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FEATURED ARTICLE

A Path to Success: Certification of Drinking Water Filtration Devices

Acquisition strengthens UL's global expertise in appliance energy efficiency services and expands European footprint

By:: Irina Garbar / UL Project Engineer

When we talk about water, we talk about everything. Water, undeniably the most essential element, does more than just quenches our thirst – it helps our body remove wastes, aids in digestion, prevents dehydration, regulates our body temperature, protects organs and tissues and lubricates joints. The health authorities commonly recommend drinking at least eight 8 ounce glasses per day, which equals to about 2 liters. Indisputably, consuming the required amount of water is important to our health, but the quality of water should not be less important than the quantity.

When it comes to drinking water, is it always safe?

In 1974, Congress enacted the Safe Drinking Water Act (SDWA) intended to regulate the quality of drinking water. Under this law, the US EPA was given the authority to set national standards for drinking water to protect the public from exposure to naturally occurring and man-made contaminants. Nevertheless, the news of contaminated drinking water has dominated headlines for months now. There are a number of threats to drinking water, including the improper disposal of chemicals, fertilizer runoff, aging infrastructure, and water main breaks resulting in the SDWA not being met. According to one study conducted by the Natural Resources Defense Council (NRDC), in 2015 there were more than 80,000 reported violations of the SDWA, including exceedance of maximum acceptable levels of health-based contaminants.

The health-effects of drinking contaminated water could range from feeling unwell to severe illness, while some might not be noticed for many years. For

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ALSO IN THIS ISSUE

A Letter From Alessio Dellanoce

The Appliances industry is constantly evolving, and UL is following suit by expanding its footprint globally in the Combustion business. UL's Denmark office became a Notified Body for the Gas Appliance Directive and will expand the status when it becomes the Gas Appliance Regulation in 2018. UL's Northbrook and Toronto facilities leveraged their extensive technical expertise to add the EN standards to their scopes of accreditation. UL also opened another state-of-the-art combustion test facility in Carugate, Italy with capabilities to further ease global market access. These continued efforts mean UL will be uniquely positioned to be both the evaluator and Notified Body. Read more in this issue.

All the best,

Alessio Dellanoce
Global Commercial Leader – Appliances Industry

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5/23/2018 Northbrook, IL

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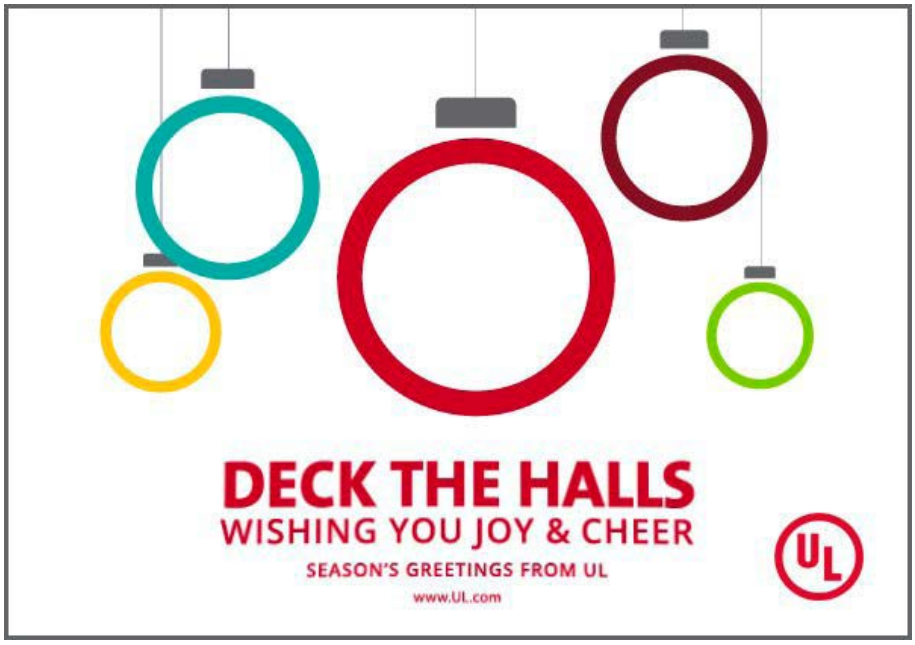

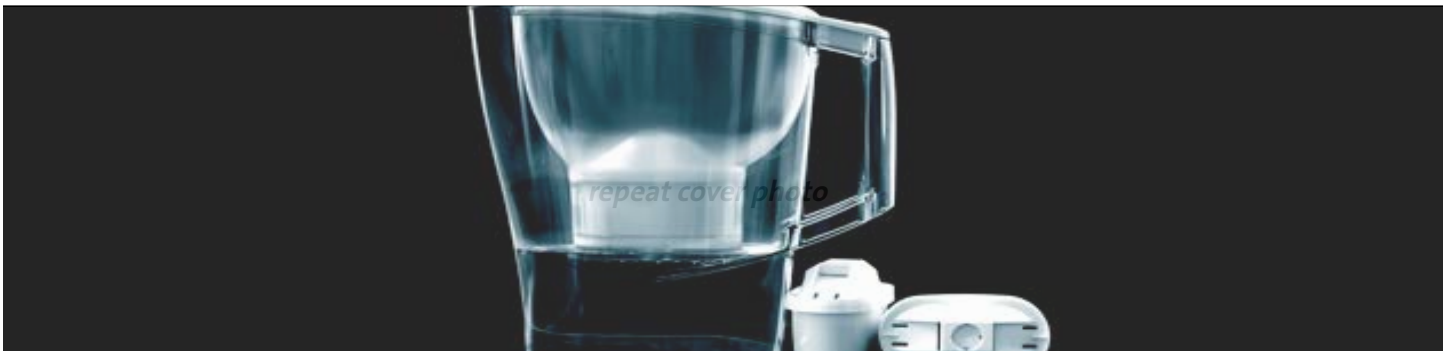

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A Path to Success: Certification of Drinking Water Filtration Devices

