



Standard Test Methods for Impact Testing of Cast Irons¹

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1. Scope

1.1 These test methods for impact testing cover the details of apparatus, test specimens and procedures for cast iron, including gray iron, white iron, malleable iron, ductile iron, and austempered ductile iron, but not including chilled rolls or rolls with white iron skins.

1.2 The values stated in inch-pound units are to be regarded as the standard. A companion standard, A 327M, lists values in SI units.

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

2. Referenced Documents

2.1 *ASTM Standards:*

E 23 Test Methods for Notched Bar Impact Testing of Metallic Materials²

METHOD A—ROUND BAR CHARPY-TYPE IMPACT TEST FOR GRAY AND WHITE IRONS

3. Scope

3.1 The Charpy-type impact test shall be employed for testing gray and white irons.

4. Apparatus

4.1 The single-blow Charpy impact test for gray and white irons shall be carried out in a pendulum-type impact machine with a capacity of at least 110 ft · lbf as used for the simple beam test for steel described in Test Methods E 23.

5. Test Specimens

5.1 The test specimens shall have a plain cylindrical form, machined or ground to a smooth finish and shall conform to the following dimensions:

	Type A	Type M
Diameter	1.125 ± 0.002 in.	0.787 ± 0.001 in.
Length	8.0 ± 0.5 in.	4.73 ± 0.08 in.
Span	6.00 ± 0.03 in.	3.937 ± 0.020 in.

6. Procedure

6.1 Test the bars on the spans indicated in the tabular data of 5.1. In all other respects, the test shall conform to the appropriate requirements of Test Methods E 23.

6.2 Make the test at room temperature.

6.3 Characterization of the fracture toughness of any cast iron should be based upon testing at least three specimens.

NOTE 1—Care should be taken to examine broken specimens for indication of anvil interference which will give erroneous results.

7. Report

7.1 The results shall be reported as ____ ft · lbf cast iron Charpy impact with ____ in. diameter bar.

METHOD B—STANDARD CHARPY-TYPE IMPACT TEST FOR MALLEABLE AND DUCTILE IRONS

8. Scope

8.1 Either the standard notched or unnotched Charpy impact test shall be employed in testing of malleable or ductile irons. Selection of the type bar is dependent upon the specific material to be evaluated as defined in Section 9.

8.2 Both types of Charpy bars have been designated to characterize the fracture toughness of irons. The unnotched Charpy bar, when tested, will produce substantially higher energy values than the notched bar type. The unnotched bar is therefore specified for testing irons that have low fracture toughness characteristics.

9. Charpy Test Bar Type

9.1 Unless specified otherwise, the notched bar type specimens in Fig. 1 or Fig. 2 (for pipe type products) shall be employed. Exceptions are defined in 9.2 and 9.3.

9.2 The unnotched Charpy type specimen in Fig. 3 shall be employed for testing of all grades of austempered ductile iron. These irons are tested after the austempering heat treatment.

¹ These test methods are under the jurisdiction of ASTM Committee A-4 on Iron Castings and are the direct responsibility of Subcommittee A04.21 on Testing.

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² *Annual Book of ASTM Standards*, Vol 03.01.