GARBA 177 Supreme

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

GARBA 177 Supreme® is a semi-austenitic precipitation-hardenable stainless steel, processed by Vacuum arc remelting (VAR), which reduces the risk of harmful inclusions. The VAR process together with a 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: 2025-03-17

Cleanliness in steel

The presence of non-metallic inclusions in the wire rod is inspected for every heat in accordance with the Suzuki Garphyttan method by the steel supplier.

For wire rod samples: Inclusion size max. 15 µm down to 1 mm below surface. Inspection area: 350 mm^2.

Inclusion size, surface	5–10	> 10–15	>15 µm
Max. number of inclusions	Max grade D3 acc. to JK scale*	20	0

** Method for assessment of the content of non-metallic inclusions. Swedish Standard SS 111116 – Microscopic methods – Jernkontoret's inclusion chart II for the assessment of non-metallic inclusions.*

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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

Resistivity

Temperature °C	20	100	200	300
nΩm	900	950	1000	1050

Linear expansion

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

Specific heat capacity

Temperature °C	100	200
J/(kg °C)	480	520

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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

Vacuum arc remelting (VAR) process
For applications demanding superior fatigue properties

The VAR process gives a material with lower level of inclusions compared to a material not processed with VAR and in addition also a better segregation level.
Material properties achieved by VAR in combination with shaved wire surface and precipitation hardening result in superior fatigue resistance.

Shaved and Eddy Current tested

Suzuki Garphyttan uses the most advanced Eddy Current testing equip¬ment available on the market. Experience from many years of surface testing in efficient continuous testing lines is a guarantee for high quality spring wire.

Eddy Current testing is carried out on material with high demands on surface quality. EC-testing is performed with both rotating (R) and stationary (D) probe test equipment.

Steel grade	Dimension, mm	VAR	Shaved	Unshaved	RD40
GARBA 177 Supreme®	0.30 – 1.99	x	x	-	-
GARBA 177 Supreme®	2.00 – 5.60	x	x	-	x

Steel grade Dimension, mm VAR Shaved Unshaved RD40
GARBA 177 Supreme® 0.30 – 1.99 X X – –
GARBA 177 Supreme® 2.00 – 5.60 X X – X

Heat treatment

Normal procedure for precipitation hardening is heat treatment at 480oC (896oF) 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.

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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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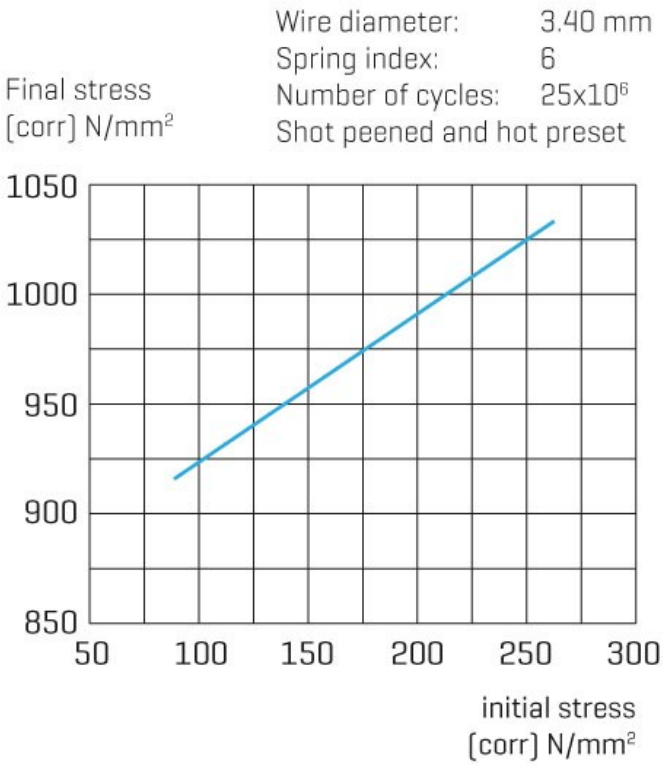
Relaxation and fatigue properties



In diagram 1 the fatigue properties of GARBA 177 Supreme® is illustrated in a Goodman-diagram, based on a special test spring design.

