

Subject 1699

July 16, 2018

SUMMARY OF TOPICS

The following changes in requirements to the Standard for Arc-Fault Circuit-Interrupters, UL 1699, are being proposed for preliminary review and comment only:

- 1. For Preliminary Review Only: Addition of Requirements to Address LCDI Shield Continuity***
- 2. For Preliminary Review Only: Allowing an Alternative Means of Providing Installation Instructions***
- 3. For Preliminary Review Only: Revision to 44.3 to Test Radiated Immunity to 6 GHz***
- 4. For Preliminary Review Only: Deletion of the Lamp Burnout Test, 41.7***
- 5. For Preliminary Review Only: Addition of Requirements to Address Immunity to Arcing Signatures of Other Circuits***

COMMENTS DUE: July 31, 2018

This proposal is for review and comment only (no ballot at this time). Please note that comments on a preliminary review document will not receive a response from the proposal author through CSDS. Instead, the proposal author will be asked to review the comments and adjust the proposals and/or supporting rationale as the author determines to be appropriate. The preliminary review process is an informal mechanism that provides authors with the opportunity to refine their proposals before they advance to the next stage in UL's standards development process.

In some cases, the author of the proposals may choose to discontinue them. In this case, the author need not do anything after preliminary review has ended. Normally, the next step in the process is the more formal STP ballot and stakeholder review process. Only comments posted during the STP ballot and stakeholder review process will be provided with a response in CSDS.

For your convenience in review, proposed additions to existing requirements are shown underlined and proposed deletions are shown ~~lined-out~~.

1. For Preliminary Review Only: Addition of Requirements to Address LCDI Shield Continuity

BACKGROUND

Proposal submitted by: Nehad El-Sherif

LCDI devices are designed to sense leakage current flowing between or from the conductors of a cord set or power supply cord and interrupt the circuit when the leakage current is not exceeding 5 mA. Shielded cables connected to LCDI device are covered in UL 758, Standard for Appliance Wiring Material. There are many shielded UL appliance wiring material (AWM) wire and cable construction styles available¹.

One popular cord style used with LCDI devices is Style 21751. This style employs an aluminium foil shield and copper braids wrapped around the power conductors. Style 21301 is another cord style used with LCDI devices. In place of aluminium, a copper shield is wrapped around the power conductors. The aluminum foil and stranded drain wire are quite fragile as depicted in the figures below.

Leakage current sensing is achieved by using the shield wrapped around the power cord conductors. Therefore, when the shield is damaged (anywhere along the length of the cord), the leakage current won't be sensed by the LCDI. Therefore, the shield continuity across the entire length of the cord is critical.

Shield damage could occur due to cable aging, improper storage, and/or mechanical stress. Examples of Style 21751 and Style 21301 damaged shields are shown in Fig. 1 and Fig. 2 respectively. In both Figures, the green conductor is the ground conductor.

¹Information on AWM styles can be found on UL iQTM database: <http://iq.ul.com/awm>

Note from the STP Project Manager: Figures 1 and 2 can be viewed under supporting documentation for Topic 1 in the CSDS Work Area.

RATIONALE

Problem Statement

In order to verify that the device is operational, similar to a GFCI, an LCDI is required to have a supervisory circuit. The supervisory circuit is activated when the test button is pressed.

Currently, the supervisory circuit of an LCDI is required to only test the SCR, interrupting mechanism, and fault current pick up threshold. The supervisory circuit does not test the shield continuity across the entire length of the protective cord and as a result, any damage in the shield won't be detected nor indicated in any way.

Accordingly, the operation of the supervisory circuit does not provide adequate verification of the LCDI protection. On the contrary, it provides the end user with a false sense of proper function and protection. Therefore, the user may not be aware of the lack of LCDI protection because of the damaged shield.

Proposed Solution

To verify the LCDI proper protective function of critical components, as so not to leave the end user misinformed, the entire protective circuit, including the shield continuity along the entire run of the cord, must be tested.

Therefore, this proposal is suggesting the addition of a new requirement for all LCDI employing a shielded power supply cord or shielded cord set to continuously monitor the shield and interrupt the circuit when the shield continuity is lost. The visual and/or audible indication in tandem with the removal of power to the load side will require that the product is safely removed from service.

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PROPOSAL

SB6A LCDI Shield Continuity

SB6A.1 An LCDI employing a shielded power supply cord or shielded cord set shall monitor shield continuity. In the event the shield continuity does not exist when an attempt is made to start using the equipment, the device shall not energize the circuitry connected to its load terminals and shall interrupt the circuit under conditions where the shield is lost during operation.

SB6A.2 An open circuit in the shield shall cause the LCDI to interrupt the circuit within a period of 0.5 seconds.

SB9A LCDI Shield Continuity Test

SB9A.1 To demonstrate that an LCDI complies with LCDI Shield Continuity, Section SB6A, the tests described in SB6A.1 and SB6A.2, shall be conducted. The LCDI shall:

- a) Interrupt the circuit within the time period given in SB6A.2;
- b) Not permit power to be applied to the circuit each time the reset button is pressed; and
- c) Provide a visual and/or audible indication.

SB9A.2 A representative LCDI is to be correctly connected to the rated line voltage and allowed to stabilize. A closed switch is placed in series with the shield. The reset button is to be operated to allow the LCDI to be in the "ON" state. The switch is then opened to simulate an open shield condition during normal operation.

SB9A.3 The test in SB9A.1 is repeated except the test button on a representative LCDI is to be operated to allow the LCDI to be in the "OFF" state. With the switch in the open state in series with the shield to simulate a damaged shield, the reset button on the LCDI is then pressed.

2. For Preliminary Review Only: Allowing an Alternative Means of Providing Installation Instructions

RATIONALE

Proposal submitted by: Frank Tse, Leviton Mfg. Co. Inc.

In the current "internet of things" age, there are now many available methods for manufacturers to provide product information to the general public. This proposal seeks to recognize these new alternatives. The use of QR codes and the internet as alternatives to actual print is increasingly being adopted by NRTLs and retailers. There are many advantages with these methods than the traditional printing:

- Ability to provide more updated information
- Ability to provide more content (both product-related and country/language-related) without adding bulk/waste. This is especially meaningful for GFCI and AFCI products, as there are more requirements for these two categories than most others and the increase in dual function AF/GF offerings.