



# Stainless steel grade chart

Grade	UNS No.	Chemical analysis (%) specified								
		C	Si	Mn	P	S	Cr	Mo	Ni	Other
Austenitic stainless steels										
253MA	S30815	0.05 -0.10	1.1 - 2.0	0.8	0.040	0.030	20.0 - 22.0		10.0 - 12.0	N 0.14-0.20 Ce 0.03-0.08
301	S30100	0.15	0.75	2.0	0.045	0.030	16.0 - 18.0		6.0 - 8.0	N 0.10
302HQ	S30430	0.03	1.00	2.0	0.045	0.030	17.0 - 19.0		8.0 - 10.0	Cu 3.0-4.0
303	S30300	0.15	1.00	2.0	0.20	0.15	17.0 - 19.0		8.0 - 10.0	
304	S30400	0.08	0.75	2.0	0.045	0.030	18.0 - 20.0		8.0 - 10.5	N 0.10
304L	S30403	0.030	1.00	2.0	0.045	0.030	18.0 - 20.0		8.0 - 12.0	N 0.10
304H	S30409	0.04 - 0.10	0.75	2.0	0.045	0.030	18.0 - 20.0		8.0 - 10.5	N 0.10
309S	S30908	0.08	1.00	2.0	0.045	0.030	22.0 - 24.0		12.0 - 15.0	
310	S31000	0.25	1.5	2.0	0.045	0.030	24.0 - 26.0		19.0 - 22.0	
316	S31600	0.08	0.75	2.0	0.045	0.030	16.0 - 18.0	2.0 - 3.0	10.0 - 14.0	N 0.10
316L	S31603	0.030	0.75	2.0	0.045	0.030	16.0 - 18.0	2.0 - 3.0	10.0 - 14.0	N 0.10
317L	S31703	0.030	0.75	2.0	0.045	0.030	18.0 - 20.0	3.0 - 4.0	11.0 - 15.0	N 0.10
321	S32100	0.08	0.75	2.0	0.045	0.030	17.0 - 19.0		9.0 - 12.0	N 0.10 Ti=5x(C+N) min. 0.70 max.
347	S34700	0.08	0.75	2.0	0.045	0.030	17.0 - 19.0		9.0 - 13.0	Nb 10xC min. 1.0 1.0 max.
904L	N08904	0.020	1.00	2.0	0.045	0.035	19.0 - 23.0	4.0 - 5.0	23.0 - 28.0	Cu 1.0-2.0

Note 1: Single values are maxima unless otherwise stated.

Note 2: Hardness specification limits given are HRB = Rockwell B scale, HRC = Rockwell C scale, HB = Brinell Hardness.

Note 4: Mechanical properties shown are for the commonly available form listed; properties of other forms for the grade may vary.

Grade	UNS No.	Mechanical properties specified (Note 4)					
		Common form	Treatment	Tensile strength MPa (min.)	Yield strength (0.2% offset) MPa (min.)	Elongation % in 50mm (min.)	Hardness (max) (Note 2)
Austenitic stainless steels							
253MA	S30815	Plate	Annealed	600	310	40	95 HRB
301	S30100	Sheet or coil	Annealed 1/4 to full hard	515 860 - 1275	205 515 - 965	40 25 - 9	95 HRB
302HQ	S30430	Wire 2.5mm dia. and over	Annealed Lightly drawn	605 max. 660 max.	—	—	—
303	S30300	Bar	Cold finished Condition A				262 HB
304	S30400	Plate	Annealed	515	205	40	92 HRB
304L	S30403	Plate	Annealed	485	170	40	88 HRB
304H	S30409	Plate	Annealed	515	205	40	92 HRB
309S	S30908	Bar	Annealed	515	205	40	95 HRB
310	S31000	Plate	Annealed	515	205	40	95 HRB
316	S31600	Plate	Annealed	515	205	40	95 HRB
316L	S31603	Plate	Annealed	485	170	40	95 HRB
317L	S31703	Plate	Annealed	515	205	40	95 HRB
321	S32100	Sheet	Annealed	515	205	40	95 HRB
347	S34700	Plate	Annealed	515	205	40	92 HRB
904L	N08904	Plate	Annealed	490	220	35	70 - 90 NRB typical

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Grade	UNS No.	ASTM standard and product use						
		A167 A240 A666 sheet, coil, strip, plate	A312 A358 A409 pipe	A213 A249 A269 A554 tube	A403 butt weld fittings	A276 A582 bar and shapes	A313 A493 A580 wire	A182 flanges pressure fittings
Austenitic stainless steels								
253MA	S30815							
301	S30100							
302HQ	S30430							
303	S30300					Also UGIMA		
304	S30400					Also UGIMA		
304L	S30403							
304H	S30409							
309S	S30908							
310	S31000							
316	S31600					Also UGIMA		
316L	S31603							
317L	S31703							
321	S32100							
347	S34700							
904L	N08904							

