

JIS

JAPANESE INDUSTRIAL STANDARD

Aluminium and Aluminium
Alloy Sheets and Plates,
Strips and Coiled Sheets

Ⓒ JIS H 4000—1988

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by

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In the event of any doubt arising,
the original Standard in Japanese is to be final authority.



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Aluminium and Aluminium Alloy Sheets and
Plates, Strips and Coiled Sheets

H 4000-1988

1. Scope

This Japanese Industrial Standard specifies rolled aluminium and aluminium alloy sheet and plate, clad sheet and plate, strip and circle plate, hereinafter referred to as the "plate", "clad plate", "coiled sheet" and "circle".

Remark: The units and numerical values given in { } in this standard is in accordance with the International System of Units (SI) and are appended for reference.

The portions where the conventional units and numerical values followed by the units in accordance with SI and numerical values converted by that units are given in { } in this standard will be switched to the units and numerical values specified in Appendix, January 1, 1991.

2. Definition

For the purposes of this standard, the following definitions apply.

- (1) clad plate A plate in which a base material (a plate constituting the base plate) is clad with a cladding material (a sheet of an alloy of the different kind) on the whole surface thereof by welding with pressure.
- (2) strip A sheet whose length is by far the larger compared with its width.

3. Grade, Class and Symbol

Grade, Class and symbol shall be as shown in Table 1.

Applicable Standards: See page 87.

Table 1. Grade, Class and Symbol

Grade		Class	Symbol	Informative reference
Alloy No.	Profile			
1085	Coiled sheet	—	A 1085 P	Being pure aluminium, low in strength but excellent in formability, weldability and corrosion resistance. For reflection plates, lighting fixtures, ornaments, tanks for chemical industry, conductive materials and so on.
1080	Plate, coiled sheet, circle	—	A 1080 P	
1070	Plate, coiled sheet, circle	—	A 1070 P	
1050	Plate, coiled sheet, circle	—	A 1050 P	
1100	Plate, coiled sheet, circle	—	A 1100 P	Strength relatively low but excellent in formability, weldability and corrosion resistance. For general vessels, architectural materials, electric appliances, various containers, printing boards and so on.
1200	Plate, coiled sheet, circle	—	A 1200 P	
1 N 00	Plate, coiled sheet, circle	—	A 1 N 00 P	A little higher strength and better formability as compared with 1100. For daily necessities and the like.
1 N 30	Coiled sheet	—	A 1 N 30 P	Excellent in ductility and corrosion resistance. For aluminium foil and others.
2014	Plate, coiled sheet	—	A 2014 P	A high strength heat-treating alloy. In the case of clad plate, 6003 is laminated on the surface of the plate to improve corrosion resistance. For materials for airplanes, various construction materials and so on.
	Clad plate	—	A 2014 PC	
2017	Plate, coiled sheet	—	A 2017 P	Heat-treating alloy. High strength and good machinability. For materials for airplanes, various construction materials and so on.

Table 1 (Continued)

Grade		Class	Symbol	Informative reference
Alloy No.	Profile			
2219	Plate, coiled sheet	—	A 2219 P	Strength high and excellent in heat resistance and weldability. For equipments of aircrafts and spacecrafts and so on.
2024	Plate	—	A 2024 P	Higher in strength than 2017 and excellent in machinability. Clad plate is one in which 1230 is laminated on the surface of the plate to improve corrosion resistance. For materials for airplane, various construction materials and others.
	Clad plate	—	A 2024 PC	
3003	Plate, coiled sheet, circle	—	A 3003 P	A little higher in strength than 1100 and excellent in formability, weldability and corrosion resistance. For general vessels, architectural materials, materials for ships, materials for fins, various containers and so on.
3203	Plate, coiled sheet, circle	—	A 3203 P	
3004	Plate, coiled sheet, circle	—	A 3004 P	Higher in strength than 3003, excellent in formability and good in corrosion resistance. For cans for beverage, roofplates, materials for door panels, colored aluminium, lamp socket, and so on.
3104	Plate, coiled sheet, circle	—	A 3104 P	
3005	Plate, coiled sheet, circle	—	A 3005 P	Higher in strength than 3003, excellent in corrosion resistance. For architectural materials, colored aluminium and others.
3105	Coiled sheet	—	A 3105 P	A little higher in strength than 3003, excellent in formability and corrosion resistance. For architectural materials, colored aluminium, caps and so on.

