

304 vs 316 Stainless Steel - Comparison Tables

Octal Steel technical reference format. Rebuilt in a clean dossier style for article support and client-facing use.

| Item | 304 stainless steel | 316 stainless steel | Technical reading |
|------------------------------------|-----------------------|--------------------------|---|
| Common grade designation | Type 304 | Type 316 | Both are standard austenitic stainless steels in the 300 series. |
| UNS / EN designation | S30400 / 1.4301 | S31600 / 1.4401 | Useful when the article needs to look more technical and less consumer-oriented. |
| Chromium (Cr) | 18.0-20.0% | 16.0-18.0% | Both grades depend on chromium for passive-film formation and basic stainless behavior. |
| Nickel (Ni) | 8.0-10.5% | 10.0-14.0% | 316 typically carries a higher nickel range. |
| Molybdenum (Mo) | - | 2.0-3.0% | This is the main chemistry upgrade in 316 and the most important reason it performs better in chloride-bearing environments. |
| Carbon (max.) | 0.08% | 0.08% | Standard grades; low-carbon L grades are usually selected where welding and intergranular corrosion control are more critical. |
| Manganese (max.) | 2.00% | 2.00% | Similar base limit in standard chemistry. |
| Silicon (max.) | 0.75-1.00%* | 0.75-1.00%* | Minor alloying role; limit varies slightly depending on the reference used. |
| Phosphorus (max.) | 0.045% | 0.045% | Similar impurity limit. |
| Sulfur (max.) | 0.030% | 0.030% | Similar impurity limit. |
| Nitrogen (max.) | 0.10% | 0.10% | Similar standard limit, though nitrogen-modified variants exist outside the basic comparison. |
| Main composition-based distinction | Cr-Ni stainless steel | Cr-Ni-Mo stainless steel | The 304 and 316 stainless steel difference is mainly a molybdenum-driven corrosion difference, not a large mechanical-class difference. |

*Different references present silicon as 0.75% or 1.00% maximum depending on the standard or product route being summarized.

Source basis: standard-grade composition ranges for 304 and 316 from SSINA and worldstainless, with designation alignment from thyssenkrupp datasheets.

Reference Physical and Mechanical Data for 304 and 316 Stainless Steel

Page two keeps the same Octal table system and separates reference physical data from composition data for cleaner technical reading.

| Property | 304 stainless steel | 316 stainless steel | Technical reading |
|---|---|--|---|
| Density | 8,000 kg/m ³ | 8,000 kg/m ³ | There is no meaningful density difference in ordinary engineering use. |
| Modulus of elasticity at 20°C | 193 GPa | 200 GPa | Both are in the same stiffness range for general design comparison. |
| Thermal conductivity at 20°C | 16.2 W/m-K | 15.0 W/m-K | 316 is slightly lower in thermal conductivity in the referenced datasheets. |
| Coefficient of thermal expansion (20-100°C) | $17.2 \times 10^{-6} /K$ | $16.0 \times 10^{-6} /K$ | 304 expands slightly more over the same temperature interval in the cited reference data. |
| Electrical resistivity at 20°C | $0.72 \times 10^{-6} \Omega \cdot m$ | $0.75 \times 10^{-6} \Omega \cdot m$ | Both are relatively high-resistivity stainless grades; 316 is slightly higher in the referenced data. |
| Tensile strength, min. | 515 MPa | 515 MPa | Standard minimum tensile requirement is the same in common reference grade sheets. |
| Yield strength, 0.2% proof, min. | 205 MPa | 205 MPa | Standard minimum yield requirement is also the same in the cited grade sheets. |
| Elongation in 50 mm, min. | 40% | 40% | Both retain high ductility in annealed condition. |
| Hardness, Rockwell B max. | 92 HRB | 95 HRB | Both are supplied as relatively ductile austenitic grades rather than high-hardness structural alloys. |
| Hardness, Brinell max. | 201 HB | 217 HB | Again, the corrosion environment is usually more decisive than hardness in this comparison. |
| Typical room-temperature mechanical data, producer bulletin | UTS 655 MPa, YS 290 MPa, elongation 55% | Common published minimums remain 515 / 205 / 40 in standard grade sheets | If you want to look more technical, you can distinguish between specification minimums and producer-typical values rather than mixing them. |

Source basis: 304 physical-property reference values from thyssenkrupp 1.4301 datasheet; 316 physical-property reference values from thyssenkrupp 1.4401 datasheet; common minimum mechanical requirements from worldstainless; typical room-temperature 304 producer data from Cleveland-Cliffs.