

Aluminium and Aluminium Alloy Extruded Shapes

1 Scope

This Japanese Industrial Standard specifies the aluminium and aluminium alloy extruded shapes, hereinafter referred to as the "shapes".

Remark: The units and numerical values given in { } in this standard are based on the International System of units (SI) and are appended for informative reference.

Further, the traditional units and numerical values accompanied by the SI units and converted values in { } shall be replaced by the units and the numerical values given in the Appendix on January 1, 1991.

2 Grade, Class and Designation

The grade, class and designaion of the shapes shall be as given in Table 1.

Notes (7) The mechanical properties for temper grade T 62 are obtained when the material of temper grade 0 is subjected to artificial age-hardening subsequent to a solution treatment by the purchaser. In case the material is cold worked or hot worked by the purchaser before a solution treatment, its mechanical properties may come out lower than the specified values.

These mechanical properties shall also be applied to the test piece subjected to a solution treatment and artificial age-hardening under the specified conditions by the manufacturer to confirm its mechanical properties.

(8) The mechanical properties for temper grade T 4 are the values obtained after a month's natural aging (at approximately 20°C) and are given for informative reference.

In the case where a material is put to a tensile test before a months natural aging expires, the material shall then be subjected to a solution treatment and artificial age-hardening, and if it is confirmed that the material possesses the properties of temper grade T 6, it shall be deemed to satisfy the requirements of temper grade T 4.

Remark: The tolerances for the product exceeding the specified range of dimensions shall be as agreed upon by the parties concerned.

Table 3 (2). Mechanical Properties for 6063

Designation	Temper grade (3)	Tensile test				Hardness test (9)	
		Thickness at specified measuring point mm	Tensile strength kgf/mm ² {N/mm ² }	Proof stress kgf/mm ² {N/mm ² }	Elongation (4) %	Thickness at specified measuring point mm	HV (5)
A 6063 S	T 1	12 max.	12 {118} min.	6.0 {59} min.	12 min.		-
		Over 12, up to and incl, 25	11 {108} min.	5.5 {54} min.	12 min.		
	T 5	12 max.	16 {157} min.	11 {108} min.	8 min.	0.8 min.	58 min.
		Over 12, up to and incl, 25	15 {147} min.	11 {108} min.	8 min.		
	T 6	3 max.	21 {206} min.	18 {177} min.	8 min.	-	-
		Over 3, up to and incl, 25	21 {206} min.	18 {177} min.	10 min.		

Note (9) Temper grade T 5 shall be subjected to either a tensile strength or a hardness test.

Remark: The tolerances for the product exceeding the specified range of dimensions shall be as agreed upon by the parties concerned.

4 Dimensions and Tolerances

The dimensional tolerances shall be on the basis of ordinary class. However, special class may be applied to part of them by agreement between the delivery parties concerned.

4.1 Tolerances on Sectional Dimensions

The dimensional tolerances on the section of the shapes shall be as specified in Table 4 (1) or Table 4 (2). Further, the application of tolerances on the section dimensions shall be as follows.

- (1) The dimensional tolerances for a portion consisting of two or more components shall be the sum of the tolerances for each component provided each dimension for the components is specified.
- (2) The portion Y in Fig. 1 is the dimension of metallic component, and the dimensional tolerances in column 2 shall be applied to this portion. The portion X is the dimension of the component including hollow space, and when metals account for 75 % or over of this component, the dimensional tolerances in column 2 shall be applied, while the requirements in 4.1 (6) shall be applied for the component which includes less than 75 % of metals.
- (3) When the outside and inside dimensions are specified instead of wall thickness, the values in column 3 as the tolerances on wall thickness (permissible deviation in wall thickness) shall be applied to the mean of the wall thickness of two sides.
- (4) The tolerances on wall thickness for the hollow shapes shall be on the basis of the mean of wall thickness of two sides facing each other instead of on the specified dimension (in column 1).
- (5) To the hollow shapes or semihollow shapes as shown in Fig. 1 or 2, where the wall thickness of one side T is 3 or more times that of the other side 1, the dimensional tolerances on each wall thickness in Table 4 shall not be applied, but the tolerances shall be subject to agreement between the parties concerned. Further, the semihollow shape is defined as the shape in which the area S of hollow space is 2 or more times greater than the square of width X of the gap part as shown in Fig. 2.
- (6) To the hollow space or its periphery, the dimensional tolerances in column 4 shall be applied. However, pertaining to the width W and height H of the hollow shape as shown in Fig 3, the values in column 4 corresponding to H shall be applied as the dimensional tolerances on W, and the values in column 4 corresponding to W shall be applied as the dimensional tolerances on H.

