

Types 302 (S30200), 304(S30400), 304L (S30403), and 305 (S30500) stainless steels are variations of the 18 percent chromium – 8 percent nickel austenitic alloy, the most familiar and most frequently used alloy in the stainless steel family. Each alloy represents an excellent combination of corrosion resistance and fabricability. This combination of properties is the reason for the extensive use of these alloys which represent nearly one half of the total U.S. stainless steel production.

Specifications

ASTM: A167, A240, A276, A313, A314, A368, A473, A478, A479, A492, A493, A511, A554, A580, A666

UNS: S30200

AMS: 5515, 5516, 5788

Chemical Composition, %

| Element | Percent by Weight | | | |
|------------|-----------------------------------|-------|-------|-------|
| | Maximum Unless Range is Specified | | | |
| | 302 | 304 | 304L | 305 |
| Carbon | 0.15 | 0.08 | 0.03 | 0.12 |
| Manganese | 2 | 2 | 2 | 2 |
| Phosphorus | 0.045 | 0.045 | 0.045 | 0.045 |
| Sulfur | 0.03 | 0.03 | 0.03 | 0.03 |
| Silicon | 0.75 | 0.75 | 0.75 | 0.75 |
| Chromium | 17 | 18 | 18 | 17 |
| | 19 | 20 | 20 | 19 |
| Nickel | 8 | 8 | 8 | 10.5 |
| | 10 | 10.5 | 12 | 13 |
| Aluminum | 0.1 | 0.1 | 0.1 | -- |

Resistance to Corrosion: Types 302, 304, 304L and 305 austenitic stainless steels provide useful resistance to corrosion on a wide range of moderately oxidizing to moderately reducing environments. The alloys are used widely in equipment and utensils for processing and handling of food, beverages and dairy products. Heat exchangers, piping, tanks and other process equipment in contact with fresh water also utilize these alloys. Building facades and other architectural and structural applications exposed to non-marine atmospheres also heavily utilize the 18-8 alloys. In addition a large variety of applications involve household and industrial chemicals.

Features

- Excellent corrosion resistance
- Ease of fabrication
- Good strength and toughness at cryogenic temperatures
- Excellent formability

Applications

- Food and beverage industry
- Pressure Containing Applications
- Sanitary or Cryogenic Applications

Physical Properties
Density: 0.29 lb/in³ (8.03 g/cm³)

Modulus of Elasticity in Tension: 29 x 10⁶ psi (200 GPa)

Linear Coefficient of Thermal Expansion

| Temperature Range | | Coefficients | |
|-------------------|---------|-------------------------|------------------------|
| °C | °F | cm/cm·°C | in/in·°F |
| 20-100 | 62-212 | 16.6 x 10 ⁻⁶ | 9.2 x 10 ⁻⁶ |
| 20 - 870 | 68-1600 | 19.8 x 10 ⁻⁶ | 11 x 10 ⁻⁶ |

Thermal Conductivity

| Temperature Range | | | |
|-------------------|-----|-------|--------------|
| °C | °F | W/m·K | Btu/hr-ft·°F |
| 100 | 212 | 16.3 | 9.4 |
| 500 | 932 | 21.4 | 12.4 |

Electrical Resistivity (Annealed Condition)

| Temperature Range | | | |
|-------------------|------|------------|------------|
| °C | °F | Microhm-cm | Microhm-in |
| 20 | 68 | 72 | 28.3 |
| 100 | 212 | 78 | 30.7 |
| 200 | 392 | 86 | 33.8 |
| 400 | 752 | 100 | 39.4 |
| 600 | 1112 | 111 | 43.7 |
| 800 | 1472 | 121 | 47.6 |
| 900 | 1652 | 126 | 49.6 |

Specific Heat

| Temperature Range | | | |
|-------------------|--------|--------|-----------|
| °C | °F | J/kg°K | Btu/lb/°F |
| 0-100 | 32-212 | 500 | 0.12 |

Magnetic Permeability
H/M Annealed: 1.02 Max @ 200 H

Mechanical Properties

Minimum mechanical properties for annealed Types 302, 304, 304L, and 305 austenitic stainless steel plate, sheet and strip as required by ASTM specifications A 240 and ASME specification SA-240 are shown below.

Minimum Room Temperature Mechanical Properties, ASTM A240 and A666 Specifications

| Property | 302,304 | 304L | 305 |
|---------------------------------------|--------------|--------------|--------------|
| 0.2% Offset Yield Strength, psi (MPa) | 30,000 (205) | 25,000 (170) | 25,000 (170) |
| Ultimate Tensile Strength, psi (MPa) | 75,000 (515) | 70,000 (485) | 70,000 (485) |
| Percent Elongation in 2 in. (51 mm) | 40 | 40 | 40 |
| Hardness, Max., Brinell (RB) | 201 (92) | 201 (92) | 183 (88) |