



**Alloys and applications**

Material	LNI Designation	Standard Designation	Nominal chemical composition %	Typical Properties	Typical Applications
Copper	<b>Cu-DHP</b>	ISO Cu-DHP F Cu-b1 D SF-Cu 2.0090 USA Cu-DHP C 12200	Cu >= 99.85 P: 0.013-0.050	Pure copper deoxidized, high phosphorus, water and air resistant, electrical conductivity 85% IACS 40m/Ohm mm <sup>2</sup>	Solder filled dial feet, rivets, tooth rings, thermometer bulbs, sparkerosion electrodes, cooling devices
	<b>Cu-OF</b>	F Cu-C1 D SE-Cu 2.0070 USA Cu-OF C 10200	Cu >= 99.95	Pure, deoxidized copper, no embrittlement due to reducing gas, electrical conductivity 98% IACS >=58m/Ohm mm <sup>2</sup>	Electrical connectors, electric cables, medical applications
Yellow Brass 63%	<b>CuZn37</b>	ISO CuZn37 F CuZn36 D CuZn37 2.0321 USA C 27400	Cu: 63 Zn: 37	Alloy for cold and hot working	Radio aeriels, musical instruments, rivets, pointers shaft machanisms, lighter bodies, fountain pen bodies, Bourdon springs, sparkerosion electrodes
Medium Leaded Brass	<b>CuZn38Pb1.5</b>	ISO CuZn38Pb2 F CuZn38Pb2 D CuZn38Pb1.5 2.0371 USA C 35300	Cu: 61 Zn: 37.5 Pb: 1.5	Alloy with 2 phases (alpha+beta) and super-fine lead distribution, for easy machining, or stamping	Tubular free-cut pieces, musical instruments
Red Brass 85%	<b>CuZn15</b>	ISO CuZn15 F CuZn15 D CuZn15 2.024 USA C 23000	Cu: 85 Zn: 15	Gold-coloured alloy resistant to zinc loss and to stress corrosion	Solder filled dial feet, musical instruments, fountain pen bodies
Low Brass 80%	<b>CuZn20</b>	ISO CuZn20 F CuZn20 D CuZn20 2.0250 USA C 24000	Cu: 80 Zn 20	The same properties. More easily cold workable	Bellows, musical instruments, solder filled dial feet, flexible waveguides luxury products
Phosphor Bronze 6%	<b>CuSn6</b>	ISO CuSn6 F CuSn6P D CuSn6 2.1020 USA C 51900	Cu: 94 Sn: 6 P: 0.2	Good wear and corrosion resistance properties	Bourdon springs, bellows
Phosphor Bronze 8%	<b>CuSn8</b>	ISO CuSn8 F CuSn9P D CuSn8 2.1030 USA C 52100	Cu: 91.5 Sn: 8.5 P: 0.2	Excellent wear and corrosion resistance properties, good bending fatigue strength	Bourdon springs, bellows, electronic probes, flexible waveguides
Bryllium Copper	<b>CuBe2</b>	CuBe 2 USA C 17200 D 2.1247	Cu: 98 Be: 2 Co: 0.25	Precipitation hardening alloy extremel resistant to relaxation, fatigue, abrasion and corrosion	Bourdon springs for precision pressure gauges, flexible waveguides, tubes for connector plugs and thermic probes, radio aeriels
Nickel Silver 12%	<b>CuNi12Zn24</b>	ISO CuNi12Zn24 F CuNi12Zn24 D CuNi12Zn24 2.0730 USA C 75700	Cu: 63 Ni: 12 Zn: 24	Excellent properties for cold working, resists to tarnishing	Watch spring bars, endoscopes, musical instruments
Nickel Silver 18%	<b>CuNi18Zn20</b>	ISO CuNi18Zn20 D CuNi18Zn20 2.0740 USA C 76400 C 75200	Cu: 61 Ni: 18 Zn: 21	Less easily cold workable but advantageous for manufacture of springs, high corrosion resistance	Bourdon springs, watch springs bars, solid profiles for watch bracelets musical instruments, spectacle parts
Aluminium	<b>Al 99.5</b>	ISO Al99.5 F 1050 A D Al99.5 3.0255 USA AA 1050 A	Al >= 99.5	High corrosion resistance, thermal and electrical conductivity, easy to work, good weldability, but low mechanical strength	Fountain pen bodies, casings for electrochemical elements, wire clamps, cryogenic applications
Anticorodal 100	<b>Al Mg Si1</b>	F 6082 D AlMgSi1 3.2315 USA AA 6081	Al: 97.5 Mg: 0.6-1.0 Si: 0.7-1.3 Mn: 0.10-0.40	Hardenable alloy with good corrosion resistance, easy to work, perfectly suitable for polishing, high mechanical strength, suitable for decorative anodising	Pointers for measuring instruments
Mild steel	<b>ACIER St 35</b>	F XC 18 D St 35 1.0308 USA UNS K 02504	C >= 0.17 Si >= 0.35 Mn >= 0.40 P >= 0.050 S >= 0.050	General use steel ductile before ease hardening	Machine industry

