

## STANDARD INFORMATION

**Standard:** UL 486A-486B / CSA C22.2 No. 65

**Standard ID:**

Wire Connectors [UL 486A-486B:2018 Ed.3+R:05May2021]

Wire Connectors [CSA C22.2#65:2018 Ed.6+U1;U2]

**Previous Standard ID:**

Wire Connectors [UL 486A-486B:2018 Ed.3+R:16Dec2019]

Wire Connectors [CSA C22.2#65:2018 Ed.6+U1]

## EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

**Effective Date:** **May 5, 2023**

## IMPACT, OVERVIEW, AND ACTION REQUIRED

**Impact Statement:** Per our accreditation, Intertek is required to review reports against the standard revisions to confirm compliance. Once compliance is confirmed, the standard reference in the report is updated to show continued compliance to the technical requirements of the standard. Reports not updated to this version by the effective date above will be withdrawn.

**Overview of Changes:**

- Add Specification that the Current-Cycling Test Shall be Performed with a 60 Hz ac Source
- Sizing and Lubricating Bushings During Secureness Test
- Testing with Metric and Non-Standard Size Conductors
- Testing with Aluminum Wire with AA-8000 Alloy Conductors
- Use of Shear Head Bolts
- Sample Length Change
- Exothermically Welded Wire Connectors

Specific details of new/revised requirements are found in table below.

***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 – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records.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.***



## STANDARD INFORMATION

CLAUSE	VERDICT	COMMENT
		<i>Additions to existing requirements are <u>underlined</u> and deletions are shown <del>lined-out</del> below.</i>
1	Info	<b>Scope</b>
		This Standard is intended for connectors suitable for use with conductors in the size ranges as follows:
1.2		e) Rigid (solid and stranded) metric wire sizes, <u>Classes 1, 2, 5, and 6, in the range of 0.5 – 2 500 mm<sup>2</sup>, in addition to AWG/kcmil sizes, with AWG/kcmil ratings mandatory and metric wire ratings optional.</u>
6	Info	<b>Construction Requirements</b>
6.3	Info	<b>Soldering lugs</b>
		<i><b>New clause added;</b></i>
6.3.5		Soldering lugs shall not be rated for use with metric conductors.
7	Info	<b>Test Requirements</b>
7.1		<b>General</b>
		<i><b>New clause added;</b></i>
		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:
7.1.6A		a) AWG/kcmil solid conductors is representative of Class 1 metric conductors. b) Class 1 metric conductors is representative of AWG/kcmil solid conductors. c) AWG/kcmil stranded conductors is representative of Class 2 metric conductors. d) Class 2 metric conductors is 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 9.1.5.3 – 9.1.5.5 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.
7.1.7		A connector rated for Class 5, 6, <u>or both Class 5 and 6</u> metric conductors (flexible stranded) shall be subjected to all test sequences using the <u>appropriate Class of flexible metric conductors based on the ratings specified by the manufacturer.</u> See <u>9.1.5.5 for testing with specific stranding counts.</u>



CLAUSE	VERDICT	COMMENT
7.2	Info	<b>Current-cycling</b>
7.2.1		<p>The specimen sets shall complete 500 cycles of equal current-on and current-off operations for the periods of time specified in Table 7, other than as noted in 9.2.2 and 9.2.5, while carrying the <u>60 Hz test</u> 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.</p> <p>Note: A current source may be maintained at or above the required value by regulation or frequent adjustment.</p>
7.2.2		<p>The current-cycling test shall be completed without any connector exceeding <u>the following</u> temperature rise for any recorded cycle:</p> <p>a) <u>Tests conducted with aluminum wire with AA-1350 alloy conductors shall not exceed a 125°C temperature rise above the ambient temperature.</u></p> <p>b) <u>Tests conducted with aluminum wire with AA-8000 alloy conductors shall not exceed a 115°C temperature rise above the ambient temperature.</u></p> <p>c) <u>Tests conducted with copper wire shall not exceed a 125°C temperature rise above the ambient temperature.</u></p>
7.2.3		<p>The stability factor "Si" (see 7.2.4) shall not exceed <u>the following</u> for connector temperature measurements taken at approximately 25, 50, 75, 100, 125, 175, 225, 275, 350, 425, and 500 cycles:</p> <p>a) <u>Tests conducted with aluminum wire with AA-1350 alloy conductors shall not exceed a stability factor of ± 10.</u></p> <p>b) <u>Tests conducted with aluminum wire with AA-8000 alloy conductors shall not exceed a stability factor of ± 8.</u></p> <p>c) <u>Tests conducted with copper wire shall not exceed a stability factor of ± 10.</u></p>
9	Info	<b>Test Methods</b>
9.1	Info	<b>General</b>
9.1.5	Info	<b>Test and control conductors</b>
9.1.5.1A		<p><i><b>New clause added;</b></i></p> <p>IEC 60228 indicates that aluminum conductors shall consist of aluminum or aluminum alloy. When testing with aluminum metric wire, alloy of the aluminum conductor shall be confirmed to be either AA-1350 or AA-8000.</p>
9.1.5.1B		<p><i><b>New clause added;</b></i></p> <p>When testing with copper metric wire, any conductor complying with IEC 60228 shall be considered acceptable.</p>
9.1.9	Info	<b>Tightening torque Tightening torque</b>



