




MATERIAL INFORMATION

Material		Unalloyed steel	C steel soft	C steel	C steel	Tool steel	CrMo steel	Cr- steel	CrNi steel	CrNiMo steel	Heat-resist. Steel	Heat-resist. Steel	Copper	Brass	Bronze	Nickel	Al alloy	Aluminium
Material number		**1.0338**	**1.1248**	**1.1274**	**1.2003**	**1.2379**	**1.4031Mo**	**1.4034 (1.2083)**	**1.4310**	**1.4404**	**1.4767**	**1.4828**	**2.0070**	**2.0321**	**2.1020**	**2.4068**		**3.0205**
Designation	**DIN/EN AISI UNS**	**DC04 1008 A 620**	**C75S LC+MA 1075 G 10750**	**C100S+QT 1095 G 10950**	**75Cr1+QT 1075 G 10780**	**X155CrVMo12-1 D2**	**X39CrMo14-1 Etwa 420**	**X46Cr13 420 S 42000**	**X12CrNi17-7 301 S 30100**	**X2CrNiMo17-12-2 316L S 31603**	**X8CrAl20-5**	**X15CrNiSi20-12 309 S 30900**	**SE-Cu58/CW021A C 10300**	**CuZn 37 C 27200**	**CuSn6/CW452K C 51900**	**LC-Ni 99.2% N 02201**	**EN-AW 8079**	**EN-AW 1200 A91200**
Dimensions	Widths Thicknesses Width tolerance Thickness tolerance	150+305 0.025-1.00mm DIN EN 10 140	300-305 mm 0.20-3.00mm	6 - 305 mm 0.02-2.00 mm B 2 T 3	350 + 610 mm 0.60 – 5.03 mm - T 3	ca. 630x1000mm 2.3-5.5 mm -0/+0.5mm	70-310 0.076-1.50 EN 9445 T1-T3	320 mm 1.00 - 3.00 mm EN 10258 R T 3	10 - 1000 mm 0.003 - 3.00 mm EN 10258 R T 3 (some EN 10258)	Approx. 300 mm 0.05 - 0.50 EN 10258 R EN 10258 (some T3)	Approx. 300 mm 0.03 – 0.20 mm EN 10 258	Approx. 300 mm 0.15 – 0.30 mm EN 10 258	150 + 305 mm 0.01 – 0.50 mm +/- 10%	150 + 305 mm 0.01 - 1.00 mm DIN 1791 T 3	150 + 305 mm 0.05 – 0.30 mm	150 + 320 mm 0.01 – 0.30 mm	150 mm 0.025 mm	150 mm 0.05 – 0.20 mm
Surface		Bright	Bright	White-polished	Bright	Scaled	White-polished	Ground	2H	2R/2H	Bright	Bright	Bright	Bright	Bright	Bright	Bright	Bright
Edge form		Cut	Cut	Cut (in a width of 12.7 mm. rounded from a thickness of 0.25 mm)	Cut	Rolled edge	Cut	Cut	Cut	Cut	Cut	Cut	Cut	Cut	Cut	Cut	Cut	Cut
Straightness		Normal		Normal	Normal		Normal	Normal	SR	Normal				DIN 1791				
Evenness		Normal		Extra precise	Extra precise	0.2% of the strip width	P2/P3	Extra precise	Wave height. max. 1 mm	DIN				DIN 1791				
Rolled condition		Hard-rolled	Hard-rolled	Hardened and tempered (H+T)	Hardened and tempered (H+T)	Hardened and tempered (H+T)	Hardened and tempered (H+T)	Hardened and tempered (H+T)	Cold-rolled – spring-tempered	Cold-rolled. annealed or spring-tempered	Hard-rolled	Annealed	Hard-rolled	Spring-tempered	Spring-tempered	Hard or semi-hard	Hard-rolled	Hard-rolled
Tensile strength/ hardness		>590 N/mm²	490-650 N/mm²	See tensile strengths table	HRC 48-50	HRC 59-61	1700-1950 N/mm²	HRC 50-54	See tensile strengths table	540-750 N/mm² (Annealed) >1100 N/mm² (Hard)	Approx.1000 N/mm²	540 – 750 N/mm²	>360 N/mm²	See tensile strengths table	HV 160-190	Approx. 500-1000 N/mm²	>180 N/mm²	> 150 N/mm²
Material – composition	C:	max.0.08%	max. 0.65-0.80%	max. 1.05%	0.70-0.80%	1.50-1.60%	Approx. 0.39%	0.40 - 0.50%	max. 0.15%	max. 0.03%	max. 0.05%	max. 0.20%				max. 0.02%		
	Si:		0.15-0.30%	0.15-0.30%	0.25-0.50%	0.35-0.40%	max. 0.40%	0.30%	max. 1.5%	max. 1.0%	max. 0.50%	1.5-2.5%		-		max. 0.1%	0.05-0.3%	Si+Fe max. 1%
	Mn:	max. 0.4%	0.30-0.45%	0.30-0.45%	0.60-0.80%	0.30-0.60%	Approx. 0.60%	0.35%	max. 2.0%	max. 2.0%		max. 2.0%				max. 0.3%		max. 0.05%
	P:	max. 0.03%	max. 0.02%	max. 0.02%	max. 0.03 %	max. 0.03%	max. 0.025%	max. 0.045%	max. 0.045%	max. 0.045%			0.002-0.007%		0.01-0.4%			
	S:	max. 0.03%	max. 0.02%	max. 0.02%	max. 0.03%	max 0.02%	max. 0.01%	max. 0.03%	max. 0.03%	max. 0.03%						max. 0.005%		
	Cr:		max. 0.40%	max. 0.40%	0.30-0.40%	11-12%	Approx. 13.5%	13.5 %	16-18%	16.50-18.50%	19.0 – 22.0 %	19.0-21.0%						
	Ni:						-	-	7-9%	10.0-13.0%	max. 0.30%	11.0-13.0%			max. 0.2%	> 99.2%		
	Mo:					0.7-0.9%	ca. 1%	-	max. 0.80%	2.0-2.5%								
	Al:							-			5.50-6.50%						balance	>99.0%
	Cu:							-					>99.95%	62-64%	balance	max. 0.25%	max. 0.05%	max. 0.05%
	Pb:							-					max. 0.005%	max. 0.1%	max. 0.02%			
	Sn:							-							5.5-7.0%			
	Zn:							-						balance	max. 0.2%		max.0.1%	max. 0.1%
	Fe:	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance			max. 0.1%	max. 0.4%	0.7-1.3%	Si+Fe max. 1%
	N:										max. 0.01%							
	Other:					V: 0.7-0.9%		-			Traces of Zr+Y+Hf		max. 0.03%		max. 0.2%	Ti: 0.01-0.1%	max. 0.15%	max. 0.15%

