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NIPPON STEEL

Cold-Rolled Steel Sheets and Coils



NIPPON STEEL CORPORATION

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Introduction

NIPPON STEEL manufactures a wide range of Cold-Rolled Steel Sheets and Coils in accordance with Japanese Industrial Standards (JIS), the standards of other countries, and our own strict standards.

Cold-Rolled Steel Sheets and Coils are extensively used as basic materials in automobiles, electrical appliances, steel office equipment, various types of containers, and numerous other products closely connected to our daily lives.

As more sophisticated products are demanded which are more economical, in a wider range of uses that also offer more advanced technology, the quality and performance required of Cold-Rolled Steel Sheets and Coils have become more refined and diversified. We at NIPPON STEEL have has been dedicated to the development of new products and quality enhancement to meet our customers' increasingly sophisticated demands with our rich experience, time honored technology, and excellent manufacturing equipment.

We develop and offer a wide range of steel products from processing steel with superb press formability to high-strength steel sheets instrumental in weight reduction, to name a few, in order to meet our customers' needs. NIPPON STEEL sincerely wishes to help our customers succeed in enhancing business performance with the Cold-Rolled Steel Sheets and Coils that best suit their needs and uses.

NIPPON STEEL is committed to providing Cold-Rolled Steel Sheets and Coils that satisfy our customers. We appreciate your continued patronage.

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Features

NIPPON STEEL manufactures Cold-Rolled Steel Sheets and Coils under integrated control that manages everything from raw materials to finished steel products, utilizing state-of-the-art equipment. The features of our products are as indicated below.

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1 Wide Range of Varieties

In addition to Cold-Rolled Steel Sheets and Coils for general purposes that meet JIS specifications, NIPPON STEEL offers a wide range of product series to support various applications and use requirements. These include processing steel with outstanding press formability, high-strength steel sheets with high formability and strength, and other types.

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2 Outstanding Quality

Through a system of integrated control that starts from the blast furnaces, NIPPON STEEL utilizes rich experience, technology, and state-of-the-art equipment to implement quality control to meet diversified use purposes and conditions. We offer products free from internal defects, with excellent surface quality and dimensional precision, not to mention the process versatility so critical to mass production, which customers can use with assurance.

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③ Technical Service for Every Need

Drawing upon rich experience and excellent technology that is supported by our robust research and development structure, NIPPON STEEL offers complete technical consultation services to satisfy our customers not only for making the most of material properties but also for technical issues related to application processes.



Kyushu Works Yawata area

Setouchi Works

Hirohata area

NIPPON STEEL CORPORATION

East Nippon Works Kashima area

East Nippon Works Kimitsu area

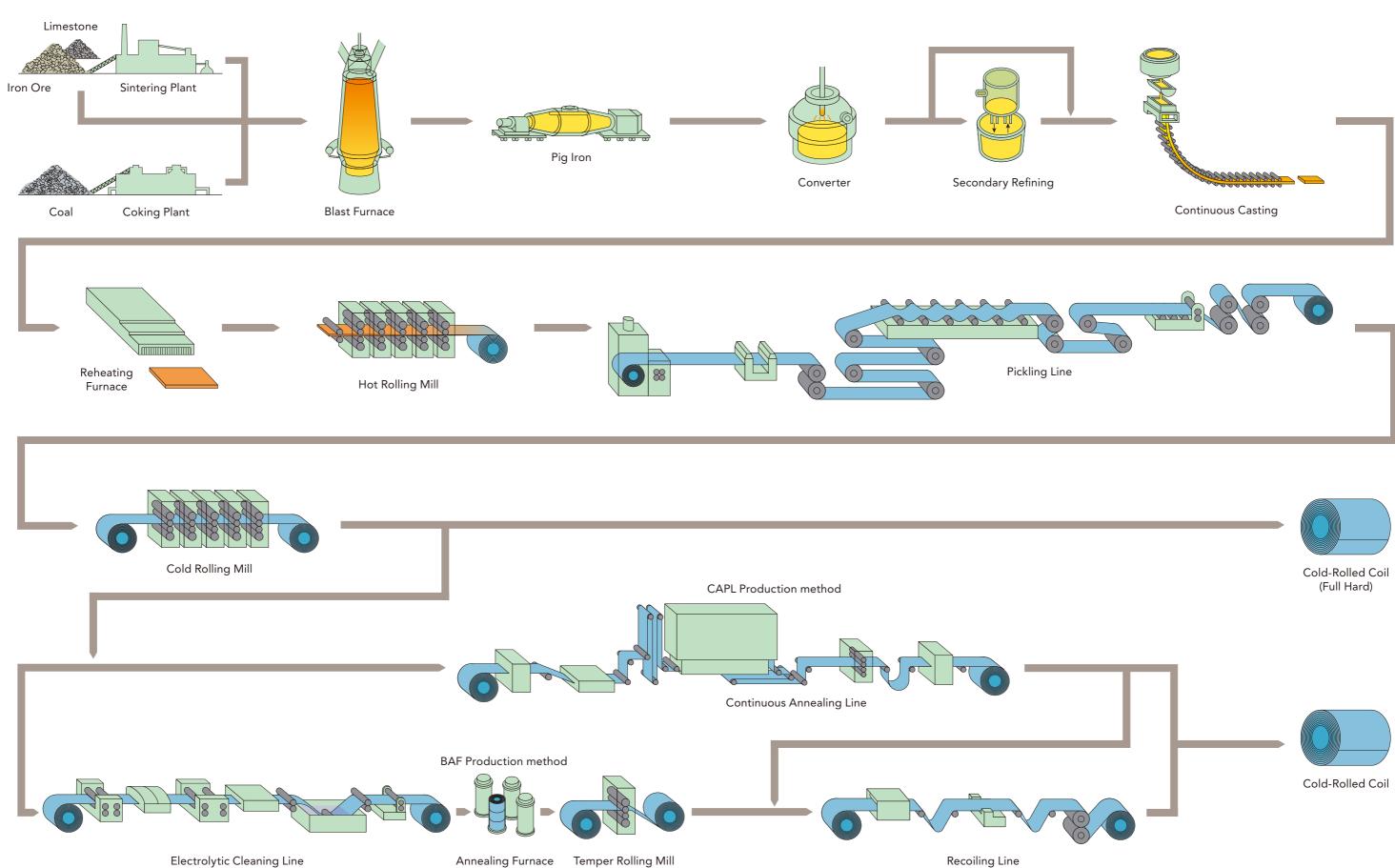
Nagoya Works

Kansai Works Wakayama area

Examples of Use



Manufacturing Processes



Manufacturing Equipment

Continuous Casting from Blast Furnace

Pig iron is formed by a chemical reaction of sinter and coke in the blast furnace. Then, in order to meet our customers' demand for ductility and robustness, the pig iron goes through four processes: hot metal pretreatment, converter process, secondary refining process, and continuous casting to remove excess carbons and impurities for chemical adjustment in order to produce an intermediate material known as "slab".





Hot-Rolling

From Hot-Rolling to Pickling

By strictly controlling the temperature and roll surface condition, stock sheets (or Hot-Rolled Steel Sheets and Coils plates) that are easy to process are produced with flawless surface condition and internal quality. All production line processes, starting from feeding to the reheating furnace to the completion of coiling, are controlled by a computerized system.

The stock sheets or Hot-Rolled Steel Sheets and Coils go through a continuous pickling process, to remove surface scale (iron oxide layer) to make the surface beautiful and flawless in the post process.

From Cold-Rolling to Annealing

Pickled coils are rolled to the specified thickness by cold rolling. The Cold-Rolled Steel Sheets and Coils have their crystal grains enlarged in the rolling direction, making the texture hardened and brittle. In the annealing process, the coils are continuously heated in reductive atmospheric gas to form uniform crystals which meet quality material standards as well as specified requirements and applications.

As there has been greater demand in recent years for a more pristine surface finish, as well as for greater strength and formability, we at NIPPON STEEL are offering light, strong, and pristine Cold-Rolled Steel Sheets and Coils that meet those demands. We do so by achieving consistent material quality and reducing surface defects with the use of continuous descaling and cold-rolled steel sheet and coil mills (CDCM).





