



UL 486A-486B

STANDARD FOR SAFETY

Wire Connectors

UL Standard for Safety for Wire Connectors, UL 486A-486B

Fourth Edition, Dated March 14, 2025

Summary of Topics

This new Fourth Edition of ANSI/UL 486A-486B dated March 14, 2025 includes the changes in requirements for testing with copper wire, new requirements for multi-tap wire connectors, addition of a definition for run and tap connectors, addition of installation instructions for tangless connectors, an alternative test method for tensile strength, along with various updates and editorial corrections.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated May 10, 2024 and November 15, 2024.

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Fifth Edition



CSA Group
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UL 486A-486B
Fourth Edition

Wire Connectors

March 14, 2025



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This ANSI/UL Standard for Safety consists of the Fourth Edition.

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PREFACE

This is the harmonized ANCE, CSA Group, and ULSE standard for Wire Connectors. It is the fifth edition of NMX-J-543-ANCE, the seventh edition of CSA C22.2 No. 65, and the fourth edition of UL 486A-486B. This edition of NMX-J-543-ANCE supersedes the previous edition published on July 20, 2023. This edition of CSA C22.2 No. 65 supersedes the previous edition published on January 11, 2013 and April 27, 2018. This edition of UL 486A-486B supersedes the previous edition published on April 27, 2018.

This harmonized standard was prepared by the Association of Standardization and Certification (ANCE), CSA Group, and ULSE Inc. (ULSE). The efforts and support of the Technical Harmonization Committee for Connectors, of the Council on the Harmonization of Electrotechnical Standards of the Nations of the Americas (CANENA), are gratefully acknowledged.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

The present Mexican standard was developed by the SC 20D – Conectores part of the CT 20 – Conductores from the Comité de Normalización de la Asociación de Normalización y Certificación, A.C., CONANCE, with the collaboration of the connectors manufacturers and users.

This standard was reviewed by the CSA Integrated Committee on Electrical Connectors, under the jurisdiction of the CSA Technical Committee on Wiring Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee. This standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

NOTE: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

Level of harmonization

This standard uses the IEC format but is not based on, nor is it considered equivalent to, an IEC standard.

This standard is published as an equivalent standard for ANCE, CSA Group, and ULSE.

An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

Reasons for differences from IEC

The Technical Harmonization Committee identified several IEC standards that address electrical wire connectors included in the scope of this standard. The IEC standards for electrical wire connectors are recognized as being generally system specific, containing the requirements for the relevant wire connectors and cables in many discrete IEC standards.

The THC determined the safe use of electrical wire connectors is dependent on the design and performance of the wire connectors in relation to the North American Electrical Codes with which they are intended to be installed. The THC agreed such future investigation will be facilitated by the harmonization of the North American Electrical Codes for wire connectors with IEC installation practices.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

Wire Connectors

1 Scope

1.1 This Standard applies to single-polarity connectors for use with all alloys of copper or aluminum, or copper-clad aluminum conductors, or all three, for providing contacts between current-carrying parts, in accordance with the Canadian Electrical Code, Part I, CSA C22.1, in Canada, the National Electrical Code, NFPA 70, in the United States of America, or the Standard for Electrical Installations, NOM-001-SEDE, in Mexico, as follows:

NOTE: Copper-clad aluminum conductors are for use only in the United States in accordance with the National Electrical Code, NFPA 70.

- a) Pressure wire connectors intended to hold one or more conductor(s);
 - b) Connectors intended for use in appliances and equipment that comply with the requirements for such appliances and equipment;
 - c) Soldering connectors;
 - d) Splicing wire connectors intended for use with 4 AWG (21.2 mm²) or larger conductors;
- NOTE: A splicing wire and cable connector taking a range of conductor sizes may include conductor sizes smaller than 4 AWG (21.2 mm²).
- e) Neutral bars;
 - f) Uninsulated connectors that are used in circuits rated 35 000 V and below;
 - g) Ampere-rated connectors not intended for general use;
 - h) Insulation piercing connectors;
 - i) Exothermically welded wire connectors;
 - j) Pressure connectors and devices for splices and taps installed on service conductors;
 - k) Multi-tap connectors; and
 - l) Run and tap connectors.

1.2 Connectors covered by this Standard are also suitable for use with conductors that are prepared using ferrules evaluated in accordance with CSA C22.2 No. 291-14 / UL 486F, or wire connector adapters evaluated in accordance with this Standard, under the following conditions:

- a) Ferrules and adapters are applied in accordance with their ratings and installation instructions.
- b) The length of exposed conductive material maintains the strip lengths required by the connector manufacturer.

1.3 This Standard is intended for connectors suitable for use with conductors in the size ranges as follows:

- a) Aluminum:
 - 1) 12 AWG (3.3 mm²) and 10 AWG (5.3 mm²) solid;

2) 12 AWG (3.3 mm²) to 2 000 kcmil (1 010 mm²) stranded, Class B concentric, compressed, and compact; and

3) 12 AWG (3.3 mm²) to 1 000 kcmil (508 mm²) stranded single input wire (SIW).

b) Copper-clad aluminum:

1) In Canada, this construction is not allowed.

2) In Mexico, this construction is not allowed.

3) In the United States:

i) 12 AWG (3.3 mm²) and 10 AWG (5.3 mm²) solid; and

ii) 12 AWG (3.3 mm²) to 2 000 kcmil (1 010 mm²) stranded, Class B concentric, compressed, and Class C concentric.

c) Copper:

1) 30 AWG (0.05 mm²) to 10 AWG (5.3 mm²) solid; and

2) 30 AWG (0.05 mm²) to 2 000 kcmil (1 010 mm²) stranded, Class B concentric and compressed, and Class C concentric.

d) Compact-stranded copper conductors:

1) In Canada for 8 AWG (8.4 mm²) and larger;

2) In the United States for 2 AWG (33.6 mm²) and larger; and

3) In Mexico for 8 AWG (8.4 mm²) and larger.

e) Rigid (solid and stranded) metric wire sizes, Classes 1, 2, 5, and 6, in the range of 0.5 – 2 500 mm², in addition to AWG/kcmil sizes, with AWG/kcmil ratings mandatory and metric wire ratings optional.

NOTE 1: Metric wire sizes are based on the IEC Standard for Conductors of Insulated Cables, IEC 60228.

NOTE 2: For example, a connector rated for 6 AWG – 350 kcmil may be additionally rated for 16 – 185 mm². See Annex [B](#) for example.

f) Other class and strand configurations as indicated by marking.

