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Subjects 45 (745, 987)  
 (In reply, refer to Subject 45)

12 Laboratory Drive  
 Research Triangle Park, NC 27709  
 September 12, 1995

**TO:** Casualty Council of Underwriters Laboratories Inc.,  
 Electrical Council of Underwriters Laboratories Inc.,  
 Subscribers to UL's Standards Services for:  
 Portable Electric Tools;  
 The Bi-National Standard for Portable Electric Tools; and  
 Stationary and Fixed Electric Tools

**SUBJECT:** Report of the Joint Meeting of the Industry Advisory Conferences of UL for Portable Electric Tools and Stationary and Fixed Tools; Request for Comments on Proposed Requirements for the Seventh Edition of the Standard for Portable Electric Tools, UL 45; Request for Comments on Proposed Requirements for the Sixth Edition of the Standard for Stationary and Fixed Electric Tools, UL 987; PROPOSED EFFECTIVE DATES

#### SUMMARY OF TOPICS

The following topics were discussed at the meeting:

*(Parenthetical references indicate the applicable UL standards)*

1. Extension Cord Lengths (45, 987)
2. Chain Lock vs Pin Lock for Miter Saws (987)
3. Consideration of Revising Existing UL Markings and Developing New UL Marking Requirements in Accordance with Requirements in ANSI Z535.4 (745, 987)
4. Harmonization (987)
5. Allied Standards
6. Angle Grinder Guard Requirements (45)
7. Jointer/Planer Blades and Accessories/Attachments (45, 987)
8. Lockouts on Tool Switches (987)
9. Detail Sanders (45)
10. Vibration and External Wiring (987)
11. Accessories (45, 987)

(Continued)

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**SUMMARY OF TOPICS (Cont'd)**

- 12. Abnormal Testing (45, 987)
- 13. Battery Operated Tool Requirements (45)
- 14. Update on UL 745 Series (745)
- 15. Class E Insulation (45)
- 16. Switches with Electronics (45)

**COMMENTS DUE: November 7, 1995**

A joint meeting of the Industry Advisory Conferences of UL for portable electric tools and for stationary and fixed tools was held on August 15, 1995 at the O'Hare Hilton Hotel. The purpose of the meeting was to discuss proposed requirements for UL 45, UL 745, and UL 987.

Attached as Appendix A are proposed requirements for UL 45. Attached as Appendix B are proposed requirements for UL 987. Attached as Appendix C is a list of those who attended the meeting. Questions regarding interpretation of requirements should be directed to the responsible UL Staff. Please see Appendix D of this bulletin regarding designated responsibility for the subject product categories.

Please note that proposed requirements are of a tentative and early nature and are for review and comment only. Current requirements are to be used to judge a product until these requirements are published in final form.

**PROPOSED EFFECTIVE DATES**

The proposed requirements specified in paragraphs 12.1.10, 14.23, and 70.1.7 of UL 987 will necessitate a review and possible retest of currently Listed products. Therefore, UL proposes that the new requirements become effective August 5, 1999. This is intended to provide manufacturers with sufficient time to submit modified products for investigation and to implement the necessary changes in production. Please note that this also includes the time that will be needed by UL to conduct a review of the modified product. These proposed effective dates also correlate to existing future effective dates in each of these standards.

The remainder of the requirements will not necessitate a review or additional testing of currently Listed products. Therefore, UL proposes that these requirements become effective upon publication.

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The following report is not intended to be a verbatim transcript of the discussions at the meeting, but is intended to record the significant features of those discussions.

## 1. EXTENSION CORD LENGTHS (45, 987)

### DISCUSSION

UL is considering revising UL 45 and UL 987 to allow tool manufacturers to recommend the use of longer extension cords. For a 120 V tool, UL 45 only allows a reference to cords up to 150 feet. Several tool manufacturers have expressed an interest in recommending the use of a longer cord, such as the cords referenced in UL 1450, the Standard for Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment. UL 1450 includes a table identifying the appropriate cords to use for up to 500 feet (for a 120 V tool). Additionally, UL is considering requiring a temperature test using the longer extension cord for tools recommending the use of the longer extension cord.

It was noted at the meeting that the lengths of cord identified in UL 1450 may be too long for a tool application. Additionally, some of the gauges specified were different in UL 1450 from UL 45 for the same length cord and ampere rating; this could be due to loading differences between tools and painting equipment.

