



Specifications

TABLE - 1
Wrought alloys : Chemical composition limits (per cent)

Alloy (ISS)	Old	New	Equivalent alloy (AA) U.S.A.	Copper		Magnesium		Silicon		Iron	Manganese		* Others (Total) Max.	Remarks
				Min.	Max.	Min.	Max.	Min.	Max.		Min.	Max.		
1 C	19000	1100	-	0.10	-	-	-	-	0.50	0.60	-	0.10	0.1	Aluminium 99.0% Min
		1200	-	0.05	-	-	-	Si+Fe 1.0	-	-	-	0.05	0.1	Aluminium 99.0% Mm
1 B	19500	1050	-	0.05	-	-	-	-	0.25	0.40	-	0.05	0.1	Aluminium 99.5% Min
1E	19501	-	-	0.04	-	-	-	-	0.15	0.35	-	0.03	0.1	Aluminium 99.5% Min
		1350	-	0.05	-	-	-	-	0.10	0.40	-	0.01	0.1	Aluminium 99.5% Min
-	19600	1060	-	0.05	-	-	-	-	0.25	0.35	-	0.03	0.1	Aluminium 99.6% Min
-	19700	1070	-	0.03	-	-	-	-	0.20	0.25	-	0.03	0.1	Aluminium 99.7% Min
H 15	24345	2014	3.80	5.00	0.2	0.8	0.5	1.20	0.70	0.3	1.20	0.5	-	-
H 14	24534	2017	3.50	4.70	0.4	1.2	0.2	0.70	0.70	0.4	1.20	0.5	-	-
N3	31000	3003	-	0.10	-	0.1	-	0.60	0.70	1.0	1.50	0.4	-	-
N21	43000	4043	-	0.10	-	0.2	4.5	6.00	0.60	-	0.50	0.2	-	-
N2	46000	4047	-	0.10	-	0.2	10.0	13.0	0.60	-	0.50	0.2	-	-
N4	52000	5052	-	0.10	1.7	2.6	-	0.60	0.50	-	0.50	0.4	-	Cr+Mn=0.5
N5	53000	5086	-	0.10	2.8	4.0	-	0.60	0.50	-	0.50	0.4	-	Cr + Mn = 0.5
N6	55000	5056	-	0.10	4.5	5.6	-	0.60	0.70	-	0.50	0.4	-	Chromium upto 0.25
N8	54300	5083	-	0.10	4.0	4.9	-	0.40	0.70	0.5	1.00	0.4	-	Chromium upto 0.25
H20	65032	-	0.15	0.40	0.7	1.2	0.4	0.80	0.70	0.2	0.80	0.4	-	**Cr =0.15-0.35%
-	-	6061	0.15	0.40	0.8	1.2	0.4	0.80	0.70	-	0.15	0.4	-	Chromium 0.04 to 0.35
H9	63400	6063	-	0.10	0.4	0.9	0.3	0.70	0.60	-	0.30	0.4	-	-
-	-	6066	0.70	1.20	0.8	1.4	0.9	1.80	0.70	0.6	1.10	0.4	-	-
-	64423	-	0.50	1.00	0.5	1.3	0.7	1.30	0.80	-	1.00	-	-	-
91E	63401	6101	-	0.05	0.4	0.9	0.3	0.70	0.50	-	0.03	0.1	-	-
-	64401	6201	-	0.10	0.6	0.9	0.5	0.90	0.50	-	0.03	0.1	-	-
H30	64430	6351	-	0.10	0.4	1.2	0.6	1.30	0.60	0.4	1.00	0.3	-	-
		6082	-	0.10	0.6	1.2	0.7	1.30	0.50	0.4	1.00	0.3	-	Chromium upto 0.25
-	74530	7039	0.20	1.0	1.5	-	-	0.40	0.70	0.2	0.70	0.4	-	Zinc 4.0-5.0%
-	-	7075	1.20	2.00	2.1	2.9	-	0.50	0.50	-	0.30	0.2	-	Zinc (5.1-6.1)% & Chromium(0.18-0.28) %

