AUBERT&DUVAL

SPECIAL STEELS AND SUPERALLOYS BARS

www.aubertduval.com

A complete product offer

Main Materials

- **HPS** — High performance steels
- **NiSA** — Nickel-based superalloys
- **Ti** — Titanium alloys

Main Processes

Melting / Remelting

Rolling

Forging

Innovation

Designing best-in class new advanced materials

Aubert & Duval is a world leader at designing new grades or optimizing legacy alloys in close cooperation with customers. Thanks to the world-renowned expertise of its metallurgists, Aubert & Duval continuously co-develops and optimizes new product grades to provide reliable solutions to customers 'requirements : MLX®17, MLX®19, ARMAD®, AD730®, ML340....

Certifications and specifications

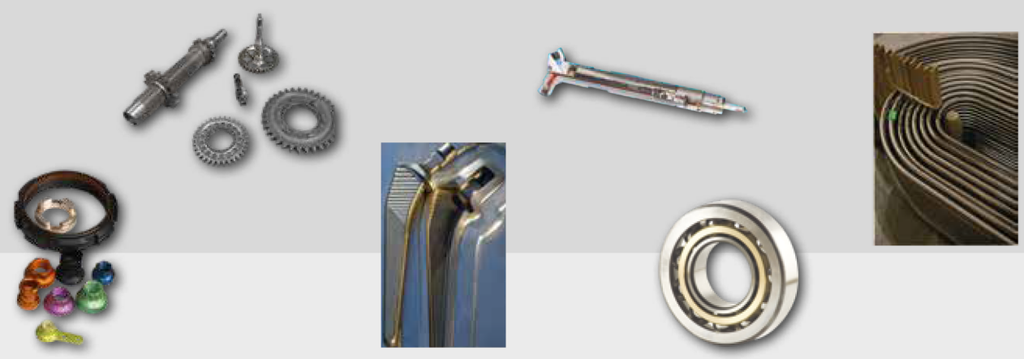
In addition to general certifications (ISO 9001, ISO 14001, ISO 18001), our Service Center is certified to the most stringent industry specific standards: IS0 9100 (aero design and manufacturing), ISO 9120 (aero distribution) and AQAP 2110 (NATO). Also, our products are AMS, ABS and ASNA specified.

Our customers transform our bars

Offering the most relevant metallurgical solutions

Aubert & Duval provides metallurgical solutions exhibiting excellent mechanical properties such as hardenability, corrosion resistance, toughness, fatigue performance, high temperature resistance or abrasion resistance. The combination of these advanced mechanical characteristics fulfils the metallurgical requirements for various critical applications:

Aerospace, Energy, Defense, Transportation, Tooling, Specialties



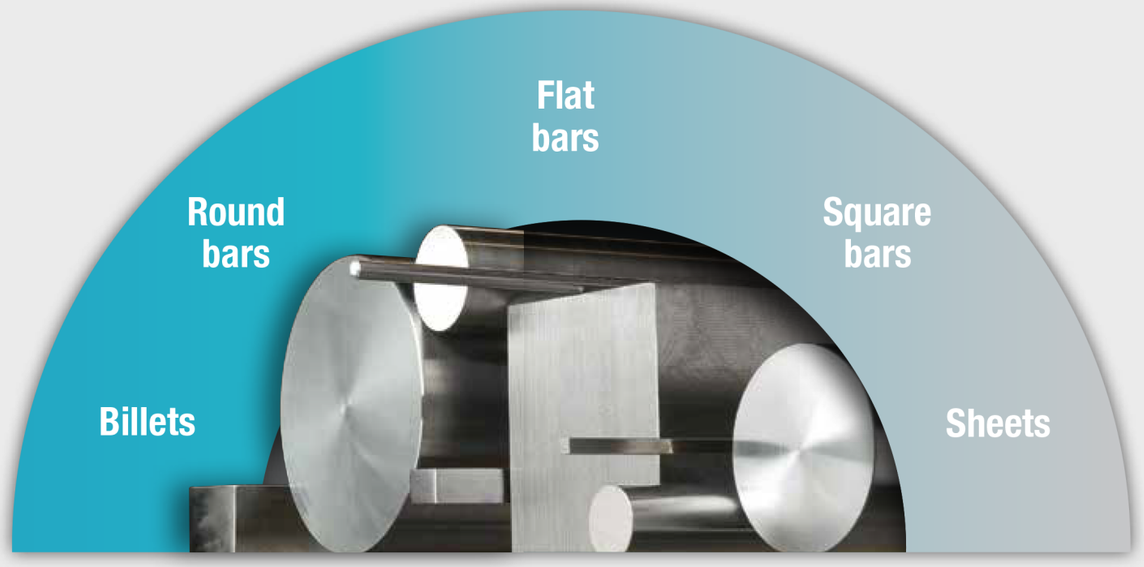
Whether used in Aerospace, Nuclear, Defense, Motosport or medical, many parts are manufactured from bars in High Performance Steels, Superalloys or Titanium.

