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REPORT ON DISCUSSIONS DURING UL MEETINGS WITH ELECTRICAL INSPECTORS AT THE 2007 IAEI SECTION MEETINGS

January 14, 2008

TO: Attendees of Underwriters Laboratories Inc. Meetings with Electrical Inspectors at the 2007 IAEI Section Meetings

SUBJECT: Report of Meetings

Underwriters Laboratories held meetings with Electrical Inspectors during the 2007 IAEI Section Meetings. Historically, these meetings have provided for an open exchange between the electrical inspection community and UL regarding any subject of interest to authorities.

UL acknowledges the importance of this feedback. The electrical inspector is an integral part of the UL information loop. It is the inspector, who during the examination of the final installation, can judge under field conditions, the adequacy of the constructions and markings for proper installation. It is the inspector who can pass this installation information to UL for use in modifying product safety requirements.

The questions and answers in this Report present the items discussed during the meetings. This is not a verbatim transcript; only the pertinent points have been recorded. Each question has been identified with the designation of the Section meeting at which the subject was discussed.

UL appreciates all those who took the time to participate in these meeting and provided us with information important for our endeavors and goals toward public safety. I would appreciate hearing from you on any comments or suggestions you have on this Report or the UL/Inspectors meetings.

UNDERWRITERS LABORATORIES INC.

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QUESTIONS AND ANSWERS

FROM

UL MEETINGS WITH ELECTRICAL INSPECTORS

AT THE 2007

ANNUAL IAEI SECTION MEETINGS

This report contains questions and answers from the 2007 meetings. Where necessary, the answers have been expanded to include information that may not have been available during the meetings. Where specific actions have taken place in response to the Inspector's input, the status of the actions is indicated. This report may provide insights into UL's intent and efforts that are associated with the certification of electrical equipment so that it meets the purposes of the National Electrical Code® and is installable in accordance with it. The questions have been arranged by subject matter and are identified in the margin with an identifier for the IAEI Section where the question was raised.

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Specific Information for AHJs and Regulators on the UL Web Site

http://www.ul.com/regulators

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IAEI Section Identifier Legend

(E) Eastern Section
(NW) North Western Section
(S) Southern Section
(SW) South Western Section
(W) Western Section

1.0 UL LISTING, CLASSIFICATION AND FIELD EVALUATION INFORMATION

1.1 (NW) (SW) **Q.** **Following manufacturer's installation instructions.** AHJs are some times placed in a difficult position due to manufacturer's installation instructions that are more stringent than minimum NEC® requirements. For a hot tub rated 50A, the installation instructions indicate that all supply conductors should be 6 AWG. The installer used an NM cable with a 10 AWG equipment grounding conductor. This would be a code-compliant installation, but had to be rejected by the AHJ because the instructions were not followed.

A. Installation instructions provided with UL Listed products are reviewed as part of the Listing investigation. Manufacturer's recommendations that are part of the installation instructions should be followed in order to comply with NEC® Section 110.3(B). The AHJ should expect all installation instructions provided with UL Listed equipment to be available for review at the time of inspection.

If an AHJ believes that the manufacturer's recommendations in the installation instructions exceed what is necessary for a safe installation, then NEC® Section 90.4 gives the AHJ the ability to approve the installation.

If an AHJ believes that a product's installation instructions conflict with the NEC® or other Model Code, we would encourage you to please file a Field Report using our online report form at: **https://www.ul.com/regulators/ahjprod.cfm**, or contact a Regulatory Services staff member at **1-800-595-9844** or by email at: **ULRegulatoryServices@us.ul.com**.

1.2 (NW) (SW) **Q.** **Out of date installation instructions.** Manufacturer's installation instructions often are out of date, obsolete or indicate that they are based on old versions of the NEC®, sometimes even referencing back to the 1987 or 1990 editions. Statements on the instructions for a hydromassage bathtub indicate that an 8 AWG bonding wire must be run back to the panel if there is no grounding source.

What can we do when this happens?

A. Manufacturer's installation instructions are reviewed as part of the Listing investigation, but we have learned that instructions have not always been included in our factory follow-up procedure, for review during regular factory follow-up audits. If manufacturers fail to update instructions to reference more recent editions of the NEC®, this may not be flagged by our Field Services staff. We will address this issue further internally.

In the meantime, if you encounter instructions with out of date, obsolete, incomplete, or erroneous information, please file a Field Report using our online report form at: **https://www.ul.com/regulators/ahjprod.cfm**, or contact a UL Regulatory Services staff member at **1-800-595-9844** for assistance.

1.3 (NW) **Q.** **Where can the AHJ find the installation instructions?** Often it is difficult to get a copy of the installation instructions when conducting an inspection. Can the installation instructions be found on the UL web site? Who is responsible for providing the installation instructions to the electricians doing the work?

A. UL requires Listed products to be provided with installation instructions when necessary so that the product can be properly installed in accordance with the manufacturer's recommendations as well as the applicable Model Code. The installing electrician should receive a copy of the installation instructions with the product.

Last year over 21 billion UL Marks appeared on products from over 71,000 manufacturers. Providing each product's installation instructions on UL's website is not feasible. Manufacturers typically provide access to installation instructions on their web sites and offer easy access to those instructions.

While it is difficult to install or inspect an installation when no installation instructions are present, it is the responsibility of the installer to insure that the product's installation instructions are provided to the AHJ in order to determine compliance with NEC® Section 110.3(B).

The UL White Book is also an important tool for determining compliance with NEC® Section 110.3(B) by locating the appropriate Guide Information for the product category. The Guide Information will provide important information on the installation of the product as well as the product's markings, etc.

If you would like a complimentary copy of the UL White Book, you can pick one up at your local IAEI Chapter Meeting, you may also use our online Regulatory Services Contact Form at: **https://www.ul.com/auth/regcon.cfm#Contact**, just put your request in the comments/questions box, or you may contact a member of UL's Regulatory Services Staff at **1-800-595-9844**.

1.4 (W) **Q.** **Understanding the CUL Mark.** Can you explain the CUL Marks?

