



thermowave
PHE for process and industry

Brewery group relies on thermowave

Polish brewing company Kompania Piwowarska (which is part of the Japanese Asahi Group) has consistently opted for thermowave plate heat exchangers (PHEs) for its heat transfer operations as part of the modernisation of its brewing technology and energy-related renovations. Over 30 thermowave PHEs with a total heat exchanger capacity of over 100 MW are used in all brewing sub-processes at the Group's sites in Poland. The Polish Energy Regulatory Office has awarded it a "white" certificate.

Polish brewing company Kompania Piwowarska boasts three historical breweries, two of which have been brewing beer for several centuries: Tyskie Browary Książęce in Tychy (founded in 1629), Browar Dojlidy in Białystok (founded in 1768) and Lech Browary Wielkopolski in Poznań (founded in 1895). These breweries produce top beer brands such as Lech, Tyskie, Żubr, Dębowe, Redd's and the Książęce specialities. Around 500 employees brew the beers using natural ingredients and traditional recipes. The beers and beer-based drinks (boasting annual production of over 13 million hectolitres) are popular both in Poland and also throughout the whole of Europe.



Overview

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| Business line: | Food and beverage |
| Application: | Beverage cooling |
| Country/Region: | Poland/Poznań, Tychy, Białystok |
| Fluid: | Wort, yeast, green beer, beer |
| Product: | thermowave thermoline TL 250 TCGL, TL 250 TDGL, TL 250 FBGV, TL 400 TBXL, TL 400 FBFV, TL 500 TCGL, TL 500 TCGL, TL 500 FCGV, TL 650 KCKL, TL 650 KCIL, TL 850 KBKL |

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▲ thermowave TL 250 TCGL, TL 500 TCGL and TL 850 KCIL plate heat exchangers form the interface in each case between the circuits for ammonia and green beer.



▲ A thermowave TL 850 KBKL unit with a heat exchanger capacity of 6.5 MW heats up over 200 m³ of wort per hour from 72 °C to 98 °C. In the counterflow, 100 °C hot water is cooled as part of this process step down to 78 °C.

Modern brewing technology

The Asahi Group's Polish sites are proof that age-old traditions and modern brewing technology are not mutually exclusive but in fact can go hand in hand. Instead of distributing cold to individual consumers via a glycol circuit (which was common practice in the past), these days central ammonia refrigeration systems provide environmentally friendly and economical cooling, sometimes directly.

In order to use both heat and cold efficiently in the production process, wherever possible in the entire brewing and cooling process heat and cold are transferred to other media with high-efficiency thermowave plate heat exchangers. The heat is transferred between the refrigerants, between beer (at different process stages) and coolant/water, predominantly in the counterflow.

Various thermowave plate heat exchanger designs are used in the individual production lines to ensure efficient and reliable operations. They are used, for example, as wort heaters and coolers, green beer coolers, pasteurisers, yeast coolers and water degassers.

The central ammonia refrigeration systems use robust thermowave thermoline TL 650, TL 500 and TL 250 plate heat exchangers for the evaporation of ammonia and for heat recovery in CO₂ systems.

thermowave thermoline in beer production

The thermowave plate heat exchangers are capable of carrying out a wide range of different tasks as part of the brewing process:

1. Wort heating

In production, several thermowave TL 850 KBKL units with a heat exchanger capacity of 6.5 MW heat up over 200 m³ of wort per hour from 72 °C to 98 °C. In the counterflow, 100 °C hot water is cooled down to 78 °C as part of this process step.

2. Wort cooling

In Tychy, for example, the freshly cooked wort is cooled from 99 °C to 10 °C using five thermowave TL 500 TCGL plate heat exchangers. In the counterflow, the approx. 7 °C cold water flow is simultaneously heated up to over 80 °C.

A total of approx. 32 MW of plate heat exchanger capacity is installed in Tychy for this process (another four thermowave PHEs are already planned in Poznań for this stage of the process).

3. Yeast cooling

Yeast cooling is a highly specialised process which, thanks to thermowave's know-how, runs smoothly, reliably and efficiently in the brewery in Tychy.

White energy-saving certificates in Poland

White energy-saving certificates were introduced in Poland as part of the transposition of the Directive on Energy End-Use Efficiency and Energy Services in order to improve overall energy efficiency in Poland which was set out as a national target. The certificates are only awarded as part of a public bidding process and confirm that energy consumption has been significantly reduced. Companies and private individuals benefit in equal measure. The supported projects range from industrial plants and the retrofitting of buildings right through to combined cooling, heating and power generation and the replacement of units for domestic use.



▲ A thermowave TL 500 FCGV unit, which boasts approx. 93 % heat recovery, is used as a pasteuriser for the high-temperature, short-time (HTST) flash pasteurisation of the beer for 15 to 30 seconds.



▲ In Tychy, wort is cooled from 99 °C to 10 °C using five thermowave TL 500 TCGL plate heat exchangers with a combined plate heat exchanger capacity of 32 MW.

A thermowave TL 400 TBXL plate heat exchanger was integrated into the yeast preparation line in 2017. It cools the yeast down from 16 °C to 2 °C. Propylene glycol is used as the coolant with an inlet temperature of 0 °C.

4. Pasteurisers

Several thermowave TL 500 FCGV units, which boast approx. 93 % heat recovery, are used as pasteurisers for the high-temperature, short-time (HTST) flash pasteurisation of the beer for 15 to 30 seconds. Both PHEs each currently have an installed heat exchanger capacity of approx. 4.7 MW; however, this can be easily expanded with the long supporting tubes whereby additional plates are incorporated.

5. Green beer coolers

thermowave has been playing an important role at all the sites of the brewing company Kompania Piwowarska ever since it renovated its refrigeration systems. The central ammonia refrigeration system provides -3,5°C/-4,0°C cold which is directly used to cool the beer. thermowave TL 250 TCGL and TL 500 TCGL plate heat exchangers and three thermowave TL 850 KCIL PHEs supplied in 2018 form the interface in each case between the circuits for ammonia and green beer. The green beer is cooled from 6 °C to -2 °C by a heat exchanger capacity of approx. 560 kW per unit.

6. Water treatment

Kompania Piwowarska also relies on thermowave's know-how for degassing water and, as such, has installed a thermowave TL 500 FBGV plate heat exchanger with three sections. The brewing liquor is first heated here then driven against the incoming fresh water before being cooled down again in the PHE's third zone. It is not until then that it is pumped into the brewing process.

The heat transfer capacity of this specially designed thermowave construction is approx. 5 MW.

Demineralised water is used to force remnants of dissolved oxygen out of the fresh water. This water is treated using a special system with the help of optimised heat exchangers and a special degassing column.

High CO₂ savings

A new, economical CO₂ refrigeration system was incorporated into the brewing process as part of the overall modernisation of the Poznań and Tychy sites. The ammonia/glycol/CO₂ systems at both sites were equipped with thermowave plate heat exchangers which together provide a heat transfer capacity of 4,500 kW.

Firstly, the CO₂ is evaporated in two thermowave TL 500 TDGL units with the warm propylene glycol from the secondary refrigeration circuit. Secondly, propylene glycol subcools the liquid ammonia via two thermowave TL 250 TDGL units.

As a result, the water consumption of the two breweries has been reduced to around one third of what it was previously. As such, correspondingly less water now needs to be made the right temperature and, according to the company, every year approx. 816.6 tonnes of CO₂ equivalent are saved.

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