

Northbrook, Illinois • (708) 272-8800
 Melville, New York • (516) 271-6200
 Santa Clara, California • (408) 985-2400
 Research Triangle Park,
 North Carolina • (919) 549-1400



Subjects 745-2-3 (745-1, 745-3, 745-4-3)

12 Laboratory Drive
 Research Triangle Park, NC 27709
 April 25, 1996

TO: Casualty Council of Underwriters Laboratories Inc.,
 Electrical Council of Underwriters Laboratories Inc.,
 Subscribers to UL's Standards Service for Portable Electric Tools
 Particular Requirements for Grinders, Polishers, and Disk-Type Sanders
 Portable Battery Operated Tools, and
 Particular Requirements for Battery-Operated Grinders, Polishers, and Disk-Type Sanders

SUBJECT: Grinder Guard Evaluation

In the course of conducting an evaluation to UL 745-1, the Standard for Portable Electric Tools, and to UL 745-2-3, the Standard for Particular Requirements for Grinders, Polishers, and Disk-Type Sanders, UL has realized that the grinder guard evaluation can not be conducted as written. Appendix E of UL 745-1 requires that a grinder guard meet the requirements in ANSI B7.1, the Standard for the Use, Care, and Protection of Abrasive Wheels. However, the test parameters in the ANSI B7.1 standard are not yet fully defined; therefore, the testing is not capable of being conducted at this time. UL has discussed this issue with the Grinding Wheel Institute, sponsors of ANSI B7.1, and they have indicated that they are considering revising the Standard.

Therefore, until B7.1 is revised, UL announces that the test program currently in effect for UL 45, the Standard for Portable Electric Tools, will be used to evaluate grinder guards investigated to UL 745-1 and UL 745-2-3. This announcement also applies to UL 745-3, the Standard for Battery-Operated Tools, and to UL 745-4-3, the Standard for Battery-Operated Grinders, Polishers, and Disk-Type Sanders. The current requirements now in effect are shown in Appendix A.

UL has discussed this situation with the Binational Working Group, and with CSA.

This bulletin should be kept with your copy of the standard.

Questions regarding interpretation of requirements should be directed to the responsible UL Staff. Please see Appendix B of this bulletin regarding designated responsibility for the subject product categories.

UNDERWRITERS LABORATORIES INC.

Sonya Bird

SONYA BIRD (Ext. 11685)
 Engineering Team Leader
 Standards Department

REVIEWED BY:

John Crickmar

JOHN CRICKMAR (Ext. 11535)
 Associate Managing Engineer
 Engineering Services 113C

SR:DES
 7450203.ANN

A not-for-profit organization
 dedicated to public safety and
 committed to quality service

APPENDIX A

REQUIREMENTS FOR GRINDER GUARDS BEING EVALUATED TO THE FIRST EDITIONS OF

THE STANDARD FOR PORTABLE ELECTRIC TOOLS, UL 745-1, AND THE
STANDARD FOR PARTICULAR REQUIREMENTS FOR GRINDERS,
POLISHERS, AND DISK-TYPE SANDERS, UL 745-2-3 OR

THE STANDARD FOR PORTABLE BATTERY OPERATED TOOLS, UL 745-3
AND THE STANDARD FOR PARTICULAR REQUIREMENTS FOR
BATTERY-OPERATED GRINDERS, POLISHERS, AND
DISK-TYPE SANDERS, UL 745-4-3

G1. A guard that does not comply with the requirements in G2, G3, G4, or G5, shall not be employed unless there is no breakage or penetration of the guard when tested as follows: A wheel of the maximum diameter and thickness recommended by the manufacturer is to be assembled to the spindle. The grinder is then to be operated at maximum no-load speed, and the grinding wheel is to be broken by a sharp impact or other means while running.

G2. A guard for a grinding wheel where grinding is done on the periphery of the wheel shall be so constructed that removal of the peripheral protection is not necessary for replacement of a grinding wheel. The wheel shall be provided with a hood type guard that does not expose the periphery or side of the wheel for more than 180 degrees. The top half of the wheel shall be enclosed at all times.

G3. A grinder guard shall be of a material and shall comply with the dimensions given in Table G1 or G2. See Figures G1 or G2 whichever is applicable.

