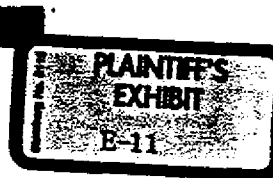


price 6-21-78

Price
\$1.00



UNDERWRITERS
LABORATORIES

INC.®

TESTING FOR PUBLIC SAFETY

GENERAL INFORMATION
FROM
ELECTRICAL CONSTRUCTION
MATERIALS DIRECTORY

May 1978

SC-ELEC-07161

Some unit substations are suitable for use as service equipment and are so marked. Such marking is part of the listing mark as noted below, or is an integral part of other required markings.

Listed unit substations are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location. If all terminals are suitable for use with aluminum conductors, the marking will indicate "Use copper or aluminum wire." A unit substation employing terminals for main or branch circuit units individually Marked Cu-Al will be marked "Use copper-Al wire" or "Use copper wire only." The latter statement indicates that wiring space or other factors make the unit substation unsuitable for aluminum conductors.

Unless the unit substation is marked with both the size and temperature rating of wire to be used, the termination provisions are based on the use of 60 C ampacities for wire sizes Nos. 14-1 Awg and 75 C ampacities for wire Nos. 1/0 Awg and larger.

Unit substations have the secondary neutral bonded to the enclosure and have provision on the neutral for connection of a grounding conductor. A terminal is also provided on the enclosure near the line terminals for use with an equipment grounding conductor between the unit substation and the enclosure of equipment on the line side of the unit substation for use when a metallic conduit system is not provided.

Unit substations are marked for outdoor use or for indoor use.

The suitability of unit substations for use on high capacity circuits has not been investigated.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "Listed", a control number, and the following product name: "Unit Substation".

WIRES (ZGZX)

Insulated wire is intended for installation and use in accordance with the National Electrical Code. Unless indicated in the individual General Information sections under the various Wire Classifications, conductor sizes range from Nos. 14 Awg to 2000 MCM inclusive.

ASBESTOS-INSULATED (ZHNV)

Asbestos-insulated wires are classified and rated as follows:

Type A—with asbestos insulation, 300 volts maximum, Sizes No. 14 through No. 8 Awg inclusive, copper.

Type AA—with an asbestos or glass braid and asbestos insulation, 300 volts maximum, Sizes No. 14 through No. 4/0 Awg inclusive, copper.

Type AI—with impregnated asbestos insulation, 300 volts maximum, Sizes No. 14 through No. 8 Awg inclusive, copper.

Type AIA—with an asbestos or glass braid and impregnated asbestos insulation, 600 volts maximum, Sizes No. 14 Awg through 1000MCM inclusive, copper.

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "Listed", a control number, and the following product name: "Asbestos-Insulated Wire".

ASBESTOS-VARNISHED-CLOTH (ZIBT)

Asbestos-varnished-cloth wires are classified as follows:

Type AVA—an asbestos or glass braid, and insulation consisting of varnished cloth and impregnated asbestos. Sizes No. 14 Awg through 2000MCM inclusive, copper.

Type AVE—a flame-retardant cotton braid, and insulation consisting of varnished cloth and impregnated asbestos. Sizes No. 18 Awg through 2000MCM inclusive, copper, and No. 12 Awg through 1000MCM inclusive, aluminum or copper-clad aluminum.

Type AVL—a lead covering, and insulation consisting of varnished cloth and impregnated asbestos. Sizes No. 14 Awg through 2000MCM inclusive, copper.

Wires for use at voltages above 600 are indicated by adding numerical suffixes to the type letters, as follows:

Numerical Designation	Maximum Working Voltage
10	1000
20	2000
30	3000
40	4000
50	5000

All manufacturers are listed for 600-volt wires. As stated in the individual listings, certain manufacturers are also listed for wires with voltage rating up to 5000 volts.

