

## WIRE ROD FOR SPRINGS

Thanks to a company history starting already 1873, Fagersta Stainless belongs to one of the world leading producers of stainless wire rod and wire. With customized chemistries the products fulfill everything from simple to high demanding applications.

### STANDARD STEEL GRADES FOR SPRINGS

Our grades have tight chemistries and therefore equal properties from delivery to delivery.

We recommend following of our standard grades:

### OPTIMUM WIRE ROD FOR SPRINGS

To get best possible properties for spring wire rod, these parameters are important:

- Tight chemistry for identical properties
- Mechanical properties and deformation hardening
- Corrosion properties
- Surfaces
- Dimension tolerances

Grade family	Marcegaglia name	Fagersta	EN	ASTM		PRE	CWH	Typical chemical composition, % by mass					
				TYPE	UNS			C	Cr	Ni	Mo	N	Others
A	321/4541	R359.10	1.4541	321	S32100	19	103	0.03	17.8	9.2	-	-	Ti
A	302/4310	R320.17	1.4310	302H	S30200	20	130	0.07	18.35	8.1	-	0.04	-
A	316/4401	R420.18	1.4401	316	S31600	24	102	0.05	16.8	10.7	2.1	-	-
PH	17-7PH	R560.21	1.4568	631	S17700	18	150	0.08	16.5	7.65	-	-	Al

Grade families: A = austenitic, PH = precipitation hardening

### MECHANICAL PROPERTIES AND DEFORMATION HARDENING

Depending on end-product's shape and required tensile strength, the wire rod should have specific ductility (formability) for the cold heading process and specific level of deformation hardening. Following methods of measurement are used regarding deformation hardening:

- **CWH-factor** "Cold Work Hardening Factor", a matrix consisting of C, Cr and Ni contents. The factor varies between 80 – 150 and increases with increasing deformation hardening in the steel.
- **Md30**: the temperature (°C) at which 30% true elongation (about 25% area reduction) makes 50% of the austenitic phase transform to deformation martensite. A higher temperature means higher deformation hardening in the steel.

### CORROSION

PRE (Pitting Resistance Equivalent =  $Cr + 3.1 \times Mo + 25 \times N$ ) is a factor comparing properties of different chemistries with regards to pitting and crevice corrosion in corrosive environments. A higher value means better resistance. In the table above, PRE is shown for the grades we recommend for springs.

### SURFACES

- Direct cooling (DK) ASTM 10-13
- "In line"-annealing (DST) ASTM 5-8
- Pit furnace (SG) ASTM 3-6

Our standard procedure is to supply the wire rod in pickled condition.

### DIMENSIONS

**Standard:** 5 – 18 mm (.197" - .709") in increments of 0.5 mm (.020") (MOQ:s for some dimensions)

**Tolerance:** 5.0 – 10.0 +/-0.15  
 >10.0 – 18.0 +/-0.20

**Ovality:** max 60% of the total tolerance span

**Surface classes:** Class 3 is the standard class which has a max defect depth of 0.10 mm for dimensions ≤ 10 mm and 1% of the diameter for dimensions > 10 mm. Welding rod has class 2 (max 0.20).

### PACKAGING METHODS

**Coil weight:** appr. 1000 kg - **Outer diameter:** max 1250 mm - **Inner diameter:** max 950 mm