When the values in the column 4 fall below those in the column 2, the value in the column 2 shall be applied.

Example: When W is 60 mm and H is 30 mm for Grade 6063 (ordinary class), the width tolerances shall be + - 0.92 mm and the height tolerances shall be + - 1.1 mm (though the value in column 4 corresponding to the height of 30 mm is + - 0.69 mm, the value shall be + - 0.92 mm since + - 0.69 mm is evidently smaller than the value + - 0.92 mm in the column 2 corresponding to the width of 60 mm).

- (7) In the case of the shape having an aperture as shown in Fig. 4 and 5, not the values in the column 2 for X or Z but those in column 4 to 9 corresponding to distance L shall be applied as the dimensional tolerances, even though the dimension Y of the metallic portion is not less than 75 % of that of X.
- (8) The dimensional tolerances for the apertures X as shown in Figs. 6 to 10, Fig. 12 and Fig. 13 shall be the values in column 4 to 9 prescribed dependent on distance L. In these cases, the dimension of part A shall not be applied.
- (9) The dimensional tolerances for X shown in Figs. 2 and 11 shall be the values in columns 4 to 9 prescribed dependent on the specified dimension B and distance L.
- (10) When the angle (a) in Figs. 12 and 13 is especially specified, the tolerances shall be as specified in Table 6.

Fig. 1

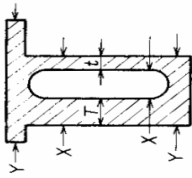


Fig. 2

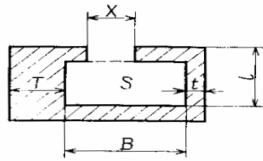


Fig. 3

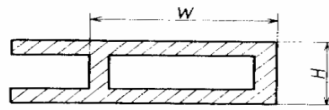


Fig. 4

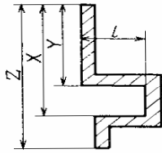


Fig. 5

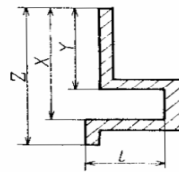


Fig. 6

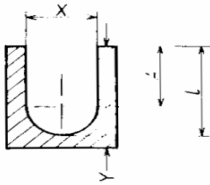


Fig. 7

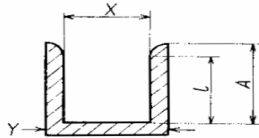


Fig. 8

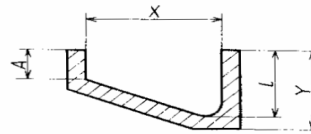


Fig. 9

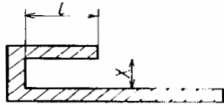


Fig. 10

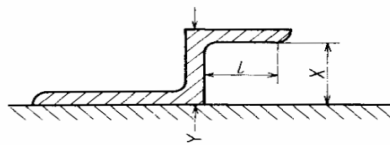


Fig. 11

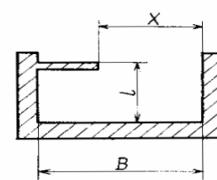


Fig. 12

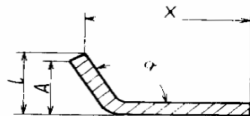


Fig. 13

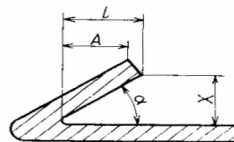
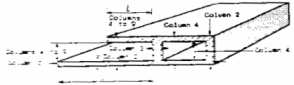


Table 4 (2). Tolerances on Sectional Dimension (Special Class)



