



Designation: E2298 – 18

Standard Test Method for Instrumented Impact Testing of Metallic Materials¹

This standard is issued under the fixed designation E2298; 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 establishes the requirements for performing instrumented Charpy V-notch (CVN) and instrumented miniaturized Charpy V-notch (MCVN) impact tests on metallic materials. This method, which is based on experience developed testing steels, provides further information (in addition to the absorbed energy) on the fracture behavior of the tested materials. Minimum requirements are given for measurement and recording equipment such that similar sensitivity and comparable absorbed energy measurements to those obtained in Test Methods E23 and E2248 are achieved.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

E4 Practices for Force Verification of Testing Machines

E23 Test Methods for Notched Bar Impact Testing of Metallic Materials

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E2248 Test Method for Impact Testing of Miniaturized Charpy V-notch Specimens

2.2 *ISO Standard:*

ISO 14556 Steel—Charpy V-notch Pendulum Impact Tests—Instrumented Test Method³

3. Terminology

3.1 *Definitions*—The symbols and definitions applicable to instrumented impact testing are indicated in Table 1.

4. Summary of Test Method

4.1 This test method prescribes the requirements for instrumented CVN and MCVN impact tests in accordance with Test Methods E23 and E2248. The E23 and E2248 tests consist of breaking by one blow from a swinging pendulum, under conditions defined hereafter, a specimen notched in the middle and supported at each end. In order to establish the impact force-displacement diagram, it is necessary to instrument the striker with strain gages⁴ and measure the voltage as a function of time during the impact event. The voltage-time curve is converted to the force-time curve through a suitable static calibration. The force-displacement relationship is then obtained by double integration of the force-time curve. The area under the force-displacement curve corresponds to the instrumented absorbed energy of the broken specimen.

4.2 Force-displacement curves for different steels and different temperatures can vary even though the areas under the curves and the absorbed energies are identical. If the force-displacement curves are divided into a number of characteristic parts, various phases of the test with characteristic forces, displacements, and partial instrumented absorbed energies can be deduced. These characteristic values provide additional information about the fracture behavior of the specimen.

4.3 Application of instrumented test data to the evaluation of material behavior is the responsibility of the user of this test method.

¹ This test method is under the jurisdiction of ASTM Committee E28 on Mechanical Testing and is the direct responsibility of Subcommittee E28.07 on Impact Testing.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ This test method refers to strikers instrumented with strain gages. However, the use of piezoelectric load cells or accelerometers is not excluded, provided their temperature sensitivity is properly accounted for.

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