It was noted that the gauges currently specified in UL 45 were determined by the Power Tool Institute (PTI). In order to better correlate with the values already included in UL 45, members of PTI plan to determine suitable extension cords gauges for lengths over 150 feet. The information will then be submitted to UL for consideration. The PTI input will be based on calculated values (using the nameplate rating) rather than actual measured values, and the voltage drop will be limited to 5 volts with the maximum length.

It was noted at the meeting that the gauges included in UL 45 represent minimum sizes. A manufacturer may choose to suggest a thicker cord, or a shorter extension cord, if so desired.

### RATIONALE

A question also arose regarding the need for the extension cord table in the instruction manual for a permanently-connected tool (in UL 987). UL clarified that the table would not be required for a permanently-connected tool; instead, local installation regulations would apply. UL proposes that the standard be revised accordingly.

### IMPACT

If the proposal is adopted then it will be clear that instructions regarding extension cord selection need not be provided for a permanently-connected tool.

## 2. CHAIN LOCK VS PIN LOCK FOR MITER SAWS (987)

### DISCUSSION

Evaluations of miter saws provided with a locking pin for the purpose of carrying are currently being handled differently by CSA and UL. CSA requires the use of a chain for locking down the unit so the unit is not operable while in this position (either as a miter saw or by using in the slide mode, as a radial arm saw). UL does not require the chain due to the following: (1) the pins are described in the instruction manual as being for the purpose of carrying only, and (2) the use of the unit as a radial arm saw would be inconvenient for the user.

This difference in requirements was discussed at the meeting.

The CSA representative present at the meeting indicated that the CSA requirements may need to be revised. He will pursue CSA changes, as necessary.

While discussing the need for a pin, the IAC considered the differences between a pull-through saw and a push-through saw. The IAC developed the following definitions:

- A pull-through miter saw is a saw constructed such that the blade stays behind the fence.
- A push-through miter saw is a saw constructed such that the blade can not travel completely behind the fence.

Although UL is not proposing that these definitions be included in UL 987, by defining them here, these types of miter saws may be better understood.

## **RATIONALE**

UL reiterated at the meeting that the instruction manual needs to stipulate that the pin is to be used for transporting the tool, or changing the blade, and is not intended to be used during cutting operations. This instruction is in accordance with 71.2. UL will continue to accept pins provided proper instructions are included. UL proposes that 72.9.3 be added to specifically indicate that instructions on the pin usage are required.

## **IMPACT**

Since push/pull type miter saws employing a lock down pin currently have instruction manuals indicating proper use of the pin, then a review of current instruction manuals will not be required.

### **3. CONSIDERATION OF REVISING EXISTING UL MARKINGS AND DEVELOPING NEW UL MARKING REQUIREMENTS IN ACCORDANCE WITH REQUIREMENTS IN ANSI Z535.4 (745, 987)**

## **BACKGROUND**

The American National Standards Institute (ANSI) has developed and published a series of standards (the ANSI Z535 series) containing guidelines for developing cautionary and warning markings for use on products. The Standard for Product Safety Signs and Labels, ANSI Z535.4-1991, contains guidelines for the type of cautionary and warning markings most like those required by UL Standards.

## **DISCUSSION**

At the meeting, UL sought to obtain manufacturer's views on the topic of evaluating the existing markings in UL 987 and UL 745 to determine how they correlate with the ANSI requirements. In addition, UL wanted industry input regarding the possibility of revising the existing markings in accordance with the ANSI requirements and relying on the ANSI requirements when developing new markings for the standard.

With regard to UL 745, the IAC representatives indicated that the markings included in UL 745 already reflect this three-part marking structure referenced in ANSI Z535.4. Additionally, the markings in UL 745 were initially developed with the input of the PTI liability coordinators, who used ANSI Z535.4 as a reference. Input at the meeting indicated that the applicable parts of ANSI Z535.4 have been incorporated into UL 745. No additional work will be done in this area.

Although the marking requirements in UL 987 may need to be revised, PTI members present at the IAC meeting reported that PTI has developed a new long-term committee to study markings, icons, and graphics. This committee is using ANSI Z535.4 as a resource, and is also considering international requirements.