1.4 This Standard is intended for connectors suitable for currents not exceeding the ampacity of insulated conductors rated 75 °C or 90 °C in accordance with the rating of the connector, if provided.

1.5 These requirements cover insulated connectors, insulating caps, and covers intended for use at 2 000 volts or less and uninsulated connectors for use in general use circuits rated 35 000 volts nominal or less.

In Canada, uninsulated connectors may also be used in applications up to 5 000 volts phase-to-phase where allowed and installed in accordance with Section 36 of the Canadian Electrical Code, Part I, CSA C22.1. For products intended for use in Canada, general requirements are given in CSA C22.2 No. 0.

1.6 This Standard does not apply to:

a) Insulated connectors for voltage levels above 2 000 V;

- b) Manual twist-on connectors;
- c) Built-in terminal connectors in devices rated less than 30 A intended for outlet box mounting or having provision for stress relief;
- d) Flat quick connect terminals;
- e) Wire binding screw terminals; and
- f) Bare or covered ferrules intended for use with 1/0 – 20 AWG stranded copper conductors.

2 Referenced Publications

2.1 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.

CSA C22.1, *Canadian Electrical Code, Part I (CE Code)*

CSA C22.2 No. 0, *General-requirements – Canadian Electrical Code, Part II*

CSA C22.2 No. 0.17, *Evaluation of Properties of Polymeric Materials*

CSA C22.2 No. 291, *Bare and Covered Ferrules*

IEC 60228, *Conductors of Insulated Cables*

UL 94, *Tests for Flammability of Plastic Materials for Parts in Devices and Appliances*

UL 486F, *Bare and Covered Ferrules*

UL 746C, *Polymeric Materials – Use in Electrical Equipment Evaluations*

NFPA 70, *National Electrical Code (NEC)*

NMX-J-508-ANCE, *Wiring Devices – Safety Requirements – Specifications and Test Methods*

NMX-J-565/3-ANCE, *Safety Requirements – Flammability of Plastic Materials for Parts in Devices and Appliances – Test Methods*

NOM-001-SEDE, *Standard for Electrical Installations*

2.2 See Annex [A](#) for a listing of supplemental standards.

3 Units of Measurement

3.1 The values given in SI (metric) units shall be normative, except for AWG/kcmil conductor sizes. Any other values are for information purposes only.

3.2 For conductor sizes, AWG/kcmil conductor sizes are noted with their metric equivalents in parenthesis, followed by the closest metric conductor size covered by IEC 60228.

NOTE 1: Specifications for conductor sizes for both AWG/kcmil and metric are shown as follows: 12 – 3 AWG (3.31 – 26.7) / 4.0 – 25.0 mm².

NOTE 2: IEC 60228 covers conductors in the metric range of 0.5 – 2 500 mm². For requirements covering AWG/kcmil wire ranges outside this scope, the specification for the metric conductor will be limited to the conductor range covered by IEC 60228.

4 Definitions

4.1 For the purpose of this Standard, the following terms and definitions apply.

4.2 CIRCULAR MIL (cmil) – The area of a circle with a diameter of 0.001 inch.

4.3 CONNECTOR – Device for connecting a conductor to an equipment terminal or for connecting two or more conductors to each other.

4.4 CONTROL CONDUCTOR – An unbroken conductor which is included in the current-cycling test loop.

4.5 CRIMPING DIE – That part of a crimping tool which forms the crimp(s) and usually incorporates the crimp anvil(s), the crimp indenter(s), and the positioner.

NOTE: Crimping dies may have separate or integral sections for compressing the insulation grip, if provided.

4.6 EQUALIZER – A busbar that provides a point of equipotential and uniform current flow in a stranded conductor without adversely affecting the temperature of the connector(s).

4.7 INTERMIXED – Describes different conductor material types (i.e., copper, vs. copper-clad aluminum, vs. aluminum) that are in direct physical contact.

NOTE: For clarity, this Standard states “intermixed and in direct physical contact” for those combination of conductor types that are permitted to be intermixed.

4.8 MULTI-TAP CONNECTOR – A type of splicing wire connector that terminates multiple conductors in three or more clamping units. Each clamping unit may terminate more than one conductor. Neutral bars are a type of multi-tap connector that is intended for a specific application.

4.9 PACKAGING CONTAINER – The container in which the unit containers are packaged.

4.10 PARALLELING CONDUCTORS – Conductors that are electrically joined at both ends.

NOTE: Paralleling conductors are limited to sizes 1/0 AWG (53.5 mm²) 70 mm² and larger, based on NFPA 70; CSA C22.1; and NOM-001-SEDE.

4.11 RATED CURRENT (Ampere Rating) – Current assigned to the connector by the manufacturer.

4.12 RUN AND TAP CONNECTOR – A type of splicing wire connector where one conductor (the “run”) is not terminated, but electrically connected to one or more terminated connectors [the “tap(s)”].

4.13 SPLICING WIRE CONNECTOR – A connector that establishes a connection between two or more conductors by means of mechanical pressure and is not intended to be permanently mounted.

4.14 SINGLE INPUT WIRE (SIW) – A stranded conductor that varies the number of wires within a range of conductor sizes in order to permit that range of conductor sizes to be constructed from a single wire size.

4.15 STABILITY FACTOR S – The measure of temperature stability of a connector during the current-cycling test.

4.16 TEMPERATURE RATING – The maximum temperature of an insulated connector, assigned by the manufacturer.

4.17 TEMPERATURE RISE – The difference of the temperature of the connector, measured under load, and the ambient temperature.

4.18 TERMINAL CONNECTOR – A connector that establishes a connection between one or more conductors to a terminal plate or stud, or to any similar device, by means of mechanical pressure.

