



## Stainless Steel Wire Rods

### ■ Head Office

2-6-1 Otemachi, Chiyoda-ku, Tokyo 100-0004, Japan  
Phone +81-3-3276-4800

### ■ Sales Offices

#### Osaka Sales Office

Yodoyabashi-Mitsui Bldg. 3F, 4-1-1 Imabashi,  
Chuo-ku, Osaka-shi, Osaka 541-0042, Japan  
Phone +81-6-4706-1180

#### Kyushu Sales Office

Hakata-NS Bldg. 4F, 5-18 Tenya-machi,  
Hakata-ku, Fukuoka-shi,  
Fukuoka 812-8522, Japan  
Phone +81-92-273-7090

#### Niigata Sales Office

COI-Niigata Bldg. 8F, 1-4-2 Higashi Oodori,  
Chuo-ku, Niigata-shi, Niigata 950-0087, Japan  
Phone +81-25-246-3113

#### Nagoya Sales Office

NS Bldg. 5F, 2-13-18 Meieki-minami, Nakamura-ku,  
Nagoya-shi, Aichi 450-0003, Japan  
Phone +81-52-581-2012

#### Chugoku Sales Office

Hiroshima-Teppouchou Bldg. 14F,  
10-12 Teppouchou, Naka-ku,  
Hiroshima-shi, Hiroshima 730-0017, Japan  
Phone +81-82-511-5115

### ■ Overseas Offices

#### NSSC Bangkok Office

NS-Thainox Auto Company Limited,  
1 MD Tower 20th Floor, Soi Bangna-Trad 25,  
Bangna Trad Rd., KM.3 Kwang Bangna,  
Khet Bangna, Bangkok 10260 Thailand  
Phone +66-2-744-0720

#### NSSC Guangzhou Office

NSSC Guangzhou Office  
Rm No.1404, South Tower, GT Land Plaza 2, No.8  
Zhujiang Xi Road,  
Guangzhou 510623, China  
Phone +86-20-38739850

#### Nippon Steel & Sumikin Stainless Steel Consulting [Shanghai] Co.,Ltd. (NSSC Shanghai Office)

Room 909, UNITED PLAZA,  
1468 Nanjing Road West,  
Shanghai 200040, China  
Phone +86-21-62892928

### ■ Works

#### Hikari Works

3434 Ooaza-shimada,  
Hikari-shi, Yamaguchi  
743-8550, Japan  
Phone +81-833-71-5004

#### Kashima Works

2-1 Hikari, Kashima-shi,  
Ibaraki 314-0014, Japan  
Phone +81-299-84-3702

#### Yawata Works

2108-1 Aza-hato, Ooaza-maeda,  
Yawatahigashi-ku, Kitakyushu-shi,  
Fukuoka 805-0058, Japan  
Phone +81-93-672-2356

For further information, please contact to the following department or nearest office  
**Wire Rod & Bar Marketing & Sales Division,**  
**Nippon Steel & Sumikin Stainless Steel Corporation Head Office**  
**Phone : +81-3-3276-4830**

**Nippon Steel & Sumikin Stainless Steel Corporation**

# Stainless Steel Wire Rods

**Nippon Steel & Sumikin Stainless Steel Corporation**





The stainless steel divisions of Nippon Steel Corporation and Sumitomo Metal Industries, Ltd. were consolidated into a new company named Nippon Steel & Sumikin Stainless Steel Corporation in 2003.

The most sophisticated stainless steel manufacturing technologies as well as state-of-the-art quality control systems, developed and held by each of these two companies, have now been integrated and wholly taken over by this new company. Moreover, as Nippon Steel & Sumikin Stainless Steel Corporation plans to strengthen R&D focusing on stainless steel, the company is confident that it will be able to meet the strictest requirements demanded by customers with its stainless steel wire rods.

## Stainless Steel Wire Rods

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## Stainless Steel Wire Rods

### Features

Nippon Steel & Sumikin 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.

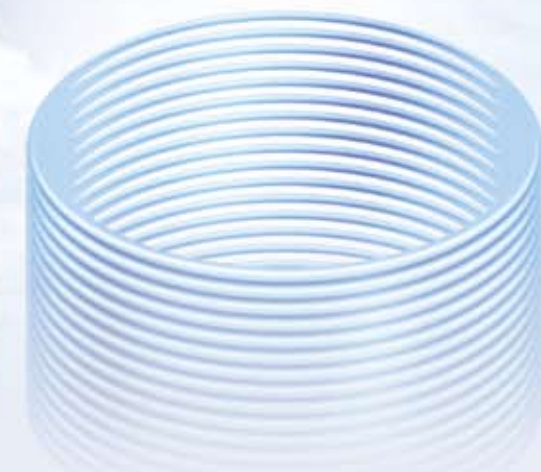
A combination of the most advanced equipment and superb manufacturing technologies, including in-line heat treatment, makes available stainless steel wire rods with the mechanical properties and surface textures being uniform and excellent over the entire length.

#### 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

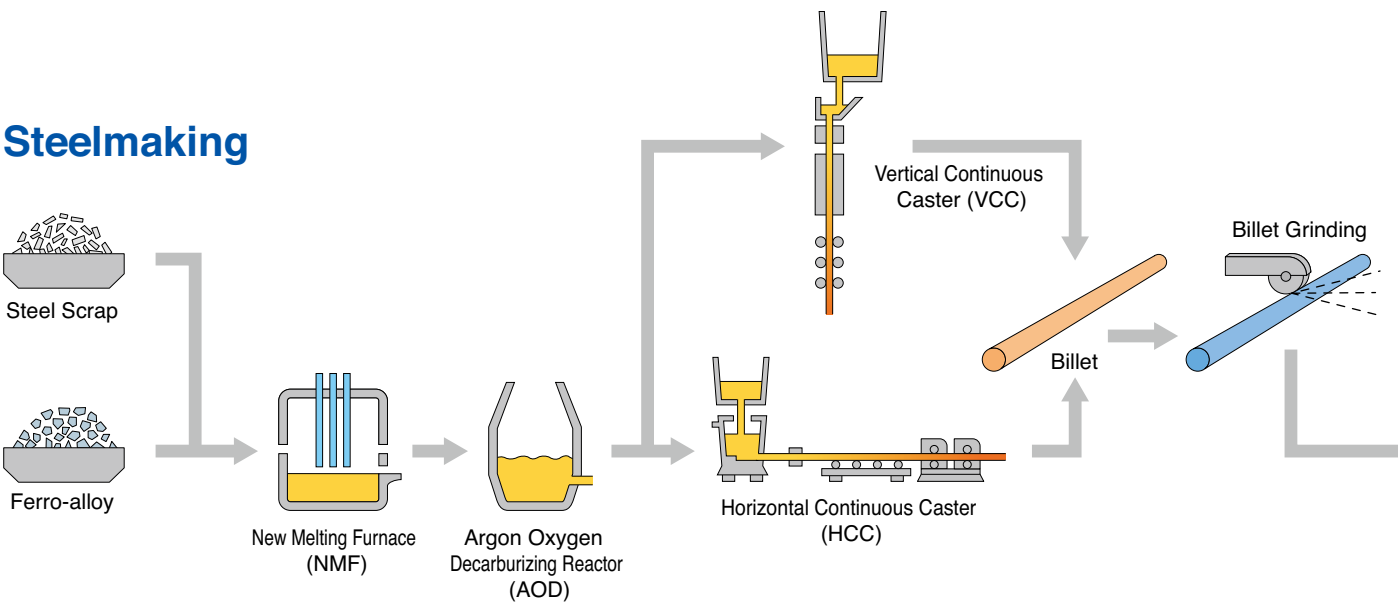
The stringent process management exercised over the entire sequence of manufacturing stainless steel wire rod also ensures the customers' full satisfaction with delivery time.