example, according to the CDC, even low levels of lead in tap water can enter the bloodstream of children, and among other issues, result in slow growth, hearing and behavioral problems and anemia. Lead exposure in adults could cause a variety of health- issues, including fertility, cardiovascular and kidney effects. Short term exposure to Arsenic from tap water begins with headaches, confusion and drowsiness, leading to cancers and heart diseases in the long term.

Consumer water treatment systems, including water filters, are designed to address many health and non-health related contaminants, keeping your water safe and great testing. There are hundreds of brands of differently shaped and sized waters filters available in today's marketplace, including pitchers/dispensers, faucet mounted/faucet integrated, refrigerator, under-the-counter/countertop and whole house filters. These products claim to reduce specific contaminants and keep the water safer.

With so many options on the market, how do manufacturers distinguish their product from the competition and give consumers confidence in its ability to reduce contaminants in a consistent and effective manner? How do they help ensure their filter is structurally sound and is not contributing contaminants into drinking water above the Maximum Contaminant Level (MCL) established by the EPA? How do they safeguard their reputation and reduce liability risks?

Luckily, UL offers independent testing and certification to voluntary industry standards for manufacturers of residential drinking water filters, including NSF/ANSI 42 – Aesthetic Effects and NSF/ANSI 53 – Health Effects. Both standards have identical requirements when it comes to evaluation for the material safety and structural integrity, but differ in the type of contaminant reduction testing performed.

NSF/ANSI 42 and NSF/ANSI 53 standards were developed on a consensus basis between manufacturers, public health and regulatory officials, consumer representatives, and independent ANSI-accredited third-party certifiers such as UL, IAPMO, NSF and WQA.

Material Safety and Structural Integrity of Residential Water Filters (NSF/ANSI 42 and NSF/ANSI 53)

Both standards contain mandatory testing requirements for the water filter's wetted materials to ensure that they do not add harmful contaminants to the drinking water. The material evaluation consists of a three-step process:

- Formulation review of all wetted materials to determine a test plan
- Material extraction testing to the test plan
- Review of analytical test results against pass/fail criteria in the standards

In addition to material safety, water filters connected to a pressurized water supply line are evaluated for structural performance to help ensure the design and fabrication quality of the product. The structural integrity (cyclic and hydrostatic pressure) test requirements vary depending on the type of water filters, but the outcome must remain the same: The product and its components must remain watertight through the test.

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A Path to Success: Certification of Drinking Water Filtration Devices

Performance of Residential Water Filters (NSF/ANSI 42 and NSF/ANSI 53)

Both NSF/ANSI 42 and NSF/ANSI 53 standards establish performance requirements for water filters designed to reduce specific contaminants from potable water.

Water filtration systems certified to NSF/ANSI 42 are intended to minimize aesthetic, non-health related contaminants from public or private water supplies, including chlorine (taste and odor), chloramine, hydrogen sulfide, phenol, iron, manganese, pH neutralization, zinc and particulate reduction.

Performance of household water filters designed to reduce contaminants that are considered harmful is evaluated under NSF/ANSI 53. Such contaminants include lead, arsenic, mercury, nitrates/nitrites, VOCs, cyst and many others that can be found in drinking water.

It is worth noting that in order to obtain a certification to either standard mentioned above, a water filtration system must make at least one contaminant reduction performance claim.

In addition to material safety, structural integrity and contaminant reduction testing requirements, NSF/ANSI 42 and NSF/ANSI 53 also sets criteria for literature that must accompany each system. This literature contains important information on the proper usage and limitations of the system and educates them on the performance of the product. Standard requirements apply to the following four pieces of literature:

- Installation, operation, and maintenance instructions
- Data plate (a permanent plate or label affixed to the system)
- Performance data sheet
- Replacement component literature (for each replacement element)

To ensure continued compliance, all certified water filters are required to go through a full re-evaluation and retesting program at least once every five years. In addition, during the five-year period, each manufacturing facility is subjected to at least one annual inspection. These inspections include an assessment of the certified product to help ensure it has not changed since the original evaluation, a review of the manufacturer's quality assurance program, and an examination of the certified product's literature.

It is apparent that certification of water filtration devices to NSF/ANSI 42 and NSF/ANSI 53 standards with an ANSI accredited third-party certification organizations such as UL LLC demonstrates the product has gone through a rigorous evaluation and testing process, protects the manufacturer's reputation by separating facts from fiction and ensures ongoing commercial success .

