



Standards &  
Engagement



# UL Standards & Engagement International Standards 2022: The Year in Review

Safety Science in Action™

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# Letter to our stakeholders



Dear Stakeholders,

As I reflect on my first year as Executive Director, I am very proud to see what our organization has accomplished. This year, we announced the creation of three distinct organizations as a significant milestone in the continuation of our 128-year history of leadership in safety science. Through the promotion of an innovative, collaborative, and global approach, we have renewed our commitment to building a safer world through actionable, rigorous safety standards.

UL Standards & Engagement translates scientific discoveries into standards and policies that have the power to make a systemic impact on public safety throughout the world. Distinguished by our independent research and informed foresight, we've been driving cutting-edge science into practical standards since 1903 when we published our first standard, UL 10A, the Standard for Tin-Clad Fire Doors. Our extensive library of standards helps to make everyday products and environments safer, more secure, and more sustainable – from life jackets to batteries to autonomous cars.

We know that a safer world starts with science and standards, and it's a mission we continue to pursue across the globe. We partner with leading minds and national standards bodies around the world to draw upon an ever-growing body of scientific knowledge from UL Research Institutes and global experts. Throughout 2022, our global team of professionals worked to further the development of standards in new and emerging technologies, while also working to ensure that existing standards remain relevant in our rapidly changing world.

Together with our stakeholders and partners, we're creating a dynamic road map to a safer future for all. At UL Standards & Engagement, we recognize the value of our international partnerships and take pride in prioritizing strong communication, information sharing, and the promotion of safety science with the help of our partners worldwide. We want to extend a sincere thanks to our partners and stakeholders for their partnership, trust, and commitment as we work together to build a safer, more secure, and sustainable world for all.

**David G. Steel**  
Executive Director  
UL Standards & Engagement



# Letter to our stakeholders



Dear Stakeholders,

As UL Standards & Engagement continues to grow and evolve, our commitment to safety science and standardization has remained the same. We translate data into practical, action-oriented safety standards by convening experts worldwide. We also serve as a vital resource for regulators and policymakers as they help advance standards and promote safety science. This year, we continued to modernize our standards development tools, prioritize collaboration with our international partners, and grow our team by adding staff in key roles and locations around the world.

Through our cooperation agreements with partner organizations and stakeholders, UL standards are adopted or adapted with national differences around the world. We remain committed to ensuring that our standards can be adopted, harmonized, and used internationally, and we take pride in our involvement in international standards development and partnership with the International Electrotechnical Commission (IEC) and International Organization for Standardization (ISO). By working with these international partners and stakeholders, our standards help to advance the UL mission of working for a safer, more secure, and more sustainable world.

In pursuit of this mission, we began work in 2022 to align our standards catalog and standards development process with the U.N. Sustainable Development Goals (SDGs), to help advance the vision of the U.N. 2030 Agenda for Sustainable Development. From helping improve access to clean and affordable energy, to supporting sustainable consumption and production, we believe standards are uniquely positioned to provide a framework to help translate the goals into action. So far, we have identified more than 950 individual cases in which a UL standard supports one or more SDGs. By participating in our standards development process, our stakeholders can help achieve these critical goals.

Looking to the year ahead, we would like to thank all of our partners and stakeholders for their trust, partnership, and collaboration as we continue to translate safety science into action in the new year.

**Phil Piqueira**

Vice President of Global Standards  
UL Standards & Engagement



# UL enterprise launches new brands

This year, the UL enterprise revealed new brands for its three entities: the two nonprofit organizations, UL Research Institutes and UL Standards & Engagement, and the commercial business, UL Solutions.

As three organizations united by one mission, UL Research Institutes, UL Standards & Engagement, and UL Solutions work together for a safer, more sustainable world. Our new brands express the legacy and mission our UL enterprise organizations share; each serves a distinct role in helping to advance safety science and address the challenges of today and tomorrow.



UL Research Institutes is a nonprofit research organization dedicated to advancing the Underwriters Laboratories public safety mission through scientific discovery and application. With best-in-class experts, we are the world's premier safety science research organization. We conduct rigorous independent research, analyze safety data, and explore at the edges of technology to be the first to uncover and act on emerging risks to human safety.



UL Standards & Engagement is a nonprofit standards development and advocacy organization that translates data from safety science into practical, action-oriented safety standards. We convene experts worldwide and serve as a vital resource for regulators and policymakers. As a part of our public outreach activities, we share knowledge, advance standards-related safety policy partnerships, and advocate for standards and regulations that result in positive safety changes.



A global leader in applied safety science, UL Solutions transforms safety, security, and sustainability challenges into opportunities for customers in more than 100 countries. UL Solutions delivers testing, inspection, and certification services, together with software products and advisory offerings that support our customers' product innovation and business growth. The UL Certification Marks serve as a recognized symbol of trust in our customers' products and reflect an unwavering commitment to advancing our safety mission. We help our customers innovate, launch new products and services, navigate global markets and complex supply chains, and grow sustainably and responsibly into the future. Our science is your advantage.



# Using standards to help advance the UN Sustainable Development Goals for 2030

The United Nations' Sustainable Development Goals (SDGs) are a universal call to action to improve human lives and protect the environment. Adopted by all U.N. member states in 2015 as a part of the 2030 Agenda for Sustainable Development, the SDGs address the economic, social, and environmental dimensions of sustainable development. The 17 SDGs represent a commitment by both developing and developed countries to come together in support of a more sustainable future for all. In total, 169 quantifiable targets that have been identified across the goals serve as a measurement of global progress to facilitate action and promote accountability.

