

सामान्य इंजीनियरिंग प्रयोजनों के लिए पिटवाँ  
एल्युमीनियम एवं एल्युमीनियम  
मिश्रधातु की चादर एवं पत्ती — विशिष्टि  
( पाँचवा पुनरीक्षण )

Wrought Aluminium and Aluminium  
Alloy Sheet and Strip for General  
Engineering Purposes —  
Specification  
( Fifth Revision )

ICS 77.150.10

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## FOREWORD

This Indian Standard (Fifth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Ores and Feed Stock for Aluminium Industry, its Metals/Alloys and Products Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1956 and revised in 1965, 1974, 1986 and 2008. In this revision efforts have been taken to incorporate all the grades of wrought Al and Al alloy sheet and strip presently used and prevalent in the Indian market. The following major modifications have been incorporated in this revision of the standard:

- a) Forty two new grades are added; and
- b) Clause [4](#) on ordering information has been added.

The composition of the Committee responsible for the formulation of this standard is given in [Annex B](#).

For the purpose of 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.

*Indian Standard*

# WROUGHT ALUMINIUM AND ALUMINIUM ALLOY SHEET AND STRIP FOR GENERAL ENGINEERING PURPOSES — SPECIFICATION

( *Fifth Revision* )

## 1 SCOPE

This standard covers the requirements for wrought aluminium and aluminium alloy sheet and strip for general engineering purposes.

## 2 REFERENCES

The standards listed in [Annex A](#) contain provisions, which through references 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 edition of these standards.

## 3 TERMINOLOGY

For the purpose of this standard, the definitions as given in IS 5047 (Part 1) and IS 5047 (Part 2) and the following shall apply.

**3.1 Heat Treatment Batch** — A quantity of material of one alloy of the same dimensions and produced in the same way, solution-treated and subsequently precipitation treated in one furnace load. More than one heat-treatment batch may comprise a furnace load.

**3.2 Sheet** — Hot or cold rolled product, over 0.15 mm but less than 6.0 mm thickness in cut lengths.

**3.3 Strip** — Hot or cold rolled product, over 0.15 mm but less than 6.0 mm thickness in coil form.

## 4 ORDERING INFORMATION

The ordering information shall include the following information:

- a) Grade/thickness;
- b) Condition;
- c) Quantity in kg;
- d) Size – thickness  $\times$  width  $\times$  length (T  $\times$  W  $\times$  L) in mm for sheets and (T  $\times$  W) in mm for strips/coils;
- e) Coil id and coil weight for strips/coils;

- f) Core/spool requirement for coils; and
- g) Packing mode.

## 5 SUPPLY OF MATERIAL

General requirements for the supply of aluminium and aluminium alloy sheet and strip shall conform to IS 10259.

## 6 FREEDOM FROM DEFECTS

The material shall be sound and free from harmful defects for the intended application.

## 7 CHEMICAL COMPOSITION

The material when analysed as per IS 504 (Part 1 to Part 12) and IS 504 (Part 13 to 16) or any other instrumental/chemical method shall conform to the requirements given in [Table 1](#). In case of dispute, the procedure given in IS 504 shall be the referee method. However, when the method is not given in IS 504 (Part 1 to Part 12) and IS 504 (Part 13 to Part 16) the referee method shall be as agreed between the purchaser and manufacturer.

## 8 MECHANICAL PROPERTIES

**8.1** The material when tested in accordance with IS 1608 (Part 1) shall conform to the values given in [Table 2](#) for grades mentioned in [Table 1](#). Mechanical properties of the grades and thickness not mentioned in [Table 2](#) may be subject to the mutual agreement between purchaser and manufacturer.

The tensile test piece shall be rectangular section and conform to the dimension as given in IS 1608 (Part 1) with a gauge length of 50 mm. The test piece shall be cut transverse to the direction of rolling for sheet and strip 300 mm wide and over. The test piece shall be cut parallel to the direction of rolling for sheet and strip under 300 mm wide. When the width of the material to be tested is insufficient to permit preparation of the standard tensile test piece, a piece of the full width of the material may be used.

### **8.2 Bend Test (for Material 2.6 mm and Thinner)**

Unless otherwise stated, the bend test piece shall be not less than 15 mm wide, of convenient length

and cut with its longer axis transverse to the direction of rolling. The longer edges shall be carefully rounded and smoothed longitudinally so that the cross-section of the test piece has approximately semi-circular ends.

**8.2.1** The test piece may be bent by hand to a U-form, and the piece thus obtained shall subsequently be closed in a vice until the inner surfaces of the test piece are twice the specified radius apart (or are in general contact, if the test piece is to be closed flat).

**8.2.2** When tested in accordance with [8.2.1](#) the outer surface of the bend shall not show any visible crack (*see* IS 1599).

## 9 CONDITION

The material shall be supplied in the condition as required by the purchaser. While specifying the condition, the temper designations laid down in IS 5052 shall be followed.

## 10 DIMENSIONS AND TOLERANCES

The dimensions and tolerances of sheet and strip shall be as specified in IS 2676.

## 11 SELECTION OF TEST SAMPLES

### 11.1 Sheet and Strip of Aluminium or Non-Heat Treatable Aluminium Alloy

Material of the same thickness, produced in the same way, and of the same nominal composition shall be grouped into batches of not more than 4 000 kg. However, if a strip in a single coil exceeds 4 000 kg in weight, it shall be deemed to represent one batch.

**11.1.1** Mechanical tests shall be carried out on each batch for determining conformity of the material to this standard.

**11.1.2** Before the test samples are cut off, they shall be marked to identify them with the batch they represent. The test sample shall be taken from the material as supplied and shall not be further annealed or mechanically worked. The test samples may be cut and prepared from the margins of the material before cutting it to size.

### 11.2 Sheet and Strip of Heat-Treatable Aluminium Alloys

One test sample shall be cut from a sheet or strip selected from each heat treatment batch. Before the test samples are cut off, they shall be marked to identify with the heat treatment batch they represent.

Unless otherwise agreed, the test samples shall be tested in the same condition in which the material is to be supplied. The test sample, after heat treatment, shall not be mechanically worked before being tested.