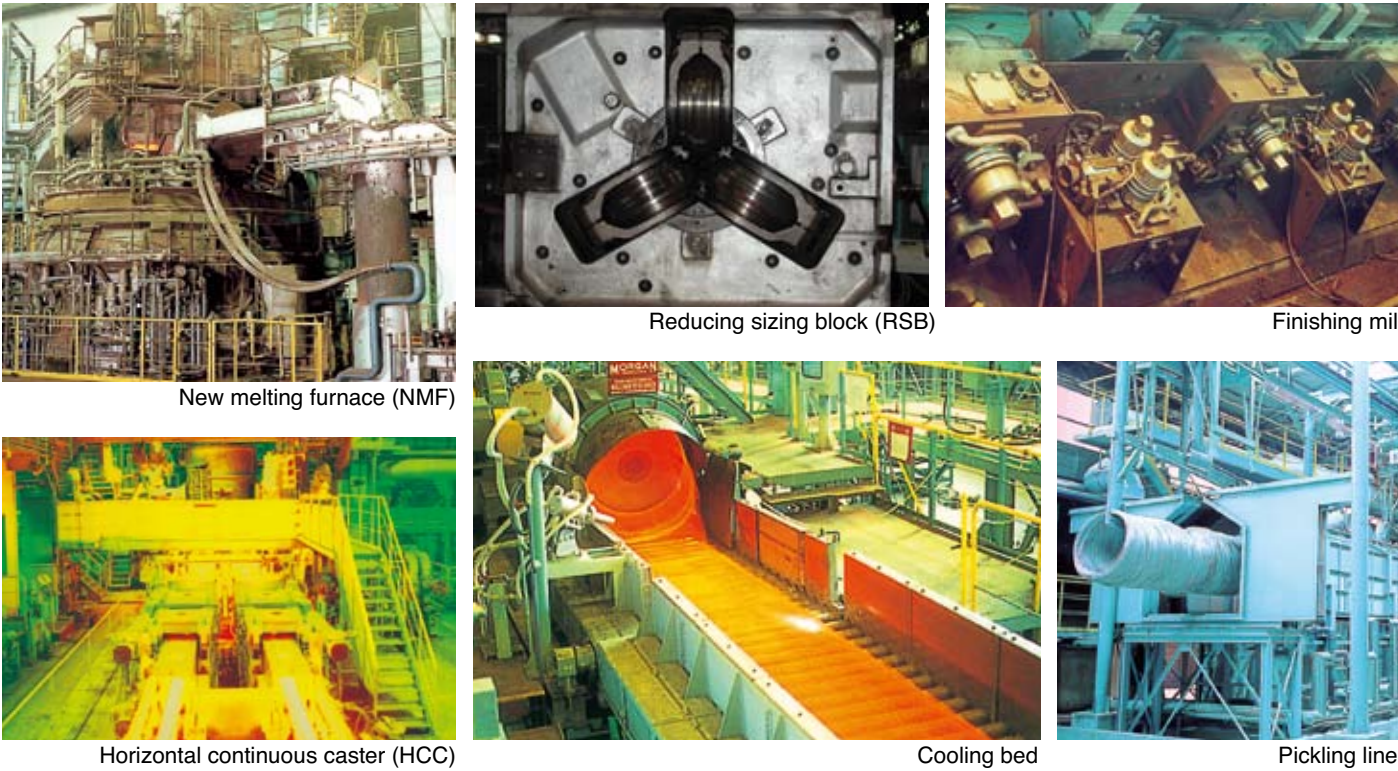
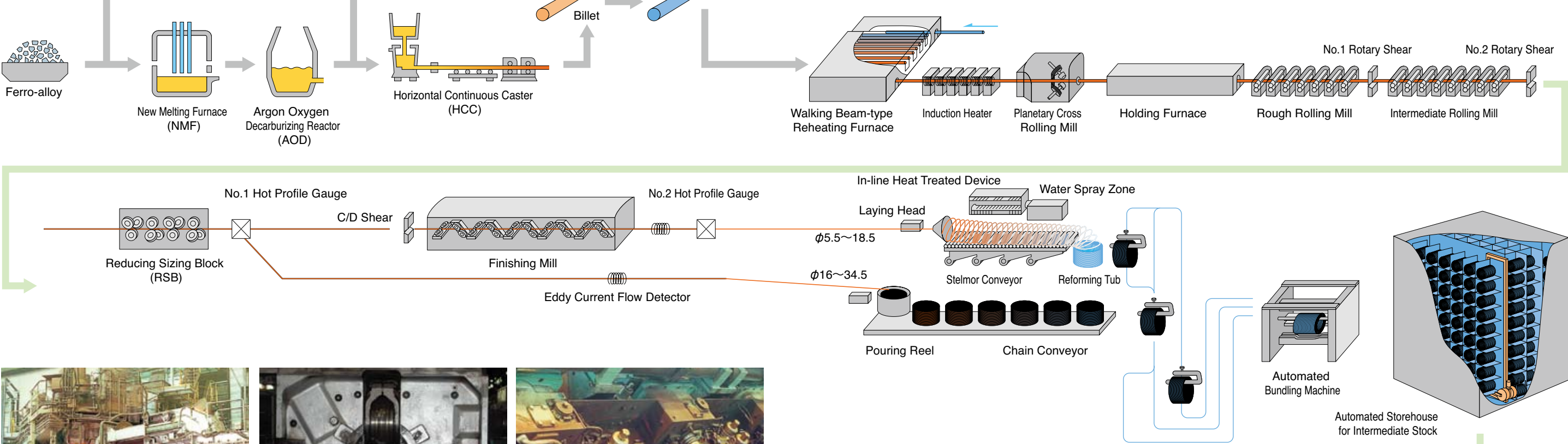


