UL PERFORMANCE MATERIALS

TAILORING SOLUTIONS TO ACCELERATE TIME TO MARKET

UNIQUE SOLUTIONS FOR YOUR UNIQUE PRODUCTS

UL certification is a critical market access requirement for product innovation and introduction in North America. UL understands the complexities that exist in this process and, with over 120 years of industry experience and knowledge, we're able to offer services that ease the process of product introduction and help bring your products to market as quickly as possible.

From comprehensive platform reviews and program research to sample molding and testing, UL enables ease of collaboration every step of the way. UL's complete range of services is modular, allowing you to take advantage of what works best for your needs. And with this complete array of services in one place, working with UL greatly enhances speed to market, coordinated communication and risk reduction while providing the familiar UL peace of mind. Whether you're ready for certification or you're not quite sure where to begin, call upon UL to offer insights, analytics, test service solutions and certification that all translate into commercial success for you.

CUSTOMER PRODUCT DEVELOPMENT CYCLE

CONCEPT	PROTOTYPE DEVELOPMENT	PROTOTYPE TESTING AND VALIDATION	CLIENT QUALIFICATION AND SCALE-UP	LAUNCH

- MARKET DEVELOPMENT SERVICES
- PLATFORM RESEARCH & INNOVATION SERVICES
- CERTIFICATION ADVISORY SERVICES
- COMPOUNDING, SAMPLE MOLDING AND PERFORMANCE TESTING
- CERTIFICATION SERVICES

MARKET DEVELOPMENT SERVICES

Whether preparing to develop a new product for the market or to enter a new market, the challenges are vast and unseen. Overcoming them is easy with UL.

UL's subject-matter experts offer advisory services on industry trends, requirements for regulatory compliance, and market analytics. UL's industry and end product experience allow you to make informed decisions about markets, applications and industry requirements.

Make UL your first stop.

MARKET INSIGHTS

The benefits of accelerated product development and short time-to-market provide significant advantages in today's rapidly changing global market. One way to fast track the development process and product launch is to better understand the market landscape.

With decades of experience in a variety of end-product markets, UL subject matter experts offer insight and guidance on market trends, global regulations and compliance schemes, and performance and safety challenges. Working with UL in the early stages of your development process helps you identify potential market problems and opportunities, allowing you to make informed decisions on where to focus your efforts.

MARKET ENTRY

UL helps manufacturers and suppliers evaluate designs, assess product prototypes, and identify performance and safety issues early within the product development process. From customized training to webinars and standards training modules, our offerings are flexible and our expertise is global.

We know the importance of geographic preferences and can help you understand how geography impacts success in the market. UL's experts can help you develop a compliance and safety roadmap for each of your target regions while offering a range of benefits including:

- A better understanding of applicable market requirements, standards and compliance schemes
- Improved time-to-market
- Compliant packaging and labeling requirements from the start
- The peace of mind associated with globally recognized testing

PRODUCT PROMOTION

The strength, recognition, and reliability of the UL brand can be a valuable tool when promoting your products and gaining confidence in the global market. UL allows your products to be tested for consistency and then promoted to a customer in any manner of your choosing including through UL's iQ database and UL Prospector®. By collaborating with UL and leveraging the UL brand to promote your performance data, you're better equipped to differentiate your products from the competition and establish credibility for your materials in the global marketplace.

PLATFORM RESEARCH & INNOVATION SERVICES

Rapid learning occurs during the research and development phase of product development. By collaborating with UL from the earliest stages of a product's lifecycle, you can make better-informed design decisions while minimizing risk. From systematic studies and predictive modeling for product research and development to new test development, independent competitive benchmarking and root-cause/forensic analysis, UL's materials and end product expertise enables confidence in having made the right design choices in developing new products. Some of the extensive global capabilities at UL include:

- *Forensic / Failure Analysis*
- *End Product Testing & Analysis*
- *Chemical Analysis*
- *Thermal / Flammability Properties Analysis*
- *Electrical / Mechanical Properties Analysis*
- *Advanced Imaging*

COMPETITIVE BENCHMARKING

Competitive product assessments are easy, respectable, and reliable with UL. With decades of expertise in materials science, UL experts facilitate independent 3rd party competitive product assessments that help you establish credibility for your material(s) and promote your product(s) for differentiation. UL's research and development teams work to understand the materials, devise appropriate tests, and develop effective means of demonstrating the results. You can rely on UL's brand, independence, integrity and attention to detail to establish credibility for your results in the market.

