



NSSC®FWseries

www.nssc-global.com/en/campaigns/fw/

FWseries/Keyword

Design

Reduced rare metals up to 40%!

No Ni and Mo added. Also reduced the contents of Cr.

FW2 reduced its Cr/Ni contents by 40% compared with SUS304(18% Cr - 8% Ni).

FW1 reduced its Cr contents by 18% compared with SUS430LX(18% Cr).

Development

FW series are the world's first stainless steel which contain Sn.

With world's first "Sn adding" technology, FW2, with only 16% of Cr., has similar corrosion resistance as 18%Cr-8%Ni.

With world's first "Sn adding" technology, FW1, with only 14% of Cr., has similar corrosion resistance and also top-class formability of 18% Cr.

Think upside down

FW series realized high corrosion resistance by melting Sn, which generally inhibits production of steel.

Dream

The 3rd representative grade.

In addition to the two main grades, 304 and 430, we promote NSSC FW series (16% Cr and 14% Cr) as the third main grades, consider licensed production for others and aspire globalization of this resourcesaving stainless steel.

FW1 and FW2 can be used for most applications of general stainless steel.

CONTACT

URL: www.nssc.nssmc.com/en/

Saving the resources for the next generation,
saving the cost for you.

Resource saving, high quality Eco-stainless steel sheet.
Eco-logical and Eco-nomical.

NSSC®FWseries



The World's First!

The first "Tin-added" ferritic stainless steel grade in the world which provide high-corrosion resistance with less rare metal.

Cr & Ni
40%
saving

Reducing rare metal contents up to 40%!
More stable cost! New technology of NSSC!
World's first! New technology of NSSC! "Tin-added" Stainless steel!

Cr, Ni, Mo are mentioned in the
"7 national-stockpile-metals".

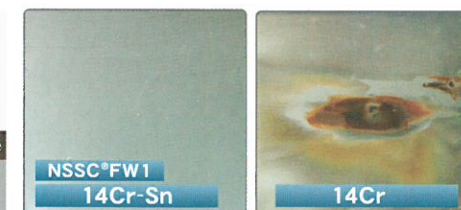
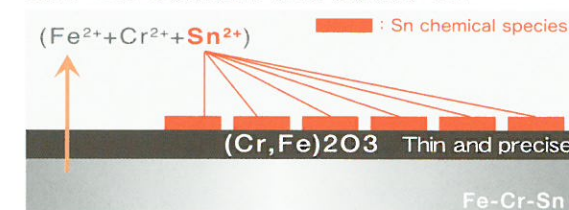


NSSC®FW series
New Standard! Ferritic!!

Adding Tin

FW series have high-corrosion resistance in salt water environment due to the "added tin" as the chemical species of tin (Sn) are attached to surface of the material.

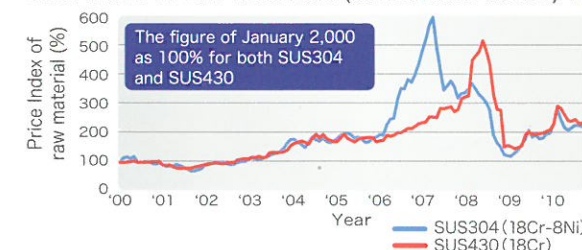
Low Cr. Content and added Sn



Comparison of 14Cr-Sn (Left) and 14Cr (Right)
(Inhibit rusting by adding Sn)