Unit: mm

Character of the section circumscribed circle	Tolerances																
	Specified dimension	Metallic part (where 75 & or over is metal)				Hollow part (where over 25 & is hollow space, where under 75 & is metal)											
		All locations not listed in column 3		Thickness of hollow shapes at a place enveloping hollow space 75 and over		Distance between the specified point and the next step (f)(D)											
		Column 1	Column 2	Column 3	Column 4	Over 2, up to and incl. 10	Over 15, up to and incl. 30	Over 30, up to and incl. 60	Over 60, up to and incl. 100	Over 100, up to and incl. 200	Over 200, up to and incl. 300	Over 300, up to and incl. 400	Over 400, up to and incl. 500	Over 500, up to and incl. 600	Over 600, up to and incl. 700	Over 700, up to and incl. 800	Over 800, up to and incl. 900
Up to and incl. 250	3 or under	± 0.23	± 0.15	± 0.33	± 0.25	± 0.38	± 0.30	—	—	—	—	—	—	—	—	—	—
	Over 3 up to and incl. 6	± 0.28	± 0.18	± 0.41	± 0.30	± 0.46	± 0.36	± 0.51	± 0.41	—	—	—	—	—	—	—	—
	Over 6 up to and incl. 12	± 0.30	± 0.20	± 0.46	± 0.36	± 0.51	± 0.41	± 0.56	± 0.46	± 0.61	± 0.51	—	—	—	—	—	—
	Over 12 up to and incl. 18	± 0.36	± 0.23	± 0.53	± 0.41	± 0.58	± 0.46	± 0.64	± 0.51	± 0.69	± 0.56	—	—	—	—	—	—
	Over 18 up to and incl. 24	± 0.38	± 0.25	± 0.58	± 0.46	± 0.64	± 0.51	± 0.69	± 0.56	± 0.76	± 0.64	± 0.89	± 0.76	—	—	—	—
	Over 25 up to and incl. 38	± 0.40	± 0.30	± 0.69	± 0.53	± 0.74	± 0.58	± 0.81	± 0.65	± 0.91	± 0.76	± 1.04	± 0.89	—	—	—	—
	Over 38 up to and incl. 50	± 0.53	± 0.36	± 0.79	± 0.61	± 0.84	± 0.66	± 0.97	± 0.79	± 1.09	± 0.91	± 1.24	± 1.07	± 1.45	± 1.27	—	—
	Over 50 up to and incl. 100	± 0.91	± 0.61	± 1.17	± 0.85	± 1.27	± 0.97	± 1.52	± 1.22	± 1.75	± 1.45	± 1.93	± 1.73	± 2.34	± 2.03	—	—
	Over 100 up to and incl. 150	± 1.30	± 0.85	± 1.55	± 1.12	± 1.70	± 1.27	± 2.06	± 1.63	± 2.41	± 1.98	± 2.82	± 2.39	± 3.23	± 2.79	—	—
	Over 150 up to and incl. 200	± 1.68	± 1.12	± 1.93	± 1.37	± 2.13	± 1.57	± 2.64	± 2.08	± 3.07	± 2.51	± 3.61	± 3.05	± 4.11	± 3.56	—	—
Over 200 up to and incl. 250	± 2.05	± 1.37	± 2.31	± 1.63	± 2.57	± 1.83	± 3.23	± 2.54	± 3.73	± 3.05	± 4.62	± 3.68	± 5.00	± 4.32	—	—	
Over 250	3 or under	± 0.53	± 0.35	± 0.64	± 0.46	± 0.69	± 0.51	—	—	—	—	—	—	—	—	—	—
	Over 3 up to and incl. 6	± 0.56	± 0.38	± 0.66	± 0.48	± 0.74	± 0.56	± 0.69	± 0.71	—	—	—	—	—	—	—	—
	Over 6 up to and incl. 12	± 0.61	± 0.41	± 0.71	± 0.51	± 0.81	± 0.61	± 0.97	± 0.76	± 1.47	± 1.27	—	—	—	—	—	—
