

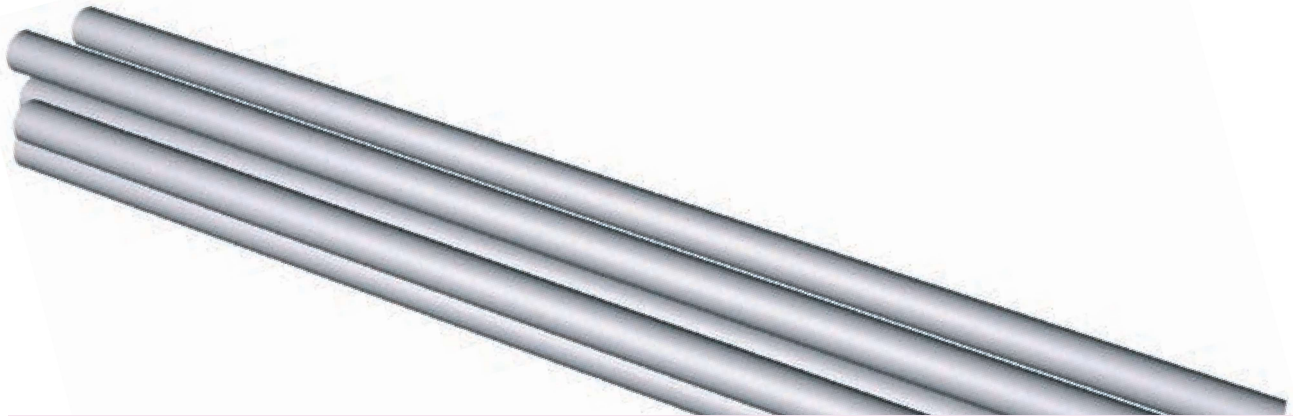
SPRING MATERIAL





SPRING WIRE

Information



STOCK RANGE

Spring wire is part of our stock range with the following material qualities:

- Spring steel EN 10270-1-SH
- Stainless wire EN 10270-3-1.4310
- Acid-proof wire EN 10270-3-1.4401

Detailed information can be found on page 205.

ORDER RANGE

A large range of materials are stocked by our unit in Sweden and can be ordered for delivery.

We can supply the following forms:

- Wire
- Wire in ring
- Wire in straight lengths

MATERIAL QUALITIES

A large range of material qualities are stocked by our unit in Sweden and can be ordered for delivery.

- Standard spring steel wire
- Oil-hardened material
- Stainless material
- Acid-proof material
- Anti-magnetic material
- Heat resistant material

More information about the characteristics of these materials can be found on pages 207-208. Information about their chemical makeup and other technical information can be found on pages 209-210.



SPRING STEEL EN 10270-1-SH

EN 10270-1-SH is a standard quality for spring wire, without corrosion resistance requirements. A very good quality for general use. Should be tempered at 250 - 350° C after shaping.

Operating temperature: -40 – +120 °C

For chemical analysis and other data, see pages 209-210.

STAINLESS SPRING WIRE EN 10270-3-1.4310

Hard drawn stainless wire with good spring qualities for general use. Good for bending.

Should be tempered at 250-350 °C after shaping.

Operating temperature: -150 – +250 °C

For chemical analysis and other data, see pages 209-210.

Spring wire in small wrapped coils

Wire Ø	Weight/pack gram	No. metre	Break limit N/mm ²	Ring Ø apx. mm	Cat.no
0,2	100	400	2100	100	6413
0,3	100	170	2050	100	6414
0,4	100	100	1950	100	6415
0,5	500	325	1950	100	6416
0,6	500	225	1900	100	6417
0,7	500	165	1900	100	6418
0,8	500	125	1850	250	6420
1	1000	160	1850	250	6419
1,2	1000	115	1750	400	6421
1,50	1000	70	1700	400	6422
2	1000	40	1650	600	6423
2,5	1000	26	1550	600	6424
3	1000	18	1500	600	6425

Upon request, other dimensions and quantities can be delivered.



