

Zn-COATED STEEL

Product Manual



Zn-COATED
STEEL



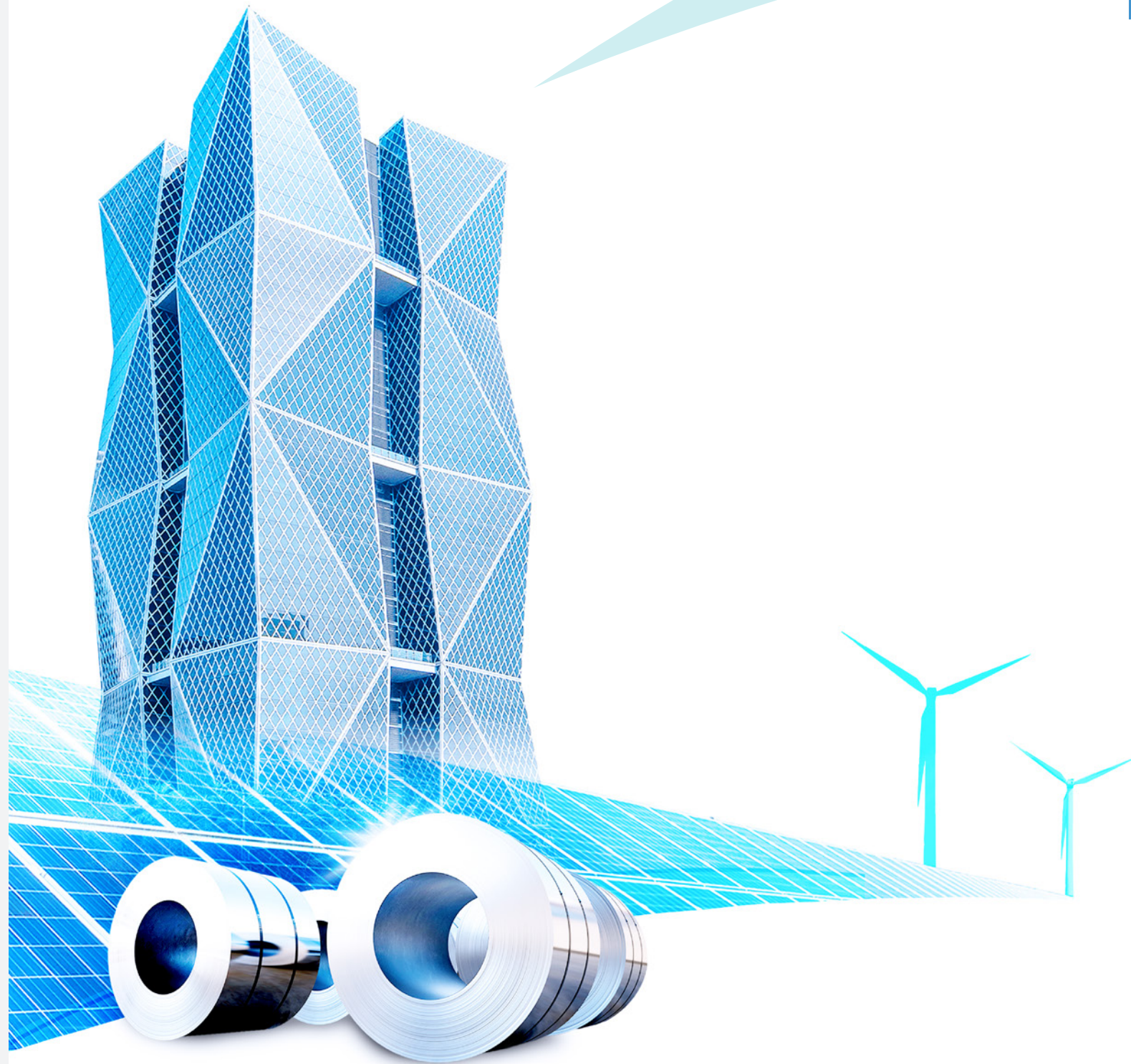
The quality policy of China Steel Corporation

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.

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Vision

Smart Innovation / **Green Energy** / **Value Co-creation**

We aspire to be a sustainable growth enterprise.

China Steel Corporation (CSC), located in Kaohsiung, Taiwan, was established in December 1971. Its annual output of crude steel is about 10 million metric tons. The main products are steel plates, bars, wire rods, hot-rolled and cold-rolled coils, electrogalvanized coils, electrical steel coils, and hot-dip galvanized steel coils. It is currently the largest domestic steel manufacturer with a domestic market share of more than 50%. About 55.2% of its products are domestically consumed and 44.8% exported mostly to Southeast Asia, Europe and Japan.

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 sustainable growth enterprise that distinguishes itself through a firm commitment to smart innovation, green energy, carbon reduction, and value co-creation." CSC actively puts in practice its corporate values of "teamwork, entrepreneurial approach, down-to-earthness and pursuit of innovation", as well as its operational concepts of "promotion of social well-being, result orientation, implementation of teamwork, and emphasis on employees' self-realization." Apart from continuing to cultivate in the steel industry, CSC is also committed to assisting the related downstream industries to upgrade and enhance the overall international competitiveness of the steel industry.



To become a steel mill that produces advanced premium products with high value

To develop the green energy industry

➤ Digital Transition

➤ Low-carbon Transition

➤ Supply Chain Transition



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, magnetic 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, electrolytic zinc-coated products with one-side coating and oiling, painted application of R-coating electro-galvanized products 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. Galvanized 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 has obtained ISO 9001, IATF 16949, and IECQ QC 080000 certifications. To meet the specific usage requirements of CSC's customers, certain Zn-Coated steel products have obtained various country certifications, including Japan's JIS Mark, Malaysia's SIRIM, India's BIS, Vietnam's QUATEST 3, Thailand's TISI, Korea's KS and have received recognition from renowned automotive manufacturers. In fulfillment of CSC's commitment to environmental sustainability, CSC has developed high-recycled steel and became the first steel mill in the world to obtain the certificate of UL 2809 validation. Additionally, CSC regularly outsources the testing of the chemical composition of steel products to ensure compliance with relevant international regulations on restricted hazardous substances. As a result, CSC's products are of excellent quality and can be trusted, providing customers with the assurance to use them confidently.

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) Zn-Coated steel

EG/CG

Equipped 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.

High lubricant Galvanized Steel

CG

Excellent lubricity and friction resistance with high lubricity coating. The product passes long-term durability and opening/closing tests. Suitable for slide rail materials in server bases, home appliances(refrigerators) and other applications

Chromated-free passivation Galvannealed Steel

CG

Compared with chromated passivation, this product is chromated-free which has excellent corrosion resistance and good paintability of environmental protection. Suitable for steel doors, steel rolling doors and other building materials.

GA Lubricating Zn-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.

Full Range of Automotive Steels

CG

The hot-dip galvanized & galvannealed automotive steel series covers a complete range from general commercial grade (270 MPa class) to high-strength grades such as 980 MPa dual-phase steels, complex-phase steels, bake hardening (BH) steels, and extra-deep drawing steels, offering both high strength and formability to meet the demands of lightweight and safe vehicle structures.

High Strength Galvanized/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 lightweight body and high security applications.

