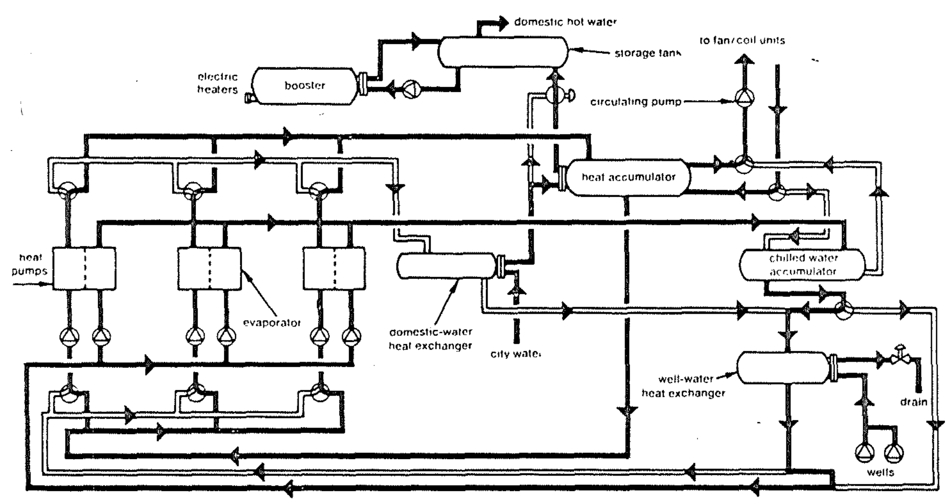
Practice World

Heat pump power for US flats

A 316 unit block of flats at Winchester, Massachusetts, USA, uses the underground springs of its site to provide heating, cooling and most of the hot water services with the aid of heat pumps. The eight storey high block of flats, known as Parkview, composes a complete semi-circle around a two-acre landscaped area with waterfalls and a lagoon. The latter forms part of the heating system and was used because the site, which originally housed a tannery, was found to have several underground springs. It was decided to make a virtue of necessity and tap the springs for a possible water-to-water heat pump system.

After test wells were dug to verify the feasibility of the project, it became apparent that structural aspects of the building precluded consideration of localised cooling equipment and that a central space conditioning system would be common to any concept. Thus, determination of first-cost differential could be reduced to a comparison of the costs of an oil-fired boiler plant against those of the additional refrigeration capacity, well construction, and other specialised facilities required by the heat pump concept. It appeared that the difference in cost between these two systems would be small. The determining factor, therefore, was operating costs and calculations showed that heating energy costs for the heat pump system would be substantially lower.

The heat pump installation for flats at Winchester, Massachusetts.



The Parkview installation is said to have a coefficient of performance of between 3 and 4, in that for each watt of electricity consumed in turning the heat pumps, three or four watts of heat energy become available for distribution to the apartments. The system also provides approximately one-half of the domestic water heating requirement at an electric energy expenditure of between one-third and one-fourth of that resulting from direct heating.

On the heating cycle well water enters the system at 12°C and leaves at between 10°C and 11°C. The heat pumps thus extract some energy from the water, and at pumping rates up to 1500 gallons per minute this adds up to a considerable amount. Both the extracted heat and the energy dissipated in the electric heat pump motors are available to use for heating the building. It is virtually a closed cycle from the standpoint of both water and energy. The water pumped up from the wells is discharged into ponds and eventually filters down again. And on the cooling cycle in summer the temperature of the well water is raised a few degrees.

Essentially the system comprises three 200-ton water-to-water heat pumps. Depending on load demands, the units are operated singly or in combination, as are the pumps for the three separate wells. To prevent contamination of the closed system, energy is transferred to and from well water via heat exchangers. Temperature of well water remains at 12°C all the year round.

On the heating cycle, condenser water at around 57°C is delivered to a 300-gal heat accumulator. From the accumulator, hot water is circulated to fan-coil units in each apartment through a two-pipe distribution network. The evaporator sides receive water from the well-water heat exchanger. The evaporator discharge passes through the 1000 gallon chilled-water accumulator, then flows back to the heat exchanger where it is reheated.

Temperature in the individual apartments is regulated by means of wall-mounted pneumatic heating/cooling thermostats and modulating valves in the fan-coil units.

For domestic water heating incoming city water passes through a tube nest within the heat accumulator, emerging at about 48°C. Then it passes to a storage tank where it mixes with water from the booster heater to bring it up to the desired tap temperature.

In summer the output of the evaporator sections collects in the chilled water accumulator where it is available for circulation through the building. Condenser water is routed to the well-water heat exchangers via the domestic water heat exchanger. The latter is considerably smaller than the heat accumulator and has less thermal inertia. This is an important benefit because for most of the summer only one heat pump is in operation and condenser water is about 35°C rather than 57° as in winter.

Synthetic rubber tiles

A new type of synthetic rubber surround for swimming pools has been produced by a French company. Applied to a pool recently built at Chattellerault, in central France, the tiles are claimed to be non-slip and offer greater safety with comfort. The tile squares are made of hydrocarbon rubber in a standard size of 750 mm × 750 mm in two thicknesses, 7 mm or 4 mm.

Materials traditionally used for swimming pool surrounds can become slippery, especially for wet feet, or their special non-slip surfaces may tend to be slightly abrasive. Synthetic rubber squares are now being used as an alternative for both outdoor and indoor swimming pools, and for use as flooring in changing rooms, showers, baths, saunas and other places where users usually go barefoot.

The synthetic rubber is resistant to sunlight (ultra-violet rays) and to ozone and does not itself support fungoid growths, but the French company has compounded certain chemicals into the tiles to act as bactericides and fungicides. The squares