Mounting Location for Garage Door Controls: Safety and Accessibility Working Together

By: Stephen Kuscsik / UL Principal Engineer

Automatic garage doors, commercial overhead doors, and pedestrian entry doors are common place in today's residential and commercial building construction. Depending on the installation, they can provide convenience, enhanced aesthetics, increased security, and improved accessibility.

Proper and compliant installation of these automated systems is key to helping ensure safe and reliable operation. As an architect or installer, you are faced with a myriad of requirements to understand and comply with. Customer requirements, model and local building codes, safety standards, manufacturer's instructions, insurers, licensing requirements, and federal and local laws all come into play. For residential and commercial garage doors, one question that has come up recently is ***"What is the proper height to mount the wall button that controls the door operator?"***

Let us first address ***residential*** garage door operators. For residential garage doors, the operator needs to comply with UL 325 safety requirements in accordance with the Consumer Product Safety Commission (CPSC) ruling Federal Register 16CFR Part 1211, the International Building Code (IBC), the International Residential Code (IRC), and many state and local codes. Additionally, the operator shall be installed in accordance with the manufacturer's instructions. When it comes to the wall control, you will likely find the following in the instructions: "Locate the control button: (a) within sight of the door, (b) at a minimum height of 1.53 m (5ft) above floors, landings, steps or any other adjacent walking surface so small children are not able to reach it, and (c) away from all moving parts of the door." This is a required statement to be included in all instruction manuals for UL 325 compliant residential and commercial garage door operators. The reason for the 5ft requirement is to reduce the likelihood of children actuating the door or playing with the control buttons, as such behavior could increase the risk of injury with a moving garage door.

So, you plan to mount the door button at least 5 ft. above the floor. Great! Well, almost.

You recently overheard a discussion from some industry colleagues about accessibility for compliance with the Americans with Disability Act (ADA) and, from what you heard, the wall control button shall be mounted not higher than 48 inches (4 ft.) above the floor to provide the required level of accessibility (for example, by a person using a wheelchair). They even showed you a copy of ICC/ANSI A117.1 (ANSI Standard for Accessible and Usable Buildings and Facilities) indicating that the height of an operable control shall be maximum 48 inches high.

You are now faced with a dilemma: Do you mount the button at 4 ft. (or lower) to satisfy ADA and A117.1, or do you mount it at 5ft (or higher) per UL 325/CPSC?

The 5ft minimum mounting height is a requirement in UL 325, and is mandated by federal law per CPSC. Installing a UL 325 listed operator is required by most state or local regulators. Regarding ADA, these are also important regulations you certainly do not want to ignore. To better understand exactly what is required, you first need to take a step back.

Are the residential garage door and the operator control button covered by A117.1 or other ADA regulations? According to information from ICC staff, who publish A117.1, "Single family houses, duplexes and 3-unit buildings are exempt

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Mounting Location for Garage Door Controls: Safety and Accessibility Working Together

from accessibility requirements either under International Building Code (IBC) or US Fair Housing." More importantly, even if the building is not exempt, the overhead garage door is usually not considered to be an "accessible route" under the regulations. Further, if a door is an automatic type (such as with a motor drive), both ADA and A117.1 indicate that compliance with ANSI BHMA A156.10 or A156.19 is required. Both of these standards cover pedestrian type doors (swing and slide type such as at the entrance to airport or grocery stores). They do not cover or address overhead garage doors. In some cases, other doors (man-doors) are provided in a garage, and can be configured to meet accessibility requirements if required. Last, even if there is a requirement to provide a control for accessibility, other options exist such as using a remote control kept by the person needing access.

For a ***commercial*** garage door operator, such as a sectional overhead door at a car service bay, or a parking garage at a shopping mall or apartment complex, a similar approach can be taken. The requirement for mounting the wall control button minimum 5ft high still applies here, in accordance with UL 325. Regarding ADA, it is more likely that the building or structure where the door is installed is within the scope of the requirements, as these locations are often accessible to the public. However, is the overhead garage door within the structure considered an accessible route? Or are there other doors/pathways that provide the required accessible route, and the overhead door is not relied upon for this purpose? From a practicality standpoint, most commercial overhead garage doors with an automatic operator will have various methods of actuating the door, such as a facilities attendant, a ground loop to detect a vehicle, a wireless remote inside a vehicle, or a ticket/pay station. Also, a separate man-door to provide entrance/exit is often provided for access per other code requirements.

Therefore, mounting the wall button to control the overhead door at least 5 ft. above the floor should not present a conflict with ADA requirements. Additional accessible options are available without mounting the control button lower than 5 ft and compromising the UL 325 safety requirements.

As you plan for future installations, keep these questions in mind:

- Is the building into which you are installing the automatic door operator one of the types addressed by ADA?
- Is the door onto which you are installing the operator considered part of an accessible route, or is it intended for vehicular access and other routes should be provided for pedestrians or wheelchairs
- Is the door type specifically addressed by A117.1 or ANSI BHMA A156.10 or A156.19?
- Are there requirements for the control button mounting height or location, and if so, what are they?
- Are there other options or features that can be installed to supplement the wall button, that provides compliant accessibility options without reducing the mounting height of the wall control lower than 5 ft.?

