

# Technology Development Solution

*From Japan to the world*

## Stainless Steel Wire Rods

[stainless.nipponsteel.com](http://stainless.nipponsteel.com)

### Stainless Steel Wire Rods

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## Stainless Steel Wire Rods

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## Stainless Steel Wire Rods

### Features

NIPPON STEEL Stainless Steel Corporation's stainless wire rods are produced and supplied under the motto "Higher Quality, Greater Variety of Steel Grades, Quicker Delivery" with its advanced technologies in order to provide customers with full satisfaction.

#### 1 Excellent Quality

Based on ISO9001, an international quality control system standard, strict quality control is being exercised on an integrated basis from steelmaking to product shipments.

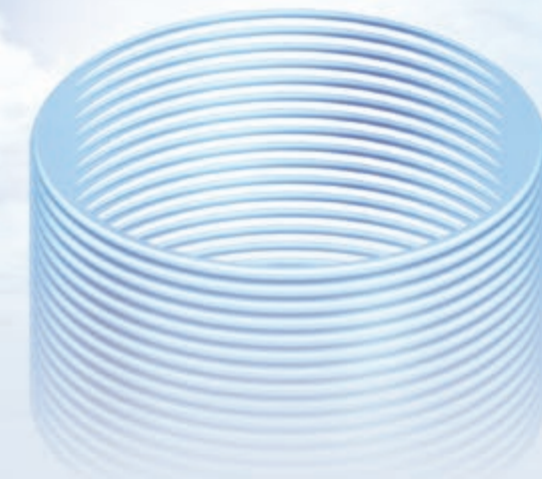
A combination of the most advanced equipment and superb manufacturing technologies, including in-line heat treatment, makes available stainless steel wire rods with the mechanical properties and surface textures being uniform and excellent over the entire length.

#### 2 A Wide Variety of Steel Grades and Sizes Available

A wide selection of steel grades ranging from Cr to Ni types is available to suit intended applications. Wire rods are also available in diameters ranging from 5.5 to 34mm.

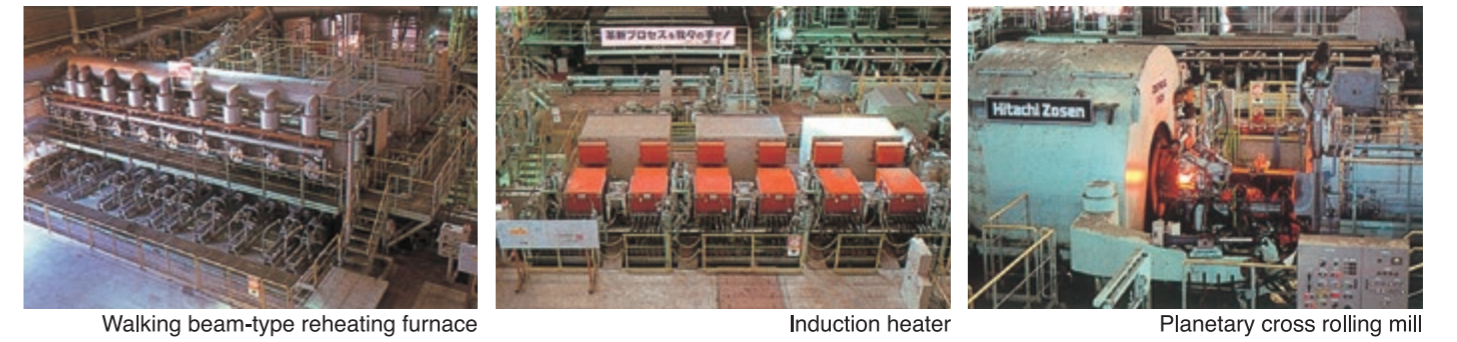
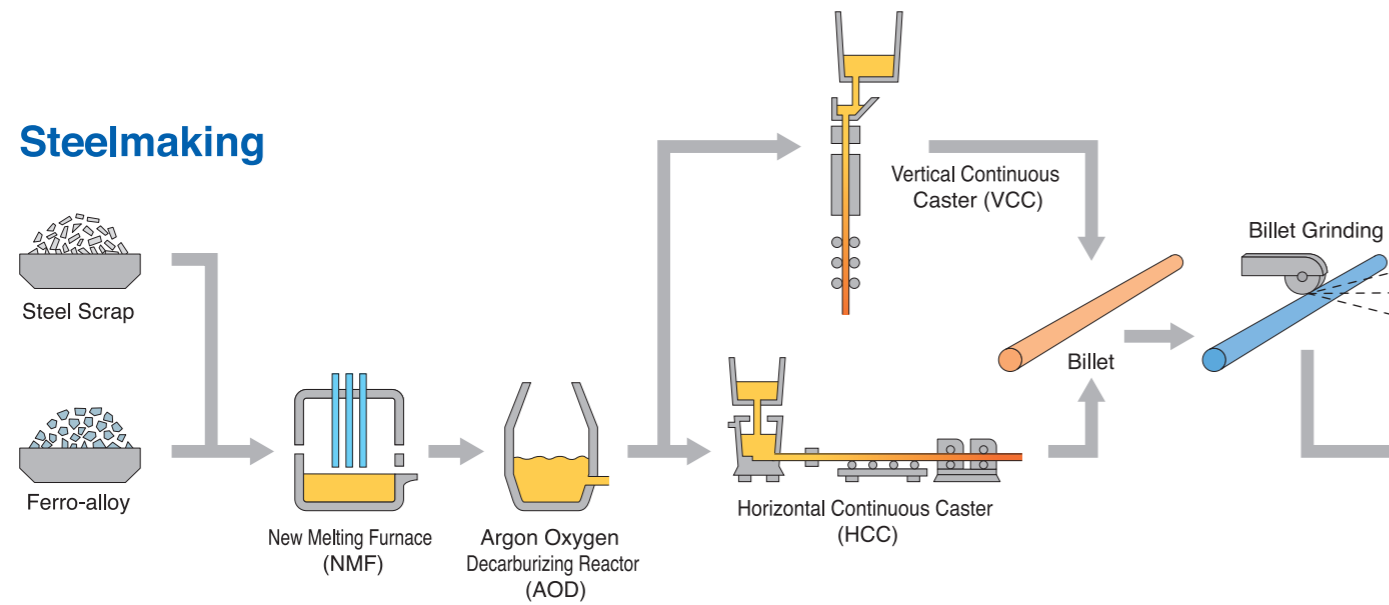
#### 3 Quick Delivery