One reported goal of the PTI committee is to identify long-term global symbols. The use of text is becoming difficult as the tool market increases because of the issue of translations. A global symbol that is easily recognized can help alleviate this problem.

The PTI committee will keep UL informed of their progress.

The following concerns associated with the ANSI Z535.4 standard were raised with regard to both UL 745 and UL 987:

1. The ANSI standard specifies colors for signal words and warning labels. These color schemes can conflict with existing tool colors, which are associated with specific manufacturers and product lines.
2. Since ANSI Z535.4 does not allow a signal word substitution, multiple signal words may be required on a nameplate. For smaller tools, the nameplate is not large enough to accommodate these markings.

#### 4. HARMONIZATION (987)

##### DISCUSSION

When the harmonization efforts for portable electric tools were first initiated, the Power Tool Institute (PTI) had indicated possible future harmonization to IEC requirements in the area of Stationary and Fixed Electric Tools, UL 987. UL requested input from the IAC on the desirability of such an action.

The industry representatives present at the meeting suggested that harmonization of UL 987 requirements with IEC requirements be put on hold for now. Although harmonization with IEC requirements is a long-term goal, the industry representatives reported that an immediate goal is to continue to work towards acceptance into the CB Scheme for portable tools while becoming more familiar with UL 745.

#### 5. ALLIED STANDARDS

##### DISCUSSION

At the 1994 UL/PTI Liaison Meeting, members of the Power Tool Institute (PTI) expressed a desire to learn of the standards development activities in allied, or related standards. This desire was prompted by the activities in UL 2054, the Standard for Batteries, a major component of battery-operated tools. UL indicated to PTI that an update would be provided on activities in other UL standards.

Since the 1994 tool IAC meeting, there have been no revisions in any of the following standards that would result in a significant change to Listed tools:

FUSES (UL 198, UL 248)  
 ATTACHMENT PLUGS AND RECEPTACLES (UL 498)  
 MOTORS (UL 519, UL 547)  
 PLASTICS (UL 746A, UL 746B, UL 746C, UL 746D)  
 CORD SETS AND POWER SUPPLY CORDS (UL 817)  
 MARKING AND LABELING SYSTEMS (UL 969)  
 SPECIAL USE SWITCHES (UL 1054)  
 SYSTEMS OF INSULATING MATERIAL – GENERAL (UL 1446)

Future meetings will also include an update on activities in UL 1004, the Standard for Electric Motors.

As part of this discussion at the meeting, the effect that the tool industry can have on another industry was discussed. Specifically, a suggestion was made that extension cord manufacturers could be requested to mark the maximum ampacity of an appliance to be used with the cord on the extension cord. A flag-type label may be needed to accomplish this marking.

The UL tool engineers will pursue this suggestion with the UL staff that are responsible for extension cords, UL 817.

## 6. ANGLE GRINDER GUARD REVISIONS (45)

### DISCUSSION

Paragraph 27.84 of UL 45 is intended to require that an angle grinder be constructed in a manner that reduces the risk of injury to the operator's fingers. However, the current wording of the standard puts emphasis on the recommended use of the tool. UL evaluates angle grinders to verify that guarding is provided to minimize the risk of the operator's fingers from coming into contact with the wheel.

UL proposed at the meeting that the standard be revised to eliminate dependence on instruction manual recommendations. The proposal made to the IAC would have required some construction changes to eliminate some of the guard movement presently allowed (currently, a guard could rotate 360° and still meet the requirement).

However, the IAC representatives raised concerns that if the movement of the guard is restricted, the user may simply remove the guard to perform certain functions, such as a side cut. This removal would be even less desirable than a fully-rotational guard. Additionally, there have been no reports of problems or injuries associated with a fully-rotational guard.

Therefore, UL withdrew the proposed change to paragraph 27.84. UL will continue to consider the manufacturer's recommended positioning of the guard when evaluating the angle grinder guard.

## 7. JOINTER/PLANER BLADES AND ACCESSORIES/ATTACHMENTS (45, 987)

### RATIONALE

UL is considering eliminating the impact test on jointer/planer blades since these blades are typically covered by the workpiece. UL requested input on this issue from the IAC.