# Manufacturing Flow

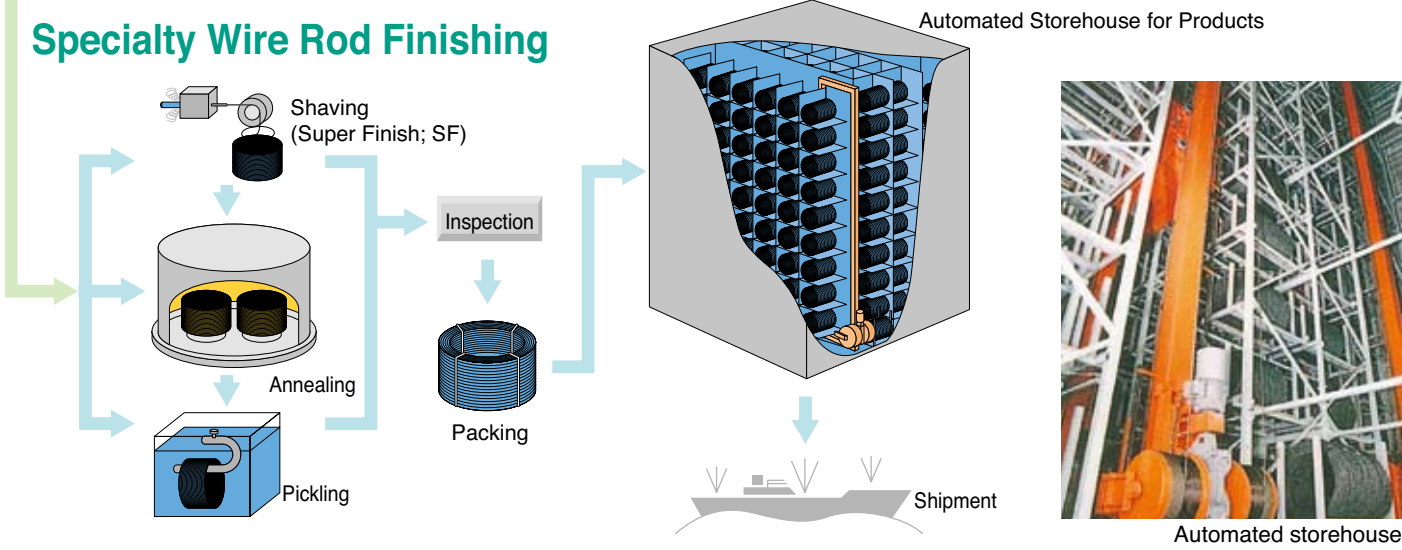
## Steelmaking



## 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

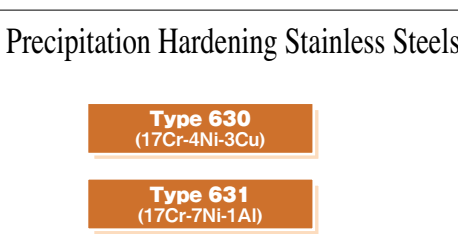
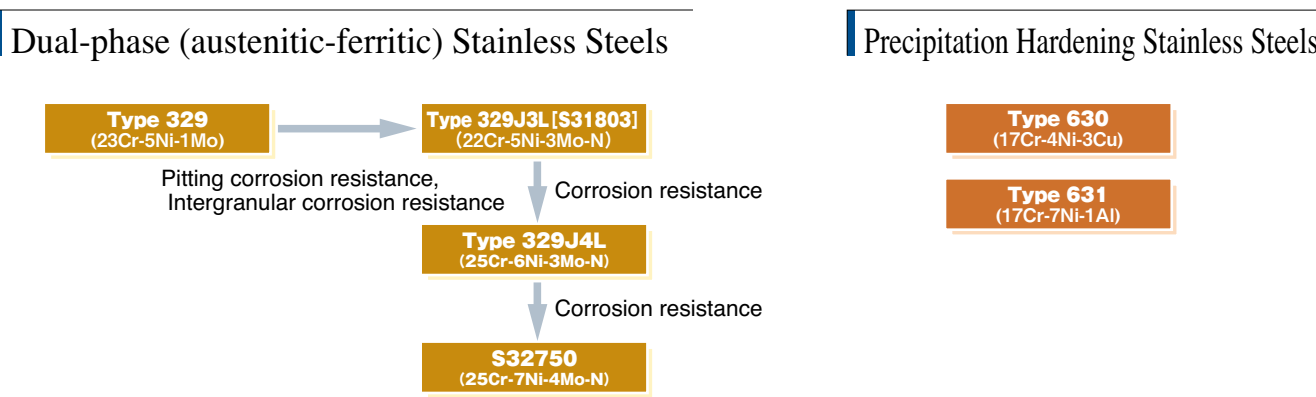
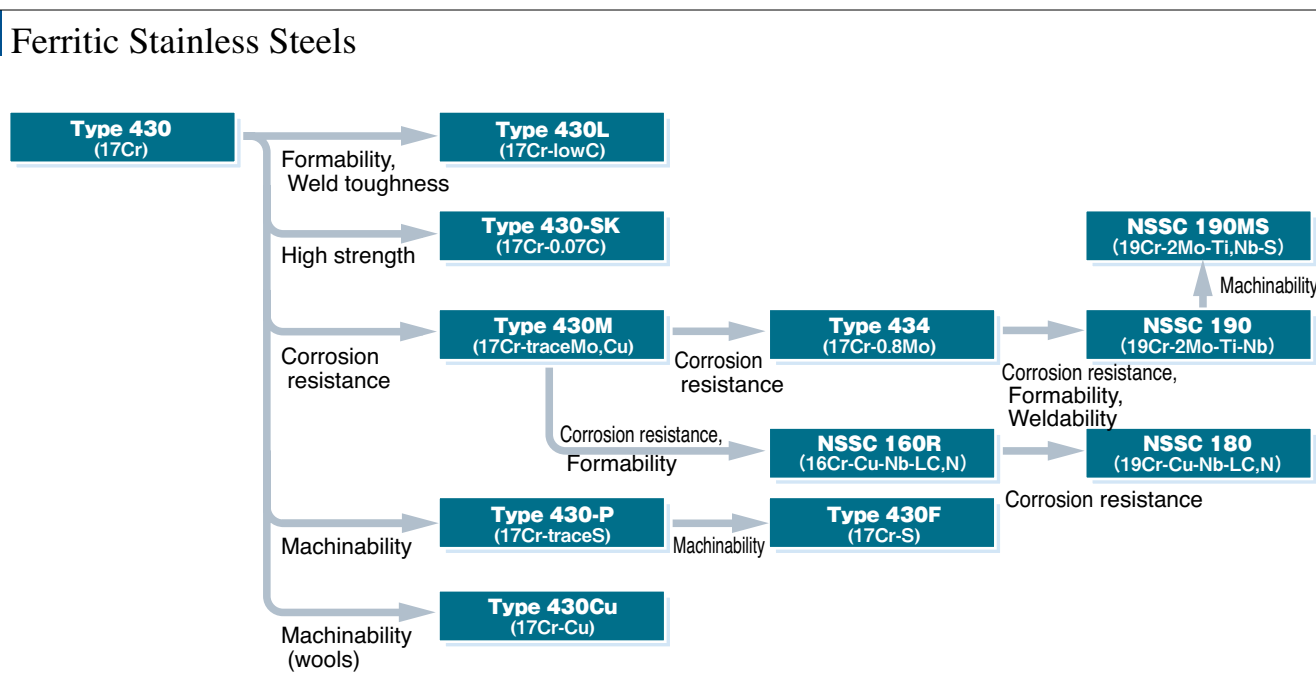
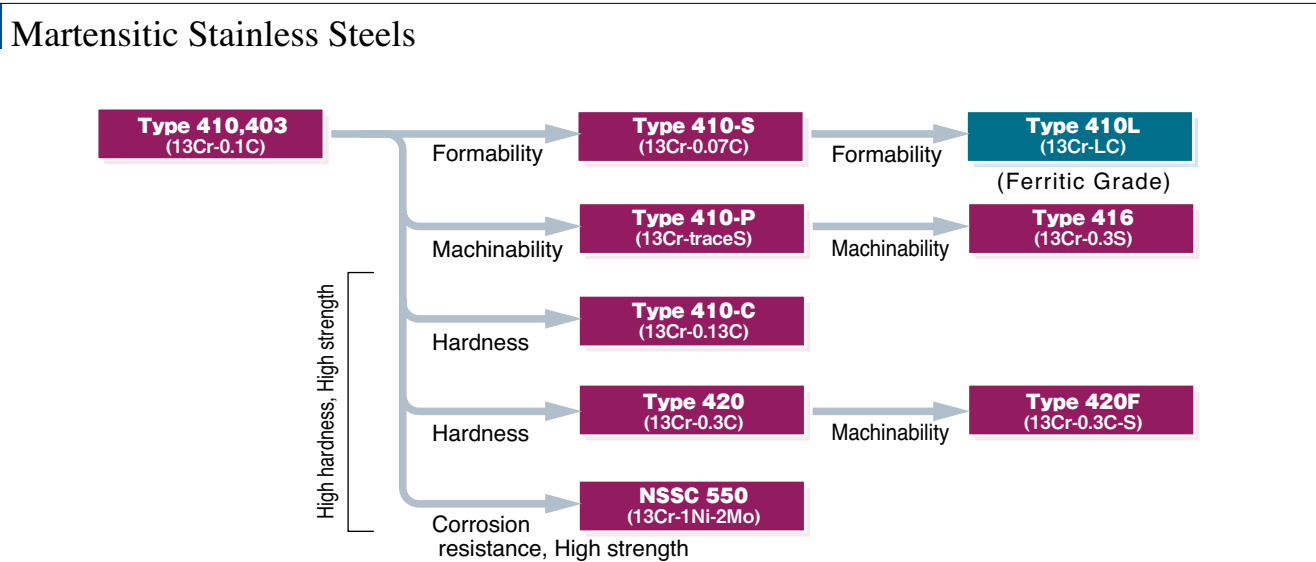
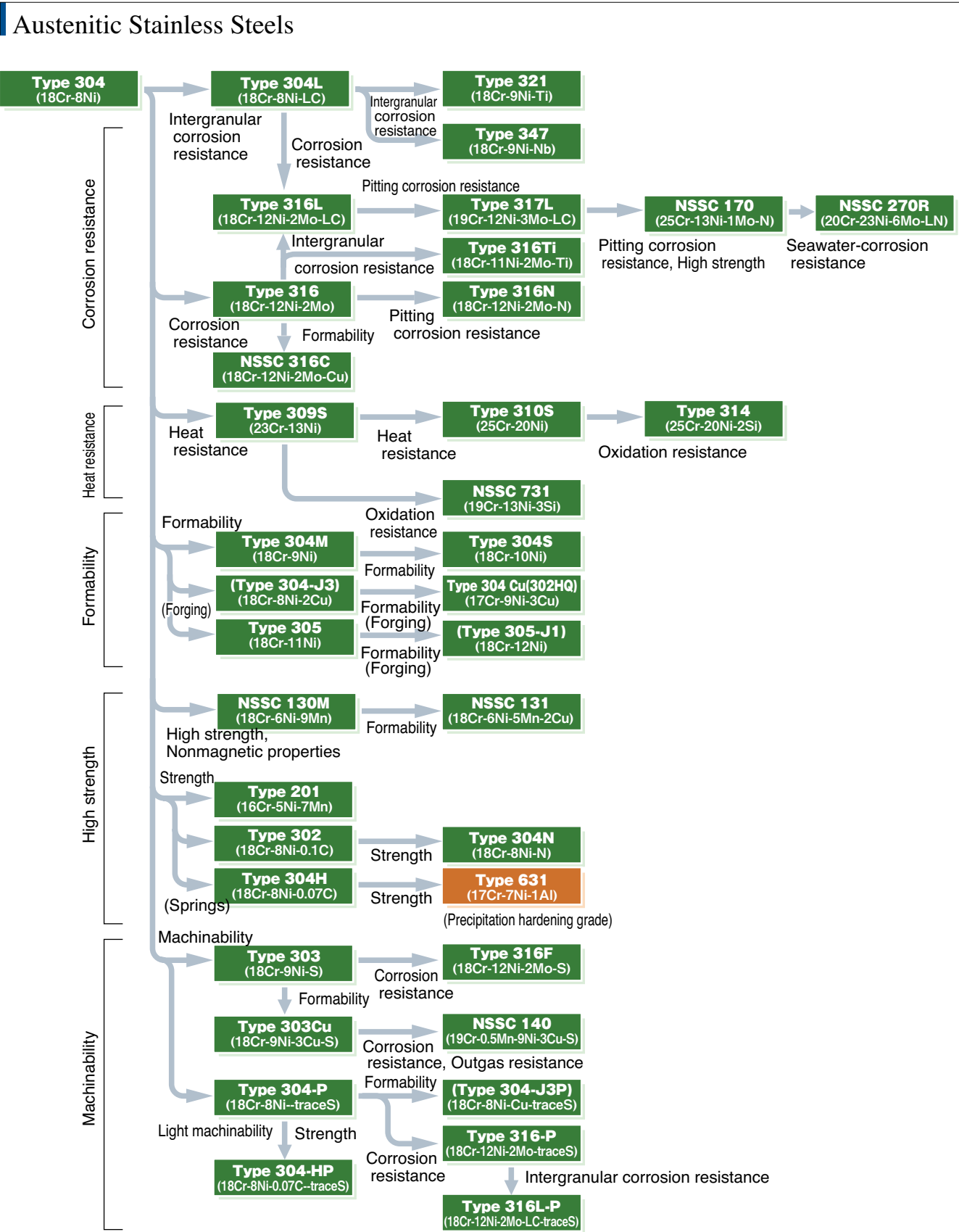
- It is an Fe-Cr-Ni alloy steel and its representative type is 18Cr-8Ni steel and is an austenitic single-phase steel non-magnetic in the range from room temperature to high temperature.
- It does not harden with heat treatment.
- Austenitic stainless steel incurs work hardening and work-induced transformation 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.

