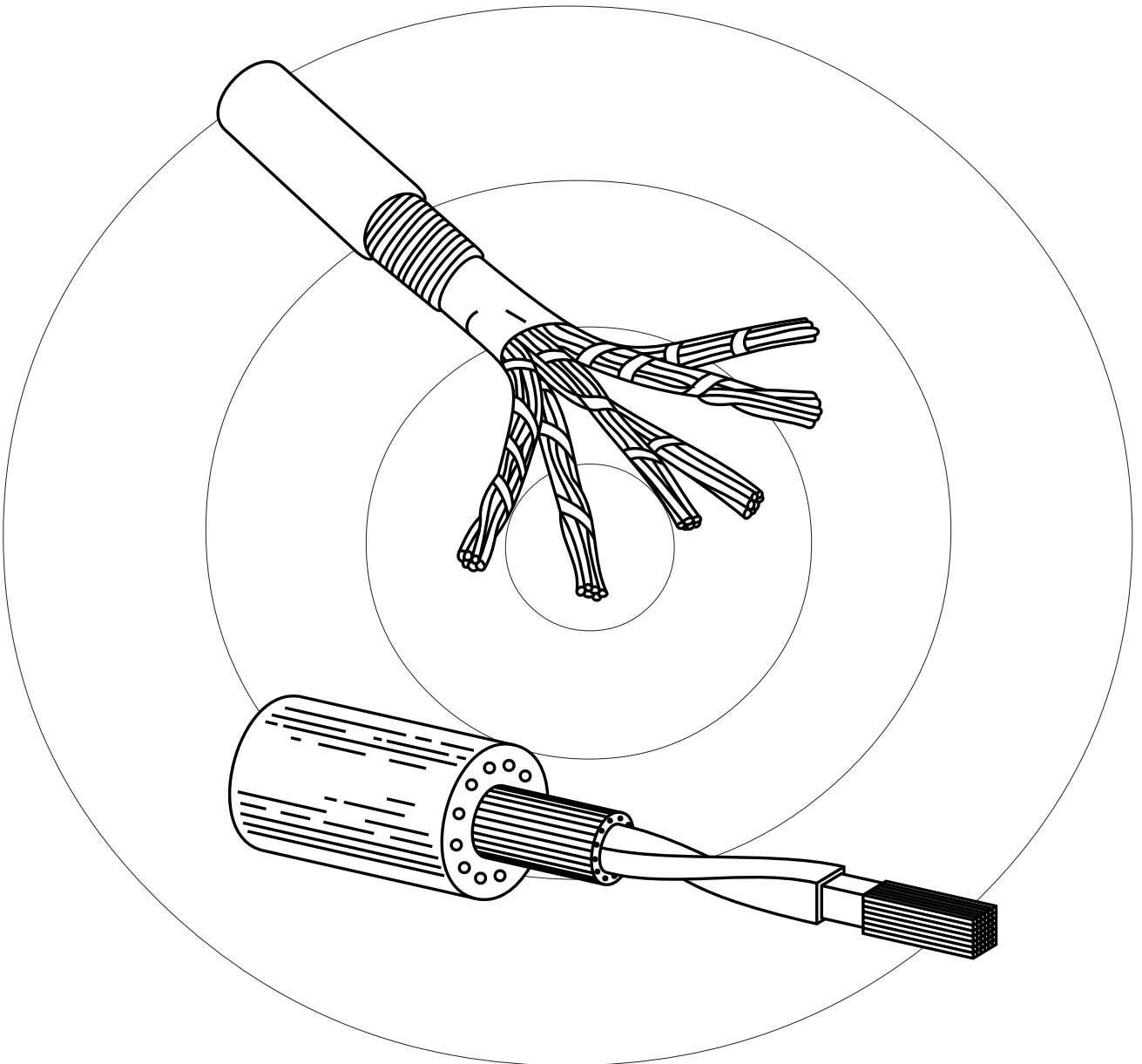


# Marking Guide

## Wire and Cable July 2005



Each year millions of feet of wire and cable are installed in all types of buildings and for use in many different environmental conditions. Because of the choices available, it is important to know which wiring systems are suitable for a specific situation. It is also important to be able to properly identify these systems. Markings on or associated with the product, the UL Listing, Classification, or Verification information, and requirements in the current edition of the *National Electrical Code*® all convey the information needed to ensure a compliant installation. This publication explains markings found on Underwriters Laboratories Inc. Listed, Classified, or Verified wire and cable. Appendices B and C also contain the Listing, Classification, or Verification information for the product categories involved. UL Online Certifications Directory Listings, Classifications, and Verifications are updated daily. To confirm the current status of any UL record, please consult UL's Online Certifications Directory at [www.ul.com](http://www.ul.com).

Although they may be broadly worded, required or optional product markings (and their locations) are specific to the product with which they are associated. This document is intended to be used in determining the suitability of a particular UL Listed, Classified, or Verified wiring product that complies with all the applicable UL requirements, in a particular application.

To confirm the current status of any UL Marking Guide, please consult the Regulators page of the UL Web Site at <http://www.ul.com/regulators/index.html>.

Your comments or suggestions are welcome and appreciated. They should be directed to:

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For field evaluations, contact Customer Service toll-free at (877) 854-3577, option 2.

# WIRE AND CABLE MARKING GUIDE

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## INTRODUCTION

This guide is intended to assist installers, contractors, and authorities having jurisdiction in determining the suitability of UL Listed, Classified, or Verified wire and cable for use in a specific installation. Toward this goal, the guide:

1. Clarifies the means used to identify UL Listed, Classified, or Verified wire and cable (see the sections titled "Identification of Listed Products", "Identification of Classified Products," "Identification of Verified Products).
2. Provides an explanation of the ratings and intended uses of UL Listed, Classified, or Verified wire and cable (see Appendix A for designations).
3. Focuses on the information contained in UL Listed, Classified, or Verified wire and cable product markings (what the markings mean, where they may be located, etc.).

This guide does not address wire and cable evaluated only for suitability as factory-installed component wiring in other Listed equipment. Those products are Recognized by UL under the Component-Appliance Wiring Material (AWM) and Component-Nonshielded cable categories and are not identified with an *NEC*® wire Type designation.

In general, Component Wire or Cable is not evaluated for field installation unless it is included as a part of a complete, Listed product or system. For example, data processing equipment Listed under the Information Technology Equipment Including Electrical Business Equipment (NWGQ) category will use external interconnect cables, such as AWM Style 2464, only if the AWM has been evaluated and described in the Listing for the particular piece of equipment. The limitations on the installation of the Listed end-use product or system also apply to the wiring. Some interconnect cables may have connectors assembled on one or both ends as a computer-interconnection assembly. When these assemblies use Recognized cable and are sent to a building site separately, instead of being supplied with the equipment, these cable assemblies may be identified as Listed Computer Interconnection Cable Assemblies (DVPJ). Similarly, for communication equipment, Listed Communication Cable Assemblies (DUNH) may be used. AWM ratings and conditions of acceptability are shown on a tag affixed to the reel or carton. Some ratings may appear on the surface of the wire or cable.

The UL label is required for Listed, Classified, and Verified wire and cable products and can be applied in various manners. It can be applied to a coil, reel, flange, or box. This label is the only means used to indicate that the product is covered under UL testing (Listing, Classification, or Verification) and UL Follow-Up Service. The UL symbol or letters "UL" on the wire/cable itself is only a supplemental method of identifying UL coverage and should not be considered primary evidence of UL coverage. UL's Guide Information (see Appendices B-D) will indicate if the UL symbol or letters on the product itself is required. The required engineering markings, which appear on the product itself, are only intended to provide information related to the product's ratings or testing scope.

This guide should be particularly useful for those who:

1. Have a working knowledge of the current edition of the *National Electrical Code*® (*NEC*®) and how locally applicable electrical codes relate to the *NEC*®.
2. Are already familiar with the requirements of the electrical installation under consideration.
3. Can identify the cable as a particular NEC type.

This guide is intended to supplement the Guide information for the appropriate wire and cable category in UL's Electrical Construction Equipment Directory (green book), UL's General Information for Electrical Equipment Directory (white book), and the *NEC*®. The Guide information for each of the applicable categories of Wire and Cable is included in Appendix B (Listing), Appendix C (Classification), and Appendix D (Verification).

## HOW TO USE THIS GUIDE

The wire and cable types covered in this guide have been divided into three tables as follows:

**Table 1** — Building Wires and Cables, including some industrial cables

**Table 2** — Low Voltage Cables, Flexible Cords and Fixture Wire

**Table 3** — Special Purpose Wire and Cable

In each table, wire and cable types are identified by the name of the category under which they appear in UL's Electrical Construction Equipment Directory. Most wire and cable types have the same category designation in the *NEC*<sup>®</sup> as they do in UL's Electrical Construction Equipment Directory.

Definitions of the column headings and codes used in each column are provided in the section titled "Explanations and Notes for Marking Tables." Table entries consist of:

Table Entry	Indicates
Yes	The wire or cable is always evaluated for the use specified by the particular column. These uses are explained in the section titled "Explanations and Notes for Marking Tables."
— (dash)	The wire or cable is not evaluated for the indicated use, either as a requirement or as an option.
Numbers	A specific rating. For example, 250 in the column headed by "Temperature (°C) Dry" indicates a 250°C temperature rating for dry locations.
Numbers in parentheses e.g., (3), (21)	Specific notes detailing a rating and/or associated marking. The explanations of the notes can be found in "Explanations and Notes for Marking Tables," following the tables.

## IDENTIFICATION OF LISTED PRODUCTS

The UL Mark may have various information around it as authorized by Underwriters Laboratories Inc.

		
For use in the USA	For use in Canada	For use in both the USA and Canada


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 UL symbol (as illustrated above) together with the word “LISTED,” a serial number, and the product or category name.




A product bearing the UL Mark for Canada is Listed to Canadian Standards for that specific product. A product bearing the combined Canada/U.S. Mark is Listed to both UL’s (U.S.) Standards and Canadian Standards for that specific product.

For wire and cable products, the complete Listing Mark is located on a tag attached to the reel or smallest unit container. Two types of UL symbols — “UL” in a circle or “UL” in parentheses — may be found on the wire or cable itself. The product markings are intended to provide information only, and the complete Listing Mark is the only proof that a particular unit of wire or cable is actually Listed.

## IDENTIFICATION OF CLASSIFIED PRODUCTS

With UL’s Classification Service, UL determines that a manufacturer has demonstrated the ability to produce a product that complies with its requirements for the purpose of classification or evaluation regarding one or more of the following: (1) specific risks only, such as casualty, fire or shock; (2) performance under specified conditions; (3) regulatory codes; (4) other standards, including international and regional standards; or (5) other conditions UL may consider desirable. UL conducts a Follow-Up Service as an audit of the means the manufacturer uses to determine continued compliance of the product with UL’s requirements.

The UL Classification Marking may appear in various forms as authorized. The Classification Marking includes: (1) the symbol of Underwriters Laboratories Inc. — ; (2) the word “CLASSIFIED”; (3) a product identity and a statement to indicate the extent of UL’s evaluation of the product such as “AS TO (nature of hazard) ONLY,” or a rating or classification as specified in the general information pertaining to the product category, or designation and title of standard published by other organization, or identification of specified product; and (4) a control number assigned by UL.

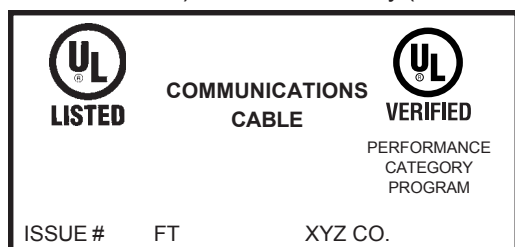
	<p>(PRODUCT IDENTITY)</p> <p>AS TO _____ ONLY</p> <p>(Control Number)</p>
—OR—	
	<p>(PRODUCT IDENTITY)</p> <p>IN ACCORDANCE WITH</p> <p>(Specification or Requirement)</p> <p>(Control Number)</p>
—OR—	
	<p>(PRODUCT IDENTITY)</p> <p>AS TO _____ ONLY</p> <p>(Control Number)</p>

## IDENTIFICATION OF VERIFIED PRODUCTS

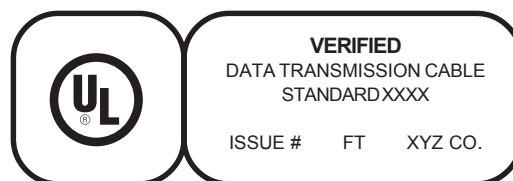
The UL Verification Mark is used to identify products evaluated under UL's Performance Verification Services. Some examples are products tested under the UL Performance Verification program for cable, Levels XP Structured Cabling Program, Proprietary Structured Cabling Program, ISO/IEC 11801, TIE/EIA 568B, Telcordia, and NEMA.

The presence of this mark provides assurance to end-users, IT managers, LAN system designers, and the regulatory community that products have been evaluated for transmission performance, in order to meet the unique needs of the telecommunications industry community.

There are two formats to the Verification Mark (label) that appear on products: Listing and Verification (As shown in Illustration A below) and Verified-Only (As shown in Illustration B below).



**Illustration A**



**Illustration B**

Listed cable tested under the UL Performance Verification Program for cable in accordance to TIA/EIA 568B have the label marking "Listed Communications Cable" also "Verified to UL Performance Category Program," on the tag, reel or smallest unit container, as shown in Illustration A. Cable Verified to another transmission performance specification, (NEMA WC63, 63.1, 66, ISO 11801, Telcordia, etc.), have the label marking "Listed Communications, Cable" also "Verified in Accordance with [Specification name and/or number]" on the tag, reel or smallest unit container. In addition, surface marking on these products would be as follows:

- 1) For performance Category Cable: "Verified (UL) Category 3, 4, 5, 5E or 6 [including latest draft number if applicable]."
- 2) For performance Category Pat Cable: "Verified (UL) Category 3, 4, 5, 5E or 6 [including latest draft number if applicable] Patch; Cable" for stranded conductor cables.
- 3) For all other Performance Verified Cable: "Verified in Accordance with [Specification name and/or number]"

Cabling products that are Verified Only (Non-UL Listed) will use the label as shown in Illustration B. The Verification Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under this Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol together with the word "VERIFIED," a control number, the product name "Data Transmission Cable", and the Specification name and/or number. In addition to the marking on the tag, reel, or smallest unit container, cables that have been *Verified by* UL in accordance with the signal transmission characteristics, and have not been Listed by UL as Communications Cable, Power-Limited Circuit Cable, or other UL Listed Cable, are surface marked with the statement "Verified by Underwriters Laboratories Inc. in accordance with [Specification name(s) and/or number(s)] Only" in the surface print legend. The UL symbol [either the UL in a circle symbol or "(UL)"] is not used in place of the wording "Underwriters Laboratories Inc." in the statement.

Cabling products tested under the Levels XP Structured Cabling Program and the Proprietary Structured Cabling Program are field assembled cabling and connectivity products. The Type R UL Verification Mark (label) is not directly applied to structured cabling products. The complete Verification Mark (illustrated below) may appear on a Bill of Lading, a Bulk Shipment Certificate, or on UL's Certificate or Conformity Assessment.

In these cases, the Mark must be reproduced in its entirety and clearly associated with the structured cabling product which was investigated by UL.



**VERIFIED**

Levels XP Program  
Solution Name and Part Number  
Control Number

## GENERAL CHARACTERISTICS

### Markings

The requirements for the exact text and location of the markings, and the method of identification, vary among the different types of wire and cable. Wherever possible, the product is surface marked with information necessary for proper installation. When surface marking is not possible — or for other considerations — all or a portion of the marking may be located on a tag, reel or the smallest unit container as permitted by the requirements of each product category. Whenever possible, the rating or characteristic is plainly indicated. Other methods — for example, colored tracers under the jacket or insulation — may be used to identify a certain characteristic, such as temperature rating for some fixture wires. To completely determine the suitability of a particular wiring system, review of the product itself, tag markings and carton markings may be necessary.

Some wire and cable may be marked with multiple Type designations. These products have been evaluated for uses of all Type designations marked.

All markings on or associated with wire and cable, as well as the Listing information of the appropriate category (see Appendix B), should be consulted to determine all ratings and limitations for proper installation in accordance with requirements of the *NEC*®.

UL evaluates wiring products with respect to the marked ratings and uses indicated by the Type designation associated with the UL Mark. Wiring products are not evaluated with respect to marked ratings and uses associated with other certification organizations.

### Conductor Material

Compact stranded copper conductors are identified by “compact” or “cmpct,” otherwise wire and cable with bare or coated copper conductor material is not marked with stranding identification.

If the conductor material is either aluminum or copper-clad aluminum, the product, tag or carton markings (depending on the product category) identify the conductor material. These markings will appear as “AL,” “ALUMINUM,” “AL (CU-CLAD),” “ALUMINUM (COPPER-CLAD),” “CU-CLAD AL” or “COPPER-CLAD ALUMINUM.”

For some wire and cable, other metals may be used as conductor material. The associated markings for that wire and cable are explained under the heading “OTHER.”

### Flammability

UL investigates wiring products with respect to their intended locations and uses as permitted by the *NEC*®. Flammability or resistance to spread or propagation of fire is one of the considerations that enters into the overall investigation of wire and cable. For instance, products that are inherently permitted by the *NEC*® to be installed in cable trays or that are marked for such use are investigated for fire conditions that could exist in a cable tray.

Similarly, cables covered for use in accordance with Articles 725, 760, 770, 800 and 820 of the *NEC*® are investigated with respect to their application: plenum, riser, general use or restricted residential use. Suffixes to the Type designation identify the use as defined in the appropriate *NEC*® articles:

-P	Plenum
-R	Riser
-No Suffix	General purpose
-X	Limited residential use

Some wire and cable may also have a suffix “-LS” which means that the entire construction complies with the requirements for flame retardant, limited smoke wiring materials as evaluated per UL 1685.