Having a discussion about this with your customers and authorities having jurisdiction (local building inspectors, etc.) can help enhance everyone's understanding and agreement as to how to achieve an installation that satisfies the concerns of all involved. For further questions regarding a particular installation, we suggest contacting the product manufacturer and the local building authority. They can best help with the necessary guidance for your particular installation, and the building inspector having jurisdiction over your installation has the authority to approve (or not) your installation.

The information above is based on the codes, standards, and regulatory requirements considered as of the date of this article. It does not address fire codes or means of egress requirements, and is not intended as an interpretation of any specific local code or regulation that may preside. As technology advances, building and construction methods change, customer needs evolve, and laws change, the relevant codes and standards are also subject to change. If you find installations in the future that cause challenges with apparently conflicting codes or regulations, feedback from the field is often a key driver for code or standard revision proposals to enable clear requirements for compliance, balancing the concerns of all involved.

New Versions of UL 763 – Commercial Food Preparing Machines, and UL 921: Commercial Dishwashers

By: Darrin Conlon / UL Engineering Director

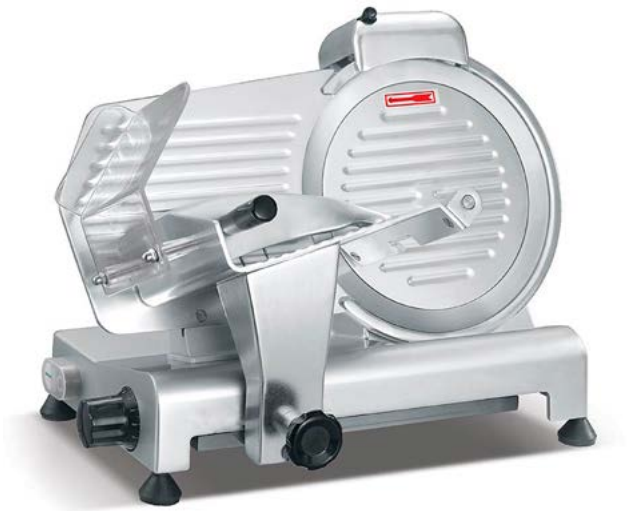
With the publication of any new edition of a UL safety standard, users of the standard typically have a few questions: What are the major changes to the standard? How will these changes be implemented? And, finally, when are these changes effective? This article will answer these important questions.

Major Changes to UL 763 – the Standard for S afety for Motor-Operated Commercial Food Preparing Machines:

The revised version of the 4th edition of UL 763 was published on October 23, 2017. The major changes to this standard are as follows:

1. Addition of Alternate Method for Evaluating Protective Electronic Circuits And Controls Using Requirements Based on UL 60335-1.

These new requirements provide an alternate method to evaluate electronic circuits in the end-product, and are based on UL 60335-1, Clause 19 abnormal operation requirements. With the addition of these requirements, there are now two paths to evaluate an electronic circuit; (1) use of UL 60730 series of standards, or (2) use of Supplement SA requirements. Since these requirements are an alternative evaluation method, there is no impact on existing certifications.



2. Blenders provided with a capacitive touch-screen

Requirements have been added to UL 763 to cover blenders provided with a capacitive touch-screen. A capacitive touch screen requires no force to activate, so unintentional (accidental) operation of the blender is a concern due to the risk of injury presented by the blender blades and, possibly, the drive coupler. Since these requirements are considered to be the expected progression of requirements for this technology, there is no impact on existing certifications.

3. UL 61058-1 switch requirements

UL 763 requires a switch that controls a motor load to be suitably rated for the application in terms of voltage, current, and load rating. The Standard for Special Use Switches, UL 1054, was withdrawn in June 2015 and was replaced by UL 61058-1, the Standard for Switches for Appliances - Part 1: General Requirements.

UL 61058-1 is a parameters-based (or declarative-type) standard, in the same way as UL 60730-1. These parameters, or the declared end-use ratings, must be specified in the end product appliance standard to give technical guidance to both end-use pump manufacturers and switch manufacturers. UL 763 was updated to include the parameters required for switches that comply with UL 61058-1. Since these requirements are considered a clarification of requirements, there is no impact on existing certifications.

UL 763 Implementation and Effective Date: These new and revised requirements are being implemented as Action Not Required* because there is no impact on existing certifications. The effective date will be January 31, 2018.

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New Versions of UL 763 – Commercial Food Preparing Machines, and UL 921: Commercial Dishwashers

Major Changes to UL 921 – the Standard for Safety for Commercial Dishwashers:

The revised version of the 7th edition of UL 921 was published on September 20, 2017. The major changes to this standard are as follows:

1. Addition of Alternate Method for Evaluating Protective Electronic Circuits and Controls Using Requirements Based on UL 60335-1.

These new requirements provide an alternate method to evaluate electronic circuits in the end-product and are based on UL 60335-1, Clause 19 abnormal operation requirements. With the addition of these requirements, there are now two paths to evaluate an electronic circuit: (1) use of UL 60730 series of standards, or (2) use of Supplement SA requirements. Since these requirements are an alternative evaluation method, there is no impact on existing certifications.