4.19 UNIT CONTAINER – The smallest container in which connectors are packaged.

4.20 VOLTAGE RATING – The maximum voltage of an insulated connector.

5 Symbols and Abbreviations

5.1 ° – Degree

5.2 A – Amps, Amperes

5.3 Al – Aluminum

5.4 AWG – American Wire Gage/gauge

5.5 C – Celsius

5.6 CC or CCA – Copper-clad aluminum

5.7 Cu – Copper

5.8 d – Days

5.9 f – Flexible

5.10 h – Hours

5.11 HgNO₃ – Mercurous nitrate

5.12 Hz – Hertz, cycles per second

5.13 in – Inch, Inches

5.14 kcmil – Thousand circular mil

5.15 m – Meter

5.16 mil – Thousandth of an inch

5.17 min – Minutes

5.18 ml – Milliliter

5.19 mm – Millimeter

- 5.20 mm² – Square millimeter
- 5.21 N – Newton – kilogram meter/sec²
- 5.22 NH₄ – Ammonia
- 5.23 r – Rigid solid and rigid stranded
- 5.24 rpm – Revolutions per minute
- 5.25 s – Seconds
- 5.26 SAE – Society of Automotive Engineers
- 5.27 sol – Solid
- 5.28 str – Stranded
- 5.29 V – Volts

6 Construction Requirements

6.1 General

6.1.1 The design and construction of a connector intended for use with stranded conductors shall be such that all strands of the conductor shall be contained within the connector.

6.1.2 A connector intended for use with conductors of different sizes shall have a clamping mechanism that adapts to conductors of different sizes without permanent removal or addition of parts. Some examples of clamping mechanisms are:

- a) Direct bearing screws with or without use of a pressure plate;
- b) A pressure plate or plates and a screw or screws;
- c) Deformation of the connector barrel (crimping) using a special tool;
- d) A nut threading onto a split bolt; and
- e) An element for insulation-piercing or displacement.

6.1.3 Any rearrangement or adjustment of a connector that is necessary to adapt it to various sizes of conductors shall be obvious unless the connector is marked as described in [10.11](#).

6.1.4 There shall be no sharp edges or corners on the outer surface of a connector that result in damage to insulation that the connector contacts.

6.1.5 The construction of a connector intended to secure more than a single conductor shall be such that there will be no intermixing (direct conductor contact) between the conductors of different materials unless the connector is investigated and found to meet the performance requirements of this Standard and is marked in accordance with [10.24](#).

6.2 Materials

6.2.1 The main current-carrying part of a connector shall be of aluminum, an aluminum alloy, copper, a copper alloy, or other material investigated and found to meet the performance requirements of this Standard.

6.2.2 A connector intended for use with aluminum conductor(s) or a connector body of aluminum or aluminum alloy shall be coated with an electrically conductive coating, such as tin, that will inhibit oxidation and corrosion. The following need not be coated:

- a) A splicing connector shipped prefilled with an oxide-inhibiting compound;
- b) The conductor-securing (barrel) portion of a terminal connector that is shipped prefilled with an oxide-inhibiting compound;
- c) An aluminum-bodied splicing connector that is intended for an aluminum conductor only;
- d) The cut ends of a neutral bar;
- e) The top cap of a lay-in connector not in contact with the wire; and
- f) The mounting hole in a connector that is intended to be secured by a bolt, nut, and washer.

NOTE: Other coatings may be used if investigated for the purpose and found suitable.

6.2.3 Iron or steel, if protected against corrosion, may be used for screws, plates, yokes, or other parts that are employed as a means of clamping the conductor, if such parts are not the primary current-carrying members.

6.2.4 Insulation employed as a part of the connector shall be suitable for its rated temperature in accordance with [Table 6.1](#).

Table 6.1
Operating Temperature Ratings of Connector Insulation Materials

Material	Temperature, °C
Thermoplastic ^a	75
	90
	105
	125
	150
Phenolic ^b	150
Urea ^c	100
Melamine ^d	130
Melamine ^e	150
^a Assigned by the manufacturer. ^b Composition may be filled or unfilled. ^c Unless the compound has been found by test to meet the requirements for use at a higher temperature. ^d Composition with a specific gravity less than 1.55. ^e Composition with a specific gravity of 1.55 or more. Compound may have cellulosic filler material.	

6.2.5 The insulating material shall have a minimum flammability classification of V-2 or VTM-2 as determined by tests described in UL 94, CSA C22.2 No. 0.17, or NMX-J-565/3-ANCE. The material thickness for determining the flammability shall be measured at points supporting live parts or within 6 mm (0.236 inch) of live parts, whichever is less.

NOTE: Insulating tubing that has a VW1 rating is not considered equivalent. Tubing may be tested using bar samples to achieve a V-2 minimum rating, or the glow wire test (see [6.2.6](#)) may be performed.

6.2.6 With reference to [6.2.5](#), a material other than V-2 or VTM-2 may be used when the insulation of the wire connector complies with the requirements for the glow-wire test as specified in UL 746C, or CSA C22.2 No. 0.17, or NMX-J-508-ANCE, with a glow wire at a temperature of 750 °C.

6.3 Soldering lugs

6.3.1 A soldering lug shall be made of copper, brass, bronze, or other material that has been shown by investigation to meet the requirements of this Standard.

6.3.2 A lug of other than wrought copper shall be subjected to an investigation that evaluates if the lug has performance equivalent to that of a wrought-copper lug.

6.3.3 The diameter and depth of the conductor hole, the wall thickness, and the contact area of the tang of a wrought-copper lug shall not be less than the values specified in [Table 6.2](#), according to the maximum size of conductor that the lug is intended to accommodate.

6.3.4 The diameters and areas of screws or bolts have not been standardized, and no addition or subtraction for these has been made in determining the areas specified in [Table 6.2](#).

6.3.5 Soldering lugs shall not be rated for use with metric conductors.

Table 6.2
Soldering Lug Minimum Dimensions

Size of conductor		Diameter of conductor hole		Depth of conductor hole		Wall thickness		Contact area	
AWG or kcmil	(mm ²)	mm	(in)	mm	(in)	mm	(in)	mm ²	(in ²)
10	(5.26)	3.6	(0.143)	8.64	(0.34)	1.14	(0.045)	75.5	(0.117)
8	(8.4)	4.1	(0.164)	6.1	(0.24)	0.81	(0.032)	113	(0.175)
6	(13.3)	5.8	(0.232)	8.9	(0.35)	0.81	(0.032)	161	(0.250)
5	(16.9)	5.8	(0.232)	8.9	(0.35)	0.81	(0.032)	178	(0.275)
4	(21.2)	6.4	(0.253)	9.6	(0.38)	0.81	(0.032)	226	(0.350)
3	(26.7)	7.6	(0.300)	11.4	(0.45)	1.02	(0.040)	258	(0.400)
2	(33.6)	8.5	(0.336)	12.7	(0.50)	1.02	(0.040)	290	(0.450)
1	(42.4)	9.5	(0.375)	14.2	(0.56)	1.02	(0.040)	323	(0.500)
1/0	(53.5)	10.1	(0.398)	15.2	(0.60)	1.30	(0.051)	403	(0.625)
2/0	(67.4)	11.4	(0.450)	17.0	(0.67)	1.30	(0.051)	484	(0.750)
3/0	(85.0)	12.7	(0.500)	19.1	(0.75)	1.30	(0.051)	565	(0.875)
4/0	(107.2)	14.2	(0.559)	21.3	(0.84)	1.57	(0.062)	726	(1.125)
250	(127)	16.5	(0.650)	24.6	(0.97)	1.57	(0.062)	806	(1.250)

