Standards Update Notice (SUN)

Issued: June 6, 2017

Standard Information

Standard Number: UL 758
Standard Name: Standard for Safety for Appliance Wiring Material
Standard Edition and Issue Date: 3rd Edition Dated May 2, 2014
Date of Revisions: 2nd Ed. September 3, 2013, 3rd Ed. December 8, 2014

Effective Date of New/Revised Requirements

Effective Date: **December 17, 2018**

Impact, Overview, and Action Required

Impact Statement: A review of all Listing Reports is necessary to determine which products comply with new/revised requirements and which products will require re-evaluation. **NOTE:** Effective immediately, this revised standard will be exclusively used for evaluation of new products unless the Applicant requests in writing that current requirements be used along with their understanding that their listings will be withdrawn on Effective Date of **December 17, 2018** unless the product is found to comply with new/revised requirements.

Overview of Changes: Revisions and Additions to Construction and Test requirements. Specific details of new/revised requirements are found in table below.

If the applicable requirements noted in the table are not described in your report(s), these requirements will need to be confirmed as met and added to your report(s) such as markings, instructions, test results, etc. (as required).

Client Action Required:

Information – To assist our Engineer with review of your Listing Reports, please submit technical information in response to the new/revised paragraphs noted in the attached or explain why these new/revised requirements do not apply to your product (s).

Current Listings Not Active? – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records. We will do this at no charge as long as Intertek is notified in writing prior to the review of your reports.

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Description of New/Revised Technical Requirements

Clause	Verdict	Comment
		Date of Revisions September 3, 2013
New 3.5		**Maximum Voltage Rating Limit for Class 2 Cable -** Class 2 cables are defined as max 150V in accordance with the NEC All existing class 2 styles rated over 150V will be changed to 'normal' styles or will be withdrawn
New Table 5.1A, Revised 5.1.1, 5.3.1, and 5.3.3		**Metric Cross-Sectional Area of Conductors** Cross sectional area of metric sized conductors defined. Manufacturers marking AWM with metric sizes will need to meet the requirements in new Table 5.1A
Revised 5.7.2 and Table 5.3		**Lay Length for Copper Alloy, Copper-Clad Steel, Aluminum, and Copper-Clad Aluminum Stranded Conductors** – the lay length for conductors using other materials shall be the same as for copper Manufacturers using these conductor materials may need to change the lay length in their production.
New 5.7.2A		**Lay Length of Metric-Sized Conductors** – lay length now defined for metric conductors Manufacturers using metric conductors may need to change the lay length in their production.
Revised 7.3.1, 7.3.2, and New 13.3.1.1 and 13.3.1.2		Manufacturers who make AWM in thicknesses less than 2 mils may need to obtain new measurement equipment that is more accurate than the current requirements. UL currently has this equipment in all wire and cable test labs. Manufacturers who make AWM in thicknesses less than 2 mils may need to obtain new measurement equipment that is more accurate than the current requirements. UL currently has this equipment in all wire and cable test labs.
New.3, Revised 11.3 and 11.4		**Copper Drain Wire and Compatibility of Copper and Aluminum Materials** – all components with copper shall not be in direct contact with aluminum Manufacturers using both copper and aluminum components in AWM shall incorporate a separator
New 12.1.1		**Mixed Voltage Rating –** Markings of AWM containing mixed voltages clarified Manufacturers using mixed voltages in their AWM may need to change the voltage rating on the tag.

