

NIPPON STEEL'S SPECIAL STEEL SHEET

On the Leading Edge: Nippon Steel

NIPPON STEEL

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Nippon Steel Corporation

FOREWORD

Nippon Steel Corporation manufactures various special steel sheets in accordance with Japanese Industrial Standards (JIS), the standards of our countries and Nippon Steel's own standards. These products are produced on some of the world's most advanced mills, with the production techniques employed having been developed by Nippon Steel during the company's many years of experience in sheet production, with very good market acceptance.

In support of its sheet products, Nippon Steel also offers a comprehensive range of technical services. For more information, contact Nippon Steel.

Some Areas of Application

Our special steel sheets are used in a wide variety of familiar items around us, from automotive safety buckles, seat gears, motorcycle chains, cutting instruments, and cutter knives to steel tape measures.



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The information in this publication is subject to change or modification without notice. Please contact the Nippon Steel office for the latest information.

Features

1 Stable Quality

Products of stable quality are manufactured under strict quality control, utilizing excellent equipment and techniques, and drawing on Nippon Steel's wealth experience.

2 Wide Availability of Grade and Size

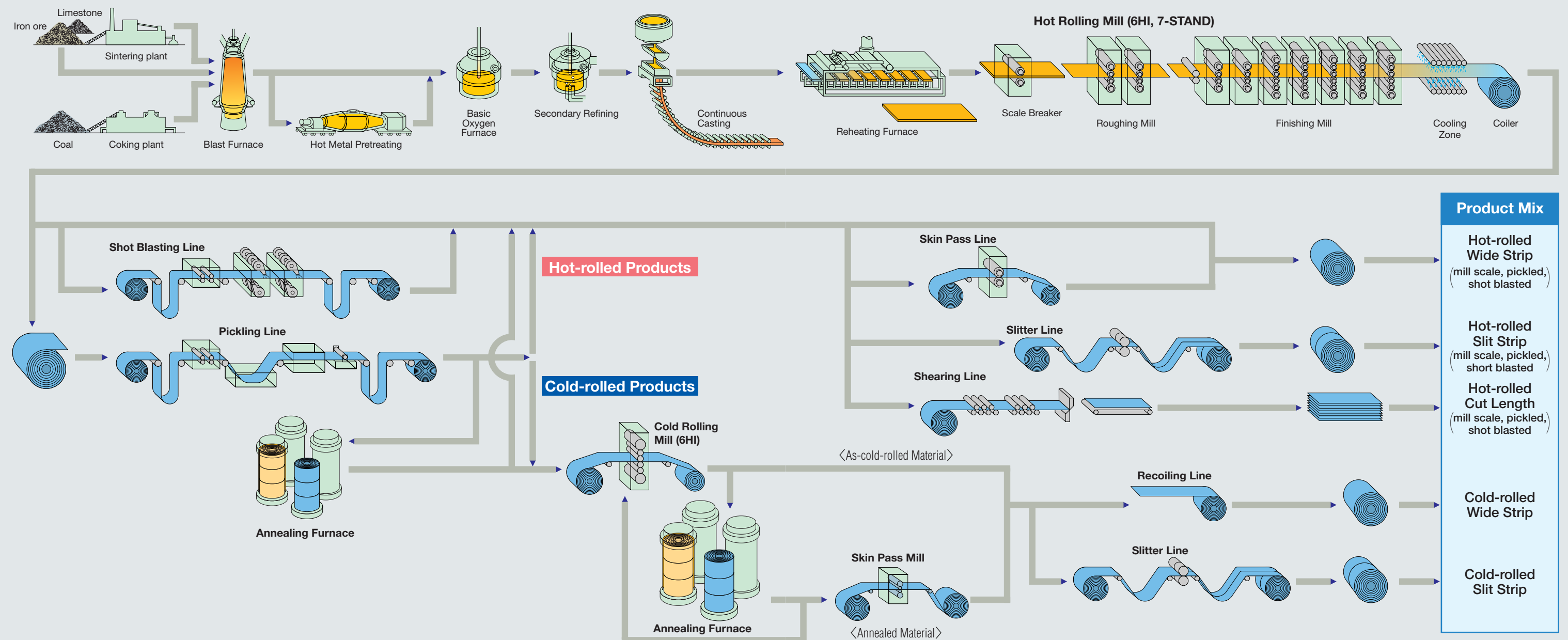
Many kinds of hot-rolled and cold-rolled special steel sheets are manufactured to JIS and other international standards. The available size range is from 0.4 mm to 13.0 mm in thickness and up to 1,270 mm in width, from which you can choose according to your needs.

3 Complete Technical Services

The Technical Service Divisions give complete consultation services concerning quality characteristics, applications, and processing methods of our sheets.

Manufacturing Processes

Flow diagram of the Equipment and Facilities of Yawata Works



Available Steel Grades and Their Chemical Compositions

Steel grades manufactured by us and their chemical compositions are shown below.
For those standards that are not listed herein, we would also welcome your contacting us
for consultation.