## 12 RETESTS

For the purpose of this standard, the retest clauses as given in IS 10259 shall apply.

## 13 PACKAGING

For the purpose of this standard, packaging clauses as given in IS 10259 shall apply.

### 13.1 MARKING

The material shall be marked with the following;

- a) Indication of the source of manufacture;
- b) Grade designation, size;
- c) Condition;
- d) Batch number;
- e) Quantity; and
- f) Date of manufacture.

The supplier shall furnish a certificate that the material supplied complies with the requirements of this standard.

### 13.2 BIS Certification Marking

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

**Table 1 Chemical Composition of Wrought Aluminium and Aluminium Alloy Sheet and Strip**  
**(Composition Limits are in Weight Percent Maximum, Unless Shown Otherwise)**

(Clause 7 and 8.1)

SI No.	IS Designation	ISO Designation	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others (Each)	Others (Total)	Al	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
i)	19900	1190	0.05	0.07	0.01	0.01	0.01	0.01	0.02	–	0.01	–	99.90, <i>Min</i>	V + Ti = 0.01 B: 0.01 Ga : 0.02
ii)	19990	1199	0.006	0.006	0.006	0.002	0.006	–	0.006	0.002	0.002	–	99.99, <i>Min</i>	Ga: 0.005; V: 0.005
iii)	19850	1085	0.10	0.12	0.03	0.02	0.02	–	0.03	0.02	0.01	–	99.85, <i>Min</i>	Ga: 0.03; V: 0.05
iv)	19800	1080	0.15	0.15	0.03	0.02	0.02	–	0.03	0.03	0.02	–	99.80, <i>Min</i>	Ga: 0.03; V: 0.05
v)	19800A	1080A	0.15	0.15	0.03	0.02	0.02	–	0.06	0.02	0.02	–	99.80, <i>Min</i>	Ga: 0.03
vi)	19700	1070	0.2	0.25	0.04	0.03	0.03	–	0.04	0.03	0.03	–	99.70, <i>Min</i>	V: 0.05
vii)	19700A	1070A	0.20	0.25	0.03	0.03	0.03	–	0.07	0.03	0.03	–	99.70, <i>Min</i>	-
viii)	19600	1060	0.25	0.35	0.05	0.03	0.03	–	0.05	0.03	0.03	–	99.60, <i>Min</i>	V: 0.05
ix)	19500	1050	0.25	0.40	0.05	0.05	0.05	–	0.05	0.03	0.03	–	99.50, <i>Min</i>	V: 0.05
x)	19500A	1050A	0.25	0.40	0.05	0.05	0.05	–	0.07	0.05	0.03	–	99.50, <i>Min</i>	-
xi)	19450	1145	–	–	0.05	0.05	0.05	–	0.05	0.03	0.03	–	99.45, <i>Min</i>	Si + Fe: 0.55 V: 0.05
xii)	19350	1235	–	–	0.05	0.05	0.05	–	0.10	0.06	0.03	–	99.35, <i>Min</i>	V: 0.05; Si + Fe: 0.65
xiii)	19002	1100	–	–	0.05 to 0.20	0.05	–	–	0.10	–	0.05	0.15	99.00, <i>Min</i>	Si + Fe: 0.95

Table 1 (Continued)

SI No.	IS Designation	ISO Designation	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others (Each)	Others (Total)	Al	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
xiv)	19000	–	0.5	0.7	0.1	0.1	0.2	–	0.10	–	–	–	99.00, <i>Min</i>	Cu + Mg + Si + P + Mn + Zn = 1.0
xv)	19000A	1200	–	–	0.05	0.05	–	–	0.10	0.05	0.05	0.15	99.00, <i>Min</i>	Si + Fe: 1.00
xvi)	24345	–	0.50 to 1.2	0.7	3.8 to 5.0	0.3 to 1.2	0.20 to 0.80	0.3	0.2	0.3	–	–	Remainder	–
xvii)	24345A	2014	0.50 to 1.2	0.7	3.9 to 5.0	0.40 to 1.2	0.20 to 0.8	0.10	0.25	0.15	0.05	0.15	Remainder	–
xviii)	24345B	2014A	0.5 to 0.9	0.50	3.9 to 5.0	0.40 to 1.2	0.20 to 0.8	0.10	0.25	0.15	0.05	0.15	Remainder	Zr + Ti: 0.20
xix)	24530	2024	0.50	0.50	3.8 to 4.9	0.30 to 0.9	1.2 to 1.8	0.10	0.25	0.15	0.05	0.15	Remainder	–
xx)	26388	2219	0.20	0.30	5.8 to 6.8	0.20 to 0.40	0.02	–	0.10	0.02 to 0.10	0.05	0.15	Remainder	V: 0.05 to 1.5, Zr: 0.10 to 0.25
xxi)	31000	–	0.6	0.7	0.10	0.8 to 1.5	0.10	0.20	0.20	0.2	–	–	Remainder	–
xxii)	31000A	3103	0.50	0.7	0.10	0.9 to 1.5	0.30	0.10	0.20	–	0.05	0.15	Remainder	Zr + Ti: 0.10
xxiii)	31200	3003	0.6	0.7	0.05 to 0.20	1.0 to 1.5	–	–	0.10	–	0.05	0.15	Remainder	–
xxiv)	31400	3102	0.4	0.7	0.10	0.05 to 0.40	–	–	0.30	0.1	0.05	0.15	Remainder	–
xxv)	31500	–	0.4	0.7	0.20	1.0 to 1.5	0.6 to 1.3	–	0.20	0.20	–	–	Remainder	–

Table 1 (Continued)