The initial quality of the selected material is therefore key in the final performance of the part. We offer a wide range of products in several forms of our bars – round, flat and square – and also in billets, sheets and to better fit customers requirements.

Because a bar is not only a bar, we bring technical support and innovation to our customers as well as different services in heat treatment and logistics.

www.aubertduval.com/services-support/technical-support

A dedicated and large offering



PRODUCTS	DIAMETERS (mm) (Please contact us for other requirements)	Tolerances (mm) (black bars)		LENGTHS (mm) (Please contact us for other requirements)	STRAIGHTNESS
Round Bars (Black or peeled)	20 ≤ Ø ≤ 500 mm	20 < Ø ≤ 40	+/-1.25% x Ø	3000 to 6000	Ø ≤= 140 mm: 2 mm/m 0.12% x L of total length
		40 < Ø ≤ 125	+/-(0.1+1% x Ø)		
		125 < Ø ≤ 170	0 / +3		Ø > 140 mm: 3 mm/m
		Ø > 170	-3 / +3		
Flats Square bars Billets Blooms Sheets	On request				

GENERAL ENGINEERING STEELS

AD GRADES	SPECIFICATIONS			MAIN STANDARDS							CHEMICAL COMPOSITION						HEAT TREATMENT see key below	MECHANICAL PROPERTIES					APPLICATIONS
	European standard	USA	Common designation	AIR	WL	AMS	NF-EN /NF-EN-ISO / NF-A		ASTM		C	Ni	Cr	Mo	V	Others		UTS (N/mm²)	0.2% YS (N/mm²)	El (%)	KCU (J/cm²)	KV (J)	
				Specification	Standard	Standard	Symbol	Numerical	Grade	Standard														
STEELS FOR CARBURIZING																							
CX13VDW	X12CrNiMoV12-3	UNS: S64152	-	-	-	5719	-	-	-	-	0.12	2.5	12.00	1.60	0.30	-	T + F + Rv 250°C	1350	1000	13		130	Aerospace industry and industrial applications for: Ball screws, blade propellers, gears, etc.
FADH	14NiCrMo13-4	UNS: K43214	-	16NCD13	1.6657 1.6658	6547 6548 6549	14NiCrMo13-4	1.6657	-	-	0.16	3.20	1.00	0.25	-	-	T + F + Rv 150°C	1350	1000	14	-	140	Transmission parts such as gears, shafts, actuators and various wear-resistant parts exposed to fatigue for aerospace industry, motor sport and mechanical parts.
FDGW	20NiCrMo13-4	UNS: K41910	-	-	-	6492 6493	20NiCrMo13-4	1.6660	-	-	0.20	3.20	1.00	0.50	-	-	T + F + Rv 150°C Tgaz + F + Rv 150°C	1450 1350	1100 1000	13 13	-	130 110	Transmission parts such as gears, shafts, actuators and various wear-resistant parts exposed to fatigue for aerospace industry, motor sport and mechanical parts.
FND®	15NiMoSiCr10	UNS: K51570	-	-	-	6494 6495	-	-	-	-	0.15	2.50	1.00	2.00	-	Si: 1.10	T + F + Rv 300°C Tgaz + F + Rv 300°C	1400 1350	1120 1030	13 13	-	120 110	Injector, transmission parts as gears, shafts, actuators and various wear-resistant parts exposed to fatigue and in-use temperature up to 250°C.