It was noted at the meeting that UL previously deleted the impact test for carbide-tipped circular saw blades. No reports of injuries associated with tips breaking off of any jointer/planer blades have been received.

Therefore, UL proposes that the impact test no longer be required for carbide-tipped jointer/planer accessories.

## IMPACT

If the proposal is adopted, then an impact test will no longer be required on carbide-tipped jointed/planer accessories.

## 8. LOCKOUTS ON TOOL SWITCHES (987)

### RATIONALE

When UL 1624, the Standard for Light Industrial Machine Tools, was withdrawn, and the products evaluated to UL 987, the issue of lockouts for tools was discussed. Lockouts have been required for stationary tools under UL 987; however, lockouts had not been required for larger tools covered by UL 1624. These tools were not intended to be used in a home workshop (i.e., in areas accessible to children), so the lockout was not required.

However, when the two standards were combined, UL determined that the lockout would be required for all tools since the distinction of tool type location is subtle. UL requested input from industry to help define which tools need not provide a lockout. UL received no clearly-defined definitions; however, some tools are obviously not intended for the home workshop.

Therefore, UL proposes that the following tools not be required to provide a lockout if the tool is clearly marked to indicate that the tool is not intended for use in the home workshop:

- A permanently-connected tool;
- A three-phase tool;
- A grinder;
- A brake lathe.

It was noted at the meeting that other tools may not require the lockout feature. However, these should be the exception. As additional tools are identified, a specific proposal will be made to revise UL 987 to exempt the lockout requirements for that particular tool type.

Since grinders and brake lathes are not currently required to be provided with a marking to indicate that the tool is not intended for a home workshop, a review of the markings on those tools will be necessary. UL proposes that 70.1.7 become effective August 5, 1999.

### IMPACT

If the proposal is adopted, then a tool as defined above that is clearly intended for use outside the home workshop need not be provided with a lockout if this tool carries the required marking. A grinder or brake lathe not employing a lockout will need to be provided with the additional marking.

## 9. DETAIL SANDERS (45)

### RATIONALE

UL 45 does not currently specify the loading to be used for a detail sander. UL currently conducts the input test with the detail sander loaded using the weight of the sander (i.e., no additional weight), or the force specified in the manufacturer's recommendations, whichever is greater. UL proposes that Table 29.1 be revised accordingly.

A discussion arose at the meeting regarding whether or not additional weight is to be added to the tool, or if the weight of the tool serves as the load. Since additional weight can impair the tool's function significantly, most detail sanders can not perform under these conditions. No additional weight is to be added unless the manufacturer specifies a load greater than operation under the weight of the tool.

Consideration was given to specifying the load required by UL 745 rather than the proposed load. However, since the UL 745 load differs from the proposed load (which reflects present practice), a review of currently Listed detail sanders would be required to comply with the UL 745 specifications. Therefore, the proposal presented in Appendix A simply reflects UL's present practice.

### IMPACT

If the proposal is adopted, then the loading of a detail sander will be clear. No review of currently Listed detail sanders will be required.

## 10. VIBRATION AND INTERNAL WIRING (987)

### RATIONALE

Paragraph 11.20 of UL 45 requires that a tool which produces vibration have splicing devices of the thread-on or set-screw type be secured by wrapping the wires and the connector with friction tape. This requirement is not present in UL 987. Since there are tools covered by UL 987 which may create vibration, and since this vibration could result in the severance of a connection, UL proposes that the requirement be added to UL 987. Additionally, UL proposes that the Standard be revised to clarify that a ground connection be secured by a closed loop connector or equivalent means and dismiss the idea of using a thread-on device for ground connections. This revision is needed to reduce the risk of the ground opening and the operator not being aware of the loss of ground.

It was noted at the meeting that all motor products, including tools, produce vibration. Therefore, this proposal applies to all grounded stationary tools.

Additionally, it was noted at the IAC meeting that CSA only required tape to be applied on hand-installed wire nuts (and not on wire nuts that are machine-installed). Since the machine-installed wire nuts are more reliable than hand-applied wire nuts, UL proposes a similar exception.

It was also noted that tape is not required on a terminal block or on wire nuts located in a confined area, such as a handle, where there is not enough room for the wire nut to back off.

### IMPACT

If the proposal is adopted, then stationary tools will be required to have splices wrapped with friction tape and ground leads secured by a pressure connector or similar device. A review of Listed stationary tools will be needed.

