

Spike Electric Controls – SAFESYNC 15kV ATS: Advanced Power Management Solutions for Large-Scale Manufacturing

Preface:

A large-scale manufacturing facility had a need to automatically align the site's 52 MW of Emergency generator power distributed across three 12.47 kV buses which would serve a standby power if either of the utilities A or B services became unstable in quality or availability. Spike Electric Controls was able to provide 16 SafeSync Automatic Transfer Switches compliant and listed per UL1008A and rated at 15kV 1200A 50kA SSCR, within a very short lead time. The following is a description of the technical application of the SafeSync ATS as an integrated automatic/manual transfer system capable of both closed and open transition, bus transfer. The SafeSync ATS also served as the monitoring means to control the supervision and synchronization reference for the generator control system.

SafeSync Power Line and Controller Composition:

The 1200A rated ATS employed identical ABB Amvac Model 4 vacuum circuit breakers as the switches of the Source 1 (S1-Utility) and Source 2 (S2-Generator) supplies. The VCB's were manually withdrawable and interchangeable providing isolation and in-service spare component. The three-phase line connected voltage transformers were wye-wye configured and withdrawable for ease of isolation. The load connected voltage transformer served as a voltage reference for source-source synchronization.

The model ATS for this application utilized a bank of three identically programmed SEL 700GT Intertie Control relays. A hardwired control network consisting of relay-to-relay programmable outputs created a "two-of-three voting" methodology that was orthodox to the customers specification for protection applications in control of medium voltage switching systems. The switch operations (S1 and S2 OPEN/CLOSE) and operational mode selection (AUTO/MANUAL) are supervised by the controller. Panel mounted 52 Open/Close circuit breaker control switches and the 43 Auto/Manual Mode Selector switch served as user interface to the ATS controller which enhanced the safety interlocking to prevent inadvertent or unsafe operations. Additionally, each of the 700GT+ relays included an optional touchscreen HMI to provide metering and remote signal input statuses. The relay-to-relay communication utilizes IEC61850 GOOSE Messaging protocol via fiber optic jumpers.

Compliance with IEEE C37.20.2-2022 Standard for Metal-Clad Switchgear

Spike Electric Controls is committed to delivering exceptional quality and reliability in our products. Upholding this commitment, we are proud to announce that our SAFESYNC 15kV ATS system is built in strict accordance with the C37.20.2-2022 - IEEE Standard for Metal-Clad Switchgear. This adherence not only underlines our dedication to superior product standards but also reflects our unwavering respect for industry norms and customer expectations.

The IEEE C37.20.2-2022 standard sets stringent guidelines for the construction, performance, and testing of metal-clad switchgear. This includes specific requirements for critical aspects such as dielectric strength, temperature rise, short-circuit withstand capabilities, and mechanical endurance. By adhering to these rigorous specifications, our SAFESYNC ATS ensures enhanced safety, reliability, and efficiency – key factors in managing complex electrical systems in large-scale manufacturing environments.

Our alignment with this standard showcases Spike Electric Controls' innovative approach to custom solutions. We understand that each manufacturing setup presents unique challenges. Thus, our ATS is not only designed to meet general industry requirements but is also tailored to address specific operational demands. This bespoke engineering approach signifies our expertise in solving complex electrical problems, offering our clients a solution that is both cutting-edge and highly dependable.

In addition, our adherence to the C37.20.2-2022 standard is a testament to our attentiveness to quality. Every component of the SAFESYNC ATS is meticulously crafted and rigorously tested to ensure it meets both the standard and our high internal benchmarks. This relentless focus on quality ensures that our clients receive a product that is not only compliant with current standards but also resilient to future challenges.

At Spike Electric Controls, respectfulness in all interactions is a cornerstone of our business philosophy. Our compliance with the IEEE C37.20.2-2022 standard is a reflection of this value. We respect the trust our customers place in us and repay that trust by ensuring our products adhere to the highest standards of safety and reliability.

