

Water Environment Association of Texas

Operations Challenge

Electrical Event

Goal

Safely troubleshoot and repair an electric motor control panel in an efficient manner.

Scenario

A lift station submersible pump has failed. The pump must be replaced and the lift station must be put back in service before the rising level in the wet well overflows.

Procedure

We have assembled a panel that consists of a 3-phase motor starter/overload block, 3-phase motor circuit protector, control power transformer, HOA switch, start/stop pushbuttons, relays, etc. We have wired this using a very typical motor control circuit so that it can operate in "Auto" from level switches or in "Hand" from the start/stop pushbuttons.

We have simulated a wet well, rising water level, and a submersible pump. The pump must be installed, connected to the motor control panel, and placed into operation. There may be "problems" with the motor control panel that will have to be identified and repaired. These issues would be similar to the type of problems found in typical applications such as tripped overload heaters and blown fuses. However, there should be no other problems with the control wiring itself in the panel as no untrained individuals have worked on the panel.

Teams will be asked to troubleshoot and repair the equipment to return it to operation.

1. Each team will consist of two people.
2. Each team will be given the replacement sump pump, wiring diagram, VOM, screwdriver, wire, etc. to make all necessary repairs.
3. Each team will be timed. The intent is to repair the circuit quickly, efficiently, and, most importantly, safely.
4. Penalties will be assessed for various infractions:
 - a. Lockout/tagout procedures must be followed.
 - b. Proper wiring color code convention must be followed to ensure proper "phase rotation" for the pump.
 - c. If a team member attempts to touch an energized circuit with bare hands, screwdrivers, etc., a penalty of five minutes per infraction will be added to the overall time.
 - d. If a team blows a control fuse or trips a circuit breaker, a penalty of five minutes per infraction will be added to the overall time.
 - e. If a team breaks the VOM by blowing the internal fuse, the team will be disqualified.
 - f. If a team does not finish before the wet well overflows, the team will be disqualified.

General Notes

This exhibition will be conducted in two different divisions:

1. The “Open” Division will consist of team made up of electrical engineers, technicians, maintenance electricians, etc. These teams will compete on Wednesday with times to be scheduled.
2. The “Professional” Division will consist of the existing Texas Operations Challenge teams. These teams will compete on Thursday with times to be scheduled.

As with any new event, there is always the potential to identify, correct, or clarify parts of the procedure that may be problematic. As such, it is our intent to review and revise the procedure in order to improve competitiveness and safety.