Other alloys, not listed here, can be delivered on request



**Mechanical properties**

Material	LNI Designation	Density	Tensile strength N/m2		Yield strength 0.2% N/mm2		Elongation %		Vickers hardness	
			Annealed	Cold worked	Annealed	Cold worked	Annealed	Cold worked	Annealed	Cold worked
				Hard		Hard		Hard		Hard
Copper	Cu-DHP	8.94	200	300	60	250	38	5	45	95
			to	to	to	to	to	to	to	to
			250	400	110	380	50	16	70	110
	Cu-OF	8.94	200	300	60	250	38	5	45	95
			to	to	to	to	to	to	to	to
			250	400	110	380	50	16	70	110
Yellow Brass 63%	CuZn37	8.43	320	450	100	360	30	5	55	130
			to	to	to	to	to	to	to	to
			380	600	230	550	50	15	75	200
Medium Leaded Brass	CuZn38Pb1.5	8.47	350	480	120	380	30	5	80	135
			to	to	to	to	to	to	to	to
			420	600	250	550	50	15	100	200
Red Brass 85%	CuZn15	8.75	300	450	100	360	30	5	50	100
			to	to	to	to	to	to	to	to
			350	550	220	500	50	15	70	180
Low Brass 80%	CuZn20	8.67	310	450	100	360	30	5	50	110
			to	to	to	to	to	to	to	to
			360	600	230	550	50	15	70	190
Phosphor Bronze 6%	CuSn6	8.84	350	500	120	400	45	5	83	145
			to	to	to	to	to	to	to	to
			400	600	240	500	60	25	110	175
Phosphor Bronze 8%	CuSn8	8.80	400	550	150	450	50	10	80	155
			to	to	to	to	to	to	to	to
			450	700	270	600	70	30	130	215
Bryllium Copper	CuBe2	8.23	450-500 +tempered 900-1000	650-800 +tempered 1100-1300	200-250 +tempered 800-900	400-650 +tempered 100-1200	30-40 +tempered 8-12	6-10 +tempered 4.-8	90-120 +tempered 350-380	150-220 +tempered 400-430
Nickel Silver 12%	CuNi12Zn24	8.69	350	500	120	400	40	10	80	150
			to	to	to	to	to	to	to	to
			420	600	250	500	50	20	115	180
Nickel Silver 18%	CuNi18Zn20	8.73	350	550	120	450	35	6	85	150
			to	to	to	to	to	to	to	to
			450	700	270	600	50	14	115	190
Aluminium	Al 99.5	2.70	65	150	25	120	25	2	20	35
			to	to	to	to	to	to	to	to
			100	200	50	170	33	8	25	50
Anticorodal 100	Al Mg Si1	2.70	100	Solution annealed +tempered	35	Solution annealed +tempered	20	Solution annealed +tempered	30	Solution annealed +tempered
			to	T6 350-420	to	T6 300-400	to	T6 2-6	to	T6 110-130
			140		70		30		40	
Mild steel	ACIER St 35	7.86	380	640	150	350	40	5	100	200
			to	to	to	to	to	to	to	to
			450	800	250	700	55	20	150	250



