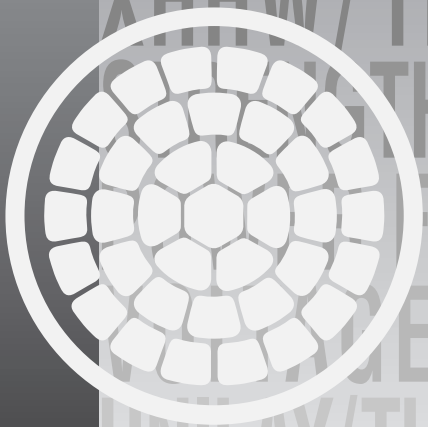
ALCAN

THE
ALCAN
GLOSSARY
HANDBOOK

GLOSSARY HANDBOOK



GLOSSARY

A

Abrasion Resistance – The ability of a material to resist prolonged surface wear by friction.

AC90 – Single- or multi-conductor insulated cables with metal interlocked armour without an overall jacket.

Accelerated Aging Test – A test in which defined conditions such as voltage, temperature, etc., to which a cable or material is subjected, are increased in magnitude above normal operating values to obtain observable deterioration in a reasonable period of time, and thereby provide a relative measure of the probable cable or material life under operating voltages, temperature, etc.

ACWU90 – Single- or multi-conductor insulated cables with metal interlocked armour with an overall jacket. AC90 with a jacket.

Admittance – The reciprocal of impedance.

AG14 – Indicates the product has passed an acid gas test which allows a maximum acid gas level of 14% by weight when calculated as HCl, of the nonmetallic components when combusted.

Alive – Electrically connected to a source of voltage of a potentially hazardous or lethal level.

Alloy – A combination of two or more metals for the purpose of modifying properties of one of the metals.

Alternating Current – An electric current that continually reverses its direction giving a definite plus and minus wave form at fixed intervals. The frequency of the change in flow is expressed in cycles per second (Hertz or Hz).

Aluminum Conductor Material – CSA recognition for aluminum alloys formulated specifically for use in building wire applications.

Aluminum Conductor Steel Reinforced – A stable conductor assembly of aluminum wires stranded around a steel core.

Aluminum-Sheathed Cable – A cable consisting of one or more conductors assembled into a core and covered with smooth or corrugated sheath of aluminum or aluminum alloy.

Ambient Temperature – The temperature of a medium, such as gas or liquid, surrounding an object.

American Wire Gauge – A North American standard system used for designating conductor diameter.

Ampacity – The maximum permitted current for a conductor in accordance with defined rules and operating conditions.

Ampere – Unit of measurement of electrical current.

Anneal – The process of controlled heating and cooling of a metal to achieve predetermined characteristics such as tensile strength and elongation.

Approved – Acceptable to the electrical authority having jurisdiction.

Armour – The outermost metal layer of a cable applied for mechanical protection usually consisting of a layer or layers of a metallic tape, braid or helically applied wires.

Armoured Cable – A cable provided with an outer metal covering for the purpose of mechanical protection.

Auxiliary Gutter – A raceway consisting of a sheet metal enclosure used to supplement the wiring space of electrical equipment and to enclose interconnecting conductors.

B

Bare Conductor – A conductor not covered with insulating material.

Bending Radius – Radius of curvature that a cable can be safely bent through without any adverse effects on mechanical and insulating properties.

Binder – A helically served tape or thread used for holding assembled cable components in place.

Bobbins – Metal spools used for taking up drawn wire and subsequently used for payout packages in cabling and stranding equipment.

Bonding – A low impedance path obtained by permanently joining all non-current-carrying metal parts to assure electrical continuity and having the capacity to conduct safely, any current likely to be imposed on it.

Bonding Conductor – A conductor which connects the non-current-carrying metal parts of electrical equipment, raceways, or enclosures to the service equipment or system grounding conductor.

Braid – A fibrous or metallic group of filaments interwoven in cylindrical shape to form a covering over one or more wires.

Branch Circuit – That portion of a wiring installation between the final overcurrent device protecting the circuit and the outlet(s).

Breakdown Voltage – The short time voltage at which the insulation between two energized conductors breaks down from an insulating to a conducting state.

Building Wire – Wire and cable used for light and power in permanent installations- in buildings in which electrical safety is governed by legislation.

Bunch Strand – Any number of conductor strands twisted together in one direction with the same lay length to form a stable assembly.

Bus – A conductor which serves as a common connection for the corresponding conductors of two or more circuits.

Busduct – A raceway consisting of metal troughing (including elbows, tees, crosses, in addition to straight runs) containing conductors, the conductors being supported on insulators. Often called Busway.

Butyl Rubber – A synthetic rubber with good insulating properties (i.e. low voltage cords).

C

Cable – Either a stranded conductor with insulation with or without other coverings (single-conductor cable), or a combination of conductors insulated from one another (multiple-conductor cable).

Cable Core – The portion of an insulated cable lying under the protective covering or coverings.

Cable Filler – The material used in multiple-conductor cables to occupy the interstices formed by the assembly of the insulated conductors, thus forming a cable core of the desired shape (usually circular).

Cable-in-Duct – System for direct burial in which a flexible conduit is extruded over electrical cables for a single, pre-assembled unit.

Cable Sheath – The outer most covering of a cable providing overall protection. North American meaning refers to a metallic component. Internationally a sheath may be metallic or nonmetallic.

Cable Tray – A raceway consisting of a prefabricated structure of troughing and fittings, so formed and constructed that cables may be readily installed and removed without injury.

Ladder Cable Tray: A cable tray with openings exceeding 50 mm in a longitudinal direction.

Non-ventilated Cable Tray: A cable tray in which there are no ventilating openings in the bottom or sides.

Ventilated Cable Tray: A cable tray having adequate ventilating openings with no opening exceeding 50 mm in a longitudinal direction.

Cabling – Assembling two or more insulated conductors by machine to form a cable.

Capacitance – That property of a system of conductors and dielectrics which permits the storage of electricity when a potential difference exists between the conductors. Its value is expressed as the ratio of a quantity of electricity to a potential difference.

Cellular Floor – An assembly of cellular metal or cellular concrete floor members, consisting of units with hollow spaces (cells) suitable for use as raceways and, in some cases, non-cellular units.

Certified Test Report – A report providing actual test data on a cable. Tests are normally conducted by the Quality Control Department to confirm that the product being shipped conforms to specifications.

Circuit Breaker – A device designed to open and close a circuit by non-automatic means and to open the circuit automatically on a predetermined over current without damage to itself when properly applied within its rating.

Circular Mil – A unit of cross-sectional area, commonly used to express the area of conductor which is the area of a circle, .001 inches in diameter.

Coaxial Cable – A cable configuration having two cylindrical conductors with coincidental axes, such as, conductor with a tubular shield surrounding the conductor and insulated from it.

Code, Installation – A document, usually enforced by legislation, which determines the installation rules for products in locations where the general public may legitimately be present, in the interest of public safety.

Coefficient of Expansion – The fractional change in dimension of a material given a unit change in temperature.

