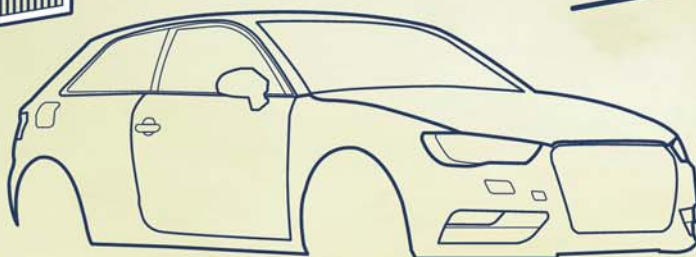
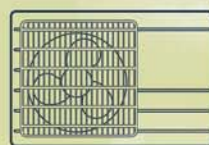
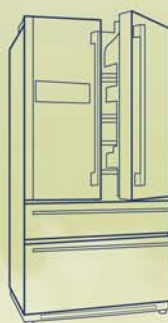
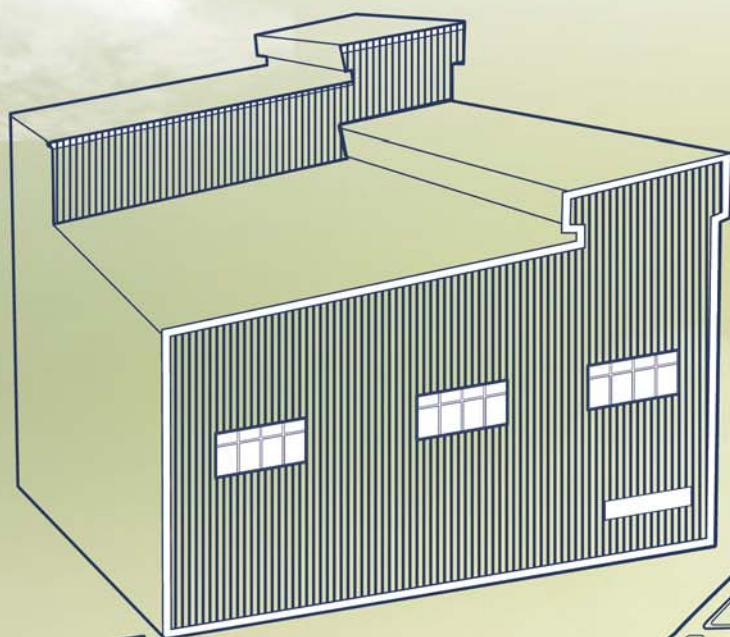
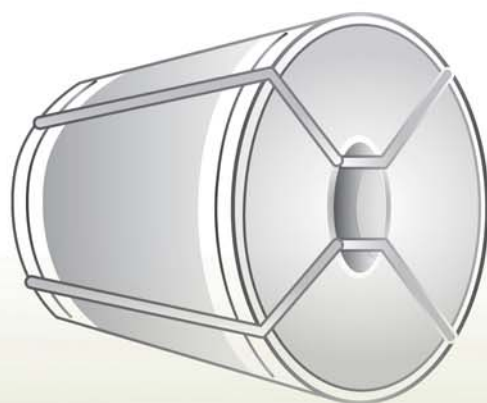


Zn-Coated Steel



PRODUCT MANUAL

鍍鋅鋼捲

The quality policy of China Steel Corporation

China Steel Corporation, based-on customer orientation, will incessantly innovate, research & develop to provide excellent and eco-friendly products, and consequently fulfill our responsibility to society.

China Steel Building (Group Headquarters)

1	1. Brief Introduction
2	2. Product and Service Features
3	3. Introduction of New Products
5	4. Certification
7	5. Manufacturing Process and Major Equipments
11	6. Application Examples
12	7. Specification
12	7.1 Chemical Composition and Mechanical Properties
20	7.2 Tolerances
26	7.3 Classification of Quality
27	8. Product Availability
28	9. Marking and Packing
29	10. Precautions for use
32	11. Conversion Tables
35	12. Comparison of Specification
36	13. Ordering Information



A NAME FOR QUALITY,
TECHNOLOGY AND SERVICE

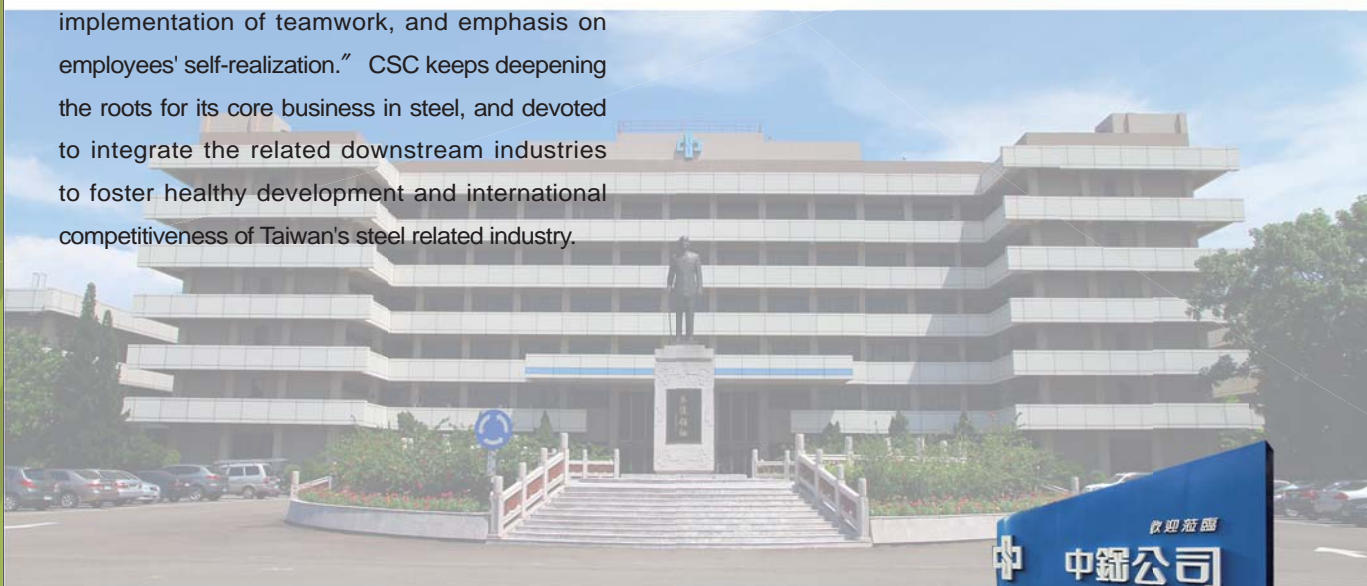


China Steel Corporation (CSC), located at Kaohsiung, Taiwan was founded in December 1971. With annual capacity (in terms of crude steel) around 10 million tonnes, CSC produces a range of products that includes plates, bars, wire rods, hot and cold rolled coils, electrogalvanized coils, electrical steel coils, hot-dip galvanized coils, and Ti/Ni-base alloy. The domestic market takes roughly 65% of CSC's production and the exports take the remaining 35%. CSC is the largest steel company in Taiwan, enjoying more than 50% of the domestic market. Major export destinations are Mainland China, Japan and Southeast Asia.

CSC is very active in innovation, and has strong capability to put the innovations into practice. The company's vision is: "We aspire to be a trustworthy steel company of global distinction that pursues growth, environmental protection, energy saving and value-innovation". CSC actively puts into practice its corporate values of "teamwork, entrepreneurial approach, down-to-earthiness and pursuit of innovation", as well as its operations beliefs of "promotion of social well-being, result orientation, implementation of teamwork, and emphasis on employees' self-realization." CSC keeps deepening the roots for its core business in steel, and devoted to integrate the related downstream industries to foster healthy development and international competitiveness of Taiwan's steel related industry.



Plant Greening



China Steel Corporation (CSC) is an integrated steel producer. After its phase II expansion construction was completed on June 30, 1982, CSC launched its production of Cold Rolling Mill. Subsequently, CSC went through to complete its phases III and IV expansion constructions. Products include cold-rolled coils, electrical steel coils, electro-galvanized coils, hot-dip galvanized coils and color coils. This manual introduces Zn-coated steel (cold rolled base) products only.

Through unceasing developments and improvements over the years, CSC's Zn-coated steel products have been gradually diversified. They are available for various processing uses and have been sufficient to meet the requirements of industries, such as hot-dip galvanized steels with general formability, high-strength-improved formability and high strength dual-phase, high conductivity anti-finger printed electrolytic zinc-coated steel coils, galvanized products with one-side coating and oiling, etc.

