Hot-Rolled Steel Sheets and Coils
Preface

Utilizing our excellent manufacturing equipment and honored technology, supported by our rich experience and never-ceasing endeavor of development, Nippon Steel & Sumitomo Metal manufactures a wide range of Hot-Rolled Steel Sheets and Coils in accordance with Japanese Industrial Standards (JIS), the standards of other countries, and our own strict standards.

Our Hot-Rolled Steel Sheets and Coils are applied to a wide range of uses such as, automobiles, electrical appliances, construction materials, containers, and steel pipes, and receive high acclaim from our customers for its excellent quality.

We are committed to meet our customers’ requirements of quality as well as on-time delivery and offer technical consultations and services for applications of our steel products.

We deeply appreciate your continued support and encouragement.

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Features

1. Wide Range of Product Selection
   Hot-Rolled Steel Sheets and Coils meeting a variety of standards ranging from mild steels to high-tensile strength steels are available. Variable sizes of cut sheets, coils, and various surface finishes such as black finish, pickled finish and shot-blasted finish can be selected in accordance with your needs.

2. Consistent Quality
   Products of consistent quality are manufactured under strict quality control, utilizing excellent equipment and techniques, and drawing on our wealth of experience.

3. Wide Variety of Sizes
   Size are available from 1.2 mm to 25.4 mm in thickness and from 600 mm to 2180 mm in width.

4. Technical Service for Every Need
   Consultation services regarding quality characteristics, applications, and processing methods of our products, and more are thoroughly provided by the technical service divisions of the headquarters and local offices.

Works

- Yawata Works
- Hirohata Works
- Kashima Works
- Kimitsu Works
- Nagoya Works
- Oita Works
Examples of Use

- Deck Plates
- Gas Cylinders
- Truck Frames
- Containers
- Steel Racks
- Wheels
Manufacturing Equipment

Continuous Casting from the Blast Furnace

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

Hot-Rolling

Hot-rolled coil is made by continuously rolling the slab, after heating the slab in the reheating furnace, by the roughing mill and finishing mill, and coiled for easier transportation. At the hot-rolling process, strictly controlling the temperature and the roll surface is essential in producing a high productive Hot-Rolled Steel Sheets and Coils, free from surface defects and internal defects. All production line processes, starting from feeding to the reheating furnace to the completion of coiling, are controlled by a computerized system.

Pickling

The hot-rolled coil passes through the pickling line, where surface scales (iron oxide layer) are removed from the surface of the coil to give an (attractive) surface finish to the steel. In the pickling line, surface scales are removed with hydrochloric acid, and the coil is completely washed and dried before anti-rust oils are applied.
### Products

<table>
<thead>
<tr>
<th>JIS (Japanese Industrial Standards)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types</td>
</tr>
<tr>
<td>JIS G 3101 Hot-Rolled Steel Sheets and Coils for General Structures</td>
</tr>
<tr>
<td>SS330</td>
</tr>
<tr>
<td>SS400</td>
</tr>
<tr>
<td>SS490</td>
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<tr>
<td>SS540</td>
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<tr>
<td>SM400A</td>
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<tr>
<td>SM400B</td>
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<tr>
<td>SM400C</td>
</tr>
<tr>
<td>SM490A</td>
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<tr>
<td>SM490B</td>
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<td>SM490C</td>
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<tr>
<td>SMS20B</td>
</tr>
<tr>
<td>SMS20C</td>
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<tr>
<td>SMS70</td>
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<tr>
<td>JIS G 3113 Hot-Rolled Steel Sheets and Coils for Automobile Structural Uses</td>
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<tr>
<td>SAPH310</td>
</tr>
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<td>SAPH370</td>
</tr>
<tr>
<td>SAPH400</td>
</tr>
<tr>
<td>SAPH440</td>
</tr>
<tr>
<td>JIS G 3131 Hot-Rolled Mild Steel Sheets and Coils</td>
</tr>
<tr>
<td>JIS G 3132 Hot-Rolled Carbon Steel Sheets and Coils for Pipes and Tubes</td>
</tr>
<tr>
<td>JIS G 3133 Hot-Rolled Steel Sheets and Coils for Automobile Formability</td>
</tr>
</tbody>
</table>

