COLD ROLLED STEEL

Product Manual

CSC

COLD ROLLED
STEEL

CSC

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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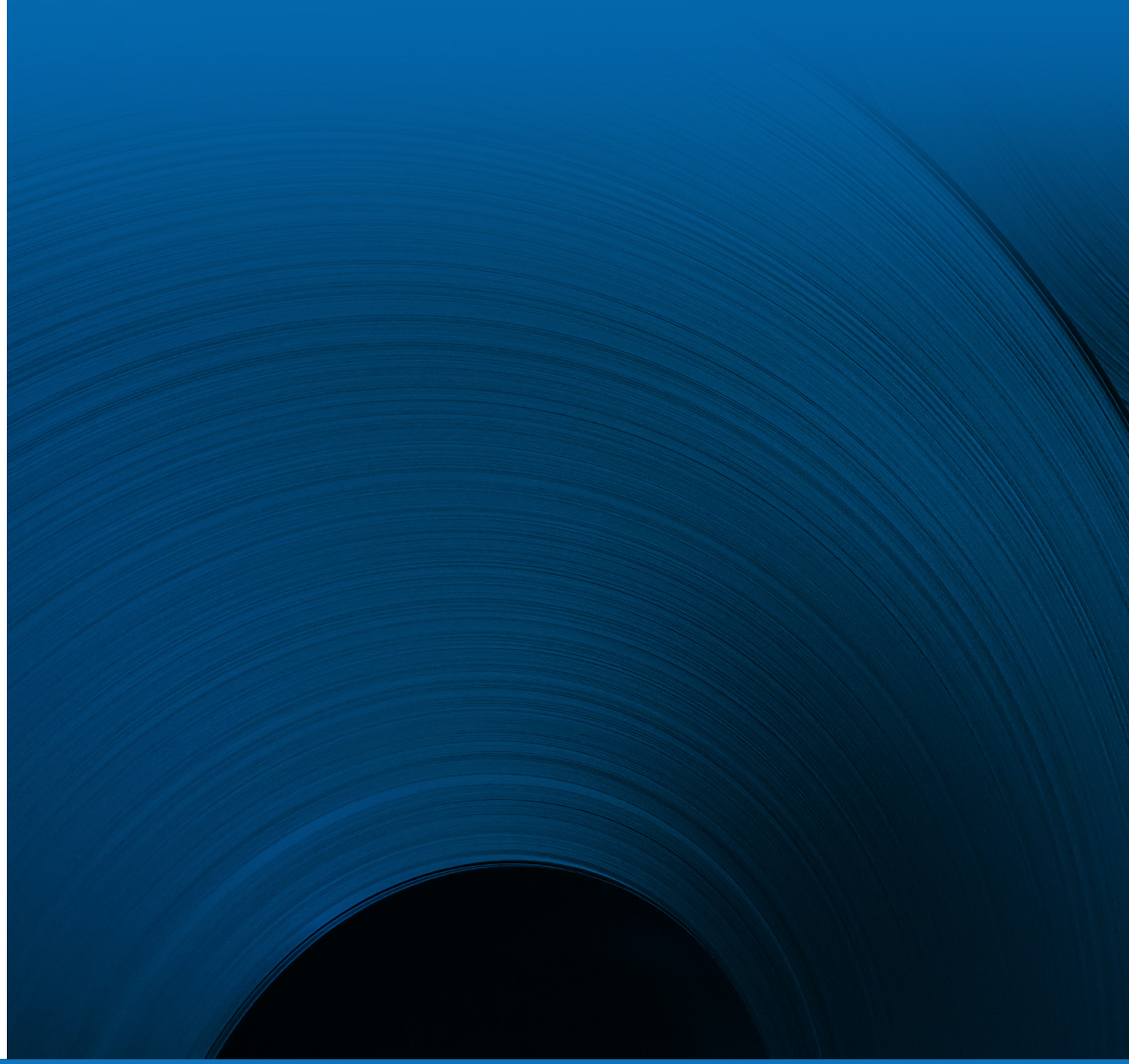
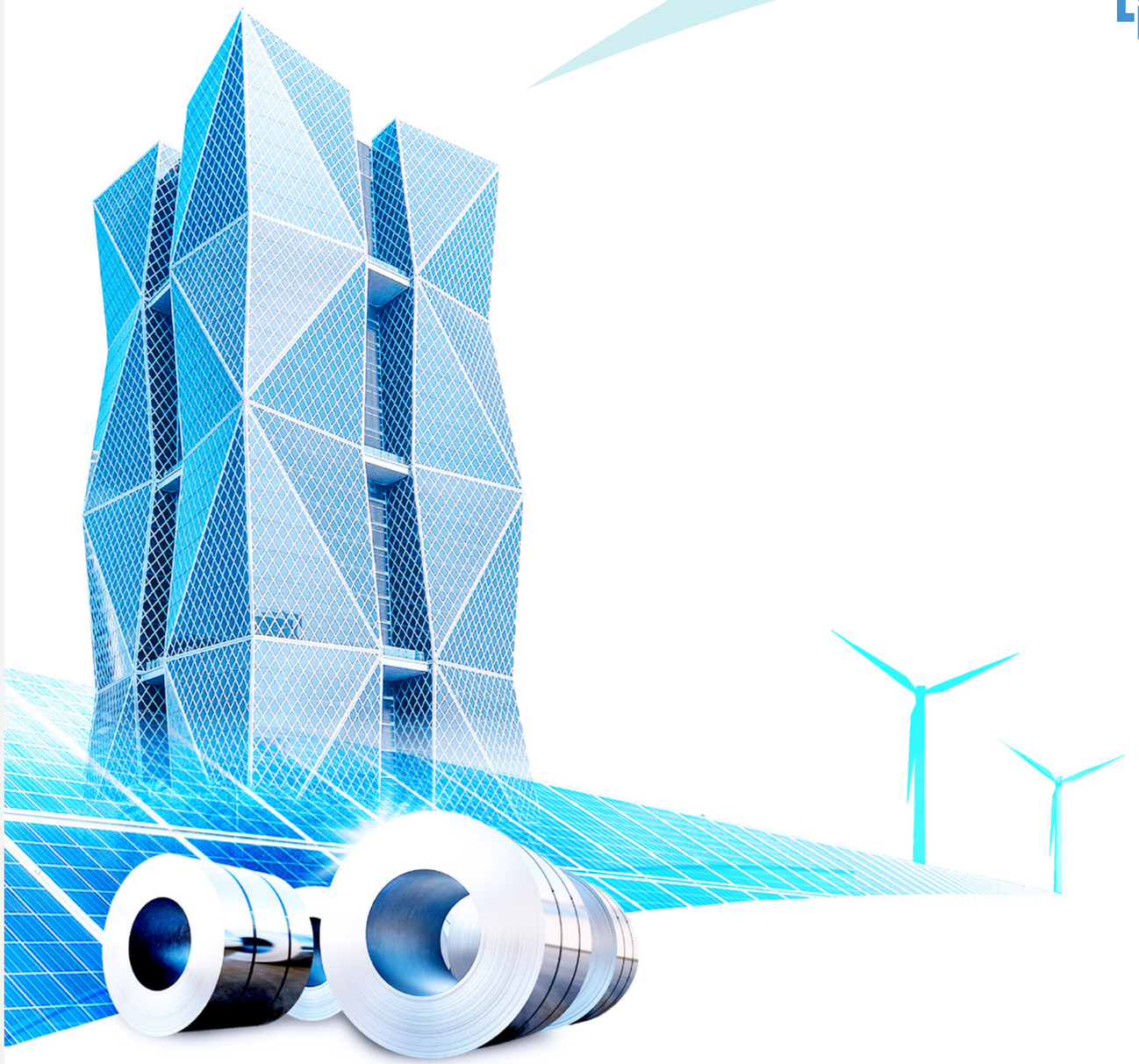




CSC

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 cold rolled products only.

CSC's Cold Rolling Mill has numerous and complete production lines. Through unceasing developments and improvements over the years, cold rolled products are diversified from narrow to wide, thin to thick, soft to hard and dull to bright. The available thickness of cold-rolled products can be provided is 0.20 ～ 3.20mm, and available width is 780 ～ 1830mm. They are available for various processing uses and have been sufficient to meet the requirements of industries, such as forming soft steels, high strength steel sheets with improved formability for automobile structures, automobile structure steels with high strength dual-phase, Martensitic Steel, Hot-Formed Steel, 3rd Generation AHSS, steel sheets for fine blanking, steel sheets for slide rails, decarburized steel sheets and strips for porcelain enameling, as well as cold-rolled medium carbon steels, high carbon steels, alloy steels and special steel strips, etc.

CSC has obtained ISO 9001, IATF 16949, and IECQ QC 080000 certifications. To meet the specific usage requirements of CSC's customers, certain cold-rolled steel products have obtained various country certifications, including Japan's JIS Mark, Malaysia's SIRIM, Vietnam's QUATEST 3, the European Union (Pressure Equipment Directive, or PED), Thailand's TISI, and have received recognition from renowned automotive manufacturers. In fulfillment of CSC's commitment to environmental sustainability, the high-recycled cold-rolled steel products passed the 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 driving related departments conducting product improvements on behalf of customers; (3) providing customers with the developed high-grade materials to meet the upgrade policy for domestic industries and increasing customers' competitness.

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 technical technologies to meet customers' demands and work with customer to increase competitiveness of the upstream and downstream steel industries.

Ultra-high strength & hole expansibility structural steel for automobile

JFS JSC980YH

The tensile strength of this model could reach 980 MPa above, which belongs to high yield ratio automobile steel. The metallurgic design select low carbon steel which added elements like manganese, chromium and molybdenum to enhance hardenability and inhibit ferrite and perlite. Coordinating with continuous annealing, it generate the bainite as main phase structure. By characteristics with high strength and superior hole expansibility, this is an important material for light-weighted energy saving automobile design including application for safety structural parts, bumper, seat skid parts, etc.

Ultra-high strength & high elongation structural steel for automobile

CSC CR980TT

The tensile strength of this model could reach 980 MPa above, which belongs to high elongation automobile steel. Material characteristics contain high elongation (≧ 15%), well forming ability and nice welding ability. Metallurgic design take modified-TRIP to generate bainite and retained austenite phase structures. Material could apply to safety structural parts, seat recliner, etc.