The stringent process management exercised over the entire sequence of manufacturing stainless steel wire rod also ensures the customers' full satisfaction with delivery time.

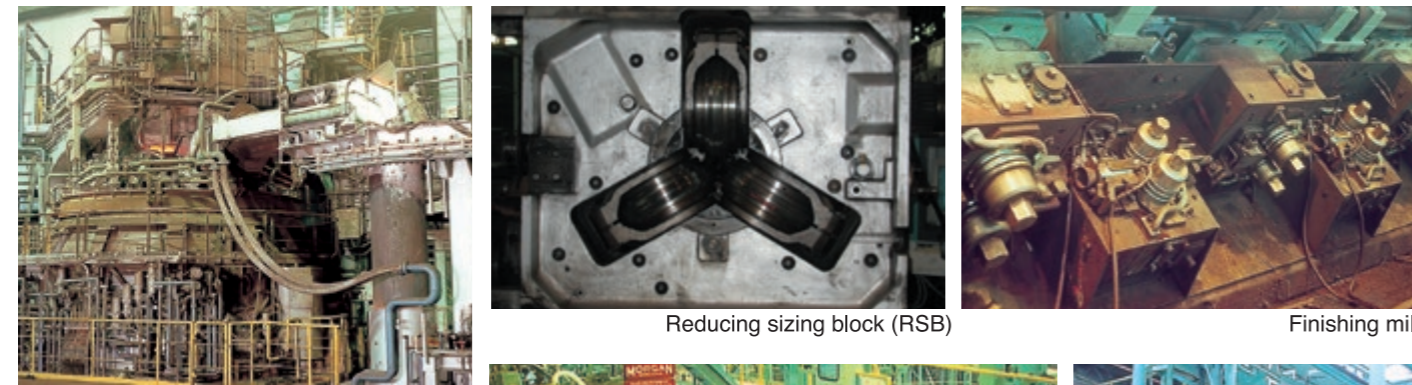
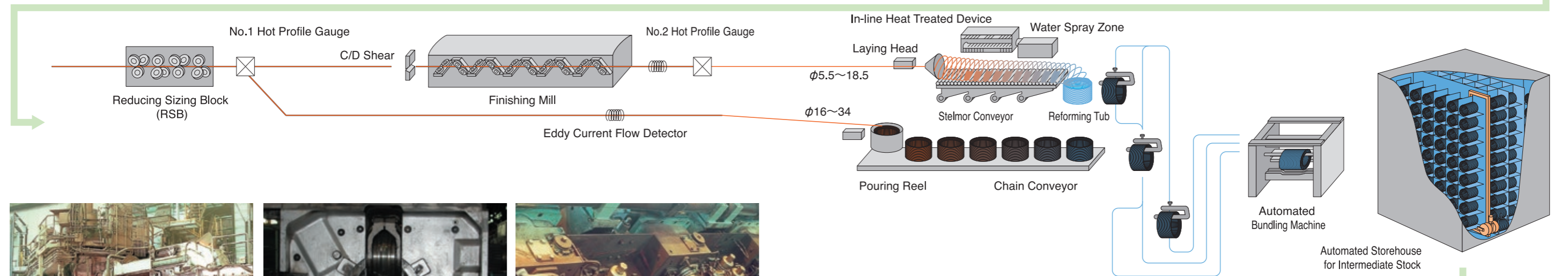
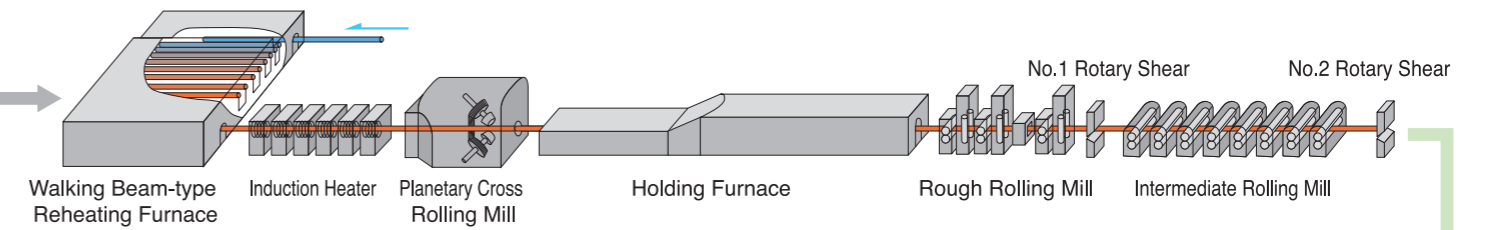


