



Standard Test Method for Drop Weight Impact Sensitivity Of Solid-Phase Hazardous Materials¹

This standard is issued under the fixed designation E 680; 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.

INTRODUCTION

This method is one of several methods being developed by ASTM Committee E-27 on Hazard Potential of Chemicals. This method is to be used in conjunction with other tests to characterize the hazard potential of chemicals.

1. Scope

1.1 This test method^{2,3} is designed to determine the relative sensitivities of solid-phase hazardous materials to drop weight impact stimulus. For liquid-phase materials refer to Method D 2540.

1.2 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 2540 Test Method for Drop Weight Sensitivity of Liquid Monopropellants⁴

3. Summary of Method

3.1 Restrictions are placed upon the ranges of impact tool masses and striking surface diameters that may be used, and a standard sample thickness is prescribed for all tests.⁵ In addition, procedures for sample preparation and treatment, as

well as procedures for detecting reactions through the use of the human senses, are outlined.

3.2 Drop-weight impact tests are to be performed using the well-known Bruceton up-and-down method.^{6,7}

3.3 Outlined is a method for normalizing data generated on different impact apparatus.

4. Significance and Use

4.1 This method does not require an overall rigid standardization of the apparatus. Samples are tested either unconfined or confined in confinement cups. For confined tests, some of the important cup parameters, such as cup material, cup wall thickness, and fit between the cup and the striking pin, are standardized. Data generated from unconfined and confined tests will not, in general, exhibit the same relative scale of sensitivities, and must be identified as confined or unconfined data and compared separately.

4.2 This method applies to all testing where the intent is to establish a relative sensitivity scale for hazardous materials. It is not intended to prohibit testing process-thickness samples nor prohibit the use of other than standard tool masses and striking diameters to generate data for special purposes or for in-house comparisons. In addition, the method is not intended to restrict the generation of results at other than the H_{50} point as may be desirable for hazard analysis techniques.

4.3 The normalized data will serve as a measure of the relative sensitivities of hazardous materials at the 50 % probability of reaction level. The normalized H_{50} values can also be used in conjunction with additional data relating to other probability of reaction levels (not a part of this method) to

¹ This method is under the jurisdiction of ASTM Committee E-27 on Hazard Potential of Chemicals and is the direct responsibility of Subcommittee E27.02 on Thermal Stability.

Current edition approved Feb. 23, 1979. Published April 1979.

² This method is a modification of and contains concepts proposed by Hercules, Inc. personnel at Allegheny Ballistics Laboratory. The method was outlined by personnel of Pittsburgh Mining and Safety Research Center, Bureau of Mines, Pittsburgh, Pa. For additional information see footnote 3.

³ Smith, D., and Richardson, R. H., "Interpretation of Impact Sensitivity Test Data," *Pyrodynamics*, PYDYA, Vol 6, 1968, pp. 159–178.

⁴ *Annual Book of ASTM Standards*, Vol 15.03.

⁵ Becker, K. R., and Watson, R. W., "A Critique for Drop Weight Impact Testing," Proceedings of the Conference on the Standardization of Safety and Performance Tests for Energetic Materials, Vol 1, September 1977, pp. 415–430. Publication ARLCD-SP-77004, U. S. Army Armament Research and Development Command, Dover, N.J.

⁶ Dixon, W. J., and Massey, F. J. Jr., *Introduction to Statistical Analysis*, McGraw-Hill Book Co., Inc., 1957, pp. 319–327.

⁷ Statistical Research Group, Princeton University, "Statistical Analysis for a New Procedure in Sensitivity Experiments," AMP Report No. 101.1R, SRG-P, No. 40, Submitted to Applied Mathematics Panel, National Defense Research Committee, July 1944, 58 pp.