Cold-Rolling

Annealing

1. General-Purpose Cold-Rolled Steel Sheets and Coils (JIS: G 3141)

Designation	Characteristics	Main Applications
SPCC SPCCT (*1)	With commercial quality suitable for bending fabrication and simple forming, this is the type in the greatest demand.	Refrigerators, cabinets, power distributing boards and drums
SPCD	Steel sheets that provide consistent quality and drawing quality second only to that of SPCE.	Automobile floor and roof panels
SPCE SPCF ^(*2)	With metallurgically controlled grain size, it retains its beautiful finish even after being deep-drawn.	Automobile fenders and quarter panels
SPCG (*2)	Extra-low carbon Cold-Rolled Steel Sheets and Coils with outstanding workability.	Automobile interior panels and deep drawn parts
	SPCC SPCCT (*1) SPCD SPCE SPCF (*2)	SPCC SPCCT (*1) With commercial quality suitable for bending fabrication and simple forming, this is the type in the greatest demand. SPCD Steel sheets that provide consistent quality and drawing quality second only to that of SPCE. SPCE SPCF (*2) With metallurgically controlled grain size, it retains its beautiful finish even after being deep-drawn. SPCG (*2) Extra-low carbon Cold-Rolled Steel Sheets and Coils with

(*1) When tension test and elongation values are guaranteed for SPCC in compliance with a customer's request, the suffix may be given to the designation: SPCCT.

(*2) Non-aging shall be guaranteed for a period of six months from the date of shipment from the works. Non-aging indicates performance in which stretcher strain does not occur during the working process.

2. Special-Purpose Cold-Rolled Steel Sheets and Coils

1 Cold-Rolled Steel Sheets and Coils with Workability (NIPPON STEEL Standards)

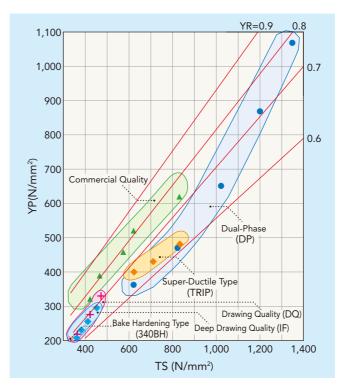
Classification	Designation	Characteristics	Main Applications
Commercial Quality	NSCC	General-purpose Cold-Rolled Steel Sheets and Coils with excellent workability and slow aging.	Automobile doors, hoods, shallow drawn parts
Drawing Quality	NSC270D NSC270E	Excellent drawability, suitable for a wide variety of forming	Automobile side panels, floors, drawn parts
Extra Deep	NSC270F	Extra-low-carbon Cold-Rolled Steel Sheets and Coils with excellent workability.	Automobile quarter panels
Drawing	NSC270G	Extra-low-carbon Cold-Rolled Steel Sheets and Coils with excellent deep-drawing workability.	Automobile oil pans, high roofs, extra deep drawn parts

2 High-Strength Steel Sheets (NIPPON STEEL Standards)

Classification	Designation	Characteristics	Main Applications
Commercial Quality	NSC390N, 440N, 490N, 540N, 590N	Suitable for light forming, such as bending.	Reinforcement, members, pillars and bumpers
Drawing Quality	NSC340R, 370R, 390R, 440R	Excellent drawability, suitable for a wide variety of forming.	Pillar side sills and dash boards
Deep Drawing Quality	NSC340E, 370E, 390E, 440E	High r-value, suitable for deep drawing.	Hood outer, door outer, members and dashboards
Bake Hardening Type Drawing Quality	NSC340BH	The yield point is increased by paint baking. Suitable for applications requiring high dent resistance.	Hood outer, door outer and trunk lid outer
Dual-Phase	NSC490D, 540D, 590D, 780D, 980D, 1180D	High strength and low yield point, excellent formability. High impact energy absorbing capability.	Bumpers, door impact bars and members
Super-Ductile Type	NSC590T, 690T, 780T	Very high ductility, excellent balance between strength and ductility, high impact energy absorbing capability.	Members, pillars, side sills, etc.

3. Six Series of High-Strength Cold-Rolled Steel Sheets and Coils

NIPPON STEEL's High-Strength Cold-Rolled Steel Sheets and Coils are classified into the following six categories, depending on their forming properties such as strength, ductility, and balance between strength and yield point.

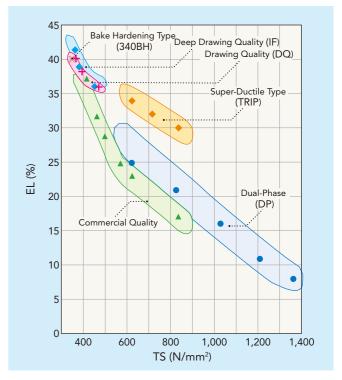


Mass-Production Menu

Classification	Designation			Strength	n (Figures	Indicate th	e Minimur	n Tensile S	Strength in	N/mm²)		
Classification	Designation	340	370	390	440	490	540	590	690	780	980	1,180
Commercial Quality	NSC***N			0	0	0	0	0				
Drawing Quality	NSC***R	0	0	0	0							
Deep Drawing Quality	NSC***E	0	0	0	0							
Bake Hardening Type Drawing Quality	NSC***BH	0										
Dual-Phase	NSC***D					0	0	0		0	0	0
Super-Ductile Type	NSC***T							0	0	0		

Representative Examples of Properties

Designation	Yield Point (N/mm²)	Tensile Strength (N/mm²)	Elongation (%)	Yield Ratio (%)	Thickness (mm)	Tensile Test Piece
NSC440R	290	459	37	63	1.6	
NSC440E	284	448	39	63	1.6	
NSC340BH	201	347	44	58	0.8	
NSC590D	318	610	31	52	1.6	JIS No.5
NSC780D	437	829	22	53	1.6	longitudinal to
NSC980D (TYPE A)	630	1,006	17	63	1.6	rolling direction
NSC980D (TYPE B)	716	1,015	15	71	1.6	
NSC1180D	900	1,199	11	75	1.6	
NSC590T	391	618	37	63	1.6	



The strength level is put in "***" of the specification code.

Standards

1. Mechanical Properties

		Charles	Test							Tensior	n Test										Bending	Test*4
Туре	Classification	Tempering Symbo/ Designation	Nominal Thick	Yield Point or 0.2% Proof Stress (N / mm²)	Tensile Strength (N / mm²)					Elongat	ion (%)				Average Plasticity Strain Ratio (\bar{r})			Sampling Direction o		Inner Radius	Sampling Direction of	
		Designation Designation	menness (mm)	_	—	< 0.20	$0.20 \le t < 0.$	25 $0.25 \le t < 0.3$	$0.30 \le t < 0.40$	$0.40 \leq t < 0.60$	$0.60 \le t < 1.0$	$1.0 \leq t < 1.6$	$1.6 \leq t < 2.5$	2.5 ≦ t	t < 0.50	0.50 ≦ t ≦ 1	.0 1.0 < t ≦	1.6 1.6 <	t Test Specim	en Aligie	itaulus	Test Specimen
	Commercial	SPCC	S, 8, 4, 2, 1	_	_	_	_	_	—	_	_	_	_	_	_	_	_			180°	Tight	JIS No.3
	Quality	SPCCT	S	_	270 ≦	_	—	28 ≦	31 ≦	34 ≦	36≦	37 ≦	38≦	39≦	—	_	_			160	bending	rolling direction
Standard Cold-Rolled Steel Sheets and Coils*1	Drawing Quality	SPCD	S	(≦240)	270 ≦	25 ≦	27 ≦	30 ≦	33 ≦	36 ≦	38≦	39≦	40 ≦	41 ≦	—				JIS No.5			
(JIS G 3141)	Deep Drawing	SPCE	S	(≦220)	270 ≦	27 ≦	29 ≦	32 ≦	35 ≦	38 ≦	40 ≦	41 ≦	42 ≦	43 ≦	_	-	_		rolling directi			
(Quality	SPCF	S	(≦210)	270 ≦	_	_	_	_	40 ≦	42≦	43 ≦	44≦	45 ≦	_	-	_			-	-	-
	Extra-Deep Drawing Quality	SPCG	S	(≦190)	270 ≦	_	_	-]	42 ≦	44 ≦	45 ≦	46≦	_	_	1.4 ≦	1.3 ≦	-				
			Т	est						Tensi	on Test									E	Bending 1	lest*4
Туре	Classification Classification According to Tempering Symbol Designation	Classification		Yield Point or 0.2 Proof Stress (N/m	th				Elong	ation (%)				Avera	age Plasticity S	Strain Ratio (r)		Sampling Direction of Test		Inner Radius	Sampling Direction of	
		ation	<i>ess (mm)</i> 0.25 ≦ t	0.25 ≦ t	0.25 ≦	t < 0.30 0.	$30 \le t < 0.40$	$0.40 \le t < 0.60$	$0.60 \le t < 1.0$	1.0 ≦ t < 1.	6 1.6≦t <	2.3 2.3 ≦	≦t	0.4 ≦ t ≦	1.0	$1.0 < t \le 1.6$	1.6 < t	Specimen	Angle	Radius	Test Specimen	
	Commercial Quality	NSCC	S, M	_	_	-	-	_	_	_	-	-			—		_	—				
	Drawing Quality	NSC270D	S	(≦ 195)	270 ≦	-	_	_	38≦	40 ≦	42 ≦	43 ≦	44 :	≦	_		_	_				
	Drawing Quality	NSC270E	S	(≦ 185)	270 ≦	-	-	_	40 ≦	42 ≦	44 ≦	45 ≦	46 :	≦	1.4 ≦		1.3 ≦	(1.2≦)	JIS No.5 rolling direction	—	-	—
Steel Sheets with Workability *2	Deep Drawing	NSC270F	S	(≦175)	270 ≦	-	-	_	_	45 ≦	46 ≦	47 ≦	48 :	≦	1.6 ≦		1.5 ≦	(1.4≦)	ronning direction			
(NIPPON STEEL Standards)	Quality	NSC270G	S	(≦ 175)	270 ≦	-	-	-	_	47 ≦	48 ≦	49 ≦	50 :	≦	1.7 ≦		1.6 ≦	(1.5≦)				
	Drawing Quality (BAF)	NSC270D-BA	S	(≦240)	270 ≦	36	≦	37 ≦	38≦	40 ≦	42 ≦	43 ≦	44 :	≦	_		_	—	JIS No.5			
	Deep Drawing Quality (BAF)	NSC270E-BA	S	(≦220)	270 ≦	38	≦	39 ≦	40≦	42 ≦	44 ≦	45 ≦	46 :	≦	_		_	_	rolling direction	—	-	-

