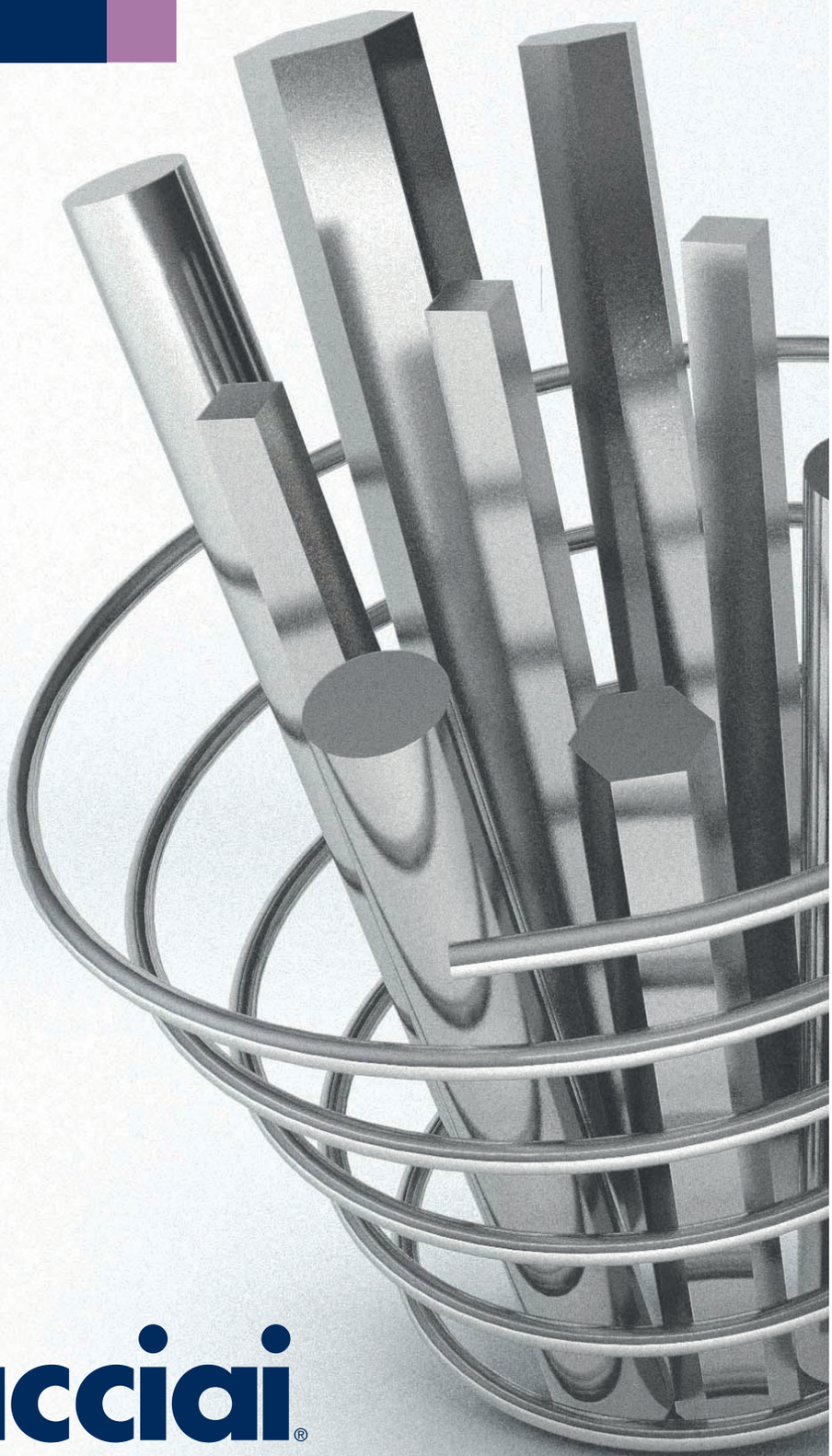
STAINLESS STEELS



Rodacciai®

SINCE 1959 ALL OVER THE WORLD

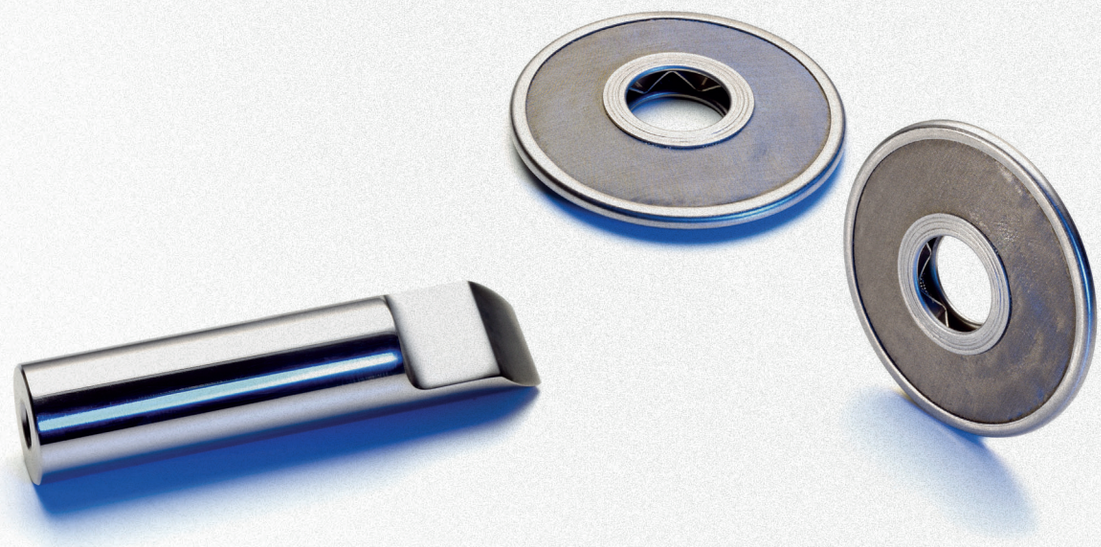
STAINLESS STEELS

Stainless steels have a **resistance to corrosion** which is significantly higher than other carbon or alloy steels. Some stainless grades also exhibit excellent resistance to high temperatures.
These characteristics are obtained with the addition of Chromium and other alloying elements, which make Stainless Steel suitable for use in **agressive corrosive environments such as chemical plants, marine environments, offshore drilling, agriculture, food processing and also architectural applications.**
Stainless Steel can by supplied hot rolled or cold finished in an annealed, normalized or quenched & tempered condition.
Bars and wire in a varity of shapes and sized are available.

	Condition	Profile	Range (mm)	Finish	Tolerances
Bars	Hot rolled	Round	20÷100	As rolled, rough peeled	-
	Cold-drawn	Round Hexagonal Square Special	2÷40 4÷65 4÷55	Bright	ISA h9-h10-h11
	Smooth-turned	Round	20÷80	Smooth and bright	ISA h9-h10-h11
	Ground	Round	3÷80	Smooth and bright	ISA h6-h7-h8-h9-h10-h11
Coils	Cold-drawn	Round Hexagonal Square Special	1÷22 3÷12 4÷12	Bright Coated	ISA h9-h10-h11 EN 10218-2 T1-T2-T3-T4-T5

For all Imperial sizes - cold drawn & smooth turned, or cold drawn wire - tolerances: Per ASTM A484

