

## भारतीय मानक ब्यूरो

DRAFT FOR WIDE CIRCULATION

(Not to be reproduced without permission of BIS or used as an Indian Standard)

भारतीय मानक प्रारूप

# धात्विक सामग्रियों पर स्थूलन परीक्षण की विधि

(IS 10167 का पहला पुनरीक्षण)

Draft Indian Standard

## Method for Upsetting Test on Metallic Materials

(First Revision of IS 10167)

ICS 77.040.10

Mechanical Testing of Metals  
Sectional Committee, MTD 03

Last date of comments:  
08/01/2024

### FOREWORD

(Formal clause to be added later)

This standard was first published in 1993 to establish a uniform procedure for conducting the upsetting test on metallic materials. This test is generally carried out on finished products (bars, rods, etc) for determining the surface quality of the material, and is also sometimes known as the 'Dump Test'.

Certain requirements have to be specified in the material specification where reference has been made to this standard. For convenience of reference, these requirements have been summarized and included in Annex A.

This revision (first revision) has been undertaken to update the requirements of test specimen and inclusion of test report in the standard.

In reporting the result of a test or analysis made in accordance with this standard, is to be rounded off, it shall be done in accordance with IS 2:2022 'Rules for rounding off numerical values (second revision)'.

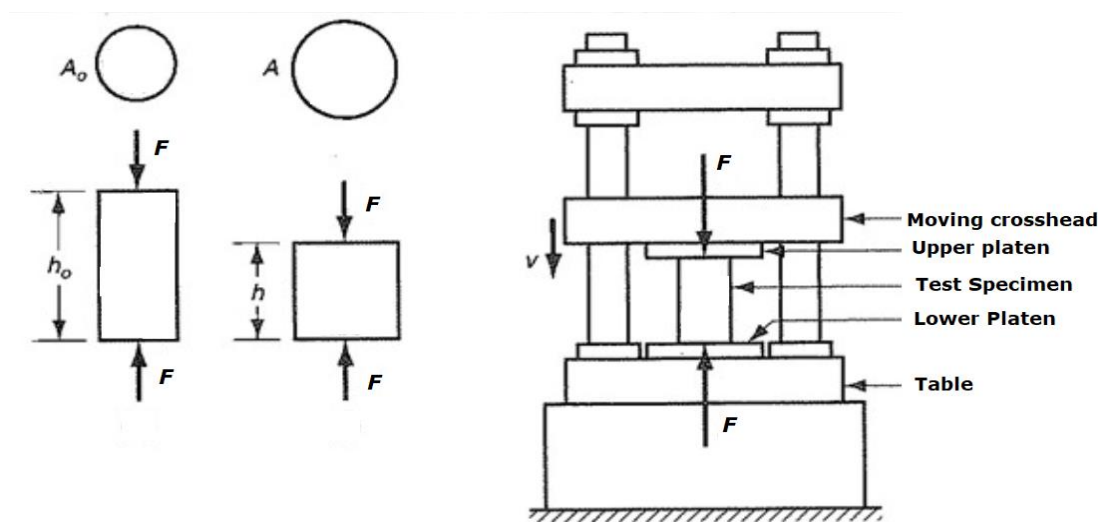
Draft Indian Standard  
Method for Upsetting Test on Metallic Materials  
(First Revision of IS 10167)

## 1 SCOPE

1.1 This standard prescribes the method for carrying out upsetting test on metallic materials.

## 2 PRINCIPLE OF TEST

2.1 The test consists of reducing the length of the test piece under uniform application of axial compressive load to evaluate surface quality of the material.



$A_0$  initial area of test specimen

$h_0$  initial length (height) of test specimen

$A$  final area of test specimen

$h$  final length (height) of test specimen

FIG. 1 PRINCIPLE OF UPSETTING TEST

## 3 TEST SPECIMEN

3.1 The test piece shall normally be from the finished materials. Unless otherwise agreed at the time of ordering, straight test pieces shall be taken from the relevant finished materials.