SI No.	IS Designation	ISO Designation	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others (Each)	Others (Total)	Al	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
xxvi)	31500A	3004	0.30	0.7	0.25	1.0 to 1.5	0.8 to 1.3	–	0.25	–	0.05	0.15	Remainder	–
xxvii)	31500B	–	0.4	0.7	0.1	0.30 to 0.8	0.20 to 0.8	0.10	0.20	–	–	–	Remainder	–
xxviii)	31500C	3105A	0.6	0.7	0.30	0.30 to 0.8	0.20 to 0.8	0.20	0.25	0.10	0.05	0.15	Remainder	–
xxix)	31540	3104	0.6	0.8	0.05 to 0.25	0.8 to 1.4	0.8 to 1.3	–	0.25	0.10	0.05	0.15	Remainder	V: 0.05; Ga: 0.05
xxx)	31542	3005	0.6	0.7	0.30	1.0 to 1.5	0.20 to 0.6	0.10	0.25	0.10	–	–	Remainder	–
xxxii)	40800	–	0.6 to 0.95	0.6 to 0.95	0.2	0.1	0.1	–	0.2	0.2	–	–	98.0 %, <i>Min</i>	–
xxxiii)	41352	4015	1.4 to 2.2	0.7	0.2	0.6 to 1.2	0.10 to 0.50	–	0.2	–	–	–	Remainder	–
xxxiv)	41800	4006	0.8 to 1.2	0.50 to 0.8	0.1	0.05	0.01	0.20	0.05	–	–	–	Remainder	–
xxxv)	44000	4343	6.8 to 8.2	0.8	0.25	0.10	–	–	0.2	–	–	–	Remainder	–
xxxvi)	45000	4045	9.0 to 11.0	0.8	0.30	0.05	0.05	–	0.10	0.20	–	–	Remainder	–
xxxvii)	51000A	5005	0.30	0.7	0.20	0.20	0.50 to 1.1	0.10	0.25	–	–	–	Remainder	–
xxxviii)	51000B	5050	0.40	0.7	0.20	0.10	1.1 to 1.8	0.10	0.25	–	–	–	Remainder	–

Table 1 (Continued)

SI No.	IS Designation	ISO Designation	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others (Each)	Others (Total)	Al	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
xxviii)	51300	–	0.6	0.9	0.3	0.2 to 0.7	0.20 to 0.9	0.2	0.4	0.2	–	–	Remainder	–
xxxix)	51300A	5010	0.4	0.7	0.25	0.10 to 0.30	0.20 to 0.60	0.15	0.30	0.10	0.05	0.15	Remainder	–
xl)	52000	–	0.6	0.7	0.1	0.5	1.7 to 2.6	0.25	0.2	0.2	–	–	Remainder	Cr + Mn: 0.5
xli)	52000A	5251	0.4	0.5	0.15	0.10 to 0.50	1.7 to 2.4	0.15	0.15	0.15	0.05	0.15	Remainder	–
xlii)	52300	–	0.8	0.9	0.2	0.5 to 1.0	1.5 to 2.4	0.20	0.40	0.20	–	–	Remainder	–
xliii)	52300A	–	0.6	0.4 to 0.7	0.2	1.1 to 1.15	1.3 to 1.7	0.2	0.4	0.2	–	–	Remainder	–
xliv)	52302	5049	0.40	0.50	0.10	0.50 to 1.1	1.6 to 2.5	0.30	0.20	0.10	0.05	0.15	Remainder	–
xlv)	53000	–	0.6	0.5	0.1	0.5	2.8 to 4.0	0.25	0.2	0.2	–	–	Remainder	Cr + Mn: 0.5
xlvi)	53000A	5754	0.4	0.40	0.10	0.50	2.6 to 3.6	0.30	0.20	0.15	0.05	0.15	Remainder	Cr + Mn: 0.10 to 0.6
xlvii)	53800	5052	0.25	0.40	0.10	0.10	2.2 to 2.8	0.15 to 0.35	0.10	–	0.05	0.15	Remainder	–
xlviii)	54000	5154A	0.50	0.50	0.10	0.50	3.1 to 3.9	0.25	0.20	0.20	0.05	0.15	Remainder	Cr + Mn: 0.10 to 0.50
xlix)	54300	–	0.4	0.7	0.1	0.5 to 1.0	4.0 to 4.9	0.25	0.2	0.2	–	–	Remainder	–
l)	54300A	5083	0.40	0.40	0.10	0.40 to 1.0	4.0 to 4.9	0.05 to 0.25	0.25	0.15	0.05	0.15	Remainder	–



Table 1 (Continued)

SI No.	IS Designation	ISO Designation	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others (Each)	Others (Total)	Al	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
li)	54380	5086	0.40	0.50	0.10	0.20 to 0.7	3.5 to 4.5	0.05 to 0.25	0.25	0.15	0.05	0.15	Remainder	Zr 0.05
lii)	55000	–	0.6	0.7	0.1	0.05	4.5 to 5.5	0.25	0.2	0.2	0.05	0.15	Remainder	Cr + Mn: 0.50
liii)	64430	–	0.6 to 1.3	0.6	0.10	0.4 to 1.0	0.4 to 1.2	0.25	0.1	0.2	–	–	Remainder	–
liv)	64430A	6351	0.7 to 1.3	0.5	0.1	0.4 to 0.8	0.4 to 0.8	–	0.20	0.2	0.05	0.15	Remainder	–
lv)	64430B	6081	0.7 to 1.1	0.5	0.1	0.10 to 0.45	0.6 to 1.0	0.1	0.2	0.15	0.05	0.15	Remainder	–
lvi)	65028	–	0.4 to 0.8	0.7	0.15 to 0.40	0.2	0.7 to 1.2	0.15 to 0.35	0.2	0.2	–	–	Remainder	–
lvii)	65028A	6061	0.40 - 0.8	0.7	0.15 to 0.40	0.15	0.8 to 1.2	0.04 to 0.35	0.25	0.15	0.0 to 5	0.15	Remainder	–
lviii)	65032	–	0.4 to 0.8	0.7	0.15 to 0.40	0.2 to 0.8	0.7 to 1.2	0.2	0.20	0.2	–	–	Remainder	–
lix)	65032A	6261	0.40 to 0.7	0.40	0.15 to 0.40	0.20 to 0.35	0.7 to 1.0	0.10	0.20	0.10	0.05	0.15	Remainder	–
lx)	65430	6082	0.7 to 1.3	0.50	0.10	0.40 to 1.0	0.6 to 1.2	0.25	0.20	0.10	0.05	0.15	Remainder	–
lxi)	71000	7072	–	–	0.10	0.10	0.10	–	0.8 to 1.3	–	0.05	0.15	Remainder	Si + Fe: 0.7
lxii)	74530	–	0.4	0.7	0.2	0.2 to 0.7	1.0 to 1.5	0.2	4.0 to 5.0	0.2	–	–	Remainder	–
lxiii)	74538	7039	0.30	0.40	0.10	0.10 to 0.40	2.3 to 3.3	0.15 to 0.25	3.5 to 4.5	0.1	0.05	0.15	Remainder	–