THROUGH HARDENING STEELS																							
819AW	35NiCrMo16	-	-	E-35NCD16H	-	-	-	-	-	-	0.38	4.00	1.75	0.50	-	-	T + F + Rv 200°C T + Rv 650°C	1900 1050	1500 900	10 18	50 110	-	Aerospace parts exposed to high stresses. Various heavily stressed mechanical parts.
819B	36NiCrMo16	-	-	35NCD16	-	-	36NiCrMo16	1.6773	-	-	0.35	3.80	- 1.70	0.30	-	-	T + F + Rv 200°C T + Rv 650°C	1850 1000	1400 850	8 19	40 130	-	Large mechanical parts of complex shape exposed to high stresses.
CNS	35NiCr6	-	-	35NC6	-	-	-	-	-	-	0.35	1.20	0.85	-	-	-	T + Rv 550°C T + Rv 650°C	1100 900	950 750	14.5 18	85 120	-	Various crankshafts, shafts, fasteners, gears.
F65	34CrMo4	-	-	35CD4	1.7220 1.7224	-	34CrMo4	1.7220	-	-	0.35	-	1.00	0.20	-	-	T + Rv 600°C T + Rv 675°C	1050 900	950 750	16.5 20	100 140	-	Truck, turbine or rotor drive shafts, gearbox gears.
FDMA	30NiCrMo16	-	-	30NCD16	-	-	-	-	-	-	0.30	3.50	1.20	0.45	-	-	T + Rv 200°C T + Rv 625°C	1750 1000	1250 900	12 19	70 140	-	Parts requiring excellent fatigue and impact resistance.
GH4	40CrMoV13-9	-	-	40CDV12	-	-	40CrMoV13-9	1.8523	-	-	0.40	-	3.00	1.00	0.20	-	T + Rv 200°C T + Rv 600°C	1950 1400	1450 1150	10 13	60 65	-	Parts for the aerospace industry exposed to high stresses (mechanical strength of the order of 1400 N/mm²).
NC40MW	41NiCrMo7-3-2	UNS: G43406 AISI / SAE: E4340	4340	-	-	6409 6414	41NiCrMo7-3-2	1.6563	B23 L23	A540 A320	0.40	1.80	0.80	0.25	-	-	T + Rv 600°C	1100	950	17	100	-	Parts requiring excellent fatigue resistance (shafts, gears, various safety-critical mechanical parts).
MARAGING STEELS																							
MARVAL®18	X2NiCoMo18-8-5	UNS: K92890	Maraging 250	E-Z2NKD18	1.6359	6512	-	-	72	A579	0.03	18.00	-	5.00	-	Ti: 0.50 Co: 8.00	H H + V 480°C	1070 1850	870 1780	14 9	- 40	-	High strength parts for the aerospace and space industry (structural and defence components, fasteners, welded assemblies).
MY19	X2NiCoMo18-9-5	UNS: K93120	Maraging 300	-	1.6354 1.6358	6514	-	-	-	-	< 0.01	18.00	-	1.90	-	Ti: 0.70 Co: 8.75 Al: 0.10	H H + V 480°C	1070 2050	870 1980	14 8.5	-	-	Structural and defence components, centrifuge components.
STEELS FOR NITRIDING																							
Armad®	32CrMoV12-10	-	-	-	-	-	-	-	-	-	0.35	0.30	3.20	1.20	0.35	Si: 0.20 S: 0.001 P: 0.005	T + Rv 570°C T + Rv 610°C	1500 1250	1300 1050	15 20	-	80 200	Gun barrels for firearms and for any safety mechanical application for which a balance between strength and impact toughness is needed expecially at low temperatures.
