

PENTHOR 111

Oil tempered unalloyed spring wire

External standard :

The material conforms with FDC acc. to EN 10270 - 2 : 2011

Further equivalent standards:

ASTM A229/A229M

JIS G3560 SWO - A

Applications:

For statically stressed springs and springs working in the finite life range.

Range of diameters :

0.40 to 6.50 mm Ø

Chemical composition (heat analysis):

C %	Si %	Mn %	P max. %	S max. %	Cu max. %
0.60 - 0.75	0.15 - 0.35	0.50 - 1.20	0.030	0.025	0.12

Raw material :

Wire rod according to in-house specifications

Mechanical properties: Penthor 111 - Edition 04/2016 (replaces edition 01/2012)

Wire diameter mm	Tolerance mm	Tensile strength MPa	Minimum reduction %	Permissible depth of surf. defects ¹⁾	Permissible part. decarburization depth ¹⁾
0.40 to 0.60	± 0.010	1900 to 2100	-	max. 0.008 mm	
> 0.60 to 0.80		1900 to 2100			
> 0.80 to 1.00	± 0.015	1860 to 2060	45	max. 1.0% of wire diameter	
> 1.00 to 1.30	± 0.020	1810 to 2010			
> 1.30 to 1.40		1790 to 1970			
> 1.40 to 1.60		1760 to 1940			
> 1.60 to 2.00	± 0.025	1720 to 1890			
> 2.00 to 2.50		1670 to 1820			
> 2.50 to 2.70		1640 to 1790			
> 2.70 to 3.00	± 0.030	1620 to 1770	42		
> 3.00 to 3.20		1600 to 1750			
> 3.20 to 3.50		1580 to 1730			
> 3.50 to 4.00		1550 to 1700			
> 4.00 to 4.20	± 0.035	1540 to 1690	40		
> 4.20 to 4.50		1520 to 1670			
> 4.50 to 4.70		1510 to 1660			
> 4.70 to 5.00		1500 to 1650			
> 5.00 to 5.60	± 0.040	1470 to 1620	38		
> 5.60 to 6.00		1460 to 1610	35		
> 6.00 to 6.50		1440 to 1590			

- a) Range of tensile strength within one coil max. 70 MPa
- b) Ovality : Difference between the largest and smallest diameter of a cross section
does not exceed 50 % of the diameter tolerance.
- c) Yield point (0.2% limit) at least 90 % of the tensile strength
- d) Modulus of elasticity E = 206.000 MPa } Standard
Shear modulus G = 79.500 MPa }
- e) Torsion tests are carried out according to EN 10218 - 1
- ¹⁾ End samples

Heat treatment:

After coiling, the springs should be stress relieved as soon as possible.

Please inquire for special tolerances, tensiles, sections, etc.