### Nippon Steel & Sumitomo Metal Standards

<table>
<thead>
<tr>
<th>Types</th>
<th>Standards</th>
<th>T.S. (N/mm²)</th>
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</thead>
<tbody>
<tr>
<td>High-Strength Hot-Rolled Steel Sheets and Coils with Automobile Formability</td>
<td>NSHA4490, NSHA4540, NSHA4590, NSHA4640, NSHA4780, NSHA4980</td>
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<tr>
<td>Dual Phase High-Strength Hot-Rolled Steel Sheets and Coils with Automobile Formability</td>
<td>NSHA400D, NSHA490D, NSHA690D, NSHA780D</td>
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<tr>
<td>High-Hole Expanding High-Strength Hot-Rolled Steel Sheets and Coils with Automobile Formability</td>
<td>NSHA370B, NSHA440B, NSHA490B, NSHA590B</td>
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<tr>
<td>High-Retained Austenite High-Strength Hot-Rolled Steel Sheets and Coils</td>
<td>NSHA490T, NSHA540T, NSHA590T, NSHA690T, NSHA780T</td>
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<tr>
<td>Flooring Sheets and Coils</td>
<td>NFP, NFPA00</td>
<td></td>
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<tr>
<td>Longitudinally Stripped Steel Sheets and Coils</td>
<td>NPA1, NPA2, NFPB1</td>
<td></td>
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<tr>
<td>Atmospheric Corrosion-Resistant Steel Sheets and Coils</td>
<td>NAW400, NAW490, COR-TEN O</td>
<td></td>
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<tr>
<td>Weldable High-Strength Steel Sheets and Coils</td>
<td>WEL-TEN™540, WEL-TEN 590RE, WEL-TEN 690RE, WEL-TEN 780RE, WEL-TEN 850RE</td>
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<tr>
<td>Sulfur Dew-Point Corrosion-Resistant Steel Sheets and Coils</td>
<td>S-TEN™2, S-TEN™2, S-TEN™2</td>
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</tr>
</tbody>
</table>

**Features:**
- They can be used for a wide range of applications, from general forming to drawing.
- They are well suited for drawing because of their low yield ratio. They have also excellent fatigue strength.
- They are well suited for drawing because of their low yield ratio. They have also excellent fatigue strength.
- They are used unpainted. They also have good wear resistance.
- They can be used as highly economical components with high performance formability of any shape.
- With maximum anti-slip properties, they drain quickly, and are thin-gauge and light in weight, so they can be economically used for various purposes.
- They can be used as highly economical strength components resistant against bending and as exterior components for their fine design.
- They have high weatherability and can be used unpainted. They also have good wear resistance.
- They are low-carbon and low-alloy steel sheets with high strength and superior notch toughness. Also they have high weldability and demonstrate sufficient joint performance.
- Developed as steels resistant against sulfuric-acid dew-point corrosion, they are suitable for use in sulfuric-acid dew-point corroding environments where ordinary and stainless steels cannot normally be used.

**Examples of Use:**
- Automobile members, wheel rims
- Wheel discs
- Suspensions, links, arms
- Steps of a car body, passageways, steps, and panels of buildings and structures
- Steps of a car body, factory floors, steel furniture, warehouse racks, steps.
- Pillars of marine containers, rail vehicle bodies, exterior construction members
- Industrial equipment, construction machinery
- Casing and dusts of dust collectors, internal cylinders

**NOTE:** COR-TEN is a registered trademark of United States Steel Corporation used under license by Nippon Steel & Sumitomo Metal Corporation.
**Product Size Ranges**

As the available range of production varies depending on standards and applications, please consult us. Contact Nippon Steel & Sumitomo Metal if your choice is not available, and we will do what we can to meet your needs.

### 1. Hot-Rolled Coil (mill edge)

<table>
<thead>
<tr>
<th>Grade</th>
<th>600</th>
<th>800</th>
<th>1,000</th>
<th>1,200</th>
<th>1,400</th>
<th>1,600</th>
<th>1,800</th>
<th>2,000</th>
<th>2,200</th>
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<tr>
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<td>1.4</td>
<td>1.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Width (mm)</td>
<td>600</td>
<td>800</td>
<td>1,000</td>
<td>1,200</td>
<td>1,400</td>
<td>1,600</td>
<td>1,800</td>
<td>2,000</td>
<td>2,200</td>
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<tr>
<td>(600, 1.2)</td>
<td>(600, 1.4)</td>
<td>(600, 1.6)</td>
<td>(600, 2.0)</td>
<td>(600, 2.5)</td>
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<td>(650, 2.5)</td>
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<td>(650, 3.5)</td>
<td>(650, 4.0)</td>
<td>(650, 4.5)</td>
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<tr>
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### 2. Pickled Coil

<table>
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<th>800</th>
<th>1,000</th>
<th>1,200</th>
<th>1,400</th>
<th>1,600</th>
<th>1,800</th>
<th>2,000</th>
<th>2,200</th>
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<tbody>
<tr>
<td>Thickness (mm)</td>
<td>1.2</td>
<td>1.4</td>
<td>1.6</td>
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<td></td>
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<tr>
<td>Width (mm)</td>
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<td>800</td>
<td>1,000</td>
<td>1,200</td>
<td>1,400</td>
<td>1,600</td>
<td>1,800</td>
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<td>2,200</td>
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<td>(600, 1.2)</td>
<td>(600, 1.4)</td>
<td>(600, 1.6)</td>
<td>(600, 2.0)</td>
<td>(600, 2.5)</td>
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<td>(800, 3.5)</td>
<td>(800, 4.0)</td>
<td>(800, 4.5)</td>
<td>(800, 5.0)</td>
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<td>(850, 1.6)</td>
<td>(850, 2.0)</td>
<td>(850, 2.5)</td>
<td>(850, 3.0)</td>
<td>(850, 3.5)</td>
<td>(850, 4.0)</td>
<td>(850, 4.5)</td>
<td>(850, 5.0)</td>
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</tbody>
</table>

Remarks:
1. Contact Nippon Steel & Sumitomo Metal about the varieties of steel strip (slit coil) dimensions available.
2. Contact Nippon Steel & Sumitomo Metal about the varieties of steel plates (cut sheets) available.