# Manufacturing Flow

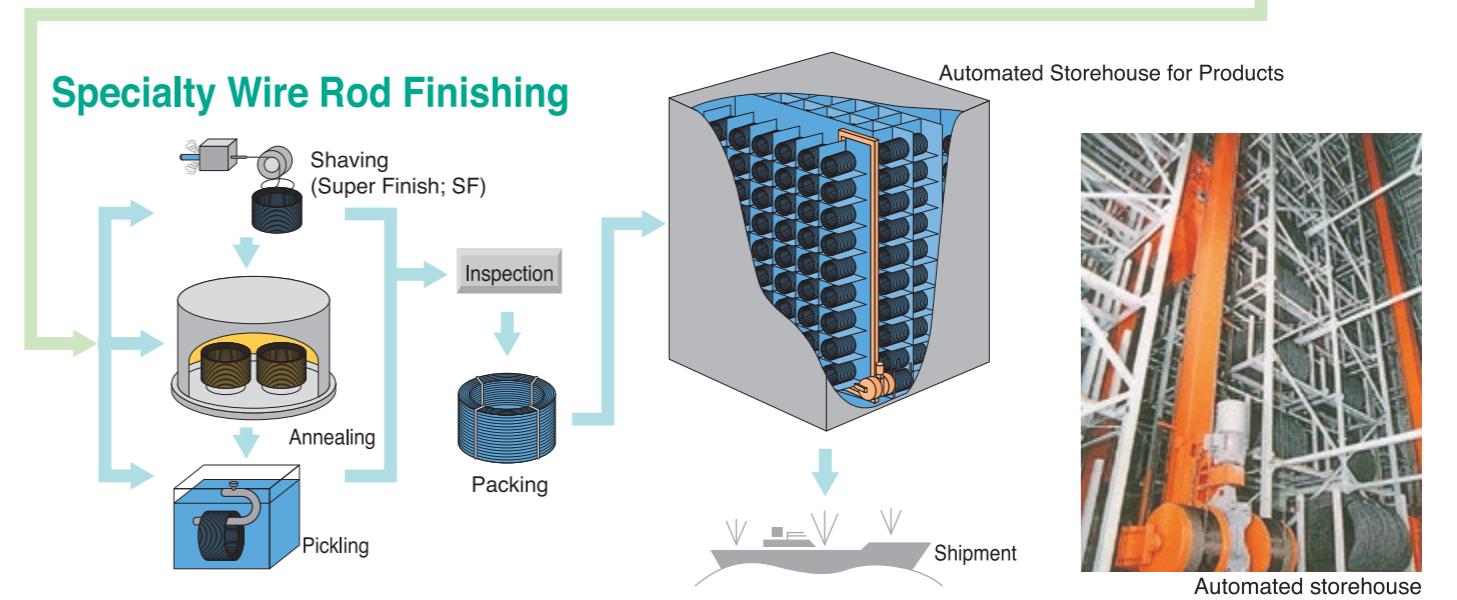
## Steelmaking



## Wire Rod Rolling



## Specialty Wire Rod Finishing



# Characteristic Properties and Application Examples by Grades and Type

## Martensitic Stainless Steels

- It is an Fe-Cr type alloy stainless steel containing 13%Cr.
- It possesses heat-treatment characteristics similar to those of most alloy steels and demonstrates wide-ranging mechanical properties after appropriate heat treatment.
- This steel grade possesses strong magnetic properties.

## Ferritic Stainless Steels

- It is an Fe-Cr alloy steel containing 18% or more Cr. It generates nearly no  $\gamma$  phase at high temperatures and is nearly a ferritic single-phase steel.
- This type of steel does not harden significantly with heat treatment.
- It demonstrates maximum softness, ductility and corrosion resistance in the as-annealed state, and possesses magnetic properties similar to those of martensitic stainless steel.