UL Standards & Engagement proudly supports the achievement of these goals – from improving access to clean and affordable energy, to supporting sustainable consumption and production – through our commitment to science and standardization. Through our cooperation agreements with partner organizations and stakeholders, UL standards are adopted or adapted with national differences around the world, helping to advance these critical goals.

In 2022, we began mapping the association between UL standards and the SDGs, in order to determine the impact and benefits of our standards globally. Our approach combined quantitative assessment with input from subject matter experts to determine the association of a UL standard to one or more SDGs. We used several algorithms to predict the association of a standard to an SDG by quantifying the similarity between the text of each standard's scope statement and a description of the SDG and its targets.

Our research into the connections between UL standards and the SDGs revealed a significant alignment between the goals of the 2030 Agenda for Sustainable Development and the requirements and specifications found in UL standards. To date,

we have identified more than 950 individual cases in which a UL standard supports one or more SDGs, with each unique standard associated with an average of at least two SDGs. For each of the 17 SDGs, there is at least one UL standard that can be used to support efforts to achieve the SDG's identified targets.

The Sustainable Development Goals with the largest number of associations with individual UL standards include:



**SDG 7**  
Affordable and Clean Energy,  
with 130 associations



**SDG 9**  
Industry, Innovation, and  
Infrastructure, with 100 associations



**SDG 11**  
Sustainable Cities and  
Communities, with 154 individual  
standards associations



**SDG 12**  
Responsible Consumption and  
Production, with 120 associations

As we continue this work, we will track the alignment and contributions of UL standards to the SDGs, to help evaluate the impact of UL standards on the environment and society, understand existing standardization gaps, and identify opportunities for new standards development to support the achievement of the SDGs.

Read the full report: [The UN Sustainable Development Goals and UL Standards & Engagement](https://ulstandards.org/research/the-un-sustainable-development-goals-and-ul-standards-engagement) at ULSE.org.

## IEC and ISO partnerships

UL Standards & Engagement is an international standards developer that is committed to working with partners such as the International Electrotechnical Commission (IEC) and the International Organization for Standardization (ISO). Staff from our organization serve as secretaries for many IEC technical committees (TCs) including IEC TC 61, Safety of household and similar electrical appliances; IEC TC 72, Automatic electrical controls; and IEC TC 108, Safety of electronic equipment within the field of audio/video, information technology and communication technology. We encourage the submission of our standards in full or in part as proposals to IEC/ISO standards, and we also have the opportunity to submit our standards for new and emerging technologies as the basis for international standards through IEC and ISO. In addition, UL Standards & Engagement staff serve on the IEC Board, the IEC Standardization Management Board (SMB), and the IEC Market Strategy Board (MSB) – all of which are critical to driving IEC efforts.

In September, we attended the 2022 ISO Annual Meeting in Abu Dhabi. We held formal meetings with over 20 National Standards Bodies (NSBs) and had brief meet-and-greet sessions with other organizations and key international and regional organizations. In

addition, we signed one new Standards Memorandum of Understanding (MOU) with Rwanda Standards Board (RSB), encouraging the use of UL standards within that country. We were able to showcase our open and transparent standards development process, the ease with which international stakeholders can become engaged, the speed of UL standards development, and the fact that participation is completely free of charge.

On Oct. 13–Nov. 4, we proudly sponsored the [86th IEC General Meeting](#) in San Francisco, hosted by the United States National Committee (USNC) to the IEC. Our organization hosted and participated in various events at the General Meeting, including a panel discussion on the role of standards and conformity assessment in addressing the U.N. SDGs and the Women at IEC Luncheon, reflecting our commitment to achieving greater gender balance, representation,

and inclusion in our standards and standards development process. We also hosted a reception for stakeholders, at which Executive Director David Steel welcomed guests and shared insight into how we're working to make the world safer, more secure, and more sustainable through standards development and collaboration with international partners. He shared overviews of UL Standards & Engagement, UL Research Institutes, and UL Solutions and explained how the three organizations work with one another under this shared mission.



*Terrence R. Brady, board chair of UL Standards & Engagement, gives the keynote address at the IEC General Meeting in San Francisco*



*UL Standards & Engagement at the ISO Annual Meeting in Abu Dhabi, United Arab Emirates*



## Modern Standards Program: The Active Standards Report



In 2020, we kicked off the [Modern Standards Program](#) (MSP) – a multiyear journey to overhaul our approach to operations, technology, and stakeholder engagement – one that would help ensure our ability to quickly adapt to our changing world and address future safety challenges through standardization. Objectives of the Modern Standards Program include reducing the time it takes to publish standards, upgrading to more modern technology, broadening stakeholder outreach, and building upon our best-in-class user experience. In 2022, we launched the Active Standards Report as part of this initiative.

### Active Standards Report

To further demonstrate our commitment to the transparency principle of the World Trade Organization's (WTO) Technical Barriers to Trade (TBT) Agreement, we launched our [Active Standards Report](#), an interactive platform

providing stakeholders with live status updates on standards with active work in progress. The Active Standards Report lists all current standards projects under development, with up-to-date information on the process stage for each, along with estimated publication dates and deadlines for comments and votes.

