



Turning off CP rectifiers prior to tank repairs, construction

A very bad practice!

It is common practice to turn off cathodic protection (CP) rectifiers during tank repairs and piping connections at oil terminals, refineries and pipeline stations. This practice is based on the misconception that turning off the CP rectifier will eliminate the electrical hazard of separating tanks and/or piping during maintenance and repairs, especially during API 653 inspections and repairs. Turning off CP rectifiers greatly increases the likelihood of tank-bottom and buried-piping corrosion due to lack of CP and does little to eliminate other sources of current that may be present at the terminal.

Safety first

The CP touch voltage is the change in the bare tank-to-soil potential after the CP system has been de-energized and is in the range of 1 volt direct current (VDC) to rarely over 3 VDC. Therefore, the touch voltage generated from the CP is not an electrical hazard. A person contacting the tank and a separated portion of the pipeline while standing on the ground (voltage across separation) would still be expected to be in the safe range of 1-3 VDC. There

are other sources of electrical energy-inducing current that may exist on tanks that must be recognized and could cause an unsafe touch voltage.

Electric arc or spark

An electric arc or spark may occur, which could be a source of ignition for hydrocarbons that may be present during separation of tanks and piping. The arc or spark may be from many other sources than the CP, like another tank CP system, foreign pipeline or terminal CP system, telluric current, welding, electric transit systems, etc. Turning off the CP will not eliminate the potential for an arc/spark to occur and does not make the tank/piping safe from possible arcing.

Problems shutting off the CP rectifier

CP is a regulatory requirement for and often recommended to be utilized in industry-recommended practices (NACE and API) for carbon steel tanks and piping at refineries, tank farms and pipeline stations. They protect the soil side of the tanks and piping from external corrosion. The objective of a CP system operating at a recog-

nized criterion is to reduce the corrosion on a steel tank bottom or buried piping to an acceptable rate of 0.01 millimeters per year (0.4 mils per year). By intentionally turning off the CP rectifier, one is intentionally allowing corrosion of the tank bottom and buried terminal piping to occur. The attempt to achieve one safety practice is at the expense of another safety practice.

Preferred safety practice

The objective is to reduce the voltage across the tank-to-pipe or pipe-to-pipe separation location to 0.0 V, so that a spark or an arc cannot be initiated. A large cable bond securely connected to both sides of the tank/piping to be separated — before separation — will achieve this goal. It will provide the necessary continuity through this separation to satisfy transfer of all tank/pipeline current from one section to the next. This is in fact a recommended practice for pipelines. The bond essentially removes the spark/arc hazard from not only the CP current but also all current in the tank and pipeline. With the rectifier on, the same level of CP will remain on the tank as before.

Conclusion

A CP system does not create a hazardous touch potential for personnel working on the tank or pipe. Turning tank CP rectifiers off allows external corrosion to progress on a tank, setting up the possibility of a future safety and/or environmental hazard through a tank failure. Intentionally turning the CP rectifiers off for extended periods during routine tank inspections is not in compliance with regulations or best practices requiring CP be maintained.

Excerpts of this article were taken from "Stay current," NACE International cathodic protection training and certification news, summer 2016, written by W. Brian Holtsbaum, PE.

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