UL 758

STANDARD FOR SAFETY

Appliance Wiring Material

UL Standard for Safety for Appliance Wiring Material, UL 758

Third Edition, Dated May 2, 2014

Summary of Topics

This revision to ANSI/UL 758 dated July 3, 2024 includes the following changes in requirements:

– Conductor Material Clarification, Revised Table 5.3

– Large, Bunch Stranded Conductors, Revised Table 5.9

– Dielectric Test on Shielded Constructions, Revised 49.1

– Addition of Silvered Copper-Beryllium Alloy to Table 5.3

– Addition of Silver and Nickel Coated Copper Alloy to Table 5.3

Text that has been changed in any manner or impacted by ULSE's electronic publishing system is marked with a vertical line in the margin.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated September 1, 2023, January 5, 2024, April 19, 2024, and April 26, 2024.

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UL 758

Standard for Appliance Wiring Material

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May 2, 2014

This ANSI/UL Standard for Safety consists of the Third Edition including revisions through July 3, 2024.

The most recent designation of ANSI/UL 758 as an American National Standard (ANSI) occurred on July 3, 2024. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

Comments or proposals for revisions on any part of the Standard may be submitted to ULSE at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements cover Appliance Wiring Material (AWM) in the form of single insulated conductors, multi-conductor cables, optical fibers, individual insulated conductors, and fiber optic members for use as components in multi-conductor cables.

1.2 The appliance wiring material covered by the requirements of this Standard are solely for use as factory-installed wiring either within the overall enclosure of appliances and other equipment (internal wiring) or as external interconnecting cable for appliances (external wiring), or for further processing as components in multi-conductor cables.

1.3 These requirements do not cover any wire, cable, or cord types that are presently covered in the National Electrical Code (NEC), NFPA 70, and are not intended for installation in buildings or structures in accordance with the NEC except within the scope of the installation instructions of the end-product for which their use is intended.

1.4 These requirements cover appliance wiring material with operating temperatures from a minimum 60°C (140°F) dry temperature rating and voltage ratings from a minimum 30-volt rating. Conductor size ranges from 50 AWG to 2000 kcmil. Appliance wiring material (AWM) composed entirely of optical fiber members or electrical conductors in combination with optical fiber members are also covered by these requirements.

1.5 These requirements do not cover the optical performance of any optical-fiber member or group of such members.

1.6 These requirements do not cover constructions which utilize flat, insulated conductors that are not laid parallel. The requirements for these products are found in the Standard for Flexible Materials Interconnect Constructions, UL 796F.

1.7 The evaluation of the performance of the semi-conductive polymeric layer described in 5.9 is not covered by this Standard.

1.8 In addition to these constructions, this Standard establishes guidelines for the evaluation of special constructions that, due to their specific end product use, are not required to meet all of the requirements for general construction AWM.

1.9 The final acceptance of AWM is dependent upon its use in complete equipment that conforms with the standards applicable to such equipment.

2 General

2.1 Components

2.1.1 Except as indicated in 2.1.2, a component of a product covered by this Standard shall comply with the requirements for that component.

2.1.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or

b) Is superseded by a requirement in this standard.

2.1.3 A component shall be used in accordance with its rating established for the intended conditions of use.

2.1.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

2.1.5 Polymeric materials evaluated for its intended use, are not prohibited from being used in the insulation and jacket applications indicated in Table 2.1.

Table 2.1
Polymeric materials for use in wire and cable and associated AWM ratings

AWM rating	Component	Minimum average thickness, inch	Minimum average thickness, (mm)	Compound's use or rating
Sunlight resistant	Insulation	0.030	0.76	Outer PVC or TPE insulation rated for 720 hours sunlight resistance
Sunlight resistant	Jacket	0.030	0.76	Outer PVC or TPE jacket rated for 720 hours sunlight resistance
60°C Wet	Insulation	0.030	0.76	PVC insulation rated for use in Type TW thermoplastic-insulated wire
60°C or 75°C Wet	Insulation	0.030	0.76	PVC insulation rated for use in Types THW or THHW thermoplastic-insulated wire
60°C or 75°C Wet	Insulation	0.015	0.38	PVC insulation rated for use in Type THWN thermoplastic-insulated wire
60°C, 75°C, or 90°C Wet	Insulation	0.015	0.38	PVC insulation rated for use in Type THWN-2 thermoplastic-insulated wire

