WHAT IS STAINLESS STEEL?
Stainless steel is an iron-based metal that has at least 10.5% chromium. Other alloying elements, such as nickel, molybdenum, manganese, can be added as well as additional amounts of chromium to achieve specific corrosion resistance and physical properties.

WHY DOESN’T IT RUST?
Stainless steel does not RUST (red rust that one normally sees on carbon steel is iron oxide), because it contains chromium and has a very low carbon content (compared to mild steel). The chromium combines with oxygen in the air to form a very adherent surface film that resists further oxidation. No iron is oxidized; therefore, no red rust.

THE MOST POPULAR KINDS OF STAINLESS STEEL
There are over 100 different kinds of stainless steel but only about 5 grades are the most popular. (For further information please refer to the SSINA publication: “Design Guidelines for the Selection and Use of Stainless Steel”)

STAINLESS TYPE 304
(UNS S30400)
By far, the most popular grade of stainless steel is 304. The 300 series designation tells one that the grade is composed basically of 18% chromium and 8% nickel. It is non-magnetic and cannot be hardened by heat treatment. Sometimes referred to as 18-8.

STAINLESS TYPE 316
(UNS S31600)
The next most popular stainless for general corrosion resistance is 316. It also consists of chromium (16%) and nickel (10%), but also contains 2% molybdenum. The additional alloying increases the resistance to salt corrosion.

SIZES AND SHAPES AVAILABLE
Stainless steel manufacturers produce many different sizes and shapes of stainless steel. Flat products called “sheets” are available in thickness from under 0.375 inches down to about 0.020 inches, either as cut sheets or as wrapped coils. Material under 0.020 inches is usually called “foil” and can be made down to 0.001 inches. Sheets are usually wider than 18 inches and can be made up to 60 inches wide. Widths under 18 inches are called “strip” and are generally available in the same thickness as sheet. Flat products with thickness of 0.375 inches and over are called “plates.” They are available up to about 10 inches thick, and usually 96 or 120 inches wide. Long products are round, square, rectangular, hexagon or octagon from 0.1875 inches in thickness up. Wire products are generally round in size from 0.703 to 0.003 inches. Tubular products from 0.1875 inches, pipes from 0.125 inches and angles products from 1.00 inches are also available.

CORROSION RESISTANCE
Generally resists corrosion in the atmosphere and in water environments, most acids, alkaline solutions and some chlorine bearing environments.

FIRE & HEAT RESISTANCE
Resistant to major deformation at temperatures up to 1000° F.

HYGIENE
Extremely easy to clean with biodegradable soap and water. Does not alter the taste of foodstuffs.

GENERAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Mechanical Properties</th>
<th>Hardness (Rb)</th>
<th>Tensile Strength (1000 Psi)</th>
<th>Yield Strength (0.2% 1000 Psi)</th>
<th>Elongation (% in 2 in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>304/316</td>
<td>78-83</td>
<td>80-85</td>
<td>30-42</td>
<td>50-60</td>
</tr>
<tr>
<td>430</td>
<td>80-85</td>
<td>70-75</td>
<td>40-50</td>
<td>30-35</td>
</tr>
<tr>
<td>410</td>
<td>80-82</td>
<td>70-75</td>
<td>36-45</td>
<td>25-35</td>
</tr>
<tr>
<td>409</td>
<td>75</td>
<td>65</td>
<td>35</td>
<td>25</td>
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### STANDARD FINISHES AVAILABLE

#### SHEET & STRIP
- **No. 1**: a rough, dull finish that results from hot rolling.
- **No. 2D**: a dull finish generally used where the surface appearance is of little concern.
- **No. 2B**: a bright finish with some reflectivity. It is a general purpose finish used as is, or it is used as a basis for subsequent polished finishes.
- **No. 4**: a polished bright surface with reasonable reflectivity, although it contains visible "grit lines" which prevent mirror reflection.
- **No. 6**: a dull satin finish with less reflectivity than a No. 4.
- **No. 7**: a highly reflective surface finish but still maintains some light "grit" lines.
- **No. 8**: the most reflective standard finish with a mirror-like reflectivity.

#### PLATE
- **Hot Rolled**: a rough surface with the annealing scale left on. Generally not recommended for use in this condition.
- **Hot Rolled, Annealed & Pickled or blast cleaned**: the commonly preferred finish with the scale removed from the hot rolled surface by acid etching or blasting.
- **Hot Rolled, Annealed & Pickled and Cold Rolled**: a smoother finish with less surface imperfections.

#### BAR
- **Hot Worked Only**: a surface where the scale is left on after hot rolling.
- **Hot Worked & Rough Turned**: a surface where the scale has been removed by turning the surface in a lathe or grinding machine.
- **Hot Rolled, Pickled, or blast cleaned & Pickled**: where the surface has been cleaned of scale by acid etching or blasting.
- **Annealed Only**: where the scale is left on after hot rolling and annealing.
- **Annealed & Rough Turned**: is the same as hot worked and rough turned but the bar has been annealed to make the structure more ductile.
- **Annealed & Pickled or blast cleaned & Pickled**: where the surface has been cleaned of scale by acid etching or blasting after annealing.
- **Annealed, Cold Drawn or Cold Rolled**: is where the surface is smooth because it has been drawn through a die or rolled through polished rolls.
- **Annealed & Centerless Ground**: is where the surface has been ground to remove some of the surface area similar to ground flat sheet surface.
- **Annealed & Polished**: is where the surface has been polished to bright finish.

