



## Hardened Spring Steel W.-Nr. 1.1274

### 1. Applications:

With a carbon content of over 1%, this material is very well suited for feeler gauge strips and precision foils as well as highly stressed springs that are not subject to any corrosion requirements. In particularly high-quality designs, as the only carbon steel, 1.1274 is suitable for shock absorbers and flapper valves.

Further applications: wear bars, doctor blades

The alloy 1.1274 is suitable for springs according to DIN 17 222 (new: DIN EN 10 132-4).

In thicknesses of more than 1.0 mm we can supply the hardened tool steel W.-Nr. 1.2003.

### 2. Material codes:

German Norm:	1.1274 C100S+QT (former known as Ck101)
AISI:	1095
ASTM:	G 10950
Engl. Norm:	95 (B.S. 5770 Part 1)
Franz. Norm:	XC100
Japan. Norm:	SK 4-CSP (Norm G 4802)

### 3. Chemical composition: \*

C:	max. 1.05 %
Si:	0.15-0.30 %
Mn:	0.30-0.45 %
P:	max. 0.02 %
S:	max. 0.02 %
Cr:	ca. 0.10 %

\* the exact composition of each batch can be documented by a material certificate 2.2 or 3.1 according to DIN EN 10 204.

### 4. Delivery condition:

Condition:	hardened and tempered (martensitic structure)
Surface:	white polished, please ask for Ra-values
Flatness:	mostly P2 (max. 0,30% of the strip width)
Tensile strength:	see table (from 1400-1600 to 2000-2200 N/mm <sup>2</sup> depending on the thickness)

Further mechanical data: see chapter 7 and 8.

### 5. Sizes:

Thicknesses: 0.02-2.00 mm (between 1.10 and 2.00mm only width 12.7mm)

Raw material width: from 12.7 up to 305 mm (see table)  
 Standard widths: 6 – 12.7 – 25 – 50 and 305 mm (not in all thicknesses)

Edges: in widths 6 and 12.7 mm round edges in thicknesses from 0.25 to 2.0mm, all other sizes with cut edges

The following sizes are available from stock (without obligation),  
 status: October 2015:

<b>Thickness s in mm</b>	<b>Maximum width in mm</b>	<b>Tensile strength in N/mm<sup>2</sup></b>	<b>Annotation</b>
0,02	12,7	2000-2200	
0,03	ca. 102	2000-2200	
0,04	ca. 102	2000-2200	
0,05	ca. 145	2000-2200	
0,06	ca. 120	2000-2200	
0,07	ca. 120	2000-2200	
0,08	ca. 120	2000-2200	
0,09	ca. 120	2000-2200	
0,10	305	2000-2200	
0,12	ca. 240	2000-2200	
0,15	305	2000-2200	
0,18	ca. 248	2000-2200	
0,20	305	1800-2100	
0,25	305	1800-2100	
0,30	305	1800-2100	
0,35	305	1800-2000	
0,40	305	1600-1900	
0,45	50	1600-1900	
0,50	305	1600-1900	
0,55	12,7	1600-1900	
0,60	305	1600-1800	
0,65	12,7	1600-1800	
0,70	305	1600-1800	
0,75	12,7	1600-1800	ca. 300 mm Coil in Ck75 16-1800 N/mm <sup>2</sup>
0,80	305	1600-1800	
0,85	12,7	1600-1800	ca. 200x1000 mm in Ck75/85
0,90	305	1600-1800	
0,95	12,7	1600-1800	ca. 200x1000 mm in Ck75/85
1,00	305	1600-1800	
1,10-2,00	12,7	1400-1600	in Schritten von 0,10 mm steigend

In the thicknesses from 1.0 to 5.03 mm we have the hardened tool steel 1.2003 (75Cr1) on stock.

#### **6. Tolerances:**

Thickness tolerance: T3

Width tolerance: B2

Straightness: normal

Flatness: P3 = 0,2% of the strip width

## 7. Further mechanical data:

Yield str. Rp0,2 : approx. 90 % of the tensile strength  
Elongation A 80: no data available

Fatigue strength: high fatigue strength, suitable for shock absorber valves and flapper valves

If good tumbling is done, the following values can be achieved:

Reversed bending stress (Mean stress = 0):  
620-680 MPa at a failure rate of 5 %.

Fluctuating bending stress (Minimum stress = 0):  
520-580 MPa at a failure rate of 5 %

As the fatigue strength depends on different factors like the corrosive conditions and the edge treatment, no definitive endurance limit values can be guaranteed.

Please ask if the requested batch meets the high demands for shock absorber valves or compressor valves.

The operation temperature should not exceed 200°C.

Please remember that the modulus of elasticity decreases at higher temperatures. For higher operation temperatures we suggest the stainless hardened steels like the alloys 1.4031Mo (up to 0.80 mm thickness) and 1.4034 (from 1.0 to approx. 10.0 mm thickness)

## 8. Physical properties (for the alloy 1.1248 = C75S)

Density: 7,9 g/cm<sup>3</sup>  
Thermal conductivity: 49 W/(m °C) at 20 °C  
Spec. heat capacity: 460 J/(kg °C) mean value at 50 – 100 °C  
Thermal expansion: 10,5 x 10<sup>-6</sup> (between 30 - 100 °C)  
11,5 x 10<sup>-6</sup> (between 30 - 200 °C)  
12,5 x 10<sup>-6</sup> (between 30 - 300 °C)  
Electric resistance: approx. 0,20 Ohm x mm<sup>2</sup>/m (for 1.1231= C67S hardened)  
Modus of elasticity: 210 000 MPa at 20 °C  
Relative permeability  $\mu_r$ : maximum 400 (for 1.1231= C67S hardened)

## 9. Blanking

We recommend a punch-to-die clearance of 4-10 % of the strip thickness. The corner radius should be at least 0.25 mm and the punching die should be at least twice the strip thickness.

After blanking a stress relieving at a maximum temperature of 250°C for 30-60 minutes is suggested.

The pieces should then be tumbled to receive a good edge roundness.

We suggest to produce the pieces by photo etching.

## 10. Laser cutting

As the material melts at the edge during laser cutting, a higher hardness and therefore a lower toughness at the cutting zone is possible.

We suggest to produce critical pieces by water jet cutting.

### **11. Photo etching**

The alloy 1.1274 can be etched easily.

### **12. Bending**

As this material is supplied in the hardened and tempered condition, the rolling direction is not important regarding the bending.

Bending radius: minimum 10 times of the strip thickness.

Spring back angle: As the spring back angle depends on several factors, bending tests are necessary. As guidance an angle of 10° at a strip thickness of 0.20 mm and an angle of 20° at a strip thickness of 0.60 mm can be expected.

### **13. Flat grinding**

The alloy 1.1274 is magnetisable and can be fixed by magnetic clamping devices of flat grinding machines.

### **14. Welding**

Due to the high content of carbon the alloy 1.1274 should not be welded.

### **15. Corrosion resistance**

The alloy 1.1274 is not corrosion resistant. We supply this alloy with a light oil film. If used at normal conditions this alloy needs to be painted or galvanized.

### **Important Annotation**

The specifications which are given in this technical information sheet about the condition and application of the alloys are only for reference and are no confirmation about certain performances and characteristics.

The information correspond to our own experiences and experiences of our suppliers.

We can not guarantee for the results during processing and utilisation.