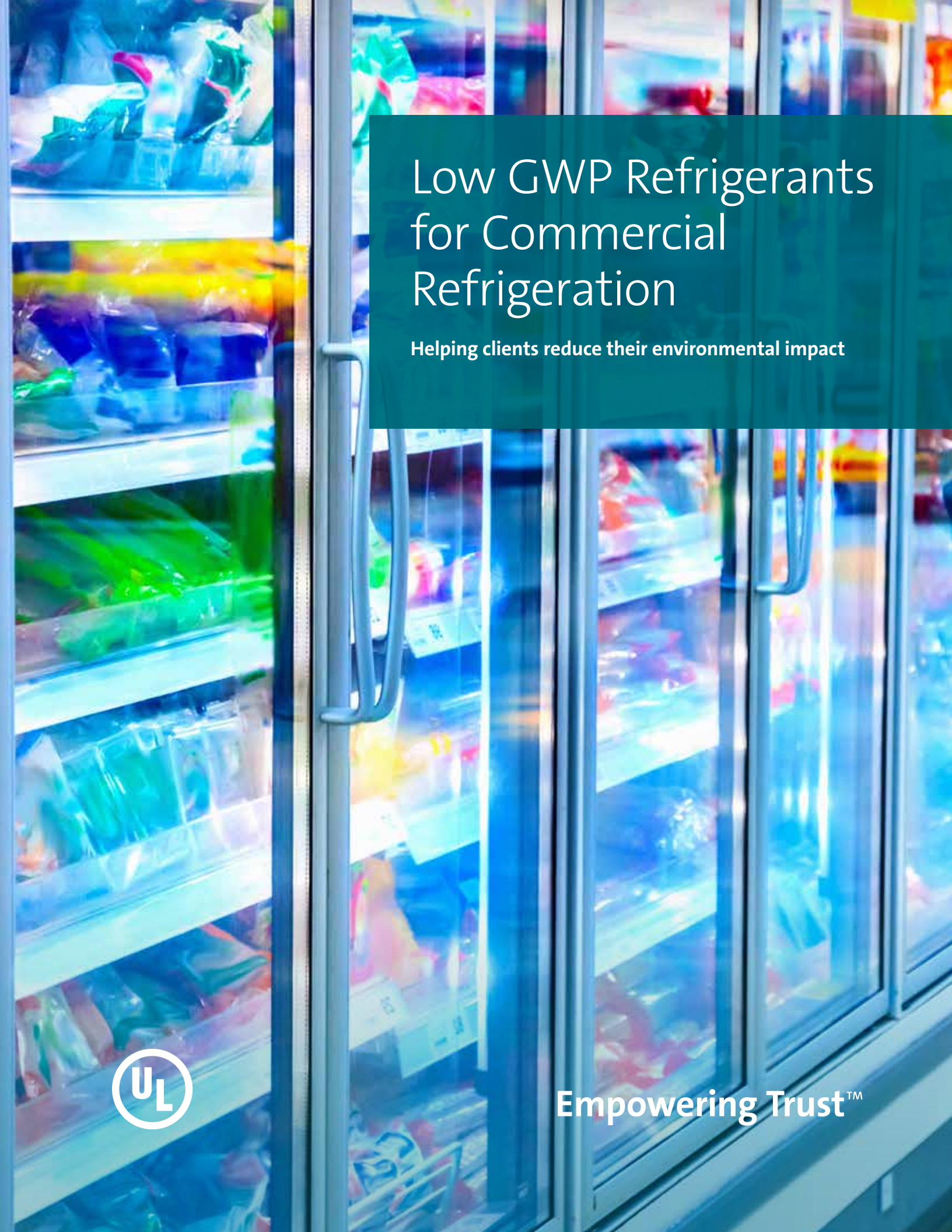
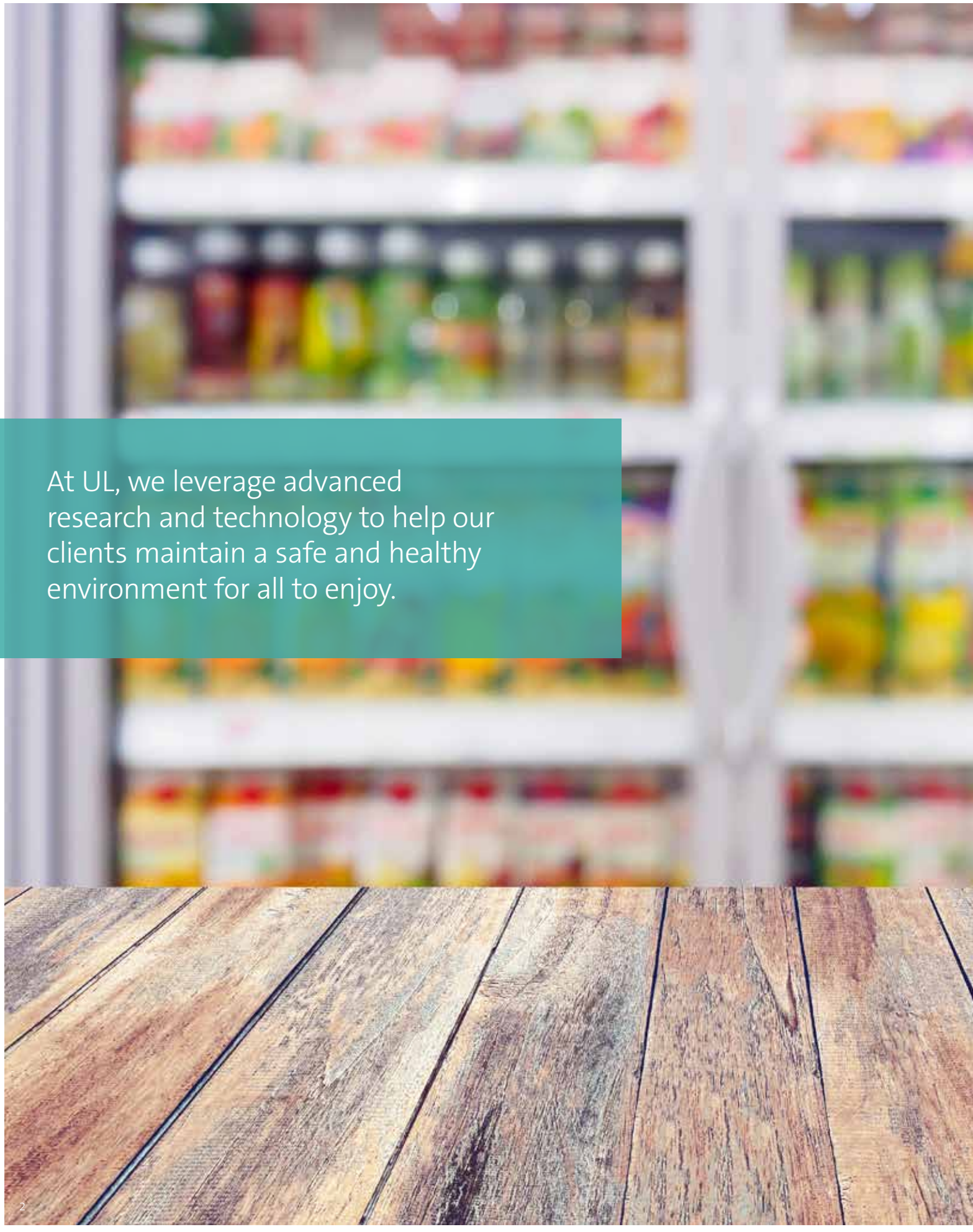