## Austenitic Stainless Steels

- It is an Fe-Cr-Ni alloy steel and its representative type is 18Cr-8Ni steel and is an austenitic single-phase steel non-magnetic in the range from room temperature to high temperature.
- It does not harden with heat treatment.
- Austenitic stainless steel incurs work hardening and work-induced transformation due to cold working, demonstrating wide-ranging mechanical properties and showing magnetism in some cases.
- Austenitic stainless steel is annealed and its precipitation of carbides is restricted through rapid cooling from high temperatures, which enables the steel to demonstrate maximum softness, ductility and corrosion resistance.

## Austenitic-Ferritic (Dual-phase) Stainless Steels

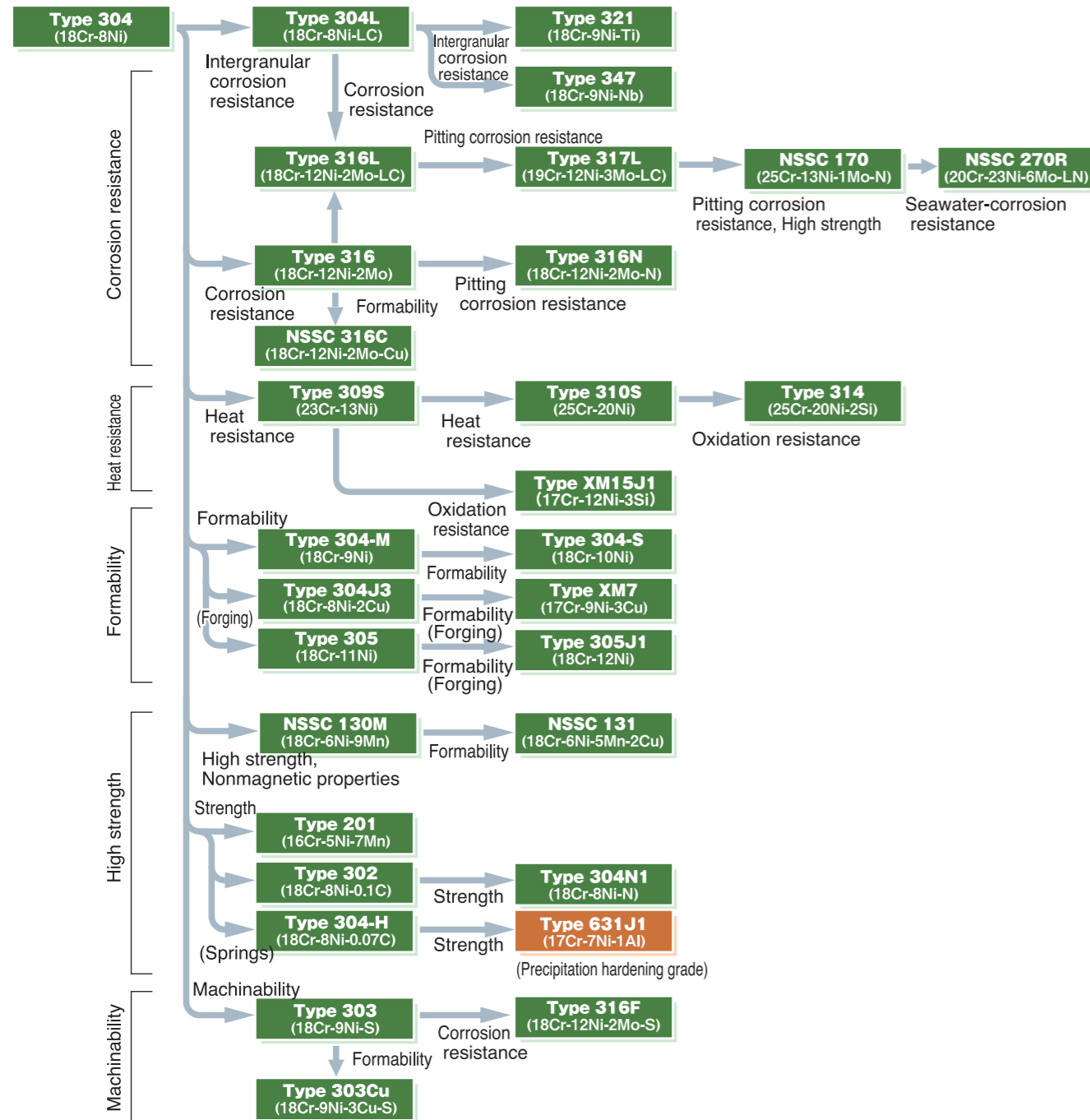
- It is the dual-phase stainless steel that has mixed metallographic structures of austenitic and ferritic phase.
- It possesses high strength in a heat-treated state.
- It demonstrates high corrosion resistance, and its stress corrosion cracking resistance is higher than those of austenitic stainless steels.

