Designation: D 3115 – 95 (Reapproved 2000)

An American National Standard

Standard Test Method for Explosive Reactivity of Lubricants with Aerospace Alloys Under High Shear[1]

This standard is issued under the fixed designation D 3115; 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.

1. Scope

1.1 This test method is used to evaluate for explosive reactivity of various lubricants in the presence of aerospace alloys under high shear conditions.

1.2 The values stated in SI units are to be regarded as the standard. In cases where materials, products, or equipment are available in inch-pound units only, SI units are omitted.

1.3 This standard should be used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions and should not be used to describe or appraise the fire-hazard or fire-risk of materials, products, or assemblies under actual fire conditions. However, results of the test may be used as elements of a fire-hazard assessment or a fire-risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard or fire risk of a particular end use.

1.4 *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 of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

B 209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate[2]

B 221 Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes[2]

2.2 *ANSI Standard:*

B 46.1 Surface Texture[3]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *explosive reactivity*, *n*—occurrence of sparks, smoke, or explosive (audible) sounds during this test.

3.1.2 *lubricants*, *n*—liquid materials used as lubricants or cutting fluids in the presence of aerospace alloys.

4. Summary of Test Method

4.1 A shaped dowel pin made of the test material is rotated at 1760 rpm under a pressure of 689 MPa (1000 psi) for 1 min in a shaped hole (drilled into a block of the test material) containing the test lubricant. Observation for indications of reaction is made.

5. Significance and Use

5.1 Explosive reactivity has resulted when parts made from some light alloys, typically high in aluminum and magnesium, are loaded under shear conditions while in contact with certain lubricants. A typical example is a threaded part, lubricated with a chlorofluorocarbon grease, pulled up normally tight.

6. Apparatus

6.1 *Fluted Ball-End End Mills,*[4] two, 12.7 ± 0.025 mm (0.500 ± 0.001 in.) in diameter with a 6.35 ± 0.025-mm (0.250± 0.001-in.) radius tip, finished to 0.203 to 0.406 µm (8 to 16 µin.) rms.

6.2 *Drill Press*, capable of rotating at 1760 rpm under a 6.89-MPa (1000-psi) load.

6.3 *Drill Chuck*, capacity 12.7-mm (½-in.) end mill.

6.4 *Loading Device*, capable of putting a pressure of 6.89 MPa (1000 psi) on the dowel test pin.

6.5 *Force Gage*, 1112 N (250-lbf) force.[5]

6.6 *Drill Press Vise*, capable of holding the test block in position.

6.7 *Surface Texture Standards*, conforming to American National Standard for Surface Texture (ANSI B46.1).

6.8 *Transparent Safety Shield*.

6.9 *Thermocouple and Potentiometer*, optional, for measuring hole-bottom temperature.

[1] This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.11 on Engineering Sciences of High Performance Fluids and Solids. ASTM Committee F-7 on Aerospace Industry Methods maintains a continued interest in this test method and will make use of it in the future.

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[2] *Annual Book of ASTM Standards*, Vol 02.02.

[3] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

[4] Carbide tipped ball-end end mills are available and may be used when working with metals harder than aluminum.

[5] A gage manufactured by AMETEK, Inc., Testing Equipment Div., Box 288, Lansdale, PA 19446, has proven satisfactory.