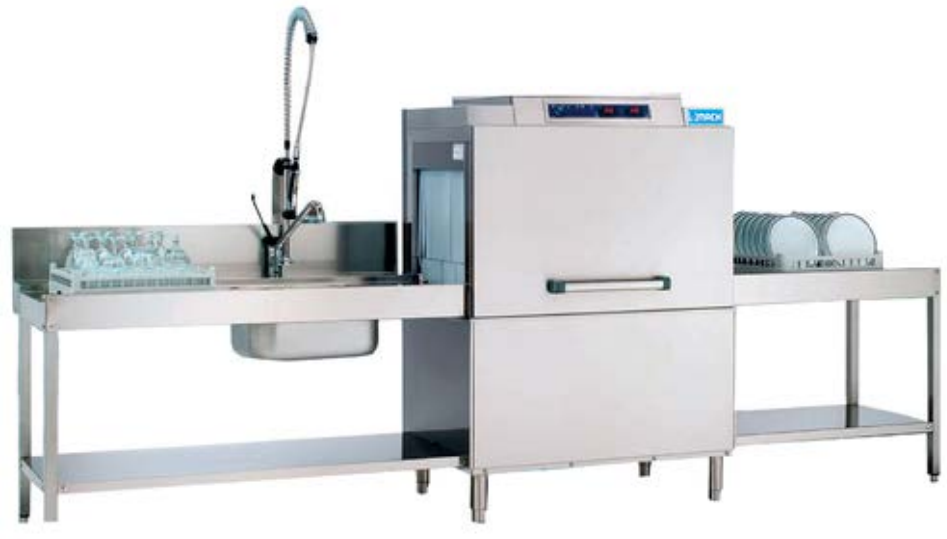
2. Relocation of Component Standard References

The component standard references that were located in Appendix A are now located and further explained in the body of the Standard. This is intended to promote consistency in the application of the component requirements in this end product standard, as well as to include additional component standard references to reflect newer technology. With these revisions, Appendix A has now been deleted. These requirements are intended to reflect present practice, so there is no impact on existing certifications.

UL 921 Implementation and Effective Date: These new and revised requirements are being implemented as Action Not Required* because there is no impact on existing certifications. The effective date is December 22, 2017.

> Note: ***For Action Not Required**, certified products are allowed to maintain their certification to the previous version of the Standard unless the product is modified. When the Applicants submits a revision to a product that was evaluated to the previous revision of the Standard, the changes to the equipment design or function (i.e. alternate construction) regardless of whether or not testing is involved must be evaluated to determine whether the revised design is required to comply with all requirements in the latest version of the Standard.

If you have questions regarding the above, or if you desire training, or would like to open a Preliminary Investigation project to learn more about these changes and how they may impact your UL Certified Commercial Dishwashers or Commercial Motor-Operated Food Preparing Machines, contact Darrin Conlon at (631) 546-2872 or Darrin.Conlon@ul.com.



By: Joe Musso / UL Standards Program Manager

Standards Corner

Click here for Standards information

Register for "What's New" to receive e-mails twice a month indicating the new published UL Standards, Outlines, and Proposals.

UL 197 – Commercial Electric Cooking Appliances

Two new proposals were circulated for preliminary STP review in November 2017. These include a topic addressing instructions provided in electronic media format, and a topic addressing and clarifying the distinct differences between countertop deep fryers for commercial use versus those intended for household use. The proposals are slated for ballot beginning December 2017.

UL 325 – Door, Drapery, Gate, Louver, and Window Operators

UL 325 remains very active with a number of proposals in various stages of the standards development process. A number of new proposals were circulated for STP preliminary review in September 2017. A meeting of STP 325 was held November 15-16, 2017, at UL's Northbrook Office to discuss the new proposals. Several new task groups were formed during the meeting, which will result in additional and/or modified proposals for consideration. It is anticipated that the next ballot cycle will be initiated Q2 of 2018.

UL 484 – Room Air Conditioners

A proposal to revise the flammable refrigerant charge size limits was circulated for STP preliminary review Q4 of 2016. Comments were received, and it was decided to form a task group to assist in reviewing the comments, and to consider any changes to the proposal before it moves to ballot. The task group met at a face to face meeting April 24, 2017 at UL's Washington, DC office. Further discussion and consideration is ongoing before the proposal will be ready for ballot. The last meeting of the task group was held as a teleconference on October 10, 2017, and this work is continuing.

UL 507 – Electric Fans

A series of five proposals were circulated for STP ballot in September 2017. Four of the five proposals reached consensus with no comments, and were published in the new 10th Edition of UL 507, November 9, 2017. One proposal (Revision of Existing Requirements for Fan Motor Failure Mode Analysis for Fans in Unattended Areas) did not reach consensus, generating a number of comments. The comments are under review to determine how they will be resolved.

Save the date: The next STP 507 Meeting is scheduled for February 28, 2018, in Clearwater, FL.

STP 745 – Electric Tools

With the IEC transition to the new IEC 62841 series of standards for hand-held and transportable tools, and lawn and garden machinery, efforts are continuing to adopt the associated UL 62841 series of standards when appropriate, as the IEC editions are published.

UL 749 – Household Dishwashers

(Bi-national standard with Canada)

The proposed new 11th Edition of UL 749 was circulated for preliminary review September 22, 2017. Comments were received and are under review by the responsible technical harmonization committee (THC), with a target ballot timeframe of Q4 2017 or early 2018.