Clause	Verdict	Comment
Revised 47.3		**Marking Interval for Cables Containing a Conductive Polymeric Shield –** The marking interval is now defined Manufacturers making cables with conductive shields may have to alter their surface print.
Revised 48.2		**Tin Overcoating on Stranded Conductor** – AWM using overcoated, stranded conductors shall include an additional tag marking Manufacturers making cables with overcoated tinned conductors may have to alter their tag marking
Revised 46.2		**Specifications of the Dielectric Tester in Production-Line Dielectric Test** – The accuracy of the dielectric tester is defined Manufacturers using a dielectric tester to evaluate their product may have to upgrade to meet the accuracy requirements
Revised 5.3.1 and 5.3.3		**Maximum Limit for Conductor Size** - The maximum physical size for a specific AWG number is defined Manufacturers who are oversizing their conductors may need to change the size marked on the surface and tag
Revised 5.3.4 and New 5.3.5		**Clarification of DC Resistance as an Alternative Method for Determining Conductor Size** – DC resistance can only be used to determine the conductor size for conductors made with 97% IACS copper or better Manufacturers may need to alter their test procedures when measuring other-than-pure copper conductors.
Revised 5.1.1, 5.6.1, 48.2		**Magnet Wire Conductor** – Magnet wire coatings used over conductors in AWM shall be Recognized. The tag marking shall indicate the presence of the coating. Manufacturers using magnet wire coatings may have to upgrade the coating material to a Recognized version. Tag marking shall indicate the presence of the coating
Revised 5.3.3 and 5.6.1		**Braided Conductors –** The method for determining the conductor size of a braided conductor is defined Manufacturers may need to change the marked size of the braided conductors based on the new measuring method.
Revised 5.1.1, 48.2		**Conductive Fibrous Yarns** The composition and marking requirements for AWM using these components is defined. Manufacturers using conductive yarns as part of their construction will need to change their tag marking.

Clause	Verdict	Comment
New 1.5.2; New 5.9, New 5.9.1, & New 5.9.2		**Semi-Conductive Polymeric Layer Over Conductor** – Semi-conductive layers may be provided over the conductor but shall be clearly distinguishable from the conductor Manufacturers using a conductive layer may need to change the color of the layer.
5.1.1		A conductor consisting of a single wire is designated as a solid conductor, while one consisting of a number of individual wires is designated as a stranded conductor. The American Wire Gauge (AWG) numbers, the kcmil (thousands of circular mils) sizes, and the square-millimeter sizes each signify a definite nominal total cross-sectional area (see Table 5.1 or Table 5.2) independent of the conductor material. The individual wires used in making up a stranded conductor are not required to correspond to any particular AWG or other standard gauge size. A tinsel conductor consists of a number of strands, twisted together, each a portion of, or all strands being composed of one or more flattened wires of copper or copper alloy, helically wound on a fibrous polymeric thread. ~~The American Wire Gauge (AWG) numbers, the kcmil (thousands of circular mils) sizes, and the square-millimeter sizes each signify a definite nominal total cross-sectional area (see Table 5.1) independent of the conductor material. The individual wires used in making up a stranded conductor are not required to correspond to any particular AWG or other standard gauge size.~~ A conductor with a tubular cross-section and uniform wall thickness shall be of copper, and may be metal coated. A bus bar conductor consists of a single bar, or two or more bars stacked to form two or more layers, with each bar of solid rectangular cross-section with two plane, parallel surfaces and round or other simple regularly shaped edges. Fibrous yarns impregnated or coated with metal or other conductive materials may be used as a conductor, or may be assembled with other types of conductor strands to form a conductor. A carbon fiber filament conductor consists of a number of carbon fibers twisted together to form the conductor and the carbon fibers may be metal coated. A resistance wire is a conductor material used in products primarily as the source of heat based on a designed resistance per unit length. A magnet wire conductor shall consist of an enameled single conductor or an assembly of individually enameled wires which may be assembled or twisted together with an overall covering of film fiber, tape, or extruded compound to form a Litz wire. The magnet wire conductor shall have a minimum temperature rating of the AWM and be evaluated in accordance with the requirements in the Standard for Systems of Insulation Materials – General, UL 1446. The size of a conductor composed of or containing conductive fibrous yarns and resistance wires including carbon fiber filament conductors, a conductor of a tubular shape, or a bus bar conductor, and a magnet wire conductor shall be determined by conductor resistance described in 5.6.1. The circular mil area (CMA) of a rectangular conductor shall be determined from the formula: average width (mils) X average thickness (mils) X 1.273 The AWG size can then be determined using Table 5.1.