Price stability

Cost chart of raw materials (constituent bases) in 2 most common grades

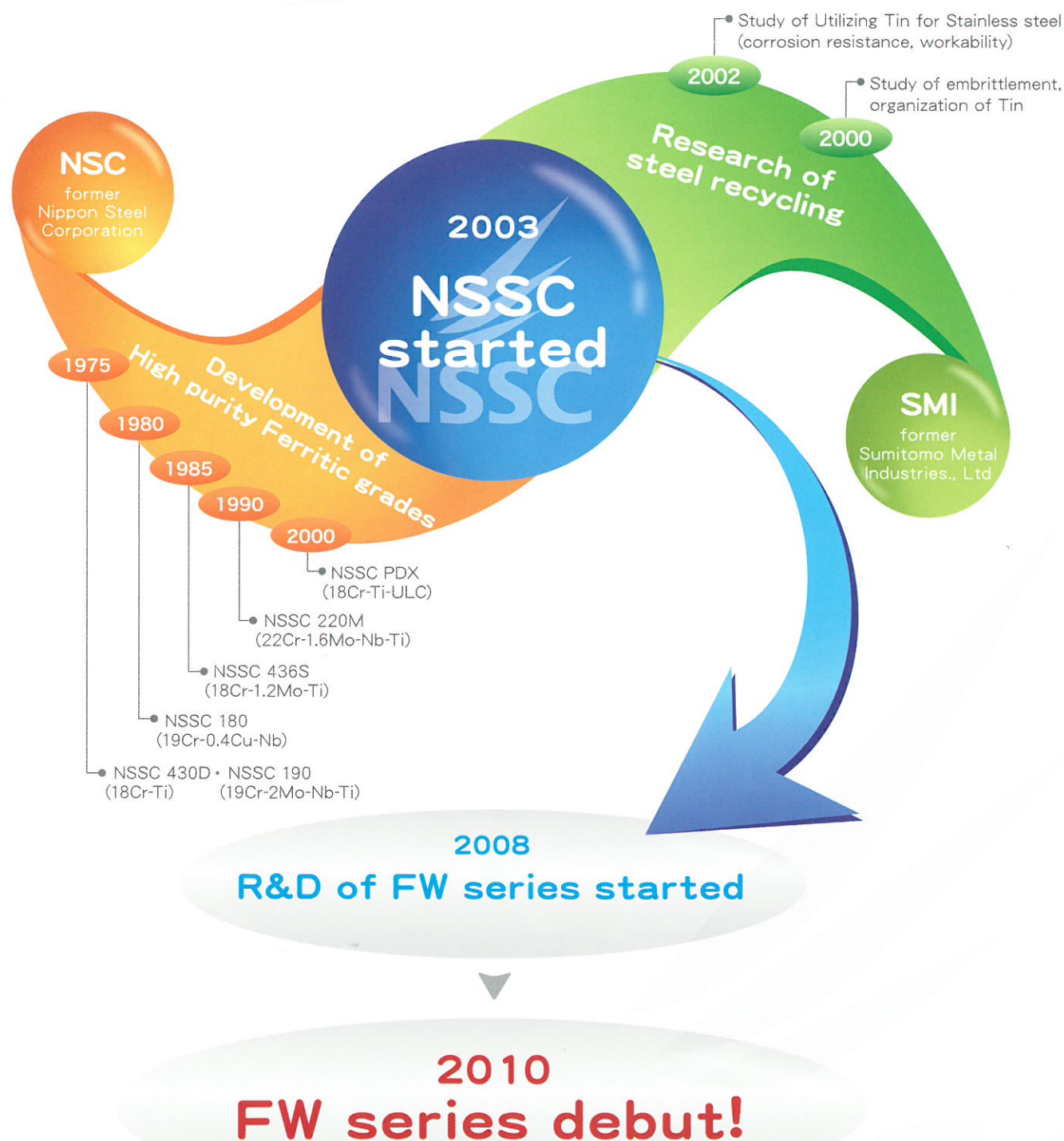


FW series require less rare metal (no Ni and Mo, and reduced Cr), which means less cost and more stable pricing.

Adding Tin !?



History of developing NSSC FW series



About the name of NSSC® FW series
Pronounced as : NSSC "Forward" Series
FW stands for:

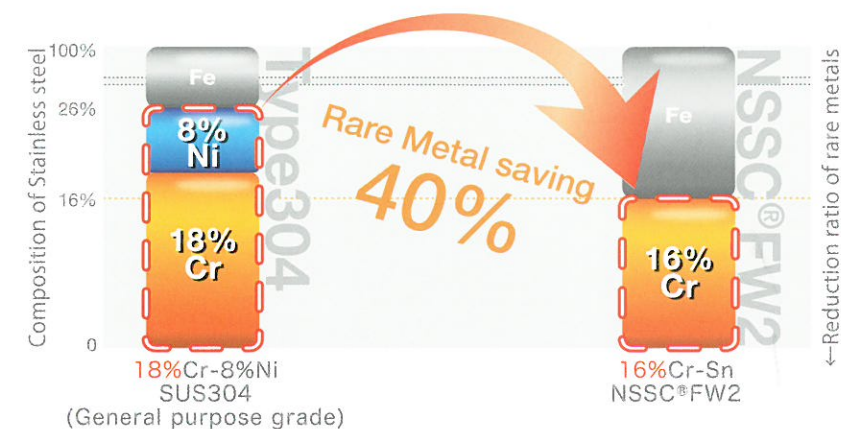
- ForWard = grades for the next generation
- Ferritic for the World = Ferritic grades to better the world

Reducing rare metal up to 40%!