Cold Flow – Permanent deformation of a material due to a mechanical force.

Colour Code – A system for circuit identification by use of solid colours and contrasting tracers.

Composite Cable – One containing more than one type or gauge size of conductors (e.g. power and control conductors in one assembly).

Compound – An insulating or jacketing material made by mixing ingredients to a base polymer to modify its properties.

Concealed – Rendered permanently inaccessible by the structure or finish of the building.

Concentric-Lay Cable – A multiple-conductor cable composed of helically laid conductors around a common axis.

Concentric Neutral – A conductor comprised of wires helically laid around a core, which are collectively connected to the neutral point of an electrical system.

Concentric Stranding – A central wire surrounded by one or more layers of helically wound strands in a round stable geometric arrangement.

Concentricity – The measurement of the location of the centre of the conductor with respect to the geometric centre of the surrounding insulation.

Conductivity – A term used in describing the capability of a conductor to carry electric current. Usually expressed as a percent of a soft copper conductor which is defined as being 100% conductive.

Conductor – A wire or stable assembly of wires of long length relative to its cross-section suitable for carrying electrical current.

Combination Unilay Conductor: A central core wire surrounded by a layer of six helically laid wires of the same diameter as the core wire with a helically laid outer layer containing six smaller wires alternated between six wires of the same diameter as the wires in the layer underneath. Both layers have a common length and direction of lay.

Compact Conductor: A concentric stranded conductor which is circumferentially deformed to reduce its diameter, thus eliminating the normal interstices in the cable.

Composite Conductor: A composite conductor consists of two or more strands of different metals, such as aluminum and steel, or aluminum and aluminum alloy. i.e.: ACSR, ACAR, AWAC.

Compressed Conductor: A concentric stranded conductor which after stranding, is passed through a die to reduce the overall diameter approximately 3%.

Conventional Concentric Conductor: A conductor constructed with a central core surrounded by one or more layers of helically laid wires. The direction of lay is reversed in successive layers, and generally with an increase in length of lay for successive layers.

Conductor Shield – An extrusion of semi-conducting material over the conductor to provide a smooth interface with the insulation for even distribution of electrical stress.

Conduit – A raceway of circular cross-section intended to contain electrical conductors for the purpose of mechanical and electrical protection.

Rigid Metal Conduit: a metal conduit assembled with the use of components with standard pipe threads.

Rigid Nonmetallic Conduit: a nonmetallic conduit which is assembled by means other than threaded components.

Rigid PVC Conduit: A form of rigid nonmetallic conduit composed of non-plasticised polyvinyl chloride.

Rigid RE Conduit: A form of rigid nonmetallic conduit composed of reinforced thermoset material suitable for direct burial or encasement in concrete.

Rigid Type DB2/ES2 PVC Conduit: A rigid nonmetallic conduit of polyvinyl chloride for direct burial or encasement in concrete or masonry.

Rigid Type EB1 PVC Conduit: A rigid conduit of polyvinyl chloride for encasement in concrete or masonry.

Connector – A device used to physically and electrically connect two or more conductors. Also used to physically connect cable to equipment.

Continuity Check – A test to determine whether electrical current flows continuously throughout the length of a single wire or individual wires in a cable.

Continuous Vulcanization – A continuous, in-line process whereby a wire has an extruded covering applied, is then passed through a tube containing such temperatures and pressures as are necessary to complete vulcanization.

Control Cable – A multi-conductor cable intended for operating in control or signal circuits.

Copolymer – A compound resulting from the polymerization of two different monomers.

Cord – A small, flexible, insulated cable intended to connect portable equipment to a source of power.

Core – In cables, a component or assembly of components over which additional components (shields, sheath, etc.) are applied.

Coreflex – Registered trademark of Alcatel Canada Wire for RA90.

Corona – A discharge due to ionization of air around a conductor due to a potential gradient exceeding a certain critical value.

Creep – The dimensional change with time of a material under a mechanical load.

Crimp – Act of compressing (deforming) a connector barrel around a cable in order to make an electrical connection.

Cross-linked – Inter-molecular bonds produced between long chain molecules in a polymeric material to increase molecular size by chemical or electron bombardment means, which changes the material from thermoplastic to thermoset.

Crosstalk – Signal interference between nearby conductors caused by pickup of stray energy.

Cured polymers – See Cross-linked.

Current – The rate of transfer of charge. Practical unit is the ampere which represents the transfer of one Coulomb per second.

Cut-through Resistance – The ability of a material to withstand cutting from a sharp edge under pressure.

D

Dead, when applied to electrical equipment – The current-carrying parts of electrical equipment are free from any electrical connection to a source of voltage and from electrical charge and does not have a voltage different from that of earth.

Decibel (db) – Unit to express differences of power level. Used to express power gain in amplifiers or power loss in passive circuits or cables.

Derating Factor – A factor used to reduce the rated ampacity of a conductor to correct for environments other than that for which the rated ampacity was established.

Dielectric – A material with good electrical insulating characteristics.

Dielectric Constant (K) – The radio of the capacitance of a condensor with dielectric between the electrodes to the capacitance when air is between the electrodes. Also called Permittivity and Specific Inductive Capacity (SIC).

Dielectric Strength – An insulation rating in terms of its ability to withstand electrical stress.

Dielectric Test – A test carried out to establish the dielectric strength of an insulation.

Direct Burial Cable – A cable installed directly in earth.

Direct Current – An electrical current which flows in one direction only.

Disconnect – A device, group of devices, or other means whereby the conductors of a circuit can be opened i.e. disconnected from their source of supply.

Distribution Cable (primary) – That portion of a supply authority's system which supplies power from the distribution substation to the distribution transformers.

Distribution Cable (secondary) – That portion of a supply authority's system which is connected to a consumer service from the secondary side of the distribution transformer at the voltage level at which it will be utilized.

Drain Wire – In a cable, an uninsulated wire laid over the component or components and used as grounding medium.

Drawing – In wire manufacturing, pulling the metal through a die or series of dies to reduce diameter to a specified size.

Duct – An underground raceway for carrying electrical conductors.

Duty – A characteristic of an electrical service that describes the degree of regularity of the load over time.

Continuous Duty: A duty of the load which is substantially constant over prolonged time.

Short time Duty: A duty of the load which is substantially constant for a short and defined time.

Intermittent Duty: A duty of the load having defined periods of:

(a) Load and no-load

(b) Load and rest, and

(c) Load, no load, and rest

Periodic Duty: A duty of the load in which the load conditions are regularly recurrent.

Varying Duty: A duty of the load having loads over intervals of time, both of which are subject to wide variation.

E

Earth – British terminology for zero-reference "ground".

Eccentricity – Like concentricity, a measure of the centre of a conductor's location with respect to the circular cross-section of the insulation. Expressed as a percentage of displacement of one circle within the other.

Elastomer – A rubber-like substance. Any material that will return to its original dimensions after being stretched or distorted.

