STAINLESS STEEL SPRING WIRE

GRADE 302 (1.4310)

One of the important applications of stainless steel wire is the fabrication of springs.

Type 302 (EN 1.4310) is the most prevalent grade used for spring making because of its high tensile strength and good corrosion resistance. Grade 302 is a low Nickel variant of the most widely used austenitic grade 304, containing 18% Chromium - 8% Nickel. Due to its composition, grade 302 maximizes the instability of austenite vis a vis the occurrence of “strain-induced martensitic” during cold work.
This martensitic hardens the matrix and thus very high tensile strength levels in the 2000-2500 N/mm² can be achieved with still a small residual ductility permitting the manufacturing of very diverse springs.

Main characteristics of stainless steel wire in grade 302 for spring making:

- Typical chemical composition %: C/ 0.07 - Cr /18.0 – Ni/8.0 - S / 0.015 max
- Standards: ASTM A313 - EN 10270-3
- Wide dimensional range, typically 0.15 to 10.0 mm
- Surface: bright (small diameters “wet drawn” in oil), soap coated (full range, most prevalent surface condition) , Nickel coated (mostly finer wires)

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- Mechanical properties in the as-delivered condition (coils, reels, spools):
  - Tensile strength: 2000 -2500 N/mm² for diameters below 1.0 mm, 1500-2000N/mm² sizes 1.0 to 5.0 mm, 1300- 1500 N/mm² sizes 5.0 to 10.0mm
  - Residual ductility: up to 2 % max.

- Good overall corrosion resistance except in Chloride-containing media

- Thermal treatments:

The 302 stainless steel wire for spring making is not subjected to any heat treatment prior to spring making operations : such treatments would affect its microstructure and hence its high strength mechanical properties.

However, after spring making, spring manufacturers frequently perform a “stress relief” treatment, typically a low temperature heat treatment in the temperature range of 200 to 300 °C (during 1 to 3 hours depending on the heat treatment equipment). Temperature and duration depend also on the type of spring: for instance, low temperature below 200°C max. for tension springs.

This has been shown by measurements of weight loss but also supported by more elaborate and precise electrochemical measurements (such as depassivation criteria, etc...).

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