

- *Evaluation of ice water aggregate condition*

Expert survey on an aggregate element condition was carried out with the aim to evaluate the range of defects and the reason that the unit has not been put into operation since the delivery time during over two years.

The ice water aggregate was installed on the roof of a huge new building during the building construction and was not put into operation from the very beginning because of lack of the elements necessary to join together the aggregate components. A trial to put the aggregate to work performed after around 20 months from its delivery did not finished with a positive result because of defective components. The expertise was ordered to overview the defected elements, the step that should be done to start with a claim.

Particularly the oil separators were painted on much rusted surfaces (Fig. 1-2). Instead of using a proper anticorrosion paint system one layer of paint was applied. The paint film did not adsorb to the substrate, and was brittle so much, that its fragments were easily crushed into small pieces between fingers and the film could be easily removed from the substrate using just fingers. The paint coating was completely destroyed and the substrate so covered with rust that a conclusion could be drawn that two separators installed in the new aggregate were not new and were kept in aggressive atmosphere.



Fig. 1. Single paint coating on the oil separator was brittle and applied over rusted surface



Fig. 2. Paint coating on the oil separator shows no adhesion to the rusted surface

Most of the copper piping was covered with dark patina and locally had grey-greenish spots of copper corrosion products. Such type of surface conversion does not happen during typical transport or storing conditions. The condition of such pipes can be compared with some new copper pipes installed, which were not covered with patina (Fig. 3-5).



Fig. 3. Copper piping with corrosion spots



Fig. 4. The installed copper piping was not a new one



Fig. 5. New parts and old ones of installed copper piping

The source of the marks on the inside of heat exchanger (evaporator) showing different levels after filling with water was not exactly known (Fig. 6). Every of such linear trace was not left after very short filling with water, because it should be period of time long enough of reaction with cast iron surface to form intense corrosion products. The specialist service during the attempt to put the heat exchanger into operation estimated 80 tubes leaking and suggested their fracture due to low temperature (Fig. 7). During a review of registered temperature it was not possible to find enough low freezing temperature at the time the exchanger was filled with water.

The light grey paint coating on the aggregate holding frame did not show any signs of destruction changes after two and a half years in atmospheric conditions, that proves its good quality.

A circumferential fracture of the compressor cast iron wall was found after a few months from the attend to put the aggregate into operation (Fig. 8).

The main reason of lack of possibilities to put the aggregate into operation were improper technical condition of the unit components.



Fig. 6. Heat exchanger cover showing several levels of water



Fig. 7. Heat exchanger after tube tightness tests carried out by the specialist company



Fig. 8. The light grey paint coating on the aggregate holding frame hard and elastic. Locally on a few points first signs of rusting after two and a half years in atmospheric conditions



Fig. 9. Circumferential fracture of the compressor wall

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