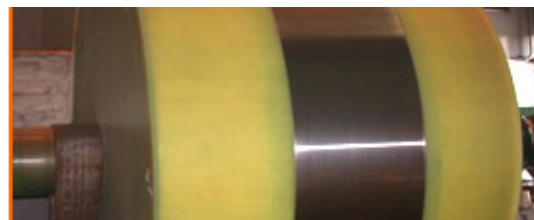
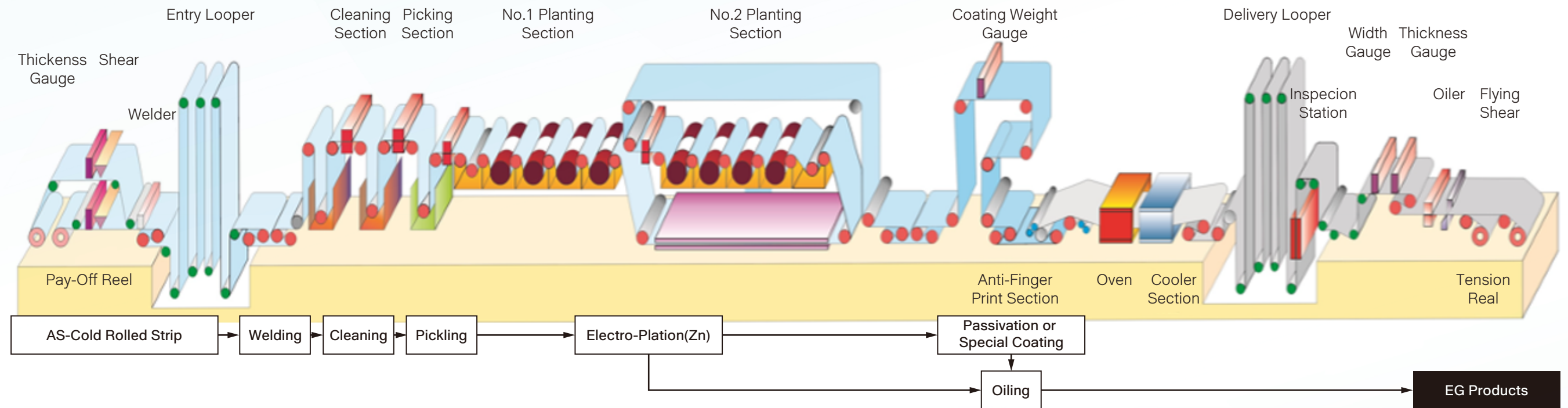
Single-sided Electro-Galvanized Oiled Products

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.

Painted application of R-coating Electro-Galvanized products

CSC R-coating EG product, compared to phosphated treatment (P), exhibits excellent corrosion resistance and paint coating properties. It complies with environmental regulations, containing no trivalent or hexavalent chromium components. Suitable for painting purposes on steel doors, electrical enclosures, and other coated applications

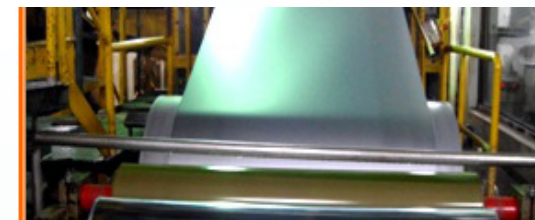
Manufacturing Processes of Electroplated Galvanizing Line(EGL)



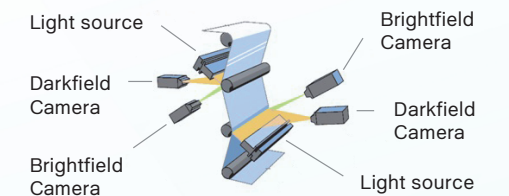
CAROSEL Conductor Roll



Electroplating with CAROSEL



Coating Area



ASIS (EGL/CGL)
(Automated Surface Inspection
System)

Consumable
Anode
Radial
One
Side
Electroplating
Line

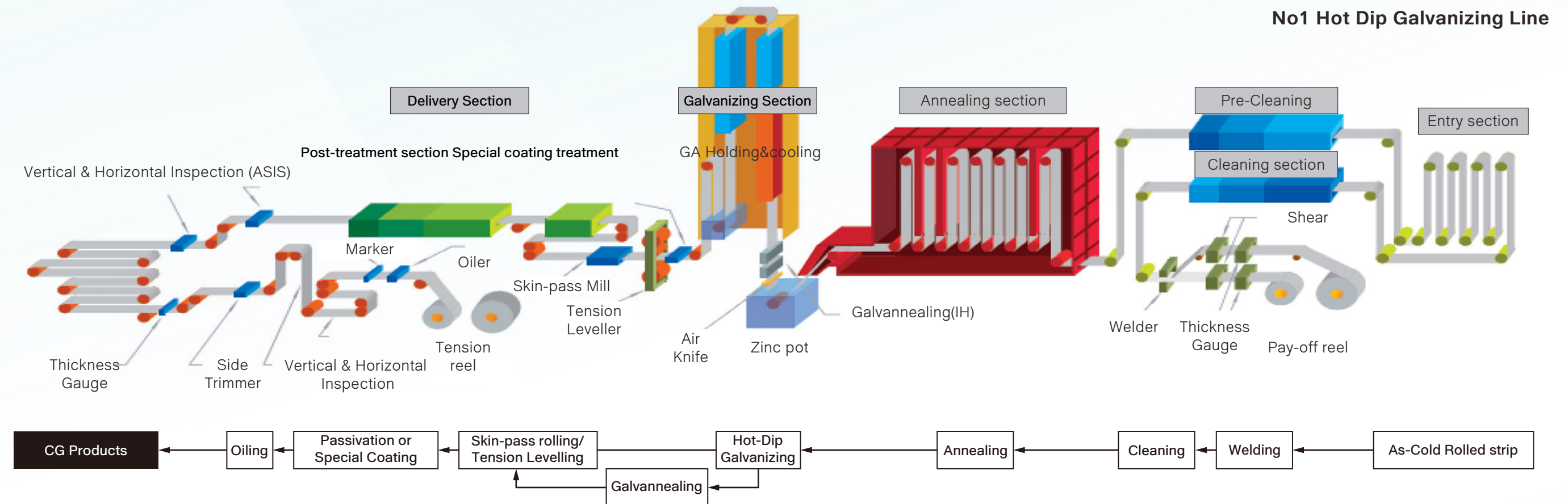
CSC is using UEC' s patent: CAROSEL. Zinc is coated layer-by-layer and uniformly through electrochemical reactions. The unique feature of CAROSEL is to use 4 individual tanks (for each side of strip), thus single-sided electroplated galvanizing coils are applicable.

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

The advantages of ASIS are as follows:

- (1) Overall consecutive automatic inspectionsignificantly 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)



Continuous Annealing Furnace

During the annealing process, cold-rolled strips will re-crystallize and eliminate residual inner stress to improve mechanical properties. The protective gas in the furnace will also help zinc adhesion to the surface of strips.



Zinc-coating Bath

Annealed strips will then enter the Zinc bath where Zinc bath is at 460°C. The composition of Zinc bath is periodically analyzed and cleaned, and its temperature is steadily controlled.