A. UL's Listing Service is the most familiar form of UL's product safety

certification programs. The UL Listing Mark on a product means that the manufacturer has demonstrated the ability to produce a product that complies with appropriate United States requirements regarding reasonably foreseeable risks associated with the product. The UL Listing Mark for Canada (CUL Mark) is applied to products for use in Canada that have been investigated to Canadian safety requirements. The UL Listing Mark for Canada and the U.S. is applied to products for use in both the U.S. and Canada that have been investigated to the requirements of both countries. UL conducts Follow-Up Service as an audit of the means the manufacturer uses to determine continued compliance of the product with UL's requirements.

Below are examples of the three different Listing Marks:

UL Listing Mark

UL Listing Mark for Canada and the United States

UL Listing Mark for Canada

For additional information on UL's Certification Marks please refer to page 33 in the 2007 UL White Book.

1.5 (S) **Q.** **Product Listing vs. Field Evaluation.** Regarding industrial machinery, how much less is the costs for a UL Listing versus having UL conduct a Field Evaluation?

A. Because of the many variables involved, there is no easy way to estimate either of these costs. However, the average cost of any Field Evaluation is presently about $3,700.

For additional information on UL's Field Evaluation Program please contact UL's Field Evaluation customer service at **1-877-UL-HELPS** (1-877-854-3577) and select prompt "2" or visit UL's online Field Evaluation Services homepage at: **http://www.ul.com/field/index.html**.

1.6 (SW) **Q.** **Up to date Guide Information.** I have noticed that the product category information on the UL White Book CD and UL online certifications page are not always the same. Why not?

A. The product category Guide Information for the UL White Book and CD are only up to date as of the date indicated on the cover. For the 2007 edition, the content was accurate as of April 13, 2007, which was UL's deadline for publication. UL's Online Certification Database contains the latest product information, it is updated daily, and is accurate in real time when viewed at: **www.ul.com/database**.

1.7 (SW) **Q.** **Assistance for AHJs.** Can UL come up with a brief "sell sheet" or FAQ to help AHJs in the field to know how to handle various situations, such as:

- Field modifications to Listed equipment
- What to do about unlisted equipment, such as industrial machinery
- Field Evaluations - estimates, average costs, time, typical outcomes
- Field Reports – reporting back to AHJs
- Mythbusters

A. UL has information addressing most of the above topics in various locations; most can be found UL's web site at **www.ul.com**.

Information on Field modifications to Listed equipment can be found in the 2007 UL White Book on page 38 as well as on page 46 under the informational product category, "Electrical Equipment for Use in Ordinary Locations (AALZ). "

With regard to unlisted equipment, including industrial electrical machinery, any requirements for having the product Listed or evaluated for safety are established by the local inspection authority. Many areas throughout the country have state laws, local ordinances, or jurisdictional policies requiring electrical products and equipment to be Listed or field evaluated.

UL will review the above list to make sure that such information is presently available and to see if supporting information on the above topics can be developed and made available to AHJs.

2.0 UL FIELD EVALUATION SERVICES

2.1 (W) **Q.** **Evaluating unlisted arcade machines.** I have had to inspect video game arcades and have come across old video and pinball machines that are not Listed. Does UL List video and pinball machines and can UL Field Evaluate these unlisted machines that have been installed for decades?

A. UL does List arcade video and pinball machines under the product category "Amusement and Gaming Machines, (ASMU)." Guide Information for category ASMU is not in the 2007 White Book, however, it can be accessed in UL's Online Certification Directory at **www.ul.com/database** and enter ASMU at the category code search window.

UL can also Field Evaluate new or used video and pinball machines that are found installed in the field. They would have to comply with the requirements in effect at the time of the Field Evaluation and may require modification to bring the machines into compliance with current requirements.

For additional information on UL's Field Evaluation Program please contact UL's Field Evaluation customer service at **1-877-UL-HELPS** (1-877-854-3577) and select prompt "2" or visit UL's online Field Evaluation Services homepage at: **http://www.ul.com/field/index.html**.

2.2 (S) Q. **Evaluating field modifications.** At what point does a field modification become a violation of a listing?

A. When a UL Listed product is modified after it leaves the factory, UL has no way to determine if the product continues to comply with the safety requirements used to certify the product without investigating the modified product. UL can neither indicate that such modifications "void" the UL Mark, nor that the product continues to meet UL's safety requirements, unless the field modifications have been specifically evaluated by UL.

Although some product marking may permit field modifications in accordance with any printed instructions supplied with the product. For example: some garbage disposal units may be supplied with a cord and plug connection kit, but could also be field wired using a NEC® Chapter 3 fixed wiring method when the manufacturers installation instructions are followed. An AHJ would make the final approval decision based on NEC® 110.3(B). For additional information on field modifications please refer to page 38 in the UL White Book or visit UL's online Field Evaluation Services homepage at: **http://www.ul.com/field/index.html**.

2.3 (S) **Q.** **Addressing deficiencies in field inspected products.** What happens when a UL Field Inspection finds deficiencies in the product being inspected?

A. A Field Inspection covers on-site inspections of products that were eligible to bear a UL Mark at the time of manufacture, but the UL Mark is not present on the product.

A UL representative will use the UL report, called a procedure, to verify that the product is in compliance with the Listing report. If the product is found to be compliant with the UL report, a manufacturer's representative will be permitted to apply the UL Mark in the field while the UL representative is present. If the product is found not to comply with UL's safety requirements, the issues are identified and the manufacture must resolve these items before a reinspection can be conducted.

Prior to conducting a Field Inspection, the AHJ is notified and is welcome to be present if they so choose. At the conclusion of the Field Inspection process, a written report is provided to the manufacturer and copied to the AHJ documenting what took place along the final status.

For unlisted products not eligible to bear a UL Mark or for Listed products that have been significantly modified, then the appropriate process for determining compliance is a Field Evaluation. Again the AHJ is notified in writing of the pending project and called when scheduled so they can be present if they desire. If issues are found, a preliminary findings report is created and issued to the client and the AHJ.

If the deficiencies remain unresolved after 90 days, both the client and the AHJ are notified that the Field Evaluation did not result in a favorable conclusion and the project is then closed. If the evaluation did find a compliant product, the UL Engineer will apply a UL Field Evaluated Product (FEP) label and a final written report is created and provided to both the client and the AHJ.

