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# Section L

## Definitions

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**Abbreviations**  
**A – CSPE**

**WIRE AND CABLE ABBREVIATIONS**

**A**

- A** Asbestos insulated, no braid, for dry locations only. In raceways, only for leads to or within apparatus. Limited to 300V, 200°C.
- AA** Asbestos insulated, asbestos or glass braid. Dry locations only. Open wiring. In raceways only for leads to or within apparatus. Limited to 300V, 200°C.
- AAR** Association of American Railroads.
- AB** High voltage butyl cable.
- ABC** Armored bushed cabled. BX armored building wire with polyvinyl chloride insulation, 600V.
- ABP** Butyl-polyethylene high voltage cable, 75°C.
- AC** Branch circuit and feeder cables with flexible metal tape armor.
- ACR** Corona-resisting insulation.
- ACSR** Aluminum conductor, steel reinforced.
- ACT** Armored cable containing plastic conductors.
- ACV** Varnished cambric insulation, polyvinylchloride interlocked armor, 5KV.
- AF** Asbestos insulated, single solid or stranded conductor fixture wire. Impregnated with moisture-resistant, flame-retardant compound. With or without braid, 300V, 150°C.
- ALS** A cable assembly having a smooth aluminum sheath.
- AN** Aircraft wire.
- ANSI** American National Standards Institute.
- ASE** Service entrance cable, aboveground use. Some constructions suitable for underground use. Flame-retardant, moisture-resistant, abuse-resistant covering.
- ASP** Filled direct burial telephone cable used in areas subject to rodent attack. It contains a filled cable core.
- ASTM** American Society for Testing and Materials, a non-profit industrywide organization that publishes standards, methods of testing, recommended practices, definitions and related material.
- AV** Asbestos and varnished cambric insulated power and control cables.
- AVA** Impregnated asbestos and varnished cambric insulated, with asbestos or glass braid, 600V, 110°C.
- AVC** Asbestos and varnished cambric-insulated power and control cables.

**AWG** American wire gauge. Based on the circular-mil system. 1 mil equals .001 inch.

**AWM** Appliance wiring material.

**B**

**BW** Braid wire armor or basket weave.

**BDC** Plastic busdrop cable.

**BX** Armored building wire, 600V.

**C**

**C** Lamp cord, two or more conductors twisted together. Rubber insulation, cotton braid. For pendant or portable use in dry places. No overall covering, 300V, or 600V, 60°C.

**CATV** Community antenna television.

**CB** Rubber-insulated brewery cord, with weatherproof braid on each conductor. Twisted, no overall covering.

**CBO** Neoprene-insulated brewery cord for use in damp locations.

**CCTV** Closed circuit television.

**CM** Communications general purpose cable suitable for general purpose communications use, with the exception of risers and plenums. Resistant to the spread of fire.

**CMG** Communications general purpose cable suitable for general purpose communications use, with the exception of risers and plenums. Resistant to the spread of fire.

**CMF** Communications plenum cable suitable for use in ducts, plenums, and other spaces used for environmental air, with fire-resistant and low smoke-producing characteristics.

**CMR** Communications riser cable suitable for use in a vertical run in a shaft or from floor to floor, with fire-resistant characteristics capable of preventing the carriage of fire from floor to floor.

**CMUC** Undercarpet communications wire and cable suitable for undercarpet use. Resistant to the spread of fire.

**CMX** Limited-use communications riser cable suitable for use in dwellings and raceways. Resistant to the spread of fire.

**CSPE** Chlorosulfonated polyethylene. An insulating and jacketing compound. Also known as Hypalon®, a DuPont registered trademark.

<b>CPE</b>	Chlorinated polyethylene. Has physical-, aging-, flame- and oil-resistant properties comparable to Neoprene® and Hypalon®, but provides processability and economic advantages. Lower coefficient of friction than Neoprene® and Hypalon® for easier installation. CPE has a halogen content equivalent to Hypalon but significantly lower than PVC.	<b>EPOS</b>	Electronic point-of-sale.
<b>CPS</b>	Cycles per second.	<b>ET</b>	Elevator lighting and control cable. Thermoplastic insulation, three braids, flame-retardant and moisture-resistant finish. May have a steel support strand in the center, 300V and 600V.
<b>CX</b>	Two conductor, 18AWG, rubber-insulated, twisted Christmas tree cord, 300V.	<b>ETT</b>	Elevator lighting and control cable. Thermoplastic insulation, one braid and a thermoplastic jacket. May have a steel support strand in the center, 300V and 600V.
<b>CXT</b>	Two conductor, 18AWG, plastic-insulated, twisted Christmas tree wire, 300V.	<b>ETPC</b>	Abbreviation for electrolytic tough pitch copper with a minimum conductivity of 99.9%.
		<b>E-Z-C</b>	Special ITT-brand jacketing that combines excellent ozones, oil and abrasion resistance, low temperature flexibility and color retention.

## D

<b>D</b>	Used as a suffix to indicate a twin wire with two insulated conductors laid parallel under an outer, non-metallic covering.
<b>dB</b>	Decibel: One tenth of a bel. It is equal to 10 times the logarithm of the power ratio, 20 times the log of the voltage ratio, or 20 times the log of the current ratio. One decibel is the amount by which the pressure of a pure sine wave of sound must be varied in order for the change to be detected by the average human ear. The decibel can express an actual level only when compared to some definite reference level that is assumed to be zero dB.
<b>DL, DLO</b>	Diesel locomotive.
<b>DR</b>	Rubber range and dryer cord (CSA).
<b>DRO</b>	Neoprene® range and dryer cord (CSA).
<b>DRT</b>	Plastic range and dryer cord (CSA).
<b>DRTP</b>	Deformation-resistant thermoplastic.

## E

<b>E</b>	Elevator lighting and control cable. Rubber insulation, three overall braids, flame retardant and moisture resistant. May have steel supporting strand in center, 300V.
<b>EO</b>	Elevator lighting and control cable. Rubber insulation, cotton braid, neoprene jacket. May have steel supporting strand in center, 300V and 600V.
<b>EP, EPR, EPM, EPDM</b>	Designations for synthetic rubber based upon ethylene-propylene hydrocarbon.
<b>EIA</b>	Electronic Industries Association.
<b>EMI</b>	Electromagnetic interference.

## F

<b>F</b>	Flat band metallic armor.
<b>FCC</b>	Flexible control cable or Federal Communications Commission.
<b>FEP</b>	Fluorinated ethylene propylene.
<b>FEPB</b>	Fluorinated ethylene propylene insulated wire but with glass or asbestos braid.
<b>FF-1</b>	Fixture wire, flexible, rubber insulated, single conductor, 300V, 60°C.
<b>FF-2</b>	Same as FFH-1 with 600V rating.
<b>FFH-1</b>	Heat-resistant fixture wire, otherwise same as FF-1, 300V.
<b>FFH-2</b>	Same as FFH-1 but with 600V rating.
<b>FPA®</b>	A registered trademark of General Cable Corporation for fused polyethylene aluminum. It consists of an 8 mil thick aluminum shield (corrugated or uncorrugated) coated on both sides with a polymer. The degree of bonding of polymer to outer cable jacket is controlled during processing.
<b>FR-1</b>	A flammability rating established by Underwriters Laboratories for wires and cables that pass a specially designed vertical flame test. This designation has been replaced by VW-1.
<b>FRMR</b>	Flame-retardant, moisture-resistant finish.
<b>FX</b>	Single rubber-insulated Christmas tree wire with outer braid, 125V, 60°C.
<b>FXT</b>	Single plastic-insulated Christmas tree wire, 125V, 60°C.

## Abbreviations

### G – NM

#### G

- G** Rubber insulated, rubber jacketed, portable power cable with two to five 8AWG or larger conductors with ground wires.
- G-GC** Same as G, but with additional ground check conductor.
- GOR** Gasoline and oil resistant wire.
- GTO** Gas tube sign and oil burner ignition cable, 5KV-15KV.

#### H

- H** Shielded power cable with spiralled metallic shielding tape over insulation with overall protective covering. Multi-conductor cables have paper or varnished cambric insulation applied directly over individual conductors.
- HC** Heater cord with two or more conductors, asbestos and rubber insulation, and cotton braid over each conductor. Twisted, no overall covering.
- HF** Polyethylene-insulated radio hookup wire with or without braid.
- HPD** Rubber- and asbestos-insulated heater cord. No braid on individual conductors but with braid overall. Also made with Neoprene® insulation and no asbestos or PVE/NBR.
- HPN** Two-conductor, Neoprene®-insulated heater cord. Parallel construction. For use in damp locations.
- HS** Rubber- and asbestos-insulated heater cord. Cotton serve and rubber jacketed overall. For use in damp locations, 14AWG or 12AWG conductors. Also made with Neoprene®-insulated interior and asbestos.
- HSJ** Same as type HS, but with 18AWG or 16AWG conductors and differing thickness of jacket.
- HSJO** Same as type HSJ but with Neoprene® jacket.
- HSO** Neoprene®-jacketed heater cord.
- HW** Radio hookup with polyvinyl insulation, with or without nylon jacket, braid or shield, 2500V.

#### I

- I** Interlocked armor of aluminum, bronze, or steel.
- IPE** Irradiated polyethylene tape.

#### J

- J** Asphalted jute, non-metallic armor.

#### K

- K** Constant used to denote insulation resistance.

#### L

- L** Lead sheath.
- LESCW** Low energy safety circuit wire.

- LW** Radio hookup wire with polyvinyl insulation, with or without Nylon jacket, braid or shielding braid, 300V.

#### M

- M** Suffix indicating two or more insulated, twisted conductors under an outer, non-metallic covering.
- MC** Metal clad.
- MI** One or more conductors insulated with highly compressed refractory minerals and enclosed in a liquid- and gas-tight metallic tube sheathing.
- ML** Single-conductor, paper lead cables twisted together without overall covering. Type A: AVC mine locomotive cable; Type B: motor lead wire.
- MM** Mining machine cable.
- MPF** Mine power feeder, 5KV, 8KV and 15KV.
- MPF-GC** Same as MPF, except with ground check conductor.
- MRFR** Moisture-resistant, flame-retardant finish.
- MTW** Thermoplastic-insulated machine tool wire, 600V, 90°C to 105°C.
- MV** Medium voltage cable between 5KV and 35KV.
- MW** Radio hookup wire with polyvinyl insulation and plain or nylon jacket, braid or shield, 1000V.
- MYD** Marina yard and dock cable.

#### N

- NBC** A blend of acrylonitrile (butadiene rubber) and polyvinyl chloride used for jacketing.
- NM** Non-metallic sheathed cable, braid or plastic covered. For dry use, 60°C.

<b>NMC</b>	Non-metallic sheathed cable, plastic or neoprene covered. Wet or dry use, 60°C.	<b>POSJX</b>	All-rubber, parallel, 20AWG ripcord for use on lamps, clocks and Christmas trees, 125V.
<b>NRHW</b>	Moisture- and heat-resistant rubber insulation with Neoprene® jacket for use in ducts. Dry and wet locations, 600V, 75°C. Also RHWN.	<b>POT</b>	Thermoplastic, parallel, light duty rip cord, 300V, 60°C, to 105°C.
<b>O</b>			
<b>OSHA</b>	Occupational Safety and Health Act of 1970 administered by US Department of Labor. Establishes standards and safety requirements that all businesses must meet.	<b>POXT</b>	Same as POT, but 20AWG for clock and Christmas tree use, 125V.
<b>P</b>			
<b>P</b>	Two or more rubber-insulated stranded conductors with cotton braid over each. Reinforced with overall covering of cotton braid over rubber filler. For pendant or portable use in damp locations, 300V-600V.	<b>PPE</b>	Portable power cable with thermoplastic elastomer insulation and jacket, with or without grounds designed for extra hard usage.
<b>PASP</b>	An air core (unfilled) direct burial double-jacketed telephone cable used in areas subject to rodent attack. Consists of unfilled cable core, inner polyethylene jacket, bare corrugated aluminum shield, and coated corrugated steel tape.	<b>PS</b>	Thermostat cable with solid conductors, individual rubber insulation and cotton braid. Twisted, rubber jacket and cotton braid overall.
<b>PCG</b>	Portable mine cable with power, control and ground conductors.	<b>PW</b>	Moisture-proof, reinforced, portable cord with two or more rubber-insulated conductors with individual cotton braid. Moisture-resistant cotton braid finish over rubber jacket, 300V-600V.
<b>PD</b>	Rubber-insulated stranded conductors with cotton braid over each. Conductors twisted with braid overall. Light duty, dry locations on appliances, 300V.	<b>R</b>	
<b>PG</b>	Portable mine cables having power and ground conductors, 600V.	<b>R</b>	Code rubber-insulated building wire, 600V, 60°C.
<b>PL</b>	Two rubber-insulated, parallel-laid, lamp cords with overall cotton or rayon braid. For light duty on small appliances in dry locations, 300V.	<b>RD</b>	Rubber-insulated twin conductors, fibrous covered.
<b>PLSJ</b>	All-rubber, parallel-jacketed, two-conductor, light duty cord for pendant or portable use in damp locations, 300V.	<b>RDL</b>	Rubber-insulated twin conductors, lead covered.
<b>PLT</b>	Same as PLSJ except thermoplastic insulation.	<b>RF</b>	Fixture wire, code or latex rubber insulation and braid over solid or stranded conductor, 60°C.
<b>PNA, PNW</b>	Polyethylene-insulated control cables with Nylon sheath on individual conductors. Cabled tape and polyvinyl chloride jacket. Dry or wet locations, 600V, 75°C.	<b>RFH</b>	Same as RF, but rubber or latex rubber insulation heat resistant, 75°C.
<b>PO</b>	Two stranded copper conductors with separator and code rubber insulation and cotton braid over each. Laid parallel with cotton or rayon braid overall. For use in dry locations on small appliances, 300V-600V.	<b>RH</b>	Rubber-insulated, heat-resistant building wire, 75°C.
<b>POSJ</b>	All-rubber, parallel, light duty ripcord for use on lamps and small appliances, 300V, 60°C.	<b>RHD</b>	Rubber-insulated, twin-conductor, heat-resistant, fibrous covered wire.
		<b>RHDL</b>	Same as RHD, except lead instead of fibrous covered.
		<b>RHH</b>	Rubber-insulated, heat-resistant building wire, 90°C.
		<b>RHL</b>	Same as RHH, but with lead sheath overall.
		<b>RHM</b>	Rubber-insulated multiple conductors, heat-resistant and overall fibrous covered.
		<b>RHML</b>	Same as RHM, but with lead cover overall.
		<b>RH/RW</b>	Rubber-insulated, heat- and moisture-resistant building wire. 75°C dry, 60° wet.
		<b>RHW</b>	Rubber-insulated building wire, heat- and moisture-resistant, 75°C dry or wet.
		<b>RHW-2</b>	Rubber-insulated building wire, heat- and moisture-resistant, 90°C dry or wet.
		<b>RJ</b>	Rubber-insulated and jute-covered cable.

## Abbreviations

# RJFJ – SJTO

<b>RJFJ</b>	Rubber-insulated cable with flat band armor.	<b>SE</b>	Aboveground service entrance cable, not protected against mechanical abuse. Flame-retardant, moisture-resistant covering. Overall rubber sheath.
<b>RJIJ</b>	Rubber-insulated cable with interlock armor.	<b>SEA</b>	Service entrance cable, steel armored under outer braid, one or two rubber-insulated conductors with neutral conductor served concentrically, moisture-resistant tape, weatherproof braid finish, 300V, 75°C.
<b>RL</b>	Rubber-insulated cable with lead sheath.	<b>SEOW</b>	600V hard service cord with thermoplastic elastomer insulation and jacket. Jacket is oil-resistant and approved for use in damp locations.
<b>RLJFJ</b>	Rubber-insulated cable with lead, jute, flat band armor and overall jute covering.	<b>SEOOW</b>	600V hard service cord with thermoplastic elastomer insulation and jacket, and oil-resistant conductors. Jacket is oil-resistant and approved for use in damp locations.
<b>RLJWJ</b>	Rubber-insulated cable with lead, jute, steel wire armor and overall jute covering.	<b>SEU</b>	Same as SEA, but not armored.
<b>RM</b>	Rubber-insulated multiple conductors with fibrous covering.	<b>SEW, SEWF</b>	Silicone rubber-insulated equipment wire (CSA).
<b>RML</b>	Same as RM, but lead instead of fibrous covering.	<b>SF-2</b>	Silicone rubber-insulated fixture wire, solid or 7-strand conductor, 200°C.
<b>RP</b>	Performance-grade rubber insulation, 60°C.	<b>SFF-2</b>	Same as SF, except flexible stranding, 150°C.
<b>RR</b>	Rubber insulation, neoprene jacket. Also see USE.	<b>SG</b>	Same as SW, except with ground wires (CSA).
<b>RS</b>	Integral rubber-insulation and jacket on single-conductor cables.	<b>SGO</b>	Same as SWO, except with ground wires (CSA).
<b>RU</b>	Rubber-insulated latex building wire, 60°C.	<b>SH-A</b>	Portable mine power cable, three or four individually shielded conductors, 5,000V.
<b>RUH</b>	Same as RU, but heat resistant, 75°C.	<b>SH-B</b>	Same as SH-A, except shield is overall.
<b>RUW</b>	Same as RU, but moisture resistant, 60°C.	<b>SH-C</b>	Same as SH-B, but with grounding conductors.
<b>RW</b>	Rubber-insulated building wire, moisture resistant, 60°C.	<b>SH-D</b>	Same as SH-A, but with grounding conductors.
<b>RWS</b>	Same as RW, but synthetic rubber.	<b>SHFS</b>	Polyvinyl insulated with felted asbestos flameproof cotton or rayon braid. Navy switchboard wire, 600V.
<b>S</b>			
<b>S</b>	Heavy duty, rubber-insulated portable cord. Stranded copper conductors with separator and individual rubber insulation. Two or more color-coded conductors cabled with filler, wrapped with separator, and rubber jacket overall, 600V.	<b>SIS</b>	Used for switchboard wiring only at 90°C. Indicates single conductor having synthetic thermosetting insulation of heat-resistant, flame-retardant grade. Also made with chemically cross-linked polyethylene insulation.
<b>SA</b>	Silicone rubber insulation, asbestos or glass braid, for use in dry locations. Maximum operating temperature for special applications, 125°C.	<b>SJ</b>	Junior hard service, rubber-insulated pendant or portable cord. Same construction as Type S, but 300V and with thinner jacket.
<b>SB</b>	Slow burning wire. Three cotton braids, impregnated, 90°C.	<b>SJO</b>	Same as SJ, but oil- or water-resistant outer jacket, 300V.
<b>SD</b>	Service drop cable. Two code rubber-insulated conductors, tape, laid parallel with neutral conductor concentric overall. Tape and braid overall. Also round construction.	<b>SJT</b>	Junior hard service thermoplastic- or rubber-insulated conductors with overall thermoplastic jacket, 300V.
<b>SDN</b>	Small diameter multi-conductor control cable with Neoprene® jacket and Nylon sheath over polyethylene insulation.	<b>SJTO</b>	Same as SJT, but oil-resistant thermoplastic outer jacket.
<b>SDT/TC</b>	Thermoplastic 90°C tray cable.		

