

Material characteristics of Stainless Steel



AISI Standard	431 (A4)	304	303	CF-8 Precision casting
German Material No.	1.4057 (A4)	1.4301	1.4305	1.4308
DIN / EN-Number	EN 10088-3	EN 10088-3	EN 10088-3	EN 10213-4
Symbol	X 17 CrNi 16-2	X 5 CrNi 18-10	X 8 CrNiS 18-9	GX 5CrNi 19-10
Alloying components %	C ≤ 0,12 ... 0,22 Cr 15,0 ... 17,0 Ni 1,5 ... 2,5	C ≤ 0,07 Cr 17,5 ... 19,5 Ni 8,0 ... 10,5	C ≤ 0,10 S ≤ 0,15 ... 0,35 Cr 17,0 ... 19,0 Ni 8,0 ... 10,0	C ≤ 0,07 Cr 18,0 ... 20,0 Ni 8,0 ... 11,0
Minimum tensile strength Rm in N/mm²	800 ... 950	500 ... 700	500 ... 700	440 ... 640
Yield strength Rp0,2 in N/mm²	≥ 600	≥ 190	≥ 190	≥ 175
Machinability	poor	medium	very good	medium
Forgeability	medium	good	poor	–
Weldability	good	excellent	poor	good
Special characteristics	magnetic, martensitic structure for elements with high stability, can be used up to 400 °C	antimagnetic, austenitic structure suitable for low temperatures, can be used up to 700 °C	antimagnetic, austenitic structure	antimagnetic, austenitic structure
Corrosion resistance	good however, sensitive to intercrystalline corrosion	good resistant to corrosion, in the natural environment: water, rural and urban atmospheres without significant chloride or acid concentrations, in food areas and in agricultural food areas	medium due to the sulphur content reservations in environments which contain acids and chlorides	good resistant to corrosion, Material is largely comparable with AISI 304
Main areas of application	Vehicle construction Chemical industry Aviation Machine construction Food industry	Food industry Agriculture Chemical industry Vehicle construction Construction industry Machine construction Decorative purposes (Kitchen equipment)	Vehicle construction Electronics Decorative purposes (Kitchen equipment) Machine construction	Food industry Beverage industry Packaging industry Fittings Pumps Agitators

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AISI Standard	301	316	316 LHC Sintered Material	316 L (A4, bar steel)
German Material No.	1.4310	1.4401 (A4)	1.4404	1.4404 (A4)
DIN / EN-Number	EN 10088-3	EN 10088-3	Sint C40	EN 10088-3
Symbol	X 10 CrNi 18-8	X 5 CrNiMo 17-12-2	X 2 CrNiMo 17-13-2	X 2 CrNiMo 17-12-2
Alloying components %	C ≤ 0,05 ... 0,15 Mo ≤ 0,8 Cr 16,0 ... 19,0 Ni 6,0 ... 9,5	C ≤ 0,07 Cr 16,5 ... 18,5 Ni 10,0 ... 13,0 Mo 2,0 ... 2,5	C ≤ 0,08 Mo 2,0 ... 4,0 Cr 16,0 ... 19,0 Ni 10,0 ... 14,0	C ≤ 0,03 Cr 16,5 ... 18,5 Ni 10,5 ... 13,0 Mo 2,0 ... 2,5
Minimum tensile strength R_m in N/mm²	500 ... 750	500 ... 700	330	500 ... 700
Yield strength R_{p0,2} in N/mm²	≥ 195	≥ 200	≥ 250	≥ 200
Machinability	poor	medium	–	medium
Forgeability	good	good	–	good
Weldability	excellent	good	–	excellent
Special characteristics	antimagnetic, austenitic structure usable as spring steel up to 300 °C	antimagnetic, austenitic structure suitable for low temperatures, can be used up to 600 °C	antimagnetic structure	antimagnetic, austenitic structure suitable for low temperatures, can be used up to 700 °C
Corrosion resistance	good however, sensitive to intercrystalline corrosion	very good significantly higher than AISI 304 in natural environmental mediums and moderate chlorine and salt concentra- tions, however not resistant to ocean water	medium by virtue of its coarser porosity the corrosion resistance is in general reduced as compared with Stainless Steel, reservations espe- cially in acid and salty environment	very good significantly higher than AISI 304 in natural environmental mediums and moderate chlorine and salt concentra- tions, however not resistant to ocean water
Main areas of application	Springs for tempera- tures up to 300 °C Tools (knives) Plates for vehicle construction Chemical and food industry	Chemical industry Food industry Machine construction Building industry	Paint, oil, soap and textile industry Electronics Decorative purposes (Kitchen equipment)	Vehicle construction Chemical industry Food industry Medical / Pharmaceutical industry Building industry

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AISI Standard	316	630	304 Cu	316 Ti (A4)
German Material No.	1.4408	1.4542	1.4567	1.4571 (A4)
DIN / EN-Number	EN 10213-4	EN 10088-3	EN 10088-3	EN 10088-3
Symbol	GX 5 CrNiMo 19-11-2	X 5 CrNiCuNb 16-4	X 3 CrNiCu 18-9-4	X 6 CrNiMoTi 17-12-2
Alloying components %	C ≤ 0,07 Cr 18,0 ... 20,0 Ni 9,0 ... 12,0 Mo 2,0 ... 2,5	C ≤ 0,07 Cr 15,0 ... 17,0 Ni 3,0 ... 5,0 Cu 3,0 ... 5,0 Nb min. 5xC ... 0,45	C ≤ 0,04 Cr 17,0 ... 19,0 Ni 8,5 ... 10,5 Cu 3,0 ... 4,0	C ≤ 0,08 Mn ≤ 2,0 Cr 16,5 ... 18,5 Ni 10,5 ... 13,5 Mo 2,0 ... 2,5 Ti ≤ 5xC max. 0,7
Minimum tensile strength R_m in N/mm²	440 ... 650	800 ... 1200	450 ... 650	500 ... 700
Yield strength R_{p0,2} in N/mm²	≥ 185	500 ... 1000	≥ 175	≥ 175
Machinability	medium	poor ... medium	medium ... good	medium ... poor
Forgeability	-	good	good	medium
Weldability	good	good	good	good
Special characteristics	antimagnetic, austenitic structure	antimagnetic, austenitic structure hardenable (precipitation hardening) suitable for low temperatures, can be used up to 450 °C	antimagnetic, austenitic structure suitable for cold forming	antimagnetic, austenitic structure suitable for low temperatures can be used up to 700 °C, high stability even at high temperatures
Corrosion resistance	very good acid-resistant	good Corrosion resistance comparable with AISI 304, insensitive to intergranular corrosion	good resistant to corrosion in the natural environment: water, rural and urban atmospheres without significant acid concentrations, in food areas and in agricultural food areas.	very good comparable with 316 L
Main areas of application	Food industry Chemical industry Fittings Pumps Machine construction	Shipbuilding Food industry Construction engineering Automotive industry Chemical industry Plant construction	Food industry Agriculture Chemical industry Machine construction Shipbuilding Electronics Screw industry	Equipment and pipeline construction Chemical industry Food industry Medical / Pharmaceutical industry Shipbuilding

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