



Güntner condenser and JAEGGI heat exchanger for the ebm-papst distribution centre

The new building complex for faster ebm-papst logistics processing in Mulfingen-Hollenbach saves 83 percent more energy than required by the 2014 German Energy Saving Regulations. This pioneering project has already gained the German company the highest possible award (Platinum) for sustainable construction. Both a JAEGGI HTK Hybrid Dry Cooler and an air-cooled Güntner GVD V-SHAPE Vario condenser ensure the dissipation of heat that cannot be used.

One central distribution centre with 51 docking ramps instead of nine satellite warehouses and distribution points – bringing them together in this way alone saves over 500,000 kilometres of journeys by HGV every year. After significant growth in recent years, ebm-papst of Mulfingen-Hollenbach (Baden-Württemberg) has invested over 40 million euros in a central cross-docking logistics concept with a highly efficient energy and heating unit right next to the Hollenbach production plant. A 35-metre high-bay multi-tier racking warehouse with 19,000 pallet spaces, a manually operated racking warehouse for different-sized pallets, a separate airfreight area, a packing



Overview

Business line:	HACV & EPC
Application:	Logistics
Country/Region:	Germany/Mulfingen-Hollenbach
Fluid:	R-134a/30% ethylene glycol solution
Product:	Güntner GVD V-SHAPE Vario condenser JAEGGI HTK Hybrid Dry Cooler

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▲ Around 100 HGVs as well as 10 to 15 sea containers with a total in excess of 300 tonnes loaded and some 2,200 pallets currently leave the ebm-papst logistics centre on a daily basis.



▲ The equipment of the sister companies JAEGGI and Güntner are situated right next to each other on the roof of the Hollenbach power plant. The JAEGGI Hybrid Dry Cooler acts as a heat exchanger for the absorption chiller, and the air-cooled Güntner V-SHAPE Vario condenses the cooling compressor's refrigerant.

warehouse, the exhibition area, and Logistics and IT offices are to be found on a 38,000 m² site. Every day, around 120 HGVs as well as 10 to 15 sea containers loaded with a total in excess of 300 tonnes and some 2,200 pallets leave the warehouse bound for customers.

Cross-docking concept

Nearly all order-related products from 13 ebm-papst production sites are directed to the Hollenbach distribution centre where they are consolidated and prepared for shipment. With the cross-docking concept implemented here, pallet handling technology channels the delivered packages directly to the automated packing lines for the products to be then picked and loaded by destination. This avoids the unnecessary interim storage of goods ready for shipment. Additional preparation and block storage areas provide capacity for peak loads. Since 2 January 2017, nearly 200 logistics staff at the distribution centre have been ensuring that the ordered goods arrive punctually at the customer.

Trigeneration

It is not only the logistics at Hollenbach that uses the latest technology, but also in particular the energy and heating or, as may apply, cooling supply designed by the engineering firm Pfähler+Rühl from Heilbronn. Two cogeneration units and solar facilities with a high degree of self-generation, as well as two absorption chillers (150 kW + 250 kW) are the central components of the new energy centre (a third cogeneration unit could be added). The continuously operating gas-fired cogeneration units generate the base load of power and heat (2 x 240 kW P_{el} and 2 x 374 kW Q_{th}). Four 10,000-litre tanks act as (heat) water buffer storage (approx. 90 °C). During peak load operation, a gas boiler is able to provide an additional 1,900 kW Q_{H} , but is not connected to the hot water buffer tank.

Absorption chiller for the base cooling load

The cogenerated heat is used to supply all heating and air conditioning in the power plant, the packing warehouse and in the distribution centre, as well as for the existing production building. In addition, the heat is used in the production centre all year round for cleaning facilities as well as for the 150-kW absorption chiller for cooling the computer centre.

By contrast, in summer, when the demand for cooling rises and the heating network is underutilised due to the low consumption of heat, the cogenerated heat is predominantly used for supplying the absorption chillers. In turn, the new absorption chiller for the distribution centre provides the base cooling load ($Q_0 = 250$ kW usable evaporation heat, $Q_{th} = 333$ kW extracted heat). Taking the heat for producing cooling (cogeneration process) significantly increases the efficiency of the cogeneration plant. A traditional cooling compressor with $Q_0 = 500$ kW and working with the refrigerant R-134a is available for peak cooling loads.

The heat of an absorption chiller to be dissipated exceeds the cooling capacity by around a factor of around 2.25 to 2.7, and the cooling water flow is almost twice that of an air-cooled cooling compressor. For this reason, in relation to the cooling capacity, a heat rejection system needs to be considerably bigger than an air-cooled cooling compressor.

A JAEGGI Hybrid HTK Dry Cooler with a Q_{th} of 580 kW cooling power is used in Hollenbach. A 30% ethylene glycol solution is used in the cooling circuit in order to guarantee safe operation, even with frost of down to -16 °C. EC axial fans with an ebm-papst AxiTop diffuser are installed in the hybrid dry cooler, working particularly quietly at 54 dB (A) and managed by the Güntner Motor Management system.



▲ The chiller's compressors are provided with an acoustic canopy.

Saving of 380 tonnes of CO₂ equivalent per year

In contrast, the cold water unit for peak load operation is cooled traditionally by an air-cooled Güntner V-SHAPE Vario condenser. The new and highly efficient generation of AxiBlade axial fans are already in use here. The condenser is also controlled by the Güntner Motor Management system and connected to the building management technology via a bus interface. The cold water (+6 °C) is pumped into a 5,000-litre buffer tank. Depending on consumers' individual loads, a variable flow can be taken from the cold-water tank or, as may apply, cooling circuit of the absorption chiller.

In contrast to a conventional solution, with which the heating and cooling circuits would be consistently separated in a gas condensing boiler and a monovalent cooling compressor (individual cooling source), this solution saves around 380 tonnes of CO₂ with a total of around 2,580 MWh electrical power across the Hollenbach site each year.

This is made up of 2,160 MWh of power produced by the cogeneration unit, 280 MWh by the provision of cooling by absorption chillers (no electrically-powered cooling compressors operated) as well as 142 MWh saved by switching the cleaning facilities (for cleaning cooling lubricant residue after rotational machining) from electrical to technical heating. ebm-papst is confident that the investment will have paid for itself in less than five years.