<b>SL</b>	Same as ML. Single-conductor paper lead cables twisted together without overall covering.	<b>SV</b>	Vacuum cleaner cord, two or three conductor, rubber insulated with overall rubber jacket. For light duty in damp locations, 300V.
<b>SO</b>	Hard service cord, same construction as Type S, except oil-resistant Neoprene® jacket, 600V.	<b>SVO</b>	Same as SV, except Neoprene® jacket, 300V.
<b>SOOW</b>	Hard service cord, same construction as Type SOW, except oil-resistant conductors and jacket.	<b>SVT</b>	Same as SV, except all-thermoplastic construction. With or without third conductor for grounding, 300V.
<b>SOW</b>	Hard service cord, same construction as Type SO, except oil-resistant conductors and water-resistant jacket.	<b>SVTO</b>	Same as SVT, except with oil-resistant thermoplastic jacket.
<b>SP-1</b>	All-rubber, parallel-jacketed, two-conductor light duty cord for pendant or portable use in damp locations, 300V.	<b>SW</b>	Rubber-jacketed power supply cable, 8AWG to 2AWG, 600V.
<b>SP-2</b>	Same as SP-1, but heavier construction, with or without third conductor for grounding, 300V.	<b>SWO</b>	Same as SW, except with Neoprene® jacket.
<b>SP-3</b>	Same as SP-2, but heavier construction for refrigerators or room air conditioners, 300V.	<b>SWT</b>	Plastic-jacketed power supply cable, 8AWG to 2 AWG, 600V.
<b>SPC</b>	Submersible pump cable.	<b>T</b>	
<b>SPT-1</b>	Same SP-1, except all thermoplastic, 300V, with or without third conductor for grounding.	<b>T</b>	Thermoplastic building wire.
<b>SPT-2</b>	Same as SP-2, except all thermoplastic, 300V, with or without third conductor for grounding.	<b>TA</b>	Switchboard wire, thermoplastic and asbestos insulation, 90°C.
<b>SPT-3</b>	Same as SP-3, except all thermoplastic, 300V, with or without third conductor for grounding.	<b>TAA</b>	Flexible nickel or nickel-clad copper, Teflon® tape, felted asbestos, asbestos braid, 200°C.
<b>SR</b>	Silicone rubber control cable, 600V, 125°C.	<b>TBS</b>	Switchboard wire, thermoplastic insulation, flame-proof cotton braid, 600V, 90°C.
<b>SR-AW</b>	Flexible, nickel-plated copper conductor, silicone rubber insulation, glass braid, 600V, 200°C.	<b>TBWP</b>	Three cotton braids, weatherproof saturated. Not voltage rated.
<b>SR-C</b>	Solid copper conductor, silicone rubber insulation, glass braid, 600V, 125°C.	<b>TC</b>	Tray cable.
<b>SRD</b>	Portable range or dryer cable. Three or four rubber-insulated conductors with rubber or Neoprene® jacket, flat or round construction, 300V, 60°C.	<b>TEW</b>	CSA-type appliance wires. Solid or stranded single conductor, plastic insulated, 600V, 105°C.
<b>SRDT</b>	Same as SRD, except all thermoplastic with a maximum temperature of 90°C.	<b>TF</b>	Fixture wire, thermoplastic covered or 7-strand.
<b>SR-H</b>	Silicone rubber-insulated, asbestos braid, 300V, 125°C.	<b>TFE</b>	Tetrafluoroethylene, or Teflon®, a trademark of DuPont.
<b>SRML</b>	Silicone rubber-insulated, glass braid motor lead wire, 600V, 200°C.	<b>TFF</b>	Same as TF, but flexible stranding, 60°C.
<b>SR-SE</b>	Flexible, nickel-plated copper conductor, silicone rubber insulation, glass braid, 600V, 200°C.	<b>TFFN</b>	Same as TFF, but with Nylon sheath.
<b>ST</b>	Hard service cord, jacketed, same as Type S except all-plastic construction, 600V.	<b>TG</b>	Flexible nickel or nickel-clad copper conductor, Teflon® tape, glass braid, 200°C.
<b>STO</b>	Same as ST, but with oil-resistant thermoplastic outer jacket, 600V.	<b>TGS</b>	Solid or flexible copper, nickel-clad iron or copper, or nickel conductor. Teflon® tape, silicone glass braid, 600V, 250°C.
		<b>THHN</b>	90°C, 600V, Nylon-jacketed building wire. Dry only.
		<b>THW</b>	Thermoplastic-insulated building wire, flame retardant, moisture and heat resistant, 75°C. Dry and wet locations.

## Abbreviations

# THW-2 – XT

<b>THW-2</b>	Same as THW, but rated 90°C. Dry and wet locations.	<b>VCL</b>	Varnished cambric insulation, lead-covered cable with hermetically sealed ends.
<b>THWN</b>	Same as THW, but with Nylon jacket overall, 75°C. Dry and wet locations.	<b>VD</b>	Indicates a twin wire having two Type V conductors laid parallel under an outer fibrous covering.
<b>THWN-2</b>	90°C 600V Nylon-jacketed building wire. Dry and wet locations.	<b>VG</b>	Varnished glass tape over a flexible copper conductor. Varnished glass or Nylon braid, 600V or 3,000V, 130°C.
<b>TP</b>	Parallel tinsel cord. All-rubber insulation and jacket over two extremely flexible conductors. Light duty, attached to appliances of 50 watts or less. For use in damp locations in lengths of 8 feet or less.	<b>VHF</b>	Very high frequency. The spectrum extending from 30 to 300 MHz as designated by the Federal Communications Commission.
<b>TPO</b>	Same construction as Type PO, but with flexible tinsel conductors, 125V.	<b>VLF</b>	Very low frequency. The spectrum extending from 10 to 30 MHz as designated by the Federal Communications Commission.
<b>TPT</b>	Same as TP, but all-thermoplastic insulation and jacket, 125V.	<b>VM</b>	Indicates a cable having two or more Type V conductors twisted together under an outer fibrous covering.
<b>TS</b>	Two- or three-conductor rubber-insulated and jacketed tinsel cord. Light duty, attached to an appliance of 50 watts or less. For use in damp locations in lengths of 8 feet or less.	<b>VSWR</b>	Volume standing wave ratio.
<b>TSO</b>	Same as Type TS, but with or fewer jacket, 125V.	<b>VW-1</b>	A flammability rating established by Underwriters' Laboratories for wires and cables that pass a specially designed vertical flame test. It is a basic flammability test for single conductors using a Tirrill burner applied intermittently to a vertical wire that is not as severe as the vertical tray flame test.
<b>TST</b>	Same as Type TS, but all-thermoplastic insulation and jacket.		
<b>TT</b>	Polyvinylchloride (PVC) insulation and sheath, aerial and duct.		
<b>TW</b>	Thermoplastic-jacketed building wire, moisture resistant.		
	<b>U</b>		<b>W</b>
<b>UF</b>	Thermoplastic underground feeder and branch circuit cable.	<b>W</b>	Heavy duty portable power cable, one to six conductors, 600/2000V, without grounds.
<b>UHF</b>	Ultrahigh frequency. The spectrum extending from 300 to 3000 MHz as designated by the Federal Communications Commission.	<b>WP</b>	Weatherproof construction, two or three impregnated cotton braids, 80°C.
<b>UL</b>	Underwriters' Laboratories, Inc.		<b>X</b>
<b>URC</b>	Weatherproof wire.	<b>X</b>	Two Type FX wires twisted together, color coded, 125V, 60°C.
<b>URD</b>	Underground residential distribution cable.	<b>XHHW</b>	Cross-linked polyethylene building wire 90°C dry, 75°C wet.
<b>USE</b>	Underground service entrance cable, rubber insulated, Neoprene® jacket.	<b>XHHW-2</b>	Cross-linked polyethylene building wire 90°C wet and dry.
	<b>V</b>	<b>XLPE</b>	Cross-linked polyethylene.
<b>V</b>	Varnished cambric insulation, with fibrous covering.	<b>XT</b>	Two Type FXT wires twisted together, color coded, 125V, 60°C.
<b>VCB</b>	Varnished cambric insulation, cotton braid, flame-retardant, moisture-resistant finish.		

## GLOSSARY OF TERMS

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### A

**Abrasion** - The damage caused by scraping or rubbing against a rough, hard surface.

**Abrasion Resistance** - A measure of the ability of a wire, wire covering, or material to resist surface wear.

**Accelerated Aging or Accelerated Life Test** - A test that duplicates longtime environmental conditions in a relatively short time. The conditions to which a cable or material is subjected to, such as temperature and voltage, are increased in magnitude above normal operating values. The observable deterioration in a reasonable period of time provides a relative measure of the probable life under operating conditions.

**Accelerator** - A chemical additive which hastens the chemical reaction under specific conditions; also called a promoter.

**Acceptance Test** - A test designed to demonstrate the degree of compliance with specified requirements.

**Adhesive** - A material capable of holding other materials together by surface attachment.

**Adjacent Conductor** - Any conductor next to another conductor in the same multi-conductor cable layer or in adjacent layers.

**Admittance** - The measure of ease with which an alternating current flows in a circuit.

**Aerial Cable** - Cable suspended in the air on poles or other overhead structures.

**Aerial Distribution Wire** - Designed for temporary use in lieu of or to supplement existing open wire plant, where shielding is not required.

**Aging** - The change in properties of a material with time under given conditions.

**Aging Stability Test** - A test of the flexibility of a cable after subjecting it to a high temperature followed by a low temperature.

**Air Spaced Coaxial Cable** - A cable in which air is essentially the dielectric material. A spirally wound synthetic filament, beads, or braided filaments may be used to center the conductor.

**Alarm Pair** - A dedicated pair connecting a remote contacting device to a central monitoring point.

**Alloy** - A metal formed by combining two or more different metals to obtain desirable properties.

**Alpeth** - Aerial telephone cable with an aluminum shield.

**Alternating Current** - Electric current that periodically and regularly reverses its direction. Expressed in cycles per second (Hertz or Hz).

**Ambient** - Conditions existing at a test or operating location prior to the energizing of equipment.

**American Wire Gauge (AWG)** - The standard measurement to indicate wire diameter. The diameters of successive sizes vary geometrically in retrogression, (i.e., the larger the number, the smaller the wire). Also known as the B&S Standard.

**Ampacity** - The allowable current-carrying capacity of a conductor measured in amperes.

**Angle of Advance** - The angle between a line perpendicular to the axis of the cable and the axis of any one member or strand of the braid; also referred to as braid angle.

**Anneal** - To heat and then gradually cool in order to relieve mechanical stresses. Annealing copper makes it softer and less brittle, thus lowering the tensile strength while improving the flex life.

**Annular Conductor** - A number of wires stranded in three reversed concentric layers around a core.

**Anode** - The positive pole on an electric source.

**Anti-Oxidant** - A substance that prevents or slows oxygen decomposition.

**Anti-Ozonant** - A substance that prevents or slows material degradation due to ozone reaction.

**Appliance Wiring Material (AWM)** - Insulated wire that will be used as component wiring inside a piece of equipment. The wire is usually designated by a four-digit style number, such as UL Style 1015, that establishes the conductor size range, insulation type and thickness, and voltage and temperature rating.

**Arc Resistance** - The time required for an arc to establish a conductive path in a material.

**Armor** - Metallic tape, tube, braid or wire that provides mechanical protection for applications where extreme wear resistance is required.

**Armored Cable** - A cable covered with a heavy outer braid, tape or tube of metal for the purpose of mechanical protection.

**Asbestos** - A silicate mineral that readily separates into flexible fibers suitable for use as an incombustible, non-conducting chemically resistant material. Fibrous asbestos wire and cable insulation is used in the form of yarn servings, felts, lap, roving and braid. Asbestos in these uses may be reinforced by or combined with other materials. Where space is important, asbestos papers and purified asbestos papers may be used.

**Attenuation** - Power drop or signal loss; the loss of electrical energy as it travels along a cable, generally expressed in decibels (dB) per unit, usually 100 feet. As applied to coaxial cables, the power drop or signal loss in a circuit.

**Attenuation Constant** - Cable rating that denotes the relative rate of voltage or current decrease in the direction of travel; measured in dB/unit length.

**Audio Frequency** - Frequencies audible to the human ear; approximately 20-20,000 cycles per second.

## Glossary

# B – Byt

## B

**B & S Gauge** - See American Wire Gauge. The B & S gauge has been adopted as the AWG standard.

**Balanced Line** - A cable having two identical conductors with the same electromagnetic characteristics in relation to other conductors and to ground.

**Band Marking** - A continuous circumferential band applied to a conductor at regular intervals for identification.

**Bare Conductor** - A conductor not covered with any material.

**Baud** - Unit of data transmission speed meaning bits per second (500 baud = 500 bits per second).

**Bel** - A unit that represents the logarithm of the ratio of two levels.

**Bell Wire** - 18AWG insulated copper wire used for making doorbell and thermostat connections in homes.

**Belt** - The number of layers of insulation on a conductor or number of layers of jacket on a cable.

**Bend Loss** - A form of increased attenuation caused by (a) having an optical fiber curved around a restrictive radius of curvature or (b) microbends caused by minute distortions in the fiber imposed by externally induced perturbations.

**Bend Radius** - Radius of curvature that a fiber optic or metallic cable can bend without any adverse affects.

**BEV** - One billion electron volts.

**Bit** - One binary digit.

**Bond Strength** - The amount of adhesion between bonded surfaces.

**Bonding Braid** - A group of metallic filaments woven together to form the electrical equivalent of 6AWG copper wire. Bonding braid is used to bond to cable sheaths or to provide a ground connection.

**Booster** - A device used to increase voltage on DC lines.

**Boot** - (1) Protective covering over any portion of a cable, wire or connector in addition to the normal jacketing or insulation. (2) A form placed around wire termination of a multiple contact connector to contain the liquid potting compound before it hardens. (3) A protective housing usually made from a resilient material to prevent the entry of moisture into a connector.

**Braid** - A fibrous or metallic woven cylinder covering a conductor or cable that provides mechanical strength and serves as a means of polarity identification. A braid may be composed of any filamentary material as cotton, glass, Nylon, tinned copper, silver or asbestos. Woven bare metallic copper wire is used as shielding for wires and cables and as ground wires for batteries of heavy industrial equipment.

**Braid Angle** - A term used in the determination of the braid configuration relating to the angle of the braided filaments or fibers in relation to the axis of the cable core being braided.

**Braid Ends** - The number of strands used to make up one carrier. The strands are wound side by side on the carrier bobbin and laid parallel in the finished braid.

**Brazing** - The joining of ends of two wires, rods or groups of wires with a non-ferrous filler metal at temperatures above 800°F.

**Breakdown (Puncture)** - A disruptive discharge through the insulation of a wire.

**Breakdown Voltage** - The voltage at which the insulation between two conductors will break down.

**Breakout** - The point at which a conductor or conductors break out from a multi-conductor cable to complete circuits at various points along the main cable. This point is usually harnessed or sealed with some synthetic rubber compound.

**Buffer (Fiber Optic)** - A soft material that mechanically isolates individual fibers in a fiber optic cable or bundle from small geometrical irregularities, distortions, or roughness, or from adjacent surfaces.

**Building Wire** - Insulated wires used in buildings for light and power rated at 600V or less. They are usually not exposed to outdoor environments.

**Buna Rubber** - A synthetic rubber made by polymerization of butadiene. Buna-N is a copolymer of butadiene and acrylonitrile. Buna-S is a copolymer of butadiene and styrene.

**Bunched Lay or Stranding** - A bunched strand is a collection of strands twisted in the same direction without regard to geometrical arrangement.

**Bundle (Fiber Optic)** - A number of fibers grouped together, usually carrying a common signal.

**Bus Bar Wire** - Uninsulated tinned copper wire used as a common lead.

**Bushings** - A mechanical device used as a lining for an opening to prevent abrasion to wire and cable. Also used as a low cost method of insulating, anchoring, cushioning or positioning. Usually a non-metallic material.

**Butt** - The joining of two conductors end-to-end, with no overlap and with their axes in line.

**Butt Wrap** - A spirally wrapped tape over a cable core where the trailing edge of one wrap just meets the leading edge of the preceding wrap with neither overlap nor spacing.

**Butyl Rubber** - A manmade rubber used for special applications. It has excellent resistance to heat, sunlight, weather, aging and ozone, and is normally rated for 90°C.

**Byte** - A group of 8 adjacent binary digits.

**C**

**Cable** - Single or multiple conductors twisted together with or without insulation and other coverings. Small single conductors are often called wires, and small flexible cables are called cords. Numerous deviations from these definitions are a result of traditional names for items in long-term use.

**Cable Assembly** - A single coaxial cable with connectors or a group of wires and cables that has been formed in definite order and position, and terminated with connectors. An assembly may include a jacket, strain relief members, potted connectors, and casted or molded junctions.

**Cable Clamp** - A device used to give mechanical support to the wire bundle or cable at the rear of a plug or receptacle.

**Cable Closure** - Any of several types of housings that can be fastened around a cable splice to make it water tight; used to enclose cable sheath openings necessary for splicing.

**Cable Core** - The portion of cable containing the insulated conductors that are under the core wrap or protective coverings.

**Cable Core Binder** - A wrapping of tapes or cords around the several conductors of a multiple-conductor cable used to hold them together. Cable core binder is usually supplemented by an outer covering of braid, jacket, or sheath.

**Cable Filler** - 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 Puller** - A tool for pulling cables through a conduit.

**Cable Sheath** - The protective covering applied to cables.

**Cable Terminal** - A device that seals cable ends and provides insulated egress for the conductors.

**Cable-in-Duct** - A system for direct burial in which a flexible conduit is extruded over electrical cables for a single, preassembled unit.

**Cabling** - The method by which a group of insulated conductors is mechanically assembled or twisted together.

**Cabling Factor** - Used in a formula for calculating the overall diameter of a cable,  $D = fd$ , where  $D$  = cable diameter,  $f$  = factor, and  $d$  = diameter of one conductor.

**Cadmium-Chromium-Copper** - An alloy used in high temperature applications that provides high strength and a good flex life with a slight sacrifice in conductivity.

**Cadmium-Copper** - A high strength alloy, easy to work with and relatively inexpensive, but with a softening temperature of 175°C to 200°C.

**Caged Armor** - Armor wires within a polyethylene jacket, often used in submarine cables.

**Capacitance** - The property of a system of conductors and dielectrics that permits electricity storage when potential differences exist between the conductors. Its value is expressed as the ratio of a quantity of electricity to a potential difference in farads and is always positive. At most commercial voltages and frequencies, the capacitance effects are negligible. At relatively high voltages, the current due to capacitance may reach sufficient value to affect the circuit, and insulation for such applications is designed for moderately low dielectric constant. In communication, the capacitance of the wire determines the maximum length of line over which the signal may be transmitted without excessive attenuation, therefore requiring insulations that have low dielectric constants.

**Capacitance Unbalance, Pair-To-Ground** - The difference between the capacitance of each conductor in a twisted pair and ground, with ground comprised of the shield and all pairs not under test. Any difference in the wire diameter of the two conductors of a pair, the insulation thickness on the two wires of a pair, and uneven twisting of the conductors of a pair may tend to increase the capacitance unbalance pair-to-ground. Capacitance unbalance is generally measured in picofarads per 1,000 feet.

**Capacitance Unbalance, Pair-To-Pair** - The difference between the four conductors of two pairs of twinned insulated conductors. The unit of measurement for pair-to-pair capacitance unbalance is usually expressed in picofarads per 1,000 feet. Any difference in the wire diameter, the insulation thickness, uneven twisting of one or both pairs among the four conductors may result in pair-to-pair capacitance unbalance. Similarly, lay length and proximity of the two pairs involved will also affect the capacitance unbalance pair-to-pair.

**Capacitance Unbalance, Pair-To-Shield** - The difference between the capacitance of each conductor in a twisted pair and the shield. Any difference in the wire diameter of the two conductors of a pair, the insulation thicknesses on the two wires of a pair, and uneven twisting of the conductors of a pair may end to increase the capacitance unbalance pair-to-shield. Capacitance unbalance is generally measured in picofarads per 1,000 feet.

**Capacitive Coupling** - The electrical interaction between two conductors caused by the capacitance between them.

**Capacitive Reactance** - The opposition to alternating current due to the capacitance of a capacitor, cable or circuit. It is measured in ohms and is equal to  $1/6.28fC$ , where  $f$  is the frequency in Hz and  $C$  is the capacitance in farads.

**Capacitor** - A device for storing an electrostatic charge.

**Capillary Action** - The phenomenon of liquid passing along the path of a small interstice due to surface tension.

**Capstan** - A set of revolving drums used in high speed insulating lines to pull the insulated conductor through the extrusion line in a uniform and vibration-free manner.

**Carbon Black** - A black pigment produced by the incomplete burning of natural gas or oil. Used in polyethylene jacketing compounds because of its useful ultraviolet protective properties.

**Carrier** - A group of conductors or yarns woven over and under to form a braid.

## Glossary

# Cas – Com

**Cast Tape** - A material formed directly into a tape by means of flowing or casting a solution or dispersion of the film-forming material onto a suitable carrier then removing the solvent, as opposed to skiving or slicing a block of material into a tape form.

**Casting** - The act of forming into desired shape by pouring.

**Catalyst** - A substance that initiates and/or accelerates a chemical reaction, but normally does not enter the reaction.