For our RPM.Bar (imperial or decimal sizes) - cold drawn & smooth turned: J9 tolerance which is half of the tolerance listed in ASTM A484, Straightness of 1/32" per 5ft, Out of roundness - ½ the dia tolerance



FERRITIC STAINLESS STEELS

Ferritic Stainless Steels cannot be heat treated and quenched . However, their mechanical properties can be increased by work hardening through cold drawing.
The corrosion resistance is ensured by the Chromium content and further increased by the addition of Molibdenum.
To enhance machinability, Sulfur is added.
These steels are **magnetic** and commonly used in automotive applications, as well as appliances and a variety of industrial applications.

	EN 10088-3: 2014 EN 10263-5: 2017	N°	AISI-UNS	C (max)	Si (max)	Mn (max)	P (max)	S	Cr	Mo	Other elements
430	X6Cr17	1.4016	430 S43000	0,08	1,00	1,00	0,040	≤ 0,030	16,0÷18,0	-	-
430Nb	X3CrNb17	1.4511	-	0,05	1,00	1,00	0,040	≤ 0,030	16,0÷18,0	-	Nb=12xC÷1,0
1.4105	X6CrMoS17	1.4105	430F S43020	0,08	1,50	1,50	0,040	0,15÷0,35	16,0÷18,0	0,20÷0,60	-
430F M	(X6CrMoS17)	(1.4105)	(430F S43020)	0,08	1,50	1,50	0,040	0,15÷0,35	16,0÷18,0	0,80÷1,10	Ni= ≤1,0
1.4106	X2CrMoSiS18-2-1*	1.4106	-	0,03	2	1,00	0,040	0,25÷0,35	17,0÷19,0	1,5÷2,50	-
434	X6CrMo17-1	1.4113	434 S43400	0,08	1,00	1,00	0,040	≤ 0,030	16,0÷18,0	0,90÷1,40	-
1.4114	X6CrMoS19-2*	1.4114*	(XM34 S18200)	0,08	1,00	2,50	0,040	0,15÷0,35	17,5÷19,5	1,50÷2,50	Ni= ≤0,75