- 270 N/mm² class
- 400 N/mm² class
- 490 N/mm² class
- 590 N/mm² class
### Examples of Standards — Chemical Compositions and Mechanical Properties

#### JIS G 3101

1. **Hot-Rolled Mild Steel Sheets and Coils**

   **Designation**
   - SPHC
   - SPHD
   - SPHE
   - SPHF

   **Chemical Composition (%)**
   - C: ≤ 0.12
   - Mn: ≤ 0.60
   - P: ≤ 0.045
   - S: ≤ 0.035

   **Yield Point or Yield Strength (N/mm²)**
   - 205 ≤ 410

   **Mechanical Test Values**
   - Tensile Test Bending Test

   **Remarks:**
   - 1. When agreed upon between the concerned parties, Si content may be specified to 0.04% or less.
   - 2. Mechanical test values do not apply to abnormal parts at both ends of steel strip (coils).

2. **Hot-Rolled Carbon Steel Sheets and Coils for Pipes and Tubes**

   **Designation**
   - SPHT 1
   - SPHT 2
   - SPHT 3
   - SPHT 4

   **Chemical Composition (%)**
   - C: ≤ 0.10
   - Si: ≤ 0.35
   - Mn: ≤ 0.50
   - P: ≤ 0.040
   - S: ≤ 0.040

   **Yield Point or Yield Strength (N/mm²)**
   - 205 ≤ 410

   **Mechanical Test Values**
   - Tensile Test Bending Test

   **Remarks:**
   - 1. When agreed upon between the concerned parties, Si content may be specified to 0.04% or less.
   - 2. Mechanical test values do not apply to abnormal parts at both ends of steel strip (coils).
   - 3. We will carry out a bending test at the customer’s request.

#### JIS G 3132

1. **Hot-Rolled Mild Steel Sheets and Coils**

   **Designation**
   - SS330
   - SS400
   - SS490
   - SS540

   **Chemical Composition (%)**
   - C: ≤ 0.30
   - Si: ≤ 1.60
   - Mn: ≤ 0.040
   - P: ≤ 0.040
   - S: ≤ 0.040

   **Yield Point or Yield Strength (N/mm²)**
   - 205 ≤ 400

   **Mechanical Test Values**
   - Tensile Test Bending Test

   **Remarks:**
   - 1. When agreed upon between the concerned parties, Si content may be specified to 0.04% or less.
   - 2. Mechanical test values do not apply to abnormal parts at both ends of steel strip (coils).
   - 3. We will carry out a bending test at the customer’s request.

#### JIS G 3101

1. **Hot-Rolled Steel Sheets and Coils for General Structures**

   **Designation**
   - SS330
   - SS400
   - SS490
   - SS540

   **Chemical Composition (%)**
   - C: ≤ 0.30
   - Si: ≤ 1.60
   - Mn: ≤ 0.040
   - P: ≤ 0.040
   - S: ≤ 0.040

   **Yield Point or Yield Strength (N/mm²)**
   - 205 ≤ 400

   **Mechanical Test Values**
   - Tensile Test Bending Test

   **Remarks:**
   - 1. When agreed upon between the concerned parties, Si content may be specified to 0.04% or less.
   - 2. Mechanical test values do not apply to abnormal parts at both ends of steel strip (coils).
   - 3. We will carry out a bending test at the customer’s request.
### Examples of Standards — Chemical Compositions and Mechanical Properties

#### JIS G 3106

**Hot-Rolled Steel Sheets and Coils for Automobile Structural Uses**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Chemical Composition (%)</th>
<th>Yield Point or Yield Strength (N/mm²)</th>
<th>Tensile Test</th>
<th>Elongation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>Si</td>
<td>Mn</td>
<td>P</td>
</tr>
<tr>
<td>SM400A</td>
<td>≤ 0.23</td>
<td>—</td>
<td>2.5±C</td>
<td>≤ 0.035</td>
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<tr>
<td>SM400B</td>
<td>≤ 0.20</td>
<td>≤ 0.035</td>
<td>0.60 – 1.50</td>
<td>≤ 0.035</td>
</tr>
<tr>
<td>SM400C</td>
<td>≤ 0.18</td>
<td>≤ 0.035</td>
<td>0.60 – 1.50</td>
<td>≤ 0.035</td>
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<td>SM400R</td>
<td>≤ 0.18</td>
<td>≤ 0.035</td>
<td>0.60 – 1.50</td>
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<td>SM500A</td>
<td>≤ 0.20</td>
<td>≤ 0.035</td>
<td>0.60 – 1.50</td>
<td>≤ 0.035</td>
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<tr>
<td>SM500B</td>
<td>≤ 0.20</td>
<td>≤ 0.035</td>
<td>0.60 – 1.50</td>
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<tr>
<td>SM500C</td>
<td>≤ 0.20</td>
<td>≤ 0.035</td>
<td>0.60 – 1.50</td>
<td>≤ 0.035</td>
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#### JIS G 3113