2.2 Units of measurement

2.2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

2.2.2 Unless otherwise indicated, all voltage values mentioned in this Standard are root-mean-square (rms).

2.2.3 Equipment calibrated in metric units is to be used when a requirement is applied in metric terms.

2.3 Undated references

2.3.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

2.3.2 Wherever the designation "UL 1581" is used in this Standard, reference is to be made to the designated part(s) of the Reference Standard for Electrical Wires, Cables, and Flexible Cords, UL 1581. Wherever the designation "UL 62" is used in this Standard, reference is to be made to the designated part(s) of the Standard for Flexible Cords and Cables, UL 62.

CONSTRUCTION

3 General

3.1 The acceptability of an AWM for use in a specific end-product is based on the construction and flame rating of each individual construction.

3.2 Table 3.1 – Table 3.9 serve as indices to requirements for construction details and basic test methods for typical AWM constructions.

3.3 Coiled cables shall comply with the requirements specified in this Standard. All tests and measurements shall be conducted on specimens obtained from the straight ends at each end of the coiled portion of the cable. The straight ends shall have been subjected to the same heat conditioning as the coiled portion during the coiling process. In addition, the minimum average thickness and minimum thickness at any point of insulation and jacket shall be made on the coiled portion and shall meet the requirements specified for an uncoiled construction.

3.4 Wires or cables which have a restricted use are those installed where not subject to movement or mechanical abuse, or where totally enclosed.

3.5 A wire or cable for Class 2 use shall have a voltage rating less than or equal to 150 V AC or DC.

3.6 The high voltage DC wire described in Table 3.6 and Table 3.6A shall have a minimum voltage rating of 3 kV DC. Wires with DC voltage rating less than 3 kV DC shall be evaluated in accordance with Table 3.1.

Table 3.1
Single or multiple conductor with extruded insulation

Conductors:		
	Material	See Conductor, Section 5
	Size	See Conductor, Section 5
Insulation:		
	Material	See Insulation, Section 7
	Thickness	See Insulation, Section 7
Covering:		
	Material	See Coverings, Section 8
Markings:		See Surface Marking of AWM, Section 50, and Markings on Tag, Reel or Carton, Section 51
Basic tests:		
	Physical Properties Unaged and Air Oven Aged, Section 14.	
	Conductor Corrosion Test, Section 18	
	Deformation Test (Thermoplastics and Class XL Only), Section 19.	
	Flexibility Test, Section. 21.	
	Heat Shock Test (Thermoplastic Materials Only), Section 22.	
	Cold Bend Test, Section 23.	
	Durability of Ink-Print Test, Section27	
	Crush Resistance Test, Section 28.	
	Dielectric Test, Method I, Section 29.	
	Dielectric Test, Method II, Section 30.	
	Dielectric Test, Method III, Section 31.	
	Horizontal Flame Test for Internal Wiring, Section 40.	
Elective tests/ratings:		See Table 3.9

Table 3.2
Single conductor with other-than-extruded insulation

Conductors:		
	Material	See Conductor, Section 5
	Size	See Conductor, Section 5
Insulation:		
	Material	See Insulation, Section 7
	Thickness	See Insulation, Section 7
Markings:		See Surface Marking of AWM, Section 50, and Markings on Tag, Reel or Carton, Section 51
Basic tests:		
	Conductor Corrosion Test, Section 18.	
	Flexibility Test, Section 21.	
	Cold Bend Test, Section 23.	

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Table 3.2 Continued

	Durability of Ink-Print Test, Section 27
	Crush Resistance Test, Section 28.
	Dielectric Test, Method I, Section 29.
	Dielectric Test, Method II, Section 30.
	Horizontal Flame Test for Internal Wiring, Section 40.
Elective tests/ratings:	See Table 3.9.
†Laminated, flat ribbon cable is covered in Table 3.5.	