Carbon Steels and Carbon Steels for Machine Structural Use

Grade		Chemical Composition (%)				
JIS	SAE	C	Si	Mn	P	S
S10C		0.08 ~ 0.13	0.15 ~ 0.35	0.30 ~ 0.60	0.030	0.035
S20C		0.18 ~ 0.23	0.15 ~ 0.35	0.30 ~ 0.60	0.030	0.035
S30C		0.27 ~ 0.33	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.035
	SAE1030	0.28 ~ 0.34	(0.15 ~ 0.30)	0.60 ~ 0.90	0.030	0.050
S35C		0.32 ~ 0.38	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.035
	SAE1035	0.32 ~ 0.38	(0.15 ~ 0.30)	0.60 ~ 0.90	0.030	0.050
S45C		0.42 ~ 0.48	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.035
	SAE1045	0.43 ~ 0.50	(0.15 ~ 0.30)	0.60 ~ 0.90	0.030	0.050
S50C		0.47 ~ 0.53	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.035
	SAE1050	0.48 ~ 0.55	(0.15 ~ 0.30)	0.60 ~ 0.90	0.030	0.050
S55C		0.52 ~ 0.58	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.035
	SAE1055	0.50 ~ 0.60	(0.15 ~ 0.30)	0.60 ~ 0.90	0.030	0.050
	SAE1060	0.55 ~ 0.65	(0.15 ~ 0.30)	0.60 ~ 0.90	0.030	0.050
	SAE1065	0.60 ~ 0.70	(0.15 ~ 0.30)	0.60 ~ 0.90	0.030	0.050
	SAE1070	0.65 ~ 0.75	(0.15 ~ 0.30)	0.60 ~ 0.90	0.030	0.050
	SAE1074	0.70 ~ 0.80	(0.15 ~ 0.30)	0.50 ~ 0.80	0.030	0.050
	SAE1075	0.70 ~ 0.80	(0.15 ~ 0.30)	0.40 ~ 0.70	0.030	0.050

Carbon Tool Steels

Grade		Chemical Composition (%)				
JIS	SAE	C	Si	Mn	P	S
SK85[SK5]		0.80 ~ 0.90	0.10 ~ 0.35	0.10 ~ 0.50	0.030	0.030
	SAE1086	0.80 ~ 0.93	(0.15 ~ 0.30)	0.30 ~ 0.50	0.030	0.050
SK95[SK4]		0.90 ~ 1.00	0.10 ~ 0.35	0.10 ~ 0.50	0.030	0.030
	SAE1095	0.90 ~ 1.03	(0.15 ~ 0.30)	0.30 ~ 0.50	0.030	0.050
SK120[SK2]		1.15 ~ 1.25	0.10 ~ 0.35	0.10 ~ 0.50	0.030	0.030

Symbols in square brackets [] represent symbols used in the former JIS.

Alloy Tool Steels

Grade	Chemical Composition (%)						
JIS	C	Si	Mn	P	S	Ni	Cr
SKS5	0.75 ~ 0.85	0.35	0.50	0.030	0.030	0.70 ~ 1.30	0.20 ~ 0.50
SKS51	0.75 ~ 0.85	0.35	0.50	0.030	0.030	1.30 ~ 2.00	0.20 ~ 0.50
SKS81	1.10 ~ 1.30	0.35	0.50	0.030	0.030	—	0.20 ~ 0.50

Chromium Steels

Grade		Chemical Composition (%)					
JIS	NSC	C	Si	Mn	P	S	Cr
SCr420		0.18 ~ 0.23	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.030	0.90 ~ 1.20
SCr435		0.33 ~ 0.38	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.030	0.90 ~ 1.20
SCr440		0.38 ~ 0.43	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.030	0.90 ~ 1.20
	NS5046	0.44 ~ 0.49	0.15 ~ 0.35	0.75 ~ 1.00	0.030	0.030	0.30 ~ 0.60

Chromium Molybdenum Steels

Grade	Chemical Composition (%)						
JIS	C	Si	Mn	P	S	Cr	Mo
SCM415	0.13 ~ 0.18	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.030	0.90 ~ 1.20	0.15 ~ 0.25
SCM420	0.18 ~ 0.23	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.030	0.90 ~ 1.20	0.15 ~ 0.25
SCM430	0.28 ~ 0.33	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.030	0.90 ~ 1.20	0.15 ~ 0.30
SCM435	0.33 ~ 0.38	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.030	0.90 ~ 1.20	0.15 ~ 0.30
SCM440	0.38 ~ 0.43	0.15 ~ 0.35	0.60 ~ 0.90	0.030	0.030	0.90 ~ 1.20	0.15 ~ 0.30

Manganese Steels

Grade		Chemical Composition (%)				
JIS	SAE	C	Si	Mn	P	S
	SAE1541	0.36 ~ 0.44	(0.15 ~ 0.30)	1.35 ~ 1.65	0.030	0.050
SMn443		0.40 ~ 0.46	0.15 ~ 0.35	1.35 ~ 1.65	0.030	0.030

Boron Steels

Grade	Chemical Composition (%)					
NSC	C	Si	Mn	P	S	B
NS22C—B	0.20 ~ 0.25	0.20	0.50 ~ 0.80	0.030	0.030	added
NS22C—BM1	0.20 ~ 0.25	0.15 ~ 0.35	0.90 ~ 1.20	0.030	0.030	added
NS28C—B	0.25 ~ 0.31	0.20	0.50 ~ 0.80	0.030	0.030	added
NS35C—B	0.32 ~ 0.38	0.20	0.40 ~ 0.70	0.030	0.030	added
NS43C—B	0.40 ~ 0.46	0.15 ~ 0.35	1.10 ~ 1.50	0.030	0.030	added
NS53C—B	0.50 ~ 0.56	0.15 ~ 0.35	1.10 ~ 1.50	0.030	0.030	added