Low GWP Refrigerants for Commercial Refrigeration

Helping clients reduce their environmental impact

Empowering Trust™



At UL, we leverage advanced research and technology to help our clients maintain a safe and healthy environment for all to enjoy.

The pace of change

A disruptive change is currently underway in the HVAC-R refrigerant market. Driven by environmental concerns, global promoters are advocating the phase-out of traditional refrigerants in favor of new alternatives with a lower global warming potential (GWP).

The impact of these new rules will dramatically alter heating and cooling in a wide range of industries over the course of the coming years. While this is hardly the first time the refrigerants market has seen significant changes, the current shift differs from past experiences in the sheer number of options that are now available.

Today, reality is much more complicated. Regulatory guidelines mean that businesses face different requirements depending on where and how they operate. A large number of new refrigerants have emerged, along with new technology to support them, but solutions that work well for some applications may not adequately support other demands.

Simply put, there is not a one-size-fits-all answer; however, UL can help demystify the confusing process of selecting the best and safest alternate refrigerant for your application. You want to invest in the development of equipment and systems that reduce your environmental impact. UL is prepared for the future of low-GWP refrigerants, and we want to help prepare you to drive innovation.

Commercial & Retail Refrigeration

UL's legacy safety standard for commercial refrigerators and freezers is UL 471. This type of equipment is transitioning to UL/CSA 60335-2-89, "Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Unit or Compressor," which was published September 29, 2017. While both standards can currently be used, products certified to UL 471 must transition to 2-89 under UL's Certification Requirements Changes – Action Not Required with a September 29, 2022 Effective Date.

Regarding environmentally friendly refrigerants that are flammable, UL 471 allows up to 150g of A3 refrigerant and 500g of an A2L refrigerant. UL and IEC 60335-2-89 (the international safety standard) both allow up to 150g of any flammable refrigerant. However, there is currently an IEC 2-89 proposal to increase the flammable refrigerant charge limits to 500g propane and 1.2 kg A2L. Assuming this proposal passes, the U.S. and Canadian committees will need to work on adopting similar requirements in the UL/CSA version of 60335-2-89.