#### WIRE
- **Cold Drawn**: a smooth surface with the residual drawing lubricant left on.
- **Cold Drawn and Clean**: has a smooth surface, free of residual drawing lubricants.
- **Diamond Drawn**: a bright smooth surface, produced with diamond drawing dies and wet drawing lubricants.
- **Electropolish Quality (SPQ)**: has a smooth surface for producing a bright finish after electropolishing.

### SUPERIOR STRENGTH-TO-WEIGHT RATIO
- The strength of many stainless steels can be increased by work-hardening thereby providing higher strength at lower weight.

### IMPACT RESISTANT
- The 300 series provides high toughness from elevated temperatures to far below freezing.

### RECYCLABLE
- Stainless steel is 100% recyclable. Recycled material is used in over 65% of all new stainless products.

### "GREEN" MATERIAL
- Stainless steel is a "Green" material as demonstrated by the evaluation of stainless steel using the following critical environmental guidelines:

#### ENVIRONMENTAL PRINCIPLES
- Developing an environmental policy is one of the most important components of environment management. Many of the North American producers of stainless steel have such a policy. SSINA member companies are committed to operating their facilities in compliance with applicable federal, state and local environmental laws and regulations.

#### ENVIRONMENTAL MANAGEMENT SYSTEMS
- SSINA member companies have established environmental affairs departments (analogous to the marketing and finance departments) that address environmental issues.

#### MATERIALS, ENERGY AND WATER USAGE
- The use of these vital resources is closely monitored. The major raw material for the production of stainless steel is "recycled" stainless steel scrap from within the plants themselves and from customers and fabricators after a long useful life in the marketplace. Furnace byproducts are collected and re-melted. Electric furnaces that melt the stainless steel are state-of-the-art with computer controls to ensure efficient use of electric power. Water, which is mainly used as a cooling medium, is recycled up to 100 times prior to discharge.

#### POLLUTION PREVENTION
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WELDING
Stainless steel can be welded as easily as carbon steel but the process is different. Stainless steel electrodes must be used and currents and cooling techniques are not the same.
(For detailed information on welding stainless steel, please contact the American Welding Society)

FOR MORE INFORMATION
You can contact us through our Web sites, www.ssina.com and www.sensationalstainless.com. The following SSINA publications can be ordered or downloaded by visiting the “Publications and What’s New” section of the ssina.com web site.

Stainless Steel Fabrication
Stainless Steel for Machining
Stainless Steel Architectural Facts
Stainless Steel for Wall Ties, Stone Anchors, Masonry Fastening Systems
Specifications for Stainless Steel
Stainless Steel Fasteners
Standard Practices for Stainless Steel
Stainless Steel for Handrails, Railings & Barrier Applications
The Care and Cleaning of Stainless Steel
Stainless Steel in Water Handling & Delivery Systems
Stainless Steel for Structural Applications
Stainless Steel for Superior Fire & Heat Resistance
Stainless Steel Repair for Construction Applications
Stainless Steel The Green Material
Why Stainless Steel
Environmental Brochure on Stainless Steel
Special Finishes for Stainless Steel
Directory of Stainless Steel Products for Building & Construction
Design Guidelines for the Selection and Use of Stainless Steel
Stainless Steel for Residential Applications
Standard Practices for Stainless Steel Roofing, Flashing, Copings

PRICE COMPARISON
Pricing of stainless steel has generally been below the CPI index for other metals and, while dependent on the price of the main alloying elements such as nickel and chromium, has not significantly increased in the past few years.

* Data provided by ERAMET

Price for Stainless Steel vs CPI
This primer has been developed by the Specialty Steel Industry of North America (SSINA) to help the novice or lay person understand some of the characteristics and uses of stainless steel. It is intended to be a “beginning” in learning about stainless steel and is not particularly comprehensive. SSINA has other publications that go into further detail on stainless steel. They are referenced throughout this primer and a complete listing is provided at the end of this publication.

### SOME TYPICAL APPLICATIONS

#### BUILDING & CONSTRUCTION
- Roofing
- Flashings
- Wall ties for masonry
- Doors & windows
- Entry ways
- Canopies
- Lobby walls & ceilings

#### COMMERCIAL
- Food processing equipment
- Wine tanks
- Fast food equipment
- Hospital equipment
- Oil & Gas processing equipment
- Petro-chemical equipment

#### INDUSTRIAL
- Farm equipment
- Animal feeding equipment
- Fertilizer manufacturing
- Aircraft parts
- Pumps and shafts
- Filters
- Chemical manufacturing
- Computer chip processing

#### RESIDENTIAL
- Kitchen appliances
- Sinks & counter tops
- Fireplace fronts & liners
- BBQ grills & outdoor kitchens
- Washer fronts and interior drums
- Furniture
- Cooking utensils
- Tableware

#### MEDICAL
- Implants
- Hospital equipment
- Orthodontic fixtures
- Sutures
- Tools

#### MARINE
- Boat hardware
- Propellers
- Safety lines
- Rigging
- Dock hardware