NSSC FW series require no Ni and Mo, as well as greatly-reduced Cr. Contents.

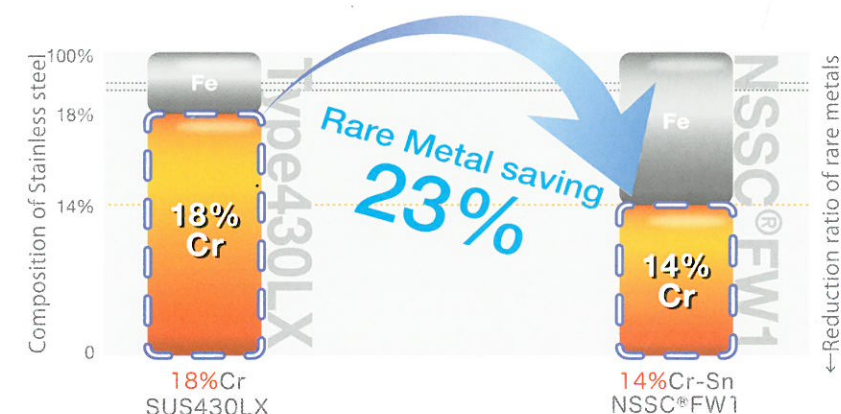
FW2(16Cr-Sn)

Compared with SUS304, FW2 can save 40% of rare metals.



FW1(14Cr-Sn)

Compared with SUS430LX, FW1 can save 23% of rare metals.



PRIZE

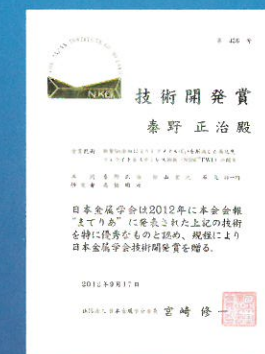
2010

"Nikkei business daily awards for excellence" of "2010 Nikkei superior products and services award"



2012

2012 Japan Institute of Metals "technical developing award"



2012

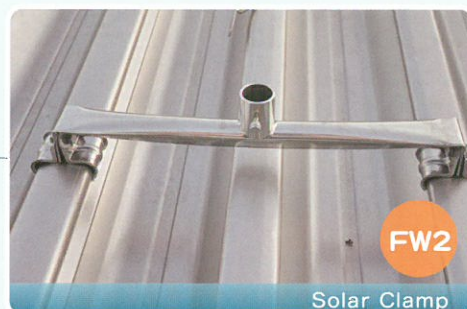
Winner of "the prime minister's Award" of the "Monodzukuri Nippon grand Awards."



Application/for outside

NSSC FW series are very widely used, for both inside and outside purpose

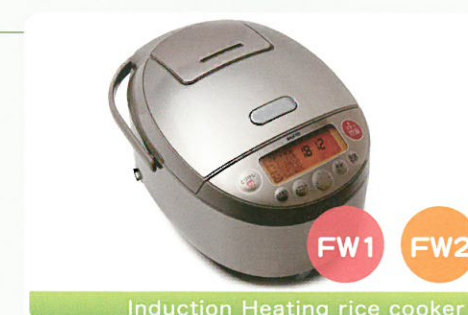
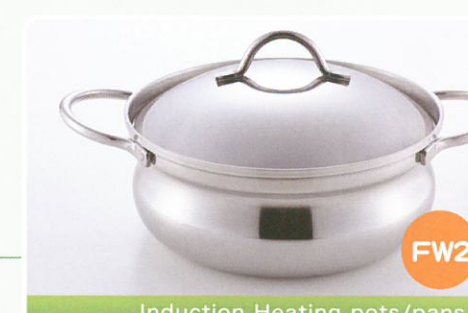
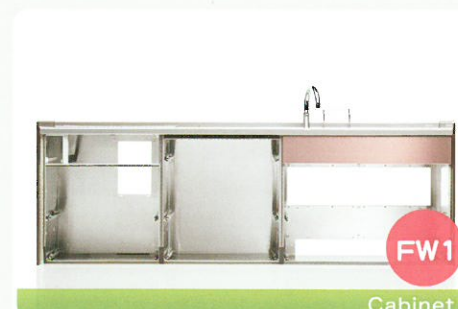
Application Example



