

Toolbox Talks 2

010: Assumptions That Can Kill You: Electrical Testing

Discussion leader duties for this session:

Pick a test procedure, and do a dry run. Walk out to the equipment “under test” and note what safety hazards could exist there.

What this Safety Talk covers:

Dangerous assumptions that people make in the course of electrical testing.

Discussion notes:

Some electrical testing facts to think about

- Electrical testing equipment may use lethal voltages.
- Cables can act like capacitors and store energy.

Assumptions

- “The test equipment is in good working order.” Equipment can be damaged between tests. Before making connections, inspect your test leads. Turn test equipment on and see if it appears to be operating normally. Then, turn the test equipment off and make your connections.
- “The local ground rod is a suitable test equipment grounding point.” An equipment ground is not an earth connection. It’s a bonding connection. Connect your test equipment grounding lead to a bonded metallic object, to eliminate a difference of potential. Ensure the equipment under test is properly bonded.
- “Everyone is clear of the equipment or cables to be tested.” If you don’t verify this, someone may receive a lethal shock. Don’t forget that “everyone” includes you.
- “The capacitance charge has been bled from the cables.” Ensure the capacitors have been shorted to bleed off any stored charge.
- “I can always change an incorrect test connection.” You may not live to make a second connection. Before you attach leads or insert probes, clearly identify what you’re connecting the test equipment to and determine that the connection is correct.
- “Test settings are probably correct.” The wrong setting can cause damage that produces catastrophic failure upon energization. Verify settings before connecting.
- “The breaker for the circuit under test is the only energy source I have to isolate.” Mechanical springs and pneumatic cylinders are two examples of other sources.
- “I don’t need to check for loads that might be operated by the equipment under test.” It may not be safe to operate a given load, for a variety of reasons.
- “I don’t need to check for loads the testing process might be disable.” Emergency and safety systems require special procedures for temporary shut-down. Some processes can create physical hazards if shut down improperly.
- “Everyone around me knows I’m conducting this test.” But they might not know what that means or what restrictions this test causes for them.
- “Everyone on my crew knows what to do.” Review the safety implications of the test with everyone involved.

Review and discussion

1. Are test voltages always at safe levels? What are some test voltages you might use?

2. If the supply breaker is locked out and tagged out, does that mean the cable is always safe to touch? Why or why not?

3. What should you do with test leads and test equipment before using them?

4. What's wrong with hooking your test equipment grounding lead to a ground rod?

5. What's wrong with thinking that you can always change a test connection, if you make a wrong connection the first time?

6. Why is it important to set the test equipment up before making connections?

7. Why do you need to check for loads that might be operated by the equipment under test? If it's unsafe to operate those loads, what should you do? *[Note to Presenter: Before testing, you need to understand the system you're testing. This is essential so you can isolate any inputs or outputs as needed to ensure safety.]*

8. In an operating facility, why is it critical that you identify which loads your tests might shut down? What are some examples of such loads?

9. Why is it important to communicate to those not involved in the testing, and what are some communication methods? *[Note to Presenter: Barrier tape is one communication method. But it may also be necessary to coordinate activities with other trades or with tenants. This is especially true if you are injecting high voltages, operating production equipment, disabling safety systems, disabling emergency systems, or shutting off the power.]*

10. Does the fact that someone is assigned to your crew mean that person understands the safety requirements of the test you are conducting? If not, how does this affect how you should work in a crew? *[Note to Presenter: People typically don't know what it is that they don't know. They have to rely on more knowledgeable people to tell them. For example, Fred is now working with Angela. She's done extensive hi-potting work, while Fred's testing experience has been all 9V DMM work. Angela needs to review the testing procedures and safety implications with Fred before they start testing. What if Angela has no idea of Fred's testing background? Then she needs to assume it's zero and start from there. Fred needs to respect her desire to be safe, rather than feel insulted that she thinks he doesn't know. If Fred really does know hi-potting, he can simply assume the role of an experienced person reviewing Angela's knowledge. Never avoid talking safety due to ego. A good example of setting ego aside is how the climbing community approaches safety. All climbers, regardless of experience, go over the same safety inspections with their partners before each climb. So an expert climber with 800 climbs of experience is not going to feel insulted when a second-time climber inspects his harness. In fact, he is likely to remind the second-time climber to do it. Testing partners need to have this same attitude of putting safety ahead of "possibly" insulting the person they're supposed to protect.]*

Participant's Signature and Date

[illegible]