BUREAU OF INDIAN STANDARDS

DRAFT AMENDMENT NO. 1

सतत् ढलाई और रोलिंग द्वारा उत्पादित ई सी ग्रेड एल्युमीनियम छड़ — विशिष्टि

EC GRADE ALUMINIUM ROD PRODUCED BY CONTINUOUS CASTING AND ROLLING — SPECIFICATION

ICS 77.150.10

Ores and Feed Stock for Aluminium Industry, its Metals/Alloys and Products Sectional Committee, MTD 07	**Last date of comments 22 June 2024**

(*Page* 2, *clause* 10) — Substitute the heading of clause from existing

'Resistivity' by 'Electrical resistivity and electrical conductivity'.

(*Page* 2, *clause* 10.1) — Replace the following for existing:

10.1 Electrical resistivity at 20 ºC shall be determined on representative sample by resistance measurement as per method mentioned in Annex C. Electrical conductivity shall be calculated by the formula mentioned below or measured by eddy current method mentioned in IS 5082:

Electrical conductivity percent, IACS = (0.017241) / (Electrical resistivity at 20 ºC) × 100

Where unit of electrical resistivity is $\Omega \cdot mm^2/m$

(*Page* 2, *clause* 10.1.1) — Replace the following for existing:

10.1.1 At a temperature of 20 °C the electrical resistivity and electrical conductivity of rods as per corresponding temper designation shall be as given in Table 2.

(*Page* 6, *After Annex* B) — Add Annex C as given below.

ANNEX C

(*Clause10*.1)

MEASUREMENT OF ELECTRICAL RESISTIVITY

C-1 Scope — This test method covers the determination of the electrical resistivity of Aluminium and Aluminium alloys in various forms (wire, strip, rod, bar).

C-2 Definitions

a) **Resistivity** — Resistivity is the electrical resistance of a body of unit length, and unit cross-sectional area or unit weight.

b) **Volume Resistivity** — Volume resistivity is commonly expressed in ohms for a theoretical conductor of unit length and cross-sectional area in acceptable metric units in Ω· mm^2/m. It may be calculated by the following equation:

$$p_v = (A/L)\ R$$

Where

p_v = volume resistivity, Ω·mm^2/m,

A = cross-sectional area, mm^2,

L = gauge length in mm

R : measured resistance , Ω

C-3 Apparatus

Resistance shall be measured with a circuit configuration and instrumentation that has a resistance measurement capability of +/-0.15 % accuracy.

C-4 Test Specimen

a) The test specimen may be in the form of a wire, strip,rod, bar, tube, or shape. It shall be of uniform cross section throughout its length within +/-0.75 % of the cross-sectional area. Wherever possible it shall be the full cross section of the material it represents, if the full cross section is such that the uniformity of the cross-sectional area can be accurately determined. A test length of at least 1 ft or 300 mm.

b) Cross-sectional dimensions of the specimen may be determined by micrometer measurements with required accuracy of ± 0.10%, if required accuracy not possible with micrometer, determine the cross-section from weight, density, and length of the specimen (for purpose of calculation take density of aluminium:2.705 g/cm3).

c) Resistance of at least 0.00001 Ω (10 μΩ) in the test length between potential contacts,

d) No surface cracks or defects visible to the unaided normal eye, and substantially free from surface oxide, dirt, and grease.

e) No joints or splices.

f) In case of wire rod; sample may be drawn from outer side of coil.

C-5 Procedure:

a) Clean the specimen surface for good electrical contact and make resistance measurement to an accuracy of ± 0.15% using Micro Ohm meter. To eliminate errors due to contact potential, take two readings, one direct and one with the current reversed, in direct succession.

b) Maintain the consistent room temperature (recommended 22ºC±2ºC) and test specimen must be kept in room for least for 45 minutes before taking resistance measurement to maintain the temperature uniformity in a test specimen.

c) Apply the temperature correction, if measurement deviate from the temperature 20ºC by the given formula.

$$R_T = \frac{Rt}{1+\alpha_T (t - T)}$$

where:

R_T = resistance at reference temperature T,

R_t = resistance as measured at temperature t,

α_T = known or given temperature coefficient of resistance of the specimen being measured at reference temperature T,

T = reference temperature, and

t = temperature at which measurement is made.

For purpose of calculation : αT(aluminium): 0.004

d) For measurement of resistivity, use formula

$$\rho_v = (A/L)\, R$$

Where

p_V = volume electricalresistivity, Ω·mm^2/m,

A = cross-sectional area, mm^2,

L = gauge length in mm

R : measured resistance , Ω