BROWN METALS COMPANY
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ALLOY TECHNICAL DATA SHEET

TYPES 302, 304, 304L & 305 STAINLESS STEEL

18-8 Austenitic Stainless Steels · UNS S30200 · S30400 · S30403 · S30500

GENERAL PROPERTIES

Types 302, 304, 304L and 305 are variations of the 18 percent chromium – 8 percent nickel austenitic alloy, the most familiar and most frequently used members of the stainless steel family. Together they account for nearly half of U.S. stainless production, with Type 304 the largest by volume followed by 304L; 302 and 305 are used in smaller quantities.

Consider these alloys when one or more of the following matter:

- Corrosion and oxidation resistance
- Prevention of product contamination
- Ease of fabrication and excellent formability
- Appearance and ease of cleaning
- High strength with low weight
- Strength and toughness at cryogenic temperatures

Food and beverage, sanitary, cryogenic and pressure-containing equipment are typical applications.

CHEMICAL COMPOSITION

Percent by weight, maximum unless range is specified — ASTM A240 / A666

Element	302	304	304L	305
Carbon	0.15	0.08	0.030	0.12
Manganese	2.00	2.00	2.00	2.00
Phosphorus	0.045	0.045	0.045	0.045
Sulfur	0.030	0.030	0.030	0.030
Silicon	0.75	0.75	0.75	0.75
Chromium	17.00–19.00	18.00–20.00	18.00–20.00	17.00–19.00
Nickel	8.00–10.00	8.00–10.50	8.00–12.00	10.50–13.00
Nitrogen	0.10	0.10	0.10	—

MECHANICAL PROPERTIES

Minimum properties, annealed plate, sheet & strip — ASTM A240 / ASME SA-240

Property	302, 304	304L	305
Tensile, psi (MPa)	75,000 (515)	70,000 (485)	75,000 (515)
0.2% Yield, psi (MPa)	30,000 (205)	25,000 (170)	30,000 (205)
Elongation in 2" (51 mm), %	40	40	40
Hardness, max. Brinell	201	201	183
Hardness, max. Rockwell B	92	92	88

PHYSICAL PROPERTIES

Melting range	2550–2590 °F (1399–1421 °C)
Density	0.285 lb/in^3 (7.90 g/cm^3)
Specific gravity	7.90
Modulus of elasticity (tension)	29 × 10^6 psi (200 GPa)*
Specific heat, 32–212 °F	0.12 Btu/lb·°F (500 J/kg·K)

Annealed condition, average composition. *The modulus is lowered in the cold-worked condition.

THERMAL EXPANSION

°F	°C	in/in/°F	cm/cm/°C
68–212	20–100	9.2×10^{-6}	16.6×10^{-6}
68–1600	20–870	11.0×10^{-6}	19.8×10^{-6}

THERMAL CONDUCTIVITY

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

Overall heat transfer depends on more than the conductivity of the metal. Because the austenitic stainless grades keep their surfaces clean, they often transfer heat better in service than metals with higher thermal conductivity.

ELECTRICAL RESISTIVITY

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

CORROSION RESISTANCE

These grades resist a wide range of moderately oxidizing to moderately reducing environments. They are used extensively for food, beverage and dairy processing equipment; heat exchangers, piping and tanks in fresh water; architectural applications in non-marine atmospheres; and handling of many household and industrial chemicals.

INTERGRANULAR CORROSION

Exposure to 800–1500 °F (427–816 °C) can precipitate chromium carbides at grain boundaries ("sensitization"), leaving the steel open to intergranular attack in aggressive environments. Low-carbon Type 304L is preferred for parts placed in service as-welded. Its low carbon delays — but does not eliminate — carbide precipitation during long exposure in that range.

Values are typical or specification minimums as noted, provided for information only, and should not be used as design limits or as a guarantee of properties for any particular lot or application. Certified test reports are supplied with each order.

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