Abbreviation	EN Norm	ASTM / AISI	AFNOR	DIN Abbreviation	ISO	Other
100Cr6	1.3505		100Cr6	1.3505	100Cr6	

1.3505 Wire

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

C	Si	Mn	Cr
0.93-1.05	0.15-0.35	0.25-0.45	1.35-1.60

Diameter 0.02 – 4.00 mm

Application
1.3505 is categorized as carbon steel. Since it is the most used steel for rolling bearings however, it is often found in the category of chrome alloyed rolling bearings. Materials used for rolling bearings have similar requirements as those used for tools, so 1.3505 is also listed with cold working steels. The most important characteristics in the production of rolling bearings are: high abrasion resistance, high corrosive resistance, and good high-temperature strength. 1.3505 meets all these criteria and in addition, it can easily be through-hardened. It has been used for over a century in the production of various bearings with the alloying elements hardly changing. The steel is alloyed with approx. 1% carbon and 1.5% chromium, identical to the proportions from when it was originally produced. Because of its high abrasive resistance, 1.3505 is used, often after surface hardening, for pump axles and fuel injection systems in motors.
The steel's quality however, did change in the second half of the 20th century. A material's homogeneity is a key factor affecting a bearing's lifespan. Slag particles and other inclusions lead to cracks in a bearing's running surface, leading to premature deterioration. Thanks to newer smelting technologies developed in the sixties (vacuum, oxygen, decarburization, VOD and argon oxygen decarburization, AOD) the carbon proportion and contaminations in the steel have been greatly reduced. This improvement alone increased bearing lifespan from about one week in 1960, to theoretical 200 years in 2000.

Resistance to Corrosion
1.3505 does not have an extraordinary corrosive resistance. During long storage greases with sulfur content convert to hydrogen sulphide, which then attacks the inventory.

Thermal Treatment
Spheroidal carbides (cementite) are formed in 1.3505 through soft annealing at 750 – 800 °C followed by slow cooling. Most of our products are delivered in this form or with additional cold forming.
Normalizing is performed at 870 – 900 °C with subsequent air cooling.
The steel is hardened at temperatures of 800 – 830 °C followed by quenching in water or at 830 – 870 °C followed by quenching in an oil bath. Successive tempering to the desired hardness is always necessary. Hardness levels from 64 HRC with 100 °C to 50HRC with 400 °C can be selected.

Weldability
100Cr6 cannot be welded.

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 (N/mm^2)
0.005 – 0.019	
0.020 – 0.199	
0.200 – 0.499	650 – 1000 (depends on diameter)
0.500 – 0.999	
1.000 – 1.999	
2.000 – 4.000	

Physical Properties

Density		7.61	g/cm^3
Coefficient of Thermal Expansion	20 ºC – 200 ºC	12.50	$10^{-6}/K$
Specific Heat Capacity	20 ºC	470.00	J/kgK
Thermal Conductivity	20 ºC	42.60	W/mK
Specific Electric Resitance	20 ºC	0.19	$\Omega\ mm^2/m$
Young's Modul	20 ºC	210.00	GPa