Through the Active Standards Report, our stakeholders, MOU partners and TC members can gain insight into ongoing standards work and identify opportunities to become involved in the development of UL standards. Users can search the report for standards by keyword or title, or they can navigate by browsing categories such as appliances, batteries, fire safety, energy storage, and cybersecurity. Additional categories will be added over time. Information shown in the dashboard is sourced from CSDS.

# Data Science team

On October 6-7, we hosted our first LATAM Fire Safety Congress in Mexico City with the objective of understanding local needs and strengthening the use of fire safety standards in the region. Members of our Data Science and International Standards teams joined forces to host this event and increase understanding of fire safety data and incident trends among Latin American countries. The event also brought together experts from other organizations including the National Fire Protection Association (NFPA) and ASTM International to identify opportunities for collaboration.

The Data Science team captures and reports data in support of standards processes, to assist leaders in making good decisions. The team provides TCs with data and analyses for safety, security, and sustainability issues that may be addressed by standards. They also develop metrics and conduct analyses on understanding the impact of our standards around the world. Additionally, they use natural language processing and machine learning in innovative ways to analyze the content of our standards.

The Data Science team collaborates with and supports the research needs of our partners located in different regions around the world. Our regional managers understand the needs of the countries and stakeholders they work with and relay the need for data and analytics to better define issues and needs. We analyze the situation and provide a report and presentation, and we also conduct webinars to meet with local stakeholders to review the results.



UL Standards & Engagement at the LATAM Fire Safety Congress in Mexico City



In 2022, the team played a major role in our agenda to help advance the U.N. SDGs by analyzing feedback from subject matter experts. Additional accomplishments this year include the following:



Gathered data in support of the standards landscape analysis conducted by the Programs and Engineering teams. This included comparing standards metadata from several systems to identify and correct invalid or conflicting data.



Refined a dashboard on the use of the free Digital View feature on [ShopULStandards.com](https://shopulstandards.com), and created real-time alerts for abnormally high use of the feature.



Analyzed data associated with incidents involving eBikes and other personal mobility devices, to understand trends and characteristics of those incidents.



Conducted a case study on the impact of changes to ANSI/CAN/UL 325, the Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems, in support of the development of a methodology for quantifying the impact of standards.



Updated the Thermal Runaway Incident Program (TRIP) Portal, which allows stakeholders to report lithium-battery thermal runaway incidents and near-misses affecting aviation safety.



# Engineering team

## Virtual House

In October, the Engineering team launched Phase Two of the Virtual Community with the deployment of the [Virtual House](#). This installment allows users to learn about the influence of UL standards on everyday life by clicking through an interactive digital home. It features four interactive areas (kitchen, living area, garage, and building/outdoors) that users can click through as they learn about safety and sustainability standards for home appliances, utilities, building materials, and more.

## Codes & Standards initiative

Our Codes & Standards initiative has been instrumental in developing our approach to codes such as the 2023 National Electric Code (NEC). This is the first year that UL Standards & Engagement has been actively involved in directly monitoring the NEC activity. The Requirements Selection and Horizontal Requirements projects are also building the landscape and technical framework for the Safety Science Ecosystem, which will utilize a hazard-based safety engineering approach to standards development including building model requirements for common tests such as the Dielectric and Leakage Current tests. Supporting a host of TCs relative to developing technical requirements and also supporting Gage R&R studies are additional projects that our team supports across UL Standards & Engagement.

## Engaging with international stakeholders

Our team is involved in many presentations and discussions with our international stakeholders, to help drive awareness about our standards and how they can be used to help drive global safety. Most recently, one of our engineers served as a speaker for the First National Convention of the Philippine Integrated Fire Protection Organization.

The presentation emphasized the importance of integrating fire safety principles as a systems approach to mitigate the risks that come with fire, smoke, and electrical hazards.

## About

The Standards Engineering team is committed to informing research components of scientific and engineering issues that arise during standards development and helping to incorporate UL Research Institutes insights into UL standards. The team provides technical expertise to help assess the effectiveness and impact of our standards and to help drive standard improvements. The team also helps UL Standards & Engagement prepare for and respond to new and emerging technologies, and facilitates the horizontal flow and consistency of information across our standards to proactively address new and emerging markets.







Highlights of our standards portfolio



## EV standards:

### **UL 2231-1**

Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 1: General Requirements

### **UL 2231-2**

Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 2: Particular Requirements for Protection Devices for Use in Charging Systems

### **UL 2251**

Plugs, Receptacles and Couplers for Electric Vehicles

### **UL 2594**

Electric Vehicle Supply Equipment

### **UL 2271**

Batteries for Use in Light Electric Vehicle (LEV) Applications

### **UL 2580**

Batteries for Use in Electric Vehicles

## Electric vehicles

UL Standards & Engagement offers many safety standards related to the charging of electric vehicles (EVs). Requirements for the personnel protection system for EV supply circuits were first published in 1996, with UL 2231-1 and UL 2231-2 becoming consensus standards in 2002. Harmonization working groups were then formed between the U.S., Canada, and Mexico to establish common requirements for these systems, as well as requirements for EV connectors and EV charging equipment that established trilateral second editions of UL 2231-1, UL 2231-2, and trilateral first editions of UL 2251, and UL 2594, in accordance with each country's national codes. Work continues today on harmonizing requirements for DC chargers, EV power export equipment, and wireless chargers. In addition, we offer standards for batteries for use in electric vehicles such as UL 2271 and UL 2580.