## 11. ACCESSORIES (45, 987)

### DISCUSSION

UL is considering offering a Classification program for accessories. Currently, no such program exists for the tool categories. A new accessory must be evaluated with each tool that refers to the accessory by catalog number in the tool instruction manual. UL is considering establishing a program to evaluate a particular accessory for use with all applicable tools. The tool manufacturer could then simply reference the accessory, and no (or little) additional testing would be required.

The various types of possible accessory programs were discussed. Listing these accessories is not a viable option since the Listing mark implies a full evaluation of the product; however, a full evaluation will not be feasible because the risk of injury associated with an accessory is not clearly evident until the accessory is installed on the tool. Due to the various tool constructions, all combinations can not be considered.

Therefore, UL's Classification program was discussed as an option. UL can evaluate an accessory with respect to certain qualities, for example, risk of fire or electric shock. The Classification mark can then clearly state what properties have been evaluated, as well as any additional characteristics that may need to be considered. One option considered was to require a warning marking similar to the following to notify the consumer of a potential risk of injury: "Classified with respect to overspeed considerations. Follow all recommendations of the power tool manufacturer during use."

A third testing option is UL's Recognition program. With Recognition, the accessory could have a limited evaluation, and Conditions of Acceptability could be identified. The difference between this program and the Classification program is that with Recognition, the Conditions of Acceptability are not known to the consumer; with the Classification program as outlined above, the marking would notify the consumer of any limitations.

The tool manufacturers raised a number of concerns regarding the establishment of an accessory evaluation program. Some of these concerns include:

- A potential misunderstanding by the consumer that the accessory is suitable for use with any tool construction.
- If some accessories are evaluated, a tool manufacturer may be forced to have accessories evaluated also.
- An otherwise inappropriate accessory may appear to be legitimate because of the UL evaluation for overspin or risk of fire.

However, the industry representatives also discussed the positive aspects of the accessory program, including the reduced testing of accessories by the tool manufacturer, and the ability of the tool manufacturer to recommend an accessory easier. It was also noted that inappropriate accessories currently exist and are being used, and an accessory program may help address this situation.

It was noted at the meeting that ANSI requirements already exist for brushes and grinder wheels. UL could Classify these accessories now.

However, requirements do not exist for other accessories, such as circular saw blades and sander backing pads. UL plans to form an ad hoc committee to address accessories individually. The committee will consist of representatives from the power tool industry, as well as manufacturers of the accessory.

The first accessory to be addressed this way will be circular saw blades. As a proposed program is developed, the tool IAC will be kept informed.

## 12. ABNORMAL TESTING (45, 987)

### RATIONALE

UL proposes that UL 45 and UL 987 be revised to clarify that during the abnormal operation test, the tool is to be connected to a 30A fast-acting fuse. UL currently requires the use of this 30A fuse during the abnormal test.

It was noted at the meeting that a circuit breaker may be used instead of the fuse, since the circuit breaker acts slower than the 30A fuse.

### IMPACT

If the proposal is adopted, no review nor retest of currently Listed tools will be required.

## 13. BATTERY OPERATED TOOL REQUIREMENTS (45)

### DISCUSSION

Paragraph 52.15A of UL 45 currently indicates that a battery-operated circular saw be provided with a warning instructing the user to remove the battery when the tool is not being used, or to change blades, or make adjustments. UL proposed in an IAC letter dated March 31, 1995 to allow an exception for a circular saw provided with a lock-off switch. The exception provided alternate wording for these circular saws, that basically required the marking to instruct the user to remove the battery pack when changing blades or making adjustments (and not when the tool is not in use). UL received a number of comments in response to the IAC proposal; therefore, this issue was discussed at the IAC meeting.

At the meeting, industry representatives reported that some tools are shipped with the battery installed. This shipment method is due to the fact that some cases can not accommodate the battery pack separate from the tool. No problems have been reported as a result of this shipping practice.

### RATIONALE

UL now proposes that paragraph 52.15A be revised to indicate that a circular saw provided with a lock off switch need not instruct users to remove the battery pack when the tool is not in use. The instruction manual will still require the instruction [See paragraph 55.2(c)(14)].