Through the integrated quality management of iron making, steelmaking and steel rolling to the release and shipping of finished products, CSC's Zn-coated steel products are excellent in their inner and outer quality, dimensional accuracy and processing properties. Zn-coated coils have ultra smooth surface which can be directly used in exposedness, as well as have excellent adhesion and corrosion resistance of galvanized layers owing to the adoption of two-stage degreasing equipment and full radiant tube heating mode, and close monitor of furnace atmosphere for stably controlling the galvanized quantities. Moreover, CSC provides customers with organic or inorganic post-treatment films completely complied with non-toxic matter, which are products with mixed good corrosion-resistance, lubrication, weldability and paintability.

CSC's Zn-coated steel products have been approved by certifications such as ISO 9001, ISO/TS16949, JIS MARK and IECQ QC080000 (Hazardous Substance Process Management), etc. They meet the regulations of RoHS (Restriction of Hazardous Substances Directive) and REACH (Registration, Evaluation, Authorisation and Restriction of Chemical substances), and are verified through certification of high-strength grades by the well-known carmakers. The approvals and qualifications are testament to CSC's commitment to reliable and superior products, thus providing its customers a peace of mind.

The vision of CSC's customer services is to gain customers' appreciation and trust and help them be successful, and the aim of that is to promote customers' technology and upgrade the steel industry. In order to enhance the customer services, CSC adopts multi-step and multi-level service pattern which is characterized by emphasizing on (1) the pre-sale services for helping customers to choose suitable materials and improve their production processes; (2) handling complains and claims from customers with proper and rapid manner, and conducting customers the corresponding improvements to the root-causes; (3) providing customers with the developed high-grade materials to meet the upgrade policy for domestic industries.

The stable and reliable quality of CSC's steel products have gained the acceptance of domestic industries widely, and CSC has also been selected as the first priority provider to purchase their needed steel materials owing to CSC's quick and efficient technical services. CSC will continue to improve customer services and the technical technologies both for customers and CSC itself to promote steel-use industries' international competitiveness.

High Conductive AFP (Anti-Finger Print) Galvanized Steel (EG/CG)

Product with excellent conductivity, it is applicable for computer case, electrical appliances, or other 3C industries' components. Suitable for anti-EMI(Electromagnetic Interference) and anti-electrostatic requirements of the circumstances.

GA Lubricating Coated Steel

Automotive steel with high lubricity coating film with chemical treatment, it can significantly improve the formability, prolong the mould's life, and avoid stamping rupture.

High Strength Galvannealed Steel (EN HX260YD/ HX300YD 、 JFS JAC390P)

High strength and good stamping formability, suitable for automotive metal and components which demand high formability purposes.

High-Strength Low Alloy Galvanized/Galvannealed Steel (EN HX380LAD / HX420LAD/ HX460LAD 、JFS JAC590R)

High strength and low carbon equivalent. Those steel grades will be suitable for use in automotive structures and components, and meet the demand for light-weight purposes.

High-Strength Dual Phase Galvanized/Galvannealed Steel(EN HCT780X / HCT980X 、JFS JAC780Y/JAC980Y)

This dual phase steel contains mainly ferrite and partly martensite, with very high strength and low carbon equivalent welding characteristics. Those steel grades will be suitable for use in automotive structures and components, and meet the demand for light-weight body and high security applications.

Single-sided Electro-Galvanized Oiled Products

It will be developed for the locomotive fuel tank production. The single-sided galvanized surface located inside the tank has good corrosion resistance, while the other cold-rolled side has excellent appearance and weldability. It enhances the efficiency and quality, and prevents alloying between welding head and zinc coating which could lead to lower welding strength and life of welding head.



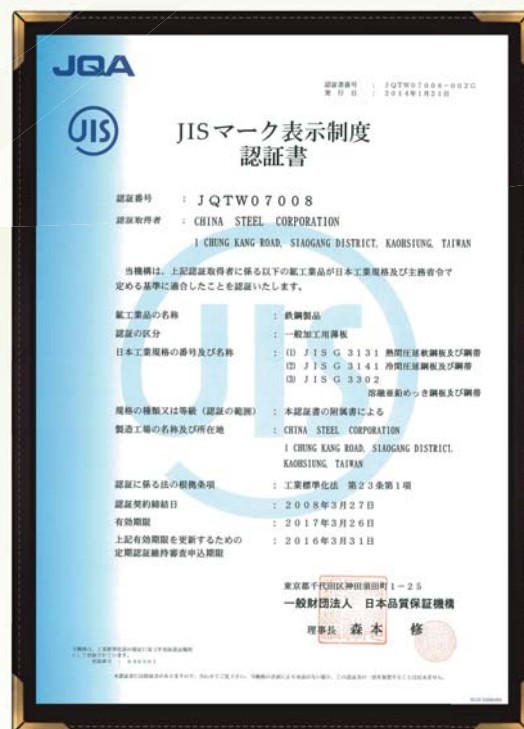
ISO 9001 Certificate



ISO/TS 16949 Certificate

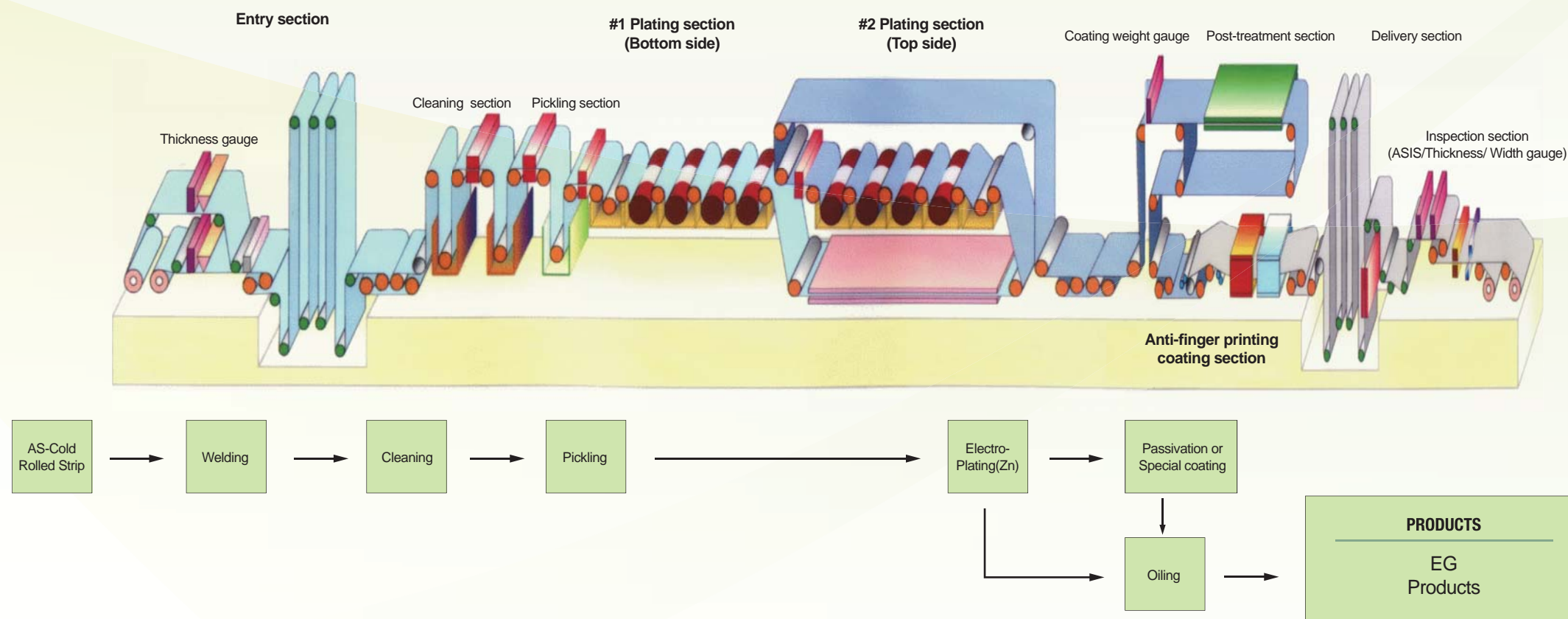


IECQ Certificate



JIS MARK 07008 Certificate

Manufacturing Processes of Electroplated Galvanizing Line(EGL)

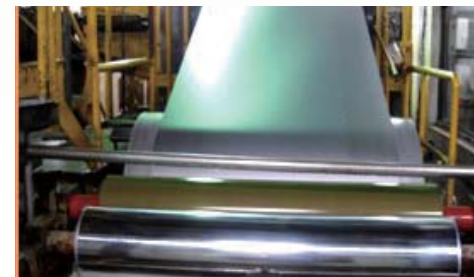
CAROSEL
Conductor Roll

Consumable
Anode
Radial
One
Side
Electroplating
Line

Electroplating with
CAROSEL

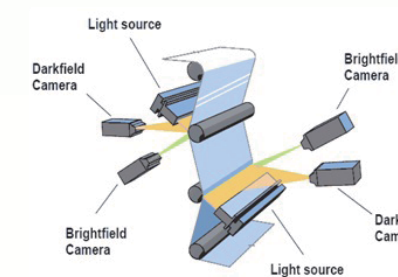
CSC is using UEC's patent: CAROSEL. Zinc is coated layer-by-layer and uniformly through electrochemical reactions. The unique feature of CAROSEL is to use 4 individual tanks (for each side of strip), thus single-sided electroplated galvanizing coils are applicable.