GK3	31CrMo12/32CrMo12	-	-	30 CD 12	1.8564	-	-	1.1815/ 1.7361	-	-	0.30	-	3.00	0.40	-	-	T + Rv 625°C	1000	850	18	150	-	Gears, spindles, machine tool components, various mechanical parts
GKH®	33CrMoV12-9	UNS: K24340	-	32CDV13	-	6481	-	-	-	-	0.30		3.00	1.00	0.20	-	T + Rv 600°C T + Rv 640°C	1250 1080	1060 900	15 19	-	130 170	Components (particularly aerospace parts) requiring very good mechanical properties in the core (surface hardness approximately 850 Vickers).
GKP®YW	32CrMoNiV5	UNS: K23280	-	-	-	6497 6498	-	-	-	-	0.30	0.80	1.40	1.20	0.30	-	T + Rv 600°C T + Rv 640°C	1430 1250	1280 1075	14 16	-	50 80	Parts which must be highly stable (gears, spindles, crankshafts, precision parts, aerospace parts).
STEELS FOR SPECIAL APPLICATIONS																							
50NILYW	13MoCrNiV42-16-14	UNS: K91231	M50NIL	-	-	6278	13MoCrNiV42-16-14	B61	-	-	0.13	3.40	4.15	4.25	0.25	-	T + F + Rv 550°C	1400	1200	13	-	-	High performance carburizing steel grade for parts requiring an excellent combination of rolling contact fatigue and in-use temperature up to 400°C
GD223	X60NiMnCr13-5-3	-	-	-	-	-	X60NiMnCr13-5-3	-	-	-	0.60	11.0	3.00	0.40	-	5.00	H	700	300	55	300	-	Fasteners used for assembly of light alloy components working at high temperatures. Distribution tubes for valveless engines with pistons and cylinders in light alloys.Pre-combustion chambers fitted to light alloy piston heads for diesel engines.
NC310YW	40SiNiCrMoV10	UNS : K51570	-	-	-	6499	-	-	-	-	0.40	1.75	0.85	0.40	0.20	Si: 2.70	T + F + 2xRv 300 °C	2150	1790	9	-	-	Various heavily stressed mechanical parts. Carburising possible (torsion bars, gears, transmission shafts).
NC40SW	40NiSiCrMo7	UNS: K44220 AISI: 300M	300M	-	-	6417 6419	-	-	32	A579	0.40	1.80	0.85	0.40	-	Si : 1.60	T + 2xRv 300°C T + Rv 600°C	2050 1450	1700 1300	12 14	50 60	-	Shafts, gears, various safety-critical mechanical parts, various heavily stressed aerospace mechanical parts.
RA50YW	80MoCrV42-16	UNS: T11350 AISI: M50	M50	E-80DCV40	1.3551 1.3552	6491	-	-	-	-	0.83	-	4.15	4.25	1.00	-	T + 3xRv 550°C	hardness: 60 / 63 HRC					Aerospace bearings exposed to high stresses.
RADW	100Cr6	UNS: G52986 AISI / SAE: E52100	-	100C6	-	6444 6447	102Cr6 100Cr6	1.2067 -	E52100	A322	1.00	-	1.50	-	-	-	T + Rv 130°C T + Rv 300°C	hardness : 800 HV hardness : 630 HV					Ball, roller or needle bearings, bearing races, thrust bearings, cams, rollers, etc...
SCV®	15CrMoV6	-	-	15CDV6	1.7734 1.7736	-	-	-	-	-	0.15	-	1.25	0.90	0.25	-	T + Rv 600°C T + Rv 625°C	1050 1150	850 1100	16 17	- 130	-	Welded assemblies requiring high mechanical properties. Complies with the requirements of the aerospace industry.

