

Standard (JIS) (Excerpted from JIS G 3323:2019)

In November 2012, the Japanese Industrial Standard JIS G 3323 (Hot-dip zinc-aluminum-magnesium alloy coated steel sheet and strip) was established.

ZAM®-EX complies with JIS G 3323.

This catalog may use different table numbers and textual descriptions than the JIS standard book.

The excerpts herein may not be free of error. Please check whether they are correct by referring to the JIS standard book. If you find any text in this catalog to be questionable, refer to the JIS standard book, which is correct.

Types, symbols, and applicable nominal thicknesses

The symbols for types and applicable nominal thicknesses are shown in **Tables 1** and **2**. The nominal thicknesses represent the thicknesses of the base sheets before coating.

● **Table 1: Type symbols and applicable nominal thicknesses (using hot-rolled base sheets^{a)})** Unit: mm

Type symbol	Applicable nominal thicknesses	Application
SGMHC	1.6 ≤ t ≤ 9.0	For general use
SGMH340		For high-strength general use
SGMH400		
SGMH440		
SGMH490	1.6 ≤ t ≤ 6.0 ^{b)}	
SGMH540		

Note ^{a)}: For nominal thicknesses between 1.6 and 3.2 mm, if hot-rolled base sheets are not explicitly specified, cold-rolled base sheets that meet the specifications for hot-rolled base sheets may be used.

● **Table 2: Type symbols and applicable nominal thicknesses (using cold-rolled base sheets)** Unit: mm

Type symbol	Applicable nominal thicknesses	Application
SGMCC	0.20 ≤ t ≤ 3.2	For general use
SGMCH	0.20 ≤ t ≤ 1.2	For hard class general use
SGMCD1	0.40 ≤ t ≤ 2.3	For drawing use class 1
SGMCD2		For drawing use class 2
SGMCD3		For drawing use class 3
SGMCD4	0.40 ≤ t ≤ 2.3	For drawing use class 4, non-aging property ^{b)}
SGMC340		For high-strength general use
SGMC400		
SGMC440		
SGMC490		
SGMC570	0.25 ≤ t ≤ 2.0	

Note ^{b)}: "Non-aging property" refers to a property that generates no stretcher strain in processing.

Skin-pass treatment

The orderer may specify skin-pass treatment for achieving a smooth surface. In this case, the symbol shall be "S."

Coating mass

Both sides shall be coated with the same thickness. The coating mass symbols are listed in **Table 3**.

● **Table 3: Minimum coating mass (total mass on both sides)** (Corresponds to Table 7 in JIS G 3323:2019) Unit: g/m²

Coating mass symbol	Triple-spot test avg. min. coating mass	Single-spot test min. coating mass
K06 ^{a)}	60	51
K08	80	68
K10	100	85
K12	120	102
K14	140	119
K18	180	153
K20	200	170
K22	220	187
K25	250	213
K27	275	234
K35 ^{a)}	350	298
K45 ^{a)}	450	383

Coating masses K35 and K45 do not apply to SGMCD1, SGMCD2, SGMCD3, and SGMCD4.

Note ^{a)}: This symbol applies only upon the agreement of the parties involved in delivery.

Chemical treatments

The types and symbols of chemical treatments for plates/sheets and coils are as shown in **Table 4**.

● **Table 4: Types and symbols of chemical treatments** (excerpted from Table 10 in JIS G 3323:2019)

Chemical treatment type	Symbol
Chromium-free inorganic treatment	ZC, QN
Chromium-free organic special treatment	ZG
Chromium-free organic lubrication treatment	ZJ
Chromium-free treatment (high corrosion resistance/high workability type)	QFK
Chromium-free phosphate treatment	ZP
Chromium-free low-gross treatment	ZPG
Chromium-free treatment (high bonding strength/high paint adhesiveness type)	QA
Chromate treatment	C
High corrosion-resistance chromate	A
Untreated	M

Note

- Chromate-free treatment includes the chromium-free treatment and the "chromate-free phosphating treatment" specified in JIS G 3323:2012.
- The symbol for chromate-free treatment shall be agreed upon between the parties involved in delivery. As the symbol, either the chromate-free treatment symbol "NC" or the chromate-free phosphating treatment symbol "NP" specified in JIS G 3323:2012 may be used.
- Chromate treatment is planned to be deleted in the next revision.

