UL PERFORMANCE MATERIALS

SUPPORTING PRODUCT INNOVATION IN THE ELECTRICAL AND ELECTRONICS INDUSTRY
The electrical and electronics (E&E) industry has always relied on high-performance materials, and turned to UL to secure safety compliance. Yet, UL’s expertise extends beyond testing for certification. UL also offers market insights, analytics and advisory services to assist in product development and test service solutions to optimize your product launch.

**CONNECT WITH EXPERTISE AT EVERY LEVEL**

Materials and end-product manufacturers find solutions in UL’s services portfolio that lead to high-performance products. Working with both sides of the industry, UL also helps match optimal materials to the right end-products. No matter what your requirements, with UL’s modular approach, you can select services at the first step of design, mid-way through development or for the entire process.

**BENEFITS OF WORKING WITH UL**

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<td>Insight to help ensure product’s success at launch</td>
<td>Collaboration with experts from both materials and end product manufacturing</td>
<td>Knowledgeable planning to avoid recall or late product launch</td>
<td>Meets standards and quality benchmarks</td>
<td>Materials manufacturers promote products / end product manufacturers find materials</td>
<td>A renowned symbol of materials safety and performance</td>
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**SERVICES FOR MATERIALS MANUFACTURERS**

**SERVICES FOR END PRODUCT MANUFACTURERS**
Market Development Services

UL wants your products and materials to be safe, as well as be successful in the market. So our Market Development Services help you identify the key players and which material ratings to target. With UL’s knowledge of the E&E landscape for engineering materials and end-products, you can optimize your product’s assets and confidently move them into selected markets and applications.

Market Entry Services

Knowing the importance of geographic preferences, UL experts develop a compliance and safety roadmap for each of your target regions. You’ll benefit from improved time-to-market, compliant packaging and labeling requirements from the start and the peace of mind associated with globally recognized testing.

Market Insights & Analytics Services

Your UL advice can offer insight and guidance on market trends, global regulations, compliance schemes, as well as performance and safety challenges. We’ll help you identify potential market gaps and opportunities, allowing you to make informed decisions on where to focus your efforts.

Product Differentiation Services

Let UL help you differentiate and promote your product while growing your business and enhancing customer satisfaction. Our range of promotional services are an excellent opportunity to win additional business from new and existing customers who are looking for materials and products that stand apart and have been independently validated for key attributes.

The UL Advisory Advantage

UL’s Advisory Services stand out by uniquely combining precise market insight with expertise in safety regulations, and a wealth of resources and databases. We focus on helping you in the E&E industry understand the applicable standards and performance expectations for materials and end-products.

With our modular approach to advisory services, UL allows you to find the answers you need to questions like:

- What materials work?
- Does my product meet the market requirements?
- What standards apply?
- What are the performance limits?

UL can pave the whole way to product launch, or simply be a bridge at a crucial crossroads. Talk to us, and we will help you identify the individual or packaged solutions to best meet your needs.
The safety and performance requirements for E&E products vary depending on the product category, intended use and, of course, in which markets it is to be sold. It is also increasingly important to address eliminating hazardous substances early on in the product development. UL can help you ‘decode’ the technical terminology. Our goal is for you to profit from our experts’ experience as early as possible, to help pave a smooth path to a product’s market entry without unnecessary delay.

### WHAT REQUIREMENTS ARE RELEVANT TO YOUR PRODUCT?

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### Replace UL 746C -> “Conduit connections”

Pumps with non-metallic enclosures shall comply with UL 778 requirements for electric shock/fire hazard:

- **UL 778, Par. 3.12.1.a**
  - End product Impact test (UL 778)
- **UL 778, Par. 3.12.1.b**
  - End product Abnormal Operations test (UL 778)
- **UL 778, Par. 3.12.1.c**
  - End product Mold stress relief distortion test (UL 778)
- **UL 778, Par. 3.12.1.d**
  - End product Strain Relief test (UL 778)

**EXAMPLE**

- **UL 346C** -> “Material property considerations” table
- **UL 746C** -> “Dimensional Stability requirements”
- **UL 746C** -> “Water exposure requirements”
- **UL 94: 5VA, 5VB, V-0, V-1 or V-2**