Example Case

Company A manufactures a plastic material used to house lithium-ion batteries in the automotive industry. This company believes its material outperforms the competition.

- UL takes Company A's plastic and molds the part.
- UL repeats the molding process with competitive materials.
- Test are developed, run, and analyzed.
- Company A is presented with objective data comparing the different materials.

ROOT CAUSE ANALYSIS

Uncovering the root cause of a specific failure can be critical to maintaining product viability. UL builds on its extensive product knowledge and expertise to conduct Fault Tree Analysis (FTA) and Failure Modes and Effects Analysis (FMEA) to identify the root cause. This thorough analysis offers confidence to the market and to your customers while helping you save time and manage risks.

Example Case

UL participated in an industry-level failure analysis exercise to identify the root cause of battery failures and fires. UL examined the battery down to every component at the material level and as part of the bigger system to determine the potential failure routes. This forensic analysis revealed previously unforeseen issues, helped to overcome these issues, and highlighted the need for new test methods in the industry.

PREDICTIVE MODELING

A physical testing approach to product development has inherent limitations that can be overcome by accessing UL's predictive modeling services. Whether you are a materials manufacturer looking to understand how individual levers of your recipe can affect material performance or you wish to understand how your materials may behave in an end product application, predictive modeling can provide you product performance insight, shortened development cycle times and flexibility to innovate.

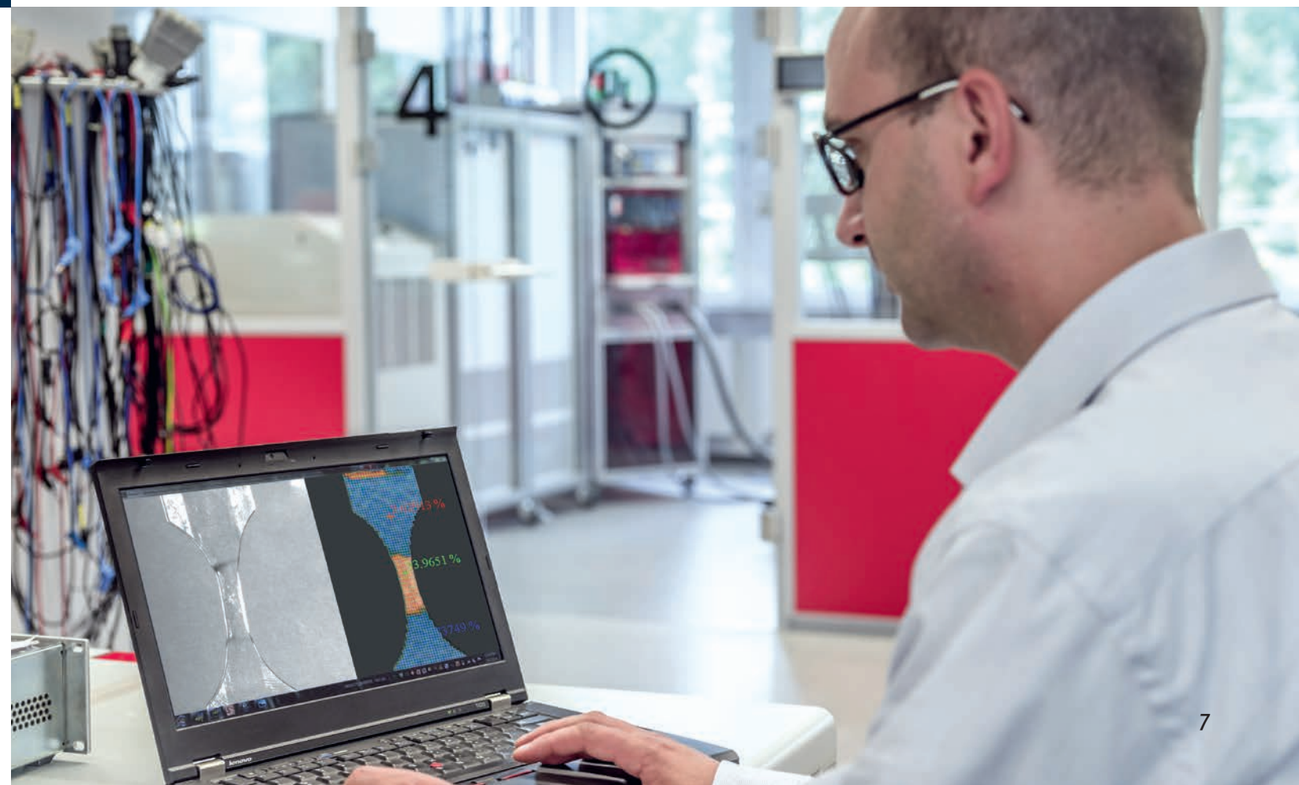
UL can help you enhance your competitive advantage using a designed experimental approach to maximize the value of your data and turn it into real learning. With our foundational material and safety science knowledge, UL can help your team quickly develop a solid plan to build and evaluate predictive models that will have real impact on your business.