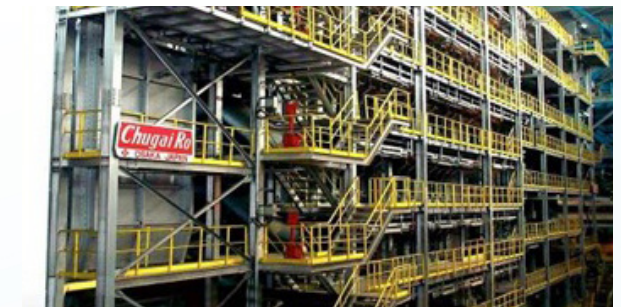
Galvannealing Furnace

High-frequency induced heater is applied to enhance GA alloying and its uniformity.



Skin-pass Mill & Tension Leveler

Eliminating the yield point of steel, endowing the strip with surface roughness, and improving the flatness.



Post-treatment Coating Area

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



Automobile



Furniture



Computer Case



Power Supply Case



TV Back Plate



Slide



MP980 Ultra-High Strength Bumper Beam



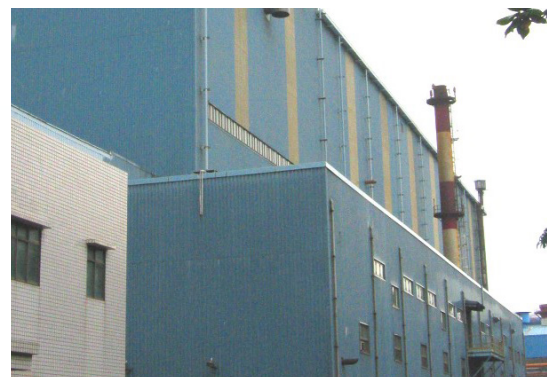
Shelf Bracket



Painted Steel Drawer



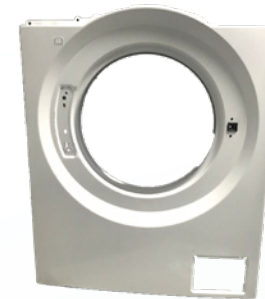
Ceiling Suspension Frame and Steel Frame



Color sheet (Roof)



Galvanized Structural C-Channel



Washing Machine Case



EG Motor Case



Antenna



Steel door



Kitchenware and Home Appliance

6.1 Chemical Compositions and Mechanical Properties

Chemical Compositions

The guaranteed chemical compositions are in accordance with international standards and are based on molten steel analysis. It shall be noted that there may be permissible deviations between molten steel analysis and product analysis. The permissible deviation range is determined by the relevant international standards, such as JIS G0321, SAE J409, and ASTM A6.

6.1.1 Hot-Dip Galvanizing Steel

(1) CNS 1244: 2013

Chemical composition

Unit : %

Symbol of grade	C	Mn	P	S
SGCC	0.15 max.	0.80 max.	0.05 max.	0.05 max.
SGCD1	0.06 max.	0.50 max.	0.04 max.	0.04 max.
SGCD2	0.02 max.	0.40 max.	0.03 max.	0.03 max.
SGCD3	0.02 max.	0.40 max.	0.03 max.	0.03 max.
SGCD4	0.02 max.	0.40 max.	0.03 max.	0.03 max.
SGC340	0.25 max.	1.70 max.	0.20 max.	0.05 max.
SGC400	0.25 max.	1.70 max.	0.20 max.	0.05 max.
SGC440	0.25 max.	2.00 max.	0.20 max.	0.05 max.
SGC490	0.30 max.	2.00 max.	0.20 max.	0.05 max.
SGC490M	0.30 max.	2.00 max.	0.20 max.	0.05 max.

Note : Except SGCD1-SGCD4, the content of Boron shall be <0.0008%

Bend test

Symbol of grade	Bending Angle	Internal Spacing of Bend (Number of Sheets of Nominal Thickness)	
		Nominal Thickness(t) Mm	
		t < 3.0	
		Coating Mass Symbol	
		Z06 to Z27	
SGCC	180°	1	
SGCD1		1	
SGCD2		0 (flat on itself)	
SGCD3			
SGCD4			
SGC340		1	
SGC400		2	
SGC440		3	
SGC490			
SGC490M			

Tensile test characteristic

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						
			0.25 ≤ 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	(205 min.)	(270 min.)	–	–	–	–	–	–	JIS No.5 in rolling direction
SGCD1	–	270 min.	–	34 min.	36 min.	37 min.	38 min.	–	
SGCD2	–	270 min.	–	36 min.	38 min.	39 min.	40 min.	–	
SGCD3	–	270 min.	–	38 min.	40 min.	41 min.	42 min.	–	
SGCD4(*)	–	270 min.	–	40 min.	42 min.	43 min.	44 min.	–	
SGC340	245 min.	340 min.	20 min.	20 min.	20 min.	20 min.	20 min.	20 min.	JIS No.5 in rolling direction or perpendicular to the rolling direction
SGC400	295 min.	400 min.	18 min.	18 min.	18 min.	18 min.	18 min.	18 min.	
SGC440	335 min.	440 min.	18 min.	18 min.	18 min.	18 min.	18 min.	18 min.	
SGC490	365 min.	490 min.	16 min.	16 min.	16 min.	16 min.	16 min.	16 min.	
SGC490M	410 min.	490 min.	12 min.	12 min.	12 min.	12 min.	12 min.	12 min.	

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. It could be agreed between purchaser and manufacture.

(2) JIS G3302: 2022

Chemical composition

Unit : %

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

Bend test

Symbol of Grade	Bending Angle	Internal Spacing of Bend (Number of Sheets of Nominal Thickness)	
		Nominal Thickness(t) mm	
		t < 3.0	
		Coating Mass Symbol	
		Z06 to Z27	
SGCC	180 °	1	
SGCD1		1	
SGCD2		0 (flat on itself)	
SGCD3			
SGCD4			
SGC340		1	
SGC400		2	
SGC440		3	
SGC490			

Tensile test characteristic

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						
			0.25 ≤ 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 ≤ 3.2	
SGCC	(205min.)	(270min.)	–	–	–	–	–	–	JIS No.5 in rolling direction
SGCD1	–	270 min.	32 min.	34 min.	36 min.	37 min.	38 min.	–	
SGCD2	–	270 min.	–	36 min.	38 min.	39 min.	40 min.	–	
SGCD3	–	270 min.	–	–	40 min.	41 min.	42 min.	–	
SGCD4(*)	–	270 min.	–	–	42 min.	43 min.	44 min.	–	
SGC340	245 min.	340 min.	20 min.	20 min.	20 min.	20 min.	20 min.	20 min.	JIS No.5 in rolling direction or perpendicular to the rolling direction
SGC400	295 min.	400 min.	18 min.	18 min.	18 min.	18 min.	18 min.	18 min.	
SGC440	335 min.	440 min.	18 min.	18 min.	18 min.	18 min.	18 min.	18 min.	
SGC490	365 min.	490 min.	16 min.	16 min.	16 min.	16 min.	16 min.	16 min.	

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. It could be agreed between purchaser and manufacture.

(3) ASTM A653/A653M-23

Chemical composition

Unit : %

Symbol of grade	C	Mn	P	S	Al	Cu	Ni	Cr	Mo	V	Nb	Ti
CS Type A ^{1,2,3}	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 ^{1,4}	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 ^{1,2,3}	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 ^{1,5}	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 ^{1,4}	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 ^{2,3}	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 ^{2,3}	0.02 max.	0.50 max.	0.020~0.100	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 ⁶	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. 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.