When electric vehicle infrastructure components are developed, they must meet safety, sustainability, and performance standards. Additionally, addressing electric vehicle safety through standardization is an ongoing process as technology continues to evolve.

Throughout the year, we partnered with the India Energy Storage Alliance (IESA) to host a Masterclass Webinar Series on safety and standards for Energy Storage Systems. One of the sessions featured an overview of standards for electric vehicle supply equipment and standards for the safety of electric vehicle charging system equipment, plugs, receptacles, and couplers.

On Sept. 12-13, we presented to Asia-Pacific Economic Cooperation (APEC) policy makers and key auto industry representatives in Bangkok at the 36th APEC Automotive Dialogue and a subsequent workshop on Advanced Vehicle Technologies. In both events, we explained the catalog of UL standards supporting electric vehicles and the transition to clean energy.

On June 21, we participated in a workshop hosted by the GCC Standardization Organization (GSO) in Abu Dhabi regarding EV plugs and sockets, as there is an initiative to unify them among GCC countries.



*UL Standards & Engagement Regional Standards Manager for the Middle East and North Africa (right) at the GCC Standardization Organization workshop in Abu Dhabi, United Arab Emirates*





## Helping companies report on circular economy and sustainability efforts

As a world-class standards development organization working in partnership with global stakeholders, UL Standards & Engagement is dedicated to incorporating sustainability and sustainable practices into its diverse portfolio of standards and documents to help make the world safer, more secure, and more sustainable. Our Sustainability Initiative strives to further our contribution and impact on sustainability globally through collaborative standards development and active participation in technical committees, as well as by implementing sensing to understand and proactively address industry trends and emerging technologies.

As sustainability continues to gain momentum in the corporate world, standards can help quantify circular economy efforts by companies around the world. [UL 3600, the Standard for Measuring and Reporting Circular Economy Aspects of Products](#), is the first Standard that assists companies in evaluating circular economy efforts and measuring corporate sustainability at the site, product, and company level.

A circular production model is one that prioritizes sustainability practices including eliminating waste, reusing and/or repurposing materials, and regenerating natural resources. UL 3600 also provides a Circularity Transparency Label with an overall score that rates the circularity of the company's material flow and factors in corporate social responsibility elements. These factors include evaluating worker safety and health as well as diversity, equity, and inclusion (DE&I) in the company workforce, to help encourage continuous improvement and reporting on environmental, social, and corporate governance (ESG) to stakeholders.

The technical committee developing UL 3600 includes experts from industries such as waste management, forestry and chemical supply, as well as regulatory and international agencies.

Throughout the year, UL Standards & Engagement conducted a masterclass series on circular economy in partnership with the Bureau of Indian Standards, the Confederation of Indian Industry, the U.S. Commercial Service, and the U.S.-India Strategic Partnership Forum. This masterclass series aimed to build awareness of circular economy efforts and develop an action plan for India to effectively implement a circular economy for moving toward net zero carbon emissions.

Members of the Sustainability Initiative team have contributed to the development of the following sustainability standards:

### **UL 110**

The Standard for Sustainability for Mobile Phones

### **UL 2700**

The Standard for Sustainability for Cleaning and Cleaning Related Products (in development)

### **UL 3420**

The Standard for Sustainability of Plastic Packaging and Packaging Components

Members are also active participants on the following external technical committees:

ISO/TC 308 – Chain of Custody

ISO/TC 323 – Circular Economy

ISO/TC 59/SC 17 – Sustainability in Buildings and Civil Engineering Works





## **National Standards Conclave: Re-orienting and Implementing India's Value Chain Integration through Standards Compliance**

On December 19-20, 2022, UL Standards & Engagement sponsored the National Standards Conclave, organized by the Ministry of Commerce and Confederation of Indian Industries (CII). As part of the conclave, UL Standards & Engagement presented at the session, "Industry Preparedness on Emergence of Sustainability Standards," emphasizing the need for sustainability standards and highlighting how UL 3600 can help facilitate the implementation of a circular economy in India.

### **UL 1974, the Standard for Evaluation for Repurposing Batteries**

In addition, [UL 1974, the Standard for Evaluation for Repurposing Batteries](#), plays a key role in supporting circular economy for electric vehicles. EV batteries are costly, they use scarce minerals such as lithium and cobalt, and they are not easily recyclable. The most common solution according to the circular economy framework is to repurpose the batteries for a second life, especially as battery energy storage system are used in the power sector. UL 1974 supports the grading and sorting of retired EV batteries and helps stakeholders gain trust in using them safely.

### **UL 3420, the Sustainability Standard for Plastic Packaging and Packaging Components**

This year, we published [UL 3420, the Sustainability Standard for Plastic Packaging and Packaging Components](#). This first edition standard covers the sustainability of plastic articles and fiber materials that are used with plastic packaging to contain, handle, protect, and/or transport solid or liquid consumer goods from the point of packaging to the consumer. The standard covers rigid and flexible bottles, bags, pouches, certain films, carded packaging, and any other plastic-based primary packaging or packaging components and systems intended for use with consumer package goods.