Ultra-high strength martensite steel for automobile

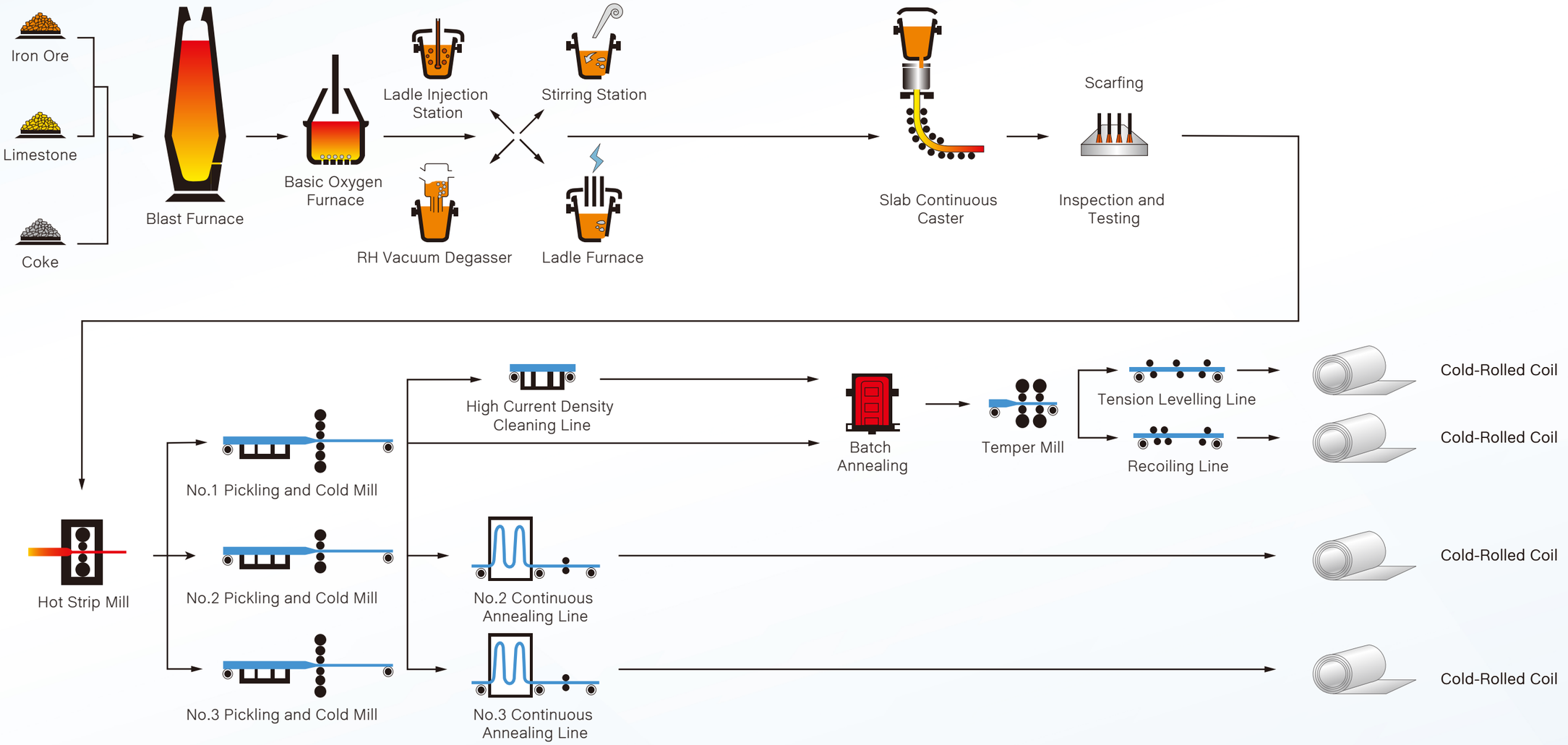
CSC CR1300T

The tensile strength of this model could reach 1300 MPa above and yield strength could reach 1000MPa above, which belongs to martensite automobile steel. The process is controlled by two step cooling to suppress the formation of ferrite and contribute to martensite for enhancing tensile strength. This is an important material for light-weighted energy saving automobile design including application for safety structural parts, bumper, etc.

AO Hot-pressing steel with AO coating

CC15B22 AO

CSC 15B22 AO is a coated material which is designed for hot pressing process. It got good anti-oxidant ability in high temperature environment to prevent material for oxidation. The metallurgic design is low carbon steel which added suitable elements to enhance hardenability. After hot-pressing process, the phase structure of material would change into martensite. Due to property of ultra-high strength, it could apply to safety structural parts, front pillar, bumper, etc.


Iron Ore
Limestone
Coke
Blast Furnace
Basic Oxygen Furnace
Ladle Injection Station
Stirring Station
RH Vacuum Degasser
Ladle Furnace
Slab Continuous Caster
Scarfing
Inspection and Testing
Hot Strip Mill
No.1 Pickling and Cold Mill
No.2 Pickling and Cold Mill
No.3 Pickling and Cold Mill
High Current Density Cleaning Line
No.2 Continuous Annealing Line
No.3 Continuous Annealing Line
Batch Annealing
Temper Mill
Tension Levelling Line
Recoiling Line
Cold-Rolled Coil
Cold-Rolled Coil
Cold-Rolled Coil
Cold-Rolled Coil

Pickling

The main purpose of this stage is to remove top-side scale of hot rolled coil strip by tempered hydrochloric acid for its smooth surface finish.

Cold rolling

The pickled coils are rolled into specified thickness by cold rolled mills with controlled rolling force and strip tension. Based on strip center and edge part measurements of the thickness at the entry and delivery sides of the mills, either the strip center or edge thickness deviation is minimized by the computer-controlled system.

Annealing

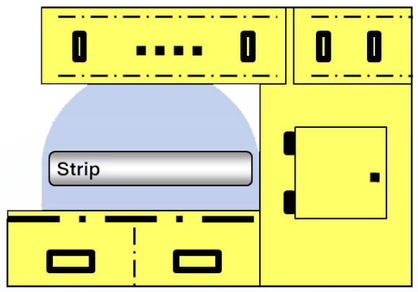
The steel strip is significantly hard and brittle after cold rolling which the grains are elongated along with lots strain energy. To obtain the desired mechanical properties of strip, the coils shall be piled and covered by the box which called batch annealing or the strip is continuous treated in furnace which called continuous annealing. Both annealing technology are possessed in CSC according to different product requirements.

Temper Rolling

After the annealing, the strip is slightly rolled by the skin-pass mill to avoid the common defect called stretcher strain and adjusting mechanical properties. The strip surface roughness is also determined by this stage.

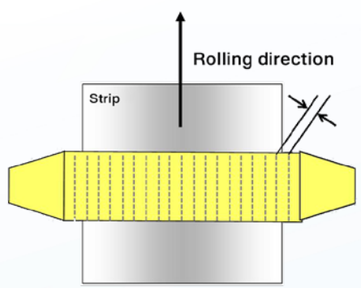
Finishing and Inspection

The entire coil strip thickness, width and surface quality are checked by automatic inspection system and well-trained inspectors in this stage. After the oil applied over strip surface, the product coil is cut into specified weight.



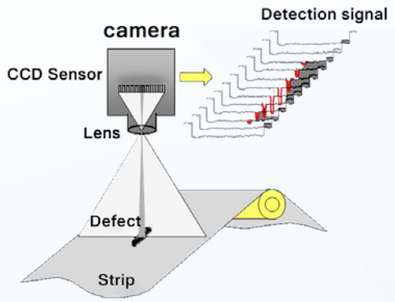
Edge Drop Measurement(EDM) System

The thickness deviation with the whole coil strip is automatically inspected by the X-ray generated system to assure the thickness accuracy.



Shape-meter Roll

The rolling controlled could be dynamically adjusted depending on the simultaneous measurement result of strip flatness by shape-meter roll.



Automatic Surface Inspection System

Both sides of strip surface with entire coil length are automatically inspected by the high resolution camera system to assure the strip surface quality.

Automotive Components

Automotive Seats

Steel Drum

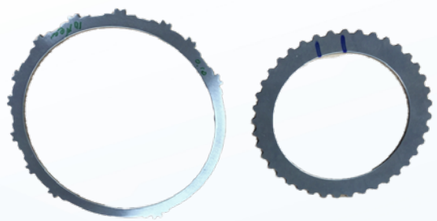
Slide Rail

B-Pillar

Front Collision Beam

Bicycle Chainring

Transmission Gear



Clutch Washer

Belt Buckle

Gas Cylinder

Kitchenware

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 Carbon Steel Sheet for Drawing of Forming

(1) JIS G3141 : 2021 SPCC/SPCD/SPCE/SPCF/SPCG (-SD, Standard temper)

Specification			JIS G3141					
Symbol of Class			SPCC	SPCCT(NOTE 2)	SPCD	SPCE	SPCF	SPCG
Chemical Composition %	C max.		0.15		0.10	0.08	0.06	0.02
	Mn max.		1.00		0.50	0.45	0.45	0.25
	P max.		0.100		0.040	0.030	0.030	0.020
	S max.		0.035		0.035	0.030	0.030	0.020
	Si max.		-		-	-	-	-
Tensile Test No.5 test piece rolling direction Thickness(t) mm	Tensile Strength N/mm^2 (min.)	0.25 ≦ t	-	270	270	270	270	270
	Yield Point N/mm^2 (max.)	0.25 ≦ t	-	-	[240]	[220]	[210]	[190]
	Elongation % (min.)	0.25 ≦ t < 0.30	-	28	30	32	-	-
		0.30 ≦ t < 0.40	-	31	33	35	-	-
		0.40 ≦ t < 0.60	-	34	36	38	40	42
		0.60 ≦ t < 1.00	-	36	38	40	42	44
		1.00 ≦ t < 1.60	-	37	39	41	43	45
		1.60 ≦ t < 2.50	-	38	40	42	44	46
		2.50 ≦ t	-	39	41	43	45	47
The average ratio of plastic strain $\bar{r}$		0.50 ≦ t ≦ 1.00	-	-	-	-	-	1.5 min.
		1.00 < t ≦ 1.60	-	-	-	-	-	1.4 min.
Bend Test No.3 test piece rolling direction	Bend Angle		180°					
	Radius of Inside Surface		Flat on Itself					

Note : 1. Alloying elements other than those in the above table can be added as necessary.
2. For SPCC that guarantees tensile strength and elongation.