Available Size Ranges

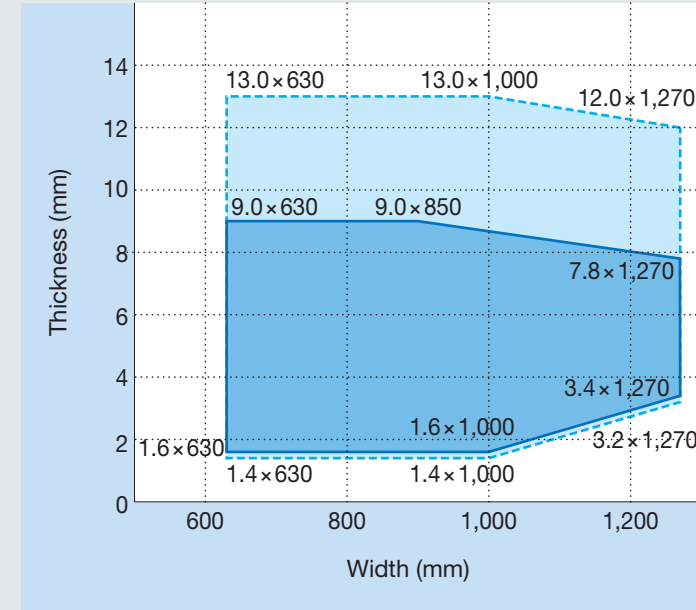
The available size ranges of hot-rolled and cold-rolled products are shown below. Your attention is called to the ranges of products that are different according to standards, uses, etc.

For those products that are outside these ranges, we would also welcome your contacting us for consultation.

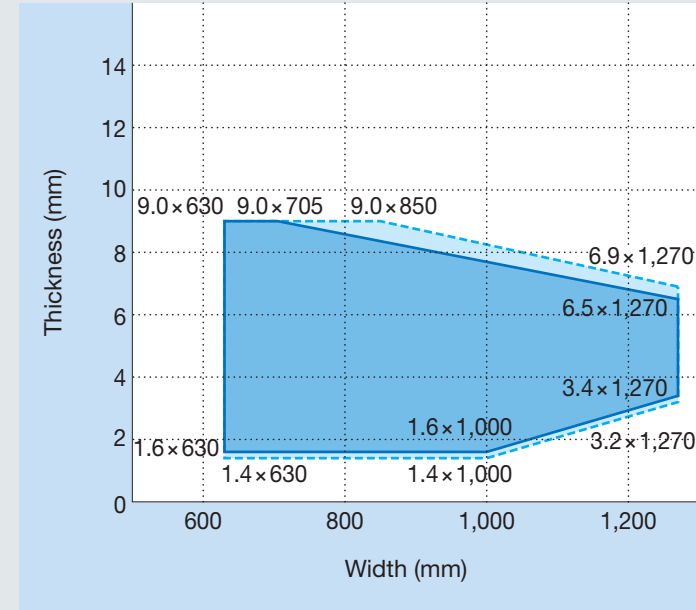
(As slitting orders are also accepted, please contact us.)

Hot-rolled Steel Sheet

Mill-scale Material (S30C~S35C)

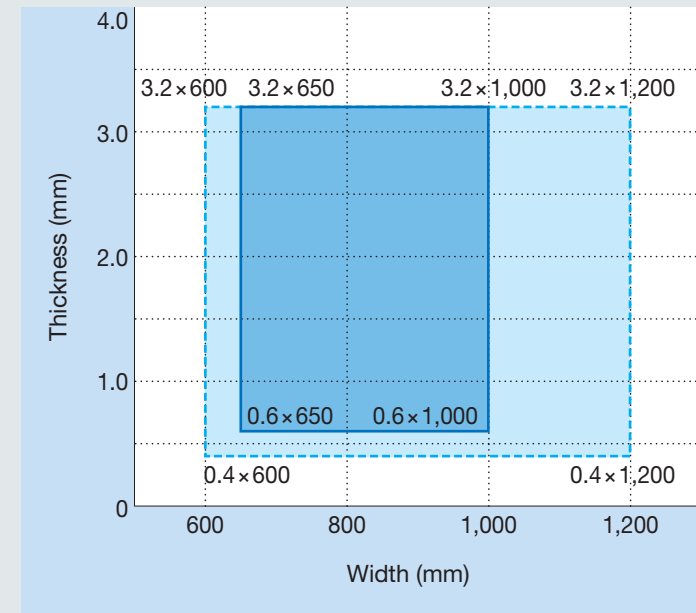


Pickled Material (S30C~S35C)

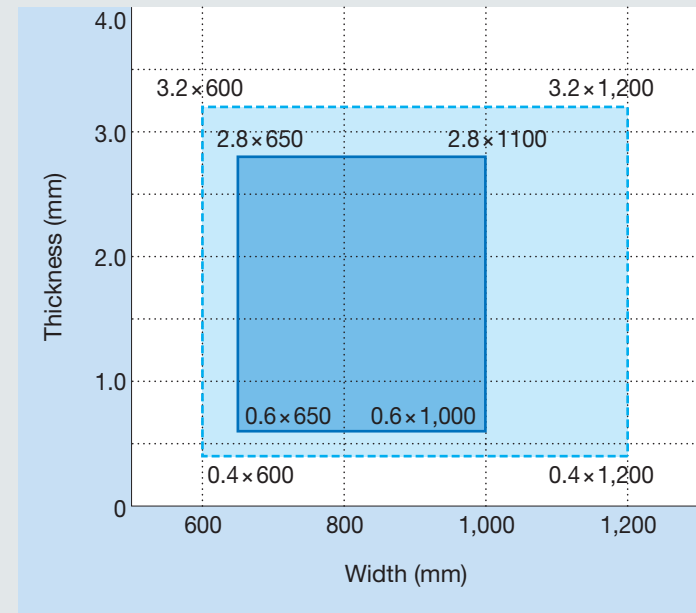


Cold-rolled Steel Sheet

As-cold-rolled Material



Annealed Material



Hot-rolled Shot-finished Steel Sheet

We also offer sheet finished by shot blasting for scale removal.