**Hot-Rolled Steel Sheets and Coils for Automobile Structural Uses**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Chemical Composition (%)</th>
<th>Yield Point (N/mm²)</th>
<th>Tensile Test</th>
<th>Elongation (%)</th>
<th>Rolling Direction</th>
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<tr>
<td></td>
<td>C</td>
<td>Si</td>
<td>Mn</td>
<td>P</td>
<td>S</td>
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<td>SAPH310</td>
<td>≤ 0.040</td>
<td>≤ 0.040</td>
<td>(185 ≤)</td>
<td>(185 ≤)</td>
<td>(175 ≤)</td>
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<td>SAPH370</td>
<td>≤ 0.040</td>
<td>≤ 0.040</td>
<td>225 ≤</td>
<td>225 ≤</td>
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<td>SAPH400</td>
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<td>≤ 0.040</td>
<td>255 ≤</td>
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<td>235 ≤</td>
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<tr>
<td>SAPH440</td>
<td>≤ 0.040</td>
<td>≤ 0.040</td>
<td>305 ≤</td>
<td>295 ≤</td>
<td>275 ≤</td>
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</table>

#### Nippon Steel & Sumitomo Metal Standards

**High-Strength Hot-Rolled Steel Sheets and Coils with Automobile Formability**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Chemical Composition (%)</th>
<th>Yield Point (N/mm²)</th>
<th>Tensile Test</th>
<th>Elongation (%)</th>
<th>Bending Test</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>Si</td>
<td>Mn</td>
<td>P</td>
<td>S</td>
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<td>NSHA490</td>
<td>≤ 0.18</td>
<td>≤ 0.035</td>
<td>1.5 ≤</td>
<td>1.6 ≤</td>
<td>0.010</td>
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<td>NSHA540</td>
<td>≤ 0.16</td>
<td>≤ 0.035</td>
<td>540 ≤</td>
<td>540 ≤</td>
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<td>NSHA590</td>
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<td>≤ 0.035</td>
<td>590 ≤</td>
<td>590 ≤</td>
<td>19 ≤</td>
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<tr>
<td>NSHA690</td>
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<td>≤ 0.035</td>
<td>690 ≤</td>
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<td>NSHA780</td>
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<td>NSHA880</td>
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<td>≤ 0.035</td>
<td>880 ≤</td>
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</table>
## Examples of Standards — Chemical Compositions and Mechanical Properties

### Nippon Steel & Sumitomo Metal Standards

#### Dual Phase High-Strength Hot-Rolled Steel Sheets and Coils with Automobile Formability

<table>
<thead>
<tr>
<th>Designation</th>
<th>Chemical Composition (%)</th>
<th>Yield Point (N/mm²)</th>
<th>Tensile Strength (N/mm²)</th>
<th>Elongation (%)</th>
<th>Test Piece</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C  Si  Mn  P  S</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA680D</td>
<td>≤ 0.12 ≤ 1.00 ≤ 1.80 ≤ 0.035 ≤ 0.020</td>
<td>295 ≤ 540</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA590D</td>
<td>≤ 0.12 ≤ 1.50 ≤ 2.00 ≤ 0.035 ≤ 0.020</td>
<td>325 ≤ 590</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA490D</td>
<td>≤ 0.14 ≤ 1.50 ≤ 2.50 ≤ 0.035 ≤ 0.020</td>
<td>355 ≤ 610</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA780D</td>
<td>≤ 0.15 ≤ 1.50 ≤ 3.00 ≤ 0.035 ≤ 0.020</td>
<td>380 ≤ 780</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks: 1. Mechanical test values do not apply to abnormal parts at both ends of steel strip (coils).
2. Alloying elements other than the above-mentioned ones can be added according to requirements.

