British hospital reduces carbon footprint by switching to ammonia

Homerton University Hospital, London **Case Story**

Since switching to a new ammonia-based cooling system based around Alfa Laval heat exchangers, the Homerton University Hospital has increased cooling capacity by 50 percent, significantly reduced the refrigerant charge, and reduced its overall environmental impact.

At first the hospital was wary of using natural refrigerants in their cooling system, but a combination of superior efficacy, reduced greenhouse gases and enhanced safety features convinced them to adopt a new system run on ammonia.

Aquachill modules with AlfaNova heat exchangers
The new system has been designed and installed by J&E Hall, one of Alfa Laval's customers, and comprises two J&E Hall Aquachill refrigeration modules based around Alfa Laval heat exchangers. Each of the modules providing 0.5 MW of cooling capacity. Built on a purpose-designed skid complete with all controls, each Aquachill module includes an AlfaNova all-stainless steel heat exchanger, two twin frame M10BW plate heat exchangers for evaporating and condensing, and a U-Turn liquid separator.

Linked to two roof-mounted 612 kW dry coolers, the system provides cooling for vital areas of the hospital such as the operating theatres, the maternity unit and the intensive care units.

Refrigerant charge reduced by one-third
Thanks to the imaginative, modular design and the use of U-Turn separators,the refrigerant charge is 33 percent less than in a conventional ammonia system. Consequently, it not only delivers highly efficient cooling but also eliminates greenhouse gas emissions. A failsafe shutdown program ensures that any leaks are contained within the system – a vital feature given the sensitive nature of the location.

Steve Gowing, Applications Engineer, J&E Hall: "The safety features we have built into the system will ensure that if there is a leak, not a drop of ammonia will escape into the atmosphere."

”With the transition, more than 300 kg of R22 has been replaced with just over 50 kg of ammonia. Yet despite the huge reduction in refrigerant, the hospital has achieved a 50 percent increase in cooling capacity”.

Compact U-Turn liquid separators
As the system was being installed while the old 340 kW J&E Hall cooling system was being decommissioned, the new system had to be sufficiently compact to fit into the same small plant room as the old system for the time it remained in operation.

Central to the compact nature of the Aquachill units are the U-Turn liquid separators, specifically designed to fit within the frame of the heat exchanger/evaporator. This gives them a significant advantage over conventional surge drums, which are generally much larger and heavier.

“Used in conjunction with the plate evaporator, it retains the advantages of a thermosyphon system but with a much smaller volume of refrigerant in the chiller; similar to a DX unit,” says Dave Ball, Engineering Director for J&E Hall, clearly impressed by the simplicity of the system.

“It’s like a dry cooling tower, enabling us to keep the ammonia refrigerant within the chiller pack, rather than using a remote condenser. Again this makes the ammonia charge smaller and easier to contain. What’s more, the entire system is enclosed in acoustic panels, reducing noise and improving safety.”

Fast facts:

Customer: J&E Hall
- Member of the DAIKIN group
- Supplier to the refrigeration and HVAC industries

End-customer: Homerton University Hospital:
- Located in the London borough of Hackney.
- Provides general hospital services and specialist care to around 250,000 people.
- Designated hospital for the 2012 Olympic Games (situated 3 km from the Olympic Village site).

Challenge
To provide compact, lightweight high performance heat transfer components for the refrigeration modules in the hospital’s new ammonia based cooling system.

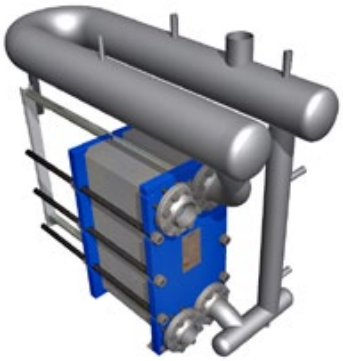
Solution
Two J&E Hall Aquachill modules, each including the following Alfa Laval components:
- One AlfaNova all-stainless steel heat exchanger
- Two twin frame M10BW plate heat exchangers for evaporating and condensing
- One U-Turn liquid separator

More about the U-Turn solution

The U-Turn liquid separator is especially designed for use with plate heat exchangers in ammonia applications. It is lightweight and compact in design, making it easy to install. It can cover ammonia capacities from 200 to 1,400 kW at 0ºC evaporation temperature and from 50 to 500 kW at -40ºC evaporation temperature.

U-Turn is designed to take advantage of the very best of Alfa Laval plate heat exchanger technology.

- Efficient separation by means of agglomeration, gravity, centrifugal forces and surface tension.
- Low internal pressure losses – good part load performance.
- Compact design and low refrigerant charges.



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