Unalloyed, hard-rolled steel, mat. no. 1.0338 (DC04)
Unalloyed steels are very cost-effective materials for simple parts that don't need to be corrosion-resistant and are not subjected to mechanical strains. With a tensile strength of at least 590 N/mm² (+C590), the products stocked at h+s are easy to blank but can only be dished or deep-drawn to a limited extent. Due to thickness tolerances according to EN 10 140, this material is only suitable for shim parts that do not have high precision requirements.

Unhardened, hardenable spring steel strip, mat. no. 1.1248
With a carbon content of 0.75%, material 1.1248 is frequently used as an alloy for springs. In an unhardened state, this steel is very easy to stamp and form; however, it must then be hardened to achieve a high tensile strength and hardness.

Hardened spring steel strip, mat. no. 1.1274
With a carbon content of over 1%, this material is very well suited for feeler gauge strips and precision foils as well as highly stressed springs that are not subject to any corrosion requirements. In particularly high-quality designs, as the only carbon steel, 1.1274 is suitable for shock absorbers and flapper valves.

Hardened tool steel, mat. no. 1.2003
The addition of a small amount of chromium gives this material high wear-resistance and a better through-hardening in large cross-sections. With a Rockwell hardness of 47–51 HRC, this material is also suitable for smaller tools.

Hardened, rust-resistant special spring steel strip 1.4031 (AISI 420)
As a result of the alloying with 13% chrome and 1% molybdenum, this alloy is corrosion-resistant against damp air, water vapour and water, but is not sufficiently resistant to chloride ions and acids. The advantages of this steel lie in its good wear-resistance and minimum internal tensions. With a tensile strength of 1700–1950 N/mm2, this material is ideal for springs, gauges, tools and knives. In a particularly high-quality design, this material is also suitable for flapper valves.

