

Agency Approvals

UL/NEC • cUL/CEC • CSA/CEC Classification

UL Standard 444/CSA C22.2: Multi-National Harmonized Communication Cable Standards CSA C22.2 No. 214-94 and UL 444.

UL (Underwriters Laboratories Inc.): Develops standards and test procedures for products, materials, components, assemblies, tool, and equipment. It mainly deals with product safety in the United States.

NEC (National Electrical Code): A United States standard for the safe installation of electrical wiring equipment.

AWM (Appliance Wiring Material): Intended for the internal wiring of factory-assembled products.

CSA (Canadian Standards Association International): Tests products for compliant to national and international standards and issues certification marks for qualified products

CEC (Canadian Electrical Code): A standard published by the CSA that pertains to the installation and maintenance of electrical equipment in Canada.

cUL: A notation indicating the UL has listed the product under the applicable CSA standard.

cRU: A notation indicating the UL has recognized the product under the applicable CSA standard.

CE (Conformité Européenne): A European Economic Community approval indicating that the product complies with LVD/73/23.

NEC Article 725 Types CL2, CL3, PLTC/CL3, (Class 2 & 3 cables)

| Plenum | Riser | Commercial | Residential |
|--------|--------|------------|-------------|
| CL2P | CL2R | CL2 | CL2X* |
| CL3P | CL3R | CL3 | CL3X* |
| (none) | (none) | PLTC* | (none) |

NEC Article 760 Type FPL (Power-Limited, Fire Protective Signaling Circuit Cable)

| Plenum | Riser | Commercial | Residential |
|--------|-------|------------|-------------|
| FPLP | FPLR | FPL | (none) |

NEC Article 800 Type CM (Communications)

| Plenum | Riser | Commercial | Residential |
|--------|-------|------------|-------------|
| CMP | CMR | CMG, CM | CMX* |

NEC Article 336 Type TC (Tray Cable)

NEC Article 690 Type PV (Photovoltaic Wire)

NEC Article 820 Type CATV (Community Antenna Television and Radio Distribution System)

| Plenum | Riser | Commercial | Residential |
|--------|-------|------------|-------------|
| CATVP | CATVR | CATV | CATVX** |

*Cable diameter must be less than 0.250" (6.35 mm)

**Cable diameter must be less than 0.375" (9.53 mm)

CSA International

CSA is a nonprofit, independent organization which operates a nationally recognized testing laboratory (NRTL) for electrical and electronic materials and equipment. Alpha Wire Company offers the following types of Canadian CSA certifications on a wide variety of both wire and cable products.

AWM (Appliance Wiring Material) is manufactured in accordance with CSA Standard C22.2 No. 210. These products are intended for the internal wiring of electrical and electronic equipment and interconnecting wiring between equipment. All of these wires and cables must pass one of the following flame tests in order to comply with CSA Certification requirements.

FT1 Vertical Flame Test per CSA C22.2 No. 3 specifies that finished cable shall not propagate a flame or continue to burn for more than one minute after five 15-second applications of the test flame. There is an interval of 15 seconds between flame applications.

FT4 Vertical Flame Test per CSA C22.2 No. 3 for cables in cable trays. This test is similar to, but more severe than, the UL Standard 1581 Vertical Tray flame test. The UL 1581 has its burner at 0° from the horizontal while the FT4 has its burner mounted at 20° from the horizontal with its burner parts facing up. The allowable char length is only 1.5 m (58"), while UL 1581 allows damage up to a maximum of 8 ft (2.4 m).

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NEC Article 800 (Communications) UL/NEC – CSA/CEC Comparable Flame Test Designations

CMP CSA FT6/UL910 Horizontal Flame and Smoke Test 300,000 BTU

Horizontal flame and smoke test in accordance with ANSI/NFPA Standard 262-1985 (UL 910). The maximum flame spread shall be 1.50 m (58"). The smoke density shall be 0.5 at peak optical density and 0.15 at maximum average optical density. This test does not investigate toxicity, combustion, or decomposition.

CMR UL 1666 Vertical Flame Test 527,500 BTU

A large scale fire test for determining values of flame propagation height for electrical and optical-fiber cables that are intended for installation vertically in shafts. The flame propagation height is not to equal or exceed 12 ft (3.6 m). The temperature of any thermocouple at the 12 ft (3.5 m) height is not to exceed 850°F (454°C). The purpose of the test is to determine whether the flame propagation characteristics of these "riser" cables are in accordance with the NEC. This test does not investigate toxicity, combustion or decomposition.

CMG CSA FT4 Vertical Flame Test 70,000 BTU

This test is more stringent than the UL 1685/UL 1581 (Vertical Tray) in so much as the cable samples must be greater than 13 mm in diameter, if not the cables are grouped in bundles of at least three to obtain an overall group diameter of 13 mm. In addition, the burner is set at a 20° angle from the horizon with the burner ports facing up. This test has a maximum char height of 1.5 m (59") measured from the lower edge of the burner.

CM UL 1581 Section 1160 (Vertical Tray) Flame Test 2500 BTU

This test consist of an essentially flat metal plate burner mounted 0 degrees from the horizon. This test does not distinguish any specific cable size or diameter. This test has a maximum flame and char height of 78" measured from the burner.