UL 858 – Electric Ranges

New proposals covering revisions to the nichrome wire test and polymeric materials, a new test for oven rack loading, a new thermal aging test, and revisions to functional safety of smart enabled ranges, were circulated for STP ballot in August 2017. All four topics reached consensus and were published in the standard November 1, 2017.

Two new proposals (New Surface Temperature Measurement Procedures; and Requirements for Commercial Oven Cleaners for Use in Self-Cleaning Electric Ovens) were circulated for STP ballot October 13, 2017 (closing November 27).

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By: Joe Musso / UL Standards Program Manager

Standards Corner

UL 923 – Microwave Cooking Appliances

The task group formed to develop proposals intended to reduce the likelihood of a child being able to open a microwave oven door (accessing heated food or drink that may then injure them) is continuing its work. This TG most recently met November 6, 2017 via teleconference, and is moving closer to a proposal which can be processed within the STP.

UL 982 – Household Food Preparing Machines

Several proposals were circulated for STP ballot in May 2017. These proposals included new requirements related to blender accessibility, stacked blade assembly & tamper, operating controls, magnetic interlocks, clarification of important safeguards, and a new supplement for household & hospitality-use single serving cold beverage dispensers. The proposals reached consensus, and were published in the standard October 25, 2017.

UL 1017 – Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines (Bi-national standard with Canada)

The new (10th) edition of UL 1017 was published September 15, 2017. A call for proposals to initiate the next revision cycle is scheduled to go out January 2018.

UL 1278 – Movable and Wall- or Ceiling-Hung Electric Room Heaters

A new supplement for smart-enabled room heaters was circulated for STP ballot in Q2 2017. In addition, proposals revising the definition of product enclosures, and requirements for cautionary markings were also balloted (Q3 2017). All three proposals reached consensus, and were published in the standard September 14, 2017.

UL 2157 – Electric Clothes Washing Machines and Extractors (Bi-national standard with Canada)

The proposed new (4th) edition was circulated for STP ballot in Q2 2017. The proposed new edition reached consensus, with comments. The recirculation phase (of the final/revised draft) opened October 27, 2017, closing December 11.

UL 2158 – Electric Clothes Dryers (Bi-national standard with Canada)

The proposed new (5th) edition was circulated for STP ballot in Q2 2017. The proposed new edition reached consensus, with comments. The recirculation phase (of the final/revised draft) opened October 27, 2017 and closed December 11.

UL 60335-2-8 – Shavers, Hair Clippers and Similar Appliances

The preliminary STP review of the proposed new (6th) edition closed September 18, 2017. Changes included in the new edition are intended to align the standard with more recent editions of IEC 60335-2-8 (Ed. 6.1) and UL 60335-1 (Ed. 6). An STP Meeting is scheduled for November 29, 2017 at UL's Northbrook office to resolve comments received during preliminary review, and to discuss/finalize the changes proposed to the standard.

UL 60335-2-34 – Hermetic Refrigerant Compressors

The new (6th) edition of UL 60335-2-34 was published November 3, 2017.

UL 60335-2-40 – Household Electrical Heat Pumps, Air-Conditioners, and Dehumidifiers

The new (2nd) edition of UL 60335-2-40 was published September 15, 2017.

An early draft version of proposals intended to seek initial input from industry and other stakeholders relative to proposed safety requirements for the use of A2L (low GWP) refrigerants in products covered by UL 60335-2-40, was circulated to the STP in Q1/Q2 2017. This phase of work is best described as "content development", and is considered an informal stage in the development process, prior to even the normal preliminary STP review phase. It is intended that the A2L proposals will be updated based on the input received, also including any associated research results. The resulting modified draft will then be included in preparation for the normal preliminary STP review phase. Ultimately, the A2L requirements would be published in the eventual 3rd edition of UL 60335-2-40.

UL 60335-2-89 – Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Condensing Unit or Compressor

The 1st edition of UL 60335-2-89 was published September 29, 2017.

INSIDE UL: Product Packaging Testing Helps Ensure Safe Delivery

The world is awash with boxes. Big boxes, small boxes, stacks and stacks of boxes waiting to be sorted, recorded and loaded onto cargo ships and freight carriers around the world. UPS alone delivered 4.9 billion packages in 2016 while FedEx says they receive over 125 million package status requests each day.

The advent of e-commerce has led to an increase in demand for transport services, be it planes, trains, trucks or ships, for a combined market total of $237 billion in estimated revenues.

With so many packages shuffling around, how do the assorted conglomerate of stakeholders help ensure the safe delivery of the millions upon millions of boxes each day?

To help ensure packages arrive safely, UL uses standardized tests to help assess a package's strength and durability before shipping.

Product Packaging

Smashed-up boxes and dented merchandise can result in costly returns to the retailer, plus the potential for additional losses due to product replacement and/or diminished consumer perception of brands. Fortunately, the hazards associated with product transportation are known and allow for the development of standardized tests to assess package strength and durability.

Packaging Testing

UL tests packages in accordance with International Safe Transit Association (ISTA) procedures to help ensure the packaged product is safe for transit. ISTA develops test protocols to simulate a variety of scenarios such as the rolling of trucks, the heavy stacking of boxes and the humidity inside a cargo container or warehouse.