NEW TEST DEVELOPMENT

For more than 120 years UL has been developing test methods, standards and certification programs that are robust and constantly evolving to meet the needs of our customers and the markets they serve. We continue to refine existing tests within the standard to ensure they meet current needs while supporting the development of new tests to accommodate evolving technology. In addition, UL can create tests specifically tailored to a customer's needs based on their product(s) and target market(s). This constant evolution ensures that UL testing will always be able to offer valuable data and certifications to meet your needs and support your product, from inception to launch.

Example Case

In response to market request, UL introduced Microscale Combustion Calorimetry (MCC) for Follow-Up Services (FUS) testing of UL 94 rated products. MCC is a thermal analysis procedure that determines the flammability characteristics of combustible materials such as plastics. This innovative method offers faster results and richer flammability behavior data that can also be used in the development of new formulations.



CERTIFICATION ADVISORY SERVICES

Several decisions must be made when pursuing certification and, with UL, you'll find that navigating this process saves you time and money. UL understands that customers faced with these challenging decisions have unique needs and interests and we make everything before certification easier than ever by offering complete certification advisory services by guiding you every step of the way.

HIGH TOUCH CONSULTATIVE MODULAR APPROACH TO UL'S CERTIFICATION ADVISORY SERVICES

END TO END CERTIFICATION MANAGEMENT

UL's End-to-End Certification Management program allows you to take advantage of our expertise to ensure that you're making decisions that make sense for your needs. With UL's unique modular approach, you can begin the collaboration with UL anywhere within your product development process.

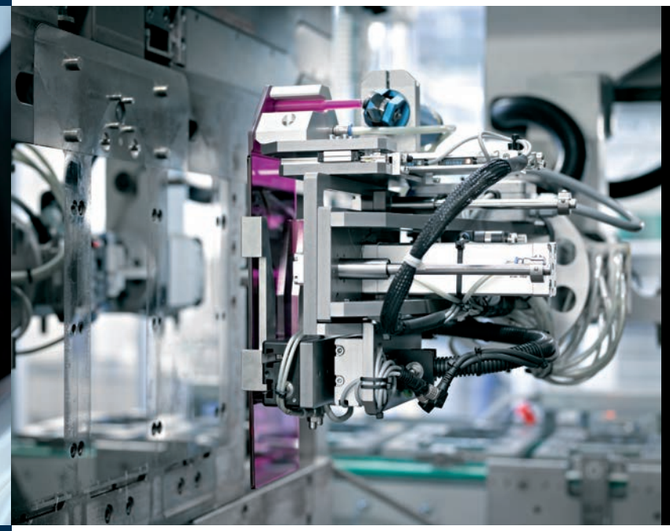
We offer full consultative services to guarantee that you reach your end goal quickly and with confidence. Services can be selected and delivered as needed helping you manage your budgets while enabling an on-time market launch.

