CASE STORY

Seawater cooled HVAC-system

COPENHAGEN OPERA HOUSE

In August 2000, the A.P. Møller and Chastine Mc-Kinney Møller Foundation donated an opera house to the Danish state. The Opera building was designed by the internationally known architect Henning Larsen. The Opera House is located right up to the waterfront on the island of Holmen - specifically called the Dock Island, in Copenhagen Harbour. The Opera opened with a Royal Command Performance on 15 January 2005.

The Opera building is totally 41,000 m^2 - and has more than 1000 rooms including a sound proof rehearsal auditorium for the orchestra. The Opera has 6 main stages - one main stage with five other stages directly connected - where large productions and setups can be changed with various decorations and easily moved around when needed. The Opera House can seat between 1490 and 1700 guests depending of the stage setup and size of orchestra to obtain the optimal performance.

The indoor climate of the Opera House is controlled by a seawater cooled HVAC-system. The HVAC-system is based on free cooling and compressor-based cooling using ammonia, R717, as refrigerant. When the seawater from Öresund is cold enough the cooling is based solely on free cooling which generates great energy-savings in terms of lack of compressors. The seawater is pumped by the seawater pumps and passes through Bernoulli Filters, 3 x BSG 150, before entering the seawater plate heat exchanger to cool the cooling water. The Bernoulli Filters protect the seawater plate heat exchanger from getting clogged up by dirt or organic growth from the seawater. When the seawater is too warm to be used in free cooling, the seawater is used for condenser cooling in the chiller system.

Facts and figures

Customer: Copenhagen Opera House

Location: Copenhagen, Denmark

Application: Seawater cooled HVAC-system

Filter model: 3 x BSG 150

Filtration: 1,0 mm

Operating flow: 3 x 160 m^3/h

Operating pressure: 2 bar g

Design pressure: 10 bar g

BERNOULLI SYSTEM

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