In conclusion, the SAFESYNC 15kV ATS is more than a product; it is a symbol of Spike Electric Controls' commitment to quality, customer care, innovation, and expertise. By building our ATS to meet the C37.20.2-2022 - IEEE Standard for Metal-Clad Switchgear, we are not just adhering to industry standards; we are setting new benchmarks for excellence in power management solutions.

Compliance with UL 1008A Standard for High-Voltage Transfer Switch Equipment

At Spike Electric Controls, we are committed to delivering solutions that exemplify our core values: attentiveness to quality, dedication to customer care, respectfulness in all interactions, and an innovative approach to custom solutions. In line with these values, we are pleased to highlight that our SAFESYNC 15kV Automatic Transfer Switch (ATS) rigorously adheres to the UL 1008A Standard for Transfer Switch Equipment, Over 1000 Volts. This compliance is a testament to our unwavering commitment to delivering products that meet the highest standards of safety, reliability, and performance.

The UL 1008A Standard represents a crucial benchmark in the industry for transfer switch equipment designed for high-voltage applications. It sets stringent requirements for the design, construction, and performance of transfer switches, ensuring they can operate safely and

reliably in environments where voltages exceed 1000 volts. These guidelines cover various aspects of the ATS, including electrical endurance, dielectric voltage withstand, temperature rise, short-circuit current ratings, and mechanical operation. By meeting these requirements, the SAFESYNC ATS provides a robust and reliable solution for large-scale manufacturing facilities that demand high-capacity power management systems.

Our compliance with the UL 1008A Standard is not just about meeting regulatory requirements; it reflects our deep-seated belief in putting our customers' needs at the forefront. We understand that the environments in which our products are used are complex and demanding. Therefore, our ATS is designed and built not only to meet but to exceed these challenges, ensuring optimal performance and safety in critical applications.

Innovation and expertise are hallmarks of Spike Electric Controls. The SAFESYNC ATS is a prime example of our ability to solve complex electrical problems through advanced engineering and thoughtful design. By incorporating the latest technologies and adhering to the UL 1008A Standard, we provide our clients with a product that is not only state-of-the-art but also reliable and safe, reflecting the cutting edge of electrical engineering solutions.

In summary, the SAFESYNC 15kV ATS from Spike Electric Controls, conforming to the UL 1008A Standard, is a clear illustration of our commitment to excellence in every aspect of our work. From the meticulous design and construction to our customer-focused approach, every element of this ATS is a reflection of our dedication to quality, innovation, and customer satisfaction.

Technical Specifications of the 15kV, 1200A, 50kA AMVAC Circuit Breaker

Spike Electric Controls' SAFESYNC ATS integrates the robust and versatile 15kV, 1200A, 50kA AMVAC Circuit Breaker, engineered to enhance the performance and reliability of medium voltage power systems. The UI listed AMVAC series by ABB, particularly the 15kV, 1200A, 50kA rated breaker, stands as a pinnacle of medium voltage circuit breaker technology. Designed for diverse applications such as motor starting, capacitor switching, and retrofitting, these breakers are rigorously tested to ANSI standards C37.04, C37.06, and C37.09. Available in various configurations, they cater to a wide range of voltage requirements, including the specific 15kV application. Key features of this circuit breaker include:

- **Voltage and Current Ratings:** Optimally suited for 15kV applications, with a continuous current rating of 1200A, ideal for managing significant electrical loads in demanding environments.
- **Short Circuit Rating:** A robust short circuit current rating of 50kA rms, indicative of its ability to safely interrupt high fault currents, thereby safeguarding electrical systems during critical fault conditions.
- **Impulse Level (BIL):** Designed to withstand high transient voltages, enhancing durability and reliability in fluctuating voltage scenarios.