Remarks : 1. SPCF and SPCG shall be guarantees for non-ageing property for six months after shipment from the manufacturer's factory.
2. The upper limit of yield point or proof stress in parenthesis is informative. It can be applied upon the agreement between the purchaser and the supplier.
3. The bend test may be omitted. However, it can be specified upon the agreement between the purchaser and the supplier.

(2) JIS G3141 : 2021 SPCC - 1D/2D/4D/8D

Specification		JIS G3141			
Classification		SPCC-1D	SPCC-2D	SPCC-4D	SPCC-8D
Hardness	HRB	85 min.	74~89	65~80	50~71
	HV	170 min.	135~185	115~150	95~130
Bend Test No.3 test piece rolling direction	Bend Angle	-	180°		
	Internal Spacing Number of sheets	-	2	1	0 (Flat on Itself)

3-1 ASTM A1008-23 ε1 Commercial Steel for forming or drawing - Chemical Composition

Classification symbol		CS Type			DS Type		DDS[5,6]	EDDS[9]
		A[3,4,5,6]	B[3]	C[3,4,5,6]	A[4,8]	B		
Chemica Composition %	C	0.10 max.	0.02/0.15	0.08 max.	0.08 max.	0.02/0.08	0.06 max.	0.02 max.
	Mn max.	0.60			0. 50		0.50	0.40
	P max.	0.025		0.100	0.020		0.020	0.020
	S max.	0.035			0.020		0.020	0.020
	Al min.	…[1]			0.01	0.02	0.01	0.01
	Si	…[1]						
	Cu max.	0.20			0.20		0.20	0.10
	Ni max.	0.20			0.20		0.20	0.10
	Cr max.[2]	0.15			0.15		0.15	0.15
	Mo max.	0.06			0.06		0.06	0.03
	V max.	0.008			0.008		0.008	0.10
	Nb max.	0.008			0.008		0.008	0.10
	Ti max.	0.025			0.025		0.025	0.15
	N	…[1]						
	B	…[1]						

Remarks : 1. An ellipsis (…) indicates that no limit is specified, but the analytical results shall be reported.
2. Chromium is permitted, at the producer's option, to 0.25 % maximum when the carbon content is less than or equal to 0.05 %.
3. When an aluminum deoxidized steel is required for the application, it is permissible to order Commercial Steel (CS) to a minimum of 0.01 % total aluminum.
4. Specify Type B to avoid carbon level below 0.02 %.
5. It is permissible to furnish as a vacuum degassed or chemically stabilized steel, or both, at the producer's option.
6. For carbon levels less than or equal to 0.02 %, it is permissible to use vanadium, columbium or titanium, or a combination thereof, as stabilizing elements at the producer's option. In such cases, the applicable limit for vanadium or columbium shall be 0.10 % max. and the limit on titanium shall be 0.15 % max.
7. When copper steel is specified, the copper limit is a minimum requirement. When copper steel is not specified, the copper limit is a maximum requirement.
8. If produced utilizing a continuous anneal process, stabilized steel is permissible at the producer'ss option, and footnotes 5 and 6 apply.
9. Shall be furnished as a vacuum degassed and stabilized steel.

3-2 ASTM A1008-23 ε1 Commercial Steel for forming or drawing – Mechanical Property

Classification symbol		CS Type A, B, C	DS Type A , B	DDS	EDDS
ASTM test piece rolling direction	Yiled Strength (MPa) [3]	[140-275]	[150-240]	[115-200]	[105-170]
	Elongation (%) [3]	30	36	38	40
	r_m Value [4]	- [6]	1.3-1.7	1.4-1.8	1.7-2.1
	n-Value [5]	- [6]	0.17-0.22	0.20-0.25	0.23-0.27

Remarks：1. These typical mechanical properties apply to the full range of steel sheet thicknesses. The yield strength tends to increase, the elongation decreases and some of the formability values tend to decrease as the sheet thickness decreases.

2. The typical mechanical property values presented here are nonmandatory. They are provided to assist the purchaser in specifying a suitable steel for a given application. Values outside of these ranges are to be expected.

3. Yield strength and elongation are measured in the longitudinal direction in accordance with Test Methods and Definitions A370.

4. Average plastic strain ratio (r_m value) as determined by Test Method E517.

5. The strain hardening exponent (n-value) as determined by Test Method E646.

6. No typical properties have been established.

4-1 JFS A2001:2020 Commercial Steel for forming or drawing- Mechanical Property

Classification symbol	Yiled Strength (MPa)	Tensile Strength (MPa)				Test Method	Mean plastic strain ratio r_m	
	Thickness	0.3 ≦ t < 0.4	0.4 ≦ t < 0.8	0.8 ≦ t < 1.0	1.0 ≦ t ≦ 3.2		0.5 ≦ t ≦ 1.0	1.0 < t ≦ 1.6
JSC270C	270 min.	155-275	145-265	135-255	125-245	Tensile Test No.5 test piece rolling direction	-	-
JSC270D	270 min.	-	135-225	125-215	115-205		1.2 min.	1.1 min.
JSC270E	270 min.	-	130-205	120-195	110-185		1.4 min.	1.3 min.
JSC270F	270 min.	-	120-185	110-175	100-165		1.6 min.	1.5 min.

4-2 JFS A2001:2020 Commercial Steel for forming or drawing - Mechanical Property

Classification symbol	Elongation %								
	0.3 ≦ t < 0.4	0.4 ≦ t < 0.6	0.6 ≦ t < 0.8	0.8 ≦ t < 1.0	1.0 ≦ t < 1.2	1.2 ≦ t < 1.6	1.6 ≦ t < 2.0	2.0 ≦ t < 2.5	2.5 ≦ t ≦ 3.2
JSC270C	36-45	37-46	38-47	39-48	40-49	41-50	42-53	43-55	44-57
JSC270D	-	40-49	41-50	42-51	43-52	44-53	45-55	46-57	47-59
JSC270E	-	42-50	43-51	44-52	45-53	46-54	47-56	48-58	49-60
JSC270F	-	44-52	45-53	46-54	47-55	48-56	49-58	50-60	-

(5) SAE J403 (2024) Low carbon steel[1]

Classification symbol	Chemical Composition %			
	C	Mn	P	S
1004[2]	0.02-0.08	0.35 max.	0.030 max.	0.035 max.
1006[3]	0.08 max.	0.45 max.	0.030 max.	0.035 max.
1008[3]	0.10 max.	0.50 max.	0.030 max.	0.035 max.
1010	0.08-0.13	0.30-0.60	0.030 max.	0.035 max.
1012	0.10-0.15	0.30-0.60	0.030 max.	0.035 max.
1017	0.15-0.20	0.30-0.60	0.030 max.	0.035 max.
1020	0.18-0.23	0.30-0.60	0.030 max.	0.035 max.
1022	0.18-0.23	0.70-1.00	0.030 max.	0.035 max.

Remarks：1. Residual elements for specific applications shall be agreed upon between purchaser and supplier. As a guide, the following table lists different options for residual element limits. Unless otherwise specified, limits for residual elements will be Option B.

Option	Cu	Ni	Cr	Mo
A	0.20 max.	0.20 max.	0.15 max.	0.06 max.
B	0.35 max.	0.25 max.	0.20 max.	0.06 max.
C	0.40 max.	0.40 max.	0.30 max.	0.12 max.
D*	-	-	-	-

Note：* For Option D: There are no limits but values must be reported.

2. Ultra low carbon, interstitial free stabilized, and nonstablized steel shall not be supplied for these grades.
3. Ultra low carbon, interstitial free stabilized, and nonstablized steel may be supplied for these grades.

(6) EN 10130:2006

Steel name		DC01	DC03	DC04	DC05	DC06
Chemical Composition %	C max.	0.12	0.10	0.08	0.06	0.02
	Mn max.	0.60	0.45	0.40	0.35	0.25
	P max.	0.045	0.035	0.030	0.025	0.020
	S max.	0.045	0.035	0.030	0.025	0.020
	Ti max.	-	-	-	-	0.3
Tensile Test Type 2 test piece Perpendicular to rolling direction	Tensile Strength MPa	270~410	270~370	270~350	270~330	270~330
	Yield Proof Stress MPa (max.)	280	240	210	180	170
	Elongation % (min.)	28	34	38	40	41
	Ratio of plastic strain r_{90} (min.)	-	1.3	1.6	1.9	2.1
	Tensile strain hardening exponent n_{90} (min.)	-	-	0.180	0.200	0.220

Remarks：1. 1MPa=1 N/mm^2

2. Titanium may be replaced by niobium. Carbon and nitrogen shall be completely bound.
3. When the thickness is less than or equal to 0.7 mm and greater than 0.5 mm, the value for yield strength is increased by 20 MPa, and the minimum value for elongation is reduced by 2 units. For thicknesses less than or equal to 0.5 mm, the value for yield strength is increased by 40 MPa, and the minimum value for elongation is reduced by 4 units.
4. The values of r_{90} and n_{90} only apply to products with a thickness equal to or greater than 0.5 mm.
5. When the thickness is over 2 mm, the value for r_{90} is reduced by 0.2.
6. For design purposes the lower limit of Yield Proof Stress for grades DC01, DC03, DC04 and DC05 may be assumed to be 140 MPa.

6.1.2 High Strength Steel Sheets with Improved Formability for Automobile Structural Uses

(1) JIS G3135:2018

Classification symbol	Tensile Test				Test Piece	Bend Test		
	Tensile Strength (N/mm^2)	Yield Proof Stress (N/mm^2)	Elongation %			Bend Angle	Radius of Inside surface	Test Piece
			Thickness (t) mm					
			0.6 ≦ t < 1.0	1.0 ≦ t ≦ 2.3				
SPFC340	340 min.	175 min.	34 min.	35 min.	JIS No.5 Perpendicular to rolling direction	180°	Flat on itself	JIS No.3 Perpendicular to rolling direction
SPFC370	370 min.	205 min.	32 min.	33 min.			Flat on itself	
SPFC390	390 min.	235 min.	30 min.	31 min.			Flat on itself	
SPFC440	440 min.	265 min.	26 min.	27 min.			Flat on itself	
SPFC490	490 min.	295 min.	23 min.	24 min.			Flat on itself	
SPFC540	540 min.	325 min.	20 min.	21 min.			Thickness × 0.5	
SPFC590	590 min.	355 min.	17 min.	18 min.			Thickness × 1.0	
SPFC490Y	490 min.	225 min.	24 min.	25 min.			Flat on itself	
SPFC540Y	540 min.	245 min.	21 min.	22 min.			Thickness × 0.5	
SPFC590Y	590 min.	265 min.	18 min.	19 min.			Thickness × 1.0	
SPFC780Y	780 min.	365 min.	13 min.[1]	14 min.[2]			Thickness × 3.0	
SPFC980Y	980 min.	490 min.	6 min.[1]	7 min.[2]			Thickness × 4.0	

Remarks：1. Applicable to thickness 0.8 mm or over to and excluding 1.0 mm.
2. Applicable to thickness 1.0 mm or over up to and including 2.0 mm.

