Comparing UL6200 and UL508 for Generator Controllers

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INTRODUCTION

The advancement of electronic controls for use in mechanical systems and machines has been growing exponentially over the last few decades. These systems and how they are controlled have transitioned from mechanical components, such as gauges, switches, and potentiometers, to microprocessor–based intelligence with a computer–like interface for their users in the power systems industry.

The complexity in controls has also been increasing. Faster emergency generator response times, multiple generators paralleled together, touch–screen user interface controls, and multiple sensors and relays all tied into these systems let the user know exactly what is happening.

This paper will explain how advancements in the power generation industry resulted in the new UL 6200 standard for power generation controllers.

CONTROL DESIGN STANDARDS

RELIABILITY

Reliability is an absolute necessity in power production and industrial controls. So, then, how does one ensure reliability?

The answer here comes down to testing. Power generation and industrial controls (of any kind) require testing for their applications.

Testing such equipment has become challenging due to how fast these controls are advancing. Test standards and regulatory requirements are slower to develop than the controls which they specify.

Ultimately, the need for developing/modifying standards is crucial to supporting all these advances for the industry. This is especially true for standby power generation and controls.

UNDERWRITERS LABORATORIES

Within the industry of industrial power controls, Underwriters Laboratories (UL) is widely known for their development, testing, and certification strategies for product safety.

UL is a nationally recognized testing laboratory (NRTL) that conducts consumer product safety tests for many different products.

However, it is important to understand they are not the only NRTL agency available.

Intertek (ETL), Southwest Research Institute (SwRI), and the Canadian Standards Association for the United States (CSAus) are also (NRTLs) and there are many others.

Most of these agencies have the capabilities to work with manufacturers in the industrial power generation business to ensure products are certified and reliable when tested under respective standards.

UL 6200 VS. UL 508

INDUSTRIAL CONTROL EQUIPMENT STANDARDS

For generator controls, there are several design and safety standards. The two that are most relevant for certified generator controls are UL 508 and UL 6200. UL 508 is the "Standard for Industrial Control Equipment," and is much more widely known in the industry because it has been a published document since 1925.

On the other hand, UL 6200 – "Standard for Controllers for Use in Power Production," published its first edition on May 31, 2019. Power generating controls can be certified under either standard.

Some controls are certified and recognized under UL 508 while others are certified for use under UL 6200. What is the difference, and why and when are such controls certified under one versus the other?

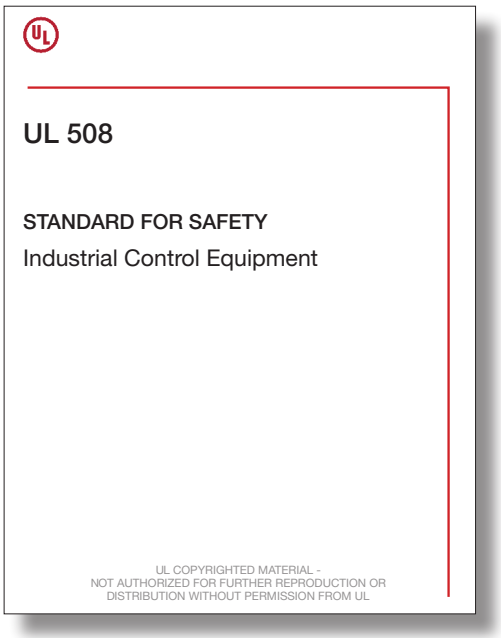
Did you know?

UL can certify a manufacturer's product as a Recognized component (e.g. generator controller), which is certified based upon conditions of acceptability (meets a set of operating parameters), or can List the product (e.g. standby generator) which is usually done with a complete assembly or finished product.

For more details reference:
https://legacy-uploads.ul.com/ wp-content/ uploads/2014/04/ul_ RecognizedComponentMarks.pdf

These questions may best be answered by understanding the "intent" of each standard. UL 508 has been the procedure of choice for decades.

In total, there are 18 different parts within UL 508 which cover everything from magnetic motor controllers to proximity switches. This standard is well known for certifying semiconductor and overload relays, along with programmable controllers. You read this correctly, programmable controllers are covered under UL 508. However, it is crucial to understand "what" is covered specifically.



THE ADDITIONAL COVERAGE OF UL 6200

While UL 508 covers components and controls specifically for hardware reliability, it does not cover the controller's software programmability.

UL 6200, on the other hand, includes both hardware reliability and the specific field of controls. The scope of UL 6200 was intended specifically for control circuit devices that support, maintain, and ensure reliable safety operations for stationary engine–driven assemblies or similar power production.

The comparison shown in *Figure 1* identifies some of the key differences between UL 508 and UL 6200 certification of programmable controls.

At a high level, the comparison touches upon some of the main areas of concern within industrial controls. The list provided is not exhaustive of every similarity or difference. The goal here is to highlight a few key areas that differentiate these two standards and how controls are certified

Reviewing the bold points within *Figure 1*, we see that UL 6200 recognizes control systems within power generating equipment.

Taking fuel system controls as an example, this standard includes the automatic safety shutoff valves (ASSV) and the control hardware switching devices that communicate with these valves to open or close the fuel train as needed (the ASSV are typically required to meet ANSI Z21.21 or related). Any circuits under this standard intended to control an automatic fuel system are required to go through overload and endurance tests on the switching devices specifically.

These tests on the switch hardware are most commonly conducted under UL 508. This relationship emphasizes the functions of each standard.