### IMPACT

If the proposal is adopted, then the hang tag on a circular saw will not be required to instruct the user to remove the battery from the tool when not in use.

## 14. UPDATE ON UL 745 SERIES (745)

### DISCUSSION

#### Background

The series of bi-national standards for portable electric tools was published on March 23, 1995. As with any standard, this series of standards will need updates and revisions to address changes in technology, field problems, and new constructions. To further promote harmonization with international standards, efforts will also need to be made to periodically review and consider other related requirements.

A working group consisting of tool manufacturers and representatives of both UL and CSA will continue to meet to discuss the situations noted above. The working group met on June 24 – 27, 1995; an update on this meeting and on the activities of the working group was provided at the IAC meeting.

#### Reduction of Deviations

Currently, the goal of the working group is to reduce the number of deviations from the IEC text in the bi-national standard. The purpose of this reduction in deviations is to bring the bi-national standard closer to the IEC 745 standard and to ultimately help with the CB Scheme. The group has tentatively identified possible changes to the standard. These changes are not intended to result in additional construction changes or performance evaluations. For instance, many informational notes appear in the bi-national standard that do not appear in the IEC standard. The working group has reviewed these notes to determine which may be proposed to be deleted, and which may be proposed to be relocated to an informational annex at the back of the standard. Once a proposal has been developed, the working group will review the proposal; the IAC and tool industry will then be given opportunities to review and comment on the proposed changes.

#### Proposed Revisions to IEC 745

The working group is also developing a list of possible proposals from the US to revise IEC 745. There were a number of deviations in UL 745 that are integral parts of a UL or CSA evaluation of the tool. These deviations will be proposed as changes to the IEC text. The goal of the working group in this area is to try to affect international standards requirements with current UL or CSA requirements which may be superior to the IEC 745 text.

#### Instruction Manuals

Another issue related to the UL 745 series of standards is the subject of instruction manuals. Currently, similar tools are required to have different instruction manuals depending upon under which standard the tool is Listed. A tool Listed to UL 45 will have an instruction manual complying with UL 45, and a tool Listed to UL 745 will have an instruction manual complying with UL 745.

However, UL has been requested by several manufacturers to accept a manual complying with UL 745 for a tool Listed to UL 45. The benefit to using a UL 745 manual for a UL 45 tool is that a manufacturer could have a single instruction manual for the same family of tools. Once one tool is Listed to UL 745, a manufacturer is currently required to keep two different manuals for very similar tools until all of these like tools comply with UL 745. For a tool being evaluated to UL 745, the instruction manual of the tool shall comply with the requirements of Clause 31.

UL 45 currently allows for equivalency in the instruction manual; UL 745 does not. One way of using the UL 745 manual while still complying with UL 45 would be to use the UL 745 manual verbatim, and then attach additional pages to address the additional instructions required by UL 45 (such as extension cord length information). This option is presently available. However, if wording from UL 745 is chosen, complete compliance with all of Clause 31 will be required.

It was suggested at the meeting that the instruction manual requirements in UL 45 be compared to those requirements in UL 745. A proposal could then be considered to delete these additional instructions from UL 45.

UL requests input on this issue from the industry.

Substituting UL 745 markings in place of UL 45 markings was also considered at the IAC meeting. This option will not be pursued because of the many differences in requirements between the two standards, especially with respect to symbols.

## 15. CLASS E INSULATION (45)

### DISCUSSION

It was noted at the meeting that UL 45 requires a Class E insulation system evaluation. Industry representatives questioned what type of evaluation would be required.

Subsequent to the meeting, UL gathered additional information on this item. A three temperature test will be required in accordance with UL 1446, the Standard for Systems of Insulating Material – General. Questions on testing of insulating systems may be directed to Bob Mayschak at UL's Northbrook office, Extension 42860.

## 16. SWITCHES WITH ELECTRONICS (45)

### RATIONALE

It was noted at the IAC meeting that UL 45 currently requires a component short circuit test. This test has sometimes been applied to components inside of switches. This test need not apply to components inside switches since these components are already stressed by other performance evaluations, such as the locked rotor evaluation. Additionally, the switch is cycle tested, either as part of the Recognition program of the switch, or as part of the end-product evaluation.

It should be noted that Section 43 applies only to discrete components, and not to surface mount components. See 43.2.