MEETING LOG
DIRECTORATE FOR ENGINEERING SCIENCES

SUBJECT: UL Ad Hoc Meeting for Home Laundering Equipment

PLACE: Rosemont, Illinois

MEETING DATE: February 4, 1998

LOG ENTRY SOURCE:Nick Marchica

ENTRY DATE: February 17, 1998

COMMISSION ATTENDEES:
Nick Marchica, ESME

NON-COMMISSION ATTENDEES:
Don Grob, UL
Chuck Williams, UL
Donna Hawkins, UL
Wayne Morris, AHAM
Dave Modtland, Frigidaire
Ed Buckles, Frigidaire
Michael Wasson, ASKO Inc.
Richard Seib, Whirlpool
Dave Shepherd, Whirlpool
Joe Gauer, Whirlpool
Tom Riley, Maytag
Dan Teich, Maytag
Gloria Pumpuni, Maytag
Vivien Jacoby, General Electric Appliance
Phil Manthei, Raytheon Laundry Products
Bryan Berringer, U.S. Department of Energy
Lou Montuoro, Amana Appliances
Bob St. Louis, CAMCO
Mike Dodd, CSA

MEETING SUMMARY:

Donna Hawkins, UL is preparing the meeting minutes. They will be appended to this meeting log when received.

cc: Colin Church
Chronological File

D. Hawkins

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Subject 2157

333 Pfingsten Road
Northbrook, IL 60062
April 1, 1998

TO: Representatives on the Ad Hoc Group of UL for Home Laundry Equipment

SUBJECT: Report on the Meeting of the Ad Hoc Group of UL for Home Laundry Equipment; Request for Comments on the Report.

SUMMARY OF TOPICS

The following topic was discussed at the meeting:

Revision of the interlock requirements in Clause 20.8.1 (b) of the Standard for Electric Clothes Washing Machines and Extractors, UL 2157.

COMMENTS DUE: MAY 13, 1998

A meeting of the Ad Hoc Group of UL for Home Laundry Equipment was held on February 4, 1998 at Clarion International Quality Inn at O'Hare. The purpose of the meeting was to discuss a revision of the interlock requirements in Clause 20.8.1 (b) of UL 2157 based on the Consumer Product Safety Commission (CPSC) proposal to UL that higher spin speeds in newer washing machines may result in an increase in the risk of personal injury.

Attached as Appendix A is a list of those who attended the meeting. Attached as Appendix B is a comparison of the requirements in UL 2157/CSA C22.2 No. 169-97 and IEC 355-2-4 and 335-2-7 as they pertain to washing machines with extractors. Questions regarding interpretation of requirements should be directed to the responsible UL Staff. Please see Appendix C of this bulletin regarding designated responsibility for the subject product categories.

* * * * *

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. REQUEST FOR REVISIONS TO CLAUSE 20.8.1 (b) OF UL 2157

BACKGROUND

Extraction Type Appliances, Section 20.8, in UL 2157 provides two methods to prevent access to a spinning drum for centrifugal-extraction washing machines. The first method, Clause 20.8.1 (a), requires a means be provided to reduce the likelihood of opening the clothes loading/unloading door during operation. The second method, Clause 20.8.1 (b), prescribers an interlock that, when the clothes loading/unloading door is opened more than 50.8 mm during operation will 1) remove the driving force from the clothes basket, and 2) stop all accessible moving parts within 7 seconds with the appliance loaded as described in Clause 4.2.1.

As a result of the Energy Policy and Conservation Act, the U.S. Department of Energy (DOE) has issued energy-efficiency standards for washing machines. The DOE plans to revise the requirements and propose increased efficiency requirements. It is anticipated that the requirements will relate to the moisture content in the clothes load. In order to meet these standards, manufacturers of washing machines anticipate designing machines with higher speeds during the spin cycle.

The U.S. Consumer Product Safety Commission (CPSC) has expressed concern that the requirements in the Standard for Electric Clothes Washing Machines and Extractors, UL 2157, may require revision to further reduce the risk of injury to persons that could be created by higher spin speeds of the washer drum (clothes basket) during the spin cycle of the washer.

The CPSC provided accident reports of incidents of people who reportedly have accessed the washer's drum during the spin cycle and received injuries ranging from lacerations and abrasions to fractures and amputations.

Considering that there may be higher spin cycle speeds on future products and that there may be an associated increased risk of injury should someone gain access to the spinning tub, the CPSC has proposed that Clause 20.8.1 (b) be removed from UL 2157; and Clause 20.8.1 (a), which requires a means to reduce the likelihood of opening of the clothes loading/unloading door during operation, be the sole requirement during the spin cycle.