* There are no standard for this grade

MARTENSITIC STAILNLESS STEELS

Martensitic Stainless Steels typically have increased Chromium content as well as higher carbon levels.
These steels are suitable to be **heat treated**, quenched and tempered.
They can be offered in the annealed condition with good machinability, enhanced by the **addition of Sulfur**, or in the quenched and temperd condition for increased mechanical properties and corrosin resistance.
High surface hardness can be achieved for these steels by induction hardening.
Typical applications include instruments and high strength components for pumps and valves.

	EN 10088-3: 2014 EN 10263-5: 2017	N°	AISI-UNS	C	Si (max)	Mn (max)	P (max)	S	Cr	Other elements
410	X12Cr13	1.4006	410 S41000	0,08÷0,15	1,00	1,50	0,040	≤ 0,030	11,5÷13,5	Ni = ≤ 0,75
416	X12CrS13	1.4005	416 S41600	0,06÷0,15	1,00	1,50	0,040	0,15÷0,35	12,0÷14,0	Mo = ≤ 0,60
420A	X20Cr13	1.4021	420 S42000	0,16÷0,25	1,00	1,50	0,040	≤ 0,030	12,0÷14,0	-
420B	X30Cr13	1.4028	420 S42000	0,26÷0,35	1,00	1,50	0,040	≤ 0,030	12,0÷14,0	-
420C	X39Cr13	1.4031	420 S42000	0,36÷0,42	1,00	1,00	0,040	≤ 0,030	12,5÷14,5	-
420C1	X46Cr13	1.4034	420 S42000	0,43÷0,50	1,00	1,00	0,040	≤ 0,030	12,5÷14,5	-
430F	X14CrMoS17	1.4104	430F S43020	0,10÷0,17	1,00	1,50	0,040	0,15÷0,35	15,5÷17,5	Mo = 0,20÷0,60
1.4122	X39CrMo17-1	1.4122	-	0,33÷0,45	1,00	1,50	0,040	≤ 0,030	15,5÷17,5	Ni = ≤ 1,00 Mo = 0,80÷1,30
431	X17CrNi16-2	1.4057	431 S43100	0,12÷0,22	1,00	1,50	0,040	≤ 0,030	15,0÷17,0	Ni = 1,50÷2,50

AUSTENITIC STAINLESS STEELS

In addition to Chromium (the common element of all Stainless Steel), Austenitic Stainless Steels contain high levels of Nickel, which significantly **improves the steels resistance to corrosion**. Varrying by grade – other alloying elements include Molybdenum, Titanium, Niobium, Copper etc. – are added to achieve specific design properties & performance.
Heat treatment with quenching & tempering is not possible for these steels.
However – cold drawing will significantly change and increas mechanical properties, with the possibility to design the process to achieve specific design values.
In the hot rolled condition – these steels are not magnetic, while in the cold drawn state they will exhibit slight residual magnetism.
Austeniutic Stainless Steels are used in a great variety of applications from cold heading where the addition of copper enhances formability to the manufacture of air craft fittings & automotive parts.
Our Steels of the **PLUS series** are calcium treated and have added **Sulfur which greatly enhances machinability**.

