Phynox

Abbreviation	EN Norm	ASTM / AISI	AFNOR	DIN Abbreviation	ISO	Other
CoCr20Ni15Mo	2.4711	ASTM F1058		2.4711	5832-7	

Phynox Wire

Chemical analysis by European norm in mass percent.

C	Si	Mn	P	S	Cr	Mo	Ni
≤ 0.15	≤ 0.12	1.50-2.50	≤ 0.015	≤ 0.015	19.0-21.0	6.5-7.5	15.0-18.0

Co	Be	Fe	Other
39.0-41.0	≤ 0.001	Rest	≤ 1.0

Diameter 0.02 – 4.00 mm

Application and use
Phynox is categorized as a cobalt alloy and possesses extraordinary characteristics in tensile strength, tenacity, ductility and resistance to corrosion. Additionally it is biocompatible and therefore well established as an implant material. The alloy is made up of: 40% cobalt, 20% chrome, 16% nickel, and 7% molybdenum. This material is used whenever high resistance to corrosion is required and material fatigue not an option. Primary implementation includes but is not limited to: the medicinal and dental sectors, chemical industry, aeronautics, and even the watch industry, where Phynox is a favoured material for spring and axle manufacturing.
Tensile strengths up to 2800N/mm^2 (depending on the diameter) can be reached with appropriate thermal treatment. A long flex life, the ability to withstand very high temperatures and non-magnetic behaviour are also key characteristics that define Phynox.

Resistance to corrosion
Both organic and mineral acids are completely or almost completely unable to attack Phynox, allowing it to leave even the best stainless steels behind in terms of resistance to corrosion. Together with its inactivity when contacting bodily fluids or tissue, this resistivity makes Phynox an excellent choice for implants.

Thermal treatment
Phynox can be hardened at a temperature of 520°C for three hours in a vacuumed or an argon flooded oven. Exposure to air will cause a green colouring to manifest, which has no impact on the materials' mechanical properties. The level of hardness at delivery should be chosen in an appropriate fashion, as the delivery condition influences the maximum effect of the heat treatment.

Weldability
Phynox can be easily welded as well as soldered; however, only cold-worked material can be hardened. Therefore areas which are welded should not be exposed to excessive mechanical stress.

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)	Tensile strength in cold-twisted condition at delivery (N/mm^2)
0.005 – 0.019	
0.020 – 0.199	
0.200 – 0.499	950 - 2250 (higher tensile strengths on request)
0.500 – 0.999	
1.000 – 1.999	
2.000 – 4.000	

Physical Properties

Density		8.30	g/cm^3
Coefficient of thermal expansion	20 ºC – 200 ºC	12.50	$10^{-6}/K$
Specific heat capacity	20 ºC	450.00	J/kgK
Thermal conductivity	20 ºC	12.50	W/mK
Specific electric resistance	20 ºC	0.10	$\Omega\ mm^2/m$
Young's Modulus	20 ºC	215.00	GPa