Coating Area



Multiple reagent can be used to post-treatment coating by coating roll. The thickness of films can be well controlled.

ASIS (EGL/CGL)

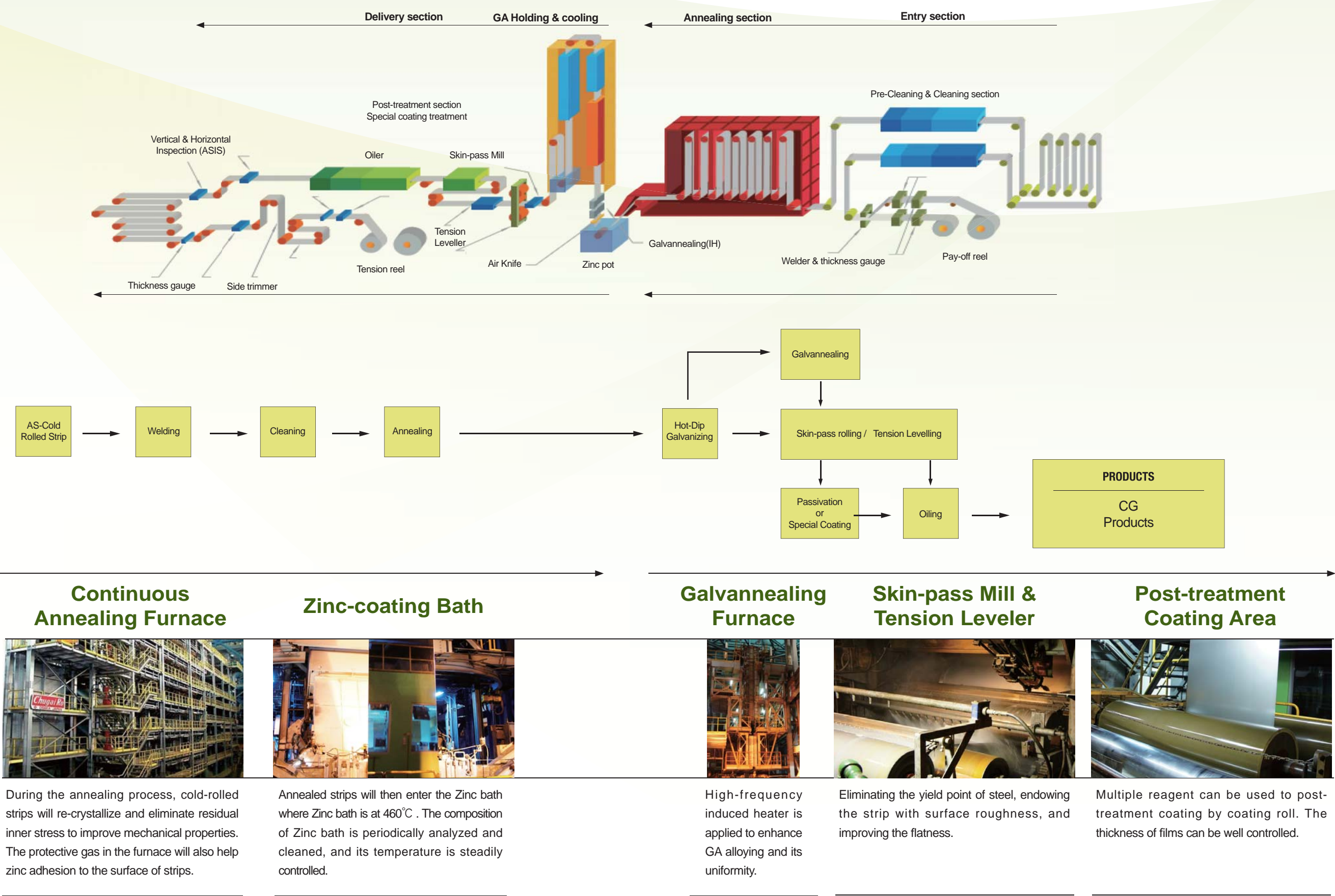


(Automated Surface Inspection System)

The advantages of ASIS are as follows:

- (1) Overall consecutive automatic inspection → Significantly enhance the inspection
- (2) Real-time quality feedback → Instant defect mending
- (3) Traceable and statistical data → Convenient for further investigate.

Manufacturing Processes of Continuous Hot Dip Galvanizing Line (CGL)





Automobile



TV back plate



Ceiling suspension frame and Steel frame



Kitchenware and Home Appliance



Color sheet(Siding and roofing)



Color sheet (Roof)



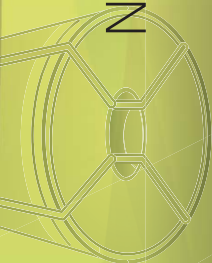
Furniture



Slide



Antenna



The contents of this catalog are for reference only. Customers are urged to consult the specifications published by the corresponding associations. Informations of the available CSC steel grades, as shown herein may be updated without notice to comply with actual production situations.

7.1 Chemical Compositions and Mechanical Properties

7.1.1 Hot-Dip Galvanized Steel

(1) JIS G3302

Chemical composition				Unit : wt %
Symbol of grade	C	Mn	P	S
SGCC	0.15max.	0.80max.	0.05max.	0.05max.
SGCD1	0.12max.	0.60max.	0.04max.	0.04max.
SGCD2	0.10max.	0.45max.	0.03max.	0.03max.
SGCD3	0.08max.	0.45max.	0.03max.	0.03max.
SGCD4	0.06max.	0.45max.	0.03max.	0.03max.
SGC340	0.25max.	1.70max.	0.20max.	0.05max.
SGC400	0.25max.	1.70max.	0.20max.	0.05max.
SGC440	0.25max.	2.00max.	0.20max.	0.05max.
SGC490	0.30max.	2.00max.	0.20max.	0.05max.

Bend test conditions

Symbol of grade	Internal spacing of bend(number of sheets of nominal thickness)								
	Nominal thickness(t) mm								
	t < 1.6			1.6 ≤ t < 3.0			3.0 ≤ t		
	Coating mass symbol			Coating mass symbol			Coating mass symbol		
	Z06 to Z27	Z35 Z37	Z45 Z60	Z06 to Z27	Z35 Z37	Z45 Z60	Z06 to Z27	Z35 Z37	Z45 Z60
SGCC	1	1	2	1	2	2	2	2	2
SGCD1	1	—	—	1	—	—	—	—	—
SGCD2	0 (Flat on itself)	—	—	0 (Flat on itself)	—	—			
SGCD3									
SGCD4									
SGC340	1	1	2	1	1	2	2	2	3
SGC400	2	2	2	2	2	2	3	3	3
SGC440	3	3	3	3	3	3	3	3	3
SGC490									

NOTE : 1. The bending angle shall be 180° for any grade of steel.

2. The test piece shall be JIS No.3, and one shall be taken from the sample in rolling direction.

Tension test characteristics

Symbol of grade	Yield point or proof stress N/mm ²	Tensile strength N/mm ²	Elongation %						Test piece and direction of tension test
			Nominal thickness (t) 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	
SGCC	(205min.)	(270min.)	—	—	—	—	—	—	JIS No.5 in rolling direction
SGCD1	—	270min.	—	34min.	36min.	37min.	38min.	—	
SGCD2	—	270min.	—	36min.	38min.	39min.	40min.	—	
SGCD3	—	270min.	—	38min.	40min.	41min.	42min.	—	
SGCD4 ^(*)	—	270min.	—	40min.	42min.	43min.	44min.	—	
SGC340	245min.	340min.	20min.	20min.	20min.	20min.	20min.	20min.	JIS No.5 in rolling direction or perpendicular to the rolling direction
SGC400	295min.	400min.	18min.	18min.	18min.	18min.	18min.	18min.	
SGC440	335min.	440min.	18min.	18min.	18min.	18min.	18min.	18min.	
SGC490	365min.	490min.	16min.	16min.	16min.	16min.	16min.	16min.	

NOTE : 1. ^(*)For the sheet and coil of SGCD4, the stretcher strain shall not be generated when working is performed during 6 months after manufacturing.

2. Values in parentheses are shown for reference.

3. 1N/mm²=1MPa.