2-1 JFS A2001 :2020

Classification symbol	Specification	Tensile Strength (MPa)	Yield Strength (MPa)			Test Piece	The average ratio of plastic strain r_m	
		Thickness	0.4 ≦ t < 0.8	0.8 ≦ t < 1.0	1.0 ≦ t ≦ 3.2		0.5 ≦ t ≦ 1.0	1.0 < t ≦ 1.6
Commercial type	JSC340W	340 min.	205-305	195-295	185-285	JIS No.5 Perpendicular to rolling direction	-	-
	JSC370W	370 min.	205-305	195-295	185-285		-	-
	JSC390W	390 min.	245-355	235-345	225-335		-	-
	JSC440W	440 min.	285-390	275-380	265-370		-	-
Bake-hardening type	JSC340H	340 min.	185-285	175-275	165-265		1.1 min.	1.0 min.
High yield ratio type	JSC590R	590 min.	430-580	420-570	410-560		-	-
High deep-drawing ratio type	JSC340P	340 min.	165-255	155-245	145-235		1.4 min.	1.3 min.
	JSC390P	390 min.	205-305	195-295	185-285		1.4 min.	1.3 min.
	JSC440P	440 min.	245-355	235-345	225-335		1.3 min.	1.2 min.
Low yield ratio type	JSC590Y	590 min.	340-460	330-450	320-440		-	-
	JSC780Y	780 min.	440-610	430-600	420-590		-	-
	JSC980Y	980 min.	-	590-930	580-920		-	-
	JSC11800Y	1180 min.	-	835-1225	825-1215		-	-
	JSC980YH	980 min.	-	730-930	720-920		-	-

2-2 JFS A2001:2020

Classification symbol	Specification	Elongation %						BH value (MPa)
		0.4 ≦ t < 0.6	0.6 ≦ t < 0.8	0.8 ≦ t < 1.0	1.0 ≦ t < 1.2	1.2 ≦ t < 1.6	1.6 ≦ t < 2.5	
Commercial type	JSC340W	33-43	34-44	35-45	36-46	37-47	38 min.	-
	JSC370W	30-40	31-41	32-42	33-43	34-44	35 min.	-
	JSC390W	29-40	30-41	31-42	32-43	33-44	34 min.	-
	JSC440W	26-38	27-39	28-40	29-41	30-42	31 min.	-
Bake-hardening type	JSC340H	34-44	35-45	36-46	37-47	38-48	39 min.	30 min.
High yield ratio type	JSC590R	-	17-32	17-32	18-33	18-33	18 min.	-
High deep-drawing ratio type	JSC340P	35-45	36-46	37-47	38-48	39-49	40 min.	-
	JSC390P	31-42	32-43	33-44	34-45	35-46	36 min.	-
	JSC440P	28-39	29-40	30-41	31-42	32-43	33 min.	-
Low yield ratio type	JSC590Y	-	17-32	18-33	19-34	20-35	21 min.	-
	JSC780Y	-	12-25	13-26	14-27	15-28	16 min.	-
	JSC980Y	-	-	9-20	10-21	11-22	12 min.	-
	JSC1180Y	-	-	5-16	6-17	7-18	7 min.	-
	JSC980YH	-	-	9-19	10-20	11-21	12 min.	-

3-1 ASTM A1008-23 ε1 HSLAS High Strength Low Alloy Steel-Chemical Composition

Classification symbol	Element % (Max.)[1]										
	C	Mn	P	S	Cu[2]	Ni	Cr	Mo	V(min.)	Nb(min.)	Ti(min.)
HSLAS[3]											
Gr.45 Class2	0.15	1.65	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005
Gr.50 Class2	0.15	1.65	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005
Gr.55 Class2	0.15	1.65	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005
Gr.60 Class2	0.15	1.65	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005
Gr.65 Class2	0.15	1.65	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005
HSLAS-F[3]											
Gr.50	0.15	1.65	0.02	0.025	0.20	0.20	0.15	0.06	0.005	0.005	0.005
Gr.60	0.15	1.65	0.02	0.025	0.20	0.20	0.15	0.06	0.005	0.005	0.005

Remarks：1. Al, Si and N there are no specified limit, but the analysis shall be reported.

2. When copper is specified, the copper limit is a minimum requirement. When copper steel is not specified, the copper limit is a maximum requirement.

3. HSLAS and HSLAS-F steels contain the strengthening elements columbium (niobium), vanadium, titanium and molybdenum added singly or in combination. The minimum requirements only apply to the microalloy elements selected for strengthening of the steel.

3-2 ASTM A1008-23 ε1 High Strength Low Alloy Steel-Mechanical Property

Classification symbol	Mechanical Property (min.)					
	Yield Strength		Tensile Strength		Elongation	Test Method
	ksi	MPa	ksi	MPa	%	
HSLAS						
Gr.45 Class2	45	310	55	380	22	ASTM rolling direction
Gr.50 Class2	50	340	60	410	20	
Gr.55 Class2	55	380	65	450	18	
Gr.60 Class2	60	410	70	480	16	
Gr.65 Class2	65	450	75	520	15	
HSLAS-F						
Gr.50	50	340	60	410	22	ASTM rolling direction
Gr.60	60	410	70	480	18	

(4) EN 10268:2006+A1:2013 Cold Rolled Steel Flat Products with High Yield Strength for Cold Forming

Steel Name	Chemical Composition %								Tensile Test 1、2、3、4						
	C max.	Si max.	Mn max.	P max.	S max.	Al min.	Ti max.	Nb max.	0.2% Proof Stress (MPa)	Tensile Strength (MPa)	Elongation		Plastic strain ratio min. r_{90}	Strain hardening exponent n min.	BH Value min.
											Test Piece	% min.			
HC180B	0.06	0.50	0.70	0.060	0.030	0.015	-	-	180~230	290~360	EN TYPE 2 transverse test pieces	34	1.6	0.17	35
HC220B	0.08	0.50	0.70	0.085	0.030	0.015	-	-	220~270	320~400		32	1.5	0.16	35
HC220Y	0.01	0.30	0.90	0.080	0.025	0.010	0.12	0.09	220~270	340~420		33	1.6	0.18	-
HC260Y	0.01	0.30	1.60	0.100	0.025	0.010	0.12	0.09	260~320	380~440		31	1.4	0.17	-
HC260LA	0.10	0.50	1.00	0.030	0.025	0.015	0.15	0.09	260~330	350~430		26	-	-	-
HC300LA	0.12	0.50	1.40	0.030	0.025	0.015	0.15	0.09	300~380	380~480		23	-	-	-
HC340LA	0.12	0.50	1.50	0.030	0.025	0.015	0.15	0.09	340~420	410~510		21	-	-	-
HC380LA	0.12	0.50	1.60	0.030	0.025	0.015	0.15	0.09	380~480	440~580		19	-	-	-
HC420LA	0.14	0.50	1.60	0.030	0.025	0.015	0.15	0.09	420~520	470~600		17	-	-	-
HC460LA	0.14	0.60	1.80	0.030	0.025	0.015	0.15	0.09	460~580	510~660		13	-	-	-

Remarks：1. 1MPa=1 N/mm^2

2. The minimum values for r_{90} and n_{90} only apply to products of thickness equal to or greater than 0.5 mm.

3. When the thickness is less than or equal to 0.7 mm and greater than 0.5 mm, the minimum value for elongation is reduced by 2 units.

4. For products with thickness over 2 mm the minimum r_{90} value is reduced by 0.2.

(5) SAE J2340 (2017) High Strength Automotive Sheet Steel

Grade	Chemical Composition 1 %			Tensile Test 2			
	C	P	S	Yield Proof Stress(MPa)	Tensile Strength(MPa)	Elongation(%)	Test Piece
340X	0.13	0.060	0.015	340~440	410 min.	22 min.	rolling direction
420X	0.13	0.060	0.015	420~520	490 min.	18 min.	rolling direction

Remarks：1. The specified minimum for niobium, titanium, or vanadium is 0.005 %.

2. For thickness less than 2.5 mm, minimum percent elongation is permitted to be 2 % less than the value shown.

(6) CSC High Strength & Elongation Steel Sheets for Automobile Structural Uses

Steel Name	Chemical Composition %					Thickness	Mechanical property*1		
	C	Si	Mn	P	S		Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)
CR980TT	0.10-0.30	0.3-2.0	1.0-3.0	0.05 max.	0.03 max.	1.0 ≦ t ≦ 2.0	600-750	980 min.	15 min.

Remarks：Test method takes JIS No.5 perpendicular to rolling direction

(7) CSC Ultra High Strength Steel Sheets for Automobile Structural Uses

Steel Name	Chemical Composition %					Thickness	Mechanical property*1			Bending test	
	C	Si	Mn	P	S		Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	Bend Angle	Radius of inside surface
CR1300T	0.10-0.40	0.1-2.0	1.0-3.0	0.05 max.	0.03 max.	1.0 ≦ t ≦ 1.8	1000 min.	1300 min.	4 min.	90°	4t
CR1350T	0.10-0.40	0.1-2.0	1.0-3.0	0.05 max.	0.03 max.	1.0 ≦ t ≦ 1.4	1100 min.	1350 min.	3 min.	90°	4t

Remarks：Test method takes JIS No.5 parallel to rolling direction

(8) CSC High Strength Steel for Automobile Forming

Steel Name	Tensile Test					Test Piece	Bend test		
	Tensile Strength (N/mm^2)	Yield Proof Stress (N/mm^2)	Elongation %				Bend Angle	Radius of inside surface	Test Piece
			Thickness(t) mm						
			0.55 ≦ t < 1.0	1.0 ≦ t ≦ 2.0	2.0 < t ≦ 2.6				
CF370R	370 min.	205 min.	33 min.	34 min.	-	No.5 Perpendicular to rolling direction	180°	Flat on itself	No.3 Perpendicular to rolling direction
CF390R	390 min.	235 min.	31 min.	32 min.	-				
CF440R	440 min.	255 min.	-	-	30 min.				