## Application Examples

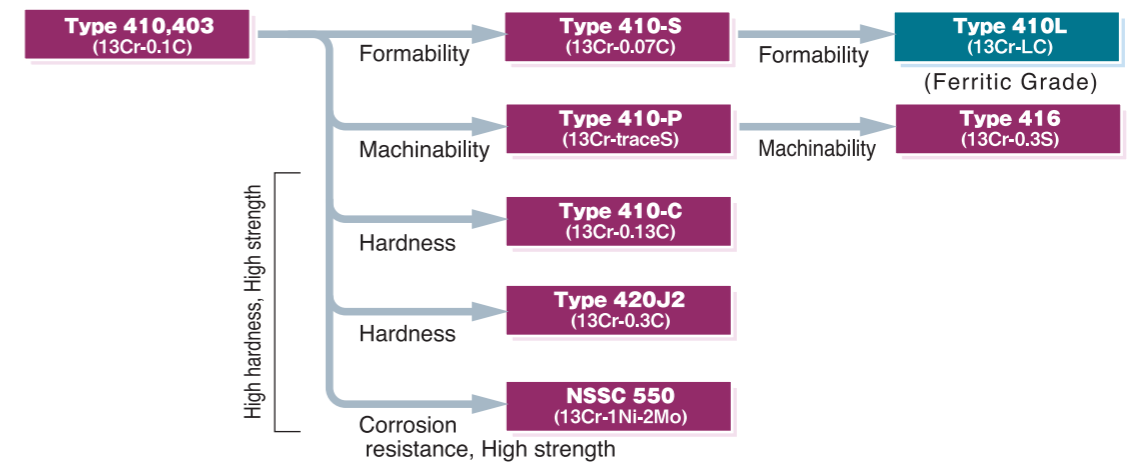
Grades	Type No.	Application examples									
		Spring	Small screw	Bolt/nut	Steel mesh	Shaft/pin	Needle	Nail	Rope	Washer	Machining parts
Martensitic	403			○		○					
	410		○			○					
	416					○					○
	420J2					○					
	NSSC 550		○	○			○	○			
Ferritic	410L			○							
	430		○		○	○					
	430F										○
	434		○								
	444				○						
	NSSC 160R		○	○	○	○					
	NSSC 180		○	○	○	○					
	NSSC 190				○	○					
Austenitic	201					○	○				
	302	○				○	○				
	303					○					○
	303Cu					○					○
	304	○		○	○	○	○	○	○	○	
	304L		○	○	○						
	304N1					○		○		○	
	304J3			○				○			
	305		○	○							
	305J1		○								
	309S				○						
	310S				○						
	316	○		○	○				○		
	316L				○						
	316C		○	○							
	316F					○					○
	317			○	○						
	317L			○	○						
	321			○	○						
	347			○	○						
	XM7		○	○							
	NSSC 170					○	○				
	NSSC 270R		○	○	○				○		
NSSC 130M	○					○					
NSSC 131						○					
Austenitic-ferritic	NSSC 2120			○	○	○			○		
Precipitation-hardening	631J1	○				○					