(2) ASTM A653 Chemical composition table

Unit : wt%

Symbol of grade	C	Mn	P	S	Al	Cu	Ni	Cr	Mo	V	Nb	Ti ⁽¹⁾
CS Type A ^{2,3,4}	0.10 max.	0.60 max.	0.030 max.	0.035 max.	—	0.25 max.	0.20 max.	0.15 max.	0.06 max.	0.008 max.	0.008 max.	0.025 max.
CS Type B ^{2,5}	0.02 ~0.15	0.60 max.	0.030 max.	0.035 max.	—	0.25 max.	0.20 max.	0.15 max.	0.06 max.	0.008 max.	0.008 max.	0.025 max.
CS Type C ^{2,3,4}	0.08 max.	0.60 max.	0.100 max.	0.035 max.	—	0.25 max.	0.20 max.	0.15 max.	0.06 max.	0.008 max.	0.008 max.	0.025 max.
FS Type A ^{2,6}	0.10 max.	0.50 max.	0.020 max.	0.035 max.	—	0.25 max.	0.20 max.	0.15 max.	0.06 max.	0.008 max.	0.008 max.	0.025 max.
FS Type B ^{2,5}	0.02 ~0.10	0.50 max.	0.020 max.	0.030 max.	—	0.25 max.	0.20 max.	0.15 max.	0.06 max.	0.008 max.	0.008 max.	0.025 max.
DDS Type A ^{3,4}	0.06 max.	0.50 max.	0.020 max.	0.025 max.	0.01 min.	0.25 max.	0.20 max.	0.15 max.	0.06 max.	0.008 max.	0.008 max.	0.025 max.
DDS Type C ⁷	0.02 max.	0.50 max.	0.020 max.	0.025 max.	0.01 min.	0.25 max.	0.20 max.	0.15 max.	0.06 max.	0.10 max.	0.10 max.	0.15 max.
EDDS ⁷	0.02 max.	0.40 max.	0.020 max.	0.020 max.	0.01 min.	0.25 max.	0.20 max.	0.15 max.	0.06 max.	0.10 max.	0.10 max.	0.15 max.

NOTE : 1. For steels containing 0.02% carbon or more, titanium is permitted at the producer's option, to the lesser of 3.4N+1.5S or 0.0025%.

2. When deoxidized steel is required for the application, the purchaser has the option to order CS and FS to a min. of 0.01% total aluminum.

3. Steel is permitted to be finished as a vacuum degassed or chemically stabilized steel or both, at the producer's option.

4. For carbon levels less than or equal to 0.02%, vanadium, columbium or combinations thereof are permitted to be used as stabilizing elements at the producer's option. In such case, the applicable limit for vanadium and columbium shall be 0.10% max and the limit for titanium shall be 0.15% max.

5. For CS and FS, specify Type B to avoid carbon levels below 0.02%.

6. Shall not be furnished as stabilized steel.

7. Shall be furnished as stabilized steel.

(3) EN 10346 Low Carbon Steel for Cold Forming

Chemical composition and mechanical properties

Symbol of grade	C	Si	Mn	P	S	Ti	Yield strength N/mm ²	Tensile strength N/mm ²	Elongation ⁽¹⁾ min. (%)	Plastic strain ratio min.	Strain hardening exponent min.
	max. (wt%)										
DX51D	0.18	0.50	1.20	0.12	0.045	0.30	—	270~500	22	—	—
DX52D	0.12		0.60	0.10			140~300	270~420	26	—	—
DX53D							140~260	270~380	30	—	—
DX54D							120~220	260~350	36	1.6 ⁽²⁾	0.18
DX56D							120~180		39	1.9 ⁽²⁾⁽³⁾	0.21 ⁽²⁾⁽³⁾
DX57D							120~170		41	2.1 ⁽²⁾⁽³⁾	0.22 ⁽²⁾⁽³⁾

NOTE : 1. Decrease min. elongation values apply for product thickness $t \leq 0.5\text{mm}$ (minus 4 units) and $0.5\text{mm} < t \leq 0.7\text{mm}$ (minus 2 units).

2. For GA products, r_{90} -value reduced by 0.2 apply, and the min. n_{90} -value reduced by 0.01 apply, and for $t > 1.5\text{mm}$, the min. r_{90} -value reduced by 0.2 apply.

3. For $t \leq 0.70\text{mm}$, the min. r_{90} -value reduced by 0.2 applies and the min. n_{90} -value reduced by 0.01 apply.

4. The value of the tension test apply for transverse pieces.

(4) EN 10346 High Strength Steel for Cold Forming

Chemical composition and mechanical properties

Symbol of grade	C	Si	Mn	P	S	Ti	Nb	T.Al	Yield strength N/mm ²	Tensile strength N/mm ²	Elongation ⁽¹⁾⁽³⁾ min. (%)	Baked hardening Index min. (MPa)	Plastic strain ratio ⁽²⁾⁽³⁾ min	Strain hardening exponent min.
	max. (wt%)							wt%						
HX180YD	0.01	0.20	0.70	0.06	0.025	0.12	0.09	≦ 0.1	180 ~240	330 ~390	34	—	1.7	0.18
HX220YD	0.01	0.20	0.90	0.08	0.025	0.12	0.09	≦ 0.1	220 ~280	340 ~420	32	—	1.5	0.17
HX260YD	0.01	0.25	1.30	0.10	0.025	0.12	0.09	≦ 0.1	260 ~320	380 ~440	30	—	1.4	0.16
HX300YD	0.015	0.30	1.60	0.10	0.025	0.12	0.09	≦ 0.1	300 ~360	390 ~470	27	—	1.3	0.15
HX180BD	0.10	0.50	0.70	0.06	0.025	0.12	0.09	≦ 0.1	180 ~240	290 ~360	34	35	1.5	0.16
HX220BD	0.10	0.50	0.70	0.08	0.025	0.12	0.09	≦ 0.1	220 ~280	320 ~400	32	35	1.2	0.15
HX260BD	0.10	0.50	0.80	0.10	0.025	0.12	0.09	≦ 0.1	260 ~320	360 ~440	28	35	—	—
HX300BD	0.11	0.50	0.80	0.12	0.025	0.12	0.09	≦ 0.1	300 ~360	400 ~480	26	35	—	—
HX260LAD	0.11	0.50	0.60	0.03	0.025	0.12	0.09	≧ 0.015	260 ~330	350 ~430	26	—	—	—
HX300LAD	0.11	0.50	1.00	0.03	0.025	0.15	0.09	≦ 0.1	300 ~380	380 ~480	23	—	—	—
HX340LAD	0.11	0.50	1.00	0.03	0.025	0.15	0.09	≧ 0.015	340 ~420	410 ~510	21	—	—	—
HX380LAD	0.11	0.50	1.40	0.03	0.025	0.15	0.09	≧ 0.015	380 ~480	440 ~560	19	—	—	—
HX420LAD	0.11	0.50	1.40	0.03	0.025	0.15	0.09	≧ 0.015	420 ~520	470 ~590	17	—	—	—

NOTE : 1. Decrease min. elongation values apply for product thickness $t \leq 0.5\text{mm}$ (minus 4 units) and for $0.5\text{mm} < t \leq 0.7\text{mm}$ (minus 2 units).

2. For $t > 1.5\text{mm}$, the min. r_{90} -value reduced by 0.2 apply.

3. For GA products, elongation value could minus 2 units, r_{90} -value reduced by 0.2 apply.

4. The value of the tension test apply for transverse pieces.

7.1.2 Electrolytic Galvanized Steel

(1) JIS G3313

Tension test characteristics

Symbol of grade	Yield point or proof stress N/mm ²	Tensile strength N/mm ²	Elongation %				Test piece and direction
			Nominal thickness (t)mm				
			0.40 ≤ t < 0.60	0.60 ≤ t < 1.0	1.0 ≤ t < 1.6	1.6 ≤ t < 2.5	
SECC	—	—	—	—	—	—	JIS No.5 rolling direction ⁽³⁾
SECCT ⁽¹⁾	—	270min.	34min.	36min.	37min.	38min.	
SECD	—	270min.	36min.	38min.	39min.	40min.	
SECE	—	270min.	38min.	40min.	41min.	42min.	
SECF ⁽²⁾	—	270min.	40min.	42min.	43min.	44min.	
SECG ⁽²⁾	—	270min.	42min.	44min.	45min.	46min.	

NOTE : 1. Applied to SECC when the purchaser has designated a tension test for it.

2. Sheet and coil of SECF and SECG shall be free from stretcher strain occurring during working for 6 months following the manufacture.

3. Where sampling of No.5 test piece is impracticable, shape and elongation of test piece shall be as agreed between the purchaser and the manufacturer.

Bend test conditions

Symbol of grade	Bend angle	Internal spacing of bend	Test piece and direction
SECC	180°	0 (Flat on itself)	JIS No.3 rolling direction
SECD			
SECE			
SECF			
SECG			

NOTE : Internal spacing of bend is the multiple of the test piece nominal thickness.

