Tank Exothermic Reaction Guidelines

A WHITE PAPER FROM ASSMANN

This letter is a general guideline addressing the storage tank in the event of an exothermic reaction. This should not be considered the only steps to take, just an overall view of what is happening and how we feel you should address the situation. Consult your chemical supplier for full instructions on how to handle the chemical reaction. Most importantly be safe!

Regardless of the cause, you have an exothermic reaction happening in your storage vessel. In most situations, the cause of an exothermic reaction is that two incompatible chemicals have been introduced within your storage tank causing an extreme elevated temperature. This can happen due to numerous causes such as equipment malfunctions, mislabeled fill ports or simply delivery errors. Regardless of the cause, it is a very serious situation. **As a first step all personnel should be removed from the area until the tank has cooled.**

Polyethylene tanks are designed for relatively low operating temperatures. Assmann tanks are manufactured from two materials. Linear polyethylene that has a maximum operating temperature 120° F and Crosslink polyethylene that has a maximum operating temperature of 140° F. When temperatures exceed these limits tank damage occurs. The higher the temperature and longer the duration of the event the more severe the damage. Softening of Linear resin occurs at 130° F. and with Crosslink resin at 150° F. Temperatures at or above these limits will eventually cause catastrophic failure of the tank. When the failure will occur is dependent on the highest temperature the stored product reaches and the duration of the exposure.

Directly after the incident you should try to monitor the tank temperature with IR (Infra-Red) equipment measuring the outer wall surface temperature of the vessel. Keep in mind polyethylene is a great insulator so the temperature reading of the tank wall will be less than the liquid temperature inside the vessel. Double wall tanks will have a lesser exterior temperature since the interstitial space needs to be heated.

When heated, polyethylene resin becomes brittle, which compromises the materials ability to handle movement from expansion and contraction. Elevated temperature accelerates this process. High temperature will actually change the molecular structure of the resin if it exceeds the recommended maximum temperature of the resin. Age also contributes to the material becoming brittle. The expansion and contraction created during the normal fill and empty process cycle will eventually cause the tank to fail if it becomes too brittle. Unfortunately, the only way to test flexibility and tensile strength of the material is destructive. Visual checks can be made for cracking, crazing, color differences and unusual shapes but that does not address the brittleness of the material.

Any non-destructive inspection would be speculative.

Considering the cost of a replacement vessel and the cost of the material it is storing we do not recommend placing a tank back in service once it has been exposed to an exothermic reaction. It is our opinion that the backend risk outweighs the front-end cost savings. Our recommendation would be that any tank surviving an exothermic reaction be taken out of service, neutralized, and disposed of due to the embrittlement of the plastic and the even greater risk of failure.

Aca Assmann™ CORPORATION OF AMERICA

300 N. Taylor Road, Garrett, IN 46738 • Manufacturing facilities in Garrett, IN and Marshall, TX
Phone: 888-357-3181 • Fax: 260-357-3738 • info@assmann-usa.com • www.assmann-usa.com