Shot-finished Steel Sheet is hot-rolled or cold-rolled sheet in coil form whose surfaces are finished by blasting with round steel shot to remove mill scale and also to impart various excellent characteristics by increasing the roughness of the surfaces.

Features:

Excellent coat adherence: Outstanding coat adherence is suitable for coating substrate.

Excellent oil retention: Good retention of lubricating oil enhances the lubricating effect during fabrication.

Excellent adherence: Suitable for uses in which friction materials and other materials are to be bonded together with the steel surface.

Usable as hoops: Processibility in coil form permits use as hoops.

Uses:

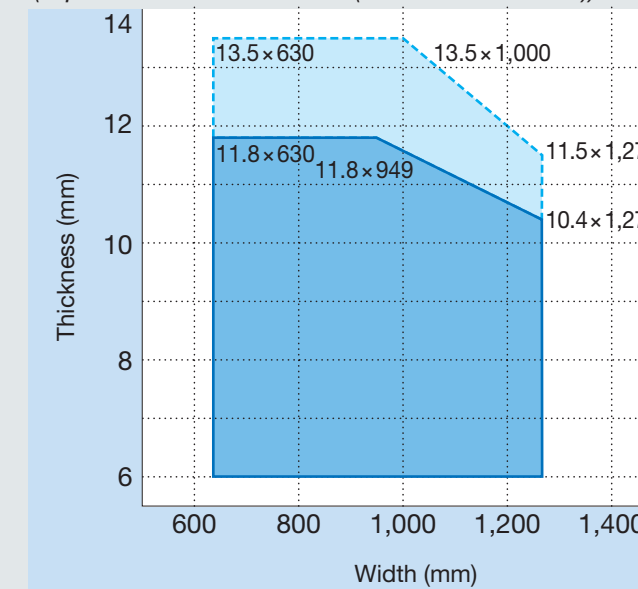
Very thick automotive parts: Very thick members to be processed by fine blanking or press forming.

Cold-forged parts: Scale-free strip is suitable for very thick parts intended for cold forging and various other applications.

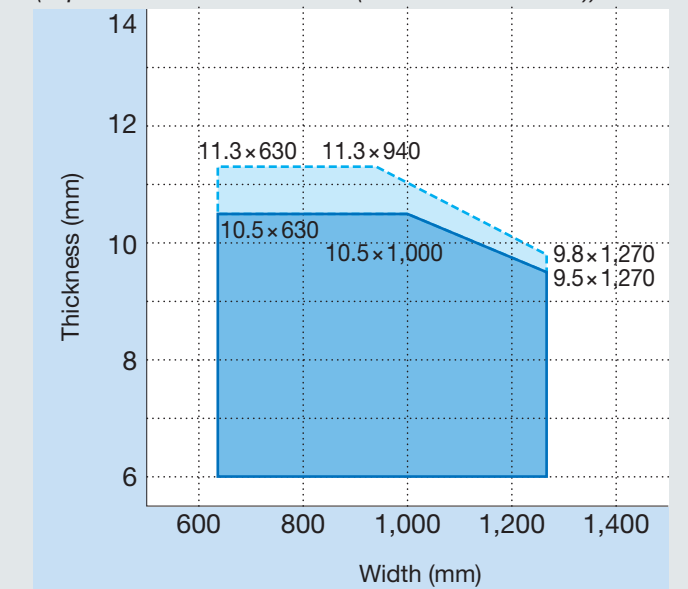
Available Size Range (on a mill-edge basis)

Shot-finished strip, as compared with pickled strip, is scale free in a strip thickness of more than 9 mm.

TS350~<490N
(Equivalent to S15C~S20C (mill scale annealed))



TS540~<590N
(Equivalent to S30C~S35C (mill scale annealed))



Dimensional Tolerances

Unless specifically designated, dimensions shall be based on JIS G 3193 (Dimensions,mass and permis-
sible variations of hot rolled steel plates,sheets and strips)^(note). However, thickness tolerances of cold-
rolled steel sheet shall be in accordance with JIS G 3141 (thickness tolerances A). Please consult us
about any special designations desired.

Hot-rolled Steel Sheet (JIS G 3193 Thickness Tolerances) (Unit: mm)

Thickness Width	1.60 t < 2.00	2.00 t < 2.50	2.50 t < 3.15	3.15 t < 4.00	4.00 t < 5.00	5.00 t < 6.30	6.30 t < 13.00
W < 1,270	± 0.19	± 0.20	± 0.22	± 0.24	± 0.45	± 0.50	± 0.55

*: Thickness measurement is made at any point more than 25mm inward from the edge for mill-edges and at any point more than 15mm inward from the edge for cut-edges.

Cold-rolled Steel Sheet (JIS G 3141 Thickness Tolerances A) (Unit: mm)

Division by Nominal Thickness	Division by Nominal Width	800 t < 1,000	1,000 t < 1,200
0.40 t < 0.60		± 0.05	± 0.05
0.60 t < 0.80		± 0.06	± 0.06
0.80 t < 1.00		± 0.06	± 0.07
1.00 t < 1.25		± 0.07	± 0.08
1.25 t < 1.60		± 0.09	± 0.10
1.60 t < 2.00		± 0.11	± 0.12
2.00 t < 2.50		± 0.13	± 0.14
2.50 t < 3.15		± 0.15	± 0.16
3.15		± 0.17	± 0.19

*: Thickness measurement is made at any point more than 25mm inward from the edge for mill-edges and at any point more than 15mm inward from the edge for cut-edges.