Clause	Verdict	Comment
5.3.1		~~The size of a conductor shall not be less than indicated in Table 5.1 when measured in accordance with Conductor Diameter, Section 200, of UL 1581~~. The size of a round, solid conductor shall not be less than indicated in Table 5.1 or Table 5.2 (as applicable) when measured in accordance with Conductor Diameter, Section 200, of UL 1581, or 5.1.1 for a rectangular conductor. The size of a solid conductor shall not be greater than the nominal value of the next larger conductor size indicated in Table 5.1. Exception: For a conductor composed of a round, solid metallic wire as described in Exception 6 to 51.2(d), the actual size of the conductor shall be within minus 1 percent, plus 10 percent of the diameter marked on the tag, reel, or carton.
5.3.3		The cross-sectional area of a stranded conductor shall not be less than indicated in Table 5.1 or Table 5.2 (as applicable) when determined by either of the following: a) The sum of the areas of its component round strands. b) The weight method outlined in UL 1581, for a round compact-stranded aluminum conductor or a round compressed-stranded copper or aluminum conductor. The cross-sectional area of a stranded conductor shall not be greater than the nominal value of the next larger conductor size indicated in Table 5.1.
Table 5.2		**Conductor dimensions in metric sizes**
		Date of Revisions December 8, 2014
5.1.3	Info	Deleted 5.1.3 effective December 8, 2016
5.6.2		Revised For conductors having a conductivity other than 100 percent as noted in Table 5.3, the maximum resistance is to be determined by multiplying the maximum resistance for uncoated copper by the ratio of 100 percent IACS (International Annealed Copper Standard) to the percent conductivity applicable to the conductor under consideration. ~~For a composite conductor of copper and hard-drawn copper alloy strands, the maximum resistance is to be determined by multiplying the maximum resistance for uncoated copper by the ratio of 100 percent IACS (International Annealed Copper Standard) to the percent conductivity applicable to the finished conductor under consideration.~~ For example, to determine the maximum resistance of a 12 AWG (6530 cmil or 3.31 mm2) solid 40-percent-conductivity copper-clad steel conductor: a) R[12 AWG copper-clad steel at 20°C (68°F)] = R(12 AWG copper at 20°C) X 100/40 = R(12 AWG copper at 20°C or 68°F) X 2.5. b) R[12 AWG copper at 20°C (68°F)] = 1.62 ohms/1000 feet or 5.31 ohms/kilometer. c) R[12 AWG copper-clad at 20°C (68°F)] = 1.62 X 2.5 = 4.05 ohms/1000 feet or 5.31 X 2.5 = 13.28 ohms-kilometer.

