

Sirromet Winery

Case Study

Ammonia (NH₃) Chiller

prepared by the AIRAH Natural Refrigerants Special Technical Group



The Sirromet Winery, located 40 km south-east of Brisbane, recently upgraded its refrigeration equipment with a new Ammonia chiller plant.

The winery replaced its existing R22 chiller (which was over 15 years old) with two screw compressors using ammonia refrigerant. A variable speed drive is fitted on the base load compressor and variable speed fans to the evaporative condenser.

The plant chills the Alcool LF secondary heat exchange fluid which is reticulated in a closed loop throughout the winery. A 25,000 Litre internally divided buffer tank provides further thermal storage to trim peak loads.

By using an evaporative condenser, lower condensing pressures are achieved in comparison to an air cooled system. This results in a lower compressor compression ratio with reduced energy costs for every kW of refrigeration. The use of a variable speed drive on the base load compressor allows the plant to reduce its capacity to just 60kWR, while still maintaining high efficiency.

Another benefit of this type of plant is that heat can be recovered from the compressor heat of rejection and oil cooling. Water is reticulated from a tank through the two heat exchangers to deliver a minimum of 60°C across most of the duty range.

Technical Information

Refrigeration plant capacity	480 kW
Refrigerant type	Ammonia
Compressor type	2 x Bitzer OSKA8561 screw compressors
Condenser type	Evaporative – Aqual cool
Design temperature	Cool Alcool LF to -6°C at 33 l/s
Heat reclaim capacity	85kW of pre-heated water for gas fired boilers
Installing contractors	Gordon Brothers

Energy saving and emissions reductions

Based on Sirromet's average medium load run time, the theoretical estimated cost saving of electricity for the new ammonia chiller is up to 32 per cent per annum. This represents savings of up to \$20,000 per annum based on a reasonable electrical tariff.

The change from an outdated air cooled F gas system to an ammonia system has seen CO₂ emissions drop by 0.35kg of CO₂ for every 750ml bottle of wine. On an average production of 1,000,000 bottles, that accounts for a reduction of 350 tonnes of CO₂ emissions.

The system delivers further reductions in emissions as the ammonia refrigerant has an ODP (ozone depletion potential) of 0 and a GWP (global warming potential) also of 0. This means that the GWP effect of emissions due to refrigerant leakage is now 0 instead of 1500 for every kg of refrigerant lost.

Safety aspects

To reduce the possibility of winery personnel being exposed to refrigerant leakage, the plant is located outside, allowing quick dispersal of any leakage. The system is also fitted with emergency stop functionality and features remote monitoring. The plant also uses a welded cassette heat exchanger and fully tested vessels and pipe work.