Electrical Metallic Tubing – A raceway of circular cross-section intended to contain electrical conductors for the purpose of mechanical and electrical protection, having thinner wall section than rigid metal conduit of equivalent nominal trade size, and assembled in the field without the use of threaded components.

Electrical Nonmetallic Tubing – A nonmetallic raceway of circular cross-section.

Electrode – A conductor through which a current enters or leaves an electrolytic cell, arc furnace, vacuum tube, gas discharge tube or other non metallic material.

Electrolysis – The production of chemical changes by passage of current through an electrolyte.

Electromagnetic Field – See magnetic field.

EMI – Electromagnetic Interference. Unwanted parasitic electromagnetic waves capable of affecting the operation of communication and signal circuits and devices.

Electromotive Force – That force which determines the flow of electricity; a difference of electric potential.

Electroplate – The term used to indicate the application of a metallic coating on a surface by means of electrolytic action.

Electrostatic Shield – A metallic envelope around a voltage source intended to control electrostatic fields.

Elongation – The increase in length of material stressed in tension.

Environmental Stress Cracking Resistance – The ability of plastics to resist stress cracking under harsh environments.

Equal Load Sharing – An even distribution of current between the parallel cables in a power circuit.

Equilay – See Unilay. More than one layer of helically laid wires with the length of the lay the same for each layer.

Ethylene-propylene-diene Monomer Rubber – A material with good electrical insulating properties.

Explosion-proof – Enclosed in a case which is capable of withstanding, without damage, an explosion, which may occur within it, of a specified gas or vapour and capable of preventing the ignition of a specified gas or vapour surrounding the enclosure from sparks, flashes, or explosion of the specified gas or vapour within the enclosure.

F

Farad (F) – A unit of electric capacitance. The capacitance of a capacitor which, when charged with one coulomb, gives a difference of potential of one volt.

Fatigue Resistance – Resistance of material to fracture due to the application of cyclical stresses.

Feeder – Any portion of an electrical circuit between the service box, or other source of supply, and the branch circuit overcurrent protective device.

Feed Through – Terminal or connector between walls or panels usually insulated from the wall.

Ferrous – Composed of and/or containing iron. A ferrous metal may exhibit magnetic characteristics (e.g. Steel armour).

Filled Conductor – Cable construction in which the cable core is filled with a material that will prevent moisture or gases from entering or passing through the cable.

Filler – Material used in multi-conductor cables to occupy the interstices formed by the assembled conductors.

Fitting – A device for securing cable, via its outer components, where it enters an enclosure of electrical equipment.

Flame Resistance – The ability of a material to resist flame propagation once the heat source is removed.

Flammability – The measure of the material's ability to support combustion.

Flat Cable – A cable with two essentially flat surfaces (e.g. NMD90).

Flexibility – The ease with which a cable may be bent without sustaining damage.

Flexible Metal Conduit – A metal conduit that may be easily bent without the use of tools.

Flex Life – The ability of a conductor, wire or cable component to withstand repeated bending, under specified test conditions.

FT1 – One of several CSA flame test designations for wires and cables which pass the C22.2 No. 0.3 test requirements. (Other designations include FT2, FT4, etc.)

Fraying – Irreversible damage of fibrous materials when exposed to friction or abrasion.

Frequency – The number of repetitive cycles of alternating current or voltage in one second.

G

Gauge – See American Wire Gauge.

Ground (GND) – A connection to earth obtained through a grounding electrode.

Grounded – Connected effectually with the general mass of the earth through a grounding path of sufficiently low impedance and having an ampacity sufficient at all times, under the most severe conditions which are liable to arise in practice, to prevent any current in the grounding conductor from causing a harmful voltage to exist:

(a) between the grounding conductors and neighbouring exposed conducting surfaces which are in good contact with the earth; or

(b) between the grounding conductors and neighbouring surfaces of the earth itself.

Ground Fault Circuit Interrupter – A device whose function is to interrupt, within a predetermined time, the electrical circuit to the load when a current to ground exceeds some predetermined value that is less than required to operate the overcurrent protective device of the supply circuit.

Grounding – A permanent continuous conducting path to the grounding electrode sufficient to carry fault currents imposed on the path for the required duration, to limit the voltage rise at any point on the path to a safe level, and to facilitate the safe operation of overcurrent protective devices in the circuit.

Grounding Conductor – The conductor which connects non-current-carrying metal of service equipment, and the neutral point at the service, to the ground electrode.

Grounding Electrode – A buried metal water-piping system, or metal object or device buried in, or driven into, the ground so as to make intimate contact therewith, to which a grounding conductor is electrically and mechanically connected.

H

Hard Drawn Wire – Wire that has not been heat-treated after drawing.

Header – A raceway for electrical conductors, associated with an under floor raceway or cellular floor system, which provides access to predetermined raceways or cells.

Heat Shock – A test to determine the resistance of a material to damage by applied mechanical force following exposure to a high temperature of specified magnitude.

Henry (H) – An electrical unit denoting the inductance of a circuit in which a current varying at the rate of one ampere per second produces an electromotive force of one volt.

Hertz (Hz) – A unit of frequency.

High Potential Test – An overvoltage test on an insulation intended to reveal weak or damaged insulation.

Hybrid Cable – A multi-conductor cable containing two or more types or sizes of conductors.

Hygroscopic – A material capable of absorbing moisture from the air.

I

Impact Strength – The resistance of a cable or cable component to damage due to the dropping of a weight onto the component under gravity.

Impedance – The total opposition of a circuit to the flow of current with an applied alternating voltage.

Impulse Voltage – A transient surge of voltage of unidirectional polarity, high magnitude, and short duration measured in microseconds.

Impulse Strength – The electrical stress at which the break-down of insulation occurs when exposed to a voltage impulse.

Impulse Test – An insulation test in which the voltage applied is an impulse voltage of specified wave shape and duration.

Inductance – A magnetic property of a circuit or circuit element that opposes a change in current flow, expressed in henrys.

Inhibitor (Corrosion) – A material which prevents or delays oxidation and other action on a connector surface.

Insulation – Material surrounding a conductor having a high resistance to the flow of electric current under expected levels of electric stress.

Insulation Level – A designation to identify the degree of capability of an insulated conductor to withstand exposure to overvoltage for a defined period of time, expressed as a percentage of normal rated voltage (100%, 133%, 173%).

Insulation Resistance – That property of an insulation material which resists electrical current flow when a potential difference is applied.

Insulation Shield – A layer of conducting material or combination of materials applied directly over the insulation of medium or high voltage cables for the purpose of confining electrical stress to the conductor insulation.

Insulation Stress – The voltage gradient at any location within an insulation, measured in volts per mil. Excessive stress leads to insulation breakdown.

Insulator – A component of such low electrical conductivity that the flow of current through it can usually be neglected.

Interaxial Spacing – Centre to centre conductor spacing.

Interstices – In cable construction, the space, valley, or void, left between or around the cabled conductors.

Intrinsically Safe – Any spark or thermal effect that may occur in normal use, or under any conditions of fault likely to occur in practice, is incapable of causing an ignition of the prescribed flammable gas, vapour, or dust.