	EN 10088-3: 2014 EN 10263-5: 2017	N°	AISI-UNS	C	Si (max)	Mn (max)	P (max)	S	N (max)	Cr	Ni	Other elements
RODINOX	Patented grade	-	-	0,10	1,00	5,0÷9,0	0,045	0,030	0,20	16,0÷19,0	3,0÷6,0	Cu = 1,00÷4,00
302	X10CrNi18-8	1.4310	302 S30200	0,05÷0,15	2,00	2,00	0,045	≤ 0,015	0,10	16,0÷19,0	6,0÷9,5	Mo = ≤ 0,80
303Plus	X8CrNiS18-9	1.4305	303 S30300	≤ 0,10	1,00	2,00	0,045	0,15÷0,35	0,10	17,0÷19,0	8,0÷10,0	Cu = ≤ 1,00
GVR	X6CrNiCuS18-9-2	1.4570	303+Cu S30331	≤ 0,08	1,00	2,00	0,045	0,15÷0,35	0,10	17,0÷19,0	8,0÷10,0	Mo = ≤ 0,60 Cu = 1,40÷1,80
304	X5CrNi18-10	1.4301	304 S30400	≤ 0,07	1,00	2,00	0,045	≤ 0,030	0,10	17,5÷19,5	8,0÷10,5	-
304Plus	X2CrNi18-9	1.4307	304L S30403	≤ 0,030	1,00	2,00	0,045	≤ 0,030	0,10	17,5÷19,5	8,0÷10,5	-
321	X6CrNiTi18-10	1.4541	(321 S32100)	≤ 0,08	1,00	2,00	0,045	≤ 0,030	-	17,0÷19,0	9,0÷12,0	Ti = 5xC÷0,70
304ST	X2CrNi19-11	1.4306	304L S30403	≤ 0,030	1,00	2,00	0,045	≤ 0,030	0,10	18,0÷20,0	10,0÷12,0	-
304Cu	X3CrNiCu18-9-4	1.4567	302HQ S30430	≤ 0,04	1,00	2,00	0,045	≤ 0,030	0,10	17,0÷19,0	8,5÷10,5	Cu = 3,00÷4,00
316	X5CrNiMo17-12-2	1.4401	316 S31600	≤ 0,07	1,00	2,00	0,045	≤ 0,030	0,10	16,5÷18,5	10,0÷13,0	Mo = 2,00÷2,50
316Plus	X2CrNiMo17-12-2	1.4404	316L S31603	≤ 0,030	1,00	2,00	0,045	≤ 0,030	0,10	16,5÷18,5	10,0÷13,0	Mo = 2,00÷2,50
316Ti	X2CrNiMoTi17-12-2	1.4571	(316Ti S31635)	≤ 0,08	1,00	2,00	0,045	≤ 0,030	-	16,5÷18,5	10,5÷13,5	Mo = 2,00÷2,50 Ti = 5xC÷0,70
1.4435	X2CrNiMo18-14-3	1.4435	316L S31603	≤ 0,03	1,00	2,00	0,045	≤ 0,030	0,10	17,0÷19,0	12,5÷15,0	Mo = 2,50÷3,00
316Cu	X3CrNiCuMo17-11-3-2	1.4578	316Cu	≤ 0,04	1,00	2,00	0,045	≤ 0,015	0,10	16,5÷17,5	10,0÷11,0	Mo = 2,00÷2,50 Cu = 3,00÷3,50
204Cu	-	-	-	≤ 0,15	1,00	6,5÷9,0	0,060	≤ 0,030	0,05÷0,25	15,5÷17,5	1,5÷3,5	Cu = 2,00÷4,00

AUSTENITIC-FERRITIC STAINLESS STEELS (Duplex)

Duplex Stainless Steels have the two-phase **microstructure of Austenitic and Ferritic grades**.
Despite **lower Nickel** content they have excellent corrosion resistance, and can achieve high mechanical properties through cold drawing.
These steels lend themselfs readily for **marine and off-shore oil** exploration.
They are magnetic, can be welded but cannot be heat treated and quenched.
Duplex steels are still undergoing research and development to fully explore new uses and applications.

R	EN 10088-3: 2014 EN 10263-5: 2017	N°	AISI-UNS	C (max)	Si (max)	Mn (max)	P (max)	S (max)	Cr	Cu	Mo	N	Ni
2304	X2CrNiN23-4	1.4362	(2304 S32304)	0,03	1,00	2,00	0,035	0,015	22,0÷24,5	0,1÷0,6	0,1÷0,6	0,05÷0,20	3,5÷5,5
1.4460	X3CrNiMoN27-5-2	1.4460	(329 S32900)	0,05	1,00	2,00	0,035	0,030	25,0÷28,0	-	1,3÷2,0	0,05÷0,20	4,5÷6,5
2205	X2CrNiMoN22-5-3	1.4462	2205 S31803	0,03	1,00	2,00	0,035	0,015	21,0÷23,0	-	2,5÷3,5	0,10÷0,22	4,5÷6,5