# **WIRE AND CABLE MARKING**

## **TABLES 1, 2, AND 3**

WIRE AND CABLE MARKING TABLE  
TABLE 1 - BUILDING WIRES AND CABLES

Wires	NEC® Article	CCN	UL Mark On Product	Temperature (°C) Dry	Temperature (°C) Wet	Voltage (V)	Outdoor Use	Sunlight Resistance	Cable Tray Use	Oil Resistance	Gasoline Resistance	Direct Burial	Submersible Pump Use	Other
<b>Thermoset - Insulated:</b>														
Types RHH	310	ZKST	R	90	-	600 or 2 kV	-	(35)	(40)	(45)	(46)	-	-	-
RHW	310	ZKST	R	75	75	600 or 2 kV	-	(35)	(40)	(45)	(46)	-	(51)	-
RHW-2	310	ZKST	R	90	90	600 or 2 kV	-	(35)	(40)	(45)	(46)	-	(51)	-
SA	310	ZKST	O	90(13)	-	600	-	-	(40)	-	-	-	-	-
SIS	310	ZKST	R	90	-	600	-	-	(40)	-	-	-	-	-
XHH	310	ZKST	R	90	-	600	-	(35)	(40)	(45)	(46)	-	-	-
XHHW	310	ZKST	R	90	75	600	-	(35)	(40)	(45)	(46)	-	(51)	-
XHHW-2	310	ZKST	R	90	90	600	-	(35)	(40)	(45)	(46)	-	(51)	-
<b>Thermoplastic - Insulated:</b>														
Types FEP, FEPB	310	ZLGR	R	90(13)	-	600	-	-	-	-	-	-	-	-
PFA	310	ZLGR	R	90(13)	-	600	-	-	-	-	-	-	-	-
PFAH	310	ZLGR	R	250	-	600	-	-	-	-	-	-	-	-
TBS	310	ZLGR	O	90	-	600	-	-	-	-	-	-	-	-
TFE	310	ZLGR	R	250	-	600	-	-	-	-	-	-	-	(55)
THHN	310	ZLGR	R	90	-	600	-	(35)	(40)	(45)	(46)	-	-	-
THHW	310	ZLGR	R	90	75	600	-	(35)	(40)	(45)	(46)	-	(51)	-
THW	310	ZLGR	R	75	75	600	-	(35)	(40)	(45)	(46)	-	(51)	-
THW-2	310	ZLGR	R	90	90	600	-	(35)	(40)	(45)	(46)	-	(51)	-
THWN	310	ZLGR	R	75	75	600	-	(35)	(40)	(45)	(46)	-	(51)	-
THWN-2	310	ZLGR	R	90	90	600	-	(35)	(40)	(45)	(46)	-	(51)	-
TW	310	ZLGR	R	60	60	600	-	(35)	(40)	(45)	(46)	-	(51)	-
Z	310	ZLGR	R	90(12)	-	600	-	-	-	-	-	-	-	-
ZW	310	ZLGR	R	90(12)	75	600	-	(35)	-	-	-	-	(51)	-
<b>Cables</b>														
<b>Armored:</b>														
Types ACTH	320	AWEZ	O	75	-	600	-	-	(40)	-	-	-	-	-
ACHH, ACTHH	320	AWEZ	O	90	-	600	-	-	-	-	-	-	-	(56)
Flat cable: Type FC	322	GQKT	R	75(3)	-	300	-	-	-	-	-	-	-	-
Flat conductor: Type FCC	324	IKKT	R	(4)	-	300, 600	-	-	-	-	-	-	-	-
Hoistway	620	MSZR	R	60, 90	-	(20)	-	(35)	(40)	(45)	(46)	(50)	-	(57, 58)
Medium Voltage: Type MV	328	PITY	R	(5)	(5)	(21)	-	(35)	(40)	(45)	(47)	(50)	-	(57, 58)
Metal-Clad: Type MC	330	PJAZ	R	(14)	(6)	6, 002, 000	Yes	Yes	Yes	Yes	Yes	Yes	-	(64)
Metal-Clad (Hazardous Location): Type MC-HL	330	PJPP	R	(14)	(6)	6, 002, 000	Yes	Yes	Yes	Yes	Yes	Yes	-	(64)
Mineral Insulated Metal Sheathed Cable: Type MI	332	PPKV	O	90(7)	90(7)	600(27)	Yes	Yes	(40)	Yes	Yes	Yes	-	(55, 64, 73)
Nonmetallic Sheathed: Types NM-B, NMC-B	334	PWVX	R	90(2)	-	600	-	-	(40)	-	-	-	-	-
Non-Power-Limited Fire Alarm Signaling:														
Types: NPLF, NPLFR, NPLFP	760	HNHT	R	(4)	-	(22)	-	-	-	-	-	-	-	(75)
Power and Control Tray Cable: Type TC	336	QPOR	R	(14)	(8)	600 or 2 kV	-	(35)	Yes	(45)	(47)	(50)	-	(57, 58, 59, 71)
Service Entrance:														
Types SE	338	TYLZ	R	(14)	-	600	Yes	Yes	(40)	-	-	-	-	-
USE	338	TYLZ	R	75(1)	75(1)	600	Yes	Yes	-	-	-	Yes	(51)	-
USE-2	338	TYLZ	R	90	90	600	Yes	Yes	-	-	-	Yes	(51)	-
<b>Underground Feeder and Branch Circuit Cable:</b>														
Types UF	340	YDUX	R	60	60	600	(31)	(35)	(40)	-	-	Yes	(51)	-
UF-B	340	YDUX	R	90(2)	60	600	(31)	(35)	(40)	-	-	Yes	(51)	-
Instrumentation Tray Cable: Type ITC	727	NYTT	R	(4)	-	(22)	-	Yes	Yes	-	-	(50)	-	(74)
Data Processing Cable	645	EMRB	R	(4)	-	(22)	-	-	-	-	-	-	-	-



WIRE AND CABLE MARKING TABLE  
 TABLE 3 - SPECIAL PURPOSE  
 WIRES AND CABLE

Article	NEC® CCN	UL Mark On Product	Temperature (°C)Dry	Temperature (°C)Wet	Voltage (V)	Outdoor Use	Sunlight Resistance	Cable Tray Use	Oil Resistance	Gasoline Resistance	Direct Burial	Submersible Pump Use	Other
Boat Cable	600	BDFX	R	(10)	(25)	-	-	-	(45)	-	-	-	-
Gas-Tube-Sign Cable: Type GTO	675	ZJQX	R	-	(26)	-	Yes	-	-	-	-	-	(72)
Irrigation Cable	675	OFFY	R	75	600	Yes	Yes	-	-	-	-	-	-
Machine Tool Wires: Type MTW	670	ZKHZ	R	90	600	-	(35)	(40)	Yes	(46)	-	-	(67)
Marina and Boatyard Cable	555	PDYQ	R	75	600	-	Yes	-	Yes	Yes	-	-	-
Portable Power Cables: Types W, G, G-GC, PPE	400	QPMU	R	75	2000	(33)	(35)	-	Yes	-	-	-	-
Shipboard Cable, Marine	-	UBVZ	R	(4)	(25)	-	-	-	Yes	-	-	-	-
Welding Cable	630	ZMAY	R	60(11)	100 or 600	Yes	-	(41)	(45)	-	-	-	-
Festooning Cable	-	ZMHX	R	(4)	600	(30)	(36)	-	Yes	-	-	-	-
Flexible Stage and Lighting Power Cable: Types SC, SCE, SCT	400	ILPH	R	60(15)	600	(30)	(36)	-	Yes	-	-	-	-
Golf Course Sprinkler Wire	-	ZMHX	O	60	300	-	-	-	-	-	Yes	-	-
Inductive-Loop Detector Lead-In Cable	-	ZMHX	R	60	600	(32)	-	-	(45)	-	-	-	-
Heat-Resistant Wire: Types TGT, TGS, TMGT, TAGT, KGS, KGT, TGGT, ITFL	-	ZMHX	O	(4)	300	-	-	-	-	-	-	-	(64)
Irrigation-Machine Feeder Cable	675	ZMHX	R	60	600	-	-	-	-	-	Yes	-	-
Photovoltaic Wire	630	ZKLA	R	90	600	Yes	Yes	-	-	-	-	-	-
Recreational Vehicle Cable (Low Voltage)	551	ZKRU	R	(8)	(22)	-	-	-	-	-	-	-	-
RF Coaxial Cable	820	ZMHX	R	60	(22)	-	-	-	-	-	-	-	60
Satellite Antenna Cable	725	ZMHX	R	(4)	(25)	-	(35)	-	-	-	(50)	-	(60, 65)
Slotted Coaxial Cable	820	ZMHX	R	60	(22)	-	-	-	-	-	-	-	-
Submersible Pump Cable Using TPE Insulation	-	ZMHX	R	(4)	600	Yes	Yes	-	-	-	-	Yes	60
Telephone Drop Wire	800	ZMHX	R	60	300	Yes	Yes	-	-	-	-	-	(69)
Traffic Signal Cable	-	XNTL	O	-	(25)	-	Yes	-	-	-	-	-	(66)
Undercarpet Digital Communications Cable	800	ZMHX	R	60	(22)	-	-	-	-	-	-	-	-
Underground Signal Cable	725	ZMHX	O	60	150	-	(35)	-	-	-	Yes	-	-
Vault Lacing Cable	-	ZMHX	O	60	150	-	-	-	-	-	-	-	-

## EXPLANATIONS AND NOTES FOR MARKING TABLES

The column headings of Tables 1, 2 and 3 identify:

### WIRE AND CABLE CATEGORY/TYPE

Lists each wire, cable and flexible cord category as it appears in UL's Electrical Construction Equipment Directory. Generally, the category, type or both are on the product.

### NEC®ARTICLE

Indicates the primary NEC® Article that references the category/type. Not marked on the product.

### CATEGORY CONTROL NUMBER (CCN)

Indicates the UL Guide Designation or Category Control Number (CCN) as it appears in UL's Electrical Construction Equipment Directory. Not marked on the product.

### UL MARK ON PRODUCT

Indicates whether the UL Mark ("UL" in a circle) is required (R), optional (O) or prohibited (P) on the product. See the section titled "UL Listing Mark."

### TEMPERATURE (°C) DRY AND TEMPERATURE (°C) WET

These two columns indicate temperature rating for the wire and cable when used in dry locations or when exposed to water or moisture such as in wet and damp locations. Numbers in parentheses indicate the following:

- (1) Wire evaluated for use at 90°C dry and wet is marked with the suffix "-2" after the Type designation.
- (2) Cable is to be used at the ampacity for 60°C conductors in accordance with NEC®, Table 310-16.
- (3) Cords evaluated for water resistance have a "W" in the Type designation, i.e. Type SJTW. The terms "water resistant" or "water resistant 60C" may also be marked in addition to the "W" designation.
- (4) The wire or cable has been investigated for the temperature rating marked on the product, tag, reel or smallest unit container.
- (5) Types MV-90 and MV-105 are evaluated for use in wet or dry locations at 90°C and 105°C, respectively. Type MV-90 DRY is only evaluated for use in dry locations at 90°C.
- (6) Cable evaluated for wet-location use is marked "WET-LOCATIONS CABLE" or "WET-LOCS CABLE." Cable containing conductors evaluated for wet-location use may be marked, but such marking is not required.
- (7) 250°C for special applications in locations where environmental conditions require operation at above 90°C temperature. Temperatures of fittings are limited to 85°C in dry locations and 60°C in wet locations.
- (8) Wire or cable evaluated for wet-location use is marked "60°C WET" or "75°C WET."
- (9) Temperature rating may be indicated on the product by colored marker threads located under either the insulation or separator as in the following table:

<b>Table</b>	<b>Rating (°C)</b>	<b>Color</b>
RFH-2, FFH-2	75	Green
TFN, TFFN RFHH-2 and RFHH-3	90	Red
XF, XFF, SFF-1, SFF-2, PFF, PGFF, ZF, ZFF	150	Orange
SF-1, SF-2, PF, PGF, ZHF	200	Black

(10) The cable is marked with one of the following temperature ratings or codes; when no code is indicated, the product is marked with the rating.

<b>Rating</b>	<b>Code</b>
60°C dry 60°C wet	BC-1W1
75°C dry 60°C wet	BC-2W1
75°C dry 75°C wet	BC-2W2
80°C dry 60°C wet	BC-3W1
80°C dry 75°C wet	BC-3W2
90°C dry 60°C wet	BC-4W1
90°C dry 75°C wet	BC-4W2
105°C dry 60°C wet	BC-5W1
105°C dry 75°C wet	BC-5W2
105°C (dry only)	
125°C (dry only)	
200°C (dry only)	

- (11) Welding cable rated 600V is investigated for use in 75°C dry or wet locations.
- (12) 90°C dry and damp location. 150°C dry locations for special applications in locations where environmental conditions require maximum conductor operating temperatures above 90°C.
- (13) 200°C in dry locations for special applications.
- (14) The temperature rating of the cable is the rating marked on the cable or implied by the conductor type in the cable.
- (15) Indicates minimum temperature rating. Suitable for use at higher temperatures if marked on the cable or cord. The higher temperatures (above 60°C) only apply to dry applications.
- (16) May be rated 600 volts when employing 45 mil insulation.
- (17), (18), (19) Notes not used.

## VOLTAGE (V)

Indicates voltage rating. If the rating is not marked on the product, the wire or cable has been evaluated for the rating entered in the table. If marked higher than the rating in the table, it is rated as marked. Notes in the tables indicate the following:

- (20) The voltage rating (kV) is one of the following, as marked: 5, 8, 15, 25, 28 or 35.
- (21) 600V or 2kV. Type MC cable containing Type MV conductors has the voltage rating of the conductors. Type MV cable in Type MC cable armor is surface or tape marked "Type MV Type MC" and it has a Type MV cable Listing Mark.
- (22) Type designation indicates suitability for use in accordance with the appropriate *NEC*® Article, with respect to voltage and power limitations.
- (23) Note not used.
- (24) Rating is indicated by number in the Type designations as follows:

<u>Suffix</u>	<u>Rating (V)</u>
-1	300
-2	600

- (25) The wire or cable may be evaluated for various voltage ratings. The rating is marked on the product, a tag attached to the reel or smallest unit container.
- (26) Voltage rating is indicated on the product by a suffix after the Type designation as follows:

<u>Suffix</u>	<u>Rating (kV)</u>
-5	5
-10	10
-15	15

- (27) Some Mineral-Insulated cable may be rated 300V for use in Class 1 remote control and signaling circuits not exceeding 300V.
- (28), (29) Notes not used.

## OUTDOOR USE

"Yes" indicates that the wire or cable has been evaluated for direct exposure to outdoor conditions. Generally, there is no marking indicating outdoor use coverage. Notes in the tables indicate the following:

- (30) A product evaluated for outdoor use has a "W" in its Type designation, e.g. "SJTW." It may additionally have the word "OUTDOOR." For a cord evaluated and marked for recreational vehicle or mobile home use, outdoor use always applies and the marking "W" is optional.

NOTE: Type CMX cable marked "Outdoor" is suitable for installation outdoors on dwellings.

- (31) Type UF and UF-B cables evaluated for installation above-ground are marked "SUNLIGHT RESISTANT."
- (32) Cable evaluated for outdoor use is marked "outdoor" or "outdoor use".
- (33) Cable evaluated for outdoor use is marked "SUNLIGHT RESISTANT" or "SUN. RES." plus "60°C WET" or "75°C WET."
- (34) Type CMX cable marked "Outdoor" is suitable for installation outdoors on dwellings.

## SUNLIGHT RESISTANCE

"Yes" indicates that the outer nonmetallic covering of the product has been evaluated for direct exposure to ultraviolet (UV) radiation from the sun. This coverage is not generally marked on the product. Cables with an overall metallic covering are always considered suitable for exposure to sunlight. The use limitations and associated markings are specified in the tables by the following:

- (35) A product evaluated for sunlight resistance is marked "SUNLIGHT RESISTANT", "SUN. RES.", or "SR."
- (36), (37), (38), (39) Notes not used.

## CABLETRAY USE

"Yes" indicates that the cable has been evaluated for use in cable trays in accordance with *NEC*® Articles 310, 318 and other applicable Articles. Generally, this coverage is not marked on the product. Notes in the tables indicate the following:

- (40) When evaluated for use in cable trays, the product is marked "for cable tray use," "for CT use" or "for use in cable trays."
- (41) For trays dedicated to welding cable only, per *NEC*® Article 630, Part E. Generally not marked on the product.
- (42), (43), (44) Notes not used.

## OIL RESISTANCE

"Yes" indicates that the product has been investigated for use in locations exposed to mineral oil at a temperature of 60°C or less. Generally, this coverage is not marked on the product. If the product has been investigated for oil resistance at higher than 60°C temperatures, it is rated as marked.

- (45) A product evaluated for 60°C oil resistance is marked "OIL RESISTANT I", "OIL RES I", "OIL RESISTANT", or "PR1."

A product evaluated for 75°C oil resistance is marked "OIL RESISTANT II", "OIL RES II", or "PR2."

## GASOLINE RESISTANCE

"Yes" indicates that the product has been evaluated for use in locations exposed to liquid gasoline, gasoline vapors and vapors from similar light petroleum solvents. Generally, this coverage is not marked on the product. Notes in the tables indicate the following:

- (46) A product evaluated for 60°C oil resistance and for gasoline resistance is marked "GASOLINE AND OIL RESISTANT I", or "GR1." Similarly, for 75°C oil and for gasoline resistance, the product is marked "GASOLINE AND OIL RESISTANT II" or "GR2."

(47) When evaluated for gasoline resistance only, the insulated conductors are marked “GASOLINE RESISTANT.” If this marking appears on the outer covering of the cable, “GASOLINE RESISTANT” is followed by “CDRS,” “CONDS” or “CONDUCTORS.”

(48), (49) Notes not used.

## **DIRECT BURIAL**

“Yes” indicates that the wire or cable has been evaluated for direct burial in the earth. Generally not marked on the product. Notes in the tables indicate the following:

(50) When evaluated for direct burial use, the product is marked “FOR DIRECT BURIAL,” “DIRECT BURIAL,” “DIR BUR” or “DIR BURIAL.”