Additional information on Field Inspection and Field Evaluation services can be found on UL's Regulators, Field Related Certification Services web page at: **http://www.ul.com/regulators/index_field.cfm** or on page 34 in the 2007 UL White Book.

2.4 (SW) **Q.** **Field Evaluation myths.** I rejected an installation of a UL Listed sign due to short spacings between the neon and the metal frame. Some modifications were made by the installer to fix the problems, but I still rejected it because UL was not involved with the fix. My city manager told me to stop complaining and approve the installation. I did not request a Field Evaluation because these typically take 6 months.

A. UL can provide next day service on Field Evaluation work when necessary. Some contractors or building owners have been known to exaggerate the amount of time (and money) needed for UL Field Evaluations, in order to avoid having them requested by AHJs. If UL is requested to provide a quote for Field Evaluation work, we would be happy to provide the details of the quote to the appropriate AHJ upon request.

For additional information on UL's Field Evaluation Program please contact UL's Field Evaluation customer service at **1-877-UL-HELPS** (1-877-854-3577) and select prompt "2" or visit UL's online Field Evaluation Services homepage at: **http://www.ul.com/field/index.html**.

2.5 (SW) **Q.** **Field Evaluation estimates.** Does UL do free Field Evaluation estimates in writing? Can an AHJ ask for a copy of that quote? Does UL have to actually visit the installation site in order to give an estimate?

A. UL does not charge to provide estimates for Field Evaluations, and a visit to the installation site would not normally be necessary in order to provide a quote. In addition, we encourage the AHJ to ask for a copy of the quote, as some installers and building owners have been known to exaggerate the amount of time and money needed for UL Field Evaluations, in order to avoid having them requested by the AHJ.

For additional information on UL's Field Evaluation Program please contact UL's Field Evaluation customer service at **1-877-UL-HELPS** (1-877-854-3577) and select prompt "2" or visit UL's online Field Evaluation Services homepage at: **http://www.ul.com/field/index.html**.

2.6 (SW) **Q.** **Field Evaluation problems.** We had a problem with a sign installation, which was rejected. UL was requested to come out to review the construction. The initial letter from UL stated that someone would visit the site during a specific week, but did not give the exact date for the visit. In addition, we did not receive a letter or report detailing what had occurred during the examination.

A. The sequence of events related in this question is not how a UL Field Inspection or Field Evaluation is supposed to work.

A Field Evaluation can be requested by anyone, and may cover a situation where modifications have been made to Listed products, or where unlisted products are installed.

For Field Evaluations it is UL's practice to involve the AHJ, including providing specific dates and times that UL staff plan to be at the installation site, and a report of our findings. Compliance is evidenced by the

application of the Field Evaluated Product Mark by UL staff and a full engineering report is prepared and provided to the client and the AHJ.

If these procedures are not being followed, please contact a UL Regulatory Services staff member at **1-800-595-9844** or by email at **ULRegulatoryServices@us.ul.com**. You may also contact UL's Field Evaluation Services Management at **1-877-UL-HELPS** (1-877-854-3577) and select prompt "2", to get resolution.

2.7 (SW) **Q.** **Field Evaluation vs. Listing.** Is a Field Evaluation considered to be a Listing, or is the product evaluated for a specific installation or location? What if the product is later moved to a different location in the same building or to a different building?

A. As stated in the UL proposal for the project and in the engineering reports, a UL Field Evaluation does not result in a UL Listing, UL Classification, or UL Recognition of the product. There is no statement or inference on the acceptability of any past or future production of the product. In addition, one of the standard Conditions of Acceptability for all Field Evaluated products is that the evaluation is site specific. If the product is relocated, UL cannot be sure the product is still in compliance with all the parameters used or assumed in the original evaluation and can only confirm suitability by conducting another Field Evaluation with the product in the new location.

For additional information on UL's Field Evaluation Program please contact UL's Field Evaluation customer service at **1-877-UL-HELPS** (1-877-854-3577) and select prompt "2" or visit UL's online Field Evaluation Services homepage at: **http://www.ul.com/field/index.html**.

3.0 SERVICE EQUIPMENT, SWITCHBOARDS, PANELBOARDS AND POWER DISTRIBUTION EQUIPMENT

3.1 (E) **Q.** **Meter socket waterproof hubs.** The waterproof hub on a meter base typically does not last for more than a couple of years. The threads easily strip, the rubber boot doesn't compress, and water can enter the gland fitting. Is there something that UL can do to strengthen the requirements?

A. UL Lists meter bases under the product category "Meter Sockets, (PJYZ)." Guide Information can be found in UL's Online Certifications Directory at: **www.ul.com/database** and on page 233 of the 2007 UL White Book. The basic Standard used to investigate these products is UL 414, the Standard for Safety for Meter Sockets. Meter sockets are complete enclosures accommodating plug-in type watt-hour and similar meters.

UL has not received similar reports of meter socket failure and encourages those who may encounter this and other types of deterioration of UL Listed equipment to file a Field Report using our online reporting form at: **https://www.ul.com/regulators/ahjprod.cfm** or you may contact UL's Regulatory Services at **1-800-595-9844** for assistance.

3.2 (E) **Q.** **Water entering panelboards.** Water contamination in a panelboard is sometimes due to installation of the weatherhead below the level of the service drop connection. Is this installation acceptable?

A. No. Sections 230.54(F) and (G) in the NEC® require service drop conductors to be arranged so that water will not enter the service raceway of equipment. UL Lists service entrance heads for use with rigid conduit and electrical metallic tubing under the product category "Outlet Bushings and Fittings, (QCRV)." Guide Information can be found in UL's Online Certifications Directory at: **www.ul.com/database** and on page 249 of the 2007 UL White Book. The basic Standard used to investigate these products is UL 514B, the Standard for Safety for Conduit, Tubing and Cable Fittings.

Drip loops may be formed to prevent the entrance of moisture. The weatherhead is intended to be installed in the vertical position, and is tested in this orientation, with a 45 degree water exposure.

3.3 (E) **Q.** **Testing of panelboards.** Now that the 42 circuit limitation for lighting and appliance panelboards has been deleted from the 2008 NEC®, is UL testing the larger 66 (or other) position panels fully populated?

