

# FERROUS

Steel family	Europe EN	France AFNOR	Russia Gost	Usa AISI-SAE	China GB	Korea KS	Japan JIS	India IS	N°	Examples of applications
Non alloy structural	S235JR		St3sp		Q235B		SS 330	Fe 330	1.0038	Light and heavy carpentry, construction, urban decoration
	E295	A50-2	St5ps		Q275	SS 490	SS 490	Fe 490B	1.0050	
	E335	A60-2	St6ps		HRB335		SM 570	Fe 620	1.0060	
	E360	A70-2							1.0070	
	S355J0	E36-3	St4sp	A441		SCC 3	SCCC 3	Fe 490	1.0553	
	S355J2		17G1S	A 350 LF2				Fe 540	1.0577	
Automatic	11SMn30	S250		1215	Y15	SUM 22	SUM 22	11C10S25	1.0715	High-speed mechanical processes, shafts for starting motors, fittings, brake fittings, hydraulics, lubricators, bearings, screws, nuts and bolts, furniture industry and small metal items in general
	11SMnPb30	S250Pb	AS14~	12L15	Y15Pb	SUM 22L	SUM 22L		1.0718	
	46S20	45MF4		1146~	Y45			40C10S18	1.0727	
	11SMn37	S300		1214		SUM 25	SUM 25		1.0736	
	11SMnPb37	S300Pb		12L14					1.0737	
	36SMn14	36SMn14		1137~				40Mn15S12	1.0764	
36SMnPb14	35MF6Pb	AS35G2						1.0765		
For case hardening	C10E	XC10	10	1010	10	SM 10C	S10C	10C4	1.1121	Gears, axles, cones, jacks, bushings, distribution and transmission gears
	C15E	XC15	15	1015	15	SM 15C	S15C	15C4	1.1141	
	16NiCr4	16NC6	12ChN2	4320				15Cr6Ni6	1.5919	
	16MnCr5	16MC5	18ChG	5115	15CrMn			16Mn5Cr4	1.7131	
	20MnCr5	20MC5	20Ch	5120	20CrMn	SMnC420 H	SMnC420 H	20Mn5Cr5	1.7147	
17NiCrMo6-4	18NCD6		4137~							
Carbon	P245GH~			A 105					1.0532~	Flanges, valves and components for pressurised systems
	S355J2		20G	A 350 LF2	16Mn	STKM16C	SM 520C	Fe 490B		
Carbon for hardening	C22E	XC18	20	1020	20	SM 22 C	S 22 C	25C8	1.1151	Shafts, gears, tie rods
	C35E	XC38H1	35	1034	35	SM 35 C	S 35 C	35C4	1.1181	
	C45E	XC48H1	45	1045	45	SM 45 C	S 45 C	45C8	1.1191	
	C50E	XC50	50	1050	50	SM 53 C	S 53 C	50C8	1.1206	