Ionization – The act of splitting into or producing ions, usually in air, under conditions of electric stress.

Irradiation – The exposure of a material to high energy particle emissions.

ISO 9000 – ISO Quality Assurance Program.

J

Jacket – A protective nonmetallic covering over a cable component or an assembly of components.

Jumper – A short length of conductor used to make connection between terminals or other conducting components of electrical equipment.

Jute – A natural fibre of plant base formed into rope-like strands. Used in cables for filling the interstices to give a round cross-section.

K

kcmil – Thousands circular mil, a unit of area used to describe electrical conductors (see circular mil).

Kilowatt – A unit of electrical power equal to one thousand watts.

L

Ladder Cable Tray – A cable tray consisting of two longitudinal side rails connected by individual transverse members, with openings exceeding 50 mm in a longitudinal direction.

Laminated Tape – A term used to describe a tape consisting of two or more layers, usually each layer being a different material, sealed or laminated together to form one tape.

Lay – The distance taken to complete one revolution of helically laid cable components, measured along the longitudinal axis of a cable.

Lay Direction – The direction of a twist in a cable as indicated by the top strands while looking along the axis of the cable away from the observer. Described as “right hand” or “left hand”.

Leakage Current – The undesirable flow of current through or over the surface of an insulation.

Life Cycle – The life of a cable or component when exposed to an environment either in service or under defined test condition.

Liquid Tight Flexible Conduit –

(a) a flexible metal conduit having a liquid-tight nonmetallic jacket; or

(b) a flexible liquid-tight nonmetallic conduit.

Line Voltage – The potential difference between two lines of a three phase alternative current circuit.

Line Wire – A suspended or aerial distribution conductor, either bare or protected from the environment by means of a covering.

Longitudinal Wrap – A tape applied over a cable or cable component in a longitudinal direction.

Location:

Damp Location – An exterior or interior location that is normally or periodically subject to condensation of moisture in, on, or adjacent to electrical equipment and includes partially protected locations under canopies, marquees, roofed open porches, and similar locations.

Dry Location – A location not normally subject to dampness, but may include a location subject to temporary dampness as in the case of building under construction, provided ventilation is adequate to prevent an accumulation of moisture.

Wet Location – A location in which uncontrolled liquids may drip, splash, or flow on or against electrical equipment.

Hazardous location – Premises, buildings, or parts thereof, in which there exists the hazard of fire or explosion, due to the presence of:

(a) highly flammable gases, flammable volatile liquid mixtures, or other highly flammable substances, manufactured, used, or stored in other than original containers;

(b) combustible dusts or filings likely to be present in quantities sufficient to produce an explosive or combustible mixture, or where it is impractical to prevent such dusts or filings from collecting in or upon motors or other electrical equipment in such quantities as to

produce overheating through normal radiation being prevented, or from being deposited upon incandescent lamps; or

(c) easily ignitable fibres or material producing combustible filings, stored in bales or containers, but not manufactured or handled in a free open state.

Longitudinal Shield – A tape shield flat or corrugated, applied longitudinally with the axis of the core being shielded.

Loop Resistance – Total resistance of two conductors, measured round trip from one end (twisted pair, shield and conductor, etc.).

Loss – Energy dissipated without accomplishing useful work.

Loss Factor – The product of the dissipation and dielectric constant of an insulating material.

Lug – Termination, usually crimped or soldered to the conductor, with provision for bolting on to terminal.

M

Magnet Wire – Insulated wire or rectangular strip intended for use in windings on motor, transformer and other coils for electromagnetic devices.

Magnetic Field – The region surrounding a magnet or current-carrying conductor through which magnetic forces act.

Magnetic Flux – The flow of magnetic energy across or through a surface (real or imaginary).

Marker Tape – A tape laid parallel to the conductors under the sheath in a cable, imprinted with a suitable legend.

Marker Thread – A coloured thread laid parallel and adjacent to the strands of an insulated conductor, which identifies the wire manufacturer and manufacturer plant location.

Melt Index – Extrusion rate of a thermoplastic polymeric material through an orifice of specified diameter and length or under specified conditions of time, temperature and pressure, as a measure of polymer crystallinity.

Melt Range – The difference in degrees F or C between the melt point of material and its flow point.

Messenger – A cable used for its strength characteristics to support power conductors and insulated power cables. A messenger can be used as a conductor, partial conductor, or non-conductor.

Microwave – A short electromagnetic wave with a wave length usually less than 30 cm.

Mineral-Insulated Cable – A cable having bare solid conductor(s) supported and insulated by a highly compressed refractory material enclosed in a liquid- and gas-tight metal tube sheathing; the term includes both the regular type (MI) and the light-weight type (LWMI).

Mining Cable – A cable having behavioural and performance characteristics which render it suitable for continuous use in an underground mine.

Modulus of Elasticity – The ratio of stress to strain in a material that is elastically deformed.

Moisture Absorption – The amount of moisture, in percentage, that a material will absorb under specified conditions.

Monomer – The simple, unpolymerized form of a compound, which is the building block of a polymer.

Multi-Conductor – A combination of two or more conductors, cabled together and insulated from one another and from sheath or armour where used.

Multiplex Cable – An assembly of any number of conductors, with or without individual jackets, in which no more than one conductor is uninsulated.

Multi-Wire Branch Circuit – A branch circuit consisting of two or more ungrounded conductors having a voltage difference between them and an identified grounded conductor having equal voltage between it and each ungrounded conductor, with this grounded conductor connected to the neutral conductor.

Mutual Capacitance – Capacitance between two conductors when all other conductors including ground are connected together.

Mylar® – A synthetic compound with high dielectric qualities. A product of DuPont. Usually sold in film form.

N

National Electric Code – Installation code governing electrical installations in the United States.

Neoprene – A synthetic rubber (also called polychloroprene) with good resistance to oil, chemicals, and flame.

Neutral Conductor – That current-carrying conductor of an alternating current polyphase circuit which is connected to the neutral point of the circuit.

Neutral Point – That point or terminal of a polyphase alternating current circuit which is at a potential such that the potential differences between it and each of the other terminals of the same circuit are approximately equal in magnitude and in phase displacement.

Neutral Supported Cable – A suspended cable between poles or between a pole and a building in which the messenger fulfills the role of a current-carrying neutral conductor.

National Fire Protection Association – Sponsor of the National Electrical Code in the United States.

NMD90 – CSA designation for non metallic sheathed cable.

Noncombustible Construction – That type of construction in which a degree of fire safety is attained by the use of noncombustible materials for structural members and other building assemblies.

Non Hygroscopic – A material incapable of taking up or absorbing moisture from the air.

Non-Incendive Circuit – A circuit in which any spark or thermal effect that may occur under normal operating conditions or due to opening, shorting, or grounding of field wiring, is incapable of causing an ignition of the prescribed flammable gas or vapour.

Non-Ventilated Cable Tray – A cable tray without openings between the integral or separate longitudinal side rails.

NS-1 – Neutral supported cable with a voltage rating of 300V maximum for overhead residential services.