A. Yes. Panelboards are tested fully populated. UL Lists panelboards under the product category "Panelboards, (QEUY)." Guide Information can be

found in UL's Online Certification Directory at **www.ul.com/database**, and on page 251 in the 2007 UL White Book. Panelboards are evaluated using UL 67, the Standard for Safety for Panelboards. Construction and performance requirements in this Standard specify that they be tested fully populated.

UL has always Listed Panelboards with more than 42 circuits in them. The 42-circuit limitation is for Class CTL or Lighting and Appliance Branch Circuit Panelboards only.

3.4 (E) **Q.** **Additional markings for panelboards.** I have noticed that some panelboards are being installed where not compliant with NEC® Section 110.26 requirements for accessibility. Can UL add marking requirements or do something to recommend compliance with the accessibility requirements of the NEC®?

A. UL's position has been to try to limit product markings and not repeat NEC® requirements. For panelboards, marking real estate is limited and the greater the number of markings, the greater the chance that they will be ignored.

UL Lists panelboards under the product category "Panelboards, (QEUY)." For specific information on the required markings, please see the product Guide Information, which can be found in UL's Online Certification Directory at **www.ul.com/database**, and on page 251 in the 2007 UL White Book. Additionally, the 2007 UL White Book includes the Marking Guide for Panelboards in Appendix A.

3.5 (E) **Q.** **UL Listings for Federal Pacific panelboards.** Did UL ever withdraw the Listing on Federal Pacific panelboards?

A. No. Please see the information available on the IAEI website at **http://www.iaei.org/subscriber/magazine/99_c/stablok.htm** for information regarding Federal Pacific circuit breakers and panelboards.

3.6 (E) **Q.** **Loose lugs in meter sockets.** I have come across installations of meter bases where the neutral lugs are loose from the factory. There is no boss to hold it in place and it can rotate easily. Is UL aware of this field issue?

A. UL has not received other reports of this nature. It is unknown whether this was noted for a specific manufacturer or installation location, and UL recommends that the submitter file a Field Report using our online report form at: **https://www.ul.com/regulators/ahjprod.cfm** or contact a Regulatory Services staff member at **1-800-595-9844** for assistance.

3.7 (E) **Q.** **Circuit breakers for older panelboards.** In the absence of product markings, is there any way to get old panelboard labeling information to know what circuit breakers can be installed?

A. UL cannot supply this information. The OEM (Original Equipment Manufacturer) may have some of this legacy data. However, if it were not marked on the panelboard then the Listing would not cover it.

3.8 (E) **Q.** **Use of non-CTL panelboards.** The NEC® will no longer limit the number of overcurrent devices that may be installed in lighting and appliance panelboards, but the panelboard must still reject more positions than they are designed for.

Does UL List non-CTL panelboards with allowance for more than 42 circuits?

A. Circuit-limiting panelboards (known as "Class CTL" panelboards) incorporate physical features which, in conjunction with the physical size, configuration, or other means provided in Class CTL circuit breakers, are designed to prevent the installation of more overcurrent protective poles than that number for which the equipment is designed and rated. Class CTL panelboards are lighting and appliance branch circuit panelboards, which are limited to a maximum of 42 circuits.

UL does List non-Class CTL panelboards, but these are intended to be used as power panelboards as described in the 2005 NEC® Section 408.34(B). As such, the NEC® requires that 10 percent or fewer of its overcurrent devices be used to protect lighting and appliance branch circuits.

A power panelboard incorporating a neutral and having provision for the mounting of more than 42 overcurrent protective devices, but not having all these devices installed at the factory, is required by UL to be marked:

"Lighting or appliance branch circuits are not to be supplied directly through more than 10 percent of the branch-circuit overcurrent protective devices."

This marking is not required if the number of 30-ampere or lesser-rated branch circuit overcurrent protective devices that are or can be installed, and for which there is a corresponding neutral connection, is not more than 10 percent of the total number of branch circuit overcurrent protective devices that can be mounted in the panelboard.

If power panelboards are being used in the field in appliance and lighting applications, this is a misuse of the product and contrary to the marking

on the equipment. These installations should be rejected by the AHJ.

UL Lists panelboards under the product category “Panelboards, (QEUY).” For additional information on the required markings, please see the Guide Information, which can be found in UL’s Online Certification Directory at **www.ul.com/database**, and on page 251 in the 2007 UL White Book. Additionally, the 2007 UL White Book includes the Marking Guide for Panelboards in Appendix A.

UL Lists molded-case circuit breakers under the product category “Circuit Breakers, Molded-Case and Circuit Breaker Enclosures, (DIVQ).” Guide Information for this product category can be found in UL’s Online Certification Directory at **www.ul.com/database**, and on page 88 in the 2007 UL White Book. Additionally, the 2007 UL White Book includes the Marking Guide for Molded-Case Circuit Breakers in Appendix A.

4.0 CIRCUIT BREAKERS AND AFCIs

4.1 (W) **Q.** **Mini-tandem circuit breakers.** How are mini-tandem circuit breakers Listed, what prevents installing more than 42 overcurrent devices in a lighting and appliance panelboard when using mini-tandem circuit breakers?

A. Mini or tandem type circuit breakers are Listed under the category Circuit Breakers, Molded-Case and Circuit Breaker Enclosures (DIVQ), located on page 88 in the 2007 UL White Book. These mini or tandem type circuit breakers are Listed as CTL Circuit Breakers. The Guide Information in DIVQ states that a "CTL Circuit Breaker — has physical size, configuration or other means which, in conjunction with the physical means provided in a Class CTL assembly, is designed to prevent the installation of more circuit breaker poles than the number for which the assembly is designed and rated. This means that there are physical rejection features incorporated into Class CTL panelboards and on the CTL circuit breakers that prevent installation of more than 42 circuits.

As is with all circuit breakers you can only install the type of circuit breakers that are identified on the panelboard marking or as identified on a Classified circuit breaker (DIXF). Just because a circuit breaker fits in a panelboard does not mean that it is automatically suitable for use in a panelboard.

4.2 (E) **Q.** **Changes in UL 1699.** AFCI circuit breakers have been reported to trip during power outages. The manufacturer has stated that there have been some changes to the UL Standard and that this is no longer an issue. Can you provide information regarding any recent changes to the Standard and when these new requirements became effective?