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

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

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

5. Shall not be furnished as a stabilized steel.

6. Shall be furnished as a stabilized steel.

(4) EN 10346 Low Carbon Steel for Cold Forming

Chemical Composition and Mechanical Properties

Steel grade	Type of coating	C	Si	Mn	P	S	Ti	Yield stress N/mm ²	Tensile stress N/mm ²	Elongation ⁽¹⁾ min.(%)	Plastic strain ratio min.	Strain hardening exponent min.		
		max.(%)												
DX51D	GI/GA	0.18	0.50	1.2	0.12	0.045	0.30	-	270~500	22	-	-		
DX52D	GI/GA	0.12		0.60	0.10			0.045	0.30	140~300	270~420	26	-	-
DX53D	GI/GA									140~260	270~380	30	-	-
DX54D	GI									120~220	260~350	36	1.6 ⁽²⁾	0.18
	GA									120~220		34	1.4 ⁽²⁾	0.18
DX56D	GI									120~180		39	1.9 ⁽²⁾	0.21
	GA									120~180		37	1.7 ^{(2) (3)}	0.20 ⁽³⁾
DX57D	GI									120~170		41	2.1 ⁽²⁾	0.22
	GA									120~170		39	1.9 ^{(2) (3)}	0.21 ⁽³⁾

Note : 1. Decrease min. elongation values apply for product thickness

0.50mm < t ≤ 0.70mm (minus 2%) ;

0.35mm < t ≤ 0.50mm (minus 4%) ;

t ≤ 0.35mm (minus 7%)

2. Decrease min. Plastic strain ratio values apply for product thickness 1.5mm < t < 2 mm (minus 0.2) ;

t ≥ 2 mm (minus 0.4)

3. Decrease min. Plastic strain ratio values apply for product thickness

0.50mm < t ≤ 0.70mm (minus 0.2) ;

0.35mm < t ≤ 0.50mm (minus 0.4) ;

t ≤ 0.35mm (minus 0.6)

Decrease min. Strain hardening exponent values apply for product thickness 0.50mm < t ≤ 0.70mm (minus 0.01) ;

0.35mm < t ≤ 0.50mm (minus 0.03) ;

t ≤ 0.35mm (minus 0.04)

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

(5) EN 10346 High Strength Steel for Cold Forming

Chemical Composition and Mechanical Properties

Steel grade	C Max	Si max	Mn max	P max	S max.	Al _{total}	Nb max.	Ti max.	Proof strength R _{p0.2} ^(a) MPa ^(f)	Bake Hardening Index BH ₂ MPa ^(f) min.	Tensile strength R _m MPa ^(f)	Elongation A ₈₀ ^(b,c) % min.	Plastic strain ratio r ₉₀ ^(c,d,e) min.	Strain hardening exponent n ₉₀ ^(e) min.
	%													
HX180YD	0.01	0.30	0.70	0.060	0.025	≧ 0.010	0.09	0.12	180~240	—	330~390	34	1.7	0.18
HX180BD	0.06	0.50	0.70	0.060	0.025	≧ 0.015	0.09	0.12	180~240	30	290~360	34	1.5	0.16
HX220YD	0.01	0.30	0.90	0.080	0.025	≧ 0.010	0.09	0.12	220~280	—	340~420	32	1.5	0.17
HX220BD	0.08	0.50	0.70	0.085	0.025	≧ 0.015	0.09	0.12	220~280	30	320~400	32	1.2	0.15
HX260YD	0.01	0.30	1.60	0.10	0.025	≧ 0.010	0.09	0.12	260~320	—	380~440	30	1.4	0.16
HX260BD	0.10	0.50	1.00	0.10	0.030	≧ 0.010	0.09	0.12	260~320	30	360~440	28	—	—
HX260LAD	0.11	0.50	1.00	0.030	0.025	≧ 0.015	0.09	0.15	260~330	—	350~430	26	—	—
HX300YD	0.015	0.30	1.60	0.10	0.025	≧ 0.010	0.09	0.12	300~360	—	390~470	27	1.3	0.15
HX300BD	0.11	0.50	0.80	0.12	0.025	≧ 0.010	0.09	0.12	300~360	30	400~480	26	—	—
HX300LAD	0.12	0.50	1.40	0.030	0.025	≧ 0.015	0.09	0.15	300~380	—	380~480	23	—	—
HX340LAD	0.12	0.50	1.4	0.030	0.025	≧ 0.015	0.10	0.15	340~420	—	410~510	21	—	—
HX380LAD	0.12	0.50	1.5	0.030	0.025	≧ 0.015	0.10	0.15	380~480	—	440~560	19	—	—
HX420LAD	0.12	0.50	1.6	0.030	0.025	≧ 0.015	0.10	0.15	420~520	—	470~590	17	—	—
HX460LAD	0.15	0.50	1.7	0.030	0.025	≧ 0.015	0.10	0.15	460~560	—	500~640	15	—	—
HX500LAD	0.15	0.50	1.7	0.030	0.025	≧ 0.015	0.10	0.15	500~620	—	530~690	13	—	—

Note : (a) If the yield strength is pronounced, the values apply to the lower yield point (R_{eL}).

(b) Decreased minimum elongation values apply for product thickness

0.50mm < t ≤ 0.70mm (minus 2 units)

0.35mm < t ≤ 0.50mm (minus 4 units) ;

t ≤ 0.35mm (minus 7 units)

(c) For ZF coatings, the minimum A₈₀ value reduced by 2 units and the minimum r₉₀-value reduced by 0.2 apply.

(d) Decreased minimum r₉₀-values apply for product thickness 1.5 < t < 2 mm (minus 0.2); t ≥ 2 mm (minus 0.4)

(e) Decreased minimum r₉₀-values apply for product thickness 0.50mm < t ≤ 0.70mm (minus 0.2)

0.35mm < t ≤ 0.50mm (minus 0.4) ; t ≤ 0.35mm (minus 0.6)

Decreased minimum n₉₀-values apply for product thickness 0.50mm < t ≤ 0.70mm (minus 0.01).

0.35mm < t ≤ 0.50mm (minus 0.03) ; t ≤ 0.35mm (minus 0.04)

(f) 1 MPa = 1 N/mm²

(g) The value of the tensile test apply for transverse pieces.

(6) EN 10346: 2015 Steels for construction

Chemical Composition and Mechanical Properties

Steel grade	C	Si	Mn	P	S	Proof strength R _{p0,2} MPa	Tensile strength R _m MPa	Elongation A ₈₀ ^(a) % min.
	max.(%)							
S220GD	0.20	0.60	1.70	0.10	0.045	220	300	20
S250GD						250	330	19
S280GD						280	360	18
S320GD						320	390	17
S350GD						350	420	16

Note : (a) Decreased minimum elongation values apply for product thickness:

0.50mm < t ≤ 0.70mm (minus 2 units).

0.35mm < t ≤ 0.50mm (minus 4 units);

t ≤ 0.35mm (minus 7 units).

(b) 1 MPa = 1 N/mm².

(c) The value of the tensile test apply for longitudinal pieces.

