



Standard Test Method for Erosion of Solid Materials by a Cavitating Liquid Jet¹

This standard is issued under the fixed designation G 134; 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.

^{ε1} NOTE—Editorial changes were made throughout in April 2001.

1. Scope

1.1 This test method covers a test that can be used to compare the cavitation erosion resistance of solid materials. A submerged cavitating jet, issuing from a nozzle, impinges on a test specimen placed in its path so that cavities collapse on it, thereby causing erosion. The test is carried out under specified conditions in a specified liquid, usually water. This test method can also be used to compare the cavitation erosion capability of various liquids.

1.2 This test method specifies the nozzle and nozzle holder shape and size, the specimen size and its method of mounting, and the minimum test chamber size. Procedures are described for selecting the standoff distance and one of several standard test conditions. Deviation from some of these conditions is permitted where appropriate and if properly documented. Guidance is given on setting up a suitable apparatus, test and reporting procedures, and the precautions to be taken. Standard reference materials are specified; these must be used to verify the operation of the facility and to define the normalized erosion resistance of other materials.

1.3 Two types of tests are encompassed, one using test liquids which can be run to waste, for example, tap water, and the other using liquids which must be recirculated, for example, reagent water or various oils. Slightly different test circuits are required for each type.

1.4 This test method provides an alternative to Test Method G 32. In that method, cavitation is induced by vibrating a submerged specimen at high frequency (20 kHz) with a specified amplitude. In the present method, cavitation is generated in a flowing system so that both the jet velocity and the downstream pressure (which causes the bubble collapse) can be varied independently.

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

1.6 *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 appro-*

priate safety and health practices and determine the applicability of regulatory limitations prior to use.

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 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁶
 - G 32 Test Method for Cavitation Erosion Using Vibratory Apparatus⁷
 - G 40 Terminology Relating to Wear and Erosion⁷
 - G 73 Practice for Liquid Impingement Erosion Testing⁷
- #### 2.2 ASTM Adjuncts:
- Manufacturing Drawings of the Apparatus⁸

3. Terminology

3.1 *Definitions*—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 – 90a.

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

3.1.1.1 *Discussion*—In general, cavitation originates from a decrease in static pressure in the liquid. It is distinguished in this way from boiling, which originates from an increase in liquid temperature. There are certain situations where it may be difficult to make a clear distinction between cavitation and boiling, and the more general definition that is given here is, therefore, preferred.

3.1.1.2 *Discussion*—In order to erode a solid surface by cavitation, it is necessary for the cavitation bubbles to collapse on or close to that surface.

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 Solids and Liquids.

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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 03.02.

⁸ Available from ASTM Headquarters, Order PCN ADJG0134.