A. UL is not aware of the phenomenon that you described. Manufacturers are always trying to find ways to improve the performance of their products, and some of these changes likely involved performance issues outside the scope of the UL 1699, the Standard for Safety for Arc-Fault Circuit-Interrupters.

UL Lists six different types of AFCI devices, of these six, two categories are of the circuit breaker variety. Guide Information for these AFCI product categories can be found in UL's Online Certification Directory at **www.ul.com/database**, and on pages 59 and 60 in the 2007 UL White Book.

Circuit breaker type Arc-Fault Circuit-Interrupter product categories are:

- Branch/Feeder Type AFCIs (AVZQ)
- Combination Type AFCIs (AWAH)

Additional information on AFCI technology and products is available on the UL web site at: **www.ul.com/regulators/afci/**.

The following are some of the adopted revisions to UL 1699 requirements that may have had some effect on reducing unwanted tripping. You will note that some of these requirements become effective in 2008.

- Unwanted Tripping Test - Ceiling fan speed control and ceiling fan - Added 2/10/2005, effective 2/10/2008
- Unwanted Tripping Test - Air purifier with UV light - Added 8/16/2005, effective 2/10/2008
- Resistance to Environmental Noise Sequence - No false tripping allowed, effective 12/1/02. Consisting of:
  - Electrostatic Discharge Immunity,
  - Radiated Electromagnetic Field Immunity,
  - Electrical Fast Transient Immunity,
  - Voltage Surge,
  - Immunity to Conducted disturbances, induced by RF Fields, and
  - Voltage dips, Short Interruptions and Voltage Variations immunity.

4.3 (E) **Q.** **Stacking multiple AFCI circuit breakers.** Can you stack multiple AFCI circuit breakers together in the same panelboard? Doing this seems to create excessive heating.

A. UL's position is that while stacked AFCI circuit breakers may feel warm to the touch, the heating is not excessive. However, if this issue continues to be raised in the field, UL plans to study this issue further.

4.4 (E) **Q.** **90°C rated equipment.** The lugs on a circuit breaker are rated 75°C, but the conductors are rated 90°C. Why is there no electrical distribution equipment rated for a full 90°C ampacity?

A. The terminal temperature rating of 75°C does not directly correlate to the conductor temperature rating of 90°C. The 75°C temperature rating means the conductors connected to the terminals need to be sized for a minimum ampacity based on the 75°C column of NEC® Table 310.16. The conductor rating of 90°C is the insulation temperature rating. Although the field conductors could be rated 90°C or higher, in the above example, sizing of ampacity is based on the 75°C rating of the terminals.

The subject of a 90°C temperature rating for the terminals of distribution equipment has been discussed with industry many times over the past 10 to 15 years. The manufacturers are reluctant to establish a 90°C

temperature rating because of the enormous amount of retesting that would be needed to verify the higher temperature rating. This could also result in derating or redesign of thermally sensitive equipment such as circuit breakers and fuses.

Additional information on terminations can be found in the 2007 UL White Book on page 46 under the informational product category, “Electrical Equipment for Use in Ordinary Locations, (AALZ).”

5.0 LUMINAIRES AND SIGNS

5.1 (S) **Q.** **Proper marking of ceiling fan light kits.** Regarding the Listing of ceiling fans with light kits, what if the Listing Mark says "ceiling fan" on the light kit?

A. Light Kits for ceiling fans are Listed by UL as Fan Accessories under the product category “Fans, Ceiling Suspended, (GPRT).” Guide Information for this category can be found in UL’s Online Certification Directory at **www.ul.com/database**, and on page 136 in the 2007 UL White Book. The basic standard used to investigate products in this category is UL 507, the Standard for Safety for Electric Fans.

Light kits intended for use with ceiling-suspended fans are provided with a marking on the light kit, on the packaging carton and in the instructions to indicate the fan models with which they are suitable.

It is important to match the proper light kit with the appropriate fan unit. Light kits are evaluated with specific fan models and not all are interchangeable within brands, certainly they are not evaluated for use on ceiling fans produced by a different manufacturer.

5.2 (S) **Q.** **Mounting portable luminaires.** Regarding wall mounted luminaires, what if they are Listed as portable luminaires, can they be attached to the structure?

A. UL 153, the Standard for Safety for Portable Luminaires, permits permanent mounting to structures in accordance with the manufacturers installation instructions. Typically portable luminaires may be used in a wall mounted application, as may be found in some hotel rooms, etc.

UL Lists portable luminaires under the product category “Luminaires, Portable, (QOWZ).” Guide Information for this category can be found in UL's Online Certifications Directory at **www.ul.com/database** and on page 262 in the 2007 UL White Book.

5.3 (S) **Q.** **Portable luminaires without cord sets.** Inspectors sometimes see Listed portable luminaires without cord sets. Is this acceptable?

A. A portable luminaire provided without an attached cord set is likely bearing a counterfeit listing mark. AHJs that come across this type of portable luminaire should submit a Field Report to UL using our online reporting form at: **https://www.ul.com/regulators/ahjprod.cfm** so that an investigation can be initiated.

Portable luminaires are required to have a 5 ft. minimum cord unless they

are special purpose, and where a lesser cord length would be acceptable based on end use application. Such conditions are specified in the installation instructions provided with the product.

5.4 (SW) **Q.** **Listing evaluations for signs.** When UL evaluates a sign for Listing, is it site specific? Interior mall signs in the International Building Code® and Uniform Building Code® have specific material requirements that are different than general UL requirements.

A. Section 600.3 of the NEC® requires that signs be Listed. UL evaluates signs for compliance with UL 48, the Standard for Safety for Electric Signs, for installation in accordance with Article 600 of the NEC®. UL Lists signs under the product category "Signs, (UXYT)." Guide Information can be found in UL's Online Certification Directory at **www.ul.com/database**, and on page 313 in the 2007 UL White Book.

Listed signs are evaluated for various environmental applications, such as indoor or outdoor use. However, additional evaluation of plastic materials, based on building code requirements for special use and occupancy, is not part of the normal UL Listing evaluation. The International Building Code® does not specifically require that signs be Listed, and it is our understanding that Listed signs have been approved for interior mall applications.