Alloy	23MnB4								1.5535	Shafts, gears, tie rods
	39NiCrMo3	40NCD3	40ChN2MA	9840					1.6510	
	30CrNiMo8	30CND8		320L43~		SNCM 431	SNCM 431		1.6580	
	34CrNiMo6	35NCD6	38Ch2N2MA	9840		SNCM 447	SNCM 447	36Ni6Cr6Mo2	1.6582	
	32CrB4								1.7076	
	42CrMo4	42CD4	38ChM	4140	42CrMo	SCM 440	SCM 440	42Cr4Mo2	1.7225	
50CrMo4	50CD4	50Ch	4150	ZG50CrMo	SCM 445	SCM 445		1.7228		
For superior tempering						S 45 CM	S 45 CM		1.1193~	Camshafts, elbow shafts, pin shafts, gears, meshes, headless screws and cogs
For bearings	100Cr6	100C6	9Ch	52100	GCr15	STB 2	SUS 2	103Cr6	1.3505	Bearings
	100CrMo7-3	100CrMo7-3		K19965~					1.3536	
	100CrMnSi8-4-6	100CrMnMo8		A 485 (B8)					1.3539	
Stainless	X12CrS13	Z11CF13		416	Y1Cr13	STS 416	SUS 416		1.4005	Chemical industry, petrochemicals, food industry, paper manufacturing, pharmaceuticals, bio-medical, automotive, off-shore structures, household appliances, construction, urban decoration
	X20Cr13	Z20C13	20Ch13	(420)	2Cr13	STS 420J1	SUS 420J1		1.4021	
	X30Cr13	Z33C13	30Ch13	(420)	3Cr13	STS 420J2	SUS 420J2	(X30Cr13)	1.4028	
	X46Cr13	Z44C14	4Ch13	(420)					1.4034	
	X46CrS13	X45CrS13							1.4035	
	X17CrNi16-2	Z15CB16-02	14Ch17N2	431	1Cr17Ni2	STS 431	SUS 431	15Cr16Ni2	1.4057	
	X14CrMoS17	Z13CF17			Y10Cr17	STS 430F	SUS 430F		1.4104	
									(1.4106)	
	X5CrNi18-10	Z5CN18-09	07Ch18N10	(304)	0Cr18Ni9			X04Cr19Ni9	1.4301	
	X8CrNiS18-9	Z8CNF18-09	12Ch18N10E	303	Y1Cr18Ni9	STS 303	SUS 303		1.4305	
	X2CrNi18-9	Z3CN19-09	03Ch18N11	(304L)	00Cr19Ni10			X02Cr19Ni10	1.4307	
	X2CrNiMo17-12-2	Z3CND17-12-02	03Ch17N13M2	316L	022Cr17Ni12Mo2	STS 316L	SUS 316L	X02Cr17Ni1Mo2	1.4404	
X2CrMoTi18-2			444	019Cr19Mo2NbTi	STS 444	SUS 444		1.4521		
X8CrNi25-21		10Ch23N18	3105	0Cr25Ni20	STS310S	SUH 310		1.4845		
Non alloys	P265NL~		18G	1018	20				1.0700 ~	
	C45E	XC48H1	45G	1045	45	SM 45 C	S 45 C	45C8	1.1191 ~	