G4. A drawn-steel guard for a Type 27 and 28 thin abrasive wheel for surface grinding shall comply with Table G3. See Figure G3.

G5. A grinder provided with a cup wheel shall be provided with a fixed guard complying with Table G4. See Figure G4.

Table G1
Thickness of peripheral and side members for guards

Material of guard	Maximum peripheral speed, ft/min (m/sec)		Maximum thickness of grinding wheel Inches (mm)		Grinding-wheel diameter, inches (mm)							
					3 (76.2) Through 6 (152)		More than 6 (152) but not more than 12 (305)		More than 12 (305) but not more than 16 (406)		More than 16 (406) but not more than 20 (508)	
					A ^a	B ^a	A ^a	B ^a	A ^a	B ^a	A ^a	B ^a
Malleable iron (A47-68 minimum tensile strength 50,000 psi)	9,000	(45)	2	(50.8)	1/4 (6.4)	1/4 (6.4)	3/8 (9.5)	5/16 (7.9)	1/2 (12.7)	3/8 (9.5)	5/8 (15.9)	1/2 (12.7)
Steel castings (A27-71 minimum tensile strength 60,000 psi)	16,000	(80)	2	(50.8)	1/4 (6.4)	1/4 (6.4)	5/16 (7.9)	5/16 (7.9)	3/8 (9.5)	3/8 (9.5)	1/2 (12.7)	7/16 (11.1)
Structural steel (A238-70 ^a and A306-64 excluding specifications for rivet steel, minimum tensile strength 60,000 psi)	16,000	(80)	2	(50.8)	1/8 (3.2)	1/16 (1.6)	5/16 (7.9)	1/4 (6.4)	5/16 (7.9)	1/4 (6.4)	5/16 (7.9)	1/4 (6.4)

^a A is minimum thickness of the peripheral protecting member; B is the minimum thickness of the side member of the guard. See Figure G1. Note: Minimum Tensile Strengths per ASTM.

Table G2
Drawn-steel guard

Material of guard minimum tensile strength sheet steel 60,000 psi, maximum peripheral speed,		Minimum thickness of wheel, Inches (mm)		Grinding-wheel diameter, inches (mm)							
				2 (50.8) through 5 (127)		More than 5 (127) but not more than 8 (203)		More than 8 (203) but not more than 10 (254)			
				A ^a	B ^a	A ^a	B ^a	A ^a	B ^a		
Ft/min	(m/sec)	Inches	(mm)								
5,000	(25)	2	(50.8)	1/16 (1.6)	1/16 (1.6)	3/32 (2.4)	1/16 (1.6)	3/32 (2.4)	1/16 (1.6)		
9,500	(47.5)	2	(50.8)	1/16 (1.6)	1/16 (1.6)	3/32 (2.4)	1/16 (1.6)	—	—		
12,500	(62.5)	2	(50.8)	3/32 (2.4)	1/16 (1.6)	3/32 (2.4)	3/32 (2.4)	—	—		
17,000	(85)	1	(25.4)	3/32 (2.4)	1/16 (1.6)	1/8 (3.2)	3/32 (2.4)	—	—		

^a A is the minimum thickness of the peripheral protecting number; B is the minimum thickness of the side member of the guard. See Figure G2.

Table G3
Drawn-steel guard for types 27 and 28 thin abrasive wheel

Maximum peripheral speed, Ft/min (m/sec)	Material of guard	Thickness of wheel, Inches (mm)	Wheel diameter, Inches (mm)	Minimum wall thickness, Inches (mm)	Minimum leg length, Inches (mm)
14,200 (71)	Sheet steel minimum tensile strength 60,000 psi	3/8 (9.5) or less	3 (76.2) through 9 (229)	A ^a	B ^a
11,000 (55)		More than 3/8 (9.5) but not more than 1 (25.4)	Not more than 7 (176)	1/16 (1.6)	1/2 (12.7)
				3/32 (2.4)	1-1/8 (28.6)

^a See Figure G3.