Table 1 (Concluded)

SI No.	IS Designation	ISO Designation	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others (Each)	Others (Total)	Al	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
lxiv)	75530	7005	0.35	0.40	0.10	0.20 to 0.7	1.0 to 1.8	0.06 to 0.20	4.0 to 5.0	0.01 to 0.06	0.05	0.15	Remainder	Zr: 0.08 to 0.20
lxv)	76528	7075	0.40	0.50	1.2 to 2.0	0.30	2.1 to 2.9	0.18 to 0.28	5.1 to 6.1	0.20	0.05	0.15	Remainder	–
lxvi)	76528A	7175	0.15	0.20	1.2 to 2.0	0.10	2.1 to 2.9	0.18 to 2.8	5.1 to 6.1	0.10	0.05	0.15	Remainder	–
lxvii)	81000	8021	0.15	1.2 to 1.7	0.05	–	–	–	–	–	0.05	0.15	Remainder	–
lxviii)	81000B	8021B	0.40	1.1 to 1.7	0.05	0.03	0.01	0.03	0.05	0.05	0.03	0.10	Remainder	–
lxix)	81400	8011	0.50 to 0.9	0.6 to 1.0	0.10	0.20	0.05	0.05	0.10	0.08	0.05	0.15	Remainder	–
lxx)	81472	8079	0.05 to 0.30	0.7 to 1.3	0.05	–	–	–	0.10	–	0.05	0.15	Remainder	–
lxxi)	81400A	8011A	0.40 to 0.8	0.50 to 1.0	0.10	0.10	0.10	0.10	0.10	0.05	0.05	0.15	Remainder	–
lxxii)	81400B	8111	0.30 to 1.1	0.40 to 1.0	0.10	0.10	0.05	0.05	0.10	0.08	0.05	0.15	Remainder	–
lxxiii)	82300	8006	0.40	1.2 to 2.0	0.3	0.30 to 1.0	0.10	–	0.10	–	0.05	0.15	Remainder	–

## NOTES

- 1 Aluminium shall be determined by difference. The aluminium content for unalloyed aluminium (1 series) is the difference between 100.00 percent and the sum of all other metallic elements.
- 2 'Others' includes the listed elements for which no specific limits are mentioned and also unlisted metallic elements. Identification of unlisted elements shall be as per the mutual agreement between the manufacturer and the purchaser. 'Others' does not include modifying or refining elements such as Na, Sr, Sb and P.

Table 2 Mechanical Properties of Wrought Aluminium and Aluminium Alloy Sheet and Strip

(Clause 8)

SI No.	IS Designation	ISO Designation	Condition	0.2 Percent Proof Stress	Tensile Strength		Elongation on 50 mm Gauge Length, Percent, for Thickness <i>Min</i>					Bend Test, Radius of Bend
				MPa	MPa							
				<i>Min</i>	<i>Min</i>	<i>Max</i>	0.2 mm to 0.5 mm	0.5 mm to 0.8 mm	Over 0.8 mm, up to and including 1.3 mm	Over 1.3 mm, up to and including 2.6 mm	Over 2.6 mm, up to and including 6.0 mm	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	19990	1199	O	–	–	65	–	30	35	40	45	close
			H14 or H24	–	80	100	–	7	6	10	12	1/2t
			H18 or H28	–	100	–	–	3	4	5	6	1t
ii)	19850	1085	O	15	55	95	20	25	30	35	35	close
			H12	55	70	110	3	4	6	8	8	close
			H14	65	85	120	2	3	4	5	5	1t
			H16	75	100	135	1	2	3	4	4	1.5t
			H18	–	120	–	1	2	3	4	4	–
iii)	19800	1080	O	15	55	95	20	25	30	35	35	close
			H12 or H22	55	70	110	3	4	6	8	8	close
			H14 or H24	65	85	120	2	3	4	5	5	1t
			H16 or H26	75	100	135	1	2	3	4	4	1.5t
			H18	–	120	–	1	2	3	4	4	–
iv)	19800A	1080A	O	15	60	90	26	28	28	28	31	0.5t
			H12	55	80	120	5	6	6	6	7	0.5t
			H14	70	100	140	4	4	4	4	5	1t
			H16	90	110	150	2	2	2	2	3	1t

Table 2 (Continued)

SI No.	IS Designation	ISO Designation	Condition	0.2 Percent Proof Stress	Tensile Strength		Elongation on 50 mm Gauge Length, Percent, for Thickness <i>Min</i>					Bend Test, Radius of Bend
				MPa	MPa							
				<i>Min</i>	<i>Min</i>	<i>Max</i>	0.2 mm to 0.5 mm	0.5 mm to 0.8 mm	Over 0.8 mm, up to and including 1.3 mm	Over 1.3 mm, up to and including 2.6 mm	Over 2.6 mm, up to and including 6.0 mm	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
v)	19700	1070	O	15	55	95	20	25	30	35	35	close
			H12 or H22	55	70	110	3	4	6	8	8	close
			H14 or H24	65	85	120	2	3	4	5	5	1t
			H16 or H26	75	100	135	1	2	3	4	4	1.5t
			H18	–	120	–	1	2	3	4	4	–
vi)	19700A	1070A	O	15	60	90	23	25	25	25	29	0.5t
			H12	55	80	120	5	6	6	6	7	0.5t
			H14	70	100	140	4	4	4	4	5	1t
			H16	90	110	150	2	2	2	2	3	1t
			H18	105	125	–	2	2	2	2	2	–
vii)	19600	1060	O	–	–	95	–	25	25	29	32	close
			H14 or H24	–	95	125	–	4	5	6	6	0.5t
			H18 or H28	–	125	–	–	3	3	4	4	1t
viii)	19500	1050	O	20	60	100	15	20	20	25	30	close
			H12 or H22	65	80	120	3	4	6	8	8	0.5t
			H14 or H24	75	95	125	2	3	4	5	5	0.5t
			H16 or H26	85	120	145	1	2	3	4	4	2t
			H18	–	125	–	1	2	3	4	4	–
ix)	19500A	1050A	O	20	65	95	20	22	22	22	26	–
			H14	85	105	145	2	3	3	3	4	–
			H18	120	120	140	1	2	2	2	2	–