Table 3.3
Single and parallel, multi-conductor cable with extruded integral insulation and jacket

Conductors:	
Material	See Conductor, Section 5
Size	See Conductor, Section 5
Integral insulation and jacket:	
Material	See Insulation, Section 7; Overall Jacket, Section 13
Thickness	See Insulation, Section 7; Overall Jacket, Section 13
Markings:	See Surface Marking of AWM, Section 50, and Markings on Tag, Reel or Carton, Section 51
Basic tests:	
	Physical Properties, Unaged and Air Oven Aged, Section 14.
	Conductor Corrosion Test, Section 18.
	Deformation Test (Thermoplastics and Class XL Only), Section 19.
	Flexibility Test, Section 21.
	Heat Shock Test (Thermoplastic Materials Only), Section 22.
	Cold Bend Test, Section 23.
	Durability of Ink-Print Test, Section 27
	Dielectric Test, Method I, Section 29.
	Dielectric Test, Method II, Section 30.
	Dielectric Test, Method III, Section 31.
	Horizontal Flame Test for Internal Wiring, Section 40.
	Cable Flame Test, Section 41.
Elective tests/ratings:	See Table 3.9.

Table 3.4
Single and multiple-conductor cable using non-integral jacket

Conductors:	
Material	See Conductor, Section 5
Size	See Conductor, Section 5

Table 3.4 Continued on Next Page

Table 3.4 Continued

Insulated conductors:	See Insulation, Section 7 The voltage and temperature rating of the cable shall not exceed the lowest rating of either the insulated conductors or the fiber optic members. Cables rated 60°C, 75°C, and 90°C wet shall use insulated conductors that comply with the applicable wet rating.
Covering:	
Material	See Coverings, Section 8
Shield:	See Shield(s), Section 11
Jacket:	
Material	See Overall Jacket, Section 13
Thickness	See Overall Jacket, Section 13
Markings:	See Surface Marking of AWM, Section 50, and Markings on Tag, Reel, or Carton, Section 51
Basic tests:	
Insulated conductors tested in accordance with Table 3.1, Table 3.2, Table 3.3, or Table 3.5.	
Physical Properties, Unaged and Air Oven Aged, Section 14 – Test jacket only.	
Deformation Test (Thermoplastics and Class XL Only), Section 19.	
Flexibility Test, Section 21.	
Heat Shock Test (Thermoplastic Materials Only), Section 22.	
Cold Bend Test, Section 23.	
Durability of Ink-Print Test, Section 27.	
Horizontal Flame Test for Internal Wiring, Section 40.	
Cable Flame Test, Section 41.	
Elective tests/ratings:	See Table 3.9.

Table 3.5
Bonded or laminated flat ribbon cable

Conductors:	
Material	See Conductor, Section 5
Size	See Conductor, Section 5
Insulation:	
Material	See Insulation, Section 7
Thickness	See Insulation, Section 7
Covering:	
Material	See Coverings, Section 8
Markings:	See Surface Marking of AWM, Section 50, and Markings on Tag, Reel, or Carton, Section 51
Basic tests:	
Physical Properties, Unaged and Air Oven Aged, Section 14 – Test bonded only.	
Conductor Corrosion Test, Section 18.	
Deformation Test (Thermoplastics and Class XL Only), Section 19.	
Flexibility Test, and Jacket, Section 21.	

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Table 3.5 Continued

	Heat Shock Test (Thermoplastic Materials Only), Section 22. Cold Bend Test, Section 23. Durability of Ink-Print Test, Section 27. Delamination Test (Laminated Constructions Only), Section 24. Crush Resistance Test, Section 28. Dielectric Test, Method I, Section 29. Dielectric Test, Method II, Section 30. Dielectric Test, Method III, Section 31. Horizontal Flame Test for Internal Wiring, Section 40.
Elective tests/ratings:	See Table 3.9.

