

Case Study: Cooling Tower Rehab

Kansas State University Vet Med Center

Project Brief: Comprehensive Refurbishment and Relining for 6-Cell 31,200-MBH Cooling Tower, allowing expansion of chiller plant capacity.

Coating Specifications: HVAC Armor CT System for Concrete Basin
Final Dry Film Thickness: 80 mils

Upgrades:

- Concrete basin repair
- New fill & support
- New fans
- New fan motors w/ VFD's
- New distribution system and nozzles
- New drift eliminators

Start Date: 21st January 2013

Completion Date: 15th March 2013

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Summary of Solution

This six-cell 50'x30'x30' tower is located immediately on the campus, and due to its condition was in need of a rehab and life extension for a concurrent chiller plant capacity upgrade. All internal components of the tower were not previously coated. Photo documentation shows the concrete basin, and distribution system had significant deterioration, scaling and corrosion. Furthermore, the fill was significantly scaled and worn.

At water level, large areas of the original internal concrete were delaminated and could be removed by hand with minimal effort, which would have only been accelerated by power washer cleaning. Continual ingress of water beneath the concrete endangered the structural wellbeing of the concrete substrate with continued corrosion, and also risked the growth of micro aquatic bacteria including Legionella, Pseudomonas and Biofilm. If left untreated, this situation would lead to further deterioration in the tower surface structure as well as potential contamination of the supply with unhygienic and potentially harmful water. Our goal, besides increasing system capacity and extending the life of the cooling tower was to enhance the cleanliness of the system and the water in it, and avoid the use of materials that harbor bacteria and other micro-organisms or provide nutrients for microbial growth.

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We therefore provided the following scope of work:

Basin Repair/Coating

Concrete Basin Repair

Existing compromises in concrete basin were evaluated based on size, and filled in with concrete and rebar when necessary. The concrete repairs were allowed to dry before mechanical abrasion to allow maximum adhesion of the coating systems.



Mechanical Preparation

All internal surfaces of the tank were prepared utilizing dry abrasive sand blasting in order to remove the existing contamination and prep the surface for the coating. Any minor holes found due to corrosion were repaired with additional concrete repair. Immediately after sand blasting all dust, residue and debris left on the surface was completely removed.

Coating Application:

The base coating for concrete, BLOME EC 590 LTC Primer was applied. During the application all crevices and deeply pitted surfaces were completely penetrated and coated with particular attention to edges, bolt heads, weld runs, etc. Crew utilized regular checks of wet thickness with a wet film thickness gauge to ensure the specified thickness was applied. The nominal DFT for the base coat of the system was 30 mils, the base coat was allowed 6 to 8 hours before the top coat application.



The top coat for concrete and all metal components was BLOME TL-40 S Medium Gray LTC. One coat was required to achieve a nominal specified thickness of 50 mils.



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Additional Project Upgrades

DISTRIBUTION SYSTEM



The existing distribution system piping comprised of schedule 40 steel and was seriously corroded. New schedule 40 PVC was used for headers and lateral distribution. ABS nozzles were installed for optimal flow and dispersion of spray system.

FILL REPLACEMENT



Existing fill was replaced with new PVC fill:15 mil after forming (Brentwood OF21ma-15). Drift eliminators were replaced with PVC Cellular 20 mil. FRP structural shapes were used for fill and drift eliminator support.

FANS



MOTORS



GEARBOX



Four existing fans were replaced with FRP blades, HDG Hubs, Ductile Iron Hub Spools, and Aluminum Blade Clamps.

Summary of Solution:

This rejuvenation system was able to significantly extend the lifecycle of the cooling tower, thereby offsetting capital replacement costs. Furthermore, since the cooling tower now utilizes variable frequency drives on the fans, there is a significant energy savings component to this project. For more information, please contact HVAC Armor at 920.267.6120.