

Subject 412

June 22, 2018

SUMMARY OF TOPICS

The following changes in requirements to the Standard for Refrigeration Unit Coolers, UL 412, are being proposed:

- 1. Revisions To Controls Requirements.***
- 2. Alternate Compliance Option for EMI Filters.***
- 3. Revisions to Include Switch Mode Power Supply Units.***
- 4. Clarification to Marking Requirements.***

STP BALLOTS AND ALL COMMENTS DUE: August 6, 2018

UL's goal is to have no interest category comprise more than one-third of the STP membership balance. To improve the current balance for STP 412, UL is looking for participants in all the interest categories. Definitions for these interest categories are available on the Standards STP Internet site:

<http://ulstandards.ul.com/develop-standards/participation/interest-categories/>

If you are interested in applying for STP 412 membership or are aware of potential candidates for this STP, please contact the STP Project Manager, Alan.T.McGrath@ul.com.

For your convenience in review, proposed additions to existing requirements are shown underlined and proposed deletions are shown ~~lined-out~~. When an entirely new section is being proposed for addition, the section is shown as a "NEW SECTION" but the individual clauses are not underlined.

1. Revisions To Controls Requirements.

RATIONALE

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After October 2018, UL 353 (Standard for Safety for Limit Controls) and UL 873 (Standard for Safety for Temperature-Indicating and -Regulating Equipment) will be withdrawn and replaced by the UL 60730 series of standards (Standard for Safety for Automatic Electrical Controls for Household and Similar Use).

The proposal below reflects the deletion of the option to use controls certified to UL 353 and UL 873. It also removes the references to UL 991 (Standard for Safety for Tests for Safety-Related Controls Employing Solid-State Devices) and UL 1998 (Standard for Safety for Software in Programmable Components), since UL 60730 and the UL 60335-1 based circuit requirements presently within UL 412 include the relevant requirements for electronic circuits and software.

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In the proposed revisions to Table 24.2, the 3 V/m field strength value for radiated electromagnetic fields was chosen years ago because UL 60730-1, 3rd edition required this value and it was also the default value in UL 991. Over the years, enhanced technology used in communication circuits and for common household appliances (such as cellular telephones and wireless devices) have pushed the need for higher levels. Therefore, safety standards such as UL 60730-1 and UL 60335-1 have revised their requirements to consider different values based on a wider range of frequencies that are presently in use. Likewise, a proposal to update Paragraph 70A.3.4 is being made for this same reason.

This proposal is intended to align the requirements in UL 412 with those in UL 60730-1 and UL 60335-1, accordingly.

A proposal to revise Table 24.2 is also being made to document the calibration requirements for motor protective electronic circuits.

Revisions to Paragraphs 25.17, 25.18 and 60A.6 are being proposed to clarify the intent of these requirements.

The proposed revisions reflect present practice.

PROPOSAL

24.2.1 All single-phase motors shall be protected by one or more of the following:

- a) A separate device responsive to motor current and rated or set to trip at not more than the percentage of the motor nameplate full-load current rating as specified in Table 24.1.
- b) A separate overload device which combines the functions of overload and overcurrent protection and is responsive to motor current. Such a device shall be set at values not greater than the percentages of the motor nameplate full-load current rating as specified in Table 24.1.
- c) ~~Deleted~~A thermal protective device or impedance protection complying with the Standard for Overheating Protection for Motors, UL 2111. If a motor protective electronic circuit relies on software as a protective component, that part of the software providing the required motor protection shall comply with software Class 1 in the Standard for Software in Programmable Components, UL 1998, or software Class B in Annex H of the Standard for Automatic Electrical Controls — Part 1: General Requirements, UL 60730-1.
- d) Impedance protection complying with the Standard for Impedance Protected Motors, UL 1004-2.
- e) A protective device integral with the motor that complies with the Standard for Thermally Protected Motors, UL 1004-3. A motor intended to move air only, by means of an air-moving fan that is integrally attached, keyed, or otherwise fixed to the motor, is required to have locked-rotor protection only.
- f) Protective electronic circuits integral to the motor that comply with the Standard for Electronically Protected Motors, UL 1004-7.
- g) Protective electronic circuits that comply with 24.2.3.
- h) Other protection that is shown by test to be equivalent to the protection specified in (a) to (g).

Exception: Overload protection of a single-speed, continuous duty fan motor having a marked rating over 746 W output (1 hp) is not required as part of the unit cooler if all of the following conditions exist:

- a) The motor is located where it is not affected by an external source of heat;*
- b) The motor is to be field-wired to a separate circuit that does not supply any other loads within the product;*
- c) The motor overload protection is part of separate, field-provided motor control equipment that does not require wiring interconnection to the product, except for the motor circuit;*
- d) Energization of electric heating elements does not occur without motor operation or evidence of air flow; and*
- e) The unit is marked as specified in 76.9.*

24.2.3 Except as indicated in 24.2.1 (e) and (f), a protective electronic circuit providing motor protection shall comply with one of the following:

- a) ~~Deleted~~ Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991;
- b) Standard for Automatic Electrical Controls – Part 1: General Requirements, UL 60730-1 as well as the Standard for Automatic Electrical Controls for Household and Similar Use, Part 2: Particular Requirements for Temperature Sensing Controls, UL 60730-2-9;
- c) 25.21 and the protective electronic circuits tests in Section 70A; or
- d) Not create any risk of fire, electric shock or injury to persons under abnormal conditions with the protective electronic circuit rendered ineffective (open or short-circuited), e.g. use of a redundant circuit or control.

Table 24.2
Factors to be considered when evaluating protective electronic circuits

No.	Factor
1	Conducting failure-mode and effect analysis (FMEA) for the protective circuits and functions.
2	Electrical supervision of critical components resulting in the control becoming permanently inoperative and disconnecting power.
3	Temperature ranges as follows: minus 35.0 $\pm$ 2°C (minus 31.0 $\pm$ 3.6°F) and 40.0 $\pm$ 2°C (104 $\pm$ 3.6°F)
4	Cycling test duration: 14 days
5	Endurance test duration: 100,000 cycles
6	Radio-frequency electromagnetic field immunity: A. To conducted disturbances ^a – test level 3 B. To radiated electromagnetic fields – field strength of 3 V/m <u>Evaluate in accordance with 70A.3.4 and 70A.3.2</u>
7	Humidity exposure: 21.1 – 26.7°C (70 – 80°F) and minimum 98 percent relative humidity
8	Electrical fast transient/burst immunity: test level 4
9	Surge immunity ^a : installation Class 4