Table 1 (Continued)

Grade		Class	Symbol	Informative reference
Alloy No.	Profile			
5005	Plate, coiled sheet, circle	—	A 5005 P	Same in strength as 3003, excellent in corrosion resistance, weldability and machinability. For exterior and interior materials of buildings, interior materials of wagons and the like.
5052	Plate, coiled sheet, circle	—	A 5052 P	A representative alloy having a medium strength. Excellent in corrosion resistance, formability, and weldability. For materials for ships, vehicles, buildings, cans for beverages, and so on.
5652	Plate, coiled sheet, circle	—	A 5652 P	An alloy which restrains decomposition of hydrogen peroxide, by limiting the content of impurities of 5052, the other characteristic being the same as those of 5052. For hydrogen peroxide vessels and others.
5154	Plate, coiled sheet, circle	—	A 5154 P	An alloy having a strength between those of 5052 and 5083. Excellent in corrosion resistance, formability and weldability. For materials for ships and vehicles and the like.
5254	Plate, coiled sheet, circle	—	A 5254 P	An alloy which restrains decomposition of hydrogen peroxide by limiting the content of impurities of 5154, the other characteristics being the same as those of 5154. For hydrogen peroxide vessels and others.
5454	Plate, coiled sheet, circle	—	A 5454 P	Higher in strength than 5052, excellent in corrosion resistance, formability and weldability. For automobile wheels and the like.

Table 1 (Continued)

Alloy No.	Grade		Class	Symbol	Informative reference Characteristics and examples of application
		Profile			
5082		Plate, coiled sheet	—	A 5082 P	Almost the same in strength as 5083, excellent in formability and corrosion resistance. For cans for beverages and the like.
5182		Plate, coiled sheet	—	A 5182 P	
5083		Plate, coiled sheet, circle	Ordinary class	A 5083 P	An alloy having the highest strength among non-heat-treating alloys. Excellent in corrosion resistance and weldability. For materials for ships and vehicles, low-temperature tanks, pressure vessels and so on.
			Special class	A 5083 PS	
5086		Plate, coiled sheet, circle	—	A 5086 P	A welding structural alloy higher in strength than 5154 and excellent in corrosion resistance. For materials for ships, pressure vessels, magnetic disks and others.
5 N 01		Plate, coiled sheet, circle	—	A 5 N 01 P	The same in strength as 3003. A high brightness can be obtained by bright processing such as chemical or electrolytic polishing followed by anodic oxidation processing. Excellent in corrosion resistance. For ornaments, kitchen utensils, name plate and the like.
6061		Plate, coiled sheet, circle	—	A 6061 P	Excellent in corrosion resistance and used as structural materials for rivet jointing. For ships, vehicles, ground constructions and others.

Table 1 (Continued)

Alloy No.	Grade		Class	Symbol	Informative reference
		Profile			
7075	Plate		—	A 7075 P	An alloy having the highest strength among aluminum alloys. Clad plate in a plate in which 7072 is laminated on the surface to improve the corrosion resistance. For materials of airplanes, skis and others.
	Clad plate		—	A 7075 PC	
7 N 01	Plate		—	A 7 N 01 P	A welding structural alloy having high strength and good corrosion resistance. For vehicles, ground constructions and others.

Remarks 1. The symbol denoting the temper grade shall be suffixed to the symbol of grade mentioned above.

2. The utilization of A 5083 PS shall be limited only for a side wall plate, annular plate and nuckle plate of storage tank for liquefied natural gas.

4. Quality

4.1 Appearance The plate, clad plate, coiled sheet and circle shall have a workmanlike finish, unheterogeneity and be free from defects such as blisters and flaws that are detrimental to practical use.

4.2 Chemical Composition The chemical composition of the plate, clad plate (base material and cladding material), coiled sheet and circle shall be as given in Table 2.

4.3 Mechanical Property The mechanical property (tensile strength, proof stress, elongation and bending property) of the plate, coiled sheet, circle and clad plate shall be as given in Tables 3 (1) and 3 (2). For a coiled sheet and circle, however, above tables shall be applied to those of 4.5 mm and under and 3.5 mm and under in thickness, respectively. In the bending test 6.3, of the plate, coiled sheet and clad plate, the test piece shall exhibit no cracking on the outside of the bent portion.

However, bend test and proof stress test for 1085, 1080, 1070, 1050, 1100, 1200, 1 N 00, 1 N 30, 3003, 3203, 3004, 3104, 3005, 3105, 5005, 5052 and 5 N 01 shall be applied only when requested by the purchaser.