Width Tolerances (JIS G 3193) of Hot-rolled Steel Sheet and Cold-rolled Steel Sheet (Unit: mm)

Width	Thickness	Mill-edge	Cut-edge	
		Steel Hoop & Sheet	Cut by an Ordinary Method	
			+	-
800 W < 1,000	t < 3.15	+ 25 0	10	0
	3.15 t < 6.00		10	0
	6.00		10	0
1,000 W < 1,270	t < 3.15	+ 30 0	10	0
	3.15 t < 6.00		10	0
	6.00		15	0

Note: Changes have made to this page corresponding to the addition (revised on November 20, 2008) of cold-rolled steel (cold-rolled steel sheet and hoop) to JIS G 4053 (Alloy steel for machine structural use).

Mechanical Properties

Surface hardness tolerances are shown below.
For any tolerances not listed herein, we welcome your contacting us for consultation.

Hot-rolled Steel Sheet

Type	Grade	Mill Scale, Pickled (Standard Specifications)	Annealed Material (Standard Specifications)
Carbon Steels	S30C,SAE1030	HRB 95	HRB 85
	S35C,SAE1035	HRB 98	HRB 88
	S45C,SAE1045	HRB 100	HRB 90
	S50C,SAE1050	HRB 104	HRB 92
	S55C, SAE1055	HRB 107	HRB 93
	SAE1060	HRC 34	HRB 94
	SAE1065	HRC 35	HRB 95
	SAE1070	HRC 37	HRB 96
	SAE1075	HRC 38	HRB 96
Carbon Tool Steels	SK85[SK5],SAE1086	HRC 43	HRB 100
	SK95[SK4],SAE1095	HRC 44	HRB 103
	SK120[SK2]	—	HRB 106
Chromium Molybdenum Steels	SCM415	HRB 105	HRB 90
	SCM435	HRC 38	HRB 93
	SCM440	HRC 39	HRB 95

*: 1. Annealed Material : Special soft sheets and strip are also available.
2. Symbols in square brackets [] represent symbols of the former JIS.

Cold-rolled Steel Sheet

Type	Grade	Annealed Sheet & Strip	As-cold-rolled Sheet & Strip
Carbon Steels	S35C, SAE1035	Hv 170	Hv 170 ~ 250
	S45C, SAE1045	Hv 170	Hv 170 ~ 260
	S50C, SAE1050	Hv 180	Hv 180 ~ 270
	S55C, SAE1055	Hv 180	Hv 180 ~ 270
	SAE1060	Hv 190	Hv 190 ~ 280
	SAE1065	Hv 190	Hv 190 ~ 280
	SAE1070	Hv 190	Hv 190 ~ 280
	SAE1074, SAE1075	Hv 200	Hv 200 ~ 290
	SK85[SK5], SAE1086	Hv 200	Hv 200 ~ 290
Carbon Tool Steels	SK95[SK4], SAE1085	Hv 210	Hv 210 ~ 300
	SK120[SK2]	Hv 220	Hv 220 ~ 310
Chromium Molybdenum Steels	SCM415	Hv 170	Hv 170 ~ 240
	SCM435	Hv 190	Hv 190 ~ 270

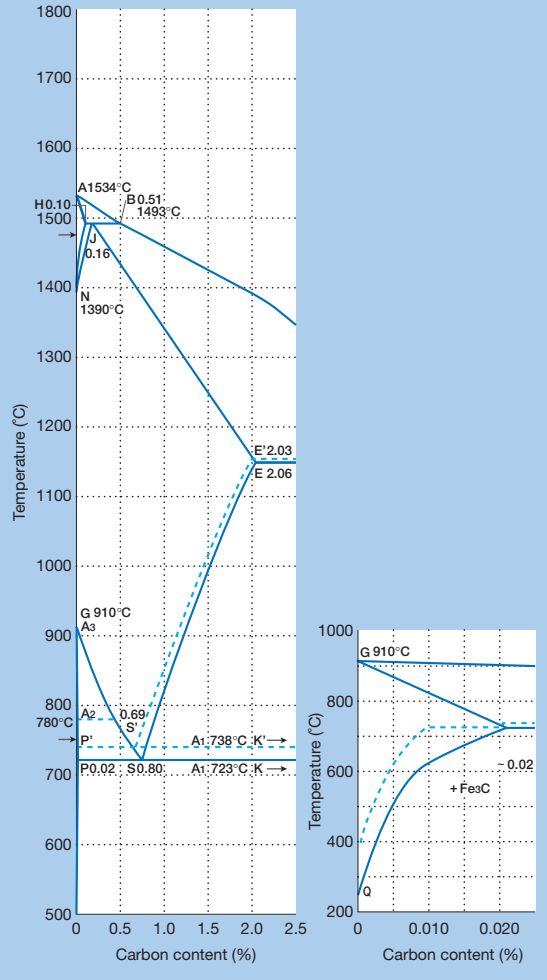
*: 1. Anisotropically controlled sheets and strip are also available.
2. Fine blanking-quality and drawing-quality sheets and strip are also available.
3. Symbols in square brackets [] represent symbols of the former JIS.

