

भारतीय मानक ब्यूरो

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भारतीय मानक मसौदा कॉपर कम्यूटेटर बार के लिए विशिष्टि (आईएस 5885 का दूसरा पुनरीक्षण)

Draft Indian Standard

SPECIFICATION FOR COPPER COMMUTATOR BAR *(Second Revision of IS 5885)*

ICS 77.120.30

Ores and Feed Stock for Copper Industry, its Metals/
Alloys and Products Sectional Committee, MTD 8

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FOREWORD

(Formal clauses will be added later)

This standard was originally published in 1970 and subsequently revised in 1977. This revision has been brought out to bring the standard in the latest style and format of the Indian Standards. In addition to this, references clause has been added and marking clause has been updated.

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 the same as that of the specified value in this standard.

Draft Indian Standard**SPECIFICATION FOR COPPER COMMUTATOR BAR***(Second Revision)***1 SCOPE**

This standard specifies requirements for copper commutator bars, except their dimensions.

2 REFERENCES

The 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 191 : 2007	Copper — Specification (<i>fourth revision</i>)
IS 440 : 1964	Method of chemical analysis of copper
IS 1387 : 1993	General requirements for supply of metallurgical materials (<i>second 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 1608 (Part 1) : 2022/ ISO 6892-1 : 2019	Metallic materials — Tensile testing Part 1 Method of test at room temperature (<i>fifth revision</i>)
IS 3635 : 1966	Methods of test for resistance of metallic electrical resistance material
IS 4519 : 1977	Dimensions for copper commutator bars (<i>first revision</i>)

3 SUPPLY OF MATERIAL

3.1 General requirements relating to the supply of material shall conform to IS 1387.

3.2 The bars may be supplied either in random lengths, in exact specified multiple lengths for subsequent cutting or as plain or shaped segments of specified length for assembly. The surface at the thick or thin edge may be flat or radiused, as required by the purchaser.

3.3 Condition

The material shall be supplied in hard-drawn condition in accordance with mechanical properties laid down in this standard.

4 FREEDOM FROM DEFECTS

The bars shall be reasonably clean, smooth and free from harmful defects, such as splits, overlapping and cracks.

5 CHEMICAL COMPOSITION

5.1 The material shall be ETP or FRHC copper or silver-bearing coppers, the latter having the following percentages of silver content (silver being counted as copper):

<i>Silver</i>	<i>Use</i>
0.03 <i>Min</i>	For automobile and slow speed moulded commutators
0.04 <i>Min</i>	For industrial and high speed moulded commutators
0.06 <i>Min</i>	For traction and large commutators

5.1.1 The chemical composition of ETP or FRHC copper shall be determined in accordance with IS 440 and shall conform to IS 191. The method for determination of silver in silver-bearing coppers shall be as agreed to between the purchaser and the manufacturer, till such time that an Indian Standard on this subject is published.

6 DIMENSIONAL TOLERANCES

The bars shall be supplied to the ordered dimensions subject to the tolerances as specified in IS 4519.

7 PHYSICAL PROPERTIES

7.1 Hardness

The hardness test shall be made on test pieces taken from the samples (*see 8*) and shall be carried out in accordance with IS 1501 (Part 1) using a load of 10 kgf. The test shall consist of three determinations made within a central longitudinal band 6 mm wide on a side-face upon each of the pieces of material selected for testing. The average of all determinations shall be regarded as the Vickers hardness (HV) of the material. The values obtained shall comply with the appropriate requirements of Table 1.

Table 1 Physical Properties
(*Clause 7.1*)

THICKNESS AT POSITION 1 (<i>See FIG 4 OF IS 4519</i>)		VICKERS HARDNESS <i>HV, Min</i>	TENSILE STRENGTH <i>Min</i> N/mm ² (kgf/mm ²)
Over mm	Up to and Including mm		
—	5	95	310 (31.5)
5	10	90	280 (28.5)

7.2 Tensile Strength

Wherever practicable, tensile tests shall be made on the full section of the material. Alternatively, a test piece having parallel edges cut from the thicker edge of the bar shall be used. Tests shall be made in accordance with IS 1608 (Part 1). The bars shall have the tensile properties as given in Table 1.

7.3 Electrical Resistivity

When tested in accordance with IS 3635 the electrical resistivity measured directly on the test sample shall be not more than 0.017777 ohm mm²/m at 20°C (equivalent to 97 percent IACS).

8 SELECTION OF TEST SAMPLES**8.1 Mechanical Tests**

When the bars are ordered in random or specified multiple lengths, portion of a bar or bars may be selected for testing such that the length selected does not exceed one percent of the total length ordered, provided that a sufficient quantity for one series of tests is taken. Bars which are shortened or divided by taking of test samples shall be accepted as good delivery.

8.1.1 In the case of bars ordered to specified length for assembly, one bar shall be selected per 1000 bars or per 200 kg whichever is smaller in mass. For orders of less amount, one bar shall be chosen. When the length of bars as ordered is insufficient to provide a satisfactory test piece, the material shall be tested before cutting into lengths.

8.2 Electrical Resistivity Test

The selection of test samples shall be agreed to between the supplier and the purchaser.

9 RETESTS

9.1 Should any of the test samples first selected by the purchaser fail to pass the tests, mentioned in 7, two further samples from the same batch shall be selected for testing, one of which shall be from the bar from which original test sample was taken unless that bar has been withdrawn by the supplier.

9.1.1 Should the test pieces from both these additional samples pass, the batch represented by the test samples shall be deemed to comply with this standard. Should the test pieces from either of these additional samples fail, the batch represented by the test samples shall be rejected.

10 MARKING

10.1 Suitable tags and labels with markings made on them with the following information suitably:

- a) Grade;
- b) Name of the manufacturer or his trade-mark;
- c) Brand name, if any; and
- d) Identification in code or otherwise, to enable to trace back the date of manufacture, batch number to factory records
- e) Any such information required by the purchaser

10.2 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 *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.