3.2 The surfaces of the end sections of the test pieces shall be flat and parallel to each other to ensure axial loading at all times. Lack of initial parallelism can be overcome by the use of adjustable bearing blocks. The blocks shall be made of, or faced with, hard material.

### 3.3 For Cold Upsetting Test

The length of the test piece shall be 1.5 times its diameter or as mutually agreed between the manufacturer and customer.

### 3.4 For Hot Upsetting Test

The length of the test piece shall be twice its diameter or as mutually agreed between the manufacturer and customer. (in the case of other sections, minor sectional dimensions shall be considered) unless otherwise specified in the appropriate standard.

3.5 In case of wire rods in coil form, if required may be straightened by applying tensile load up to 0.5 percent extension to avoid buckling.

3.6 For bars over 30 mm in diameter a co-axial hole may be drilled on the test piece to reduce its cross-section to suit the capacity of the testing machine provided no 'cave-in' is found after testing.

## 4 COLD UPSETTING

### 4.1 Testing Machine

The testing machine may be of any reliable type of sufficient capacity required for conducting the test and capable of applying the load at a uniform rate. The machine shall be equipped with two steel platens with hardened faces. One of the platens shall be fitted with a ball seating in the form of a portion of a sphere, the centre of which coincides with the centre point of the face of the platen. The other compression platen shall be plane rigid bearing block. The bearing surfaces of the platens shall be maintained within a permissible variation of 0.02 mm from the plane. The movable portion of the spherically seated compression platen shall be held on the spherical seat and shall be such that the bearing face may be rotated freely and tilted through small angles in any direction.

#### **4.2 Test Procedure**

The bearing surfaces of the testing machine shall be wiped clean before placing the test piece in position the axis of the test piece shall be carefully aligned with the centre of the upper platen to ensure axial loading. No packing shall be used between the faces of the test piece and the steel plates of the testing machine. The movable platen shall be gently rotated before being brought in contact with the test piece so that uniform seating may be obtained. The load shall be applied uniformly and without jerk or shock and increased continuously till the [length \(height\) of the test piece shall be reduced to 1/3 of its initial value or till the](#) desired length of the test piece, as specified in the material specification, is obtained. A maximum rate of strain of 0.15 per minute is recommended. [The tests shall be carried out at room temperature.](#)

#### **5 HOT UPSETTING**

**5.1** If upsetting in hot condition is specified, the test piece shall be heated to the forging temperature appropriate to the material composition and soaked for such period so as to attain uniform temperature and tested as described above. The rate of loading in case of hot upsetting may be faster as compared to cold upsetting. Hot upsetting test may also be conducted under a forging press or hammer provided the test is finished quickly enough so that there is no significant drop in temperature of the test piece. A bearing block equal to the final length to be obtained on test piece after test may be kept by the side of the test piece for guidance.

#### **6 TEST REQUIREMENTS**

**6.1** At the end of the test, the test piece shall be examined. The interpretation of the appearance of the test piece shall be done in accordance with the material specification [or the assessment and acceptance criteria shall also be agreed at the time of enquiry and order.](#)

#### **7 TEST REPORT**

Following information may be recorded in the test report:

- 1) Dimensions of test specimen – actual measured dimensions of the specimen
- 2) Specimen Configuration – include drawing
- 3) Test Fixture and Lubricant – Describe the test fixture or refer to fixture drawings, specifying lubricant used if any
- 4) Testing Machine – Include the make, model, and load, range of testing machine
- 5) Speed of Testing – Record the test rate and mode of control.
- 6) Temperature of Test (in case of hot upsetting)

**ANNEX A**  
*(Foreword)*

**REQUIREMENTS TO BE SPECIFIED IN MATERIAL SPECIFICATION**

**A-1.** In the material specification, where reference to this standard has been made, the following points shall be specified for carrying out the test:

- a)** The initial and final length of the test piece (*see 3.1 and 4.2*);
- b)** Whether the test is to be conducted in the hot or the cold condition (*see 4 and 5*); and
- c)** The interpretation of the visual appearance of the test piece after the test (*see 6.1*).