## **SUBMERSIBLE PUMP USE**

“Yes” indicates that the wire or cable has been evaluated for use in wiring of pumps and/or submersible pumps. Product name identifies the use. Notes in the tables indicate the following:

(51) When evaluated, the product is marked “PUMP CABLE” or “SUBMERSIBLE PUMP CABLE.”

(52), (53), (54) Notes not used.

## **OTHER**

Uses, exposures, and constructional features not otherwise covered in the tables are referenced in this column through the following notes. If not otherwise specified, the product has not been evaluated for any other condition unless marked on the product.

(55) Nickel or nickel-based alloy may be used with the product. Marking not required.

(56) Product is marked with the ampacity: “\_\_\_\_ amp” or “\_\_\_\_ A.”

(57) Optical Fibers. When these are present, the product is marked “Contains optical-fiber member(s)” or “OF” after the wire or cable Type designation.

(58) Gas/Vapor Blocked. When evaluated for gas/vapor blocking, the product is marked with “Gas/Vapor Blocked,” the minimum length required to attain the blocking, and the designation of the hazardous location for which the wire or cable is intended, such as “Class \_\_\_\_, Group \_\_\_\_.”

(59) The overall jacket on Types TC and PLTC is a “gas/vapor tight continuous sheath” as discussed in Sections 501-5(d) and 501-5(e) of the *NEC*®.

(60) Copper-clad steel conductor may be used with product. Marking not required.

(61) Each pair of thermocouple-extension wires is marked with the nominal AWG size and one of three designations — “THCPLXEXTN,” “For thermocouple-extension use only” or “Thermocouple-extension wire only,” — plus an identification(s) from either of the following columns for the combination(s) of thermocouple-extension conductor metals used:

<u>Type Designation</u>	<u>Combination of Metals</u>
JX	Iron/Constantan
KX	Chromel/Alumel
TX	Copper/Constantan
EX	Chromel/Constantan
SX, RX	Copper/Alloy
BX	Copper/Copper
NX	Nickel-Chromium-Silicon/Nickel-Silicon-Magnesium
GX	Tungsten/Tungsten-26% Rhenium
CX	Tungsten-5% Rhenium/Tungsten-25% Rhenium
DX	Tungsten-3% Rhenium/Tungsten-25% Rhenium

Only cables containing thermocouple-extension wire may have the markings on the cable instead of having each pair marked.

- (62) Recreational Vehicle or Mobile Home Use. When evaluated for this use, the product is marked “For Mobile Home or Recreational Vehicle Use: \_\_\_\_\_ Amperes.”
- (63) Low Leakage Current Rating. When evaluated for use as low leakage-current cord in a cord set or power-supply cord for earth-grounded, direct-patient, contact medical and dental equipment, the cable is marked “Max leakage/10 ft. at \_\_\_\_\_ V: \_\_\_\_\_  $\mu$ A to green and \_\_\_\_\_  $\mu$ A thru jacket.”
- (64) Various conductor materials may be used. The metal type is marked on the tag attached to the reel or smallest unit container.
- (65) Insulated conductors evaluated for a 600V rating are marked “Power Leg” on the insulation surface.
- (66) Conductive Thermoplastic Shield or Jacket. Jacket or thermoplastic shield is conductive when the product is marked “Conductive PVC shield” or “Black material is conductive.”
- (67) Flexing and Constant-Flexing Services. When evaluated for flexing services, the product is marked “Flexing” or “Class K.” When evaluated for constant-flexing services, the product is marked “Constant flexing,” “Class M” or “Class K.”
- (68) Listed cables that are additionally marked “Verified UL Category 2, 3, 4, 5 or 5E or 6” comply with the UL Data-Transmission Performance Category Marking Program. “CAT” may be substituted for “Category.” Listed cables that are additionally marked “Verified in Accordance With (Specification: Name and/or number)” comply with the requirements of a referenced transmission performance specification. For example, “Verified (UL) Category 6 or 7 NEMA WC-66.”

**Category 1** — Category 1 cable performance is intended for basic communications and power-limited circuit cable. There are no performance criteria for cable at this level. The word “Verified ” is not to be used in association with Category 1.

**Category 2** — Category 2 cable performance requirements are similar to those for Type 3 cable (multi-pair communications cable) of the IBM Cabling System Technical Interface Specification (GA27-3773-1).

**Category 3** — Category 3 data cable complies with the transmission requirements in the Telecommunications Industry Association/Electronic Industries Association (TIA/EIA) 568B Commercial Building Telecommunications Category Standard.

**Category 4** — Category 4 cable complies with the requirements in the Telecommunications Industry Association/Electronic Industries Association (TIA/EIA) 568B Commercial Building Telecommunications Category Standard.

**Category 5** — Category 5 cable complies with the requirements in the Telecommunications Industry Association/Electronic Industries Association (TIA/EIA) 568B Commercial Building Telecommunications Category Standard.

**Category 5E** — Category 5E cable complies with the requirements in the Telecommunication Industry Association/Electronic Industries Association (TIA/EIA) 568B Commercial Building Telecommunications Category Standard Addendum No. 5.

**Category 6** — Category 6 cable complies with the requirements in the Telecommunication Industry Association/Electronic Industries Association (TIA/EIA) 568B Commercial Building Telecommunications Category Standard TIA/EIA 568B.2-1.

- (69) Classified in accordance with International Municipal Signal Association, Inc. (IMSA) specifications. Intended for use in underground conduit or as an aerial cable only. Not evaluated for use as a substitute for cables or wiring systems covered in the *NEC*®.
- (70) "00" indicates oil resistant insulation and jacket. "0" indicates oil resistant jacket only.
- (71) Cable suitable for use as described in NEC Section 336.10(7) is surface marked with the suffix "-ER" (formally "Open Wiring") directly following the Type letters.
- (72) Cables marked "Integral Sleeve" have been evaluated for equivalence to a GTO cable with a sleeve installed over it as required in some electric signs.
- (73) MI Cables with outer nonmetallic jackets are:
  - (1) not suitable for use in ducts, plenums, or other spaces used for environmental air and are so marked.
  - (2) marked "not suitable for use on or in buildings" if they have not been investigated for flame retardance. Such cables are sunlight resistant.
  - (3) marked for cable tray use if they comply with the applicable flame test. These cables may be marked for sunlight resistance if applicable.
- (74) Cables suitable for use as described in NEC Sections 725.61(D)(4) or 727.4(6) are surface marked "Open Wiring."
- (75) Plenum cables (those with a "P" as the last letter) may also be Listed as "Limited Combustible Cable." All marking requirements apply.

## APPENDIX A

### WIRE, CABLE AND CORD DESIGNATIONS

In general, the letter designations assigned to wire, flexible cord and cable in the *NEC*<sup>®</sup>, for identification purposes, are established according to a coding system that provides information on intended use, insulation type and insulation temperature rating. This coding system, to which there are exceptions, does not cover all *NEC*<sup>®</sup> designations. The coding system is as follows:

#### CONDUCTORS FOR GENERAL WIRING

##### *NEC*<sup>®</sup> Article 310, Table 310-13

A	—	Asbestos (obsolete; now must be glass fiber or similar material)
FEP	—	Fluorinated ethylene propylene insulation
H	—	75°C (Note: Lack of "H" indicated 60°C)
HH	—	90°C
L	—	Lead sheath
N	—	Nylon jacket
PF	—	Perfluoroalkoxy insulation
R	—	Thermoset insulation
S	—	Silicone (Thermoset) insulation
T	—	Thermoplastic insulation
U	—	Underground use
W	—	Moisture resistant
X	—	Cross-linked synthetic polymer insulation
Z	—	Modified tetrafluoroethylene insulation

Examples:           RHW—Thermoset Insulation, 75°C Wet

                          THHN—Thermoplastic Insulation, 90°C dry, nylon jacket

## FLEXIBLE CORD AND CABLE

### NEC® Article 400, Table 400-4

C	—	Cotton or rayon braid
E	—	As first letter — Elevator cable
E	—	After first letter — Thermoplastic elastomer insulation
H	—	Heater cord
NI	—	“Non-Integral,” used for parallel cords such as Type NISPT-1 to denote insulated conductors and jacket are separate
O	—	Oil resistant. Single “O” means jacket only is oil resistant; double “O” means jacket and conductor insulation are oil resistant
P	—	Parallel conductor cord
S	—	Hard Service Flexible Cord
SJ	—	Junior Hard Service Flexible Cord
T	—	As first letter — Tinsel cord. Single flattened No. 27 AWG conductor wound around insulating core, for very low current, highly flexible application
T	—	After first letter — Thermoplastic insulation
-1, -2, -3	—	Insulation thickness for parallel cords, thinnest to thickest. Actual insulation thickness varies with cord type and AWG size
XTW	—	Parallel cord for decorative lighting strings
CXTW	—	Twisted pair cord or single conductor for decorative lighting strings
W	—	Moisture and sunlight resistant

Examples: SJTO—Junior Hard Service, thermoplastic, oil resistant jacket

SPT-2—Parallel Cord Service, thermoplastic

## FIXTURE WIRE

### NEC® Article 402, Table 402-3

- F — Fixture wire, standard stranding
- FF — Fixture wire, flexible stranding
- G — Glass braid
- H — 75°C insulation
- HH — 90°C insulation
- K — Aromatic polyimide tape insulation
- N — Nylon jacket
- P — Fluorinated ethylene propylene insulation
- R — Thermoset insulation
- S — Silicone (Thermoset) insulation
- T — Thermoplastic insulation
- X — Cross-linked synthetic polymer insulation
- Z — Modified tetrafluoroethylene insulation
- 1, — Insulation thickness, thinnest to thickest for some types. Actual insulation thickness varies  
-2, with insulation types and AWG size.  
-3

Examples: SF-1—Silicone rubber fixture wire

TFF—Thermoplastic, flexible stranded fixture wire

## APPENDIX B

### WIRE, CABLE AND CORD LISTING INFORMATION

#### ARMORED CABLE (AWEZ) GENERAL

This category covers armored cable in sizes 14-1 AWG copper and 12-1 AWG aluminum or copperclad aluminum and rated 600 V or less. Aluminum-armored cable is suitable for use in alternating current circuits only. Armored cable is for use in accordance with Article 320 of ANSI/NFPA 70, "National Electrical Code."

**ACTH** — Indicates armored cable rated 75°C employing conductors having thermoplastic insulation.

**ACTHH** — Indicates armored cable rated 90°C employing conductors having thermoplastic insulation.

**ACHH** — Indicates armored cable rated 90°C employing conductors having thermosetting insulation.

Armored cable connectors (box connectors) other than the direct bearing setscrew type are suitable for use on cable employing aluminum armor.

For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### PRODUCT MARKINGS

Armored cable complies with the Flame and Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables" and may be marked with the suffix "LS" and/or "For Use in Cable Trays."

Cable with aluminum armor is identified with the words "ALUMINUM ARMOR" on a marker tape and tag on coils.

Cable with copper-clad aluminum conductors is identified with the designation "AL (CU-CLAD)" or "Cu-Clad Al." on a tag, on the carton or reel. Cable with aluminum conductors is identified with the designation "AL" on a tag, on the carton or reel.

In addition, cable with compact-stranded copper conductors is identified with the designation "Compact Copper" or "CMPCT CU" following the conductor size and the words "Terminate with connectors identified for use with compact-stranded copper conductors" on a tag, on the carton or reel.

#### RELATED PRODUCTS

For fittings suitable as a grounding means, see Armored Cable Connectors (**AWSX**).

#### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### REQUIREMENTS

The basic standard used to investigate products in this category is UL 4, "Armored Cable."

#### UL MARK

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 products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate:

Armored cable that contains copper or copper-clad aluminum conductors has the product name "Armored Cable"; armored cable that contains aluminum conductors has the product name "Armored Aluminum Cable." Armored cable that has aluminum armor has the product name "Aluminum Armored Cable."

#### BOAT CABLE (BDFX)

##### GENERAL

This category covers boat cable, which consists of a single insulated conductor without a jacket or two or more insulated conductors with or without an overall nonmetallic jacket, and which is suitable for use in marine pleasure crafts. Boat cable is rated 600 V or less, 60°C (122°F) or 75°C (167°F) wet, 60 to 200°C dry locations and, for cable so marked, 60°C (140°F) and lower temperatures where exposed to oil. The cable employs stranded copper conductors in a size range of 18 to 4/0 AWG inclusive for multiple-conductors, 16 to 4/0 AWG inclusive for single conductors.

Ampacities shall be in accordance with United States Coast Guard Regulations Title 33, Chapter I Parts 183.430 and 183.435 of the CFR.

#### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**) and Marine Products (**AAMP**).

#### REQUIREMENTS

The basic standard used to investigate products in this category is UL 1426, "Electrical Cables for Boats."

Cable rated 600 V is investigated to UL 1426. Cable rated 50 V is investigated to SAE J1127, J1128 or J378b.

## UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Boat Cable."

### COMMUNICATIONS CABLE (DUZX) USE AND INSTALLATION

This category covers communications cable which is a single conductor coaxial cable or a multiple conductor jacketed cable for telephone and other communications circuits for use as described in Article 800 of ANSI/NFPA 70, "National Electrical Code" (NEC).

This cable is used as wiring from a protector to a telephone or other communications equipment within a building, and for use as interconnecting wiring between parts of a communications system.

Except for special locations specifically required by the NEC, communications cable, in general, is not required to be installed in conduit or raceway.

### PRODUCT MARKINGS

Communications cable is identified by marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

**CM** — Indicates cable intended for general use within buildings in accordance with Section 800.53(E)(1) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

**CMG** — Indicates cable for general use within buildings in accordance with Section 800.53(E)(1) of the NEC. The damage height of this cable does not exceed 4 ft 11 in. when tested in accordance with the CSA FT4 Vertical-Tray Flame Test in UL 1685.

**CMP** — Indicates cable intended for use within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 800.53(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft, when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wire and Cables for Use in Air-Handling Spaces."

**CMR** — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 800.53(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

**CMUC** — Indicates cable for undercarpet use in accordance with Section 800.53(E)(6) of the NEC.

This cable complies with the VW-1 Flame Test requirements in UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

**CMX** — Indicates cable intended for use within buildings (1) where the wire or cable is enclosed in raceway or noncombustible tubing, or (2) in nonconcealed spaces where the exposed length of wire or cable does not exceed 10 ft, or (3) in one- or two-family or multifamily dwellings when the cable diameter is less than 0.25 in., in accordance with Section 800.53(E) of the NEC. Type CMX cable may be marked "Outdoor" to indicate its suitability for installation outdoors on dwellings. This cable complies with the VW-1 Flame Test requirements in UL 1581.

Cable that contains one or more optical fiber members has the suffix "-OF" added to the above.

Cable that complies with the Limited Smoke Requirements specified in UL 1685 is surface marked with the suffix "LS."

Cable marked "Shielded" contains one or more electromagnetic shields.

Cable that complies with the requirements for "Limited Combustible" specified in NFPA 90A,

"Installation of Air Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

Multipurpose cable complies with the requirements for Types CM, CMG, CMP, or CMR and also complies with the requirements as described in Sections 760.71(B) and (I) of the NEC, and has one of the following designations:

**MP\*** — Indicates cable intended for use within buildings in accordance with Section 800.53(E)(1) of the NEC. This cable does not spread flame to the top of the tray when tested in accordance with the requirements of the Vertical-Tray Flame Test in UL 1685.

**MPG\*** — Indicates cable for general use within buildings in accordance with Section 800.53(E) of the NEC. The damage height of this cable does not exceed 4 ft 11 in. when tested in accordance with the CSA FT4 Vertical-Tray Flame Test in UL 1581.

**MPP\*** — Indicates cable that is intended for use within buildings in ducts, plenums or other spaces used for environmental air in accordance with Section 800.53(B) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5.0 ft when tested in accordance with NFPA 262.

**MPR\*** — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 800.53(E)(1) of the NEC. The flame propagation height of this cable is less than 12 ft when tested in accordance with UL 1666.

\* Types MP, MPR, MPG and MPP cable will no longer be manufactured after July 1, 2003. Cable manufactured before that date continues to be suitable for use in accordance with the NEC Sections shown above.

Listed cable that is additionally marked “Verified (UL) Category 2, 3, 4, 5, 5E or 6 [including latest draft number if applicable]” or “Verified (UL) Category 3, 4, 5, 5E or 6 [including latest draft number if applicable] Patch Cable” for stranded conductor cable, has been investigated in accordance with the UL Data Transmission Performance Category Marking Program and is manufactured under an acceptable quality assurance system.

Listed cable that is additionally marked “Verified (UL) Category 6 or 7 NEMA WC66” has been investigated in accordance with NEMA WC66-1999, “Performance Standard for Category 6 and 7 100 Ohm Shielded and Unshielded Twisted Pair Cable.” Additionally, this cable has been manufactured under an acceptable quality assurance system.

Listed cable that is additionally marked “Verified In Accordance With [Specification name and/or number]” complies with the requirements of a transmission performance specification referenced and is manufactured under an acceptable quality assurance system.

Communications wire is a single wire or unjacketed multi-conductor assembly of these wires that is intended for use in distributing frames and in cross-connect arrays in accordance with Section 800.53(C) of the NEC. This wire or assembly is marked “cross-connect wire.”

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 444, “Communications Cable.”

In addition, the standards used to investigate cables marked “Verified In Accordance With [Specification]” include the applicable Performance Standards.

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Communications Cable.”

Cable that is also Verified to the UL Data Transmission Performance Category Marking Program has the marking “Verified to UL Performance Category Program,” along with the UL symbol (as illustrated in the Introduction of this Directory) on the product, or the UL Verification Mark along with the words “Performance Category Program,” together with the Listing Mark information on the tag, the reel or the smallest unit container. Cable that is also Verified to another transmission performance specification has the marking “Verified in Accordance with [Specification name and/or number],” along with the UL symbol (as illustrated in the Introduction of this Directory) on the product, or the UL Verification Mark along with the applicable Specification name and/or number together with the Listing Mark information on the tag, the reel or the smallest unit container.

