ARMSTRONG

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Plate Heat Exchanger Sizing Considerations

It should be noted that some competitors in the Plate and Frame Heat Exchanger market occasionally present incorrect values for Total Heat Transfer Surface Area on their quotations/proposals. This is a tactic that reduces the amount of material used to build the product, which results in a lower cost and a more competitive price, without contractors or engineers noticing the difference.

This Transfer Surface Area is an indication of the heat transfer capabilities of the heat exchanger and is also directly proportional to the price.

In the examples that we have seen, competitors have stated on their spec sheets that the Heat Transfer Surface Area of their unit is a certain value (something realistic for the application). However, the actual unit selected and depicted in the shop drawings has a Heat Transfer Area much lower than that indicated on the spec sheet.

Listed below is the methodology needed to estimate the Heat Transfer Area, based on the drawings and dimensions of a unit, (usually included in a shop drawing package).

We encourage Representatives to be aware of this tactic when discussing competitive pricing with contractors and engineers so that we may put an end to this unethical business practice.

Another method to assess the accuracy of a PHE selection is by calculating the U-factor to see if the heat transfer coefficient is realistic as follows:

The Total Heat Transfer Area also affects the U value of the unit (Overall Heat Transfer Coefficient) which is a factor that indicates the ability of the heat transfer device to transfer heat.

Using the equation:

$$\mathbf{Q = UxLMTDxA}$$

or

$$\mathbf{U = Q/LMTDxA}$$

Where: Q is Heat Load
U is Overall Heat Transfer Coefficient
LMTD Log Mean Temperature Difference
A is Heat Transfer Surface Area

Engineers usually use this equation to calculate the U value of a submitted heat exchanger, which is in turn used to gauge whether the heat exchanger submitted is capable of performing the desired heat duty.

Plate and frame heat exchangers usually have a U value between 800 and 1200 Btu/(h)(°F)(ft^2), however our aggressive X Series plates can obtain U values as high as 1400 & 1500 Btu/(h)(°F)(ft^2)

When competitors “fudge” the value for Total Heat Transfer Area, this tricks the engineers, as they will now obtain a U value that seems reasonable, however, if they were to use the real area the U value would be too high and unrealistic.

To calculate the actual surface area from the drawing and number of plates, please follow the step by step instructions below.

1. First find the Total Heat Transfer Surface area on the competitors Spec Sheet (This is usually on the spec sheet that is included in the shop drawing package provided to the engineers for approval)

Plate Heat Exchanger

CUSTOMER	:
REFERENCE	:
PROJECT	:
SERVICE OF UNIT	:
MODEL	: S-X29-750L-51
SURFACE PER UNIT	: 152.96 ft²

2. Note the plate count of the unit, which should also be located on the Spec Sheet, as well as the drawing.

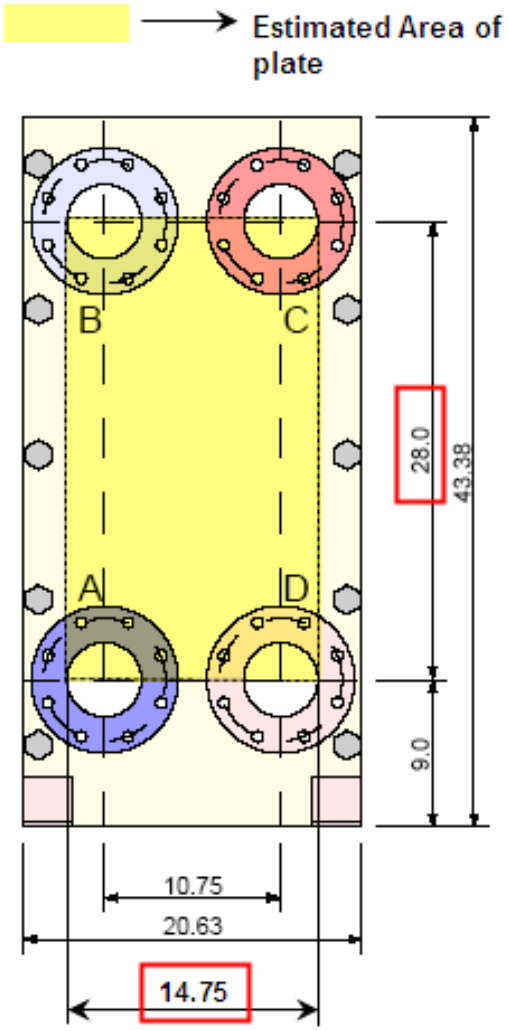
PLATE MATERIAL	AISI 304
NO. OF PLATES	51
PLATE THICKNESS (mm)	0.40
FRAME MATERIAL:	Carbon Steel

3. Estimate the individual plate area. Now, most illustrations will not include the dimension of the plate itself, but will indicate the dimensions of the head plate from which the plate dimensions can be estimated.

   You will notice that the height of the plate (effective height where heat is transferred) is the height between the higher and lower connections and it is safe to assume that the plate is around 65% of the height of the head.

   Also, the width of a plate (effective width where heat is transferred) is usually the width from the outer edge of one connection to the outer edge of the other, horizontally next to it (see diagram below).

   In the case shown, the dimension between the centre points of the connections was given, and we also know that the unit has 4 inch ports, therefore the distance between the outer edges = Distance between centre points (10.75) + 4 inches = 14.75 inches (in this case) Now if the distance between the centre points is not provided on the drawing, one would have to estimate what this is in relation to the width of the head. It is usually safe to assume that it is 74% of the head width.



4. Calculate the individual area of each plate (in this case 14.75 inches x 28 inches = 413 inches^2 → 2.87 ft^2)

5. Now that we have the individual plate area, it is simple to calculate the estimated Total Heat Transfer Area as this is just: Total Heat Transfer Area = Individual Plate Area X No. of Plates (2.87 x 51 = 146 ft^2 for this case)

6. Make a comparison between estimated and indicated Areas. In this case our indicated area was 153 ft^2 and our estimated was 146 ft^2, which is only a discrepancy of less than 5%. We can therefore assume that the indicated area is accurate. If the discrepancy is more than 10%, then there would be a strong possibility of "foul play".

It is hoped that this new information sheds some light on the activities of some competitors, and helps representatives identify this practice.

If you have any questions or concerns regarding this process, please contact your Regional Manager.

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