Sustainability factors for plastic packaging addressed in this standard include:

- Limitations on regulated contaminants
- Promotion of the reuse and recyclability of materials
- The use of cellulose fibers as an ingredient in the packaging materials or a component of a packaging system
- Energy use and material efficiency
- Extension of useful life and end of life management
- Sustainability of packaging for transport to consumer
- Corporate practices
- Manufacturing and operations
- Innovation



# Fire safety

## Mexico and Latin America

This year, UL Standards & Engagement convened the first edition of the [Young Professionals in Fire Safety Program](#). The program extends from our efforts to promote the awareness and use of standards and technical regulations in Mexico, as well as our commitment to the country's National Quality Infrastructure System. The purpose of the program is to train the next generation of leaders in the fire safety industry by creating an immersive experience to learn and network with Mexican and international industry experts. In the future, we would like to expand the program to other LATAM and Caribbean countries as we work to provide educational and awareness opportunities on the development and regulation of fire safety standards for students and young professionals in the region.

The program is organized in conjunction with the Technical Committee for National Standardization of Fire Safety and Life-Saving Devices (CTNNSIDS) in Mexico, with support from colleagues at UL Research Institutes and UL Solutions, as well as partners from Mexico's General Bureau of Standards (DGN), the NFPA, Mexico's National Council for Fire Protection (CONAPCI), and the Mexican Association of Automatic Fire Sprinklers (AMRACI).



*Ismael Galicia, safety engineer at KIEWIT and winner of the 2022 Young Professionals in Fire Safety Program*

## Indonesia

Badan Standardisasi Nasional (BSN), the national standards body of Indonesia, recently collaborated with UL Standards & Engagement to [publish SNI UL 19-2018](#), the Standard for Lined Fire Hose and Hose Assemblies – an identical adoption of UL 19, which shares the same title. To celebrate our first national standard adopted in Indonesia, we [interviewed Professor Yulianto Sulisty Nugroho](#), Ph.D., vice-chairman of BSN TC 13-04, Firefighting Vehicles and Equipment, who shared his views on the development of fire hose standards in the country.

## China

Following our successful [2021 workshop series](#) on fire safety standards with MOU partner Shenzhen International Safety Technology Co., Ltd. (SZIST), we held more workshops in 2022 on smoke detectors, alarm systems, and sprinklers. These workshops were designed to help further collaboration with SZIST, and to help local stakeholders better understand and utilize UL fire safety standards – equipping them to help improve the quality of their products by referring to UL standards, make their voices heard globally, and impact global trade.

Additionally, a workshop was held on fire doors, windows, and accessories in partnership with the Fire Safety Door (Lock) Industry Alliance.

## Middle East and North Africa

Our regional standards manager in the Middle East and Northern Africa represented UL Standards & Engagement in September at the Intersec Saudi Arabia Conference – the Kingdom's largest trade fair for security, safety, and fire protection. He delivered a keynote address and chaired a panel session on the role of leadership in the implementation of standards for achieving the kingdom's 2030 sustainability goals. The panel included local and international organizations such as the Saudi Standards, Metrology, and Quality Organization (SASO); the NFPA; and Crash Institute.

# International fire safety standards

Why is a global view of fire safety important? Consider the devastating fires that occurred in recent years at the [Tamwel Tower](#) and [Torch skyscraper](#) in Dubai, [Plasco in Tehran](#), [Pemex in Mexico City](#), and [Grenfell Tower in the UK](#). The science of fire knows no geographical or political limits.

As a member of the [International Fire Safety Standards \(IFSS\) Coalition](#), UL Standards & Engagement helped to develop and release the Global Plan for a Decade of Action for Fire Safety, which kicked off its first year in 2022. The initiative aims to help save lives by reducing risk and preventing devastating fires through the establishment of an internationally consistent approach to the safety and management of buildings, infrastructure, and more.

The plan delivers a clear goal, performance-based objectives framework, and common actions that align with the U.N. SDGs. These can take place at the individual, community, city, national, regional, and global levels, which can be defined through the following pillars:



**Pillar 1 – People** – Actions to help individuals and groups understand fire, what they can do to increase their understanding



**Pillar 2 – Products** – Actions to reduce fire hazards associated with appliances, contents, and building components



**Pillar 3 – Structures** – Actions to reduce fire hazards associated with structures, including planning, design, and operation



**Pillar 4 – Infrastructure** – Actions to help enhance firefighting infrastructure



**Pillar 5 – Communities** – Actions to facilitate sustainable and fire-resilient communities.

UL Standards & Engagement is involved in pillars two and three, and is taking the lead on pillar four by helping firefighters and rescue personnel construct or expand their fire service capabilities. This includes helping improve fire suppression infrastructure and wildland fire suppression capacity by developing a global knowledge-sharing database that can be referenced by any firefighter who wants to know how other departments deal with fires depending on the various levels of funding, equipment, training, staff, and types of fires. This effort is in its first year, and UL Standards & Engagement is partnering with other organizations to collect data and develop the various data points for the database.

