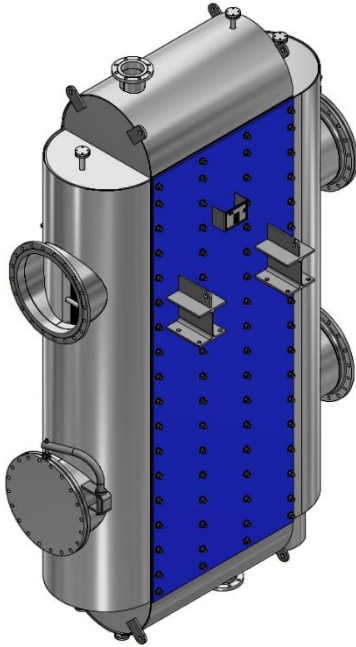


VAU Thermotech ensures good air around Swiss sugar factories

Heldringen, September 1st, 2023 – Air pollution control plays a very important role in Switzerland. According to the Swiss BAFU (Bundesamt für Umwelt i.e. Federal Office for the Environment), 3 µg of ammonia per cubic meter of air should not be exceeded. This is because nitrogenous air pollutants, which include ammonia, contribute to increased nitrogen deposition and thus to the overfertilization of ecosystems and soil acidification.



Although the factories of Schweizer Zucker AG - the only sugar producer in Switzerland - in Aarberg and Frauenfeld are already up to date in terms of energy, the company has decided to further improve environmental friendliness. Currently, for example, valuable resources are already being saved and production processes optimized through the successful use of energy-efficient [falling film evaporators](#), vapor recompression and juice softening.

One of the main sources of ammonia emissions in sugar factories is juice purification. During carbonation, the ammonia from the juice passes into the gas phase and is absorbed by the carbonation vapor (a mixture of exhaust gas and vapor). In some factories, the carbonate vapor is immediately released into the atmosphere and the small amount of NH₃ in the gas is emitted directly into the environment. However, due to international agreements, the limits of emissions have to be lowered more and more.

In order to further reduce NH₃ emissions at the Swiss sugar factories in Aarberg and Frauenfeld, the carbonation vapors will each be cooled with a sophisticated [fully welded hybrid tubular plate heat exchanger](#) from VAU Thermotech in the near future. The water-glycol mixture used for cooling is heated in the process and is available in the factory for preheating raw juice, for heating the low-temperature drying of beet pulp or for other thermal requirements. The cooling of the carbo vapor enables an additional thermal output of 3 MW to be used in each of the two factories by heat transfer.

As a side effect, a very large proportion of the steam in the gas mixture condenses, as well as some of the NH₃ content. As the ammonia solubility in the water (condensate) increases with decreasing condensate temperature, a large part of the NH₃ content in the exhaust gas is reduced by the condensation. The condensate is then separated from the NH₃ in the water treatment system.

The legally specified limit values are not fully achieved with the waste heat utilization of the Carbo vapors. NH₃ separation efficiencies of 82 to 86 percent are possible depending on the exhaust gas vapor outlet temperature. To achieve the limit values, either subsequent thermal decomposition or a downstream acid gas scrubber is required. The fully welded VAU [hybrid tubular plate heat exchanger](#) has been installed several times in sugar factories as a carbonation vapor condenser and has proved very successful there.



The reasons for this are as follows: Thanks to its tube-like shaped structure on the primary side, the hybrid tubular has a variably large cross-section for the flow of large gas volumes. Due to the variable shaping depth of the tube cross-section in the shaping tool, the pressure loss can be kept relatively low for large volumes. Since the Carbo vapors have to be discharged into the environment via a chimney at some point after further NH_3 reduction, the pressure drop generated in the condenser is very important so that the downstream fan does not generate excessive operating costs. The condensate produced by the partial condensation can flow off downwards unhindered by the non-continuous tube-shaped structure. This means that the flow channel of the hybrid tubular plate heat exchanger is not blocked by the condensate.

On the water or water-glycol side, the shape resembles the structure of a normal plate heat exchanger. A good heat transfer on the carbo vapor side, due to the partial condensation of the steam portion, combined with the good heat transfer on the water-glycol side create a small required heating area.

Furthermore, additional manholes in the carbo vapor condenser were added to the inlet and outlet ports to allow inspection and cleaning of the heating surface. Due to its design, the VAU hybrid plate heat exchanger has no connections in the plate, so the plate pack can be surrounded in a tank of any design.

During the campaign, when the factories process around 10,000 tons of sugar beet a day, the use of our two carbo vapor condensers will in future reduce the water content of the vapor by around 85% by weight and at the same time significantly reduce the ammonia load in the environment. A win-win situation for both, the factory operators and the environment.

About VAU Thermotech GmbH & Co. KG

The independent and owner-managed VAU Thermotech GmbH & Co. KG was formed in 2008 by the takeover of VAU Werkzeug- und Gerätebau GmbH & Co. KG, which was founded in 1977. Owner and CEO is Osama Nasser. Headquarter and production are located in northern Thuringia, the branch office in Munich is an innovation hotspot for the development of new products.

The ISO 9001 certified company manufactures brazed plate heat exchangers, fully welded hybrid tubular heat exchangers and gasketed plate heat exchangers. In addition to series products such as brazed plate heat exchangers, VAU Thermotech is one of the few German heat exchanger manufacturers to master the project business with custom-made products and high-end solutions in which fully welded hybrid tubular plate heat exchangers are used for high performance. The company designs and produces its goods 100 percent in Germany and always delivers "from a single source".

The broad portfolio addresses heating, refrigeration and building technology, (petro) chemical industry as well as sugar, food and pharma-ceutical industries. The heat exchanger plates are manufactured on fully automated production lines. The required shaping tools are made by the company's own CNC-controlled machine park.

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