**Cathode** - The negative pole on an electric source.

**Cavity** - A depression in a mold.

**Cellular** - Refers to conductor compounds having expanded plastic compounds. Cellular insulations differ from solid insulations by the dispersion of small gaseous cells uniformly distributed throughout the solid plastic resin matrix during the extrusion or insulating process. Foam and foam/skin conductor insulations are commercially developed by this process.

**Cellular Polyethylene** - Polyethylene in foam form consisting of individual closed cells of inert gas suspended in a polyethylene medium. Reduces dielectric constant, but limited to operation below 80°C.

**Cellulose Acetate** - A tough cellulose material used to impregnate cotton insulation.

**Center-to-Center Distance** - See Pitch.

**Characteristic Impedance (of a uniform line)** - The ratio of an applied potential difference to the resultant current at the point where the potential difference is applied, when the line is of infinite length. The term applies only to uniform lines such as coaxial cable.

**Chromel-Alumel** - Two alloys used in forming one type of thermocouple pair. Chromel is primarily an alloy of chrome and nickel, and Alumel is an alloy of aluminum, nickel, manganese, and silicon.

**Cigarette Wrap** - Tape insulation wrapped longitudinally instead of spirally over a conductor.

**Circuit** - A system of conducting media designed to pass an electric current.

**Circuit Sizes** - Normally 16AWG through 10AWG used for circuit wiring.

**Circular Mil (cm)** - Used to define cross-sectional areas of conductors. The area of a circle 1/1000 inches in diameter is one circular mil. 1,000,000 cm = 1 circular inch, and 1 cm =  $\pi/4$  square mils.

**Clad Wire** - Wire comprised of a given metal covered with a relatively thick application of a different metal.

**Coated Wire** - Wire comprised of a given metal covered with a relatively thin application of a different metal, usually tin or a polymer.

**Coaxial Cable** - Cable containing two cylindrical conductors with a common axis. The two conductors are separated by a dielectric. The outer conductor, normally at ground potential, acts as a return path for current flowing through the center conductor and prevents energy radiation from the cable. The outer conductor, or shield, is also commonly used to prevent external radiation from affecting the current flowing in the inner conductor. The outer shield consists of woven strands of wire or is a metal sheath.

**Coil Effect** - The inductive effect exhibited by a spiral-wrapped shield, especially above audio frequencies.

**Cold Bend Test** - A test procedure where a sample of wire or cable is wound around a mandrel or a specified size in a cold chamber at a specified temperature for a given number of turns at a given rate of speed. The sample is then removed and examined for defects or deterioration in the materials for construction.

**Cold Flow (Creep)** - The permanent deformation of a material due to mechanical force or pressure and not due to heat softening.

**Cold Joint** - A soldered joint made with insufficient heat.

**Cold Work** - The hardening and embrittlement of a metal by repeating flexing action.

**Cold-Drawing** - Reducing the cross-sectional area by pulling the material through one or more dies at a temperature lower than the recrystallization temperature of the material.

**Color Code** - A method of identifying different conductors by means of colors, numbers, printing, tracers or braids on the outer surface of a jacket wire.

**Combination Stranded Conductor** - A conventional concentric conductor in which the wires in the outer layer are larger in diameter than the wire in the inner layer or layers. The diameters of all wires are within 5% of the nominal wire diameter for the same size non-combination stranded conductor.

**Commutator** - A device that changes AC current to DC.

**Composite Cable** - A cable that contains more than one gauge or more than one type of circuit such as pairs, quads, video pairs or coaxials.

**Composite Conductor** - A conductor consisting of two or more types of plain, clad or coated wire stranded together to operate mechanically and electrically as a single conductor.

**Compound** - An insulating and jacketing material made by mixing two or more ingredients.

**Compressed Stranded Conductor** - A conventional concentric conductor manufactured to a diameter not more than 3% below the nominal diameter of a non-compressed conductor of the same cross-sectional area.

**Compression Cable** - A pipe-type cable in which the pressure is separated from the insulation by a membrane or sheath.

**Compression Molding** - A method of molding thermosets. Compounds, usually preheated, are placed in an open mold. Upon closing the mold, heat and pressure are applied until the material is cured. Also usable with synthetic rubber materials.

**Compressive Strength** - The crushing load at failure divided by the original sectional area of the specimen.

**Concentric** - A central core surrounded by one or more layers of helically wound strands in a fixed round geometric arrangement. The direction of lay for successive layers may be reversed or remain the same; the lay length shall increase with each successive layer. The standard direction of lay of the outer layer is left hand.

**Concentric Lay Cable** - A concentric-lay conductor of a multi-conductor cable composed of a central core surrounded by one or more layers of helically laid wires.

**Concentric Lay Conductor** - A conductor composed of a central core surrounded by one or more layers of helically laid wires.

**Concentric Strand** - Consists of an insulated strand as the core around which wires are spirally laid in layers. Each layer after the first has six more strands than the preceding layer and is applied contrahelically.

**Concentricity** - The measurement in a wire or cable of the location of the center of the conductor with respect to the geometric center of the circular insulation.

**Condensation** - A chemical reaction in which two or more molecules combine resulting in a molecule of greater density as where water vapor condenses to form water.

**Conductance** - The ability of a conductor to carry an electric charge. The ratio of the current flow to the potential difference causing the flow. The reciprocal of resistance.

**Conductivity** - The ability of a material to allow electrons to flow. Measured by the current per unit of voltage applied. The reciprocal of resistivity.

**Conductor** - Any material capable of easily carrying an electrical charge. Specifically, a wire or combination of bare or insulated wires suitable for carrying electrical current.

**Conduit** - A solid or flexible protective tube or trough in which wires are run.

**Connector** - A device used to physically and electrically connect two or more conductors.

**Contact** - The element in a connector that makes electrical contact between two halves. Also, the point of joining in an electrical connection.

**Contamination** - The increase in attenuation due to a degradation of characteristics of the dielectric material within a transmission line.

**Continuity** - The ability of a conductor to carry a current over its entire length.

**Continuous Vulcanization** - After a rubber or rubber-like compound is extruded onto a conductor, the wire is then passed into a vulcanizing chamber where the insulation or jacket is continuously vulcanized under high pressure and temperature control.

**Contrahelical** - The direction of a layer with respect to the previous layer. Specifically, spiralling in the opposite direction than the preceding layer.

**Control Cable** - A cable used for remote operation of any type of electrical power equipment.

**Copolene** - A dielectric material composed of polyisobutylene and polystyrene developed as a substitute polystyrene.

**Copolymer** - A compound resulting from the chemical reaction of two chemically different monomers.

**Copper** - A common metal with the best conductivity of the non-precious metals per volume. Available in rod, sheet, foil, tube and wire forms. Copper and copper alloys offer excellent corrosion resistance, high thermal conductivity, and ease of fabricating, joining and forming. The strength-to-weight ratio of copper is relatively low and loses strength at elevated temperatures. Copper is the most widely used electrical conductor in wire and cable.

**Copper-Constantan** - An alloy of copper, nickel, manganese and iron used in thermocouple pairs.

**Copper-Covered Steel Wire** - A wire with a steel core and fused outer shell of copper.

**Copperweld®** - The trade name for copper-covered steel wire manufactured by the Copperweld Steel Company. A drawing process enables a thick copper covering to be placed over a steel core so that the copperweld performs as one metal. Hot rolling, cold drawing, pounding and temperature changes do not affect its properties.

**Cord** - A small, flexible conductor or group of conductors insulated one from another and covered by an outer sheath or covering; usually not larger than 10AWG or more than four conductors.

**Cord Sets** - Portable cords fitted with any type of wiring device at one or both ends.

**Core** - The component separating the inner or outer conductor within a coaxial cable.

**Corona** - A high-voltage electrical discharge that attacks insulation. This luminous discharge is caused by the ionization of gas surrounding a conductor around which exists a voltage gradient exceeding a certain critical value.

**Corona Resistance** - The time that insulation will withstand a specified level of field-intensified ionization that does not result in the immediate and complete breakdown of the insulation.

**Corrosion** - Chemical or electrical action that destroys the surface of a metal. The latter is known as electrolytic corrosion or electrolysis.

**Coulomb** - A measure of electrical current; one Coulomb = one amp per second.

**Coupling** - The transfer of energy between two or more cables or components of a circuit.

**Crazing** - Minute cracks on or near the surface of materials such as plastics or ceramics.

**Creep** - The dimensional change of a material under pressure or tension over a period of time.

**Creepage** - Electrical leakage on a solid dielectric surface.

## Glossary

# Cre – Die

**Creepage Surface** - An insulating surface that provides physical separation as a form of insulation between two electrical conductors of different potential.

**Cross-Connect Wire (CCW)** - Wiring used for cross-connect terminations on various types of distributing frames in the central office or in the field. It can also be installed during building construction, prior to applying drywall on lath where another jacket is not required. 24AWG is used. Previously called Pre-Wiring Cable.

**Cross-Connecting Terminal** - A cable terminal at a junction of two cables that terminates pairs from both cables so that they can be cross-connected. Often used at the junction of a feeder cable and the distribution cables it serves.

**Cross-Linked Polyethylene** - A form of polyethylene with molecules permanently set to produce a greater balance of physical and electrical properties.

**Cross-Linking** - In polymer molecules, the setup of chemical links between molecular chains. Found in most thermosetting resins.

**Cross-Sectional Area (of a conductor)** - The sum of the cross-sectional areas of component wires with each wire being measured perpendicular to its individual axis. This measure is expressed in circular mils or square inches.

**Crosshead** - A device attached to the discharge end of an extruder cylinder to facilitate extruding at an angle.

**Crosstalk** - Audio signal interference between nearby conductors caused by the pickup of stray energy; also called electro-magnetic coupling. May be reduced by proper overall shielding.

**Cupeth** - A cable sheath similar to alpth except copper is used as the shield instead of aluminum.

**Cure** - To alter the physical properties of a material by chemical reaction, the action of heat and catalysts, alone or in combination, with or without pressure.

**Curing Temperature** - The temperature at which a material is subjected to curing.

**Curing Time** - The time required in molding or thermosetting plastics for the material to be properly cured.

**Curl** - The degree to which a wire tends to form a circle after removal from a spool; indicates the ease with which the wire can be wrapped.

**Current** - The flow of electricity measured in amps.

**Current Carrying Capacity** - The maximum current a capacitor can carry without heating beyond a safe limit.

**Current Loop** - A two-wire transmit/receive interface.

**Current Penetration** - The depth a current of a given frequency will penetrate into the surface of a conductor carrying the current.

**Cut-Through Resistance** - The ability of a material to withstand mechanical pressure without separation. Pressure is usually applied as a sharp edge of prescribed radius.

**Cycle** - The complete sequence of alternation or reversal of flow in an alternating electric current.

## D

**Dacron®** - A polyester fiber plied into two yarns and formed into a braid over a cable insulation or jacket. When impregnated with a high temperature lacquer, the braid forms a layer that will not fray and exhibits a high abrasion resistance. It is limited to use below 150°C.

**Decibel** - An exponential unit to express differences of power level. The decibel is 10 times the common logarithm of the power ratio. It is used to express power gain in amplifiers or power loss in passive circuits or cables.

**Delay Line** - A transmission line or equivalent device designed to delay a wave or signal for a specific length of time.

**Denier** - Describes the weight of a yarn which determines its physical size. Refers to materials other than cotton and spun rayon.

**Derating Factor** - A factor used to reduce a current-carrying capacity of a wire when used in other environments from that for which the value was established.

**Dielectric** - A non-conducting material or a material with the property that the energy required to establish an electric field is recoverable, in whole or part, as electric energy. Any insulating medium that intervenes between two conductors and permits electrostatic attraction and repulsion to take place across it.

**Dielectric Absorption** - The property of an imperfect dielectric whereby there is an accumulation of electric charges within the body of the material when it is placed in an electric field.

**Dielectric Breakdown** - Any change in the properties of a dielectric that causes it to become conductive; normally a catastrophic failure of an insulation because of excessive voltage.

**Dielectric Constant (K)** - The property of an insulation that determines the electrostatic energy stored per unit volume for unit potential gradient. Expressed as a ratio. K for air is 1.0, while that for polyethylene is 2.2 times that of air. It is also referred to as Specific Inductive Capacity or Permittivity.

**Dielectric Heating** - The heating of an insulating material when placed in a radio frequency field, caused by internal losses during the rapid polarization reversal of molecules in the material.

**Dielectric Loss** - The rate of time at which electric energy is transformed into heat in a dielectric when it is subjected to a changing electric field.

**Dielectric Power Factor** - An expression of energy loss in an electric current due to the effect of the dielectric.

**Dielectric Strength** - The maximum voltage insulation can withstand without rupture or breakdown occurring. Usually expressed as a voltage gradient in volts per unit thickness.

**Dielectric Tests** - Test that consists of the application of voltage higher than the rated voltage for a specific time for the purpose of determining the adequacy against breakdown of insulating materials and spacings under normal conditions.

**Digital** - Used to describe electronic technology that generates, stores, and processes data in terms of two states: positive and non-positive. Positive is expressed or represented by the number 1 and non-positive by the number 0; data is transmitted or stored as a string of 0s and 1s.

**Dip Coating** - An insulating coating applied to the conductor by passing the conductor through an applicator containing a liquid insulating medium. Can be used for magnet wire.

**Direct Current** - Electricity that flows in one direction only.

**Direction of Lay** - The lateral direction in which the strands of a cable run over the top of the cable as they recede from an observer looking along the axis of the cable. This is the same designation used for thread direction of screws. ASTM symbols are used to indicate direction with "S" for left hand and "A" for right hand.

**Dispersion** - The cause of bandwidth limitations in an optical fiber. Dispersion causes a broadening of input pulses along the length of a fiber. Mode dispersion is caused by varying optical path lengths in a multimode fiber, and material dispersion is caused by a delay of various wavelengths of light in a wave guide material.

**Displacement Current** - A current that exists in addition to ordinary conduction current in AC circuits. It is proportional to the rate of change of the electric field.

**Disruptive Discharge** - The sudden and large increase in current through an insulation medium due to the complete failure of the medium under the electrostatic stress.

**Dissipation Factor** - The tangent of the loss angle of the insulation material. Also referred to as loss tangent and approximate power factor.

**Distortion** - An undesired change in wave form as a signal passes through a device.

**Distribution Cable** - In a CATV system, the transmission cable from the distribution amplifier to the drop cable.

**Disturbed Conductor** - A conductor carrying energy generated by the field of another conductor or an external source such as a transformer.

**Drain Wire** - An uninsulated stranded or solid conductor located directly under a shield. Because it comes in contact with the shield throughout the entire length of the cable, it may be used to terminate the shield and eliminate a considerable amount of dispersion.

**Drawing** - The process of pulling metal through a die or a series of dies to achieve a desired diameter.

**Drop Cable** - The transmission cable in a CATV system from the distribution cable to a dwelling.

**Dual Coaxial Cable** - Two individually insulated conductors laid parallel or twisted and placed within an overall shield and sheath.

**Duct** - An overhead or underground tube used for carrying electrical conductors.

**Duobond® II** - Laminated shielding tape consisting of heat sensitive adhesive, aluminum foil and polyester.

**Duofoil®** - Belden trademark for a shield in which metallic foil is applied to both sides of a supporting plastic film.

**Duplex Cable** - A cable composed of two insulated conductors twisted together with no sheath or outer covering. The assembled cables may or may not have a common covering or sheath.

**Durometer** - A measure of surface resistivity or material hardness, usually referring to thermosetting and thermoplastic materials.

## E

**Eccentricity** - A measure of the center of a conductor's location with respect to the circular cross section of the insulation. Expressed as a percentage of center displacement of one circle within the other.

**Elastomer** - Any material that will return to its original size after stretching (within reasonable limits).

**Electric Gradient** - The space rate of change of potential at a point in the direction of the greatest change.

**Electrical Length** - That length of cable expressed as degrees of a cycle or fraction of a wavelength for the signal transmitted.

**Electro Positive** - A substance that has a tendency to unite electrons in electrolysis, leaving the electrolyte with a positive charge.

**Electrode** - Either terminal or an electric source (anode and/or cathode).

**Electrolysis** - The chemical changes produced by passing a current through an electrolyte.

**Electrolyte** - A substance which in solution conducts electric current.

**Electrolytic Corrosion** - Corrosion by means of electrochemical erosion.

**Electromagnet** - A coil of wire, usually wound on an iron core, that produces a strong magnetic field when current is sent through the coil.

**Electromagnetic Coupling** - The transfer of energy by means of a varying magnetic field; inductive coupling.

**Electromagnetic Field** - A rapidly moving electric field and its associated moving magnetic field, located at right angles both to the electric lines of force and to their direction of motion.

**Electromagnetic Induction** - The production of a voltage in a coil due to a change in the number of magnetic lines of force (flux linkages) passing through the coil.

**Electromotive Force (EMF)** - The force that determines the flow of electricity; a difference of electric potential.

**Electron** - The portion of an atom that circles around the center, or nucleus. An electron possesses a negative electric charge and is the smallest charge of negative electricity known.

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

## Glossary

# Ele – Fla

**Electrostatic** - Pertaining to static electricity or electricity at rest.

**Electrostatic Coupling** - The transfer of energy by means of a varying electrostatic field. Capacitive coupling.

**Elongation** - The fractional increase in length of a material stressed in tension or by a tension load in a section of a test specimen. It is expressed either as a percentage of the original length between benchmarks or indicated by specifying a minimum distance between benchmarks.

**Embossing** - Marker identification by means of thermal indentation leaving raised lettering on the cable sheath material.

**Enameled Wire** - A conductor with a baked-on enamel film insulation used on magnet wire, thermocouple type wires and other wires.

**Energy** - The capability of doing work.

**Energy Dissipation** - The loss of energy from a system due to the conversion of work into undesirable forms. An example of this is heat loss due to friction in a mechanical system.

**Energy Source** - A potential source for electricity, e.g. water, coal, oil, gas, uranium.

**Environmental Stress Cracking** - The susceptibility of a thermoplastic article to crack or craze formation under influence of certain chemicals and stresses.

**Epoxy Resins** - Strain-chain thermoplastics and thermosetting resins based on ethylene oxide, its derivatives or homologs.

**Equilay** - More than one layer of helically laid wires with the length of the lay the same for each layer.

**Ethylene Chlorotrifluoroethylene (ECTFE)** - A homopolymer of ethylene and chlorotrifluoroethylene. This high temperature resin is well suited for wire insulations and jackets for plenum applications. It can withstand an unusual amount of physical abuse during and after installation, has very good electrical characteristics, good thermal and low temperature properties, and chemical inertness.

**Ethylene Tetrafluoroethylene (ETFE)** - A homopolymer of ethylene and tetrafluoroethylene. This high temperature resin is well suited for wire insulations and jackets for plenum applications. It can withstand an unusual amount of physical abuse during and after installation, has very good electrical characteristics, good thermal and low temperature properties, and chemical inertness.

**Ethylene-Propylene Rubber (EPR)** - Chemically cross-linked polymer with physical properties similar to butyl rubber.

**Even Count Code** - A system of using colored insulation and unit binders so that every pair in a cable can be positively identified. Building blocks are 25-pair binder groups that can be combined to make cables in multiples of 100.

**Exchange Area Cable** - Cable originally used to provide local loop service in the local area around an exchange. Currently used to describe any multi-pair cable having 0/083 mfd/mile capacitance.

**Exothermic** - Characterized by the liberation of heat.

**Expanded Polyethylene** - See Cellular Polyethylene.

**External Interference** - The effects of any electrical waves or fields that cause sounds other than the desired signal; static.

**Extra Pairs** - One or more color-coded pairs included in the cable to ensure meeting a cable manufacturers guarantee.

## F

**Farad** - A unit of capacity that will store one Coulomb of electrical charge when one volt of electrical pressure is applied.

**Fatigue Resistance** - Resistance to metal crystallization that leads to conductors or wires breaking from flexing.

**Feedback** - The returning of a fraction of the output of an electric oscillation to the input.

**Feeder Cable** - In a CATV system, the transmission cable from the head end (signal pickup) to the trunk amplifier; also called a trunk cable.

**Ferrous** - Material composed of and/or containing iron. A ferrous metal exhibits magnetic characteristics as opposed to a non-ferrous metal, such as aluminum, which does not.