Spring wire in small wrapped coils

Wire Ø	Weight/pack gram	No. metre	Break limit N/mm ²	Ring Ø apx. mm	Cat.no
0,2	100	400	2350	100	6426
0,3	100	170	2300	100	6427
0,4	100	100	2200	100	6428
0,5	500	325	2200	100	6429
0,6	500	225	2100	100	6430
0,7	500	165	2100	100	6431
0,8	500	125	2100	250	6432
1	1000	160	2000	250	6433
1,2	1000	115	2000	400	6434
1,5	1000	70	1850	400	6435
2	1000	40	1850	600	6436
2,5	1000	26	1750	600	6437
3	1000	18	1750	600	6438

Upon request, other dimensions and quantities can be delivered.

ACID-PROOF SPRING WIRE EN 10270-3-1.4401

Hard drawn acid-proof wire and hard rolled strip suited for naval applications, provisions, medicine and other environments where more stringent corrosion resistance requirements are imposed. Slightly lower tensile strength than stainless EN 10270-3-1.4310. Good for bending.

Should be tempered at 250 - 350 °C after shaping.

Operating temperature: -200 – +300 °C

For chemical analysis and other data, see pages 209-210.

Spring wire in small wrapped coils

Wire Ø	Weight/pack gram	No. metre	Break limit N/mm ²	Ring Ø apx. mm	Cat.no
0,2	100	400	1750	100	0887
0,3	100	170	1750	100	0888
0,4	100	100	1700	100	0889
0,5	500	325	1700	100	0890
0,6	500	225	1650	100	0891
0,7	500	165	1650	100	0892
0,8	500	125	1650	250	0893
1	1000	160	1600	250	0894
1,2	1000	115	1600	400	0895
1,5	1000	70	1500	400	0896
2	1000	40	1500	600	0897
2,5	1000	26	1400	600	0898
3	1000	18	1400	600	0899

Upon request, other dimensions and quantities can be delivered.



MATERIAL OVERVIEW

Terms and conditions



TERMS AND CONDITIONS

Order

Spring material from the order range is supplied from our unit in Sweden.

Contact your nearest sales office for pricing and delivery times.

Detailed contact info on our homepage, lesjoforsab.com.

Tolerances:

Please ask for information on tolerances.

Delivery times

Normal delivery time is 1-2 working week.

Other

Spring material from the order range is supplied from our unit in Vällingby and cannot be supplied in conjunction with other standard products from this catalogue.





The following material can be ordered for delivery. Contact our materials department for pricing and delivery times.

For chemical analysis and other data, see pages 209-210.

Please ask for information on tolerances. Spring material is supplied from our unit in Sweden and cannot be delivered in conjunction with other standard products.

**STRIP STEEL SS 1770,
DIN 1.1231, W.NR CK 67**

CK 67 is a standard quality in spring strip steel, with no corrosion resistance requirements.

Available both as unhardened and hardened.

Operating temperature: -40 – +120 °C

Tempering instruction: Heat to 800–820 °C, cool in oil.

Temper for approx. 30 min at 400 °C, cool in air.

**STRIP STEEL SS 2230,
EN 10089 51CRV4, W.NR 1.8159**

High strength spring steel for high pressures and temperatures with a good relaxation limit. We keep a stock of the unhardened steel, which requires tempering after shaping.

Operating temperature: -40 – +225 °C

**SPRING STEEL SS 2331-06,
EN 10270-3-1.4310,
DIN 17224: X10CRNI18 8**

Hard drawn stainless wire with good spring qualities for general use and suitable for bending.

Should be tempered in 250–350 °C after shaping.

Operating temperature: -150 – +250 °C

**SPRING STEEL SS 2347,
EN 10270-3-1.4401,
DIN 17224: X5 CRNIMO 18 10**

Hard drawn acid proof wire and hard rolled strip suited for naval applications, provisions, medicine and other environments where higher demands for corrosion resistance are required. Slightly lower tensile strength than stainless SS2331. Good for bending.

Should be tempered in 250–350 °C after shaping.

Operating temperature: -200 – +300 °C

**SPRING STEEL SS 2388,
EN 10270-3-1.4568,
DIN 17224: X7 CRNIAL 17 7**

Stainless hard rolled strip, which after tempering increases in tensile strength by approx. 350 N/mm². This facilitates shaping as it can be performed on a softer material. The steel has excellent spring qualities with enhanced strength and a lower relaxation, even at higher temperatures.

