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Wastewater Plant Plugs Into Savings and Safety

A Wisconsin wastewater treatment plant is saving time with a combination plug/receptacle and disconnect switch that makes motor and generator connections safe, fast and easy, whether in the plant or at lift stations around town. The Meltric DECONTACTOR™ Series switch-rated motor plug allows workers to safely make and break electrical connections, even under full load, and also provides the NEC-required "line of sight" disconnect.

The $23.6 million plant serves Watertown, Wisconsin, a city of about 23,000 located midway between Milwaukee and Madison on the Rock River. It replaces an earlier plant and was completed in 2004. The 5.2 mgd facility is expected to accommodate future growth well beyond the next 20 years and is located on a 40-acre site that will permit additional future expansion.

During construction of the plant, which began in 2002, submersible mixers in the aeration basins were hard-wired. Shortly after operations began, one of the mixers had to be replaced, which put the tank out of service for about a day while the mixer was disconnected and a new one re-wired. About the same time, Jim Arndt, a department maintenance technician, saw the Meltric Decontactors at a trade show and suggested installing them on the mixers to prevent delays on future mixer replacements. As a result, the facility installed DSN30 (30A, 480V, 10 HP rated) Decontactors on all its aeration tank mixers.

Closeup shows Meltric Decontactors for two adjacent mixers. Pressing the pawl on top of the device disconnects the power safely before the plug and receptacle can be separated.

These devices allow the mixers to be connected and disconnected safely with plug-and-play simplicity. Now, mechanics can easily replace or service the mixers without needing an electrician and without the need for cumbersome electrical PPE (personal protective equipment), as required by NFPA 70E. Assistant Water Systems Manager-Wastewater Kevin L. Freber explains, "When the first mixer failed, we had to shut everything off and disconnect all the wiring before we could pull it out and drop in a replacement. If one failed on a weekend, the weekend staff couldn't handle it, so we either had to wait until Monday or call in an electrician. Now we just pull the plug, crank the mixer up and plug in a new one. We're ready to go in minutes, and there's never any exposure to live power."

Connecting a generator to the lift station is fast, safe and easy, and an electrician is not required at the jobsite. When disconnected, the plug's dead-front construction keeps workers safe by preventing accidental contact with live parts.

Disconnecting a motor is a simple operation that is initiated by pressing a pawl on the Decontactor, which causes it to break the circuit and eject the plug to its rest position. Then, a simple quarter-turn of the plug allows it to be

totally withdrawn from the receptacle in complete safety, since the circuit is already dead. When the plug and receptacle are separated, a safety shutter prevents access to live parts.

The Decontactors incorporate spring-loaded, silver-nickel butt-style contacts that provide consistently superior electrical performance over thousands of operations and are resistant to wear, corrosion, oxidation and other factors that contribute to premature failure of pin and sleeve-type devices. Freber confirms that the silver-nickel contacts used in the devices stand up well to the corrosive gases in the plant. “They have been online for more than a year without any problems,” he states

Safer and Faster Lift Station Connections

Success with the aeration basins led the utility to equip its portable emergency generators and remote lift stations with similar connectors. The city is underlain by 105 miles of sewers that collect wastewater from a 12 square mile area. The collection system also includes 18 remote lift stations. The lift stations, located around the city, use submersible pumps to elevate the wastewater in the sewer lines and facilitate gravity flow to the treatment plant. Typically, they are located below ground level with a control panel above ground. Freber says the total capacity of the pumps is 27 million gallons per day, although flow generally averages between three and three-and-a-half mgd.

While some lift stations are equipped with stationary generators to provide emergency power, a power failure may make it necessary to bring the department’s portable generators to the other lift stations and connect them to power the pumps until service is restored. Previously, these stations were equipped with conventional pin and sleeve connectors. However, they could not be locked easily to prevent tampering or injury to children or vandals who might try to remove the plug. Freber says, “The generators deliver 100A service, and with the plugs we had before, there was no way of locking the two parts together. Any child could walk up and pull it apart.”

Unlike pin and sleeve devices, the Decontactor can be padlocked easily in the on or off position to eliminate the dangers of tampering.

Freber points out that the Decontactors are easy to lock to prevent tampering and also are safe when they are separated. He states, “You have to twist it to open it, and even if someone could get it apart, they never could get at the live contacts.” This is due to their dead-front construction and enclosed arc chambers. Easily accessible contacts on the previous connectors had the potential to expose workers or others to live power, so switching to Meltric’s Decontactors also helped the utility to simplify compliance with NFPA 70E arc flash requirements.

Arc flash can be a concern when it becomes necessary to switch power connections, but the city’s lift stations that use mobile generators for emergency power are constructed to minimize or eliminate this risk. Freber says that wiring typically comes up from the pump into the bottom section of the control panel, which is constructed so that the related starters and other electronics are segregated in a sealed area. He explains, “Because of the new arc flash laws, we have them separated so our technicians can open the outside panel without danger from arc flash. There is also a walking beam inside, so when we switch from city power to emergency power, the power can’t back feed. Using the Decontactor to connect to the generator with this arrangement we can switch safely from city to emergency power.” Now, it takes only minutes to connect a generator and begin pumping. The ability to connect or disconnect quickly and safely makes it easier to move generators around to various lift stations for monthly test runs or if necessary during a prolonged or widespread power outage.