Table 6.2 Continued on Next Page

Table 6.2 Continued

Size of conductor		Diameter of conductor hole		Depth of conductor hole		Wall thickness		Contact area	
AWG or kcmil	(mm ²)	mm	(in)	mm	(in)	mm	(in)	mm ²	(in ²)
300	(152)	17.8	(0.700)	26.7	(1.05)	1.57	(0.062)	887	(1.375)
350	(177)	18.8	(0.750)	28.2	(1.11)	1.57	(0.062)	968	(1.500)
400	(203)	19.7	(0.775)	29.5	(1.16)	1.83	(0.072)	1 048	(1.625)
500	(253)	21.1	(0.830)	31.5	(1.24)	1.83	(0.072)	1 290	(2.000)
600	(304)	23.4	(0.920)	33.8	(1.33)	2.29	(0.090)	1 451	(2.250)
700	(354)	26.7	(1.050)	39.9	(1.57)	2.44	(0.096)	1 613	(2.500)
800	(405)	27.4	(1.080)	41.1	(1.62)	2.44	(0.096)	1 774	(2.750)
900	(456)	28.6	(1.125)	42.7	(1.68)	2.44	(0.096)	1 965	(3.000)
1 000	(508)	30.7	(1.209)	46.0	(1.81)	2.79	(0.110)	2 096	(3.250)
1 100	(558)	33.5	(1.320)	50.3	(1.98)	2.79	(0.110)	2 225	(3.450)
1 200	(609)	34.9	(1.375)	52.3	(2.06)	2.79	(0.110)	2 354	(3.650)
1 300	(660)	36.6	(1.440)	54.9	(2.16)	3.68	(0.145)	2 483	(3.850)
1 400	(708)	37.1	(1.460)	55.6	(2.19)	3.68	(0.145)	2 612	(4.050)
1 500	(759)	37.1	(1.460)	55.6	(2.19)	3.68	(0.145)	2 741	(4.250)
1 600	(812)	41.1	(1.620)	61.7	(2.43)	3.68	(0.145)	2 870	(4.450)
1 700	(862)	42.2	(1.660)	63.2	(2.49)	3.68	(0.145)	2 999	(4.650)
1 800	(912)	42.2	(1.660)	63.2	(2.49)	3.96	(0.156)	3 128	(4.850)
1 900	(964)	42.2	(1.660)	63.2	(2.49)	3.96	(0.156)	3 257	(5.050)
2 000	(1 016)	42.2	(1.660)	63.2	(2.49)	3.96	(0.156)	3 386	(5.250)

7 Test Requirements

7.1 General

7.1.1 A connector shall meet the test requirements when separate specimen sets using each conductor type for which the connector is intended (copper, copper-clad aluminum, and aluminum), as specified in [Table 7.4](#), are subjected to the applicable tests for the design of the connector as specified in [Table 7.1](#) through [Table 7.3](#), and with specific modifications noted below:

- A copper-bodied or copper alloy-bodied connector need not be subjected to the current-cycling sequence using copper conductors, unless the connector is dependent upon insulation piercing, insulation displacement, or spring action.
- An aluminum-bodied connector, intended to be used with copper conductor only, shall be subjected to the current-cycling, static-heating sequence, and mechanical sequence using copper conductors.
- The initial static-heating test need not be conducted in the static-heating sequence using copper conductor.
- Other than a tool-applied crimp connector, the current-cycling test using copper conductors need not be performed when the connector has been current-cycling tested with an aluminum conductor of a size not smaller than the size of the copper conductor required for the current-cycling test.

e) Conductor sizes 30 – 20 AWG (0.05 – 0.52 mm²) need not be subjected to the secureness test in the static-heating sequence or mechanical sequence.

f) Any conductor material may be used for the Dielectric Voltage-Withstand, Stress Corrosion, Secureness of Insulation, Flexing, and Low Temperature Installation Tests.

g) If a connector is rated for copper to copper, aluminum to aluminum, and copper to aluminum (intermixed), the mechanical sequence with copper to aluminum conductor may be omitted.

h) In all test sequences, with the exception of [7.1.1\(i\)\(3\)](#), aluminum conductor shall be permitted to represent tests with copper-clad aluminum conductor.

i) For a connector intended for the intermixing of copper and aluminum [marked “AL-CU (intermixed and dry locations)”], copper-clad aluminum and copper (marked “CC-CU”), or copper-clad aluminum and aluminum [marked “CC-AL (intermixed and dry locations)”], the heat-cycling tests shall be conducted using the following conductor materials:

1) For copper to aluminum (also covers copper-clad aluminum to aluminum):

- i) Maximum size copper with maximum size aluminum;
- ii) Maximum size copper with minimum size aluminum;
- iii) Minimum size copper with minimum size aluminum; and
- iv) Maximum size copper in combination with a minimum size aluminum, or conductors where the sum of test currents of the minimum size conductors is approximately equal to the current of the maximum size conductor.

2) For copper to copper-clad aluminum:

- i) Maximum size copper with maximum size copper-clad aluminum;
- ii) Maximum size copper with minimum size copper-clad aluminum;
- iii) Minimum size copper with minimum size copper-clad aluminum; and
- iv) Maximum size copper in combination with a minimum size copper-clad aluminum, or conductors where the sum of test currents of the minimum size conductors is approximately equal to the current of the maximum size conductor.

3) For copper-clad aluminum to aluminum (does not cover copper to aluminum):

- i) Maximum size copper-clad aluminum with maximum size aluminum;
- ii) Maximum size copper-clad aluminum with minimum size aluminum;
- iii) Minimum size copper-clad aluminum with minimum size aluminum; and
- iv) Maximum size copper-clad aluminum in combination with a minimum size aluminum, or conductors where the sum of test currents of the minimum size conductors is approximately equal to the current of the maximum size conductor.

The test currents are based on the lesser current dictated by the two different conductor materials.