	Over 12 up to and incl. 18	± 0.64	± 0.43	± 0.76	± 0.56	± 0.89	± 0.69	± 1.24	± 1.02	± 1.73	± 1.52	—	—	—	—	—	—
	Over 18 up to and incl. 24	± 0.69	± 0.46	± 0.79	± 0.58	± 0.99	± 0.76	± 1.45	± 1.27	± 2.01	± 1.78	± 2.51	± 2.29	—	—	—	—
	Over 24 up to and incl. 38	± 0.71	± 0.48	± 0.84	± 0.61	± 1.39	± 0.85	± 1.75	± 1.52	± 2.26	± 2.03	± 2.77	± 2.54	—	—	—	—
	Over 38 up to and incl. 50	± 0.91	± 0.61	± 1.17	± 0.85	± 1.42	± 1.12	± 2.08	± 1.78	± 2.59	± 2.29	± 3.19	± 2.79	± 4.62	± 4.32	—	—
	Over 50 up to and incl. 100	± 1.30	± 0.85	± 1.55	± 1.12	± 1.80	± 1.37	± 2.46	± 2.03	± 2.97	± 2.54	± 3.48	± 3.05	± 5.00	± 4.57	—	—
	Over 100 up to and incl. 150	± 1.68	± 1.12	± 1.93	± 1.37	± 2.18	± 1.63	± 2.84	± 2.29	± 3.35	± 2.79	± 3.85	± 3.30	± 5.38	± 4.83	—	—
	Over 150 up to and incl. 200	± 2.05	± 1.37	± 2.31	± 1.63	± 2.57	± 1.88	± 3.23	± 2.54	± 3.73	± 3.05	± 4.24	± 3.56	± 5.77	± 5.08	—	—
Over 300	3 or under	± 0.85	± 0.53	± 1.04	± 0.71	± 1.12	± 0.85	± 1.12	± 0.85	± 1.12	± 0.85	± 1.12	± 0.85	± 1.12	± 0.85	± 1.12	± 0.85
	Over 3 up to and incl. 6	± 0.88	± 0.61	± 1.07	± 0.74	± 1.15	± 0.88	± 1.15	± 0.88	± 1.15	± 0.88	± 1.15	± 0.88	± 1.15	± 0.88	± 1.15	± 0.88
	Over 6 up to and incl. 12	± 0.91	± 0.63	± 1.10	± 0.76	± 1.18	± 0.91	± 1.18	± 0.91	± 1.18	± 0.91	± 1.18	± 0.91	± 1.18	± 0.91	± 1.18	± 0.91
	Over 12 up to and incl. 18	± 0.94	± 0.65	± 1.13	± 0.78	± 1.21	± 0.94	± 1.21	± 0.94	± 1.21	± 0.94	± 1.21	± 0.94	± 1.21	± 0.94	± 1.21	± 0.94
	Over 18 up to and incl. 24	± 0.99	± 0.68	± 1.18	± 0.81	± 1.26	± 0.99	± 1.26	± 0.99	± 1.26	± 0.99	± 1.26	± 0.99	± 1.26	± 0.99	± 1.26	± 0.99
	Over 24 up to and incl. 38	± 1.01	± 0.70	± 1.20	± 0.83	± 1.28	± 1.01	± 1.28	± 1.01	± 1.28	± 1.01	± 1.28	± 1.01	± 1.28	± 1.01	± 1.28	± 1.01
	Over 38 up to and incl. 50	± 1.21	± 0.80	± 1.40	± 0.96	± 1.48	± 1.21	± 1.48	± 1.21	± 1.48	± 1.21	± 1.48	± 1.21	± 1.48	± 1.21	± 1.48	± 1.21
	Over 50 up to and incl. 100	± 1.60	± 1.00	± 1.80	± 1.20	± 1.88	± 1.60	± 1.88	± 1.60	± 1.88	± 1.60	± 1.88	± 1.60	± 1.88	± 1.60	± 1.88	± 1.60
	Over 100 up to and incl. 150	± 1.98	± 1.38	± 2.18	± 1.58	± 2.26	± 1.98	± 2.26	± 1.98	± 2.26	± 1.98	± 2.26	± 1.98	± 2.26	± 1.98	± 2.26	± 1.98
	Over 150 up to and incl. 200	± 2.36	± 1.76	± 2.56	± 1.96	± 2.64	± 2.36	± 2.64	± 2.36	± 2.64	± 2.36	± 2.64	± 2.36	± 2.64	± 2.36	± 2.64	± 2.36

Remark: When the tolerances are to be specified either only on the plus or on the minus side, the value in the above table shall be doubled.

