

Phenolic Mortar Protects Concrete Tanks From Chemical Wastes



LOCATION

Kalamazoo,
Michigan



COMPLETION

1979



OPERATION

Production of a variety
of pharmaceuticals and
chemicals



PRODUCTS

ASPLIT™ CN Mortar

Challenge: Required chemical resistant tank lining over concrete for quick installation to reduce down-time

Solution: ASPLIT CN Mortar using panels of plywood secured by Monel bolts and studs

The Fine Chemicals Division of The Upjohn Company produces a variety of pharmaceuticals and fine chemicals in the plant at Kalamazoo, Michigan. The wide range of chemical reactions results in a quantity of waste materials which is collected in large 85,000 gallon concrete holding tanks prior to a series of treatments that assure a pollution-free effluent for safe disposal. The waste fluids, which may contain many different organic and inorganic salts plus traces of solvents, are adjusted to a pH of 3½ – 5½ in these tanks as the first step in the treatment process.

The tanks each measure 28 x 38 x 15 feet deep and are used alternately. Each one is completely filled and emptied every other day. The interior surfaces of the tanks were originally coated with an epoxy-based system to protect the concrete from chemical attack. A new chemical-resistant lining was needed that could be applied in a relatively short time to minimize downtime, and cost was a consideration.

A number of lining materials and protective coatings were tested in a search for a cost-effective system. During the testing program it was noted that a partition of plywood in filtering tanks handling the same waste material, showed no deterioration or delamination of the layers after seven years of service. Apparently the phenolic-type glue used as a binder in marine grade plywood was resistant to the waste. Consequently, Upjohn engineers felt that a liner of phenolic-based material would provide the protection needed for the tanks of concrete.

ErgonArmor's ASPLIT CN Mortar, a modified phenolic, graphite filled mortar, was selected that is resistant to acids, alkalis and organic chemicals. However, the mortar, formulated for bonding acid-proof brickwork, cannot be used on vertical surfaces without support. The contractor for the lining project solved this problem by facing the mortar with panels of plywood held in place with studs and bolts of Monel. Monel was selected to avoid galvanic-type corrosion between the graphite in the mortar and the alloy which could weaken the fasteners.

The lining process consisted of first scabbling and sandblasting the concrete and then applying a coating of epoxy to fill in irregularities. The dried epoxy was then sandblasted to provide a good bond for the mortar and approximately 3000 Monel studs were set in holes drilled on one foot centers. A 3/16 inch thick layer of the mortar was troweled over the floor and lower portion of the four walls. Predrilled panels of marine-grade plywood-2 x 2 foot for the walls and 2 x 4 foot for the floors-were set over the studs and drawn tightly into the mortar with nuts and washers of Monel. The lining of mortar and plywood was applied to a total area of 2800 sq. ft. in the two tanks.

The first tank was lined in August 1979 and the second in September 1979. There had been no external evidence of chemical attack on the lining in either tank after seven months of service. The same type of lining will be considered for other tanks in the waste treatment system if the original application continues to provide the desired protection.