# NON FERROUS FERROUS

## BRASS

Steel family	Europe EN	France AFNOR	Russia Gost	Usa AISI-SAE	China GB	Korea KS	Japan JIS	India IS	N°	Examples of applications
For chrome plating	C53	XC48TS		1050		SM 50 C	S 50 CM	S0C4	1.1213	
				A381	20MnV				1.5217 ~	
	39NiCrMo3	40NCD3	40ChN2MA	9840					1.6510	
	42CrMo4	42CD4	38ChM	4140	42CrMo	SCM 440	SCM 440	42Cr4Mo2	1.7225	

Family		ISO designation	EN	ASTM SAE UNS	JIS	DIN	Examples of applications
Standard and corrosion-proof alloys	Z10	CuZn37Pb0.5	CW604N	C33500		2.0332	High-copper brass alloys with excellent machinability and cold forming behaviour as well as good hot formability. Hence mainly used for parts subject to cold forming, such as machined crimp contacts, rivets, flanged and stamped parts. Suitable for the production of thin plug connectors bent to relatively narrow radii up to 180°. Machining brass grades are generally resistant to organic substances and neutral or alkaline compounds. The former alloy CuZn36Pb1.5 was replaced by the alloys CuZn35Pb1 and CuZn35Pb2.
	Z11	CuZn35Pb1	CW600N	C34000	C3501	2.0331	
	Z12	CuZn35Pb2	CW601N	C34200	C3601	2.0331	
	Z14	CuZn37Pb2	CW606N	C35000 C35300	C3601		Alloy for machined and cold formed components, which has established itself in the UK used by manufactures or writing utensils
	Z21	CuZn38Pb2	CW608N	C35000 C35300	C3603	2.0371	Ideal for all applications requiring good chipless shaping properties (flanging, upsetting, expanding) in addition to excellent machinability. Predominantly used in electrical engineering and fine mechanics
	Z23	CuZn36Pb3	CW603N	C36000	C3601 C3602	2.0375	Standard free-machining alloy which has established itself across all industries, especially in the USA
	Z24	CuZn41Pb0.5					Low-lead brass alloy whose microstructure has been adjusted for excellent machinability and hot forming properties
	Z29	CuZn39Pb2	CW612N	C37700 C38000	C3771	2.0380	This alloy possesses excellent machinability and is suitable for hot die forging. It is used for high torque resistant electrical terminals
	Z31	CuZn40Pb2	CW617N	C37700 C38000	C3713	2.0402	Reference alloy for hot forming, including complex sections and geometries
	Z32-Z33	CuZn39Pb3	CW614N	C38500	C3603 C3604	2.0401	Reference alloy for machining, with good hot forming and low cold forming properties. Suitable for flanging
	Z40	CuZn43Pb2Al	CW624N	C38000		2.0410	Alloy with excellent hot forming properties and relatively high strength. Suitable for the production of extruded products/ sections with complex geometries
	Z45-Z46	CuZn36Pb2As	CW602N	C35330	C3601	2.0331	Resistant to dezincification as per EN ISO 6509. The alloys meet DIN 50930-6 requirements. Hot forging must be followed by a heat treatment, to restore the resistance to dezincification
	Z48	CuZn40Pb2	CW617N	C37700	C3603 C3604	2.0402	Reference alloy for hot forming, including complex sections. Suitable for drinking water applications in accordance with DIN 50930-6

# BRASS

Family		ISO designation	EN	ASTM SAE UNS	JIS	DIN	Examples of applications
Poor lead alloys	SA5	CuZn34Mn3Si1Pb1		C67300			Very high resistance to wear due to silicide inclusions in the microstructure. Mainly used for slide bearings
	S35	CuZn35Ni3Mn2AlPb	CW710R			2.0540	Alloy with good toughness and medium to high strength. Due to its excellent weathering resistance, it is used in machinery and plant construction, shipbuilding and offshore technology
	S40	CuZn37Mn3Al2PbSi	CW713R	C67410		2.0550	This alloy owes its very high wear resistance to manganese silicide inclusions. It is mainly used for slide bearing applications, valve guides and structural engineering parts
	S43/S46	CuZn33Pb1.5AlSiAs					Resistant to dezincification as per EN ISO 6509. The alloy is DVGW approved and meets the requirements of DIN 50930-6, 50931 and EN 15665-1 for drinking water applications
	Sw1	CuZn21Si3P	CW724R	C69300			A special lead-free brass approved for drinking water applications. The alloy possesses high strength and very good resistance to intercrystalline corrosion and dezincification. DIN 50916-1 requirements regarding resistance to stress corrosion cracking are comfortably met
	Sx1	CuZn31Mn2Si1Al1					A special lead-free brass with high resistance to wear and relaxation
	M57	CuZn42	CW510L				A low-lead brass alloy featuring reduced machinability, for less demanding requirements on mechanical properties and corrosion resistance
	M60	CuZn40	CW509L			2.0360	It is a low-lead sanitary brass with reduced machinability, for less demanding requirements on mechanical properties and corrosion resistance
			CuZn38As	CW511L			

# BRONZE

	ISO designation	EN	ASTM SAE UNS	JIS	DIN	Examples of applications
B44	CuSn4Zn4Pb4	CW456K	C54400	C5441		An alloy with very high strength and excellent machinability. Beside other applications, it is outstandingly suitable for spring plug connectors, slide bearings and valve guides