Table 7. Allowance for Camber (11) (12)

Diameter of circumscribed circle	Minimum wall thickness	CLASS Length	Allowance			
			Ordinary class		Special class	
			For any 300 mm length	For overall length (L) mm (13)	For any 300 mm length	For overall length (L) mm (13)
Up to and incl. 38	—	Up to and incl. 2.4	2 max.	$2 \times \frac{L}{300}$ max.	1.3 max.	$1.3 \times \frac{L}{300}$ max.
		Over 2.4	0.5 max.	$0.5 \times \frac{L}{300}$ max.	0.3 max.	$0.3 \times \frac{L}{300}$ max.
Over 38, up to and incl. 500	—	—	—	—	—	—
Over 500	—	—	0.8 max.	$0.8 \times \frac{L}{300}$ max.	0.5 max.	$0.5 \times \frac{L}{300}$ max.

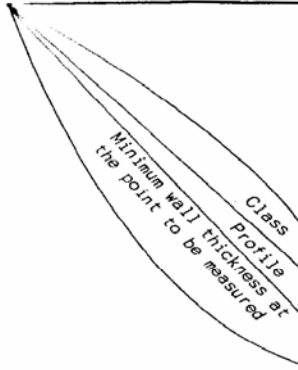
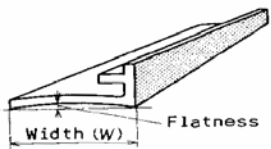
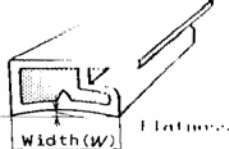
Notes: The value is obtained when the shape lies under its own weight on a flat surface minimizing the camber.

In the case where the overall length does not coincide with an exact multiple of 300 mm, the value shall be raised to the nearest multiple to provide a basis for determining the maximum allowance.

4.5 Tolerances on Flatness

The tolerances on flatness for shapes shall be as specified in Table 8.

Table 8. Tolerances on Flatness (11) (14)

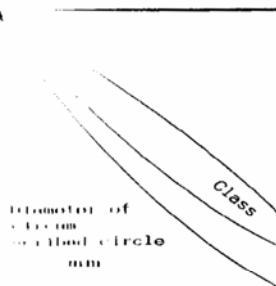
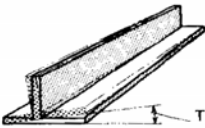
	Allowance							
								
	Ordinary class		Special class					
	Solid shape or hollow shape		Solid shape		Hollow shape			
Width W	—		—		Up to and incl. 4.7		Over 4.7	
	For any 25 width	For overall width (W)	For any 25 width	For overall width (W)	For any 25 width	For overall width (W)	For any 25 width	For overall width (W)
Up to and incl. 25	—	0.20 max.	—	0.10 max.	—	0.15 max.	—	0.10 max.
Over 25	0.20 max.	0.008 W max.	0.10 max.	0.004 W max.	0.15 max.	0.006 W max.	0.10 max.	0.004 W max.

Notes: This table does not apply to the face including an aperture.

4.6 Allowance for Twist

The maximum allowance for twist of the shapes shall be as specified in Table 9.

