

Subject 713

November 28, 2012

SUMMARY OF TOPICS

The following changes in requirements to the Standard for Dummies, UL 713, are being proposed:

1a. PROPOSAL: Composite Conductor of Copper and Hard-Drawn Copper Alloy Strands, New 5.1.3 and Revised 5.6.2 and 48.2

1b. IMPLEMENTATION OF THE REQUIREMENTS (INDUSTRY FILE REVIEW QUESTION, NOT PART OF THE ANSI PROCESS): The changes cited in Topic 1, should they obtain consensus, do not warrant all existing equipment certified to the present requirements to be reevaluated and recertified to the new/revised requirements.

STP BALLOTS AND COMMENTS DUE: JANUARY 31, 2013

The following topics are for STP member ballot and comment. Subscribers and public review participants are invited to comment only.

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

1a. PROPOSAL: Composite Conductor of Copper and Hard-Drawn Copper Alloy Strands, New 5.1.3 and Revised 5.6.2 and 48.2

RATIONALE

Proposal submitted by: Hirotako Asao, Taiyo Cable

This revision is proposed to introduce the composite conductor of copper wires and hard-drawn copper alloy wires that conform to the reference of ANSI/ASTM B 105 (Alloy 40) and ANSI/ASTM B 3 of UL 713 Table 5.2 requirements. The reasons for the proposed changes are as follows: a) the improvement of the tensile properties by the hard-drawn copper alloy wires; b) the improvement of the conductivity by the copper wires; c) this proposal shows that composite conductor combines the strong tensile properties and good conductivity. Therefore, it can be used in mechanical abuse or any various situations; and d) There have been no problems with practical use of this proposed composite conductor since 1996.

Please also see the figure, and test data (condition) and (result) included as supporting documentation under the "Quick View" tab in the right column of the work area home page.

PROPOSAL

(NEW)

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5.1.3 A composite conductor composed of copper wires and hard-drawn copper alloy wires specified by Table 5.2 is not prohibited, and the placement of the hard-drawn copper alloy wires within a finished composite conductor are not specified, furthermore shall comply with the following:

- a) The cross-sectional area of the copper alloy wires shall not exceed 50 percent of the cross-sectional area of the complete conductor.
- b) The complete conductors have 80 percent minimum conductivity of 100% IACS standard copper.
- c) The composite conductor's maximum temperature limits shall use the lowest temperature of composite material in Table 5.2.

Note from the Project Manager: For brevity, only the affected portion of Table 5.2 is shown.

Table 5.2
Conductor – metal specifications

Conductor metal	ASTM reference for the metal	Temperature limit for the metal, °C (°F)	Other limits
NOTES <u>1 – "Copper, tin coated" mentioned in this table refers to copper strands of a conductor that are coated with tin before they are twisted. "Copper, overcoated with tin" mentioned in this table refers to copper strands that are twisted and then coated with tin.</u> <u>2 – The copper wires and hard-drawn copper alloy wires specified by Table 5.2 may be combined into a composite conductor in accordance with 5.1.3.</u>			

5.6.2 For conductors having a conductivity other than 100 percent as noted in Table 5.2, the maximum resistance is to be determined by multiplying the maximum resistance for uncoated copper by the ratio of 100 percent IACS (International Annealed Copper Standard) to the percent conductivity applicable to the conductor under consideration. For a composite conductor of copper and hard-drawn copper alloy strands, the maximum resistance is to be determined by multiplying the maximum resistance for uncoated copper by the ratio of 100 percent IACS (International Annealed Copper Standard) to the percent conductivity applicable to the finished conductor under consideration. For example, to determine the maximum resistance of a 12 AWG (6530 cmil or 3.31 mm²) solid 40-percent-conductivity copper-clad steel conductor:

- a) $R[12 \text{ AWG copper-clad steel at } 20^{\circ}\text{C (68}^{\circ}\text{F)}] = R(12 \text{ AWG copper at } 20^{\circ}\text{C}) \times 100/40 = R(12 \text{ AWG copper at } 20^{\circ}\text{C or } 68^{\circ}\text{F}) \times 2.5.$
- b) $R[12 \text{ AWG copper at } 20^{\circ}\text{C (68}^{\circ}\text{F)}] = 1.62 \text{ ohms/1000 feet or } 5.31 \text{ ohms/kilometer.}$
- c) $R[12 \text{ AWG copper-clad at } 20^{\circ}\text{C (68}^{\circ}\text{F)}] = 1.62 \times 2.5 = 4.05 \text{ ohms/1000 feet or } 5.31 \times 2.5 = 13.28 \text{ ohms-kilometer.}$

48.2 Markings on the tag, reel, or carton shall contain the following elements:

- a) Wire/cable designation: "AWM."
- b) Statement that describes the intended use of the AWM [location of the wire (internal or external), the equipment in which the wire is intended to be used, and conditions to which the wire is exposed (i.e. gasoline, oil, gas vapor)], the temperature rating, and the minimum voltage

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