#### **COMMUNITY ANTENNA TELEVISION CABLE (DVCS) USE AND INSTALLATION**

This category covers community antenna television cable for use in accordance with Article 820 of ANSI/NFPA 70, “National Electrical Code” (NEC).

#### **PRODUCT MARKINGS**

Community antenna television cable is identified by marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

**CATVP** — Indicates cable intended for use within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 820.51(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame-spread distance of 5 ft when tested per NFPA 262, “Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.”

**CATVR** — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 820.51(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, “Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.”

**CATV** — Indicates cable intended for general use within buildings in accordance with Section 820.51(C) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581, “Reference Standard for Electrical Wires, Cables, and Flexible Cords.”

**CATVX** — Indicates cable intended for limited use within buildings (1) where the cables are enclosed in raceway or noncombustible tubing, or (2) in nonconcealed spaces where the exposed length of cable does not exceed 10 ft, or (3) installed in one- or two-family or multifamily dwellings when the cable diameter is less than 0.375 in. in accordance with Section 820.51(D) of the NEC. This cable complies with the VW-1 Flame Test requirements in UL 1581.

Type CATVX was known as “Community Antenna Television Cable” and the cable was so marked.

Cable marked “sunlight resistant” or “sun res” may be exposed to the direct rays of the sun.

Cable marked “-30C,” “-40C,” “-50C,” “-60C” or “-70C” complies with a cold bend test conducted at that temperature.

Cable marked “direct burial,” “for direct burial” or “dir bur” has been investigated and found suitable for direct burial in the earth.

Cable that complies with the requirements for “Limited Combustible” specified in NFPA 90A, “Installation of Air Conditioning and Ventilating Systems,” is surface marked “Limited Combustible.”

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1655, “Community Antenna Television Cables.”

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Community Antenna Television Cable.”

#### **DATA PROCESSING CABLE (EMRB)**

##### **GENERAL**

This category covers Type DP data processing cable for use in computer rooms and under the raised floors of computer rooms in accordance with Article 645 of ANSI/NFPA 70, “National Electrical Code.”

The cable consists of one or more insulated conductors that are covered with a nonmetallic jacket. The cable may contain grounding conductors and/or optical fiber members.

##### **PRODUCT MARKINGS**

Data processing cable is identified by marking on the jacket or on a marker tape under the jacket.

This marking includes one of the following Type designations:

**DP-1** — Indicates cable rated 600 V in conductor sizes 18 AWG to 1000 kcmil copper or 12 AWG to 1000 kcmil aluminum or copper-clad aluminum. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581, “Reference Standard for Electrical Wires, Cables, and Flexible Cords.”

**DP-1P** — Indicates cable rated 600 V in conductor sizes 18 AWG to 1000 kcmil copper or 12 AWG to 1000 kcmil aluminum or copper-clad aluminum. This cable meets the requirements of NFPA 262, “Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.”

**DP-2** — Indicates cable rated 300 V in conductor sizes 24 to 8 AWG copper or 12 to 8 AWG aluminum or copper-clad aluminum. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581.

**DP-2P** — Indicates cable rated 300 V in conductor sizes 24 to 8 AWG copper or 12 to 8 AWG aluminum or copper-clad aluminum. This cable meets the requirements of NFPA 262.

**DP-3** — Indicates cable with no voltage rating in conductor sizes 30 to 10 AWG copper for general use and copper-clad steel for use in coaxial conductors. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581.

**DP-3P** — Indicates cable with no voltage rating in conductor sizes 30 to 10 AWG copper for general use and copper-clad steel for use in coaxial conductors. This cable meets the requirements of NFPA 262.

Type DP-3 and Type DP-3P cable is for use in circuits having maximum available ac voltage of 30 V, dc voltage of 60 V, peak voltage of 42.2 V, VA of 100 and current of 8 A or in circuits designated DP-3 in UL 60950, “Information Technology Equipment.”

Cable with aluminum conductors is surface printed “AL.”

Cable with copper-clad aluminum conductors is surface printed “AL (CU-CLAD)” or “Cu-Clad.”

Type DP-1, DP-2 and DP-3 cable that complies with the Limited Smoke Test requirements specified in UL 1685, “Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables,” is surfaced marked with the suffix “-LS.”

The temperature rating of the cable is 60°C unless otherwise marked on the cable.

Cable containing optical fiber members is identified with the suffix “OF.”

Type DP-1, DP-2 and DP-3 cable which has a damage height that does not exceed 4 ft. 11 in. when tested in accordance with the FT-4 Vertical-Tray Flame Test in UL 1581 may have the additional marking "FT-4" on the surface.

For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1690, "Data Processing Cable."

#### **UL MARK**

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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Data Processing Cable, Type DP."

#### **FC CABLE (GQKT) USE AND INSTALLATION**

This category covers Type FC cable which is an assembly of three or four parallel 10 AWG special stranded copper wires formed integrally with an insulating material web. Type FC cable is intended for installation in accordance with Article 322 of ANSI/NFPA 70, "National Electrical Code."

The cable is marked with the size of the maximum branch circuit to which it may be connected, the cable type designation, manufacturer's identification, maximum working voltage, conductor size and temperature rating.

Type FC cable is not intended to be installed outdoors or in wet or damp locations unless identified for use in wet locations.

A marking accompanying the cable on a tag or reel indicates the special metal raceways and specific FC cable fittings with which the cable is intended to be used. Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector and others concerned with the installation.

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

#### **UL MARK**

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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "FC Cable."

#### **NONPOWER-LIMITED FIRE ALARM CABLE (HNHT) USE AND INSTALLATION**

This category covers nonpower-limited fire alarm cable for use in nonpower-limited circuits in accordance with Section 760.30 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Unless a higher temperature rating is marked on the cable, nonpower-limited fire alarm cable is intended for use where the operating temperature does not exceed 60°C. The marked voltage rating is 150 V.

#### **PRODUCT MARKINGS**

Nonpower-limited fire alarm cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

**NPLF** — Indicates cable intended for use within buildings in accordance with Section 760.30(B)(4) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

**NPLFR** — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 760.30(B)(3) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

**NPLFP** — Indicates cable intended for use within buildings in other spaces used for environmental air in accordance with Section 760.30(B)(2) of the NEC. This cable exhibits a maximum peak optical density of 0.50, a maximum average optical density of 0.15, and a maximum flame spread distance of 5.0 ft when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

Cable that complies with the requirements for "Limited Combustible" specified in NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

Cable marked "sunlight resistant" or "sun res" may be exposed to the direct rays of the sun.

Cable marked "-30C," "-40C," "-50C," "-60C" or "-70C" complies with a cold bend test conducted at that temperature.

Cable marked "CI (max voltage \_\_\_\_)" is suitable for use as circuit integrity cable at the maximum voltage to ground indicated, in accordance with Section 760.31(F) of the NEC.

## ADDITIONAL INFORMATION

For additional information, see Fire Alarm Cable (**HNGV**) and Electrical Equipment for Use in Ordinary Locations (**AALZ**).

## REQUIREMENTS

The basic standard used to investigate products in this category is UL 1425, "Cables for Nonpower-Limited Fire Alarm Circuits."

## UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Nonpower-limited Fire Alarm Cable."

## POWER-LIMITED FIRE ALARM CABLE (HNIR) USE AND INSTALLATION

This category covers power-limited fire alarm cable intended for use in power-limited circuits in accordance with Article 760 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Unless a higher temperature rating is marked on the cable, power-limited fire alarm cable is intended for use where operating temperature does not exceed 60°C. The voltage rating is 300 V but is not marked.

## PRODUCT MARKINGS

Power-limited fire alarm cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

**FPL** — Indicates cable intended for use within buildings in accordance with Section 760.61(C) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

**FPLP** — Indicates cable intended for use within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 760.61(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

**FPLR** — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 760.61(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

**Power-limited Fire Alarm Cable** — Indicates cable suitable for use within buildings (1) where the cable is enclosed in a raceway, or (2) in nonconcealed spaces where the exposed length of cable does not exceed 10 ft, in accordance with Sections 760.61(C)(2) and (3) of the NEC. This cable complies with the VW-1 Flame Test requirements in UL 1581.

Listed Type FPLP cable that is additionally marked "Also Classified NYC CERT Fire Alarm Cable" has been evaluated in accordance with the requirements of the Fire Alarm Code of the Department of Buildings of the City of New York.

Cable that complies with the requirements for "Limited Combustible" specified in NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

Cable marked "direct burial," "for direct burial" or "dir bur" has been investigated and found suitable for direct burial in the earth.

Cable marked "sunlight resistant" or "sun res" may be exposed to the direct rays of the sun.

Cable marked "CI (max voltage \_\_\_\_)" is suitable for use as circuit integrity cable at the maximum voltage to ground indicated, in accordance with Section 760.71(G) of the NEC.

## ADDITIONAL INFORMATION

For additional information, see Fire Alarm Cable (**HNGV**) and Electrical Equipment for Use in Ordinary Locations (**AALZ**).

## REQUIREMENTS

The basic standard used to investigate products in this category is UL 1424, "Cables for Power-Limited Fire-Alarm Circuits."

## UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power-limited Fire Alarm Cable."

In addition, the Listing Mark for cable also Classified for use in accordance with the requirements of the Fire Alarm Code of the Department of Buildings of the City of New York includes the statement "Also Classified for Use as Fire Alarm Cable in New York City."

**FLAT CONDUCTOR CABLE, TYPE FCC (IKKT)  
GENERAL**

This category covers flat conductor cable, Type FCC, which is an assembly of three or more solid, flat, parallel, insulated copper conductors. The cable is intended for installation in accordance with Article 324 of ANSI/NFPA 70, "National Electrical Code." The cable is marked for use with specific fittings [see Flat Conductor Cable Fittings (IKMW)] to make up a particular flat conductor cable, Type FCC, wiring system.

The cable is marked on both sides with the manufacturer's identification, wire size in AWG, Type FCC, 300 V, temperature rating and ampacity. Type FCC cable always has one conductor identified as the grounding conductor and one conductor identified as the grounded conductor. The identification means shall be printing or striping the conductor green (grounding) or white (grounded).

Installation instructions are supplied by the manufacturer for use by the general contractor, erector, electrical contractor, electrical inspector and others concerned with the installation.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**UL MARK**

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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flat Conductor Cable, Type FCC."

**FLEXIBLE STAGE AND LIGHTING POWER CABLE (ILPH)  
USE AND INSTALLATION**

This category covers flexible stage and lighting power cable constructed for use in accordance with Article 400 of ANSI/NFPA 70, "National Electrical Code" (NEC). Flexible stage and lighting cable consists of either a single insulated conductor or two or more insulated conductors, with or without fully insulated equipment grounding conductors, with an overall jacket.

**RATINGS**

The cable is rated 600 V, 60°C, 75°C, 90°C or 105°C. The cable is intended for use at ampacities in accordance with Table 400.5(B) of the NEC. Cable rated 105°C has the same ampacities assigned to 90°C rated cable in Table 400.5(B) and is so marked.

Flexible stage and lighting power cable employs flexible stranded copper conductors in a size range of 8 AWG to 250 kcmil and is designated as Type SC (thermoset insulation and jacket), Type SCT (thermoplastic insulation and jacket) and Type SCE (thermoplastic elastomer insulation and jacket).

**PRODUCT MARKINGS**

Cable marked "Oil Resistant 60C" is suitable for exposure to oil at 60°C. Cable marked "Oil Resistant 75C" is suitable for exposure to oil at 75°C.

Cable marked "water resistant" is suitable for immersion in water.

This cable may be marked "-40C." If so marked, the cable complies with a bend test (not a suppleness test) at -40°C. Cable marked "-50C," "-60C" or "-70C" complies with a bend test (not a suppleness test) at -50°C, -60°C or -70°C, as applicable.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic requirements used to investigate products in this category are contained in Subject 1680, "Outline of Investigation for Stage and Lighting Cables."

**UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Flexible Stage and Lighting Power Cable."

**HOISTWAY CABLE (MSZR)**  
**GENERAL**

This category covers hoistway cable which is a single and multiple conductor cable for use in raceways in accordance with Article 620 of ANSI/NFPA 70, "National Electrical Code." Insulated conductors are 20 to 14 AWG inclusive. Multiple-conductor cable consists of insulated conductors cabled together with a suitable binder or sheath. The cable is rated 300 V or 600 V. The temperature rating, if so marked, is 90°C, otherwise it is 60°C. All cable complies with a vertical flame test.

**PRODUCT MARKINGS**

Hoistway cable is identified by the words "Hoistway Cable" printed on each insulated conductor and on the sheath, if provided.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 62, "Flexible Cord and Fixture Wire."

**UL MARK**

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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Hoistway Cable."

**INSTRUMENTATION TRAY CABLE (NYTT)**  
**GENERAL**

This category covers Type ITC instrumentation tray cable for use only in industrial establishments in accordance with Article 727 of ANSI/NFPA 70, "National Electrical Code" (NEC). The cable consists of two or more insulated copper or thermocouple alloy conductors enclosed within a nonmetallic jacket.

The cable may have a metal sheath or armor over the nonmetallic jacket, and may contain grounding conductors and/or optical fiber members.

The cable is rated 300 V and is intended for use on circuits rated 150 V or less and 5 A or less. The cable is Listed in conductor sizes 22 AWG to 12 AWG. Conductor sizes within a cable may be mixed.

Regarding cable seals outlined in Article 501 of the NEC, Type ITC cable has a sheath which is considered to be gas/vapor tight but the cable has not been investigated for inability to transmit gases through its core.

**PRODUCT MARKINGS**

The cable identification "TYPE ITC" and other markings are visible on the surface of the nonmetallic jacket.

Cable with thermocouple alloy conductors is intended for thermocouple extension use only and is so marked or has the marking "THCPL EXTN."

The temperature rating of the cable is 60°C unless otherwise marked on the cable.

Cable containing optical fiber members is identified with the suffix "OF."

Cable that has been evaluated in accordance with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables" is marked with the suffix "-LS."

Cable investigated for direct burial in the earth is marked "DIRECT BURIAL" or "DIR BUR."

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 2250, "Instrumentation Tray Cable."

**UL MARK**

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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Instrumentation Tray Cable" or "Type ITC."

**IRRIGATION CABLE (OFFY)**  
**GENERAL**

This category covers irrigation cable for use with electrically driven or controlled irrigation machines in accordance with Article 675 of ANSI/NFPA 70, "National Electrical Code."

Irrigation cable used to interconnect enclosures on the structure of an irrigation machine is an assembly of stranded, insulated conductors with nonhygroscopic fillers in a core of moisture and flame resistant, nonmetallic material overlaid with a metallic covering and jacketed with a moisture, corrosion and sunlight-resistant nonmetallic material. Irrigation cable is suitable for direct burial in the earth and may, optionally, be so marked.

This cable may consist of a composite of power, control and grounding conductors in sizes 18 AWG and larger, stranded copper, and is rated 75°C and 600 V.

#### **RELATED PRODUCTS**

Fittings for use with this cable are covered under Outlet Bushings and Fittings (**QCRV**).

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic requirements used to investigate products in this category are contained in Subject 1263, "Outline of Investigation for Irrigation Cables."

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel, or smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Irrigation Cables."

### **LIMITED COMBUSTIBLE CABLE (OWKZ)**

#### **GENERAL**

This category covers electrical and optical fiber cable that meets the limited combustible and smoke developed requirements for cable in ceiling cavity and raised floor plenums in accordance with NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems." This cable also meets the requirements for cable used in ducts, plenums and other spaces used for environmental air in accordance with Articles 725, 760, 770, 800, 820 and 830 of ANSI/NFPA 70, "National Electrical Code".

This cable has a maximum Potential Heat value of 3500 Btu/lb when tested in accordance with NFPA 259, "Standard Test Method for Potential Heat of Building Materials." This cable has a maximum smoke developed index of 50 and a maximum flame spread index of 25 when tested in accordance with UL 723 (NFPA 255), "Test for Surface Burning Characteristics of Building Materials" before and after exposure to elevated temperature and humidity. The cable also meets the requirements for plenum cable in one or more of the following product categories:

- Power-limited Circuit Cable (**QPTZ**) - Types CL2P or CL3P
- Communications Cable (**DUZX**) - Type CMP
- Power-limited Fire Alarm Cable (**HNIR**) - Type FPLP
- Nonpower-limited Fire Alarm Cable (**HNHT**) - Type NPLFP
- Optical Fiber Cable (**QAYK**) - Types OFNP or OFCP
- Community Antenna Television Cable (**DVCS**) - Type CATVP
- Network-powered Broadband Communications Cable (**PWIP**) - Type BLP

#### **PRODUCT MARKINGS**

This cable is identified by the marking "Limited Combustible FHC 25/50" on the surface of the jacket or on a marker tape under the jacket. This marking is immediately followed by one of the Type designations shown above. The cable also has the required markings including optional markings as indicated in the product categories referenced above. This cable may also be verified for transmission performance if authorized in the product categories referenced above, and will bear the appropriate performance verification marking.

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic requirements used to investigate products in this category are contained in Subject 2424, "Outline of Investigation for Cable Marked 'Limited Combustible.'"

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Limited Combustible Cable."

Cable which is also Verified to the UL Data Transmission Performance Category Marking Program has the marking "Verified to UL Performance Category Program," or the UL Verification Mark along with the words "Performance Category Program" together with the Listing Mark information on the tag, the reel, or the smallest unit container. Cable which is also Verified to another transmission performance specification has the marking "Verified in Accordance with [Specification name and/or number]" or the UL Verification Mark along with the applicable

Specification name and/or number together with the Listing Mark information on the tag, the reel, or the smallest unit container.

### **MARINA AND BOATYARD CABLE (PDYQ) USE**

This category covers cable for use as flexible branch circuit and feeder wiring in marinas and boatyards in accordance with Article 555 of ANSI/NFPA 70, "National Electrical Code."

The cable is rated 600 V, 75°C and is suitable for exposure to sunlight, fresh water, salt water, gasoline, diesel fuel and lubricating oil.

