



Standard Test Method for Cavitation Erosion Using Vibratory Apparatus¹

This standard is issued under the fixed designation G 32; 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 produces cavitation damage on the face of a specimen vibrated at high frequency while immersed in a liquid. The vibration induces the formation and collapse of cavities in the liquid, and the collapsing cavities produce the damage to and erosion (material loss) of the specimen.

1.2 Although the mechanism for generating fluid cavitation in this method differs from that occurring in flowing systems and hydraulic machines (see 5.1), the nature of the material damage mechanism is believed to be basically similar. The method therefore offers a small-scale, relatively simple and controllable test that can be used to compare the cavitation erosion resistance of different materials, to study in detail the nature and progress of damage in a given material, or—by varying some of the test conditions—to study the effect of test variables on the damage produced.

1.3 This test method specifies standard test conditions covering the diameter, vibratory amplitude and frequency of the specimen, as well as the test liquid and its container. It permits deviations from some of these conditions if properly documented, that may be appropriate for some purposes. It gives guidance on setting up a suitable apparatus and covers test and reporting procedures and precautions to be taken. It also specifies standard reference materials that must be used to verify the operation of the facility and to define the normalized erosion resistance of other test materials.

1.4 The values stated in SI units are to be regarded as standard. The inch-pound units given in parentheses are for information only.

1.5 *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.* For specific safety precautionary information, see 6.1, 10.3, and 10.6.

2. Referenced Documents

2.1 ASTM Standards:

- A 276 Specification for Stainless Steel Bars and Shapes²
- B 160 Specification for Nickel Rod and Bar³
- B 211 Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire⁴
- D 1193 Specification for Reagent Water⁵
- E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods⁶
- E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁶
- E 960 Specification for Laboratory Glass Beakers⁷
- G 40 Terminology Relating to Wear and Erosion⁸
- G 73 Practice for Liquid Impingement Erosion Testing⁸
- G 134 Test Method for Erosion of Solid Materials by a Cavitating Liquid Jet⁸

3. Terminology

3.1 Definitions:

3.1.1 See Terminology G 40 for definitions of terms relating to cavitation erosion. For convenience, definitions of some important terms used in this test method are quoted below from Terminology G 40 – 98.

3.1.2 *average erosion rate, n*—a less preferred term for cumulative erosion rate.

3.1.3 *cavitation, n*—the formation and subsequent collapse, within a liquid, of cavities or bubbles that contain vapor or gas, or both.

3.1.3.1 *Discussion*—In general, cavitation originates from a local decrease in hydrostatic pressure in the liquid, produced by motion of the liquid (see *flow cavitation*) or of a solid boundary (see *vibratory cavitation*). It is distinguished in this way from boiling, which originates from an increase in liquid temperature.

² *Annual Book of ASTM Standards*, Vol 01.03.

³ *Annual Book of ASTM Standards*, Vol 02.04.

⁴ *Annual Book of ASTM Standards*, Vol 02.02.

⁵ *Annual Book of ASTM Standards*, Vol 11.01.

⁶ *Annual Book of ASTM Standards*, Vol 14.02.

⁷ *Annual Book of ASTM Standards*, Vol 14.04.

⁸ *Annual Book of ASTM Standards*, Vol 03.02.

¹ This test method is under the jurisdiction of ASTM Committee G02 on Wear and Erosion and is the direct responsibility of Subcommittee G02.10 on Erosion by Liquids and Solids.

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