Figure 1

Differences Between UL 508 and UL 6200	
UL 508	**UL 6200**
Construction Requirements	
• Internal wiring • Battery circuits • External interconnections • Transformers • Overcurrent protective devices • Relays • Risks of fire and electrical shock avoidance • Coil windings • Insulation barriers • Isolation devices • Electrical spacings	• Internal wiring • Battery circuits • External interconnections • Transformers • Overcurrent protective devices • Relays • Risks of fire and electrical shock avoidance • Coil windings • Insulation barriers • Isolation devices • Electrical spacings • **Fuel system controls** • **Engine start and speed controls** • **Synchronization controls** • **Multiple generator paralleling equipment** • **Excitation controls**
UL 6200 captures many of the specifications within UL 508, but goes a step further to address the advances in controls within power production while still calling upon UL 508 for hardware component tests to ensure reliability.	

UL 6200 INTERACTIONS BETWEEN SUBASSEMBLIES

UL 6200 NFPA 37 & 110

Further differentiating these two technical standards is the focus on installation requirements.

For stationary standby and emergency engine driven power production equipment, two key installation standards that come into play are the Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, NFPA 37 and the Standard for Emergency and Standby Power Systems, NFPA 110.

Automatic control of engine starting requires specific starting duty cycles of the start controls of the generator. Start requirements are specified per installation site, but a common one is ten seconds or less starting capabilities.

Unlike UL 508, UL 6200 takes these controls into account and requires duty cycles be completed of the automatic start control system as an assembly (the controller, engine ECU, switching devices, starting solenoid, and fuel valves). All these controls can be classed as safety circuits due to the fact they control whether the unit is active, under load, or off.

UL 6200 SAFETY RISK ASSESSMENT

UL 6200 pulls in several other standards with the intention of offering manufacturers in a “one stop shop” for design criteria and test methodologies within the industry. For example, synchronization controls and generator paralleling methodologies were pulled and harmonized with IEEE 1547.

UL 6200 also has safety requirements for electrical equipment for measurement, control, and laboratory use (IEC 61010) and includes portions of IEC 60204 which covers many areas under electrical equipment and machinery safety.

UL 6200 is an amalgamation of existing specifications ensuring reliability for controls used in generators and other stationary power production products.

UL 6200 utilizes the hardware tests under UL 508 and the above-referenced standards to include the interactions between the subassemblies regarding how the controls communicate with each other, thus harmonizing hardware and software together.

REHLKO ADVANTAGES

DESIGN, TEST, AND INTEGRATION

Rehlko designs, tests, and integrates controllers for their generators, automatic transfer switches, and paralleling switchgear. All controllers are UL-certified and designed to work together for a reliable backup power system. Rehlko is a UL-approved testing facility, wherein the product is tested and witnessed/audited by UL at the factory so the product will be safe and meet the highest industry standards. This is a reflection of the high standard achieved within Rehlko for product design and testing.

As shown in *Figure 1* on page 3, paralleling and synchronization functionality is something that requires significant testing and validation that would not be reviewed under the UL 508 standard.

Rehlko's APM603 (see *Figure 2* below) is a UL 6200 listed, on-board paralleling controller, that has integral alternator thermal protection and energy reduction maintenance switching (ERMS), classifying it as an overcurrent protection device per the NEC 240.87 Arc Energy Reduction standard.

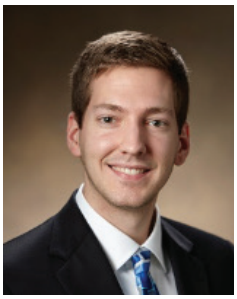
Please be sure to ask your Rehlko® distributor representative about the APM603 and how it might benefit your power system design.

FINAL THOUGHTS

In conclusion, UL 508 provides a set of construction and safety requirements for industrial controls more specific to the hardware reliability without any specific means of testing applications for programmability. UL 6200 pulls from UL 508, IEC, and IEEE to blend these gaps.

Power generation controls involve many different components, such as fuel control, electronic means for overcurrent protection sensing, and engine operations. Construction design and testing under UL 6200 with a respected NRTL ensures these complex controls are captured.

Figure 2



ABOUT THE AUTHOR

Brady Eifrid, is a Senior Project Engineer within Rehlko's Standards and Regulations team that ensures product compliance for all power system products, including safety certifications with UL, Canadian Standards Association (CSA), and structurally for the International Building Codes (IBC). Brady also drives certifications, as applicable, for the Commonwealth of Massachusetts Plumbers and Gas Fitters (Mass Gas) and California Department of Health Care Access and Information (HCAI).

Brady is a member of the Standard Technical Panel (STP) for UL 2200, UL 2200A, and UL 6200. He is also a Technical Committee board member for NFPA 37. He consults with many driving authorities within the industry to understand and provide feedback on the ever-changing world of standards and regulations.

ABOUT POWER SYSTEMS

Power Systems, Rehlko's largest division, delivers worldwide energy solutions designed to ensure resilience for mission-critical applications of all sizes. Building on more than a century of expertise and dedication, the company offers complete power systems, including industrial backup generators (HVO, diesel, gaseous), enclosures, hydrogen fuel cells systems, automatic transfer switches, switchgear, monitoring controls, genuine parts and end-to-end services. As a global company with service partners in every country, Power Systems provides reliable, cutting-edge technology to keep industries and businesses running.
www.powersystems.rehlko.com

ABOUT REHLKO

A global leader in energy resilience, Rehlko delivers innovative energy solutions critical to sustain and improve life across home energy, industrial energy systems, and powertrain technologies, by delivering control, resilience and innovation. Leveraging the strength of its portfolio of businesses – Power Systems, Home Energy, Uninterruptible Power, Clarke Energy, Heila Technologies, Curtis Instruments, and Engines, and more than a century of industry leadership, Rehlko builds resilience where and when the grid cannot, and goes beyond functional, individual recovery to create better lives and communities, and a more durable and reliable energy future.

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