* Titanium and/or other grain refining elements

**Either Mn or Cr shall be present



TABLE - 2
Wrought alloys Near equivalent designations

INDIA IN NEW I.S.	OLD I.S.	U.S.A. (A.A.)	BRITAIN (B.S.)	CANADA	GERMANY (DIN)	RUSSIA	I.S.O.	FRENCH ND
19501	1E	1050(E.C.)	1E	C 1S	E-A199.5	-	-	-
19500	1B	1050	1B	1S	A-99.5	-	Al-99.5	1050A
19600	-	1060	-	-	-	-	-	-
19700	-	1070	-	-	Al-99.7	-	Al-99.7	-
19800	1A	1080	1A	-	-	-	Al-99.8	-
19000	1C	1100	1C	2S	Al-99.0	AD	Al-99.0	1200
-	-	2011	FC1	28S	Al-Cu-Bi-Pb	-	Al-Cu-6 Bi Pb	2011
24345	H15	2014	H15	B26S	Al-Cu-Si	AK	-	-
24534	H14	2017	H14	17S/16S	-	D1	Al-Cu-4MgSi	-
-	-	2024	-	24S	Al-Cu-Mg.2	-	Al-Cu-4Mg 1	2024
31000	N3	3003	N3	3S	Al-Mn	A-Mn	Al-Mn 1	3003
43000	N21	4043	N21	33S	Al-Si-5	AK	Al-Si5	4043
46000	N2	4047	N2	35S	-	-	-	-
51000	-	5005	-	B57S	-	-	Al-Mg-1	-
52000	N4	5052	N4	M57S	Al-Mg.2	A-Mg	Al-Mg-2.5	5051
53000	N5	5086	N5	54S	-	A-Mg-3	Al-Mg-4	-
54300	N8	5083	N8	D54S	Al-Mg-4.5 Mn	-	Al-Mg-4.5 Mn	5083
55000	N6	5056	N6	A56S	Al-Mg.5	-	Al-Mg.5	5356
65032	H20	6061	H20	65S	Al-Mg-Si Cu	-	Al-Mg-1SiCu	-
63400	H9	6063	H9	50S	Al-Mg-Si 0.5	-	Al-Mg-Si	-
64430	H30	6351	H30	B51S	Al-Mg-Si 1	AV	Al-Si-1 Mg	6081
64423	H11	6066	H11	C62S	-	-	-	-
62400	-	6005	-	C51S	-	-	-	-
63401	91E	6101	91E	D50S	E-Al-Mg-Si 0.5	-	-	-
64401	-	6201	-	-	-	-	-	-
74530	-	7039	-	D74S	Al-Zn-Mg.1	-	-	3004
-	-	7075	DTD 5124	75S	Al-Zn-Mg Cu 1.5	-	Al-Zn 6 Mg Cu	7075

TABLE-3
Wrought alloys : Guide to selection

Alloy	Temper	Resistance to Corrosion	Workability (Cold)	Brazeability	Machinability	Weldability	Commonly available forms	Indication of use
EC/1050, 1060 (1B) (19501) (19500) (19600)	F,0	A	A	A	D	A	Flats, Rods, Tubes & other sections	Electrical conductors, cable sheathings, impact- extruded products, pressing utilities of anodizing quality, pen caps, piping etc.
1100 (1C) (19000)	F,0	A	A	A	D	A	Flats, Rods, Tubes & other sections	Packaging lightly stresses and decorative assemblies in architecture and transport, equipment for chemical, food and brewing industries.

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Wrought alloys : Guide to selection

Alloy	Temper	Resistance to Corrosion	Workability (Cold)	Machinability	Brazeability	Weldability	Commonly available forms	Indication of use
2014 (H 15) (24345)	T4 T6	C C	C D	B B	D D	C C	Rods & Bars Rods & Bars	Highly stressed component of all , types in aircraft, ordnance and general engineering.
2017(H 14) (24534)	T4	C	C	D	B	C	Rods & Bars	Highly stressed parts in aircraft and other structures, screw. machine products.
4043 (N 21) (43000)	F,0	A	A	A	D	A	Rods & other sections	Welding wire, architectural applications.
5005 (51000A)	F,0	A	A	B	B	A	Flats, Rods & other sections	Consumer durable with attractive anodised finish, architectural, electrical conductors etc.
5052 (N 4) (52000)	0,F	A	A	D	C	A	Flats, Rods, Tubes & other sections	Structures exposed to marine atmosphere, aircraft parts, wire rope ferrules, rivet stock.
5086 (N 5) (53000)	0,F	A	A	D	D	A	Flats, Rods & other sections	Ship building and other marine applications, rivets, coinage etc.
5056 (N 6) (55000)	0,F	A	A	D	D	A	Rods	Zips, Welding Rods and Rivets.
6061 (H 20) (65032)	0,F T4 T6	A A A	A C D	D C C	A A A	A A A	Rods, Flats, Tubes & other sections	Heavy duty structures, building hardware, sections for bus body, truck and rail coach, furniture, rivets etc.
6063(H9)	0,F T4 T6 T5	A A A A	A B C C	D C C C	A A A A	A A A A	Rods, Flats, Tubes & other sections	Building hardware, architectural sections with good surface finish, medium strength furniture and anodized sections.
6066 (22450)	0,F T4 T6	B B B	B C C	D B B	A A A	A A A	Rods and other solid sections	For welded structures, textile parts, heavy duty machine parts.
6101 (91 E) (63401)	T4 T6	A A	B B	C C	A A	A A	Rods, Flats, Tubes & other sections	High strength electrical busbar sections.
6201 (64401)	T4	A	A	C	A	A	Redraw Rod	Overhead conductors, ACAR and AAAC.
6351 (H 30) (64430)	0,F T4 T6	A A A	A C D	D C C	A A A	A A A	Rods, Flats, Tubes & other sections	Structural and general engineering items such as rail & road transport vehicles, bridges, cranes, roof trusses, rivets etc.

