

BUREAU OF INDIAN STANDARDS

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भारतीय मानक मसौदा

इस्पात पात, पर्यास और दाब गढ़ाई के लिए सामान्य अपेक्षाएं

(IS 3479 का पहला पुनरीक्षण)

Draft Indian Standard

General Requirements for Steel Drop, Upset and Press Forgings

(first revision of IS 3479)

ICS 77.140.85

Alloy Steels and forging
Sectional Committee MTD 16

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Draft Indian Standard

GENERAL REQUIREMENTS FOR STEEL DROP, UPSET AND PRESS FORGINGS

FOREWORD

(Formal clauses to be added later)

This standard was first published in 1966. This revision has been brought out to bring the standard in the latest style and format of the Indian Standards alongside other changes as given below:

a) Method of Manufacture (clause 5);

Forgings are used in the production of various components to impart the desired grain structure and also to impart fibre strength in the most suitable direction to withstand service stresses. With the growing demand for forgings in the country, a standard covering the general requirements will be useful. Requirements other than those given in this standard may be specified for special components and such requirements shall be laid down in the respective standards.

This standard contains clauses **5.6, 7.1, 8.1, 9.1, 11, 12 and 14.1** which permit the purchaser to use his option for selection to suit his requirements.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be same as that of the specified value in this standard.

GENERAL REQUIREMENTS FOR STEEL DROP, UPSET AND PRESS FORGINGS

1 SCOPE

1.1 This standard covers the general requirements for steel components or parts manufactured by the technique of drop, upset or press forgings.

2 REFERENCES

The Indian Standards listed below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
IS 1387 : 1993	General requirements for the supply of metallurgical materials (<i>second revision</i>)
IS 1500 (Part 1) : 2019 / ISO 6506-1 : 2014	Metallic materials - Brinell hardness test Part 1 test method (<i>fifth revision</i>)
IS 1501 (Part 1) : 2020 / ISO 6507-1:2018	Metallic materials — Vickers hardness test Part 1 Test method (<i>fifth revision</i>)
IS 1570 Part 2/ Sec 1:1979	Schedules for wrought steels: Part 2 carbon steels (Unalloyed Steels): Sec 1 wrought products (Other Than Wires) with specified chemical composition and related properties (<i>first revision</i>)
IS 1598: 1977	Method for izod impact test of metals (<i>first revision</i>)
IS 1599 : 2019/ ISO 7438 : 2016	Metallic materials - Bend test (<i>fourth revision</i>)
IS 1608 (Part 1) : 2022/ ISO 6892-1 : 2019	Metallic materials - Tensile testing - Part 1 : Method of test at room temperature
IS 1956 (Part 6) : 1976	Glossary of terms relating to iron and steel Part 6 Forging (including drop forging) (<i>first revision</i>)
IS 3469 (Part 1 to 3) : 1974	Tolerances for closed die steel forgings (<i>first revision</i>)

3 SUPPLY OF MATERIAL

3.1 General requirements relating to the supply of material shall be as laid down in IS 1387.

4. TERMINOLOGY

4.1 For the purpose of this standard, definitions of forging terms as given in IS 1956 (Part 6) shall be applicable.

5. MANUFACTURE

5.1 Billets, blooms, slabs and bars for forgings shall be manufactured by any process which will meet the requirements of the standard.

5.2 Steels for forgings shall conform to IS 1570 Part 2/Sec 1.

5.3 Amount of hot working and finishing temperature shall be such as to ensure complete soundness and adequate uniformity of structure and mechanical properties. The forgings shall not be overheated.

5.4 Failings shall be finished to shape and size by hot-working, and shall, where practicable, be so worked as to cause metal flow in the direction most favourable for resisting the service stresses where these are known. When specified in the order, the supplier shall submit, for the approval of the purchaser, a sketch showing the shape of the rough forging before machining and the supplier may also be required to show, by sectioning and etching a representative forging that soundness and a satisfactory grain flow have been obtained.

5.5 With certain steels, special precautions after hot-working are necessary and in such cases the supplier shall ensure that the condition in which the steel is supplied is satisfactory.