Technical Lists and Tables Attached

Effects of Various Elements on Steel

C	Steel is an alloy of Fe and C, and its various properties are determined by the C content (%). The phase diagram of the equilibrium state of the Fe-C system shows the phase of steel at C content and temperature. What is generally called steel is an Fe-C alloy, which has a C content of less than 2.06%. The alloy is called hypoeutectoid steel when the C content is less than 0.80%, called eutectoid steel when the C content is 0.80%, and called hypereutectoid steel if C is in the range of 0.80 to 2.06%. The maximum quench hardness is principally governed by the C content. C solid solves into austenite and produces martensite at the time of quenching. With an increase in carbon equivalent, the stress ratio of martensite rises, and quench hardness increases.
Mn	Increases quench hardenability and strength, but with no attendant increase in antitemperability. Effective as a deoxidizing agent, like Si, during refining. Bonds with S, produces sulfide (MnS), preventing red shortness.
Si	Used as a deoxidizing agent during refining. As an element for reinforcing solid solution, raises strength. At temperatures of less than 300oC, increases antitemperability.
P	Generally contained as an impurity element. Segregated along grain boundaries, reducing impact property. Accelerates temper brittleness.
S	Generally contained as an impurity element. Forming FeS, produces red shortness, impairing hot workability. On the other hand, helps improve machinability as an Mn sulfide (MnS).
Cu	Liable to induce red shortness. Improves corrosion resistance.
Ni	Drastically reduces A1 transformation and improves hardness, strength, toughness, and hardenability. The effect is enhanced by the compounded addition of a small amount of Cr and Mo. Improves corrosion resistance. Prevents low-temperature brittleness.
Cr	Enhances hardenability and antitemperability. Enhances corrosion resistance. Liable to form a stable carbide, accelerates cementation.
Mo	Forming a stable combined carbide with Cr, increases antitemperability. Combined use with Cr produces a markedly improved effect.
V	With a C content of less than 0.25%, increases hardenability. By the addition of a small amount, crystal grains become minute. Enhances antitemperability, also improving strength and toughness.
Nb	Very effective in the fining of crystal grains and raises crystal grain-coarsening temperatures. Decreases antitemperability, while somewhat inducing deterioration of hardenability.
Al	Used as a deoxidizing agent during refining. Oxides remain as hard inclusions. When nitrified, bonds with Ni to result in pronounced hardening of the surface. A steel nitride (AlN) is able to bring about the fining of crystal grains.
N	Bonding with Al, V, Ti, Nb, etc., forms a nitride, leading to the fining of crystal grains.
B	The addition of a trace amount (0.001~9.993%) markedly enhances hardenability. Any excessive addition impairs hot workability.

Phase Diagram of the Fe-C System



Quench hardness, hardenability

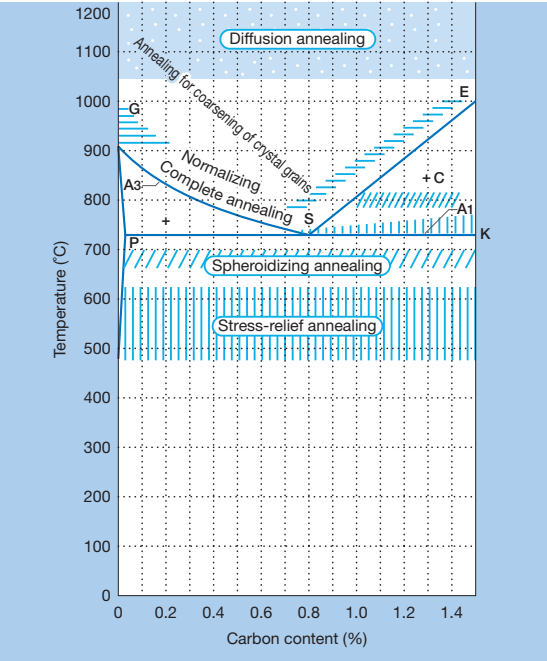
	Designation			Quench Hardness (Oil Quenching)		Estimated Hardenability*
	JIS	SAE	NSC	Quenching Temperature (°C)	Quench Hardness (HRC)	
Carbon Steels	S30C			850 ~ 900(Water Quenching)	44	314
		SAE1030		850 ~ 900(Water Quenching)	44	
	S35C			850 ~ 900	44	249
		SAE1035		850 ~ 900	44	
	S45C			830 ~ 880	51	156
		SAE1045		830 ~ 880	51	
	S50C			810 ~ 860	53	124
		SAE1050		810 ~ 860	53	
	S55C			810 ~ 860	54	98
		SAE1055		810 ~ 860	54	
Carbon Tool Steels	SK85[SK5]			770 ~ 830	60	29
		SAE1086		770 ~ 830	60	
	SK95[SK4]			770 ~ 830	60	18
		SAE1095		770 ~ 830	60	
Alloy Tool Steels	SKS5			800 ~ 850	61	16
	SKS51			800 ~ 850	61	11
Chromium Steels	SCR420			850 ~ 900	35	144
	SCR435			830 ~ 880	46	69
Chromium Molybdenum Steels			NS5046	830 ~ 880	51	70
	SCM415			850 ~ 900	33	132
	SCM420			850 ~ 900	35	109
	SCM430			830 ~ 880	43	68
	SCM435			830 ~ 880	46	52
Manganese Steels				830 ~ 880	49	41
	SAE1541			830 ~ 880	50	47
			NS22C-B	850 ~ 900	35	70
Boron Steels			NS35C-B	850 ~ 900	44	51
			NS43C-B	820 ~ 870	51	12
			NS53C-B	810 ~ 860	52	8

*: 1. Estimated hardenability is shown as the cooling rate needed to transform the microstructure to 90% martensite (critical cooling rate) in quenching.
2. Symbols in square brackets [] represent those of the former JIS.

