



Discussion leader duties for this session:

If a UPS is onsite, see if you can identify any safety equipment related to it.

What this Safety Talk covers:

Safety considerations that are unique to an UPS.

Discussion notes :

096: UPS Hazards

Definition

“UPS” stands for Uninterruptible Power System. A UPS provides continuous power to a connected load upon loss of the main source. A UPS will support its connected load until one of the following occurs: Normal utility power returns, the UPS power source (typically one or more batteries) can no longer support the load, or an alternate power supply such as a generator comes online.

Pre work considerations

Working on a UPS often involves several parties. Members of each party must know their respective roles. Failure to follow procedures in a specific order may result in dumping the connected load, damaging equipment, or injuring people.

A common practice in working with a UPS is to follow a Method of Procedure (MOP). This is a script that details every step in the proper order by the responsible party. All parties involved in the work should have input in the development of the MOP.

Review the one-line of the electrical system related to the UPS plant before commencing work.

The purpose of a UPS is to not allow its connected load to lose power. Therefore, design engineers will provide multiple circuits to connected equipment, internal bypass feeds around the power components in the UPS and maintenance bypass feeds around the entire UPS. These alternate and bypass feeds may not allow you to isolate the UPS for purposes of lockout/tagout. Failure to understand how the UPS is supported electrically may result in the shock of your life.

Working on a functioning UPS

You may need to work on a functioning UPS before turnover to the owner when doing a retrofit, an expansion, or for maintenance.

When a UPS is operational but needs work, the owner will transfer the connected load to a bypass source or shut the connected load down. Verify the required action for connected load is complete before commencing work.

A UPS will continue to supply power even with a loss of input power. You cannot open the input circuit breaker to the UPS and expect it to shut down. You will usually find shutdown instructions posted on the UPS. Follow these instructions to assure a proper shutdown. Resist the temptation to shutdown the UPS by using the emergency shutdown button. This may cause hardware failures and software lockups that will require manual resets.

After shutting down the UPS, you must determine where there is and is not AC and DC voltage. What you'll find is a function of how the UPS is configured to support the connected load. In some UPS configurations, you must shut down the connected load if you need to isolate the UPS for lockout/tagout purposes. This is why it is important to understand the electrical one-line of the UPS plant.

If you can completely shut down the UPS, lock open and tag the associated input and output circuit breakers.

A UPS may have an alternate energy source connected to it. This may be a battery plant, flywheel, or another UPS. You must also isolate this source and confirm

Review and Discussion

What is a UPS system and what is its special danger?

Why is it important to have a MOP for the work you are to perform?

Why should you review the one-line of the UPS plant?

What is the proper way to shut down a UPS system?

What are some lockout/tagout considerations for a UPS?

What can happen if you use the emergency shutdown button on the UPS?

Why is it important to check for both AC and DC voltages before working on the UPS?

What is the proper way to check for DC voltages?

Why is it important to replace all barriers and close all doors before energizing the UPS?

Why is it important to follow the manufacturer's instructions when starting a UPS?

isolation with a meter. Some UPS manufacturers will trip the alternate source circuit breaker off when the UPS is shut down, but some do not.

Most UPS systems will have large AC and DC capacitor banks. Capacitors store energy. Although the capacitors will discharge to ground or through bleed resistors when the UPS system is shut down, don't bet your life on it—shock happens. Check for voltages across the bus before commencing work.

The DC side of a UPS usually floats with respect to ground, so check for DC voltage across the line. You may not register a voltage if you look for it line to ground.

Maintenance and other efforts often require the UPS to cycle on and off. Remember, every time the UPS starts, the capacitors will recharge.

Understand and follow the start up procedures for the UPS. An improper startup may result in loss of connected load, damaged equipment and injured people.

Before energizing the UPS, verify all tools have been removed and that all guards, barriers, shields, and doors are in place.

Capacitors that have been in continuous service for years are most likely to fail when re-energizing on UPS startup after they have cooled down. The failure is usually an internal short. The result may be a loud explosion followed by smoke and fire. The barriers and doors are designed to contain the explosion and keep you safe.

Participant's Signature and Date

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