NSF-2 – Neutral supported cable, rated up to 600V, similar to NS-1 but each insulated conductor is covered with a PVC jacket which imparts greater resistance to flame, oil and mechanical damage.

NUAL® – An aluminum alloy formulated by Alcan Cable for use in building wire applications. NUAL is CSA certified as an ACM (Aluminum Conductor Material) meeting all of the requirements of the Canadian Electrical Code.

Nylon® – An abrasion-resistant thermoplastic with good chemical resistance. A DuPont registered trademark.

O

Ohm – A unit of electrical resistance, the resistance of a circuit in which a potential difference of one volt produces a current of one ampere.

Ohm's Law – Current **I** in terms of electromotive force **E** and resistance **R**; given by equation: **I = E/R**

Operating Temperature – Temperature an insulation is capable of operating at continuously without risk of damage.

Outlet – A point in the wiring installation at which current is taken to supply utilization equipment.

Overcurrent Device – Any device capable of automatically opening an electric circuit, under both predetermined overload and short-circuit conditions, either by fusing of metal or by electro-mechanical means.

Overlap (Overlay) – The amount the trailing edge laps over the leading edge of a spiral tape wrap.

Overload Device – A device which will provide overcurrent protection under overload, but not necessarily short-circuit, conditions.

Overload Temperature – Temperature above the temperature rating of the insulation.

Overpotential – A voltage above the normal operating voltage of a device or circuit.

Oxidation – The process of uniting a compound with oxygen, usually resulting in unwanted surface degradation of the material or compound.

Oxygen Index – Percentage of oxygen necessary to support combustion in a gas mixture. Flame retardant materials have a higher oxygen index.

Ozone – Gas whose molecules are comprised of the element oxygen formed from the ionized air surrounding an electrical discharge.

P

Pair – Two insulated wires of a single circuit twisted together or laid parallel.

Parallel Conductors – Two or more conductors of like phase so as to share the phase current in power circuits so as to permit the use of smaller conductors.

Percent Conductivity – Conductivity of a metal expressed as a percentage of the international annealed copper standard (%IACS).

Permittivity – Preferred term for dielectric constant.

pH – The measure of the acidity or alkalinity of a substance, neutrality being at pH 7. Acid solutions are under 7, alkaline solutions over 7.

Phase – A particular point of advancement or retardation of current or voltage with respect to another defined reference point in an electrical alternating current cycle measured in degrees or radians.

Phase Shift – Change in phase of a voltage or current after passing through a circuit or device.

Pitch – See Lay.

Pitch Diameter – The diameter of a circle passing through the centre of the conductors in any layer of a multi-conductor cable.

Plastic – See Thermoplastic.

Plasticizer – A chemical agent added to plastics to make them softer and more pliable.

Plastic Deformation – Permanent change in dimensions under mechanical stress.

Plenum – A chamber associated with air-handling apparatus for distributing the processed air from the apparatus (supply plenum) to the supply ducts or for receiving air to be processed by the apparatus (return plenum).

Plenum Cable – Cable approved for installation in plenums spaces, such as suspended ceilings in buildings, without further protection.

Polyester – Polyethylene terephthalate which is used extensively in the production of a high strength moisture-resistant film used as a cable core wrap.

Polyethylene – A thermoplastic polymeric material of the family of polyolefins having excellent electrical and physical properties used for wire and cable insulation and jacketing.

Polymer – A solid hydrocarbon formed by polymerization, which results in the chemical union of monomers or the continued reaction between lower molecular weight polymers.

Polyolefin – A family of thermoplastics based upon the unsaturated hydrocarbons known as olefins.

Polypropylene – A thermoplastic similar to polyethylene but stiffer and having a higher softening point (temperature).

Polyvinyl Chloride – A general purpose thermoplastic compound based on vinyl chloride, used for low voltage wire and cable insulation or jacketing.

Power Cables – Cables of various sizes, construction and insulation, single- or multi-conductor, designed to distribute primary power to various types of equipment.

Power Factor – The ratio of the power in an alternating current circuit to the product of the scalar values of voltage and current.

Primary Insulation – The material which is designed to provide the major component of electrical insulation.

Proximity Effect – The phenomenon of non-uniform current distribution over the cross-section of a conductor caused by the variation of the magnetic field produced by current in an adjoining conductor of an alternating current circuit.

Pulling Eye – A device fastened to a conductor or cable to which a hook may be attached in order to pull the cable.

R

R90 – Rubber (Thermoset) insulated wires intended for use in raceways.

RA90 – CSA designation for single- and multi-conductor cables having a seamless, smooth aluminum sheath or seamed or seamless, corrugated aluminum sheath. Conductors have a maximum temperature rating of 90°C.

Raceway – A channel designed for holding wires, cables, or bus-bars, which may include conduit (rigid or flexible, metallic or nonmetallic), electrical metallic and nonmetallic tubing, underfloor raceways, cellular floors, surface raceways, wireways, cable trays, busways, and auxiliary gutters.

Rated Voltage – That maximum voltage at which an electrical component is permitted to operate for extended periods without undue degradation or safety hazard.

Reactance – Capacitive - That part of the impedance of an alternating current circuit which is due to capacitance. Inductive - That part of the impedance of an alternating current circuit which is due to inductance.

Redraw – The consecutive drawing of wire through a series of dies to reach a desired wire size.

Reducing Joint – A joint between two lengths of conductor, where the conductors are not the same size.

Reel Drum Diameter – Diameter of the drum (or hub) of the reel.

Reel Flange Diameter (Reel Height) – Diameter of the reel flanges.

Reel Traverse – Width of space between reel flanges.

Reel Width – Overall width of reel.

Reinforced Sheath – The outermost covering of a cable that has a cable sheath constructed in layers with a reinforcing material, usually a braided fibre, molded in place between layers.

Resistance – The property of an electrical circuit determined by the ratio of the applied voltage to the current under direct current conditions, expressed in ohms.

RH – Rubber insulated, heated resistant cable, 75˚C dry locations, now allowed to be cross-linked polyethylene insulated. (UL designation for US building wire.)

RHH – Rubber insulated, heat-resistant cable, 90˚C dry locations, now allowed to be cross-linked polyethylene insulated. (UL designation for US building wire.)

RHW – Rubber insulated, heat- and moisture-resistant cable 75˚C dry locations, now allowed to be cross-linked polyethylene insulated. (UL designation for US building wire.)

Ridge Marker – One or more ridges running laterally along the outer surface of an insulated wire or cable for purposes of identification.

Rod – The solid round metallic form of aluminum or copper from which to draw wire.

Rope Strand Conductor – A conductor composed of a centre group of twisted strands surrounded by one or more layers of similar groups of twisted strands.

Rubber – An elastomer obtained from natural or synthetic sources which is capable of rapid elastic recovery.

Rupture – The separation of joined or segments of common material, under mechanical force.

Rural Electrification Administration – A branch of the U.S. Department of Agriculture.

RW90 – Rubber (Thermoset) insulated cable for exposed wiring where exposed to the weather.