## 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     |                      |             |          |            | ○         |        |      |      |        |                 |
|                         | 420F      |                      |             |          |            | ○         |        |      |      |        | ○               |
|                         | NSSC 550  |                      | ○           | ○        |            |           | ○      | ○    |      |        |                 |
| Ferritic                | 410L      |                      |             | ○        |            |           |        |      |      |        |                 |
|                         | 430       |                      | ○           |          | ○          | ○         |        |      |      |        |                 |
|                         | 430F      |                      |             |          |            |           |        |      |      |        | ○               |
|                         | 434       |                      | ○           |          |            |           |        |      |      |        |                 |
|                         | 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  |                      |             |          |            | ○         |        |      |      |        |                 |
| Precipitation-hardening | 631J1     | ○                    |             |          |            | ○         |        |      |      |        |                 |

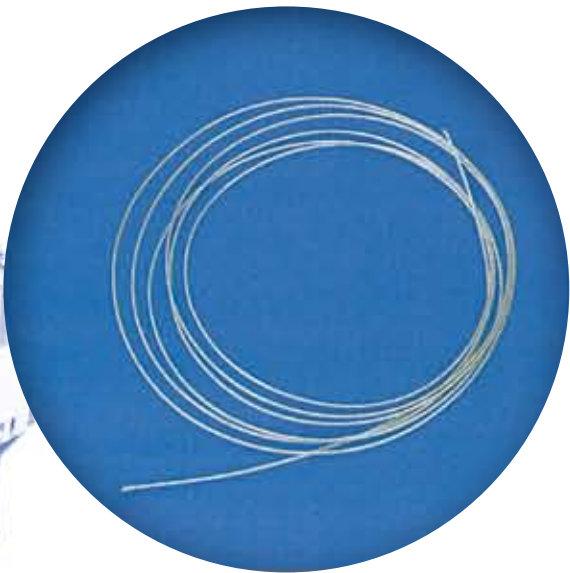
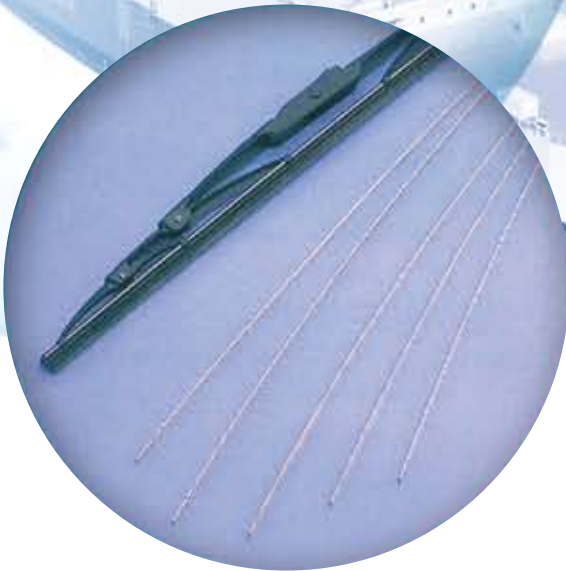
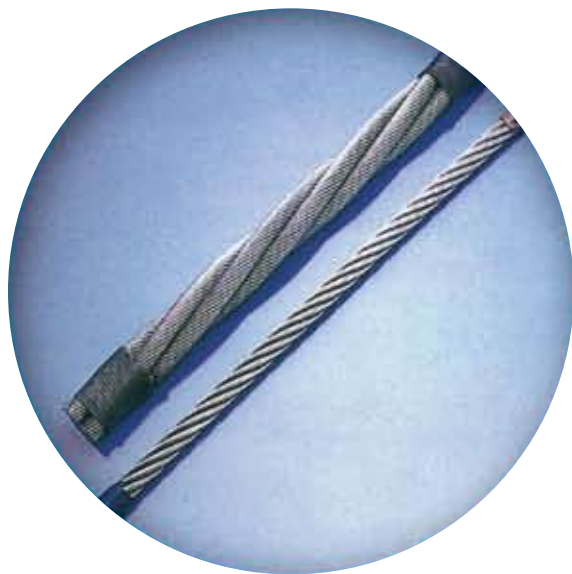