			Test							Tensi	on Test				Bending Test	k 4	
Туре	Classification	Classification According to Non Tempering Symbol Designation	ninal This	Yield Point or 0.2% Proof Stress (N / mm²)	Tensile Strength (N / mm²)					Elonga	ation (%)		Sampling Direction of Test	Bending Angle	Inner Radius	Sampling Direction of Test	Bake Hardenability (N/mm²)
		Designation Designation	(mm)	-	—	$0.40 \leq t < 0.60$	$0.60 \le t < 0.80$	$0.80 \le t < 1.00$	$1.00 \le t < 1.20$	$1.20 \le t < 1.60$	$1.60 \le t < 2.00$	$2.00 \leq t \leq 2.30$	Specimen	Aligie		Specimen	
		NSC390N	S	235 ≦	390 ≦	28 ≦	30 ≦	30 ≦	31 ≦	31 ≦	32 ≦	33 ≦					
	Commercial Quality	NSC440N	S	275 ≦	440 ≦	24 ≦	26 ≦	26 ≦	27 ≦	27 ≦	28 ≦	29 ≦]		Tight bending		
		NSC490N	S	315 ≦	490 ≦	_	23 ≦	23 ≦	24 ≦	24 ≦	24 ≦	25 ≦		180°	light bending		
		NSC540N	S	355 ≦	540 ≦	_	20 ≦	20 ≦	21 ≦	21 ≦	21 ≦	22 ≦]				
		NSC590N	S	390 ≦	590 ≦	—	17 ≦	17 ≦	18 ≦	18 ≦	18 ≦	19 ≦]		0.5 times thickness] [
		NSC340R	S	185 ≦	340 ≦	32 ≦	34 ≦	35 ≦	36 ≦	37 ≦	38 ≦	39 ≦] [
	Drawing Quality	NSC370R	S	205 ≦	370 ≦	31 ≦	33 ≦	34 ≦	35 ≦	36 ≦	37 ≦	38 ≦]	180°	Tight bending		
		NSC390R	S	225 ≦	390 ≦	29 ≦	31 ≦	32 ≦	33 ≦	34 ≦	35 ≦	36 ≦]	180	light bending		
		NSC440R	S	265 ≦	440 ≦	27 ≦	29 ≦	30 ≦	30 ≦	31 ≦	31 ≦	32 ≦					
High-Strength Cold-Rolled	Deep Drawing	NSC340E	S	165 ≦	340 ≦	—	34 ≦	35 ≦	36 ≦	37 ≦	38 ≦	39 ≦	JIS No.5 longitudinal to rolling 180°			JIS No.3 longitudinal	
Steel Sheet and Coils *3		NSC370E	S	205 ≦	370 ≦	_	33 ≦	34 ≦	35 ≦	36 ≦	37 ≦	38 ≦		100°	Tight bending	to rolling	
(NIPPON STEEL Standards)	Quality	NSC390E	S	205 ≦	390 ≦	—	31 ≦	32 ≦	33 ≦	34 ≦	35 ≦	36 ≦	direction	160	light bending	direction	
		NSC440E	S	245 ≦	440 ≦	—	29 ≦	30 ≦	30 ≦	31 ≦	32 ≦	33 ≦					
	Bake Hardened Type Drawing Quality	NSC340BH	S	195 ≦	340 ≦	32 ≦	35 ≦	35 ≦	36 ≦	37 ≦	38 ≦	39 ≦		180°	Tight bending		30≦
		NSC590D	S	≦ 410	590 ≦	—	17 ≦	18 ≦	19 ≦	20 ≦	21 ≦	21 ≦] [] [
		NSC780D	S	≦ 645	780 ≦	—	—	13 ≦	14 ≦	15 ≦	16 ≦	16 ≦]				
	Dual-Phase	NSC980D	S	≦ 885	980 ≦	—	—	9≦	10 ≦	11 ≦	12 ≦	12 ≦					
		NSC1180D	S	(≦ 1,130)	1,180 ≦		_	6≦	6 ≦	7 ≦	8 ≦	8 ≦					
	Super-Extra	NSC590T	S	≦ 480	590 ≦		25 ≦	26 ≦	27 ≦	28 ≦	29 ≦	30 ≦					
	Ductile Type	NSC780T	S	≦ 570	780≦	_	_	19 ≦	19 ≦	20 ≦	20 ≦	21 ≦					

Specific Hardness (Standard Tempering, 1/8, 1/4, 1/2, Full Hardness)

Tempering Classification	Symbol	HRB	HV	Bending Angle*4	Inner Diameter*4	Test Piece*4	
Standard Tempering	S	—	_	180°	Tight bending	No. 3 rolling direction	
1/8 Hardness	8	50-71	95-130	180°	Tight bending	No. 3 rolling direction	
1/4 Hardness	4	65-80	115–150	180°	0.5 times thickness	No. 3 rolling direction	-
1/2 Hardness	2	74-89	135–185	180°	1.0 times thickness	No. 3 rolling direction	-
Hardness	1	85 ≦	170 ≦	—	—	No. 3 rolling direction	Rockwell or Vickers hardne shall be employed.

*1) 1 In principle, tension values shall not apply to SPCC.
2 When tension test and elongation values are guaranteed for SPCC in compliance with a customer's request, the suffix T may be given to the designation: SPCCT.
3 For sheets under 0.6mm thick, ordinarily, tension tests shall be omitted.
4 This table shall apply to sheets 30mm wide or over.
5 SPCF and SPCG shall be guaranteed for non-aging property for a period of 6 months from the shipment from the works.
*2) The yield point or 0.2% proof stress value and average plasticity strain ratio (*i*) in the parentheses indicate the target values.
*3) The bake hardenability (BH) indicates an increase in yield point after 2%-pre-stain and heat treatment at 170°C for 20 minutes.
*4) The bending test shall not be conducted unless otherwise specified.

Standards

2. Size Tolerances (JIS G 3141 Standards)

Tolerances on thickness, length, and width are usually in accordance with Table A. When tolerances stricter than those in Table A are specified, the tolerances will comply with Table B.

①Tolerance on thickness

The position for measuring thickness is the normal position for coil, and for steel sheet it is 15 mm in from both edges. In the case of a width less than 30 mm, the position is the center of the width.