RWU90 – Rubber (Thermoset) insulated cable for use in raceways, except cable trays, in wet locations.

S

SBR – A copolymer of styrene and butadiene. Also GR-S or Buna-S. Most commonly used type of synthetic rubber.

Sealed (Filled) Strand – A conductor to which a material has been added to the interstitial spaces of a stranded conductor to prevent the longitudinal penetration of water.

Secondary Insulation – A non-conductive material whose prime function is to protect the conductor against mechanical damage and provide a second electrical barrier. Placed over the primary insulation.

Sector Cable – A multiple-conductor cable in which the cross-section of each conductor is approximately the sector of a circle.

Segmental Conductor – A stranded conductor consisting of two or more stranded conducting elements, each element having approximately the shape of the sector of a circle, assembled to give a substantially circular cross-section.

Self-Extinguishing – The characteristic of a material whose flame is extinguished after the igniting flame is removed.

Self-Supporting Cable – A cable consisting of insulated conductors, with or without jacket, in an assembly, which is intended to be suspended by a messenger.

Semi-Conductor – A non-conductive material made partially conductive by the addition of conductive material such as carbon.

Separator – A layer of insulating material, usually fibrous or polymeric, which is placed between two components of a cable, such as between conductor and insulation.

SER – Round Service Entrance Cable (type SE, style R). UL designation for US service entrance cable.

Series Resistance – A series of electric resistance in which the total resistance is the sum of the component resistances.

Served Wire Armour – Helical wrap of metal wires applied around a cable to afford mechanical protection and improve the cable pulling tension characteristics, (mineshaft, submarine cable, etc.).

Service Box – An approved assembly consisting of a metal box or cabinet constructed so that it may be effectually locked or sealed, containing either service fuses and a service switch or a circuit breaker, and of such design that either the switch or circuit breaker may be manually operated when the box is closed.

Service, Consumer's – All that portion of the consumer's installation from the service box or its equivalent up to and including the point at which the supply authority makes connection.

Service, Supply – Any one set of conductors run by a supply authority from its mains to a consumer's service.

Service Room – A room or space provided in a building to accommodate building service equipment, and constructed in accordance with the National Building Code of Canada, or applicable local legislation.

SEU – Service Entrance Cable (type SE, style U). UL designation for service entrance cable for above ground use.

Sheath – The outer metallic or nonmetallic covering or jacket of a cable, of uniform annular cross-section.

Shield – A metallic layer placed around an insulated conductor or group of conductors to prevent undesired electrostatic or electromagnetic linkages between the enclosed wires and external fields.

Short Circuit – An abnormal connection of relatively low resistance between two points on a circuit having a difference in potential, causing the flow of large fault currents.

Shrink Tubing – Tubing which has been extruded, cross-linked, and mechanically expanded which when reheated will shrink to its original diameter.

Side Wall Bearing Pressure – A term used in reference to the pressure on a cable which is being pulled around a curved surface under tension. If excessive, SWBP can damage cable components and reduce the life of the cable.

Signal Cable – A cable designed to carry electrical signals for the actuation of electrical devices or communication of intelligence.

Silicone – A material made from silicone and oxygen. Can be in the thermosetting elastomer or liquid form. The thermosetting elastomer form is noted for high heat resistance.

Skin Effect – The phenomenon of the non-uniform distribution of current in the conductor of an alternating current, caused by the current magnetic field produced by the electrical current in that conductor.

Solid Conductor – A conductor consisting of a single wire, rod or bar.

Spark Test – An overvoltage test of short duration performed on wire and cable to detect porosity (pin holes) or defects in the insulation or other covering.

Specific Gravity – The density (mass per unit volume) of any material divided by that of water at a standard temperature.

Specific Inductive Capacity – See Dielectric Constant.

Splice – A connection of two or more conductors or cables to provide good mechanical strength, as well as good electrical continuity.

Steel Wire Armour – Helical wrap of galvanized steel wires applied around cable to afford mechanical protection and improve the cable pulling tension characteristics.

Strand – One of the wires, of any stranded conductor.

Stranded Conductor – A conductor composed of a group of wires, or of any combination of groups of wires, assembled into a stable configuration.

Strand Shield – Shield over the conductor and under the insulation.

Stress Cone – Shaped profile of insulation at termination of shielded cable to permit relief from electrical stress.

Surface Raceway – A raceway mounted on a surface, or a pendant enclosure, consisting of one or more channels for the purpose of containing and protecting conductors and intended to accommodate associated fittings, wiring devices, luminaires, and accessories.

Surface Resistivity – The resistance of a material between two opposite sides of a unit square of its surface.

Systems – An electrical energy source derived from its own distinct transformer or bank of transformers, or generators or other sources.

T

T90 Nylon – Nylon jacketed thermoplastic insulated conductor primarily intended for installation in raceways.

Tank Test – A term used to describe a voltage dielectric test where the specimen to be tested is submerged in a liquid (usually water) and voltage potential applied between the conductor and the liquid as ground.

Tear Strength – The ability of a material to resist the force required to initiate or continue a tear in a material under specified conditions.

TECK90 – Armoured cable characterized by an assembly of insulated conductors covered by an inner jacket, interlocked metallic armour, and outer covering, for use in a wide variety of industrial and other applications.

Teflon® – DuPont Company trademark for fluorocarbon resins. (See FEP and TFE).

Temperature Coefficient of Resistance – The fractional change of resistance of a material per degree of temperature change.

Temperature Rating – The maximum temperature at which an insulating material may be used in continuous operation without loss of its desired properties (i.e. operating, overload, short circuit).

Tensile Strength – The greatest longitudinal force required to rupture a material.

Tensile Stress – Tensile force divided by the cross-sectional area to which it is applied.

Terminal – A terminal is any fitting on an item of electrical equipment intended for making a convenient electrical connection to conductors.

Thermal Aging – Loss of mechanical properties due to exposure to an elevated condition or a programmed series for prescribed periods of time.

Thermal Cutout – A device affording protection from excessive current, but not necessarily short-circuit protection, and containing a heating element in addition to, and affecting, a fusible member which opens the circuit.

Thermal Endurance – The time at a selected temperature for an insulating material or system of material to deteriorate to some predetermined level of electrical, mechanical or chemical performance under prescribed conditions of test.

Thermal Expansion (Coefficient of) – The fractional linear change in dimensions of a material for a unit change in temperature.

Thermoplastic – A polymeric based material that can be repeatedly softened by heating and hardened by cooling, and that in the softened state can be shaped through the application of force.

Thermoset – A polymeric based material that, when cross-linked, will not soften to the point of flowing with subsequent application of heat.

THHN – UL designation for thermoplastic insulated, heat- and moisture-resistant, nylon jacketed cable, 90˚C dry location. (UL designation for building wire similar to CSA designated T90).

THHN-2 – UL designation for thermoplastic insulated, heat- and moisture-resistant, nylon jacket cable, 90˚C dry and wet location.

THW – UL designation for thermoplastic insulated, heat- and moisture-resistant, 75˚C dry and wet location. (UL designation for building wire similar to CSA designated TW75).