CMX CSA FT-1/UL 1581 Section 1080 (VW-1) Vertical Flame Test 1700 BTU

A vertical finished cable shall not flame longer than 60 seconds following any of five 15 second applications of the specified nominal 125-mm premixed 500-W test flame (1700 BTU/hr.), the period between applications being (1) 15 seconds if the cable flaming ceases within 15 seconds or less time or (2) the duration of the cable flaming if the cable flame persists longer than 15 seconds. The cable shall not ignite combustible materials in the vicinity or damage more than 25% of the indicator flag during, between, or after the five applications of the test flame. The CSA FT-1 test is similar; however, it refers to CSA C22.2 No. 3, Paragraph 4.11.1 for flame test procedures.

The descriptions for the above flame tests are paraphrased from the applicable documents. For specific information, please consult the appropriate agency documentation.

Military Specifications

| Military Specifications | |
|-------------------------|--|
| MIL-DTL-17 | RG cables-polyethylene and PTFE cores. |
| MIL-W-76 | General purpose hook-up wire for internal wiring of electronic equipment. Temperature range -40°C to +80°C vinyl, Types LW, MH, HW for service up to 2500 volts, polyethylene Type HF to 1000 volts. |
| MIL-W-3861 | Copper conductors (uninsulated). Solid, bunches, concentric and rope constructions. Replaced by QQ-W-343 then superseded by A-A-59551. |
| MIL-DTL-16878 | Military specification, covering unshielded wire for hook-up and lead wiring of electronic and electrical components and equipment. Formerly MIL-DTL-16878. |
| MIL-DTL-22759 | PTFE insulated hook-up wire MIL-DTL-22759. |
| MIL-DTL-27500 | 600 volt aircraft wire with PTFE insulation. Formerly MIL-DTL-27500. |
| QQ-W-343 | Copper conductors (uninsulated). Solid, bunches, concentric and rope constructions. Superseded by A-A-59551. |
| AMS-DTL-23053 | General specification for heat shrinkable insulation sleeving. Formerly MIL-DTL-23053. |
| MIL-L-631 | Non-rigid synthetic resin composition electrical insulation. May be in the form of film, sheets, tapes, or tubing. |
| MIL-I-3190 | General specification for coated, flexible insulation sleeving. |
| A-A 59551 | Wire, electrical, copper (uninsulated). |
| A-A 59569 | Braid, wire (copper, tin-coated, silver-plated, or nickel coated, tubular or flat). |
| A-A 52080 | Tape, lacing and tying, nylon. |
| A-A 52081 | Tape, lacing and tying, polyester. |
| A-A-52083 | Tape, lacing and tying, glass. |
| A-A-52084 | Tape, lacing and tying, aramid. |
| A-A-59602 | Tube, spiral wrap, polyethylene, PTFE and polyamide. |
| A-A-59301 | Sleeving, textile, braided, synthetic polymer, -55°C to +105°C. |
| MIL-DTL-713 | Twine, fibrous: impregnated, lacing and tying. |
| FED-STD-191 | Textile test methods. |
| MIL-Y-1140 | Yarn, cord, sleeving, cloth and tape-glass. |
| NEMA HP-3 | PTFE insulated hook-up wire. |

Military Cross Reference Index to Alpha Tubing and Sleeving Products

| Heat-Shrink Tubing | |
|--|---|
| MIL-SPEC | Alpha Tubing Family |
| AMS-DTL-23053/1, CL 1,2 | FIT- 600, ST-700 |
| AMS-DTL-23053/2, CL 2, CL2 Except Longitudinal Shrinkage | Special Order |
| AMS-DTL-23053/4, CL 1, 2 & 3 | FIT-300, FIT-750, FIT-321, ST-300, ST-302, ST-303 |
| AMS-DTL-23053/5, CL , 2 & 3, CL1 Overexpanded | FIT-221, FIT-221B, FIT-221V, FIT-421, FIT-321V (except dimensions), FIT-421, ST-421 |
| AMS-DTL-23053/6, CL 1 & 2 | FIT-295 |
| AMS-DTL-23053/8 | FIT-350 |
| AMS-DTL-23053/11, CL 1 | FIT-400 |
| AMS-DTL-23053/12, CL 3 | FIT-500 |
| AMS-DTL-23053/12, CL 5 | Special Order |
| AMS-DTL-23053/13 | FIT-650, ST-650 |
| AMS-DTL-23053/18, CL | FIT-CLEAR |
| AMS-DTL-23053/15, CL1 & 2 | SPC, SPCM |

| Extruded Tubing | |
|-----------------|---------------------|
| MIL-SPEC | Alpha Tubing Family |
| MIL-I-631D | PVC-105 |

| Coated-Fiberglass Sleeving | |
|----------------------------|-----------------------|
| MIL-SPEC | Alpha Sleeving Family |
| MIL-I-3190/3 Type C | AF-155 |
| MIL-I-3190/2 Type B | PIF-130 |
| MIL-I-3190/2 Type B | MPF-130 |
| MIL-I-3190/6 Type D | PIF-200 |
| MIL-Y-1140 | PIF-240 |

| Spirally Cut Tubing | |
|---------------------|----------------|
| MIL-SPEC | Part No. |
| A-A-59602, Type 1 | SW-1 to SW-6 |
| A-A-59602, Type 2 | SW-20 to SW-25 |
| A-A-59602, Type 3 | SW-30 to SW-35 |
| A-A-59602, Type 1 | SW-40 to SW-45 |