Table 7.1
Test Sequences for All Connectors

Sequence			
1	2 ^a	3 ^b	4 ^c
Current-cycling	Static-heating Secureness Static-heating (repeated) Pullout	Secureness Pullout	Stress Corrosion
NOTE: Table 3 applies to connectors for non-parallel applications, in which case Table 7.2 would not be applicable. However, some connectors may have dual functionality, both parallel and non-parallel, in which case both Tables are applicable.			
^a This series of tests is referred to as static-heating sequence.			
^b This series of tests is referred to as mechanical sequence.			
^c The stress corrosion test, either moist ammonia or mercurous nitrate, need only be conducted for copper alloy parts not conforming to the copper requirements in 7.12 and 7.13 .			

Table 7.2
Test Sequences for All Connectors Intended for Parallel Conductors

Sequence			
1	2	3 ^a	4 ^b
Current-cycling	Static-heating	Secureness Pullout	Stress Corrosion
NOTE: Table 4 applies to connectors for parallel applications, in which case Table 7.1 would not be applicable. However, some connectors may have dual functionality, both parallel and non-parallel, in which case both Tables are applicable.			
^a This series of tests is referred to as mechanical sequence.			
^b The stress corrosion test, either moist ammonia or mercurous nitrate, need only be conducted for copper alloy parts not conforming to the copper requirements in 7.12 and 7.13 .			

Table 7.3
Additional Tests for Insulated Connectors or Connectors Employing Insulating Covers

Sequence					
1	2	3	4	5 ^a	6 ^b
Dielectric withstand	Secureness of insulation	Drop Dielectric withstand (after drop)	Flexing	Low temperature installation	Moisture absorption
NOTES:					
1) For connectors employing separable insulating covers, latches, and locks, Sequences 1 and 3 shall be followed.					
2) For connectors employing separable insulating covers with hinges, latches, and locks, Sequences 1, 3, and 4 shall be followed.					
3) For all other insulated connectors, Sequences 1 and 2 shall be followed.					
^a Applicable to insulated connectors where the crimping application is applied through the insulating material. This is an additional test for Canada only.					
^b Applicable only to porcelain or cold molded insulating materials.					

Table 7.4
Conductor Materials to be Used in Test Sequences and Suitable Combinations Based on Markings

Marking (or equivalent)	Conductor used in test sequences	Type of conductor suitable for use with	
		Single conductor in an opening	Two or more conductors in an opening
"CU"	Copper	Copper	Copper to copper
"AL"	Aluminum	Aluminum	Aluminum to aluminum
"AL-CU" or "CU-AL"	Copper and aluminum	Copper Aluminum Copper-clad aluminum	Copper to copper, Aluminum to aluminum, Copper to aluminum, but not intermixed or in direct physical contact, Copper-clad aluminum to copper-clad aluminum, Copper to copper-clad aluminum (intermixed and in direct physical contact), Aluminum to copper-clad aluminum but not intermixed or in direct physical contact
"CC-CU"	Copper and copper-clad aluminum	Copper Copper-clad aluminum	Copper-clad aluminum to copper-clad aluminum, copper to copper-clad aluminum (intermixed and in direct physical contact)
"CC-AL (intermixed – dry locations)"	Copper-clad aluminum and aluminum	Copper-clad aluminum Aluminum	Copper-clad aluminum to copper-clad aluminum, Copper-clad aluminum to aluminum (intermixed and in direct physical contact)
"AL-CU (intermixed - dry locations)"	Copper and aluminum	Copper Copper-clad Aluminum Aluminum	Copper to copper, Aluminum to aluminum, Copper to aluminum (intermixed and in direct physical contact), Copper-clad aluminum to copper-clad aluminum, Copper to copper-clad aluminum (intermixed and in direct physical contact), Aluminum to copper-clad aluminum (intermixed and in direct physical contact)

7.1.2 Testing may be conducted using AWG/kcmil solid and stranded sized conductors or Class 1 (rigid solid) and Class 2 (rigid stranded) metric sized conductors as follows:

- AWG/kcmil solid conductors are representative of Class 1 metric conductors.
- Class 1 metric conductors are representative of AWG/kcmil solid conductors.
- AWG/kcmil stranded conductors are representative of Class 2 metric conductors.
- Class 2 metric conductors are representative of AWG/kcmil stranded conductors.

Testing covers conductor sizes that are within the cross-sectional area envelope of the sizes tested, as determined by the circular mils of the conductor. See [9.1.5.5](#) – [9.1.5.7](#) for AWG/kcmil stranding classes. See Annex F for conductor area, in circular mils, for conductor stranding, and for conductor diameters, of both AWG/kcmil and metric conductor sizes.

NOTE: See Annex [B](#) for example.

7.1.3 A connector rated for Class 5, 6, or both Class 5 and 6 metric conductors (flexible stranded) shall be subjected to all test sequences using the appropriate Class of flexible metric conductors based on the ratings specified by the manufacturer. See [9.1.5.7](#) for testing with specific stranding counts.

7.1.4 Tests conducted on a connector with compact-stranded copper conductors shall represent tests with concentric and compressed stranded copper conductors of the same size. Tests conducted on a connector with compact, compressed, or concentric-stranded aluminum conductors shall represent tests with compact, concentric, and compressed stranded aluminum conductors of the same size. See [Table 9.3](#).

7.2 Current-cycling

7.2.1 The specimen sets shall complete 500 cycles of equal current-on and current-off operations for the periods of time specified in [Table 7.5](#), other than as noted in [9.2.2](#) and [9.2.5](#), while carrying the 60 Hz test current specified for the connector temperature rating and conductor size being tested. For a splicing wire connector involving two different conductor sizes, the test current shall be based on the lesser current dictated by the two different conductor sizes.

NOTE: A current source may be maintained at or above the required value by regulation or frequent adjustment.