Operating temperature: -200 – +350 °C

**TIN BRONZE SS 5428-7,
DIN 17670/17677: SUSN6**

Tin bronze (phosphor bronze) is a non-magnetic corrosion resistant spring material for low loads.

Operating temperature: -200 – +80 °C

**BERYLLIUM COPPER CUBE 250,
DIN 17670/17677: CUBE2**

Beryllium copper is a non-magnetic acid proof spring material with excellent spring qualities.

This medium-hard material is easily formed, after tempering optimum spring hardness is achieved. The gas emitted during heat treatment is toxic, therefore it is important to provide good ventilation.

Operating temperature: -200 – +150 °C

**SPRING WIRE STATO 70,
EN 10270-2-FDSICR,
DIN 17223-2: FDSICR**

Stato 70 is high strength oil hardened valve spring steel. A high class spring steel for highly stressed springs. Bending is possible down to a radius equal to the wire thickness. After shaping, tempering should be done at 300–400°C. Handle carefully when supplied in ring as the wire may straighten when released.

Operating temperature: -60 – +250 °C



SUPER ALLOYS

Order range

The following material can be ordered for delivery. Contact our materials department for pricing and delivery times.

For chemical analysis and other data, see pages 209-210.

Please ask for information on tolerances.

ALLOY X-750

A nickel-chrome alloy, made precipitation hardenable with high creep rupture resistance at increased temperatures up to 700 °C. The material is available from stock in wire and sheet form, but also straight lengths and strip can be supplied. Our stock wire is compliant with the spring temper AMS 5699 standard, which gives higher strength but at lower operating temperatures.

Tempering must be performed to take full advantage of the mechanical qualities. Applications include nuclear reactors, gas turbines, rocket engines, vehicle components and the aircraft industry.

Operating temperature:

Wire AMS 5699, - 200 – +300 °C

Sheet AMS 5542, - 200 – +550 °C

ALLOY 90

A precipitation hardenable nickel-chromium-cobalt alloy, having high stress-rupture strength and creep resistance at elevated temperatures up to about 950 °C. For springs exposed to lower loads, the material can be used up to 700 °C.

Nimonic 90 offers good resistance to corrosion and is non-magnetic. Applications include the aircraft industry, gas turbines, vehicle components and springs in high temperature environments, and thermal processing. Our stocked standard programme covers cold drawn wire and cold rolled strip. Full mechanical properties are obtained after heat treatment.

Operating temperature: -100 – + 550 °C

ALLOY 718

A nickel-chromium precipitation hardenable alloy with a high resistance to relaxation and creep ruptures at temperatures up to 700 °C. This non-magnetic alloy has a higher strength than Inconel X-750 and better mechanical properties at lower temperatures than both Nimonic 90 and Inconel X-750.

Suitable for applications involving elevated temperatures in corrosive environments such as gas turbines, rocket engines, space and aero industries, oil and gas extraction, nuclear reactors and pumps. For spring applications, this material requires heat treatment to optimise its mechanical properties. Inconel 718 can easily be welded and is especially resistant to weld induced strain age cracking.

Operating temperature: -200 – +550 °C

HASTELOY C-276

A nickel-molybdenum-chromium alloy with the addition of tungsten which has excellent resistance to strong oxidisers, hot concentrated mineral acids and a wide range of corrosive environments, and is especially resistant to pitting and crevice corrosion. Applications include pollution control, waste treatment, pulp and paper production, and seawater.

Cold drawing or cold rolling Hastelloy C-276 optimises tensile strength values, which cannot be increased by heat treatment. Tempering at 450 °C (max) is however recommended, in order to relieve stresses generated during the shaping process.

Operating temperature: -100 – +200 °C

MP 35 N

A nickel-cobalt based alloy that has a unique combination of qualities including ultra high strength and ductility, and also outstanding corrosion resistance. MP 35 N resists corrosion in hydrogen sulphide, salt water and other chloride solutions. It also has excellent resistance to crevice and stress corrosion cracking in sulphuric liquids, seawater and other hostile environments.

MP 35 N is recommended for applications where a combination of high strength and high corrosion resistance is required. It must be heat treated in order to achieve its full mechanical properties.

Operating temperature: -200 – +315 °C

MATERIAL OVERVIEW



This overview contains only standard spring materials. German and English standards refer to the closest comparable qualities.