(Unit: mm)

T	hic	kness	То	lerar	ices	Ta	ble	• A
---	-----	-------	----	-------	------	----	-----	-----

Nominal Width Nominal Thickness	W < 600	600 ≦ W < 1,000	1,000 ≦ W < 1,250	1,250 ≦ W < 1,600	1,600 ≦ W
t < 0.25	± 0.03	± 0.03	± 0.03	(± 0.05)	(± 0.06)
$0.25 \le t < 0.40$	± 0.04	± 0.04	± 0.04	(± 0.06)	(± 0.07)
$0.40 \le t < 0.60$	± 0.05	± 0.05	± 0.05	± 0.06	(± 0.07)
$0.60 \le t < 0.80$	± 0.06	± 0.06	± 0.06	± 0.06	± 0.07
$0.80 \le t < 1.00$	± 0.06	± 0.06	± 0.07	± 0.08	± 0.09
$1.00 \le t < 1.25$	± 0.07	± 0.07	± 0.08	± 0.09	± 0.11
$1.25 \le t < 1.60$	± 0.08	± 0.09	± 0.10	± 0.11	± 0.13
$1.60 \le t < 2.00$	± 0.10	± 0.11	± 0.12	± 0.13	± 0.15
$2.00 \le t < 2.50$	± 0.12	± 0.13	± 0.14	± 0.15	± 0.17
$2.50 \leq t < 3.15$	± 0.14	± 0.15	± 0.16	± 0.17	± 0.20
3.15 ≦ t	± 0.16	± 0.17	± 0.19	± 0.20	(± 0.22)
					()) () () () () () () () () () (

(Unit: mm)

Thickness Tolerances Table B

Nominal Width Nominal Thickness	W < 160	160 ≦ W < 250	250 ≦ W < 400	400 ≦ W < 600
t < 0.10	± 0.010	± 0.020	—	—
$0.10 \leq t < 0.16$	± 0.015	± 0.020	—	_
$0.16 \le t < 0.25$	± 0.020	± 0.025	± 0.030	± 0.030
$0.25 \leq t < 0.40$	± 0.025	± 0.030	± 0.035	± 0.035
$0.40 \leq t < 0.60$	± 0.035	± 0.040	± 0.040	± 0.040
$0.60 \leq t < 0.80$	± 0.040	± 0.045	± 0.045	± 0.045
$0.80 \leq t < 1.00$	± 0.04	± 0.05	± 0.05	± 0.05
$1.00 \le t < 1.25$	± 0.05	± 0.05	± 0.05	± 0.06
$1.25 \le t < 1.60$	± 0.05	± 0.06	± 0.06	± 0.06
$1.60 \leq t < 2.00$	± 0.06	± 0.07	± 0.08	± 0.08
$2.00 \leq t < 2.50$	± 0.07	± 0.08	± 0.08	± 0.09
$2.50 \leq t < 3.15$	± 0.08	± 0.09	± 0.09	± 0.10
3.15 ≦ t	± 0.09	± 0.10	± 0.10	± 0.11

(): Not specified in JIS

(Unit: mm)

Thickness Tolerances Tables A and B

		(Unit: mm)
Nominal Width Thickness	Thickness Tolerances Tables A	Thickness Tolerances Tables B
W < 1,250	+7	+3
VV < 1,230	-0	-0
1,250 ≦ W	+10	+4
1,250 ≧ ₩	-0	-0

3. Shapes (JIS G 3141 Standards)

Flatness

n wath of standard temper grade. Oness otherwise speenred, Flattess / shar									
apply.						(Unit: mm)			
Kind of Strain		Flatness A		Flatness B					
Nominal Thickness	Bow	Edge Wavy	Center Buckle	Bow	Edge Wavy	Center Buckle			
W < 1,000	12	8	6	2	2	2			
$1,000 \le W < 1,250$	15	9	8	3	2	2			
$1,250 \le W < 1,600$	15	11	8	4	3	2			
1,600 ≦ W	20	13	9	5	4	2			

OCamber

Camper		(Unit: mm)
Nominal Width	Maximum Values of Camber A	Maximum Values of Camber B
Nominal Thickness	Steel Strip	Steel Strip
$30 \leq W < 40$	8 per any length of 2,000	25 per any length of 2,000
$40 \leq W < 600$	4 per any length of 2,000	10 per any length of 2,000
600 ≦ W	2 per any length of 2,000	

4. Tempering and Surface Finish

OTempering Classification

Cold-Rolled Steel Sheets and Coils with standard tempering are mainly produced. For those other than standard tempering, please consult us.

Standard Cold-Rolled Steel Sheets and Coils JIS G 3141

Tempering Classification	Symbol
Standard Tempering	S
1/8 Hardness	8
1/4 Hardness	4
1/2 Hardness	2
Full Hardness	1

NIPPON STEEL Standards

Tempering Classification	Symbol
Standard Tempering	S
Not Annealed	М

D A dull or matte finis roughening of the st dull finish are: a. Facilitates draw surface holds the b. Better paint adhe

2Surface Finish

Paint adhesion is roughness of th results in improve

Classification	Symbol
Standard Tempering	S
Not Annealed	М

(JIS G 3141 Standards)

5. Chemical Composition Values Chemical composition values are defined as follows.

Designation	
SPCC	
SPCD	
SPCE	
SPCF	
SPCG (*)	

2Width Tolerances

The position for measuring width is the normal position for coil, and the arbitrary position for steel sheets.

Thickness Tolerances Table C

Nominal Width Nominal Thickness	W < 160	160 ≦ W < 250	250 ≦ W < 400	400 ≦ W < 600
t < 0.60	± 0.15	± 0.20	± 0.25	± 0.30
$0.60 \le t < 1.00$	± 0.20	± 0.25	± 0.25	± 0.30
$1.00 \le t < 1.60$	± 0.20	± 0.30	± 0.30	± 0.40
$1.60 \le t < 2.50$	± 0.25	± 0.35	± 0.40	± 0.50
$2.50 \leq t < 4.00$	± 0.30	± 0.40	± 0.45	± 0.50
$4.00 \le t < 5.00$	± 0.40	± 0.50	± 0.55	± 0.65

The specifications shall apply to Cold-Rolled Steel Sheets and Coils 500mm or more in width of standard temper grade. Unless otherwise specified, Flatness A shall

The table does not apply to the abnormal part of a steel strip.

Two surface finishes are available - dull and bright. Dull-finish products are mainly produced. For bright-finish products, please consult us.

Dull Finish	Bright Finish					
ish is produced by a minute steel surface. The merits of a	Bright finishes are applied to the steel by the use of smoothly polished rolls.					
ving, because the matte e lubricant evenly. esion s excellent due to the minute the sheet surfaces, which red paint durability.	The sheet surfaces are outstandingly smooth, processed with a mirror-like luster. Accordingly, these bright finishes are ideal for decorative plating.					

С Mn Ρ S ≦ 0.15 ≦ 1.00 ≦ 0.100 ≦ 0.035 ≦ 0.10 ≦ 0.50 ≦ 0.040 ≦ 0.035 ≦ 0.08 ≦ 0.45 ≦ 0.030 ≦ 0.030 ≦ 0.06 ≦ 0.45 ≦ 0.030 ≦ 0.030 ≦ 0.02 ≦ 0.25 ≦ 0.020 ≦ 0.020

Alloying elements other than those listed in the table may be added as need arises.

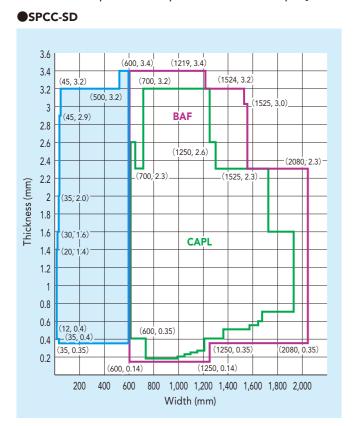
(*) The maximum value for Mn, P or S may be changed according to agreements between both parties to deliveries (Applied to sheets and coils as-annealed and with standard tempering.)

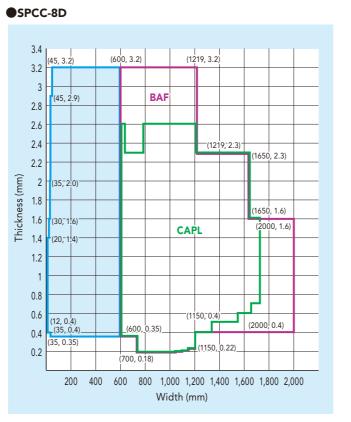
(Unit: mm

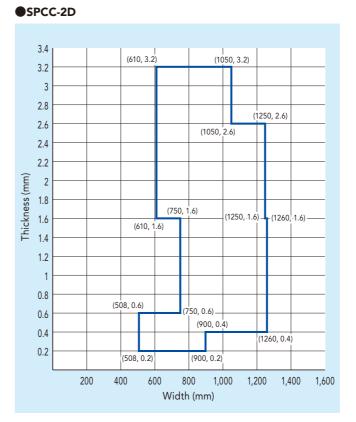
Product Size Range

- As sizes other than those listed are also available, please inquire.
- Please direct inquiries about the range of manufacturability of SPCF and SPCG to the pertinent department of our company.
- CAPL: Continuous annealing production method