#### High-Hole Expanding High-Strength Hot-Rolled Steel Sheets and Coils with Automobile Formability

<table>
<thead>
<tr>
<th>Designation</th>
<th>Chemical Composition (%)</th>
<th>Yield Point (N/mm²)</th>
<th>Tensile Strength (N/mm²)</th>
<th>Elongation (%)</th>
<th>Test Piece</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C  Si  Mn  P  S</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA370B</td>
<td>≤ 0.10 ≤ 0.50 ≤ 1.50 ≤ 0.025 ≤ 0.010</td>
<td>225 ≤ 370</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA440B</td>
<td>≤ 0.10 ≤ 0.50 ≤ 1.50 ≤ 0.025 ≤ 0.010</td>
<td>255 ≤ 400</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA440B</td>
<td>≤ 0.15 ≤ 0.80 ≤ 1.90 ≤ 0.025 ≤ 0.010</td>
<td>305 ≤ 440</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA490B</td>
<td>≤ 0.16 ≤ 0.80 ≤ 2.00 ≤ 0.025 ≤ 0.010</td>
<td>335 ≤ 490</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA640B</td>
<td>≤ 0.16 ≤ 1.00 ≤ 2.00 ≤ 0.025 ≤ 0.010</td>
<td>355 ≤ 540</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA640B</td>
<td>≤ 0.16 ≤ 1.00 ≤ 2.00 ≤ 0.025 ≤ 0.010</td>
<td>440 ≤ 590</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA640B</td>
<td>≤ 0.16 ≤ 1.00 ≤ 2.00 ≤ 0.025 ≤ 0.010</td>
<td>500 ≤ 690</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA780B</td>
<td>≤ 0.16 ≤ 1.00 ≤ 2.20 ≤ 0.025 ≤ 0.010</td>
<td>675 ≤ 780</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks: 1. Mechanical test values do not apply to abnormal parts at both ends of steel strip (coils).
2. Alloying elements other than the above-mentioned ones can be added according to requirements.

### Nippon Steel & Sumitomo Metal Standards

#### High-Retained Austenite High-Strength Hot-Rolled Steel Sheets and Coils

<table>
<thead>
<tr>
<th>Designation</th>
<th>Chemical Composition (%)</th>
<th>Yield Point (N/mm²)</th>
<th>Tensile Strength (N/mm²)</th>
<th>Elongation (%)</th>
<th>Test Piece</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C  Si  Mn  P  S</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA590T</td>
<td>≤ 0.21 ≤ 0.20 ≤ 1.80 ≤ 0.025 ≤ 0.010</td>
<td>390 ≤ 590</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA690T</td>
<td>≤ 0.23 ≤ 0.20 ≤ 2.00 ≤ 0.025 ≤ 0.010</td>
<td>440 ≤ 610</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSHA780T</td>
<td>≤ 0.25 ≤ 0.20 ≤ 2.20 ≤ 0.025 ≤ 0.010</td>
<td>490 ≤ 780</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks: 1. Mechanical test values do not apply to abnormal parts at both ends of steel strip (coils).
2. Alloying elements other than the above-mentioned ones can be added according to requirements.

#### Flooring Sheets and Coils

<table>
<thead>
<tr>
<th>Designation</th>
<th>Chemical Composition (%)</th>
<th>Yield Point (N/mm²)</th>
<th>Tensile Strength (N/mm²)</th>
<th>Elongation (%)</th>
<th>Test Piece</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P  S</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NFP</td>
<td>--</td>
<td>--</td>
<td>-- (270 ≤)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NFP400</td>
<td>≤ 0.050 ≤ 0.050</td>
<td>245 ≤ 400 - 510</td>
<td>21 ≤ 17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks: 1. Values in parentheses are reference values.
2. Mechanical test values do not apply to abnormal parts at both ends of steel strip (coils).
### Examples of Standards — Chemical Compositions and Mechanical Properties

#### Nippon Steel & Sumitomo Metal Standards

**Atmospheric Corrosion-Resistant Steel Sheets and Coils**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Chemical Composition (%)</th>
<th>Tensile Test</th>
<th>Bending Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>Si</td>
<td>Mn</td>
</tr>
<tr>
<td>NAV430</td>
<td>0.12</td>
<td>0.15 - 0.35</td>
<td>0.06 - 0.12</td>
</tr>
<tr>
<td>NAV450</td>
<td>0.12</td>
<td>0.15 - 0.35</td>
<td>0.06 - 0.12</td>
</tr>
</tbody>
</table>

#### Nippon Steel & Sumitomo Metal Standards

**Weldable High-Strength Steel Sheets and Coils**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Chemical Composition (%)</th>
<th>Tensile Test</th>
<th>Bending Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>Si</td>
<td>Mn</td>
</tr>
<tr>
<td>WEL-TEN 540</td>
<td>0.20</td>
<td>0.13</td>
<td>0.17</td>
</tr>
<tr>
<td>WEL-TEN 590RE</td>
<td>0.13</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>WEL-TEN 490RE</td>
<td>0.14</td>
<td>0.13</td>
<td>0.12</td>
</tr>
<tr>
<td>WEL-TEN 790RE</td>
<td>0.16</td>
<td>0.13</td>
<td>0.12</td>
</tr>
</tbody>
</table>

#### Nippon Steel & Sumitomo Metal Standards

**Sulfur-Dew Point Corrosion-Resistant Steel Sheets and Coils**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Chemical Composition (%)</th>
<th>Tensile Test</th>
<th>Bending Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>Si</td>
<td>Mn</td>
</tr>
<tr>
<td>S-TEN 1</td>
<td>0.14</td>
<td>0.13</td>
<td>0.12</td>
</tr>
<tr>
<td>S-TEN 2</td>
<td>0.14</td>
<td>0.13</td>
<td>0.12</td>
</tr>
</tbody>
</table>

#### Nippon Steel & Sumitomo Metal Standards

**Longitudinally Stripped Steel Sheets and Coils**

(There are no specifications of chemical components or mechanical properties. Normal tensile strength is 270 N/mm² or more.)