Table G4
Material thickness for drawn steel cup type wheel guards

Wheel diameter, Inches (mm)	B Washer back plate thickness, Inches (mm)	C Hood, Inches (mm)	D Skirt Inches (mm)
4 (100)	3/32 (2.4)	1/16 (1.6)	1/8 (3.2)
5 (125)	3/32 (2.4)	3/32 (2.4)	1/8 (3.20)
6 (150)	3/32 (2.4)	3/32 (2.4)	1/8 (3.20)

NOTE - Thickness based 50,000 psi minimum tensile strength and operating speed not exceeding 9,500 SFPM. See Figure G4.

Figure G1
Typical guard for wheel not more than 20 inches in diameter

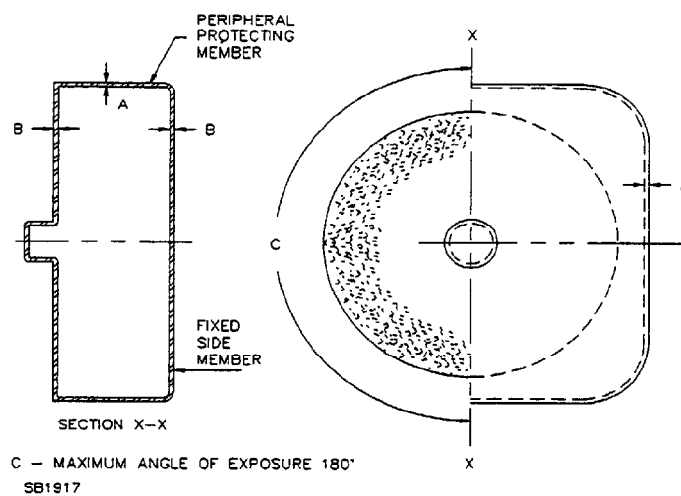


Figure G2
Typical drawn-steel guard for type 1 straight wheels not more than 10 inches in diameter

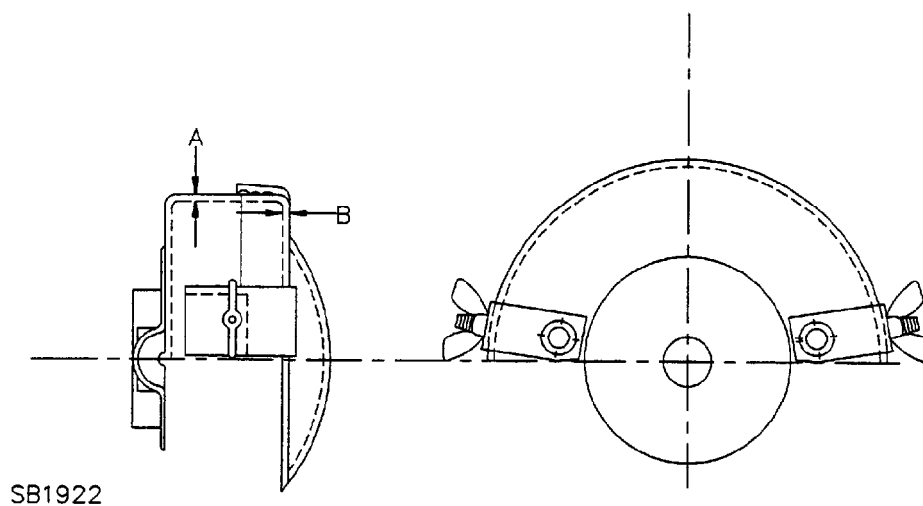
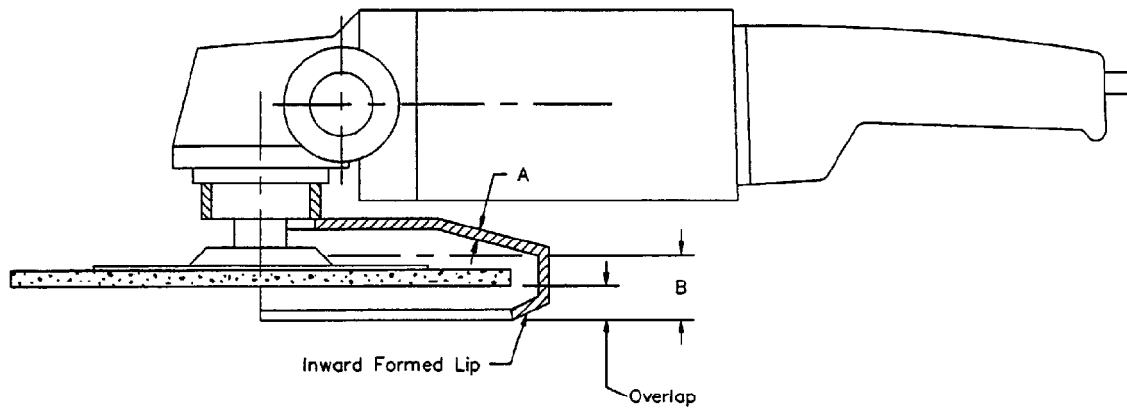