The U.N. launched the IFSS Coalition in 2018 with the aim of setting minimum levels of fire safety and professionalism around the world. The IFSS Coalition intends to address inconsistencies in regulation, design, construction, and management that result in unnecessary risk, confusion, and loss of confidence. In 2020, the coalition published the IFSS-Common Principles, which delivers a clear, performance-based framework and common principles applying to all stages of a building's life cycle, which are intended to be universally applicable worldwide, regardless of the existing codes, standards, and guidance already in place. The common principles are as follows:

- 1. Prevention** – Safeguarding against the outbreak of fire and/or limiting its effects.
- 2. Detection and Communication** – Investigating and discovering fire followed by informing occupants and the fire service.
- 3. Occupant Protection** – Facilitating occupant avoidance of and escape from the effects of fire.
- 4. Containment** – Limiting fire and all of its consequences to as small an area as possible.
- 5. Extinguishment** – Suppressing fire and protecting the surrounding environment.



## Wire and cable

Our portfolio includes more than 40 wire and cable consensus standards and it continues to grow as we address safety issues that arise with the introduction of new technologies. While some standards are developed for voluntary compliance, the majority are organized to match the corresponding requirements in the U.S. National Electrical Code, NFPA 70, and are identified as applicable to the relevant installation types in that code.

Several of the standards were first published more than a century ago, including UL 4, the Standard for Armored Cable, and UL 62, the Standard for Safety for Flexible Cords and Cables. By contrast, the First Edition of UL 4703, the Standard for Safety for Photovoltaic Wire, was published less than 10 years ago, and new standards are currently under development. Current topics include charging cables for portable electronics, and connection cables for rapid-charging stations for electric vehicles.

Stakeholders in countries outside of the U.S. have adopted or applied some of the standards in their jurisdictions, and we continue to support ongoing engagement with current and future overseas users. Recent examples are below:

### The Philippines

In Sept. 2022, [the Bureau of Philippine Standards \(BPS\) adopted and published three UL Standards](#) as Philippine National Standards (PNS): PNS UL 248-1:2021 Low-Voltage Fuses - Part 1: General Requirements, PNS UL 248-6:2021 Low-Voltage Fuses - Part 6: Class H Non-Renewable Fuses, and PNS UL 67:2021 Panelboards. The adoption of these standards follows a 2021 presentation of our wire and cable standards portfolio to BPS Technical Committee 1 (TC1) – Electrical Wires & Cables.

In Dec. 2022, [BPS also adopted PNS UL 588, the Standard for Safety for Seasonal and Holiday Decorative Products](#). The publication follows a



*A traditional Filipino parol lantern on display for the Christmas season*

series of workshops with the BPS technical committees on ground fault circuit interrupters and decorative lighting.

### Ecuador

In Feb. 2022, we held a joint [webinar](#) with el Instituto Ecuatoriano de Normalización (INEN), the national standards body for Ecuador, to explore harmonization opportunities for UL 83, the Standard for Thermoplastic-Insulated Wires and Cables. UL 83 is already harmonized in the United States, Canada and Mexico.

In April, we held another training webinar on UL 62, the Standard for Flexible Cords and Wires with more than 20 members of the INEN Technical Committee interested in adopting the standard. UL Standards & Engagement Standards Program Manager John Wade, who served as TC Chair for UL 62, explained the scope of standard and its general content, and invited all the attendees to participate in the UL technical committee responsible for its development. Principal Engineer Dave Mercier also participated and explained the standard's testing methods. INEN thanked UL Standards & Engagement for the technical support to facilitate the adoption of UL 83 and to convert it into a national standard.

# Energy storage systems

With increasing demand for electric vehicles and energy storage systems (ESS), safety standards are critical to help support the rapidly changing energy storage ecosystem. To help promote safety in areas around the world where ESS technology is being adopted, we held several webinars throughout 2022 with international MOU partner organizations.

## Masterclass series with IESA

We partnered with the India Energy Storage Alliance (IESA) to host a six-session masterclass webinar series on safety and standards for energy storage systems. The series consisted of topics including standards for lithium-ion batteries and their transportation, recycling and repurposing of batteries, and challenges and mitigation plans for battery fires.

## Workshop series with SON

We also partnered with the Standards Organization of Nigeria (SON) to conduct a six-session workshop series on topics such as standards for energy storage systems and electric vehicles. Topics for the series were selected by SON to address specific standardization needs and goals in the country. The workshop series was attended by technical committee members from SON to promote communication and collaboration between our two organizations, and to encourage joint standards development and adoption or adaptation of UL standards with national differences, as outlined in our [2021 MOU agreement](#).

## 2022 SBC-UL Standards & Engagement Battery Conference

In August, we held the 2022 SBC-UL Standards & Engagement Battery Conference in collaboration with the Singapore Battery Consortium (SBC) to support Singapore's clean energy goal. The conference featured many expert speakers including fire safety practitioners and representatives from industry, leading institutions, and academia. Speakers reviewed safety challenges and discussed the development of battery energy storage systems (BESS)

in Singapore. The conference was attended by approximately 80 participants, with sizeable representation from the governmental agencies.

We presented on international standards for ESS and batteries, with a focus on UL 9540, UL 9540A, UL 1973, and UL 1974. UL 9540A – our standard on evaluating thermal runaway fire propagation in BESS, also known as large scale fire test, attracted significant interest as this unique standard helps to characterize the performance of BESS.