Remarks: 1. Mechanical test values do not apply to abnormal parts at both ends of steel strip (coils).
2. We will carry out a bending test at the customer's request.
### Examples of Standards — Dimensional Tolerances

#### JIS G 3193

**Shape, Dimensions, Weight, and Tolerance of Hot-Rolled Steel Sheets and Coils.**

- **Thickness Tolerance of Nippon Steel & Sumitomo Metal Standards**
  - Flattened Steel Sheets and Coils (NFP series), Longitudinally Stripped Steel Sheets and Coils (NFA series), Atmospheric Corrosion-Resistant Steel Sheets and Coils (NAW series), Weldable High-Strength Steel Sheets and Coils (WEL-TEN series), Sulfur Dew-Point Corrosion-Resistant Steel Sheets and Coils (S-TEN series).

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>W &lt; 1,600</td>
<td>2.00 g width</td>
</tr>
<tr>
<td>W &lt; 2,000</td>
<td>2.50 g width</td>
</tr>
<tr>
<td>W &lt; 2,500</td>
<td>3.15 g width</td>
</tr>
</tbody>
</table>

**Examples of Standards — Dimensional Tolerances**

- **Resistant Steel Sheets and Coils (NAW series), Weldable High-Strength Steel Sheets and Coils (WEL-TEN series), Sulfur Dew-Point Corrosion-Resistant Steel Sheets and Coils (S-TEN series).**

<table>
<thead>
<tr>
<th>Width</th>
<th>Thickness</th>
<th>Tolerance A</th>
<th>Tolerance B</th>
<th>Tolerance C</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤1,250</td>
<td>≤2.00 g</td>
<td>±0.18</td>
<td>±0.23</td>
<td>±0.29</td>
</tr>
<tr>
<td>≤1,600</td>
<td>≤2.50 g</td>
<td>±0.20</td>
<td>±0.25</td>
<td>±0.31</td>
</tr>
<tr>
<td>≤2,000</td>
<td>≤3.15 g</td>
<td>±0.24</td>
<td>±0.34</td>
<td>±0.34</td>
</tr>
<tr>
<td>≤3.15 g</td>
<td>≤3.15 g</td>
<td>±0.26</td>
<td>±0.36</td>
<td>±0.36</td>
</tr>
<tr>
<td>≤4.00 g</td>
<td>≤2.00 g</td>
<td>±0.24</td>
<td>±0.34</td>
<td>±0.34</td>
</tr>
<tr>
<td>≤2.00 g</td>
<td>≤1.25 g</td>
<td>±0.20</td>
<td>±0.25</td>
<td>—</td>
</tr>
<tr>
<td>≤2.50 g</td>
<td>≤2.50 g</td>
<td>±0.19</td>
<td>±0.23</td>
<td>—</td>
</tr>
<tr>
<td>≤3.15 g</td>
<td>≤4.00 g</td>
<td>±0.20</td>
<td>±0.25</td>
<td>—</td>
</tr>
<tr>
<td>≤4.00 g</td>
<td>≤6.00 g</td>
<td>±0.16</td>
<td>±0.24</td>
<td>—</td>
</tr>
<tr>
<td>≤6.00 g</td>
<td>≤6.00 g</td>
<td>±0.17</td>
<td>±0.25</td>
<td>—</td>
</tr>
</tbody>
</table>

**Thickness Tolerance of High-Strength Hot-Rolled Steel Sheets and Coils (NSHA370B-400B - 440B)**

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Width</th>
<th>Tolerance A</th>
<th>Tolerance B</th>
<th>Tolerance C</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤1.60 g</td>
<td>≤3.15 g</td>
<td>±0.14</td>
<td>±0.19</td>
<td>±0.21</td>
</tr>
<tr>
<td>≤1.60 g</td>
<td>≤2.00 g</td>
<td>±0.16</td>
<td>±0.21</td>
<td>±0.25</td>
</tr>
<tr>
<td>≤2.00 g</td>
<td>≤3.15 g</td>
<td>±0.19</td>
<td>±0.24</td>
<td>±0.26</td>
</tr>
<tr>
<td>≤3.15 g</td>
<td>≤4.00 g</td>
<td>±0.22</td>
<td>±0.28</td>
<td>±0.29</td>
</tr>
<tr>
<td>≤4.00 g</td>
<td>≤6.00 g</td>
<td>±0.24</td>
<td>±0.30</td>
<td>±0.35</td>
</tr>
<tr>
<td>≤6.00 g</td>
<td>≤6.00 g</td>
<td>±0.29</td>
<td>±0.34</td>
<td>±0.40</td>
</tr>
</tbody>
</table>

**Remarks:**

1. Thickness measurement points conform to the standards.
2. This method does not apply to abnormal parts at both ends of a steel coil.
3. The application of thickness and width is provided in the appropriate standards.