HEAT-RESISTANT STAINLESS STEELS

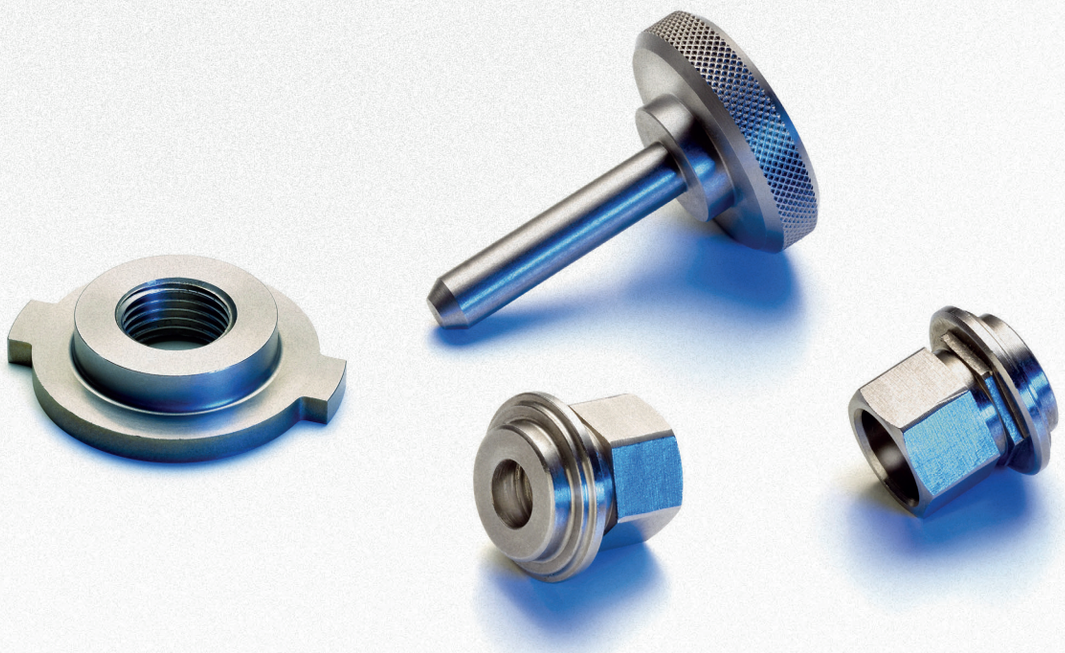
Heat-Resistant Stainless Steels have good strength and **corrosion resistance** at elevated **temperatures**.
This is achieved with high levels of Chromium and Nickel content.
These steels are used in mechanical applications such as **heat treating furnace components** and coils of resistors for heat treating elements.
There characteristics ensure long service life at **elevated temperatures**, with excellent corrosion protection.

	EN 10088-1:2014 EN 10095: 1999	N°	AISI-UNS	C (max)	Si (max)	Mn (max)	P (max)	S (max)	N (max)	Cr	Ni	Nb
310	X8CrNi25-21	1.4845	(310S S31008)	0,10	1,50	2,00	0,045	0,015	0,11	24,0÷26,0	19,0÷22,0	-
314	X15CrNiSi25-21	1.4841	(314 S31400)	0,20	1,50÷2,50	2,00	0,045	0,015	0,11	24,0÷26,0	19,0÷22,0	-
330Nb	X10NiCrSiNb35-22	1.4887	330Nb	0,15	1,00÷2,00	2,00	0,030	0,015	0,10	20,0÷23,0	33,0÷37,0	1,0÷1,5

PRECIPITATION HARDENING STEELS

These steels will achieve very high hardness through the addition of copper and an **age hardening** process defined by specific temperature and times the steel is exposed to these temperatures.
Rodacciai's **precipitation hardening** steels are martensitic and depending on the age hardening time & temperature will achieve hardnesses higher than quenched & tempered steels.
Parts are usually machined in the annealed condition and then agehardened to the desired properties.
Applications include **marine and medical use**.

	EN 10088-3: 2014 EN 10263-5: 2017	N°	AISI-UNS	C (max)	Si (max)	Mn (max)	P (max)	S (max)	Cr	Ni	Mo (max)	Cu	Other elements
17-4 PH	X5CrNiCuNb16-4	1.4542	17-4PH S17400	0,07	0,70	1,50	0,040	0,030	15,0÷17,0	3,0÷5,0	0,60	3,0÷5,0	Nb=5xC÷0,45
631M	X7CrNiAl17-7	1.4568	17-7PH S17700	0,09	0,70	1,00	0,040	0,015	16,0÷18,0	6,5÷7,8	-	-	Al=0,70÷1,50



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