5.6 Descaling of forgings by any approved method shall be subject to agreement between the supplier and the purchaser.

6 WORKMANSHIP

6.1 Forgings shall be free from any harmful surface defects.

7 HEAT TREATMENT

7.1 Forgings may be supplied in the as forged, normalized, annealed or hardened and tempered conditions as agreed to between the supplier and the purchaser. The heat treatment shall be suitably conducted to impart the required physical properties. If a forging is subsequently heated for any purpose, it shall be reheat-treated.

8 TOLERANCES

8.1 Forgings shall normally be manufactured in accordance with the tolerances specified in IS 3469 (Part 1 to 3). In special cases, tolerances shall be agreed to between the supplier and the purchaser.

9 SELECTION OF TEST SAMPLES FOR PHYSICAL TESTS

9.1 For forgings with ruling sections equivalent to a diameter greater than 28 mm, integral test samples may be provided subject to mutual agreement between the supplier and the purchaser. In that case a prolongation shall be made on an agreed portion of forgings. Unless agreed otherwise, the prolongation shall have a ruling section approximately equal to that of the forging and it shall be heat-treated similarly and simultaneously with the forging it represents.

9.2 Where integral test samples are not required and for small forgings with ruling section equivalent to a diameter of 28 mm or less, separate test samples shall be provided from the bars or billets from which forgings are made. They shall be forged to the ruling section of the forgings and shall be heat-treated similarly and simultaneously with the forgings they represent.

9.3 The number of tests shall be as specified in the respective material standard.

9.4 Unless specified otherwise, the axis of the test samples shall be located at any point midway between the centre and the surface of solid forgings and at any point midway between the inner and outer surface of the wall of hollow forgings and shall be parallel to the axis of the forgings in the direction in which the metal is most drawn out.

10 PHYSICAL TESTS

10.1 Tensile Test

Tensile test shall be carried out in accordance with IS 1608 Part 1. The test piece shall be machined lengthwise from each test sample. The tensile properties shall conform to the requirements specified in IS 1570 Part 2/Sec 1.

10.2 Bend Test

Bend test shall be carried out in accordance with IS 1599. The degree of bend and the diameter of the former through which the test piece is to be bent shall be as laid down in the respective material standard.

10.3 Impact Test

In case of special forgings and wherever it is stated either in the contract or in the drawing, Izod impact test shall be carried out on each test sample. Impact test shall be carried out on test piece machined lengthwise from each sample in accordance with IS 1598.

10.4 Hardness Test

Hardness test, where required, shall be carried out either in accordance with IS 1500 Part 1 or IS 1501 Part 1.

11 DECARBURIZATION

Decarburization shall be kept to minimum. The limit of decarburization shall be subject to mutual agreement between the supplier and the purchaser.

12 OPTIONAL TESTS

Subject to mutual agreement between the supplier and the purchaser, tests other than those specified in 9 shall be carried out

13 RETEST

13.1 Should any of the original test pieces fail to pass physical tests specified in respective material standards, two further samples shall be selected for retest for each of the test sample that fails. One of the test samples shall be taken from the forging from which original test sample was taken unless that forging has been withdrawn by the manufacturer.

13.2 The mechanical properties obtained from the test pieces prepared from the two further test samples shall comply with the specific requirements. Should either of the test pieces fail to meet the specific requirements, the material represented shall be liable to rejection except that the supplier may reheat-treat the forging or forgings represented and re-submit it for testing. No forging shall be reheat-treated more than twice.

14 SURFACE CONMTION

14.1 The forgings may be supplied in any one of the following surface conditions, subject to mutual agreement between the manufacturer and the purchaser:

- a) As forged,
- b) Machined, and
- c) Treated.

15 MARKING AND PACKING

15.1 Unless agreed otherwise between the manufacturer and the purchaser, each forging shall be clearly marked with the following information.

- a) Manufacturer's name or trade-mark,
- b) Steel designation, and
- c) Identification mark by which it can be traced to the cast of steel from which the forging was made.

15.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the Bureau of Indian Standards Act, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.