

Notched bar tests —

Part 6: Method for precision determination of Charpy V-notch impact energies for metals

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Committees responsible for this British Standard

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- AEA Technology
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- Electricity Association
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- Lloyd's Register of Shipping
- Ministry of Defence
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- Society of British Aerospace Companies Limited
- UK Steel Association
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Foreword

This part of BS 131 has been prepared by Subcommittee ISE/NFE/4/4. It supersedes BS 131-6:1989 which is withdrawn.

It is intended that this part of this British Standard should be used in conjunction with BS 131-7, *Notched bar tests — Part 7: Specification for verification of the test machine used for precision determination of Charpy V-notch impact energies for metals*. Results from the calibration, which are recorded on the certificate of calibration, are needed for the determination, using this part of BS 131.

BS 131-6 and BS 131-7 are designed to satisfy the demand from sectors of British industry for a more stringent standard of Charpy testing appropriate to the needs of specific applications where a more precise measure of Charpy impact energy is required.

This part defines a method of precision Charpy impact testing.

The requirements of quality control impact testing will continue to be met by BS EN 10045-1 and BS EN 10045-2, or BS 131-1, BS 131-4 and BS 131-5 unless BS 131-6 and BS 131-7 are specified in the product standard.

It should be noted that no trustworthy relationship between the energies absorbed in breaking test pieces of different dimensions has been found, and comparison of results is only valid when considering test pieces of identical form and dimensions.

It has been assumed in the drafting of this standard that the execution of its provisions is entrusted to appropriately qualified and experienced people.

WARNING. It is important to note that tests of the type described involve the use of rapidly moving test pieces and machine parts. Therefore it is important to consider the safety of machine operators.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 9 and a back cover.

Method

1 Scope

This part of BS 131 describes a method for carrying out a precision Charpy V-notch impact test.

2 Normative references

The following normative document contains provisions which, through reference in this text, constitute provisions of this part of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 131-7, *Notched bar tests — Part 7: Specification for verification of the test machine used for precision determination of Charpy V-notch impact energies for metals.*

3 Definitions

For the purposes of this part of BS 131 the following definitions apply.

3.1

compensated machine

machine in which correction for the loss in energy of the pendulum due to windage and friction has been made such that on a free half-cycle of swing of the pendulum from the release position the indicated absorbed energy is zero

3.2

non-compensated machine

machine in which no correction for loss of energy due to windage and friction has been made

NOTE With a machine of this type the indicated absorbed energy on a free half-cycle of swing of the pendulum will have a small positive value.

3.3

test piece terminology

(see Figure 1)

3.3.1

width

minor dimension in the horizontal plane when placed in the test position, i.e. the distance between the notched face and the opposite unnotched face

3.3.2

height

vertical dimension of the test piece when placed in the test position, i.e. the distance across the notched face

3.3.3

length

major dimension in the horizontal plane when placed in the test position

3.4

C-type pendulum

pendulum in which any portion of the hammer or weighted mass at the lower end of the pendulum and distance greater than $L_s - 15$ mm from the spindle axis passes between the anvils of the impact test machine (see Figure 2)

NOTE L_s is the length of pendulum from centre of strike of pendulum to axis of rotation.

3.5

U-type pendulum

pendulum in which the part of the necessary weighted mass at the lower end is designed to pass below and on either side of the test piece anvils of the impact test machine (see Figure 2)

4 Principle

A standard notched test piece is fractured with one blow of a swinging pendulum with known energy. The energy absorbed in fracturing the test piece is measured. This represents the Charpy impact energy of the material.

NOTE The increase in the specimen thickness may be measured. This is designated the lateral expansion of the specimen.

5 Testing machine

5.1 Calibration

The machine shall conform to the requirements of BS 131-7.

5.2 Choice of striker

The machine shall be equipped with a striker of either the 2 mm tip radius or the 8 mm tip radius design (see Figure 3).

The striker to be used shall be as specified in the product standard or agreed and documented at time of order.

NOTE Results obtained using the different strikers are known to differ and the relationship is both material and energy dependent.

6 Test piece preparation

6.1 The test piece shall be machined such that the metallurgical condition of the material is not affected. At the mid-length position on one face, the test piece shall be notched, the notch having a “V” configuration. The dimensional and surface finish requirements for the test piece shall be as given in Table 1.

NOTE When test pieces are to be heat treated it is recommended that finish machining be carried out after the final heat treatment.

6.2 Identification marks shall be placed outside any area of the test piece that contacts the striking edge, anvils or test piece supports, or which is within 5 mm of the notch (see Figure 4).