled Water*.

6.3 *Cleaning Solvent*—Capable of sufficiently cleaning the test bearing for use in the test. Either reagent grade Stoddard solvent, also known as Mineral Spirits, (**Warning**—Combustible. Vapor harmful), or American Chemical Society

reagent grade *n*-heptane[5] (**Warning**—Flammable. Harmful if inhaled) has been found suitable for use.

7. Preparation of Apparatus

7.1 Clean the reservoir and water passages by flushing with distilled water. Wipe off any oil scum which has been deposited on the surfaces of the reservoir. Clean the test bearing with cleaning solvent (see 6.3).

8. Procedure

8.1 Pack the tared bearing with 4.00 ± 0.05 g of test grease. Insert the bearing and tared shields into the housing, and assemble the unit in the test apparatus.

8.2 Add a minimum of 750 mL of preheated distilled water to the reservoir, but keep the water level below the bearing housing. Without starting the bearing, start the water circulating pump while diverting the water spray from the housing by means of a piece of tubing attached to the capillary discharge tube or with a deflecting metal shield until equilibrium temperature is attained. When the test is to be made at the higher temperature of 79 ± 1.7°C (175 ± 3°F), it will be necessary to heat the water to the specified temperature by a previously selected source of heat.

8.2.1 If the rig has one motor driving both pump and test bearing, remove the belt from the test bearing spindle pulley during water warm-up time.

8.3 When the water reaches the specified temperature, adjust the bypass valve to give a water-flow rate, through the rubber tubing and into a glass graduate, of 5 ± 0.5 mL/s (Note 2). Remove the rubber tubing from the capillary discharge tube, and adjust the water jet so that it impinges on the end plate 6 mm (¼ in.) above the outer opening of the bearing housing. Start the bearing.

NOTE 2—Sufficient experience should be obtained with a particular tester to make sure that the water-flow rate can be maintained within the specified limits for a 60 ± 1 min test run.

8.4 With the bearing operating at a speed of 600 ± 30 rpm, continue the operation for 60 ± 1 min.

8.5 Shut off the motor and heating source, if used. Remove the test bearing and shields and place them on a tared watch glass, with the shields being separated from the bearing and placed with their inner faces upward to expose the wet grease to the air.

8.6 Dry the bearing and shields for 15 ± 0.25 h at 77 ± 6°C (170 ± 10°F), and then weigh to determine the grease loss (Note 3). The grease remaining on the shields, and any leakage occurring during the drying period, should not be considered as grease lost. Duplicate tests shall be run.

NOTE 3—Some weight loss may be experienced for greases containing highly volatile oils because of evaporation during drying.

NOTE 4—Some greases may contain components which make it difficult to completely dry the sample at 77 ± 6°C (170 ± 10°F). For those greases, the drying temperature may be increased to 93 ± 3°C (200 ± 5°F) to facilitate removal of water during the time specified.

9. Report

9.1 Report the average of duplicate tests as the percentage weight of grease washed out at the test temperature, and indicate the temperature at which the bearing assembly and grease were dried.

10. Precision and Bias

10.1 The precision of this test method was obtained using ADJD6300 (D2PP).[3]

10.2 *Repeatability*—The difference between successive results obtained by the same operator with the same apparatus under constant operating conditions on identical test material would, in the long run, in the normal and correct operation of the test method, exceed the following values only in one case in twenty.

	Repeatability
38°C	$r = 0.8\ (X + 2)$
79°C	$r = 0.6\ (X + 4.6)$

where:

X is the average of two results in %.

10.2.1 *Reproducibility*— The difference between two single and independent results obtained by different operators working in different laboratories on identical test material would, in the long run, exceed the following values only in one case in twenty.

	Reproducibility
38°C	$R = 1.4\ (X + 2)$
79°C	$R = 1.1\ (X + 4.6)$

where:

X is the average of two results in %.

10.3 *Bias*—The procedure in this test method has no bias because the value of grease washout can be defined only in terms of a test method.

11. Keywords

11.1 grease; washout; water

SUMMARY OF CHANGES

Subcommittee D02.G0 has identified the location of selected changes to this standard since the last issue (D 1264 – 00) that may impact the use of this standard.

(*1*) Updated Referenced Documents Section.

(*2*) Updated Reagents Section.