### THE PERFECT UNION OF MATERIALS AND END-PRODUCT

This chart illustrates how UL engineers might go about determining the correct requirements for a non-metallic material to be successfully used in a certain end-product. The example is a pump as the end-product using UL 778 as the required standard. Instead of waiting for the end-product testing to possibly determine that the material will fail, a lot of time and money can be saved when materials manufacturers and end-product manufacturers come together to communicate from the start about requirements. By examining property considerations and safety tests with UL in advance, delays in manufacturing times and ultimately market entry can be avoided:

- **UL 746C** -> “Conduit connections”
- **UL 94: 5VA, 5VB, V-0, V-1 or V-2**
- **UL 346C** -> “Material property considerations”
- **UL 778**
- **UL 778, Par. 3.12.1.a**
- **UL 778, Par. 3.12.1.b**
- **UL 778, Par. 3.12.1.c**
- **UL 778, Par. 3.12.1.d**
- **UL 778, Par. 3.12.1.e**
- **UL 778, Par. 3.12.1.f**

**Extract of UL tests & standards for different E&E products. Please contact your UL Representative to discuss the details of your specific application.**

**COLLABORATIVE EXPERTISE**

In the Joint Review, you and your business partners will sit together with UL engineers. UL works directly with both materials and end product manufacturers, so we can bring to the table a unique combination of safety science and expertise in material requirements. So whether a material is needed for a product to be used indoors or outdoors, fixed or portable, together we will determine the exact properties which the materials and the end product must have.

Our goal is to help materials and end product manufacturers get it right the first time, saving time and money for all stakeholders.

**Joint Review Service**

- **Pumps with non-metallic enclosure shall comply with UL 778 requirements for electric shock/fire hazard:**
  - **UL 778, Par. 3.12.1.a**
    - End product Impact test (UL 778)
  - **UL 778, Par. 3.12.1.b**
    - End product Abnormal Operations test (UL 778)
  - **UL 778, Par. 3.12.1.c**
    - End product Mold stress relief distortion test (UL 778)
  - **UL 778, Par. 3.12.1.d**
    - End product Strain Relief test (UL 778)
- **UL 778, Par. 3.12.1.e**
  - End product Impact test (UL 778)
- **UL 778, Par. 3.12.1.f**
  - End product Abnormal Operations test (UL 778)
- **UL 778, Par. 3.12.1.g**
  - End product Mold stress relief distortion test (UL 778)
- **UL 778, Par. 3.12.1.h**
  - End product Strain Relief test (UL 778)
TEST PROGRAM DEVELOPMENT

By helping you understand the critical parameters to test, UL gets the most value out of your testing. We create tests specifically tailored to your products and the target markets. The primary goal is to avoid costly late-stage remediation or recalls. The sooner testing begins, the better, so we can spot potential performance and safety problems early in the product development process.

SAFETY AND PERFORMANCE TESTING

By outsourcing testing to UL, you minimize fixed costs. UL can be relied upon to provide state-of-the-art test equipment, which meets the latest requirements, as well as technicians fully trained and knowledgeable in testing procedures. UL provides testing covering:

- Screening & Research Testing in the product development phase
- Performance Testing
- Safety Testing for Certification

MATERIALS TESTING

When end product manufacturers are searching for materials to use in their products, they are more likely to select ones that have been tested and validated to meet their stringent specifications. UL testing can include the determination of a wide variety of material properties including:

- Ignition and burning characteristics from thermal and electrical sources (UL 94 and UL 746A)
- Electrical, physical and mechanical characteristics, including impact, hardness and abrasion tests (UL 746A)
- The effect of exposure to elevated temperatures (air/oven aging), cold, water, ultraviolet rays, etc. (UL 746B and UL 746C)
- Spectroscopy and Gas chromatography (UL 746A)
- Coatings (UL 1332)
- Gaskets and seals (UL 157)
- Electrical insulation materials and systems (includes magnet wire, varnishes, tapes etc.) (UL 1446)
- Tapes, tubing and sleeving (UL 510, UL 224, UL 1446)
- Marking and labelling (UL 956)
- Positioning devices (UL 1565)
- Non-Halogenated Materials (UL 746H)
- Restricted Use Substances in Polymeric Materials (UL 746R)

END PRODUCT TESTING

If you are using materials that have already been tested by UL, they don’t need to be tested again. Some tests are only performed on the end products themselves. This depends on how and where a material is used, but also on product dimensions and other specifications.

Many of the tests are within UL 746C Polymeric Materials – Use in Electrical Evaluations, for example:

- Resistance to impact
- Abnormal operation
- Mold stress relief distortion
- Creep
- Water exposure tests
- Dimensional stability tests

With joint product reviews from UL and the right testing, manufacturers of thermoplastic materials can help their customers comply with end-product requirements.