Clause	Verdict	Comment
48.1.2		Added DC spark testing is an alternative method and the potential of DC values shall be three times the AC values described above. The test potential for wire rated for direct current is specified in Table 48.1. Insulated conductors or the insulated conductors of a jacketed cable shall be tested. In the case of a jacketed cable or a cable with a covering, the insulated conductors shall be tested prior to the application of the overall jacket or covering, or forming an assembly of insulated conductors.
48.2	Info	**Appliance wiring material constructed of laminated film insulating material with uninsulated intervals**
48.2.1		The spark test shall be performed by the manufacturer as a routine test at the factory on 100 percent of both the top and bottom laminating films in accordance with the test, Spark in the Standard for Wire and Cable Test Methods, UL 2556 using a roller or brush-type spark tester, and the method described in 48.2.3. The potential shall be 10 times the voltage rating of the wire that the film will be used on, up to 1000 V AC, with a minimum potential of 1500 V AC. If the rated voltage of the wire is not specified, the potential shall be 3000 V AC. For wire rated more than 1000 V AC, the potential shall be two times the rated voltage with a minimum potential of 10,000 V AC.
48.2.2		DC spark testing is an alternative method and the potential of DC values shall be three times the AC values described above. The test potential for wire rated for direct current is specified in Table 48.1.
48.2.3		The spark test on the laminating film shall be performed at a point in the production operation just prior to the film entering the laminating process.
48.2.4		Any faults shall be cut out or repaired. The insulating film at points of repair shall be resparked.
48.2.5		If the Spark test on the laminating film described in 48.2.1 – 48.2.4 is not performed, a Dielectric Voltage Withstand Test as described in 48A shall be performed on laminated constructions with uninsulated intervals or a Spark test on the short lengths shall be performed in accordance with 48.1.1 – 48.1.5.
48A	Info	**Cut-Piece Dielectric Voltage Withstand Test**
48A.1		A potential in accordance with Table 29.1 shall be applied for 2 seconds between the conductors joined together and a metal electrode in intimate contact with at least 90 percent of the insulated portion of the specimen. The test potential is to be supplied from a suitable test transformer. The dielectric tester shall have a voltmeter with an accuracy that does not introduce an error greater than five percent on the high voltage side of the transformer. If analog, it shall have a response time that does not introduce a lagging error greater than 1 percent of full scale at the specified rate of increase in voltage. The number of specimens tested shall be in accordance with Table 48A.1.
48A.2		The dielectric voltage withstand test shall be performed at a point in the production operation just prior to packaging for shipment.
48A.3		All lots containing samples that broke down during the dielectric voltage withstand test shall be discarded.

Clause	Verdict	Comment
49.2		The insulation on the individual wires in the finished assembly shall be capable of withstanding at room temperature the test potential, without breakdown, stated in Table 29.1 applied between all interconnected conductors and all the interconnected shields. ~~The test potential is to be supplied from a suitable test transformer. The dielectric tester shall have a voltmeter with an accuracy that does not introduce an error greater than five percent on the high voltage side of the transformer. If analog, it shall have a response time that does not introduce a lagging error greater than 1 percent of full scale at the specified rate of increase in voltage. The test potential is to be gradually increased from zero until the required test voltage is reached and is to be held at that value for one minute.~~ A DC test potential may be applied in lieu of an AC test potential. The DC test potential shall be as indicated in Table 49.1. The test potential is to be supplied from a suitable test transformer.
49.3		For an AC test, the dielectric tester shall have a voltmeter with an accuracy that does not introduce an error greater than five percent on the high voltage side of the transformer. If analog, it shall have a response time that does not introduce a lagging error greater than 1 percent of full scale at the specified rate of increase in voltage. The test potential is to be gradually increased from zero until the required test voltage is reached and is to be held at that value for one minute.
49.4		For the DC test, the power supply is to have an output potential of the voltage specified. Any ripple in the voltage shall not exceed 1 percent. The test potential is to be gradually increased from zero until the required test voltage is reached and is to be held at that value for one minute.
51.2(e)		e) Conductor material. Exception: Conductor material marking is not required for unalloyed copper which is at least 97 percent unalloyed copper as referenced in IACS (International Annealed Copper Standard). ~~unless the conductor is a composite conductor composed of copper and hard-drawn copper alloy strands. Composite conductors shall be marked "Conductor composed of composite of copper and hard-drawn copper alloy."~~
51.2(f)		f) The conductivity of the conductor in percent of unalloyed copper. Reference IACS (International Annealed Copper Standard). ~~For a composite conductor of copper and harddrawn copper alloy strands, the finished conductor's conductivity shall be shown.~~ ~~Exception: Not applicable for minimum 97 percent IACS unalloyed copper, or 61 percent IACS aluminum, or carbon fiber filament conductor, or magnet wire conductor, or where the resistance of the conductor is identified as indicated in Exceptions 1, 2, and 4 to 51.2(d) and Exception 5 to 51.2(d).~~
Table 5.3	Info	~~Note 2~~
Table 48A.1		**Number of specimens for cut-piece dielectric voltage withstand test**
		CUSTOMERS PLEASE NOTE: This Table and column "Verdict" can be used in determining how your current or future production is or will be in compliance with new/revised requirements.