

## **PRE-COMMISSION CLEANING AS PER BSRIA GUIDELINES AND ITS CONCERNS FOR NEW HVAC SYSTEMS**

Kindly find the below notes and attachments regarding the Precommission cleaning concerns regarding new HVAC systems.

" If BSRIA pre-commissioning cleaning not done for HVAC systems, as per BSRIA, how the welding flux, welding debris, fabrication debris and wastes, dust etc. will be removing from system? If the above wastes and debris not removed through Precommissioning cleaning all this debris will be circulating in entire chilled water system including chiller tubes. The chiller tubes are made of copper with low thickness & the Condenser tubes are also made of thin Copper tubes with low tube thickness. Also, AHUs and FCUs will have such very thin copper tubes where the system water is circulating. When pre-installation fabrication wastes & debris circulates in chiller tubes and in condenser tubes, there will be metal to metal scrubbing issues will be occurring and hence the chiller copper tubes will be erasing in this scrubbing effect. Hence the copper tubes thickness will be decreasing and the equipment's life will be shortened. If Precommissioning cleaning not done as per proper procedure, how will assure the equipment's life after commission?"

### **Details of Why Pre-Commission Cleaning Required?**

During Installation & Fabrication procedures, the pipes and the entire lines would have Welding Joints. The outer sides of welding surfaces are cleaned during the fabrication process itself. But the Welding Flux formed during the welding on the inner sides of the pipes can't be removed and will be staying there even after the fabrication process completion.



Welding Flux, Iron Fins and Pre – fabrication debris during Chemical flushing

Most times the Erection and Fabrication team will complete their works and the Chiller suppliers and the commissioning team will flush the entire lines with just fresh water. But this water flushing will remove only the dust and other light debris inside the pipes. The main welding fluxes and such Iron fines will not be removed from system by the fresh water flushing.

The Welding flux debris and such iron fines will be removed from new systems only if the system undergoes proper Precommission cleaning as per the guidelines. For removing such stucked Welding flux debris will be removed from its sources only if the system water circulated with proper Mineral dispersant and Surfactants as advised. Otherwise such Welding flux and Iron fine debris will stay on its sources inside the pipe lines even after the system startup and later on continues operation slowly such Welding fluxes and Iron fines will be removed/ loosened from its sources and will start to circulate in entire chilled water system lines including Chiller copper tubes, AHU/FCU copper tubes and in entire MS chilled system lines.

While we do Proper Pre-commission cleaning prior to the commissioning of system all such Welding flux and Iron Fines will be loosened from its sources and will be removed through the strainers and from the 1 Micron PP Filter bags used in Cleaning processes as shown in above picture.

Later slowly during the regular operation of the Chillers by the client, this loosened welding flux and the existing Iron fine debris will be circulating in system will be resulting in Metal to Metal scrubbing inside the entire lines and tubes. This is known as Erosion Corrosion.

This Erosion corrosion, also known as impingement damage, is the combined effect of corrosion and erosion caused by water contaminated with high residual Iron and Tiny Iron Fines. It is the second most common cause of copper tube failures behind Type 1 pitting corrosion due to the stagnation of Contamination in Pipe lines. Hence the Copper tubes of Chiller unit and the AHU/FCU units will be damaged soon.

Also, due to the Erosion corrosion to the inner walls of MS pipe lines of the entire chilled system, the Iron will be loosened and will be transferred as Colloidal Iron Residual. This Colloidal Iron residual slowly will start to stagnate in lower velocity areas of the Chilled water system lines. Mainly in Supply/ Return lines of AHU /FCU units and will cause Pitting Corrosion under this stagnated area as shown below:



Stagnation of Colloidal Iron in Lines



Pitting Corrosion Under Colloidal Iron Stagnation

Hence due to the above all concerns, BSRIA and such authorities have made Pre-commission Procedures and Guidelines for HVAC system's start up and such guidelines should be implemented in every stage of Commissioning of new HVAC systems.

Such Guidelines are Mandatory now and all the known Consultants insists the Clients and the supplier to proceed the Commissioning of the HVAC system only after the Pre-commission cleaning Procedure as per BSRIA guidelines. This will be helping in increasing the performance of the entire system and will ensure the life of the equipments like Chillers, AHUs and FCUs etc and will be resulting in Energy saving concerns too.

### **Pre-Commission cleaning Concerns to Condenser water system after Installation completion.**

Same is the concern to the Condenser water system too. The Welding Flux and the Iron Fines formed during the installation and the Pre- Installation debris from site also can cause same concerns – Erosion Corrosion to Condenser tubes – and will affect the Condenser tube's life and the performance of the Condenser unit as a whole.

END OF NOTES ON PRE-COMMISSION CLEANING FOR NEW HVAC SYSTEM