DISCUSSION

CPSC reviewed incident data previously provided to UL. The incident data covered the period of 1980 through June 1997. Seventeen incidents were reported, 15 of which were addressed by CPSC in-depth reports. Nine incidents involved amputation of an arm and six involved a fractured arm. Ten of the incidents apparently occurred in laundromats. UL 2157 requires commercial washing machines intended for use in laundromats, to be equipped with an interlock. Washing machines identified in the field reports as installed in laundromats either did not have the required interlocks, or the interlock had been defeated. Seven of the reported incidents were identified as likely involving a household washer. Of the incidents involving household washing machines, only one could be identified as directly related to access to a spinning tub.

It was agreed that field incident reports do not serve to identify need for revision of current requirements applicable to washing machines. Concern was expressed that the potential for increasing spinning speeds in newer designs of washing machines has a potential for introducing a new risk of injury.

UL reviewed the current requirements and performance criteria in Clause 20.8.1 (b) of UL 2157. Clause 20.8.1 (b) requires that the design provide an interlock so that when the door is opened more than 50.8 mm; (1) the driving force must be removed from the basket, and (2) the spinning tub must stop within 7 seconds. The performance requirements of Clause 20.8.7 requires that a 6,000 cycle endurance test be conducted with the spinning tub loaded with twice the maximum dry-weight load as specified by the machine manufacturer. At the end of the test, the spinning tub shall stop within 10 seconds. UL noted that the lid switch which initiates the braking action is generally recessed.

UL also reviewed the current requirements of the International Electrotechnical Commission (IEC) Standards 335-1, Safety of Household and Similar Appliances Part 1: General Requirements; 335-2-7, Particular Requirements for Washing Machines; and 335-2-4, Particular Requirements for Spin Extractors. In Europe, it is common for spin extraction to take place in a drum that is separate from the washing tub. Spin extraction may take place in a separate tub that is an integral part of the washing machine or in a totally separate machine intended for water extraction only. The spin extraction requirements for all washing machines covered by IEC 335-2-7 are contained in IEC 335-2-4. A representative of industry indicated that European machines employ spin speeds that are comparable to the spin speeds of US washing machines that are designed to meet future DOE energy efficiency standards. European washing machines typically have spin speeds of 1000 to 1600 rpm. A brief comparison of the IEC requirements with the UL requirements was discussed. A comparison of the requirements is attached as Appendix B.

The representatives of industry indicated that based on their product and safety analysis, an increase in the spin speed of the washing machine would not necessarily affect the overall safety record of the product. The machine would still need to meet the current requirements specified in UL 2157. Since it is known that the present machine designs could cause an injury to a person if they put an arm into a spinning machine, an increase in the machine's speed does not necessarily correlate to an increased risk of injury.

A representative of the Association of Home Appliance Manufacturers (AHAM) noted that there are approximately 100 million washing machines presently in use in the United States. On the average, these machines are used 416 times per year and over the last 20 years, this equals about 800 billion operations. The AHAM representative expressed the view that these products have an excellent safety record.

As a result of the discussions, additional information was requested in order to address the CPSC's proposal to revise the interlock requirements in Clause 20.8.1 (b) of UL 2157.

A representative of the AHAM requested a more detailed accident data report from the CPSC including newspaper clippings, National Electronic Injury Surveillance System (NEISS) data, and in-depth reports. AHAM asked if Hazard Base Safety Engineering (HBSE) is applicable to this situation. AHAM also requested a more detailed report of a CPSC 1983 corrective action plan for Laundromats. A preliminary analysis of this plan suggests that accidents were significantly reduced in Laundromats as a result of the CPSC communication in 1983.

AHAM also suggested that the representatives of industry share their product safety analysis data to determine the percentage of incidents due to defeating the interlock switch on the machine, and the percentage of incidents due to the speed of the machine.

ACTION PLAN

1. UL will investigate whether a HBSE study could assist in the analysis of the CPSC's proposal that higher spin speeds in newer washing machines may or may not, result in an increase in the risk of personal injury.

2. The CPSC will provide a detailed accident data report, including newspaper clippings, NEISS data, and in-depth reports. The CPSC will also provide a summary of incidents occurring since 1983 to the present, and send a copy to UL and AHAM.

3. AHAM will attempt to collect accident data from other available sources.

4. The Canadian Standards Association (CSA) will collect incident data that is available in Canada and send the information to AHAM.

NEXT MEETING

The representatives of industry requested more time to study all of the information collected, discuss the suggested options, develop other options, and work on developing a potential proposal to address the CPSC's request. UL will collect all the information requested and plan for another Ad Hoc meeting during 1998 to discuss the findings.

REQUEST FOR COMMENTS

Please provide your comments concerning the meeting report.

Written comments should be sent to the attention of Donna Hawkins at UL's Northbrook office, 333 Pfingsten Road, Northbrook, IL 60062-2096. Comments may be sent by mail or faxed to (847) 509-8217. Please reference all correspondence to Subject 2157.

All comments should be sent by May 13, 1998.

UNDERWRITERS LABORATORIES INC.