Type AVE wire may employ copper, or aluminum, or copper-clad aluminum conductors. Wires with copper-clad aluminum conductors are surface printed "AL (CU-CLAD)." Wires with aluminum conductors shall be surface printed "AL."

The ampacity of copper-clad aluminum conductors is the same as for aluminum conductors. The wire connectors used with copper-clad aluminum conductors shall be recognized for use with copper and aluminum conductors and shall be marked "AL-CU," except that 12-10 Awg solid copper-clad aluminum conductors may be used with wire binding screws and in pressure-plate and push-in spring-type connecting mechanisms that are recognized for use with copper conductors. Copper-clad aluminum conductors are suitable for intermixing with copper or aluminum conductors in terminals for splicing connections only when the wire connectors are specifically recognized for such use. Such intermixed connections are limited to use in dry locations.

→ LOOK FOR THE LISTING MARK ←

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FIXTURE WIRE (ZIPR)

Fixture wires are rated 600 volts, or less, as shown, and comply with the Standard for Flexible Cord and Fixture Wire of Underwriters Laboratories Inc. (UL62).

All conductors are copper except fixture wire having a temperature rating higher than 90 C may employ nickel.

Thermoplastic compounds may stiffen at temperatures below minus 10 C (14 F) and care should be used in handling at such temperatures.

Gasoline resistant wire has been tested at 30 C when immersed in gasoline. It is considered inherently resistant to gasoline vapors within the limits of the temperature rating of the wire type.

Gasoline resistant TFN or TFFN—Indicates a TFN and TFFN conductor with a jacket of extruded nylon suitable for exposure to mineral oil, and to liquid gasoline and gasoline vapors at ordinary ambient temperature. It is identified by tag marking and by printing on the insulation or nylon jacket with the designation "Type TFN (TFFN) Gasoline and Oil Resistant I" if suitable for exposure to mineral oil at 60 C or "Type TFN (TFFN) Gasoline and Oil Resistant II" if the compound is suitable for exposure to mineral oil at 75 C.

Fixture wires are classified as follows:

- 60 C maximum operating temperature.
- Thermoplastic-insulated wires.
- 600 v, 18-16 AWG sizes: Types TF, TFF.
- Christmas-tree wires.
- 125 v, 20-18 AWG size: Type FXT*.
- *The maximum voltage is 300, provided that the nominal thickness of the insulation on the conductor is 2.64 in.
- 75 C maximum operating temperature.
- Rubber-insulated, heat-resistant wires.
- 300 v, 18 AWG size: Types RPH-1, FPH-1.
- 600 v, 18-16 AWG sizes: Types RPH-2, FPH-2.
- 90 C maximum operating temperature.
- Cotton-insulated wire.
- 300 v, 18-10 AWG sizes: Type CF.
- Thermoplastic-insulated wire.
- 600 v, 18-16 AWG sizes: Types TFN, TFFN.
- 150 C maximum operating temperature.
- Asbestos-insulated wire.
- 300 v, 18-10 AWG sizes: Type AF.
- Silicone-rubber-insulated wire.
- 600 v, 18 AWG size: Type SFF-1.
- 600 v, 18-14 AWG sizes: Type SFF-2.
- Fluorinated ethylene propylene-insulated wire.
- 600 v, 18-14 AWG sizes: Types PFF, PGFF.
- Polytetrafluoroethylene-insulated wire.
- 600 v, 18-14 AWG sizes: Type PTFE.
- 250 C maximum operating temperature.
- Silicone-rubber-insulated wire.
- 300 v, 18 AWG size: Type SF-1.
- 600 v, 18-14 AWG sizes: Type SF-2.
- Fluorinated ethylene propylene-insulated wire.
- 300 v, 18-14 AWG sizes: Types PF, PGF.
- 250 C maximum operating temperature.
- Polytetrafluoroethylene-insulated wire.
- 600 v, 18-14 AWG sizes: Type PTF.

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "Listed", a control number, and the following product name: "Fixture Wire".

