Abbreviation	EN Norm	ASTM / AISI	AFNOR	DIN Abbreviation	ISO	Other
X46CrS13	1.4035	420C + S	X46CrS13	1.4035		1.4034 + S

1.4035 Wire

Chemical analysis by European norm EN 10088-1 in mass percent

C	Si	Mn	P	S	Cr	Fe
0.43-0.50	≤ 1.00	≤ 2.00	≤ 0.040	0.15-0.35	12.50-14.50	Remainder

Diameter 0.02 – 4.00 mm

Application
1.4035 is categorized as martensitic, stainless steel, similar to 1.4034 but with additional sulphur to simplify machining processes. Typical applications are those which require easy machinability but a high level of hardness. Examples include but are not limited to: cutting tools, scrapers, and milling heads. In the medicinal sector 1.4035 is used chiefly in bone cutters, drill bits, screw drivers and curettes. In mechanical engineering, 1.4035 is used for axles, piston rods, and valves due to its resistance to wear and corrosion.

Resistance to Corrosion
1.4035 is resistant to corrosion caused by steam and water. However, it has a higher sulphur content, and is thus not as resistant to corrosion, as 1.4034. Full resistivity is only reached after tempering is complete. When used in high temperature environments, 1.4035 should not be heated above 400°C, and for continuous operation, temperatures should not exceed the annealing temperature. As with all tempered chrome materials, maintained temperatures higher than 400°C lead to embrittlement and can result in tool failure. (Embrittlement begins at 475°C)

Weldability
Welding should be avoided, as with all martensitic steels, due to the danger of hardening cracks forming.

Thermal Treatement
1.4035 is soft annealed between 750°C and 850°C, then hardened between 950°C and 1050°C, followed with quenching in oil. The hold temperature is selected according to the desired material hardness and ranges from 100 – 300°C. The tempering diagram is equivalent to that of 1.4034.

Surface Finish

Drawn	Chemically purged	0.020 – 3.499 mm
Surface Ground	Chemically purged	3.500 – 4.000 mm

Lieferform

As a ring

On assorted spools

Straightened

Axles

Diameter Tolerance

Diameter (mm)	Tolerance (%)	Tolerance (µ)
0.020 – 0.249		± 1.0
0.250 – 0.399		± 1.5
0.400 – 1.500		± 2.0
1.500 – 4.000		± 2.5

Mechanical Properties

Condition at delivery (mm)	Ultimate Tensile Strength (N/mm^2)
0.005 – 0.019	
0.020 – 0.199	
0.200 – 0.499	800 - 1100 (depends on diameter)
0.500 – 0.999	
1.000 – 1.999	
2.000 – 4.000	

Physical Properties

Density		7.70	g/cm^3
Coefficient of Thermal Expansion	20 ºC – 200 ºC	11.00	$10^{-6}/K$
Specific Heat Capacity	20 ºC	460.00	J/kgK
Thermal Conductivity	20 ºC	30.00	W/mK
Specific Electric Resistance	20 ºC	0.55	$\Omega\ mm^2/m$
Young's Modulus	20 ºC	215.00	GPa