# System Diagram of Stainless Steels

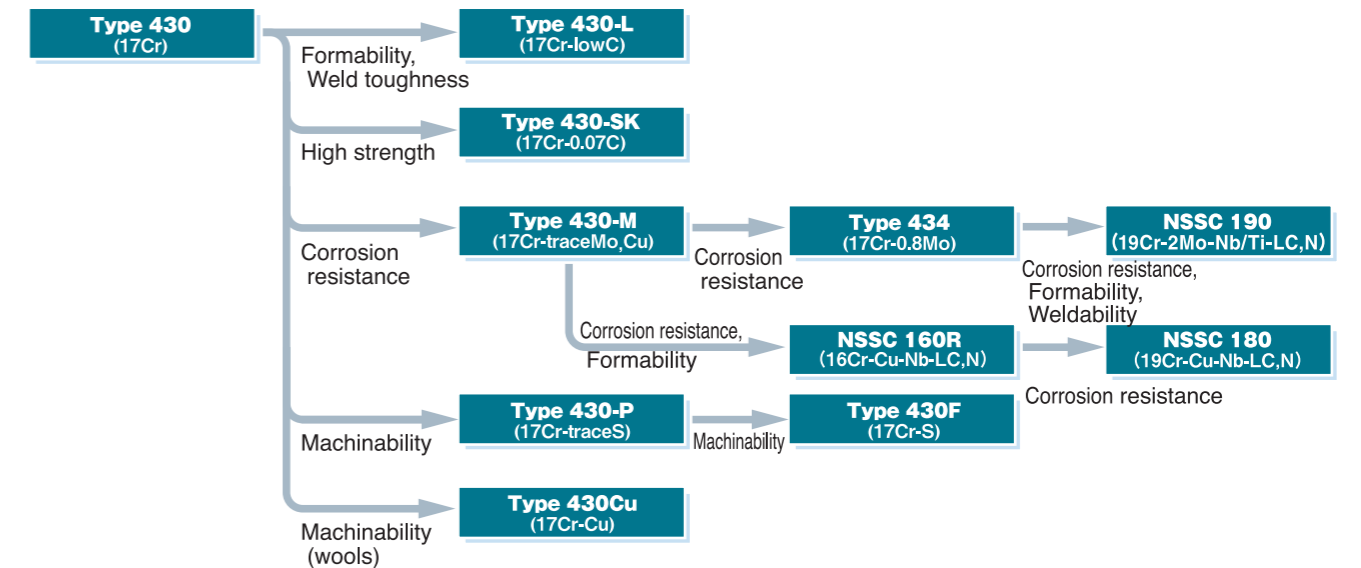
## Austenitic Stainless Steels



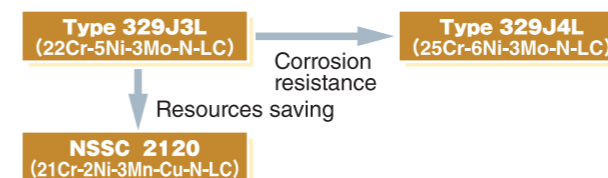
## Martensitic Stainless Steels



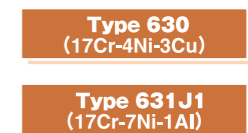
## Ferritic Stainless Steels



## Dual-phase (austenitic-ferritic) Stainless Steels

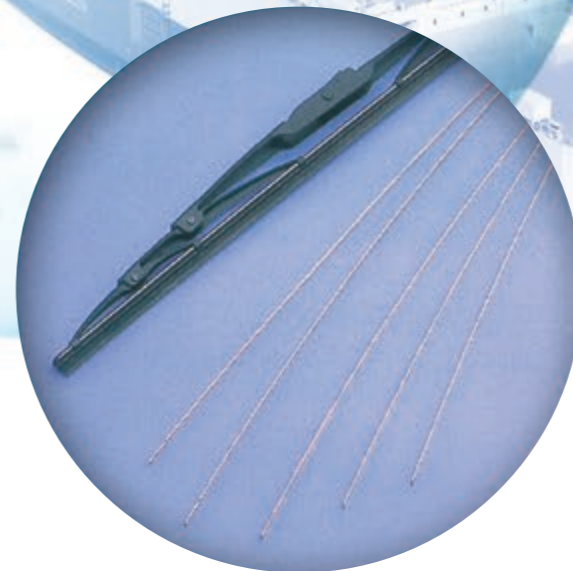
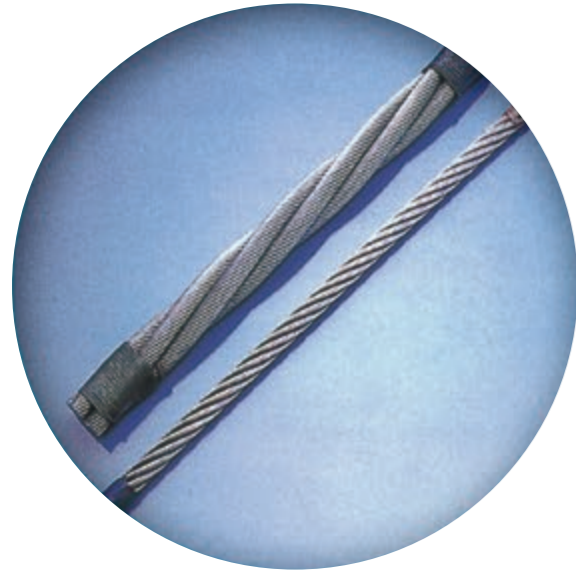