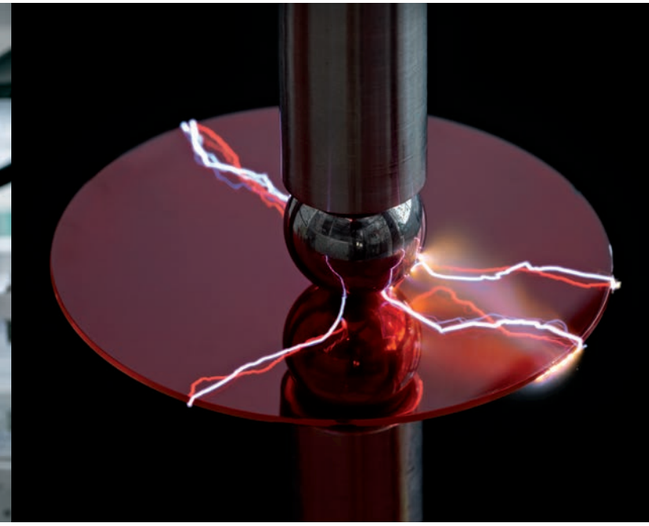
COMPOUNDING, SAMPLE MOLDING AND PERFORMANCE TESTING

UL is equipped to handle a variety of standard tests for all major plastics, rubbers, and film applications. The range of tests offered by UL meets the needs of companies and industries around the world.

Products tested include:

- *Plastics*
- *Electrical Insulation Systems*
- *Marking & Labeling Systems*
- *Gaskets and Seals*
- *Coatings and Liquids*
- *Tape, Tubing and Sleeving*





COMPOUNDING

With the ability to manufacture various compounds, UL offers a comprehensive solution from plastic formulation to the final test result. Small quantities of material are compounded using a reproducible process that meets ISO 17025 requirements for quality assurance. Allowing UL to handle compounding guarantees consistency and helps you save time in the process.

SAMPLE MOLDING

UL can produce a range of test specimens. From CAMPUS® test specimens to specialty test specimens such as optical rectangular sheets, UL's expertise can greatly simplify the sample molding process. Specimens are manufactured with the aid of insert molds in order to guarantee maximum possible flexibility and short set-up times. Optimal connections and the use of the UL Mold-Control-System ensure consistently high quality and absolute reproducibility. Test specimens produced at UL can be either dispatched to the internal testing laboratories or sent to directly to you.

PERFORMANCE/VALIDATION TESTING

It's critical to meet constantly changing consumer demands while bringing your product to market as quickly as possible. Failures during development are part of the process and avoiding late problem discoveries is key in reducing product launch disruptions.

UL tests prototypes to the point of failure while there's still time to make necessary product modifications. Our in-house quality programs also helps ensure compliance with regulatory and industry standards, allowing your products to meet expectations and get to market quickly.

UL testing includes:
• Mechanical • Rheological • Heat resistance • Thermal analysis
• Physical • Electrical • Combustion (Fire) • Thermal aging
• Weathering • Optical • Chemical resistance • Shrinkage
• Climate Testing

UL also helps with post- production issues including:
• Material selection • Part design • Mold layout • Processing method • Product assembly • Application • Environment

CERTIFICATION COMPLIANCE AND FOLLOW UP SERVICES

Certification remains at UL's core. Plastics testing has been a part of UL since 1941 and today the UL mark is recognized around the world. Our Plastics database is a powerful search engine containing more than 46,000 grades of UL-Recognized Plastics. The database enables end-product manufacturers to search and select plastics by safety, performance and compliance attributes, technical specifications, company name, generic family, grade and description for any project. These plastics are referenced in over 300 end product standards and are accessed by more than 350,000 design engineers and plastics processors.
We work closely with plastic industry stakeholders to maintain and enhance existing UL Standards, establish new requirements, and develop certification and testing programs that address emerging technologies and product applications.

UL CERTIFICATION SERVICES

UL is known for offering comprehensive testing, certification, assessment and regulatory compliance services designed to foster innovation, enhance product and process quality, enable safety and help our customers meet their business goals.
Our broad capabilities enable us to collaborate with you to address a wide variety of key business needs that may arise between product development and market launch.

FLAMMABILITY TESTING

UL conducts two pre-selection test programs on plastic materials to measure flammability characteristics. Variations exist within each program depending on the specifications of the relevant test method.

1. The first program – described in UL 94 – determines the material's tendency to either extinguish or spread the flame once the specimen has been ignited.

2. The second program – described in UL 746A – measures the ignition resistance of the plastic to electrical ignition sources.

LONG-TERM THERMAL AGING

Materials can be examined for thermal aging. This program – described in UL 746B – tests materials with respect to the retention of certain critical mechanical and electrical properties.

ARTIFICIAL WEATHERING

Under UL 746C, Polymeric Materials, Use in Electrical Equipment, a material is tested for outdoor use by being subjected to the following tests:
1. 1,000 hours of xenon-arc weatherometer conditioning
2. Water immersion for seven days at 70 degrees C.