(7) EN 10346: 2015 Dual-phase steels for cold forming

Chemical Composition

Steel grade	C	Si	Mn	P	S	Al _{total}	Cr+Mo	Nb+Ti	V	B	Proof strength R _{p0.2} MPa ^(a)	Tensile strength R _m MPa ^(a)	Elongation A ₈₀ ^(b, c) % min.	Strain hardening exponent n _{10-UE} min.	Bake Hardening Index BH ₂ MPa ^(a) min.	
	max.					-	max.									
	(%)															
HCT590X	0.15	0.75	2.50	0.040	0.015	0.015 ~1.5	1.40	0.15	0.20	0.005	330 ~ 430	590	20	0.14	30	
HCT780X	0.18	0.80	2.50	0.080	0.015	0.015 ~2.0	1.40	0.15	0.20	0.005	440 ~ 550	780	14	-	30	
HCT980X	0.20	1.00	2.90	0.080	0.015	0.015 ~2.0	1.40	0.15	0.20	0.005	590 ~ 740	980	10	-	30	

Note : (a) 1 MPa = 1 N/mm².

(b) Decreased minimum elongation values apply for product thickness t < 0.60 mm (minus 2 units)

(c) For ZF coatings the minimum elongation value reduced by 2 units applies. For ZF coatings in product thickness t < 0,60 mm, the minimum elongation value reduced by 4 units applies.

(d) The value of the tensile test apply for longitudinal pieces.

(8) CSC 370P

Steel grade	Tensile test					
	Tensile stress N/mm ²	Yield stress N/mm ²	Elongation %	Test peice	Plastic strain ratio	Test piece
	Thickness(t) mm				Thickness(t) mm	
	0.50 ≦ t < 2.30				0.50 ≦ t < 2.30	
CSC370P	370 min.	175~285	32~44	JIS No.5 Perpendicular to rolling direction	1.20 min.	JIS No.13 Perpendicular to rolling direction

6.1.2 Electrolytic Galvanizing Steel

JIS G3313: 2021

Chemical Composition (%)

Unit : %

Symbol of grade	C	Mn	P	S
SECC	0.15 max.	1.0 max.	0.100 max.	0.035 max.
SECD	0.10 max.	0.50 max.	0.040 max.	0.035 max.
SECE	0.08 max.	0.45 max.	0.030 max.	0.030 max.
SECF	0.06 max.	0.45 max.	0.030 max.	0.030 max.
SECG	0.02 max.	0.25 max.	0.020 max.	0.020 max.

Mechanical Properties

Symbol of grade	Yield point or proof stress N/mm ²	Tensile stress N/mm ²	Elongation %					Test piece and direction
			Nominal Thickness(t) mm					
			0.30 ≤ t < 0.40	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⁾	-	270 min.	31 min.	34 min.	36 min.	37 min.	38 min.	
SECD	-	270 min.	33 min.	36 min.	38 min.	39 min.	40 min.	
SECE	-	270 min.	35 min.	38 min.	40 min.	41 min.	42 min.	
SECF ⁽²⁾	-	270 min.	-	40 min.	42 min.	43 min.	44 min.	
SECG ⁽²⁾	-	270 min.	-	42 min.	44 min.	45 min.	46 min.	

Note : 1. Applied to SECC when the purchaser has designated a tensile test for it.

2. For the sheet and coil of SGCD4, the stretcher strain shall not be generated when working is performed during 6 months after manufacturing.

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 grades	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.

CSC Electrolytic Galvanizing Steel

Chemical Composition (%)

Unit : %

Symbol of grade	C	Mn	P	S
SECC1	0.15 max.	1.0 max.	0.100 max.	0.035 max.
SECC2	0.15 max.	1.0 max.	0.100 max.	0.035 max.
SECD	0.10 max.	0.50 max.	0.040 max.	0.035 max.
SECE	0.08 max.	0.45 max.	0.030 max.	0.030 max.
SECF	0.06 max.	0.45 max.	0.030 max.	0.030 max.
SECG	0.02 max.	0.25 max.	0.020 max.	0.020 max.

Mechanical Properties

Symbol of grade	Yield point or proof stress N/mm ²	Tensile stress N/mm ²	Elongation %					Test piece and direction
			Nominal Thickness(t) mm					
			0.30 ≦ t < 0.40	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	-	270 min.	33 min.	36 min.	38 min.	39 min.	40 min.	
SECE	-	270 min.	35 min.	38 min.	40 min.	41 min.	42 min.	
SECF	-	270 min.	-	40 min.	42 min.	43 min.	44 min.	

6.1.3 Coating mass 、Chemical treatment 、Spangle and Oiling

6.1.3.1 Hot-Dip Galvanizing Steel

(1) CNS 1244

Classification and symbol of surface finish for non-alloy coating

Classification of coating surface finish	Symbol	Definition
Minimized spangle	Z	Surface finish obtained by restricting spangle formation

Coating Mass & Equivalent Coating Thickness

Coating mass symbol	Z06	Z08	Z09	Z10	Z12	Z14	Z18	Z20
Minimum triple-spot average coating mass (g/m ²)	60	80	90	100	120	140	180	200
Equivalent coating thickness (mm)	0.010	0.013	0.014	0.015	0.018	0.021	0.027	0.029

Coating mass symbol	Z22	Z25	Z27	F06	F08	F10	F12
Minimum triple-spot average coating mass (g/m ²)	220	250	275	60	80	100	120
Equivalent coating thickness (mm)	0.032	0.036	0.040	0.010	0.012	0.015	0.018

Type and symbol of chemical treatment

Type of chemical treatment	Symbol
Untreated	M
Phosphate treatment	P
Chromate treatment	C
Chromate-free treatment	NC
Chromate-free anti-finger print treatment	NF

Type and symbol of oiling

Type of oiling	Symbol
Oiled	O
Uncoiled	X

Note : Unless otherwise specified, non-alloyed coating (GI) is generally not oiled, while alloyed coating (GA) is oiled.

(2) JIS G3302

Classification and symbol of surface finish for non-alloy coating

Classification of coating surface finish	Symbol	Definition
Minimized spangle	Z	Surface finish obtained by restricting spangle formation

Coating Mass & Equivalent Coating Thickness

Coating mass symbol	Z06	Z08	Z10	Z12	Z14	Z18	Z20	Z22
Minimum triple-spot average coating mass (g/m ²)	60	80	100	120	140	180	200	220
Equivalent coating thickness (mm)	0.013	0.017	0.021	0.026	0.029	0.034	0.040	0.043

Coating mass symbol	Z25	Z27	F06	F08	F10	F12
Minimum triple-spot average coating mass (g/m ²)	250	275	60	80	100	120
Equivalent coating thickness (mm)	0.049	0.054	0.013	0.017	0.021	0.026

Type and symbol of chemical treatment

Type of chemical treatment	Symbol
Untreated	M
Chromate-free treatment	NC
Chromate-free anti-finger print treatment	B

Note : The symbol for chromate-free treatment shall be as agreed between manufacturer and purchaser.

Type and symbol of oiling

Type of oiling	Symbol
Oiled	O
Uncoiled	X

Note : Unless otherwise specified, the non-alloyed coating shall be uncoiled and the alloyed coating shall be oiled.