TITANIUM

AD GRADES	SPECIFICATIONS			MAIN STANDARDS							CHEMICAL COMPOSITION										HEAT TREATMENT see key below	MECHANICAL PROPERTIES			APPLICATIONS
	European standard	USA	Common designation	AIR	WL	AMS	NF-EN /NF-EN-ISO / NF-A		ASTM		Ti	C	Cr	Mo	V	O	N	Fe	Al	Others		UTS (N/mm²)	0.2% YS (N/mm²)	El (%)	
				Specification	Standard	Standard	Symbol	Numerical	Grade	Standard															
TITANIUM																									
TA6V	Ti-6Al-4V	UNS: R56400	-	-	-	-	-	-	-	-	Ba-lance	<0.08	-	-	4.00	<0.20	<0.07	<0.30	6.00	-	Annealed	896	827	10	Aerospace industry: discs, compressor blades, structural parts, fasteners for low and high temperature environments etc.

STAINLESS STEELS

AD GRADES	SPECIFICATIONS			MAIN STANDARDS							CHEMICAL COMPOSITION											HEAT TREATMENT see key below	MECHANICAL PROPERTIES					APPLICATIONS
	European standard	USA	Common designation	AIR	WL	AMS	NF-EN /NF-EN-ISO / NF-A		ASTM		C	Ni	Cr	Mo	V	Ti	Nb	Al	N	Cu	Others		UTS (N/mm²)	0.2% YS (N/mm²)	El (%)	KCU (J/cm²)	KV (J)	
				Specification	Standard	Standard	Symbol	Numerical	Grade	Standard																			
MARTENSITIC STAINLESS STEELS																												
APX®	X17CrNi16-2	UNS: S43100 AISI: 431	431	Z15CN17-03	1.4044	5628	X17CrNi16-2	1.4057	431	A276 A479 F899	0.16	2.00	17.00	-	-	-	-	-	-	-	-	T + Rv 400°C T + Rv 630°C	1400 1000	1050 750	13 15	- 40	-	Aerospace, chemical, oil production and nuclear industries, parts exposed to marine corrosion.
APX®4	X4CrNiMo16-5-1	-	-	Z8CND17-04	-	-	X4CrNiMo16-5-1	1.4418	-	-	0.06	4.00	16.00	1.00	-	-	-	-	-	-	-	T + Rv 400°C T + Rv 580°C	1200 1000	950 750	16 18	100 120	-	Nuclear energy, weldable safety-critical parts exposed to marine corrosion (hydraulic pumps and turbines, shafts, tie rods, fasteners).
X13VD	X12CrNiMoV12-3	UNS: S64152	JETHETE M152	Z12CNDV12	1.4933 1.4939	5719	X12CrNiMoV12-3	1.4938	XM32	A565	0.12	2.50	11.50	1.60	0.30	-	-	-	-	-	-	T + Rv 250°C T + Rv 650°C	1350 1050	1000 700	17 15	110 120	-	Various mechanical parts, especially for the aerospace industry and gas and steam turbines.
XD15NW®/ X15TN	X40CrMoVN16-2	UNS: S42025	-	-	1.4123	5925	X40CrMoVN16-2	1.4123	-	-	0.42	-	16.00	1.80	0.35	-	-	-	0.20	-	-	T + F + Rv 180°C	hardness: 59 HRC					Bearings, ball screws, valve seats, guide collars.
XD16N	X50CrSiMnVN16-1	UNS: S42716	-	-	-	5926	-	-	-	-	0.50	-	16.0	-	0.30	0.30	-	-	-	-	V:2, Si:3	T + F + Rv 180°C	hardness 58 HRC					Bearings, ball-screws for industrial applications.
XDBD	X105CrMo17	UNS: S44004 AISI: 440C	440C	Z100CD17	1.3544	5630 5880 5618	X105CrMo17	1.4125	440C	A276 A314 F899 A473	1.00	-	17.00	0.50	-	-	-	-	-	-	-	T + F + Rv 140°C	hardness: 59 HRC					Bearing parts exposed to corrosive effects or operating at temperatures of up to 500°C.
AUSTENITIC STAINLESS STEELS																												
NYB66	X1CrNiMoWN24-22-6	UNS: S31266	-	-	-	-	-	-	-	-	0.03	22.0	24.0	5.50	-	-	-	-	0.50	-	W:2	H	800	420	50	-	-	For components operating in corrosive environments. Marine industry, paper pulp industry, chemical industry...
