

## Dehumidification and heat recovery is essential

### A review of design parameters for dehumidification, ventilation and heat recovery for private swimming pools

When someone begins to plan and design a new swimming pool, their first consideration is usually the water circulation and treatment system. Excellent pool water quality is required so that bathers can enjoy their time spent in the pool. It is also obvious that the pool hall must be dehumidified in order to maintain pleasant conditions for bathers. Although frequently, it is not until the pool is in operation that the need for an efficient ventilation system is realised. The symptoms are recognised when windows are covered in condensation and temperature control spoils bather comfort. Energy consumption is often found to be much higher than expected.

After the pool has been in operation for some time, attempts are made to cover the pool and perhaps wall mounted dehumidifiers are installed to alleviate some of the condensation problems. It then becomes apparent that lower energy costs and better environmental conditions could have been achieved. However, these problems are more effectively solved by careful design during the initial stages of construction.

#### How can poor environmental conditions be avoided?

Balanced circulation of warm dehumidified air must be introduced to the pool hall in order to maintain good environmental conditions. Only in this way can undesirable cold draughts and condensation be avoided. It means that an individual air distribution system must be designed for each pool. Special attention should be given to the boundary layer between the air and water because of the interchange of temperature and moisture that takes place there.

The introduction of warm air in front of window surfaces prevents condensation even at low outdoor temperatures. It is important that cool air and unpleasant draughts are not allowed to drop down to floor level. This particularly necessary where bathers may be relaxing before or after their swim. However it is wrong to blow warm air directly at the windows. This breaks down the boundary layer insulation effect at the window surface and increases heating costs. Instead this can be solved by the installation of continuous slot diffusers at low level under the windows. The Menerga slot diffuser system can be installed flush with the pool floor tile finish and provides an effective and unobtrusive means of solving this problem. The diffuser system can safely be installed in doorways and other areas where bathers may be walking.

By avoiding disturbance of the moist boundary layer above the pool, evaporation is reduced. Especially when the pool is not in use, a humid boundary layer is formed above the pool water and the evaporation rate is considerably reduced. Evaporation rates and thereby energy costs are increased if supply air is directed onto the pool surface or if cool air is allowed to drop to low level and to disturb the boundary layer.

#### Radiant heating is not required if the air distribution is correct

The ventilation system for an indoor swimming pool must have the correct performance in terms of air volume and dehumidification capacity. The air should be distributed and circulated such that an even temperature distribution is achieved across the whole pool hall and so all components of the building fabric will absorb heat. The poolhall ventilation system will then meet the whole heating requirement of the poolhall and additional radiant heating will not be required.

#### Design temperature and humidity levels

The temperature of the pool hall air should be maintained 1-2°C above the pool water temperature in order that bathers feel comfortable emerging from the pool, when their bodies are wet. Evaporation is minimised if the air temperature is kept higher than the water temperature. Typical pool water temperatures will be 28 or 29°C and so the air temperature should be approximately 30°C. High humidity levels will not only damage the structure and decoration of the pool hall but will also affect the well-being and health of bathers. At a pool hall temperature of 30°C the relative humidity should not be allowed to exceed 60%.

Menerga dehumidification and heat recovery systems solve the problem of dehumidification. These compact units are equipped with all the necessary components to automatically maintain the required temperature and humidity design conditions.

### **Heat Recovery is absolutely essential**

Humid and warm air contains sensible and latent heat and consequently useful energy. In the past, when energy costs were low, this warm humid pool hall air was simply exhausted to outside without heat recovery. Outside air was heated and introduced to the pool hall. Applying such a system today would result in unacceptable energy costs.

The 3 stage recuperator at the heart of the Menerga ThermoCond type 23 unit has a heat recovery efficiency (temperature efficiency) of up to 85% under winter conditions. In this way, the installed heating capacity and energy consumption is reduced. Low energy direct coupled fans with the latest motor technology minimise the fan motor power consumption.

Alternatively, the air can be further cooled and dehumidified by a heat pump (Menerga ThermoCond Type 29). Energy released during the dehumidification process is transferred back to the previously cooled and dehumidified air to produce warm, dry pool hall supply air. At higher outdoor temperatures it is more economical to run with an outside and exhaust air cycle. Heat is recovered from the exhaust air to heat the supply air or even the pool water.

### **Easy to use control system**

All Menerga units feature a digital (DDC) control system that is readily programmable. Clear text messages on the controller indicate set points and actual values for temperature and humidity. A compact mini remote panel is available for installation away from the pool plant room. The pool hall temperature can be reduced automatically if a pool cover is in place.

### **Low maintenance**

The service interval for Menerga ThermoCond units in private pools is every 12 months. Between service visits all you need to remember is to periodically check and change the air filters.

### **Systems for low energy use**

Menerga ThermoCond pool hall units are factory assembled and tested and are delivered ready for operation. Outside air can always be introduced to the pool hall when bathers are present. The most economical size and type should be installed in a separate plant room and in conjunction with Menerga slot diffusers. The system then becomes unobtrusive and almost invisible and inaudible. The pool hall then truly becomes an area for leisure and relaxation where you can enjoy it undisturbed.