- **Mechanical Operations:** Engineered for a high count of mechanical operations, ensuring durability and minimal maintenance for both the mechanism and vacuum interrupter.
- **Control Power Requirements:** Energy efficiency is a hallmark, requiring less than 10 watts in resting state and under 100 watts during capacitor charging.
- **Operating Time:** Features a specified closing time, facilitating rapid response in power system operations for effective protection and control.
- **Physical Dimensions and Weight:** Designed for compatibility with standard switchgear, facilitating ease of installation in both fixed mount and drawout configurations.
- **Environmental and Operational Resilience:** Built to perform reliably under diverse environmental conditions, ensuring consistent operation across various settings.
- **Standards Compliance:** ABB's AMVAC circuit breakers are engineered to meet the highest standards of safety and performance, adhering to a comprehensive range of international and national regulations. These breakers are designed in compliance with ANSI (American National Standards Institute) standards, ensuring they meet the rigorous requirements for medium voltage circuit breakers in the United States. Additionally, they align with IEC (International Electrotechnical Commission) standards, which are recognized globally, reflecting their suitability for a wide array of international applications. The AMVAC breakers also boast UL (Underwriters Laboratories) certification, a testament to their safety, reliability, and quality, as UL is a globally recognized leader in product safety testing and certification. Furthermore, these breakers are designed considering the NEC (National Electrical Code) guidelines, ensuring they meet the essential requirements for safe electrical design, installation, and inspection, keeping up with the latest safety standards. This comprehensive adherence to ANSI, IEC, UL, and NEC standards makes ABB's AMVAC circuit breakers a reliable and safe choice for a variety of electrical applications, both in the United States and internationally.

Theory of Application – Automatic Operation:

Real Generator Call

For this opportunity, each SafeSync ATS served as the arbitrator for standby generator operation for system critical and lifesaving system continuous operations. Serving as a tertiary power source to complement the two distinct utility feeds, the ATS controller's first role was to monitor the stability of the utility power. If programmed controller inputs sensed source S1 power faltering with respect to voltage or frequency, the ATS transmitted a signal to the Generator bank controller to start the generators.

S1 to S2 Transfer – Open Transition (non-parallel)

To allow for generator start and load stripping/transfer time to pass before allowed 3 second delay and the opening of switch S1 (this delay was supervised the protective elements set in the controller). S1 switch would open when the delay expired and then, the remaining connected loads could be re-energized by closing S2.

S2 to S1 Re-Transfer – Closed Transition (parallel)

When source S1 power was restored, the ATS evaluated the system conditional inputs, monitored S1 voltage and frequency which was transmitted to the generator controller via IEC 61850 GOOSE Messaging protocol. Additionally, the sync-check protection of the ATS controller supervised the S1 breaker closing. Once in parallel with both breakers closed, S2 would open allowing the utility to pick up the load with no power interruption.

Theory of Application – Manual Operation:

Test Generator Call

Each SafeSync ATS served as a call point to a consolidated generator controller. A programmable pushbutton on either of the relays (password protected) could be activated initiating the generator starting and syncing adjustment to occur. As in the Auto mode the ATS would evaluate the generator synchronization, and S2 would be blocked from closing due to breaker S1 being closed.

Note: any or all ATS that remained in AUTO mode were still allowed to perform their programmed operation.

Manual Transfer S1 to S2 – Open Transition (non-parallel)

If the operator wished to perform manual transfer of the ATS to S2 from S1, the controller would open breaker S1 and then close S2. If the ATS controller was placed back in AUTO, an Automatic S2 to S1 Closed Transition sequence would begin as described earlier.

Summary:

Spike Electric Controls' recent deployment of the SafeSync Automatic Transfer Switch (ATS), boasting a UL1008A listing, exemplifies our commitment to delivering customized, reliable, and innovative electrical solutions. Understanding the urgency and specificity of our client's needs, we provided a highly configurable and robust ATS, ensuring compliance with stringent safety standards and local regulations. This project not only met the client's expectations within a compressed delivery schedule but also reinforced our dedication to excellence in addressing complex electrical challenges. Our ability to combine empathy, technical expertise, and innovative practices in a time-sensitive environment showcases Spike Electric Controls as a trusted partner in pioneering dependable power solutions.

