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## **MAINTENANCE BULLETIN**

***10<sup>th</sup> Feb 2019***

TO: Fleet

**SUBJECT: Cleaning and Handling Procedures for Plate Exchanger / Plate Cooler**

The purpose of this Maintenance Bulletin is to have the correct guidelines in place for cleaning, handling and assembling of Plate type Heat Exchanger/Cooler on board ships for their optimum performance and durability. This Bulletin is listed under the below categories for easy and clear understanding

**a) Damage to Equipment:**

Damage to these plate Exchangers and plate Coolers can be caused by certain factors:

- Corrosion;
- Erosion
- External force
- Water hammer
- Thermal and / or mechanical shock
- Wrong transport / lifting and incorrect handling during maintenance.

**b) Opening the Plate Heat Exchanger/Cooler:**

While opening and assembling the heat exchanger/cooler following steps to be taken:

- Check and note dimension of plates stack width • Shut down the heat exchanger
- Make sure the heat exchanger cools down.
- Ensure there is no pressure on any part of the unit
- Clean the tie (clamping) bolts and grease the threads
- Loosen the tie (clamping) bolts equally and diagonally in the correct order
- Remove the plates without damaging the gaskets.

**c) Cleaning of Plates:**

- Do not place the plates on a metal surface (floor plate), always lay them flat on a wooden surface when cleaning.
- Do not clean the plates whilst holding them vertically upright as it could lead to their distortion from use of excessive handling.
- Never use a metal brush, steel wool or sand/glass paper for cleaning the plates as this will damage the passivation film of the plates.

- Do not use any type of solvents which contains chlorine to remove old gasket glue.
- Ensure that any detergent used for cleaning is compatible with the plate and gasket material before use. In case plates are removed for manual cleaning, make sure that they are re-fitted in the same order.
- Always remove plates one by one and number them. If the scaling observed is thick the plates can be placed inside a container large enough to lay them flat immersed in a suitable cleaning agent.
- Alternatively cleaning of these plates can be done by high pressure water washing as well depending on plate's condition.
- Before fitting back, chemically cleaned plates should be thoroughly rinsed with fresh water.

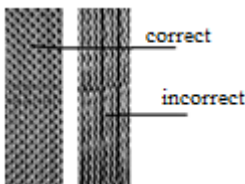
Important: Cleaning is an important part which will influence the effectiveness of the heat exchangers/coolers and insufficient cleaning can have the following results:

- too low circulation flow
- insufficient thermal output
- Life time of the heat exchanger will be shortened.

#### **d) Plates Replacement:**

Plates must be clean, dry and free from oil or grease. If there are any oil remains on the gaskets, or on the gasket seating area then there is a high risk that the plates or gaskets shall slip out of place when the unit is being tightened. If the gaskets are contaminated with dirt or grit, then these could cause leakage of fluid. Therefore,

- Make sure that all seating areas are flat, clean and undamaged.
- Put back the plates according to the Plate Sequence indicated in the Suppliers Instruction Manual.:



#### **e) Gasket Replacement :**

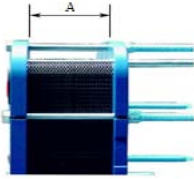
The Instruction Manual must be referred to for the correct type of gaskets to be used. Usually glue free gaskets which require no adhesives are used in plate type exchangers/coolers . Make sure the grooves and gaskets are clean and free of oil before replacing them.

#### **f) Assembling of Plate Stack and Pressure Testing:**

This has to be done with extra care and attention as below:

- Lubricate the clamping bolt threads slightly by oil. Do not allow oil or grease onto the gaskets or the gasket seating faces on the back of the plates as wet or contaminated plates can get misaligned during tightening. Evenly tighten all bolts in the correct order diagonally from top to bottom forming symbol "X" (refer instruction manual also) preferably by a ratchet spanner.

- Ensure clamping is as uniform as possible thus keeping the frames and plates parallel throughout the operation. Avoid skewing (shifting/twisting) the frame plates by more than 5 mm.
- Tightening is complete when the distance between the inside faces of both frame plates equals the distance "A" in the below drawing
- This tightening distance can also be calculated using the following formula:  
Assembly distance = No. of plates x (plate thickness + coefficient) The coefficients can vary depending on the model type but is often 0.1 mm.
- On completion the unit can be pressure tested (test pressure is usually stated on the name plate) or else refer Instruction manual.



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