Technical Document: Storing Solvents (Benzene, Toluene, Xylene, etc.) in High Density Polyethylene Tanks)

R.A.W. Corporation is a leading manufacturer and supplier of High Density Polyethylene and High Density Cross-linked Polyethylene tanks to the oilfield chemical treatment market. Management has 27 years experience in actual rotational molding manufacturing processes and is familiar with storing chemicals ranging from 98% sulfuric acid, 35% HCL, 50% Caustic, and a wide variety of paraffin inhibitors, corrosion control and H2S scavengers. We also have relationships with all of the major polyethylene resin manufacturers such as Exxon/Mobil, Conoco/Phillips, DuPont, Nova Chemical and Ingenia Polymers. While R.A.W. manufactures and supplies our customers with both materials, our #1 objective is to supply our customers with a product that is correct for the intended application that is competitively priced.

Before we delve into the storage of specific solvents, it is important to understand the differences in polyethylene resins. As you can see in the attached "Resins – Reference" provided by Thermo Fisher Scientific, Inc., there are various types polyethylene from LDPE, HDPE, LLDPE and XLPE. "Cross-linked high-density polyethylene (XLPE) is a form of high-density polyethylene wherein the individual molecular chains are bonded to each other (using heat, plus chemicals or radiation) to form a three-dimensional polymer of extremely high molecular weight. This structure provides a superior stress-crack resistance and somewhat improves the toughness, stiffness and chemical resistance of HDPE."

Recently, claims have been made regarding the storage of solvents in HDPE (poly) tanks with a simple 20% increase in wall thickness. Will this additional thickness increase the life of your tank, yes, but the question is for how long. If your tank wall thickness is .200 and you increase the thickness by 20%, your nominal wall thickness now becomes .240. R.A.W.'s nominal minimum thickness on horizontal leg tanks up to 330 gallons is .250, and we still do NOT recommend storing solvents in HDPE tanks for 3 primary reasons. 1) The resin manufacturers do not recommend storing benzene, toluene, or xylene as illustrated in Thermo Fisher Scientific's Chemical Resistance Table attached. 2) In order to determine the percent of cross-linking that has occurred in a finished product, one must perform a percent gel test in accordance with ASTM D-1998-06. Cross-linked PE begins as HDPE with an additive added that creates the chemical bond. For the percent gel test a sample of the XLPE part is weighed and then boiled in a solution of xylene. During this process, the solvent dissolves the uncross-linked HDPE polymers left in the sample thus yielding a percent of cross-link. The same process occurs naturally on location, particularly in very hot climates diminishing the useful life of your tank. 3) Due to the extremely low flash point of these solvent based products, coupled with the heat typically found in July thru September, the vapor space becomes saturated at 100% of the combination of the product making the top of the tank brittle.

The leading tank manufacturers in the country will not offer a warranty of any type on either the HDPE or XLPE resins in solvent applications. Due to our knowledge and 27 years of experience in the gulf coast region we have had very good success with using XLPE. We have seen these tanks remain in service from 18 months to 3 years. Many external and environment factors can and do influence the service life. Because of the need provide cost effective solutions to our customers needing to store high concentrations of solvent based products, we have developed the UltraTank™. See attached flyer.

- ✓ UltraTank™ manufactured from cross-linked polyethylene
- ✓ UltraTank™ wall thickness increases by 50%
- ✓ UltraTank™ vent capacity doubles to deal with the vapor space
- ✓ UltraTank™ is available up to 1025 gallons
- ✓ UltraTank™ has a 2 year manufacture's warranty for solvent based product