**Fiber** - A single, separate optical transmission element characterized by core and cladding.

**Fiber Dispersion (Fiber Optic)** - Pulse spreading in a fiber caused by differing transit times of various modes.

**Fiber Optics** - Light transmission through optical fibers for communication and signaling.

**Fiber Tubing (Fiber Optic)** - A loose crush-resistant cylinder applied over individual fibers to provide mechanical protection.

**Fiberglas®** - A trademark name for fiberglass, glass that is formed into thin fibers. When twisted and plied into yarns, it is used to form a braid covering for wire and cable. Normally saturated with silicone-base varnish to prevent passage of moisture and fraying of fibers.

**Field** - The area that electric and/or magnetic lines of force pass through.

**Field Strength** - The strength of an electromagnetic field.

**Figure 8 Cable** - An aerial cable configuration in which the conductors and the steel strand that supports the cable are integrally jacketed. A cross section of the finished cable approximates the figure 8.

**Filled Cable** - A telephone cable construction in which the cable core is filled with a material that will prevent moisture from entering or passing through the cable.

**Filler** - Various material cabled with insulated conductors to achieve roundness, strength or flexibility. Fillers are used in multi-conductor cables to occupy the interstices formed by the assembled conductors. Filler is also a substance, often inert, added to a plastic to improve properties and/or decrease cost.

**Flame Resistant** - The ability of a material to extinguish flame once the source of heat is removed.

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

**Flat Braid** - A woven braid, composed of tinned copper strands, that is rolled flat at time of manufacture to a specific width depending upon construction. It is generally used as a high current conductor at low voltages.

**Flat Conductor** - A wire manufactured in a flattened form, as opposed to round or square conductors.

**Flex Life** - The time of heat aging that an insulating material, when bent around a specific radius, can withstand before failure. Flex life is used to evaluate thermal endurance.

**Flexural Strength** - The strength of a material in bending.

**Floating** - Referring to a circuit that has no connection to ground.

**Flow** - The movement of a conductor within an insulating or dielectric material.

**Fluorinated Ethylene Propylene (FEP)** - A homopolymer of ethylene and propylene. This high temperature resin is well suited for wire insulations and jackets for plenum applications. It can withstand an unusual amount of physical abuse during and after installation, has very good electrical characteristics, good thermal and low temperature properties, and chemical inertness.

**Fluorocarbons** - Resins that include fluorine in their molecular structure; the greater the fluorine content, the better the polymer's electrical, mechanical, thermal and chemical properties. Polyvinylidene fluoride (PVDF), ethylene tetrafluoroethylene (ETFE), fluorinated ethylene propylene (FEP), and ethylene chlorotrifluoroethylene (ECTFE) are common wire insulations and jackets from the fluorocarbon family used for plenum wiring applications. PVDF is used primarily for jacketing purposes only. Also see Fluoropolymer.

**Fluoropolymer** - Family of polymers of general paraffinic structure in which some or all of the hydrogen replaced by fluorine. Polymer has characteristics that will pass stringent flammability tests, making them desirable for jacket and conductor insulations for inside cables placed in commercial building plenum areas.

**Flux** - (1) A material that help produce fusion, as solder flux. (2) A continuous flowing or passing, as in the field created by a magnet.

**Foam Filled Cable** - A jelly-filled (polyethylene modified petrolatum) outside plant cable utilizing foamed polyolefin as the conductor insulation (dielectric).

**Foam Skin Cable** - A jelly-filled (polyethylene modified petrolatum) outside plant cable utilizing a foamed polyolefin inner layer covered by air outer layer of solid polyolefin as the conductor insulation (dielectric).

**Foam-Polyethylene** - A polyethylene compound that has been whipped in the presence of an inert gas.

**Fraying** - In cabling, a term used to describe the unraveling of a fibrous braid.

**Frequency** - The number of times an alternating current reverses itself in one second.

**Frequency Power** - The 50 to 60 cycle power available in residential areas.

**Frequency Response** - The characteristic of a device denoting the range of frequencies over which it may be used effectively.

## G

**Gain** - The increase of electrical power in decibels.

**Galvanized Steel Wire** - Steel wire covered with zinc.

**Galvanometer** - A device for detecting the presence or direction of small electrical currents.

**Gas-Filled Cable** - A self-contained pressure cable in which the pressure medium is an inert gas having access to the insulation.

**Gasoline Resistant** - A UL listing for insulated wire that has passed the 60-day immersion test in water-saturated gasoline at a temperature of 30°C. This listing does not mean that a wire so marked may be continuously immersed in gasoline. It simply means that the particular wire has passed UL tests to demonstrate a certain degree of gasoline resistance and may therefore be used where occasional splashing or exposure to gasoline is expected.

**Gauge** - A term to denote size of wire.

**Generator** - A machine that transforms mechanical energy into electrical energy; also a dynamo.

**Geophysical Cable** - Cable used in exploring for underground oil deposits.

**Giga-** - *Prefix.* One billion.

**Gigahertz (Ghz)** - A unit of frequency equal to one billion hertz.

**Ground Fault** - A failure of transmission involving insulation to shield or insulation to ground wire.

**Ground Loop** - A completed circuit between shielded pairs of a multiple pair cable created by random contact between the shields. This is an undesirable circuit condition in which interference is created by ground currents when grounds are connected at more than one point.

**Ground Potential** - The potential of the earth. A circuit, terminal or chassis is said to be at ground potential when it is used as a reference point for other potentials in the system.

**Ground Rods** - A solid metal pipe or rod that is driven into the earth to provide a ground for electrical circuits.

**Ground Support Cable** - A cable construction, usually rugged and heavy, for use in ground support control or power systems.

**Ground Wire** - A single soft-drawn copper wire, insulated or bare, used for connecting protectors and cable terminals to a ground.

**Grounded Neutral** - The neutral wire is metallically connected to ground.

**Guider Tip** - The device used to center the conductor or cable in the die. It also prevents plastic melt from existing at the rear of the crosshead.

## Glossary

# H – Imp

## H

**Halogen** - Fluorine, chlorine, bromine, iodine and astatine, usually diatomic molecules and toxic.

**Hard Drawn Copper Wire** - Resistance of material to plastic deformation, usually by indentation. Indentation hardness may be measured by various hardness tests, such as Brinell, Rockwell, and Vickers. Also refers to stiffness or temper, or to resistance to scratching, abrasion, or cutting.

**Hardwired** - The connection of the telephone set line (mounting) cord to a connecting block with screw terminations. Under the FCC's Registration Program for terminal equipment, only those telephone sets connected to the telecommunications network in a hardwired manner prior to July 1, 1979, may remain connected in such a fashion.

**Harness** - A group of conductors laid parallel or twisted by hand, usually with many breakouts, laced or bundled together, or pulled into a rubber or plastic sheath, used to interconnect electrical circuits.

**Hash Mark Stripe** - A non-continuous helical stripe applied to a conductor for circuit identification.

**Hazardous Locations** - Article 500-504 in the NEC covers hazardous (Classified) locations and the requirements for electrical equipment and wiring in locations where fire or explosive hazards may exist due to flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings. Locations are defined by Class and Division depending upon properties and/or mixture of the hazardous elements. Acceptable wiring methods, including types of cables, are mentioned in the NEC articles for the specific Class and Division locations.

**Head** - The end section of an extruder in which the plastic melt is transferred to the cable.

**Heat Distortion** - Distortion or flow of a material or configuration due to the application of heat.

**Heat Endurance** - The time of heat aging that a material can withstand before failing a specific physical test.

**Heat Seal** - In cabling, a method of sealing a tape wrap jacket by means of thermal fusion.

**Heat Shock** - A test to determine stability of a material by sudden exposure to a high temperature for a short period of time.

**Heater Cord** - Cord containing flexible stranded copper conductor, cotton wrap, rubber insulation, and asbestos roving, for indoor use on household appliances.

**Helical** - Spiral.

**Helical Stripe** - A continuous, colored, spiral stripe applied to a conductor for circuit identification.

**Henry (H)** - A practical unit of inductance that will produce a voltage drop of one volt when the current changes at a rate of one ampere per second.

**Hertz (Hz)** - A unit of measurement of frequency equal to one cycle per second.

**Hi-Pot** - A test designed to determine the highest potential that can be applied to a conductor without breaking through the insulation.

**High Frequency** - The band from 3 to 30 Mhz in the radio spectrum, as designated by the Federal Communications Commission.

**High Voltage** - Generally considered to be a wire or cable with an operating voltage of more than 600 volts.

**Holding Strength** - Ability of a connector to remain assembled to a cable when under tension.

**Hook Up Wire** - Insulated wire used for low current, low voltage (under 1000 volts) applications internally within enclosed electronic equipment.

**Horizontal Stripe** - A colored stripe running horizontally with the axis of a conductor, sometimes called longitudinal stripe, used as a means of circuit identification.

**Hospital Wiring** - The NEC, in its section on hospital anesthetizing locations, requires wiring with a dielectric constant of 3.5 or less. This is to minimize capacitive coupling thereby lowering the capacitive leakage current for patient safety reasons.

**Hot Tin Dip** - A process of passing bare wire through a bath of molten tin to provide a coating.

**Hot-Rolled Rod** - The as-rolled section, normally round, produced by hot-rolling in a rod mill from a billet or wire bar.

**Hum** - A term used to describe the 10- or 120-hps sound present in the sound of some communications equipment. Usually hum is the result of undesired coupling to a 60-hps source or to the defective filtering of 120-hps ripple output of a rectifier.

**Hybrid Cable** - A multi-conductor cable containing two or more types of components.

**Hygroscopic** - Having the tendency to absorb moisture and retain moisture.

## I

**ICEA** - Abbreviation for Insulated Cable Engineers Association, an association of cable manufacturers that writes standards for insulated wire and cable. The standards are co-sponsored by NEMA (National Electrical Manufacturers Association), which prints and distributes the standards.

**Ignition Cable** - A cable designed primarily for automotive ignition system.

**Impact Bar Specimen** - A test specimen of specified dimensions that is utilized to determine the relative resistance of a plastic to fracture by shock.

**Impact Resistance** - The relative susceptibility of material to fracture by shock.

**Impact Strength** - A test for determining the punishment a cable can withstand without physical or electrical breakdown by impacting with a given weight, dropped a given distance, in a controlled environment.

**Impedance** - The resistance to flow of an alternating current; expressed in ohms.

**Impedance Matching** - Very generally, connecting cables and devices together that have the same impedance value in ohms.

**Impedance Matching Sub** - A section of transmission line or pair of conductors cut to match the impedance of a load. Also called matching sub.

**Impedance Matching Transformer** - A transformer designed to match the impedance of one circuit to that of another.

**Impedance, Characteristic** - In a transmission cable of infinite length, the ratio of the applied voltage to the resultant current at the point the voltage is applied, or the impedance that makes a transmission cable seem infinitely long when connected across the cables output terminals.

**Impedance, High** - Generally, the area of 25,000 ohms or higher.

**Impedance, Low** - Generally, the area of 1 through 600 ohms.

**Impregnate** - To fill the voids and interstices of a material with a compound. This does not imply complete fill or complete coating of the surfaces by a hole-free film.

**Incoherent Source (Fiber Optic)** - A light source that emits wide, diffused beams of light of many wave lengths. The light waves emitted from an incoherent source are out of phase.

**Index Edge** - See Reference Edge.

**Inductance** - The power of an electric current to develop an electromotive force in its own or an adjacent circuit.

**Induction** - The phenomenon of a voltage, magnetic field, or electrostatic charge being produced in an object by lines of force from the source of fields.

**Induction Heating** - Heating a conducting material by placing it in a rapidly changing magnetic field. The changing field induces electric currents in the material and I<sup>2</sup>R losses account for the resultant heat.

**Inductive Coupling** - Crosstalk resulting from the action of the electromagnetic field of one conductor on the other.

**Inhibitor** - For example, a corrosion inhibitor is a material that prevents or delays oxidation and galvanic action on a connector surface, or the interface of different conductors. Also, a chemical compound added to a mixture to restrain its chemical reaction until a desired condition exists.

**Injection Laser Diode** - Sometimes called the semiconductor diode. A laser in which the lasing occurs at the junction of "n" Type and "p" Type semiconductor materials.

**Inorganic** - Designating or composed of matter other than animal or vegetable, such as earthy or mineral matter.

**Input** - A signal (power) that is applied to a piece of electric apparatus or the terminals on the apparatus to which a signal or power is applied.

**Insertion Loss** - A measure of the attenuation of a device by determining the output of a system before and after the device is inserted into the system.

**Inside Plant** - Usually considered all cable and equipment inside a central office or subscriber's location.

**Inside Wire** - Wire designed to carry a telephone circuit(s) through the customer's premises. Typically, it consists of four insulated conductors covered by a jacket. Sometimes referred to as station wire.

**Inside Wiring Cable** - Usually a thermoplastic PVC-insulated and -jacketed cable with fully color-coded insulated non-tinned copper conductors, either 22AWG or 24AWG.

**Instron** - An instrument utilized to determine the tensile properties of materials.

**Insulated Wire** - A conductor of electricity covered with a non-conducting material (dielectric).

**Insulating Wire** - Covering a conductor of electricity with a non-conducting material.

**Insulation** - A conducting substance surrounding the conductor, also called the dielectric. The material has such a low conductivity that the flow of electrical current through it can usually be neglected.

**Insulation Adhesion** - The degree of looseness or tightness of the insulation over the base conductor measured in terms of force required to remove a specified length of insulation from the wire.

**Insulation Level -100%** - Cable for use on grounded systems or where the system is provided with relay protection such that ground faults will be cleared as rapidly as possible, but in any case, within one minute.

**Insulation Level - 133%** - Cable for use on ungrounded systems or where the faulted section will be de-energized in a time not exceeding one hour.

**Insulation Resistance** - The electrical resistance offered by its insulation to an impressed direct current potential tending to produce a leakage of current through the same. For wire usually measured in megohms per 1000 ft.

**Insulation Stress** - The molecule separation pressure caused by a potential difference across an insulator. The practical stress on insulation is expressed in volts per mil.

**Insulator** - A material of such low electrical conductivity that it will not support an electrical current.

**Integral Belt** - In a cable, a layer of insulation or semiconductive material applied usually by extrusion over two or more insulated, twisted or parallel conductors, to form a round smooth diameter.

**Intercom Wire** - Wire used to connect communications instruments, telephones, or telegraph.

**Interconnecting Cable** - The wiring between modules, between units, or the larger portions of a system.

**Interconnecting Wire** - Wire for external use in electronic equipment where exposed to physical abuse. Encompasses both control and power circuits.

**Interface** - The region where two systems or a major and a minor system meet and interact with each other.

## Glossary

# Int – Las

**Interference** - Any undesirable electromagnetic emission or any electrical or electromagnetic disturbance, phenomenon, signal or emission, man-made or natural that causes (or can cause) an undesired response, malfunctioning or degradation of the electrical performance of electrical and electronic equipment.

**Intermediate Frequency** - A frequency to which a signal is converted for ease of handling. Receives its name from the fact that it is an intermediate step between the initial and final conversion or detection stages.

**Internal Wiring** - Electronic wiring that interconnects components, usually within a sealed subsystem.

**Interstice** - A minute space between one thing and another, especially between items closely set or between the parts of a body.

**Interstitial Pairs** - One or more pairs laid individually in the spaces between the units, coaxials, or spiral-four quads.

**Ion** - An electrical portion of matter of subatomic, atomic, or molecular dimensions such as is formed when a molecule of gas loses an electron (when the gas is stressed electrically beyond the critical voltage) or when a neutral atom or group of atoms in a fluid loses or gains one or more electrons.

**IR Drop** - The designation of a voltage drop in terms of current and resistance.

**Isolation** - The ability of a circuit or component to reject interference, usually expressed in dB.

## J

**Jack** - A plug-in type terminal widely used in electronic apparatus for temporary connections. A connection is made to a jack simply by plugging into it a probe or plug attached to a flexible insulated wire or cable.

**Jacket** - (1) A rubber, plastic, or synthetic covering applied over the primary insulation, braids, shields, cable components, or over the cable itself. (2) In fiber optics, a covering, frequently plastic, over a fiber, bundle of fibers, or cable that protects against the environment.

**Joule (J)** - A unit of energy or work. The absolute joule is equal to 10 million ergs. The internal joule is equal to the work required to maintain a current of one ampere for one second in a resistance of one ohm.

**Jumper** - A short length of conductor used to make a connection, usually temporary, between terminals, around a break in a circuit, or around an instrument.

**Jumper Cable** - A short, flat cable interconnecting two wiring boards or devices.

**Jumper Wire** - PVC-insulated copper conductors twisted together and used for cross-connecting on distributing frames, usually 22AWG.

**Junction** - A point in a circuit where two or more wires are connected.

## K

**Kil-** - *Prefix*. Thousand.

**Kilocycle** - A term denoting one thousand cycles.

**Kilovolt (KV)** - A term denoting one thousand volts.

**Kilowatt (KW)** - A term denoting one thousand watts.

**Kirchoff's Laws** - (1) The algebraic sum of the currents that meet at any point is zero. (2) In any closed circuit, the algebraic sum of the products of the current and the resistance in each conductor in the circuit is equal to the electromotive force in the circuit.

**Knock-Out Carton** - A bending grade of boxboard having one or more die-cut areas for removal or to aid in breaking down the carton. Usually used for small size telephone wires and cables up to six pair.

**KPSI** - Tensile strength in thousands of pounds per square inch.

**KVA** - Kilovolt ampere.

**Kynar** - Pennwalt Corporation trademark for a thermoplastic fluoropolymer material with excellent chemical resistance, electrical properties, thermal characteristics, and impact resistance. The temperature rating is -20°C to 125°C.

## L

**L** - Symbol for inductance.

**Lacquer Finish** - A finish applied over braided wire or cable for appearance and protection against fraying, wicking, moisture absorption, abrasion, etc.

**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.

**Laminates** - Two or more layers, usually of different materials, bonded or laminated together.

**LAN (Local Area Network)** - A network spanning a limited geographical area, providing data communications between computers and peripherals, and switching equipment.

**Lanyard** - A device attached to certain quick disconnect connectors which permits uncoupling and separation of connector halves by a pull on a wire or cable.

**Laser** - A coherent source of light with a narrow beam and a narrow spectral bandwidth (about 2nm).

**Laser Diode (Fiber Optic)** - A semiconductor diode that lases, that is, when pulsed, a laser diode emits coherent light - light of essentially one wave length, in phase, traveling in the same direction.

**Laser Light (Fiber Optic)** - Light amplification by stimulated emission of radiation.

**Lashing Wire** - A thin, high strength, bare metal wire used for spirally wrapping an aerial cable to its suspension strand.

**Latex** - Rubber material used for wire insulation.

**Launch Angle (Fiber Optic)** - The angle between the radiation vector and the axis of the fiber or fiber bundle.

**Lay** - The axial distance required for one cabled conductor or conductor strand to complete one revolution about the axis around which it is cabled.

**Lay Direction** - The twist in the 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.”

**Lead Covered Cable (Lead Sheathed Cable)** - A cable covered with a sheath of lead for the purpose of excluding moisture and affording mechanical protection.

**Lead (pronounced “lead”)** - A connecting wire, such as a test lead, battery lead, or conductor brought out from a coil or winding.

**Lead Dress** - The placement or routing of wiring and component leads in an electrical circuit.

**Lead-in** - The cable that provides the path for r-f energy between the antenna and the receiver or transmitter.

**Leakage** - The undesirable passage of current over the surface of or through an insulator.

**Level** - A measure of the difference between a quantity or value and an established reference.

**LF** - Low frequency.

**Life Cycle** - A test performed on a material or configuration to determine the length of time before failure in a controlled, usually accelerated, environment.

**Light Emitting Diode (LED) (Fiber Optic)** - A semiconductor device that emits incoherent optical radiation when biased in the forward direction.

**Light Source (Fiber Optic)** - Any object capable of emitting light, normally either an LED or a laser.

**Lightguide (Fiber Optic)** - A flexible bundle of fibers used to transmit light.

**Light-Intensity Ratio (Fiber Optic)** - Ratio of input light intensity to the output light intensity.

**Lightwave Communications (Fiber Optic)** - Communications using light instead of an electric current to carry the information. Also called optical communications.