Table 2 (Continued)

Sl No.	IS Designation	ISO Designation	Condition	0.2 Percent Proof Stress	Tensile Strength		Elongation on 50 mm Gauge Length, Percent, for Thickness					Bend Test, Radius of Bend
				MPa	MPa		<i>Min</i>					
				<i>Min</i>	<i>Min</i>	<i>Max</i>	0.2 mm to 0.5 mm	0.5 mm to 0.8 mm	Over 0.8 mm, up to and including 1.3 mm	Over 1.3 mm, up to and including 2.6 mm	Over 2.6 mm, up to and including 6.0 mm	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
x)	19350	1235 and 1200	O	25	75	105	17	22	22	30	30	Close
			H12 or H22	75	95	125	3	4	6	8	8	0.5 t
			H14 or H24	95	120	145	2	3	4	5	5	1t
			H16 or H26	115	135	165	1	2	3	4	4	2t
			H18	130	150	–	1	2	3	4	4	–
xi)	19002	1100	O	25	75	105	17	22	22	30	30	close
			H12 or H22	75	95	125	3	4	6	8	8	close
			H14 or H24	95	120	145	2	3	4	5	5	1t
			H16 or H26	115	135	165	1	2	3	4	4	2t
			H18	130	150	–	1	2	3	4	4	–
xii)	19000	1200	O	25	75	105	17	22	22	30	30	close
			H12 or H22	75	95	125	3	4	6	8	8	close
			H14 or H24	95	120	145	2	3	4	5	5	1t
			H16 or H26	115	135	160	1	2	3	4	4	2t
			H18	130	150	–	1	2	3	4	4	–
xiii)	19000A	1200	O	25	75	105	17	22	22	22	30	close
			H12 or H22	75	95	125	3	4	6	8	8	close
			H14 or H24	95	120	145	2	3	4	5	5	1t
			H16 or H26	115	135	165	1	2	3	4	4	2t
			H18	130	150	–	1	2	3	4	4	close

Table 2 (Continued)

SI No.	IS Designation	ISO Designation	Condition	0.2 Percent Proof Stress	Tensile Strength		Elongation on 50 mm Gauge Length, Percent, for Thickness <i>Min</i>					Bend Test, Radius of Bend	
				MPa	MPa								
				<i>Min</i>	<i>Min</i>	<i>Max</i>	0.2 mm to 0.5 mm	0.5 mm to 0.8 mm	Over 0.8 mm, up to and including 1.3 mm	Over 1.3 mm, up to and including 2.6 mm	Over 2.6 mm, up to and including 6.0 mm		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
xiv)	24345	–	O	–	–	240	–	14	14	14	14	14	close
			T4	240	380	–	–	13	14	14	14	14	3.0t
			T6	345	425	–	–	6	6	6	6	6	5t
xv)	24345A	2014	O	–	–	220	16	16	16	16	16	16	0.5t
			T4	240	395	–	14	14	14	14	14	14	3.0t
			T6	390	440	–	6	6	6	7	7	7	5t
xvi)	24345B	2014A	O	–	–	220	16	16	16	16	16	16	–
			T3 or T4	240	395	–	14	14	14	14	14	14	–
			T6	380	440	–	6	6	6	7	7	7	–
xvii)	24530	2024	O	–	–	220	12	12	12	12	12	12	close
			T4	275	425	–	12	15	15	15	15	15	3t
			T6	345	440	–	5	5	5	5	5	5	–
xviii)	26388	2219	O	–	–	220	–	12	12	12	12	12	4t
			T6	250	370	–	–	6	6	6	7	8	5t

Table 2 (Continued)

SI No.	IS Designation	ISO Designation	Condition	0.2 Percent Proof Stress	Tensile Strength		Elongation on 50 mm Gauge Length, Percent, for Thickness <i>Min</i>					Bend Test, Radius of Bend
				MPa	MPa		0.2 mm to 0.5 mm	0.5 mm to 0.8 mm	Over 0.8 mm, up to and including 1.3 mm	Over 1.3 mm, up to and including 2.6 mm	Over 2.6 mm, up to and including 6.0 mm	
				<i>Min</i>	<i>Min</i>	<i>Max</i>						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
xix)	31000	--	O	–	90	115	–	20	23	24	24	Close
			H12 or H22	–	115	150	–	5	6	7	8	Close
			H14 or H24	–	130	180	–	3	4	5	5	1/2t
			H16 or H26	–	150	195	–	2	3	4	4	1t
			H18	–	170	-	–	2	2	3	3	3t
xx)	31000A	3103	O	35	90	130	17	19	19	19	21	–
			H 14	120	140	180	2	2	2	2	4	–
			H18	165	185	-	1	2	2	2	2	–
xxi)	31200	3003	O	35	95	135	18	20	22	22	25	Close
			H12 or H22	85	120	155	3	6	7	8	9	Close
			H14 or H24	115	140	180	2	4	4	5	6	0.5t
			H16 or H26	145	165	205	1	3	3	4	4	2t
			H18	165	180	–	1	2	2	3	3	–
xxii)	31500	--	O	–	125	165	–	16	16	18	20	Close
			H12 / H22	–	150	210	–	5	5	6	8	Close
			H14 / H24	–	190	245	–	3	4	5	5	1/2t
			H16 / H26	–	215	275	–	2	2	3	4	1/2t
			H18 / H28	–	245	–	–	1	1	1	2	1t

Table 2 (Continued)