#### JIS G 3116 (SG325, SG365), 3132 (SPT4H, 3134 (SPFH)

- **High-Strength Hot-Rolled Steel Sheets and Coils with Formability (NSHA-D), High-Strength Hot-Rolled Steel Sheets and Coils (NSHA)**

**Width Tolerance of Nippon Steel & Sumitomo Metal Standards**

<table>
<thead>
<tr>
<th>Width</th>
<th>Thickness</th>
<th>Tolerance A</th>
<th>Tolerance B</th>
<th>Tolerance C</th>
</tr>
</thead>
<tbody>
<tr>
<td>W &lt; 1,200</td>
<td>≤3.15 g</td>
<td>±0.10</td>
<td>±0.14</td>
<td>±0.18</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤2.00 g</td>
<td>±0.16</td>
<td>±0.21</td>
<td>±0.25</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤1.25 g</td>
<td>±0.17</td>
<td>±0.25</td>
<td>±0.30</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤1.00 g</td>
<td>±0.19</td>
<td>±0.22</td>
<td>±0.25</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤0.80 g</td>
<td>±0.21</td>
<td>±0.25</td>
<td>±0.30</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤0.60 g</td>
<td>±0.20</td>
<td>±0.24</td>
<td>±0.26</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤0.40 g</td>
<td>±0.25</td>
<td>±0.30</td>
<td>±0.35</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤0.25 g</td>
<td>±0.30</td>
<td>±0.35</td>
<td>±0.40</td>
</tr>
</tbody>
</table>

**Remarks:**

1. Thickness measurement points conform to the standards.
2. The application of thickness and width is provided in the appropriate standards.

#### Nippon Steel & Sumitomo Metal Standards - High-Strength Hot-Rolled Steel Sheets and Coils with Formability (NSHA)

**Width Tolerance of Nippon Steel & Sumitomo Metal Standards**

<table>
<thead>
<tr>
<th>Width</th>
<th>Thickness</th>
<th>Tolerance A</th>
<th>Tolerance B</th>
<th>Tolerance C</th>
</tr>
</thead>
<tbody>
<tr>
<td>W &lt; 1,200</td>
<td>≤3.15 g</td>
<td>±0.10</td>
<td>±0.14</td>
<td>±0.18</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤2.00 g</td>
<td>±0.15</td>
<td>±0.19</td>
<td>±0.23</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤1.25 g</td>
<td>±0.17</td>
<td>±0.21</td>
<td>±0.25</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤1.00 g</td>
<td>±0.20</td>
<td>±0.24</td>
<td>±0.28</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤0.80 g</td>
<td>±0.22</td>
<td>±0.26</td>
<td>±0.30</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤0.60 g</td>
<td>±0.24</td>
<td>±0.28</td>
<td>±0.33</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤0.40 g</td>
<td>±0.25</td>
<td>±0.30</td>
<td>±0.35</td>
</tr>
<tr>
<td>W &lt; 1,200</td>
<td>≤0.25 g</td>
<td>±0.30</td>
<td>±0.35</td>
<td>±0.40</td>
</tr>
</tbody>
</table>

**Remarks:**

1. Thickness measurement points conform to the standards.
2. This method does not apply to abnormal parts at both ends of a steel coil.
3. The application of thickness and width is provided in the appropriate standards.

**NOTE:** Width tolerance refers to JIS G 3193.
## Reference Tables

### 1. Standard Size and Weight for Hot-Rolled Steel Sheets

<table>
<thead>
<tr>
<th>Thickness (mm)</th>
<th>1.04</th>
<th>1.08</th>
<th>1.59</th>
<th>1.63</th>
<th>1.67</th>
<th>1.71</th>
<th>2.02</th>
<th>2.43</th>
<th>2.84</th>
<th>3.25</th>
<th>3.66</th>
<th>4.07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width (mm)</td>
<td>1,829</td>
<td>2,028</td>
<td>2,028</td>
<td>2,414</td>
<td>2,414</td>
<td>2,814</td>
<td>2,814</td>
<td>2,814</td>
<td>2,814</td>
<td>2,814</td>
<td>2,814</td>
<td>2,814</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>1.100</td>
<td>1.120</td>
<td>1.140</td>
<td>1.160</td>
<td>1.180</td>
<td>1.200</td>
<td>1.220</td>
<td>1.240</td>
<td>1.260</td>
<td>1.280</td>
<td>1.300</td>
<td>1.320</td>
</tr>
</tbody>
</table>

### 2. Calculation Chart Example for Coil Width, Inner Diameter, Outer Diameter, and Mass

<table>
<thead>
<tr>
<th>Inner Diameter of Coi (mm)</th>
<th>Outer Diameter of Coi (mm)</th>
<th>Coil Mass (MT) for Coil Width of 1,000 mm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>762</td>
<td>0.97</td>
</tr>
</tbody>
</table>

### Information on Usage

**Hot-Rolled Steel Sheets and Coils**

- **Production**: Coils are produced in a wide range of grades, each having its own unique characteristics. Selection of the right grade, therefore, is essential for the most economical production of high-quality end products. Nippon Steel & Sumitomo Metal can help customers choose the grade best suited for each application. We are also ready to cooperate with customers by offering optimal technical and production support.