**Lightwave Transmission (Fiber Optic)** - A transmission method using modulated light frequencies directed through a fiber optic wave guide. Used for local distribution facilities with high bandwidth signals, high capacity long haul facilities, and distribution cabling within digital switching systems.

**Limpness** - The ability of a cable to lay flat or conform to a surface as with microphone cables.

**Line Balance** - The degree to which the conductors of a cable are alike in their electrical characteristics with respect to each other, to other conductors, and to ground. Similar to balanced line.

**Line Cord** - A two-wire cord terminating a two-prong plug at one end used to connect equipment or appliances to a power outlet.

**Line Drop** - A voltage loss occurring between any two points in a power or transmission line. Such loss, or drop, is due to the resistance, reactance, or leakage of the line.

**Line Equalizer** - A reactance (inductance and/or capacitance) connected in series with a transmission line to alter the frequency-response characteristics of the line.

**Line Level** - The amplitude of a signal at a certain point on a transmission line. Usually expressed in dB.

**Line Voltage** - The value of potential existing on a supply or power line.

**Liquor-Finished Wire** - Wire, usually of ferrous material, drawn through a wet solution of metallic salts to enhance the appearance and surface characteristics of the finished wire, not to provide the properties of a coated wire.

**Listed** - UL term to describe a product that has been fully tested for all safety-related functions.

**Litz Wire** - A conductor made up of several insulated twisted wires to reduce skin effect and lower radio frequency losses.

**Live** - Energized wire or circuit connected to a source of an electrical voltage.

**Load** - A device that consumes power from a source of an electrical voltage.

**Loaded Line, Loading Line** - A transmission line that has lumped elements (inductance or capacitance) added at uniformly spaced intervals. Loading is used to provide a given set of characteristics to a transmission line.

**Loading Coil** - A coil of wire, wound around a magnetic core, that provides a lumped inductance which can be inserted in series with a cable pair to improve voice frequency transmission.

**Loading Section** - The length of cable between two load points. 3,000- and 6,000-foot loading sections are the most common.

**LOCA** - Abbreviation for loss of coolant accident, a system malfunction associated with nuclear generating stations.

**Long Pair Twist** - Refers to toll quads or pairs in which the pair twist length is approximately 16 to 52 inches. In a quad, the phantom twist length is 5 to 11 inches, depending on the gauge.

**Long-wire Antenna** - Any conductor length in excess of one-half of a wavelength. In a residential television installation, a horizontal run or unshielded lead-in will act as a long-wire antenna and introduce additional signal on top of the regular antenna signal, causing ghosts.

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

**Longitudinal Wrap** - A tape applied longitudinally with the axis of the core being covered, as opposed to a helical, or spiral, tape wrapped core.

## Glossary

# Loo – Mic

**Loop** - The closed path in an electrical circuit.

**Loop Resistance** - The total resistance of two conductors measured round trip from one end (twisted pair, shield and conductor, etc).

**Loss** - The portion of energy applied to a system that is dissipated and performs no useful work.

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

**Lossy** - Having poor efficiency.

**Low Frequency** - A band of frequencies extending from 30 to 300 Khz in the radio spectrum, designated by the Federal Communications Commission.

**Low Loss Dielectric** - An insulating material that has a relatively low dielectric loss, such as polyethylene or Teflon®.

**Low Noise Cable** - A cable configuration specially constructed to eliminate spurious electrical disturbances caused by capacitance changes or self-generated noise.

**Lug** - Termination, usually crimped or soldered to the conductor, with provision for screwing to terminal.

## M

**MA** - Milliampere (one-thousandth of an ampere).

**Magnet** - A body possessing the property of attracting particles of iron. A material capable of maintaining within and about itself a field of magnetic force.

**Magnet Wire** - Insulated wire intended for use in windings on motor, transformer, and other coils for electromagnetic devices.

**Magnetic Field** - The region within which a body or current experiences magnetic force.

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

**Manufacturer's Identification** - (1) Colored threads or marker tape under insulation or jacket, or jacket surface printing or marking, intended to identify an inside wire or cable construction as the product of a particular manufacturer. Often required by UL, CSA or Government specifications. (2) On outside plant cables, the manufacturers identification (ESSEX is identified SX), cable size, gauge and year of manufacture are marked on the outer jacket at two-foot intervals.

**Margin** - Distance between reference edge of cable and nearest edge of first conductor.

**Marker Tape** - A tape laid parallel to the conductors under the sheath in a cable, imprinted with the manufacturer's name and the specification to which the cable is made. Other information such as manufacturing date or cable type may also be included.

**Marker Thread** - A colored thread laid parallel and adjacent to the strands of an insulated conductor that identifies the cable manufacturer. It may also denote a temperature rating or the specification to which the cable is made.

**Master Carton** - A shipping boxboard container used to overpack or unitize a number of individual cartons. Usually used in enclosing four knock-out cartons.

**Maximum Operating Temperature** - The maximum temperature to which any portion of a cable can be subjected.

**Mechanical Protection (MP)** - An outer cable covering made up of a corrugated steel tape soldered at the overlap, plus an outer polyethylene jacket. If the steel is unsoldered it is called unsoldered mechanical protection (UM).

**Medium-Hard Drawn Wire** - Copper wire having tensile strength less than the minimum for hard-drawn wire, but greater than the maximum for soft wire.

**Mega-** - *Prefix*. One million.

**Megahertz** - One million cycles per second.

**Megarad** - A unit for measuring radiation dosage.

**Megavolt** - One million volts.

**Megawatt** - One million watts.

**Megohm** - One million ohms.

**Melt** - Plastic material in molten condition.

**Melt Extrude** - To heat a material above its melt point and extrude it through an orifice.

**Melt Index** - The amount, in grams, of a thermoplastic resin that can be forced through a 0.0825 inch orifice when subjected to 2160 GMS force in 10 minutes at 190°C.

**Member** - A group of wires stranded together for combination with other stranded groups into a multiple membered conductor.

**-mer** - *Suffix*. The repeating structural unit of any high polymer.

**Messenger Wire** - A metallic supporting member, either solid or stranded, that may also perform the function of a conductor.

**MEV** - One million electron volts.

**MFD** - Microfarad (one-millionth of a farad).

**MHO** - The unit of conductance equal to the reciprocal of the unit of resistance (ohm).

**Mica** - A silicate which separates into layers and has high insulation resistance, dielectric strength, and heat resistance. It is used as an insulation wrap in wires and cables to a limited degree where radiation resistance requirements are severe and for high temperature work demanding good heat resistance.

**Micro-** - *Prefix*. One-millionth.

**Microbending Loss (Fiber Optic)** - Loss due to small geometrical irregularities along the core-clad interface of the fiber.

**Microfarad** - One-millionth of a farad (uf, ufd, mf, and mfd are common abbreviations).

**Microhenry** - One-millionth of a henry (1x10<sup>-6</sup> henrys).

**Microinch** - One-millionth of an inch.

**Micromicrofarad** - One-millionth of a microfarad (uuf, uufd, mmf, mmfd are common abbreviations). Also, a picofarad (pf or pfd), 1x10<sup>-12</sup>.

**Micron** - One-millionth of a meter (1x10<sup>-6</sup> meter).

**Microphone Cable** - A special shielded cable used to connect a microphone to an amplifier.

**Microphonics** - The noise caused by mechanical excitation of a system component. In a single-connector microphone, for example, microphonics can be caused by the shield rubbing against the dielectric, as the cable is flexed.

**Microwave** - A short electrical wave, usually less than 30 cm.

**Microwave Frequency** - The frequency of a microwave, usually above 1000 megacycles per second.

**Mil** - A unit of length equal to one-thousandth of an inch.

**Milli-** - *Prefix.* One-thousandth.

**Millivolt** - One-thousandth of one volt.

**Mineral Insulation (MI)** - Mineral-insulated cable and thermocouple wire consists of one or more conductors surrounded by magnesium oxide insulation and enclosed in a liquid gas-tight metal sheathing. Because the construction is completely inorganic, the cable is very heat resistant and inert to most conditions.

**Mining Cable** - A flame-retardant cable especially constructed to withstand longtime immersion or exposure to moisture for underground use in the environment of a mine or tunnel.

**Mismatch** - A termination having a different impedance than that for which a circuit or cable is designed.

**Mode (Fiber Optic)** - One of the components of a general configuration of a propagating wave front. Mode is characterized by a particular geometrical pattern and propagation constant.

**Modem** - Device that converts signals in one form to another form to be compatible with a different kind of equipment.

**Modular** - Applied to connection of a telephone line (mounting) cord to the telecommunications network via plugs affixed on the ends of such cords and jacks used in termination of premises station or inside wiring. Modular telephone apparatus consists of mini-plugs and jacks that replace former plus and jack arrangements. These are broken down into three general phases: (a) quarter modular - the telephone mounting cord is equipped with spade tips on one end and a plug on the opposite end. The cord is hard wired in the telephone. (b) half modular - the telephone mounting cord is equipped with a plug on each end. (c) full modular - the telephone mounting and handset cords are equipped with plugs on each end.

**Modulation (Fiber Optic)** - Manner in which information is coded into light for transmission through a fiber. Modulation method may be either pulse modulation (digital) or intensity modulation (analog).

**Modulus of Elasticity** - The ratio of stress to strain in an elastic material.

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

**Moisture Resistance** - The ability of a material to resist absorbing moisture from the air or when immersed in water.

**Moisture Seal** - A layer of material applied for the purpose of impregnating compounds.

**Molded Plug** - A connector molded on either end of a cord or cable.

**Molding** - Forming material into a particular shape.

**Molecular Weight** - The weight of any molecule, which is the sum of the weights of its constituent atoms.

**Monofilament** - A single-strand filament as opposed to a braided or twisted filament.

**Monomer** - The basic chemical unit used in building a polymer.

**MSHA** - Mine Safety and Health Act administered by U.S. Department of Labor. Establishes employee safety standards in all underground and surface mines and preparation plants.

**MTW** - Thermoplastic insulated machine tool wire.

**Multi-Conductor** - A combination of two or more conductors cabled together under a common jacket, insulated from one another and from sheath or armor.

**Multimode Fiber (Fiber Optic)** - A fiber that transmits many modes.

**Multiple-Conductor Cable** - A combination of two or more conductors cabled together and insulated from one another and from sheath or armor. Special cables are referred to as 3-conductor cable, 7-conductor cable, 50-conductor cable, etc.

**Multiplex** - A technique for putting two or more signals into a single channel.

**Multistain Pairs** - Pulp-insulated pairs in which the ring side is colored by intermittent bands of stain sprayed on the pulp insulation after application to the conductor.

**Munsell Color Code** - A means for specifying the colors of insulated conductors within the telecom industry based on the color-perception attributes of hue, chroma, and value. Hue identifies the differing colors, value covers lightness or darkness of the color, and chroma refers to the color quality, whether bright or muted.

**Mutual Capacitance** - The capacitance between two conductors when all other conductors including ground are connected together and then regarded as an ignored ground.

**Mylar®** - The DuPont tradename for polyethylene terephthalate (polyester) film.

## N

**Nano** - *Prefix.* One-billionth ( $1 \times 10^{-9}$ ).

**Nanometer (nm)** - One-billionth of a meter.

**Nanosecond** - One-billionth of a second.

**National Electrical Code** - A consensus standard published by the National Fire Protection Association (NFPA) and incorporated in OSHA regulations.

**National Electrical Manufacturer's Association (NEMA)** - An industry association that standardizes specifications for wires, cables and electrical components.

**NBR** - Nitrile-butadiene rubber, resistant to oil and chemicals.

**Near End Crosstalk** - Crosstalk measured by applying and measuring the disturbing signal on two pairs at the same end.

**NEC** - Abbreviation for National Electrical Code, which covers the use of wire and cable in many applications.

**NEMA** - National Electrical Manufacturer's Association.

**Neoprene®** - A DuPont trademark for a synthetic rubber known as polychloroprene. The physical properties of CR (chloroprene Rubber) Neoprene® are similar in some respects to natural rubber but it is considerably more resistance to oil, ozone, heat, weather, sunlight, and aging. It does not support combustion and resists abrasion and cutting. It is used for a wide variety of wire and cable jacketing applications. The temperature range of this material can vary from  $-55^{\circ}\text{C}$  to  $90^{\circ}\text{C}$ .

**Neper** - An electrical unit similar to dB, used to express the ratio between two amounts of power existing at two distinct points. A neper is 8.686 decibels.

**Nibble** - One-half byte (4 bits).

**Nickel** - This metal offers combination of corrosion resistance, formability, and tough physical properties. For these reasons, nickel is used for alloying purposes and in nickel-clad copper wire.

**Nickel Clad** - Nickel tube drawn down into copper core.

**Nickel Plate** - Nickel electroplated on a copper conductor.

**Noise** - In a cable or circuit, any extraneous sounds or signals that tend to interfere with the sound of signal normally present in or passing through the system.

**Nomex®** - The DuPont tradename for a temperature-resistant, flame-retardant nylon.

**Nominal** - The name or identifying value of a measurable property by which a conductor or component or property of a conductor is identified, and to which tolerances are applied.

**Non-Conductor** - An insulating material.

**Non-Contaminating** - Type of PVC jacketing material in which the plasticizer will not migrate into the dielectric of a coaxial cable and thus will avoid contaminating and destroying the dielectric.

**Non-Contaminating Compound** - A compounded material that will not leach ingredients so as to contaminate or degrade adjacent materials under given environmental conditions.

**Non-Hygroscopic** - The opposite of hygroscopic; that is, not absorbing moisture.

**Non-Migrating** - Synonymous with non-contaminating.

**Non-Modular** - Refers to connection of the telephone line (mounting) cord to the telecommunications network via 4-prong plugs and jacks or terminal lugs located on the end of such cords and jacks used to terminate premise station or inside wiring.

**Numerical Aperture (NA) (Fiber Optic)** - The characteristic of an optic conductor in terms of its acceptance of light. The phrases "degree of openness," "light gathering ability," and "angular acceptance" describe this characteristic. Mathematically, numerical aperture equals the sine of one-half of the acceptance angle.

**Nylon** - A generic trade name of DuPont for synthetic fiber-forming polyamides. A polymer of nitrogen, carbon and oxygen; Nylon's chemical unbalance and tendency to absorb moisture limit its use as a dielectric or insulating material. However, it is often used in wire and cable as a jacket over polyethylene or polyvinyl chloride to increase temperature stability, chemical and abrasion resistance.

**Nylon-Jacketed** - Refers to the outer covering of Nylon on wire or cable that can be either an extruded layer or a braid of Nylon filaments.

## O

**Offgassing** - Percentage of a specified gas released during the combustion of insulation or jacketing material.

**OFHC** - Abbreviation for oxygen-free, high conductivity copper. It has no residual deoxidant, 99.95% minimum copper content, and an average annealed conductivity of 101%.

**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** - Stated  $V = IR$ ,  $I = V / R$  or  $R = V / I$ , the current  $I$  in a circuit is directly proportional to the voltage  $V$ , and inversely proportional to the resistance  $R$ .

**Oil Resistant** - A UL listing for an insulation or jacket that has passed an oil immersion test. (Oil Resistant II: 60-day oil immersion test at a temperature of  $75^{\circ}\text{C}$ ; Oil Resistant I: Test performed for 96 hours in  $100^{\circ}\text{C}$  oil). These listings do not mean that the wire or cable can be operated continuously immersed in oil. It means that the wire has passed UL tests that demonstrate superior resistance to oil-induced degradation. The wire is thus deemed suitable for occasional splashing or exposure to oil at the elevated temperature indicated by the test.

**Oil-Filled Cable** - A self-contained pressure cable in which the pressure medium is low viscosity oil having access to the insulation.

**Open** - A discontinuity in an electrical conductor or piece of electrical equipment.

**Open Cell** - Foamed or cellular material with cells which are generally interconnected. Closed cells refers to cells which are not interconnected.

**Open Wire** - A transmission facility comprised of pairs of bare (uninsulated) conductors supported on insulators that are mounted on crossarms or poles to form an aerial (above ground) pole line.

**Optical Communication Cable (Fiber Optic)** - Fiber with a protective jacket around it. A cable may have one or more fibers within it.

**Optical Communication Fiber (Fiber Optic)** - A term analogous to a single strand of electrical wire in that it carries information from point to point. See Optical Communication Cable.

**Optical Communications (Fiber Optic)** - Communications using light, instead of an electric current, to carry the information. Also called Lightwave Communications.

**Optical Conductors (Fiber Optic)** - Materials that offer a low optical attenuation to transmission of light energy. Types of optical conductors include: (1) Single Fiber - a discrete optical conductor; (2) Bundle - a number of optical conductors in a random arrangement, grouped together and used as a single transmission medium (channel); (3) Single Channel Single Bundle Cable - a bundle with a protective covering; (4) Multi Channel Single Fiber Cable - more than one single fiber cable jacketed; (5) Single Channel Single Fiber Cable - a discrete optical conductor with a protective covering; (6) Multi Channel Bundle Cable - more than one single bundle cable jacketed; (7) Multi Channel Cables - a combination of cables.

**Optical Fibers (Fiber Optic)** - Filaments comprised of a glass core clad with a glass coating of a different refractive index. These fibers are approximately .005 inches in diameter. Because of the different refractive index of core and cladding, light transmitted through the fiber is continuously reflected off this glass interface and retained within the core for the length of its travel down the tube. Attenuation on lightwave fibers can be as low as on twisted copper pairs or coaxial cable.

**Optical Waveguide Fiber** - A transparent filament of high refractive index core and low refractive index cladding that transmits light.

**Organic** - Designating or composed of matter originating in plant or animal life or composed of chemicals of hydrocarbon origin, either natural or synthetic.

**Organic Fiber** - A fiber derived or composed of matter originating in plant or animal life or composed of chemicals of hydrocarbon origin, either natural or synthetic.

**Orifice** - The opening in the extruder die.

**OSHA** - The Occupational Safety and Health Act was written into the Federal Register in 1971. OSHA does not approve, list or label anything, including cables. OSHA is set of U.S. federal regulations that establish safety requirements. Pertaining to cable, an installation subject to OSHA would be in compliance if two criteria are met: (1) The cable or wire is listed by UL or another recognized testing laboratory; and (2) The cable or wire is installed and used in accordance with the NEC.

**Out of Round** - The condition of a conductor or conductor insulation which when formed does not remain round.

**Output** - The useful power or signal delivered by a circuit or device.

**Outside Plant** - Telephone plant poles, conduits, cables or hardware that is outside of the telephone building.

**Overcoat** - Strands individually tinned, twisted together and retinned.

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

**Oxygen Index** - Percentage of oxygen necessary to support combustion in a gas mixture.

**Ozone** - Extremely reactive form of oxygen, normally occurring around electrical discharges and present in the atmosphere in small but active quantities. In sufficient concentrations it can break down certain rubber insulations.

**Ozone Test** - Exposure of material to a high concentration of ozone to give an accelerated indication of oxidation in normal environments and in proximity to ozone-producing apparatus.

## P

**POS** - Point of sale.

**Pair** - Two wires of a single circuit held together by twisting, binding, or by an overall braid or jacket. The first wire of the pair is designated "tip" and the second "ring" or sometimes "wire" and "mate."

**Pair Color** - Distinctively colored insulation on a twisted pair, for example, white on one conductor and green on the other.

**Pair Twist** - The twist imparted to two insulated conductors to hold them together as a pair.

**Pair Twist Length** - The average distance between successive turns of one wire of a pair around the other.

**Pair Type** - Designation of the different lengths of pair twist used in a cable.

**Paired Cable** - Cable in which the conductors are paired, (i.e., two wires that are twisted about each other). Each wire of the pair has its distinctive color of insulation.

**Pan Cured** - Method of vulcanizing. Coils of unvulcanized insulated wire are coiled in pans and vulcanized under pressure with live steam.

**PAP** - A term for air core (unfilled) direct burial telephone cable with a corrugated aluminum shield.

**Paper** - Insulation used for telephone cable, high voltage cable, magnet wire, and with a lead sheath for underground service conductors. Oil-impregnated paper has improved electrical and moisture resistance properties. Paper is also used as a cable filler.

**Paper Insulated Cable** - Cable in which the conductors are insulated with a paper ribbon either spirally or longitudinally applied.

**Parallel** - A construction in which two or more conductors are laid parallel and surrounded and separated by an insulating material.