SBC-UL Standards & Engagement Battery Conference



## Energy storage systems, continued

### **FiSAC 2022**

In November, we took part in a battery energy storage systems workshop at the Fire Safety Asia Conference & Exhibition Singapore (FiSAC) 2022. The workshop focused on UL 9540A and was supported by UL Standards & Engagement and the Institution of Fire Engineers Singapore.

### **Collaboration in China**

In August, we attended the CNESA Standards Seminar and the UL Energy Storage Standard China Working Group Meeting in Beijing. We introduced UL 9540, UL 9540A, UL 1974, and other energy storage-related standards.

Presenters introduced the framework and first draft of the standard for lithium-ion BESS fire spread testing, as well as the standard for electrochemical ESS fire suppression devices. The background and preliminary ideas of the safety performance evaluation standard for lithium-ion BESS were also introduced and discussed.

Both events were sponsored by Zhongguancun Energy Storage Industry Alliance, the State Key Laboratory of Fire Science of the University of Science and Technology of China and the UL Energy Storage Standard China Working Group. More than 60

experts from the industry, supply chain, and research institutes attended.

In 2021, Zhongguancun Energy Storage Industry Alliance and UL Standards & Engagement established the UL Energy Storage Standard China Working Group with the goal of developing and promoting energy storage safety standards. The alliance will also participate in the development of UL energy storage-related standards, promote the implementation of standards in energy storage projects, and help to make standards the foundation for the safe development of the energy storage industry.

### **Standards for energy storage systems:**

#### **UL 9540**

Energy Storage Systems and Equipment

#### **UL 9540A**

Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems

#### **UL 1973**

Batteries for Use in Stationary and Motive Auxiliary Power Applications

#### **UL 1974**

Evaluation for Repurposing Batteries



*CNESA working group meeting on energy storage system standards, in Beijing*



## Energy storage systems, continued

### **Distributed energy systems in India: BIS-CEA-ULSE joint workshop and roundtable**

Distributed energy systems are the most important elements in the efficient management of the power supply infrastructure in India. With increased interoperability, IoT enabling, smart metering, and related IT infrastructure, the power grid is more vulnerable than ever to cybersecurity threats.



#### **Workshop on cybersecurity in distributed energy systems**

In November, UL Standards & Engagement partnered with the Bureau of Indian Standards (BIS) and the Central Electricity Authority (CEA) to organize a workshop on the importance of cybersecurity in distributed energy systems. The purpose of the workshop was to promote awareness of cybersecurity challenges and the role of international standards in building a secure power distribution system.



#### **Roundtable power grid safety and security**

This workshop was followed by a roundtable in December to develop an actionable work plan to make Indian power grid systems safe and secure. The action plan focused on building awareness of standards for the cybersecurity of distributed energy systems through a joint workshop program between UL Standards & Engagement and BIS that would help address standardization gaps and promote the development of new related standards.





## Leading the harmonization of cybersecurity standards in ASEAN



*UL Standards & Engagement and the Indonesia Ministry of Commerce at the ASEAN Economic Ministers' Meeting, 2022*

As Chair of the US-ASEAN Business Council (USABC) subcommittee on standards, UL Standards & Engagement led a dialogue session in March 2022 with the ASEAN Consultative Committee for Standards and Quality's Digital Trade Standards and Conformance Working Group (ACCSQ-DTSCWG). The session followed a June 2020 meeting with ACCSQ, which was held to explore how U.S. industry can support ASEAN

in strengthening cybersecurity and cyber resiliency through the adoption and harmonization of cybersecurity standards across ASEAN Member States (AMS).

Through these sessions, the USABC developed a [cybersecurity whitepaper](#) on best practices to support harmonization, recommended international standards for adoption, and address technical barriers to trade in the region.

The whitepaper was presented to the ASEAN Economic Ministers (AEM) during the AEM-USTR Consultative Meeting on Sept. 18, 2022. This whitepaper will also serve as a baseline document for further discussion with ACCSQ-DTSCWG to identify further collaboration and capacity building programs that can help support the harmonization of standards for digital trade in ASEAN.





## Word to the W.I.S.E. podcast series

Launched in October 2021, the Word to the W.I.S.E. (women in science and engineering) podcast series provides a platform for conversations around safety, security, sustainability, representation of women in standards development, and more.

The first season focused on the professional journeys of remarkable women in STEM fields including safety, security, and sustainability. We brought together a wide range of these experts to engage in conversations on safety science, trends in STEM, and representation in their fields.

The second season kicked off in Sept. 2022, focusing on the theme, “Why Standards Matter.” The season is intended to help advance our mission of working for a safer world through impactful conversation, awareness building, and exploration of strategies to help increase gender diversity in the development of standards and technical regulations.

The Word to the W.I.S.E. podcast is available on [ULSE.org](https://ulse.org), as well as on [Apple Podcasts](#), [Google Podcasts](#), and [Spotify](#).

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## Installation codes and product standards

On Nov. 9, UL Standards & Engagement and the Institute of Integrated Electrical Engineers of The Philippines (IIEE) conducted the joint roundtable, [“Coherence in Installation Code and Product Standards,”](#) during the 47th IIEE Annual National Convention. This roundtable, with support from the Bureau of Philippine Standards, successfully reached more than 1200 participants, mostly electrical engineers, and members of IIEE responsible for implementing installation codes. The discussion provided IIEE engineers with information on proper application of installation codes, to help enhance electrical safety in the Philippines.