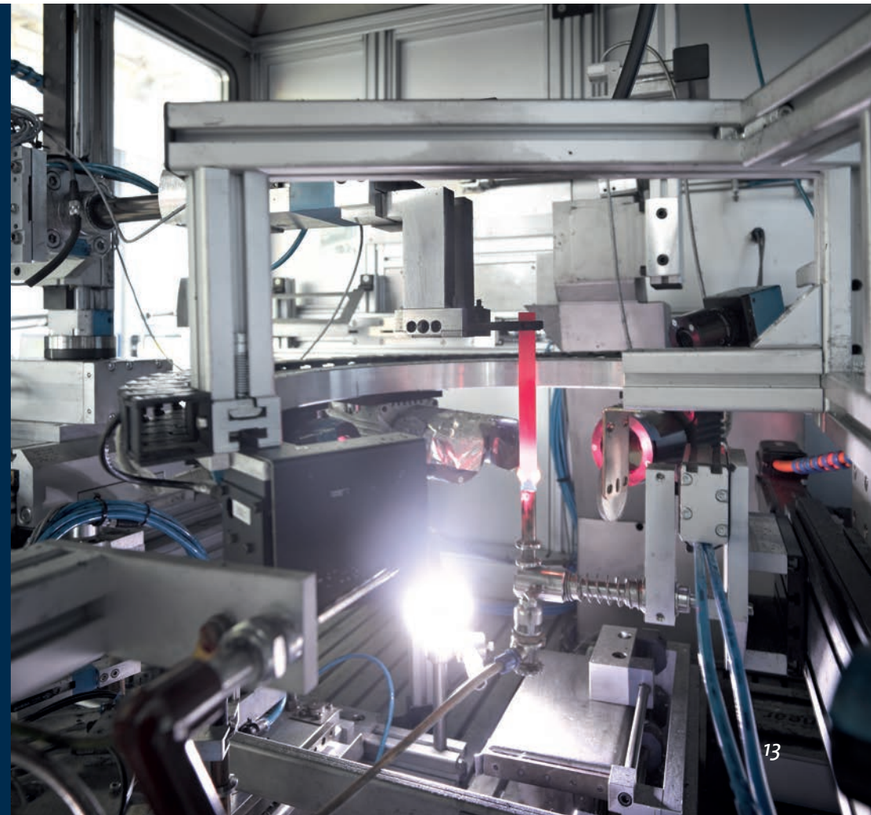
The material is tested for flammability, mechanical impact and mechanical strength before and after exposure to these conditions.

ONGOING BENEFITS OF UL RECOGNITION

Yellow Card – A globally respected product information card that carries the name of the company who can use the UL mark with the specified product.

Prospector® – Every Recognized material is listed on Prospector, the largest database in the world focused on plastics safety standards.

Products Recognized by UL are subjected to follow-up services (FUS) to ensure continued compliance. UL Field Representatives conduct quarterly visits to manufacturing locations and representative production samples of the UL Recognized Plastic are picked up annually and sent to UL for comparison and testing as needed.



NEW DEVELOPMENTS IN CERTIFICATION TESTING

As a leader in certification, UL is always looking for ways to streamline testing and simplify the certification process to help you bring your products to market faster. Some recent developments are described below.

LONG-TERM HEAT AGING

In addition to the testing already conducted for Long-Term Thermal Aging, UL offers additional, specialized services. The **Specialized Long-Term Thermal Aging Program (LTTA)** Polymer Variation Test method is comprised of a study of analytical and performance data to help identify the chemistry of the compound and its relationship to the degradation mechanisms of the reference material. This new program can help manufacturers reduce test times while effectively simulating long term reliability behavior.

UL's Relative Temperature Index (RTI) Banding Program enables customers who have a new formulation to receive an elevated RTI value through the use of compositional analysis. This program applies when the new material shares a similar chemical structure and formulation ingredients to other related materials that are known to have an elevated RTI.

Multi-Variate Analysis helps you accelerate product development and increase product efficiency. Plastics can be highly complicated compounds with multiple components, making experience-based trial and error inefficient; with Multi-Variate Analysis, multiple variables (X) are simultaneously assessed for their response. These responses are placed into models that make it easier to find the optimum combination of factors for your desired response.