Oiling

The types and symbols of oiling for plates/sheets and coils are as shown in **Table 6**.

● **Table 6: Types and symbols of oiling** (Corresponds to Table 11 in JIS G 3323:2019)

Oiling type	Symbol
Oiling	O
No oiling	X

Mechanical properties

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Bendability

Plates/sheets and coils are tested for bendability using the bending test conditions listed in **Tables 7** and **8**. Test pieces shall have a width of 75 to 125 mm and a length about twice the width. In the test that bends the test piece in the longitudinal direction, no fractures or cracking (visible to the naked eye) shall occur over the external surface (the area 7 mm or more distant from both side edges).

● **Table 7: Bending test conditions 1** (Corresponds to Table 8 in JIS G 3323:2019)

Type symbol	Bending angle	Inner gap of bending (Maximum number of sheets with the nominal thickness)					
		Nominal thickness 1.6 mm ≤ t < 3.0 mm			Nominal thickness 3.0 mm ≤ t		
		Coating mass symbol			Coating mass symbol		
		K06 ~ K27	K35	K45	K06 ~ K27	K35	K45
SGMHC	180°	1	2	2	2	2	2
SGMH340		1	1	2	2	2	3
SGMH400		2	2	2	3	3	3
SGMH440		3	3	3	3	3	3
SGMH490							
SGMH540							

● **Table 8: Bending test conditions 2** (Corresponds to Table 9 in JIS G 3323:2019)

Type symbol	Bending angle	Inner gap of bending (Maximum number of sheets with the nominal thickness)								
		Nominal thickness t < 1.6 mm			Nominal thickness 1.6 mm ≤ t < 3.0 mm			Nominal thickness 3.0 mm ≤ t		
		Coating mass symbol			Coating mass symbol			Coating mass symbol		
		K06 ~ K27	K35	K45	K06 ~ K27	K35	K45	K06 ~ K27	K35	K45
SGMCC	180°	1	1	2	1	2	2	2	2	2
SGMCD1		1	—	—	1	—	—	—	—	—
SGMCD2		0 (close contact)	—	—	0 (close contact)	—	—	—	—	—
SGMCD3		1	1	2	1	1	2	2	2	3
SGMCD4										
SGMC340		2	2	2	2	2	2	3	3	3
SGMC400		3	3	3	3	3	3	3	3	3
SGMC440										
SGMC490										

Section 13.4.2 (Bending test) in JIS G 3323 stipulates that "The bending test may be omitted." We will omit bending tests if not otherwise specified.

Tensile characteristics

The tensile characteristics of plates/sheets and coils are listed in **Tables 9** and **10**.

The test pieces and test methods shall conform to **JIS Z 2241** (Metallic materials – Tensile testing – Method of test at room temperature).

● **Table 9: Tensile characteristics 1 (using hot-rolled base sheets)** (Corresponds to Table 13 in JIS G 3323:2019)

Type symbol	Yield point or yield strength N/mm ²	Tensile strength N/mm ²	Elongation (%)						Test piece/direction
			Nominal thickness (mm)						
			1.6 ≤ t < 2.0	2.0 ≤ t < 2.5	2.5 ≤ t < 3.2	3.2 ≤ t < 4.0	4.0 ≤ t ≤ 6.0	6.0 < t	
SGMHC	—	—	—	—	—	—	—	—	—
SGMH340	245 ≤	340 ≤	20 ≤	20 ≤	20 ≤	20 ≤	20 ≤	20 ≤	JIS No. 5, rolling direction, or perpendicular to rolling direction
SGMH400	295 ≤	400 ≤	18 ≤	18 ≤	18 ≤	18 ≤	18 ≤	18 ≤	
SGMH440	335 ≤	440 ≤	16 ≤	16 ≤	16 ≤	16 ≤	16 ≤	—	
SGMH490	365 ≤	490 ≤							
SGMH540	400 ≤	540 ≤							