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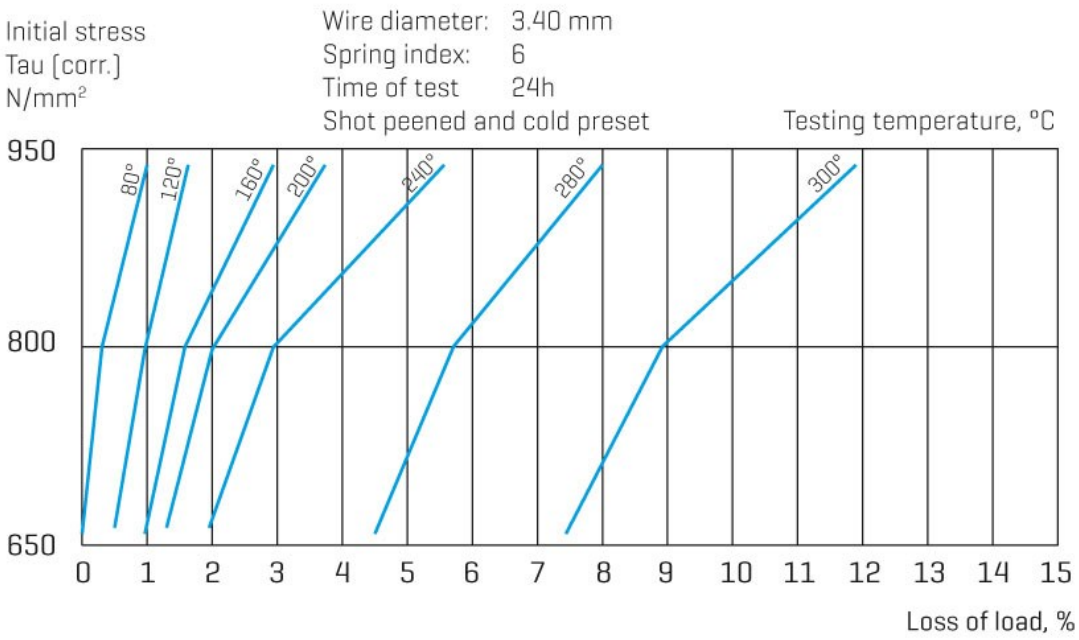

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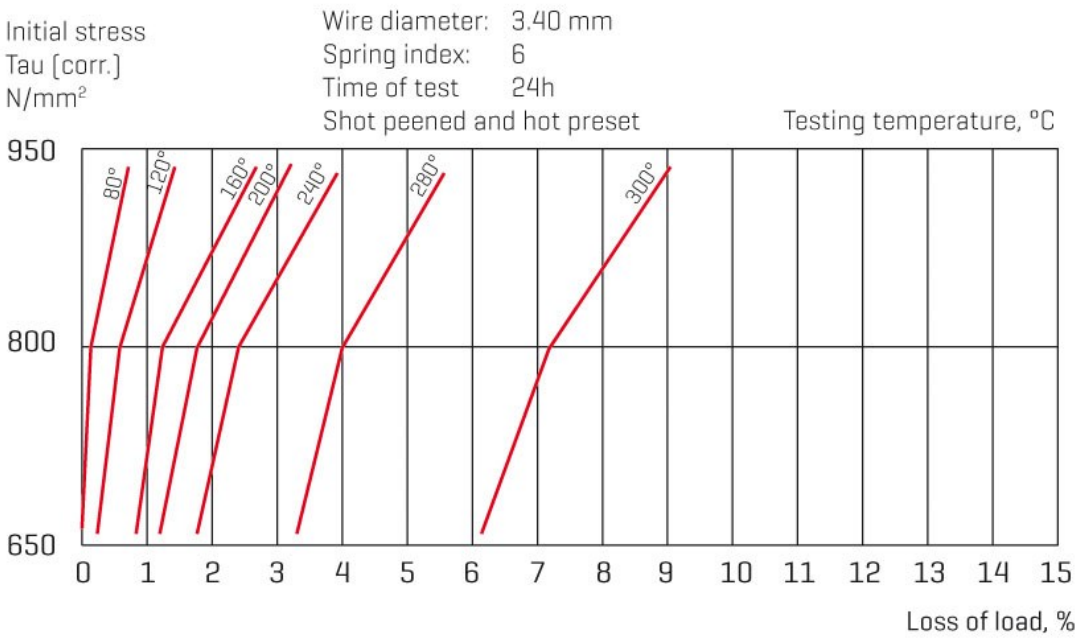

Diagram 2-3 show the relaxation properties (loss of load) of springs made from GARBA 177 Supreme® subjected to three different stress levels at different temperatures.

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