CLAUSE	VERDICT	COMMENT
9.1.9.5A		<p><b><i>New clause added;</i></b></p> <p>For wire connectors with shear bolt style clamping means, all tests shall have the specimens prepared with the shear bolt tightened to the point of shearing.</p>
10	Info	<p><b>Marking, Labeling, and Packaging</b></p> <p>A connector rated for use with specific metric conductors shall be marked in close proximity to the metric wire range marking with the following, as applicable:</p> <ul style="list-style-type: none"><li>a) <u>“Class 1” or “Rigid Solid”;</u></li><li>b) <u>“Class 2” or “Rigid Stranded”;</u></li><li>c) <u>“Class 1 and 2,” “Rigid Solid and Stranded,” or the letter “r” for rigid solid and rigid stranded;</u></li><li>d) <u>“Class 5”</u></li><li>e) <u>“Class 6”;</u> or</li><li>f) <u>“Class 5 and 6,” “Flexible,” or the letter “f” for flexible.</u></li></ul> <p>A connector rated for <u>rigid, solid, rigid stranded,</u> and <u>both Class 5 and 6 flexible</u> conductors need not be marked. <u>“Solid” and “Stranded” may be abbreviated as “Sol” and “Str” respectively.</u></p>
10.42		<p><b><i>New clause added;</i></b></p> <p>In addition to other requirements in Section 10, exothermically welded wire connectors shall be provided with installation instructions on the unit container in which the connector is packaged or on an information sheet packed in the unit container. These installation instructions shall include the following information:</p> <ul style="list-style-type: none"><li>a) Identification of all materials involved in the process;</li><li>b) Unless provided in the form of a kit, with premeasured amounts of mixture – the recommended weight of mixture for the size and type of wires to be connected;</li><li>c) Installer’s and inspector’s guide for electrical connections, which shall include the following information:<ul style="list-style-type: none"><li>1) Details regarding the preparation of all materials involved in the process; and</li><li>2) Instructions on how to inspect the mold cavity (i.e., ensuring it is dry and clean) prior to use,</li></ul></li></ul> <p>In lieu of the markings in 10.2 appearing on the wire connector, exothermically welded connectors shall be permitted to have those markings appear on the smallest unit container containing the components of the system.</p>
Table 7		<p><b>Test current for connectors intended for a single conductor, A</b></p> <p>Table 7 has been revised, see standard for details.</p>



CLAUSE	VERDICT	COMMENT
Table 8		<b>Static test currents for connectors intended for paralleling conductors, A</b> Table 8 has been revised, see standard for details.
Table 13		<b>Cycling test currents for 75°C and 90°C connectors intended for paralleling conductors, A</b> Table 13 has been revised, see standard for details.
Table 14A		<b>Conductor stranding for Class 2 mm<sup>2</sup> conductors</b> See standard for details.
Table 26		<b>Secureness test values</b> Table 26 has been revised, see standard for details.
Table 27		<b>Pullout test values</b> Table 27 has been revised, see standard for details.
Annex B	Info	<b>Flammability Test (Material V-2 and VTM-2)</b>
Annex B.1	Info	<b>General</b>
Annex B.1.2		Test specimens, <del>130</del> <u>125</u> mm (5.0 in) in length by 13 mm (0.50 in) in width in the minimum and maximum thicknesses, shall be tested, covering the thickness range to be considered. Specimens tested by this method shall be limited to a maximum thickness of 13 mm (0.50 in). Specimens in intermediate thicknesses shall be provided and shall be tested if the results obtained on the minimum or maximum thickness indicate a need. Intermediate thicknesses shall not exceed increments of 3 mm (0.125 in). The specimens shall have smooth edges and the radius on the corners shall not exceed 1 mm (0.05 in).