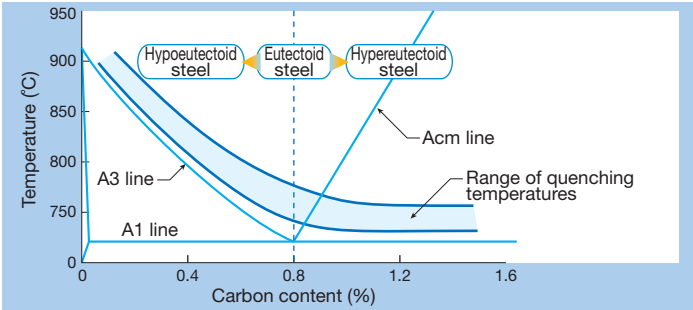
Heat Treatment of Steel

Kind of Heat Treatment		Purpose	Heating Temperature	Cooling Method
Tempering	Diffusion annealing	Improvement of structure	On the high side, over A3-point	Furnace cooling
	Complete annealing	Fining of crystal grains	A3 or Acm and over, 40~60°C	
	Spheroidizing annealing	Spheroidizing of carbides	Just over or just under A1-point	
	Stress-relief annealing	Removal of internal stresses	Under A1-point (500~650°C)	
Normalizing		Uniformity & minuteness of structure	A3-point and over, 40~60°C (hypoeutectic steel)	Air cooling
			A1-point and over, 40~60°C (hypereutectic steel)	
Quenching		Hardening	A3-point and over, 30~50°C (hypoeutectic steel)	Rapid cooling
			A1-point and over, 30~50°C (hypereutectic steel)	
Tempering	Low-temperature annealing	Stress relief & prevention of secular change in size	100~200°C	Air cooling or rapid cooling
	High-temperature annealing	Toughness increase	500~600°C	

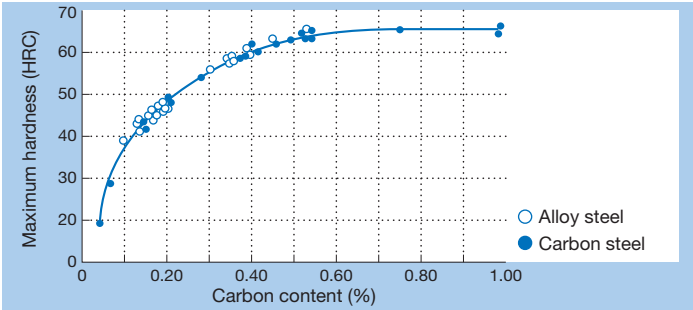
The range of temperatures for annealing in the phase diagram of the Fe-C system



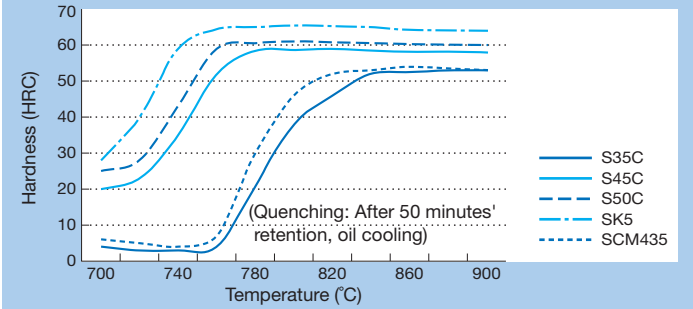
Quenching temperatures of carbon steel



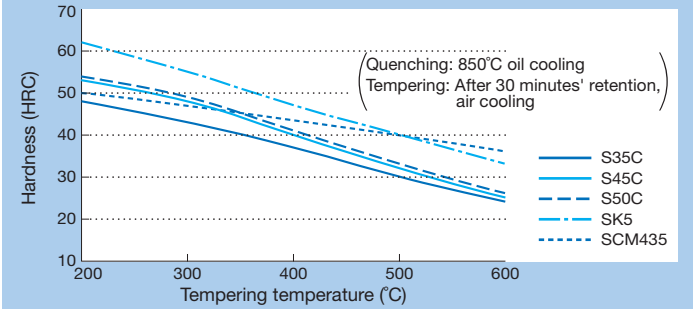
Relations between carbon content of steel and the maximum quench hardness



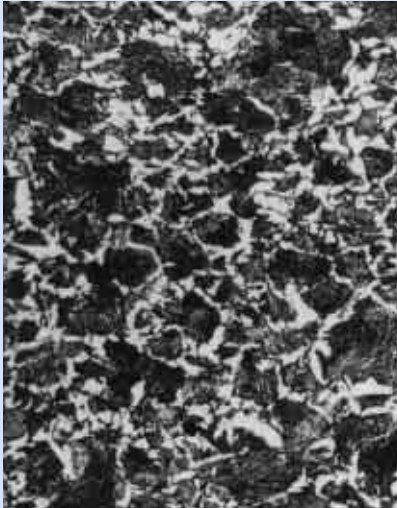

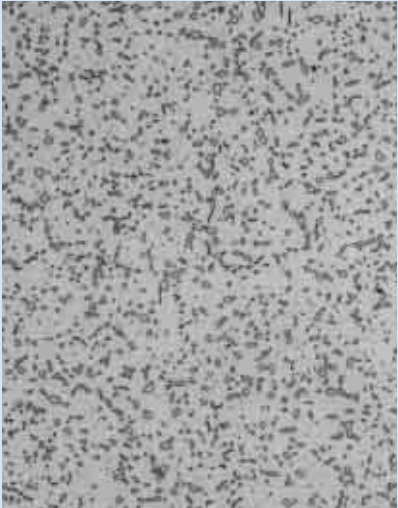
Relations between quenching temperature and hardness