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Grade	UNS No.	Properties and typical applications
<b>Austenitic stainless steels</b>		
253MA	S30815	Excellent resistance to scaling and useful creep strength at temperatures up to 1150°C.
301	S30100	Combination of strength and ductility to withstand severe forming methods. Corrosion resistance comparable to 302. Rail cars, automotive components.
302HQ	S30430	Wire for severe cold heading such as the manufacture of cross recess screws. Corrosion resistance at least equivalent to type 304.
303	S30300	Free machining grade. Domestic and mild industrial environment. Water low in chlorides. Nuts and bolts, shafts, fittings. Corrosion resistance lower than 304.
304	S30400	Good resistance to corrosion, good for malleability and weldability. Most commonly used grade. Wine storage, laundry and kitchen products, water, food, architectural, cryogenic and high temperature applications. UGIMA 304 – improved machinability bar with same properties.
304L	S30403	Corrosion resistance as for 304. Low carbon variation for heavy gauge welded sections.
304H	S30409	Corrosion resistance as for 304. High carbon gives improved high temperature strength.
309S	S30908	Excellent resistance to corrosion, particularly attack by hot sulphur compounds in oxidising gases. Sulphite liquors and acids such as acetic, citric, lactic and nitric. Welding wire for joining dissimilar steels.
310	S31000	Excellent corrosion resistance at normal temperatures. Good resistance to oxidation and carburising atmospheres in high temperatures over 850°C to 1100°C. Welding wire for joining dissimilar steels.
316	S31600	High corrosion resistance to the complex sulphur compounds used in pulp and paper processing. Also resists attack by marine and corrosive industrial atmospheres. Suitable for mild seacoast atmosphere, pulp and paper, heat exchangers, propeller shafts, dyeing equipment. UGIMA 316 improved machinability bar, with same properties.
316L	S31603	Corrosion resistance as for 316. Low carbon variation, suitable for heavy gauge welding.
317L	S31703	Improved corrosion resistance over type 316. Often successfully applied where type 316 has given only moderate performance. Applications such as acetic acid distillation, pulp and paper machinery, ink and dyeing processes. 317L is a variation of 317 suitable for heavy gauge welding.
321	S32100	Excellent corrosion resistance, equivalent to 304 in the annealed condition and superior if the application involves service in 425°C-870°C range. Typical applications include expansion joints, furnace parts, aerospace and power industries, heat exchangers and steam generators.
347	S34700	This grade is resistant to chromium carbide precipitation. Most commonly found as a consumable for welding 321.
904L	N08904	'Super austenitic' grade with very high corrosion resistance, especially to strong acids and chlorides. Frequently used in sulphuric acid service.

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Note 2: Hardness specification limits given are HRB = Rockwell B scale, HRC = Rockwell C scale, HB = Brinell Hardness.

Note 3: 3CR12 generally conforms with both ASTM A240 grade S41003 and with EN 10088 Parts 1 and 2, grade 1.4003. Properties quoted are from EN 10088.2.

Note 4: Mechanical properties shown are for the commonly available form listed; properties of other forms for the grade may vary.



## SECTION 9: APPENDICES

Grade	UNS No.	Chemical analysis (%) specified								
		C	Si	Mn	P	S	Cr	Mo	Ni	Other
Ferritic stainless steels										
3CR12 (Note 3)	1.4003	0.03	1.00	1.50	0.040	0.015	10.5 - 12.5		0.3 - 1.0	N 0.03
409	S40900	0.08	1.0	1.0	0.045	0.030	10.5 - 11.75		0.50	Ti 6xC min. 0.75 max.
430	S43000	0.12	1.0	1.0	0.04	0.030	16.0 - 18.0		0.75	
430F	S43020	0.12	1.0	1.25	0.06	0.15 min.	16.0 - 18.0			
434	S43400	0.12	1.0	1.0	0.04	0.03	16.0 - 18.0	0.75 - 1.25		
Ferritic/Austenitic (Duplex) stainless steels										
2205	S31803	0.030	1.00	2.0	0.030	0.020	21.0 - 23.0	2.5 - 3.5	4.5 - 6.5	N 0.08 - 0.20
UR52N <sup>+</sup>	S32520 S32550	0.030	0.80	1.50	0.035	0.020	24.0 - 26.0	3.0 4.0	5.5 - 8.0	N 0.20-0.35 Cu 0.5-2.0
Martensitic stainless steels										
410	S41000	0.15	1.00	1.00	0.040	0.030	11.5 - 13.5		0.75	
420	S42000	0.15 min	1.00	1.00	0.040	0.030	12.0 - 14.0			
431	S43100	0.20	1.00	1.00	0.04	0.030	15.0 - 17.0		1.25 - 2.50	
Precipitation hardening steel										
630	S17400	0.07	1.00	1.00	0.04	0.03	15.0 - 17.5		3.0 - 5.0	Cu 3.0-5.0 Nb + Ta 0.15-0.45

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Note 4: Mechanical properties shown are for the commonly available form listed; properties of other forms for the grade may vary.

