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PHE for process and industry

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Biodiesel made from rapeseed by using PHE

The market for bio fuels is under rapid development. According to statements of the EU Commission, their share in the overall consumption up to 2030 should be increased from today's 2% up to 20 – 25 % – a target that can only be achieved with modern and efficient industrial infrastructure. The Bio-Ölwerk Magdeburg, one of Germany's largest production sites for fuel made from re-growing raw materials, is well prepared to face this challenge.

Already in 2003 the Bio-Ölwerk Magdeburg started with the production of biodiesel from rapeseed. After extension of this first plant in 2005, the plant produced some 75.000 metric tonnes of biodiesel, 100.000 metric tonnes of rapeseed cake and 7.500 metric tonnes of refined glycerine per year.

In 2005, the growing demand for biodiesel encouraged the management to invest some 35 million Euro to build a second plant designed to process vegetable oils. Bio-Ölwerk II is a plant for refining and transesterification of vegetable oils and for production of refined glycerine. In March 2012 Bio-Ölwerk III, a plant for extraction, was brought into service.



Technical data

Business Line:	Process Technology
Application:	Refinery
Country:	Germany / Magdeburg
Refrigerant:	water, oil, glycine mixture
Product:	thermolineVario TL 90 – TL 650

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Already when the first factory was planned the contractor CPM Sket appealed to thermowave to jointly develop solutions to increase the efficiency of production processes through the use of plate heat exchangers. thermowave's wide product range of gasketed and modul welded plate heat exchangers and its wide range of plate materials and gasket composites made thermowave the perfect partner. In a continuous production process in four steps, all of them using PHE, biodiesel is made from rapeseed.

Hot pressing – step 1: In conditioners the rapeseed will be heated and with the aid of the hot pressing method the oil will be pressed out of the seed. As valuable byproduct rapeseed cake, an animal food full of nutrients, is produced. The extracted crude oil is heated with water vapour. In a next step it will be cleaned and will be fed to the refining.

Refining – step 2: The crude oil obtained contains mucilage, which is swollen with the aid of phosphoric acid and washed away with water by means of centrifuges. These in turn are used for rapeseed cake cooling and increase the nutritional value of the animal feed. Fatty acids are removed from the oil in a process called deacidification. Plate heat exchangers are used here for example for cooling water rich in fatty acids.

Transesterification – step 3: Biodiesel is produced by transesterification of the vegetable oil. The refined rapeseed oil is heated after the addition of methanol and a catalyst. By the chemical reaction of transesterification the structure of the oil is changed so that biodiesel and crude glycerol are formed. In several subsequent stages of the biodiesel is washed and dried.

Glycerine distillation – step 4: The crude glycerine has a glycerol content of at least 80%. It still contains undesirable organic substances and is colored yellow. Means of cleaning and bleaching it can be refined into pharmaceutical grade glycerol. thermowave plate heat exchangers are used to heat crude glycerol for further processing, for pre-cooling of glycerol before filtering, and finally for cooling the final product glycerol before storage in tanks.

Some 60 thermowave plate heat exchangers are now in operation at the bio-oil plant in Magdeburg. They support the production process with high reliability and powerful performance. The bio-oil plant uses almost exclusively thermowave PHE. This speaks for itself and all parties look back on many years of efficient, successful and powerful collaboration.

Fabr.no.	Media	Palte type	Gasket	Plate material	Gasketed	Modul-welded
FN 25645	rapeseed oil / rape oil	TL 500	Viton	1.4404		x
FN 25646	water / glycine mixture	TL 250	NBR	1.4571		x
FN 25647	water / water containing fatty acids	TL 650	EPDM / Viton	1.4404	x	
FN 25650	mixture / mixture	TL 150	2.4605 Alloy 59	PTFE-V / EPDM	x	
FN 25656	water / water	TL 90	EPDM	1.4539		x
FN 25657	water / vapour	TL 650	EPDM / PTFE-L	1.4539		x
FN 25655	water / water	TL 250	EPDM / Viton	1.4404	x	
FN 25668	crude rapesees / rapeseed oil raffinate	TL 500	NBR	1.4404		x
FN 25669	crude rapeseed oil / water vapour	TL 250	Viton	1.4404		x