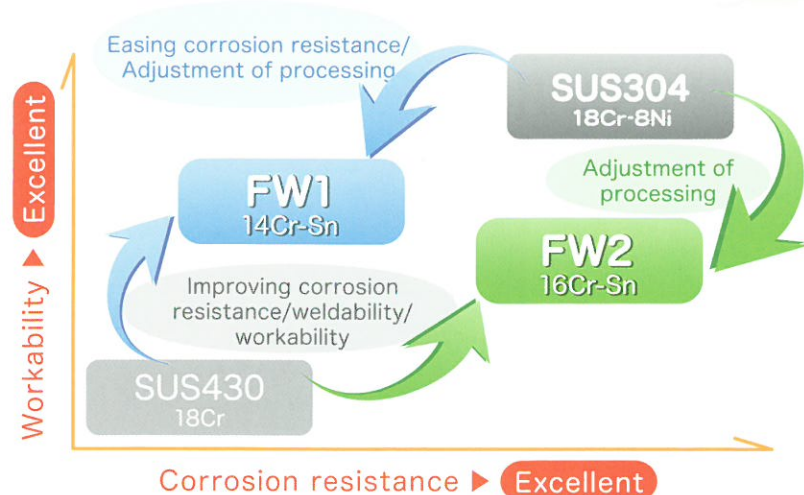
NSSC®FWseries

Application/for inside

Nippon Steel & Sumikin Stainless Steel Corporation



Scope of application of FW series



Specialty of FW series

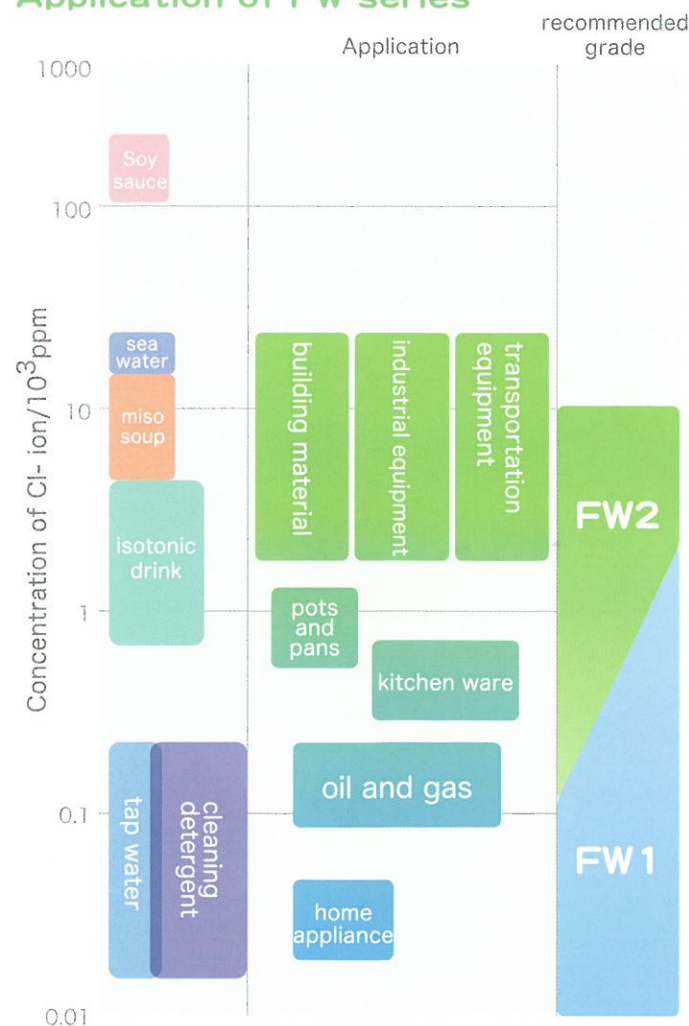
Corrosion resistance

NSSC FW2 is recommended when similar corrosion resistance of SUS304 is required, and NSSC FW1 for less corrosion resistance. Both grades have good corrosion resistance at the welding area.

