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American Association State Highway
and Transportation Officials
Standard AASHTO No.: T 243

Standard Specification for Sampling Procedure for Impact Testing of Structural Steel[1]

This standard is issued under the fixed designation A 673/A673M; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification establishes the procedure for longitudinal Charpy V-notch testing of structural steel and contains two frequencies of testing. The impact properties of steel can vary within the same heat and piece, be it as rolled, control rolled, or heat treated. The purchaser should, therefore, be aware that testing of one plate, bar, or shape does not provide assurance all plates, bars, or shapes of the same heat as processed will be identical in toughness with the product tested. Normalizing or quenching and tempering the product will reduce the degree of variation.

1.2 This specification is intended to supplement specifications for structural steel when so specified.

1.3 This specification does not necessarily apply to all product specifications; therefore, the manufacturer or processor should be consulted for energy absorption levels and minimum testing temperatures that can be expected or supplied.

1.4 Two frequencies of testing (P and H) are prescribed.

1.5 The values stated in either inch-pound units or SI units are to be regarded as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with this specification.

2. Referenced Documents

2.1 *ASTM Standards:*

A 6/A6M Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling[2]

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products[3]

3. Ordering Information

3.1 The inquiry and order shall indicate the following:

3.1.1 The frequency of testing, (P) or (H).

3.1.2 The test temperature to be used.

3.1.3 The absorbed energy (ft·lbf [J]) requirements.

3.1.4 Condition of material: as rolled, stress relieved, normalized, normalized and stress relieved, or quenched and tempered.

4. Tests

4.1 An impact test shall consist of three specimens taken from a single test coupon or test location, the average of which shall comply with the specified minimum with not more than one value below the specified minimum, but in no case below either two thirds of the specified minimum or 5 ft·lbf [7J], whichever is greater (see Test Methods and Definitions A 370).

4.2 The specimen for plates and bars shall be taken adjacent to the tension test specimen and the specimen for shapes shall be taken from the end of a shape at a point one third the distance from the outer edge of the flange or leg to the web or heel of the shape (see Fig. 1 and Fig. 2). For plates produced from coils, three impact tests shall be taken from the product of each coil or qualifying coil (see Section 5). One test shall be taken adjacent to each of the tension tests (see Specification A 6/A 6M) and a third test coupon shall be obtained immediately after the last plate produced to the qualifying specification.

4.2.1 The longitudinal axis of the specimen shall be parallel to the final direction of rolling of the plate or parallel to the major axis of the shape.

4.2.2 The center longitudinal axis of the specimen shall be located as near as practicable mid-way between the surface and the center of the material thickness and the length of the notch shall be perpendicular to the rolled surface of the material.

4.3 The impact energy values obtained on sub-size specimens shall not be less than shown in Table 1, which are proportional to energy values required for the full-size specimen.

4.4 The test temperature should be specified on the order. At the manufacturer's option, the actual test temperature may be lower than the specified test temperature. This accommodation does not change the required impact energy values unless there has been prior agreement between the purchaser and the manufacturer to do so. The actual test temperature shall be reported with the test results.

5. Frequency of Testing

5.1 *Frequency (H) Heat Testing for Plates, Shapes, and*

[1] This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.02 on Structural Steel for Bridges, Buildings, Rolling Stock, and Ships.