Note 1: For SGMHC, a yield point or yield strength of 205 N/mm² or more and a tensile strength of 270 N/mm² or more are sometimes used.
Note 2: 1 N/mm² = 1 MPa

● **Table 10: Tensile characteristics 2 (using cold-rolled base sheets)** (Corresponds to Table 14 in JIS G 3323:2019)

Type symbol	Yield point or yield strength N/mm ²	Tensile strength N/mm ²	Elongation (%)						Test piece/direction
			Nominal thickness (mm)						
			0.25 ≤ t < 0.40	0.40 ≤ t < 0.60	0.60 ≤ t < 1.0	1.0 ≤ t < 1.6	1.6 ≤ t < 2.5	2.5 ≤ t	
SGMCC	—	—	—	—	—	—	—	—	—
SGMCH	—	—	—	—	—	—	—	—	—
SGMCD1	—	270 ≤	—	30 ≤	33 ≤	36 ≤	38 ≤	—	JIS No. 5, rolling direction, or perpendicular to rolling direction
SGMCD2	—	270 ≤	—	36 ≤	38 ≤	39 ≤	40 ≤	—	
SGMCD3	—	270 ≤	—	38 ≤	40 ≤	41 ≤	42 ≤	—	
SGMCD4 ^{a)}	—	270 ≤	—	40 ≤	42 ≤	43 ≤	44 ≤	—	
SGMC340	245 ≤	340 ≤	20 ≤	20 ≤	20 ≤	20 ≤	20 ≤	20 ≤	
SGMC400	295 ≤	400 ≤	18 ≤	18 ≤	18 ≤	18 ≤	18 ≤	18 ≤	
SGMC440	335 ≤	440 ≤	18 ≤	18 ≤	18 ≤	18 ≤	18 ≤	18 ≤	
SGMC490	365 ≤	490 ≤	16 ≤	16 ≤	16 ≤	16 ≤	16 ≤	16 ≤	
SGMC570	560 ≤	570 ≤	—	—	—	—	—	—	

Note 1: For SGMCC, a yield point or yield strength of 205 N/mm² or more and a tensile strength of 270 N/mm² or more are sometimes used.
Note 2: Because SGMCH is not annealed, it usually has a Rockwell hardness of 85 HRBW or more, or a Vickers hardness of 170 HV or more.
Note 3: 1 N/mm² = 1 MPa
Note ^{a)}: SGMCD4 plates/sheets and coils shall not generate stretcher strain in processing for six months after production.

Dimensional tolerances

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Product thickness tolerances

The thicknesses of plates, corrugated sheets, and coils shall be the nominal thicknesses of their base sheets before coating, and their product thicknesses shall be the thicknesses of the base sheets after coating.

Product thickness tolerances shall apply to the value obtained by rounding the sum of the nominal base sheet thickness and the equivalent coating thickness shown in **Table 11** off to two decimal places according to rule A of **JIS Z 8401**.

Product thickness tolerances shall be in accordance with **Table 12, 13, or 14**.

The product thickness shall be measured at an arbitrary point more than 25 mm distant from the edge (cross-direction end).

● **Table 11: Equivalent coating thicknesses** (excerpted from Table 15 in JIS G 3323:2019) Unit: mm

Category	Coating mass symbol												Reference
	K06	K08	K10	K12	K14	K18	K20	K22	K25	K27	K35	K45	Mass fraction of aluminum in coating film
2	0.016	0.021	0.027	0.033	0.036	0.044	0.051	0.054	0.062	0.068	0.082	0.101	More than 9.0% but 13.0% or less

● **Table 12: Product thickness tolerances** (using hot-rolled base sheets; for general use) (Applies to SGMHC) (Corresponds to Table 18 in JIS G 3323:2019) Unit: mm