Workability

Both NSSC FW1, FW2 have the best level of workability in all ferritic grades. Also, it can have similar formability as 304 by suitably adjusting the processing conditions.

Application of FW series

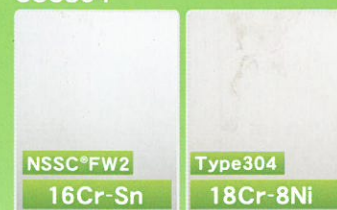


Examples of FW series application.
Please use suitable FW grade for your applications.
As for details, please feel free to contact us. (Please see contact information at the end of the book.)

High corrosion resistance

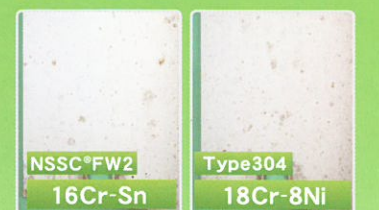
FW2

FW2's corrosion resistance through MST is similar as SUS304



Comparison of 16Cr-Sn(left) and 18Cr-8Ni(right)
Solution 0.5%NaCl+2%H₂O₂, 35°C,24hr

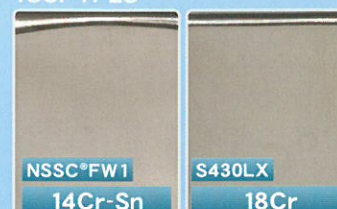
Corrosion resistance in exposure test is similar as 304



Sample appearance after 1 year of exposure test in OKINAWA

FW1

FW1's corrosion resistance through SST is good as 18Cr-Ti-LC



Comparison of 14Cr-Sn(left) and 18Cr(right)
0.5%NaCl solution, 35°C, 168hr continuous spray

Corrosion resistance of welded area is also good



Test condition :
TIG welding: penetration bead to be 1.5mm
Surface condition :
As TIG welded (2B), #600 polish after TIG welding
immersion solution, time :
80°C, 0.5%NaCl, 168hr

high workability

Forming property/workability (0.6mm thickness)

	Deep drawing forming property		Bulging forming property	
	Average r value	LDR	n value	hydraulic bulge test height (mm)
NSSC®FW1	1.7	2.3	0.22	31.5
NSSC®FW2	1.7	2.3	0.24	30.5
SUS430	1.0	2.0	0.16	27.0
SUS304	1.1	2.1	0.42	40.5

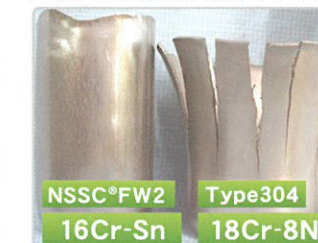
It has less ridging which help reducing maintenance time after processing.



Comparison of 14Cr-Sn-LC,N(left) and 18Cr(right)

one-time cold rolling drawing ratio : 2.0

Can be deep drawn several times, does not cause season cracking

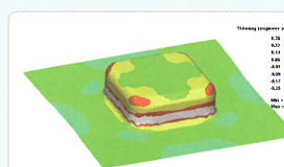


Comparison of 16Cr-Sn(left) and 18Cr-8Ni(right)

(one-time cold rolling) Blank dia : φ80mm,
lubricant: J.W.#122
Punch dia(mm): 1stφ40→2ndφ35→3rdφ30→4thφ25

Examples of replacement from SUS304 to FW series

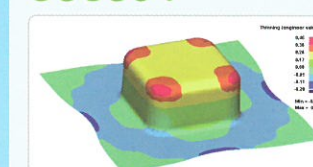
Simulation result of workability comparison in same condition as SUS304



NSSC®FW1; h=32mm

Blank : 240×240mm
Punch : 100×100mm,
コーナーr20mm, rp10mm
Die: 103×103mm, rd5mm
COF : 0.10, thickness: 0.8mm
blank-holding pressure : 20ton

