



## 082: Testing–Pre-Op and Startup

### *Safety checklist*

Review the installation manual and verify that all steps have been completed and checked. For example, are the proper grounds in place? Have you removed any shunts or straps used for shipping? Are the required safety switches installed?

Visually check all terminations to verify they have been properly torqued and marked. Loose connections may arc when the circuit is energized. An arc can produce personal injury on its own, but may also serve as an ignition source in a hazardous location for ignitables present in a non-hazardous location.

Verify that the equipment is clean and free of construction debris. Dirt, metal shavings and other foreign materials can provide an electrical path for phase-to-phase and phase-to-ground faults.

Account for all tools. If tools are missing, find them before energizing the equipment. In one case, for example, a wrench that was apparently left in a switchboard caused millions of dollars in lost revenue and thousands of dollars in damaged equipment when the switchboard exploded when it was energized. During the forensic investigation, the electrician who worked on the equipment was not able to produce one of his wrenches.

Verify all safety barriers, shields, covers and doors are in place and properly secured. Remember, a panel cover may be the only thing between you and a fireball of vaporized copper and insulation.

Verify all switches, disconnects, circuit breakers, and other safety devices are operating properly and are in their proper position for startup.

Walk the electrical system to verify it is clear. Provide safety signs, lockouts, barriers and other safety equipment as required. Do not energize any equipment until you have personally verified the system is clear.

Before energizing any equipment, put on your PPE as required for your application. The required PPE will range from safety glasses to a full flash suit. The determining factor is not whether you are doing the work. If you are in a place where a danger is present, you must wear the PPE that guards you against that danger. An arc blast, for example, does not differentiate between who was taking a measurement and who was merely in the room.

If you are not directly involved in energizing equipment, leave the area during energization. For example, suppose your crew is closing breakers for start-up. One person should close the breakers while another watches the panel meters or other indicators. Everyone else should stay back.

Ask all persons not involved in the start-up process to leave the area while energizing the equipment. Remember that working on energized equipment needs to be at least a two-person job.

When energizing for the first time, place as much distance between the equipment and yourself as possible. For example, if you are energizing a transformer that has a local primary disconnect switch mounted adjacent to the transformer and the primary circuit breaker is in a panelboard several hundred feet away, close the local switch first and then close the circuit breaker.

When operating a disconnect or breaker, stand to one side of it so you are out of the arc blast path.

### *Discussion leader duties for this session:*

Review pre-op testing procedures, startup procedures, or a key vendor's installation manual. Be prepared to ask and answer questions.

### *What this Safety Talk covers:*

The procedures to follow for safely energizing equipment for the first time.

### *Discussion notes :*

