

Subject 60745-1

September 28, 2018

SUMMARY OF TOPICS

The following changes in requirements to the Standard for Hand-Held Motor-Operated Electric Tools – Safety – Part 1: General Requirements, UL 60745-1, are being proposed:

1. Proposed Addition Of National Differences To Clause K.18.1 To Align Abnormal Testing Requirements With The Inherent System Protections Of Electronically Commutated Motors

STP BALLOTS AND ALL COMMENTS DUE: October 29, 2018

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

1. Proposed Addition Of National Differences To Clause K.18.1 To Align Abnormal Testing Requirements With The Inherent System Protections Of Electronically Commutated Motors

RATIONALE

Proposal submitted by: John Stimitz, UL LLC, on behalf of the International Harmonization Committee (IHC) for the adoption of the IEC series of standards for Hand-Held, Motor-Operated Electric Tools

Hand-Held, Motor-Operated Electric Tools with brushless DC (BLDC) motors require an electronic system to supervise the energizing sequence of the coils and provide other control functions. BLDC motors typically have multiple forms of response mechanisms from the motor in the form of motion, over current protection and thermal sensors for normal operation. Since there are multiple protection methods incorporated into the motor controller, if one sensor fails, another sensor will serve to activate under an abnormal condition to protect the motor. It is unlikely that all sensors would fail simultaneously. The abnormal tests for BLDC motors are therefore considered to be unwarranted in view of the inherent system protection.

Clauses K.18.1DV.1 and K.18.1DV.2 are being proposed to be added to modify the abnormal test requirements to reflect applicable tests for BLDC motors.

In addition, the electronic circuits are evaluated in accordance with Clause 18.10 to determine risk of fire hazard.

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The National Difference Page and IEC Foreword have been provided for your reference in reviewing this document. However, they are not considered to be part of the ANSI balloted material.

PROPOSAL

K.18 Abnormal operation

K.18.1 All tools when operating under battery power and their battery packs shall be so designed that the risk of fire or electric shock as a result of abnormal operation is obviated as far as is practical.

Compliance is checked by the following tests:

The battery tool and battery pack, as is appropriate, are to be placed on a soft wood surface covered by two layers of tissue paper; the battery tool and battery pack are to be covered by one layer of untreated 100% cotton medical gauze. The test is to be conducted until failure or until the test sample returns to room temperature. A new sample can be used for each fault listed below. There shall be adequate protection against electric shock as defined in Clause K.9 and no charring or burning of the gauze or tissue paper shall result when a battery tool and battery pack are subjected to any one of the following fault conditions shown below in tests a to f.

Charring is defined as a blackening of the gauze caused by combustion. Discolouration of the gauze caused by smoke is acceptable.

Thermal cut-outs and thermal overloads may operate during the above tests. In this case, the same test is to be repeated three more times, using three additional samples. The resistance for the short in items a), b), d), e) and f) shall not exceed 10 mΩ.

- a) The terminals of a detachable battery pack with exposed terminals are shorted. Battery pack terminals that can be contacted using either figure 1 or figure 2 probes are considered exposed. The means of shorting shall not attain excessive temperatures so as to char or ignite the tissue paper or gauze.*
- b) The motor terminals are shorted.*
- c) The motor rotor is locked.*
- d) A cord provided between the separable battery pack and the battery tool shall be shorted at the point likely to produce the most adverse effects.*
- e) A cord provided between the tool and the charger shall be shorted at the point likely to produce the most adverse effects.*
- f) For battery tools a short is introduced between any two uninsulated parts of opposite polarity not in accordance with the spacings given in clause K.28.*