STAINLESS STEELS WITH STRUCTURAL HARDENING																												
MARVAL®X12	X1CrNiMoAlTi12-9	UNS: S11800	-	-	-	5928	X1CrNiMoAlTi12-9	1.4530	-	-	≤ 0.02	9.00	12.00	2.00	-	0.30	-	0.70	-	-	-	H + V 550°C H + V 520°C	1240 1430	1195 1385	12.5 10.5	-	120 45	Heavily stressed parts requiring good corrosion resistance and very good mechanical properties..
MAR-VAL®X12H	X1CrNiMoAlTi12-10-2	UNS: S10120	-	-	-	5935	X1CrNiMoAlTi12-10-2	1.4596	-	-	≤ 0.02	10.00	12.00	2.00	-	0.30	-	0.90	-	-	-	H + V 540°C H + V 510°C	1440 1570	1370 1490	10.5 10	-	60 35	Very heavily stressed parts requiring good corrosion resistance and very good mechanical properties.
MARVAL®13X	X3CrNiMoAl13-8-2	UNS: S13800	PH13-8Mo	-	1.4534	5629	X3CrNiMoAl13-8-2	1.4534	XM13	A564 A705	≤ 0.05	8.30	12.50	2.10	-	-	-	1.00	-	-	-	H + V 560°C H + V 540°C	1240 1450	1205 1410	12.5 10.5	-	80 40	High performance mechanical parts combining very high strength, excellent damage tolerance properties and good corrosion resistance.
MLX®17	X1CrNiMoAlTi12-11-2	UNS: S11000	-	-	-	5937	X1CrNiMoAlTi12-11-2	1.4612	-	-	≤ 0.02	11.00	12.00	2.00	-	0.30	-	1.50	-	-	-	H + V 538°C H + V 510°C	1590 1725	1500 1610	12 11	-	45 25	Very high performance mechanical parts combining very high strength and corrosion resistance (including stress crack corrosion).
MLX®19	X1NiCrMoAlTi12-10-2	UNS: S11902	-	-	-	5955	-	-	-	-	≤ 0.02	12.25	10.00	2.00	-	-	-	1.45	-	-	Mn: 1.15	H + V 510°C H + V 490°C	1890 1930	1750 1800	10 9	-	-	Very high performance mechanical parts combining the highest strength and corrosion resistance (including stress crack corrosion).
X15U5W	X5CrNiCu15-5	UNS: S15500	15-5PH XM12	-	1.4545	5659	-	-	XM12	A564	≤ 0.07	5.00	15.00	-	-	-	0.30	-	-	3.00	-	H + V 550°C H + V 620°C	1120 950	1060 750	15 16	-	130 160	Mechanical parts combining strength and fatigue, excellent damage tolerance properties and good corrosion resistance.
X17U4	X5CrNiCuNb16-4	UNS: S17400	17-4PH 630	-	1.4548	5643 5622	X5CrNiCuNb16-4	1.4542	630	A564	≤ 0.07	4.00	16.50	-	-	-	0.35	-	-	4.00	-	H + V 550°C H + V 620°C	1070 950	1000 750	10 16	-	120 140	Mechanical parts combining strength and good corrosion resistance.
STAINLESS STEELS FOR HIGH TEMPERATURES																												
56T5	X19CrMoNbVN11-1	-	-	Z20CDNb11	-	-	X19CrMoNbVN11-1	1.4913	-	-	0.20	-	11.00	0.70	0.18	-	0.40	-	-	-	-	T + Rv 675/700°C	1000	800	12	-	-	Mechanical parts for steam turbines combining temperature resistance up to 560°C and corrosion resistance.
XN26AW	X2NiCrTiMoV25-15	-	-	Z 3 NCT 25	-	-	-	-	-	-	0.02	26	15.00	1.30	0.30	2.00	-	-	-	-	-	H + V 720°C	1000	650	25	80	-	Gas and steam turbine discs and blades, fasteners and parts working under high stresses at temperature.
XN26TW	X6NiCrTiMoVB25-15-2	UNS: S66286	A286	E-Z6NCT25	1.4944	5731 5732 5734 5737	X6NiCrTiMoVB25-15-2	1.4980	660	A453	0.05	26.00	15.00	1.25	0.25	2.00	-	-	-	-	-	H + V 720°C	1000	650	25	80	-	Gas and steam turbine blades, fasteners for high temperature environments, parts operating at high temperature stress levels.