## Precipitation Hardening Stainless Steels



# Application Examples

Stainless steel wire rods are used for components of automobiles, aircraft, electric railway cars, ships, rockets, artificial satellites and other indispensable equipments.





## NSSC Standard

Grades	Type No.	Typical chemical composition	Similar steel grade (reference)	Feature	Typical application
Martensitic	NSSC550	13Cr-2Mo-1Ni		High strength, high corrosion resistance	Pin, shaft
Ferritic	NSSC160R	16Cr-Cu-Nb-LC	SUS430J1L	Weld corrosion resistance	Heading parts, welding material
	NSSC180	19Cr-Cu-Nb-LC	SUS430J1L	Weld corrosion resistance	Heading/welding parts
	NSSC190	19Cr-2Mo-Nb/Ti-LC	SUS444	High corrosion resistance	Corrosion-resistant parts
Austenitic	NSSC130M	18Cr-5Ni-9Mn		High strength, non-magnetic property	Pin, shaft
	NSSC131	18Cr-5Ni-4Mn-LC		Non-magnetic property, formability	Screw
	NSSC170	24Cr-13Ni-1Mo-0.3N	SUS317J2	High corrosion resistance, high strength	Spring
	NSSC316C	17Cr-10Ni-2.5Mo-3Cu	SUS316J1	High corrosion resistance	Corrosion-resistant parts
	NSSC270R	20Cr-22Ni-6Mo-Cu	SUS836L	High corrosion resistance	Corrosion-resistant parts
Austenitic-ferritic	NSSC2120	21Cr-2Ni-3Mn-Cu-N	SUS821L1	High corrosion resistance, high strength	High-strength, corrosion-resistant parts

## Mechanical Properties

Grades	Type No.	[Reference] Mechanical properties (wire rods after heat treatment)				
		Heat treatment	Tensile Strength (N/mm <sup>2</sup> )	Elongation (%)	Reduction of area (%)	Hardness (Hv)
Martensitic	Type403	Annealing	≤600	≥20	≥55	≤240
	Type410	Annealing	≤600	≥20	≥55	≤240
	Type416	Annealing	≤600	≥20	≥55	≤240
	Type420J2	Annealing	≤800	≥12	≥40	—
Ferritic	Type410L	Annealing	≤600	≥20	≥55	≤240
	Type430	Annealing	≤600	≥20	≥50	≤240
	Type430F	Annealing	≤600	≥20	≥50	≤240
	Type434	Annealing	≤600	≥20	≥60	≤240
Austenitic	Type201	Solid-solution treatment	≤900	≥35	≥45	≤330
	Type302	Solid-solution treatment	≤700	≥35	≥60	≤330
	Type303	Solid-solution treatment	≤700	≥35	≥50	≤270
	Type304	Solid-solution treatment	≤700	≥40	≥60	≤260
	Type304L	Solid-solution treatment	≤650	≥40	≥60	≤255
	Type304N1	Solid-solution treatment	≤750	≥35	≥50	≤285
	Type305	Solid-solution treatment	≤600	≥40	≥60	≤240
	Type305J1	Solid-solution treatment	≤600	≥40	≥60	≤240
	Type309S	Solid-solution treatment	≤750	≥40	≥60	≤270
	Type310S	Solid-solution treatment	≤650	≥40	≥50	≤255
	Type316	Solid-solution treatment	≤650	≥40	≥60	≤255
	Type316L	Solid-solution treatment	≤650	≥40	≥60	≤255
	Type321	Solid-solution treatment	≤700	≥40	≥50	≤270
	TypeXM7	Solid-solution treatment	≤550	≥40	≥60	≤225
Austenitic-ferritic	Type329J3L	Solid-solution treatment	≤900	≥20	≥60	≤315
	Type329J4L	Solid-solution treatment	≤900	≥20	≥60	≤315



# Sizes Available

## General Materials

Size (millimeters) *1)				
5.5	8.1	11.0	16.0	23.0
5.7	8.3	11.5	17.0	23.5
6.0	8.5	12.0	18.0	24.0
6.15	8.7	12.5	18.5	25.0
6.35	9.0	13.0	19.0	26.0
6.5	9.3	13.5	19.5	27.0
7.0	9.5	14.0	20.0	28.0
7.3	10.0	14.5	21.0	30.0
7.5	10.3	15.0	22.0	32.0
8.0	10.5	15.5	22.5	34.0

\*1) As regards the production period, confirm it when placing an order.