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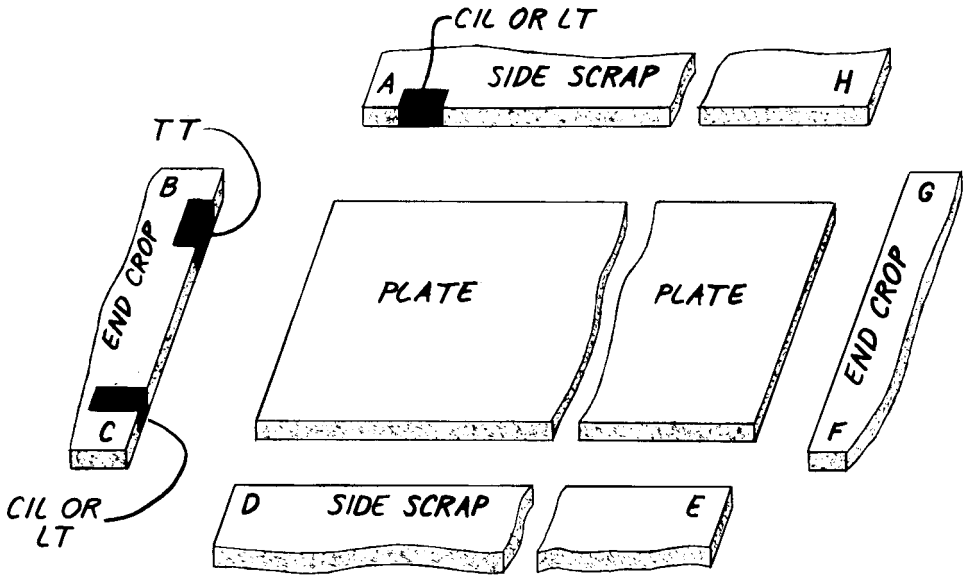
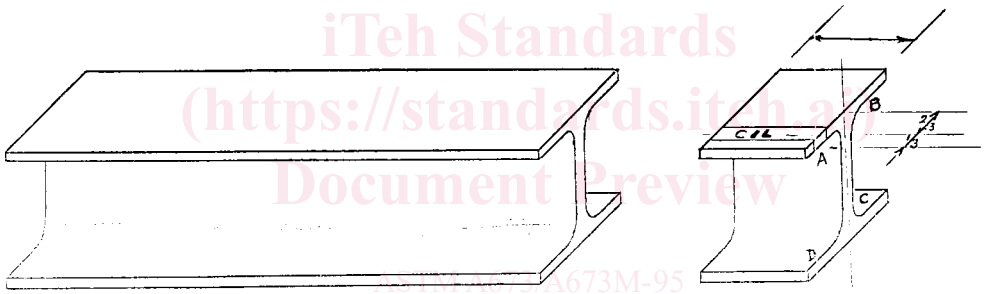
[2] *Annual Book of ASTM Standards,* Vol 01.04.

[3] *Annual Book of ASTM Standards,* Vol 01.03.



NOTE 1—*LT* (Longitudinal tensile test) For widths through 24 in. [600 mm], may be taken at any location, *A* through *H*.
NOTE 2—*TT* (Transverse tensile test) For widths over 24 in. [600], may be taken at locations *B*, *C*, *F*, or *G*.
NOTE 3—*CIL* (Charpy impact longitudinal) May be taken at any location, *A* through *H*.

FIG. 1 Plate Test Location



NOTE 1—*CIL* = Charpy impact longitudinal.
NOTE 2—Test coupon for impact specimens may be taken from locations *A*, *B*, *C*, or *D* as shown laid out at location *A*.

FIG. 2 Shape Test Location

TABLE 1 Equivalent Absorbed Energy for Various Specimen Sizes

Full Size, 10 by 10 mm		3/4 Size, 10 by 7.5 mm		2/3 Size, 10 by 6.7 mm		1/2 Size, 10 by 5 mm		1/3 Size, 10 by 3.3 mm		1/4 Size, 10 by 2.5 mm	
ft·lbf	[J]	ft·lbf	[J]	ft·lbf	[J]	ft·lbf	[J]	ft·lbf	[J]	ft·lbf	[J]
40	[54]	30	[41]	27	[37]	20	[27]	13	[18]	10	[14]
35	[48]	26	[35]	23	[31]	18	[24]	12	[16]	9	[12]
30	[41]	22	[30]	20	[27]	15	[20]	10	[14]	8	[11]
25	[34]	19	[26]	17	[23]	12	[16]	8	[11]	6	[8]
20	[27]	15	[20]	13	[18]	10	[14]	7	[10]	5	[7]
16	[22]	12	[16]	11	[15]	8	[11]	5	[7]	4	[5]
15	[20]	11	[15]	10	[14]	8	[11]	5	[7]	4	[5]
13	[18]	10	[14]	9	[12]	6	[8]	4	[5]	3	[4]
12	[16]	9	[12]	8	[11]	6	[8]	4	[5]	3	[4]
10	[14]	8	[11]	7	[10]	5	[7]	3	[4]	2	[3]
7	[10]	5	[7]	5	[7]	4	[5]	2	[3]	2	[3]

Bars—One impact test (a set of three specimens) shall be made for each 50 tons [45 Mg] of the same type of product subject to the requirements of this specification produced on the same mill from the same heat of steel. The impact test(s) shall be taken from different as-rolled or heat-treated pieces. Impact specimens shall be selected from the thickest material rolled subject to the following modifications: When material rolled up to 2 in. [50 mm] inclusive in thickness differs 3/8in. [10 mm] or more in thickness, one impact test shall be made from both the thickest and thinnest material rolled. When material rolled over 2 in. [50 mm] in thickness differs 1 in. [25 mm] or more in thickness, one impact test shall be made from both the thickest