

Subject 1561

September 28, 2018

## **SUMMARY OF TOPICS**

***The following changes in requirements to the Standard for Dry-Type General Purpose and Power Transformers, UL 1561, are being proposed:***

### ***1. Proposal to add cooper bus bar requirements***

## **STP BALLOTS AND ALL COMMENTS DUE: October 29, 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 506, UL is looking for participants in the following interest categories: AHJ, Commercial/Industrial User, Consumer, General, Government, Supply Chain, and Testing & Standards. 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 506 membership or are aware of potential candidates for this STP, please contact the STP Project Manager, Megan.Monsen@ul.com.

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

### **1. Proposal to add cooper bus bar requirements**

## **RATIONALE**

Proposal submitted by: Ken McKinney, UL LLC

Currently, there are no requirements for copper bus bars in UL 1561. The requirements specify the current density, contact area for a bolted joint and temperature rise for unplated copper.

## **PROPOSAL**

11.11 The cross section of a bus bar as specified in 11.10 and 11.12 may be reduced by no more than 5 percent due to rounding, shaping, or dimensional tolerances.

11.12 Copper bus bars should be sized based on the transformer full load current determined in accordance with 21.4 and the following:

a) the current density of copper shall not be less than 1000 A/in<sup>2</sup> (1.55 A/mm<sup>2</sup>);

b) the current density of the contact area at a bolted copper joint shall not be less than 200 A/in<sup>2</sup>; and

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c) each bus bar shall be plated at each joint with tin, silver, or nickel.

11.13 Unplated copper bus bars shall meet the temperature requirements in Table 23.1.

**Table 23.1**  
**Maximum temperature rises**

| Material or component                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                              | °C                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------|--------------------------------------------------|
| a) Fiber used as electrical insulation                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |                              | 50                                               |
| b) Any point on a surface adjacent to a transformer, including the surface on which the transformer is mounted                                                                                                                                                                                                                                                                                                                                                                                                |                |                              | 50                                               |
| c) Insulated wire                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                              | 40°C less than its recognized temperature rating |
| d) Any point within a terminal or wiring compartment that a field-installed conductor might contact, including such a conductor itself, unless the transformer is marked in accordance with 38.12.3                                                                                                                                                                                                                                                                                                           |                |                              | 20 <sup>a,b</sup>                                |
| 1) Field-wiring conductor current rating of 100 amperes or less                                                                                                                                                                                                                                                                                                                                                                                                                                               |                |                              | 35 <sup>a,b</sup>                                |
| 2) Field-wiring conductor current rating of greater than 100 amperes                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                              |                                                  |
| e) Any point on the exterior of the transformer enclosure, except as indicated in 23.2.1 and 23.3.1                                                                                                                                                                                                                                                                                                                                                                                                           |                |                              | 50                                               |
| f) Transformer winding insulation systems (resistance method)                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                              |                                                  |
| <u>Insulation System</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <u>Ambient</u> | <u>Hot Spot Differential</u> |                                                  |
| Class 105                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 40             | 10                           | 55                                               |
| Class 130                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 40             | 15                           | 75                                               |
| Class 155                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 40             | 20                           | 95                                               |
| Class 180                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 40             | 25                           | 115                                              |
| Class 200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 40             | 25                           | 135                                              |
| Class 220                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 40             | 30                           | 150                                              |
| Class 240                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 40             | 35                           | 165                                              |
| g) Polymeric insulation materials                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                              | 40°C less than its recognized temperature rating |
| h) Bolted joints involving aluminum except where lower limit is specified in (d)                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                              | 65                                               |
| <sup>a</sup> The temperature on a wiring terminal or lug is measured at the point most likely to be contacted by the insulation of a conductor installed as in actual service.<br><sup>b</sup> If the rise is 35°C or less and an aluminum bodied connector is used or aluminum wire is intended, the connector shall be marked AL7CU or AL9CU. If the terminal temperature rise exceeds 35°C but does not exceed 50°C, the connector shall be marked AL9CU. See 38.12.3 and 38.12.4 for additional markings. |                |                              |                                                  |

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