## SF (Super Finish) Materials

●SF material is produced by surface-grinding rolled wire rods.

Basic Diameters (mm)
S5.3~S17.3

(The figure shows practically-finished size.)

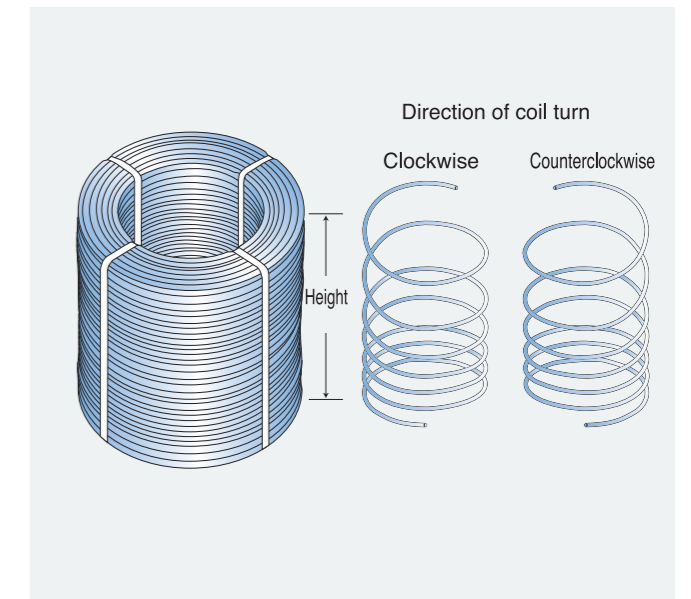
# Specifications and Bundling of Coil

## Coil Specifications

Item	Specifications
Unit coil weight	Approx. 1 (tons) *1) *2)
Coil diameter	Approx. 1 (m) *2)
Coil height	Approx. 1 (m) *2)
Direction of coil turn	Clockwise

\*1) A 2-ton coil is available for part of steel grades. Confirm it when placing an order.

\*2) Coil weight, diameter and height change depending on the product size and heat-treatment process.



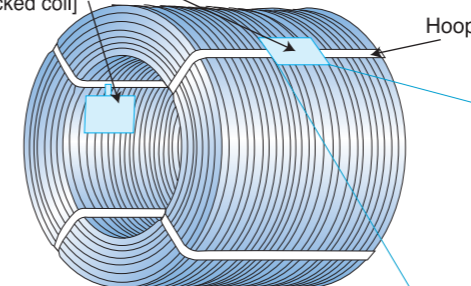
## Binding Method

Item	Specifications
Material	Hoop (resin or steel)
Number of hoops	4

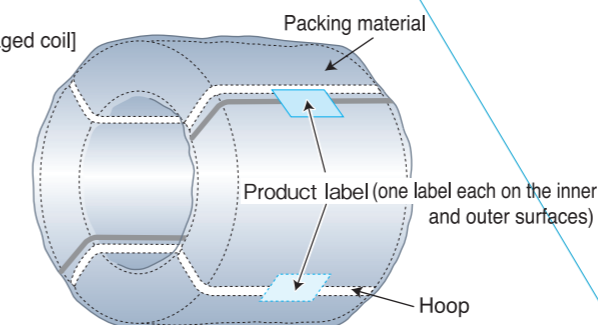


## Coil Shape and Marking

Product label (one label each on the inner and outer surfaces)  
[Unpacked coil]



[Packaged coil]



## Example of marking

(Customer's Name)	
Code	<b>SUS304</b>
Size	<b>5.50</b>
Heat No.	<b>E27315</b>
Coil No.	<b>8-20-674-01-0-0</b>
Prod Month	<b>18-08</b>
Heat Treatment	<b>DS</b>
Weight	<b>1.087 kg</b>
<b>NIPPON STEEL</b> <b>Stainless Steel Corp.</b> <b>HIKARI WORKS/ Made in Japan</b>	
S.W.P.G. HUANGPU SSPH-M-1712 TYPE631 S5.3 DIA NSSC MADE IN JAPAN 1	
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