**Alloys and applications**

Material	LNI Designation	Standard Designation	Composition %	Typical Properties	Typical Applications
Austenitic stainless steels	<b>AISI 304</b>	F Z6 CN 18.9 D XR CrNi 18.1 1.4301 USA AISI 304 UNS S 30400	Fe:72 Ni:8.5-10 Cr:17-20 C:<=0.07	Regular grade of austenitic stainless steel: easy to coldwork and good corrosion resistance, creep resistant up to 700°C	Medical instruments, bellows, endoscopes
	<b>AISI 304L</b>	F Z2 CN 18.10 D X2 CrNi 19.11 1.4306 USA AISI 304 L UNS S 30403	Fe:71 Ni:8-12 Cr:18-20 C:<=0.03	Compared with the above grade, this low-carbon grade offers improved corrosion resistance	Wristbands for watches : Cryogenics Bellows
	<b>AISI 316L</b>	F Z2 CND 17.12 D X2 CrNiMo 17.13.2; X2 CrNiMo 18-14-3 1.4404 1.4435 USA AISI 316L UNS S 31603	Fe:68 Ni:11-14 Cr:16.5-18.5 Mo:2.5-3 C:<=0.03	Low-carbon grade : excellent resistance to acid stress corrosion	Bourdon springs, bellows, electromechanical parts, thermometer bulbs. Food and Chemical industries, heat exchangers, wristbands for watches
	<b>AISI 316L VM</b>	D X2 CrNiMo 18.15.3 1.4441 USA AISI 316L VM	Fe:65 C>= 0.030 Ni:13-15 Cr:17-19 Mo:2.5-3.2 S >= 0.010 P >= 0.025	Vacuum melted austenitic stainless steel. No free ferrite phase and good microcleanliness	Medical instruments Surgical implants Watch industries Automotive industries
	<b>AISI 316Ti</b>	F Z6 CNDT 17.12 D X2 CrNiMoTi 17-12-2 1.4571 USA AISI 316 Ti UNS S 31635	Fe:68 C:<=0.10 Ni:105-13.5 Cr:16.5-18.5 Mo:2-2.5 Ti:5xC	Titanium-stabilised grade for improved stress corrosion resistance and reduced creep at high temperatures	Bourdon springs Bellows
	<b>AISI 321</b>	F Z6 CNT 18.10 D X6 CrNiTi 18.10 1.4541 USA AISI 321 UNS S 32100	Fe:71 Ni:9-11.5 Cr:17-19 Ti:5xC C:<=0.10	Same typical properties as above	Bourdon tubes, bellows, special cooling circuits
	<b>AISI 347</b>	F Z6 CN Nb 18.10 D X6 CrNiNb 18.10 1.4550 USA AISI 347 UNS S 34700	Fe:71 Ni:9-12 Cr:17-19 Nb:10C-1 C:0.06	Niobium-stabilised grade for better high temperature properties : mechanical strength, oxidation resistance	Bourdon springs Bellows Aerospace heat exchangers
Super austenitic stainless steel	<b>AISI 904L</b>	F Z2 NCDU 25.20 D X1 NiCrMoCuN25-20-5 1.4539 USA AISI 904L UNS N08904	Fe:51 Ni:24-26 Cr:19-21 Mo:4-5 Cu:1-2 N:0.04-0.15 C:<=0.02	Very good resistance to sea water corrosion and to sulfuric and phosphoric acids	Tubes and profiles for chemical and watch industries
Ferritic stainless steel	<b>AISI 446</b>	F Z12 CAS 25 D X10 CrAl24 X18CrN24 1.4762 1.4749 USA AISI 446 UNS S 44600	Fe:72 Cr:26 C:0.18 N:0.25	Good resistance to oxidation at high temperature	Instrumentation used at high temperature or in specific corrosion media
Iron-nickel-chromium alloy	<b>Ni-Span C-902</b>	F DURINVAL C D Ni-Span C 902 USA Ni-Span C 902	Fe:49 Ni:41-43.5 Cr:4.9-5.75 Ti:2.20-2.75 Al:0.3-0.8	Structure-hardenable alloy with constant elasticity modulus from -45°C to +65°C. Good fatigue strength and low mechanical hysteresis	Bourdon springs with constant modulus of elasticity. Transducers
Nickel	<b>Nickel 200</b>	F Ni-01 D Ni 99.2 2.4066 USA Nickel 200 UNS N 02200	Ni:99.5 C:0.08	Good stress corrosion resistance : alkalis, chlorides, fluorides	Food and chemical industry. Heat exchangers
Nickel alloys	<b>Monel 400</b>	F NU 30 D NiCu30Fe 2.4360 USA Monel 400 N 04400	Ni:66.0 Cu:31.5 Fe:1.35	Excellent resistance to a variety of stress corrosion types	Bellows, hoses, rivets, medical instruments
	<b>Monel K500</b>	F NU30UT D NiCu30Al 2.4375 USA Monel K500 N 05500	Ni:65 Cu:29.5 Fe:1.0 Al:2.8 Ti:0.50	Structure-hardenable alloy with excellent corrosion resistance and high mechanical stability to low temperatures (-250°C)	Bourdon tubes
	<b>Inconel 600</b>	F Z8 NC 75 15 D NiCr15Fe 2.4816 USA Inconel 600 N 06600	Ni:72 Cr:15.5 Fe:8	Good corrosion and oxidation resistance up to 1175°C	Cooling circuits for space industry

