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INNOVATIVE ACID TANK LINING SOLUTION

When Simon Storage was looking for a lining system for a hydrochloric acid tank they approached Abfad

Abfad Limited, which is based in the North East of England, were approached by Simon Storage in April 2011 regarding the application of Abfad's innovative double skin tank lining system, Fuelvac. They wanted to see if the system could be applied in a 14.8m diameter x 13m high tank that would be used for the storage of hydrochloric acid at the company's storage site in Seal Sands, Teesside, in the UK.

Fuelvac is a double skin lining system developed and patented by Abfad Limited that can be applied to both above and below ground storage tanks. This system not only protects the tank from any internal corrosion, as steelwork is coated and therefore cannot physically corrode, but also allows for 24/7 vacuum pressure leak detection monitoring.

With today's environmental pollution laws and the protection of valuable assets a major concern, double walled installations and tank

monitoring are becoming more and more crucial. If an internal breach does occur in a Fuelvac protected tank, then the client is immediately alerted and can plan inspection knowing that the stored product is fully contained and safe. In most instances an internal breach of the double skin liner can be fully repaired and operational again with minimal down time. This results in no environmental clean-up costs and no expensive tank replacement or repair. Because the tank is monitored 100% of the time this reduces the need for inspections and Non Destructive Testing, enabling better managed operations running simply, effectively and efficiently at all times.

RESISTANT COATING

The first obstacle faced on the Simon Storage project was to locate a coating that would be fully resistant to hydrochloric acid.

Abfad Limited went to several of its resin suppliers and discussed two potential coatings

that would offer suitable protection for the tank. Abfad then made some free film resin samples to be immersed in the acid to physically test the resistance of the selected coating. Both the resin manufacturer and Simon Storage agreed to test the samples over a two year period. After that time it was deemed that the tests had been successful for the chosen coating and that it was resistant to the hydrochloric acid. Now the real work could begin.

"We use solvent free coatings for our tank lining, including on the HCL tank, as we find these offer greater long term protection as well as being friendlier to personnel, the public and the environment as they don't contain any harmful VOCs," explains Paul Glister, Marketing & Business Development Manager for Abfad. "Also because there isn't any solvent, the coatings don't break down over time. These are hot spray applied using a plural component heated spray pump and sprayed to the required thickness."

He told PCE: "On the HCL tank, the one we went with was a 3M ScotchKote epoxy coating, as our tests showed this would offer the greatest protection. We also looked at several International Enviroline epoxies, as we have a lot of experience with them for storing hydrocarbon fuels and ethanol products."

PROJECT RESEARCHED

Abfad Limited was commissioned to review the project and formulate all engineering aspects to be able to double skin the tank floor areas and importantly up to the top of the wall sections.

The company's research team reviewed all aspects of the project, including the weight of the double skin materials, and developed a method to ensure that the 13m high wall sections would be fully secure during the installation process and after the double skin liner was fully installed.

INSTALLATION

With all research and planning done, the installation process was ready to begin, the client emptied the tank, cleaned and de-gassed it and the structural integrity of the tank was established through Non Destructive Testing. Abfad then arranged scaffolding, which consisted of six lifts and a dance floor at the top of the tank, in order to gain access to blast the underside of the tank lid.

All areas of the tank were blasted clean and then an initial single skin coating was applied. All areas of the tank were then visually inspected and holiday (spark) tested to ensure no pin holes existed in the single skin coating. Any pin holes found were repaired and the coating was successfully commissioned prior to sign off.

Once the single skin coating was completed

and signed off, the double skin application commenced with the side walls first to be done.

CRITICAL ASPECT

Another critical aspect of the project was to section off the tank into six separate zones each with its own vacuum monitoring instrument gauge, this was to allow for more precise monitoring of the tank.

To enable each area to be separate, Abfad overlapped their double skin system, which they believe to be a first performed in the industry. Once the first wall zone was double skin lined and terminated back onto the original coating, the company then applied the next wall zone section. This was overlapped onto the existing zone double skin, ensuring each zone remained a separate entity, and could be independently monitored with vacuum pressure within each interstice.

The walls of the tank were split into four separate sections in this way, with all zones overlapping onto the previous zones double skin.

The floor section was split into two zones using the same method as the wall sections. In this way the tank had six separate areas of monitoring, each with its own Endress+Hauser vacuum instrument gauge, which was linked back to the client's control room.

At each stage and with every zone, sign off was completed only when the zone could hold its vacuum and there was no doubt in regards to pin holes or any defects. Commissioning consisted of visual inspection and holiday detection (spark testing) of every inch of the tank coating onto the original steel and again after the coating was applied to the double skin materials. Testing was performed several times on each zone, before sign off and prior to the tank being handed back to the client.

Due to the highly corrosive nature of the hydrochloric acid, all pipe connections to the tank were reviewed and protected and the tank hatch was internally coated to ensure there was no area of the tank that could potentially be a leak path due to any corrosion of the steel.

SUCCESSFUL OUTCOME

The project was a complete success with the tank coming into use and storing the product in August 2014. With no problems reported, and all zones monitored within specifications, both Abfad and Simon Storage are delighted with the outcome of the project.

Abfad Limited believes that this is the first hydrochloric acid storage in the UK, if not the world, to be double skin lined, enabling Simon Storage to store hydrochloric acid in the North East for the first time. ■