NON-HALOGEN RATINGS

Easily stand apart from the current industry confusion surrounding "halogen free" certification by earning Recognition from a globally trusted source: UL. UL's non-halogenated, and non-chlorine & non-bromine certification program for plastics (QMFZ2) provides easy and independent means for specifiers and other purchasers to find plastics rated for their halogen contents. Plastic materials with these ratings are assigned a UL Yellow Card and benefit from global recognition and the ability to be marketed as, "UL Recognized Components that meet UL's 746H Outline of Investigation for Non-halogenated (or Non-chlorine & Non-bromine) rated materials."

RESTRICTION OF HAZARDOUS SUBSTANCES DIRECTIVE

UL's Restriction of Hazardous Substances Directive (RoHS) Certification for plastics (QMFZ2) program, certifies that plastics meet EU's Restriction of Hazardous Substances (RoHS) Directive (2002/95/EC and 2011/65/EU) and UL's Outline of Investigation for Restricted Use Substances In Polymeric Materials (UL 746R). This program uses the globally recognized test methods from IEC 62321 to determine that the levels of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated dihphenyl ethers) are below the minimums established by law.

Plastic materials with these ratings are assigned a UL Yellow Card and benefit from global recognition and the ability to be marketed as, "UL Recognized Components that meet UL's Outline of Investigation for Restricted Use Substances In Polymeric Materials (UL 746R)."

MICROSCALE COMBUSTION CALORIMETRY

Follow-Up Services (FUS) are a critical part of UL Recognition. UL is constantly looking for ways to meet these surveillance needs with advanced tools that provide sufficient information for appropriate validation of product requirements. With this in mind, UL is introducing Microscale Combustion Calorimetry (MCC) for FUS testing of UL 94 rated products.

MCC is a thermal analysis procedure that determines the flammability characteristics of combustible materials such as plastics. This method is highly beneficial as it eliminates flame bars, sample conditioning, molding, and the waste associated with molding bars. That means you experience faster results and potentially decreased costs. Additionally, MCC provides a more quantitative comparison of combustion characteristics of polymeric materials that can be correlated to flammability behavior of new formulations in ways that might be useful in new product development.

EUROPE

Denmark
T: +45.44.85.65.65
E: info.dk@ul.com

France
T: +33.1.60.19.88.00
E: info.fr@ul.com

Germany
T: +49.69.489810.0
E: info.de@ul.com

UL TTC
T: +49.2151.5370.370
E: ttc@ul.com

Italy
T: +39.039.6410.101
E: info.it@ul.com

Poland
T: +48.22.336.33.39
E: info.pl@ul.com

Spain
T: +34.93.368.13.00
E: info.es@ul.com

Sweden
T: +46.8.795.4370
E: info.se@ul.com

The Netherlands
T: +31.26.376.4800
E: info.nl@ul.com

United Kingdom
T: +44.1483.302.130
E: info.uk@ul.com

AMERICAS

Argentina
T: +54.11.4316.8200
E: info.ar@ul.com

Brazil
T: +55.11.3049.8300
E: info.br@ul.com

Canada
T: +1.866.937.3ULC, 1.866.937.3852
E : customerservice.ca@ul.com

Mexico
T: +52.55.3000.5400
E: info.mx@ul.com

United States
T: 877.UL.HELPS, 1.877.854.3577
E : cec@ul.com

ASIA PACIFIC

Australia
T: +61.1.8824.7775
E: customerservice.au@ul.com

China
E: customerservice.cn@ul.com

Guangzhou
T: +86.20.3213.1000

Shanghai
T: +86.21.6137.6300

Suzhou
T: +86.512.6808.6400

Hong Kong
T: +852.2276.9898
E: customerservice.hk@ul.com

India
T: +91.80.4138.4400
E: customerservice.in@ul.com

Japan
E: customerservice.jp@ul.com

Ise
T:+81.596.24.8116

Tokyo
T:+81.3.5293.6200

Korea
T: +82.2.2009.9100
E: customerservice.kr@ul.com

Malaysia
T: +603.5632.5922
E: customerservice.my@ul.com

New Zealand
T: +64.3.940.4400
E: customerservice.nz@ul.com

Singapore
T: +65.6274.0702
E: customerservice.sg@ul.com

Taiwan
T: +886.2.7737.3168
E: customerservice.tw@ul.com

Thailand
T: +66.2.207.2408
E: customerservice.th@ul.com

Learn more at
ul.com/plastics
ulttc.com

03/15.us.artemis