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**) and Marine Products (**AAMP**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 83, "Thermoplastic Insulated Wire."

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Marina and Boatyard Cable."

### **MEDIUM-VOLTAGE CABLE (PITY) GENERAL**

This category covers medium-voltage cable rated 5000 to 35,000 V intended for use and installation in accordance with Article 328 of ANSI/NFPA 70, "National Electrical Code" (NEC).

The cable is single or multiconductor, aluminum or copper, with solid extruded dielectric insulation and may have an extruded jacket, metallic covering or combination of both over the single conductors or over the assembled conductors in a multiconductor power cable.

All insulated conductors rated higher than 8000 V have electrostatic shielding. Cable rated 5000 or 8000 V may be shielded or nonshielded.

Nonshielded cable is intended for use where conditions of maintenance and supervision ensure that only competent individuals service and have access to the installation.

#### **PRODUCT MARKINGS**

Shielded cable is marked "MV-90" or "MV-105" and is suitable for use in wet or dry locations at 90 or 105°C.

Nonshielded cable is marked either "MV-90" indicating suitability for use in wet or dry locations at 90°C maximum, or "MV-90 Dry Locations Only" indicating suitability for use only in dry locations at 90°C maximum.

Cable marked "oil resistant I" or "oil resistant II" is suitable for exposure to mineral oil at 60°C or 75°C, respectively.

Cable marked "sunlight resistant" may be exposed to the direct rays of the sun.

Cable intended for installation in cable trays in accordance with Article 392 of the NEC is marked "for CT Use" or "for use in cable trays."

Cable with aluminum conductors is marked with the word "aluminum" or the letters "AL."

The cable is marked with the conductor size, voltage rating and insulation level (100 percent or 133 percent).

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1072, "Medium-Voltage Power Cables."

#### **UL MARK**

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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Medium-Voltage Cable."

### **METAL-CLAD CABLE (PJAZ) GENERAL**

This category covers Type MC metal-clad cable. It is rated for use up to 2000 V, and Listed in sizes 18 AWG through 2000 kcmil for copper, 12 AWG through 2000 kcmil for aluminum, or copper-clad aluminum, and employs thermoset or thermoplastic insulated conductors. It is intended for installation in accordance with Article 330 of ANSI/NFPA 70, "National Electrical Code" (NEC).

The cable consists of one or more insulated conductors; one or more grounding conductors (required for interlocked armor, as needed for smooth or corrugated tube); one or more optional optical fiber members; and an overall metal sheath. The metal sheath is an interlocked metal tape, a corrugated metal tube, or a smooth metal tube. The metal sheath of single-conductor cable is nonferrous. A nonmetallic jacket may be provided under and/or over the metal sheath. Cable with metal armor, rated 5000 to 35,000 V is covered under Medium-voltage Cable (PITY) and is marked "Type MV or MC."

Cable with interlocked armor that has been determined to be suitable for use as a grounding means has interlocked aluminum armor in direct contact with a single, full-sized, bare aluminum grounding/bonding conductor. This cable is marked to indicate that the armor/grounding conductor combination is suitable for ground. The equipment grounding conductor required within all other cable with interlocked armor may be insulated or bare, may be sectioned, and is located in the cable core but not in contact with the armor. Any additional grounding conductors of either design have green insulation.

One insulated grounding conductor may be unmarked, one other may have only a yellow stripe and the balance have surface markings that indicate they are additional equipment grounding conductors or isolated grounding conductors.

The sheath of the smooth or corrugated tube Type MC cable or a combination of the sheath and a supplemental bare or unstriped green insulated conductor is suitable for use as the ground path required for equipment grounding. The supplemental grounding conductor may be sectioned. When sectioned, all sections are identical. Each additional green insulated grounding conductor has either a yellow stripe or a surface marking or both to indicate that it is an additional equipment or isolated grounding conductor. Additional grounding conductors, however marked, are not smaller than the required grounding conductor.

#### **PRODUCT MARKINGS**

Information regarding temperature rating, voltage rating, cable and conductor Type and AWG size is shown either on a marker tape under the armor or on the surface of a nonmetallic jacket, if used.

Copper-clad aluminum conductors are surface printed "AL (CU-CLAD)" or "Cu-clad Al." Aluminum conductors are surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

For termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

Cable suitable for use in cable trays, direct sunlight or direct burial application is so marked. Cable marked for direct burial is also considered acceptable for encasement in concrete.

Cable marked "Oil Resistant I" or "Oil Res I" is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is marked "Oil Resistant II" or "Oil Res II."

Cable containing one or more optical fiber members is marked "MC-OF."

Cable with a nonmetallic outer jacket that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," and all unjacketed metal-clad cable may be marked with the suffix "LS."

Cable with an interlocked armor that is intended as a ground path is marked "armor is grounding path component," and is provided with installation instructions.

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1569, "Metal-Clad Cable."

#### **UL MARK**

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 products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate:

Metal-clad cable that contains copper or copper-clad aluminum conductors has the product name "Metal-clad Cable"; metal-clad cable that contains aluminum conductor has the product name "Metalclad Aluminum Cable."

### **METAL-CLAD CABLE FOR USE IN HAZARDOUS LOCATIONS (PJPP)**

#### **GENERAL**

This category covers Type MC metal-clad cable for use in Class I and II, Division 1 hazardous (classified) locations. It is rated for use up to 35,000 V, and Listed in sizes 18 AWG through 2000 kcmil for copper, 12 AWG

through 2000 kcmil for aluminum, or copper-clad aluminum, and employs thermoset- or thermoplastic-insulated conductors. It is intended for installation in accordance with Articles 334, 501 and 502 of ANSI/NFPA 70, "National Electrical Code" (NEC). Cable containing conductors rated 2 kV may be used in circuits operating at 2 kV, nominal or less, in accordance with Articles 600 and 710 of the NEC. Cable containing conductors rated 5,000 to 35,000 V is intended for installation and use in accordance with Articles 326, 501 and 502 of the NEC.

The cable consists of two or more insulated conductors, one or more grounding conductors, and an overall gas/vapor tight continuous corrugated aluminum sheath. A nonmetallic jacket is provided over the metal sheath.

The equipment grounding conductor required within a cable may be insulated or bare and may be sectioned. Any additional grounding conductors have green insulation. One insulated grounding conductor may be unmarked, one other may have only a yellow stripe and the balance have surface markings that indicate they are additional equipment grounding conductors or isolated grounding conductors. Additional grounding conductors, however marked, are not smaller than the required grounding conductor.

#### **PRODUCT MARKINGS**

Information regarding temperature rating, voltage rating, cable and conductor Type and AWG size is shown on the surface of a nonmetallic jacket. The cable is identified as "Type MC-HL." Cable rated 5,000 to 35,000 V is marked "Type MV or MC-HL."

Copper-clad aluminum conductors are surface printed "AL (CU-CLAD)" or "Cu-clad Al." Aluminum conductors are surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

For termination information see Cable Sealing Fittings for Use in Hazardous Locations (**CYMX**).

Cable suitable for use in cable trays, direct sunlight or direct burial application is so marked. Cable marked for direct burial is also considered acceptable for encasement in concrete.

Cable marked "Oil Resistant I" or "Oil Res I" is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is marked "Oil Resistant II" or "Oil Res II."

Cable investigated in accordance with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables" may be marked with the suffix "LS."

#### **ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (**AAIZ**).

#### **REQUIREMENTS**

The basic standards used to investigate products in this category are UL 1569, "Metal-Clad Cables" and UL 2225, "Metal-Clad Cables and Cable Sealing Fittings for Use in Hazardous (Classified) Locations."

#### **UL MARK**

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 products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Metal-clad cable that contains copper or copper-clad aluminum conductors has the product name "Metal-clad Cable for Use in Hazardous Locations"; metal-clad cable that contains aluminum conductors has the product name "Metal-clad Aluminum Cable for Use in Hazardous Locations."

### **MINERAL INSULATED METAL-SHEATHED CABLE (PPKV)**

#### **GENERAL**

This category covers Type MI mineral insulated metal-sheathed cable which consists of one or more solid copper conductors insulated with highly compressed magnesium oxide and enclosed in a continuous copper or alloy steel sheath, with or without a nonmetallic jacket. It is intended for use in accordance with Article 332 of NFPA 70, "National Electrical Code." Cable rated 600 V is labeled in sizes 16 AWG to 500 kcmil single conductor, 16 to 4 AWG two and three conductor, 16 to 6 AWG four conductor, and 16 to 10 AWG seven conductor constructions. Cable rated 300 V is labeled in two, three, four and seven conductor, sizes 18 to 16 AWG, for use on signaling circuits.

The copper sheath is suitable as an equipment grounding conductor. For cable with alloy steel outer sheath one of the conductors is to be used for equipment grounding.

Nonmetallic jackets or coatings have not been investigated for resistance to corrosion.

## PRODUCT MARKINGS

Information regarding voltage rating, cable Type, and conductor size is shown either on a tag affixed to the reel or carton, or on the surface of the metal sheath. If a nonmetallic jacket is used, the information is printed on the surface of the jacket.

Cable with nonmetallic jackets has the following marking on a tag affixed to the reel or carton: "Not suitable for use in Ducts, Plenums or Other Spaces used for environmental air."

Cable with nonmetallic jackets marked "Not suitable for use on or in buildings" has not been investigated for fire retardance but are sunlight resistant.

Cable with nonmetallic jackets that has been investigated for use in cable trays is surface marked "CT Use" or "Cable Tray Use" and may additionally be marked "sunlight Resistant" if applicable.

## RELATED PRODUCTS

Terminations especially investigated for use with this cable are covered under Mineral Insulated Cable Fittings (PPYT).

## ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

## UL MARK

The Listing Mark of Underwriters Laboratories Inc. affixed to the reel supporting the cable or tag attached to the cable 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Mineral Insulated Metal-Sheathed Cable."

## NETWORK-POWERED BROADBAND COMMUNICATIONS CABLE (PWIP) USE

This category covers network-powered broadband communications cable, which is a jacketed single-conductor coaxial cable or a multiple-conductor jacketed cable, consisting of a combination of coaxial members, insulated conductors and/or optic fiber members. The cable is intended for use in low-power and medium-power circuits in accordance with Article 830 of ANSI/NFPA 70, "National Electrical Code" (NEC). All Types, with the exception of Types BLU and BMU, have been investigated for use where exposed to the direct rays of the sun.

## PRODUCT MARKINGS

Network-powered broadband communications cable is identified by markings on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

**BMU** — Indicates medium-power cable intended for outdoor underground use in accordance with Section 830.151(C) of the NEC.

**BM** — Indicates medium-power cable intended for general use within buildings in accordance with Section 830.151(C) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test described in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," or as an alternative, the damage height of this cable does not exceed 4 ft 11 in. when tested in accordance with the CSA FT4 Vertical-Tray Flame Test also described in UL 1685.

**BMR** — Indicates medium-power cable intended for use within buildings in vertical shafts in accordance with Section 830.151(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested in accordance with ANSI/UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

**BLP** — Indicates cable intended for use in ducts or plenums or other spaces used for environmental air in accordance with Section 830.154(B) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame-propagation distance of 5 ft, when tested in accordance with ANSI/NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

**BLR** — Indicates low-power cable intended for use within buildings in vertical shafts in accordance with Section 830.154(C) of the NEC. The flame propagation height of this cable is less than 12 ft. when tested in accordance with UL 1666.

**BL** — Indicates low-power cable intended for general use within buildings in accordance with Section 830.154(D) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test described in UL 1685, or as an alternative, the damage height of this cable does not exceed 4 ft. 11 in. when tested in accordance with the CSA FT4 Vertical-Tray Flame Test also described in UL 1685.

**BLU** — Indicates low-power cable intended for outdoor underground use in accordance with Section 830.154(D)(3) of the NEC. **BLX** — Indicates cable intended for limited use within buildings in accordance with Sections 830.154(D)(2), (4) and (5) of the NEC. This cable complies with the VW-1 Flame Test requirements in ANSI/UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

Cable that contains one or more optical-fiber members has the suffix "OP" added to the above.

Cable that complies with the Limited Smoke Requirements specified in UL 1685 is surface marked with the suffix "LS."

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic requirements used to investigate products in this category are contained in UL Subject 2261, "Outline of Investigation for Cables for Network-Powered Broadband Communications Systems."

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged, 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Network-powered Broadband Communications Cable."

### **NONMETALLIC-SHEATHED CABLE (PWVX)**

#### **USE**

This category covers Types NM-B and NMC-B nonmetallic-sheathed cable, rated 600 V, intended for use in accordance with Article 334 of ANSI/NFPA 70, "National Electrical Code" (NEC), and Listed in copper sizes 14 to 2 AWG inclusive and aluminum or copper-clad aluminum sizes 12 to 2 AWG inclusive.

This cable contains conductors rated 90°C; however, the ampacities of the cable are those of 60°C conductors as specified in Article 334 and Table 310.16 of the NEC.

#### **PRODUCT MARKINGS**

Cable with copper-clad aluminum conductors is surface marked "AL (CU-CLAD)" or "Cu-clad Al," and cable with aluminum conductors is surface marked "AL."

Wire and cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

Cable suitable for use in cable trays is appropriately marked. Cable marked for cable tray use may also have a supplementary sunlight resistant marking.

Cable that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is surface marked with the suffix "LS."

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 719, "Nonmetallic-Sheathed Cables."

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Nonmetallicsheathed cable that contains copper or copper-clad aluminum conductors has the product name "Nonmetallic-sheathed Cable"; nonmetallic-sheathed cable that contains aluminum conductors has the product name "Nonmetallic-sheathed Aluminum Cable."

### **OPTICAL FIBER CABLE (QAYK)**

#### **USE AND INSTALLATION**

This category covers optical fiber cable which is a jacketed cable for use within buildings in accordance with Article 770 of ANSI/NFPA 70, "National Electrical Code" (NEC). Where optical fiber is installed in a laser system, the system shall comply with the ANSI Z136 laser system safety standards.

#### **PRODUCT MARKINGS**

Optical fiber cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

**OFC** — Indicates cable containing noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers for use in accordance with Section 770.154(C) of the NEC. This cable does not spread fire to the top of the tray when tested as described under UL Flame Exposure (smoke

measurements are not applicable) in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

**OFN** — This cable is the same as Type OFC except it contains no metallic members and no other electrical conductive materials.

**OFNG** — Indicates cable containing noncurrent-carrying conductive members, such as metallic strength members and metallic vapor barriers, for use in accordance with Section 770.154(C) of the NEC. The damage height of this cable does not exceed 4 ft 11 in. when tested as described under FT4/IEEE 1202, "Type of Flame Exposure" (smoke measurements are not applicable) in UL 1685.

**OFNG** — This cable is the same as Type OFCG except it contains no metallic members and no other electrically conductive materials.

**OFNR** — Indicates cable containing noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers for use in vertical runs in a shaft in accordance with Section 770.154(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per ANSI/UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

**OFNR** — This cable is the same as Type OFCR except it contains no metallic members and no other electrically conductive materials.

**OFNP** — Indicates cable containing noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers for use in ducts or plenums or other spaces used for environmental air in accordance with Section 770.154(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested per ANSI/NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

**OFNP** — This cable is the same as Type OFCP except it contains no metallic members and no other electrically conductive materials.

Cable that complies with the requirements for "Limited Combustible" specified in ANSI/NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

Cable that complies with the Limited Smoke Requirements specified in UL 1685 is surface marked with the suffix "LS."

Cable marked "sunlight resistant" or "sun res" may be exposed to the direct rays of the sun.

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/UL 1651, "Optical Fiber Cable".

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Optical Fiber Cable."

Cable also verified to a performance specification under Optical Fiber Cable Verified in Accordance with National or International Specifications (**QAZI**) has the marking "Also Verified [Specification name and/or number]" together with the Listing Mark information on the tag, reel or smallest unit container.

### **OPTICAL FIBER CABLE, FIELD ASSEMBLED (QAZD)**

#### **USE AND INSTALLATION**

This category covers field-assembled optical fiber cable which is an on-site assembly of one or more optical fiber units and an optical fiber jacket. Field-assembled optical fiber cable is intended for installation in buildings in accordance with Article 770 of ANSI/NFPA 70, "National Electrical Code" (NEC). The optical fiber jacket is installed in a manner similar to conduit or raceway. Once the jacket is installed, the optical fiber units are inserted into the jacket, completing the assembly.

Listed field-assembled optical fiber cable is for use with Class I laser products, in accordance with applicable provisions of 21CFR Part 1040, or with light emitting diodes with power levels that do not exceed the limits for Class I lasers.

#### **PRODUCT MARKINGS**

Optical fiber cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the Type designations below and the Listee's name and catalog designation.

**OFN** — Indicates cable containing only optical fiber units for use in accordance with Section 770.53(C) of the NEC. This cable does not spread fire to the top of the tray during the Vertical-Tray Flame Test in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

**OFNP** — Indicates cable containing only optical fiber units, for use in ducts or plenums or other spaces used for environmental air in accordance with Section 770.53(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance, when tested per NFPA 262, “Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.”

**OFNR** — Indicates cable containing only optical fiber units, for use in vertical runs in a shaft in accordance with Section 770.53(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, “Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.”

The marking on the attached tag, coil, reel or smallest unit container in which the optical fiber jacket is packaged includes the following: “For Use Only with Optical Fiber Units, Cat. No. \_\_\_\_\_, manufactured by [company name].”

The marking on the attached tag, coil, reel or smallest unit container in which the optical fiber units are packaged includes the following: “[Company name] Optical Fiber Unit, For Use Only With Optical Fiber Jacket Cat. No. \_\_\_\_\_, manufactured by [company name].”

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1651, “Optical Fiber Cable.”

#### **UL MARK**

The UL symbol on the optical fiber jacket and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the optical fiber jacket is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Field Assembled Optical Fiber Cable.”