FLEXIBLE CORD (ZJCZ)

Flexible cords are rated 600 volts, or less, as shown, and comply with the Standard for Flexible Cord and Fixture Wire of Underwriters Laboratories Inc. (UL62).

All conductors are copper.

Thermoplastic compounds may stiffen at temperatures below minus 10 C (14 F) and care should be used in handling at such temperatures.

Types HPN and HPD heater cords have a temperature limit, due to exposure to externally applied heat sources, of 90°C. Types HS, HSO, HSJ and HSJO heater cords have a core temperature limit of 90°C and a jacket temperature limit of 60°C.

The impregnated asbestos insulation on Types AFC, AFPO, AFPD, AFSJ, and AFS cords has a temperature limit of 180°C. The cotton or rayon over-all braid on Types AFPO and AFPD is limited to 90°C. The rubber jacket on Types AFSJ and AFS has a temperature limit of 75°C.

Other cord types have a temperature limit of 60°C.

Flexible Cords are not identified as to their temperature limit unless a limit higher than that outlined above is appropriate. Such limits are indicated on the outer surface of the cord.

→ LOOK FOR THE LISTING MARK ←

**TRANSIENT VOLTAGE SURGE SUPPRESSORS
(XUHT)**

Advanced Electronics Systems, Inc., Chambersburg, PA 17201

Transient voltage surge suppressors, Models S, STP.

Circle F Industries, Inc., Trenton, NJ 08604

Transient voltage surge suppressors, Model 1590-IG.

Cook Electric Co., Morton Grove, IL 60053

Overvoltage surge protector, Models 501-1450, -1480, -1481, -1483 and -1484.

International Marketing & Engineering, Inc., Roanoke, VA 24011

Transient voltage surge suppressors, Models WP-1S, -3D, -3Y, WP1S-480, WP34-277/480.

Little Enterprise, Hampton, MN 55031

Transient voltage surge suppressors, Model L120208Y.

Magnum Electronics, Inc., Wichita, KS 67211

Transient voltage surge suppressors, Models MA-120-A, -277-A, MB-240-1, MC-125-DPT-R, -208-3NN, -208-3Y, -240-3DHL, -240-3NN, -240-DPT-R, MD-125-POS/DPT, -480-3NN, -480-3Y.

N.R.G. Products Inc., Vineland, NJ 08360

Transient voltage surge suppressors, Models NRG-012, -027, -208Y, -241, -243D, -243NN, -483NN, -483Y.

Powerguard, Div. of NEPCO, Hawthorne, NJ 07506

Transient voltage surge suppressors, Models PG-012, -027, -208Y, -241, -243D, -243NN, -483NN, -483Y.

TII Corp., Lindenhurst, NY 11757

Transient voltage surge suppressors, Type TII 411 followed by A or B, followed by 2, 4, 6, 8, 10 or 15; Type TII 422 followed by A or B, followed by 2, 4, 6, 8, 10, 15 or 20.

Transient Control Corp., Corte Madera, CA 94925

Transient voltage surge suppressors, Models ME1 thru -10.

United Systems International, Inc., Lynchburg, VA 24506

Transient voltage surge suppressors, Models USI-012S, -027S, -208YS, -241S, -243DS, -243NNS, -483NNS, -483YS

**UNDERGROUND FEEDER AND BRANCH
CIRCUIT CABLE (YDUX)**JEMCO Insulated Wire Co., Div. of J. E. Messenger Co., Inc.,
Newport, AR 72112

Formerly Jemco Insulated Wire Co.

TPI Corp., Johnson City, TN 37601

WIRES (ZGZX)**ASBESTOS-INSULATED (ZHNV)**JEMCO Insulated Wire Co., Div. of J. E. Messenger Co., Inc.,
Newport, AR 72112

Formerly Jemco Insulated Wire Co.