## Glossary

# Par – Pla

**Parallel Circuit** - A circuit in which the identical voltage is presented to all components, with current dividing among the components according to the resistances of the impedances of the components.

**Parallel Pair** - A duplex construction in which two insulated conductors are laid parallel and then covered overall with a braid or jacket. It is often referred to as "duplex cable."

**Parallel Stripe** - A stripe applied longitudinally on a wire or cable parallel to the axis of the conductor.

**PASP** - An air core (unfilled) direct burial telephone cable used in areas subject to rodent attack. It consists of an unfilled cable core, corrugated aluminum shield, corrugated steel tape, flooding compound and polyethylene jacket.

**Paste Extrude** - An extrusion method whereby the extrudable material is in a fine powder form mixed with a lubricant and is forced through a die of given size, without heat, as opposed to melt extrude.

**Patch Cable** - A cable with plugs or terminals on each end of the conductor or conductors used to temporarily connect circuits of equipment together.

**Payoff** - The process of feeding a cable or wire from a bobbin, reel, or other packages. Also a device used for paying out wire or cable into a piece of equipment or machinery.

**PCP** - A commonly used term of air core (unfilled) direct burial cable with a corrugated copper shield.

**PE Specifications** - See Rural Electrical Administration.

**Peak** - The maximum instantaneous value of a varying current or voltage.

**Peak Voltage** - The maximum instantaneous voltage.

**Percent Conductivity** - Conductivity of a material expressed as a percentage of that of copper.

**Periodicity** - Uniformly spaced variations in the insulation diameter of a transmission cable that result in reflections of a signal.

**Permittivity** - See Dielectric Constant.

**pH** - An expression of the degree of acidity or alkalinity of a substance. Neutrality is pH7 - acid solutions are below 7 and alkaline solutions above 7.

**Phase** - A particular state or point of advancement in an electrical cycle. The fractional part of the period through which the time has advanced measured from some arbitrary point usually expressed in electrical degrees where 360° represents its one cycle.

**Phase Shift** - A change in the phase relationship between two alternating quantities.

**Photodetector (Receiver)** - Converts light energy to electrical energy. The silicon photodiode is most commonly used for relatively fast speeds and good sensitivity in the 0.75um to 0.95um wavelength region. Avalanche photodiodes (APD) combine the detection of optical signals with internal amplification of photocurrent. Internal gain is realized through avalanche multiplication of carriers in the junction region. The advantage in using an APD is its higher signal-to-noise ratio, especially at high bit rates.

**PIC** - Any type of plastic insulated telephone cable.

**Pick** - Distance between two adjacent crossover points of braid filaments. The measurement in picks per inch indicates the degree of coverage.

**Picks Per Inch** - The number of times the carriers in a braid cross over each other in the same direction along the longitudinal axis for each inch of length.

**Pickup** - Any device that is capable of transforming a measurable quantity of intelligence (such as sound) into relative electrical signals (e.g., a microphone).

**Pico-** - Prefix. One-millionth of one-millionth ( $1 \times 10^{-12}$ ).

**Picofarad** - One-millionth of one-millionth of a farad. A micromicrofarad (abbreviation pF).

**Pigtail** - The splice made by twisting together the bare ends of two conductors laid side by side. Not used in telephone today.

**Pin** - Denotes an electrical terminal, usually in a connector. Normally a smaller termination than a lug.

**Pin diode** - A photodetector used to convert optical signals to electrical signals in a receiver.

**Pinhole** - A very small hole in the extruded resin coating.

**Pitch** - (1) In flat cable, nominal distance between the index edge of any conductor and the index edge of an adjacent conductor, expressed in decimal inches or millimeters. (2) The distance separating one turn in a coil winding from its successor. See Lay.

**Pitch Diameter** - Diameter of a circle passing through the center of the conductors in any layer of a multiconductor cable.

**Plain Conductor** - A conductor made up of one or more plain wires of the same metal.

**Plain Wire** - Consisting of one metal only.

**Planetary Cabling** - A versatile cabling capable of laying down any number of overbraided or jacketed singles, pairs, groups, or any combination of conductors in a pre-arranged sequence.

**Planetary Twister** - A twisting machine whose payoff spools are mounted in rotating cradles that hold the axis of the spool in a fixed direction as the spools are revolved about one another so the wire will not kink as it is twisted.

**Plant** - Physical property of a telephone company that contributes to the furnishing of communication services. See also "Inside Plant" and "Outside Plant."

**Plastic** - High polymeric substances, including both natural and synthetic products, but excluding the rubbers that are capable of flowing under heat and pressure.

**Plastic Deformation** - The change in the dimensions of an object under load that is not recovered when the load is removed.

**Plasticizer** - A chemical agent added in compounding plastics to make them softer and more flexible.

**Plastifying Extrusion** - An extrusion process in which a solid material is fed to the extruder and made plastic (soft) by means of heat within the extruder.

**Plastometer** - An instrument for determining the flow properties of a thermoplastic resin by forcing the molten resin through a die or orifice of specific size at a specified temperature and pressure.

**Plating** - One method of applying a coating one metal over another.

**Plenum** - A compartment or chamber to which one or more air ducts are connected and which forms part of the air distribution system.

**Plenum Area** - The space between the drop ceiling and the floor above, typically continuous throughout the length and width of each commercial building floor.

**Plenum Cables** - Low smoke cables approved for use in a plenum area.

**PLTC** - Designation for power-limited tray cable for use in Class 2 or 3 Power-Limited circuits, instrumentation, supervisory control and thermocouple extension. PLTC are approved for use in circuits up to 300V.

**Pock Mark** - Irregular indentations on the surface of the cable caused by air gas entrapment or moisture in the melt.

**Point-to-Point Wiring** - Continuous conductors terminated at each end to circuit destinations.

**Polar Ingredient** - Any ingredient in a material or complex capable of ionization.

**Polarity** - (1) An electrical condition determining the direction in which current tends to flow. (2) The quality of having two opposite charges.

**Polarization** - The orientation of a flat cable or a rectangular connector. For flat cable, the index edge is used as a reference.

**Polishing (Fiber Optic)** - The act of smoothing ends of fibers to an optically smooth finish, generally using abrasives. Optically smooth surfaces allow maximum transmission of light between fibers at connections and minimize coupling loss.

**Polyamide** - A compound characterized by more than one amide group. See Nylon.

**Polybutadiene** - A type of synthetic rubber often blended with other synthetic rubbers to improve their properties.

**Polychloroprene** - The chemical name for Neoprene®. Used for wire and cable jacketing where the wire or cable will be subject to rough usage, oils, greases, moisture, solvents, and other chemicals. The name itself indicates that it is a polymer of chloroprene, a combination of vinyl acetylene and hydrogen chloride.

**Polyester** - A resin formed by the reaction between a dibasic acid and dihydroxy alcohol.

**Polyethylene (Solid and Cellular)** - A very good insulator in terms of electrical properties. Low and stable dielectric constant over all frequencies, very high insulation resistance. In terms of flexibility, polyethylene can be rated stiff to very hard, depending on molecular weight and density - low density being the most flexible, and with high density, high molecular weight formulation being very hard. Moisture and weather resistance are rated excellent. The dielectric constant is 2.3 for solid insulation and 1.64 for cellular designs.

**Polyhalocarbon** - Polymers that contain halogen atoms. The halogens are fluorine, chlorine, bromine, and iodine and astatine.

**Polyimide** - Available for wire insulation in both film form and as a magnet wire enamel. The resin is produced by reacting pyromellitic dianhydride (PMDA) with an aromatic diamine. The enamel can be used in applications where a wire is required to operate over a wide temperature range as high as 220°C. It is chemically inert and is radiation resistant. One polyimide in film form, in combination with FEP film, is a heat-sealable material that offers possibilities as a space- and weight-saving wire insulation. As a supplementary insulation, particularly with PTFE and FEP insulation, it improves cut-through and abrasion resistance. It possesses very high heat resistance.

**Polymer** - A substance made of any repeating chemical units or molecules. The term polymer is often used in place of plastic, rubber or elastomer.

**Polymerization** - A chemical reaction in which low molecular weight molecules unite with each other to form molecules with higher molecular weights.

**Polymerize** - To change, by union of two or more molecules of the same kind, into another compound having the same elements in the same proportions, but a higher molecular weight and different physical properties.

**Polyolefin** - Any of the polymers and copolymers of the ethylene family of hydrocarbons.

**Polyolefins** - A family of plastics based upon the additional polymerization of ethylene polypropylene, butylene and other vinyls. Polyolefins are also used as high speed laminated flat cable insulations.

**Propylene (Solid and Cellular)** - A plastic made by the polymerization of high-purity propylene gas in the presence of an organometallic catalyst at relatively low pressures and temperatures. It is similar to polyethylene but is lighter and offers even better heat resistance, tensile strength, abrasion resistance and lower dielectric constant. This makes it suitable for thin wall insulation. UL maximum temperature ratings may be 60°C or 80°C. Most UL styles call for 60°C maximum. The dielectric constant is 2.25 for solid and 1.55 for cellular designs.

**Polyrad®** - Brand-Rex trade name for its irradiated polyolefin insulated wires and cables.

**Polystyrene** - A thermoplastic produced by the polymerization of styrenes, vinyl benzene.

## Glossary

# Pol – Qua

**Polytetrafluoroethylene (PTFE)** - The most thermally stable and chemically resistant of all carbonaceous insulation compounds. It is unaffected by sunlight, moisture and practically all chemicals. Temperature range is -90 to +250°C. Electrical properties are very constant over the temperature range and also over a wide range of frequencies.

**Polytrifluorochloroethylene (PTFCE)** - Similar to PTFE in many properties but characterized by somewhat lower heat resistance.

**Polyurethan** - Used primarily as a cable jacket material. It has excellent oxidation, oil and ozone resistance. Some formations also have good flame resistance. It is a hard material with excellent abrasion resistance. It has outstanding "memory" properties, making it an ideal jacket material for retractile cords.

**Polyvinyl Acetate** - A thermoplastic material composed of polymers of vinyl chloride. A colorless solid with outstanding resistance to water, alcohol and concentrated acids and alkalies.

**Polyvinyl Chloride** - A thermoplastic material composed of polymers of vinyl chloride. A tough, non-flammable, water-resistant insulator must be used for wire installation for inside wires and cables. It has higher dielectric losses than polyethylene and polypropylene.

**Polyvinylidene Fluoride (PVDF)** - A PVDF homo- or copolymer. This high temperature resin is well suited for cable jacketing for plenum applications.

**Polyvinylidene Fluoride** - This thermoplastic resin, a fluorocarbon, is characterized by good mechanical, electrical and chemical properties. In primary insulation and in jackets for multi-conductor cables, it has performed successfully at temperatures from -80° to -300°F.

**Portable Power Cable** - Flexible, all-rubber insulated cable for hard usage. Some cables have shielded conductors (metallic or non-metallic) and can have neoprene sheath overall.

**Power Factor** - The ratio of resistance to impedance. The ratio of the actual power of an alternating current to apparent power. Mathematically, the cosine of the angle between the voltage applied and the current resulting.

**Power Loss** - The difference between the total power delivered to a circuit, cable or device and the power delivered by that device to a load.

**Power Ratio** - The ratio of power appearing at the load to the input power. Expressed in dB, it is equal to 10 log base 10 (P1/P2) where P1 is input power and P2 is the power at that load.

**Preheater** - A device used to clean, dry and heat the conductor prior to extruding the insulation material. Its purpose is to prevent rapid freezing of the insulating material.

**Premise Wire** - (1) Wiring that connects separately housed equipment or system components to one another. (2) Inside cable or wiring that connects equipment or system components to the telephone network interface located at the customer's premises.

**Pressurization** - The use of pressurized gas or dry air inside of air core cables to prevent the entry of water at faulty splices or minor sheath cracks. It can also trigger an alarm when major faults occur and can assist in locating the damaged areas.

**Primary Insulation** - The first layer of non-conductive material applied over a conductor, whose prime function is to act as electrical insulation.

**Propagation Constant** - A complex quantity characteristic of a radio frequency transmission line that indicates the effect of the line on the transmitted wave. The real part indicates the attenuation and the imaginary part of the phase shift.

**Propagation Delay** - Time required for a signal to pass from the input to the output of a device.

**Propagation Time** - Time required for a wave to travel between two points on a transmission line.

**Propagation Velocity** - See Velocity of Propagation.

**Pseudo Random NRZ** - A wave form of binary signals that may be used in a computer system. It is called NRZ, non-return to zero, because the voltage does not return to zero.

**Pulling Eye** - A device fastened to a cable to which a hook may be attached in order to pull the cable into or out of a duct.

**Pulse** - A current or voltage that changes abruptly from one value to another and back to the original value in a finite length of time. Used to describe one particular variation in a series of wave motions.

**Pulse Cable** - A type of coaxial cable constructed to transmit repeated high voltage pulses without degradation.

**Put-Up** - Packaging of finished wire or cable.

**PVC** - Sometimes referred to as vinyl or polyvinyl chloride. Extremely high or low temperature properties cannot be found in one formulation. Certain formulations may have a -55°C to +105°C rating. Other common vinyls may have -20°C. There are many formulations for a variety of different applications. The many varieties of PVC also differ in pliability and electrical properties. The price range can vary accordingly. Typical dielectric constant values can vary from 3.5 to 6.5.

## Q

**Quad** - (1) Four wires. (2) A group of four wires composed of two pairs twisted together. The quad twist is of a shorter length than the pair twist.

**Quad Twist or Phantom Twist** - The twist by which the two twisted pairs are combined to form the quad.

**Quad Type** - Designation applied to quads having different lengths of twist to facilitate lay-up in the core and to reduce crosstalk.

**Quad-Rated Wire** - ITT name for 90°C and 105°C wire that replaces four other types of wire: 90°C TW 600V, 90°C MTW 600V, 90°C AWM 1000V, and 105°C AWM 600V.

**Quadders** - Three-bay machines that can twist four wires together. They can be cable braided and shielded wires with varying lay lengths.

**Qualified Products List (QPL)** - A QPL source of supply is a manufacturer that has been registered by the U.S. government and issued a QPL number as a qualified producer of a given commodity. There are, however, other manufacturers who produce identical products, equal or better in quality and performance, but because unregistered, sell the product at a lower price.

**Quench (Thermoplastics)** - A process of shock cooling thermoplastic materials from the molten state.

## R

**R-F** - Radio frequency.

**Raceways** - Metal or plastic channels used for loosely holding electrical and telephone wires in buildings. A raceway is usually located in the floor and is usually encased on three or four sides by concrete.

**Radio Frequency** - The frequencies in the electromagnetic spectrum that are used for radio communications.

**Rated Temperature** - The maximum temperature at which an electric component can operate for extended periods without loss of its basic properties.

**Rated Voltage** - That maximum voltage at which an electrical component can operate for extended periods without undue degradation or safety hazard.

**Ray (Fiber Optic)** - A straight line, representing light, perpendicular to the light wave front and traveling in the same direction. At a boundary surface, or interface such as the surface between a fiber core and cladding, the ray may change direction suddenly but remains a straight line.

**REA** - Rural Electrification Administration of the U.S. Department of Agriculture.

**Reactance (X)** - That part of the impedance of an alternating current circuit due to capacitance or inductance.

**Ready Access Closure** - A special type of cable closure having a Neoprene® or plastic hood that can be removed easily for termination connections. Used only for PIC cable as the closures are neither gas nor moisture tight.

**Receiver** - An electronic package that converts light energy to electrical energy in a fiber optic system.

**Redrawn** - The drawing of wire that has already been drawn to an intermediate size through a series of dies to reach a desired wire size.

**Reducing Joint** - A joint between two lengths of cable where the conductors are not the same size.

**Reduction Gear** - The gear device used to reduce the speed between the drive motor and extruder screw. Supplementary speed reduction means may also be used, such as belts and sheaves.

**Reel** - A revolvable flanged device made of wood, plastic, and/or metal which is used for winding flexible metal wire or cable.

**Reference Edge** - Edge of cable or conductor from which measurements are made. Sometimes indicated by a thread, identification stripe, or printing. Conductors are usually identified by their sequential position from the reference edge, with number one conductor closest to this edge. Also called index edge.

**Reflection** - The change in direction (or return) of waves striking a surface.

**Reflection (Fiber Optic)** - Change in direction of a light wave, or light ray when it strikes a surface.

**Reaction Loss** - The part of a signal that is lost due to reflection of power at a line discontinuity.

**Reflow Soldering** - The process of connecting two solder-coated conductive surfaces by remelting the solder.

**Refraction (Fiber Optic)** - The bending of light waves or rays as they go from one material to another due to the difference in velocities in the materials.

**Refractive Index (Fiber Optic)** - The ratio of the velocity of light in a vacuum to its velocity in a material such as a fiber. Also, the ratio of the sine of the angle of incidence of light on the material to the angle of refraction of the light. Refractive index of any material varies with the wavelength of the light. Also called index of refraction. In a fiber, core refractive index must be greater than that of the cladding.

**Registration** - Alignment of one object with relation to another. Also called register.

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

**Relative Humidity** - The ratio of the quantity of water vapor present in the atmosphere to the quantity that would saturate it at the existing temperature.

**Repeater** - A receiver and transmitter combination used to regenerate an attenuated signal.

**Resin** - Any of a class of solid or semi-solid organic products of natural or synthetic origin, generally of high molecular weight with no definite melting point. Most resins are polymers.

**Resistance** - The property of a wire or conductor that determines the current flow for a given applied voltage measured in ohms.

**Resistance Unbalance** - The difference in resistance between two wires of a pair.

**Resistive Conductor** - A conductor used primarily because it possesses the property of high electric resistance.

**Resistivity** - The ability of a material to resist passage of electrical current either through its bulk or on a surface. The unit of volume resistivity is the Ohm-Cm of surface resistivity, the Ohm.

**Resonance** - An AC circuit condition in which inductive and capacitive reactances interact to cause a minimum or maximum circuit impedance.

## Glossary

# Res – Rub

**Respool** - To rerun material from one package spool to another for various purposes, such as to verify lengths, inspect the defect, etc.

**Retractable Cord** - A cord having specially treated insulation or jacket so that it will retract like a spring. Retractability may be added to all or part of a cord's length.

**RF Cable** - Designed for use for frequencies above approximately 1 megacycle.

**RF Connector** - Connector used for connecting or terminating coaxial cable.

**RFI** - Radio frequency interference.

**RG Cable** - Coaxial cable covered by JAN-C-17 or MIL-C-17.

**RG/U** - Military designation for coaxial cable (RG), general utility (U).

**RHH** - NEC designation for conductors with heat-resistant rubber or XLPE insulation, for use in wet or dry locations, 90°C.

**RHW** - NEC conductor type designation for conductors with heat and moisture resistant rubber or XLPE insulation, for use in wet or dry locations, 75°C.

**RHW-2** - Rubber-insulated building wire, heat and moisture resistant, 90°C dry or wet.

**Ribbon Burner Flame Test** - Cable tray flame test using either a 70,000 BTU/Hr or 210,000 BTU/Hr ribbon burner as the flame source. The test procedure first appeared in IEEE STD 383-1974 for qualifying nuclear generating station cables. This test has since been adopted for cables used in fossil-fueled generating stations and in substations of electric utilities. It has entered the industrial cable market by being written into several UL standards (TC Tray Cable, For CT Use). The Navy (MIL-C-915, MIL-C-24643) and Coast Guard (IEEE-45) have also adopted this test for their cables. ICEA has published a guide (T-29-520) for conducting a 210,000 BTU/Hr flame test on cables in tray.

**Ribbon Cable** - A cable consisting of two or more conductors laid parallel in one plane and held in place by some means. Usually contains molded polyethylene insulation.

**Ridge Marker** - One or more ridges running laterally along the outer surface of plastic wire for purposes of identification. Readily perceptible to sight and touch, they are formed by minute notching of the extrusion die. Usually associated with aerial drop wire.

**Ring** - (1) An audible signal by a bell. (2) An application of current to ring a bell or operate an alerting signal. (3) The side of a two-wire telephone circuit or loop that is connected to the negative side of a battery located at the telephone company's central office. Comparable to the "hot" side of a residential lighting circuit.

**Ring Banding** - A method of color coding insulated conductors by means of a small band of colored ink applied circumferentially at regular intervals along the axis of an insulated conductor.