#### **PORTABLE POWER CABLE (QPMU)**

##### **GENERAL**

This category covers portable power cable constructed and Listed for use in accordance with Article 400 of ANSI/NFPA 70, “National Electrical Code” (NEC). Portable power cable consists of either a single insulated conductor or two or more insulated conductors, with or without grounding conductors, with an overall fiber reinforced jacket. The insulation and jacket are thermoset on Types G, G-GC and W, and thermoplastic elastomer on Type PPE.

This cable is used to supply power to mobile equipment and machinery and is rated 2000 V, 90°C (194°F) dry, and 60°C (140°F) where exposed to oil. For cable so marked, ratings of 60°C (140°F), 75°C (167°F), or 90°C (194°F) “wet” are also assigned. The term “wet” indicates that the cable is acceptable for immersion in water. Cable that has been investigated for use where exposed to the direct rays of the sun is marked “Sunlight Resistant” or “Sun Res.”

Portable power cable employs flexible stranded copper conductors in a size range of 12 AWG to 500 kcmil, except for single conductor Type W and single conductor Type PPE which employs flexible stranded copper conductors in sizes 12 AWG to 1000 kcmil. Ampacities for portable power cable can be found in Table 400.5(B) of the NEC.

**Type G** — Contains 2 - 6 circuit conductors and a grounding conductor. The grounding conductor is either bare or covered with a green-colored braid or tape, and may either be a single conductor or be sectioned into two or more parts.

**Type G-GC** — Same as Type G except that the cable also contains one, 10 AWG or larger, yellow insulated conductor which is used as a ground check.

**Type W** — Contains 1 - 6 circuit conductors and may or may not contain a grounding conductor. If included, the grounding conductor is fully insulated.

**Type PPE** — Contains 1 - 6 circuit conductors and may or may not contain a grounding conductor. If included, the grounding conductor is fully insulated.

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standards used to investigate products in this category are UL 62, “Flexible Cord and Fixture Wire,” UL 44, “Thermoset-Insulated Wires and Cables” and UL 1581, “Reference Standard for Electrical Wires, Cables, and Flexible Cords.”

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged 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 UL

symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Power Cable."

## **POWER AND CONTROL TRAY CABLE (QPOR)**

### **GENERAL**

This category covers Type TC power and control tray cable intended for use in accordance with Article 336 of ANSI/NFPA 70, "National Electrical Code" (NEC). The cable consists of one or more pairs of thermocouple extension wires or two or more insulated conductors, with or without one or more grounding conductors, with or without one or more optical fiber members and covered with a nonmetallic jacket. A single grounding conductor may be insulated or bare and may be sectioned. Any additional grounding conductor is fully insulated and has a distinctive surface marking. The cable is rated 600 or 2000 V.

The cable is Listed in conductor sizes 18 AWG to 1000 kcmil copper or 12 to 1000 kcmil aluminum or copper-clad aluminum. Conductor sizes within a cable may be mixed. Thermocouple extension conductors are Listed in sizes 24 to 12 AWG.

### **PRODUCT MARKINGS**

Cable with copper-clad aluminum conductors is surfaced printed "AL (CU-CLAD)" or "Cu-clad Al."

Cable with aluminum conductors is surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors." For termination information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

If the type designation of the conductors is marked on the outside surface of the cable, the temperature rating of the cable corresponds to the rating of the individual conductors. When this marking does not appear, the temperature rating of the cable is 60°C unless otherwise marked on the surface of the cable.

Cable investigated for use where exposed to direct rays of the sun is marked "sunlight resistant."

Cable investigated for direct burial in the earth is so identified.

Cable suitable for use between cable trays and utilization equipment in accordance with NEC 336.10(7) is surface marked with the suffix "-ER."

Cable consisting of thermocouple extension wires is surface marked "THCPL EXTN," "For thermocouple extension use only" or "Thermocouple extension wire only."

Cable surface marked "Oil Resistant I" or "Oil Res I" is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is surface marked "Oil Resistant II" or "Oil Res II."

Cable that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is surface marked with the suffix "-LS."

Cable containing optical fiber members is identified with the suffix "-OF."

Regarding cable seals outlined in Article 501 of the NEC, Type TC cable has a sheath which is considered to be gas/vapor tight but the cable has not been investigated for transmission of gases or vapors through its core.

### **RELATED PRODUCTS**

Fittings for use with this cable are covered under Outlet Bushings and Fittings (**QCRV**), Nonmetallic-sheathed Cable Connectors (**PXJV**) or Service Entrance Cable Fittings (**TYZX**).

### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

### **REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/UL 1277, "Electrical Power and Control Tray Cables with Optional Optical-Fiber Members."

### **UL MARK**

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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Power and control tray cable that contains copper or copper-clad aluminum conductors has the product name "Power and Control Tray Cable Type TC"; power and control tray cable that contains aluminum conductors has the product name "Aluminum Power and Control Tray Cable Type TC."

## **POWER-LIMITED CIRCUIT CABLE (QPTZ)**

### **USE**

This category covers power-limited circuit cable intended for use in Class 2 or Class 3 circuits as described in Article 725 of ANSI/NFPA 70, "National Electrical Code" (NEC).

### PRODUCT MARKINGS

Cable with a nonmetallic jacket is identified by a marking on the surface of the jacket or on a marker tape under the jacket. Cable with an outer metal sheath is identified by a marking on a tag attached to the reel or coil. This marking includes one of the following Type designations:

**CL2P or CL3P** — Indicates cable intended for use in Class 2 or Class 3 circuits within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 725.61(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5 a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft, when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

**CL2R or CL3R** — Indicates cable intended for use in Class 2 or Class 3 circuits within buildings in vertical shafts in accordance with Section 725.61(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

**CL2 or CL3** — Indicates cable intended for general use in Class 2 or Class 3 circuits within buildings in accordance with Section 725.61(E) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

**CL2X or CL3X** — Indicates cable intended for use in Class 2 or Class 3 circuits within buildings (1) where the cable is enclosed in raceway or noncombustible tubing, or (2) in nonconcealed spaces where the exposed length of cable does not exceed 10 ft, or (3) in one- or two-family or multifamily dwellings when the cable diameter is less than 0.25 in., in accordance with Section 725.61(E) of the NEC. This cable complies with the VW-1 Flame Test requirements in UL 1581.

**PLTC** — Indicates cable for use in Class 3 circuits within buildings that is suitable for use in cable trays, in accordance with Sections 725.61(C) and (D) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581.

Cable marked "direct burial," "for direct burial" or "dir bur" has been investigated and found suitable for direct burial in the earth.

Cable marked "sunlight resistant" or "sun res" may be exposed to the direct rays of the sun.

Cable marked "wet" or "wet location" is suitable for use in wet locations.

Cable marked "-30C," "-40C," "-60C" or "-70C" complies with a cold bend test conducted at that temperature.

Cable that complies with the requirements for "Limited Combustible" specified in NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," are surface marked "Limited Combustible."

Type PLTC cable suitable for use as open wiring between cable trays and utilization equipment in accordance with Section 725.61(D)(4) of the NEC is surface marked "open wiring."

Listed cable which is additionally marked "In Accordance With [Specification name and/or number]" complies with the requirements of the transmission performance specification referenced and is manufactured under an acceptable quality assurance system.

### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

### REQUIREMENTS

The basic standard used to investigate products in this category is UL 13, "Power-Limited Circuit Cables."

### UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power-limited Circuit Cable."

Cable verified to another transmission performance specification has the Marking "Verified In Accordance With [Specification name and/or number]" together with the Listing Mark information on the tag, reel or smallest unit container.

### SERVICE ENTRANCE CABLE (TYLZ)

#### GENERAL

This category covers service entrance cable designated Type SE and Type USE for use in accordance with Article 338 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Service entrance cable, rated 600 V, is Listed in sizes 14 AWG and larger for copper, and 12 AWG and larger for aluminum or copper-clad aluminum. Type SE cable contains Type RHW, RHW-2, **XHHW**, **XHHW-2**, THWN or

THWN-2 conductors. Type USE cable contains conductors with insulation equivalent to RHW or **XHHW**. Type USE-2 contains insulation equivalent to RHW-2 or **XHHW-2** and is rated 90°C wet or dry.

The cable is designated as follows:

**Type SE** — Indicates cable for aboveground installation. Both the individual insulated conductors and the outer jacket or finish of Type SE are suitable for use where exposed to sun.

**Types USE and USE-2** — Indicates cable for underground installation including direct burial in the earth. Cable in sizes 4/0 AWG and smaller and having all conductors insulated is suitable for all of the underground uses for which Type UF cable is permitted by the NEC. Types USE and USE-2 are not suitable for use in premises or aboveground except to terminate at the service equipment or metering equipment. Both the insulation and the outer covering, when used, on single and multiconductor Types USE and USE-2, are suitable for use where exposed to sun.

**Submersible Water Pump Cable** — Indicates a multiconductor cable in which 2, 3 or 4 single-conductor Type USE or USE-2 cables are provided in a flat or twisted assembly. The cable is Listed in sizes 14 AWG to 4/0 AWG inclusive, copper, and 12 AWG to 4/0 AWG inclusive, aluminum or copper-clad aluminum. The cable is tag marked “For use within the well casing for wiring deep well water pumps where the cable is not subject to repetitive handling caused by frequent servicing of the pump units.”

The insulation may also be surface marked “Pump Cable.” The cable may be directly buried in the earth in conjunction with this use.

For termination information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

Based upon tests which have been made involving the maximum heating that can be produced, an uninsulated conductor employed in a service cable assembly is considered to have the same current-carrying capacity as the insulated conductors even though it may be smaller in size.

#### **PRODUCT MARKINGS**

The Type designation of the conductors may be marked on the surface of the cable. When used, this marking indicates that the temperature rating for the cable corresponds to the temperature rating of the conductors. When this marking does not appear, the temperature rating of the cable is 75°C.

Cable acceptable for installation in cable trays is so marked.

Cable may employ copper, aluminum, or copper-clad aluminum conductors. Cable with copper-clad aluminum conductors is surface printed “AL (CU-CLAD)” or “Cu-Clad Al.” Cable with aluminum conductors is surface printed “AL.”

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel) by “compact copper.” The abbreviations “CMPCT” and “CU” may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: “Terminate with connectors identified for use with compact-stranded copper conductors.”

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 854, “Service-Entrance Cables.”

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name as appropriate: Service entrance cable that contains copper or copper-clad aluminum conductor(s) has the product name “Service-Entrance Cable”; service-entrance cable that contains aluminum conductors has the product name “Aluminum Service-Entrance Cable.”

### **SHIPBOARD CABLE, MARINE (UBVZ) USE AND INSTALLATION**

This category covers cable for installation and use aboard marine vessels, fixed and floating offshore petroleum facilities and mobile offshore drilling units (MODUs) in accordance with Section 111.60 of the United States Coast Guard Electrical Engineering Regulations, Sub Chapter J (Title 46 Code of Federal Regulations, Parts 110 to 113 inclusive). This cable has not been investigated for use in accordance with ANSI/NFPA 70, “National Electrical Code.”

The cable covered under this category is distribution cable rated 600 V, 1 kV, 2 kV or 5 kV, 5-35 kV shielded, control cable rated 600 V, 1 kV, and signal and instrumentation cable rated 300 V.

#### **PRODUCT MARKINGS**

Cable is surface marked with temperature and voltage rating and the cable Type designation.

Cable surface marked with a low temperature rating complies with low temperature bending and low temperature impact tests.

Cable surface marked "FT4" complies with the requirements of the CSA FT4 Flame Test.

Cable that has a continuous corrugated aluminum armor is identified by the marking "CWCMC" in addition to the cable Type designation.

#### **ADDITIONAL INFORMATION**

For additional information, see Marine Products (**AAMP**) and Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1309, "Marine Shipboard Cable."

Listed cable that is additionally marked "ALSO CLASSIFIED IN ACCORDANCE WITH IEEE 1580-2001" complies with the construction and performance requirements of that international standard.

Listed cable that is additionally marked "ALSO CLASSIFIED IN ACCORDANCE WITH IEEE 45-1998" complies with the construction and performance requirements of that international standard.

Listed cable that is additionally marked "ALSO CLASSIFIED IN ACCORDANCE WITH IEC 60092 Part No. [specify appropriate Part No.]" complies with the construction and performance requirements of that international standard.

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Marine Shipboard Cable."

**Combination Listing/Classification Mark** — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with IEEE 1580-2001, IEEE 45-1998, or IEC 60092 Part No. 350, 353, 354, 373, 374, 375 and/or 376. The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and "ALSO CLASSIFIED IN ACCORDANCE WITH [Specification name and number]."

### **UNDERGROUND FEEDER AND BRANCH CIRCUIT CABLE (YDUX)**

#### **GENERAL**

This category covers underground feeder and branch circuit cable, rated 600 V, in sizes 14 to 4/0 AWG inclusive, copper, and 12 to 4/0 AWG inclusive, aluminum or copper-clad aluminum, for single and multiple conductor cables. It is designated as Type UF cable and is intended for use in accordance with Article 340 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Some multi-conductor cable is surface marked with the suffix "B" immediately following the type letters to indicate the usage of conductors employing 90°C rated insulation.

Such cable may also be installed as Nonmetallic-sheathed Cable, per Section 340.10(4) of the NEC.

The ampacities of Type UF cable, with or without the suffix "B," are those of 60°C rated conductors as specified in the latest edition of the NEC.

**Submersible Water Pump Cable** — Indicates multi-conductor cable in which 2, 3 or 4 single-conductor Type UF cables are provided in a flat or twisted assembly. The cable is Listed in sizes from 14 AWG to 4/0 AWG inclusive, copper, and from 12 AWG to 4/0 AWG inclusive, aluminum or copper-clad aluminum. The cable is tag marked "For use within the well casing for wiring deep well water pumps where the cable is not subject to repetitive handling caused by frequent servicing of the pump units."

The insulation may also be surface marked "Pump Cable." The cable may be directly buried in the earth in conjunction with this use.

This cable may employ copper, aluminum, or copper-clad aluminum conductors. Cable with copper-clad aluminum conductors is surface printed "AL (CU-CLAD)" or "Cu-Clad Al." Cable with aluminum conductors is surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size wherever it appears (surface, tag, carton or reel) by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors." For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

This cable may be terminated at boxes and other enclosures by using nonmetallic-sheathed cable connectors [see Nonmetallic-sheathed Cable Connectors (**PXJV**)].

Cable suitable for exposure to direct rays of the sun is indicated by tag marking and marking on the surface of the cable with the designation “Sunlight Resistant.”

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 493, “Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables.”

**UL MARK**

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 UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name as appropriate: Underground feeder cable that contains copper or copper-clad aluminum conductors has the product name “Underground Feeder Cable”; underground feeder cable that contains aluminum conductors has the product name “Aluminum Underground Feeder Cable.”

**FESTOON CABLE (ZIPF)**

**GENERAL**

This category covers single- and multiple-conductor festoon cable intended for use and installation in accordance with Article 610 of ANSI/NFPA 70, “National Electrical Code.” The cable consists of one or more insulated conductors cabled together with an overall jacket. The cable is rated 60°C, 75°C, 90°C or 105°C and 600 V.

**PRODUCT MARKINGS**

Cable marked “Oil Resistant 60°C” is suitable for exposure to oil at 60°C. Cable marked “Oil Resistant 75°C” is suitable for exposure to oil at 75°C.

Cable marked “outdoor” or “outdoor use” is suitable for installation outdoors.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic requirements used to investigate products in this category are contained in Subject 2273, “Outline of Investigation for Festoon Cables.”

**UL MARK**

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 products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Festoon Cable.”

**FIXTURE WIRE (ZIPR)**

**GENERAL**

This category covers fixture wire for use in accordance with Article 402 of ANSI/NFPA 70, “National Electrical Code.”

All conductors are copper; however, fixture wire having a temperature rating higher than 90°C may employ nickel. Thermoplastic compounds tend to stiffen at temperatures below -10°C (14°F) and care should be taken in handling at such temperatures.

Gasoline-resistant wire has been tested at 23°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 suitable for exposure to mineral oil at 75°C.

Wire that complies with a special Vertical Flame Test is marked “VW-1.”

Fixture wire is designated as follows:

60°C maximum operating temperature	Thermoplastic-insulated wire: 600 V, 18-16 AWG: Types TF, TFF
75°C maximum operating temperature	Thermoset-insulated, heat-resistant wire: 600 V, 18-16 AWG: Types RFH-2, FFH-2
90°C maximum operating temperature	Thermoplastic-insulated wire: 600 V, 18-16 AWG: Types TFN, TFFN Thermoset-insulated, heat-resistant wire:

	600 V, 18-16 AWG: Types RFHH-2, RFHH-3
150°C maximum operating temperature	Silicone rubber-insulated wire: 300 V, 18 AWG: Type SFF-1600 V, 18-14 AWG: Type SFF-2 Fluorinated ethylene propylene-insulated wire: 600 V, 18-14 AWG: Types PFF, PGFF Polytetrafluoroethylene-insulated wire: 600 V, 18-14 AWG: Type PTFE Cross-linked polyolefin-insulated wire: 300 V, 18-10 AWG: Types XF, XFF Ethylene tetrafluoroethylene-insulated wire: 600 V, 18-14 AWG: Types ZF, ZFF
200°C maximum operating temperature	Silicone rubber-insulated wire: 300 V, 18 AWG: Type SF-1600 V, 18-14 AWG: Type SF-2 Fluorinated ethylene propylene-insulated wire: 600 V, 18-14 AWG: Types PF, PGF Aromatic polyimide tape insulated wire: 300 V, 18-10 AWG: Types KF-1, KFF-1600 V, 18-10 AWG: Types KF-2, KFF-2 Ethylene tetrafluoroethylene-insulated wire: 600 V, 18-14 AWG: Type ZHF
250°C maximum operating temperature	Polytetrafluoroethylene-insulated wire: 600 V, 18-14 AWG: Type PTF

### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### REQUIREMENTS

The basic standard used to investigate products in this category is UL 66, "Fixture Wire."

#### UL MARK

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 products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Fixture Wire."

### FLEXIBLE CORD (ZJCZ)

#### GENERAL

This category covers flexible cord constructed and Listed for use in accordance with Article 400 of ANSI/NFPA 70, "National Electrical Code" (NEC). All conductors are stranded copper.

