



Begin Implementing UL 991/UL 1998 and IEC/UL 60730-1 Annex H

Functional safety training for cross-industry technologies

Course overview

This three-day technical training course will give you in-depth exposure to industrial functional safety standards UL 991: Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 1998: Standard for Software in Programmable Components, and IEC/UL 60730-1 Annex H: Standard for Automatic and Electrical Controls for Household and Similar Use. This course teaches how to effectively use the standards in a product's design phase, which is critical to its certification and acceptance. During the course, the concepts covered by the Standards will be applied to a cross-industry technology topic, highlighting the fact that different standards used in different industries use different metrics for assessing and testing functional safety. Day 1 consists of a general overview of the Standards and will cover Failure Mode and Effects Analysis (FMEA) techniques, the environmental stress test program and other topics of UL 991. Day 2 focuses on the embedded software requirements of UL 1998. Day 3 covers commonalities between IEC/UL 60730-1 Annex H and UL 991, UL 1998 and this international standard.

Training topics

- Overview of functional safety
- UL 991:
 - FMEA
 - Environmental stress tests, including EMC immunity
 - Computational investigation and demonstrated method
 - Follow-up program
- UL 1998:
 - Risk analysis and microelectronic hardware considerations
 - Process definition
 - Qualification of development tools and off-the-shelf (OTS) software
 - Software design and partitioning
 - Product and user interfaces
 - Software verification, validation and testing
 - Configuration management and maintenance
 - Documentation
- IEC/UL 60730-1 Annex H:
 - Overview of IEC/UL 60730 standard series
 - Similarities between UL 991 and UL 1998
 - Hardware requirements
 - Software requirements
 - Testing requirements
- Review the UL process steps for functional safety certification



Optional UL Certified Functional Safety Professional Exam

Participants who complete all three days of training are eligible to take a two-hour certification exam on the morning of the fourth day. Those who pass the exam are individually certified as a *UL Certified Functional Safety Professional (UL-CFSP)* in UL 991/UL 1998 and IEC/UL 60730-1 Annex H.

Upon the successful completion of the *UL-CFSP* exam, participants will receive a certificate and badges that they can use to demonstrate their competence in UL 991/UL 1998 and IEC/UL 60730-1 Annex H industrial functional safety. The certification is effective for three years, after which individuals may recertify.



Objectives

Upon completion of this workshop, you will be able to:

- Analyze the relationship of end-product standard requirements to UL 991, UL 1998 and IEC/UL 60730-1 Annex H requirements
- Recognize the applicability of UL 991, UL 1998 and IEC/UL 60730-1 Annex H requirements to the end-product design
- Apply FMEA techniques to safety-related circuits to identify critical components
- Learn how to evaluate critical components through computational investigation and demonstrated method
- Walk through an example UL 991, UL 1998 and IEC/UL 60730-1 Annex H test program
- Trace risk identification and analysis through programmable component and software design, implementation and validation processes
- Assess project management practices against UL 991, UL 1998 and IEC/UL 60730-1 Annex H requirements
- Develop submittal documentation for UL 991, UL 1998 and IEC/UL 60730-1 Annex H compliance
- Learn more about how these requirements may apply to your own product(s) during the interactive Q&A throughout the workshop
- Identify commonalities between UL 991, UL 1998, and other international standards like IEC/UL 60730-1 Annex H

Target audience

- Hardware/firmware designers
- Embedded software designers and development managers
- Project and product leaders
- Compliance engineers
- Design and manufacturing engineers

Why choose UL?

From materials testing to supply chain management, new energy options to security and interoperability solutions, leverage our expertise and insights to navigate the global regulatory landscape and bring your products to market.

UL's global network of technical experts and state-of-the-art facilities, along with our longstanding relationships with regulatory authorities, partner laboratories and industry technical leaders, helps manufacturers gain the compliance credentials they need to compete in a more complex global supply chain.

Knowledge you can trust – Our experienced staff will support you from the initial design stage of product development through testing and production. Our experts can assist you in understanding the certification requirements for your specific markets.

Speed and efficiency – Our cost-effective systems and state-of-the-art facilities cut through the red tape and help accelerate your time to market.

Single-source provider – UL meets all of your compliance needs and, by bundling safety, performance and interoperability services, also helps save you valuable time and money.

Global reach and access – Our global network of expert engineers helps you understand the various national and global requirements for your specific market application.

For more information, call 1.864.630.5373, email: kvasales@UL.com or visit kvausa.com.



Empowering Trust®

UL and the UL logo are trademarks of UL LLC © 2020.
CT26027149-1020 | 250.01.1020.EN.EPT