SI No.	IS Designation	ISO Designation	Condition	0.2 Percent Proof Stress	Tensile Strength		Elongation on 50 mm Gauge Length, Percent, for Thickness <i>Min</i>					Bend Test, Radius of Bend
				MPa	MPa							
				<i>Min</i>	<i>Min</i>	<i>Max</i>	0.2 mm to 0.5 mm	0.5 mm to 0.8 mm	Over 0.8 mm, up to and including 1.3 mm	Over 1.3 mm, up to and including 2.6 mm	Over 2.6 mm, up to and including 6.0 mm	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
xxiii)	31500A	3004	O	60	155	195	10	14	16	18	18	0t,0.5t
			H12 or H22	145	195	245	3	3	4	5	5	1t
			H14 or H24	175	225	65	1	3	3	4	4	1.5t
xxiv)	31500B	--	O	–	95	145	–	16	16	18	20	Close
			H12 or H22	–	130	180	–	5	5	6	8	1/2t
			H14 or H24	–	150	200	–	3	4	5	5	1t
			H16 or H26	–	170	220	–	2	2	3	4	2t
			H18	–	190	–	–	1	1	1	2	4t
xxv)	31500C	3105A	O	40	100	155	14	15	15	15	17	0.5t
			H12	105	130	180	3	4	4	4	4	1.5t
			H14	130	150	200	2	2	2	2	2	2.5t
			H16	160	175	225	1	2	2	2	2	–
			H18	180	195	–	1	1	1	1	1	–
xxvi)	31540	3104	O	60	155	195	10	14	16	18	18	0.5t
			H12 or H22	145	195	245	1	3	4	5	5	1t
			H14 or H24	175	225	265	1	3	3	4	4	1.5t
xxvii)	31542	3005	O	45	120	165	14	16	18	18	–	0t
			H12 or H22	120	135	185	1	2	2	2	–	1t
			H14 or H24	145	165	215	1	1	2	2	–	2t
			H16 or H26	165	195	245	1	1	2	2	–	3t
			H18	205	225	–	1	1	2	2	–	–



Table 2 (Continued)

SI No.	IS Designation	ISO Designation	Condition	0.2 Percent Proof Stress	Tensile Strength		Elongation on 50 mm Gauge Length, Percent, for Thickness <i>Min</i>					Bend Test, Radius of Bend
				MPa	MPa							
				<i>Min</i>	<i>Min</i>	<i>Max</i>	0.2 mm to 0.5 mm	0.5 mm to 0.8 mm	Over 0.8 mm, up to and including 1.3 mm	Over 1.3 mm, up to and including 2.6 mm	Over 2.6 mm, up to and including 6.0 mm	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
xxviii)	40800	--	O	–	85	120	19	20	23	25	30	close
			H12 or H22	–	105	140	4	5	6	7	8	close
			H14 or H24	–	125	160	1/3	3	4	5	5	1/2t
			H16 or H26	–	150	180	1/2	2	3	4	4	1t
			H18	–	175	-	1	2	2	3	3	3t
xxix)	41352	4015	O	45	-	150	20	20	20	20	20	–
			H12	90	120	175	4	4	4	4	4	–
			H14	120	150	200	2	3	3	3	3	–
			H16	150	170	220	1	2	2	2	2	–
			H18	180	200	250	1	1	1	1	1	–
xxx)	41800	4006	O	40	95	130	17	19	19	19	22	0t, 1t
			H12	90	120	160	4	4	4	4	5	1.5t
			H14	120	140	180	3	3	3	3	3	0t, 2t
xxxi)	51000A	5005	O	-	105	150	–	18	18	18	22	close
			H12	85	120	160	–	2	2	2	4	0.5t
			H14	105	140	180	–	2	2	2	3	1.5t
			H16	125	160	200	–	2	2	3	3	3t
			H18	–	185	–	–	2	2	2	2	
xxxii)	51000B	5050	O	45	130	170	16	17	17	17	19	0.5t
			H12	130	155	195	2	2	2	2	4	–
			H14	150	175	215	2	2	2	2	3	–
			H16	170	195	235	1	2	2	2	2	–
			H18	190	220	–	1	2	2	2	2	–

Table 2 (Continued)

SI No.	IS Designation	ISO Designation	Condition	0.2 Percent Proof Stress	Tensile Strength		Elongation on 50 mm Gauge Length, Percent, for Thickness					Bend Test, Radius of Bend
				MPa	MPa		<i>Min</i>					
				<i>Min</i>	<i>Min</i>	<i>Max</i>	0.2 mm to 0.5 mm	0.5 mm to 0.8 mm	Over 0.8 mm, up to and including 1.3 mm	Over 1.3 mm, up to and including 2.6 mm	Over 2.6 mm, up to and including 6.0 mm	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
xxxiii)	51300	-	O	-	95	145	-	14	14	15	16	close
			HX 2	-	130	180	-	6	6	7	8	1/2t
			HX 4	-	150	200	-	4	4	5	6	1t
			HX 6	-	175	215	-	2	2	3	4	2t
			H X8	-	195	-	-	1	1	1	2	4t
xxxiv)	51300A	-	O	35	90	130	17	19	19	19	21	1t
			H12	85	110	155	2	3	3	3	4	2t
xxxv)			H14	115	140	175	2	2	2	2	3	2.5t
			H16	140	155	195	1	2	2	2	2	2.5t
			H18	160	175		1	2	2	2	2	-
xxxvi)	52000	-	O	60	175	215	13	16	16	16	18	Close
			HX2	125	200	240	3	3	4	5	6	1/2t
			HX4	175	230	275	2	2	2	3	4	1t
xxxvii)	52000	-	HX6	190	235	295	1	2	2	3	-	-
			HX8	215	265	-	1	1	2	3	-	-
xxxviii)	52000A	5251	O	60	160	200	13	14	14	14	16	0.5t
			H12	150	190	230	3	4	4	4	5	2t
			H14	170	210	250	2	2	2	2	3	2.5t
			H16	200	230	270	1	2	2	2	3	3.5t
			H18	230	255		1	2	2	2	2	-

Table 2 (Continued)

