

Toolbox Talks 2

043: Unsafe Acts: Transformer Installation

Discussion leader duties for this session:

Think about the various dangers possible when installing transformers, and what work habits or methods might be unsafe.

What this Safety Talk covers:

Most injuries occur not due to unsafe conditions, but due to unsafe acts. This Safety Talk addresses unsafe acts when installing transformers.

Discussion notes:

Background

Transformers are often large and heavy. To install one, you may set it on a pad or hang it on a wall or in an overhead space. You wire it to the load, which is typically a panel or switchboard set. You wire it to the supply (switch, fuse, or breaker), which may be at 480V or higher. And, finally, you need to energize it. Each of these tasks poses dangers you must plan for.

Some unsafe acts in transformer installations

- Failing to assess the work area for required PPE, location of fire exits, and emergency notification systems. Especially important for transformer vaults.
- Lifting a transformer overhead on ladders. This puts your back at risk, in addition to creating a falling hazard and a dropping hazard. Use a lifting rig to bear the weight of the transformer.
- Trying to muscle a transformer into place. Use a prybar or other tool, to reduce possible strain to your shoulders and back. This will also protect your fingers.
- Inserting or removing shims with your fingers. You may use shims to level a pad-mounted transformer. Handle them with pliers.
- Breaking connections for neutral or ground, without first providing bypass jumpers or performing lockout/tagout on the affected loads.
- Energizing before verifying the wiring and connections, and ensuring there are no ground faults in the associated panel or switchgear. Checking is your first and best defense against an arc blast.
- Energizing with downstream (load) breakers closed. To reduce arc blast hazards, open the downstream (load) breakers before closing the disconnect to the transformer. After you energize the transformer, close each downstream breaker one at a time.
- Leaving the transformer cover off when you energize. The force of an arc blast is greatly reduced and properly directed/diverted when the cover is properly secured.
- Energizing when someone is standing near the vent of a dry-type transformer. That person is standing directly in the path of a potential arc blast. Keep this in mind any time you are working near transformers.

Review and discussion

1. What are some safety considerations for working in transformer vaults?
2. If you're installing service entrance transformers, what are some work area safety considerations?
3. You need to mount a couple of small transformers in a ceiling space. You looked on the shipping crates and see these weigh just under 100 lbs each. You're sure you and the big guy you're working with can lift these to the brackets with no problem. How should you proceed? *[Note to presenter: All*

kinds of safety rules come into play, here. Good ladder safety practices, for example, mean not carrying things up ladders. The safe way to move those transformers into place is with lifting straps or other devices secured to the brackets or other structural component. Yes, most guys can lift a 100 lb object overhead. The problem isn't the lifting—the problem is what happens if you drop it.]

4. You're installing a distribution transformer on the load side. Its supply is a feeder breaker at the main panel. The drawing provided by the customer shows that you should connect the transformer ground to a driven rod, rather than run a ground wire back to the panel. Why is this a safety problem? *[Note to presenter: Number one, it's an illegal installation. This customer's drawing violates the NEC, Article 250. The transformer case will be at a different potential from other metallic objects, creating an electrocution hazard for anyone working on this system. If this rod serves as the ground for the panel, it will be unsafe for you to work in that panel as well.]*

5. You are installing several dry-type transformers, and the customer requires you to disconnect the internal bonding strap because of harmonics issues in the facility. Why should you not do this? *[Note to presenter: This violates the NEC on several counts, voids the warranty on each transformer, and creates an electrocution hazard. This practice is sometimes proposed as a solution to power quality problems, but it serves only to create a hazardous difference of potential.]*

6. What steps are involved in verifying the wiring before energizing a transformer?

7. What steps do you take to account for your tools, so you know you didn't leave a wrench inside a transformer you are about to energize?

8. Why should you avoid having a load on the transformer when you energize it?

9. Why should you put all transformer and panel covers securely in place before energizing a transformer?

10. Why should you not stand in front of a transformer vent?

Participant's Signature and Date

[illegible]