WARRINGTON, UK, JUNE 4, 2013

ABB motors power world's largest heat pump district heating plant

Six ABB medium voltage motors are providing the compression stage for the world's largest district-wide natural heat pump system. Based on a heat pump solution provided by Star Refrigeration of Glasgow, the district heating system will provide over 13 MW of heat for Drammen, a community of 60,000 on the Drammen Fjord near Oslo, Norway.

The system passed its efficiency trials in December 2012, the system will supply hot water pumped through a network of underground pipes, providing heating for several thousand homes and businesses in the city.

The heat pump extracts heat from sea water by raising the temperature of an ammonia refrigerant via a heat exchanger. The now gaseous ammonia is then compressed by a motor driven compressor, raising the temperature of the ammonia to around 90 ^{0}C. The heat from the ammonia is then transferred via another heat exchanger to the hot water supply system. Six ABB 11 kV motors were selected to drive the ammonia compressors, three of 660 kW and three of 1250 kW.

Dave Pearson, Director of Innovation for Star Refrigeration, says: "This was a very challenging project and we chose ABB because we needed a partner that could step up to the plate and help us develop some of the technical aspects of the application."

One of the requirements of the project was to recover waste heat from the compressor motors. Says Pearson: "We had never bought water-cooled motors before and we needed someone who could understand our requirements. ABB had the right attitude and were prepared to use first principals engineering to supply just what we needed - not just standard conditions from a brochure."

Usually supplied as air-cooled units, ABB fitted the six motors with air-to-water single tube coolers. To achieve the best cooling of the motor whilst giving the best heat output, the cooling medium water contained 30 percent glycol. Water enters the coolers at 30 ^{0}C. The 660 kW motors have a water inflow of 2.8 m^{3} per hour and raise the temperature at the output to 42.2 ^{0}C, while the 1250 kW motors have an inflow of 3.1 m^{3} per hour and raise the outlet water temperature to 46 ^{0}C.

As well as the cooling requirements, the ABB motors also had to cope with frequent starts and stops to account for the varying heating demands throughout the day and year.

Caption: Six ABB medium voltage motors are providing the compression stage for the world's largest district-wide natural heat pump system.

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