SI No.	IS Designation	ISO Designation	Condition	0.2 Percent Proof Stress	Tensile Strength		Elongation on 50 mm Gauge Length, Percent, for Thickness					Bend Test, Radius of Bend
				MPa	MPa		<i>Min</i>					
				<i>Min</i>	<i>Min</i>	<i>Max</i>	0.2 mm to 0.5 mm	0.5 mm to 0.8 mm	Over 0.8 mm, up to and including 1.3 mm	Over 1.3 mm, up to and including 2.6 mm	Over 2.6 mm, up to and including 6.0 mm	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
xxxix)	52300	–	O	75	160	210	–	12	14	16	18	Close
			H12 or H22	140	170	220	–	4	5	6	7	1t
			H14 or H24	180	190	250	–	4	4	5	5	2t
			H16 or H26	200	225	285	–	3	3	4	–	–
			H18	225	250	–	–	2	2	3	–	–
xli)	52300A	–	O	–	160	210	–	12	13	14	14	Close
			H12 or H22	–	190	260	–	4	4	5	5	2t
			H14 or H24	–	220	280	–	3	3	4	4	3t
			H16 or H26	–	250	300	–	2	2	3	3	–
			H18	–	270	–	–	2	2	3	3	–
xlii)	52302	5049	O	80	190	240	12	14	14	14	16	1t
			H12	170	220	270	4	5	5	5	6	–
			H14	190	240	280	3	3	3	3	4	–
xliii)	53000	–	H16	220	265	305	2	3	3	3	3	–
			H18	250	290	–	1	2	2	2	2	–
xliv)	53000	–	O	85	210	270	–	12	14	16	18	Close
			H 12	160	240	290	–	4	5	6	7	1t
			H 14	220	270	320	–	3	3	5	5	2t
			H 16	225	290	340	–	2	2	4	0	0
			H 18	235	310	0	–	2	2	3	0	0

Table 2 (Continued)

SI No.	IS Designation	ISO Designation	Condition	0.2 Percent Proof Stress	Tensile Strength		Elongation on 50 mm Gauge Length, Percent, for Thickness					Bend Test, Radius of Bend
				MPa	MPa		<i>Min</i>					
				<i>Min</i>	<i>Min</i>	<i>Max</i>	0.2 mm to 0.5 mm	0.5 mm to 0.8 mm	Over 0.8 mm, up to and including 1.3 mm	Over 1.3 mm, up to and including 2.6 mm	Over 2.6 mm, up to and including 6.0 mm	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
xliv)	53000A	5754	O	80	190	240	12	14	14	14	16	–
			H24 or H34	160	240	280	6	6	6	6	7	–
			H38	230	290	–	3	3	3	3	4	–
xlv)	53800	5052	O	65	170	215	15	17	17	19	19	1t
			H12 or H22	155	215	265	4	5	5	7	7	1.5t
			H14 or H24	180	235	285	3	4	4	6	6	2t
			H16 or H26	205	255	305	3	3	4	4	4	3t
			H18 or H28	220	270	–	3	3	4	4	4	–
xlvi)	54000	5154A	O	85	215	275	12	13	13	13	15	1t
			H12	190	250	305	3	4	4	4	5	–
			H14	220	270	325	2	3	3	3	3	–
			H18	270	310	–	1	1	1	1	1	–
xlvii)	54300	–	O	130	265	365	–	12	14	16	16	1t
			HX2	235	315	395	–	5	6	7	7	2t
			HX4	275	355	–	–	4	4	5	5	3t
xlviii)	54300A	5083	O	125	275	350	–	16	16	16	16	2t
			H22 or H32	215	305	380	–	8	8	8	8	5t
			H34	270	345	405	–	–	–	6	6	–
xlix)	54380	5086	O	100	245	305	–	15	15	18	18	2.5t
l)			H22 or H32	195	275	325	–	6	6	8	8	3t
			H24 or H34	235	305	355	–	4	5	6	6	4t
			H26 or H36	265	325	375	–	3	4	6	6	5t
			H18 or H38	285	345	–	–	3	3	–	–	–

Table 2 (Continued)

SI No.	IS Designation	ISO Designation	Condition	0.2 Percent Proof Stress	Tensile Strength		Elongation on 50 mm Gauge Length, Percent, for Thickness <i>Min</i>					Bend Test, Radius of Bend
				MPa	MPa							
				<i>Min</i>	<i>Min</i>	<i>Max</i>	0.2 mm to 0.5 mm	0.5 mm to 0.8 mm	Over 0.8 mm, up to and including 1.3 mm	Over 1.3 mm, up to and including 2.6 mm	Over 2.6 mm, up to and including 6.0 mm	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
li)	55000	-	O	130	265	365	-	12	14	16	16	close
			HX2	220	310	395	-	5	6	7	7	2t
lii)	64430	-	O	-	-	175	-	14	16	16	17	Close
			T4	115	200	-	-	12	15	15	15	2t
			T6	250	295	-	-	5	5	5	6	3t
liii)	65028	-	O	-	-	175	-	14	16	16	18	Close
			T4	110	200	-	-	12	15	15	15	2t
			T6	235	280	-	-	5	5	5	6	3t
liv)	65028A	6061	O	-	-	145	-	16	16	16	16	1.5t
			T4	110	205	-	-	16	16	16	16	1.5t
			T6	245	295	-	-	10	10	10	10	3t
lv)	65032	-	O	-	-	175	-	14	16	16	18	Close
			T4	110	200	0	-	12	15	15	15	2t
			T6	235	280	0	-	5	5	5	6	3t
lvi)	65430	6082	O	-	-	150	-	16	16	16	16	2.5 t
			T4	110	205	-	-	15	15	15	15	2t
			T6	260	310	-	-	10	10	10	10	4.5t
lvii)	74530	-	T4	175	280	-	-	8	9	9	10	5t
			T6	270	315	-	-	6	7	7	8	5t

Table 2 (Concluded)