Terms: T = wire, S = rod, B = strip

Material type	SS-ref or works ref.	Equivalent standard		Form	Operating temp. range °C	Description
Standard	SS1774-04	EN 10270-1-SM	DIN 17223 B	T	-40 – +120	Standard spring steel wire.
	SS1774-05	EN 10270-1-SH	DIN 17223 C	T	-40 – +120	Music wire.
	SS1774-06	EN 10270-1-DH	DIN 17223 D	T	-40 – +120	Piano wire with increased tensile strength.
	SS1770	1.1231 CK 67	BS 5770 CSHT	B	-40 – +120	Standard material.
	SS2090		DIN 17221 67SiCr5	T S B	-40 – +150	Standard spring steel alloy.
	SS2230	EN 10089 51CrV4	DIN 17221 50CrV4	T S B	-40 – +225	Alloy material for higher temp. and stresses. Good relaxation limit.
Oil hardened	Oteva 60	EN 10270-2-VDCrV	17223 T2 VD CrV	T	-60 – +200	Standard valve spring wire.
	Stato 70	EN 10270-2-FDSiCr	17223 T2 FD SiCr	T	-60 – +250	High-class spring wire.
	Oteva 70	EN 10270-2-VDSiCr	17223 T2 VD SiCr	T	-60 – +250	High-class ultrasonic checked valve spring steel.
Stainless steel	SS2331	EN 10270-3-1.4310	W 1.4310 X10CrNi18 8	T B	-150 – +250	Standard stainless steel spring material. Allows extra high loads $D_t < 2.0$ mm
	11R51	EN 10270-3-1.4310-HS		T B	-150 – +300	Stainless material with increased tensile strength and relaxation properties. "Semi" acid-proof.
	SS2388	EN 10270-3-1.4568	W 1.4568 X7CrNiAl177	T B	-200 – +350	Stainless material for high stress with excellent relaxation resistance.
Acid-proof	SS2347-04	EN 10270-3-1.4401	W 1.4401 X5CrNiMo1810	T B	-200 – +300	Acid-proof standard material.
	Titanium alloys			T S B	-200 – +150	High corrosion resistant lightweight material.
Non-magnetic acid-proof	SS5428-07	2.1020 CuSn 6	BS 2870 Pb 103	T B	-200 – +80	Phosphor bronze. Non-magnetic and corrosion resistant. For low loads.
	Beryllium copper	2.1247 CuBe	BS 2873/ 2870 CB101	T B	-200 – +150	Beryllium copper. Non-magnetic and corrosion resistant with excellent spring characteristics.
Heat resistant acid	Hastelloy C276			T S B	-100 – +500	High corrosion/temperature/resistant material.
	Alloy X-750, Spring Temper			T S B	-200 – +370	High temperature material with good corrosion resistance.
	Alloy X-750, Temper No 1			T S B	-200 – +540	High temperature material with good corrosion resistance.
	Alloy 90	2.4969		T B	-100 – +550	High temperature material with good corrosion resistance.
	Alloy 718	2.2668		T B	-200 – +550	High temperature material with good corrosion resistance.
	MP 35 N			T B	-200 – +315	Exceptionally good corrosion resistance and tensile strength.

