Circuit Breaker Replacement & Retrofill For Uptime, Compliance

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[1]
A **Square D Masterpact NW circuit breaker retrofill.**

Circuit breakers are key to an industrial facility’s power distribution system. That’s why it’s not surprising that several warning signs of an aging system relate to these devices, such as nuisance tripping or a main breaker failure.

When these warning signs occur, it’s a message to facility ownership and management that breakers may need to be upgraded to help the power distribution system meet current and future needs. However, standing in the way are fears of extended periods of downtime to complete an upgrading project.

Still, looming in the distance for facility owners and managers are anticipated changes to the 2008 version of the National Fire Protection Association’s NFPA 70E® “Standard for Electrical Safety in the Workplace.” Due at the end of 2008, NFPA 70E 2008 will likely outline, via NFPA 70B 2006, how maintenance should be done, when it should be done, and the proper documentation required. These changes will provide further impetus to upgrade circuit breakers, in order to avoid increased hazard levels from arcing incidents and unplanned downtime.

However, even if NFPA 70E-2008 doesn't directly reference the idea, it is well

understood by anyone familiar with the techniques of arc flash hazard calculations that improper maintenance leads to longer fault clearing times, which elevate the release of energy if an arc flash occurs. If maintenance is deferred for a sufficiently long period of time, that lack of maintenance can actually cause an arcing fault occurrence.

The key question is, will your circuit breakers keep your facility running? If unconvinced, are you prepared to make decisions about upgrading them via replacement or retrofill options, so your facility will be both safer and compliant with NFPA 70E 2008?

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A **Masterpact NT circuit breaker** is a replacement for an obsolete manually operated circuit breaker.

Replacing And Retrofilling

Replacing or retrofilling the existing decades-old circuit breakers with today's devices can go a long way in modernizing a system and avoiding the problems associated with removing old switchgear and replacing it with new equipment. For example, fused switches and circuit breakers provided arc flash protection in the past, but breakers have been introduced to the market that provide high interrupting ratings without fuses, up to 200,000A at a maximum of 508Vac.

Such breakers eliminate problems common to fused switches and breakers, including hazards associated with changing fuses and the need to stock/replace fuses, along with dependence on related mechanical hardware that requires maintenance or replacement. Plus, they are built to trip faster in order to protect both equipment and workers nearby, and typically feature a smaller footprint than fused breakers.

More importantly, today's breakers can also feature trip units that act as a communications interface and provide power metering and monitoring capability. That allows facilities management to communicate with breakers, gather power

information, monitor events, and even remotely control them. The trip units can also be tied into a facility's power monitoring system, so if the breaker trips, an alert can be sent to facilities management detailing where it's located.

Best of all, replacement and retrofill options don't require a major time commitment. For example, replacing a typical circuit breaker can result in a 15 to 20 minute outage. A retrofill process is a bit more extensive, and can take 8 to 10 hours per breaker section, but that is certainly more desirable than a complete system upgrade.

Breaker Replacement

A replacement power circuit breaker is a new circuit breaker that is designed and tested to interface with components inside the existing switchgear's breaker compartment. A low- or medium-voltage replacement circuit breaker is designed to be installed into an existing OEM switchgear or switchboard. With the LV upgrade option, a new cradle adapter is inserted into the existing breaker compartment. The cradle adapter design typically includes a new racking mechanism, safety interlocks, primary and secondary disconnecting devices, truck-operated contact (TOC) mechanisms, a new breaker compartment door, and other provisions.

A replacement LV/MV power circuit breaker matches the original breaker in form, fit, and function and is designed and tested in accordance with ANSI C37.59 and C37.09 standards. Because a number of breakers manufactured more than 50 years ago are still in operation but no longer supported, the replacement breaker provides facilities with older switchgear a viable alternative for increasing performance and reliability.

Breaker Retrofill

A LV/MV circuit breaker retrofill involves the replacement of the old breaker and related compartment components, such as the stationary primary and secondary disconnects, cell interlocks and racking mechanisms, with a drawout circuit breaker and cradle of a modern, previously qualified design.

During the retrofill design and installation, the existing switchgear cell is modified and equipped with a new drawout cradle assembly. Significant changes are made to the structural components of the existing circuit breaker compartment as well as to the line and load bus structure and bus bracing. New isolating barriers are installed to conform to the latest electrical switchgear industry standard requirements.

A LV/MV circuit breaker retrofill is employed when and where a facility can afford modifications that require extended switchgear shutdown (minimum 8 to 10 hours). When the available fault current is higher than the withstand capabilities of the existing circuit breaker, a retrofill or replacement can upgrade the capacity of the existing system. In such cases, the entire switchgear bus structure and bus bracing must be evaluated and upgraded, which requires the switchgear to be de-energized during modifications.

The retrofill solution is also recommended for breakers exceeding 2,000A continuous current rating due to primary current path interface complexity and the

significant temperature increase generated by the primary conductors. Because breakers above 2,000A are typically “main” breakers, they always require a bus outage, which makes a retrofill as advantageous as a direct replacement.

Be Proactive

Facility owners and managers facing the warning signs of an aging power distribution system should consider commissioning a facilities audit, which can be completed by an engineering firm or the services branch of some major electrical equipment manufacturers.

Such a study includes evaluation of the entire electrical infrastructure, and can indicate if replacement or retrofill options are appropriate, or if a more extensive upgrade is required. The company can also suggest measures to enhance a system, such as a power monitoring system, which can generate data that can be analyzed in order to increase energy efficiency and plan future maintenance and upgrades.

The bottom line, however, is to be proactive if the warning signs are present, particularly with anticipated changes to NFPA 70E on the horizon.

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