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Testing Times

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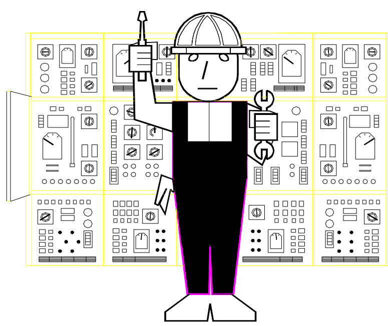
Routine Torquing: a good practice?

As part of annual maintenance, a facility performs routine torquing of all electrical connections. Is this a good idea? Unfortunately, the answer is no! Evidence shows that this practice can do as much harm as good. Factory Mutual states that "once properly made, an electrical connection should never need retightening". This does not mean a

The best corrective action is to completely disassemble the connection.

connection will never become loose or experience a problem, but it does mean that the fix is not necessarily just tightening. To begin with, a connection may be perfectly acceptable. Systematic torquing could create a problem where there was none due to overtightening. An overtorqued connection can be just as dangerous as a loose connection.

To identify problem areas, electrical connections are commonly inspected by an infrared survey. This type of survey will often identify problem areas or "hot spots" at connection points. Many infrared and maintenance personnel mistakenly assume that a hot spot at a connection is a loose connection. A better diagnosis would be to call it a "poor" connection. A poor connection can have many causes: it can be loose, corroded, cross threaded, dirty, oxidized, or overtightened. Without identifying the exact cause of the poor connection, to automatically tighten the connection in question may or may not correct the problem. The best corrective action is to completely disassemble, clean with the appropriate cleaner, possibly replace parts (such as washers), reassemble the connection, and re-torque to the



Routine retorquing is not only an unnecessary practice, it may actually do more harm than good.

manufacturer specified torque value.

Is it O.K. to check the torque on a connection? Absolutely, but any further action should not be taken until the condition of the connection is evaluated. ❖

Code News

Ground Fault Protection: A necessity

The electrical industry spends a lot of time talking about ground fault protection systems, but you may wonder: what is a ground fault and why is this topic important to me? A ground fault occurs when a phase conductor becomes exposed to grounded metal (switchgear enclosures, conduit, etc.) creating a ground return path. When this occurs, the phase to neutral voltage causes fault current to flow through this new and unintentional ground return path.

The magnitude of this ground current can vary. High level faults in the overload and short circuit range can be quickly detected and cleared by standard overcurrent protection (fuses, circuit breakers). Detection of low level ground faults with standard devices is not practical because the magnitude of the current is outside of the overcurrent device time current characteristics. This situation creates a tremendous fire hazard because distribution equipment can be subjected to considerable low level arcing ground fault damage.
The electrical industry addressed this situation in the 1971 National

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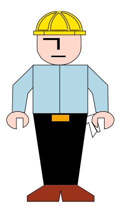
Electric Code (NEC) by requiring ground fault protection systems. These systems were designed to operate in the lower magnitude ranges not covered by standard overcurrent devices. The NEC (Article 230-95) requires ground fault protection of equipment on service entrance equipment rated 1,000 amps or more operating at 480Y/277 volts.

The NEC requires performance testing of the ground fault system on site prior to initial energization.

In 1978, the NEC went one step further and began requiring Performance Testing of ground fault protection systems (Article 230-95 (c)). This requirement specifies that the ground fault system shall be tested when first installed **on site**. (A factory test report is not an acceptable substitute.) This mandate came "as a result of numerous reports of ground fault protection systems that were improperly wired and that could not or did not perform the function for which they were intended", according to the NEC Handbook. Our field testing data validates this statement; we fail close to 1 in 4 ground fault systems.

Many local electrical inspectors strictly enforce this NEC requirement and will not issue a Certificate of Occupancy until the ground fault system is performance tested on site. As a building owner, consulting engineer, or contractor, you have an obligation to your facility and people to ensure that the ground fault protection system will perform when necessary. An inoperable system is no better than not having one at all. ❖

Testing Terms...



Push-To-Test

Modern ground fault protection systems come equipped with a "push-to-test" button. Is this an acceptable means of testing the ground fault protection system? **NO!** A push- to-test button does not simulate a real ground fault but only checks out the secondary side of the ground fault system. This type of test tells you nothing about the system's ground fault sensing capability. Problems can exist undetected by this testing method including incorrectly located or installed sensors, incorrectly rated sensors, improper system neutral to ground connections, inoperable ground fault sensors, or ground fault system misapplications.

Ground fault systems should be tested by the primary current injection method upon initial energization and routinely as a maintenance test. ❖

For additional information, questions, or back issues of any newsletter, please contact:
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We welcome comments, questions, or suggestions for future issues. Also, please let us know if you wish to add or remove people from our mailing list.

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