

Material Guide 304 Stainless Steel



304 Grade Stainless Steel is one of the most widely used types of stainless steel due to its versatility and durability. It is part of the austenitic family of stainless steels, which are known for their ability to resist oxidation and corrosion while maintaining strength and flexibility. Here's a detailed overview of the characteristics and benefits of 304 grade stainless steel:

CHARACTERISTICS of 304 STAINLESS STEEL:

- **Composition:**
 - Iron (Fe): The base metal.
 - Chromium (Cr): 18-20% — this provides corrosion resistance.
 - Nickel (Ni): 8-10.5% — enhances formability and increases corrosion resistance.
 - Manganese (Mn): 2% max — improves toughness and hardness.
 - Silicon (Si): 0.75% max — improves strength and resistance to oxidation.
- **Corrosion Resistance:**
 - 304 stainless steel is resistant to a variety of corrosive environments. Its chromium content forms a passive oxide layer on the surface, which protects the material from rust and corrosion from atmospheric, chemical and food industry exposures.
 - It resists corrosion from many acids, salts, and industrial chemicals, making it ideal for use in harsh environments.
- **Temperature Resistance:**
 - 304 stainless steel has a high melting point, typically around 1,400-1,450°C (2,550-2,650°F).
 - It can withstand high temperatures in intermittent service (up to around 870°C or 1,600°F) and continuous service (up to 925 °C or 1,700°C) without losing its structural integrity.
- **Magnetic Properties:**
 - As an austenitic stainless steel, 304 is generally non-magnetic in its annealed state, although it may become slightly magnetic when cold worked.
- **Appearance:**
 - The #4 brushed finish is both functional and aesthetically pleasing, and can be used in visible applications.

APPLICATIONS for 304 STAINLESS STEEL:

- **Food and Beverage Industry:**
 - Labels for manufacturing food processing equipment
 - Labels for kitchen appliances
 - USDA/FDA compliant labels
- **Medical and Pharmaceutical:**
 - Labeling surgical equipment in pharmaceutical clean rooms
 - Labeling medical devices
 - Labeling surgical instruments, where non-reactivity is crucial
 - Autoclavable tags
- **Architectural and Decorative Uses:**
 - Signs for building facades
 - Handrail signage
 - Elevator signage
 - Decorative plates and signs
- **Chemical Processing:**
 - Tags used to label pumps, tanks, and valves
 - Quick identification for maintenance inspections
 - Mark contents of pipelines
 - Used as warning signs - corrosive, toxic, etc
 - Barcode asset tracking & equipment identification
- **Heat Exchangers:**
 - Equipment ID tags to identify heat exchangers and boilers
 - Compliance and safety warnings mandated by ASME standards
- **Automotive Industry:**
 - Tags exhaust systems, trim and underbody parts
 - VIN tags
 - Engine and component labeling
 - Under the hood labels
 - Regulatory compliance, safety certification tags

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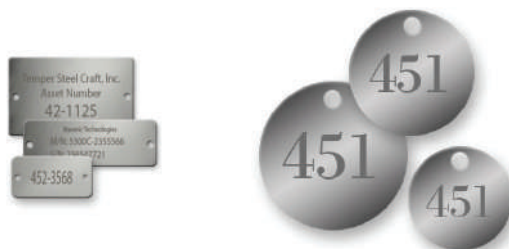
Local: 616-647-0998

www.NapTags.com

info@napindgroup.com

7777 Childsdale Ave NE | Rockford, MI 49341

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BENEFITS of 304 STAINLESS STEEL:

- **Corrosion Resistance**

The high chromium and nickel content make 304 stainless steel highly resistant to oxidation and corrosion. It is especially resistant to rust in moist environments where acids, salts, and alkaline substances are present.

- **Durability and Longevity**

304 stainless steel is incredibly durable and will last for many years with little to no degradation. It does not require frequent maintenance or replacement, making it a cost-effective material over time.

- **Sustainability**

Stainless steel, including 304, is 100% recyclable, which contributes to its environmental sustainability. It can be recycled indefinitely without a loss in quality.

- **Hygienic and Easy to Clean**

Due to its smooth surface, 304 stainless steel is easy to clean and sterilize, making it ideal for applications where hygiene is crucial, such as in food processing, medical equipment, and kitchens.

- **Non-Reactive**

Unlike some metals, 304 stainless steel does not react with food or beverages, making it the preferred material in the food and beverage industry. It does not impart any metallic taste or chemicals to food.

- **Temperature Resistance**

304 stainless steel performs well in both high and low temperatures, providing stability in temperature-controlled environments like refrigeration, ovens, and heat exchangers.