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**Mechanical properties**

Material	LNI Designation	Density	Tensile strength N/mm2		Yield strength 0.2% N/mm2		Elongation %		Vickers hardness	
			Annealed	Cold worked	Annealed	Cold worked	Annealed	Cold worked	Annealed	Cold worked
				Hard		Hard		Hard		Hard
Austenitic stainless steels	AISI 304	7.90	580	750	220	500	40	5	150	250
			to	to	to	to	to	to	to	to
			650	1000	360	900	55	20	190	300
	AISI 304L	7.90	580	700	220	450	40	5	150	250
			to	to	to	to	to	to	to	to
			650	950	360	850	55	20	190	300
	AISI 316L	7.95	580	700	220	450	40	5	150	250
to			to	to	to	to	to	to	to	
650			950	360	850	55	20	190	300	
AISI 316L VM	7.95	580	700	220	450	40	5	150	250	
		to	to	to	to	to	to	to	to	
		650	950	360	850	55	20	190	300	
AISI 316Ti	7.95	600	750	240	500	40	5	150	250	
		to	to	to	to	to	to	to	to	
		670	1000	380	900	55	20	190	300	
AISI 321	7.95	600	750	240	500	40	5	150	250	
		to	to	to	to	to	to	to	to	
		670	1000	380	900	55	20	190	300	
AISI 347	7.95	600	750	240	500	40	5	150	250	
		to	to	to	to	to	to	to	to	
		670	1000	380	900	55	20	190	300	
Super austenitic stainless steel	AISI 904L	8.00	580	800	220	500	35	5	150	250
			to	to	to	to	to	to	to	to
			700	1000	380	900	55	20	190	300
Ferritic stainless steel	AISI 446	7.70	550	700	220	450	25	2	150	250
			to	to	to	to	to	to	to	to
			630	900	360	800	40	15	190	300
Iron-nickel-chromium alloy	Ni-Span C-902	8.15	600-700 + tempered	800-900 + tempered	200-350 + tempered	600-800 + tempered	30-50 + tempered	3-10 + tempered	150-190 + tempered	280-350 + tempered
			1000-1200	1200-1400	900-1100	1100-1300	15-20	5-10	350-400	380-430
Nickel	Nickel 200	8.89	380	650	150	350	40	5	80	165
			to	to	to	to	to	to	to	to
			500	850	280	750	60	15	110	230
Nickel alloys	Monel 400	8.83	450	700	180	450	35	5	100	200
			to	to	to	to	to	to	to	to
			600	850	330	750	50	15	150	250
Nickel alloys	Monel K500	8.47	630-700 + tempered	850-100 + tempered	200-300 + tempered	650-900 + tempered	25-45 + tempered	15-25 + tempered	170-230 + tempered	250-300 + tempered
			900-100	1050-1200	800-1000	950-1100	20-30	10-20	280-330	320-380
Nickel alloys	Inconel 600	8.42	600	800	200	500	35	10	140	240
			to	to	to	to	to	to	to	to
			700	1050	350	900	55	25	180	300