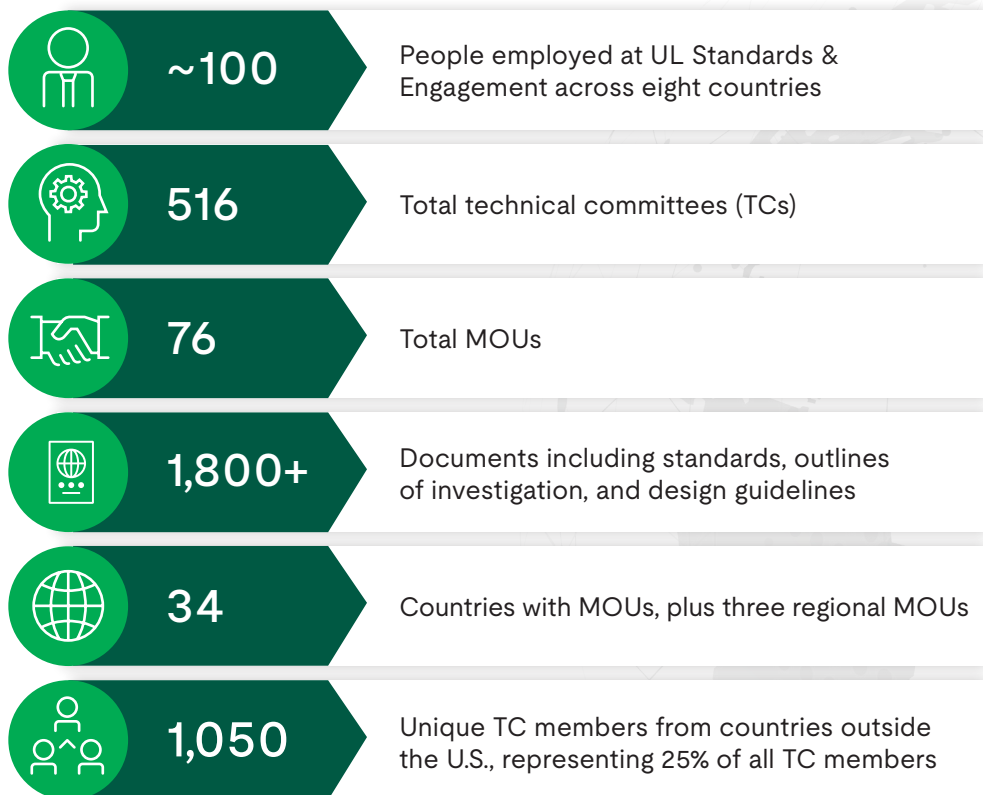
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## MOU partnerships

In line with the UL mission of working for a safer world, [we collaborate with national and regional SDOs, industry, and academia, around the globe](#) to develop and harmonize standards that address local safety and sustainability needs. We sign memorandums of understanding (MOUs) to formalize partnerships with these organizations and outline how we will share knowledge and support one another’s standards development activities. Each partnership is structured with the goals of promoting communication, fostering ongoing collaboration, and facilitating participation of stakeholders while developing and harmonizing safety standards.



# Our impact



Our entire library of UL standards documents can be accessed through our free Digital View feature (with site registration) on [ShopULStandards.com](https://shopulstandards.com). Registration is open to any interested individual or organization globally.

## List of new standards published

### UL 248-18

Standard for Low-Voltage Fuses – Part 18: Class CD Fuses

### UL 258

Shutoff Valves for Trim and Drain Purposes for Fire Protection

### UL 486L

Standard for Large Ferrules

### UL 498B

Standard for Receptacles with Integral Switching Means

### UL 2263

Electric Vehicle Cable

### UL 2735C

Electric Utility Meters for Canada

### UL 2800-1-1

Risk Concerns for Interoperable Medical Products

### UL 2800-1-2

Interoperable Item Development Life Cycle

### UL 2800-1-3

Interoperable Item Integration Life Cycle

### UL 3420

Standard for Formulated Plastics Packaging

### UL 4402

Indoor Air Quality in Buildings and Facilities Utilized for the Cultivation and Post-Harvest Processing of Cannabis

### UL 5840

Standard for Safety for Electrical Systems of Battery Powered Aviation Ground Support Equipment

### UL 8801

Photovoltaic (PV) Luminaire Systems

### UL 60079-46

Recommended Practice for Explosive Atmospheres – Part 46: Equipment Assemblies

### UL 60079-47

Standard for Explosive Atmospheres – Part 47: Equipment Protection by 2-Wire Intrinsically Safe Ethernet Concept (2-WISE)

### UL 60335-2-69

Standard for Household and Similar Electrical Appliances – Safety – Part 2-69: Particular Requirements for Wet and Dry Vacuum Cleaners, including Power Brush, for Commercial Use

### UL 61058-2-1

Standard for Switches for Appliances – Part 2: Particular Requirements for Cord Switches

### UL 62841-2-6

Standard for Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery – Safety – Part 2-6: Particular Requirements for Hand-Held Hammers

### UL 62852

Connectors For DC-Application in Photovoltaic Systems – Safety Requirements and Tests

### UL 62915

Technical Specification for Photovoltaic (PV) Modules – Type Approval, Design and Safety Qualification – Retesting