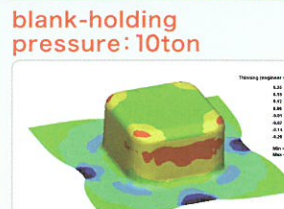
SUS304



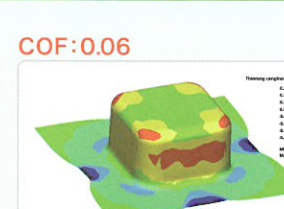
SUS304; h=52mm

NSSC Solution

Simulation result of workability comparison in suitable condition for FW series

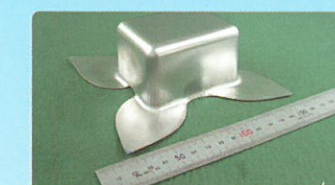


NSSC®FW1; h=60mm

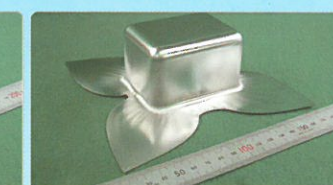


NSSC®FW1; h=60mm

blank size : SUS304/150×150mm
NSSC®FW2/175×175mm
thickness : 0.6mm, blank-holding pressure : 500kN
Die : 82mm×62mm, rC/9mm, rd/5mm
Punch : 80mm×60mm, rC/8mm, rp/8mm
lubricant : Die side/PVC film, Punch side/#122wax



SUS304 casting height: 50mm



NSSC®FW2 casting height: 50mm

Technical data

FW1(14Cr-Sn)

Grade

Mechanical properties

	0.2%proof strength (N/mm2)	tensile strength (N/mm2)	elongation (%)	hardness (HV)
Grade	≥175	≥360	≥28	≤180
Typical figure	260	420	35	130

Reference	Surface finish: No.2B, thickness: 0.6mm			
SUS430	307	536	29	153

Physical properties

measured results

item	unit	figure	reference
density	kg/mm/m2 (RT)	7.70	SUS430 7.70
specific electric resistivity	10-8Ωm (RT)	51	57
specific heat	kJ/kg/°C (0~100°C)	0.49	0.46
heat conductivity	W/m/°C (100°C)	26.6	24.2
heat expansion coefficient	10-6/°C (RT~100°C)	10.8	11.0
longitudinal elastic modulus	kN/mm2	217	200

FW1&FW2

Size range

Size range of NSSC FW1 is as below. Please consult with us for out-of-range sizes.
Please feel free to ask about any other surface finishes (i.e. bright 2B, dull finish, emboss, etc).

Surface finish : No.2D, No.2B

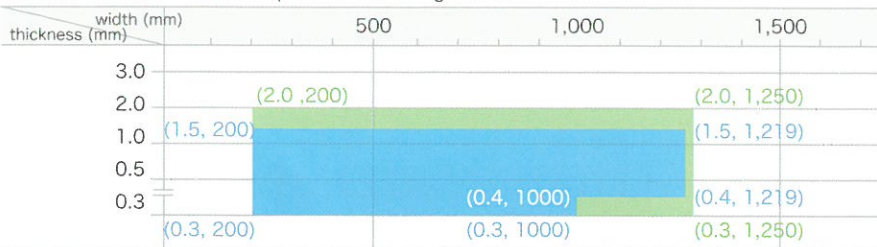
■Coil ※: Thickness, Width, production range



In regard to CTL sheets, width≥300mm, length≤8,000mm

Surface finish : BA (bright annealing)

■Coil ※: Thickness, Width, production range



In regard to CTL sheets, width≥300mm, length≤8,000mm

FW2(16Cr-Sn)

Grade

Mechanical properties

	0.2%proof strength (N/mm2)	tensile strength (N/mm2)	elongation (%)	hardness (HV)
Grade	≥205	≥390	≥25	≤200
Typical figure	279	463	32	144

Reference	Surface finish: No.2B, thickness: 0.6mm			
SUS304	297	675	61	173

Physical properties

measured results

item	unit	figure	reference
density	kg/mm/m2 (RT)	7.70	SUS304 7.93
specific electric resistivity	10-8Ωm (RT)	54	72
specific heat	kJ/kg/°C (0~100°C)	0.48	0.50
heat conductivity	W/m/°C (100°C)	25.6	16.3
heat expansion coefficient	10-6/°C (RT~100°C)	10.8	16.9
longitudinal elastic modulus	kN/mm2	211	193

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As for latest information, please ask each department.

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Solution from NSSC Resource saving, high quality stainless steel sheet

Weight saving solution Alternative duplex grade of SUS304!