6.0 WIRING SYSTEMS AND WIRING DEVICES

6.1 (W) **Q.** **Relocatable power taps in kitchens.** I have seen these power strips that pop up out of a counter in a kitchen, are these power strips Listed for use in kitchen counters? Are they intended to take the place of the small appliance branch circuit?

A. UL Lists power strips under the product category "Relocatable Power Taps (XBYS)." Guide Information for this product category can be found in UL's Online Certification Directory at **www.ul.com/database**, and on page 343 in the 2007 UL White Book.

There are some Listed relocatable power taps that have been investigated for use in kitchen counters. They are marked as suitable for use in kitchens and have been subjected to a spill test when the power tap is recessed into the counter with no attachment plugs inserted into the power tap. Relocatable power taps are not intended to be used as a substitute for fixed wiring and are not intended to replace the small appliance branch circuit as detailed in NEC® 210.52.

6.2 (W) **Q.** **Relocatable power taps in hospital patient care areas.** I have seen computer carts in hospital rooms and exam areas that are provided with relocatable power taps. The Guide Information for Relocatable Power Taps (XBYS), states that "…relocatable power taps have not been investigated and are not intended for use with general patient care areas or critical patient care areas of health care facilities as defined in Article 517 of ANSI/NFPA 70, "National Electrical Code." How can these carts be Listed when they conflict with the XBYS Guide Information?

A. As indicated the Guide Information for Relocatable Power Taps (XBYS) states that relocatable power taps are not intended for use in general or critical care patient care areas of a hospital because UL cannot control what is connected to the power taps which could possibly result in leakage current that would be in excess of what is permitted for patient care areas of hospitals.

UL does Classify computer cart assemblies for use in hospitals under the product category "Medical Equipment (PIDF)." Guide Information for this product category can be found in UL's Online Certification Directory at **www.ul.com/database**, and on page 228 in the 2007 UL White Book.

These carts are not Classified as a stand alone cart, the cart as well as the computer monitoring equipment are Classified as a complete system so that the equipment connected to the power tap is controlled and the leakage current level is known to be below the permitted leakage current levels for patient care equipment in accordance with UL 60601-1, the

Standard for Safety for Medical Electrical Equipment, Part 1: General Requirements for Safety.

6.3 (E) **Q.** **Identifying weather-resistant receptacles.** How can an AHJ identify weather-resistant receptacles, a new requirement in the NEC® for 2008?

A. Actually, the receptacles will be identified as "weather-resistant" or by the abbreviation "WR" on the receptacle face, where visible after installation and with the cover plate secured as intended.

UL Lists weather-resistant receptacles under the product category "Receptacles for Plugs and Attachment Plugs, (RTRT)." Guide Information for this category can be found in UL's Online Certifications Directory at **www.ul.com/database**, it does not appear in the 2007 UL White Book, since the Guide information was updated to include weather-resistant receptacles after the 2007 edition was printed. The basic Standard used to evaluate weather-resistant receptacles is UL 498, the Standard for Safety for Attachment Plugs and Receptacles.

6.4 (E) **Q.** **Volume markings on boxes and conduit bodies.** On multiple gang outlet boxes and conduit bodies, the cubic inch volume marking (and marking for number and size of conductors for conduit bodies) is located on the inside of the enclosure, and is very difficult or impossible to verify by an AHJ after wires and devices are installed.

Can the volume marking be located on the outside of the box? That way, the AHJ could verify the marking after the wiring is completed, and before the drywall is finished.

A. The volume marking is required to be visible after installation, which means that it has to be located on the inside surface of the box or conduit body. That way, it would be visible even after the drywall is finished, although it may be necessary to remove a wiring device to view the information. The manufacturer is not prohibited from repeating the marking on the outside as well.

Metal multi-gang outlet boxes and conduit bodies are Listed by UL under the product category "Metallic Outlet Boxes, (QCIT)." Guide Information for this category can be found in UL's Online Certifications Directory at **www.ul.com/database**, and on page 247 in the 2007 UL White Book. The basic Standard used to evaluate metal outlet boxes and conduit bodies is UL 514A, the Standard for Safety for Metallic Outlet Boxes.

6.5 (E) **Q.** **Boxes for specific applications.** Is an "old work" box specifically identified and limited for this application?

A. Many "old work" boxes lack the mounting means needed to secure the box to a stud in a new work application. However, some are constructed with mounting means that are capable of being secured in both old and new work applications. UL Lists electrical boxes designed for "old work" under the product category "Metallic Outlet Boxes, (QCIT)." Guide Information for this category can be found in UL's Online Certifications Directory at **www.ul.com/database** and on page 247 in the 2007 UL White Book. The basic Standards used to investigate these boxes is UL 514A, the Standard for Safety for Metallic Outlet Boxes.

Some boxes that are intended for old work applications may be identified specifically for this application, particularly in sales literature or the installation instructions, however, this marking is not required by the UL Standard.

6.6 (E) **Q.** **Appliance leakage current levels.** For the 2008 NEC®, there is no longer any exceptions from providing GFCI protection for receptacles in garages, basements, and for sump pumps. At the NFPA meeting, appliance industry representatives stated that the leakage current of a refrigerator during the defrost cycle exceeded 6 mA, which would trip a GFCI device. Does UL allow these appliances to exceed 6 mA leakage current?

A. UL 250, the Standard for Safety for Household Refrigerators and Freezers, specifically limits the maximum permitted leakage current to 0.75 mA during the defrost cycle, which is well below the trip point for a GFCI. A properly working refrigerator or freezer will not trip a GFCI.

6.7 (E) **Q.** **Green twist-on wire connectors.** For grounding applications, are Wire-Nuts® required to be colored green, or can other colors be used as well?

A. Twist-on wire connectors, such as Ideal™ Wire-Nuts® and other listed pressure connectors do not have to be colored green to be used in this application. For the 2008 code cycle, this issue was clarified by NEC® Code Making Panel 5. NEC® Section 250.8, now states:

"**250.8 Connection of Grounding and Bonding Equipment**

(A) Permitted Methods. Grounding conductors and bonding jumpers shall be connected by one of the following means:
(1) Listed pressure connectors…
(3) Pressure connectors listed as grounding and bonding equipment…
(8) Other listed means…."