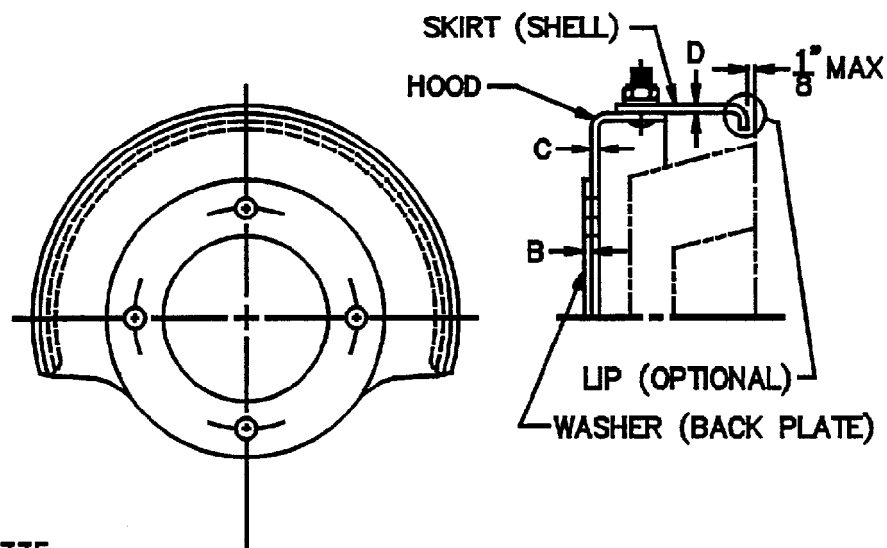
Figure G3
Typical drawn-steel guard for type 27 and 28 wheels



S2176

Figure G4
Typical drawn-steel guard for cup-type wheels, types 6 and 11

1



SM335

APPENDIX B

DESIGNATED RESPONSIBILITY FOR UL PRODUCT CATEGORIES XJYW, PORTABLE ELECTRIC TOOLS XJYW2, PORTABLE ELECTRIC TOOLS, COMPONENT

The individuals shown in the following table are involved with the investigation of products covered under the subject categories. The Primary Designated Engineer (**shown in UPPERCASE letters**) coordinates the establishment and uniform interpretation of UL requirements applicable to the product categories. The Designated Engineers (**shown in lowercase letters**) work with the Primary Designated Engineer to interpret requirements and maintain standards.

Should you have questions regarding any adopted requirements that affect your product, you are encouraged to contact the individual at the office to which you normally submit your products.

The Industry Advisory Conference (IAC) Chairman for the subject categories is Raffic Ali at UL's Research Triangle Park office. The IAC Chairman oversees the significant interpretations made by the Primary Designated Engineer and arbitrates any differences regarding interpretation of UL requirements.

CCN	Office/Subsidiary	Responsible Engineer	Extension
XJUW, XJYW2	Camas	H. Copley	55612
	Melville	J. Stimitz	22214
	Northbrook	F. Wordlaw	42995
	RTP	M. BELCHER	11649
	Santa Clara	M. Arce	32520

Northbrook, Illinois • (708) 272-8800
 Melville, New York • (516) 271-6200
 Santa Clara, California • (408) 985-2400
 Research Triangle Park,
 North Carolina • (919) 549-1400



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)

A not-for-profit organization
 dedicated to public safety and
 committed to quality service

AVA Documents
 Document Sharing Hub

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.

* * * * *

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.