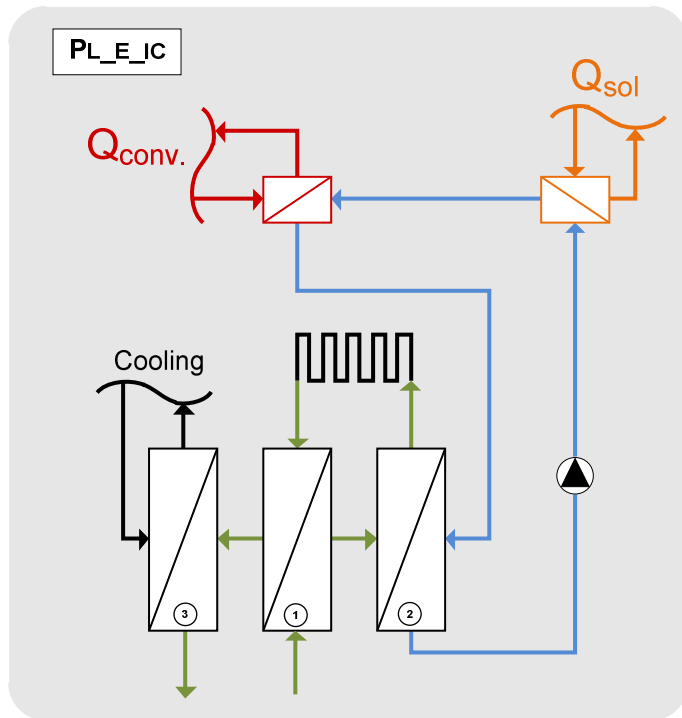


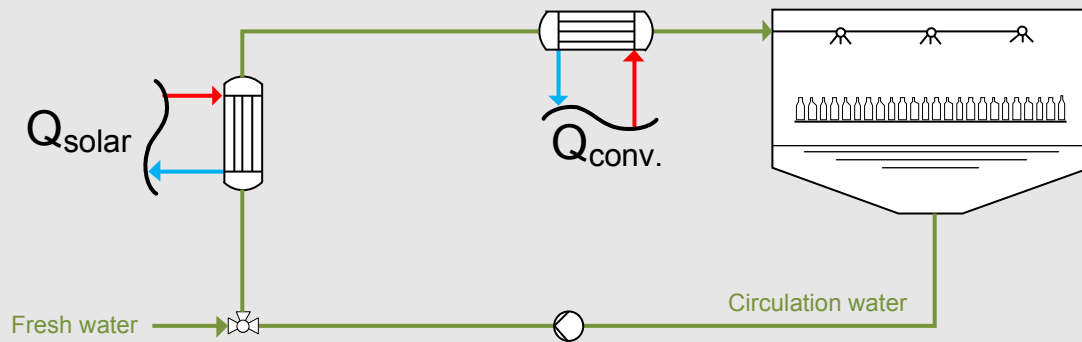
Pasteurization



Example how to integrate solar heat for flash pasteurization.

Flash pasteurization takes place before the bottling of beer. Usually multi-zone plate heat exchangers are used for flash pasteurization. They can have an internal or external heating and heat retention section. Within the first section, the beer is recuperatively preheated in counter flow by already pasteurized beer. Within the second section of the multi-zone heat exchanger, the beer is heated to pasteurization temperature by a hot water circuit. This additional hot water circuit is heated with steam or pressurized hot water. This is necessary to ensure a gentle heating of the product.

Solar heat has to be integrated to the water circuit prior to the conventional heating. Flash pasteurization systems with external heat exchangers as shown in the figure can be easily supplied with solar heat, since the piping is usually accessible. Water with approximately 70..75 °C leaves the heating section during operation, is heated by solar energy, and if necessary with steam in the external heat exchanger by 3..4 K.



Example how to integrate solar heat for a tunnel pasteurizer.

Tunnel pasteurizers are often used in larger breweries. The filled bottles are transported on wide conveyor belts (sometimes on several floors) through the machine while they are sprayed with water. The bottles are preheated by passing several temperature zones within the first section of the tunnel pasteurizer. Within the middle section they are heated up to pasteurization temperature and kept at this temperature for a defined time. The bottles are cooled down within the last section.

Usually, tunnel pasteurizers have an internal heat recovery. The water that is heated within the recooling zone by the pasteurized bottles is used within the first section to preheat the bottles that enter the tunnel pasteurizer. Only the middle section with the highest temperature level has to be heated conventional. Therefore, one or more external heat exchangers are usually installed. The overall heating demand of tunnel pasteurizers consists of three parts: Heat is required to heat all baths to the required temperature before production. Since there is no heat recovery between the equivalent zones, the maximum power requirement occurs during start-up. In stationary mode of operation the heat demand is limited to increase the temperature of the bottles by approximately 10..15 K within the middle section.

Usually, the baths of the different temperature zones are heated externally. In this case, solar heat can be used to increase the return temperature as shown in the figure. New systems can be equipped with a multi-zone heat exchanger for solar and conventional heating. Due to evaporation and carryover, there is an additional demand of fresh water (up to 20 ml per bottle), which can also be heated by solar energy.