



## Conductor Facts / Glossary of Terms for Conductor Wire

**Alloy:** A combination of a metal with one or more elements to form a new material with different properties.

**Attenuation:** Weakening or reduction of the strength of a transmitted signal through a cable or circuit. It is also a measure of a cable's efficiency to transmit a signal at a given frequency.

**Anneal:** To subject a material to a heat treatment to remove the effects of cold work, lowering its tensile strength, rendering it softer with greater elongation.

**AWG (American Wire Gauge):** A standard used to specify the physical size of a solid or stranded conductor primarily used in the United States. Originally called the Brown and Sharpe Gage.

**Birdcaging:** A phenomenon that occurs during stranding or insulating where the conductor enters a restriction such as a die or extrusion tip. The outer layers of strands back-up, spread out, or otherwise separate away from the core strands. The problem has been attributed to poor stranding techniques and improper tensions during processing.

**Break Strength:** The maximum load that a specimen attains when tested in tension to fracture.

**Bunch Construction:** A stranded construction in which the individual strands are randomly laid and twisted in the same lay direction and same length of lay. The strands do not follow a geometric arrangement or pattern.

**Capacitance:** A measure of a component's opposition to a change of voltage in a circuit, specified in farads.

**Cast:** The natural curvature of a wire when in an unrestrained state.

**CMA (Circular Mil Area):** A measure of a round wire's cross-sectional area, calculated by squaring the diameter (in mils) of a strand and multiplying the result by the number of strands. One circular mil (cmil) is equivalent to the area of a circle 0.001 inch in diameter, equal to  $7.854 \times 10^{-7}$  in<sup>2</sup>.

**Concentric Construction:** A central wire surrounded by one or more layers of helically laid wires in a geometric pattern. Concentric constructions have 7, 19, 37, 61, etc. strands.

**Conductivity:** The inverse of resistivity and a measure of a material's ability to conduct electric current. It is usually compared to that of annealed copper, and is generally stated in terms of %IACS.

**Elongation:** A measure of a material's ability to stretch or elongate prior to fracture. It is expressed as a percentage (increase in length) over a specified gauge length (typically 10 inches for wire).

**Equilay Concentric:** A central wire surrounded by one or more layers of helically laid wires in a geometric pattern, with alternately reversed lay direction and the same lay length.

**Flex Life (or Flex Fatigue Life):** The number of cycles a sample can withstand when subjected to a repetitive stress or strain mode before failure.

**Flexibility:** The capability of being bent when an external force is applied, its pliability or limberness. Low flexibility translates to being more rigid or stiff.

**Gauge (or Gage):** A term used to designate the physical size of a wire or strand. Some definitions specify "Gage" as a size designation and "Gauge" as a measuring device (such as pressure gauge). These terms are often used interchangeably.

**Hard Drawn:** A term referring to the temper of conductors that are drawn without annealing to the finish temper.

**IACS:** International Annealed Copper Standard

**Impedance:** The analog of resistance in an AC (alternating current) circuit. Impedance depends upon the resistance, inductance, capacitance and frequency of the circuit. The unit of impedance is the ohm.

**Inductance:** A measure of a component's opposition to a change in the current of a circuit, specified in henries.

**Intermetallic Compound:** Two or more metals with a chemical composition based on a definite atomic formula. Intermetallics may have a fixed stoichiometric or a very narrow range of chemical composition.

**Custom constructions are available, please contact the sales department**

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**Lay Direction:** The helical direction of the strands or members in any layer of a stranded construction. The two lay directions are usually denoted as “S” (left hand lay) or “Z” (right hand lay).

**Lay Factor:** The ratio of the lay length to the external diameter of the corresponding layer of wires or members in the stranded conductor.

**Lay Length (length of lay):** The axial length for one revolution of a strand or member in any layer of a stranded or rope stranded construction.

**MCM:** An area unit equivalent to 1,000 circular mils. MCM may also be referred to as kcmil.

**Ohm:** A unit of electrical resistance defined as the resistance necessary to produce 1 ampere of current to flow in a circuit with an applied potential of 1 volt.

**Plating Percentage:** See Volume Percentage of Plating and Weight Percentage of Plating.

**Plating Thickness:** The measured thickness of the plated coating on a wire strand. Measurements are usually in micro-inches (millionths of an inch) or microns (millionths of a meter).

**Polysulfide Testing:** A test method that exposes a sample to a sodium polysulfide solution to qualitatively determine the continuity of the plating on a wire strand. The test method is specified in ASTM B 298 and B 355.

**Resistance:** A measure of a component’s opposition to the flow of electric current, specified in ohms.

**Resistivity:** The characteristic of a material to impede the flow of electrons (electrical current). It is the material’s electrical resistance for a unit volume. This value is specific to a material and not its geometry.

**Rope Construction:** A conductor composed of separate stranded constructions that are then twisted into the final construction.

**Rope Member:** A bunched or concentric stranded construction subsequently stranded again to form a rope construction.

**Stranding Factor:** The increase in weight and electrical resistance of a conductor due to the lay length of the strands or members.

**Temperature Coefficient of Resistance:** The change in a material’s electrical resistance (resistivity) due to a change of one degree in temperature. It is expressed in units per °C (or units per °F).

**Tensile Strength:** The maximum longitudinal tensile stress that may be applied to a material without fracturing or rupturing, calculated to a reference unit (lbs/in<sup>2</sup>, kg/mm<sup>2</sup>, etc.) by dividing the breaking load by the cross-sectional area.

**Tensile Stress:** Force per unit cross-sectional area applied to a material.

**True Concentric:** A central wire surrounded by one or more layers of helically laid wires in a geometric pattern, with alternately reversed lay direction and increasing lay length.

**Tubular Strander:** A type of twisting machine where the payoffs are located inside the tube and the take-up is external.

**Unidirectional Concentric:** A central wire surrounded by one or more layers of helically laid wires in a geometric pattern, with the same lay direction and an increasing lay length.

**Unilay (Unidirectional Equilay Concentric):** A central wire surrounded by one or more layers of helically laid wires in a geometric pattern, with the same lay direction and the same lay length.

**Volume Percentage of Plating:** The ratio of the volume of the plated material to the total volume of the conductor.

**Weight Percentage of Plating:** The ratio of the weight of the plated material to the total weight of the conductor. Conductor plating percentages usually refer to weight percentage when a distinction is not made.

**Weight per Unit Length:** A method of specifying the weight of conductor or wire using a standard length. Common lengths of 1,000 feet or 1,000 meters are used, however other lengths may also be specified.

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