

Where there is heat, there is also cold

WHENEVER TEMPERATURES BELOW ZERO ARE REQUIRED FOR PRODUCT COOLING IN THE FOOD INDUSTRY, ELECTRICAL COMPRESSOR COOLING PLANTS ARE STILL REQUESTED

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+ This might change soon! The price for electrical power is rising and its generation is connected with undesired emission of pollutants. Therefore, the utilization of another type of energy seems to be a suitable alternative, in particular as it is already available in many companies. Here we are talking about waste heat, which is generated during the production process of food (e.g. large baking lines) or in a co-generation unit. This heat is more or less discharged into the environment without further use. What a waste!

Increasing energy costs prompt companies to look for alternative energy utilization methods. The food industry is no exception. This is reflected by the trend of many processors of fruit and vegetable who are able to make further use of their organic waste in biogas plants. The manufacturers of equipment are also eager to show the industry new ways for more efficient energy utilization. Recently, AGO AG Energie + Anlagen (Kulmbach, Germany) in cooperation with the Institute for Air and Refrigeration Technology (ILK, Dresden, Germany) has rediscovered and revived a refrigeration concept which is an energy – and cost – saving alternative to conventional refrigeration plants for some food producers. The principle behind the innovative ammonia/water absorption refrigeration plant is that the low temperatures required for cooling the food products are obtained from waste heat.

Low temperatures of up to -30 °C

“Cold temperatures from heat” – this slogan might make one sit up and think. However, it describes precisely the

principle of ammonia/water absorption refrigeration plants. While the commonly used compressor-type refrigeration plants require a high amount of energy, the ammonia/water absorption refrigeration plants, in general, are satisfied with “energy waste”; waste heat as energy for cold production. This energy from heat is available in the food industry at a low cost as it originates in the production process and has not been utilized up to now.

The principle of absorption refrigeration plants is not revolutionary – it is only the use of ammonia as a refrigerant which is extraordinary. In traditional water/lithium bromide absorption refrigeration plants, water is used as a refrigerant. The lowest achievable temperature is here +6 °C which is sufficient for air conditioning purposes but not for frozen storage, chilled storage, for cooling processes during food processing or for the generation of low processing temperatures. The innovative AGO technology with ammonia and water as materials, provides for temperatures in the freezing range. Ammonia/water absorption refrigeration plants with a performance range of 30-500 kW will generate temperatures as low as -10 °C. In a cascade-type installation arrangement – connected in series with a compression refrigeration plant – this technology is capable of achieving temperatures as low as -30 °C.

Basic requirement: waste heat at 90 °C

Generating temperatures of minus 30 degrees from hot waste heat with a significantly lower consumption of electricity or other additional energy than before – this seems to be paradox at first sight. However, in practice this principle

might soon develop into an energy-saving and environmentally friendly alternative. One decisive prerequisite for the utilization of this technology is the availability of waste heat with a temperature of at least 90 °C, otherwise temperatures below zero degrees cannot be generated. In this respect, ammonia/water absorption refrigeration plants are a niche product and above-average for the food industry. Almost everywhere in food processing, hot and cold temperatures are important. Therefore, food companies are predestined for the use of such plants which according to the calculations by ILK Dresden require up to 90% less electrical energy than compressor plants. Due to the enormous efficiency, the indisputably higher investment costs are quickly compensated for.

Save energy costs!

The level of energy and cost reduction in practice is dependent on a number of parameters. For example, companies with co-generation plants can feed more electrical energy into the public power net because they need less for the generation of low temperatures. In general, it can be assumed that the relative saving potential increases with the refrigeration requirements.

Normally, an ammonia/water absorption refrigeration plant can completely replace a compression plant. However, it is advisable to choose the dimension of the new plant, based on the basic load requirements in order to guarantee a high annual operating time. The former plant should be kept available for peak times or redundancy.