The EPA's Significant New Alternatives Policy (SNAP) allows 150g of propane or isobutane refrigerant with use conditions similar to those in UL 471. This applies to standalone equipment only, but retrofitting a flammable refrigerant is not allowed. EPA SNAP also de-listed many previously acceptable refrigerants with a high Global Warming Potential (GWP), but a lawsuit has prevented its implementation. Because the EPA regulation has been put on hold, the California Air Resource Board (CARB) adopted similar requirements for California. Many common refrigerants have been prohibited, including R-404A and R-507A, with effective dates of January 1, 2019 or January 1, 2020 depending on the size and type of equipment.

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Household Refrigeration

UL's legacy standard for household refrigerators, UL 250, was withdrawn May 29, 2018. All new and revised household refrigeration equipment is required to comply with UL/CSA 60335-2-24. Both UL and IEC 60335-2-24 allow the use of up to 150g of a flammable refrigerant. EPA's SNAP program references UL 60335-2-24 and also allows up to 150g of flammable refrigerant. EPA SNAP also de-listed many high GWP refrigerants for household refrigerators, including R-134a, but this ruling is currently under litigation. A January 1, 2021 effective date is referenced.

Commercial Ice Makers

The UL safety standard for ice makers is UL 563. This standard allows up to 150g of A3 refrigerant and 500g of A2L refrigerant. EPA SNAP allows 150g propane with use conditions consistent with UL 563. This applies to self-contained equipment only, and retrofitting a flammable refrigerant is not allowed. Internationally, ice makers have historically been evaluated to IEC 60335-2-24, but the scope of IEC 60335-2-89 is currently being revised to add commercial ice makers. Upon revision, ice makers will transition from UL 563 to UL 60335-2-89 with a timeline to be determined. It is noted that ASHRAE 15, the Installation Standard for Refrigeration Systems, does not allow equipment with a flammable refrigerant to be used in hallways and corridors of public buildings.

Flammable Refrigerant Safety

UL is here to help you understand flammable refrigerant requirements and bring safe products to market. We are also available to collaborate with your team to provide information early in the design and development process.

Members from UL's engineering staff participate on both national and international technical committees. Our extensive knowledge of the upcoming requirements puts us in a unique position to help you navigate the flammable-refrigerant landscape. Whether you are familiar with these requirements or are new to flammable refrigerants, a conversation with UL's technical experts will ensure that your organization understands the impact of these refrigerants.

If you are new to the UL 60335 Series of Standards or would like to have your engineering and lab teams better understand the construction and testing requirements, we can assist, as well. A custom training course tailored to your needs will be created and can be delivered at your facility or one UL's many global facilities. This training can concentrate on the material in a classroom setting or can be expanded to review a current product/prototype to provide hands on feedback and a direct application of the requirements to your team. Depending on the depth of material covered, this training can range from less than a day (only covering an overview of the standard) to two days (addressing requirements, reviewing test methods and physically reviewing products). The class can also be scaled to work with various engineering team sizes from one or two design engineers to a full product-design and test-lab group. If you are already part of UL's Third-Party Data Acceptance Program (DAP), this training should be scheduled prior to the annual DAP audit to help ensure that all required equipment and test methods are in place. This will validate that your lab has the documentation in place to support expanding the scope of participation.

Several of the tests in the standard require that refrigerant is introduced into the equipment to simulate leaks. UL's Hazardous Location test labs have been designed to ensure that this can be done in a safe manner. If you are interested in preforming some preliminary testing a small test program can be created to provide feedback on the construction. In addition to the flammable refrigerant leak testing UL has traditional HVAC psychrometric rooms where we can conduct testing for safety certification or energy efficiency.

The geometry of the equipment and the space where it is installed will have an impact if refrigerant leaks into an occupied space. UL has larger facilities that can simulate a single room or whole building installation of HVAC equipment.

This testing can be conducted to validate anticipated mitigation means for a particular product or to determine the results of use of products before being installed in the field. In addition to having the space to conduct the tests, UL's experience with fire safety ensures that these tests are conducted in a way that gains the most information possible without compromising personal safety. UL's facilities operate under strict emissions standards based on the jurisdiction where they are located, and all byproducts of the testing are collected and processed before being released into the atmosphere.

Since UL's beginning in 1894, we have been one of the most recognized and trusted resources for product safety testing, certification and information, and choosing to work with UL says something important about your own commitment to the highest levels of safety and quality. Our integrated service teams deliver what you need when you need it to help you bring safer products to market faster. When your success is at stake, leave nothing to chance—put UL's vast expertise, thoroughness, broad capabilities, widespread acceptance and world-class reputation to work for you. No other compliance organization speaks with more authority and integrity or can add more value to your brand.

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