Nominal thickness	Width			
	W < 1,200	1,200 ≤ W < 1,500	1,500 ≤ W < 1,800	1,800 ≤ W < 2,000
1.60 ≤ t < 2.00	± 0.17	± 0.18	± 0.19	± 0.22
2.00 ≤ t < 2.50	± 0.18	± 0.20	± 0.22	± 0.26
2.50 ≤ t < 3.15	± 0.20	± 0.22	± 0.25	—
3.15 ≤ t < 4.00	± 0.22	± 0.24	± 0.27	—
4.00 ≤ t < 5.00	± 0.25	± 0.27	± 0.29	—
5.00 ≤ t < 6.00	± 0.27	± 0.29	—	—
6.00 ≤ t < 8.00	± 0.30	± 0.31	—	—
8.00 ≤ t ≤ 9.00	± 0.33	—	—	—

● **Table 13: Product thickness tolerances** (using hot-rolled base sheets; for structural use) (Applies to SGMH340, SGMH400, SGMH440, SGMH490, and SGMH540) (Corresponds to Table 19 in JIS G 3323:2019) Unit: mm

Nominal thickness	Width	
	W < 1,600	1,600 ≤ W < 2,000
1.60 ≤ t < 2.00	± 0.20	± 0.24
2.00 ≤ t < 2.50	± 0.21	± 0.26
2.50 ≤ t < 3.15	± 0.23	± 0.30
3.15 ≤ t < 4.00	± 0.25	—
4.00 ≤ t < 5.00	± 0.46	—
5.00 ≤ t < 6.30	± 0.51	—
6.30 ≤ t ≤ 9.00	± 0.56	—

● **Table 14: Product thickness tolerances** (using cold-rolled base sheets) (Applies to SGMCC, SGMCH, SGMCD1 to SGMCD4, and SGMCD340 to SGMCD570) (Excerpts from Table 20 in JIS G 3323:2019) Unit: mm

Nominal thickness	Width				
	W < 630	630 ≤ W < 1,000	1,000 ≤ W < 1,250	1,250 ≤ W < 1,600	1,600 ≤ W
0.20 ≤ t < 0.25	± 0.04	± 0.04	± 0.04	—	—
0.25 ≤ t < 0.40	± 0.05	± 0.05	± 0.05	± 0.06	—
0.40 ≤ t < 0.60	± 0.06	± 0.06	± 0.06	± 0.07	± 0.08
0.60 ≤ t < 0.80	± 0.07	± 0.07	± 0.07	± 0.07	± 0.08
0.80 ≤ t < 1.00	± 0.07	± 0.07	± 0.08	± 0.09	± 0.10
1.00 ≤ t < 1.25	± 0.08	± 0.08	± 0.09	± 0.10	± 0.12
1.25 ≤ t < 1.60	± 0.09	± 0.10	± 0.11	± 0.12	± 0.14
1.60 ≤ t < 2.00	± 0.11	± 0.12	± 0.13	± 0.14	± 0.16
2.00 ≤ t < 2.50	± 0.13	± 0.14	± 0.15	± 0.16	± 0.18
2.50 ≤ t < 3.15	± 0.15	± 0.16	± 0.17	± 0.18	± 0.21
3.15 ≤ t ≤ 3.20	± 0.17	± 0.18	± 0.20	± 0.21	—

Width tolerances

Plate and coil width tolerances shall be in accordance with **Table 15**. **Table 15** assumes the use of conventional cutting methods.

● **Table 15: Width tolerances** (Corresponds to Table 21 in JIS G 3323:2019) Unit: mm

Width	Applicable type symbols		
	SGMHC, SGMH340, SGMH400, SGMH440, SGMH490, SGMH540		SGMCC, SGMCH, SGMCD1 ~ SGMCD4, SGMCD340 ~ SGMCD570
	Tolerance A ^{a)}	Tolerance B ^{a)}	
W < 1,500	+ 25 0	+ 10 0	+ 7 0
1,500 < W			+ 10 0

Note ^{a)}: Usually, tolerance A applies to mill edges, while tolerance B applies to cut edges.

Available sizes

- Plate thickness 0.25mm~6mm
- Width 600mm~1840mm

※For the details of the products range, please contact us.