# System Diagram of Stainless Steels



# Application Examples

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





Chemical Composition

| Standard Types (Stainless and Heat-resistant Steels) |                              |                          |       |           |                    |                    |                        |                            |                        |           |              |
|------------------------------------------------------|------------------------------|--------------------------|-------|-----------|--------------------|--------------------|------------------------|----------------------------|------------------------|-----------|--------------|
| Grades                                               | AISI Type No.<br>& [UNS No.] | Chemical Composition (%) |       |           |                    |                    |                        |                            |                        |           |              |
|                                                      |                              | C                        | Si    | Mn        | P                  | S                  | Ni                     | Cr                         | Mo                     | Cu        | Others       |
| Martensitic                                          | 403 [S40300]                 | ≤0.15                    | ≤0.50 | ≤1.00     | ≤0.040             | ≤0.030             | ≤0.60                  | 11.50/13.00                | —                      | —         | —            |
|                                                      | 410 [S41000]                 | ≤0.15                    | ≤1.00 | ≤1.00     | ≤0.040             | ≤0.030             | ≤0.60                  | 11.50/13.00                | —                      | —         | —            |
|                                                      | 410S [S41008]                | ≤0.08                    | ≤1.00 | ≤1.00     | ≤0.040             | ≤0.030             | ≤0.60                  | 11.50/13.50                | —                      | —         | —            |
|                                                      | 416 [S41600]                 | ≤0.15                    | ≤1.00 | ≤1.25     | ≤0.060             | ≥0.15              | ≤0.60                  | 12.00/14.00                | ≤0.60                  | —         | —            |
|                                                      | 420 [S42000]                 | 0.16/0.25                | ≤1.00 | ≤1.00     | ≤0.040             | ≤0.030             | ≤0.60                  | 12.00/14.00                | —                      | —         | —            |
|                                                      | 420F [S42020]                | 0.26/0.40                | ≤1.00 | ≤1.25     | ≤0.060             | ≥0.15              | ≤0.60                  | 12.00/14.00                | ≤0.60                  | —         | —            |
| Ferritic                                             | 410L [ — ]                   | ≤0.030                   | ≤1.00 | ≤1.00     | ≤0.040             | ≤0.030             | ≤0.60                  | 11.00/13.50                | —                      | —         | —            |
|                                                      | 430 [S43000]                 | ≤0.12                    | ≤0.75 | ≤1.00     | ≤0.040             | ≤0.030             | ≤0.60                  | 16.00/18.00                | —                      | —         | —            |
|                                                      | 430F [S43020]                | ≤0.12                    | ≤1.00 | ≤1.25     | ≤0.060             | ≥0.15              | ≤0.60                  | 16.00/18.00                | ≤0.60                  | —         | —            |
|                                                      | 434 [S43400]                 | ≤0.12                    | ≤1.00 | ≤1.00     | ≤0.040             | ≤0.030             | ≤0.60                  | 16.00/18.00                | 0.75/1.25              | —         | —            |
| Austenitic                                           | 201 [S20100]                 | ≤0.15                    | ≤1.00 | 5.50/7.50 | ≤0.060             | ≤0.030             | 3.50/5.50              | 16.00/18.00                | —                      | —         | N≤0.25       |
|                                                      | 302 [S30200]                 | ≤0.15                    | ≤1.00 | ≤2.00     | ≤0.045             | ≤0.030             | 8.00/10.00             | 17.00/19.00                | —                      | —         | —            |
|                                                      | 303 [S30300]                 | ≤0.15                    | ≤1.00 | ≤2.00     | ≤0.20              | ≥0.15              | 8.00/10.00             | 17.00/19.00                | ≤0.60                  | —         | —            |
|                                                      | 304 [S30400]                 | ≤0.08                    | ≤1.00 | ≤2.00     | ≤0.045             | ≤0.030             | 8.00/10.50             | 18.00/20.00                | —                      | —         | —            |
|                                                      | 304L [S30403]                | ≤0.030                   | ≤1.00 | ≤2.00     | ≤0.045             | ≤0.030             | 9.00/13.00             | 18.00/20.00                | —                      | —         | —            |
|                                                      | 305 [S30500]                 | ≤0.12                    | ≤1.00 | ≤2.00     | ≤0.045             | ≤0.030             | 10.50/13.00            | 17.00/19.00                | —                      | —         | —            |
|                                                      | 309S [S30908]                | ≤0.08                    | ≤1.00 | ≤2.00     | ≤0.045             | ≤0.030             | 12.00/15.00            | 22.00/24.00                | —                      | —         | —            |
|                                                      | 310S [S31008]                | ≤0.08                    | ≤1.50 | ≤2.00     | ≤0.045             | ≤0.030             | 19.00/22.00            | 24.00/26.00                | —                      | —         | —            |
|                                                      | 316 [S31600]                 | ≤0.08                    | ≤1.00 | ≤2.00     | ≤0.045             | ≤0.030             | 10.00/14.00            | 16.00/18.00                | 2.00/3.00              | —         | —            |
|                                                      | 316L [S31603]                | ≤0.030                   | ≤1.00 | ≤2.00     | ≤0.045             | ≤0.030             | 12.00/15.00            | 16.00/18.00                | 2.00/3.00              | —         | —            |
|                                                      | 316F [S31620]                | ≤0.08                    | ≤1.00 | ≤2.00     | ≤0.045             | ≥0.10              | 10.00/14.00            | 16.00/18.00                | 2.00/3.00              | —         | —            |
|                                                      | 317 [S31700]                 | ≤0.08                    | ≤1.00 | ≤2.00     | ≤0.045             | ≤0.030             | 11.00/15.00            | 18.00/20.00                | 3.00/4.00              | —         | —            |
|                                                      | 317L [S31703]                | ≤0.030                   | ≤1.00 | ≤2.00     | ≤0.045             | ≤0.030             | 11.00/15.00            | 18.00/20.00                | 3.00/4.00              | —         | —            |
|                                                      | 904L [N08904]                | ≤0.020                   | ≤1.00 | ≤2.00     | ≤0.045             | ≤0.030             | 23.00/28.00            | 19.00/23.00                | 4.00/5.00              | 1.00/2.00 | —            |
|                                                      | 321 [S32100]                 | ≤0.08                    | ≤1.00 | ≤2.00     | ≤0.045             | ≤0.030             | 9.00/13.00             | 17.00/19.00                | —                      | —         | Ti≥5×C%      |
|                                                      | 347 [S34700]                 | ≤0.08                    | ≤1.00 | ≤2.00     | ≤0.045             | ≤0.030             | 9.00/13.00             | 17.00/19.00                | —                      | —         | Nb≥10×C%     |
| Austenitic-Ferritic                                  | (304CU)<br>(302HQ) [S30430]  | ≤0.08                    | ≤1.00 | ≤2.00     | ≤0.045             | ≤0.030             | 8.50/10.50             | 17.00/19.00                | —                      | 3.00/4.00 | —            |
|                                                      | 329 [S32900]                 | ≤0.08                    | ≤0.75 | ≤1.50     | ≤0.040             | ≤0.030             | 2.5/5.0                | 23.0/28.0                  | 1.0/2.0                | —         | —            |
|                                                      | 329J3L [S31803]              | ≤0.030                   | ≤1.00 | ≤2.00     | ≤0.040<br>(≤0.030) | ≤0.030<br>(≤0.020) | 4.50/6.50<br>(4.5/6.5) | 21.00/24.00<br>(21.0/23.0) | 2.50/3.50<br>(2.5/3.5) | —         | N:0.08/0.20  |
|                                                      | 329J4L [ — ]                 | ≤0.030                   | ≤1.00 | ≤1.50     | ≤0.040             | ≤0.030             | 5.50/7.50              | 24.00/26.00                | 2.50/3.50              | —         | N:0.08/0.30  |
| Precipitation-hardening                              | — [S32750]                   | ≤0.030                   | ≤0.80 | ≤1.20     | ≤0.035             | ≤0.020             | 6.0/8.0                | 24.0/26.0                  | 3.0/5.0                | ≤0.50     | N:0.24/0.32  |
|                                                      | 630 [S17400]                 | ≤0.07                    | ≤1.00 | ≤1.00     | ≤0.040             | ≤0.030             | 3.00/5.00              | 16.00/18.00                | —                      | —         | Al:0.75/1.50 |
|                                                      | 631 [S17700]                 | ≤0.09                    | ≤1.00 | ≤1.00     | ≤0.040             | ≤0.030             | 6.50/7.75              |                            | —                      |           |              |