THWN – UL designation for thermoplastic insulated, heat- and moisture-resistant, nylon jacket cable, 75˚C dry and wet location.

Three Conductor Cable – Three insulated conductors assembled with or without other cable components (shield, filler, etc.) to form a core, protected by an overall jacket, and / or other coverings.

Three-Phase Current – Current delivered through three wires, with each wire serving as a return for the other two and with three current components differing in phase successively by one-third cycle or 120 electrical degrees.

Tinned Wire – Copper wire that has been coated with a layer of tin or solder to simplify soldering.

Tolerance – A specified allowance for deviation from a standard nominal or given dimension, weight or property.

Tracer – A means of identifying polarity, by means of bands of contrasting colour in braid or wind, or surface ridges to an electrical system.

Transformer – A piece of equipment capable of changing voltage in an alternating current system.

Transmission Line – A high voltage arrangement of bare conductors, together with their mechanical and electrical support systems, which interconnect the main generating stations with the subtransmission or primary distribution transformers of an electrical system.

Transmission Loss – A term used to denote a decrease or loss in power during the transmission of energy from one point to another.

Tray Cable – A factory assembled multi-conductor or multi-pair control, signal or power cable specifically approved under the Canadian Electrical Code for installation in trays.

Tree Wire – A conductor with an abrasion resistant outer covering, usually nonmetallic, and intended for use on overhead lines passing through trees.

Triad – Three insulated wires of a single circuit forming a unit. (Two or more units are cabled to form a multi-triad cable.)

Triplex Cable – A cable assembly composed of three single-conductors of which at least two are insulated, with or without jackets or coverings over the insulation.

TW – Thermoplastic insulated, moisture-resistant cable. 60˚C wet or dry location.

TW75 – Thermoplastic insulated, moisture-resistant cable. 75˚C wet location.

Twin Cable – A pair of insulated conductors twisted and/or sheathed, or held together mechanically and not identifiable from each other in a common covering.

Twisted Pair – A cable composed of two small insulated conductors, twisted together without a common covering.

Two-Phase Current – Current delivered through two pairs of wires (or a three wire system) with a phase difference between the currents in the two pairs.

U

Ultraviolet Degradation – The loss of mechanical properties caused by long-time exposure of a material to ultraviolet rays, such as are present in natural sunlight.

Underfloor raceway – A raceway set in the floor.

Unidirectional Concentric Stranding – A concentric stranded conductor, in which all layers have the same direction of lay.

Unilay Conductor – Conductor constructed with a central core surrounded by more than one layer of helically laid wires, all layers having common length and direction of lay.

USE – UL designation for underground service entrance cable, rated 75˚C wet location.

Utilization Equipment – Equipment which utilizes electrical energy for mechanical, chemical, heating, lighting, or similar useful purposes.

V

Vault (Transformer vault or electrical equipment vault) – An isolated enclosure, either above or below ground, with fire-resisting walls, ceilings, and floors, for the purpose of housing transformers and other electrical equipment.

Ventilated Cable Tray – A cable tray consisting of a ventilated bottom between integral longitudinal side rails with no openings exceeding 50 mm in a longitudinal direction.

Volt – A unit of electromotive force and potential difference.

Voltage – The term most often used in place of electromotive force, potential, potential difference, or voltage drop, to designate electric pressure that exists between two points and is capable of producing a flow of current when a closed circuit is connected between the two points.

Voltage Drop – A voltage loss occurring between any two points in a power circuit due to impedance.

Voltage, Extra-Low – Any voltage up to and including 30V.

Voltage, Low – Any voltage from 31 up to and including 750V.

Voltage, High – Any voltage over 750V.

Voltage Rating – The highest RMS voltage between two conductors of a circuit that is permitted to be continuously applied to a cable.

Volume Resistivity – The electrical resistance between opposite faces of uniform unit cube of insulation material, commonly expressed in ohms-centimeter.

Vulcanization – Cross-linking effected by the addition of sulfur to the material before suitable heat-treatment.

VW-1 – A flammability rating established by Underwriters Laboratories for wires and cables that pass a specially designed vertical flame test, formerly designated FR-1. Similar to CSA designation FT1.

W

Wall Thickness – A term used to express the thickness of a layer of applied insulation or jacket.

Water Absorption – Ratio of the weight of water absorbed by a material to the weight of the dry material. Usually expressed in percent.

Water Blocked Cable – A cable constructed with no internal voids in order to allow no longitudinal water passage under a given pressure.

Watt – Unit of power, or work done at rate of one joule per second, or rate of work represented by current of one ampere under a pressure of one volt (volt-ampere).

Wave Length – The distance, measured in the direction of propagation, of a repetitive electrical pulse or wave-form between two successive points that are characterized by the same phase or waveform.

Weather Resistance – The ability of a conductor to withstand environmental conditions.

Wicking – The longitudinal transmission of a liquid in a wire or cable component, due to capillary action.

Wireway – A raceway consisting of a completely enclosing arrangement of metal troughing, and fittings thereof, so formed and constructed that insulated conductors may be readily drawn in and withdrawn, or laid in and removed, after the wireway has been completely installed, without injury either to conductors or their covering.

Wire Gauge – See American Wire Gauge.

Wrapping – The method of insulating wire by serving insulating tapes around a conductor.

X

XHHW – Cross-linked polyethylene insulated, 90˚C dry location, 75˚C wet location.

XHHW-2 – Cross-linked polyethylene insulated, 90˚C wet or dry location.

XLPE – Cross-linked polyethylene.

Y

Yield Strength – The minimum stress at which a material will start to permanently deform under mechanical load.

ACRONYM

AA – Aluminum Association.

AAAC – All Aluminum Alloy Conductor.

AAC – All Aluminum Conductor.

AASC – Aluminum Alloy Stranded Conductor.

AC – Alternating Current.

ACM – Aluminum Conductor Material.

ACSR – Aluminum Conductor Steel Reinforced.

AEIC – Association of Edison Illuminating Companies.

AIA – Aluminum Interlocked Armour.

AWG – American Wire Gauge.

ANSI – American National Standards Institute.

ASC – Aluminum Stranded Conductor.

ASHRAE – American Society of Heating, Refrigerating & Air Conditioning Engineers.

ASTM – American Society for Testing Materials.

AWM – Appliance Wiring Material.

CEA – Canadian Electrical Association.

CEC – Canadian Electrical Code.

CANENA – Consejo de Armonizacion de Normas Electrotecnicas de Norte America (Council for Harmonization of Electrotechnical Standardization of North America).

CTR – Certified Test Report.

CMA – Circular Mil Area.

CV – Continuous Vulcanization.

CSA – Canadian Standard Association.

DC – Direct Current.

EC – Grade of aluminum Electrical Conductor (Alloy 1350).

EEMAC – Electrical and Electronic Manufacturers Association of Canada (US. counterpart is NEMA).

EFC – Electro-Federation of Canada.

e.m.f. – Electromotive Force.

EMRC – Energy Mines and Resources Canada.