Remarks：The bend test is informative. It can be specified upon the agreement between the purchaser and the supplier.

6.1.3 High Strength Steel Sheets for Strap (CSC HS840)

Steel Name	Chemical Composition %					Tensile Test			Bend test		
	C	Si	Mn	P	S	Tensile Strength (N/mm^2)	Elongation (%)	Test Piece	Bend Angle	Radius of inside surface	Test Piece
HS840	0.20 max.	0.50 max.	0.70-1.50	0.030 max.	0.030 max.	840 min.	6.0 min.	JIS No.9A Parallel to rolling diretion	90°	Thickness × 1.0	JIS No.9A Parallel to rolling direction
HS880	0.20 max.	0.50 max.	0.70-1.50	0.030 max.	0.030 max.	880 min.	6.0 min.		90°	Thickness × 1.5	

6.1.4 Cold Rolled Medium Carbon Steel, High Carbon Steel, Alloy Steel and Special Steel Strip

(1) JIS G3311:2021 Special Steel Strip

Symbol of Class	Chemical Composition %									
	C	Si	Mn	P max.	S max.	Cu max.	Ni max.	Cr	Ni+Cr max.	Mo
S35CM	0.32~0.38	0.15~0.35	0.60~0.90	0.030	0.035	0.30	0.20	0.20	0.35	-
S55CM	0.52~0.58	0.15~0.35	0.60~0.90	0.030	0.035	0.30	0.20	0.20	0.35	-
S50CM	0.47~0.53	0.15~0.35	0.60~0.90	0.030	0.035	0.30	0.20	0.20	0.35	-
S65CM	0.60~0.70	0.15~0.35	0.60~0.90	0.030	0.035	0.30	0.20	0.20	0.35	-
SK85M	0.80~0.90	0.10~0.35	0.10~0.50	0.030	0.030	0.25	0.25	0.30	-	-
SK95M	0.90~1.00	0.10~0.35	0.10~0.50	0.030	0.030	0.25	0.25	0.30	-	-
SKS51M	0.75~0.85	0.35	0.50	0.030	0.030	0.25	1.30~2.00	0.20~0.50	-	-
SCM415M	0.13~0.18	0.15~0.35	0.60~0.90	0.030	0.030	0.30	0.25	0.90~1.20	-	0.15~0.25
SCM435M	0.33~0.38	0.15~0.35	0.60~0.90	0.030	0.030	0.30	0.25	0.90~1.20	-	0.15~0.30

Remarks：1. For steel strips and cut-lengths of thicknesses over 4.00 mm or widths 600 mm or over, the thickness tolerance shall be as agreed between the purchaser and the supplier.

(2) SAE J403 (2024) / J404 (2009) (Medium Carbon Steel, High Carbon Steel and Alloy Steel)

Symbol of Class	Chemical Composition %						
	C	Si	Mn	P	S	Cr	Mo
1050	0.48~0.55	-	0.60~0.90	0.030 max.	0.035 max.	-	-
1055	0.50~0.60		0.60~0.90				
1060	0.55~0.65		0.60~0.90				
1065	0.60~0.70		0.60~0.90				
1070	0.65~0.75		0.60~0.90				
1552	0.47~0.55	-	1.20~1.50	0.030 max.	0.035 max.	-	-
4130	0.28~0.33	0.15~0.35	0.40~0.60	0.030 max.	0.040 max.	0.80~1.10	0.15~0.25
4135	0.33~0.38	0.15~0.35	0.70~0.90	0.030 max.	0.040 max.	0.80~1.10	0.15~0.25

(3) ASTM A684-17 (High Carbon Steel)

Symbol of Class	Chemical Composition %				
	C	Si	Mn	P	S
1050	0.48~0.55	0.15~0.30	0.60~0.90	0.030 max.	0.035 max.
1065	0.60~0.70	0.15~0.30	0.60~0.90	0.030 max.	0.035 max.
1070	0.65~0.75	0.15~0.30	0.60~0.90	0.030 max.	0.035 max.

6.1.5 Steel Sheets for Slide Rail Use (CSC SL250Y/ SL330Y/ SL420Y)

Symbol Of Class	Tensile Test		Bend test			Hardness (HRB)
	Yield Proof Stress (N/mm^2)	Test Piece	Bend Angle	Radius of inside surface	Test Piece	
SL250Y	250~330	No.5 Perpendicular to rolling direction	180°	Thickness × 1.0	No.3 Perpendicular to rolling direction	65~80
SL330Y	330~410					72~82
SL420Y	420 min.					-

Remarks：1. Thickness tolerance as per 1/4 JIS G3141 Class A.
2. Width tolerance as per JIS G3141 Class A.
3. Flatness tolerance as per 1/2 JIS G3141 Class A.
4. For SL420Y, thickness tolerance as per 1/4 JIS G3135.

6.1.6 Decarburized Steel Sheets and Strip for Porcelain Enameling

(1) JIS G3133:2021

Symbol Of Class	Chemical Composition [1] %				Tensile Test					
	C	Mn	P	S	Yield point or proof stress	Tensile Strength	Elongation (%)			Test Piece
	Thickness (mm)						0.40 ≦ t < 0.60	0.60 ≦ t < 1.00	1.00 ≦ t < 1.60	1.60 ≦ t < 2.50	
SPPC	0.008 max.	0.40 max.	0.040 max.	0.030 max.	-	270 min.	34 min.	36 min.	37 min.	38 min.	No.5 Parallel to rolling direction
SPPD	0.008 max.	0.40 max.	0.040 max.	0.030 max.	(240max.) [2]	270 min.	36 min.	38 min.	39 min.	40 min.	
SPPE	0.008 max.	0.40 max.	0.040 max.	0.035 max.	(220max.) [2]	270 min.	38 min.	40 min.	41 min.	42 min.	

Remarks：1. Alloy elements may be added as necessary.
2. The yield point or proof stress may be agreed between the purchaser and the manufacturer.

(2) EN 10209:2023

Symbol Of Class	Chemical Composition %					Tensile Test [1,7]				
	C max.	Ti max.	Mn max.	P max.	S max.	Yield Strength[2,3] (MPa)	Tensile Strength (MPa)	Elongation [4]		Plastic strain ratio r_m [5]
								Test Method	%	
DC04EK	0.06	-	0.50	0.030	0.050	220 max.[8]	270-350	EN TYPE 2 transverse test pieces	36 min.	-
DC05EK	0.06	-	0.50	0.025	0.050	220 max.[8]	270-350		36 min.	1.7 min.
DC06EK	0.02	0.15	0.50	0.020	0.050	190 max.	270-350		38 min.	1.8 min.

Remarks：1. The mechanical properties apply only to skin-passed product.

2. The value for yield stress is the Rp 0.2% for products which do not present a definite yield point and the lower yield stress (Rel) for the others. When the thickness is less than or equal to 0.7 mm and greater than 0.5mm, the value for yield stress is increased by 20 MPa. For thicknesses less than or equal to 0.5mm, the value is increased by 40 MPa.

3. For forming purposes, the lower limit of Re for qualities DC04EK and DC05EK may be assumed to be 140MPa and for quality DC06EK, 120MPa.

4. When the thickness is less than or equal to 0.7mm, and greater than 0.5mm, the minimum elongation value after fracture is reduced by 2 units. For thicknesses equal to or less than 0.5mm, the minimum value is reduced by 4 units.

5. The minimum value of r only applies to products of thicknesses equal to or greater than 0.5mm. When the thickness is over 2.0mm, the minimum value of r is reduced by 0.2 units.

6. Titanium may be replaced by niobium if agreed upon at the time of ordering. Carbon and nitrogen shall be completely bound.

7. Subject to agreement at the time of ordering, other steels may be supplied which have the same mechanical properties. If so, the chemical composition of these steels shall be agreed at the time of ordering.

8. At the request of the purchaser, the DC04EK and DC05EK qualities may be supplied with Re ≦ 210 MPa and A80 ≧ 38% in the 0.7mm to 1.5mm thicknesses. It is therefore for the manufacturer to select the surface roughness within the range of normal roughness options.

6.1.7 Low-carbon High Manganese Wear-resisting Steel

Symbol of Class	Thickness (t) mm	Width (w) mm	Hardness HRB
CSC CC1513	1.61~1.97	850~1250	65~75

Remarks：1. Thickness tolerance as per ASTM A568.

2. Flatness tolerance as per ASTM A568.

6.1.8 High Strength Manganese-Boron Steel

Symbol of Class	Chemical Composition %						
	C	Si	Mn	P	S	Al	B
CSC 10B18	0.16-0.20	0.04 max.	0.65-0.85	0.020 max.	0.020 max.	0.060 max.	0.0005-0.0033
CSC 15B22	0.19-0.25	0.15-0.25	1.05-1.35	0.020 max.	0.010 max.	0.075 max.	0.0005-0.0045
CSC 15B36	0.30-0.40	0.20-0.30	1.10-1.40	0.020 max.	0.015 max.	0.040 max.	0.0005-0.0045

Remarks：1. Thickness tolerance as per 1/2 JIS G3141 Class A.

6.1.9 Steel Sheets for Relay Use

Symbol of Class	Tensile Test				
	Thickness (t) mm	Width (w) mm	Hardness HRB	Elongation %	Test piece
CSC CM-1	0.40~3.20	850~1250	35 min.	37 min.	JIS No.5 Parallel to rolling direction

Remarks：1. Thickness tolerance as per 1/2 JIS G3141 Class A.
2. Thickness of 2.01 mm or more of the steel sheet are subject to the coil breaks.