(2) CSC Electrolytic Galvanized Steel

Tension test characteristics

Symbol of grade	Yield point or proof stress N/mm ²	Tensile strength N/mm ²	Elongation %				Test piece and direction
			Nominal thickness (t) mm				
			0.40 ≤ t < 0.60	0.60 ≤ t < 1.0	1.0 ≤ t < 1.6	1.6 ≤ t < 2.5	
SECC1	—	—	—	—	—	—	JIS No.5 rolling direction
SECC2							
SECD	—	270min.	36min.	38min.	39min.	40min.	
SECE	—	270min.	38min.	40min.	41min.	42min.	
SECF	—	270min.	40min.	42min.	43min.	44min.	

7.1.3 Coating mass, Chemical treatment, Spangle and Oiling

7.1.3.1 Hot-Dip Galvanized Steel

(1)JIS G3302

Equivalent coating thickness

Coating mass symbol	Z06	Z08	Z10	Z12	Z14	Z18	Z20	Z22	Z25	Z27
Coating mass (g/m ²)	60	80	100	120	140	180	200	220	250	275
Equivalent coating thickness (mm)	0.013	0.017	0.021	0.026	0.029	0.034	0.040	0.043	0.049	0.054

Coating mass symbol	Z35	Z37	Z45	Z60	F04	F06	F08	F10	F12
Coating mass (g/m ²)	350	370	450	600	40	60	80	100	120
Equivalent coating thickness (mm)	0.064	0.067	0.080	0.102	0.008	0.013	0.017	0.021	0.026

Type and symbol of chemical treatment

Type of chemical treatment	Symbol
Untreated	M
Phosphate treatment	P
Chromate treatment	C
Chromate-free treatment	NC

NOTE : The type of chemical treatment other than the above table may be agreed upon between the purchaser and the manufacturer, like chromate-free anti-finger print treatment(B).

Type and symbol of oiling

Type of oiling	Symbol
Oiled	O
Uncoiled	X

NOTE : The type and the symbol of the sheets, corrugated sheets and coils shall be given in the table below. Unless otherwise specified, the non-alloyed coating shall be uncoiled and the alloyed coating shall be oiled.

Type and symbol of surface finish for non-alloyed coating

Type of coating surface finish	Symbol	Remark
Minimized spangle	Z	A coating having the spangles obtained by restricting normal spangle formation to a minimum.
Regular spangle	R	A coating having the spangles as a result of the unrestricted growth of zinc crystals during normal solidification.

(2) ASTM A653

Coating mass

Inch-Pound Units		SI Units	
Coating mass symbol	Coating mass (oz/ft ²)	Coating mass symbol	Coating mass (g/m ²)
G01	—	Z001	—
G30	0.30	Z90	90
G40	0.40	Z120	120
G60	0.60	Z180	180
G90	0.90	Z275	275
G100	1.00	Z305	305
G115	1.15	Z350	350
G140	1.40	Z450	450
G165	1.65	Z500	500
G185	1.85	Z550	550
G210	2.10	Z600	600
G235	2.35	Z700	700
G300	3.00	Z900	900
G360	3.60	Z1100	1100
A01	—	ZF001	—
A25	0.25	ZF75	75
A40	0.40	ZF120	120
A60	0.60	ZF180	180

Type and symbol of chemical treatment

Type of chemical treatment	Symbol
Untreated	M
Chromate treatment	C

NOTE : The type of chemical treatment other than the above table may be agreed upon between the purchaser and the manufacturer.

Type and symbol of oiling

Type of oiling	Symbol
Oiled	O
Uncoiled	X

NOTE : The type and the symbol of the sheets, corrugated sheets and coils shall be given in the table below. Unless otherwise specified, the non-alloyed coating shall be uncoiled and the alloyed coating shall be oiled.

Type and symbol of surface finish for non-alloyed coating

Type of coating surface finish	Symbol	Remark
Minimized spangle	Z	A coating having the spangles obtained by restricting normal spangle formation to a minimum.

(3) EN 10346

Equivalent coating thickness

Coating mass symbol	Z100	Z140	Z200	Z225	Z275	Z350	Z450	Z600	ZF100	ZF120
Coating mass (g/m ²)	100	140	200	225	275	350	450	600	100	120

Type and symbol of chemical treatment

Type of chemical treatment	Symbol
Untreated	U
Sealed	S
Phosphate treatment	P
Chemically passivated	C

NOTE : The type of chemical treatment other than the above table may be agreed upon between the purchaser and the manufacturer, like chromate-free anti-finger print treatment (B).

Type and symbol of oiling

Type of oiling	Symbol
Oiled	O
Uncoiled	X

NOTE : The type and the symbol of the sheets, corrugated sheets and coils shall be given in the table below. Unless otherwise specified, the non-alloyed coating shall be uncoiled and the alloyed coating shall be oiled.

Type and symbol of surface finish for non-alloyed coating

Type of coating surface finish	Symbol	Remark
Minimized spangle	M	A coating having the spangles obtained by restricting normal spangle formation to a minimum.
Normal spangle	N	A coating having the spangles as a result of the unrestricted growth of zinc crystals during normal solidification.

Type and symbol of surface qualities

Type of surface qualities	Symbol
As coated surface	A
Improved surface	B
Best quality surface	C

7.1.3.2 Electrolytic Galvanized Steel

JIS G3313/CSC Specification

Type and symbol of chemical treatment

Type of chemical treatment	Symbol
Untreated	—
Chromate-free anti-finger treated	A/A

Type and symbol of oiling

Type of oiling	Symbol
Oiled	O
Uncoiled	X

7.2 Tolerances

7.2.1 JIS G3302 Thickness tolerance for Hot-Dip Galvanized Steel

Unit : mm

width (w) Nominal thickness (t)	Thickness tolerance			
	$630 \leq w < 1000$	$1000 \leq w < 1250$	$1250 \leq w < 1600$	$1600 \leq w$
$0.25 \leq t < 0.40$	± 0.05	± 0.05	± 0.06	—
$0.40 \leq t < 0.60$	± 0.06	± 0.06	± 0.07	± 0.08
$0.60 \leq t < 0.80$	± 0.07	± 0.07	± 0.07	± 0.08
$0.80 \leq t < 1.00$	± 0.07	± 0.08	± 0.09	± 0.10
$1.00 \leq t < 1.25$	± 0.08	± 0.09	± 0.10	± 0.12
$1.25 \leq t < 1.60$	± 0.10	± 0.11	± 0.12	± 0.14
$1.60 \leq t < 2.00$	± 0.12	± 0.13	± 0.14	± 0.16
$2.00 \leq t < 2.50$	± 0.14	± 0.15	± 0.16	± 0.18

NOTE : The thickness tolerance shall be measured at any point 25 mm or over from the side edge(the end in the width direction) °

7.2.2 JIS G3302 Width tolerance for Hot-Dip Galvanized Steel

Unit : mm

Width (w)	Tolerance on product width
$w \leq 1500$	+7 0
$1500 < w$	+10 0

7.2.3 JIS G3302 Flatness tolerance for Hot-Dip Galvanized Steel

Unit : mm

Type of strain width (w)	Flatness tolerance (max.)		
	Bow, wave	Edge wave ⁽¹⁾	Centre buckle ⁽²⁾
$w < 1000$	12	8	6
$1000 \leq w < 1250$	15	9	8
$1250 \leq w < 1600$	15	11	8
$1600 \leq w$	20	13	9

NOTE : 1.Edge wave: wave appearing on the edge of steel sheet (end part in the width direction).

2. Centre buckle: wave appearing on the centre part of the steel sheet.

7.2.4 JIS G3302 Camber tolerance for Hot-Dip Galvanized Steel

Unit : mm

Width (w)	Maximum value of camber
$630 \leq w$	2 in any 2000 length

7.2.5 ASTM A924M Thickness tolerance for Hot-Dip Galvanized Steel

Nominal thickness		Unit : mm
thickness (t)	Width (w)	Thickness tolerance
		<div>$w \leq 1500$</div> <div>$w > 1500$</div>
$t \leq 0.40$		± 0.08
$0.40 < t \leq 1.00$		± 0.10
$1.00 < t \leq 1.50$		± 0.13
$1.50 < t \leq 2.00$		± 0.15
$2.00 < t \leq 2.40$		± 0.30

NOTE : The coated sheet thickness includes the base metal and coating and is measured at any point across the width of the coated sheet not less than 25mm from a side edge.

7.2.6 ASTM A924M Width, flatness, camber tolerance for Hot-Dip Galvanized Steel

Width tolerance		Unit : mm
Width (w)	Width tolerance	
	Upper limit	Lower limit
$800 \leq w < 1200$	5	0
$1200 \leq w < 1500$	6	0
$1500 \leq w < 1880$	8	0

Flatness tolerance		Unit : mm
width (w)	thickness (t)	Flatness tolerance (max.)
		<div>$t \leq 1.0$</div> <div>$1.0 < t$</div>
$w \leq 900$		10
$900 < w \leq 1500$		15
$1500 < w \leq 1880$		20

NOTE : 1. This table applies to all designations except SS, HSLAS.

