

# Specification Sheet: Alloy 304/304H

(UNS S30400, S30409) W. Nr. 1.4301

**Most Widely Used Austenitic Stainless Steel Modified with a Controlled Carbon Chemistry for Increased Strength to 1500°F (816°C)**

Chromium	18.0 min. – 20.0 max.	18.0 min. – 20.0 max.
Nickel	8.0 min. – 10.5 max.	8.0 min. – 10.5 max.
Carbon	0.08	0.04 min. – 0.10 max.
Manganese	2.00	2.00
Phosphorus	0.045	0.045
Sulfur	0.030	0.030
Silicon	0.75	0.75
Nitrogen	0.10	0.10
Iron	Balance	Balance

16.3 W/m-°K <sup>2</sup>/ft/°F

### Electrical Resistivity

29.1 Microhm-in at 68°F  
73 Microhm-cm at 20°C

### Mean Coefficient of Thermal Expansion

68–212	20–100	9.2 x 10 <sup>-6</sup>	16.6 x 10 <sup>-6</sup>
68–932	20–500	10.0 x 10 <sup>-6</sup>	18.0 x 10 <sup>-6</sup>
68–1600	20–870	11.0 x 10 <sup>-6</sup>	

ASTM ..... A 240  
ASME ..... SA 240  
AMS ..... 5513  
QQ-S ..... 766

0.2% Offset Yield Strength, ksi	43	30 min.	30 min.
Ultimate Tensile Strength, ksi	91	75 min.	70 min.
Elongation in 2 inches, %	58	40 min.	40 min.
Reduction in Area, %	68	—	—
Hardness, Rockwell B	83	92 max.	92 max.

## Corrosion Resistance

Alloy 304/304H has good resistance to atmospheric corrosion, foods and beverages and to many organic and inorganic chemicals in moderately oxidizing to moderately reducing environments. The high chromium content of the alloy provides resistance to oxidizing solutions such as nitric acid up to 55% weight and up to 176°F (80°C).

Alloy 304/304H also resists moderately aggressive organic acids such as acetic. The nickel present in the alloy provides resistance to moderately reducing solutions such as pure phosphoric acid, whatever the concentration, in cold solutions and up to 10% diluted hot solutions. The alloy can also operate successfully in caustic solutions free of chlorides or fluorides at moderate temperatures.

Alloy 304/304H does not perform well in more highly reducing environments such as those containing chlorides and sulfuric acid.

Alloy 304/304H performs well in fresh water service with low levels of chlorides (less than 100ppm). At higher chloride levels the grade is susceptible to crevice corrosion and pitting. For successful performance under these more severe conditions, higher molybdenum content is needed such as 316/316L. Alloy 304/304H is not recommended for service in marine environments.

In most instances, the corrosion resistance of Alloys 304, 304L and 30H will be roughly equal in most corrosive environments. However, in environments that are sufficiently corrosive to cause intergranular corrosion of welds and heat-affected zones Alloy 304L should be used because of its low carbon content.

### Lowest Temperature (°F) at Which the Corrosion Rate Exceeds 5 mpy

0.2% Hydrochloric Acid	>Boiling	>Boiling	>Boiling	>Boiling
1% Hydrochloric Acid	86p	86	185	>Boiling
10% Sulfuric Acid	—	122	140	167
60% Sulfuric Acid	—	<54	<59	<57
96% Sulfuric Acid	—	113	77	86
85% Phosphoric Acid	176	203	194	203
10% Nitric Acid	>Boiling	>Boiling	>Boiling	>Boiling
65% Nitric Acid	212	212	221	230
80% Acetic Acid	212p	>Boiling	>Boiling	>Boiling
50% Formic Acid	50	104	194	194
50% Sodium Hydroxide	185	194	194	230
83% Phosphoric Acid + 2% Hydrofluoric Acid	113	149	122	140
60% Nitric Acid + 2% Hydrochloric Acid	>140	>140	>140	>140
50% Acetic Acid + 50% Acetic Anhydride	>Boiling	248	212	230
1% Hydrochloric Acid + 0.3% Ferric Chloride	68p	77p	113ps	203ps
10% Sulfuric Acid + 2000ppm Cl <sup>-</sup> + N <sub>2</sub>	—	77	95	122
10% Sulfuric Acid + 2000ppm Cl <sup>-</sup> + SO <sub>2</sub> <sup>104</sup> Content	—	<<59p	<59	104
WPA1, High Cl <sup>-</sup> Content	<<50	≤0	Content <<50	Ts41,5t 133.0573

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Operation / Tool / Lubrication			CONDITIONS					
Operation	Tool	Lubrication	Depth-mm	Depth-in				
Turning	High Speed Steel	Cutting Oil	6	.23	0.5	.019	13-18	42.6-59
			3	.11	0.4	.016	20-25	65.6-82
			1	.04	0.2	.008	26-31	85.3-101.7
	Carbide	Dry or Cutting Oil	6	.23	0.5	.019	75-85	246-278.9
			3	.11	0.4	.016	90-100	295.3-328.1
			1	.04	0.2	.008	110-120	360.8-393.7
			Depth of cut-mm	Depth of cut-in	Feed-mm/t	Feed-in/t	Speed-m/min	Speed-ft/min
Cutting	High Speed Steel	Cutting Oil	1.5	.06	0.03-0.05	.0012-.0020	18-23	59-75.5
			3	.11	0.04-0.06	.0016-.0024	19-24	62.3-78.7
			6	.23	0.05-0.07	.0020-.0027	20-25	65.6-82
			Drill ø mm	Drill ø in	Feed-mm/t	Feed-in/t	Speed-m/min	Speed-ft/min
Drilling	High Speed Steel	Cutting Oil	1.5	.06	0.02-0.03	.0007-.0012	10-14	32.8-45.9
			3	.11	0.05-0.06	.0020-.0024	12-16	39.3-52.5
			6	.23	0.08-0.09	.0031-.0035	12-16	39.3-52.5
			12	.48	0.09-0.10	.0035-.0039	12-16	39.3-52.5
					Feed-mm/t	Feed-in/t	Speed-m/min	Speed-ft/min
Milling Profiling	High Speed Steel	Cutting Oil			0.05-0.10	.002-.004	12-22	39.4-72.2

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