According to Carissa Samonte-Cam, an engineering project handler with UL, tests are primarily performed on the finished package to see if the packing material is sufficient enough to withstand test protocols and to evaluate if damage occurs to the actual product during testing. The products tested could consist of anything from books or glassware to household items or medical devices.

"We have the capability to test to several series–Amazon, Sam's Club and FedEx, to name a few," says Samonte-Cam, who

helped select the packaging test equipment for UL's packaging testing facility in Allentown, Pennsylvania.

The equipment includes an electrodynamic shaker, also known as a vibration table, which moves along three different planes, X, Y and Z.

"One test example is when a package is subjected to an abrupt 1 inch displacement, peak to peak, which could last up to 1 hours duration of time," says David Edwards, program manager for AHL Performance Testing. "It's a violent shaking motion similar to what you'll see out in transit conditions."

Many of the tests call for preconditioning of the product, which means the product is held for a specified timeframe under controlled temperature and humidity settings. The lab uses a chamber to simulate the high humidity and temperatures found in many of the shipments from manufacturing locations around the globe.

"Products typically sit in a container for about eight weeks so there could be a lot of damage to the cartons or the skid based on the type of packaging materials used," Samonte-Cam explains.

Other tests include a compression assessment that uses one clamp on top and one on the bottom of a carton to assess the force needed to crush the container.

"Freight carriers often stack packages in a truck to maximize their load, so there is a good chance that a package will be compressed between other boxes," says Edwards. "We need to determine how much compression load a box can withstand before it collapses," he adds.

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New UL 60335-2-34, Sixth Edition Published

By: Barry G. Karnes / UL Principal Engineer

UL announced the publication of the Sixth Edition of UL 60335-2-34, *The Standard for Safety for Household and Similar Electrical Appliances, Part 2: Particular Requirements for Motor-Compressors*. This Standard deals with the safety of refrigerant motor-compressors — the "heart" of any refrigeration or air conditioning system. This new edition was created for the purpose of harmonizing U.S. and Canadian motor-compressor requirements with the requirements in IEC 60335-2-34, edition number 5.2. This new standard includes several new North American differences, such as:

- Covering motor-compressors rated up to 15,000 Volts
- Determining the Maximum Rated Current (MRC) for motor-compressors with electronic controls
- Permitting an alternate test method for the primary single-phase failure protection test
- Requiring a refrigerant leakage test – max 3 grams per year leakage allowed – for motor-compressors intended for use with flammable refrigerants
- An increased voltage test of positive coefficient resistors (PTCR), typically used as motor starting devices, to determine if the PTCR can cause ignition
- Permitting an optional compatibility test based on the use of simulated "motorettes/coilettes"

Significant updates also include IEC-based requirements from IEC 60335-2-34, Ed. 5.2, such as:

- Annex AA, which now specifies test requirements for electronically controlled motor-compressors
- Compatibility tests of winding wire insulation, tie cord and electrical insulating materials

The requirements in this new Sixth Edition will be implemented as "Action Not Required" so no industry file review of previously certified motor-compressors is necessary.

Presently, the fourth and fifth editions of UL 60335-2-34 are active and motor-compressors can continue to be evaluated to these editions until March 31, 2021, when both of these editions are scheduled to be withdrawn. Motor-compressors evaluated to previous editions of UL 60335-2-34 will remain certified even after these editions are withdrawn, provided no changes are made to the motor-compressors that would require a certification decision (or unless a future requirement is determined to be "Action Required," such that an industry file review would be necessary).

- For ***Action Not Required***, certified products are allowed to maintain their certification to the previous editions of UL 60335-2-34 unless the product is modified. After March 31, 2021, when a client submits a revision to a product that was evaluated to the previous editions of UL 60335-2-34, the changes to the product (i.e. alternate construction), will be evaluated to determine whether the revised design is required to comply with the relevant requirements in the Sixth Edition of UL 60335-2-34.

The Sixth Edition is expected to remain active until a future edition of UL 60335-2-34 is published.

The Sixth Edition requirements went into effect on November 3, 2017 and motor-compressors can now be certified using requirements in this new edition. This new edition of UL 60335-2-34 is intended to be used in conjunction with the Sixth Edition of UL 60335-1.

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Designing Parts that Go Beyond the Minimum

By: Paul Bates / UL Engineer

The possibilities with additive manufacturing (AM) continue to grow decades after a group of MIT engineers patented the technology in the mid-1980s. Commonly known as 3D printing, AM has been quietly observed by many manufacturers, content to follow the experimentation of small startups and individual tinkerers and see where the technology leads.

Today, large scale manufacturers, such as GE, Boeing and Ford, have committed to the technology, revolutionizing product design and simplifying the production of parts in the process.

Heavyweight GE led the way with its redesign of a fist-sized part, the compressor inlet temperature sensor, then moved on to incorporating AM design into its fuel injection nozzles and engine turbine blades, a process that reduced the assembly of around 800 individual parts into 12 separate components.

American Standard, the maker of bathroom and kitchen products, innovated with AM to develop a select line of luxury metal faucets printed with a 3D machine. The collection, designed to reinvent the concept of water delivery, includes three models. But that is only part of the story.