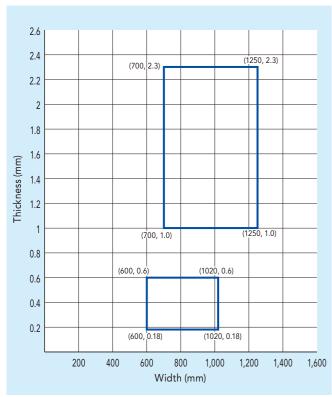
BAF: Batch annealing production method



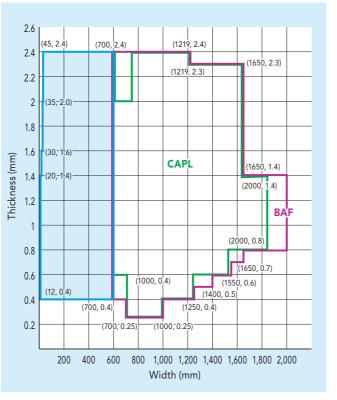




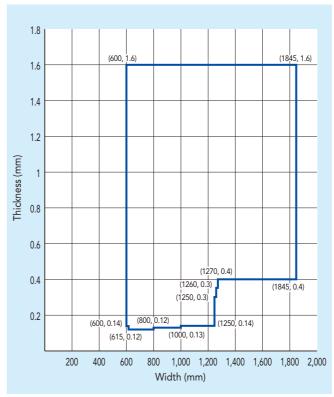
●SPCC-SB



SPCC-4D

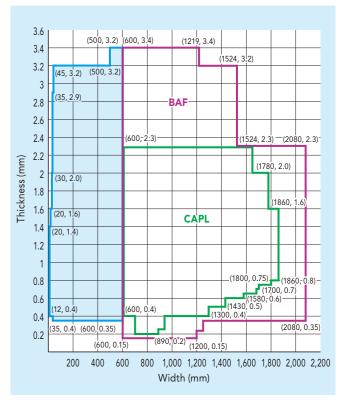


SPCC-1D



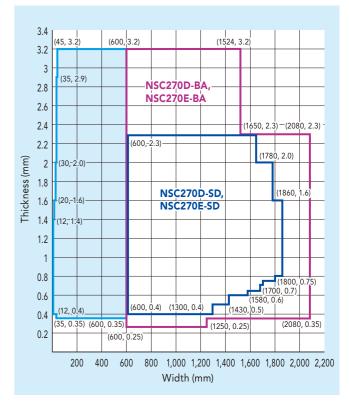
A

Available in coil only by option fee. (Option fee is required for a manufacturing arrangement.)

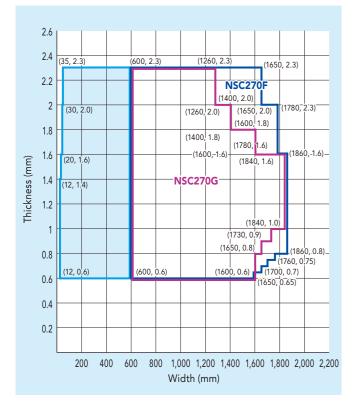


●SPCD-SD SPCE-SD

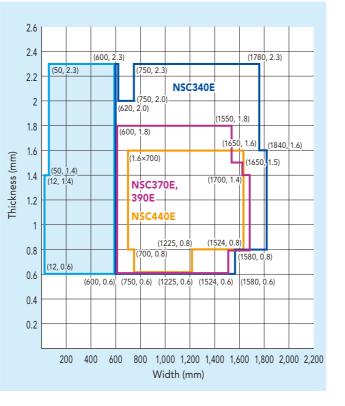
NSC270D-SD NSC270E-SD NSC270D-BA NSC270E-BA



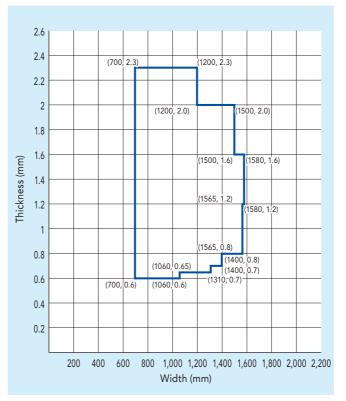




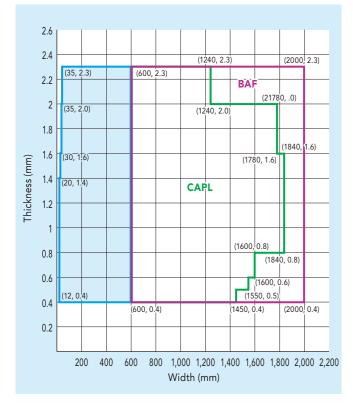
●NSC340E NSC370E NSC390E NSC440E



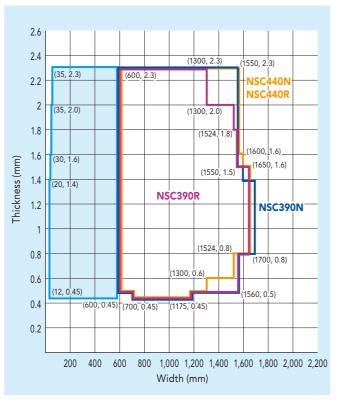




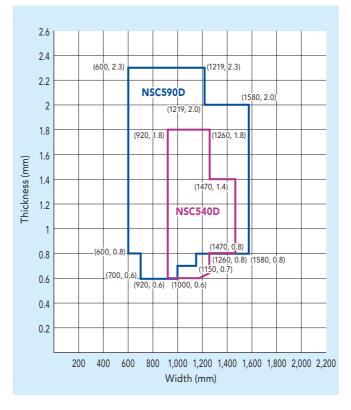
•NSC340R NSC370R NSC340BH



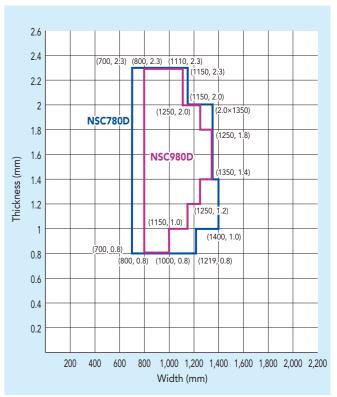
•NSC390N NSC390R NSC440N NSC440R



Insc540D NSC590D

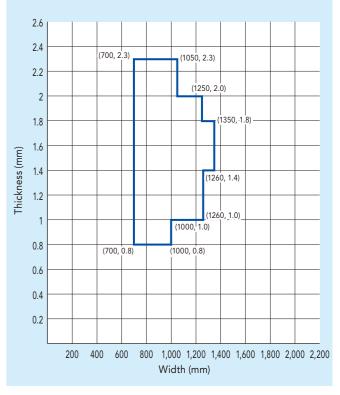


Available in coil only by option fee. (Option fee is required for a manufacturing arrangement.)



NSC780D NSC980D





Precautions for Use

Cold-Rolled Steel Sheets and Coils are produced in a wide range of grades, each having its own unique characteristics. Selection of the right grade, therefore, is essential for the most economical production of high-quality end products.

NIPPON STEEL can help customers choose the grade best suited for each application. We are also ready to cooperate with customers by offering optimal technical and production advice.

1. Painting

In most cases, Cold-Rolled Steel Sheets and Coils are used after painting for the purpose of ornamentation as well as for protection against rusting.

It is therefore recommended that the most suitable paint and painting method be selected with careful consideration given to the shape of the end product and the environment in which it will be used.

Painting Methods

a. Simple methods

Degreasing \rightarrow Painting \rightarrow Drying

b. Methods to be employed when special paint durability is required.

Degreasing \rightarrow Chemical Treatment* \rightarrow Painting \rightarrow Drying

* Phosphate film or wash primer

Probable Causes of Faulty Paint Coating

a. Inadequate degreasing

Optimal paint film cannot form on an inadequately degreased surface. Paint adherence and corrosion resistance will inevitably be poor.

b. Insufficient chemical treatment

Adherence and corrosion resistance of the paint coating is also affected by insufficient chemical treatment. The effect of chemical treatment may also be impaired by humidity, resulting in an uneven tone of the chemical film applied or in its discoloration.

Since these two probable causes described in a and b are the major factors affecting paint results, the work must be done carefully.

- c. Insufficient water rinsing and drying after chemical treatment In this case, the same results will occur as "a" and "b" mentioned above.
- d. Improper paint
- Avoid paints with poor durability. For top coating, new synthetic resin paints are developed by numerous paint manufacturers. Please consult with them to make the best selection for your needs.

2. Plating

Cold-Rolled Steel Sheets and Coils are applied with oils for rust protection. The lubricant used in the press working may also remain on the surface. All traces of such oil and impurities present on the surface must be removed before beginning the plating operations.