2. This table also applies to sheet cut to length from coils by the consumer when adequate flattening measures are performed.

Flatness tolerance		Unit : mm
thickness (t)	width (w)	Flatness tolerance (max.)
		Strength N/mm ² (max.)
		275 340 380~410 480 550
$t \leq 1.5$	$w \leq 900$	15 20 22 25 30
	$900 < w \leq 1500$	25 30 32 35 38
	$1500 < w$	35 38 40 45 48
$1.5 < t$	$w \leq 1500$	15 20 22 25 30
	$1500 < w$	25 30 32 35 38

NOTE : This table applies to all designations include SS, HSLAS.

Camber tolerance		Unit : mm
Length	Camber tolerance	
In any 2000 length	Under 5	

7.2.7 EN10143 Thickness tolerance for Hot-Dip Galvanized Steel

		Nominal thickness			Unit : mm
Nominal thickness (t)	Width (w)	$w \leq 1200$	$1200 < w \leq 1500$	$1500 < w$	
$0.30 < t \leq 0.40$		± 0.04	± 0.05	± 0.06	
$0.40 < t \leq 0.60$		± 0.04	± 0.05	± 0.06	
$0.60 < t \leq 0.80$		± 0.05	± 0.06	± 0.07	
$0.80 < t \leq 1.00$		± 0.06	± 0.07	± 0.08	
$1.00 < t \leq 1.20$		± 0.07	± 0.08	± 0.09	
$1.20 < t \leq 1.60$		± 0.10	± 0.11	± 0.12	
$1.60 < t \leq 2.00$		± 0.12	± 0.13	± 0.14	
$2.00 < t \leq 2.40$		± 0.14	± 0.15	± 0.16	

NOTE : 1. The coated sheet thickness includes the base metal and coating and is measured at any point across the width of the coated sheet not less than 40mm from a side edge.

2. Tolerance for steel grades with specified minimum proof strength $R_{p0.2} < 260\text{MPa}$

		Nominal thickness			Unit : mm
Nominal thickness (t)	Width (w)	$w \leq 1200$	$1200 < w \leq 1500$	$1500 < w$	
$0.30 < t \leq 0.40$		± 0.05	± 0.06	± 0.07	
$0.40 < t \leq 0.60$		± 0.05	± 0.06	± 0.07	
$0.60 < t \leq 0.80$		± 0.06	± 0.07	± 0.08	
$0.80 < t \leq 1.00$		± 0.07	± 0.08	± 0.09	
$1.00 < t \leq 1.20$		± 0.08	± 0.09	± 0.11	
$1.20 < t \leq 1.60$		± 0.11	± 0.13	± 0.14	
$1.60 < t \leq 2.00$		± 0.14	± 0.15	± 0.16	
$2.00 < t \leq 2.40$		± 0.16	± 0.17	± 0.18	

NOTE : 1. The coated sheet thickness includes the base metal and coating and is measured at any point across the width of the coated sheet not less than 40mm from a side edge.

2. Tolerance for steel grades with specified minimum proof strength $260\text{MPa} \leq R_{p0.2} < 360\text{MPa}$ and for grade DX51D.

		Nominal thickness			Unit : mm
Nominal thickness(t)	Width (w)	$w \leq 1200$	$1200 < w \leq 1500$	$1500 < w$	
$0.30 < t \leq 0.40$		± 0.05	± 0.06	± 0.07	
$0.40 < t \leq 0.60$		± 0.06	± 0.07	± 0.08	
$0.60 < t \leq 0.80$		± 0.07	± 0.08	± 0.09	
$0.80 < t \leq 1.00$		± 0.08	± 0.09	± 0.11	
$1.00 < t \leq 1.20$		± 0.10	± 0.11	± 0.12	
$1.20 < t \leq 1.60$		± 0.13	± 0.14	± 0.16	
$1.60 < t \leq 2.00$		± 0.16	± 0.17	± 0.19	
$2.00 < t \leq 2.40$		± 0.18	± 0.20	± 0.21	

NOTE : 1. The coated sheet thickness includes the base metal and coating and is measured at any point across the width of the coated sheet not less than 40mm from a side edge.

2. Tolerance for steel grades with specified minimum proof strength $360\text{MPa} \leq R_{p0.2} < 420\text{MPa}$

		Nominal thickness			Unit : mm
Nominal thickness(t)	Width (w)	$w \leq 1200$	$1200 < w \leq 1500$	$1500 < w$	
$0.30 < t \leq 0.40$		± 0.06	± 0.07	± 0.08	
$0.40 < t \leq 0.60$		± 0.06	± 0.08	± 0.09	
$0.60 < t \leq 0.80$		± 0.07	± 0.09	± 0.11	
$0.80 < t \leq 1.00$		± 0.09	± 0.11	± 0.12	
$1.00 < t \leq 1.20$		± 0.11	± 0.13	± 0.14	
$1.20 < t \leq 1.60$		± 0.15	± 0.16	± 0.18	
$1.60 < t \leq 2.00$		± 0.18	± 0.19	± 0.21	
$2.00 < t \leq 2.40$		± 0.21	± 0.22	± 0.24	

NOTE : 1. The coated sheet thickness includes the base metal and coating and is measured at any point across the width of the coated sheet not less than 40mm from a side edge.

2. Tolerance for steel grades with specified minimum proof strength $420\text{MPa} \leq R_{p0.2} < 900\text{MPa}$

7.2.8 EN10143 Width, flatness, camber tolerance for Hot-Dip Galvanized Steel

Width tolerance

Unit : mm

Width (w)	Width tolerance	
	Upper limit	Lower limit
$w \leq 1200$	5	0
$1200 < w \leq 1500$	6	0
$1500 < w \leq 1800$	7	0
$1800 < w$	8	0

Flatness tolerance

Unit : mm

Width (w) \ Thickness (t)	Flatness tolerance (max.)	
	$t < 0.70$	$0.70 \leq t < 3.00$
$w < 1200$	10	8
$1200 \leq w < 1500$	12	10
$1500 \leq w$	17	15

NOTE : Tolerance for steel grades with specified minimum proof strength $R_{p0.2} < 260\text{MPa}$

Flatness tolerance

Unit : mm

Width (w) \ Thickness (t)	Flatness tolerance (max.)	
	$t < 0.70$	$0.70 \leq t < 3.00$
$w < 1200$	13	10
$1200 \leq w < 1500$	15	13
$1500 \leq w$	20	19

NOTE : Tolerance for steel grades with specified minimum proof strength $260\text{MPa} \leq R_{p0.2} < 360\text{MPa}$ and for grade DX51D.

Camber tolerance

Unit : mm

Length	Camber tolerance (max.)
$L \leq 2000$	0.25%
$2000 < L$	5 mm

7.2.9 JIS G3313 Thickness tolerance for Electrolytic Galvanized Steel

Unit : mm

Nominal thickness (t) \ width (w)	$630 \leq w < 1000$	$1000 \leq w < 1250$	$1250 \leq w < 1600$
$0.40 \leq t < 0.60$	± 0.05	± 0.05	± 0.06
$0.60 \leq t < 0.80$	± 0.06	± 0.06	± 0.06
$0.80 \leq t < 1.00$	± 0.06	± 0.07	± 0.08
$1.00 \leq t < 1.25$	± 0.07	± 0.08	± 0.09
$1.25 \leq t < 1.60$	± 0.09	± 0.10	± 0.11
$1.60 \leq t < 2.00$	± 0.11	± 0.12	± 0.13
$2.00 \leq t < 2.50$	± 0.13	± 0.14	± 0.15

NOTE : The thickness tolerance shall be measured at any point 15 mm or over from the side edge(the end in the width direction) °

7.2.10 JIS G3313 Width, flatness, camber tolerance for Electrolytic Galvanized Steel

Width tolerance

Unit : mm

width (w)	Width tolerance
$w < 1250$	+7 0
$1250 \leq w$	+10 0

Flatness tolerance

Unit : mm

Type of strain Width (w)	Flatness tolerance (max.)		
	Bow and wave	Edge wave ⁽¹⁾	Centre buckle ⁽²⁾
$w < 1000$	12	8	6
$1000 \leq w < 1250$	15	9	8
$1250 \leq w < 1600$	15	11	8
$1600 \leq w$	20	13	9

NOTE : 1.Edge wave: wave appearing on the edge of steel sheet (end part in the width direction).