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Wrought alloys : Guide to selection

Alloy	Temper	Resistance to Corrosion	Workability (Cold)	Brazeability	Machinability	Weldability	Commonly available forms	Indication of use
7039 (D74S) (74530)	0,F	A	A	D	A	A	Flats, Tubes, Rods & other sections	Defence structures like mobile bridges etc. Tread and chequered plates. Excellent welding property with no loss of strength in welded zone.
	T4	A	C	C	A	A		
	T6	A	D	C	A	A		
7075 (DTD5124)	0,F	A	A	A	A	A	Rods	Highly stressed structural applications.
	T4	A	A	A	A	A		
	t6	A	D	A	A	A		

Notes:

- Relative ratings for corrosion, workability and machinability in decreasing order of merit A, B, C and D.
- Weldability & brazeability ratings A, B, C and D are relative ratings defined as follows:
 - Generally weldable by the commercial procedure & methods.
 - Weldable with special technique.
 - Limited weldability due to crack sensitivity or loss in corrosion resistance and mechanical properties.
 - Generally not weldable.
- Availability of other forms subject to special enquiries and methods.

TABLE-4
Wrought Aluminium & Aluminium Alloys:- Mechanical and Electrical Properties

Alloy	Temper Designation	Tensile Strength Min.	0.2 Percent Proof Stress Min.	Percent Elongation on 5.65 √Sa Min.	Electrical Conductivity at 20°C, Min	Maximum Electrical Resistivity at 20°C	Thickness	Inside bend radius Min.	Coeff. Of thermal expansion	Thermal Conductivity
AA IS		Mpa	Mpa		% IACS	ohm mm/mm ²	mm		per °C at 20°C typical	CGS at 25°C typical
1050 19501	M	60	-	25	60.00	0.02874	upto 12	1x thickness	23.8x10 ⁻⁶	0.56
6101 63401	W	140	80	12	-	-	-	-	-	-
6101 63401	WP (range 1)	170	135	12	56.50	0.03052	3.00 to 9.50	1x thickness	23.4 x 10 ⁻⁶	0.52
6101 63401	WP (range 2)	200	170	10	55.00	0.03135	3.00 to 9.50	2x thickness	23.4 x 10 ⁻⁶	0.52
6201	T81	-	-	-	52.50	0.03283	-	-	23.5 x 10 ⁻⁶	0.50

NOTE

MPa=1N/mm²= 0.102 kg/mm²

Properties in M temper are only typical values and are given for information only.

If required the cross-section shall be calculated from the mass and length of a straight test piece taking density 2.705 for grade 19501 and 2.700 for grade 63401

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TABLE-5
Wrought alloys : Mechanical properties

Non - Heat Treatable Alloys					
Alloy AA Old (ISS) New (ISS)	Temper	Ultimate Tensile Strength Kg/mm ²		0.2% Proof Stress Kg/mm ²	Elongation On 50 mm GL
		Min.	Max.		
1100[1C][19000]	0	-	11.0	-	25
1050[1B][19500]	0	-	10.0	-	25
1060[19600]	0	-	9.5	-	25
1070[19700]	0	-	9.5	-	25
4043[N21][43000]	0	-	13.0	-	18
4047[N2][46000]	0	-	15.0	-	12
5052[N4][52000]	0	-	24.5	-	18
5086[N5][53000]	0	-	26.5	-	16
5056[N6][55000]	0	-	34.5	-	15
5083[N8][54300]	0	-	35.5	-	13

Heat Treatable Alloys					
2014 [H15] [24345]	T4[W] T6 [WP]	39.00 49.00	- -	24.00 43.00	10 6
2017[H14] [24534]	T4[W]	39.00	-	24.00	10
6063 [H9] [63400]	T4[W] T6 [WP]	14.00 19.00	- -	8.00 15.50	14 7
6061 [H20] [65032]	M or O T4[W] T6 [WP]	- 19.00 28.50	15.0 - -	- 11.50 24.00	16 14 7
6351[H30] [64430]	M or O T4[W] T6 [WP]	- 19.00 31.50	15.0 - -	- 12.00 27.50	16 14 7
6066	O T4[W] T6 [WP]	- 28.00 35.00	20.5 - -	- 17.50 31.50	16 14 7
6101[91E] [63401]	T4[W] T6 [WP]-Range1 T6 [WP]-Range2	14.00 17.34 20.50	- - -	8.00 13.77 17.00	12 12 16
6201 [64401]	T4[W] T8 [WDP]	16.00 32.00	- -	7.00 -	14 3
7039 [74530]	T4[W] T6 [WP]	28.00 31.50	- -	23.50 26.50	9 7
7075	T6 [WP]	54.00	-	46.50	6

Properties indicated herein are typical properties and are given for information only. However properties of all the profiles in specific alloy shall be as per I.S. Specification.

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