Degreasing methods to achieve that end include those using emulsions, alkali cleaners, etc. Of these, alkali cleaning is the most widely employed because of its economy and ease of handling. Caustic soda, carbonic soda, and silicate soda are the most commonly used alkali cleaners. Time, temperature, and agitation are the determining factors in degreasing. A surface activator added to the solution usually improves degreasing effect.

Pickling

Oxide film and rust on the sheet's surface must be removed by pickling. Warm sulfuric acid or hydrochloric acid are usually used as pickling solutions. Overpickling may cause roughness and/or hydrogen embrittlement. Underpickling on the other hand, may lead to poor plating. Satisfactory pickling is usually achieved by adding the proper amount of inhibitor to the solution and establishing conditions that permit slight overpickling. When an acid solution is used for plating, pickling may be omitted if surface conditions of the sheet permit.

Method of Checking Surface Cleanness

The following methods are widely employed on the spot to check the surface cleanness of the sheets.

- a. Judgments based on water behavior on the sheet surface The cleanness of a steel sheet surface may be checked by the water spray test, although judgment can be difficult when water drops are too small. In the atomizer test, water is spraved onto a test specimen inclined 5 to 10 degrees from vertical. The spray must be applied in proper amounts and in such as way that the clean and stained areas will be distinguishable from each other through the patterns made by the atomized water. The sensitivity of the atomizer test is proportionate to the size of the water drops, i.e., the smaller the better.
- b. Other methods include those based on the results of test plating.

3. Rust Prevention

In order to provide maximum protection against rusting and at the same time facilitate degreasing, Cold-Rolled Steel Sheets and Coils are lightly and uniformly treated with an oil that is low in viscosity and easy to remove but still provides superior protection against rusting. Since the sheets are only lightly oiled, they may rust if left exposed for an inordinately long time after unpacking. Unpacked sheets, therefore, should be used promptly. When production conditions make it necessary to keep the unpacked or fabricated sheets exposed for a certain period of time before painting or plating, the following precautions should be taken.

- a. Since humidity over 70 percent usually accelerates the formation of rust, sheets should be kept in a place of less than 60 percent humidity.
- b. Air pollution also affects rusting. Hygroscopic substances such as hydrochloric acid gas, ammonium chloride gas, and seawater salt particles accelerate rust even when humidity is of 60 percent or less or temperatures are above the dew point.
- c. Dust and contaminants present on the surface tend to break the protective oil film, produce local galvanic activity with the base metal, and cause rust.

4. Stretcher Strains and Aging

When a rimmed steel sheet is subjected to moderate press forming, wrinkles may appear on the surface. These markings are known as "stretcher strains".

If steel sheets are properly cold-reduced during the temper process with about 1 percent of draft after annealing, stretcher strains will not appear for a certain period of time. However, under certain conditions stretcher strains will appear one week after temper rolling. Factors causing these conditions include temperature, solid solution carbon and nitrogen content in the steel, and the degree of forming of parts. When the formation of stretcher strains is considered likely, the sheet is normally roller-leveled before forming. It is advisable to use roller-leveled material within 24 hours of roller leveling, because roller leveling is effective against aging (a state in which stretcher strains appear) for a shorter time than temper rolling.

5. Welding

Manufacture of satisfactory end products greatly depends on the selection of proper welding methods and welder skills. Steel sheets may be welded by one of the following methods. The proper method should be determined on the basis of the required appearance and strength of the end products as well as economic considerations.

Gas Welding

For oxyacetylene welding, the highest possible grade of acetylene should be used. For this method, JIS Specification Z 3201 (Gas Welding Rods for Mild Steel) rods are recommended.

Submerged-Arc Welding

Of the electrodes produced to JIS Specification Z 3211 (Covered Electrodes for Mild Steel), high oxygenation titania or lime titania types are recommended because of their capacity of producing excellent bead appearance and penetration.

Spot Welding Conditions for Mild Steel Sheets (Examples)

Sheet Thi	ckness ^{(1) (7)}	Electr	ode (2)	Minimum	Minimum	0	ptimum (Conditio	on (Class	A)	Medium Condition (Class B)				Standard Condition (Class C)					
(mm)	(in)	d (mm)	D min (mm)	Pitch ⁽³⁾ (mm)	Lap ⁽⁴⁾ (mm)		Pressure (kg)	Current (A)	Weld Diameter (mm)	Strength ⁽⁶⁾ ±14% (kg)	Time ⁽⁵⁾ (∞)	Pressure (kg)	Current (A)	Weld Diameter (mm)	Strength ⁽⁶⁾ ±14% (kg)	Time ⁽⁵⁾ (∞)	Pressure (kg)	Current (A)	Weld Diameter (mm)	Strength ⁽⁶⁾ ±20% (kg)
0.6	0.024	4.0	10	10	10	7	150	6,600	4.7	300	13	100	5,500	4.3	280	26	50	4,300	4.0	225
0.8	0.031	4.5	10	12	12	9	190	7,800	5.3	440	15	125	6,500	4.8	400	30	60	5,000	4.6	355
1.0	0.040	5.0	13	18	18	10	225	8,800	5.8	610	20	150	7,200	5.4	540	36	75	5,600	5.3	530
1.2	0.048	5.5	13	20	20	12	270	9,800	6.2	780	23	175	7,800	5.8	680	40	85	6,100	5.5	650
1.6	0.062	6.3	13	27	27	16	360	11,500	6.9	1,060	30	240	9,100	6.7	1,000	52	115	7,000	6.3	925
2.0	0.078	7.0	16	35	35	20	470	13,300	7.9	1,450	36	300	10,300	7.6	1,370	64	150	8,000	7.1	1,305
3.2	0.125	9.0	16	50	50	32	820	17,400	10.3	3,100	60	500	12,900	9.9	2,850	105	260	10,000	9.4	2,665

(1) These welding materials indicated in the table are lightly oiled Cold-Rolled Steel Sheets and Coils with tensile strength ranging from 290 to 310 N/mm². The surface to be welded must be free from oxides, paint, dust, and other impurities.

(2) RVMA Class 2 electrodes (75% specific conductance and Rockwell B75 hardness) are to be used. The end profile is as illustrated in Figure (a) and permissible variations in d are ± 0.4mm.

(3) The minimum pitch indicates the limit to which the diversion effect of the neighboring spot may be ignored for practical purposes. When it is necessary to perform welding at shorter pitches, the current value must be increased accordingly to compensate for

the diversion effect. (4) The minimum lap equals the area indicated by "L" in Figure (b).



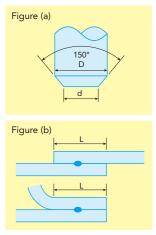
Resistance Welding

a. Spot welding Adequate weld strength cannot be obtained if the

welded joint is not in nugget form. Standard Figure (a) spot welding conditions for mild steel sheets are shown in the table below for reference.

b. Seam welding

Seam welding may be considered a variation of continuous spot welding. Good seam welds are obtained with a current 1.5 to 2.0 times greater and pressure 1.2 to 1.6 times greater than those for spot welding.



6. Coils

The use of coil is generally more advantageous than sheet for improving yield and maintaining continuous and automated operations in working. Coil is the material from which sheet is cut, and possesses characteristics which differ from those of sheet. Thus the effective use of coil improves productivity.

• Use of Coils

Coils may contain defective portions attributable to surface imperfections, and thus it is necessary to conduct inspection, selection and rectification. Off-gauge portions at both edges of coils are removed as a rule, but off-gauge portions at welds and their vicinities may be included, for which due attention should be paid. The material quality of coil is not different from that of sheet.

(5) Welding time is expressed in terms of the number of cycles when the frequency of the power supply is 60 Hz. As this means that 10 Hz equal one-sixth of a second, when welding is carried out on 50 Hz power the welding time must be five-sixths of the figure in the table above. (6) Strength refers to unit shear strength per spot weld, and the percentage refers to per

missible variation

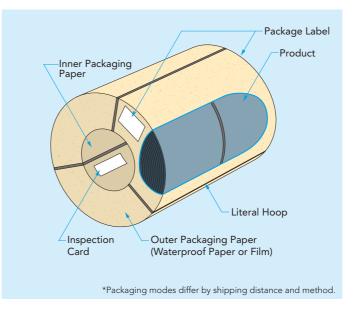
(7) When welding sheets are different in thickness, the conditions for the thinner sheet may prevail, provided that the thickness ratio is 1:3 or less and that the current flow is in the direction from the thinner to the thicker sheet. The conditions in the table may also be applied to lap welding of up to four sheets (the total number of sheets thus welded should not exceed four times the thickness of one under any circumstances).