For information on other steel types than listed in this table, inquire us.

| NSSC Standard                                       |             |              |           |       |            |        |        |             |             |           |           |                                       |
|-----------------------------------------------------|-------------|--------------|-----------|-------|------------|--------|--------|-------------|-------------|-----------|-----------|---------------------------------------|
| Series and Grades                                   |             | Type No.     |           |       |            |        |        |             |             |           |           |                                       |
|                                                     |             |              | C         | Si    | Mn         | P      | S      | Ni          | Cr          | Mo        | Cu        | Others                                |
| NSSC series                                         | Martensitic | NSSC 550     | 0.10/0.20 | ≤1.00 | ≤1.00      | ≤0.040 | ≤0.010 | 1.00/2.40   | 12.50/14.00 | 1.80/2.30 | —         | N:0.05/0.15                           |
|                                                     | Ferritic    | NSSC 160R    | ≤0.02     | ≤1.00 | ≤1.00      | ≤0.040 | ≤0.006 | ≤0.60       | 16.00/18.00 | —         | 0.30/0.60 | N≤0.02<br>Nb:0.30/0.60<br>Nb/(C+N)≥10 |
|                                                     |             | NSSC 180     | ≤0.020    | ≤1.00 | ≤1.00      | ≤0.040 | ≤0.006 | ≤0.60       | 19.00/21.00 | —         | 0.30/0.60 | Nb≥10×(C+N)                           |
|                                                     |             | NSSC 190*1)  | ≤0.015    | ≤0.50 | ≤0.50      | ≤0.040 | ≤0.030 | —           | 18.00/20.00 | 1.75/2.25 | —         | Ti+Nb≥16×(C+N)                        |
|                                                     | Austenitic  | NSSC 130M*2) | 0.07/0.12 | ≤1.00 | 9.00/10.00 | ≤0.030 | ≤0.030 | 5.00/6.00   | 17.00/19.00 | —         | —         | N:0.20/0.35                           |
|                                                     |             | NSSC 131     | 0.01/0.05 | ≤1.00 | 3.00/7.00  | ≤0.040 | ≤0.030 | 5.00/6.00   | 17.00/19.00 | —         | —         | N:0.10/0.30                           |
|                                                     |             | NSSC 316C    | ≤0.08     | ≤1.00 | ≤2.00      | ≤0.045 | ≤0.030 | 10.00/14.00 | 16.00/18.00 | 2.00/3.00 | 2.00/4.00 | —                                     |
|                                                     |             | NSSC 170     | ≤0.06     | ≤1.50 | ≤2.00      | ≤0.040 | ≤0.030 | 12.00/16.00 | 23.00/26.00 | 0.50/1.20 | —         | N:0.25/0.40                           |
|                                                     |             | NSSC 270R    | ≤0.020    | ≤0.80 | ≤1.00      | ≤0.030 | ≤0.015 | 22.00/23.50 | 19.00/21.00 | 5.50/6.50 | 0.50/1.00 | N≤0.05                                |
|                                                     |             | NSSC XM7SH   | ≤0.030    | ≤1.00 | ≤2.00      | ≤0.045 | ≤0.030 | 8.50/10.50  | 17.00/19.00 | —         | 3.00/4.00 | —                                     |
| Similar steel grade<br>*1) Type 444<br>*2) Type 202 |             |              |           |       |            |        |        |             |             |           |           |                                       |

Mechanical Properties

Stainless Steel for Welding Application

| Grades                  | AWS Classification | Chemical Composition (%) |           |           |        |        |             |             |           |           |                  |
|-------------------------|--------------------|--------------------------|-----------|-----------|--------|--------|-------------|-------------|-----------|-----------|------------------|
|                         |                    | C                        | Si        | Mn        | P      | S      | Ni          | Cr          | Mo        | Cu        | Others           |
| Martensitic             | ER410              | ≤0.12                    | ≤0.50     | ≤0.60     | ≤0.030 | ≤0.030 | ≤0.60       | 11.50/13.50 | ≤0.75     | ≤0.75     | —                |
|                         | ER420              | 0.25/0.40                | ≤0.5      | ≤0.6      | ≤0.03  | ≤0.03  | ≤0.6        | 12.0/14.0   | ≤0.75     | ≤0.75     | —                |
|                         | ER409Cb            | ≤0.08                    | ≤1.0      | ≤0.8      | ≤0.04  | ≤0.03  | ≤0.6        | 10.5/13.5   | ≤0.50     | ≤0.75     | Nb≥10×C%         |
| Ferritic                | ER430              | ≤0.10                    | ≤0.50     | ≤0.60     | ≤0.030 | ≤0.030 | ≤0.60       | 15.50/17.00 | —         | —         | —                |
| Austenitic              | ER308              | ≤0.08                    | 0.30/0.65 | 1.00/2.50 | ≤0.030 | ≤0.030 | 9.00/11.00  | 19.50/22.00 | ≤0.75     | ≤0.75     | —                |
|                         | ER308L             | ≤0.030                   | 0.30/0.65 | 1.00/2.50 | ≤0.030 | ≤0.030 | 9.00/11.00  | 19.50/22.00 | ≤0.75     | ≤0.75     | —                |
|                         | ER308LSi           | ≤0.030                   | 0.65/1.00 | 1.00/2.50 | ≤0.030 | ≤0.030 | 9.00/11.00  | 19.50/22.00 | ≤0.75     | ≤0.75     | —                |
|                         | ER309              | ≤0.12                    | 0.30/0.65 | 1.00/2.50 | ≤0.030 | ≤0.030 | 12.00/14.00 | 23.00/25.00 | ≤0.75     | ≤0.75     | —                |
|                         | ER309L             | ≤0.030                   | 0.30/0.65 | 1.00/2.50 | ≤0.030 | ≤0.030 | 12.00/14.00 | 23.00/25.00 | ≤0.75     | ≤0.75     | —                |
|                         | ER309LSi           | ≤0.030                   | 0.65/1.00 | 1.00/2.50 | ≤0.030 | ≤0.030 | 12.00/14.00 | 23.00/25.00 | ≤0.75     | ≤0.75     | —                |
|                         | ER310              | 0.08/0.15                | 0.30/0.65 | 1.00/2.50 | ≤0.030 | ≤0.030 | 20.00/22.50 | 25.00/28.00 | ≤0.75     | ≤0.75     | —                |
|                         | ER312              | ≤0.15                    | 0.30/0.65 | 1.00/2.50 | ≤0.030 | ≤0.030 | 8.00/10.50  | 28.00/32.00 | ≤0.75     | ≤0.75     | —                |
|                         | ER316              | ≤0.08                    | 0.30/0.65 | 1.00/2.50 | ≤0.030 | ≤0.030 | 11.00/14.00 | 18.00/20.00 | 2.00/3.00 | ≤0.75     | —                |
|                         | ER316L             | ≤0.030                   | 0.30/0.65 | 1.00/2.50 | ≤0.030 | ≤0.030 | 11.00/14.00 | 18.00/20.00 | 2.00/3.00 | ≤0.75     | —                |
|                         | ER316LSi           | ≤0.030                   | 0.30/0.65 | 1.00/2.50 | ≤0.030 | ≤0.030 | 11.00/14.00 | 18.00/20.00 | 2.00/3.00 | ≤0.75     | —                |
|                         | ER317              | ≤0.08                    | 0.30/0.65 | 1.00/2.50 | ≤0.030 | ≤0.030 | 13.00/15.00 | 18.50/20.50 | 3.00/4.00 | ≤0.75     | —                |
|                         | ER317L             | ≤0.030                   | 0.30/0.65 | 1.00/2.50 | ≤0.030 | ≤0.030 | 13.00/15.00 | 18.50/20.50 | 3.00/4.00 | ≤0.75     | —                |
|                         | ER347              | ≤0.08                    | 0.30/0.65 | 1.00/2.50 | ≤0.030 | ≤0.030 | 9.00/11.00  | 19.00/21.50 | ≤0.75     | ≤0.75     | Nb+Ta≥10×C%      |
|                         | ER307              | 0.04/0.14                | 0.30/0.65 | 3.3/4.75  | ≤0.03  | ≤0.03  | 8.0/10.7    | 19.5/22.0   | 0.5/1.5   | ≤0.75     | —                |
|                         | ER318              | ≤0.08                    | 0.30/0.65 | 1.00/2.50 | ≤0.030 | ≤0.030 | 11.0/14.0   | 18.0/20.0   | 2.0/3.0   | ≤0.75     | Nb+Ta: 0.15/0.30 |
| Precipitation-hardening | ER630              | ≤0.05                    | ≤0.75     | 0.25/0.75 | ≤0.030 | ≤0.030 | 4.5/5.0     | 16.0/16.75  | ≤0.75     | 3.25/4.00 | Nb+Ta: 0.15/0.30 |

