

User Report



SIEMENS

Siemens in Germany  
receives UL

**FUNCTIONAL SAFETY**  
mark for frequency inverters

# Functional Safety mark gains momentum



A growing number of companies are recognizing the importance of Functional Safety – as well as the growing marketing impact of this safety mark. Safety is also increasingly dependent on error-free operation of microelectronics and software. Today, manufacturers can gain an important competitive advantage by achieving Functional Safety certification, demonstrating that they are committed to safety in all forms and active in risk prevention. UL has been testing and evaluating products for Functional Safety since the 1990s, creating an important foundation from which UL launched a special Functional Safety mark in 2010.

# Siemens in Germany receives UL Functional Safety mark for frequency inverters

German companies are calling on UL to test and certify their products' Functional Safety compliance, with the aim of obtaining Functional Safety Listing mark from UL. One example of this is Siemens: in November 2012 Siemens AG received the Functional Safety Listing mark for their SINAMICS G110D frequency inverter. The G110D from Siemens is an IP65 rated distributed frequency inverter for cabinetless designs. Benefits include the low-profile design, rugged metal enclosure, ability to be located close to the motor and standard connector.

## Functional Safety gains in importance



Thomas Maier, UL's Primary Designated Engineer for Functional Safety: *"It can be said that Functional Safety has made further progress in Europe than in the North American market – not least because of Germany's strong mechanical engineering background. Through its service*

*offerings in both the United States and Canada, UL supports and increases the understanding and acceptance of the principles of Functional Safety. When German companies such as Siemens work with UL to obtain the Functional Safety Listed mark, they also have the North American market growth in mind. Functional Safety is gaining importance globally and UL is backing this trend: through education, advisory services and the Functional Safety Listed mark."*

Functional Safety testing at UL evaluates the compliance of a product with applicable norms and standards related to reliability and efficacy of technical safety systems. To do this, UL tests the device's input parameters and determines whether its reaction meets the scope of specifications. This testing also includes evaluating software, hardware, environmental factors and the underlying life-cycle process of Functional Safety. Functional Safety is a key element in a wide range of products: whether it is control systems for pre-combustion chambers and combustion control devices, internal and external components in electrical vehicles, electro-sensitive protective equipment, elevator components, gas detectors, processor control units, programmable controllers, robotics, protective and safety relays or – as with the Siemens project – frequency inverters.

Siemens and UL have enjoyed several decades of business relations in Germany. This effective, long-term collaboration played an important role in Siemens choosing UL as their partner to certify their G110D product for compliance with Functional Safety standards. For years Siemens has counted on UL's help to introduce products to the North American market with UL evaluating, testing, and certifying its products to meet standards in terms of electrical safety and shock hazards fire hazards. Many German companies are aware of UL's leadership in testing and certification as it is widely recognized in North America since 1894 by regulators, insurance companies and consumers. This recognition also applies to Functional Safety: the UL Functional Safety mark is widely accepted in North America. For companies looking to break into the North American

market, it makes sense to work with UL on compliance for Functional Safety along with traditional safety certification. UL offers a comprehensive portfolio of services, supporting each step in a manufacturer's product life-cycle. This support ranges from testing new technologies to enabling global market penetration. UL, through its many years of experience in the Functional Safety sector, can help manufacturers get one step ahead.

## Standards and certification process

The majority of standards in the Functional Safety sector are accepted worldwide as international standards. For example, UL applied the following safety standards as the basis for testing the Siemens frequency inverter:

1. IEC 61508:2010, Functional safety of electrical/electronic/programmable electronic safety-related systems, parts 1, 2, 4.
2. ISO 13849-1:2006, Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design.
3. IEC 61800-5-2:2007, Adjustable Speed Electrical Power Drive Systems – Part 5-2: Safety Requirements – Functional.
4. NFPA 79, Electrical Standard for Industrial Machinery, 2007 Edition, in accordance with requirements of clauses 9.2.5.4.1.3, 9.2.5.4.1.4, A.9.2.5.4.1.4.

UL utilizes a four-phase process to evaluate and test for Functional Safety and individually customizes this approach for each customer. *“Even if the testing processes of the various certification bodies may resemble each other, Functional Safety is hard to generalize”*, explains Thomas Maier, of UL. *“For the certifying organization, it is more important to be flexible and to adapt services precisely to a customer's individual requirements, needs and preferences, so that product development, market penetration and life cycle stages are successful in meeting timelines and expectations.”* Global resources and worldwide market presence are substantial benefits UL brings to this testing process as a certifier. This means UL is capable of managing complex challenges and working flexibly at an international level with local engineers.

For Siemens, the process started with a service launch meeting for UL to gain an understanding of the planned product and to work together to develop a process and plan for evaluation and certification. This is the first phase in any UL functional safety certification process.

The aim is that all those involved are all working together from the design phases to ensure the product meets the basic features demanded by the relevant standards. The schedule and key phases are reviewed together and prototypes are discussed. Having this service launch meeting early in the research and development phase can prevent the need for subsequent modifications and can enable a lean and smooth Functional Safety investigation.



**FUNCTIONAL  
SAFETY**



**LISTED**

Siemens SINAMICS G110D  
frequency inverter



*“Siemens had nothing but praise for UL’s Functional Safety certification process for the G110D frequency inverter, which was both efficient and of an excellent technical quality”, reports Thomas Winkovich, Functional Safety Manager, from the Siemens AG. “Following our already existing internal life cycle process of outstanding issues has ensured that the project could be completed as planned and without unexpected delays by UL.”*

**Thomas Winkovich, Functional Safety Manager, Siemens AG**

As a next step, the product is examined on a conceptual level. Knowing that the specifications and design parameters are compliant gives more confidence that the functional safety requirements can be met.

*“UL is normally design neutral”, says Thomas Maier, “however, we can inform the customer of our review results and therefore help prevent errors as early as the development phase.”*

The formal certification audit continues when UL tests compliance of the quality management system for Functional Safety with the standards provided in terms of safety levels. In the case of the Siemens certification project for the G110D frequency inverter, the actual tests took place in the UK at the Siemens Congleton plant. The development and test documentation are then evaluated by UL. The final phase comprises regular follow-up audits for the product. UL ensures the integrity of the mark through a two-step control program. This includes quarterly audits by UL field staff and then, every three years, an audit of the Functional Safety quality system.

The duration of an evaluation process, defined collaboratively in the early stages of the product development, naturally depends on the schedule of the manufacturer’s development phase and UL will work with the client to establish a mutually agreeable timeline.

## Competitive edge through Functional Safety

It is due to a partnership with the client centered on commitment, experience and educational efforts that Functional Safety plays an increasingly important role for Siemens customers, product users, machine engineers and system integrators. They all benefit from the fact that the recognition of the UL Functional Safety mark increasingly creates a competitive advantage in the North American market. The subject of Functional Safety is gaining increasing momentum– which is further supported by growing recognition and acceptance of the Functional Safety Listing mark from UL.

### Enhancement of the Functional Safety Listed Mark



**Enhanced UL Certification Mark**  
For the next 10 years, both the Listed Certification Mark and the enhanced UL Certification Mark will be in use, will appear on products in the marketplace and are indications of UL certification.

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