Table 7.5
Test Current^h for Connectors Intended for a Single Conductor, A

Conductor size			Copper						Aluminum and copper-clad aluminum						On (and off) times for current-cycling hours ^f
			Assigned maximum ampere rating ^b	Static-heating ^{a,c,g}	Current-cycling connector temperature rating ^a				Assigned maximum ampere rating ^b	Static-heating ^{a,c,g}	Current-cycling connector temperature rating ^a				
AWG or kcmil (mm ²)	mm ² ⁱ	75 °C ^{d,g}			90 °C ^{e,g}		75 °C ^{d,g}	90 °C ^{e,g}							
30	(0.05)	—	0.5	3	3.5		4		—	—	—		—	1	
28	(0.08)	—	0.8	3.5	4		5		—	—	—		—	1	
26	(0.13)	—	1	5.5	6		8		—	—	—		—	1	
24	(0.20)	—	2	7	8		10		—	—	—		—	1	
22	(0.32)	—	3	9	12		13		—	—	—		—	1	
—	—	0.5	4.8	11.7	15.6		16.6		—	—	—		—	1	
20	(0.52)	—	5	12	16		17		—	—	—		—	1	
—	—	0.75	6.5	15.8	18.3		22.4		—	—	—		—	1	
18	(0.82)	—	7	17	19		24		—	—	—		—	1	
—	—	1	8	17.4	19.4		26.6		—	—	—		—	1	
16	(1.31)	—	10	18	20		31		—	—	—		—	1	
—	—	1.5	11.2	21	23.2		33.2		—	—	—		—	1	
14	(2.08)	—	15	[20] 30	[22] 33	[27] 40	—		—	—	—		—	1	
—	—	2.5	16.7	[21.7] 31.7	[24] 35	[31.4] 44.8	—		—	—	—		—	1	
12	(3.31)	—	20	[25] 35	[28] 39	[40] 54	15	[20] 30	[22] 33	[29] 43	—		—	1	
—	—	4	23.5	[30.3] 40.3	[34] 45	[47] 61.4	18.5	[23.5] 33.5	[26.2] 37.2	[35] 49	—		—	1	
10	(5.26)	—	30	[40] 50	[45] 56	[60] 75	25	[30] 40	[34] 45	[46] 60	—		—	1	
—	—	6	34.7	54.7	61.7	81	28.5	43.6	48.6	64	—		—	1	
8	(8.37)	—	50	70	80	100	40	55	60	77	—		—	1	
—	—	10	55	78.3	88.3	110	43.3	61.6	68.3	85.3	—		—	1	
6	(13.3)	—	65	95	105	131	50	75	85	102	—		—	1	
—	—	16	71.8	105	117	146	55.1	83.5	93.5	115	—		—	1	
4	(21.2)	—	85	125	140	175	65	100	110	140	—		—	1	
—	—	25	105	132	149	185	68.4	105	115	147	—		—	1	
3	(26.7)	—	100	145	165	205	75	115	125	160	—		—	1	

Table 7.5 Continued on Next Page

Table 7.5 Continued

Conductor size			Copper				Aluminum and copper-clad aluminum				On (and off) times for current-cycling hours ^f
			Assigned maximum ampere rating ^b	Static-heating ^{a,c,g}	Current-cycling connector temperature rating ^a		Assigned maximum ampere rating ^b	Static-heating ^{a,c,g}	Current-cycling connector temperature rating ^a		
AWG or kcmil (mm ²)	mm ² ⁱ	75 °C ^{d,g}			90 °C ^{e,g}	75 °C ^{d,g}			90 °C ^{e,g}		
2	(33.6)	—	115	170	190	240	90	135	150	190	1
—	—	35	117	174	195	246	91.6	138	154	194	1
1	(42.4)	—	130	195	220	275	100	155	175	215	1
—	—	50	144	219	244	306	114	172	192	239	1
1/0	(53.5)	—	150	230	255	320	120	180	200	250	1
2/0	(67.4)	—	175	265	300	370	135	210	230	295	1
—	—	70	179	272	307	380	138	214	236	301	1
3/0	(85.0)	—	200	310	345	435	155	240	270	335	1
—	—	95	214	333	372	467	166	258	290	360	1
4/0	(107)	—	230	360	405	505	180	280	315	390	1-1/2
—	—	120	246	389	431	544	196	303	338	423	1-1/2
250	(127)	—	255	405	445	565	205	315	350	440	1-1/2
—	—	150	283	442	496	620	228	347	387	486	1-1/2
300	(152)	—	285	445	500	625	230	350	390	490	1-1/2
350	(177)	—	310	505	555	708	250	395	435	555	1-1/2
—	—	185	318	517	570	726	256	404	446	567	1-1/2
400	(203)	—	335	545	605	765	270	425	470	595	1-1/2
—	—	240	368	601	668	843	300	470	522	658	2
500	(253)	—	380	620	690	870	310	485	540	680	2
—	—	300	417	685	768	960	338	536	595	754	2
600	(304)	—	420	690	775	968	340	540	600	760	2
700	(355)	—	460	755	850	1055	375	595	675	835	2
750	(380)	—	475	785	885	1100	385	620	700	870	2
—	—	400	487	809	913	1132	393	640	720	898	2
800	(405)	—	490	815	920	1140	395	645	725	905	2
900	(456)	—	520	870	980	1220	425	700	785	980	2

Table 7.5 Continued on Next Page

Table 7.5 Continued

Conductor size			Copper				Aluminum and copper-clad aluminum				On (and off) times for current-cycling hours ^f
			Assigned maximum ampere rating ^b	Static-heating ^{a,c,g}	Current-cycling connector temperature rating ^a		Assigned maximum ampere rating ^b	Static-heating ^{a,c,g}	Current-cycling connector temperature rating ^a		
					75 °C ^{d,g}	90 °C ^{e,g}			75 °C ^{d,g}	90 °C ^{e,g}	
AWG or kcmil (mm ²)	mm ² ⁱ										
—	—	500	542	926	1036	1298	442	743	832	1040	2
1000	(507)	—	545	935	1045	1310	445	750	840	1050	2
—	—	630	589	1062	1182	1486	484	853	947	1192	3
1250	(633)	—	590	1065	1185	1490	485	855	950	1195	3
1500	(760)	—	625	1175	1320	1645	520	950	1065	1330	3
—	—	800	633	1208	1356	1691	528	981	1100	1374	3
1750	(887)	—	650	1280	1435	1790	545	1050	1175	1470	3
—	—	1000	664	1376	1531	1928	559	1142	1271	1599	3
2000	(1010)	—	665	1385	1540	1940	560	1150	1280	1610	3

^a See [7.2](#), [8.2](#), and [9.2](#).

^b Values for 30-16 AWG (0.05 – 1.31 mm²) are based on the 75 °C column in Table 12.5.1 of NFPA 79. Values for 14 – 10 AWG (2.08 – 5.26 mm²) are based on the 60 °C column in Table 310.16 of NFPA 70 and the overcurrent protection limitations for these wire sizes. Values for 8 AWG (8.37 mm²) and larger are based on the 75 °C column in Table 310.16 of NFPA 70, Tables 1, 3, and 5B of CSA C22.1, and Table 310-16 of NOM-001-SEDE.