Table 2. Chemical Composition

Alloy No.	Cladding and base material	Chemical composition %											
		Si	Fe	Cu	Mn	Mg	Cr	Zn	Zr, Zr + Ti, Ga, V	Ti	Others ⁽¹⁾		Al
											Each	Total	
1085	—	0.10 max.	0.12 max.	0.03 max.	0.02 max.	0.02 max.	—	0.30 max.	—	0.02 max.	0.01 max.	—	99.85 min.
1080	—	0.15 max.	0.15 max.	0.03 max.	0.02 max.	0.02 max.	—	0.03 max.	—	0.03 max.	0.02 max.	—	99.80 min.
1070	—	0.20 max.	0.25 max.	0.04 max.	0.03 max.	0.03 max.	—	0.04 max.	—	0.03 max.	0.03 max.	—	99.70 min.
1050	—	0.25 max.	0.40 max.	0.05 max.	0.05 max.	0.05 max.	—	0.05 max.	—	0.03 max.	0.03 max.	—	99.50 min.
1100	—	Si + Fe 1.0 max.		0.05 to 0.20	0.05 max.	—	—	0.10 max.	—	—	0.05 max.	0.15 max.	99.00 min.
1200	—	Si + Fe 1.0 max.		0.05 max.	0.05 max.	—	—	0.10 max.	—	0.05 max.	0.05 max.	0.15 max.	99.00 min.
1 N 00	—	Si + Fe 1.0 max.		0.05 to 0.20	0.05 max.	0.10 max.	—	0.10 max.	—	0.10 max.	0.05 max.	0.15 max.	99.00 min.
1 N 30	—	Si + Fe 0.7 max.		0.10 max.	0.05 max.	0.05 max.	—	0.05 max.	—	—	0.03 max.	—	99.30 min.
2014	—	0.50 to 1.2	0.7 max.	3.9 to 5.0	0.40 to 1.2	0.20 to 0.8	0.10 max.	0.25 max.	Zr + Ti 0.20 max.	0.15 max.	0.05 max.	0.15 max.	Remainder

Table 2 (Continued)

Alloy No.	Cladding and base material	Chemical composition %											
		Si	Fe	Cu	Mn	Mg	Cr	Zn	Zr, Zr + Ti, Ga, V	Ti	Others(¹)		Al
											Each	Total	
2014 Clad plate	Base plate	0.50 to 1.2	0.7 max.	3.9 to 5.0	0.40 to 1.2	0.20 to 0.8	0.10 max.	0.25 max.	Zr + Ti 0.20 max.	0.15 max.	0.05 max.	0.15 max.	Remainder
	Cladding plate [6003]	0.35 to 1.0	0.6 max.	0.10 max.	0.8 max.	0.8 to 1.5	0.35 max.	0.20 max.	—	0.10 max.	0.05 max.	0.15 max.	Remainder
2017	—	0.20 to 0.8	0.7 max.	3.5 to 4.5	0.40 to 1.0	0.40 to 0.8	0.10 max.	0.25 max.	Zr + Ti 0.20 max.	0.15 max.	0.05 max.	0.15 max.	Remainder
2219	—	0.20 max.	0.30 max.	5.8 to 6.8	0.20 to 0.40	0.02 max.	—	0.10 max.	V 0.05 to 0.15, Zr 0.10 to 0.25	0.02 to 0.10	0.05 max.	0.15 max.	Remainder
2024	—	0.50 max.	0.50 max.	3.8 to 4.9	0.30 to 0.9	1.2 to 1.8	0.10 max.	0.25 max.	Zr + Ti 0.20 max.	0.15 max.	0.05 max.	0.15 max.	Remainder
2024 Clad plate	Base plate	0.50 max.	0.50 max.	3.8 to 4.9	0.30 to 0.9	1.2 to 1.8	0.10 max.	0.25 max.	Zr + Ti 0.20 max.	0.15 max.	0.05 max.	0.15 max.	Remainder
	Cladding plate [1230]	Si + Fe 0.7 max.		0.10 max.	0.05 max.	0.05 max.	—	0.10 max.	—	0.03 max.	0.03 max.	—	99.30 min.
3003	—	0.6 max.	0.7 max.	0.05 to 0.20	1.0 to 1.5	—	—	0.10 max.	—	—	0.05 max.	0.15 max.	Remainder
3203	—	0.6 max.	0.7 max.	0.05 max.	1.0 to 1.5	—	—	0.10 max.	—	—	0.05 max.	0.15 max.	Remainder