EPDM – Ethylene-Propylene-Diene Monomer Rubber.

EPR – Ethylene Propylene Rubber.

ESCR – Environmental Stress Cracking Resistance.

FEP – Fluorinated Ethylene Propylene insulated wire.

ACRONYM

FM (FMRC) – Factory Mutual (Factory Mutual Research Corporation).
HDPE – High Density Polyethylene.
Hi Pot – High Potential.
IACS – International Annealed Copper Standard.
IAEI – International Association of Electrical Inspectors.
ICC – Insulated Conductor Committee.
ICEA – Insulated Cable Engineers Association.
IEC – International Electrotechnical Commission.
IEEE – Institute of Electrical and Electronic Engineers.
ISO – International Organization for Standards.
LDPE – Low Density Polyethylene.
LFS/LGE – Low Flame Spread/ Low Gas Emission.
LLDPE – Linear Low Density Polyethylene.
MCM – One thousand Circular Mils (kcmil).
MDPE – Medium Density Polyethylene.
NEC – National Electric Code.
NEMA – National Electrical Manufacturers Association.
NFPA – National Fire Protection Association.
OSHA – Occupational Safety and Health Association.
PE – Polyethylene.
PPE – Polypropylene.
PVC – Polyvinyl Chloride.
REA – Rural Electrification Administration.
RMS – Root-Mean-Square.
SCC – Standards Council of Canada.
SDC – Self Damping Conductor.
SIA – Steel Interlocked Armour.
SWBP – Side Wall Bearing Pressure.
SIC – Specific Inductive Capacity.
SWA – Steel Wire Armour.
TFE – Tetrafluoroeythlene.
UL – Underwriters Laboratories Inc.
UV – Ultraviolet.

BASIC METRIC CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY BY
circular mils	sq cm	5.067×10^{-6}
circular mils	sq mils	0.7854
circular mils	sq inches	7.854×10^{-7}
cubic inches	cu cm	16.39
cubic inches	cu feet	5.787×10^{-4}
cubic inches	cu meters	1.639×10^{-5}
cubic inches	gallons	4.329×10^{-3}
cubic inches	litres	0.01639
feet	centimeters	30.48
feet	kilometers	3.048×10^{-4}
feet	meters	0.3048
feet	millimeters	304.8
feet	mils	1.2×10^{4}
inches	centimeters	2.540
inches	meters	2.540×10^{-2}
inches	miles	1.578×10^{-5}
inches	millimeters	25.40
inches	mils	1,000.0
kilograms	pounds	2.205
kilograms	tons (long)	9.842×10^{-4}
kilograms	tons (short)	1.102×10^{-3}
kilograms	tons, metric	0.001
kilograms	grams	1,000.0
kilograms per kilometer	pound per foot	0.00067197
kilograms per sq millimeter	pound per sq inch	1422.34
kilometers	centimeters	10^{5}
kilometers	feet	3,281.0
kilometers	inches	3.937×10^{4}
kilometers	meters	1,000.0
kilometers	miles	0.6214
kilometers	millimeters	10^{6}
kilometers	yards	1.094

BASIC METRIC CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY BY
meters	centimeters	100.0
meters	feet	3.281
meters	inches	39.37
meters	kilometers	0.001
meters	millimeters	1,000.0
meters	yards	1.094
millimeters	centimeters	0.1
millimeters	feet	3.281×10^{-3}
millimeters	inches	0.03937
millimeters	kilometers	10^{-6}
millimeters	meters	0.001
Newton/MM^2	PSI	145.037
Pounds Force	Newton	4.448
pounds	kilograms	0.4536
pounds/foot	kilograms per kilometer	1488.16
pound/sq in	Newton/MM^2	0.006895
pounds/sq in	kgs/sq meter	703.1
pounds/sq in	pounds/sq ft	144.0
square inches	circular mils	1.273×10^{6}
square inches	sq cm	6.452
square inches	sq feet	6.944×10^{-3}
square inches	sq millimeters	645.2
square inches	sq mils	10^{6}
square millimeters	circular mils	1.973
square millimeters	sq cm	0.01
square millimeters	sq feet	1.076×10^{-5}
square millimeters	sq inches	1.550×10^{-3}
tons (long)	kilograms	1,016.0
tons (long)	pounds	2,240.0
tons (long)	tons (short)	1.120
tons (metric)	kilograms	1,000.0
tons (metric)	pounds	2,205.0
tons (short)	kilograms	907.0848
tons (short)	ounces	32,000.0
tons (short)	ounces (troy)	29,166.66
tons (short)	pounds	2,000.0

WIRE SIZE COMPARISON

AWG-kcmil Vs INCH² Vs MM²

Wire Size AWG	Wire Size kcmil	Wire Size mm²	Wire Size inch²
14	4.11	2.1	0.0032
12	6.53	3.3	0.0051
10	10.38	5.3	0.0082
9	13.09	6.6	0.0103
8	16.51	8.4	0.01296
7	20.82	10.6	0.01635
6	26.24	13.3	0.02061
5	33.09	16.8	0.02598
4	41.74	21.2	0.3278
3	52.62	26.7	0.04133
2	66.36	33.6	0.05212
1	83.69	42.4	0.06573
1/0	105.6	53.5	0.08294
2/0	133.1	67.4	0.10454
3/0	167.8	85.0	0.13179
4/0	211.6	107.2	0.16619
	250.0	126.7	0.19635
	300.0	152.0	0.23562
	350.0	177.3	0.27489
	400.0	202.7	0.31416
	450.0	228.0	0.35343
	500.0	253.4	0.39270
	550	278.7	0.43197
	600	304.0	0.47124
	650	329.4	0.51051
	700	354.7	0.54978
	750	380.0	0.58905
	800	405.4	0.62832
	900	456.0	0.70686
	1000	506.7	0.78540
	1100	557.4	0.86394
	1200	608.1	0.94248
	1250	633.4	0.98175
	1300	658.7	1.02102
	1400	709.4	1.09956
	1500	760.1	1.17810
	1600	810.7	1.25664
	1700	861.4	1.33518
	1800	912.1	1.41372
	1900	962.7	1.49226
	2000	1013.4	1.57080

BASIC METRIC UNITS
MAGNITUDE (POWERS OF 10)

PREFIX	SYMBOL	MULTIPLICATION FACTORS
tera	T	1 000 000 000 000 = 10^{12}
giga	G	1 000 000 000 = 10^{9}
mega	M	1 000 000 = 10^{6}
kilo	k	1 000 = 10^{3}
hecto	h	100 = 10^{2}
deka	da	10 = 10^{1}
–	–	1 = 10^{0}
deci	d	0.1 = 10^{-1}
centi	c	0.01 = 10^{-2}
milli	m	0.001 = 10^{-3}
micro	u	0.000 001 = 10^{-6}
nano	n	0.000 000 001 = 10^{-9}
pico	p	0.000 000 000 001 = 10^{-12}
femto	f	0.000 000 000 000 001 = 10^{-15}
atto	a	0.000 000 000 000 000 001 = 10^{-18}