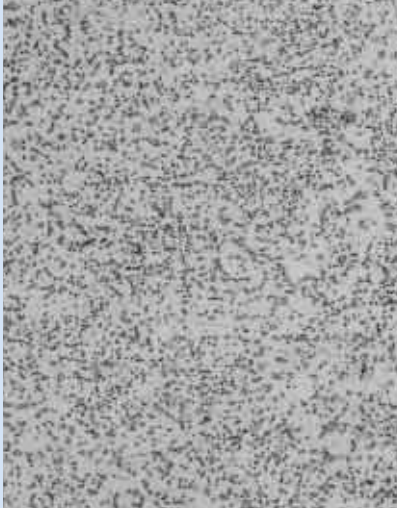
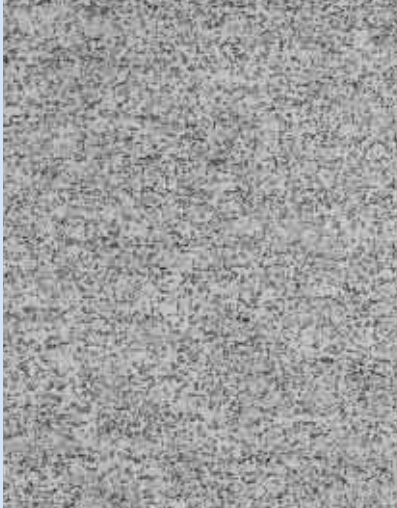
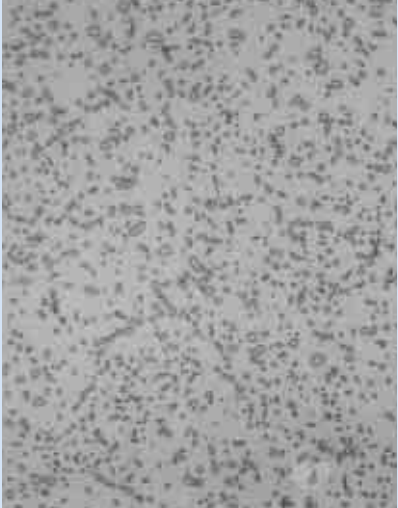
Relations between Tempering temperature and hardness



Microstructures

S45C (hot rolled)	As-rolled material			Ordinary annealed material			Spheroidizing annealed material (soft)*1		
									
	Hardness (HRB)			Hardness (HRB)			Hardness (HRB)		
	96			86			77		

*1 Spheroidizing annealed material (soft): Of materials of this kind, particular softening is provided.

S35C (hot rolled)	Spheroidizing annealed material		
	Standard material	Special material-A *2	Special material-B*3
			
Hardness (HRB)			
	81	83	73

*2 Special material-A: By structural control, carbides are made to finely disperse. Very high burring property.

*3 Special material-B: Like soft materials given spheroidizing annealing, special softening is provided.

Conversion table of hardness (SAE J417)

Vickers Hardness (Hv)	Rockwell Hardness		Shore Hardness (HS)	Tensile Strength (N/mm²)	Vickers Hardness (Hv)	Rockwell Hardness		Shore Hardness (HS)	Tensile Strength (N/mm²)	Vickers Hardness (Hv)	Rockwell Hardness		Shore Hardness (HS)	Tensile Strength (N/mm²)
	B scale (HRB)	C scale (HRC)				B scale (HRB)	C scale (HRC)				B scale (HRB)	C scale (HRC)		
940	—	68.0	97	—	540	—	51.7	69	1860	280	(103.5)	27.1	40	890
920	—	67.5	96	—	530	—	51.1	—	1825	275	—	26.4	—	875
900	—	67.0	95	—	520	—	50.5	67	1795	270	(102.0)	25.6	38	855
880	—	66.4	93	—	510	—	49.8	—	1750	265	—	24.8	—	840
860	—	65.9	92	—	500	—	49.1	66	1705	260	(101.0)	24.0	37	825
840	—	65.3	91	—	490	—	48.4	—	1660	255	—	23.1	—	805
820	—	64.7	90	—	480	—	47.7	64	1620	250	99.5	22.2	36	795
800	—	64.0	88	—	470	—	46.9	—	1570	245	—	21.3	—	780
780	—	63.3	87	—	460	—	46.1	62	1530	240	98.1	20.3	34	765
760	—	62.5	86	—	450	—	45.3	—	1495	230	96.7	(18.0)	33	730
740	—	61.8	84	—	440	—	44.5	59	1460	220	95.0	(15.7)	32	695
720	—	61.0	83	—	430	—	43.6	—	1410	210	93.4	(13.4)	30	670
700	—	60.1	81	—	420	—	42.7	57	1370	200	91.5	(11.0)	29	635
690	—	59.7	—	—	410	—	41.8	—	1330	190	89.5	(8.5)	28	605
680	—	59.2	80	—	400	—	40.8	55	1290	180	87.1	(6.0)	26	580
670	—	58.8	—	—	390	—	39.8	—	1240	170	85.0	(3.0)	25	545
660	—	58.3	79	—	380	(110.0)	38.8	52	1205	160	81.7	(0.0)	24	515
650	—	57.8	—	—	370	—	37.7	—	1170	150	78.7	—	22	490
640	—	57.3	77	—	360	(109.0)	36.6	50	1130	140	75.0	—	21	455
630	—	56.8	—	—	350	—	35.5	—	1095	130	71.2	—	20	425
620	—	56.3	75	—	340	(108.0)	34.4	47	1070	120	66.7	—	—	390
610	—	55.7	—	—	330	—	33.3	—	1035	110	62.3	—	—	—
600	—	55.2	74	—	320	(107.0)	32.2	45	1005	100	56.2	—	—	—
590	—	54.7	—	2055	310	—	31.0	—	980	95	52.0	—	—	—
580	—	54.1	72	2020	300	(105.5)	29.8	42	950	90	48.0	—	—	—
570	—	53.6	—	1985	295	—	29.2	—	935	85	41.0	—	—	—
560	—	53.0	71	1950	290	(104.5)	28.5	41	915					
550	—	52.3	—	1905	285	—	27.8	—	905					