#### Voltage Ratings

"Clock Cord" is rated 125 V.

Types C (14-10 AWG), PD (14-10 AWG), S, SO, SOO, SOW, SOOW, ST, STO, STOO, STW, STOW, STOOW, SE, SEO, SEOO, SEW, SEOW and SEOOW are rated 600 V.

Types C (18-16 AWG), PD (18-16 AWG) and all other types are rated 300 V.

#### Conductor Sizes

The conductor size ranges are as specified in the NEC with the following exceptions:

Types XTW, 20-18 AWG; CXTW, 22-18 AWG; "Clock Cord," 20 AWG; and "Shaver Cord," 27 and 20 AWG.

#### Temperature Ratings

Types C, PD, SP-1, SP-2, SP-3, NISP-1, NISP-2, SRD, E, EN, ETP, ETT, TPT, TS, TST and "Shaver Cord" are rated 60°C.

Type SRDT is rated 60 or 90°C.

Types XTW and CXTW are rated 105°C.

Types SPE-1, SPE-2, SPE-3, SVE, SVEO, SVEOO, SJE, SJEO, SJEOO, SJEW, SJEOW, SJEOOW, SE, SEO, SEOO, SEW, SEOW, SEOOW, HPD, HPN, HSJ, HSJO, HSJOO, HS, HSO and HSOO are rated 90 or 105°C.

"Clock Cord" is rated 60 or 105°C.

All other cord types are rated 60, 75, 90 or 105°C. Cord having a temperature rating higher than 60°C has the rating printed on the outer surface of the cord. If the cord is rated 60°C, no temperature rating appears.

### **Cord Types or Characteristics Not Covered by the NEC**

Types NISP-1, NISP-2, NISPT-1, NISPT-2, NISPE-1 and NISPE-2 are parallel constructions, similar to SPT-1, etc., except that the conductors are individually insulated, laid parallel, with a non-integral, overall jacket.

Type XTW is a parallel assembly of two conductors intended for use in decorative lighting equipment.

Type CXTW is a single conductor or twisted assembly of two conductors intended for use in decorative lighting equipment.

“Clock Cord,” which has no Type designation, is similar to Type XTW except for conductor size.

“Shaver Cord,” which has no Type designation, is similar to Type TPT except for the conductor configuration.

#### **PRODUCT MARKINGS**

“Water Resistant” indicates that the cord is suitable for immersion in water.

“For Mobile Home Use,” “For Recreational Vehicle Use” or “For Mobile Home and Recreational Vehicle Use,” followed by current rating in amps, indicates suitability for use in mobile homes or recreational vehicles.

“Outdoor” or “W-A” indicates suitability for use outdoors. The low temperature rating for this cord is -40°C unless otherwise marked on the cord.

“W” indicates suitability for use outdoors and for immersion in water. The low temperature rating for this cord is -40°C unless otherwise marked on the cord with optional ratings of -50, -60, or -70°C. The 45 low temperature ratings are determined by means of a bend test (not a suppleness test) at the given temperature.

“VW-1” indicates that the cord complies with a Vertical Flame Test. Cord that has been evaluated for leakage currents between the circuit conductor and the grounding conductor, and between the circuit conductor and the outer surface of the jacket, may have the values so marked on the cable jacket.

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 62, “Flexible Cord and Fixture Wire.”

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Flexible Cord.”

### **GAS-TUBE-SIGN CABLE (ZJQX)**

#### **USE AND INSTALLATION**

This category covers gas-tube-sign cable Listed as single conductor Type GTO-5 (5000 V), GTO-10 (10,000 V) or GTO-15 (15,000 V), in sizes 18-10 AWG copper. This cable is intended for use with gas-tube systems for signs, outline lighting, and interior lighting in accordance with ANSI/NFPA 70, “National Electrical Code,” and UL 48, “Electric Signs.”

#### **ADDITIONAL INFORMATION**

For conductor terminal information and additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 814, “Gas-Tube-Sign Cable.”

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” and the product name “Gas-Tube-Sign Cable.”

### **MACHINE-TOOL WIRE (ZKHZ)**

#### **GENERAL**

This category covers machine-tool wire and cable, which is all-thermoplastic Type MTW 600 V wire and cable for use as specified in ANSI/NFPA 70, “National Electrical Code,” and NFPA 79, “Electrical Standard for Industrial Machinery.” The finished wire or cable is flame retardant and suitable for use at 90°C (194°F) and lower temperatures in dry locations, and at 60°C (140°F) and lower temperatures where exposed to moisture, oil or coolants, that is, to cutting oils and the like.

The single-conductor constructions are:

Construction A — All PVC-insulated

Construction B — PVC-insulated with a nylon jacket

Both constructions are labeled in sizes 22 AWG to 1000 kcmil inclusive, stranded copper.

The multiple-conductor constructions consist of assemblies of these single-conductor constructions enclosed by a PVC jacket.

Single- and multiple-conductor wire and cable employing 16-10 AWG conductors having the stranding for flexing service are surface marked "flexing" or "Class K." This marking is optional for smaller conductors intended for flexing service.

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1063, "Machine-Tool Wires and Cables."

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Machine Tool Wire."

### **PHOTOVOLTAIC WIRE (ZKLA)**

#### **GENERAL**

This category covers single-conductor, insulated and integrally or non-integrally jacketed, sunlight resistant, photovoltaic wire rated 90°C wet or dry, 600 V, intended for interconnection wiring of grounded and ungrounded photovoltaic power systems as described in Section 630.31(A) and other applicable parts of ANSI/NFPA 70, "National Electrical Code."

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic requirements used to investigate products in this category are contained in UL Subject 4703, "Outline of Investigation for Photovoltaic Wire."

#### **UL MARK**

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 products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Photovoltaic Wire."

### **PROCESSED WIRE (ZKLU)**

#### **GENERAL**

This category covers Listed wire, flexible cord and cable, and Classified cable that has been subjected to processing subsequent to Labeling and identified as either processed wire or processed wire - respooled.

Listed wire, flexible cord and cable identified as "Listed Processed Wire" has been cut into certain lengths from which the insulation may be stripped from one or both ends. The stripped ends may be soldered or tinned and may have simple terminals of the eyelet, ring, open spade or quick-connect type attached by crimping, soldering or welding.

These lengths may be packaged for further processing. Single lengths of Listed processed wire and cable may be paralleled with other insulated wires and cables and may be held together by an open binder.

Products identified as "Listed Processed Wire - Respooled" are single, continuous lengths of Listed wire, flexible cord or cable cut from a longer length and coiled or placed on a spool or reel.

Products identified as "Classified Processed Wire" are Classified cable that has been cut into certain lengths from which the insulation may be stripped from one or both ends. These lengths may be packaged for further processing. Single lengths of Classified processed wire may be paralleled with other insulated cable and may be held together by an open binder.

Products identified as "Classified Processed Wire - Respooled" are single, continuous lengths of Classified cable cut from a long length and coiled or placed on a spool or reel.

The tag markings from the wire spooler reel (e.g., voltage, temperature, insulation thickness, usage) are provided on the processed wire tag attached to the product.

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

## REQUIREMENTS

The basic standards used to investigate products in this category are UL 62, "Flexible Cord and Fixture Wire," UL 66, "Fixture Wire," UL 83, "Thermoplastic-Insulated Wires and Cables," or UL 44, "Thermoset-Insulated Wires and Cables," and UL 486A-486B, "Wire Connectors," or UL 486C, "Splicing Wire Connectors."

### UL MARK

The Listing or Classification Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing or Classification and Follow-Up Service. The Listing or Classification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED" or "CLASSIFIED" respectively, a control number, and the product name "Processed Wire" or "Processed Wire - Respoled."

## RECREATIONAL VEHICLE CABLE, LOW VOLTAGE (ZKRU)

### GENERAL

This category covers single-conductor, multi-conductor parallel and jacketed flat, parallel or round multiple-conductor recreational vehicle cable rated 90°C or higher, intended for use in low-voltage circuits as described in Article 551 and other applicable parts of ANSI/NFPA 70, "National Electrical Code."

### PRODUCT MARKINGS

Cable marked "Oil Resistant 60C" is suitable for exposure to oil at 60°C. Cable marked "Oil Resistant 75C" is suitable for exposure to oil at 75°C.

Cable marked "Outdoor" or "Outdoor Use" is suitable for installation outdoors.

### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

### REQUIREMENTS

The basic requirements used to investigate products in this category are contained in UL Subject 2276, "Outline of Investigation for Recreational Vehicle Cable."

### UL MARK

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 products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Recreational Vehicle Cable."

## THERMOSET-INSULATED WIRE (ZKST)

### GENERAL

This category covers thermoset-insulated wire and cable (tabulated below) which is flame retardant and rated 600 V, except for Types RHH, RHW and RHW-2 which may be rated 2000 V. The voltage rating is marked on the outer surface of the wire or cable.

### PRODUCT MARKINGS

**RHW** — Indicates a single conductor having a thermoset insulation, with or without a nonmetallic covering, rated 75°C dry, 75°C wet.

**RHW-2** — Indicates a single conductor with the same description as Type RHW, except that it is rated 90°C dry, 90°C wet.

**RHH** — Indicates a single conductor with the same description as Type RHW, except that it is rated 90°C dry only.

**XHH** — Indicates a single conductor having a cross-linked synthetic polymer insulation with no overall covering provided, rated 90°C dry.

**XHHW** — Indicates a single conductor with the same description as Type XHH, except that it is rated 90°C dry, 75°C wet.

**XHHW-2** — Indicates a single conductor with the same description as Type XHH, except that it is rated 90°C dry, 90°C wet.

**SA** — Indicates a single conductor having thermosetting silicone rubber insulation and a nonmetallic covering rated 90°C dry, general use, 200°C dry, special applications.

**SIS** — Indicates a single conductor having thermosetting insulation with no overall covering provided rated 90°C dry, for switchboard wiring only.

**D** — Used as a suffix indicating a twin wire having two insulated conductors laid parallel under an outer nonmetallic covering.

**M** — Used as a suffix indicating a cable having two or more insulated single conductors twisted together under an outer nonmetallic covering.

This wire, in sizes mentioned below, may employ copper, aluminum, or copper-clad aluminum conductors. Wire with copper-clad aluminum conductors is surface printed "Cu-Clad Al" or "AL (CUCLAD)."

Wire with aluminum conductors is surface printed "AL."

In addition to the required AWG or kcmil size, the metric equivalent may be marked on the wire, e.g. "6 AWG (13.3 MM2)" or "13.3 MM2 (6 AWG)."

Types RHH, RHW, RHW-2, XHH, **XHHW**, **XHHW-2** and SA are Listed in sizes 14 AWG through 2000 kcmil copper, and 12 AWG through 2000 kcmil aluminum or copper-clad aluminum. Type SIS is Listed in sizes 14 through 4/0 AWG copper, and 12 through 4/0 AWG aluminum or copper-clad aluminum.

Wire and cable employing compact-stranded copper conductors is so identified directly following the conductor size wherever it appears (surface, tag, carton or reel) by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

Wire bearing multiple type designations is suitable for the temperature associated with each use. For example, a wire marked "RHH or RHW" is suitable for 90°C in dry locations, and 75°C in wet locations.

Wire marked "gasoline resistant" has been tested at 23°C when immersed in gasoline. Wire marked "Oil Resistant I" and "Oil Resistant II" has been tested for immersion in mineral oil at 60°C and 75°C, respectively.

Wire and cable marked "Cable Tray Use" complies with a Vertical-Tray Flame Test. Wire and cable marked "Sunlight Resistant" complies with an artificial weathering test. The "Cable Tray Use" marking, with or without the "Sunlight Resistant" marking, pertains to single conductor sizes 4 through 1 AWG for grounding conductors only, single conductor sizes 1/0 AWG and larger, and all sizes of multiconductor Types RHH, RHW, RHW-2, XHH, **XHHW** and **XHHW-2**. Wire Types RHW, RHW-2, **XHHW** and **XHHW-2** intended to be installed on a messenger may be marked "Sunlight Resistant" in all sizes.

Wire marked "VW-1" complies with a Vertical Flame Test; all others comply with a Horizontal Flame Test.

Wire that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is surface marked with the suffix "-LS."

Wire and cable marked "-40 C" complies with a cold impact test conducted at that temperature. This does not necessarily mean that the cable can be easily installed at that temperature. Different installation conditions and configurations require that care be taken when installing cable at low temperatures.

**Submersible Water Pump Cable** — Indicates multiconductor cable in which two, three or four Type RHW, RHW-2, **XHHW** or **XHHW-2** conductors are provided in a flat or twisted assembly. The cable is Listed in sizes from 14 AWG through 500 kcmil copper, and from 12 AWG through 500 kcmil aluminum or copper-clad aluminum. The cable is tag marked "For use within the well casing for wiring deep well water pumps where the cable is not subject to repetitive handling caused by frequent servicing of the pump units." The surface of the wire may also be marked "Pump Cable." The cable has not been evaluated for direct burial in the earth unless the single conductors carry an additional "Type USE" or "Type USE-2" marking.

#### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### REQUIREMENTS

The basic standard used to investigate products in this category is UL 44, "Thermoset-insulated Wires and Cables."

#### UL MARK

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 products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Thermoset-insulated wire that contains copper or copper-clad aluminum conductors has the product name "Insulated Wire"; thermoset-insulated wire that contains aluminum conductors has the product name "Insulated Aluminum Wire."

### THERMOPLASTIC-INSULATED WIRE (ZLGR)

#### GENERAL

This category covers thermoplastic-insulated wire for use in accordance with Article 310 of ANSI/NFPA 70, "National Electrical Code."

Thermoplastic-insulated wire is rated 600 V and is designated as follows:

**TW** — Indicates a single conductor having flame-retardant, moisture-resistant thermoplastic insulation. The wire is rated 60°C wet or dry.

**THHN** — Indicates a single conductor having flame-retardant and heat-resistant thermoplastic insulation with a jacket of extruded nylon or equivalent material. The wire is rated 90°C dry only.

**THW** — Indicates a single conductor having flame-retardant, moisture- and heat-resistant thermoplastic insulation. The wire is rated 75°C wet or dry.

**THW-2** — Same as THW except that the wire is rated 90°C wet or dry.

**THHW** — Indicates a single conductor having flame-retardant, moisture- and heat-resistant thermoplastic insulation. The wire is rated 90°C dry and 75°C wet.

**THWN** — Indicates a single conductor having flame-retardant, moisture- and heat-resistant thermoplastic insulation with a jacket of extruded nylon or equivalent material. The wire is rated 75°C wet or dry. THWN wire suitable for exposure to mineral oil and to liquid gasoline and gasoline vapors at ordinary ambient temperature is marked "Gasoline and Oil Resistant I" if suitable for exposure to mineral oil at 60°C, or "Gasoline and Oil Resistant II" if the compound is suitable for exposure to mineral oil at 75°C. Gasoline resistant wire has been tested at 23°C when immersed in gasoline. It is considered inherently resistant to gasoline vapors within the limits of the temperature rating.

**THWN-2** — Same as THWN except that the wire is rated 90°C wet or dry.

**FEP** — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (fluorinated ethylene propylene) insulation. Type FEP wire is suitable for use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 200°C and lower temperatures for special applications.

**FEPB** — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (fluorinated ethylene propylene) insulation with a glass braid. Type FEPB wire is suitable for general use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 200°C and lower temperatures for special applications.

**PFA** — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (perfluoroalkoxy) insulation. Type PFA wire is suitable for use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 200°C and lower for special applications.

**PFAH** — Indicates a single, nickel or nickel-coated copper conductor having flame-retardant and heat-resistant thermoplastic (perfluoroalkoxy) insulation. The PFAH is suitable for use at 250°C and lower temperatures only for leads within apparatus or within raceways connected to apparatus, in dry locations only.

**TFE** — Indicates a single, nickel-coated copper or nickel base alloy conductor having flame-retardant and heat-resistant thermoplastic (polytetrafluoroethylene) insulation. Type TFE wire is suitable for use at 250°C and lower temperatures in dry locations as leads within apparatus or within raceways connected to apparatus or as open wiring.

**Z** — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (ethylene tetrafluoroethylene) insulation. Type Z wire is suitable for use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 150°C and lower temperatures for special applications.

**ZW** — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (ethylene tetrafluoroethylene) insulation. Type ZW wire is suitable for use in dry locations at 90°C or wet locations at 75°C. It is also suitable for use in dry locations at 150°C and lower temperatures for special applications.

**ZW-2** — Same as ZW except that the wire is rated 90°C wet or dry.

**TBS** — Indicates a single conductor switchboard wire having thermoplastic insulation and a flameretardant nonmetallic covering. Type TBS is suitable for use at 90°C and lower temperatures in dry locations.

#### PRODUCT MARKINGS

Types TW, THW, THW-2, THHN, THHW, THWN, THWN-2, PFA, PFAH and Z in sizes 4 to 1 AWG for grounding conductors only and in sizes 1/0 AWG and larger for circuit and grounding conductors that are marked "Cable Tray Use" or "CT" comply with a vertical-tray cable flame test. Wire so marked may additionally be marked "Sunlight Resistant" indicating compliance with an artificial weathering test.

Types TW, THW, THW-2, THHW, THWN and THWN-2 in all sizes that are marked "Sunlight Resistant" comply with an artificial weathering test.

Wire suitable for exposure to mineral oil is marked "Oil Resistant I" for 60°C oil resistance, or "Oil Resistant II" for 75°C oil resistance, on the surface of the wire. An Oil Resistant marking, by itself, does not include resistance to gasoline or similar petroleum solvents.

Wire that complies with a special vertical flame test is surface marked "VW-1."

Constructions in this category that comply with a flame and smoke test (as described in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables") may have the additional marking "ST1" indicating "Limited Smoke," (Note: The suffix "-LS," added to the Type letters, has also been used to indicate Limited Smoke. Effective November 15, 204, only "ST1" may be used.)