Table 9. Allowance for Twist (11)

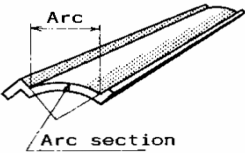
	Allowance			
				
	Ordinary class		Special class	
Diameter of circle or circle mm	For any 300 mm length	For overall length (L) mm (13)	For any 300 mm length	For overall length (L) mm (13)
	Up to and incl. 50	$1\frac{1}{2}$ max.	$1\frac{1}{2} \times \frac{L}{300}$ max. max. $10\frac{1}{2}$	1 max.
Over 50, up to and incl. 75	$\frac{3}{4}$ max.	$\frac{3}{4} \times \frac{L}{300}$ max. max. $7\frac{1}{2}$	$\frac{1}{2}$ max.	$\frac{1}{2} \times \frac{L}{300}$ max. max. 5
Over 75	$\frac{1}{2}$ max.	$\frac{1}{2} \times \frac{L}{300}$ max. max. $4\frac{1}{2}$	$\frac{1}{4}$ max.	$\frac{1}{4} \times \frac{L}{300}$ max. max. 3

Unit: degree

4.7 Tolerances on Arc Section

The tolerances on arc section for the shapes shall be as specified in Table 10. The tolerances in this table shall, however, be applied only when required by the purchaser.

Table 10. Tolerances on Arc Section (11) (13)

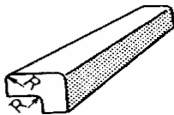
Tolerances

<p>The tolerances shall be ± 0.13 mm for each 25 mm of arc length for arc length over 25 mm and ± 0.13 for arc length 25 mm or under</p>

4.8 Tolerances on Corner Radius

The tolerances on corner radius for the shapes shall be as specified in Table 11. The tolerances in this table shall, however, be applied only when required by the purchaser.

Table 11. Tolerances on Corner Radius

Unit: mm

	Tolerances
	
Sharp corner	$+0.4$ 0
Up to and incl. 4.7	± 0.4
Over 4.7	$\pm 0.1 R$

Remark: When the tolerances are specified either on the plus or on the minus side only, the values in the above table shall be doubled. However, this stipulation shall not be applied to a sharp corner.

5 Tests

5.1 Analytical Test

The analysis method of chemical comparison shall conform to one of the following Standards.

JIS H 1305	JIS H 1306	JIS H 1352	JIS H 1353
JIS H 1354	JIS H 1355	JIS H 1356	JIS H 1352
JIS H 1358	JIS H 1359	JIS H 1362	JIS H 1363

The analysis methods for elements not listed above shall be as agreed upon between the parties concerned.

5.2 Tensile Test

The tensile test shall be as specified in JIS Z 2241. The test piece, in this case, shall be prepared in accordance with JIS Z 2201.

The test piece shall be taken in the direction parallel to that of extrusion, and the sampling location shall be as specified in Table 12, and the kind of test piece shall be as specified in Table 13.

Table 12. Sampling Location of Test Piece

Thickness mm	Sampling location
Over 20, up to and below 40	A test piece shall be taken so that its axis lies in the main part or in the middle of the thickest part of the shape.
Over 40	A test piece shall be taken so that its axis lies midway between the surface and the center of the shape, or midway between the edges and the center of the main part or the thickest part of the shape.

Table 13. Kinds of Test Piece

Condition		Test piece
Thickness at sampling location	Up to and incl. 20 mm	No. 5 test piece
	Over 20 mm	No. 4 test piece
When it is impracticable to prepare No. 4 and No. 5 test piece		No. 13 B test piece
When it is impracticable to prepare No. 4, No. 5 and No. 13 B test piece		Square or round test piece (15) with a maximum sectional area or extruded as it is section test piece (15) (gauge length is 50 mm)

Note: The elongation value, in this case, are shown for informative reference.

5.3 Hardness Test

The hardness test shall be as specified in JIS Z 2244, and the average value of a triple spot test shall be taken as the hardness.

6 Inspection

The inspection shall be carried out as follow:

- (1) The shapes shall be subjected to the inspection on appearance and dimensions and to the test of 5., and those complying with the specifications of 3. and 4. shall be judged acceptable.
- (2) Arbitrarily take each sample for the tensile and hardness tests from each lot, as a rule, of each 1000 kg or its fraction of the shapes 3 kg/m or under in weight of the same grade, temper grade and sectional dimensions, from and each lot, as a rule, of each 2000 kg or its fraction of the shapes over 3 kg in weight of the identical purport. From each sample take a test piece.
- (3) Other general requirements shall be as specified in JIS H 0321.

7 Marking

The shapes shall be marked with the following items on each package, on each bundle or on each shape by suitable means.