(3) ASTM A653/A653M

Classification and symbol of surface finish for non-alloy coating

Classification of coating surface finish	Symbol	Definition
Minimized spangle	-	Surface finish obtained by restricting spangle formation

Coating mass

Inch-Pound Units		SI Units	
Coating mass symbol	Minimum triple-spot coating mass (oz/ft ²)	Coating mass symbol	Minimum triple-spot coating mass (g/m ²)
G01	0.01	Z03	3
G30	0.30	Z90	90
G40	0.40	Z120	120
G60	0.60	Z180	180
G90	0.90	Z275	275
A01	0.01	ZF03	3
A25	0.25	ZF75	75
A40	0.40	ZF120	120

Type and symbol of chemical treatment

Type of chemical treatment	Symbol
Untreated	M
Chromate treatment	C
Chromate-free treatment	NC
Chromate-free anti-finger print treatment	B

Note : If the chemical treatment is not in the table above that can depend on the agreement of round turns

Type and symbol of oiling

Type of oiling	Symbol
Oiled	O
Uncoiled	X

Note : Unless otherwise specified, the non-alloyed coating shall be uncoiled and the alloyed coating shall be oiled.

(4) EN 10346

Classification and symbol of surface finish for non-alloy coating

Type of coating surface finish	Symbol	Remark
Minimized spangle	M	Surface finish obtained by restricting spangle formation

Coating Mass

Coating mass symbol	Z100	Z140	Z200	Z225	Z275	ZF100	ZF120
Minimum triple-spot coating mass (g/m ²)	100	140	200	225	275	100	120
Equivalent coating thickness (mm)	0.014	0.020	0.028	0.032	0.040	0.014	0.016

Type and symbol of chemical treatment

Type of chemical treatment	Symbol
Untreated	-
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	-

Note : Unless otherwise specified, the non-alloyed coating shall be uncoiled and the alloyed coating shall be oiled.

Type and symbol of surface qualities

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

6.1.3.2 Electrolytic Galvanizing Steel

JIS G3313/CSC Specification

Coating Mass & Equivalent coating thickness

JIS G3313 Symbol for one-side coating mass	Minimum triple-spot coating mass(one-side) (g/m ²)		Equivalent coating one side thickness (mm)	corresponding to CSC spec
	Equal coating	Differential coating		
ES	-	(1)	-	ZZ00
E8	8.5	8	0.001	ZZ10
E16	17.0	16	0.003	ZZ20

Note : (1) The maximum coating mass shall be specified, which is no more than 50 mg/m² in any parts excluding the edges (in the width direction)

Type and symbol of chemical treatment

Type of chemical treatment	Symbol
Untreated	-
Chromate-free anti-finger treated	A
R coating	R

Type and symbol of oiling

Type of oiling	Symbol
Oiled	O
Uncoiled	X

6.2 Tolerances

6.2.1 IS G3302 & CNS 1244 Thickness tolerance for Hot-Dip Galvanizing Steel

Unit : mm

Nominal Thickness(t) Width (w)	Thickness Tolerance			
	630 ≤ w < 1000	1000 ≤ w < 1250	1250 ≤ w < 1600	1600 ≤ w
0.25 ≤ t < 0.40	± 0.05	± 0.05	± 0.06	–
0.40 ≤ t < 0.60	± 0.06	± 0.06	± 0.07	± 0.08
0.60 ≤ t < 0.80	± 0.07	± 0.07	± 0.07	± 0.08
0.80 ≤ t < 1.00	± 0.07	± 0.08	± 0.09	± 0.10
1.00 ≤ t < 1.25	± 0.08	± 0.09	± 0.10	± 0.12
1.25 ≤ t < 1.60	± 0.10	± 0.11	± 0.12	± 0.14
1.60 ≤ t < 2.00	± 0.12	± 0.13	± 0.14	± 0.16
2.00 ≤ 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)

6.2.2 JIS G3302 & CNS 1244 Width tolerance for Hot-Dip Galvanizing Steel

Unit : mm

Width (w)	tolerance on product width
w ≤ 1500	+7 0
1500 < w	+10 0

6.2.3 JIS G3302 & CNS 1244 Flatness tolerance for Hot-Dip Galvanizing Steel

Unit : mm

Width (w) Type of strain	Flatness tolerance (max.)		
	Bow, wave	Edge wave ⁽¹⁾	Centre buckle ⁽²⁾
w < 1000	12	8	6
1000 ≤ w < 1250	15	9	8
1250 ≤ w < 1600	15	11	8
1600 ≤ 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.

6.2.4 JIS G3302 & CNS 1244 Camber tolerance for Hot-Dip Galvanizing Steel

Unit : mm

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

6.2.5 ASTM A924M Thickness tolerance for Hot-Dip Galvanizing Steel

Thickness tolerance

Unit : mm

Thickness(t) \ Width (w)	Thickness tolerance	
	$w \leq 1500$	$w > 1500$
$t \leq 0.40$	± 0.04	± 0.04
$0.40 < t \leq 1.00$	± 0.05	± 0.05
$1.00 < t \leq 1.50$	± 0.065	± 0.065
$1.50 < t \leq 2.00$	± 0.075	± 0.075
$2.00 < t \leq 2.50$	± 0.100	± 0.115

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.

6.2.6 ASTM A924M Width, flatness, camber tolerance for Hot-Dip Galvanizing Steel

Width tolerance

Unit : mm

Width (w)	Width tolerance	
	Upper limit	Lower limit
$800 \leq w \leq 1200$	5	0
$1200 < w \leq 1500$	6	0
$1500 < w \leq 1800$	8	0

Flatness tolerance

Unit : mm

Width (w) \ Thickness(t)	Flatness tolerance (max.)	
	$t \leq 1.0$	$t > 1.0$
$w \leq 900$	10	8
$900 < w \leq 1500$	15	10
$1500 < w \leq 1800$	20	15

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.

Camber tolerance

Unit : mm

Length	Camber tolerance
In any 2000 length	Under 5

6.2.7 EN 10143 Thickness tolerance for Hot-Dip Galvanizing Steel

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

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.

Thickness tolerance for steel grades with specified minimum proof strength

$260\text{MPa} \leq R_{p0.2} < 360\text{MPa}$ and DX51D.

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.

Thickness tolerance for steel grades with specified minimum proof strength

$360\text{MPa} \leq R_{p0.2} < 420\text{MPa}$

Unit : mm

Nominal Thickness(t) \ Width (w)	$w \leq 1200$	$1200 < w \leq 1500$	$1500 < w$
$0.35 \leq t \leq 0.40$	± 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.

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

Unit : mm

Nominal Thickness(t) \ Width (w)	w \leq 1200	1200 < w \leq 1500	1500 < w
0.35 < 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.

6.2.8 EN10143 Width, flatness, camber tolerance for Hot-Dip Galvanizing 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 < 3.0
w < 1200	10	8
1200 \leq w < 1500	12	10
1500 \leq w	17	15

Note : Flatness tolerance for steel grades with specified minimum proof strength R_{p0.2} < 260MPa

Flatness tolerance

Unit : mm

Width (w) \ Thickness (t)	Flatness tolerance (max.)	
	t < 0.70	0.70 \leq t < 3.0
w < 1200	13	10
1200 \leq w < 1500	15	13
1500 \leq w	20	19

Note : Flatness tolerance for steel grades with specified minimum proof strength 260MPa \leq R_{p0.2} < 360MPa and DX51D.