Hardened, stainless tool steel, mat. no. 1.4034 (1.2083)
As a result of the alloying with 13% chromium, this martensitic chrome steel is corrosion-resistant against damp air, water vapour and water, but is not sufficiently resistant to chloride ions and acids. This material has a lower corrosion-resistance compared to 1.4310. The advantages of this steel lie in its good wear-resistance and minimum internal tensions. With a Rockwell hardness of 50–54 HRc, this material is ideal for gauges, tools and machine cutting tools in the food industry and scalpels. Materials 1.4034 and 1.2083 are only marginally different in terms of carbon content.

Cold-rolled, stainless spring steel strip, mat. no. 1.4310
As a result of the alloying with 17% chrome and 7% nickel, this material is particularly corrosion-resistant. Cold-rolling gives this material a high tensile strength. It has a significantly higher strength than 1.4301. As a result, material 1.4310 is very well suited for stainless-steel precision gauge strips and precision foils. This material is only weakly magnetic and therefore cannot be held in place on magnetic clamping plates during grinding.
When chamfering or bending material 1.4310, please be aware that folds should always run transversely to the roll direction. The roll direction must also be observed when using the material as a flat spring.

Stainless precision steel strip 1.4404
Due to its higher content of nickel and molybdenum, this material is significantly more resistant to corrosion than 1.4301 or 1.4310. In an annealed state, this material has very good deep-drawing properties due to the high nickel content. In a hard-rolled state, this material can be used for springs in corrosive environments. Similarly to 1.4310, 1.4404 becomes slightly magnetisable as a result of hard-rolling; however, due to its higher nickel content, its magnetism is less than in 1.4310.

Heat-resistant ferritic chrome steel, mat. no. 1.4767
By adding approximately 6% aluminium and traces of yttrium and hafnium, this ferritic steel is incredibly heat-resistant up to 1200°C.
We stock this material in a hard-rolled state but it becomes soft during the first heating. This alloy is used for heating conductors in hobs, sensors and in flue gas cleaning. Ferritic steels can be magnetised.

Heat-resistant austenitic steel, mat. no. 1.4828
This material is heat-resistant to 1000°C as a result of its high chromium, nickel and silicon content. We stock this material in an annealed state.

Hard-rolled copper strip, mat. no. 2.0070 (SE-Cu58)
With a copper content of at least 99.95% and low oxygen and phosphorous content, the SE-Cu58 alloy is better quality than the generally used copper types, E-Cu (UNS C11000) and SF-Cu (UNS C12200).
This material is used in general electrical engineering for cable straps and connectors, transformer coils, semiconductors and sheet metal parts (e.g. for seals).

Hard-rolled brass strip, mat. no. 2.0321
Composed of 63% copper and 37% zinc, this material is the standard product for spring-tempered, rolled brass. This material is not magnetic. Observe the roll direction when using the brass as a flat spring or when chamfering or bending brass.

Hard-rolled bronze strip, mat. no. 2.1020 (CuSn6)
With zinc content of 6%, the bronze alloy CuSn6 is the most frequently used type of bronze. Examples of typical applications are connectors, contact pins and general sheet metal parts and springs that require good electrical conductivity. Unlike brass, bronze can also be used in vacuum technology.

Pure nickel, mat. no. 2.4068 (Ni 99.2)
Pure nickel is very corrosion-resistant in alkaline media in particular, even at temperatures above 300°C. It is used in the chemical apparatus construction and pharmaceuticals industries.
As nickel is resistant to chemical substances, the absolute purity of the product being processed is ensured. In thicknesses from 0.01 to 0.05 mm, nickel is available in a hard-rolled state; in thicknesses from 0.10 to 0.30 mm, it is available in a semi-hard state

Aluminium alloy EN-AW 8079
Due to its low specific weight and good formability, aluminium can be used for a wide range of applications. EN-AW contains iron and silicon, giving it a higher tensile strength. This allow is therefore used for aluminium foils of a thickness of up to around 0.05 mm.

Pure aluminium, mat. no. 3.0502 (Al 99.0%)
Due to its relatively good thermal conductivity, pure aluminium is also used for heat exchangers (however, alloys 3003 or 6063 should be used in soldered heat exchangers).
As a result of its high electrical conductivity, aluminium can also be used in the electronics industry and, thanks to its high reflective properties, in lamp reflectors too.