SI No.	IS Designation	ISO Designation	Condition	0.2 Percent Proof Stress	Tensile Strength		Elongation on 50 mm Gauge Length, Percent, for Thickness					Bend Test, Radius of Bend
				MPa	MPa		<i>Min</i>					
				<i>Min</i>	<i>Min</i>	<i>Max</i>	0.2 mm to 0.5 mm	0.5 mm to 0.8 mm	Over 0.8 mm, up to and including 1.3 mm	Over 1.3 mm, up to and including 2.6 mm	Over 2.6 mm, up to and including 6.0 mm	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
lviii)	74538	-	O	103	227	-	-	22	22	22	22	1.5t
			T6	330	400	-	-	13	13	14	14	6t
lix)	76528	7075	O	-	-	275	-	10	10	11	11	1.5t
			T6	460	525	-	-	6	6	7	7	6t
lx)	81000	8021B	H14	-	135	185	2	-	-	-	-	-
lxi)	81472	8079	H14	-	125	175	2	-	-	-	-	-
lxii)	81400	8011	O	30	85	130	-	20	23	25	30	close
			H12 or H22	90	105	140	-	5	6	7	8	close
			H14 or H24	110	120	165	-	3	4	5	5	1/2t
			H16 or H26	130	150	180	-	2	3	4	4	1t
			H18	145	175	-	-	2	2	3	3	3t
lxiii)	81400A	8011A	O	30	85	130	19	21	21	21	24	-
			H14	110	125	165	1	3	3	3	3	-
			H16	130	140	190	1	2	2	2	3	-
			H18	145	160		1	2	2	2	2	-

## NOTES

1 1 MPa = 1 N/mm<sup>2</sup> = 1 MN/m<sup>2</sup> = 0.102 kgf/mm<sup>2</sup> = 144.4 psi.

2 't' is the thickness of the test piece.

3 For thickness 2.6 mm and less, elongation values are for guidance only and not guaranteed. For this purpose, bend test as specified in 8.2 may be

## ANNEX A

(Clause 2)

## LIST OF REFERRED STANDARD

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
IS 504 (Part 1 to 12) : 2002	Chemical analysis of aluminium and its alloys: Parts 1 to 12 ( <i>second revision</i> )	IS 5047	Glossary of terms relating to aluminium and aluminium alloys
IS 504 (Part 13 to 16) : 2003	Chemical analysis of aluminium and its alloys: Parts 13 to 16 ( <i>second revision</i> )	(Part 1 : 1986)	Unwrought and wrought metals ( <i>second revision</i> )
IS 1599 : 2023/ ISO 7438 : 2020	Metallic materials — Bend test ( <i>fifth revision</i> )	(Part 2 : 1979)	Plant and operations, thermal treatment, control and testing, finishing
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 5052 : 1993	Aluminium and its alloys — Temper designations ( <i>first revision</i> )
IS 2676 : 1981	Dimensions for wrought aluminium and aluminium alloys sheet and strip ( <i>first revision</i> )	IS 10259 : 1982	General condition of delivery and inspection of aluminium and aluminium alloy products

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## ANNEX B

*(Foreword)*

## COMMITTEE COMPOSITION

Ores and Feedstock for Aluminium Industry, its Metals/Alloys and Products Sectional Committee, MTD 07

<i>Organization</i>	<i>Representative(s)</i>
CSIR - Institute of Minerals and Materials Technology, Bhubaneswar	DR KALI SANJAY ( <i>Chairperson</i> )
Aluminium Association of India, Bengaluru	SHRI ANIL MATHEW SHRI T. VIMAL RAJ ( <i>Alternate</i> )
Aluminium Secondary Manufacturers Association, New Delhi	SHRI NAVEEN PANT SHRI PRAVEEN DIXIT ( <i>Alternate</i> )
Bharat Aluminium Company Limited, New Delhi	MS ANJALI PAWAR SHRI JITENDRA KUMAR VERMA ( <i>Alternate</i> )
Century Extrusions Limited, Kolkata	SHRI V. JHUNJHUNWALA SHRI SANJAY SINGH SEHRAWAT ( <i>Alternate</i> )
Century Metal Recycling Limited, Faridabad	SHRI MOHAN AGARWAL
CSIR - Advanced Materials and Processes Research Institute, Bhopal	DR D. P. MONDAL
CSIR - National Metallurgical Laboratory, Jamshedpur	DR KANAI SAHOO DR V. C. SRIVASTAVA ( <i>Alternate</i> )
Defence Metallurgical Research Laboratory, Ministry of Defence, Hyderabad	DR G. JAGAN REDDY DR S. N. SAHU ( <i>Alternate</i> )
Defence Research and Development Laboratory, Ministry of Defence, Hyderabad	DR G. RAJA SINGH DR N. A. ARUN ( <i>Alternate</i> )
Directorate General Quality Assurance, New Delhi	SHRI K. SAHA SHRI AJAY KUMAR ( <i>Alternate</i> )
Hindalco Industries Limited, Mumbai	SHRI RAJAN KUMAR SUR CHAUDHURY SHRI TUSHAR PANDA ( <i>Alternate</i> )
Jawaharlal Nehru Aluminium Research Development and Design Centre, Nagpur	DR ANUPAM AGHINOTRI SHRI R. N. CHAUHAN ( <i>Alternate</i> )
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Material Recycling Association of India (MRAI), Mumbai	SHRI DHAWAL SHAH SHRI JAYANT JAIN ( <i>Alternate</i> )
National Aluminium Company Limited, Bhubaneswar	SHRI TARUN KANT MS KIRAN KANDEYANG ( <i>Alternate</i> )
National Test House, Kolkata	DR NISHI SRIVASTAVA SHRI BUDDH PRAKASH ( <i>Alternate</i> )



<i>Organization</i>	<i>Representative(s)</i>
Vedanta Limited, Mumbai	SHRI VIVEK SAXENA SHRI RAM SANDIPAM ( <i>Alternate</i> )
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Panel on Wrought Product Panel, Panel 2

<i>Organization</i>	<i>Representative(s)</i>
Bharat Aluminium Company Limited, Korba	MS ANJALI PAWAR ( <i>Convenor</i> )
Aluminium Association of India, Bengaluru	SHRI SIDDHARTH MANJREKAR
Aluminium Secondary Manufacturers Association, New Delhi	SHRI ANIL AGARWAL
Bharat Aluminium Company limited, Korba	SHRI DUGESHWAR SAHU ( <i>Alternate</i> )
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