UL Lists wire connectors and pressure connectors under the product category "Wire Connectors and Soldering Lugs, (ZMVV)." Guide

Information for this category can be found in UL's Online Certifications Directory at **www.ul.com/database** and on page 370 in the 2007 UL White Book. The basic Standards used to investigate products in this category are UL 486A-486B, the Standard for Safety for Wire Connectors, and UL 486C, the Standard for Safety for Splicing Wire Connectors.

6.8 (SW) **Q.** **Hubs suitable for grounding.** For a grounding bushing on a watertight hub, the manufacturer gave the AHJ Listing information that covered just the hub without the grounding bushing. Are these suitable for grounding?

A. The installed product may be UL Listed under the product category for Conduit Fittings (DWTT). Conduit fittings are Listed for grounding. However, there are sections in the NEC®, such as for bonding service equipment in Section 250.94(B)(4) that require more than a standard conduit fitting and locknut for bonding. Although similar to hubs with a grounding bushing or locknut, which are UL Listed under the product category for Grounding and Bonding Equipment (KDER), the absence of the grounding bushing or locknut is likely evidence that it has not been evaluated for an application requiring bonding at the hub, such as in NEC® Section 250.94(B)(4).

Please check the UL Listing Mark (it may be located on the packaging) or the UL Online Certifications Directory at **www.ul.com/database** to determine if the product is Listed as a conduit fitting or as grounding and bonding equipment.

7.0 APPLIANCES AND UTILIZATION EQUIPMENT

7.1 (W) **Q.** **Listed boat hoists.** I do inspections on lakes and run into boat hoists that are not Listed. Does UL List boat hoists?

A. Yes. Hoists that may be used as boat hoists are Listed under the product category "Hoists, (MSXT)." Guide Information for this category can be found in UL's Online Certifications Directory at **www.ul.com/database** and on page 197 in the 2007 UL White Book.

Guide Information for MSXT states, "This category covers power-operated hoists of the overhead type, intended for material lifting service using either chain or wire rope. Power hoists may include electric or pneumatic types of operation. They are intended to be suspended from a fixed member and may include trolleys for mobility."

7.2 (W) **Q.** **Sump pump leakage current levels.** What is the maximum permitted leakage current allowed for Listed sump pump? Will they trip a GFCI?

A. UL Lists sump pumps under the product category "Pumps, Electrically Operated, Liquid, (REUZ)." Guide Information for this category can be found in UL's Online Certifications Directory at **www.ul.com/database** and on page 277 in the 2007 UL White Book. Sump pumps Listed under this product category are evaluated for compliance with the Standard for Safety for Motor Operated Water Pumps, UL 778.

UL 778, permits a maximum leakage current of 0.75 mA and therefore if operating properly they should not trip a ground fault circuit interrupter (GFCI), which is required to trip in the range between 4 to 6 mA.

7.3 (E) **Q.** **Swimming pool grounding connections.** NEC® Section 680.26(D) requires that you must connect all metal parts, but you cannot use sheet metal screws. I have seen UL Listed pool heaters employing sheet metal screws for this purpose. Is this permitted by the UL standard?

A. No, sheet metal screws are not permitted. It is required for a screw or bolt to have 2 full threads of engagement. We would encourage you to file a Field Report if you encounter this type of situation. UL Lists swimming pool heaters under the product category "Heaters, (WBRR)." Guide Information for this category can be found in UL's Online Certifications Directory at **www.ul.com/database** and on page 322 in the 2007 UL White Book. The basic standard used to investigate products in this category is UL 1261, the Standard for Safety for Electric Water Heaters for Pools and Tubs.

Please provide us with further information or file a Field Report online at

https://www.ul.com/regulators/ahjprod.cfm.

7.4 (E) **Q.** **Bonding pool pump filtration systems.** I have a UL Listed pool pump filtration system that has a stainless steel canister. Since this canister does not have a lug for bonding, how do you bond it to the grid system?

A. UL requires a bonding lug to be provided on the pump motor, but not an additional bonding means for the filter canister. If an additional lug is deemed necessary by the AHJ, this would have to be added in the field.

UL Lists swimming pool pump motors and filters under the product category "Pumps, (WCSX)." Guide Information for this category can be found in UL's Online Certifications Directory at **www.ul.com/database** and on page 324 in the 2007 UL White Book. The basic standard used to investigate products in this category is UL 1081, the Standard for Safety for Swimming Pool Pumps, Filters, and Chlorinators.

8.0 COUNTERFEITING AND OTHER TOPICS

8.1 (NW) **Q.** **Counterfeiting questions.** How do AHJs determine if a product has a counterfeit UL Mark? What do we look for? Counterfeiting seems to be a big problem, what is UL doing to try and combat these offshore manufacturers that are producing counterfeit products and what is UL doing to prevent these products from entering the United States?

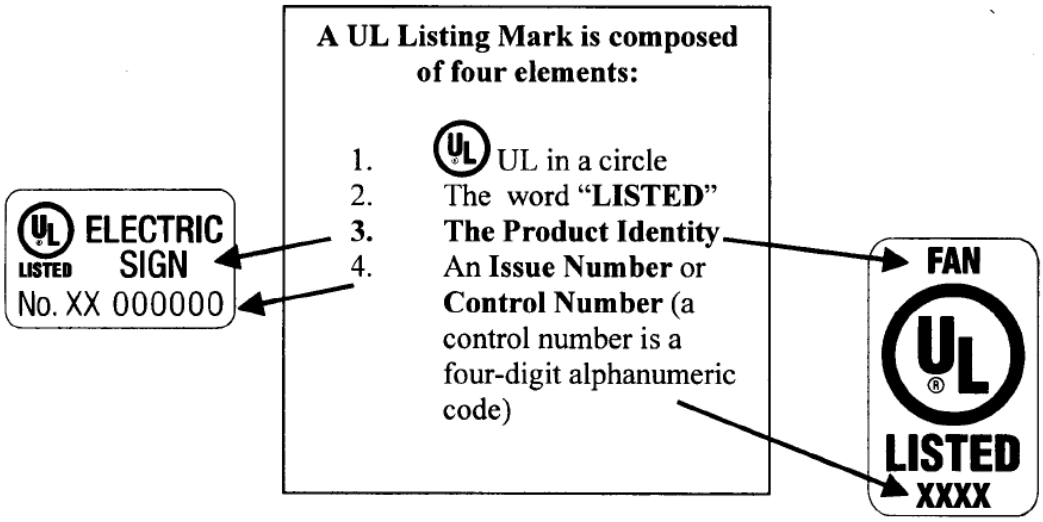
A. For over a century, the UL Mark, has been considered the American Symbol of Safety. Each day, employees at UL go to work for a safer world. On the other hand, counterfeiters go to work to profit at the expense of the public's well being and a company's reputation. Each year, over 21 billion authentic UL Marks appear on products that have been evaluated by UL for safety from fire, electric shock, and physical hazards. While incidents of counterfeiting represent only a fraction of a percentage point of all the legitimate UL labels used annually, UL is totally committed to aggressive anti-counterfeiting activities.