2. Centre buckle: wave appearing on the centre part of the steel sheet.

Camber tolerance

Unit : mm

Width (w)	Camber tolerance
$630 \leq w$	2 max. (Any portion 2,000 in length)

7.3 Classification of Quality

7.3.1 Hot-Dip Galvanized Steel

Classification	Quality	Common Specification	Typical Application
For Forming Fabrication	Commercial Quality (CQ)	JIS G3302 SGCC ASTM A653 CS、FS TYPE EN 10346 DX51D,DX52D	Computer case & parts、Pre-painted base、Deck、Construction material、LQF use、OA Furniture and Cabinet
	Drawing & Deep Drawing Quality & Extreme Drawing Quality (DQ,DDQ,EDDQ)	JIS G3302 SGCD1~3 ASTM A653 DS,DDS EN 10346 DX53D~DX57D EN 10346 HX180~300YD	Household electrical appliances、Inner or outer panel of automobile、Air condition or washing machine case & frame、Computer case & parts、Automobile used steel
For Structural Uses	Structural Quality (SQ)	JIS G3302 SGC~XXX ASTM A653 SS-XX EN 10346 HX260~420 LAD	Slide rail、Duck、Auto-vending machines case & parts、Steel door、Construction material、Automobile used steel

7.3.2 Electrolytic galvanized Steel Coils

Classification	Quality	Common Specification	Typical Application
For Forming Fabrication	Commercial Quality (CQ)	JIS G3313 SECC	Computer case & parts、Household electrical appliance、LCD-TV parts
	Drawing & Deep Drawing Quality & Extreme Drawing Quality (DQ,DDQ,EDDQ)	JIS G3313 SECD、SECE、SECF、SECG	Household、electrical appliance、Machine case...etc.



8.1 Unit mass

Product Type	Min. Unit mass
Hot-dip Galvanized Coil	3t/Coil
Electrolytic Galvanized Coil	3t/Coil

8.2 Available Sizes

Unit : mm

Product Type	Thickness	Width
Hot-dip Galvanized Coil	0.30~2.60	780~1830
Electrolytic Galvanized Coil	0.40~2.00	865~1525

NOTE : 1. The available sizes in the table above are for reference, and the details please refer China Steel web site(www.csc.com.tw):
Customer service → Production → Available sizes and Thickness.

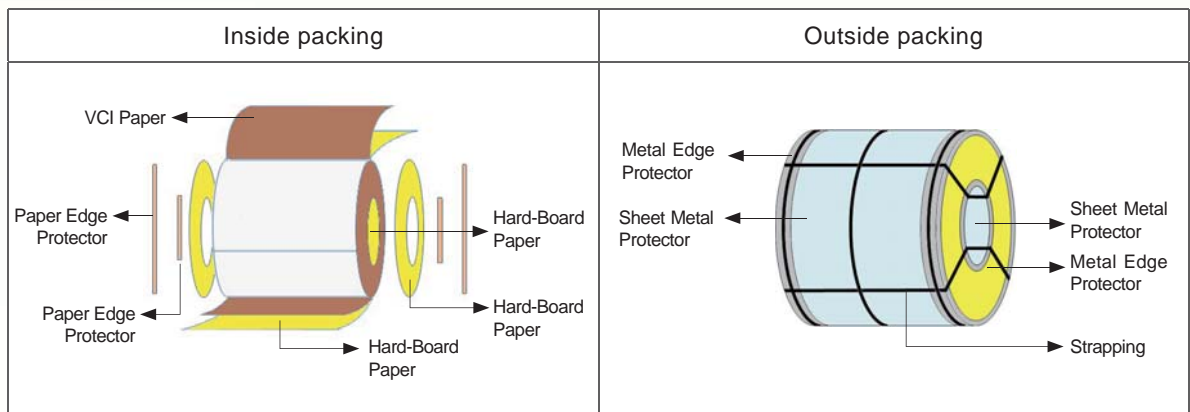
2. If you have any question concerning steel specification, sizes, coating type, coating mass and chemical treatment, please contact CSGT or CSC technical service people.

9.1 Marking for Zn-coated steel



Marking Item	1	2	3	4	5	6	7	8	9	10	11
Product Category	CSC logo	CSC name	Product name	Specification	Size	Identification no	Net mass	Gross mass	Coating code	Quality type	Heat no
Hot-Dip Galvanized Coil	V	V	V	V	V	V	V	V	V	V	V
Electrolytic Galvanized Coil	V	V	V	V	V	V	V	V	V		V

9.2 Packing for Zn-coated steel



Packing Material	VCI Paper	Hard-Board Paper			Paper Edge Protector		Sheet Metal Protector			Metal Edge Protector	
Product Category		circumferential surface	side wall	inner surface	outside diameter	inside diameter	circumferential surface	side wall	inner surface	outside diameter	inside diameter
Hot-Dip Galvanized Coil	V		V				V		V	V	V
Electrolytic Galvanized Coil	V	V	V		V	V			V	V	V

10



(1) Rust Prevention

If antirust treatment is not properly performed for the Zn-coated steel products, it will be easy to rust the steel surface. Therefore, the coils have to be spread with proper rust preventive oil or chemical treatment according to the orders to protect zinc layer surface, and the coils are packed completely to protect them before shipping. However, the steel sheets and coils are easy to rust owing to the environmental factors during their storage and use. Especially the condensation problems are easy to occur when the coil storage is in an environment of high humidity and high/low temperature with rapid changes. Therefore, it should particularly pay attention to the prevention of condensation and drain water in advance. Besides, since the dust or acidic substance in the atmosphere are also easy to rust the surface of steel coils or sheets, such problems in the storage or processing must be eliminated for keeping good surface quality.

(2) Stretcher strain and Aging

There are solid solution Carbon and Nitrogen in the low carbon steels. If they are not treated properly, the stretcher strain marks will be occurred in the process. Therefore, the temper rolling process will be carried out appropriately on these products to eliminate the extension of yield point. However, the extension of yield point may appear again with the longer period of storage as we called the aging problem. Aging is mainly related to solid solution Carbon, storing temperature and time. The “first in, first out (FIFO)” management to use these grades of steel is recommended as soon as possible in order to avoid the aging problems.

(3) Decontamination of film treatment coils after processing

The surfaces of Zn-coated steel sheets are often treated with anti-finger print as a temporary antirust treatment. Such steel materials will again be degreased, decontaminated, rust removed and cleaned, and film antirust treated after processing. Since these treatments may cause discoloration and damages on the film of steel surface, the operations toward to the lower concentration of medicament, the lower processing temperature, and shorter processing time will be advantageous. Concrete recommendations are as follows :

- a. The pH of degreasing liquid is recommended as $7.0 < \text{pH} < 10.0$. It is possibly close to the room temperature and not to take much time to treat degreasing liquid.
- b. Please use the non-polar solvents to clean samples and graze it slightly. Do not use the polar organic solvents.
- c. If the products are needed to dry, the drying temperature and time are maximum 180°C and maximum 15 minutes respectively.

(4) Painting

The painting is one of the common ways to apply for further protecting the Zn-coated steel products, or enhancing their beauty and function. The selection of types of paint and the adoption of painting methods have to carefully consider the shape of products, the application, and the environment-friendly requirements.

— Simple painting mode

Surface cleaning → painting → baking

It may paint directly on the surface of cleaned substrate. The choice of paint should consider the compatibility with the post-treatment layer.

— Durability painting mode

Surface cleaning → chemical treatment → painting → baking

These products are suitable for the long-term use and high-corrosion-resistance requirements. The substrates of application are usually the cold-rolled steels or Zn-coated steels with oiled. It should wait for painting on the cleaned substrate surfaces after the overall chemical passivation reaction with chemical medicament is produced. The passivated films can keep the paints from directly contacting with active metals, and have long-term stability to protect the products. Common chemical treatment is phosphate-zinc treatment. The densely phosphate-zinc crystals can improve the adhesion between the primer and the substrate. The multi-level painting should consider the compatibility with the paints.

— The factors of failure coating

- (a) Insufficient clean: The residual oil and contaminant are often seen on the steel surfaces. These foreign matters may cause the paint to be unable to bond to the substrate surfaces, and may result in declining to fail the adhesion of film. It is better to understand the rust preventive oil, lubricants and other characteristics, proper choosing the way of cleaning and cleaning agents, paying more attention to storage conditions and painting operation environment for helping to improve the insufficient clean.
- (b) Unsuitable chemical treatment: If the passivation film of chemical treatment is not sufficient or uneven, once outside corrosion factors are contacted with metal, the reactive metal is very easy to oxidize. Then oxide will thoroughly destroy the adhesion of primer paint to the steel surface. Moreover, if there are loose passivation films and coarse crystals or the residue contamination on the chemical treatment liquid, it will also cause the deficiency of the film adhesion. It is better to understand the reaction properties of the chemical treatment liquid, paying more attention on the differences between different cold-rolled steel sheet surfaces, properly adjusting the treatment liquid concentration, temperature and time, as well as emphasizing on the clean of the treated surface.
- (c) Improper paint : The environment and the end-use of products should be considered in the selection of paint, and the appropriate painting procedure should be adopted to ensure that the treated substrate surfaces are sufficiently wetted, are compatible with the paint, and have the ability to resist the environmental corrosion factors.

