GARBA 177 Premium

Precipitation hardenable stainless spring wire. Shaved and EC-tested. For applications demanding high fatigue properties.

GARBA 177 Premium is a semi-austenitic precipitation-hardenable stainless steel with high relaxation resistance at elevated temperatures and excellent fatigue properties. This material has good formability and good form stability during the precipitation hardening heat treatment and a moderate level of corrosion resistance. The shaved surface improves the fatigue resistance as compared to GARBA 177PH.

Chemical composition

Element	Weight %
C	0.09%
Si	0.70%
Mn	1.00%
P max.	0.040%
S max.	0.015%
Cr	16.00% - 18.00%
Ni	6.50% - 7.80%
Al	0.70% - 1.50%

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Data last verified: 2023-04-12. Supersedes all previous editions.

Mechanical properties

For round wire

Diameter (mm)	Tolerance (mm)	Tensile strength (N/mm^2)	Tensile strength after heat treatment 480C 1h (N/mm^2)
0.30 - 0.40	±0.005	1885 - 2165	2205 - 2525
0.41 - 0.50	±0.008	1860 - 2130	2180 - 2490
0.51 - 0.65	±0.008	1810 - 2070	2130 - 2430
0.66 - 0.80	±0.010	1810 - 2060	2130 - 2430
0.81 - 1.00	±0.010	1780 - 2030	2100 - 2390
1.01 - 1.25	±0.015	1720 - 1960	2040 - 2310
1.26 - 1.50	±0.015	1670 - 1910	1990 - 2260
1.51 - 1.75	±0.015	1610 - 1850	1910 - 2180
1.76 - 2.00	±0.015	1570 - 1800	1900 - 2160
2.01 - 2.50	±0.015	1540 - 1770	1860 - 2120
2.51 - 3.00	±0.020	1500 - 1710	1820 - 2060
3.01 - 3.50	±0.020	1400 - 1600	1660 - 1940
3.51 - 4.25	±0.020	1350 - 1550	1620 - 1920

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Diameter (mm)	Tolerance (mm)	Tensile strength (N/mm^2)	Tensile strength after heat treatment 480C 1h (N/mm^2)
4.26 - 5.00	±0.025	1310 - 1500	1580 - 1800
5.01 - 5.60	±0.025	1300 - 1490	1550 - 1790

Surface conditions

Surface condition

Surface performance
AC-surface 0.30–5.60 mm Ø. The AC-coating can be removed before heat treatment by using a 10-20% nitric acid pickle at room temperature.

SURFACE CONDITION

Surface condition – non-destructive testing
In the standard size range 2.00-5,60 mm the wire can be tested continuously in Eddy Current equipment to a surface level of >40 microns.

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Physical properties

Heat conductivity

Temperature °C	20	100	300
W/(m* °C)	15.0	15.5	19.0

Linear expansion

Pro °C	30-100	30-200	30-300
$x10^{-6}$	13.0	13.5	14.0

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Technical specification

Property	Value	
E modulus of elasticity	Abt. 190 kN/mm2 in drawn condition.	Abt. 200 kN/mm2 after heat treatment.
G modulus of shear	Abt. 73 kN/mm2 in drawn condition.	Abt. 78 kN/mm2 after heat treatment.
Density	7.90 kg/dm3	

Steel grades and product standards

Nearest equivalent product standards	EN ISO 6931-1	ASTM A313	AMS 5678	BS 2056 301 S81	JIS G4314
Nearest equivalent steel grades	EN/DIN 1.4568	AISI/SAE 631	JIS SUS 631		

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Recommendations

Heat treatment

Normal procedure for precipitation hardening is heat treatment at 480°C (896°F) for 1 hour and then air cooling. This should be done as soon as possible after spring coiling. The tensile strength of the wire before and after this treatment is given in the table in previous page.

Shot peening

In order to obtain optimum fatigue properties, the process time should be adjusted to get a complete treatment. Size of shots should be adapted to wire dimension, pitch and shot peening equipment.
Shot peening of the inside of the spring coils is particularly critical.

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