



EDITORIAL

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Case Study – Opening and closing a film heat exchanger - SPX maintenance know-how brings plant back on line faster

Introduction

Opening and closing the film heat exchangers for routine maintenance was taking forever and was a far from popular task for the maintenance crew at a fruit juice plant. Pulling the case closed by progressively tightening the tie bars, the normal procedure for closing plate heat exchangers, is not applicable to the evaporator film plate which is a much easier task if you understand the differences. The key difference here is the fact that the correct final dimension for evaporator film plates is established by under vacuum. Secondly, some evaporator plate types don't settle squarely due to the lack of symmetry of the gaskets. So tightening to a fixed squared dimension can actually damage the plates.

Result

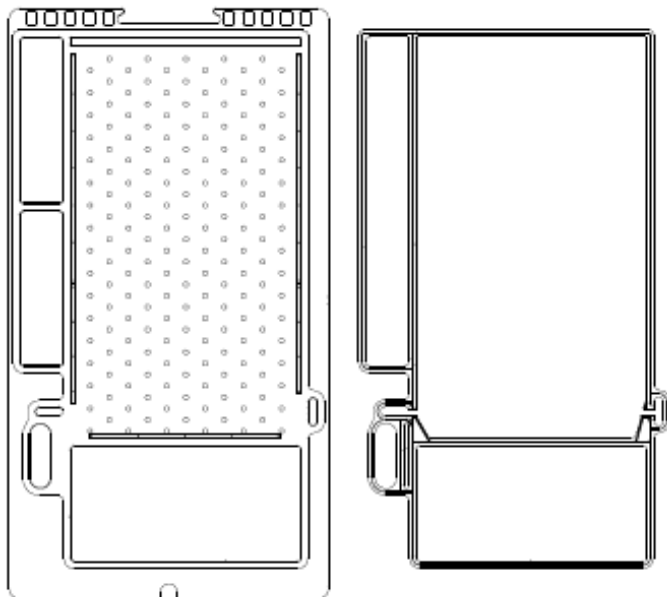
Discussing the procedures with SPX engineer Bob Vail quickly established that the crew were using the same method for both conventional plate heat exchangers and the evaporator film type units, and that there is a better way which takes the strain out of the job and brings the plant back on stream in half the time. The key ingredient is experience : having originally invented plate heat exchanger technology and having decades of manufacturing experience with thousands of units installed worldwide, SPX can call on a wealth of knowledge in the form of a host of tips and methods to make life easier. In this case, the key is knowing how to harness the power of the vacuum pump.

A different procedure for film heat exchangers

In the case of the common Plate Heat Exchangers (PHE) used for standard industrial and sanitary heating and cooling, the procedure is to pull the case closed by manually tightening the tie bars up to a specific dimension based on the number of plates. This also applies to two special types of APV evaporators, the ParaVap and the ParaFlash.

It is important to consult the product manual for the exact procedure for the model in question, but in general you close starting from the top pair of tie bars and working towards the bottom squarely in 1" – 1/2" increments until you reach 10% of the final closure dimension. After that, tighten in 1/4" increments to the final dimension ensuring the top, middle and bottom dimensions are the same.

Rising and falling film heat exchangers are different – because of the configuration of the gaskets which are not symmetrical, the correct final dimensions are not symmetrical either. In the diagram below, you can see that the steam chest side of this type of heat exchanger has two rectangular steam passage openings with appropriate gaskets which are not present on the other side. This asymmetry is reflected in the final dimensions and this is what makes the job tricky if you attempt to close the case using the same wrench and tie bar procedure as the plate heat exchanger.



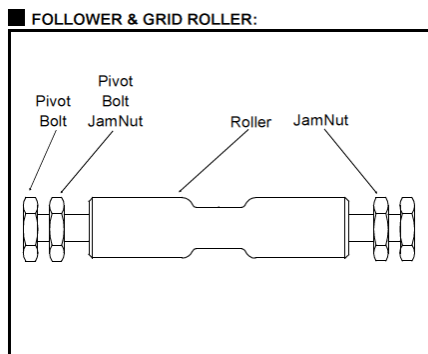
Film evaporators from SPX use vacuum pumps as part of the process to attain low boiling points. The easier and quicker procedure proposed by Bob Vail is to use the vacuum pump and not the tie bars both to open and later to close the assembly and to attain the final correct compressed dimensions.

Use the vacuum pump to do the hard work

First use the vacuum pump to open the plates. Start by taking the system off line and draining it as normal when shutting down. Follow all the safety procedures in doing so. Now start the vacuum pump and pull down to the lowest achievable vacuum. It may be necessary to isolate the feed supply manually by closing the feed flow control valve. After full vacuum is applied loosen the tie bars and back off the nuts at least 3" from the follower. Magically all the tie bars are now loose and can be removed easily while the follower stays in place because the vacuum holds it and the plates together as one unit. With all the tie bars removed stop the vacuum pump and slowly break vacuum. The plates will open up like an accordion – all in less time and with less effort than the conventional procedure.

Use the vacuum pump again to close the assembly.

First make sure the top rails hanging strip from which the plates hang is smeared with greased so the plates don't hang up as the process of compressing the assembly moves them along. If it is not greased the plates may drag and there is a risk of bending their hooked edges. Next grease the followers' roller bearings, the grease fittings are on each side of the roller.



Now slide all the plates forward to the head along with the follower. It helps to keep them tight against the head as it will save some tightening distance with the wrench. Load the tie bars on each side and begin tightening evenly and squarely just as described earlier for a PHE plate pack. Work from top to bottom so as

to keep the plates tensioned down on the hanging strip, otherwise the plates will ride up and off the strip and they can also move side to side causing leaks. Tighten manually until the first plate gasket is in contact with the head all the way around. At this point start the vacuum pump and continue to tighten watching for the vacuum to catch. Once the vacuum catches the reduced internal pressure will pull the plates in and cause them to begin nesting naturally without further effort with the wrench.

Let the vacuum continue to pull down as far as it will go which should be to 1.5 PSIA or lower (that's 27" Hg). If it stops before reaching that value listen for leaks between the head and first plate as this is where the least amount of compression takes place because the plates are moving from the follower to the head. Once final vacuum is attained the plates will be fully compressed and seated and the tie bar nuts can be hand tightened without effort. Note that it is important to use the proper size, thick washers that are specially designed. Their job is to take the load when the vacuum is released which a standard washer is not designed for.

That's it, the heat exchanger is re-assembled with the plates at their natural compressed pitch in half the time, with minimal effort and the plates are not crushed which can occur if the tie bars are overtightened by hand. Note also that, when using this method, the rising falling film plates will nest correctly at a final pitch which is uneven when comparing left side to right. Do not try to even them up. The falling film plates will be very close to even when using this method. Remember also to replace the gaskets before the plates become damaged from metal to metal contact. For more information please contact Bob.Vail@spx.com.

About SPX:

Based in Charlotte, North Carolina, SPX Corporation (NYSE: SPW) is a global, multi-industry manufacturing leader with approximately \$5 billion in annual revenue, operations in more than 35 countries and over 14,000 employees. The company's highly-specialized, engineered products and technologies are concentrated in Flow Technology and energy infrastructure. Many of SPX's innovative solutions are playing a role in helping to meet rising global demand for electricity and processed foods and beverages, particularly in emerging markets. The company's products include food processing systems for the food and beverage industry, critical Flow components for oil and gas processing, power transformers for utility companies, and cooling systems for power plants. For more information, please visit www.spx.com.

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