In place of three of the marking described above, the following multinational markings may be used:

"SR" in place of "Sunlight Resistant"

"PR" in place of "Oil Resistant"

"GR" in place of "gasoline and Oil Resistant"

**Submersible Pump Cable** — Indicates multiconductor cable consisting of two or three flat or two to six twisted insulated conductors with or without an overall jacket. The cable is labeled in size 14 AWG to 500 kcmil copper, and 12 AWG to 500 kcmil aluminum or copper-clad aluminum. The cable is tag marked. The insulation is surface marked "Pump Cable." The cable has not been evaluated for direct burial in the earth.

Wire, in sizes mentioned below, may employ copper or aluminum, or copper-clad aluminum conductors. Wire with copper-clad aluminum conductors is surface printed "AL (CU-CLAD)" or "Cu-Clad Al." Wire with aluminum conductors is surface printed "AL."

Wire and cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for product employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

#### **SIZE AND CONDUCTOR INFORMATION**

Types TW and THW and THW-2 are Listed in sizes 14 AWG to 2000 kcmil copper and 12 AWG to 2000 kcmil aluminum or copper-clad aluminum.

Types THHN, THWN THWN-2 and THHW are Listed in sizes 14 AWG to 1000 kcmil copper and 12 AWG to 1000 kcmil aluminum or copper-clad aluminum.

Types TA, TBS, PFA, PFAH and Z are Listed in sizes 14 to 4/0 AWG copper and 12 to 4/0 AWG aluminum or copper-clad aluminum.

Types ZW, ZW-2, FEP and FEPB are Listed in sizes 14 to 2 AWG copper and 12 to 2 AWG aluminum or copper-clad aluminum.

For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 83, "Thermoplastic-insulated Wires and Cables."

#### **UL MARK**

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 products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name as appropriate: Thermoplastic-insulated wire that contains copper or copper-clad aluminum conductors has the product name "Insulated Wire"; thermoplastic-insulated wire that contains aluminum conductors has the product name "Insulated Aluminum Wire."

#### **WELDING CABLE (ZMAY)**

##### **GENERAL**

This category covers welding cable, which is a single-conductor cable intended for use in the secondary circuit of electric welders in accordance with Article 630, Part IV of ANSI/NFPA 70, "National Electrical Code." Welding cable is rated 60, 75 or 90°C and 100 or 600 V. The voltage and temperature ratings, if higher than 100 V and 60°C, respectively, are identified by tag marking and by printing on the surface of the insulation. The conductors are flexible-stranded copper, 8 AWG through 250 kcmil, the individual strands of which are 34 through 30 AWG.

##### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel, or smallest unit container in which the product is packaged 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 UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Welding Cable."

#### **WIRE, MISCELLANEOUS (ZMHX)**

##### **GENERAL**

This category covers different wire and cable products, each intended for the particular application marked on the product, tag, carton or reel. Included in this category are:

- Aircraft Ground Support Cable
- Battery Lead Wire
- Brake Control Cable

- Burglar Alarm Cable
- Bus Drop Cable
- Irrigation Machine Feeder Cable
- Low-ohmic Distribution Cable
- Cathodic Protection Cable
- DLO Cable
- Flexible Power Feed Cable
- Golf Course Sprinkler Wire
- Heat Resistant Wire
- Induction Heating Cable
- Inductive Detector Lead-in Cable
- Insulated Grounding Conductors
- Litz Wire
- Marine Cable
- Mine Power Feeder Cable
- Mineral-insulated Metal-sheathed Control Cable
- Pendant Cable
- PVC-jacketed, Thermoplastic Polyolefin-jacketed and Thermoplastic CPE-jacketed Thermoset-insulated Wire
- Railroad Underground Power Cable
- Recreational Vehicle Cable (low voltage)
- RF Coaxial Cable
- SAE Wire Types TWP, GPT, HDT, TXL, GXL and SXL
- Satellite Antenna-Cable
- Shore Power Cable
- Slotted Coaxial Cable
- Solar Panel Wire
- Strobe Flash-head Cable
- Submersible Pump Cable (TPE or PE insulation)
- Surge Protection Cable
- Telephone Central Office Power Cable
- Telephone Drop Wire
- Tower and Case Wire
- Tracer Wire
- Track Wire
- Traction Power Cable
- Undercarpet Data Cable
- Underground Low-energy Circuit Cable
- Underground Signal Cable
- Vault Lacing Cable
- Wireless Antenna Interface Cable

#### **PRODUCT MARKINGS**

Information regarding installation, ampacity, etc., where appropriate, is included in the marking found on the tag, reel or carton.

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standards used to investigate products in this category are:

- ANSI/UL 44, "Thermoset-Insulated Wires and Cables"
- ANSI/UL 62, "Flexible Cords and Cables"
- ANSI/UL 66, "Fixture Wire"
- ANSI/UL 83, "Thermoplastic-Insulated Wires and Cables"
- ANSI/UL 493, "Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables"
- ANSI/UL 854, "Service-Entrance Cables"
- ANSI/UL 1072, "Medium-Voltage Power Cables"
- UL 1309, "Marine Shipboard Cable"

ANSI/UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords"  
SAE 1128, "Surface Vehicle Standard"

#### **UL MARK**

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 products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product identifier, such as "Tracer Wire." The term "Special Purpose Wire" is not used.

## APPENDIX C

### WIRE, CABLE AND CORD CLASSIFICATION INFORMATION

#### MEDIUM-VOLTAGE CABLE CLASSIFIED IN ACCORDANCE WITH UL 1072, WITH METRIC CONDUCTOR SIZES (PIVW)

##### GENERAL

This category covers medium-voltage cable rated 2001 to 35,000 V and in conductor sizes 10 through 500 sq mm.

The cable complies with all requirements specified in UL 1072, "Medium-Voltage Power Cables," except that metric conductor sizes are used instead of AWG sizes. The cable is for use in jurisdictions where metric conductor sizes are required or permitted.

The cable is single or multi-conductor, aluminum or copper, with solid extruded dielectric insulation.

An extruded jacket, metallic covering, or combination of both may be provided over single conductors or over the assembled conductors in a multi-conductor power cable.

All insulated conductors rated 8001 V and higher have electrostatic shielding. Cable rated 2001 to 8000 V may be shielded or nonshielded.

Nonshielded cable is intended for use where conditions of maintenance and supervision ensure that only competent individuals service and have access to the installation.

##### PRODUCT MARKINGS

Shielded cable is marked "MV-90" or "MV-105" and is suitable for use in wet or dry locations at 90°C or 105°C.

Nonshielded cable is marked either "MV-90" indicating suitability for use in wet or dry locations at 90°C maximum, or "MV-90 Dry Locations Only."

Cable marked "oil resistant I" or "oil resistant II" is suitable for exposure to mineral oil at 60°C or 75°C, respectively.

Cable marked "sunlight resistant" may be exposed to the direct rays of the sun.

Cable intended for installation in cable trays is marked "For CT Use" or "For Use In Cable Trays."

Cable with aluminum conductors is marked with the word "Aluminum" or the letters "AL."

Cable is marked with conductor size in sq mm, voltage rating and insulation level (100 percent or 133 percent).

##### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

##### REQUIREMENTS

The basic standard used to investigate products in this category is UL 1072, "Medium-Voltage Power Cables."

##### UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product, the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products shall only be as illustrated below:

**MEDIUM VOLTAGE CABLE  
CLASSIFIED BY UNDERWRITERS LABORATORIES INC®  
IN ACCORDANCE WITH UL 1072, WITH METRIC  
CONDUCTOR SIZES  
Control No.**

#### METAL-CLAD CABLE CLASSIFIED IN ACCORDANCE WITH UL 1569, WITH METRIC CONDUCTOR SIZES (PJPJ)

##### GENERAL

This category covers Type MC metal-clad cable. It is rated for use up to 2000 V, and Classified in sizes 1.5 through 35 sq mm copper, 4.0 through 35 sq mm aluminum or copper-clad aluminum and employs thermoset or thermoplastic insulated conductors.

The cable complies with all the requirements specified in UL 1569, "Metal-Clad Cables," except that metric conductor sizes are used instead of AWG/kcmil sizes. This cable is for use in jurisdictions where metric conductor sizes are required or permitted.

Type MC cable is of three designs (a) interlocked metal tape, (b) corrugated tube and (c) smooth tube, and all are intended for aboveground use except when marked for direct burial.

The armor of the interlocked metal tape type may or may not be used for grounding. Interlocked armor constructions that may be used as a ground path have a grounding/bonding conductor outside the cable core and in

direct contact with the armor. Interlocked armor constructions that are not intended as a ground path have a grounding conductor inside the cable core and not in contact with the armor. The tube of corrugated or smooth tube Type MC Cable in combination with the equipment grounding conductor, when provided, is suitable for grounding; otherwise the tube by itself is suitable for grounding.

#### **PRODUCT MARKINGS**

Information regarding temperature rating, voltage rating, cable and conductor Type and sq mm size is shown either on a marker tape under the armor or on the surface of a nonmetallic jacket, if used.

Copper-clad aluminum conductors are surface printed "AL (CU-CLAD)" or "Cu-Clad Al." Aluminum conductors are surface printed "AL."

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by "compact copper." The abbreviations "CMPCT" and "CU" may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: "Terminate with connectors identified for use with compact-stranded copper conductors."

Cable suitable for use in cable trays, direct sunlight or direct burial application is so marked.

Cable marked "Oil Resistant I" or "Oil Res I" is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is marked "Oil Resistant II" or "Oil Res II."

Cable with an interlocked armor that is intended as a ground path is marked "armor is grounding path component," and is provided with installation instructions.

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1569, "Metal-Clad Cable."

#### **UL MARK**

The Classification Mark of Underwriters Laboratories Inc. on the product, the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products shall only be as illustrated below using the appropriate product name: Metal-clad cable that contains copper or copper-clad aluminum conductors has the product name "Metal-Clad Cable"; metal-clad cable that contains aluminum conductors has the product name "Metal-Clad Aluminum Cable."

#### **[PRODUCT NAME]**

**CLASSIFIED BY UNDERWRITERS LABORATORIES INC.  
IN ACCORDANCE WITH UL 1569, WITH METRIC  
CONDUCTOR SIZES  
Control No.**

#### **TRAFFIC SIGNAL CABLE CLASSIFIED IN ACCORDANCE WITH IMSA SPECIFICATIONS (XNTL) GENERAL**

This category covers cable investigated in accordance with International Municipal Signal Association Inc. specifications. The cable is intended for installation as aerial cable or in underground conduit as part of a traffic signal system. This cable employs a color-code scheme that permits a conductor with green insulation to be used for other than grounding purposes. This cable has not been investigated for flammability. This cable is not suitable for use as a substitute for cable or wiring systems covered in ANSI/NFPA 70, "National Electrical Code."

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **UL MARK**

The Classification Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products is as illustrated below:

**TRAFFIC SIGNAL CABLE  
CLASSIFIED BY UNDERWRITERS LABORATORIES INC.®  
IN ACCORDANCE WITH IMSA SPECIFICATIONS XX-X  
Control No.**

In addition, the Classification Mark may include the UL symbol (as illustrated in the Introduction of this Directory).

#### **PROCESSED WIRE (ZKLU) GENERAL**

This category covers Listed wire, flexible cord and cable, and Classified cable that has been subjected to processing subsequent to Labeling and identified as either processed wire or processed wire - respooled.

Listed wire, flexible cord and cable identified as “Listed Processed Wire” has been cut into certain lengths from which the insulation may be stripped from one or both ends. The stripped ends may be soldered or tinned and may have simple terminals of the eyelet, ring, open spade or quick-connect type attached by crimping, soldering or welding.

These lengths may be packaged for further processing. Single lengths of Listed processed wire and cable may be paralleled with other insulated wires and cables and may be held together by an open binder.

Products identified as “Listed Processed Wire - Respoled” are single, continuous lengths of Listed wire, flexible cord or cable cut from a longer length and coiled or placed on a spool or reel.

Products identified as “Classified Processed Wire” are Classified cable that has been cut into certain lengths from which the insulation may be stripped from one or both ends. These lengths may be packaged for further processing. Single lengths of Classified processed wire may be paralleled with other insulated cable and may be held together by an open binder.

Products identified as “Classified Processed Wire - Respoled” are single, continuous lengths of Classified cable cut from a long length and coiled or placed on a spool or reel.

The tag markings from the wire spooler reel (e.g., voltage, temperature, insulation thickness, usage) are provided on the processed wire tag attached to the product.

#### **ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (**AALZ**).

#### **REQUIREMENTS**

The basic standards used to investigate products in this category are UL 62, "Flexible Cord and Fixture Wire," UL 66, "Fixture Wire," UL 83, "Thermoplastic-Insulated Wires and Cables," or UL 44, "Thermoset-Insulated Wires and Cables," and UL 486A-486B, "Wire Connectors," or UL 486C, "Splicing Wire Connectors."

#### **UL MARK**

The Listing or Classification Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing or Classification and Follow-Up Service. The Listing or Classification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED” or “CLASSIFIED” respectively, a control number, and the product name “Processed Wire” or “Processed Wire - Respoled.”

**APPENDIX D  
WIRE, CABLE, AND CORD  
VERIFICATION INFORMATION  
LEVELS XP STRUCTURED CABLING PROGRAM (VZZL)  
GENERAL**

This category covers field-assembled structured cabling systems (referred to as “Solutions”) whose signal transmission characteristics have been investigated in accordance with UL’s Levels XP Structured Cabling Program.

The Levels XP Program investigates how a Solution’s transmission performance affects live data as it interacts with active network components. Solutions investigated for performance under the Levels XP Program have been investigated for the expanded performance properties necessary to maintain true data throughput and component interoperability.

The Levels XP Test Program requires testing of the Solution’s horizontal cable, patch cords and connecting hardware, as well as passive channel, active channel and expanded active channel testing.

**ADDITIONAL INFORMATION**

For additional information, see Structured Cabling Programs (VZYY) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is the UL Levels XP Specification.

Components used in the Solution are also required to be UL Listed for Safety and UL Verified for Performance in accordance with the Standards shown below:

**Safety**

Component	Standard	Guide
Cable	UL 444, “Communications Cables”	<b>DUZX</b>
Connecting Hardware	UL 1863, “Communications-Circuit Accessories”	<b>DUXR</b>
Patch Cords	UL 1863, “Communications-Circuit Accessories”	<b>DUXR</b>

**Performance Verification**

Component	Standard	Guide
Category 5e Cable	TIA/EIA 568 B.2, “Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components Revision of TIA/EIA-568-A”	<b>DUZX</b>
Category 6 Cable	TIA/EIA 568 B.2-1, “Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted Pair Cabling Components Addendum 1 - Transmission Performance Specifications for 4-Pair 100 Category 6 Cabling Addendum No. 1 to TIA/EIA-568-B.2”	<b>DUZX</b>
Category 5e Connecting Hardware	TIA/EIA 568 B.2	<b>DUXR</b>
Category 6 Connecting Hardware	TIA/EIA 568 B.2-1	<b>DUXR</b>
Category 5e Patch Cords	TIA/EIA 568 B.2	<b>DUXR</b>
Category 6 Patch Cords	TIA/EIA 568 B.2-1	<b>DUXR</b>

**UL MARK**

The Verification Mark of Underwriters Laboratories Inc. on the Bill of Lading, the Bulk Shipment Certificate, or on UL’s Certificate of Conformity Assessment is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “VERIFIED,” the term “Levels XP Program,” a control number, and the Solution name and part number. The Verification Mark (label) is not applied directly to Solutions that have been investigated for performance under the Levels XP Program, since these products are field assembled.

**PROPRIETARY STRUCTURED CABLING PROGRAMS (VZZX)**

**GENERAL**

This category covers field-assembled structured cabling systems (referred to as “Solutions”) whose signal transmission characteristics have been investigated in accordance with proprietary manufacturer network cabling standards or industry standards.

Performance Verification testing includes passive and/or active testing of the Permanent Link, Basic Link or Channel. If the performance standard specifies active testing, the investigation will review how a Solution's transmission performance affects live data as it interacts with active network components.

Solutions subjected to active testing have been investigated for the performance properties necessary to maintain true data throughput and component interoperability.

**ADDITIONAL INFORMATION**

For additional information, see Structured Cabling Programs (**VZYY**) and Electrical Equipment for Use in Ordinary Locations (**AALZ**).

**REQUIREMENTS**

Components used in the Solution are also required to be UL Listed for Safety and UL Verified for Performance in accordance with the Standards shown below:

**Safety**

<b>Component</b>	<b>Standard</b>	<b>Guide</b>
Cable	UL 444, "Communications Cables"	<b>DUZX</b>
Connecting Hardware	UL 1863, "Communications-Circuit Accessories"	<b>DUXR</b>
Patch Cords	UL 1863, "Communications-Circuit Accessories"	<b>DUXR</b>

**Performance Verification**

<b>Component</b>	<b>Standard</b>	<b>Guide</b>
Category 5e Cable	TIA/EIA 568 B.2, "Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components Revision of TIA/EIA-568-A"	<b>DUZX</b>
Category 6 Cable	TIA/EIA 568 B.2-1, "Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted Pair Cabling Components Addendum 1 - Transmission Performance Specifications for 4-Pair 100"	<b>DUZX</b>
Category 6 Cabling	Addendum No. 1 to TIA/EIA-568-B.2"	<b>DUXR</b>
Category 5e Connecting Hardware	TIA/EIA 568 B.2	<b>DUXR</b>
Category 6 Connecting Hardware	TIA/EIA 568 B.2-1	<b>DUXR</b>
Category 5e Patch Cords	TIA/EIA 568 B.2	<b>DUXR</b>
Category 6 Patch Cords	TIA/EIA 568 B.2-1	<b>DUXR</b>

**UL MARK**

The Verification Mark of Underwriters Laboratories Inc. on the Bill of Lading, the Bulk Shipment Certificate, or on UL's Certificate of Conformity Assessment is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "VERIFIED," the name of the Performance Standard, a control number, and the Solution name and part number. The Verification Mark (label) is not applied directly to Solutions that have been investigated for performance under this category, since these products are field assembled.