**Plating Finish**

- Hot-rolled sheets (pickled) are coated with oil for protection against rusting. The lubricating oil used in the forming process may also remain on the surface. All traces of oil and impurities present on the surface must be removed before beginning the plating operations.

**Degreasing**

- Can be achieved by various methods, including those using emulsions, alkali cleaners, etc. Of these, alkali cleaning is most widely employed because of its economy and ease of handling.

**Resistance Welding**

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

**Gas Welding**

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

**Submerged-Arc Welding**

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

**Resistance Welding**

- Adequate weld strength cannot be obtained if the welded joint is not in the nugget form. Submerged-arc welds may be considered a variation of continuous spot welding. Good seam welds are obtained by increasing the electrical current to 1.5 to 2.0 times and the pressure to 1.4 to 1.6 times those of a spot weld.

**Use of Coils**

- The use of coils generally has more advantage than the use of steel sheets, as means of improving yield ratio and automating line production. Coils are the material from which sheet is cut, and possesses characteristics which differs from those of a sheet. Thus effective use of coil improves productivity.

**Coils**

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

Our products are shipped bundled and packaged to prevent any possible damages possibly caused by ordinary handling practices or storage conditions prior to actual use. As the products have packaging labels affixed describing the shipped content, please see the affixed label to confirm the product after receipt.

1. Package Label Information

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Name</td>
<td>Describes a specified product name.</td>
</tr>
<tr>
<td>JIS Certification Mark</td>
<td>JIS is marked on the label of products authorized to designate the JIS certification mark.</td>
</tr>
<tr>
<td>Standards Designation</td>
<td>Code of Standards Name, Standards Number, and Standards Code.</td>
</tr>
<tr>
<td>Dimensions</td>
<td>The ordered size (thickness width length) is marked. For coil, “C” is marked in place of length.</td>
</tr>
<tr>
<td>Net Mass</td>
<td>The actual net or calculated mass is marked in accordance with contract terms and conditions.</td>
</tr>
<tr>
<td>Sheets</td>
<td>The actual number of sheets contained.</td>
</tr>
<tr>
<td>Coils</td>
<td>Marked only if two or more hoops are bundled.</td>
</tr>
<tr>
<td>Inspection Number</td>
<td>Marked with the unit inspection number for each shipped product.</td>
</tr>
<tr>
<td>Coil Number</td>
<td>Marked with the production lot unit coil number.</td>
</tr>
<tr>
<td>Steel Making Number</td>
<td>Marked with the production lot unit steel making number.</td>
</tr>
<tr>
<td>User Name</td>
<td>User’s name.</td>
</tr>
<tr>
<td>Maker’s Name</td>
<td>Nippon Steel &amp; Sumitomo Metal Corporation</td>
</tr>
<tr>
<td>Works</td>
<td>(Location Name) Works</td>
</tr>
</tbody>
</table>

2. Package Label Sample

HOT ROLLED STEEL SHEETS (Pickled)
SAPH440
3.6 × 1050 × C
4,440KG

PW14731 L88330-11 TP7790

3. Packaging Sample

<As-Rolled Coil>

<Pickled Coil>
Specifications

Hot-Rolled Steel Sheets and Coils are produced in a wide range of grades satisfying both JIS and Nippon Steel & Sumitomo Metal specifications. Select the most suitable specifications by intended use, degree of fabrication, method of fabrication, and other factors. Inquire if any questions arise. If you have any questions, please contact Nippon Steel & Sumitomo Metal.

Dimensions

Thickness varies in increments of 0.1 mm as a rule. This may be reduced to increments of 0.05 mm in special cases. Width and length may be specified at increments of 1 mm.

Packaging Mass

Specify the packaging mass based on unloading capacity and working conditions.

Cut sheets: Normally, 2 tons or more are standard.

Coils: Normally available from 5 to 20 tons.

Specify the maximum weight (and the minimum weight if necessary).

Coil Inside/Outside Diameters

For coils, the inside diameters of 762 mm (30 inches) or 610 mm (24 inches) are standard.

Specify the maximum outside diameter acceptable, if necessary.

Surface Finish

Specify finish: black finish (as-rolled), pickled finish, or shot blasted finish.

Oiling

Specify either “oiled” or “unoiled”. Normally, rust-prevention “oiled” products are produced.

Roll Edge Finish

Specify either “mill edge” or “slit edge” depending on your use condition. Slit edges are recommended, especially if the delivered product will be used as-rolled and without further processing, thus requiring edge finishing, or when strict width tolerance is required.

Applications

Nippon Steel & Sumitomo Metal exercises through quality control over the entire manufacturing process in order to suit the products to our customers’ intended use. Therefore, when placing orders we kindly request our customers to present information necessary for quality control, such as intended use and the method of fabrication.

Other

Some intended applications require rigorous specifications of assembly accuracy, component accuracy, and other conditions. If there are any requests of such kind, please consult with Nippon Steel & Sumitomo Metal beforehand to clarify the required specifications.