UL continues to work tirelessly to combat counterfeiting of the UL Mark. Examples of our anti-counterfeiting initiatives include the introduction of holographic labels, color schemes specific to each product category, and overt or covert security coding, to maintain the integrity of our Marks. Additionally, UL and the U.S. Customs Service have partnered in extensive and unprecedented nationwide anti-counterfeiting efforts. UL has a "zero-tolerance" policy concerning anti-counterfeiting and our anti-counterfeiting program has increased in its effectiveness resulting in increased seizures of products with counterfeit labels and destruction of these items. As a direct result of UL's increased emphasis on anti-counterfeiting, many individuals have been tried, convicted and are now serving time in prison for their actions.

A legitimate UL Listing Mark is composed of four elements:

1. The familiar UL symbol in a circle;
2. The word "LISTED" in capital letters;
3. The product identity; and
4. An Issue Number or Control Number (An Issue Number is a serialized multi-digit alphanumeric code. A Control Number is a unique four-digit alphanumeric code assigned by UL).

Below is an example of the four elements that comprise a UL Listing Mark. Additional information on identifying legitimate UL Marks, please refer to the "Practical Application of the White Book in the Field" section of the 2007 UL White Book on page 36. Additional information on UL's Anti-Counterfeiting Operations can be found on the UL web site at: **www.ul.com/ace/index.html**.



Some of the common indications that a product may be counterfeit include:

- A product whose label does not contain the four elements outlined above;
- A product that references UL on the carton or product but has no company name or address;
- A product that references UL on the packaging, but not on the product itself;
- Cheap, shoddy workmanship and/or packaging; or
- Marks with the letters "UL" side by side instead of staggered, the lack of a control or issue number, or the words "Approved" or "Pending" instead of "LISTED" or "CLASSIFIED"

If you come across a suspicious product referencing UL, or would like more information on UL's anti-counterfeiting or U.S. Customs programs, please contact a Regulatory Services staff member at **1-800-595-9844** or by email at **ULRegulatoryServices@us.ul.com**.

8.2 (NW) **Q.** **The role of the AHJ in fighting counterfeiting.** UL has been providing a lot of information regarding counterfeit products. What is the AHJ's role in fighting counterfeiting? What type of information is provided in a public notice? Does UL inspect product at companies outside of the U.S.?

A. The AHJ plays an important part in the fight against counterfeiting. The National Electric Code®, as well as local building and fire codes, often require that certain products being installed bear a third party certification, such as an Underwriters Laboratories Listing or Classification Mark. The presence of this Mark is reassurance for the code official that the product meets the requirements for the installed application. The AHJ can play a pivotal role in determining if a product or Certification Mark is authentic or counterfeit at the time of inspection. If there is suspicion that a product or

Mark may not be genuine, the AHJ may elect to withhold approval of the project until verification is obtained as to its authenticity.

A UL public notice is intended to provide end users (i.e. consumers, retailers, distributors, AHJs, etc.) with information that will help them determine if a product that they have is counterfeit. Pictures of the product, along with a description of the counterfeit aspect of the product, and mention of where the products could have been purchased are provided along with any recommended actions that should be taken.

UL conducts Follow-Up Service Inspections at manufacturers of UL-certified products all over the world. Each year, over 500,000 product inspections are conducted to ensure the integrity of the UL Mark and the products that they are applied to. It is just one of several ways UL controls the use of its Marks.

Additional information on UL's Anti-Counterfeiting Operations can be found on the UL web site at: **www.ul.com/ace/index.html**.

8.3 (W) **Q.** **Information on the Residential Electrical System Aging Research Project.** Earlier this year, UL did a presentation for my local IAEI division on the Aged Wiring research that is being conducted with UL, FPRF, NEMA and others. This was an excellent presentation and interested many members in participating in the program. Where can we get additional information on participating in the research program?

A. The Fire Protection Research Foundation's (FPRF) Residential Electrical System Aging Research Project is nearing completion after more than four years of work. The final report on this project is expected to be completed by the spring of 2008. A presentation on the findings of the project will likely be presented at the NFPA's Annual Meeting in Las Vegas in June of 2008. The report will also be available on the FPRF web site.

The Power Point presentation that UL has presented on this project at some IAEI meetings is available at the following web site:

http://www.nfpa.org/assets/files//PDF/Proceedings/Dini_presentation_-_RESA_Project.pdf

8.4 (S) **Q.** **Regulatory Services contact information.** Does UL have contact information on their website for regulators to find help from UL?

A. Yes, contact information for Regulatory Services is available on the UL web site at **https://www.ul.com/auth/regcon.cfm**. You may also just simply want to call **1-800-595-9844**, which is the toll free number for UL's Regulatory Services.

8.5 (S) **Q.** **UL's nonprofit status.** Will there be two facets to UL, profit and nonprofit, once UL goes for profit?

A. UL's mission will not change. People should continue to feel the positive changes at UL. Please remember, currently there are both profit and nonprofit sectors within UL's global family.

8.6 (SW) **Q.** **Making the UL White Book easier to use.** Can UL add more industry-accepted terms to the White Book index?

A. Yes. For the 2008 edition of the White Book, UL plans to expand the Index of Product Categories to include many more industry-accepted terms.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