Types and Applications of Stainless Steel

100 Series:

Grade	Description	Application
101	Austenitic. Hardenable through cold-working.	Furniture
102	Austenitic. General purpose stainless.	Furniture

200 Series: Austenitic Chromium-Nickel-Manganese Alloys

Grade	Description	Application
201	Replacing some nickel with manganese makes this an inexpensive stainless steel. Not appropriate for applications that require high corrosion resistance, as it is susceptible to pitting and crevice corrosion. Weldable with 308L filler. Hardenable through cold working.	Household appliances, cooking utensils, automotive trim, trailers
202	One of the most common precipitation hardening grades, it has excellent toughness especially at low temperatures. Excellent weldability (except with gas) with ER630 filler, machining produces long, gummy chips. Used as a cost-effective stainless where medium hardness but high strength is needed.	Hose clamps, pipes, rebar, hinges, hard toes and soles in work boots, windows and doors, restaurant equipment, cooking utensils, trailers, railway cars
204Cu	Developed as a low-cost alternative to 304 stainless. Copper is added to boost corrosion resistance. Excellent formability. Prone to work hardening during machining. Weldable with ER630 filler.	Hinges, baskets, fasteners
205	Precipitation hardening stainless. About 30% higher yield strength than 304 stainless. Weldable with ER630 filler.	For whatever reason, it's really hard to find info about common applications of this grade. I've never knowingly worked with it.

300 Series: Austenitic Chromium-Nickel Alloys

Grade	Description	Application
301	Very ductile, but quickly work hardens when forming. Good weldability, reasonable machinability. Better fatigue strength and wear resistance than 304. It becomes more magnetic than other austenitic grades when cold worked.	Aircraft parts, appliances, trailers, utensils, automotive trim, conveyors, roof drainage systems

302	Very similar to 304 in terms of corrosion resistance, but higher strength because of added carbon. Comparatively harder to weld.	Pressure vessels, radio antennas, bottling equipment, spring clips, washers, retainers, hospital equipment
303	The free-machining version of 304 stainless. Also referred to A1 stainless.	Machined components
304	The hands-down most common type of stainless, generally the benchmark of comparison for everything. Also called 18-8, A2 stainless, or “Staybrite” (old trade name).	Literally, almost anything.
304L	A low-carbon variation of 304, used to increase weldability. Mildly reduced strength.	Weldments, tanks, pipes
304LN	Similar to 304L for weldability, but added nitrogen compensates for lower carbon in terms of strength.	Higher strength weldments
308	Used as weld filler. Common for welding 304.	Welding rod/filler
309	Higher temperature resistance than 304. Also used for joining dissimilar steels.	Burners, heat exchangers, high-temp wrapping foil, welding rod/filler
309S	Low carbon version of 309 to improve weldability.	Burners, heat exchangers
310	Higher temperature applications than 309. Resists scaling and creep. Has good high temperature strength.	Higher-temp burners where Inconel is cost-prohibitive
310S	Low carbon version of 310 for increased weldability.	Welded higher-temp burners where Inconel is cost-prohibitive
314	Added silicon for higher heat resistance than 310.	High-temp burners
316	The second most common grade, molybdenum added for high corrosion resistance. Also called A4 stainless. Almost identical to 304 otherwise.	Boats/marine, surgical instruments, pulp and paper processing equipment, food processing, consumer goods like watches, etc
316L	Low carbon, used for welding applications. Slightly weaker in terms of testing requirements than 316. Very common. Stainless can be dual-certified to both 316/316L as long as 316L meets minimum strength requirements for 316.	Corrosive-environment weldments, pipes, tanks
316N	Nitrogen added to increase strength with a minimal effect on ductility and corrosion resistance. High creep strength at elevated temperatures.	Pressure vessels, textile finishing, photographic, food processing, chemical processing
316H	Higher carbon content for higher temp applications. Not very common.	Chemical and petroleum processing, pressure vessels, heat exchangers, fittings, valves, pumps, flanges, pipes

317	Additional molybdenum and chromium for higher corrosion resistance than 316.	Highly corrosive environments where titanium is cost-prohibitive
317L	Low carbon variation of 317 for welding applications. Lower strength than 317.	Weldments in highly corrosive environments where titanium is cost-prohibitive
317LMN	Molybdenum and nitrogen added to compensate for lower strength due to reduced carbon.	Weldments in highly corrosive environments where strength is important, pressure vessels
321	Similar to 304 but for higher strength welds due to addition of titanium. Formable. Does not polish well.	Aircraft exhaust manifolds, bellows, furnace parts, burner pipes and flues
321H	High-carbon variation of 321 to improve high temperature strength.	
330	Nitrogen added to resist carburization and thermal shock.	Petrochemical furnace parts, heat exchangers, ore processing, boiler fixtures
347	Similar to 321 but uses niobium to help with welding and to prevent carbide precipitation. Often used as a weld filler for 321.	Weld filler
348	Similar to 321 but with niobium or tantalum to stabilize.	Nuclear