NSSC®2120

ASTM A240/A240M-12 UNS No. "S82122"

"Weldability" has long been a disadvantage point for duplex grades. Introducing our new duplex grade of "NSSC2120" which has dramatically-improved weldability. With the advantages of Duplex, "High mechanical strength (almost double of 304)" and "High corrosion resistance", NSSC2120 would enable to significantly reduce total cost by cutting "construction cost", "transportation cost" and "production cost" etc.

As an "alternative grade of 304", NSSC2120 is available in wide size range, from sheets to plates,. Please use this grade for "resource saving" and "large total cost reduction".

High corrosion resistance
ferritic solution.

NSSC220M

Its corrosion resistance is better than SUS316L

NSSC190

Its pitting resistance is excellent.
Its pitting resistance and deposit corrosion resistance is the same or more than that of SUS316.

There is another grade, NSSC220ECO, in which its rare metal contents are further reduced.

Ultrasoft, excellent workability
austenitic solution

NSSC304JS

Ultrasoft(low proof strength, Inhibiting work hardening)
austenitic new grade.
➡ Pressing pressure can be reduced, and shape-fixability is good.

Heat shield typed Eco-painted
stainless steel sheets.

NARcolor®series

Heat shield function... heat shield pigments are added for roofing materials in order to resist the temperature rise.

Lubricated stainless steel which enables
lubricant-free processing.

High performance clear coated stainless

You can add workability/ anti-fouling property/
anti-weatherability.

Company

NSSMC Group



Steelmaking Business



Plate

Flat Products

Bar & Wire Rod

Construction Products

Pipe & Tube

Railway, Automotive & Machinery Parts

Titanium & Specialty Stainless Steel

Stainless Steel

Nippon Steel & Sumikin
Stainless Steel Corporation

Engineering Business

Nippon Steel & Sumikin Engineering Co., Ltd.

Chemicals Business

Nippon Steel & Sumikin Chemical Co., Ltd.

New Materials Business

Nippon Steel & Sumikin Materials Co., Ltd.

System Solutions Business

NS Solutions Corporation

NSSC/Corporate Data

Company name : Nippon Steel & Sumikin Stainless Steel Corporation
Type of business : Production and sales of stainless steel products
Date of establishment : October 1, 2003
Capital : 5 billion yen
Shareholders : Nippon Steel & Sumitomo Metal Corporation 100%
Number of employees : 1,500
Head office : 2-6-1, Otemachi, Chiyoda-Ku, Tokyo
100-0004, Japan

Yawata Works

2108-1 Aza-hato, Ooaza-maeda, Yawatahigashi-ku,
Kitakyushu-shi Fukuoka Pref., Japan 805-0058
Tel. 093 (672) 2356



Plate mill:
Finishing rolling mill



Hot rolling mill:
Finishing rolling mill



Cold rolling mill:
Tandem rolling mill

Kashima Works

2-1 Hikari, Kashima-shi, Ibaraki Pref., Japan 314-0014
Tel. 0299 (84) 3702



Cold rolling mill:
No.3 cold-rolling mill



Cold rolling mill:
No.4 Annealing & pickling

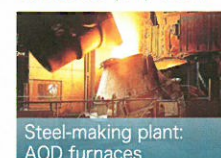


Automatic carriers

Manufacturing and R&D

Hikari Works / R&D Center

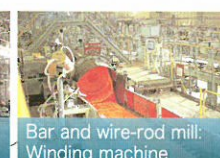
3434 Ooaza-shimada, Hikari-shi, Yamaguchi Pref., Japan 743-8550
Tel. 0833 (71) 5004



Steel-making plant:
AOD furnaces



Cold rolling mill:
No.3 cold-rolling mill



Bar and wire-rod mill:
Winding machine



Locations / Manufacturing

Dusseldorf Office
EUROPE

CHINA Shanghai Office
NSSC Guangzhou Office
Bangkok Office
THAILAND
Singapore Office
Jakarta Office
SOUTHEAST ASIA

JAPAN Head Office
Osaka Sales Office
Nagoya Sales Office
Kyushu Sales Office
Chugoku Sales Office
Niigata Sales Office
Hikari Works · R&D Center (Yamaguchi Pref.)
Kashima Works (Ibaraki Pref.)
Yawata Works (Fukuoka Pref.)

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South America

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Niigata Sales Office

COI Niigata Bldg. 8F, 1-4-2 Higashi Oodori, chuo-ku,
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