Concerns regarding the toxicity of ammonia when used in the food industry can be easily refuted. It is true that ammonia is toxic and combustible within certain limits. However, the ammonia circulates in a closed system. The low temperatures are transferred to the application via another medium, namely a mixture of water and glycol.

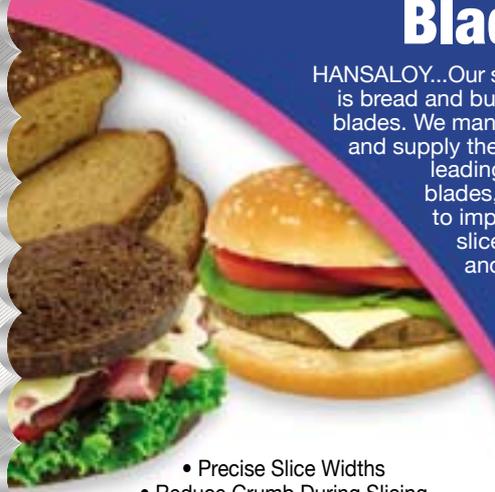
Buying or contracting?

An ammonia/water absorption refrigeration plant can be installed by a machine manufacturer such as AGO AG. Generally, for planning and implementation, six months are required. There is also the opportunity to use this innovative technology via so-called "contracting". Here, the machine manufacturer builds and operates the installation at his own expense – preferably on the premises of the customer. The customer will be supplied with the refrigeration performance according to pre-determined conditions. The congeniality of contracting for the user of the plant is that he is not concerned with the erection, operation and maintenance of the plant. Incidentally, maintenance is not a serious challenge for the operator. While components in compressor plants require elaborate routine checks, it is only the solvent pump in an ammonia/water absorption refrigeration plant that needs to be maintained on a regular basis. Therefore, ammonia/water absorption refrigeration plants are not only characterized by their potential to reduce costs but also by their easy-maintenance operation. +++

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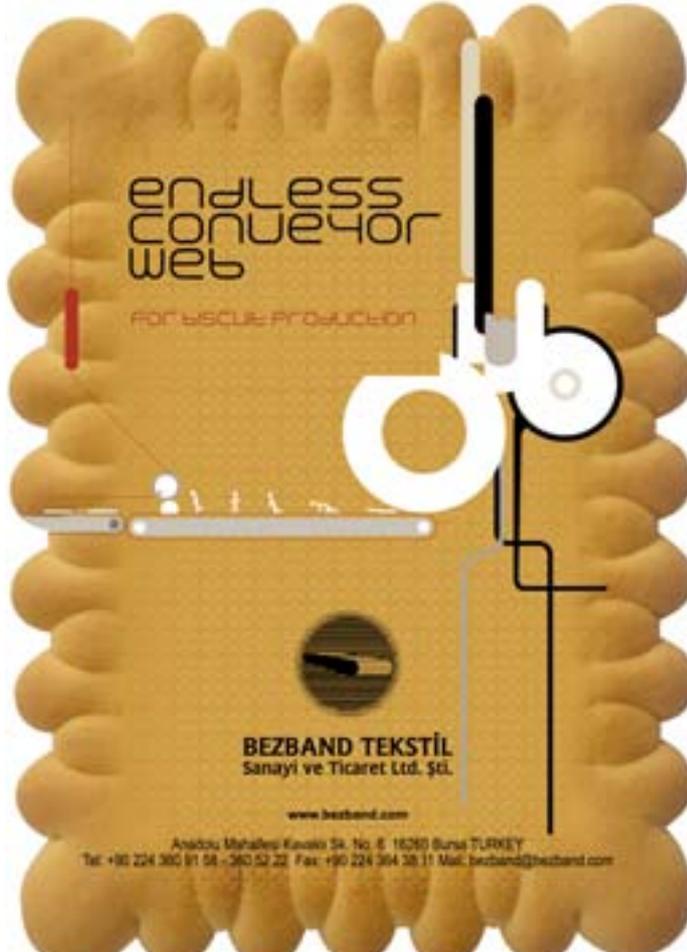


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