400 Series: Ferritic and Martensitic Chromium Alloys

Grade	Description	Application
403	Martensitic. Reasonable corrosion resistance and high mechanical strength. Usually it's just re-certified 410 since it's practically identical.	When engineers dislike 410 for whatever reason.
405	Ferritic. Cheap stainless that's used for welding applications.	Steam nozzles, partitions, quenching racks, annealing boxes
408	Ferritic. Heat resistant but low corrosion resistance.	
409	Ferritic. Extremely low cost, able to handle high temperatures. Consists of only iron and chromium.	Automotive exhausts, other low-end applications where you want something to minimally meet the "stainless" criteria
410	Martensitic. Good wear resistance, lower corrosion resistance. Can be hardened, tempered, and polished for greater corrosion resistance.	Bolts, screws, nuts, shafts, pumps, valves, mine ladder rungs, gas turbines
416	Free machining because of added sulfur. Less corrosion resistant than 300 series stainless.	Fasteners, bushings, cutlery, turbine blades
420	Martensitic. Highly polishable.	Surgical instruments, cutlery

430	Ferritic. Typically for decorative applications. Formable, but lower corrosion and temperature resistance.	Automotive trim
439	Ferritic. Slightly higher end version of 409 because of higher chromium content.	Catalytic converter exhaust systems
440A	Martensitic. Highest corrosion resistance of the 440's, lowest carbon content. Found in cheaper knives, but also really practical for diving knives (and other salt-water situations) where the corrosion resistance is key. Fast to sharpen, but also quickly dulls.	Good diving knives, cheaper knives, replica swords and whatnot
440B	Martensitic. It's the middle road between 440A and 440C.	Knives
440C	Martensitic. The most common grade of 440. It's known as a high-grade cutlery steel, or "razor steel". It makes good quality knives and they hold an edge really well. Not too expensive compared to "name brand" proprietary versions of stainless.	Knives, razors, and other blades
440F	The free-machining variation of 440C, but not too common. Otherwise basically the same.	Machined knives
446	Good for high-temp applications, corrosion resistant, low strength. Able to withstand molten copper and brass. Weldable with E310 or E312. Forming and bending must be done at low speeds.	Recuperators, furnace linings, combustion chambers, glass molds, spouts for molten copper alloys

500 Series: Heat Resisting Chromium Alloys

Grade	Description	Application
501	Reasonably strong in high-heat applications. Almost always annealed when used.	Refinery equipment like oil pump and pipe parts, flanges and fittings
502	Reasonably heat and corrosion resistant, generally used for mild atmospheres where carbon or alloy steel isn't sufficient.	Oil and chemical plants

600 Series: Proprietary Alloys

Grade	Description	Application
601	Martensitic. Low alloy. Difficult to machine. Good high temperature strength.	Rotary kilns, copper brazing, radiant tubes, thermocouple protection tubes
602	Martensitic. Low alloy. Highly resistant to oxidation at high temperatures.	applications available
603	Martensitic. Low alloy.	for 600 series stainless
604	Martensitic. Low alloy.	
610	Martensitic. Secondary hardening.	
611	Martensitic. Secondary hardening.	
612	Martensitic. Secondary hardening.	

613	Martensitic. Secondary hardening.	
614	Martensitic chromium steel.	
615	Martensitic chromium steel.	
616	Martensitic chromium steel.	
617	Martensitic chromium steel.	
618	Martensitic chromium steel.	
619	Martensitic chromium steel.	
630	Martensitic. Best known as 17-4, and the most common of the precipitation hardening stainless steels. Easy to heat treat, and known for high strength as well as hardness and corrosion resistance up to operating temperatures of 600 F	Petroleum and chemical processing, aerospace, food processing, pulp and paper, general metalworking
631	Austenitic and martensitic. Precipitation hardening.	
632	Austenitic and martensitic. Precipitation hardening.	
633	Austenitic and martensitic. Precipitation hardening.	
634	Austenitic and martensitic. Precipitation hardening.	
635	Austenitic and martensitic. Precipitation hardening.	
650	Austenitic. Strengthened by hot or cold work.	
651	Austenitic. Strengthened by hot or cold work.	
652	Austenitic. Strengthened by hot or cold work.	
653	Austenitic. Strengthened by hot or cold work.	
660	Austenitic. Superalloy. Strengthened by second-phase precipitation.	
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665	Austenitic. Superalloy. Strengthened by second-phase precipitation.	

900 Series: Austenitic Chromium-Molybdenum Alloys

Grade	Description	Application
904 /904L	Similar to 316 but with higher corrosion resistance. Highly polishable. Does not machine well and difficult to form.	Extremely corrosive environments, such as piping systems, pollution control equipment, heat exchangers, bleaching systems, marine applications, and Rolex watches (possibly because people that wear Rolexes are corrosive??)

Duplex

Grade	Description	Application
2205	Ferritic/austenitic. The most common Duplex grade. Excellent corrosion resistance and high strength.	

Other Common Stainless Steels

Grade	Description	Application
15-5 /15-5PH	Martensitic. Precipitation hardening with copper. Higher toughness and corrosion resistance than 17-4. Developed from 17-4	Aerospace fasteners and structural components, nuclear
17-4 /17-4PH	See type 630.	See type 630
18-8	See type 304.	See type 304