- (1) Grade, class and temper grade or their symbols

Example 1: 6063. ordinary class-T6

Example 2: 6063. special class-T6

Example 3: A6063S-T6

Example 4: A6063SS-T6

- (2) Dimensions
- (3) Manufacture number or date of manufacture
- (4) Manufacturer's name or identifying brand

Appendix

The mechanical property values specified in 3.3 of the main table of the standard shall be replaced by the specified values based on the 31 units on January 1, 1991.

Appendix Table 1. Mechanical Properties

(Applicable on and after Jan 1, 1991.)

Designation	Temper grade	Tensile test					
		Thickness at specified measuring point	Sectional area	Tensile strenght	Proof stress	Elogation	
		mm	cm2	N/mm2	N/mm2	%	
A 1100 S A 1300 S	H 112	-	-	75 min.	20 min.		
	O (3)	-	-	245 max.	125 max.	12 min.	
A 2014 S	T 4	-	-	345 min.	245 min.	12 min.	
	T 42 (4)	-	-	345 min.	205 min.	12 min.	
	T 6	Up to and incl. 12	-	-	410 min.	365 min.	7 min.
		Over 12, up to and incl. 19	-	-	440 min.	400 min.	7 min.
		Over 19	Up to and incl. 160	-	470 min.	410 min.	7 min.
			Over 160, up to and incl. 200	-	470 min.	400 min.	6 min.
	Over 200, up to and incl. 250		-	450 min.	380 min.	6 min.	
	T 62 (5)	Over 250, up to and incl. 300	-	430 min.	365 min.	6 min.	
		Up to and incl. 19	-	-	410 min.	365 min.	7 min.
	A 2017 S	T 4	Up to and incl. 160	-	410 min.	365 min.	7 min.
Over 160, up to and incl. 200			-	410 min.	365 min.	6 min.	
O (3)		-	-	245 max.	125 max.	16 min.	
T 42 (4)		-	Up to and incl. 700	345 min.	215 min.	12 min.	
A 2024 S	T 4	Over 700, up to and incl. 1000	-	335 min.	195 min.	12 min.	
		O (3)	-	-	245 max.	125 max.	12 min.
		Up to and incl. 6	Up to and incl. 6	-	390 min.	295 min.	12 min.
			Over 6, up to and incl. 19	-	410 min.	305 min.	12 min.
	Over 19, up to and incl. 38		-	450 min.	315 min.	10 min.	
	Over 38	Up to and incl. 160	-	480 min.	365 min.	10 min.	
		Over 160, up to and incl. 200	-	470 min.	335 min.	8 min.	
		Over 200, up to and incl. 300	-	460 min.	315 min.	8 min.	
	T 42 (4)	Up to and incl. 19	-	390 min.	265 min.	12 min.	
		Over 19, up to and incl. 38	-	390 min.	265 min.	10 min.	
Over 38		Up to and incl. 160	-	390 min.	265 min.	10 min.	
A 3003 S A 3203 S	H 112	Over 160, up to and incl. 200	-	390 min.	265 min.	8 min.	
		-	-	95 min.	35 min.	-	
A 5052 S	H 112	-	-	175 min.	70 min.	-	
	O	-	-	175 min. 245 max.	70 min.	20 min.	
A 5454 S	H 112	Up to and incl. 130	200 max.	215 min.	85 min.	12 min.	
	O	Up to and incl. 130	200 max.	215 min. 285 max.	85 min.	14 min.	
A 5083 S	H 112	Up to and incl. 130	200 max.	275 min.	110 min.	12 min.	
		O	Up to and incl. 38	200 max.	275 min. 355 max.	120 min.	14 min.
			Over 38, up to and incl. 130	200 max.	275 min. 355 max.	110 min.	14 min.
A 5086 S	H 112	Up to and incl. 130	200 max.	240 min.	95 min.	12 min.	
	O	Up to and incl. 130	200 max.	240 min. 315 max.	95 min.	14 min.	
A 6 N 01 S	T 5	Up to and incl. 6	-	245 min.	205 min.	8 min.	
		Over 6, up to and incl. 12	-	225 min.	175 min.	8 min.	
	T 6	Up to and incl. 6	-	265 min.	235 min.	8 min.	
A 6061 S	O (3)	-	-	145 max.	110 max.	16 min.	
	T 4	-	-	175 min.	110 min.	16 min.	
	T 42 (4)	-	-	175 min.	85 min.	16 min.	
	T 6	Up to and incl. 6	-	265 min.	245 min.	8 min.	
A 7003 S	T 5	Over 6	-	265 min.	245 min.	10 min.	
		Up to and incl. 12	-	285 min.	245 min.	10 min.	
		Over 12, up to and incl. 25	-	275 min.	235 min.	10 min.	