(5) Welding

- a. To compare with cold-rolled steel sheets, the Zn-coated steel sheets have lower resistance values and need more welding current or longer welding time to obtain sufficient resistance welding heat.
- b. The foreign matter phenomenon contaminated with electrodes in the welding process occurs easily when the Zn-coated steel coils or sheets are used. The electrode durability of the Zn-coated steel products is lower than that of cold rolled coils or sheets. Therefore, the electrode must be replaced or polished during welding if necessary.
- c. If the welding parameters (welding time and welding current) can be adjusted properly, the Zn-coated steel sheets can get similar weld lobe curve and welding strength to the cold-rolled steel sheets.
- d. The resistance welding process as an example, if you want to weld the Zn-coated steel sheets (GA), please refer to the following table of suggested welding parameters to ensure stable welding quality.
- e. If the destructive test of the welding-core is needed to perform, please refer to the JIS Z3136 and Z3137 specifications.

Suggested welding parameter table of resistance welding

Thickness of Steel (mm)	Electrode force (kgf)	Electrode Face Diameter (mm)	Holding time before welding (cyc)	Welding time (cyc)	Welding Current (kA)	Holding time after welding (cyc)
0.30~0.49	170	5	> 30	9	Expulsion of welding current-0.4	2
0.50~0.69	180	5	> 30	10	Expulsion of welding current-0.4	2
0.70~0.89	210	6	> 30	11	Expulsion of welding current-0.4	2
0.90~1.09	230	6	> 30	12	Expulsion of welding current-0.4	3
1.10~1.29	250	6	> 30	14	Expulsion of welding current-0.4	3
1.30~1.49	270	6	> 30	16	Expulsion of welding current-0.4	3
1.50~1.69	300	6	> 30	18	Expulsion of welding current-0.4	4
1.70~1.89	340	6	> 30	20	Expulsion of welding current-0.4	4
1.90~2.09	380	6 or 8	> 30	22	Expulsion of welding current-0.4	4
2.10~2.29	420	6 or 8	> 30	26	Expulsion of welding current-0.4	6
2.30~2.49	450	8	> 30	28	Expulsion of welding current-0.4	6

11

CONVERSION TABLES

	ft	inch	mm	m
Length	1	12	304.8	0.3048
	0.08333	1	25.4	0.0254
	0.003281	0.03937	1	0.001

Mass	1 kg = 2.20462 lb
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Force	1 kgf = 9.80665 N
-------	-------------------

	ksi (=1000psi)	psi	kgf/mm ²	N/mm ² (Mpa)
Stress	1	1000	0.70307	6.89476
	0.001	1	7.0307×10^{-4}	6.89476×10^{-3}
	1.42233	1422.33	1	9.80665
	0.145038	145.038	1.101972	1

	ft-lbf	kgf-m	N-m (=Joule)
Absorbed Energy	1	0.138255	1.35582
	7.23301	1	9.80665
	0.737562	0.101972	1

Conversion Table from HR30T to HRB

HR30T	Converted HRB	HR30T	Converted HRB	HR30T	Converted HRB	HR30T	Converted HRB
35.0	28.1	47.0	46.0	59.0	63.9	71.0	81.9
36.0	29.6	48.0	47.5	60.0	65.4	72.0	83.4
37.0	31.1	49.0	49.0	61.0	66.9	73.0	84.9
38.0	32.5	50.0	50.5	62.0	68.4	74.0	86.4
39.0	34.0	51.0	52.0	63.0	69.9	75.0	87.9
40.0	35.5	52.0	53.5	64.0	71.4	76.0	89.4
41.0	37.0	53.0	55.0	65.0	72.9	77.0	90.8
42.0	38.5	54.0	56.5	66.0	74.4	78.0	92.3
43.0	40.0	55.0	58.0	67.0	75.9	79.0	93.8
44.0	41.5	56.0	59.5	68.0	77.4	80.0	95.3
45.0	43.0	57.0	60.9	69.0	78.9	81.0	96.8
46.0	44.5	58.0	62.4	70.0	80.4	82.0	98.3

Note : This table shall be in according with ASTM E140. Hardness not in the table of ASTM is obtained by interpolation °

Conversion Table from HR15T to HRB

HR15T	Converted HRB	HR15T	Converted HRB	HR15T	Converted HRB	HR15T	Converted HRB
70.0	28.8	76.0	47.3	82.0	65.8	88.0	84.3
70.5	30.3	76.5	48.8	82.5	67.3	88.5	85.8
71.0	31.9	77.0	50.4	83.0	68.8	89.0	87.3
71.5	33.4	77.5	51.9	83.5	70.4	89.5	88.9
72.0	35.0	78.0	53.4	84.0	71.9	90.0	90.4
72.5	36.5	78.5	55.4	84.5	73.5	90.5	92.0
73.0	38.0	79.0	56.5	85.0	75.0	91.0	93.5
73.5	39.6	79.5	58.1	85.5	76.6	91.5	95.0
74.0	41.1	80.0	59.6	86.0	78.1	92.0	96.6
74.5	42.7	80.5	61.1	86.5	79.6	92.5	98.1
75.0	44.2	81.0	62.7	87.0	81.2	93.0	99.7
75.5	45.7	81.5	64.2	87.5	82.7		

Note : This table shall be in according with ASTM E140. Hardness not in the table of ASTM is obtained by interpolation °

Conversion Table from HV to HRB

HV	Converted HRB	HV	Converted HRB	HV	Converted HRB	HV	Converted HRB
85	41.0	145	76.6	210	93.4	330	—
90	48.0	150	78.7	220	95.0	340	(108.0)
95	52.0	155	79.9	230	96.7	350	—
100	56.2	160	81.7	240	98.1	360	(109.0)
105	59.4	165	83.1	250	99.5	370	—
110	62.3	170	85.0	260	(101.0)	380	(110.0)
115	65.0	175	86.1	270	(102.0)		
120	66.7	180	87.1	280	(103.5)		
125	69.5	185	88.8	290	(104.5)		
130	71.2	190	89.5	300	(105.5)		
135	73.2	195	90.7	310	—		
140	75.0	200	91.5	320	(107.0)		

Note : 1. This table shall be in according with ASTM E140. Hardness not in the table of ASTM is obtained by interpolation.

2. The value in parentheses is out of the scope of HRB and for reference. It may be reported as the round number

12

COMPARISON OF SPECIFICATION

classification	JIS G3302	JFS A3011	ASTM A653	EN 10346
Mild Steel	SGCC		CS A,B,C	DX51D
	SGCC	JAC270C		DX52D
	SGCD1	JAC270D		DX53D
	SGCD2			
	SGCD3	JAC270E	DDS A	DX54D
	SGCD4	JAC270F	EDDS	DX56D
Bake-hardening Steel		JAC270H		HX180BD
		JAC340H		HX220BD
Deep-drawing Steel		JAC340P		HX220YD,HX220PD
				HX260YD
		JAC440P		HX300YD
High Strength Steel		JAC340W		
		JAC390W		
		JAC440W		
High Yield Ratio Steel				HX260LAD
				HX300LAD
	SGC 440			HX340LAD
		JAC440R	HSLAS50 (340)	
				HX380LAD
				HX420LAD
		JAC590R		
Low Yield Ratio Steel		JAC590Y		HDT600X
		JAC780Y		HDT780X
		JAC980Y		HDT980X
Structure Steel			SS 33 (230)	S220GD
	SGC340		SS 37 (255)	
	SGC400		SS 40 (275)	S280GD
	SGC490			

Note : The grades of these specifications are similar, not the same in the above table

13

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Required Ordering Data			Example
1	Specification (Name, Number, Grade)		JIS G3302 SGCC ZSBX UE
	Coating Type	ZZ(GI), ZF(GA)	
	Coating Thickness	Z08, Z12, F06, F08...etc.	
	Chemically Treatment Type	M, C, P, NC	
	Surface Quality	General (GP)	
		Exposed (GE)	
		Unexposed (UE)	
2	Oiling		Unoil
3	Dimensions (Thickness × Width × Length (or coil))		1.0mm×1219mm×Coil
4	Coil size (Inside Dimensions, Outside Dimensions)		ID 508mm · OD 1650mm max.
5	Mass	Max. Mass	10t max.
		Order Mass	45t
6	Application and Fabrication Methods		Welded Pipe
7	Special Requirements (if Required)		HRB 55max.

- (1) The contents of this catalog are for reference only, customers are urged to consult the specifications published by the corresponding Associations.
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