For information on other steel types than listed in this table, please inquire us.

| Grades                  | Type No. | [Reference] Mechanical properties (wire rods after heat treatment) |                                       |                |                       |               | [Reference] Heat treatment conditions (JIS G 4303)   |                            |                          |                               |
|-------------------------|----------|--------------------------------------------------------------------|---------------------------------------|----------------|-----------------------|---------------|------------------------------------------------------|----------------------------|--------------------------|-------------------------------|
|                         |          | Heat treatment                                                     | Tensile strength (N/mm <sup>2</sup> ) | Elongation (%) | Reduction of area (%) | Hardness (Hv) | Annealing (°C)                                       | Quenching (°C)             | Tempering (°C)           | Solid-solution treatment (°C) |
| Martensitic             | Type403  | Annealing                                                          | ≤600                                  | ≥20            | ≥55                   | ≤240          | 800 to 900 slow cooling or approx. 750 rapid cooling | 950 to 1,000 oil quenching | 700 to 750 rapid cooling | —                             |
|                         | Type410  | Annealing                                                          | ≤600                                  | ≥20            | ≥55                   | ≤240          | 800 to 900 slow cooling or approx. 750 rapid cooling | 950 to 1,000 oil quenching | 700 to 750 rapid cooling | —                             |
|                         | Type416  | Annealing                                                          | ≤600                                  | ≥20            | ≥55                   | ≤240          | 800 to 900 slow cooling or approx. 750 rapid cooling | 950 to 1,000 oil quenching | 700 to 750 rapid cooling | —                             |
|                         | Type420  | Annealing                                                          | ≤800                                  | ≥12            | ≥40                   | —             | 800 to 900 slow cooling or approx. 750 rapid cooling | 950 to 980 oil quenching   | 600 to 750 rapid cooling | —                             |
| Ferritic                | Type430  | Annealing                                                          | ≤600                                  | ≥20            | ≥50                   | ≤240          | 780 to 850 air cooling or slow cooling               | —                          | —                        | —                             |
|                         | Type430F | Annealing                                                          | ≤600                                  | ≥20            | ≥50                   | ≤240          | 680 to 820 air cooling or slow cooling               | —                          | —                        | —                             |
|                         | Type434  | Annealing                                                          | ≤600                                  | ≥20            | ≥60                   | ≤240          | 780 to 850 air cooling or slow cooling               | —                          | —                        | —                             |
| Austenitic              | Type201  | Solid-solution treatment                                           | ≤900                                  | ≥35            | ≥45                   | ≤330          | —                                                    | —                          | —                        | 1,010 to 1,120 rapid cooling  |
|                         | Type302  | Solid-solution treatment                                           | ≤700                                  | ≥35            | ≥60                   | ≤330          | —                                                    | —                          | —                        | 1,010 to 1,150 rapid cooling  |
|                         | Type303  | Solid-solution treatment                                           | ≤700                                  | ≥35            | ≥50                   | ≤270          | —                                                    | —                          | —                        | 1,010 to 1,150 rapid cooling  |
|                         | Type304  | Solid-solution treatment                                           | ≤700                                  | ≥40            | ≥60                   | ≤260          | —                                                    | —                          | —                        | 1,010 to 1,150 rapid cooling  |
|                         | Type304L | Solid-solution treatment                                           | ≤650                                  | ≥40            | ≥60                   | ≤255          | —                                                    | —                          | —                        | 1,010 to 1,150 rapid cooling  |
|                         | Type305  | Solid-solution treatment                                           | ≤600                                  | ≥40            | ≥60                   | ≤240          | —                                                    | —                          | —                        | 1,010 to 1,150 rapid cooling  |
|                         | Type309S | Solid-solution treatment                                           | ≤750                                  | ≥40            | ≥60                   | ≤270          | —                                                    | —                          | —                        | 1,030 to 1,150 rapid cooling  |
|                         | Type310S | Solid-solution treatment                                           | ≤650                                  | ≥40            | ≥50                   | ≤255          | —                                                    | —                          | —                        | 1,030 to 1,180 rapid cooling  |
|                         | Type316  | Solid-solution treatment                                           | ≤650                                  | ≥40            | ≥60                   | ≤255          | —                                                    | —                          | —                        | 1,010 to 1,150 rapid cooling  |
|                         | Type316L | Solid-solution treatment                                           | ≤650                                  | ≥40            | ≥60                   | ≤255          | —                                                    | —                          | —                        | 1,010 to 1,150 rapid cooling  |
|                         | Type321  | Solid-solution treatment                                           | ≤700                                  | ≥40            | ≥50                   | ≤270          | —                                                    | —                          | —                        | 920 to 1,150 rapid cooling    |
|                         | TypeXM7  | Solid-solution treatment                                           | ≤550                                  | ≥40            | ≥60                   | ≤225          | —                                                    | —                          | —                        | 1,010 to 1,150 rapid cooling  |
| Precipitation-hardening | Type631  | Solid-solution treatment                                           | ≤1050                                 | ≥20            | ≥60                   | ≤315          | —                                                    | —                          | —                        | 1,000 to 1,100 rapid cooling  |