Donna Hawkins

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Engineering Associate
Standards Department

REVIEWED BY:

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Managing Engineer
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SR: DES

2157MTG.D01

APPENDIX A

ATTENDANCE AT THE FEBRUARY 4, 1998 MEETING OF THE AD HOC GROUP FOR HOME LAUNDRY EQUIPMENT

UL's Industry Advisory Conference for Home Laundry Equipment

Phil Manthei	Raytheon Laundry Products
*Greg Miller	General Electric Appliance
*Fred Pauk	Frigidaire
Tom Riley	Maytag
Dave Sheppard	Whirlpool
Michael Wasson	ASKO Inc.

Invited Guests

Bryan Berringer	U.S. Department of Energy
Ed Buckles	Frigidaire
M Todd	Canadian Standards Association
J uer	Whirlpool
Vivien Jacoby	General Electric Appliance
Nick Marchica	U.S. Consumer Product Safety Commission
Dave Modtland (Substitute for Fred Pauk)	Frigidaire
Lou Montuoro	Amana Appliance
Wayne Morris	Association of Home Appliance Manufacturers
Gloria Pumpuni	Maytag
Richard Selb	Whirlpool
Bob St. Louis	CAMCO
Dan Telch	Maytag

UL Staff

Don Grob	Northbrook Office
Donna Hawkins	Northbrook Office
Chuck Williams	Northbrook Office

*Not in attendance

APPENDIX B

COMPARISON OF REQUIREMENTS

WASHING MACHINES WITH SPIN EXTRACTION

UL/CSA STANDARD	INTERNATIONAL STANDARD
Standard for Electric Clothes Washing Machines and Extractors, UL 2157/CSA C22.2 No. 169-97, dated June 1, 1997.	International Electrotechnical Commission (IEC) Safety of household and similar electrical appliances, Part 2: Particular requirements for washing machines; IEC 335-2-7, Fourth Edition, Dated 1993; and Part 2: Particular requirements for spin extractors, IEC 335-2-4, Fourth Edition, Dated 1993.
Requirements for spin cycle: Clause 20, Stability and mechanical hazards (UL 2157/CSA C22.2 No. 169-97)	*Requirements for spin cycle:* Clause 20, Stability and mechanical hazards (IEC 335-2-4)
Summary of applicable requirements: These are two constructions permitted during the spin cycle without exceptions or requirements related to speed or kinetic energy as follows:	*Summary of applicable requirements:* These are two constructions permitted during the spin cycle as follows:
1. Lid lock (Clause 20.8.1(a))	1. Lid lock (Clause 20.102-20.103, and 20.105) required as follows: *Spin extraction takes place in separate drum from washing* a) Kinetic energy is greater than 1500 J or spin velocity is greater than 20 m/s (Clause 20.103) *Spin extraction takes place in some drum as washing* a) Kinetic energy exceeds 1500 J (Clause 20.105); or b) Spin velocity exceeds 40 m/s
Lid lock solenoid is tested for 6000 c. The solenoid is required to be operable after testing. (Clause 20.8.10)	No IEC solenoid testing required.
No minimum force test is specified for the lid lock to resist opening by the user.	A minimum force test is required for lid lock to resist opening by user. (Clause 22.101)
2. Brake (Clause 20.8.1 (b))	2. Brake (Clause 20.104 and 20.106) permitted as follows: *Spin extraction takes place in separate drum from washing* a) kinetic energy is less than 1500 J and spin velocity is less than 20 m/s (Clause 20.104)
Brake is required to stop drum within 7 s after lid is opened 50.8 mm (Clause 20.8.1(b))	Moving parts cannot be touched which exceed 60 rev/min as follows: 4 to 10 mm opening judged by probe in Figure 101, greater than 10 mm to 12 mm opening requires no power to motor & drum speed less than 60 rev/min. (Clause 20.104)
Drum cannot be started unless lid is closed to a minimum of 50.8 mm from opening. Front loading machines require secondary function control before drum can restart. (Clause 20.8.6)	*Spin extraction takes place in same drum as washing* a) Kinetic energy less than 1500 J and spin velocity less than 40 m/s (Clause 20.106)
	50 N force applied to lid, if it opens drum speed cannot exceed 60 rev/min (with no power to motor) within 7 s after lid opened by 50 mm (Clause 20.106)
Brake is tested for 6000 c at twice rated load for every cycle. After testing the brake, the brake shall stop drum within 10 s. (Clause 20.8.7)	All braking systems tested for 1000 c at rated load with load saturated with water every 250 c. No time to stop measurement specified or recorded during this test. (Clause 18)
	Safety instructions about forcing open lid or installing automatic timers required for machines with safety interlock used by the public. (Clause 7.12.1)

APPENDIX C

DESIGNATED RESPONSIBILITY FOR UL PRODUCT CATEGORY ZCTT, WASHING MACHINES

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

Should you have questions regarding the interpretation of the requirements proposed in this bulletin or 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 category is Don Grob at UL's Northbrook 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
ZCTT	Melville	Darrin Conlon	22872
	Northbrook	CHUCK WILLIAMS	42914