A 7 N 01 S	O	-	200 max.	245 max.	145 max.	12 min.
	T 4 (6)	-	200 max.	315 min.	195 min.	11 min.
	T 5	-	200 max.	325 min.	245 min.	10 min.
	T 6	-	200 max.	335 min.	275 min.	10 min.
A 7075 S	O (3)	-	-	275 max.	165 max.	10 min.
	T 6 T 62 (5)	Up to and incl. 6	-	540 min.	480 min.	7 min.
		Over 6. up to and incl. 75	-	560 min.	500 min.	7 min.
		Over 75. up to and incl. 110	130 max.	560 min.	490 min.	7 min.
			Over 130. up to and incl. 200	540 min.	480 min.	6 min.
Over 110. up to and incl. 130	200 max.	540 min.	470 min.	6 min.		

Notes (1) The temper grade shall be as specified in JIS H 0001.

(2) The elongation values shall not be applied to the shapes under 1.6 mm in wall thickness.

(3) The material of temper grade 0 shall guarantee that its properties are equal or superior to those of temper grade T 42 or T 62.

(4) The mechanical properties for temper grade T 42 are obtained when the material of temper grade 0 is subjected to natural aging subsequent to a solution treatment by the purchaser. In case the material is cold worked or hot worked by the purchaser before a solution treatment, its mechanical properties may come out lower than the specified values. These mechanical properties shall also be applied to the test piece subjected to a solution treatment and natural age-hardening under the specified conditions by the manufacturer to confirm its mechanical properties.

(5) The mechanical properties for temper grade T 62 are obtained when the material of temper grade 0 is subjected to artificial age-hardening subsequent to a solution treatment by the purchaser. In case the material is cold worked or hot worked by the purchaser before a solution treatment, its mechanical properties may come out lower than the specified values. These mechanical properties shall also be applied to the test piece subjected to a solution treatment and artificial age-hardening under the specified conditions by the manufacturer to confirm its mechanical properties.

(6) The mechanical properties for temper grade T 4 are the values obtained after a month's natural aging (at approximately 20°C) and are given for informative reference.

In the case where material is put to a tensile test before a month's natural aging expires, the material shall then be subjected to a solution treatment and artificial age-hardening and if it is confirmed that the material possesses the properties of temper grade T 6, it shall be deemed satisfy the requirements of temper grade T 4.

Remark: The tolerances for the product exceeding the specified range of dimensions shall be as agreed upon by the parties concerned.

Appendix Table 2. Mechanical Properties of 6063

(Applicable on and after Jan. 1, 1991)

Designation	Temper grade	Tensile test				Hardness test (7)	
		Thickness at specified measuring point mm	Tensile strength N/mm ²	Proof stress N/mm ²	Elongation %	Thickness at specified measuring point mm	HV (5)
A 6063 S	T 1	12 max.	120 min.	60 min.	12 min.	-	-
		Over 12. up to and incl. 25	110 min.	55 min.	12 min.		
	T 5	12 max.	155 min.	110 min.	8 min.	0.8 min.	58 min.
		Over 12. up to and incl. 25	145 min.	110 min.	8 min.		
	T 6	3 max.	205 min.	175 min.	8 min.	-	-
		Over 3. up to and incl. 25	205 min.	175 min.	10 min.		

Note (7) The temper grade T 5 shall be as specified by either of tensile test or hardness test.

Remark: The tolerances for the product exceeding the specified range of dimensions shall be as agreed upon between the delivery parties concerned.