^c Values for 14 AWG (2.08 mm²) and larger are for 75 °C single conductor in free air ampacities, NFPA 70, Table 3 of CSA C22.1, and Table 310-16 of NOM-001-SEDE.

^d Values are approximately 112 % of the static-heating test currents.

^e Values for 8 AWG (8.4 mm²) and larger conductors are approximately 140 % of the static-heating test current.

^f See [9.2.5](#).

^g Values in brackets apply to connectors with assigned ampere ratings. Values are based on the footnote from Table 310-17 of the 1984 Edition of NFPA 70.

^h Test current shall be from a 60 Hz ac power source.

ⁱ Values in the mm² column represent the common sizes for metric conductors, as specified in IEC 60228. Corresponding ampacities and test currents are determined by interpolation of the values for AWG/kcmil conductors, as permitted in NFPA 70, Section 310.15(A).

NOTES:

1) Conductor sizes between the values provided in the table may be used for testing and rating connectors. Test currents shall be determined by interpolation of adjacent conductors based on the conductors area. See [Table E1.1](#) for conductor area.

2) In Mexico and Canada, copper-clad aluminum conductors are not recognized.

7.2.2 The current-cycling test shall be completed without any connector exceeding the following temperature rise for any recorded cycle:

- a) Tests conducted with aluminum or copper-clad aluminum wire with AA-1350 alloy conductors shall not exceed a 125 °C temperature rise above the ambient temperature.
- b) Tests conducted with aluminum or copper-clad aluminum wire with AA-8000 alloy conductors shall not exceed a 115 °C temperature rise above the ambient temperature.
- c) Tests conducted with copper wire shall not exceed a 125 °C temperature rise above the ambient temperature.

7.2.3 The stability factor " S_i " (see [7.2.4](#)) shall not exceed the following for connector temperature measurements taken at approximately 25, 50, 75, 100, 125, 175, 225, 275, 350, 425, and 500 cycles:

- a) Tests conducted with aluminum or copper-clad aluminum wire with AA-1350 alloy conductors shall not exceed a stability factor of ± 10 .
- b) Tests conducted with aluminum or copper-clad aluminum wire with AA-8000 alloy conductors shall not exceed a stability factor of ± 8 .
- c) Tests conducted with copper wire shall not exceed a stability factor of ± 10 .

7.2.4 The stability factor " S_i " for each of the 11 temperature measurements shall be determined by applying the following equations:

$$S_i = d_i - D$$

$$D = [(d_1 + d_2 + \dots + d_{11}) / 11]$$

in which:

D is the average temperature deviation,

i is a number from 1 to 11 and signifies one of the 11 individual temperature measurements, and

d_i is a temperature deviation for an individual temperature measurement.

NOTE: The value for d_i is determined by subtracting the control conductor temperature from the connector temperature. The value for d_i is a positive number when the connector temperature is more than that of the control conductor and a negative number when the connector temperature is less than that of the control conductor. The average of the 11 temperature deviations is then determined. See Annex C for example.

7.3 Static-heating sequence

7.3.1 The specimen sets shall carry continuously the value of 60 Hz test current specified in [Table 7.5](#) or [Table 7.6](#) for the conductor size being tested until stable temperatures are reached without exceeding a 50 °C temperature rise above ambient temperature. For a splicing wire connector involving two different conductor sizes, the test current shall be based on the lesser current dictated by the two different conductor sizes.

NOTE 1: The temperature rise on an ampere-rated connector may exceed 50 °C when the connector, as used in the intended equipment application, does not exceed the maximum allowable temperature rise permitted for the end-use application.

NOTE 2: A current source may be maintained at or above the required value by regulation or frequent adjustment.

NOTE 3: When testing with aluminum or copper-clad aluminum conductors, testing may be conducted with either AA-1350 or AA-8000 conductors, with the same allowed temperature rise.

Table 7.6
Static Test Currents^a for Connectors Intended for Paralleling Conductors, A

Conductor sizes			Number and material of conductors											
			Two				Three				Four			
			Copper		Aluminum and copper-clad aluminum		Copper		Aluminum and copper-clad aluminum		Copper		Aluminum and copper-clad aluminum	
AWG or kcmil	(mm ²)	mm ²	Assigned maximum ampere rating ^b	Static test currents	Assigned maximum ampere rating ^b	Static test currents	Assigned maximum ampere rating ^b	Static test currents	Assigned maximum ampere rating ^b	Static test currents	Assigned maximum ampere rating ^b	Static test currents	Assigned maximum ampere rating ^b	Static test currents
1/0	(53.5)	—	300	300	240	240	450	450	360	360	480	480	384	384
2/0	(67.4)	—	350	350	270	270	525	525	405	405	560	560	432	432
—	—	70	357	357	276	276	536	536	414	414	572	572	441	441
3/0	(85)	—	400	400	310	310	600	600	465	465	640	640	496	496
—	—	95	427	427	333	333	641	641	499	499	684	684	532	532
4/0	(107)	—	460	460	360	360	690	690	540	540	736	736	576	576
—	—	120	492	504	392	393	738	755	588	589	787	942	627	735
250	(127)	—	510	527	410	410	765	790	615	615	816	1 053	656	820
—	—	150	566	575	456	456	849	862	684	684	906	1 150	730	903
300	(152)	—	570	579	460	460	855	868	690	690	912	1 158	736	910
350	(177)	—	620	657	500	514	930	985	750	770	992	1 314	800	1 028
—	—	185	636	673	512	526	954	1 009	768	788	1018	1 346	819	1 052
400	(203)	—	670	709	540	553	1005	1 063	810	829	1072	1 418	864	1 106
—	—	240	736	781	600	611	1105	1 171	900	916	1178	1 562	960	1 221
500	(253)	—	760	806	620	631	1140	1 209	930	946	1216	1 612	992	1 262
—	—	300	834	1 017	676	796	1251	1 527	1014	1 194	1334	2 034	1082	1 592
600	(304)	—	840	1 035	680	810	1260	1 554	1020	1 215	1344	2 070	1088	1 620
700	(355)	—	920	1 133	750	893	1380	1 699	1125	1 339	1472	2 266	1200	1 786
750	(380)	—	950	1 178	770	930	1425	1 767	1155	1 395	1520	2 356	1232	1 860
—	—	400	974	1 214	786	960	1461	1 821	1179	1 441	1559	2 428	1258	1 921
800	(405)	—	980	1 223	790	968	1470	1 834	1185	1 452	1568	2 446	1264	1 936
900	(456)	—	1040	1 305	850	1 050	1560	1 958	1275	1 575	1664	2 610	1360	2 100

