

Abbreviation	EN Norm	ASTM / AISI	AFNOR	DIN Abbreviation	ISO	Other
X12CrS13	1.4005	416	Z11CF13	1.4005		

## 1.4005 Wire

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

C	Si	Mn	P	S	Cr	Mo	Fe
0.08-0.15	≤ 1.00	≤ 1.50	0.040	0.15-0.35	12.0-14.0	≤ 0.60	Remainder

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**Diameter** 0.02 – 4.00 mm

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### Application

1.4005 is categorized as stainless, martensitic steel. Due to its high sulfur content, it is particularly suitable for machining. The material is usually processed into wire after annealing and cold-twisting. 1.4005 is mainly used in turbine, motor and pump manufacture, in the form of screws, bolts, shafts, and valves, etc.

### Resistance to Corrosion

Out of all stainless steels, 1.4005 is the least resistant to corrosion. It possesses corrosion resistance to humidity, but the large sulfur content lowers its resistance to pitting in halogen-containing mediums.

### Weldability

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

### Thermal Treatment

Soft annealing is carried out at 750 – 820°C, followed by slow cooling. 1.4005 is tempered at 950 – 1000°C and subsequently quenched in oil, polymer or air. After being hardened, the steel is tempered at 660 – 680°C. Stress-relief heat treatment is performed at 210 – 250°C.

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### Surface Finish

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

### Delivery mode

As a ring  
 On assorted spools  
 Straightened  
 Axles

### Diameter tolerances

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 in cold-twisted delivery condition (N/mm <sup>2</sup> )
0.005 – 0.019	Max. 1100 (depends on diameter)
0.020 – 0.199	
0.200 – 0.499	
0.500 – 0.999	
1.000 – 1.999	
2.000 – 4.000	

### Physical Properties

Density		7.70	g/cm <sup>3</sup>
Coefficient of Thermal Expansion	20 °C – 200 °C	11.50	10 <sup>-6</sup> /K
Specific Heat Capacity	20 °C	460.00	J/kgK
Thermal Conductivity	20 °C	30.00	W/mK
Specific Electric Resistance	20 °C	0.60	Ω mm <sup>2</sup> /m
Young's Modulus	20 °C	215.00	GPa

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