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CASE HISTORY

"Preservation of Distral Brand Type D Boilers with Economizers, De-Aerator and Chimneys"

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REPORT

*Preservation of two "Distral" Brand Type D Boilers
with Economizers, De-Aerator and Chimneys*

CHEMICALS USED

Rust Remover CORTEC VCI-422

Corrosion Inhibitors CORTEC VCI-309, VCI-388 and VCI-386

Corrosion Inhibitor CORTEC VCI-170

PROCEDURE

BOILERS

Wash

The boiler wash was done with water supplied by tank trucks using the following method:

All the doors were opened, both at the top dome and the bottom dome. One of our people went inside the top dome to wash each of the tubes that go from the top dome to the bottom dome, in order to do a complete wash of each tube.

After performing this procedure, we confirmed that in addition to rust and dirt being deposited in the bottom dome there were pieces of electrodes as well as a piece of sheet metal 20 centimeters long, 1 inch wide and 1/8 inch thick. This material was removed from the bottom dome before proceeding to dry the inside of the boilers.

While washing the boilers we recorded the relative humidity and temperature of the environment, obtaining average values of 50-55% and 32-35°C respectively.

The procedure described above was performed in both boilers and in order to control the pressurization, a 1/2" diameter valve and a 4" diameter manometer measuring kg/cm² were installed in each boiler.

Boiler Firehole

The inspection windows, two in each boiler and the side firehole inspection door were sealed with 24-gauge galvanized sheeting and silicon and the floor of the firehole was sprinkled with 45.5 kg of powdered VCI-309 to protect 77 cubic meters of internal volume plus the outside surface area of all the tubes. Once the application of the inhibitor was completed, the mouth of the burner was sealed with 24-gauge galvanized sheeting attached to the existing bolts with nuts. Lastly, it was sealed with silicon.

ECONOMIZERS

Rust Removal from Finned Tubing with VCI-422

In order to apply this product we mounted the economizers on supports with trays to collect the product during the recycling process. The mounting was done with the help of Carilifters from Maraven.

Once the economizers were mounted on the supports the recycling system was assembled, including tubing, valves, rust traps and pumps. The preliminary wash was done with water to eliminate dirt and loose rust in the finned tubing of the economizers and the sprinkling system used to apply the rust remover VCI-422 was tested.

Next, the VCI-422 was recycled in the first economizer for 1 1/2 hours and the product was recovered. Next, the entire system was washed with water to remove any VCI-422 residues. We verified that all the rust had been removed and that all the finned tubing had a white metal appearance.

Preservation with VCI-309 and Pressurization with nitrogen

After the wash, we proceeded to seal the system for its preservation and pressurization as follows:

We manufactured gaskets and blind caps for the dome doors and existing flanges in each boiler, following the diagrams, in the amounts and sizes shown below:

- 4 - 1 1/2" diameter
- 3 - 2" diameter
- 1 - 8" diameter

These gaskets and caps were installed and sealed with silicon. In addition, we sealed five (5) tubes on the top dome which did not have flanges and were not threaded. To solve this problem we used a threaded bar that was 3/4" in diameter and 8" long with washer stops, gaskets and nuts. Lastly, they were sealed with silicon.

Once the entire system was sealed we proceeded to apply the powdered inhibitor VCI-309 by sprinkling it along the top dome, using 3.9 kilograms of product per boiler to protect a total equipment volume of 13 cubic meters.

Afterwards we proceeded to pressurize the system with nitrogen. After injecting 1 1/2 tanks of nitrogen we found that the system did not pressurize. We carefully inspected the equipment and found leaks in the top dome under the outside insulation of the boiler. After removing the outside insulation we found three tubes with the same characteristics as the five tubes mentioned before (without flanges and unthreaded). We proceeded to seal those tubes with an epoxy resin made of two components.

Before again trying to pressurize them, they were sprinkled with one (1) additional kilogram of VCI-309 to compensate for the possible loss of this product due to the leak. The equipment was pressurized and after that a small leak appeared in the top flange vent, which is 8 inches in diameter. It was corrected, leaving the equipment pressurized at 15 psi (1.1 kg/cm²)

The VCI-422 product recovered from the first recycling was allowed to settle for 12 hours and was filtered to eliminate the rust removed from the first economizer as much as possible. Then the procedure was repeated to remove the rust from the finned tubing of the second economizer.

Preservation of the Finned tubing

Once the rust was removed and the surface was washed with water, we proceeded to apply corrosion inhibitor VCI-388 on the entire external surface of the finned tubing until we achieved a coating thickness of 2 mils (50 microns) of dry film.

Washing the internal surface of the economizer tubing

We performed an internal wash of the finned tubing in the same vertical position in which the equipment was placed on the supports in order to have good drainage of the water used in this operation. During this procedure we could confirm the existence of two vent tubes 7/8" in diameter connected to the system, which we had not considered because they were not in the diagrams. Next, the economizers were lowered to a horizontal position at their storage site.

Internal preservation and pressurization of the 2" diameter tubing

We proceeded to seal the vent tubes and apply 300 grams of VCI-309 dispensing it by using the nitrogen pressure of the tank, until it was verified that dust was coming out on the opposite side of the tubing, thus confirming the uniform application of the product along the entire length. After sealing with a flange and gasket, we pressurized the 2" diameter tubing with nitrogen at 15 psi.

After the pressurization we proceeded to seal the ends of the economizers by putting self-adhesive foam rubber with corrosion inhibitor VCI-170 on the edges of the openings and covering them with 24-gauge galvanized sheeting and lastly, sealing the edges with silicon. This method was used in both economizers and on both faces.

To control the pressurization, valves 1/2" in diameter and manometers with 2" diameter dials measuring psi and bars were left installed.

DE-AERATOR

Equipment wash

We proceeded to wash the interior with water under pressure using a tank truck with an 8,000 liter capacity. Once they were dry, all the plugs and missing flanges - 10 plugs and 4 flanges with their respective gaskets where needed - were installed.

Preservation using corrosion inhibitor

Corrosion inhibitor VCI-309 (4 kg) was sprinkled inside the de-aerator and the equipment was sealed.

CHIMNEYS

All the chimneys were cleaned inside to eliminate loose dust and rust that might be stuck to the surface. Then we proceeded to coat this surface with corrosion inhibitor VCI-386. Four coats of this product were applied to achieve an average dry film thickness of 3 mils (75 microns). After this application the chimneys were tilted in order to avoid water deposits inside them from rain.

List of diagrams of type D Boilers supplied by Distral Termica

Equipment Diagram No.

Boiler 6750-01-03-001
 6750-05-00-0001
 6750-02-03-2002
 6750-02-04-2002
 6750-02-13-0001
 6750-01-03-0002
 6750-02-03-2001
 6750-02-02-3001

Economizer 6750-02-15-0002

De-Aerator 0755-20-11-0001