

Toolbox Talks 2

034: Working Safely On Energized Equipment

Discussion leader duties for this session:

Make sure you can explain the voltage rating and CAT info on the face of your DMM.

What this Safety Talk covers:

Reducing the hazards of working on energized equipment.

Discussion notes:

Background

Some tasks require the circuits and equipment to be energized. Examples include functional testing, taking voltage and current measurements, conducting thermography, using power quality analyzers, and rotationally testing motors.

Outputs

We usually use lockout/tagout to isolate the equipment we're working on from its energy *sources*. When working with energized equipment, it may be necessary to isolate that equipment from its *outputs*. For example, decouple a motor from its load before rotational testing or take process equipment out of service.

Energized equipment best practices

- Select test equipment rated for the voltage and Category (e.g., Cat III) in which you will be working. Look for this information on the face of the instrument. Consult the manual or manufacturer's Website, as needed.
- Determine what PPE is necessary to protect you from the arc blast and shock hazards that may be present.
- Before operating breakers or controls, determine what equipment they will affect and what the effect will be. Isolate loads where adverse operation is possible. Isolate unnecessary loads as much as possible.
- If you don't know how to isolate a specific load that should be isolated, don't guess. A wrong guess can easily prove fatal. Ask your foreman to help you find a person who is qualified in isolating that specific load.
- Ensure all metallic objects are properly bonded, to eliminate the differences of potential that create a shock hazard. "Bonded" means a metallic path, not a driven ground rod. See NEC Article 100 for the definitions of grounded and bonded.
- Determine what touch hazards exist where you're working, and take the necessary precautions against them. This may include such things as using rubber blankets and other barriers, using insulated tools, and modifying work procedures.
- Guard against "drop accidents." If it's possible to drop a wrench across two phase conductors, cover those conductors with rubber blankets or take similar precautions.
- Apply and remove test equipment leads one at a time. This prevents an ionization trail from forming between energized parts.
- Practice good housekeeping at all times. If you're not using a tool, put it back in the pouch (or other holder) rather than set it down.
- Don't be there, unless you *have* to be there. Unintentional energy releases are possible with all equipment, even if you're not actually working on it.

Review and discussion

1. What are some tasks you might do on energized equipment?
2. How do outputs come into play, when working on energized equipment?
3. What is the meaning of the CAT number that appears on the front of a DMM? *[Note to presenter: Understanding the energy category of your DMM is your prep assignment for this talk. Essentially, you have to use a CATIV meter when working at the service entrance or a higher energy area. You can't use a CATIII meter there. Further information can be found on manufacturers' Websites and other online resources.]*
4. How do you know what PPE to use when working with energized equipment?
5. What should you do before operating breakers or controls?
6. Suppose you need to close a certain breaker so you can take the voltage measurements required for the pre-startup checklist. What should you do before closing that breaker? *[Note to presenter: In addition to isolating the loads, as mentioned earlier, ensure there has been inspection and testing to determine that it's safe to energize the circuit. With first-time energization, there is always the risk of tools left in the wrong place, unterminated or damaged conductors presenting a fault hazard, and so forth. If a visual inspection hasn't been made, and if the conductors have not undergone insulation resistance testing, that breaker may be unsafe to operate.]*
7. Suppose you are about to perform a battery of baseline voltage and current tests so the new power distribution system can be signed off and turned over to the owner. You know this involves removing covers, so you are walking down the system to see what arc blast protection and other PPE you will need. You spot a Number 10 wire running from a load panel to a ground rod. What's wrong here? *[Note to presenter: This could be evidence of a load side neutral ground bond, which is illegal. It may also be evidence of grounding being used where bonding is required. That ground rod serves no technical purpose. If the enclosure of that panel isn't bonded, an electrocution hazard exists.]*
8. What are some ways you can guard against tool drop hazards?
9. Why should you apply and remove test equipment leads one at a time?
10. What's unsafe about leaving tools scattered all over the work area until the job is completed?

Participant's Signature and Date

[illegible]