



**TECHNICAL
ARTICLE
SERIES**

PVC Tank/Pump Systems Handle Corrosive Waste

ARTICLE # TL-130

INDUSTRY: Metal Finishing

ENTITY:

SOLUTION(S) PUMPED: Chromic acid, Hydrochloric acid, Hydrofluoric acid, Nitric

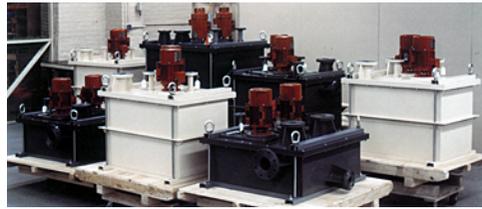
PUMP TYPE(S): Non-metallic Tank Pump Systems

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PVC Tank/Pump Systems Handle Corrosive Waste

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This photo shows various sizes of Vanton PVC tank/pump systems used to safely handle plating, chemical cleaning and other corrosive plant wastes. All units are skid mounted, with pumps, valves, controls and piping installed so that the systems can be put into operation as soon as external electrical connections and piping hook-ups are made. All pumps feature a cantilevered shaft design, which eliminates the need for shaft sleeve bearings in solution. The integral pump/motor shafts are supported by large diameter, oversized bearings in hollow shaft motors.

A manufacturer of military equipment faced a difficult waste-handling problem because of the many corrosive electroplating and metal finishing solutions held in the processing areas.

Extreme temperature variations and environmental elements also were of concern. Site temperatures ranged from slightly below freezing to 44°C. Some of the waste collection sumps were kept outdoors, where they were exposed to direct sunlight. In addition, humidity readings as low as 9 percent were common.

The metal finishing rinse waters collected in the sumps ranged in pH from two to seven. They included varying percentages of chromic acid sodium dichromate, nitric acid, hydrochloric acid, sulfuric acid, hydrofluoric acid and phosphoric acid.

To handle the waste, the manufacturer needed a tank/pump system that would withstand corrosion and exposure to the elements.

The design-engineering firm for the project recommended that all fluid-contacting components, including tanks, pumps, valves, pipes and fittings, be constructed of solid, homogeneous thermoplastic. Metallic construction (stainless steel) was ruled out almost immediately because of anticipated problems with corrosion, maintenance, galling or seizing of threaded connections, and high initial cost.

Although polypropylene pumps and valves tend to be slightly less expensive than polyvinylchloride (PVC), the latter is more suitable for handling oxidizing acids such as chromic and nitric acids. Tensile and compression strength also are high, providing the rigidity needed for the tanks. Outdoor units were painted with an ultraviolet-inhibiting white finish.



These Vanton PVC tank/pump systems stand 66" high, 78" long and 26" wide. The 48" cantilevered shafts of the two Vanton SGH sump pumps are housed in heavily ribbed PVC columns to provide the extra rigidity required. The pumps are driven by 5 HP, 1750 RPM hollow shaft motors and deliver 120 PGM at 40' TDH.

System Design

The system consisted of 11 PVC tanks, each fitted with two heavy-duty sump pumps from Vanton Pump and Equipment Corp., Hillside, N.J. The pumps were driven by hollow-shaft motors, which were protected from corrosive fumes by vapor seals. The stainless steel shaft was completely isolated from fluids by a thick-sectioned PVC sleeve, and exposed motors and motor brackets were coated in epoxy.

Tanks were constructed of solid ½-inch-thick PVC sheets, and a 1 ¼-inch-thick bolted PVC cover supported the two sump pumps and float controls. Stainless steel lifting lugs at the four corners facilitated handling.

Each skid-mounted tank/pump unit contained pumps, a motor, valves, level controls and piping. Only external connections and wiring needed to be added to make the units operable. A duplex pump control panel housed the fuse disconnect switch, magnetic motor starters, on/off

indicating lights, transformer and relays.

The units handle a broad range of materials and pH levels, and resist corrosion. Other features of the system included automated operation and easy maintenance.