Camber tolerance

Unit : mm

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

6.2.9 JIS G3313 Thickness tolerance for Electrolytic Galvanizing Steel

Unit : mm

Nominal Thickness(t) \ Width(w)	630 ≤ w < 1000	1000 ≤ w < 1250	1250 ≤ w < 1600
0.30 ≤ t < 0.40	± 0.04	± 0.04	–
0.40 ≤ t < 0.60	± 0.05	± 0.05	± 0.06
0.60 ≤ t < 0.80	± 0.06	± 0.06	± 0.06
0.80 ≤ t < 1.00	± 0.06	± 0.07	± 0.08
1.00 ≤ t < 1.25	± 0.07	± 0.08	± 0.09
1.25 ≤ t < 1.60	± 0.09	± 0.10	± 0.11
1.60 ≤ t < 2.00	± 0.11	± 0.12	± 0.13
2.00 ≤ 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)

6.2.10 JIS G3313 Width, flatness, camber tolerance for Electrolytic Galvanizing Steel

Width tolerance

Unit : mm

Width(w)	Width tolerance
w < 1250	+7 0
1250 ≤ 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 ≤ w < 1250	15	9	8
1250 ≤ w < 1600	15	11	8
1600 ≤ 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 ≤ w	2(Any portion 2,000 in length)

6.3 Classification of Quality

6.3.1 Hot-Dip Galvanizing Steel

Classification	Quality	Common Specification	Typical Application
For Forming Fabrication	1. Commercial Quality(CQ)	CNS 1244 SGCC 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
	2. Drawing & Deep Drawing Quality & Extreme Drawing Quality (DQ,DDQ,EDDQ)	CNS 1244 SGCD1~3 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	3. Structural Quality (SQ)	CNS 1244 SGC~XXX 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

6.3.2 Electrolytic galvanized Steel Coils

Classification	Quality	Common Specification	Typical Application
For Forming Fabrication	1. Commercial Quality (CQ)	JIS G3313 SECC CSC SECC1, SECC2	Computer case & parts、 Household electrical appliance、LCD-TV parts
	2. Drawing & Deep Drawing Quality & Extreme Drawing Quality (DQ,DDQ,EDDQ)	JIS G3313 SECD、SECE、SECF、SECG CSC SECD、SECE、SECF	Household、electrical appliance、Machine case... etc.

7.1 Unit mass

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

7.2 Available Sizes

unit : mm

Product Type	Thickness	Width	Coil Inside Diameter	Coil Outside Diameter
Hot-dip Galvanizing Coil	0.30 ~ 0.34	850 ~ 1221	508	2134 MAX.
	0.35 ~ 0.40	850 ~ 1221		
	0.41 ~ 0.50	850 ~ 1260		
	0.51 ~ 0.59	850 ~ 1525		
	0.60 ~ 0.69	850 ~ 1650	508/610 (Recommend 610)	
	0.70~0.94	850 ~ 1500		
	0.95~1.80	850 ~ 1500	610	
	1.81~ 2.40	850 ~ 1221		
Electrolytic Galvanizing Coil	0.30 ~ 0.37	1219	508	2134 MAX.
	0.38 ~ 0.59	914~1300		
	0.60 ~ 0.99	865~1525		
	1.00 ~ 1.61	914~1525	508/610	
	1.61 ~ 2.00	1000~1250	610	

Note : Please note that the information above is for reference only. For detailed information on the orderable size range of each specification, please refer to the official website (<https://www.csc.com.tw/>).

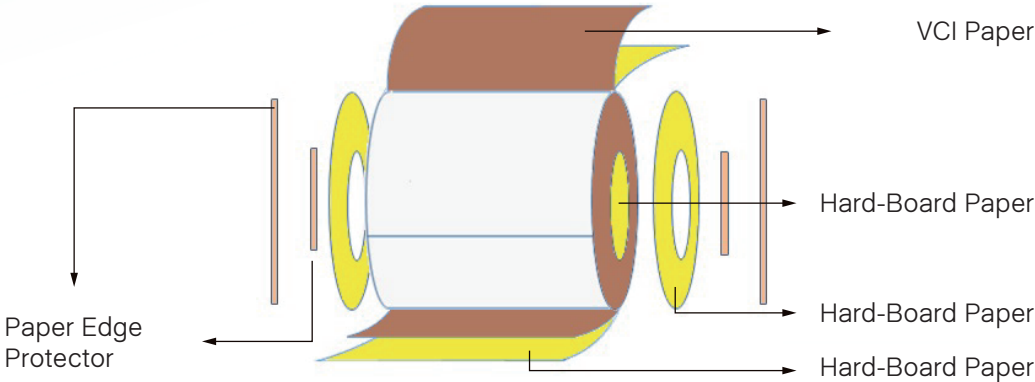
8.1 Marking for Zn-Coated steel

1		2	中國鋼鐵股份有限公司 China Steel Corporation	(Certification Marking)
Product name 品名	3	HDG – CGI COIL		
Specification 規格	4	DX54D		
Size 尺寸	5	0.700mm x 1650mm x COIL		
Identification no 鑑別代號	6	J772500		
Net mass 淨質量	7	22,620 kg	10	Quality type 品質型號 UE
Gross mass 總質量	8	22,700 kg		
Coating code 塗層代號	9	Z100 MB – 0	11	Heat no 爐號 5SJ63

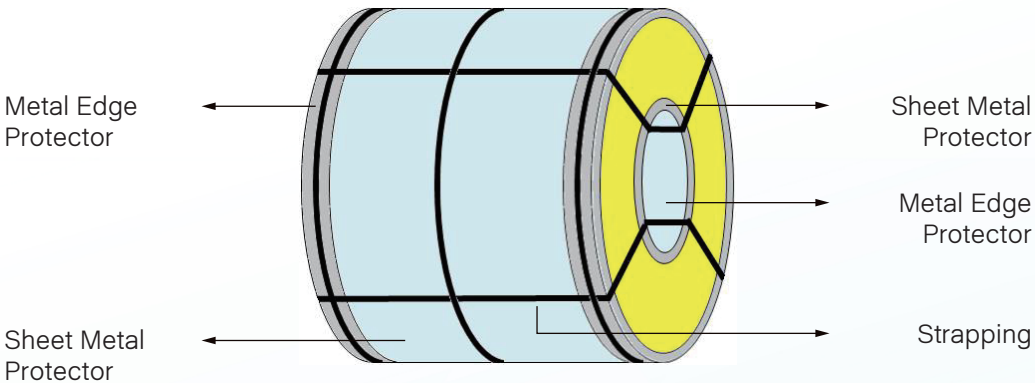
Product Category		Marking Item	Hot-Dip Galvanized Coil	Electrolytic Galvanized Coil
1	CSC logo		●	●
2	CSC name		●	●
3	Product name		●	●
4	Specification		●	●
5	Size		●	●
6	Identification no		●	●
7	Net mass		●	●
8	Gross mass		●	●
9	Coating code		●	●
10	Quality type		●	
11	Heat no		●	●

8.2 Packing for Zn-Coated steel

Inside packing



Outside packing



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



Rust Prevention

Zinc metal is susceptible to oxidation, and galvanized steel will readily form zinc oxide corrosion products on the surface if it has not been adequately treated. In general, an appropriate anti-corrosion oil or chemical treatment will be applied in accordance with the specifications set forth during the production process. Additionally, the steel sheet will be fully packaged to ensure its protection during transportation. However, during the storage and utilisation of steel coils, environmental factors will facilitate the oxidation and corrosion of the steel rolls or steel sheets, particularly in the context of high humidity and significant fluctuations in temperature. In particular, in conditions of high humidity and significant fluctuations in temperature, the formation of condensation is probable, necessitating a heightened awareness of the importance of preventing condensation and eliminating water at this juncture. Furthermore, the presence of dust or acidic air in the atmosphere can facilitate the onset of corrosion on the surface of the steel sheet. Consequently, these detrimental factors must be circumvented during the storage or processing phase to ensure the attainment of optimal surface quality. Subsequent to the unpacking of the steel coils It is recommended that the steel coils be processed and used as soon as possible to prevent long-term corrosion. In general, the unpacked steel coils should be used to prevent corrosion within 12 months of delivery from the factory.