**Ring Wire** - The second wire of a pair, of which the first wire is the "tip."

**Ring Out** - The process of locating or identifying specific conductive paths by means of passing current through selected conductors.

**Ripcord** - A cord placed usually in inside wires and cables directly under the jacket of a cable or wire in order to facilitate stripping and removal of the jacket.

**RMS** - Root mean square. Applied to alternating voltage and current, it means the effective value: that is, it produces the same heating effect as a direct current or voltage of the same magnitude.

**Rockwell Hardness** - A test for hardness (resistance to indentation) of a material in which a hardened steel ball or diamond point is pressed into the material under test.

**Rod Mill** - A factory in which copper rod is drawn down to a smaller size. This may then be sold to other wire mills for drawing to still smaller sizes.

**Roentgen** - A unit of radiation exposure equal to the quantity of ionizing radiation that will produce one electrostatic unit of electricity in one cubic centimeter of dry air at 0°C and standard atmospheric pressure.

**Rolling Mill** - Plant where copper bars or ingots are rolled into copper rods.

**Romex** - Non-metallic sheath cable.

**Root Mean Square (RMS)** - The effective value of an alternating periodic voltage or current.

**Rope Strand** - A conductor composed of a center group of twisted strands surrounded by one or more layers of similar groups of twisted strands.

**Rope Unilay** - A group of stranded conductors assembled in a unilay manner with left-hand lay.

**Rope-Lay Conductor or Cable** - A cable composed of a central core surrounded by one or more layers of helically laid groups of wires. (Note: This kind of cable differs from a concentric lay conductor in that the main strands are themselves stranded. In the most common type of rope-lay conductor or cable, all wires are of the same size and the central core is a concentric lay conductor.)

**Round Wire** - A wire circular in cross section as opposed to flat, square, etc.

**Round Wire Shields** - Shields constructed from bare, tinned, or silver-plated copper wire. Three types of round wire shields include braided, spiral and reverse spiral.

**Routing** - The path followed by a cable or conductor.

**RS-232C** - A technical specification published by the Electronic Industries Association that established mechanical and electrical interface requirements between terminals, computers, modems, and communication lines.

**RS-422** - A high speed electrical interface defined by the CCITT (Consultative Committee of International Telegraph and Telephone) as supporting data rates of up to 768 Kbit/s over up to 300 feet of cable.

**Rubber (Wire Insulation)** - A general term used to describe wire insulations made of thermosetting elastomers, such as natural or synthetic rubbers, EPR, Neoprene®, Hypalon®, butyl rubber, and others.

**Rupture** - In breaking strength or tensile strength tests, the point at which a material physically comes apart as opposed to yield strength, elongation, etc.

**Rural Electrical Administration (REA)** - In 1948, the telephone amendment to the Rural Electrification Act was passed under the Rural Electrical Administration (REA) to ensure universal telephone service and area coverage at reasonable and affordable rates served by rural telephone companies and cooperatives. They developed Plant Engineering (PE) specifications for various outside and inside telecommunication cables. Those current include: PE-22 Aerial Underground Telephone Cable - Air Core Solid Conductor, PE-39 Filled Telephone Cables - Solid Conductor Insulation, PE-89 Filled Telephone Cables - Expanded or Cellular Insulation.

## S

**Safety Factor** - The ratio of the voltage at which it is tested to that at which it is used or designed for.

**Sag** - (1) Conductor: The vertical distance between a suspended conductor and an imaginary straight line connecting the points of suspension. Sag may be measured at the midpoint between the suspensions, the lowest point of the conductor or at any specified point. (2) The downward curvature of a wire or cable due to its weight.

**Scattering (Fiber Optic)** - Change in direction of a light ray due to heterogeneity (imperfections) in material. When ray hits an imperfection, it is reradiated in a direction different from that of the original ray.

**Screen** - (1) A semi-conductor or high resistance material used to reduce stress concentrations at the surface of stranded conductors or edges of outer shielding tapes. May be extruded plastic, rubber-filled tapes, carbon black paper, or thin aluminum foil laminated to paper (metallized paper). In the U.S., a screen at the conductor is frequently called a strand shield although a shielded cable frequently has no strand shield. (2) A cable core design where an aluminum shield divides the cable core into two separate compartments. See T Screen Cables. (3) In cable manufacturing, a woven metal screen or equivalent device that is installed across the flow of the molten plastic (stock) between the tip of the screen and the die and supported by a breaker plate to strain out contaminants or to increase the back pressure or both.

**Screened Cables** - See T Screen Cables.

**Screw Extruder** - A machine that conveys solid material under pressure through an orifice via a surrounding barrel by means of one or more rotating screws and pumps.

**Screw Flight** - The helical metal thread of the screw.

**Screw Root or Stem** - The continuous central shaft of a screw, usually of cylindrical or conical shape.

**Screw Speed** - Number of revolutions of screw per minute.

**SEALPIC®** - ESSEX GROUP, INC. trademark for an outside plant cable having a coated 8 mil thick aluminum (AL) shield polyolefin jacket and plastic insulated conductors (PIC). Designed for aerial and duct use. Can also be used for direct buried applications having a filled cable core where rodent or mechanical protection is not required.

**Secondary Insulation** - A non-conductive material whose prime functions are to protect the conductor against abrasion, and provide a second electrical barrier placed over the primary insulation or the shield.

**Selenium** - A finely ground form of an elementary metal; used as a vulcanizing agent in rubber compounds.

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

**Self-Supporting Aerial Cable** - A cable consisting of one or more insulated conductors factory-assembled to a messenger that supports the assemblage and does not form a part of the electric circuit. See Figure 8 Cable.

**Semi-Conductor** - A non-conductive material made slightly conductive by the addition of a specified sum of conductive material.

**Semi-Rigid** - A cable containing a flexible inner core and a relatively inflexible sheathing material, such as a metallic tube, but can be bent for coiling or spooling and placing in a duct or cable run.

**Separator** - A layer of insulating material such as textile, paper, etc. that is placed between a conductor and its dielectric, between a cable jacket and the components it covers, or between various components of a multiconductor cable. Used to improve stripping qualities and/or flexibility, or can offer additional mechanical or electrical protection to the components it separates.

**Sequential Marks** - The manufacturer's identification, cable size, gauge and year of manufacture that are surface marked on the outer cable jacket at 2 ft intervals.

**Series Circuit** - Components of a circuit arranged end to end to form a single path for a current.

**Series Resistance** - Any sum of resistances installed in sequential order within one current.

**Serve** - A type of separator applied directly over the conductor or conductors. The serve may consist of one or more materials such as paper, cotton, silk, nylon, or rayon. These materials may be applied spirally or laterally.

**Service Pairs** - These pairs are located in the extra unit(s) in BOC screened cables, and located in the interstices of non-Bell cables. They are included in the pair count, and are used for T-carrier service, (e.g., order wire, pressure monitor, etc).

**Sheath** - The material, usually an extruded plastic or elastomer, applied outermost to a wire or cable. Very often referred to as a jacket, but usually consists of a shield and jacket for outside plant telephone cables.

## Glossary

# Shi – Sol

**Shield** - A metallic layer applied over the insulated conductor (dielectric) or group of insulated conductors cable core to prevent electrostatic or electromagnetic interference between the enclosed wires and external fields. Shields can be composed of braided or served wires, foil wrap, foil-backed tape, metallic tube or tape (flat or corrugated), or conductive vinyl rubber. Sometimes called "tape" in telephone cables. Shields are usually die-constructed from copper and aluminum (either alone or laminated with a dielectric) bimetallic tape (copper/stainless steel/copper), and bronze.

**Shield Coverage Percent** - Percentage of the surface area of cable core insulation covered by the shield. Also called Shield Percentage.

**Shield Effectiveness** - The relative ability of a shield to screen out undesirable signals.

**Shield Percentage** - See Shield Coverage Percent.

**Shielded Cables** - A cable in which the insulated conductor or conductors are enclosed within an envelope of conducting material. The shield of conducting metal or other material is applied so every point on the surface of the insulation is at ground potential.

**Shielded Conductor** - An insulated conductor shielded by a copper braid or tape, aluminum foil, copper foil, or semi-conductive vinyl, to confine or reject extraneous electrical fields.

**Shielded Pair** - A twisted pair to which a metal covering has been applied, usually in the form of a bare or tinned copper braid but may be metal ribbon or metal-backed Mylar® tape.

**Shiner** - A hole or bare spot on the insulated conductor through which the copper can be seen.

**Shock** - A sudden stimulation of the nerve and convulsive contraction of the muscles caused by a discharge of electricity through the body. The severity depends upon (a) the amount of current, (b) whether the path of the current is through the path of a vital organ, and (c) the duration of the current.

**Shore Hardness** - A measure of the surface hardness of an insulating or jacket material.

**Short** - A short circuit.

**Short Circuit** - An accidental or intentional near-zero resistance connection between two sides of a circuit that disrupts transmission and may cause an excessive current flow.

**Short Pair Twist** - Toll quads in which the pair twist length is approximately 4 to 7 inches. In the quad, the phantom twist length is 6 to 10 inches, depending on the gauge.

**Shrinkable Tubing** - Tubing used to provide protection against mechanical damage for wires, cables, wire harnesses, splices, terminations, etc., that shrinks to a predetermined size upon application of heat or solvent evaporation.

**Shunt** - A device used to divert part of an electric current.

**Shunt Wire** - A conductor joining two parts of an electric circuit to divert part of the current.

**Signal** - An electric current used to convey information either digital, analog, audio or video.

**Signal Cable** - A cable designed to carry current of less than one ampere per conductor.

**Signal Conductor** - An individual conductor used to transmit an impressed signal.

**Silica** - Silica fibers produced from melted quartz offer properties similar to fiberglass but higher heat resistance, above 2000°F.

**Silicone** - A thermosetting elastomer insulation with excellent heat resistance; polymeric materials in which the recurring chemical group contains silicon and oxygen atoms as links in the main chain. A thermosetting plastic material used for wire and cable covering that is thermally stable and has electrical properties exceeding those of most organic polymers.

**Silver** - Similar to gold corrosion resistance, used as a plating or coating. It costs less than other precious metals, is very soft when fully annealed, but hardens work during fabrication. It provides very good conductivity and solderability.

**Single Mode Fiber (Fiber Optic)** - A fiber wave guide in which only one mode will propagate. The fiber has a very small core diameter of approximately 8 micrometers. It permits signal transmission at extremely high bandwidths and is generally used with laser diodes.

**Single-ended** - Unbalanced, such as grounding one side of a circuit or transmission line.

**Sinter** - To thermally cure or treat a material.

**Sinusoidal** - Varying in proportion to the sine of an angle or time function. Ordinary alternating current is sinusoidal.

**Sizing** - Applying a material to a surface to fill pores. Also, the surface treatment applied to glass fibers.

**Skew Rays** - A ray that does not intersect the fiber axis. Generally, a light ray that enters the fiber core at a very high angle.

**Skin Effect** - The phenomenon wherein the depth of penetration of electric currents into a conductor decreases as the frequency of the current increases.

**Sleeve** - A braided, knitted, or woven tube used over wires or components as insulation tubing. Also called Sleeving.

**Snips** - Scissors for cutting wire.

**SNM** - A cable designed for use in hazardous locations consisting of insulated conductors in an extruded non-metallic jacket which is then covered with an overlapping spiral metal tape and wire shield and jacketed with an extruded moisture-, flame-, oil-, corrosion-, fungus- and sunlight-resistant non-metallic material.

**Soft Wire** - Wire that has been drawn or rolled to final size and then heated to remove the effects of cold working.

**Soft-Drawn Copper Wire** - Copper wire annealed just before the final wire drawing process.

**Solef®** - Soltex's trademark for a reacted fluorocopolymer intended for extrusion of telecommunications wire and cable jacketing, particularly suited to plenum applications. Solef is a registered trademark of Solvay et Cie, s.a. (Brussels, Belgium). Solef is distributed by the Soltex Polymer Corporation in the U.S.

**Solid Color Pairs** - Pulp-insulated pairs in which the ring side is colored throughout its length by dye mixed in the pulp before application to the conductor.

**Solid Conductor** - An electrical conductor consisting of a single wire.

**Solid Insulation** - Refers to conductor insulations not having expanded plastic compounds. Solid insulations differ from that of cellular insulations by having no dispersion of small gaseous cells being uniformly distributed throughout the solid resin matrix during the extrusion or insulating process.

**Solid Wire** - Wire consisting of a single conductor, not of multiple strands.

**Spacing** - The distance between the closest edges of two adjacent conductors.

**Span** - (1) Pertaining to flat conductors, distance from reference edge of the first conductor to the reference edge of the last conductor. (2) Pertaining to round conductors, distance between centers of the first and last conductors.

**Spark Test** - A continuous test designed to locate pinholes in an insulated wire by application of an electrical potential across the material for a very short period of time while the insulated wire is drawn through an electrode field. One end of the wire is grounded, and if a pinhole exists in the insulation a spark occurs, permanently marking the faulty area. Usually the wire is cut at this spot.

**Sparker** - A device utilizing AC or DC voltage potential used to detect voids, shiners, or weak spots in the walls of jacketed cables or insulated conductors.

**Sparking** - Continuous high voltage testing of insulated wire.

**Specific Gravity** - The ratio of the weight of any volume of substance to a weight of an equal volume of some substance taken as a standard, usually water for liquids and hydrogen for gases.

**Specific Inductive Capacity (SIC)** - See Dielectric Constant.

**Spectral Bandwidth** - The difference between wavelengths at which the radiant intensity of illumination is half its peak intensity.

**Spectrum** - Frequencies that exist in a continuous range and have a common characteristic. A spectrum may include many spectrums (e.g., the electromagnetic radiation spectrum includes the light spectrum, radio spectrum, infrared spectrum, etc.).

**Speed of Light (c)** -  $2,998 \times 10^8$  meters per second; 186,000 miles per second.

**Spiral Four Quad Wire** - A group of four conductors spiralled together. It is not a true quad, and both side-to-side and side-to-phantom crosstalk are high. Conductors diametrically opposite are used to form a pair.

**Spiral Shield** - A metallic shield of fine stranded wires applied spirally rather than braided.

**Spiral Stripe** - A color coding stripe applied helically to the surface of an insulated wire or cable.

**Spiral Wrap** - A term given to describe the helical wrap of a tape or thread over a core.

**Splice** - A connection of two or more conductors or cables, usually twisted together at the ends.

**Spool** - A circular container on which wire is wound for storage or transit; usually refers to sizes smaller than 18" diameter.

**Square Mil** - The area of a square one mil by one mil.

**Stability Factor** - The difference between the percentage power factor at 80 volts/mil and at 40 volts/mil measured on wire immersed in water at 75°C for a specified time.

**Stabilizer** - An ingredient added to some plastics to maintain physical and chemical properties throughout processing and service life.

**Staggered Twist** - Cables in which adjacent pairs in a layer have different lengths of twist to reduce crosstalk.

**Standing Wave** - The stationary pattern of waves produced by two waves of the same frequency traveling in opposite directions on the same transmission line. The existence of voltage and current maxima and minima along a transmission line is a result of reflected energy from an impedance mismatch.

**Standing Wave Ratio (swr)** - A ratio of the maximum amplitude to the minimum amplitude of a standing wave stated in current or voltage amplitudes.

**Static Charge** - An electrical charge that is bound to an object. An unmoving electrical charge.

**Station** - (1) A term used to denote the customer's main telephone. (2) Broadly used term referring to the end of a circuit.

**Station Wire (SW)** - Station wire is designed for inside-outside use in station installations from the station protector to the telephone terminal block. The jacket is made of a tough weather- and flame-resistant polyvinyl chloride (PVC) that provides protection when exposed to outside weather conditions and inside cleaning aids such as detergents, waxes, moisture, oil, and most solvents. The wire is installed with an appropriate stapling gun. Generally, 22AWG copper color-coded polyethylene insulated wire conductors with a single overall polyvinyl chloride (PVC) jacket in beige or gray. Available with 2, 3, or 4 conductors. UL listed as CMX.

**Station Wire Plenum (SWP)** - Station wire plenum is designed for use in air ducts and plenums without metal conduit in PBX, PABX, key system and telephone instrument communication systems. Installations require less station wiring (shorter direct runs), which reduces station installation costs (wire placement vs. wire plus conduit installation). Generally, 22AWG copper conductors having color-coded fluoropolymer resin insulation and non-colored fluoropolymer resin jacket. Available with 2, 3, or 4 conductors. UL listed as CMP.

## Glossary

# Sta – T

**Station Wire Twisted (SWT)** - Station wire twisted is designed for inside-outside runs from station protectors or building terminals to telephone terminal blocks. The jacket is made of a tough weather- and flame-resistant polyvinyl chloride (PVC) that provides protection when exposed to outside weather conditions and inside cleaning aids such as detergents, waxes, moisture, oil, and most solvents. Generally, 22AWG copper color-coded polyethylene paired insulated wire with a single overall polyvinyl chloride jacket in beige or gray. Available with 2, 3 or 4 pair sizes. UL listed as CMX.

**Stay Cord** - A component of a cable, usually a high tensile textile, used to anchor cable ends at their points of termination and to keep any pull on the cable from being transferred to the electrical connections.

**Step Index Fiber (Fiber Optic)** - A multimode fiber consisting of a core of uniform refractive index, surrounded by cladding of slightly lower refractive index. Accepts light rays over wider angle, but has smaller bandwidth than single mode fiber. See also Single Mode Fiber.

**Stiffness** - The property of a conductor that causes it to resist permanent deformation by bending.

**Stock** - Plastic material which is being processed in an extruder.

**Stock Temperature** - The temperature of molten plastic material.

**Strain Gauge** - A device for determining the amount of strain (change in dimensions) when a stress is applied.

**Strain Hardening** - An increase in hardness and strength caused by plastic deformation at temperatures lower than the recrystallization range.

**Strand** - A wire, or groups of wires, of a stranded conductor.

**Strand Lay** - The distance of advance of one strand of a spirally stranded conductor, in one turn, measured axially.

**Strand Shield** - A layer of semiconducting material or tape applied directly over the stranded conductor of cables rated 2000 volts or higher. This reduces the possibility of high stress points occurring between the conductor and insulation.

**Stranded Conductor** - A conductor composed of a group of wires, or of any combination of groups of wires. The wires in a stranded conductor are usually twisted or braided together.

**Stranding** - The process of forming the twinned conductors into a small cable or units for a large cable by means of floor-mounted supply stands with a rotating take-up reel. The cable is formed by a closing die followed by a smaller binder die and secured by nylon binder.

**Strip Force** - The force required to remove a small section of insulating material from the conductor it covers. Usually measured in pounds.

**Submarine Cable** - Cable used under water from one point to another for power or communication. Usually contains lead sheath and/or rubber jacket.

**Subscriber's Loop** - The pair of wires or telephone wire from a subscriber's telephone and the central office that receives it.

**Subscriber's Loop Resistance** - The total effective resistance of the loop from the central office to and including the subscriber's instrument. Usually assumed to be the resistance of the outside plant at 68°F, plus 200 ohms for the subscriber's telephone plus 100 ohms for inside wire, heat coils, temperature variation, etc.

**Superconductors** - Certain metals, alloys, and ceramics in which the resistance drops to almost zero at temperatures near absolute zero (-273°C), and in some cases at temperatures hundreds of degrees above absolute zero.

**Surface Leakage** - The passage of current over the boundary surfaces of an insulator as distinguished from passage through its volume.

**Surface Resistivity** - The ratio of the potential gradient parallel to the current along a material's surface to the current per unit width of the surface, usually expressed in ohms. Surface resistivity of a material is numerically equal to the surface resistance between two electrodes forming opposite sides of a square, the square size being immaterial.

**Surge** - A temporary but large increase in the current and/or potential at any point in the circuit.

**Surging** - A pronounced fluctuation in output over a short period of time without deliberate change in operating conditions.

**Sweep-Test** - A test in which the frequency response is verified by generating an RF voltage whose frequency is swept repeatedly through a given frequency range at a rapid constant rate. The cable response is observed on an oscilloscope. The structural return loss sweep-test measures the magnitude of internal cable reflections. A high structural return loss is desirable.

**Switchboard Cable** - A cable used within and between the central office main frames and the switchboard, usually containing tinned conductors to facilitate soldering of 24AWG wires. See Tinned Wire.