Table 7.6 Continued on Next Page

Table 7.6 Continued

Conductor sizes			Number and material of conductors											
			Two				Three				Four			
			Copper		Aluminum and copper-clad aluminum		Copper		Aluminum and copper-clad aluminum		Copper		Aluminum and copper-clad aluminum	
AWG or kcmil	(mm ²)	mm ²	Assigned maximum ampere rating ^b	Static test currents	Assigned maximum ampere rating ^b	Static test currents	Assigned maximum ampere rating ^b	Static test currents	Assigned maximum ampere rating ^b	Static test currents	Assigned maximum ampere rating ^b	Static test currents	Assigned maximum ampere rating ^b	Static test currents
–	–	500	1084	1 390	884	1 115	1626	2 084	1326	1 672	1735	2 779	1415	2 229
1 000	(507)	–	1090	1 403	890	1 125	1635	2 104	1335	1 688	1744	2 806	1424	2 250
–	–	630	1178	1 593	968	1 378	1767	2 390	1452	1 918	1885	3 187	1549	2 558
1 250	(633)	–	1180	1 598	970	1 383	1770	2 397	1455	1 924	1888	3 196	1552	2 566
1 500	(760)	–	1250	1 763	1040	1 425	1875	2 644	1560	2 138	2000	3 526	1664	2 850
–	–	800	1266	1 812	1056	1 472	1899	2 596	1584	2 209	2026	3 625	1690	2 944
1 750	(887)	–	1300	1 920	1090	1 575	1950	2 880	1635	2 363	2080	3 840	1744	3 150
–	–	1 000	1328	2 065	1118	1 713	1992	3 098	1677	2 570	2125	4 130	1789	3 426
2 000	(1 010)	–	1330	2 078	1120	1 725	1995	3 117	1680	2 588	2128	4 156	1792	3 450

NOTES:

- 1) The static test current values for conductor sizes 1/0 – 4/0 AWG (53.5 – 107 mm²) are based on NFPA 70, Table 310.16, 75 °C column, multiplied by the number of conductors.
- 2) The static test current values for conductor sizes 250 kcmil (127 mm²) and larger are in accordance with NFPA 70, Sections 392.80(A)(2)(a) and 392.80(A)(2)(b) for Table 310.17, 75 °C column, multiplied by the number of conductors and adjusted as follows:
 - 250 – 500 kcmil (127 – 253 mm²) – adjusted to 65 % (static test current values for Aluminum and Copper-Clad Aluminum sizes 150 mm² and 300 kcmil are adjusted higher to match the assigned maximum ampere rating).
 - 600 kcmil (304 mm²) and larger – adjusted to 75 %
- 3) Any number of conductors other than tabulated shall be adjusted in accordance with NFPA 70, Table 310.-15(C)(1). The four conductor column is already adjusted to 80 % based on this table.
- 4) The static test current values for conductor sizes are based on Tables 2, 4, and 5C of CSA C22.1.
- 5) Values in the mm² column represent the common sizes for metric conductors, as specified in IEC 60228. Corresponding test currents are determined by interpolation of the values for AWG/kcmil conductors, as permitted in NFPA 70, Section 310.15(A).
- 6) Conductor sizes between values provided in the table may be used for testing and rating connectors. Static test currents shall be determined by interpolation of adjacent conductors based on the conductors area. See [Table E1.1](#) for conductor area.
- 7) Test current shall be from a 60 Hz ac power source.
- 8) Assigned maximum ampere ratings are based on the 75 °C column in Table 310.16 of NFPA 70, Tables 1, 3, and 5B of CSA C22.1, and Table 310-16 of NOM-001-SEDE.

7.3.2 The joint between a connector and the conductor shall be intact after being subjected for 30 minutes to the secureness test described in [9.3.2](#).

7.3.3 The joint between a connector and the conductor of a specimen set shall be intact after being subjected for 1 minute to the pullout test described in [9.3.4](#).

7.3.4 As a result of the tests, there shall be no breakage of the conductor or any strand of a stranded conductor, stripping of threads, shearing of parts, or other damage to the connector. Breaking of the conductor or any strand of a stranded conductor shall be determined by examination of the complete connector assembly while still intact after the secureness or pullout tests. Breakage has occurred if the conductor or a strand of a stranded conductor becomes visibly unattached. Strand breakage of 5 % is allowed for flexible and fine stranded conductors.

7.4 Mechanical sequence

7.4.1 The joint between a connector and the conductor of a specimen set shall be intact after being subjected for 30 minutes to the secureness test described in [9.3.2](#).

7.4.2 The joint between a connector and the conductor of a specimen set shall be intact after being subjected for 1 minute to the pullout test described in [9.3.4](#).

7.4.3 As a result of the tests, there shall be no breakage of the conductor or any strand of a stranded conductor, stripping of threads, shearing of parts, or other damage to the connector. Breaking of the conductor or any strand of a stranded conductor shall be determined by examination of the complete connector assembly while still intact after the secureness or pullout tests. Breakage has occurred if the conductor or a strand of a stranded conductor becomes visibly detached. Strand breakage of 5 % is allowed for flexible and fine stranded conductors.

7.5 Dielectric-withstand test sequence

7.5.1 An insulated wire connector shall withstand, without breakdown, the dielectric-withstand tests as specified in [Table 7.7](#).

Table 7.7
Dielectric-Withstand Test Sequence

Connector construction	Required test
1. A connector having insulation in the form of a tubular sleeve and intended to accommodate only one conductor in each opening and intended for use with:	
a) 10 AWG (5.26 mm ²) / 6 mm ² or smaller conductor	A, C
b) 8 – 4/0 AWG (8.4 – 107 mm ²) / 10 – 95 mm ²	A
2. Connectors having insulation in other than a tubular form or for a conductor size not covered in item 1	A, B
NOTES:	
A – Test A as described in 9.5.2 .	
B – Test B as described in 9.5.3 .	
C – Test C as described in 9.5.4 .	

7.5.2 The insulation of an insulated connector shall not crack or break when the connector is assembled as intended on the conductor.