

Wire Facts



Wire ... an Engineered Material

Shape

Copper alloy wire is available in a variety of shapes, tailor made to customer specified size and tolerances. These shapes are:

- round
- square
- rectangular
- flat
- special

Parts manufactured from wire offer several advantages over parts made from strip:

- wire and the part cross section are usually the same,
- wire stamping is a very low scrap process,
- all sides of the part are alike, with no residual stress or roughness from stamped edges,
- high production efficiencies are realized from long, continuous wire lengths.

The result, when wire is specified, is improved quality, very low process scrap and high production and yield efficiencies.

Square or rectangular wire shapes are specified by defining two of three variables: size, corner radii or diagonals. Also, special features such as crowned surfaces may be specified in square or rectangular wire. Flat wire edges are usually free formed but these may be shaped to specification.

Alloys

Wire is available in a wide variety of the popular engineering alloys. The most frequently specified grades are:

- C172 Beryllium Copper
- C197 Copper-Iron-Phosphorus-Magnesium
- C260 Cartridge Brass
- C510 Phosphor Bronze
- C7025 Copper-Nickel-Silicon-Magnesium
- C725 Copper-Nickel-Tin

Many other useful alloys are available upon inquiry.

Properties

Physical properties are alloy dependent.

Mechanical properties are also alloy dependent but are controlled primarily by the wire manufacturing process.

Tensile Strength-Wire processing reduces the total cross sectional area, not just the thickness. The higher cold work possible with wire (excluding rolled flat wire) produces higher tensile strength (TS) values than are produced in strip, for comparable temper names.

Formability-The natural geometry of wire provides only good way bends. Also, the width to thickness ratio of wire promotes better bend performance than equivalent strength levels in strip.

% Elongation-This test has limited utility for measuring wire ductility. The annealed value drops quickly to 1-3% elongation with cold work.

Yield Strength-The YS of the frequently specified tempers of wire are very close to the TS (few ksi less). This predictable relationship of TS/YS makes TS the specified parameter for controlling and measuring the useful strength of wire.

Packaging

Wire can be packaged from small to extremely large spools containing miles of material unbroken by welds. Wire is drawn or shaped with an intentional longitudinal curvature. It assists the natural lay of the wire onto the spool during level layer winding. This characteristic is called cast. Wire can be 'cast' from a tight spring coil to a straight running length. Wire offset is similar to camber in strip.

Tolerance, Size and Plating

Tighter thickness and width tolerances are achievable with wire. Multiple size combinations with smaller cross sections and shapes are readily available in wire. Wire can be efficiently and uniformly plated in long continuous lengths with multiple metallic layers of precious and non-precious coatings.

....An Engineered Material

Large packages containing long production lengths, production and yield efficiencies, tighter tolerances, different shapes, alloys with improved formability and mechanical properties, plating, reduced scrap, net shape: all combine to make wire an engineered material with many attributes and advantages.

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Fisk Alloy Wire, Inc. • P.O. Box 26 • 10 Thomas Road • Hawthorne, NJ 07507 • U.S.A.
Phone (973) 427-7550 • Fax (973) 427-4585 • E-mail: sales@fiskalloy.com