**Switchboard Wire** - Chemically cross-linked polyethylene or asbestos-insulated wire that is resistant to heat, flame and corrosive vapor.

**Synchro-Cure** - An improved, perfected method of vulcanizing rubber-insulated cable which makes it possible to balance the cure of the rubber-insulated conductors with the cure of the Neoprene® or rubber outer sheath. By eliminating the possibility of overcure or undercure, maximum physical properties and electrical characteristics are maintained.

## T

**T Screen Cables** - Cable design in which a 4 mil polyolefin-coated flat aluminum shield divides the cable core into two compartments. The integral screen/shield is formed in such a manner that it shields the entire cable core as it screens and isolates each separate compartment. The cable design satisfied the original requirements of two cables under one sheath for pulse code modulation (PCM) carrier applications. Cables are generally manufactured for 24 channel, 0.772 KHz transmission (T1) and for 48 channel 1.576 KHz transmission (T1C). See T1 and T1C cables.

**T1 Cables** - Cables designed for two-way T1 pulse code modulation (PCM) carrier operation under one cable sheath. The T1 cable design provides superior near and crosstalk loss at 772 KHz compared to the same count cable without the high frequency shield. This permits T1 cables to be used with 100% T1 PCM utilization and maximum repeater spacing. T1 cables are offered in all-filled and air core cable designs.

**T1C Cables** - Cables are designed for two-way T1C pulse code modulation (PCM) carrier operation under one cable sheath. The T1C cable design provides superior near end crosstalk loss at .576 KHz compared to the same count cable without the high frequency shield. This permits T1C cables to be used with 100% T1C PCM utilization and maximum repeater spacing. T1C cables are offered in all filled and air core cable designs.

**Take-Up** - (1) The process of accumulating wire or cable onto a reel, bobbin, or some other type of pack. (2) also refers to the device utilized for pulling wire or cable through a piece of equipment or machine.

**Talk Pairs** - See Tracer Pairs.

**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 a voltage potential applied between the conductor and the liquid as ground.

**Tape** - A relatively narrow, woven or cut strip of fabric, paper, film, or metal material. In telephone cable, manufacturing it refers to the shield.

**Taped** - Layer of tapes wrapped around a cable or conductor so as to form a cushion, insulation, or a seal against material subsequently wrapped.

**Tape Cable** - A form of multiple conductor consisting of parallel metal strips imbedded in insulating material. Also called Flat Flexible Cable.

**Tape Shields** - Shields constructed from copper and aluminum (either alone or laminated with a dielectric), bimetallic tape (copper/stainless steel/copper), steel, and bronze. Tape shields are supplied in two forms, flat and corrugated. See Shield.

**Tape Wrap** - A term denoting a spirally or longitudinally applied tape material wrapped around the wire, either insulated or uninsulated, used as an insulation or mechanical barrier.

**Tarnish** - A term used to describe a discolored or stained conductor or shield wire caused by exposure to the atmosphere.

**Tear Strength** - Force required to initiate or continue a tear in a material under specified conditions.

**Tear Test** - A test to determine tear strength of insulating material.

**Teflon®** - DuPont's trademark for tetrafluorethylene, a tough heat-and chemical-resistant thermoplastic used as conductor and jacket insulations for plenum cables. Chemical designation is FEP.

**Tefzel®** - DuPont's trademark for a modified copolymer of ethylene and tetrafluorethylene. Designed to serve as jacket and conductor insulation for plenum area cables. Chemical designation is ETFE.

**Telemeter** - To measure, transmit, and receive data (temperature, voltage, current, etc.) automatically from a remote source.

**Telephone Cable** - A multiconductor cable normally made up of twisted pairs for audio use.

**Telephone Drop Wire** - Wire used to transmit telephone service into a customer's premises. It may be aerial or buried.

**Telephone Wire** - General term referring to many different types of communication wire; refers to a class of wires and cables, rather than a specific type.

**Temperature Coefficient of Resistivity** - The amount of resistance change of a material per degree of temperature rise.

**Temperature Rating** - The maximum temperature at which the insulating material may be used in continuous operation without loss of its basic properties.

**Temperature Stress** - The maximum stress that can be applied to a material at a given temperature without tearing or rupturing.

**Tensile Strength** - A term denoting the greatest longitudinal tensile stress a substance can bear without tearing or rupturing.

**Tensile Stress** - Force per unit cross-sectional area applied to elongate a material without tearing apart or rupturing.

**Tension** - (1) Electric potential or potential difference. (2) Mechanical stress caused by forces which tend to stretch the material.

**Tension Set** - Refers to permanent deformation, caused by stress, that a plastic material exhibits after the stress is removed.

**Terminal Block** - An insulating mounting equipped with binding post or quick-clip terminals which are usually factory connected to a stub cable or to wire leads.

**Terminals** - Screws, soldering lugs, or wire wrap pins to which an external circuit can be connected.

**Terminated** - (1) The condition of a wire or cable pair connected to (terminated on) binding posts or a terminal block. (2) The condition of a circuit connected to a network that has the same impedance the circuit would have if it were infinitely long.

**Terminating Cable** - A multipaired cable usually with twinned conductors and always with fire-resistant insulation that is used primarily between the cable vault and the main distributing frame.

**Termination** - The connection of a line to a terminal, distributing frame, switch, or matrix.

**Thermal Aging** - Exposure to a given thermal condition or a programmed series of conditions for prescribed periods of time.

**Thermal Alloying** - The act of uniting two different metals to make one common metal by the use of heat.

**Thermal Conductivity** - Ability of a material to conduct heat.

**Thermal Expansion** - The expansion of a material when subjected to heat.

## Glossary

# The – Tra

**Thermal Rating** - The maximum and/or minimum temperature at which a material will perform its function without undue degradation.

**Thermal Resistance** - The change in the electrical resistance of a material when subjected to heat. Resistance to heat flow from conductors to outer surface of insulation or sheath in a wire or cable.

**Thermal Resistivity** - Thermal resistance of a unit cube of material.

**Thermal Shock** - A test to determine the ability of a material to withstand heat and cold by subjecting it to rapid and wide changes in temperature.

**Thermal Stress Cracking** - Cracking and cracking of some thermoplastic resins that results from overexposure to elevated temperatures.

**Thermocouple** - A device for measuring temperature where two electrical conductors of dissimilar metals are joined at the point of heat application and a resulting voltage difference, directly proportional to the temperature, is developed across the free ends and is measured potentiometrically.

**Thermocouple Lead Wire** - Similar to thermocouple wire except the degree of accuracy in temperature measurements is not as high. Used to transmit thermocouple information to remote indicators.

**Thermocouple Wire** - A two-conductor cable, each conductor employing a dissimilar metal, made up specifically for temperature measurements.

**Thermoplastic** - Plastic insulation that will soften and distort from its formed shape by heating above a critical temperature peculiar to the material.

**Thermosetting** - Plastic insulation that will not resoften or distort from its formed shape by heating until a destructive temperature is reached.

**Three-Quarter-Hard-Wire** - As applied to aluminum, wire that has been processed to produce a strength approximately midway between that of half-hard wire and that of hard-drawn wire.

**Tie** - An electrical connection or strap.

**Tinned Conductor** - A bare copper wire with a thin coating of tin, which acts as a separator between the copper and insulation, and facilitates soldering the wire to a terminating connection.

**Tinned Wire** - Copper wire, used for strapping or in switchboard cables, that has been coated or plated with a layer of metallic tin or solder to simplify soldering to terminals.

**Tinsel Wire** - A very flexible conductor made by serving one or more very small flat conductors over a fibrous core such as a high tenacity rayon, Nylon, Fortisan or cotton fibers.

**Tip** - (1) The first wire in a pair of wires. (2) That side of a two-wire telephone circuit connected to the positive side of a battery at the telephone company's central office. Comparable to the neutral side of a residential lighting circuit.

**Tip Wire** - The first wire of a pair, the second of which is called the "ring."

**Tolerance** - A specified allowance in weighing, measuring, etc., for deviations from the standard dimensions or weight.

**Toll Cable** - Cable in which there is low capacitance quads or pairs for long distance voice frequency transmission.

**Top Coat** - Bare copper strands twisted and then tinned overall.

**Torpedo** - A streamlined metal block placed in the path of flow of the plastic material in the heating cylinder of the extruder to speed it into thin layers, thus forcing it into intimate contact with the heating areas.

**Torque Test** - A test designed to ascertain the stiffness of a material under given environmental conditions.

**Total L/D Ratio** - The distance from the rear edge of the feed opening to the forward end of the barrel bore divided by the bore diameter and expressed as a ratio wherein the diameter is reduced to 1, such as 15:1 or 20:1.

**Tracer Pairs** - In stripe paper and solid color pulp cables, a distinctively colored pair to provide easy identification at the two ends of the reel. Also called Talk Pairs.

**Tracer Stripe** - When more than one color-coding stripe is required, the first, or widest, stripe is the base stripe, the other, usually narrower stripes, are called tracer stripes.

**Tractor Capstan** - The motivating power for large cables consisting of a nip between two moving endless bolts which grip the cable.

**Transducer** - A device for converting mechanical energy to electrical energy.

**Transfer Impedance** - For a specified cable length, transfer impedance relates a current on one surface of a shield to the voltage drop generated by this current on the opposite surface of the shield. Transfer impedance is used to determine shield effectiveness against both ingress and egress of interfering signals. Cable shields are normally designed to reduce the transfer of interference, hence shields with lower transfer impedance are more effective than shields with higher transfer impedance.

**Transformer** - (1) An electrical device that changes voltage in direct proportion to currents and inverse proportion to the ratio of the number of turns of its primary and secondary windings. (2) An electrical device that reduces the voltage in electrical wiring to a low voltage in order to operate a dial light. It plugs into an electrical outlet and has externally located low voltage connections that are extended by inside wiring to the telephone set dial light.

**Transmission Cables** - Two or more transmission lines. If the structure is flat, it is sometimes called flat transmission cable to differentiate it from a round structure such as a jacketed group of coaxial cables. See Transmission Line.

**Transmission Line** - An arrangement of two or more conductors or a wave guide used to transfer signal energy from one location to another.

**Transmission Loss** - The decrease or loss in power during transmission of energy from one point to another. Usually expressed in dB.

**Transmitter** - The electronic package that converts electrical energy to light energy in a fiber optic system.

**Tray** - A cable tray system is a unit or assembly of units or sections and associated fittings made of metal or other noncombustible materials that forms a rigid structural system used to support cables. Cable tray systems (previously termed continuous rigid cable supports) include ladders, troughs, channels, solid bottom trays, and similar structures.

**Tray Cable** - A factory-assembled multiconductor control, signal and power cable specifically approved under the National Electrical Code for installation in trays.

**Treeing** - A term used to describe a deterioration phenomenon in solid dielectric insulations that form branch-like channels in the insulation wall. These channels or trees reduce the dielectric strength and impulse strength of the insulation, ultimately progressing to the point of electrical failure. All trees form at imperfections in cables, such as voids, contaminants, and protrusions from semiconducting conductor and insulation shield layers.

There are two basic types of trees: (1) electrical trees, which grow under high electrical stress in relatively short times, have measurable corona discharge and do not need the presence of water; and (2) electrochemical trees, commonly called water trees, which require a long period of time at relatively low stress to develop, no corona discharge can be measured, and the presence of water and imperfections in the cable are necessary.

Treeing has been a significant problem in the electric utility industry, which has thousands of miles of buried cables using a concentric neutral, non-jacketed cable design. This problem has not been significant in the industrial market where only a small portion of cables are used below grade and jacketed type cable designs are used rather than conventional concentric neutral cables. There are several ways to reduce the problems of treeing: (1) Reduce the level of imperfections in cable (voids, contaminants, protrusions), (2) Utilize water barriers on cables that will be used where water is present (lead sheath, overall jacket), and (3) Use insulations that are inherently more tree-retardant than others (EPR or TR-XLP rather than XLP).

**Triad** - A group of three insulated conductors twisted together with or without a sheath overall. Usually color coded for identification; also called a triplex.

**Triax** - A type of shielded conductor that employs a shield and jacket over the primary insulation plus a second shield and jacket overall. Aside from applications requiring maximum attenuation of radiated signals or minimum pickup of external interference, this cable can also be used to carry two separate signals.

**Triaxial** - Cable with three concentrically arranged conductors.

**Triaxial Cable** - A cable construction having three coincident axes, such as conductor, first shield and second shield, all insulated from one another.

**Triboelectric Noise** - Noise generated in a shielded cable due to variations in capacitance between the shield and conductor as the cable is flexed.

**Triplex Cable** - A cable having three insulated conductors twisted together without a sheath overall.

**Trolley Wire** - A round or shaped, solid, bare, hard conductor ordinarily used to supply current to motors through travelling current collectors located on the trolley.

**True Concentric** - A true concentric stranding or twisted cable is formed when each successive layer has a reversed direction of lay from the preceding layer.

**Trunk Cable** - See Feeder Cable.

**Tubed** - Term to describe a cable with a tube of material over the cable core, which is easily separable from the underlying construction.

**Tubing** - A tube of extruded non-supported plastic material.

**Turbine** - Converts stored energy in an energy source to generate electricity.

**Turn-Key** - A contractual arrangement in which one party designs and installs a system and another party will operate the system.

**Twin Cable** - A cable having two insulated conductors, laid parallel and with an overall protective sheath or jacket.

**Twin Coaxial** - A configuration containing two separate, complete coaxial cables laid parallel or twisted around each other.

**Twin Conductor Cable** - Varies with specification, but sometimes constructed as two conductors included in a circular core of dielectric material and covered overall with a shield and jacket.

**Twin Line or Lead** - A type of transmission line with solid insulating material, in which the two conductors are placed in parallel to each other and whose impedance is determined by the diameter and spacing of the conductors and the insulating material.

**Twin-Lead** - A transmission line with two parallel conductors separated by insulating material. Line impedance is determined by the diameter and spacing of the conductors and the insulating material, and is usually 300 ohms for television receiving antennas.

**Twisted Pair** - A cable composed of two small insulated conductors, twisted together without a common covering. The two conductors are usually substantially insulated and often color coded.

## U

**UL (Underwriters Laboratories)** - An independent, nonprofit testing laboratory that establishes test procedures and provides a listing service for a wide variety of products including electrical wire and cable, which are recognized for use in accordance with the National Electrical Code (NEC).

**UL Approved** - Designates a product or device that has been inspected, tested and approved by Underwriters Laboratories. Cable will carry the UL trademark or an "E" listing number printed on the jacket to indicate UL approval.

**Ultimate Strength** - Term used to describe the maximum unit stress a material will withstand when subjected to an applied load in a compression, tension or shear test.

**Ultraviolet Degradation** - Caused by longtime exposure of a material to sunlight or other ultraviolet rays.

## Glossary

# Unb – Wei

**Unbalanced Line** - A transmission line in which voltages on the two conductors are unequal with respect to ground or another pair of conductors.

**Underground Cable** - Cable installed below ground in conduits or ducts, usually terminating at certain intervals in manholes which allows easy placing, replacing or removal of the cables.

**Underwriters Laboratories, Inc.** - See UL.

**Unidirectional Concentric Stranding** - Each successive layer has a different lay length, thereby retaining a circular form without migration of strands from one layer to another.

**Unidirectional Stranding** - All layers in a stranded conductor have the same direction lay.

**Unilay** - A conductor with more than one layer of helically laid wires with the direction of lay and length of lay the same for all layers.

**Unilay Stranding** - A bunched construction having 19, 27, 37 or any number of strands in a concentric stranding.

**Units** - The grouping of twinned conductors used in forming a cable, usually 25 pairs. The units may be divided into such units of 12 and 13 pairs or 8 and 9 pairs.

## V

**Velocity of Propagation** - The transmission speed of electrical energy in a length of cable compared to the speed of light. Usually expressed as a percentage.

**Vertical Tray Flame Test** - UL and IEEE test criteria for resistance to flame propagation of conductors or cables; employs a 70,000 BTU/hr flame source applied to the test specimen installed in a vertical cable.

**VHF** - Very high frequency. Designated by the Federal Communications Commission as the spectrum extending from 30 to 300 Mhz.

**Video** - Pertains to picture information in a television system.

**Video Pair Cable** - A transmission cable containing low-loss pairs with an impedance of 125 ohms. Used for TV pick-ups, closed circuit TV, telephone carrier circuits, etc.

**Viscosity** - A measure of the resistance of a fluid to flow.

**VLF** - Very low frequency. Designated by the Federal Communications Commission as the spectrum extending from 10 to 30 KHz.

**VN-TC®** - Brand-Rex trade name for its 90°C, 600-volt power and control cable designed for use in continuous rigid cable supports and in raceways.

**Volt** - A unit of electrical pressure. One volt is the electrical pressure that will cause an ampere of current to flow through one ohm of resistance.

**Voltage** - Electrical potential or electromotive force expressed in volts.

**Voltage Breakdown** - Test to determine maximum voltage of insulated wire before electrical current leakage through insulation.

**Voltage Drop** - The voltage developed across a component or conductor by the current flow through the resistance or impedance of the component or conductor.

**Voltage Levels** - Power limited: 0 to 300V. Low voltage: 600 to 2000V. Medium voltage: 5 to 35KV. High voltage: greater than 35KV.

**Voltage Standing Wave Ratio** - The ratio of the maximum effective voltage to the minimum effective voltage measured along the length of a mismatched radio frequency transmission line.

**Volume Resistivity (Specific Insulation Resistance)** - The electrical resistance between opposite faces of a 1 cm cube of insulating material, commonly expressed in ohms/centimeter.

**Vulcanization** - A chemical reaction in which the physical properties of an elastomer are changed by reaction with sulfur or other cross-linking agents.

**VW-1** - A vertical flame test designation applying to single-conductor low voltage wires only. It is a modification of the standard industry vertical flame test using a Terrill burner, with restrictions added regarding reapplication of the burner until all flaming from previous application self-extinguishes. Also, cotton batting is placed beneath the specimen to check for dripping of flaming particles or other material. The test specimen is usually a size 14AWG wire rated 600V.

## W

**Wall Thickness** - A term expressing the insulation or jacket layer thickness.

**Water Absorption** - Ratio of the weight of water absorbed by a material to the weight of the dry material.

**Water Absorption Test** - A method to determine the amount of water absorbed through an insulating material after a given immersion period.

**Water Blocked Cable** - A cable specially constructed with no interval voids in order to allow no longitudinal water passage under a given passage under a given pressure.

**Watt (W)** - A unit of electrical power; the power of one ampere of current pushed by one volt of electromotive force.

**Waveguides** - A transmission media that can expand capacity of channels for enormous pair gain by utilizing a circular metal tube through which high frequency radio waves travel. More than 200,000 voice channels have been transmitted simultaneously in prototype testing.

**Wave Length (Fiber Optic)** - The distance, measured in the direction of propagation, of a repetitive electrical pulse or waveform between two successive points that are characterized by the same phase of vibration.

**Weight Resistivity** - The resistance in ohms at a specified temperature of a body of uniform cross-section and of unit weight and unit length.

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**Welding** - Joining the ends of two wires, rods or groups of wires by (1) fusing, using the application of heat or pressure or both, by means of a flame torch, electric arc or electric current; or (2) cold pressure.

**Wetting** - The ability of a material to absorb moisture.

**Wicking** - The longitudinal flow of a liquid in a wire or cable construction due to capillary action.

**Width** - Pertaining to flat cable, the distance between edges of the cable.

**Wire Wrapping Tools** - Portable electric tools and automatic stationary machines used to make solder-free, wrapped connections of wires to terminals.

**Working Life** - The period of time during which a liquid resin of adhesive remains usable after mixing with a catalyst, solvent, or other compounding ingredients.

**Working Voltage** - The recommended maximum voltage of operation for an insulated conductor, usually set at approximately 1/3 of the breakdown voltage.

## X

**XLP** - Term used for cross-linked polyethylene insulation, a popular polymeric type of insulation with outstanding electrical, moisture, and physical properties. XLP is generally physically tougher than EPR. Used in non-jacketed form on low voltage cables such as XHHW and RHH-RHW-USE. Also widely used on medium voltage power cables through 35KV.

## Y

**Yield Strength** - The minimum stress at which a material will start to physically deform without further increase in load. Below this stress, the material is elastic; above it, viscous.

**Yield Value** - See Yield Strength.