Grade	UNS No.	Mechanical properties specified (Note 4)					
		Common form	Treatment	Tensile strength MPa (min.)	Yield strength (0.2% offset) MPa (min.)	Elongation % in 50mm (min.)	Hardness (max) (Note 2)
Ferritic stainless steels							
3CR12 (Note 3)	1.4003	Plate	Annealed	450 - 650	280 (>6mm) 320 (≤6mm)	18 (>6 mm) 20 (≤6mm)	220 HB (≤12mm) 250 (>12mm)
409	S40900	Tube	Annealed	380	205	20	95 HRB
430	S43000	Sheet	Annealed	450	205	22	89 HRB
430F	S43020	Bar	Annealed	550	380	25	262 HB
434	S43400	Sheet and strip	Annealed	450	240	22	89 HRB
Ferritic/Austenitic (Duplex) stainless steels							
2205	S31803	Plate	Annealed	620	450	25	31 HRC
UR52N <sup>+</sup>	S32520 S32550	Plate	Annealed	770	550	25	310 HRB
Martensitic stainless steels							
410	S41000	Plate	Annealed	450	205	20	96 HRB
420	S42000	Bar	Annealed	655 typical	345 typical	25 typical	241 HB
431	S43100	Bar	Annealed	860 typical			285 HRB
Precipitation hardening steel							
630	S17400	Bar	Solution treated	1105 typical	1000 typical	15 typical	38 HRC

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		A167 A240 A666 sheet, coil, strip, plate	A312 A358 A409 pipe	A213 A249 A269 A554 tube	A403 buttweld fittings	A276 A582 bar and shapes	A313 A493 A580 wire	A182 flanges pressure fittings
Ferritic stainless steels								
3CR12 (Note 3)	1.4003							
409	S40900							
430	S43000							
430F	S43020							
434	S43400							
Ferritic/Austenitic (Duplex) stainless steels								
2205	S31803							
UR52N <sup>+</sup>	S32520 S32550							
Martensitic stainless steels								
410	S41000							
420	S42000							
431	S43100							
Precipitation hardening steel								
630	S17400							

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Grade	UNS No.	Properties and typical applications
<b>Ferritic stainless steels</b>		
3CR12 (Note 3)	1.4003	Useful corrosion resistance particularly in wet abrasion environments. Readily welded and formed into tanks, flues, bins, chutes, rail wagons, etc.
409	S40900	Resists atmospheric and automotive exhaust gas corrosion. Extensively used in auto exhaust systems.
430	S43000	Good combinations of corrosion resistance, formability and mechanical properties. Typical applications include automotive trims, element supports, cold headed fasteners, refrigerator doors.
430F	S43020	430F is a free machining version of 430, suitable for high speed machining. Corrosion resistance is lower than 430.
434	S43400	Molybdenum improves the pitting resistance over grade 430. Good for automotive trim components.
<b>Ferritic/Austenitic (Duplex) stainless steels</b>		
2205	S31803	2205 microstructure is approximately 50% ferrite and 50% austenitic, which results in the steel possessing high strength and hardness, and resistance to erosion, fatigue, stress corrosion cracking and pitting and crevice corrosion. Applications in marine, chemical and petrochemical industries.
UR52N <sup>+</sup>	S32520 S32550	'Super Duplex' grade exhibiting exceptional resistance to hot chlorides and sulphides with high strength. Applications in marine, chemical and petrochemical industries.
<b>Martensitic stainless steels</b>		
410	S41000	Resists dry atmospheres, fresh water, mild alkalines and acids, steam and hot gases. Must be hardened for maximum heat and corrosion resistance. Typical applications include cold heading, bolts, nuts and screws, pump parts and shafts, steam and gas turbine parts, mine ladder rungs.
420	S42000	Good resistance in the hardened condition to the atmosphere. Food, fresh water and mild alkalines or acids. Higher carbon hardenable grade. Typical applications include cutlery, surgical instruments, shear blades, needle valves.
431	S43100	Excellent resistance to a wide variety of corrosive media, approaching that of 304. High tensile and torque strength. Pump and boat shafts, nuts, bolts and marine hardware.
<b>Precipitation hardening steel</b>		
630	S17400	Precipitation hardening ('aging') treatment after machining gives high strength without distortion. Corrosion resistance similar to type 304. Pump shafts and valve spindles.

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