6.1.10 Atmospheric corrosion resisting cold rolled steel (JIS G3125:2015 SPA-C)

Symbol of Class	Chemical Composition %								Tensile Test				Bending Test	
	C	Si	Mn	P	S	Cu	Ni	Cr	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation %	Test Method	Bend Angle	Radius of inside surface
SPA-C	0.12 max.	0.20-0.75	0.60 max.	0.07-0.15	0.035 max.	0.25-0.55	0.65 max.	0.30-1.25	315 min.	450 min.	26 min.	JIS No.5 Parallel to rolling direction	180°	1t

6.2 Tolerances

6.2.1 Thickness Tolerances

6.2.1.1 JIS G3141 Thickness Tolerances

unit : mm

Tolerance / Width(w) / Thickness(t)	780 ≦ w < 1000	1000 ≦ w < 1250	1250 ≦ w < 1600	1600 ≦ w
t < 0.25	± 0.03	± 0.03	-	-
0.25 ≦ t < 0.40	± 0.04	± 0.04	-	-
0.4 ≦ t < 0.60	± 0.05	± 0.05	± 0.06	-
0.60 ≦ t < 0.80	± 0.06	± 0.06	± 0.06	± 0.07
0.80 ≦ t < 1.00	± 0.06	± 0.07	± 0.08	± 0.09
1.00 ≦ t < 1.25	± 0.07	± 0.08	± 0.09	± 0.11
1.25 ≦ t < 1.60	± 0.09	± 0.10	± 0.11	± 0.13
1.60 ≦ t < 2.00	± 0.11	± 0.12	± 0.13	± 0.15
2.00 ≦ t < 2.50	± 0.13	± 0.14	± 0.15	± 0.17
2.50 ≦ t < 3.15	± 0.15	± 0.16	± 0.17	± 0.20
3.15 ≦ t	± 0.17	± 0.19	± 0.20	-

Note : The tolerance on thickness shall be applied to the thickness at a position not less than 15 mm inside from each edge of the steel sheet or strip.

6.2.1.2 JIS G3135 Thickness Tolerances

unit : mm

Applicable Division According to Tensile Strength	Width (w) / Thickness (t)	850 ≦ w < 1000	1000 ≦ w < 1250	1250 ≦ w < 1600	1600 ≦ w
Steel sheets of under 780 N/mm^2 in specification lower limit of tensile strength	0.60 ≦ t < 0.80	± 0.06	± 0.06	± 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	± 0.11	± 0.12	± 0.14	± 0.16
	2.00 ≦ t ≦ 2.30	± 0.13	± 0.14	± 0.16	± 0.18
Steel sheets of 780 N/mm^2 min. in specification lower limit of tensile strength	0.80 ≦ t < 1.00	± 0.09	± 0.09	± 0.10	-
	1.00 ≦ t < 1.25	± 0.10	± 0.10	± 0.12	-
	1.25 ≦ t < 1.60	± 0.12	± 0.12	± 0.15	-
	1.60 ≦ t ≦ 2.00	± 0.14	± 0.14	± 0.16	-

Remarks : 1. In the case of mill-edged products, the tolerances on thickness shall apply to any thickness not less than 25 mm inside from each edge for the steel sheet. In the case of cut-edged products, the tolerances on thickness shall apply to any thickness not less than 15 mm inside from each edge.

2. In the case of steel strip, the tolerances on thickness shall not apply to irregular portions such as surface flaws and breaks.

6.2.1.3 CSC CF370R/390R/440R Thickness Tolerances

unit：mm

Thickness(t) \ Width(w)	850 ≦ w < 1000	1000 ≦ w < 1250	1250 ≦ w
0.55 ≦ t < 0.60	± 0.02	± 0.02	± 0.03
0.60 ≦ t < 0.80	± 0.03	± 0.03	± 0.03
0.80 ≦ t < 1.00	± 0.03	± 0.04	± 0.04
1.00 ≦ t < 1.25	± 0.04	± 0.04	± 0.05
1.25 ≦ t < 1.60	± 0.05	± 0.05	± 0.06
1.60 ≦ t ≦ 2.00	± 0.05	± 0.06	± 0.07

Remarks：Thickness shall be measured at any point 15 mm or more apart from both edges.

6.2.1.4 ASTM A568 Thickness Tolerances (All Designations) (Specified Nominal Thickness Tolerances)

unit：in. (mm)

Thickness(t) \ Width(w)	15 (381) < w ≦ 72 (1829)
0.014 (0.36) ≦ t ≦ 0.019 (0.48)	± 0.0010 (0.025)
0.019 (0.48) < t ≦ 0.039 (0.99)	± 0.0015 (0.038)
0.039 (0.99) < t ≦ 0.057 (1.45)	± 0.0020 (0.050)
0.057 (1.45) < t ≦ 0.071 (1.80)	± 0.0025 (0.063)
0.071 (1.80) < t ≦ 0.098 (2.49)	± 0.0025 (0.063)
0.098 (2.49) < t ≦ 0.142 (3.60)	± 0.0030 (0.076)

Remarks：Thickness shall be measured at any point 1 inch (25.4 mm) or more apart from both edges.

6.2.1.5 ASTM A568M Thickness Tolerances (All Designations) (Specified Nominal Thickness Tolerances)

unit：mm

Thickness(t) \ Width(w)	w ≦ 1800	1800 < w ≦ 2000
0.20 ≦ t ≦ 0.40	± 0.025	-
0.40 < t ≦ 1.00	± 0.040	± 0.040
1.00 < t ≦ 1.20	± 0.050	± 0.050
1.20 < t ≦ 2.50	± 0.060	± 0.075
2.50 < t ≦ 4.00	± 0.075	± 0.090

Remarks：Thickness shall be measured at any point 25 mm or more apart from both edges.

6.2.1.6 EN 10131 EN 10131 Thickness Tolerances (Minimum Yield Strength Re < 260 MPa)

unit : mm

Tolerance / Width(w) / Thickness(t)	w ≦ 1200	1200 < w ≦ 1500	1500 < w
0.35 ≦ t ≦ 0.40	± 0.03	± 0.04	± 0.05
0.40 < t ≦ 0.60	± 0.03	± 0.04	± 0.05
0.60 < t ≦ 0.80	± 0.04	± 0.05	± 0.06
0.80 < t ≦ 1.00	± 0.05	± 0.06	± 0.07
1.00 < t ≦ 1.20	± 0.06	± 0.07	± 0.08
1.20 < t ≦ 1.60	± 0.08	± 0.09	± 0.10
1.60 < t ≦ 2.00	± 0.10	± 0.11	± 0.12
2.00 < t ≦ 2.50	± 0.12	± 0.13	± 0.14
2.50 < t ≦ 3.00	± 0.15	± 0.15	± 0.16

6.2.1.7 EN 10131 Thickness Tolerances (Minimum Yield Strength 260 ≦ Re < 340 MPa)

unit : mm

Tolerance / Width(w) / Thickness(t)	w ≦ 1200	1200 < w ≦ 1500	1500 < w
0.35 ≦ t ≦ 0.40	± 0.04	± 0.05	± 0.06
0.40 < t ≦ 0.60	± 0.04	± 0.05	± 0.06
0.60 < t ≦ 0.80	± 0.05	± 0.06	± 0.07
0.80 < t ≦ 1.00	± 0.06	± 0.07	± 0.08
1.00 < t ≦ 1.20	± 0.07	± 0.08	± 0.10
1.20 < t ≦ 1.60	± 0.09	± 0.11	± 0.12
1.60 < t ≦ 2.00	± 0.12	± 0.13	± 0.14
2.00 < t ≦ 2.50	± 0.14	± 0.15	± 0.16
2.50 < t ≦ 3.00	± 0.17	± 0.18	± 0.18

6.2.1.8 EN 10131 Thickness Tolerances (Minimum Yield Strength 340 ≦ Re ≦ 420 MPa)

unit : mm

Tolerance / Width(w) / Thickness(t)	w ≦ 1200	1200 < w ≦ 1500	1500 < w
0.35 ≦ t ≦ 0.40	± 0.04	± 0.05	± 0.06
0.40 < t ≦ 0.60	± 0.05	± 0.06	± 0.07
0.60 < t ≦ 0.80	± 0.06	± 0.07	± 0.08
0.80 < t ≦ 1.00	± 0.07	± 0.08	± 0.10
1.00 < t ≦ 1.20	± 0.09	± 0.10	± 0.11
1.20 < t ≦ 1.60	± 0.11	± 0.12	± 0.14
1.60 < t ≦ 2.00	± 0.14	± 0.15	± 0.17
2.00 < t ≦ 2.50	± 0.16	± 0.18	± 0.19
2.50 < t ≦ 3.00	± 0.20	± 0.20	± 0.21

6.2.2 Width Tolerances

6.2.2.1 JIS G3141 Width Tolerances

unit：mm

Width(w)	Class A		Class B	
	Upper	Lower	Upper	Lower
w < 1250	7	0	3	0
w ≧ 1250	10	0	4	0

Remarks：Tolerance B generally applies to the re-cutting or precise cutting practice. Unless specified by the customer, Tolerance A is to be applied.

6.2.2.2 Width Tolerances of JIS G3135 and CSC CF370R/390R/440R

unit：mm

Width(w)	Tolerances	
	Upper	Lower
w < 1250	7	0
w ≧ 1250	10	0

6.2.2.3 ASTM A568 Width Tolerances (All Designations) (Specified Nominal Thickness Tolerances)

unit：in. (mm)

Width(w)	Tolerances	
	Upper	Lower
30 (762) < w ≦ 48 (1219)	3/16 (4.7)	0
48 (1219) < w ≦ 60 (1524)	1/ 4 (6.3)	0
60 (1524) < w ≦ 80 (2032)	5/16 (7.9)	0

6.2.2.4 ASTM A568M Width Tolerances(All Designations) (Specified Nominal Thickness Tolerances)

unit：mm

Width(w)	Tolerances	
	Upper	Lower
850 < w ≦ 1200	5	0
1200 < w ≦ 1500	6	0
1500 < w ≦ 1800	8	0
1800 < w	10	0

6.2.2.5 EN 10131 Width Tolerances

unit：mm

Width(w)	Tolerances	
	Upper	Lower
w ≦ 1200	4	0
1200 < w ≦ 1500	5	0
1500 < w	6	0

6.2.3 Flatness Tolerances

6.2.3.1 JIS G3141 Flatness Tolerances

unit : mm

Classification	Class A			Class B		
Flatness (max.) / Width (w)	Bow Wave	Edge Wave	Center Buckle	Bow Wave	Edge Wave	Center Buckle
w < 1000	12	8	6	2	2	2
1000 ≦ w < 1250	15	9	8	3	2	2
1250 ≦ w < 1600	15	11	8	4	3	2
1600 ≦ w	20	13	9	5	4	2

Remarks : 1. Class B generally applies to the steel sheets of stretcher-leveled steel sheet.
2. Class A applies to the normally refined steel sheets.