According to an interview with Jean-Jacque L'Henaff, vice president of design at DVX, an American Standard division, it was obsolete inventory and the resulting costs that triggered the creation of the 3D printed line.

Designing for the future

AM offers manufacturers several benefits over injection molded manufacturing. From a design perspective, AM facilitates complex designs that cannot be produced with conventional manufacturing technologies. Designers are now free to innovate outside the constraints of injection molding.

Maybe it is combining several parts together into the assembly as GE did with its turbine blades. For appliance manufacturers, it could be incorporating the spring and door clasp together or fusing the impeller shaft and motor into one part.

Perhaps one could design a better methodology to deliver water to a washing machine or, as is the case with American Standard's 3D printed faucets, the redesigned process could make water flow more efficiently than previous models.

Additionally, the process reduces material costs due to its ability to create shapes without added bulk or material waste. Less material equals lower variable costs over current manufacturing processes.

Another benefit is the reduced tooling costs of AM. No longer will a manufacturer need a $100,000 injection mold to make a part. AM parts are designed with specially created software to optimize the AM process. Today's software allows the designer to simulate and build parts for a range of AM machines and material combinations.

But the real cost savings and the one many manufacturers are most excited about occurs through reduced inventory as replacement parts could conceptually be printed on demand and drop-shipped to customers, shaving days, if not weeks off traditional turnaround-time for parts delivery. A part that takes six to eight weeks to manufacture, ship and deliver could be crafted by one person with a 3D printer.

Vast stretches of warehouses can be replaced by geographically selected processing centers placed in a variety of locations, such as home improvement stores, specially equipped trucks or industrial retail spaces.

Alternatively, manufacturers could allow digital files to be sent electronically to a certified third-party manufacturer or even the customer if that is the path the appliance maker wants to take. Some industry strategists even believe that 3D platforms will be created to allow for the purchase and use of spare parts.

Incorporating AM into product design will dramatically shorten supply chains and diminish the need for vast warehouses filled with parts, while design engineers can leverage the unique capabilities and design aspects offered by the technology. To benefit organizations, such as appliance manufacturers, the use of AM requires a mind shift to develop and refine the manufacturing process to optimize for this new method.

Designing for the process

Designing for AM is not the same as planning for conventional manufacturing methods. The injection molding process works by inserting a molten plastic resin into a cast-metal mold under high pressure, while AM takes the material and builds layer upon layer to create objects and parts via a specialized machine.

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Designing Parts that Go Beyond the Minimum

The real challenge for manufacturers will be rethinking the entire process, from part design to finish, as additive parts have complex material properties that must be considered in the design process.

For example, depending on the geometry of the object on a layer-by-layer build, one might need a support structure which must be removed during the post-production finish process. Different machines require different structures, all of which must be incorporated into the original design of the part for the AM process.

Post-process finishing requirements will also need to be integrated into the process. The surface finish requirements should be considered before selecting the printing method. Often, designs need to be simplified to handle the dimensional demands of the machine.

Another factor concerns material selection. The material considerations – both the composition and safety concerns – are different for AM. Additionally, some AM materials are powders so small/fine that they are not even considered powder, but rather fine dust. The dust, in its raw state, has an explosivity issue and, if it is not treated and handled properly, could ignite.

The key to remember is that while there are nuances to the technology, product requirements and standards remain the same. Manufacturers already follow a particular path, guided by industry requirements and safety standards, that is not going to change. But, for AM, manufacturers will have to look at the process again to set new quality standards for their materials and printing processes and to help ensure safety requirements incorporate AM's unique properties into the organization.

Designing for success

Much of the buzz with using AM has been around replacement parts. Minds are going straight to transferring design files for the manufacturing of an individual part; however, to pursue two separate technologies means one will have to create the part twice. GE and American Standard focused on leveraging AM to make better parts, parts that last longer and are more robust for the respective industry.

At the same time, using AM in the original design allowed them to build out their replacement parts more quickly and take advantage of decreased costs in inventory control.

Many industries are still taking the time to evaluate AM, lacking confidence in the maturity and cost-saving potential of the technology, but the time to jump in is now as it will take at least three to five years to fully reap the benefits of AM.

Worth Considering

Create for consistency - AM part design requires attention to detail in all aspects. From material selection to post-finishing, each step needs to be carefully considered and coordinated to develop a process that is easy to reproduce.

Go outside the box - The design engineer has to step into other areas of manufacturing, which is challenging but much better for the finished product. The first part is to talk with people who perform the finishing on 3D printed objects. Ask how the product can be designed to decrease the number of steps needed to finish the object.

Remember the product life cycle - Every process starts with prototyping and tooling. Before one can get to serial production, designs often go through several iterations. Define the specifications of one part using AM technology before moving on to another and another.

Investigate automated finishing machines - Hand finishing can be difficult and may lead to variances in the final unit. Automating the process helps with compliance and uniformity of parts.

Find great partners - Identifying the right partners will bring components and service together to help reduce upfront costs.

Final thoughts

AM, the process, continues to evolve with innovation in the technology to allow for different materials and finishing processes. Adoption of AM into the design and production process means the technology is starting to act like every other manufacturing innovation as mainstream acceptance is just around the corner. Companies that move ahead now with AM will have a clear advantage over competitors.

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