MATERIAL OVERVIEW

Chemical analysis %

SS standard Works ref.	C	Si	Mn	P<	S<	Cr	Mo	Ni	V	Al	Ti	Cu	Co	Fe	Others
EN 10270	0,70	0,25	0,75	0,03	0,03	-	-	-	-	-	-	-	-	-	-
1.1231 (CK 67)	0,69	0,25	0,75	0,03	0,03	-	-	-	-	-	-	-	-	-	-
67SiCr5	0,55	1,75	0,80	0,03	0,03	0,30	-	-	-	-	-	-	-	-	-
EN 10089	0,51	0,28	0,90	0,03	0,03	1,05	-	-	0,15	-	-	-	-	-	-
EN270-2-VDCrV	0,70	0,25	0,75	0,03	0,02	0,50	-	-	0,10	-	-	-	-	-	-
EN270-2-FDSiCr	0,55	1,40	0,75	0,03	0,03	0,70	-	-	-	-	-	-	-	-	-
EN270-2-VDSiCr	0,55	1,40	0,70	0,03	0,03	0,70	-	-	-	-	-	-	-	-	-
EN 10270-3-1.14310	<0,1	<1,0	<2,0	0,04	0,03	17,0	-	8,0	-	-	-	-	-	-	-
EN 10270-3-1.14310-HS	<0,1	<1,0	<2,0	0,04	0,03	17,0	0,7	8,0	-	-	-	-	-	-	-
EN 10270-3-1.4568	<0,1	<1,0	<1,0	0,04	0,03	17,0	-	7,1	-	1,13	-	-	-	-	-
EN 10270-3-1.4401	<0,07	<1,0	<2,0	0,04	0,03	17,5	2,25	12,0	-	-	-	-	-	-	-
Hastelloy C	<0,02	<0,08	<1,0	0,04	0,03	15,5	16,0	57,0	0,03	-	-	-	<2,5	5,0	W 4,0
2.020 (CuSn6)	-	-	-	0,40	-	-	-	-	-	-	-	Rest	-	-	Sn 7,0
2.1247	-	-	-	-	-	-	-	>0,2	-	-	-	Rest	0,2	-	Be 1,95
Alloy X750	<0,08	<0,5	<1,0	-	-	15,5	-	<70	-	0,70	2,5	<0,5	-	7,0	Nb 0,95
Alloy 718	-	-	-	-	-	18,0	3,0	<70	-	0,50	0,9	-	-	Rest	Nb 5,0
Alloy 90	0,09	<1,0	<1,0	-	0,015	19,5	-	Rest	-	1,40	2,35	-	15-21%	16,5	<2,0
Titanleg.	-	-	-	-	-	-	-	-	4,0	6,20	Rest	-	-	<0,3	-
MP 35 N	-	-	-	-	-	20	10	35	-	-	<1,0	-	35	<1,0	-

Other technical information

The values for modules E and G apply at 20 °C. The majority of the materials mentioned below can also be obtained with square or rectangular cross sections. However, stock is limited, which is why it is usually necessary to have large quantities to make production possible.

SS-ref or works ref lengths	Elast. modulus (E)N/mm ²	Shearing (G)N/mm ²	Density kg/dm ³	Size range Wire Ø	Strip t	Straight Ø
EN 10270-1-SM	206 000	81 500	7,85	0,1-14,0		
EN 10270-1-SH	206 000	81 500	7,85	0,1-12,0		
EN 10270-1-DH	206 000	81 500	7,85	0,1-10,0		
1.1231 (CK 67)	206 000	78 500	7,85		0,1-10,0	
67SiCr5	206 000	78 500	7,85	8,0-20,0	5,0-15,0	10-30
EN 10089	206 000	78 500	7,85	8,0-20,0	1,0-10,0	10-65
EN270-2-VDCrV	206 000	79 500	7,85	0,5- 9,0		
EN270-2-FDSiCr	206 000	79 500	7,85	0,5- 9,0		
EN270-2-VDSiCr	206 000	79 500	7,85	0,5- 9,0		
EN 10270-3-1.4310	185 000	73 000	7,9	0,1-12,0	0,10- 3,0	
EN 10270-3-1.4310-HS	185 000	73 000	7,9	0,1-10,0	0,10- 1,5	
EN 10270-3-1.4568	200 000	78 000	7,9	0,1- 8,0	0,10- 3,0	
EN 10270-3-1.4401	180 000	71 000	8	0,1-10,0		
Hastelloy C	205 000	73 300	8,89	0,1-10,0	0,10-10,0	6-150
2.1020 (CuSn6)	115 000	42 000	8,9	0,2- 7,0	0,10- 3,5	
2.1247	135 000	47 000	8,9	0,5-1,30	0,15- 3,0	
Alloy X750	212 400	75 800	8,25	0,5- 9,0	0,50- 4,0	10-150
Alloy 90	204 000	75 800	8,28	0,5- 6,0	0,20- 3,0	15-150
Titanleg.	106 200	40 700	4,45	0,1-10,0	0,10-10,0	6-150
Alloy 718	204 900	77 200	8,22	0,5-15,0	0,50-10,0	
MP 35 N	234 000	80 700	8,57	0,2-10,0	0,20- 3,0	