6.2.3.2 JIS G3135 Flatness Tolerances

unit : mm

Classification	Bow Wave			Edge Wave			Center Buckle		
Flatness (max.) / Width (w)	1	2	3	1	2	3	1	2	3
w < 1000	12	16	18	8	11	12	6	8	9
1000 ≦ w < 1250	15	19	21	10	12	13	8	10	11
1250 ≦ w < 1600	15	19	21	12	14	15	9	11	12
1600 ≦ w	20	-	-	14	-	-	10	-	-

Remarks : 1. Grade 1 to 3 shall respectively be applied to the steel sheet of which the lower limit specification value of tensile strength is under 780 N/mm^2, 780 N/mm^2 and 980 N/mm^2.
2. The value of flatness shall, as a rule, be measured by placing the steel sheet on a surface plate. It shall be obtained by subtracting nominal thickness of steel sheet from the maximum value of strain and be applied to the upper side surface of steel sheet.

6.2.3.3 Flatness Tolerances for CSC CF370R/390R/440R

The flatness tolerances of CSC CF370R/390R shall conform to JIS G3135, and 1/2 of the maximum deviation from flatness shall be applied to those greater than 0.8 mm in thickness.

6.2.3.4 ASTM A568 Flatness Tolerances (All Designations) (Specified Nominal Thickness Tolerances)

unit : in. (mm)

Specified Yield Point, min. / Width (w)	Thickness(t)	Under 45ksi (Under 310 MPa)	45 to 50 ksi (310 to 345 MPa)
t ≦ 0.044(1.12)	w ≦ 36 (914)	3/8 (9.5)	3/4 (19.1)
	36 (914) < w ≦ 60 (1524)	5/8 (15.9)	11/8 (28.6)
	60 (1524) < w	7/8 (22.2)	11/2 (38.1)
0.044(1.12) < t	w ≦ 36 (914)	1/4 (6.4)	3/4 (19.1)
	36 (914) < w ≦ 60 (1524)	3/8 (9.5)	3/4 (19.1)
	60 (1524) < w ≦ 72 (1829)	5/8 (15.9)	11/8 (28.6)

Remarks : Tolerances for high-strength, low-alloy steel with specified minimum yield point in excess of 50 ksi are subject to negotiation.

6.2.3.5 ASTM A568 Flatness Tolerances (All Designations)(Specified Nominal Thickness Tolerances)

unit : mm

Specified Yield Point, min. / Thickness(t) / Width (w)		Under 310 MPa	310 to 345 MPa
t ≦ 1.0	w ≦ 900	10	20
	900 < w ≦ 1500	15	30
	1500 < w	20	40
1.0 < t	w ≦ 900	8	20
	900 < w ≦ 1500	10	20
	1500 < w ≦ 1800	15	30
	1800 < w	20	40

Remarks : Tolerances for high-strength, low-alloy steel with specified minimum yield point in excess of 340 MPa are subject to negotiation.

6.2.4 Camber Tolerances

6.2.4.1 JIS G3141 Camber Tolerances

unit : mm

Width (w)	Tolerance (max.)
630 ≦ w	2 (Any portion of 2000 in length)

6.2.4.2 Camber Tolerances of JIS G3135 and CSC CF370R/390R/440R

unit : mm

Lower limit specification value of tensile strength	Width (w)	Tolerances, maximum value
Under 780 N/mm^2	w ≧ 630	2 per an arbitrary length of 2000
780 N/mm^2 or over	w ≧ 630	3 per an arbitrary length of 2000

6.2.4.3 ASTM A568 Camber Tolerances

unit : in. (mm)

Production	Tolerance
Coils	1/4 (6.35) in any 8 ft (2438 mm)

6.2.4.4 ASTM A568M Camber Tolerances

unit : mm

Production	Tolerance
Coils	5.0 in any 2000

6.3 Surface Processing (Roughness)

Surface processing	Code	Typical roughness (Ra)	Description
Mirror	R20	0.30 μm max.	The surface has a mirror-like luster, suitable for high grade decorative application.
Bright	R25	0.60 μm max.	The surface is smooth and glossy, without pits and undulations. It's suitable for electroplating processing.
Matt	R35	0.60-1.30 μm	The surface has fine fluctuations, and it has good adhesion to painting or lubricating oil. It's suitable for forming process or painting process.

6.4 Surface Quality

Surface Quality	Code	Features	Applications
Unexposed	UE	It allows slight defects which do not affect formability or coating are permitted on surface.	Pipe, Drum, Auto inner panel, Auto structural use
General Purposes	GP	The surface get better surface than UE, it allows defects which do not affect coating or painting are permitted on surface.	Painting, Furniture, Chain, Galvanizing
Exposed	GE	High demand for surface quality. It shall be free from any defects affecting the coating or painting.	Auto outer panel, Electroplating

6.5 Classification of Quality

Classification	Quality	Common Specification	Typical Applications
For Forming Fabrication	1. Commercial Quality (CQ)	JIS G3141 SPCC JFS A2001 JSC270C ASTM A1008 CS EN10130 DC01 CSC CB270TE	Furniture Refrigerator Case, Piping, Steel Drum, Tool Box, Computer Case, Cabinet Lock, Electronic Parts, Wheel Rim & Cap etc.
	2. Drawing Quality (DQ)	JIS G3141 SPCD JFS A2001 JSC270D ASTM A1008 DS EN 10130 DC03	Motor Housing Fender, Chassis, Lamp Shell, Door Inner, & Outer for Automobile, Roaster Oven, etc.
	3. Deep Drawing Quality (DDQ)	JIS G3141 SPCE/SPCF JFS A2001 JSC270E ASTM A1008 DDS EN 10130 DC04	Fuel Tank, Oil Can, Fender, Bumper, Trunk Lid Inner, Door Inner for Automobile, Front Lamp Set, Lighting Fixture, etc.
	4. Extra Deep Drawing Quality (EDDQ)	JIS G3141 SPCG JFS A2001 JSC270F ASTM A1008 EDDS EN 10130 DC05	Oil Can, Fuel Tank for Automobile, Lid inner & Door inner for Automobile, etc.
For Structural Use	1. Commercial structural steel	ASTM A1008 SS Grade XX JFS A2001 JSCXXXW JIS G3135 SPFCXXX	Frame, Automobile Body, Roofing Deck, etc.
	2. High strength sheet with improved formability for automobile quality	JFS A2001 JSCXXXP CSC CF370R/390R/440R	Fender Bumper, Luggage Carrier, Automobile Frame, Bonnet and Trunk, etc.
	3. High strength low alloy steel	EN 10268 HCXXXLA ASTM A1008 HSLA Grade XX	Pillar, Reinforcements
	4. Low yield ratio high strength steel	JIS G3135 SPFCXXXY JFS A2001 JSCXXXY	Automotive bumper, Seat
	5. Bake-hardening steel	EN 10268 HCXXXB	Hood, Fender, Door
	6. Hot stamping	CSC 15B22 CSC 15B36	Automotive bumper
For Hardware, Tool Use	1. Special steel strip	JIS G3311 ASTM A684 SAE J404	Chain Plate, Hand Tool, Saw Plate, Golf Club
For Enamel	1. Porcelain enameled steel	JIS G3133 EN 10209	Pots, Kitchen utensils, Water heater, Curtains

7.1 Unit mass

Product Type	Minimum Unit mass
CR Coil (Carbon Steel)	3 t / Coil
CR Coil (High Strength Low Alloy Steel)	3 t / Coil

7.2 Available Sizes

unit：mm

Product Type	Thickness	Width	Coil Inside Diameter
CR Coil (Carbon Steel)	0.20 ~ 0.29	850 ~ 1000	508 or 610
	0.30 ~ 0.34	850 ~ 1100	
	0.35 ~ 0.40	850 ~ 1219	
	0.41 ~ 0.49	780 ~ 1250	
	0.50 ~ 0.59	780 ~ 1410	
	0.60 ~ 0.69	780 ~ 1630	
	0.70 ~ 0.79	780 ~ 1776	
	0.80 ~ 1.60	780 ~ 1830	
	1.61 ~ 2.00	780 ~ 1676	
	2.01 ~ 3.20	780 ~ 1250	
CR High Strength Coil (30-45kg)	0.40 ~ 2.00	850 ~ 1524	
CR High Strength Coil (45-45kg)	0.40 ~ 2.00	850 ~ 1400	
CR High Strength Coil (30-45kg)	0.40 ~ 2.00	850 ~ 1350	
CR High Strength Coil (30-45kg))	0.80 ~ 2.00	850 ~ 1170	
CR Coil (Special Steel Strip)	0.40 ~ 2.50	850 ~ 1000	

Remarks：Above as a reference only. Actual orders range according to Notice.