Stretcher strain and Aging

There are solid solution Carbon and Nitrogen in the low carbon steels such as SGCC、ASTM CS、ASTM FS、DX51D、DX52D. 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(within 3~6 months of production) in order to avoid the aging problems



Blackening phenomenon

The typical corrosion of a zinc coating results in white zinc oxide (ZnO), which continues to protect the substrate even after oxidation. The blackening phenomenon, on the other hand, is a form of mild zinc oxidation and can be regarded as a transitional phase of zinc coating oxidation. The black color occurs primarily due to the extremely thin oxide layer, measuring only 50 to 100 nm, which strongly absorbs light and interferes with reflection from the substrate without displaying its own color. Despite the appearance, blackening does not impact corrosion resistance; the quality and protective properties of the oxidized zinc coating remain unchanged.

Zinc coating oxidation is a natural process, but high temperature and humidity can accelerate blackening. Proper moisture barriers and improvements to storage conditions can slow this process. Since blackening often occurs in long-term storage, particularly in areas of the coil exposed to moisture, it is recommended to use the steel coils promptly to avoid prolonged storage that may lead to blackening.

Storage and Transportation Damage

The galvanized coating has relatively low hardness, making it prone to surface damage or marks during storage and transportation due to heavy pressure, vibration, and other factors. Therefore, extra caution must be taken during these processes to mitigate related risks and ensure optimal surface quality.

Proper cushioning is essential to prevent steel coils from coming into direct contact with hard surfaces such as sleepers, pallets, or concrete. Use padded slings when hoisting to avoid direct coil contact. Avoid poor road conditions, sudden stops, or overloading during transportation.

Regularly inspect and replace worn or hardened protective pads. For enhanced packaging protection, contact our sales team when placing your order for tailored packaging and handling solutions.

Decontamination of film treatment coils after processing

The surfaces of galvanized steel sheets are often treated with anti-finger print or chromate-free 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 :

- 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.
- Please use the non-polar solvents to clean samples and graze it slightly. Do not use the polar organic solvents.
- If the products are needed to dry, the drying temperature and time are maximum 180°C and maximum 15 minutes respectively.

Painting

To further protect galvanized products or enhance their aesthetic and functional qualities, we offer a variety of coatings, including oiling, chromate treatment, anti-fingerprint treatment, and chromate-free passivation. The selection of painting types and application methods should be carefully considered based on the product's shape, application, and environmental requirements to ensure optimal coating under the most suitable conditions.

- 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 galvanized 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

- 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.
- 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.
- 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.

Welding

- To compare with cold-rolled steel sheets, the galvanized steel sheets have lower resistance values and need more welding current or longer welding time to obtain sufficient resistance welding heat.
- 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, it is unnecessary to replace or polish the electrode grinding during the use.
- If the welding parameters (welding time and welding current) can be adjusted properly, the galvanized steel sheets can get similar weld lobe curve and welding strength to the cold-rolled steel sheets.
- The resistance welding process as an example, if you want to weld the galvanized steel sheets (GA), please refer to the following table of suggested welding parameters to ensure stable welding quality.
- 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

Length			
ft	in.	mm	m
1	12	3.048	0.3048
0.08333	1	2.54	0.0254
0.003281	0.03937	1	0.001

Weight	Force
1 kg=2.20462 lb	1 kgf=9.80665 N

Stress			
ksi (=1000psi)	psi	kgf/mm ²	N/mm ² (MPa)
1	1000	0.703070	6.89476
0.001	1	0.703070 × 10 ⁻⁴	6.89476 × 10 ⁻³
1.42233	1422.33	1	9.80665
0.145038	145.038	1.101972	1

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

Conversion Table From HR30 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 ^(a)	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 ^(a)	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

Classification/ SPEC.	CNS 1244	JIS G3302	JFS A3011	ASTM A653	EN 10346
Mild Steel	SGCC	SGCC		CS A,B,C	DX51D
	SGCC	SGCC	JAC270C		DX52D
	SGCD1	SGCD1	JAC270D		DX53D
	SGCD2	SGCD2			
	SGCD3	SGCD3	JAC270E	DDS A	DX54D
	SGCD4	SGCD4	JAC270F	EDDS	DX56D
Bake-hardening Steel			JAC270H		HX180BD
			JAC340H		HX220BD
Deep-drawing Steel			JAC340P		HX220YD
			CSC 370P		HX260YD
			JAC390P		HX300YD
			JAC440P		
High Strength Steel			JAC340W		
			JAC390W		
			JAC440W		
High Yield Ratio Steel					HX260LAD
					HX300LAD
	SGC440	SGC440			HX340LAD
			JAC440R	HSLAS50(340)	
	SGC490	SGC490			HX380LAD
	SGC490M				HX420LAD
			JAC590R		HX500LAD
Low Yield Ratio Steel					HCT450X
					HCT490X
			JAC590Y		HCT590X
			JAC780Y		HCT780X
			JAC980Y		HCT980X
Structure Steel				SS 33(230)	S220GD
	SGC340	SGC340		SS 37(255)	S250GD
				SS 40(275)	S280GD
	SGC400	SGC400			S320GD

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

For prompt and proper processing of your inquiries and orders, please furnish complete details of items as shown in the box below. Please feel free to call CSC's Sales Offices or Metallurgical Department, if you need any information about CSC's products or services.

Required Ordering Data			Example
1	Specification (Name, Number, Grade)		JIS G3302 SGCC ZSBX Z12 UE
	Coating Type	ZZ(GI), ZF(GA)	
	Coating Thickness	Z08, Z12, F06, F08...etc.	
	Chemically Treatment Type	M, C, NC, B(NF)	
	Surface Quality	General (GP)	
		Exposed (GE)	
Unexposed (UE)			
2	Oiling		Uncoiled
3	Dimensions (Thickness × Width × Coil)		1.0mm × 1219mm × Coil
4	Coil size (Inside Dimensions)		ID 508mm
5	Weight	Max. Weight	7~10t
		Order Weight	100t
6	Application and Fabrication Methods		Household Electrical Appliances.
7	Special Requirements (if Required)		HRB 60max.

1. The contents of this catalog are for reference only-customers are urged to consult the specifications published by the corresponding Associations.
2. Information of the available steel grades, sizes, marking and packing as shown herein may be updated without notice to comply with actual production situations.
3. We invite you to contact our Head Office should you have any questions concerning steel specifications or ordering requirements.

1. Sales services

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E-mail	c00681@mail.csc.com.tw

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Fax	002-81-6-69100851
E-mail	gdwu@csgtjpn.co.jp

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E-mail	c00392@csgtsha.com

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Fax	65-62256054
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	BARS & WIRE RODS	886-7-8051092	ELECTRICAL STEEL	886-7-8051270
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