**NON FERROUS**

**NON FERROUS**

# NON FERROUS-ALUMINUM

Family	Denomination	State	Machinability	Anodizing			Corrosion resistance		Weldability			Cold plastic deformation	Typical applications
				Protective	Decorative	Hard	Atmospheric	Marine	MIG-TIG	in resistance	Brazing		
Serie 2000 Avional	2011	T3	High	Medium	Low	Low	Medium	Low	Low	Low	Low	Medium	Turning
		T8	High	Medium	Low	Low	Medium	Low	Low	Low	Low	Medium	
	2030	T4	Medium	Medium	Low	Low	Medium	Low	Low	Low	Low	Low	Turning
	2007	T4	Medium	Medium	Low	Low	Medium	Low	Low	Low	Low	Low	Turning
	2017/A	T4	Medium	Medium	Low	Low	Medium	Low	Medium	Medium	Low	Low	Mechanics
	2024	T3	Medium	Medium	Low	Low	Medium	Low	Medium	Medium	Low	Low	Items for the mechanics and aeronautics industry
Serie 6000 Anticorodal	6005	T6	Medium	High	High	High	High	Medium	High	High	High	Medium	Transport
	6026	T6	Medium	Medium	Medium	High	Medium	Low	Medium	Medium	Low	Low	Turning and pressing
		T9	Medium	Medium	Medium	High	Medium	Low	Medium	Medium	Low	Low	
	6060	T1	Low	High	High	High	High	Medium	High	High	High	High	Building and transport
		T5	Low	High	High	High	High	Medium	High	High	High	Medium	
		T6	Medium	High	High	High	High	Medium	High	High	High	Medium	
	6063	T6	Medium	High	High	High	High	Medium	High	High	High	Medium	Electronics and pneumatics
	6061	T6	Medium	Medium	Medium	High	High	Medium	High	High	High	Medium	Mechaning industry
	6082	T6	Medium	Medium	Medium	High	High	Medium	High	High	High	Medium	Transport and pressing
6064A	T9	Medium	Medium	Medium	High	Medium	Medium	Medium	Medium	Medium	Low	Turning	
Serie 7000- Ergal	7003	T5	Medium	Medium	Medium	Medium	Medium	Medium	High	High	High	Medium	High-resistance items
	7020	T6	Medium	Medium	Medium	Medium	Medium	Medium	High	High	Medium	Medium	High-resistance items
	7075	T6	Medium	Medium	Medium	High	Medium	Low	Medium	Medium	Medium	Low	High-resistance items

The green color indicates the **VALUE**

# NICKEL SILVER

	ISO designation	EN	ASTM SAE UNS	JIS	DIN	Examples of applications
N22	CuNi12Zn24	CW403J	C75700		2.0730	Lead-free nickel silver alloys with very high toughness and outstanding tarnish resistance. Mainly used for optical and spectacle frame components and for jewellery. Both alloys possess excellent cold forming properties
N29	CuNi18Zn20	CW409J	(C76400)	C7521	2.0740	
N31	CuNi7Zn39Pb3Mn2	CW400J			2.0771	Outstandingly suitable for the production of ball-pen points and writing utensils. The alloy is also used for spectacle parts. It combines high strength with good cold forming properties and machinability
N32	CuNi12Zn30Pb1	CW406J	C79300		2.0780	A lead-free nickel silver alloy with high toughness and excellent tarnish resistance
N35	CuNi15Zn23Pb2					Outstandingly suitable for the production of ball-pen points and writing utensils. It combines high strength with good cold forming properties and machinability
N37	CuNi18Zn19Pb1	CW408J		C7941	2.0790	Optical material for spectacle parts made by a combination of machining and cold forming
N48	CuNi12Zn37Mn6Pb2	CW407J				Outstandingly suitable for the production of ball-pen points and writing utensils. It combines high strength with good cold forming properties and machinability

# COPPER

	ISO designation	EN	ASTM SAE UNS	JIS	DIN	Examples of applications
KC1	CuPb1P	CW113C	C18700		2.1160	Very good machinability coupled with high electrical and thermal conductivity. Used for machined electronic and electrical contacts
K41	CuNiPb1P		C19150 C19160			Age-hardenable alloy with good electrical and thermal conductivity and high strength. Used for spring contacts with high requirements to relaxation and fatigue resistance
K44	CuNiPb0.6P		C19140 C19150			The alloy is optimized for spring contacts which are being produced by cold heading operations

**NON FERROUS**

**NON FERROUS**