Packaging and Labeling

Our products are packaged to prevent any damages possibly caused by normal handling practices or storage conditions before actual use after unpacking. Package marking indicating the product contents is attached to the outer package. Also an inspection card, which guarantees the product, is enclosed in the product. These cards are used to confirm the product of delivery after it is received. The items recorded on the cards are listed below.

2. Packaging Sample

Coil Paper Without Inner/Outer Rings or Film Packaging



3. Package Label Sample

·	
COLD ROLLED STEEL SHE	ETS First Class
SPECIFICATION JIS G3141 SPCC:S D N	
NET MASS (THEO)	
<u>4.700KG</u>	
	1120077
701255120 PRODUCTION DATE	
2019-04-01	
NIPPON STEEL CORPORATION	OOWORKS (or AREA)

1. Examples of Contents Marked on Package Label and Package Card

	Marking (Conditions								
Item Name	Normal Marking Marking by User Marking Method and Content Examples Designation									
Brand Name	0		Marking with prescribed brand name.							
Inspector Mark	0		First class							
JIS Certification Mark	*		(3) is marked on the label of products authorized to designate the JIS- certification mark. No marking is done on the package card.							
Specification Symbol	0		Marking orders are as follows. The item that does not fall under marking is not marked, and is deleted to put to the left. JIS G3141 SPCC: SDN ① ② ① ② ③ ④ ③ ④ ③ ④ ③ ④ ③ ④ ③ ④ ③ ④ ③ ④ ③ ④ ③ ④ ⑤ ⑦ ① ② ③ ● ③ ● ③ ● ③ ● ③ ● ③ ● ③ ● ③ ● ③ ● ③ ● ○ ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●							
Coating	*)		treated steel sheet. Unit numbers are marked in parentheses after the item name.							
Size	0		Ordered size (thickness × width × length) is marked. For coil, "COIL" ("C" on the inspection card) is marked in place of length.							
Inspection Side		*)	Marked if reverse side use or both side use is designated.							
Net Mass	0		The net mass of the product is marked.							
Sheet	*		The actual number of sheets contained.							
Coils	*0		Marked only when two or more hoops are bundled.							
Case No.	~	*)	Marked only for designated materials labeled with case numbers.							
Inspection No.	0		Marked with the unit inspection number for each shipped product.							
Coil No.	0		Marked with the production lot unit coil number.							
Production Date	0		Always marked except for materials designated not to be marked.							
User Name	0		Marked on the label.							
Maker's Name	0		NIPPON STEEL CORPORATION							
Works	0		(Location Name) WORKS (or AREA)							

○ : Marked unconditionally

 $*\bigcirc$ Marked when marking method and indication of contents are conditional

)		

Reference

1. Conversion Table for Hardness (JIS G 3141)

Hardness Conversion Table from HR30T to HRB

Conversion HRB	HR30T	Conversion HRB	HR30T	Conversion HRB	HR30T	Conversion HRB
28.1	47.0	46.0	59.0	63.9	71.0	81.9
29.6	48.0	47.5	60.0	65.4	72.0	83.4
31.1	49.0	49.0	61.0	66.9	73.0	84.9
32.5	50.0	50.5	62.0	68.4	74.0	86.4
34.0	51.0	52.0	63.0	69.9	75.0	87.9
35.5	52.0	53.5	64.0	71.4	76.0	89.4
37.0	53.0	55.0	65.0	72.9	77.0	90.8
38.5	54.0	56.5	66.0	74.4	78.0	92.3
40.0	55.0	58.0	67.0	75.9	79.0	93.8
41.5	56.0	59.5	68.0	77.4	80.0	95.3
43.0	57.0	60.9	69.0	78.9	81.0	96.8
44.5	58.0	62.4	70.0	80.4	82.0	98.3
	29.6 31.1 32.5 34.0 35.5 37.0 38.5 40.0 41.5 43.0	29.6 48.0 31.1 49.0 32.5 50.0 34.0 51.0 35.5 52.0 37.0 53.0 38.5 54.0 40.0 55.0 41.5 56.0 43.0 57.0	29.6 48.0 47.5 31.1 49.0 49.0 32.5 50.0 50.5 34.0 51.0 52.0 35.5 52.0 53.5 37.0 53.0 55.0 38.5 54.0 56.5 40.0 55.0 58.0 41.5 56.0 59.5 43.0 57.0 60.9 44.5 58.0 62.4	29.6 48.0 47.5 60.0 31.1 49.0 49.0 61.0 32.5 50.0 50.5 62.0 34.0 51.0 52.0 63.0 35.5 52.0 53.5 64.0 37.0 53.0 55.0 65.0 38.5 54.0 56.5 66.0 40.0 55.0 58.0 67.0 41.5 56.0 59.5 68.0 43.0 57.0 60.9 69.0 44.5 58.0 62.4 70.0	29.648.047.560.065.431.149.049.061.066.932.550.050.562.068.434.051.052.063.069.935.552.053.564.071.437.053.055.065.072.938.554.056.566.074.440.055.058.067.075.941.556.059.568.077.443.057.060.969.078.944.558.062.470.080.4	29.648.047.560.065.472.031.149.049.061.066.973.032.550.050.562.068.474.034.051.052.063.069.975.035.552.053.564.071.476.037.053.055.065.072.977.038.554.056.566.074.478.040.055.059.568.077.480.041.556.059.568.077.480.043.057.060.969.078.981.0

ing to ASTM E140 Table 2. Interpolation method is applied for hardness not listed in the ASTM table

Hardness Conversion Table from HR15T to HRB

HR15T	Conversion HRB	HR15T	Conversion HRB	HR15T	Conversion HRB	HR15T	Conversion 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	55.0	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		

According to ASTM E140 Table 2. Interpolation method is applied for hardness not listed in the ASTM table.

Hardness Conversion Stable from HV to HRB

HV	Conversion HRB	HV	Conversion HRB	HV	Conversion HRB	HV	Conversion HRB
85	41.0	115	65.0	145	76.6	175	86.1
90	48.0	120	66.7	150	78.7	180	87.1
95	52.0	125	69.5	155	79.9	185	88.8
100	56.2	130	71.2	160	81.7	190	89.5
105	59.4	135	73.2	165	83.1	195	90.7
110	62.3	140	75.0	170	85.0	200	91.5

According to SAE J417 Table 1. Interpolation method is applied for hardness not listed in the SAE table.

1. This table is an excerpt from JIS G 3141. The conversion table does not provide precise values because there are unavoidable effects on these values attributable to size, mass, chemical composition, and heat treatment method.