SUPERALLOYS

AD GRADES	SPECIFICATIONS			MAIN STANDARDS							CHEMICAL COMPOSITION										HEAT TREATMENT see key below	MECHANICAL PROPERTIES			APPLICATIONS
	European standard	USA	Common designation	AIR	WL	AMS	NF-EN /NF-EN-ISO / NF-A		ASTM		C	Ni	Cr	Mo	Si	Ti	Co	Fe	Al	Others		UTS (N/mm²)	0.2% YS (N/mm²)	El (%)	
				Specification	Standard	Standard	Symbol	Numerical	Grade	Standard																
NICKEL ALLOYS																									
AD730®	NiCr16Co9Fe-4Mo3-W3Ti3Al2	-	-	-	-	-	-	-	-	-	-	Balance	16.00	3.00	-	4.00	9.00	4.00	2.00	Nb: 1 W: 3	H + V	1580	1200	20	Aero Engines and Land Turbines : engines disk, buckets, fasteners, blades. Specialties : hot parts for turbo shafts in motorsport, hot tooling
PER625	NiCr22Mo9Nb	UNS: N06625	INCO 625	-	-	5599 5666	NiCr22Mo9Nb	2.4856	N06625	B446	≤ 0.05	Balance	22.00	9.00	≤ 0.50	≤ 0.40	≤ 1.00	≤ 5.00	≤ 0.40	Mn: 0.50 Nb: 3.60	H - Grade 1 H - Grade 2	850 750	450 350	40 65	Excellent resistance to oxidation combined with very good mechanical properties at high temperatures. Good low temperature resistance and corrosion resistance.
PER718	NiCr19Fe19Nb5Mo3	UNS: N07718	INCO 718	-	-	-	NiCr19Fe19Nb5Mo3	2.4668	-	-	0.04	Balance	18.00	3.00	-	0.90	-	18.50	0.50	Nb: 5.20	H + V	1360	1120	18	Fasteners or various parts requiring a particularly high elastic limit, corrosion resistance or non-magnetic properties.
PYRAD53NW	NiCr19Fe19Nb5Mo3	UNS: N07718	INCO 718	NC19FeNb	2.4668	5662 5663	NiCr19Fe19Nb5Mo3	2.4668	N07718	B637 B670	0.04	Balance	18.00	3.00	-	0.90	-	18.50	0.50	Nb: 5.20	H + V	1360	1120	18	Aerospace industry: compressor discs. Marine and land-based machines. Fasteners or diverse components.
COBALT ALLOYS																									
XSH	CoCr20W15Ni	UNS: R30605	HS25 L605	KC20WN	2.4964	5537 5759	-	-	-	F90	0.10	10.00	20.00	-	-	-	Balance	≤ 0.30	-	Mn: 1.20 W: 15.00	H	1005	460	45	Aerospace parts for turbomachines exposed to high temperatures (blades, combustion chambers, nozzles, etc). Surgical implants.

KEY TO HEAT TREATMENT SYMBOLS			
SOLUTION TREATED	H	ANNEALED	R
THERMO-MECHANICAL TREATMENT	TM	QUENCHED AND TEMPERED	T+Rv
SUB-ZERO TREATMENT	F	SOLUTION TREATED AND AGED	H+V

The list of products in the table is not exhaustive, please consult us for other materials.

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