

**CHEMICAL & MECHANICAL PROPERTIES OF
VARIOUS GRADES OF STAINLESS STEEL**

**CHEMICAL COMPOSITION REQUIREMENTS, %¹
Austenitic (Chromium-Manganese - Nickel)**

UNS Designation ²	Type ³	Carbon ⁴	Manganese	Phosphorus	Sulfur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Copper	Other Elements
S30400	304	0.08	2.00	0.045	0.030	0.75	18.0-20.0	8.0-10.5	-	0.10	-	-
S30403	304L	0.030	2.00	0.045	0.030	0.75	18.0-20.0	8.0-12.0	-	0.10	-	-
S31600	316	0.08	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	2.00-3.00	0.10	-	-
S31603	316L	0.03	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	2.00-3.00	0.10	-	-
S31635	316Ti ⁵	0.08	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	2.00-3.00	0.10	-	Ti 5 X (C+N) min, 0.70 max
S31703	317L	0.03	2.00	0.045	0.030	0.75	18.0-20.0	11.0-15.0	3.0-4.0	0.10	-	-
S32100	321	0.08	2.00	0.045	0.030	0.75	17.0-19.0	9.0-12.0	-	0.10	-	Ti 5 X (C+N) min, 0.70 max
S34700	347	0.08	2.00	0.045	0.030	0.75	17.0-19.0	9.0-13.0	-	-	-	Cb 10 X C min, 1.00 max
	J 1	0.08	7.00-8.00	0.070	0.010	0.70	14.50-15.5	4.00-4.2		0.10	1.50-2.00	
	J 4	0.10	8.50-10.00	0.090	0.030	0.75	15.00-16.00	0.80-1.20		0.20	1.50-2.00	

Ferritic or Martensitic (chromium)

S41008 410S 0.08 1.00 0.040 0.030 1.00 12.0-13.0 0.50 - 0.10 - -

¹ - Maximum, unless range or minimum is indicated

² - Designation established in accordance with Practice E 527 and SAE J 1086.

³ - Unless otherwise indicated, a grade designation originally assigned by the American Iron and Steel Institute (AISI)

⁴ - Carbon analysis shall be reported to nearest 0.01% except for the low - carbon

⁵ - Common name, not a trademark, widely used, not associated with any one producer.

MECHANICAL TEST REQUIREMENTS

Austenitic (Chromium - Nickel) (Chromium-Manganese-Nickel)

UNS Designation	Type ¹	Tensile Strength, min		Yield Strength ² , min		Elongation %	Hardness, max ³	Rockwell	Cold Bend ⁴
		ksi	MPa	ksi	MPa		Brinell		
S30400	304	75	515	30	205	40.0	201	92	
S30403	304L	70	485	25	170	40.0	201	92	
S31600	316	75	515	30	205	40.0	217	95	
S31603	316L	70	485	25	170	40.0	217	95	
S31635	316Ti ⁶	75	515	30	205	35.0	217	95	
S31703	317L	75	515	30	205	40.0	217	95	
S32100	321	75	515	30	205	40.0	217	95	
S34700	347	75	515	30	205	40.0	201	92	
	J 1	80	550	30	205	40.0	217	95	
	J 4	100	700	50	350	40.0	222	97	

Ferritic or Martensitic (Chromium)

S41008 410S 60 415 30 205 22.0 183 89 180

¹ - Unless otherwise indicated, a grade designation originally assigned by the American Iron and Steel Institute (AISI)

² - Yield strength shall be determined by the offset method at 0.02% in accordance with Test Methods and Definitions

³ - Either Brinell or Rockwell B Hardness is permissible

⁴ - Bend Tests are not required for chromium steels (ferritic or martensitic) thicker than 1 in (25mm) or for any austenitic or duplex (austenitic-ferritic)

stainlesssteels regardless of thickness.

⁵ - Elongation for thickness, less than 0.015 in (0.38 mm) shall be 20% minimum in 1 in (25.4 mm)

⁶ - Common name, not a trademark, widely used not associated with any one producer.

* - Elongation in 2 inches or 50 mm, minimum %

SOURCE -

Annual Book of ASTM Standards - Iron and Steel Products- 2001

Properties of Soft Magnetic Alloys

The Nominal Composition by Weight %

Ni	Mo	Si	Mn	C	Fe
80 - 81	4.5 - 6	0.050 - 0.40	0 - 0.50	0.010	Bal

Mechanical & Other Typical Properties

Hard Temper			Soft Temper			Properties of Component after final heat treatment
HV	TS Mpa	% EL GL - 50	HV	TS Mpa	% EL GL - 50	
325	1000	3	160	700	40	HV = 125 TS = 550 Mpa

Density Gm / Cms ³	Resistivity	Curie Temp (OC)	Thermal Expansion
8.70	60	400	12

Magnetic Properties After Heat Treatment

Typical Value				Some Useful Guaranteed Value
μi	μm	Hc A/c m	Bs Tesla	
50,000	150,000	0.015	0.75	Mm (dc) - 100,000 - 300,000