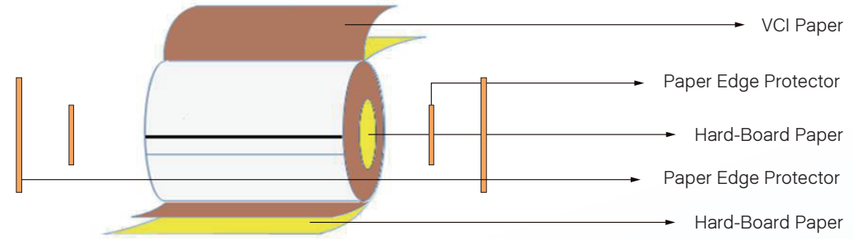
8.1 Marking for cold rolled steel

Label for cold rolled coil

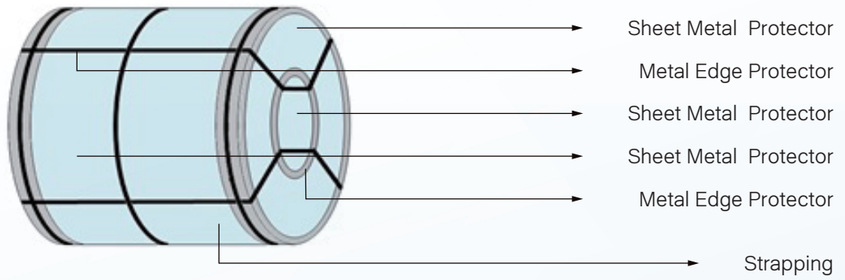
Making Item	
1	CSC logo
2	CSC name
3	Product name
4	Specification
5	Size
6	Identification no
7	Net mass
8	Gross mass
9	Quality type
10	Rough code
11	Heat no

8.2 Packing for cold rolled steel

Inside packing



Outside packing



Product \ Material	Paper Pipe	VCI Paper	Hard-Board Paper			Paper Edge Protector		Sheet Metal Protector			Metal Edge Protector	
			circumferential surface	side wall	inside diameter	outside diameter	inside diameter	circumferential surface	side wall	inner surface	outside diameter	inside diameter
Cold Rolled Coil		●	●			●	●	●	●	●	●	●
Non-Oiled Cold Rolled Coil		●	●		●	●	●	●	●	●	●	●
Thin Cold Rolled Coil	●	●	●			●	●	●	●	●	●	●
Non-Oiled Thin Cold rolled Coil	●	●	●		●	●	●	●	●	●	●	●

Rust Prevention

If antirust treatment is not properly performed for the cold-rolled steel coils and sheets, 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 to prevent rust occurrence. After unpacking steel coils, please process and use them as soon as possible. In principle, unpacked steel coils are usually guaranteed to be free of rust within 12 months after shipping from factory.

Stretcher strain and Aging

There are solid solution Carbon and Nitrogen in the low carbon steels (JIS SPCC/ JSC270C/DC01). 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 and proceed these grades of steel as soon as possible (3~6 months after manufacturing) are recommended to applied in order to avoid aging problems

Kink mark(inner circle)

Steel plates of large pieces application such as enamel steel used for curtain wall, elevator panels, and mild steel used for barbecue stove panels are subject to “kink” located at inner portion of coil naturally. However, with continuous improvement, the length of kink mark can be reduced and controlled effectively. Therefore, in order to reduce the proportion of kink mark, please choose an inner diameter of 610 mm and order coil weight of more than 10 tons to meet the actual market use.

Painting

The painting is one of the common ways to apply for further protecting the cold-rolled products, or enhancing their beauty and function. Not only the paint itself but also the painting pre-treatment is important factor to influence the coating performance. The main factors resulting in poor painting are:

- 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.

Electroplating

Electroplating is covering the cold-rolled steel sheets with a layer of metal or alloy by the principle of electrolysis, and the finishing products will have decorative metallic color and property. After electroplated, the appearance of the electroplated object is related to the current density. In the operational current density range, when the current density is smaller, the electroplated object will be more beautiful. Oppositely, there will be some uneven shapes. Generally, the electroplating bath is acidic that can dissolve the coating layer of Cathode. When the current density is too small, as a result of the dissolution of the acidic bath, the metal of coating layer will show the appearance of loose and matt. The contaminated water generated by electroplating process is an important source of water pollution, which is needed to concentrate on sewage treatment. The common electroplating is zinc-coated、copper-coated、nickel-coated、chrome-coated. The main factors resulting in poor electroplating are:

- Uneven coated layer: To obtain a uniform coated method is the well composition of coating bath. The reasonable operation makes the surface activity to be uniform. The reasonable hanging of the coated pieces makes the best current to be distributed uniformly. The current distribution can be improved by the distance and height between the anode and cathode, and by adding to auxiliary electrode、transmission device、insulation barrier etc.
- Coated layer with slag: Since it is due to impurity contamination, and impurity accumulation of long operation, it must always purify the coating bath. The main methods are：To use the filter material to remove solid impurities, to use activated carbon to remove organic matter, and to remove the metallic impurities by the electrolysis. Furthermore, the impurities can be removed by using the chemical methods of replacement、precipitation、pH adjustment and others.
- Coated layer with poor adhesion: It is due to the poor surface pre-treatment and oil contamination that the coated layer is unable to combine with the substrate. Therefore, it must execute the proper degreasing clean sufficiently.

Welding

- To compare with galvanized steel sheets, there are higher resistance values on cold-rolled steel sheets that only need a small welding current or shorter welding time to obtain sufficient resistance welding heat.
- Because the cold-rolled steel does not have the galvanized layer, there will be no phenomenon of the foreign matter contaminated with electrodes in the welding process. The electrode durability of the cold-rolled steel sheets is higher than that of the galvanized steel sheets. Therefore, it is unnecessary to replace or polish the electrode grinding during the use.
- Although the cold-rolled steel sheets do not have the interference of the galvanized layer, it still needs to consider the correct welding parameters (welding time and welding current) that can obtain the correct welding strength and life of electrode tip.
- The resistance welding process as an example, if you want to weld the cold-rolled steel sheets, please refer to the following table of suggested welding parameters to ensure stable welding quality.

Suggested welding parameter table

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	7	Expulsion of welding current-0.4	2
0.50 ~ 0.69	180	5	> 30	8	Expulsion of welding current-0.4	2
0.70 ~ 0.89	210	6	> 30	9	Expulsion of welding current-0.4	2
0.90 ~ 1.09	230	6	> 30	10	Expulsion of welding current-0.4	3
1.10 ~ 1.29	250	6	> 30	12	Expulsion of welding current-0.4	3
1.30 ~ 1.49	270	6	> 30	14	Expulsion of welding current-0.4	3
1.50 ~ 1.69	300	6	> 30	16	Expulsion of welding current-0.4	4
1.70 ~ 1.89	340	6	> 30	18	Expulsion of welding current-0.4	4
1.90 ~ 2.09	380	6 or 8	> 30	20	Expulsion of welding current-0.4	4
2.10 ~ 2.29	420	6 or 8	> 30	24	Expulsion of welding current-0.4	6
2.30 ~ 2.49	450	8	> 30	26	Expulsion of welding current-0.4	6

Length			
ft	in.	mm	m
1	1.2×10^{1}	3.048×10^{2}	3.048×10^{-1}
8.333×10^{-2}	1	2.54×10^{1}	2.54×10^{-2}
3.281×10^{-3}	3.937×10^{-2}	1	1×10^{-3}

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

Stress			
ksi(=1000 psi)	psi	kgf/mm^2	N/mm^2(=MPa)
1	1×10^{3}	7.03070×10^{-1}	6.89476
0.001	1	7.03070×10^{-4}	6.89476×10^{-3}
1.42233	1.42233×10^{3}	1	9.80665
1.45038×10^{-1}	1.45038×10^{2}	1.101972	1

Absorbed Energy		
ft-lbf	kgf-m	N-m (=Joule)
1	1.38255×10^{-1}	1.35582
7.23301	1	9.80665
7.37562×10^{-1}	1.01972×10^{-1}	1

Hardness Conversion Tables

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 conversion table shall be in accordance 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 conversion table shall be in accordance 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 conversion table shall be in accordance 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.

Mild Steel

Classification	JIS G3141	JFS A2001	ASTM A1008	SAE J2329	EN 10130
CQ	SPCC	JSC270C	CS	Gr.1	DC01
DQ	SPCD	JSC270D	DS	Gr.2	DC03
DDQ	SPCE	JSC270E	DDS	Gr.3	DC04
EDDQ	SPCF	JSC270F	EDDS	Gr.4	DC05
SEDDQ	SPCG	JSC270G	-	Gr.5	DC06

Structural Steel-
Commercial Type/Deep-drawing Type/Bake-hardening Type

Classification	JIS G3135	JFS A2001	ASTM A1008(SS)	SAE J1392	SAE J2340	EN 10268
Commercial Type	-	-	Gr.25	-	-	-
	-	JSC340W	Gr.30	-	-	-
	SPFC370	JSC370W	Gr.33	035CL	-	HC220P
	SPFC390	JSC390W	Gr.40	040CL	300S	-
	SPFC440	JSC440W	-	045CL		HC260P
Deep-drawing Type	-	JSC340P	-	-	180A	-
	-	JSC370P	-	-	210A	HC220Y
	-	JSC390P	-	-	250A	-
	-	JSC440P	-	-	280A	HC260Y
Bake-hardening Type	-	JSC270H	-	-	-	-
	-	JSC340H	-	-	180B	HC180B
	-		-	-	210B	HC220B
	-	-	-	-	250B	HC260B
	-	-	-	-	280B	HC300B

Structural Steel －High Yield Ratio Type/ Low Yield Ratio Type

Classification	JIS G3135	JFS A2001	ASTM A1008 (HSLAS)	SAE J1392	SAE J2340	EN 10268
High Yield Ratio Type	-	-	Gr.45	045XL	300X	HC300LA
	-	JSC440R	Gr.50	050XL	340X	HC340LA
	-	-	Gr.55	-	380X	HC380LA
	-	-	Gr.60	060XL	420X	HC420LA
	-	JSC590R	Gr.65	-	-	HC460LA
	-	-	Gr.70	070XL	490X/R	HC500LA
	-	-	Gr.80	080XL	550X/R	-
Low Yield Ratio Type	-	-	-	-	500DL	-
	-	-	-	-	600DL1	-
	SPFC590Y	JSC590Y	-	-	600DL2	-
	SPFC780Y	JSC780Y	-	-	800DL	-
	SPFC980Y	JSC980Y	-	-	950DL	-
	-	-	-	-	1000DL	-
	-	JSC1180Y	-	-	-	-

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

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 G3141 SPCC-SD CQ2 GP R35
	Temper	A,S,8,4,2,1	
	Surface Finish	Bright Finish (B)	
		Matte (Dull) Finish (D)	
	Surface Quality	General Purposes (GP)	
		Unexposed (UE)	
2	Oiled or Non-oiled		Oiled
3	Dimensions (Thickness × Width × Length(or coil))		$1.00^{mm} \times 1219^{mm}$ × Coil
4	Coil Size (Inside Dimensions，Outside Dimensions)		ID 508mm，OD 1650 mm max.
5	Mass	Max. Mass	10t max.
		Order Mass	450t
6	Applications and Fabricating Methods		Welded Pipe
7	Special Requirements (if Required)		Hardness：55 HRB max.

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.

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E-mail	c00392@csgtsha.com

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

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Fax	65-62256054
E-mail	changcc@csgtsg.com.sg

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	BARS & WIRE RODS	886-7-8051092	ELECTRICAL STEEL	886-7-8051270
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