Opening up energy reserves in tank refrigeration

Saving energy is a major topic for all process steps in breweries. Looking at the energy requirement during fermentation and storage makes clear that the requirements of the fermentation process allow a graduated refrigeration, which will save energy. With the STEINECKER TwinCool two-step refrigeration system, breweries will reduce their energy consumption during refrigeration.

At a glance
- Reduced demand for electrical energy in the refrigeration process
- Retrofittable refrigeration system with two temperature circuits
- Individual calculation of the potential for optimising the energy efficiency of each individual brewery in a simulation program
Which tasks must be especially considered with regard to fermentation control?

**Technological requirements:**

- During the main fermentation process, the extract is quickly reduced at high temperatures.

- Just before the final degree of fermentation is reached, the green beer is cooled down and yeast is cropped in several steps.

- Flavouring substances are produced in a first, warm storage process.

- Mainly undesirable by-products of fermentation are eliminated during the following cold storage process.
Which tasks must be especially considered with regard to fermentation control?

Energetic requirements:

− The heat produced by yeast during main fermentation is dissipated to maintain a constant temperature.

− At the third day of main fermentation and during the cool-down phase to warm storage, the need for refrigeration amounts to its maximum.

− Only losses are compensated during the two storage phases.

− The cool-down phase to cold storage requires a lower refrigeration rate in order to maintain the refrigerating performance at a moderate level.
The efficiency of the refrigeration system is described by the coefficient of performance (COP):

- The COP of a refrigeration system indicates the ratio between thermal and electrical energy.

- Electrical energy is mainly required for compressing the gaseous phase of the refrigerant.

- The higher the evaporating temperature and the resulting pressure at the consumer is selected, the less compression is required for the gaseous phase of the refrigerant.
Technology for optimised refrigerating performance: TwinCool

The coefficient of performance (COP) for ammonia as refrigerant (R717):

- The log p/h-diagram of R717 explains why a higher evaporation temperature involves saving of energy.

- To compress the refrigerant to the same condensation pressure requires less work to be done.

- Nonetheless, the released enthalpy in the evaporator is nearly the same.
Saving energy with TwinCool

How does TwinCool save energy during refrigeration?

- As long as the fermentation process takes place at temperatures above 10 °C, the required refrigeration is provided with an evaporation temperature of approximately +5 °C.

- For the following processes below a temperature of 10 °C, refrigeration is provided with a minimum evaporation temperature of approximately –4.5 °C.

- Required is a cooling system with at least two temperature levels and a separate return pipe for the refrigerant.
Your benefits in figures

Savings potential

– **TwinCool** provides refrigeration up to a process temperature > 10 °C at the higher temperature level of the refrigeration system.

– All processes below 10 °C are refrigerated at a lower temperature level.

– The COP of the refrigeration system amounts to 7.3 for the +5 °C level and to 5.1 for the –4.5 °C level.

The current demand for the above example is reduced by approximately 17 %.
Benefits at a glance

**Can be retrofitted in existing plants**
The refrigeration system is especially designed and adjusted to suit each individual application, even for existing plants.

**Exact determination of the saved energy**
The used simulation software can exactly predict the energy saved for your brewery. Thereby, the ROI can exactly be determined.

**Individual adjustment to suit your refrigeration system**
The TwinCool concept can also be used for indirect refrigeration via a glycol circuit.

**Simple option for an improved energy efficiency**
TwinCool requires only a small input to render your refrigeration system more efficient.
Digitalisation
Process technology
Bottling and packaging equipment
Intralogistics
Lifecycle service

We do more.