SAMPLE PREPARATION FOR PLASTICS MANUFACTURERS

UL provides a wide range of test specimen shapes and sizes. Our sample preparation services help to ensure sample consistency, reducing delays and costs associated with flawed data produced by unreliable samples. UL manufactures samples with optimal properties, which can also be shipped to your location of choice for inspection and/or internal testing needs.

Sample preparation services include:

- Injection Molding to produce a wide range of test specimens for ASTM, ISO, IEC, and UL tests.
- High-speed machining and fabrication services to cut test samples out of larger samples or parts for testing purposes.
- Two-roll milling of rubbers and plastics in preparation for sample plaque fabrication.
- Compression molding in a range of plaque thicknesses.

THIN WALL MOLDING TECHNOLOGY

Thinner and thinner plastics are increasingly being used in end products. As a number of testing properties are thickness dependent, it is important to have test samples that are equally thin to their end product application. UL TTC is capable of offering thin wall injection molding sample preparation for many plastics to a thickness as low as 0.4 mm. UL continues to research additional ways to reduce this thickness even more, in line with customers’ evolving end product application needs.
CERTIFICATION AND MARKET ENTRY

Manufacturers and UL share the common goal of seeing only those products fully complying with applicable safety requirements are produced and carry the UL Mark. UL product certification shows that your product or company has successfully met stringent standards for product safety.

For a product to bear a UL Certification Mark, it must both comply with the applicable requirements when initially evaluated as well as maintain ongoing compliance as it is being produced and sold in the market. UL works closely with industry stakeholders to maintain and enhance existing UL Standards, establish new requirements, and develop programs that address emerging technologies and applications.

Certified products are added to UL’s Online Certification Database (ul.com/database) or UL iQ databases and UL Prospector. UL’s databases bring immediate visibility to your certified products as thousands of designers, engineers, and suppliers search and utilize our databases monthly to verify important safety critical features.

UL iQ™ DATABASES

The UL iQ™ family of databases (iq.ul.com) is a suite of relational databases that allow users to search for UL Certified Components (e.g. plastics, insulation systems, labels) and view important safety certification information

UL PROSPECTOR®

While plastics manufacturers can advertise their products via the UL Prospector, end product compliance specialists can explore this plastics database and find materials with specific properties. UL Prospector includes:

- More than 85,000 plastics datasheets
- Over 46,000 metals datasheets
- Over 85,000 plastics datasheets
- Also information on plastics additives

MATERIALS MANUFACTURERS – GET FOUND

Are your materials easy to find for OEMs? Last year more than 138,000 UL Prospector datasheet searches were conducted by OEMs from the E&E industry, looking for particular material properties. UL Prospector, enables end-product compliance specialists to fully explore your materials and find the right one.

END PRODUCT MANUFACTURERS – FIND YOUR MATCH

With a free online database currently comprising technical datasheets from 874 plastics manufacturers, Prospector is a powerful search tool which helps you find the right materials for your application or end product.

THE UL YELLOW CARD

The UL Yellow Card features the properties of a tested polymeric material, enabling end product manufacturers to determine if the material is appropriate for a specific application. The UL Yellow Card is globally recognized which ensures customers that products have been tested by a trusted, independent 3rd party. It demonstrates ongoing quality and performance with regular follow-up testing. It is the ideal recognition for manufacturers of plastics or end-products in the E&E industry to promote products and their properties to global markets and existing / potential customers.

Example Yellow Card, other information and ratings may be shown

UL RECOGNIZED COMPONENT MARK

This mark is designated for components, which are intended to be part of a UL listed product, but which cannot bear an end product listing or Classification Mark themselves.

MATERIALS MANUFACTURERS – SEARCHABLE YELLOW CARDS ON YOUR WEBSITE

Showcase your compliance test data in the trusted UL Yellow Card format right on your company website. Integrated seamlessly with your site, the Yellow Card Plug-in provides a simple and direct way to display your UL-rated materials. It supports full searches and automatically updates.

END PRODUCT MANUFACTURERS – RELY ON TESTED SAFETY

Using UL tested and certified components, identifiable through the UL Recognized Components Mark on the Yellow Card, can help facilitate a UL certification of an end product or system. Additionally, it can save time and money by eliminating the need for further material testing.
Learn more at
ul.com/plastics
ulttc.com