FIXTURE WIRE (ZIPR)

Bremen Insulated Wire, Inc., Bremen, IN 46506

Silicone-rubber-covered wires, Types SF-2, SFF-2.

»»→ LOOK FOR THE LISTING MARK ←«

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Jack
Bosto
Brain
Heat
Dah
Chris
Electr
Jack
Brain
MiscGC E
BraidGrom:
Form:ITT J
PavJacke
S, SJ, IJEMC
Ne
FormMax I
BraidOba I
Braid
MiscPatele
Jacke
Jacke

3ORS

- Dah San Electric Wire & Cable Co. Ltd., Yun-Lin Shen Taiwan R.O.C.
Christmas tree wire: Type FXT.
- Dielectric Materials Div., ENM Co., Chicago, IL 60660
Formerly Dielectric Materials Co.
- Eung Li Industry Co., Ltd., Hsinchu, Taiwan.
Christmas tree wire: Type FXT.
- International Electric Wire & Cable Co., Ltd., Taipei Hsien, Taiwan.
Christmas tree wire: Type FXT.
- JEMCO Insulated Wire Co., Div. of J. E. Messenger Co., Inc.,
Newport, AR 72112
Formerly Jemco Insulated Wire Co.
- Monroe Wire & Cable Corp., The James, South Lancaster, MA 01561
Thermoplastic-covered wires, Types TF, TFF, TFN, TFFN.
- Tokai Electric Wire Co. Ltd., Mei Prefecture, Japan.
Thermoplastic insulated wires: Types TF, TFF. Christmas tree wire: Type FXT.
- Wireflex, Inc., Bourbon, IN 46504
Thermoplastic-covered wires: Types TFFN, TFN.

4-277/480.

MC-125-
POS/DPT,

, -243NN,

, -243NN,

Howed by
15 or 20.

, -243DS,

FLEXIBLE CORD (ZJCZ)

- BICC General Cables Ltd., Warrington WA6 ODJ, England.
Jacketed cords: Types SJT, SJTO, ST, STO.
- Boston Insulated Wire & Cable Co., Dorchester, MA 02122
Braidless parallel cords: Types SP-1, SP-2, SPT-1, SPT-2.
Heat-resistant cords: Type AFPO.
- Dah San Electric Wire & Cable Co., Ltd., Yun-Lin Shen, Taiwan.
Christmas-tree cords: Types CXT, XT.
- Electro-Cords, Div. of Groman Corp., Los Angeles, CA 90011
Jacketed cords: Types SJT, SJTO, ST, STO, SVT, SVTO.
Braidless parallel cords: Types SPT-1, -2.
Miscellaneous and special cords: Refrigerator cord, Type SPT-3.
- GC Electronics, Div. of Hydrometals, Inc., Rockford, IL 61101
Braidless parallel cords: Types SPT-1, SPT-2, SPT-3.
- Groman Corp., Chicago, IL 60606
Formerly Coleman Cable & Wire Co.
- ITT Royal Electric Div., International Telephone & Telegraph Corp.,
Pawtucket, RI 02862
Jacketed cords coiled in form of a helix: Types ST, STO, SVT, SVTO, SJT, SJTO,
S, SJ, SO, SJO.
- JEMCO Insulated Wire Co., Div. of J. E. Messenger Co., Inc.,
Newport, AR 72112
Formerly Jemco Insulated Wire Co.
- Max Engineering (S) Pte. Ltd., North Industrial Estate, Singapore 12.
Braidless parallel cords: Types SPT-1, -2.
- Oba Electric Wire Co. Ltd., Saitama-Ken, Japan.
Braidless parallel cords: Types SPT-1, -2.
Miscellaneous and special cords: Refrigerator cord, Type SPT-3.
- Patelec-Kabel S.p.A., 13100 Vercelli, Italy.
Jacketed cords: Types SJT, ST.
Jacketed cords: Type SVT.

»→ LOOK FOR THE LISTING MARK ←«