Sizes Available

General Materials

| Millimeter size | Inch size<br>(millimeter conversion value) | Reference | Millimeter size | Inch size<br>(millimeter conversion value) | Reference | Millimeter size | Inch size<br>(millimeter conversion value) | Reference |
|-----------------|--------------------------------------------|-----------|-----------------|--------------------------------------------|-----------|-----------------|--------------------------------------------|-----------|
| 5.5             | 9/32(5.56)                                 |           | 11.0            |                                            |           | 18.5            |                                            |           |
| 5.7             |                                            |           | 11.2            |                                            | *1)       | 19.0            |                                            |           |
| 6.0             | 15/64(5.95)                                |           | 11.5            | 29/64(11.51)                               |           | 19.5            |                                            |           |
| 6.15            |                                            | *1)       | 11.9            |                                            | *1)       | 20.0            |                                            |           |
| 6.35            | 1/4(6.35)                                  |           | 12.0            | 13/32(11.91)                               |           | 20.5            |                                            | *1)       |
| 6.5             |                                            |           | 12.3            |                                            | *1)       | 21.0            | 53/64(21.03)                               |           |
| 6.75            |                                            |           | 12.5            |                                            |           | 21.5            | 27/32(21.43)                               |           |
| 7.0             |                                            |           | 12.7            | 1/2(12.70)                                 |           | 22.0            |                                            |           |
| 7.3             |                                            |           | 13.0            |                                            |           | 22.7            |                                            | *1)       |
| 7.5             | 19/64(7.54)                                |           | 13.5            |                                            |           | 23.0            | 29/32(23.02)                               |           |
| 8.0             | 5/16(7.94)                                 |           | 14.0            |                                            |           | 23.5            | 59/64(23.42)                               |           |
| 8.1             |                                            | *1)       | 14.5            |                                            | *1)       | 24.0            |                                            |           |
| 8.3             | 21/64(8.33)                                |           | 14.7            |                                            | *1)       | 25.0            | 63/64(25.00)                               |           |
| 8.5             |                                            |           | 15.0            | 19/32(15.08)                               |           | 26.0            |                                            |           |
| 8.7             | 11/32(8.73)                                |           | 15.5            | 39/64(15.48)                               |           | 26.5            |                                            |           |
| 9.0             |                                            |           | 15.7            |                                            | *1)       | 27.0            |                                            |           |
| 9.5             | 3/8(9.52)                                  |           | 16.0            |                                            |           | 28.0            |                                            |           |
| 9.7             |                                            | *1)       | 16.3            |                                            | *1)       | 30.0            |                                            |           |
| 10.0            | 25/64(9.92)                                |           | 16.5            |                                            |           | 31.0            |                                            |           |
| 10.3            |                                            | *1)       | 17.0            | 43/64(17.07)                               | *1)       | 32.0            |                                            |           |
| 10.5            |                                            |           | 17.5            | 11/16(17.46)                               |           | 33.0            |                                            |           |
| 10.7            | 27/64(10.72)                               |           | 18.0            |                                            |           | 34.0            |                                            |           |
|                 |                                            |           |                 |                                            |           | 34.5            |                                            |           |

\*1) Because of non-standard size, please consult us when ordering.  
FYI, sizes more than φ16 are available at a pitch of 0.1mm.

SF (Super Finish) Materials

| Grade | Description                                                                         |
|-------|-------------------------------------------------------------------------------------|
| A     | An as-rolled size is specified and scalping is performed to assure surface quality. |
| B     | A finished size after scalping is specified.                                        |

Basic Diameters in Grade A

| Nominal size                | A6.0 | A6.35 | A7.0 | A8.0 | A8.7 | A9.0 | A9.5 | A10.0 | A11.0 | A12.0 | A13.0 | A14.0 | A15.0 | A16.0 | A17.0 | A18.0 |
|-----------------------------|------|-------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Basic diameter<br>(at SF-P) | 5.4  | 5.75  | 6.4  | 7.4  | 8.1  | 8.4  | 8.9  | 9.4   | 10.4  | 11.4  | 12.4  | 13.4  | 14.4  | 15.4  | 16.4  | 17.4  |

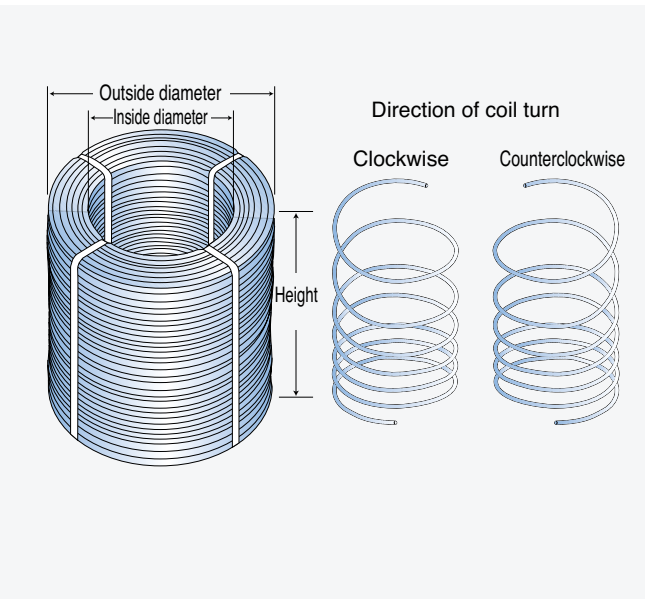
Notes  
1) Actual diameter of A7 is 6.4mm, while actual diameter of B7 is 7.0mm.  
2) For Grade B, please consult us when ordering.

Specifications and Bundling of Coil

Coil Specifications

| Item                   |                  | General material       |                                  | SF material of<br>A6.0 to A18.0 |
|------------------------|------------------|------------------------|----------------------------------|---------------------------------|
|                        |                  | 5.5mm φ<br>~18.5mm φ   | 16.0mm φ<br>~34.5mm φ            |                                 |
| Coil weight<br>(kg)    | Name             | 1 (ton)                | 1 (ton)                          | 1 (ton) *1)                     |
|                        | Standard         | 1,050                  | 1,050                            | 1,000 *1)                       |
|                        | Range            | 500~1,100<br>(min.200) | 500~1,100<br>(min.200)           | 400~1,050*1)<br>(min.150)       |
| Coil size<br>(mm)      | Inside diameter  | 800                    | 870                              | 850                             |
|                        | Outside diameter | 1,350                  | 1,250                            | 1,350                           |
|                        | Height (max)     | 1,200                  | 900                              | 1,200                           |
| Direction of coil turn |                  | Clockwise              | Clockwise or<br>counterclockwise | Clockwise                       |

\*1) For some austenitic stainless steels, the unit coil weight may become 0.5 (ton).  
Confirm this in placing an order. [Standard: 500kg, range: 200 to 600 kg  
(100 kg min.).



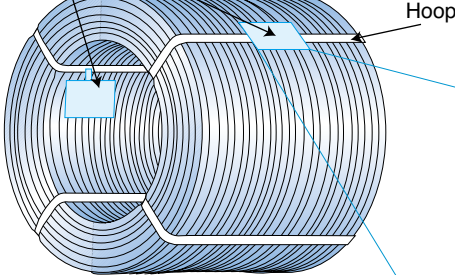
Binding Method

| Material        | Hoop (resin or iron) |
|-----------------|----------------------|
| Number of hoops | 4                    |

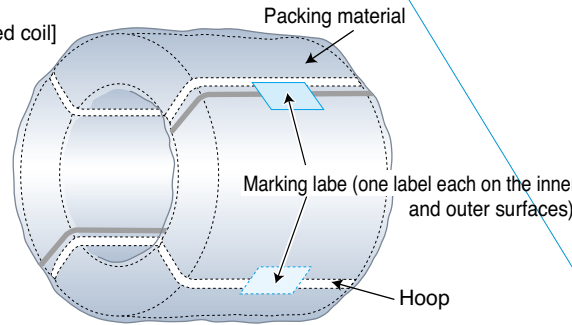


Coil Shape and Marking

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



[Packaged coil]



Example of marking

(Customer's Name)

Specification **AISI304**

Size **7.00** Heat Treatment **ST**

Heat No. **E12345**

LOT **1-10-111-01-0-0**

Prod Month **11-10** Weight **1,000kg**

**Nippon Steel & Sumikin**  
**Stainless Steel Corp.**  
**HIKARI WORKS/Made in Japan**

SAMPLE

15