2. Hardness Scales

Rockwell B Scale------1/16" steel ball used: load: 100kg

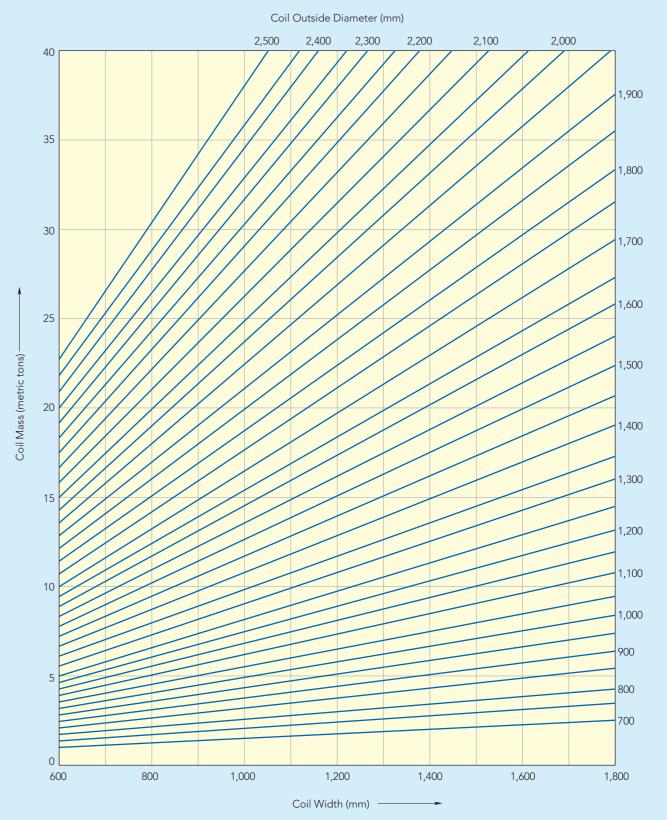
2. Table on Mass per Sheet

	Width x Length	762× 1,829	762× 2,134	762× 2,438	672× 2,743	762× 3,048	914× 1,829	914× 2,134	914× 2,438	914× 2,743	914× 3,048
Thickness mm	Area m ²	1,394	1,626	1,858	2,090	2,323	1,672	1,950	2,228	2,507	2,786
	Unit Mass kg/m²	Mass Per Sheet kg									
0.15	1.178	1.64	1.92	2.19	2.46	2.74	1.97	2.30	2.62	2.95	3.28
0.19	1.492	2.08	2.43	2.77	3.12	3.47	2.49	2.91	3.32	3.74	4.16
0.20	1.570	2.19	2.55	2.92	3.28	3.65	2.63	3.06	3.50	3.94	4.37
0.25	1.963	2.74	3.19	3.65	4.10	4.56	3.28	3.83	4.37	4.92	5.47
0.30	2.355	3.28	3.83	4.38	4.92	5.47	3.94	4.59	5.25	5.90	6.56
0.35	2.748	3.83	4.47	5.11	5.74	6.38	4.59	5.36	6.12	6.89	7.66
0.40	3.140	4.38	5.11	5.83	6.56	7.29	5.25	6.12	7.00	7.87	8.75
0.50	3.925	5.47	6.38	7.29	8.20	9.12	6.56	7.65	8.74	9.84	10.9
0.60	4.710	6.57	7.66	8.75	9.84	10.9	7.88	9.18	10.5	11.8	13.1
0.70	5.495	7.66	8.93	10.2	11.5	12.8	9.19	10.7	12.2	13.8	15.3
0.80	6.280	8.75	10.2	11.7	13.1	14.6	10.5	12.2	14.0	15.7	17.5
0.90	7.065	9.85	11.5	13.1	14.8	16.4	11.8	13.8	15.7	17.7	19.7
1.00	7.850	10.9	12.8	14.6	16.4	18.2	13.1	15.3	17.5	19.7	21.9
1.20	9.420	13.1	15.3	17.5	19.7	21.9	15.8	18.4	21.0	23.6	26.2
1.40	10.99	15.3	17.9	20.4	23.0	25.5	18.4	21.4	24.5	27.6	30.6
1.60	12.56	17.5	20.4	23.3	26.3	29.2	21.0	24.5	28.0	31.5	35.0
2.00	15.70	21.9	25.5	29.2	32.8	36.5	26.3	30.6	35.0	39.4	43.7
2.30	18.06	25.2	29.4	33.6	37.7	42.0	30.2	35.2	40.2	45.3	50.3
2.60	20.41	28.5	33.2	37.9	42.7	47.4	34.1	39.8	45.5	51.2	56.9
2.90	22.77	31.7	37.0	42.3	47.6	52.9	38.1	44.4	50.7	57.1	63.4
3.20	25.12	35.0	40.8	46.7	52.5	58.4	42.0	49.0	56.0	63.0	70.0

Tab	le on	Mass	per	Sheet	
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	Width x Length	1,219× 1,829	1,219× 2,438	1,219× 2,743	1,219× 3,048	1,524× 1,829	1,524× 2,438	1,524× 3,048	1,524× 3,658	1,829× 1,829	1,829× 2,438	1,829× 3,048	1,829× 3,658
Thickness mm	Area m²	2,230	2,972	3,344	3,716	2,787	3,716	4,645	5,575	3,345	4,459	5,575	6,690
	Unit Mass kg/m²	Mass Per Sheet kg											
0.15	1.178	2.63	3.50	3.94	4.38	3.28	4.38	5.47	6.57	3.94	5.25	6.57	7.88
0.19	1.492	3.33	4.43	4.99	5.54	4.16	5.54	6.93	8.32	4.99	6.65	8.32	9.98
0.20	1.570	3.50	4.67	5.25	5.83	4.38	5.83	7.29	8.75	5.25	7.00	8.75	10.5
0.25	1.963	4.38	5.83	6.56	7.29	5.47	7.29	9.12	10.9	6.57	8.75	10.9	13.1
0.30	2.355	5.25	7.00	7.88	8.75	6.56	8.75	10.9	13.1	7.88	10.5	13.1	15.8
0.35	2.748	6.13	8.17	9.19	10.2	7.66	10.2	12.8	15.3	9.19	12.3	15.3	18.4
0.40	3.140	7.00	9.33	10.5	11.7	8.75	11.7	14.6	17.5	10.5	14.0	17.5	21.0
0.50	3.925	8.75	11.7	13.1	14.6	10.9	14.6	18.2	21.9	13.1	17.5	21.9	26.3
0.60	4.710	10.5	14.0	15.8	17.5	13.1	17.5	21.9	26.3	15.8	21.0	26.3	31.5
0.70	5.495	12.3	16.3	18.4	20.4	15.3	20.4	25.5	30.6	18.4	24.5	30.6	36.8
0.80	6.280	14.0	18.7	21.0	23.3	17.5	23.3	29.2	35.0	21.0	28.0	35.0	42.0
0.90	7.065	15.8	21.0	23.6	26.3	19.7	26.3	32.8	39.4	23.6	31.5	39.4	47.3
1.00	7.850	17.5	23.3	26.3	29.2	21.9	29.2	36.5	43.8	26.3	35.0	43.8	52.5
1.20	9.420	21.0	28.0	31.5	35.0	26.3	35.0	43.8	52.5	31.5	42.0	52.5	63.0
1.40	10.99	24.5	32.7	36.8	40.8	30.6	40.8	51.0	61.3	36.8	49.0	61.3	73.5
1.60	12.56	28.0	37.3	42.0	46.7	35.0	46.7	58.3	70.0	42.0	56.0	70.0	84.0
2.00	15.70	35.0	46.7	52.5	58.3	43.8	58.3	72.9	87.5	52.5	70.0	87.5	105
2.30	18.06	40.3	53.7	60.4	67.1	50.3	67.1	83.9	101	60.4	80.5	101	121
2.60	20.41	45.5	60.7	68.3	75.8	56.9	75.8	94.8	114	68.3	91.0	114	137
2.90	22.77	50.8	67.7	76.1	84.6	63.5	84.6	106	127	76.2	102	127	152
3.20	25.12	56.0	74.7	84.0	93.3	70.0	93.3	117	140	84.0	112	140	168

3. Coil Width-Mass Curves for Coils



Ordering Information

When placing an order, check the following items according to the intended use.

When placing an order, check the	e following items according to the intended use.
Specification	Cold-Rolled Steel Sheets and Coils are produced in a wide range of grades satisfying both JIS and NIPPON STEEL specifications. Select the specifications best suited for the intended use, degree of fabrication, method of fabrication and other factors. Inquire if any questions arise.
Size	Thickness varies in increments of 0.1 mm as a rule. This may be reduced to increments of 0.05 mm in special cases. Width and length may be specified at increments of 1 mm.
Packaging Mass	Specify the packaging mass based on unloading capacity and working conditions. Cut sheets: Normally, 2 tons or more are standard. Coils: Normally available from 5 to 20 tons. Specify the maximum weight (and the minimum weight if necessary).
Coil Inside/ Outside Diameter	For coils, the inside diameters of 508 mm (20 inches) or 610 mm (24 inches) are standard. Specify the maximum outside diameter acceptable, if necessary.
Temper Grade	Specify the "standard temper" or select one from among the "four hardness grades".
Surface Finish	Specify either "dull finish" or "bright finish".
Oiling	Specify either "oiled" or "unoiled". Normally, rust-prevention "oiled" products are produced.
Reversal Use	Appearance quality is normally guaranteed for the outside surface of coils. If the guaranteed side is to be the reverse side of the end product, or if both sides are to be the face sides of the end product, please specify so beforehand.
Edge Finishing	Specify "slit edge" based on conditions of use. Slit edges are recommended especially if the delivered product will be used as rolled and without further processing, thus requiring edge finishing, or when exacting width tolerance is required.
Weld Portions	Cold-Rolled Steel Sheets and Coils may contain welds made in the pickling line. Since such welds may sometimes be hard, vary in thickness or be detrimental to use, it is recommended that they be removed at the customer's shop. If such removal is difficult, specify "no weld portion". In such cases, however, the available coil mass will be limited. If marking of weld portions is required, specify so beforehand.
Applications	NIPPON STEEL manufactures our steel products with adequate quality control so that the products comply with the intended use as indicated in the customer's order. Therefore, we ask customers to clearly specify the names of the uses/applications and conditions pertaining to the intended methods of process.
Other	Dimensional accuracy, shapes and other requirements are usually within the ranges of JIS Table A. However, assembling accuracy, component accuracy and other conditions may require more exacting specifications. In such cases, please clearly specify about the required specifications beforehand.