

Case Study

CO₂ as refrigerant, a cool piece of art!

Norit Haffmans helps Brand Brouwerij to be more sustainable!

Introduction

The Dutch-based Brand Bierbrouwerij BV has a long history with centuries of experience. Since 1340, beer has been brewed in Wijkre. The name comes from the Brand family who purchased the oldest brewery of The Netherlands in 1871 and remained in management after its acquisition by Heineken in 1989. Brand continuously strives towards the highest standards of environmental responsibility, looking for more sustainable production while keeping the highest quality of their products.



Brand was looking for a new, more sustainable CO₂ recovery plant that met the following requirements:

- Run continuously on 300 kg/h with a maximum capacity of 500 kg/h
- Be energy-efficient
- Contribute to a more sustainable brewery

As a specialist in CO₂ management Norit Haffmans develops and supplies a range of solutions from cost-effective conventional CO₂ recovery plants to state-of-the-art plants incorporating the latest technologies, including using CO₂ as refrigerant.

CO₂ as refrigerant

In the past, CO₂ was used as a refrigerant but was replaced by chemical refrigerants such as chlorofluorocarbons. These haloalkanic gases are created by chemical processes and dissolve when released into the atmosphere. For a long period of time, these haloalkanes were believed to be safer, more energy-efficient and cheaper than natural refrigerants.

However, recent research has shown that they are one of the major causes for the reduction of the ozone layer and contribute to global warming. As a result of this, working with chemical refrigerants is put under strict supervision of the government.

Using CO₂ as a refrigerant has the following advantage:

- Environmentally friendly as CO₂ is noncorrosive and non-flammable.
- The amount of CO₂ produced in the installation is not harmful to employees. With the use of detectors, leaks easily can be tracked down.
- A coolant with good cooling properties at a lower temperature providing energy savings.
- Cost-efficient, with lower operating costs.

Norit Haffmans offered Brand an LO CO₂ recovery plant with a maximum capacity of 500 kg/h. The system, using CO₂ as a coolant, operates at low temperatures (-40 °C and -30 °C) and works as a cascade system in combination with Brand's NH₃ cooling system. Heat coming from the recovery system is cooled by the original NH₃ cooling system. Especially in such a combination, the energy return is very positive.

LiquiVap

In addition, Norit Haffmans brings all advantages of CO₂ as a coolant together by installing a closed cooling system - LiquiVap. With LiquiVap the cooling energy stored in the liquid CO₂ is reused for condensing the CO₂ gas that needs to be condensed. By "recycling" this cooling energy, 90 percent of the required cooling energy can be recovered and up to 60 percent of the electrical energy costs saved.



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Because it is a closed cooling system, no gasses are emitted to the atmosphere. The only emission is caused by the electrical energy usage, produced from fossil fuels.

When the brewery runs on full capacity, the NH₃ cooling system delivers just enough cooling energy when the need of CO₂ gas from the brewery is at it's greatest. Therefore, the LiquiVap can produce at full capacity, creating a lot of cooling energy and relieving the NH₃ system. Due to the fact that system produces cooling energy when is most needed, during the high production time, a brewery can save significantly on energy and costs and also is prepared for expansion in the future.



Conclusion

Norit Haffmans offered Brand Bierbrouwerij BV a solution that not only met their requirements, but proved that Norit Haffmans is a future-oriented and thinks outside of the box. With new cooling equipment available, CO₂ is a safe and reliable refrigerant. It excels through its energy efficiency and environmental friendliness.

Installing a HRS LiquiVap and utilizing CO₂ as a refrigerant, provides a reduction in energy consumption resulting in OPEX savings, a lower CAPEX and a smaller footprint, because no additional liquefaction plant or additional vaporizer is needed.

Brand was one of the first breweries to choose for a Norit Haffmans CO₂ recovery plant with a double cooling unit, utilizing CO₂ as a refrigerant.



Haffmans BV reserves the right to make changes in the technical specifications at any time.



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