Table 3.6
High voltage* DC wire with extruded insulation

Conductors:		
	Material	See Conductor, Section 5
	Size	See Conductor, Section 5
Insulation:		
	Material	See Insulation, Section 7 (solid insulation only)
	Thickness	See Insulation, Section 7
Covering:		
	Material	See Coverings, Section 8
Jacket:		
	Material	See Overall Jacket, Section 13
	Thickness	See Overall Jacket, Section 13
Markings:		See Surface Marking of AWM, Section 50, and Markings on Tag, Reel, or Carton, Section 51
Basic tests:		
	Physical Properties, Unaged and Air Oven Aged, Section 14.	
	Conductor Corrosion Test, Section 18.	
	Deformation Test (Thermoplastics and Class XL Only), Section 19.	
	Flexibility Test, Section 21.	
	Heat Shock Test (Thermoplastic Materials Only), Section 22.	
	Shrinkback Test – Special Rating TV Wires Only, Section 25.	
	Ozone Resistance Test – Special Rating TV Use Wires Only, Section 26.	
	Durability of Ink-Print Test, Section 27.	
	Crush Resistance Test, Section 28.	
	High-Voltage DC Wire Dielectric Voltage-Withstand Test, Method I, Section 32.	
	High-Voltage DC Wire Dielectric Voltage-Withstand Test, Method II, Section 33.	
	High-Voltage Cut-Through Test, Special Rated TV Wire Only, Section 34.	
	Horizontal Flame Test for Internal Wiring, Section 40.	
	VW-1 Flame Test (required for TV wire), Section 41.	
Elective tests/ratings:		See Table 3.9.
*High voltage indicates wires rated 3kV DC or higher.		

Table 3.6A
High voltage* DC wire with other-than-extruded insulation

Conductors:		
	Material	See Conductor, Section 5
	Size	See Conductor, Section 5
Insulation:		
	Material	See Insulation, Section 7
	Thickness	See Insulation, Section 7

Table 3.6A Continued on Next Page

Table 3.6A Continued

Covering:	
Material	See Coverings, Section 8
Jacket:	
Material	See Overall Jacket, Section 13
Thickness	See Overall Jacket, Section 13
Markings:	See Surface Marking of AWM, Section 50, and Markings on Tag, Reel, or Carton, Section 51
Basic tests:	
Conductor Corrosion Test, Section 18.	
Flexibility Test, Section 21.	
Shrinkback Test – Special Rating TV Wires Only, Section 25.	
Ozone Resistance Test – Special Rating TV Use Wires Only, Section 26.	
Durability of Ink-Print Test, Section 27.	
Crush Resistance Test, Section 28.	
High-Voltage DC Wire Dielectric Voltage-Withstand Test, Method I, Section 32.	
High-Voltage DC Wire Dielectric Voltage-Withstand Test, Method II, Section 33.	
High-Voltage Cut-Through Test, Special Rated TV Wire Only, Section 34.	
Horizontal Flame Test for Internal Wiring, Section 40.	
VW-1 Flame Test (required for TV wire), Section 41.	
Elective tests/ratings:	See Table 3.9.
*High voltage indicates wires rated 3kV DC or higher.	

Table 3.7
Fiber optic cables*

Optical fiber:	See Cable composed entirely of optical-fiber members, 6.3
Buffer:	
Material	See Cable composed entirely of optical-fiber members, 6.3
Thickness	See Cable composed entirely of optical-fiber members,6.3
Covering:	
Material	See Coverings, Section 8
Jacket:	
Material	See Overall Jacket, Section 13
Thickness	See Overall Jacket, Section 13
Markings	See Surface Marking of AWM, Section 50, and Markings on Tag, Reel, or Carton, Section 51
Basic tests:	
Physical Properties, Unaged and Air Oven Aged, Section 14.	
Deformation Test (Thermoplastics and Class XL Only), Section 19.	
Flexibility Test, Section 21.	
Heat Shock Test (Thermoplastic materials only), Section 22.	
Cold Bend Test, Section 23.	
Durability of Ink- Print Test, Section 27.	
Horizontal Flame Test for Internal Wiring, Section 40.	
VW-1 Flame Test (required for external use), Section 42.	
*Cables covered by this table contain no current-carrying parts.	

Table 3.8
Single- and multiple-conductor cable employing a non-extruded covering as the outermost layer§

Conductors:	
Material	See Conductor, Section 5
Size	See Conductor, Section 5
Insulated conductors:	
Material	See Insulation, Section 7
Thickness	See Insulation, Section 7
Shield:	See Shield(s), Section 11
Covering:	
Material	See Coverings, Section 8
Markings:	See Surface Marking of AWM, Section 50, and Markings on Tag, Reel, or Carton, Section 51
Basic tests:	
Insulated conductors tested in accordance with Table 3.1, Table 3.2, Table 3.3, or Table 3.5.	
Flexibility Test, Section 21.	

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