

ADIABATIC COOLING SYSTEM

Operation and Safety Features

The following document, relevant to Hitema adiabatic coolers and condensers, gives details on technical and safety features, designed to improve the reliability and safety of the adiabatic process, in line with current thinking.

The Hitema adiabatic system retains all the advantages that our chillers offer, with the additional benefit of a lower condensing temperature than the design with ambient dry bulb and it means a higher cooling capacity and also a lower absorbed power for the chiller, especially with air relative humidity lower than 50% (Figure 1). The goal of the adiabatic system is the cooling of the air before entering in the condenser/ free-cooling section to allow an increased performance of the finned heat exchanger. This is achieved thanks to a direct heat exchange between air and water that allows the cooling of the air down to its wet bulb temperature. The heat exchange between air and water is guaranteed by a wet pad which the air passes through.

Referring to Figures 2 and 3, the Hitema adiabatic system works as follows: the water is supplied through a pipe to a distribution pad on top (1) (2) (3). This ensures a uniform supply of the water to the cooling pad and minimizes the risk of dry spots. The water is then evaporated into the dry and warm air that passes through the pad. The heat that is needed for the evaporation is taken from the air itself. The air that leaves the pad is therefore cooled and humidified simultaneously. The water that is not evaporated is drained back to the reservoir (5). A circulation pump (6) takes the water from the reservoir and it sends the water to the distribution pipe. When the adiabatic system doesn't work, an automatic drain (4) empties the reservoir to avoid water stagnation. The consumption of water due to the evaporated water and the bleed-off is restored by a float valve (4).

Additionally, an air probe is used to lock out adiabatic operation at ambient temperatures below the design figures. All design features aim to minimize water consumption and running costs and to provide a long product life.

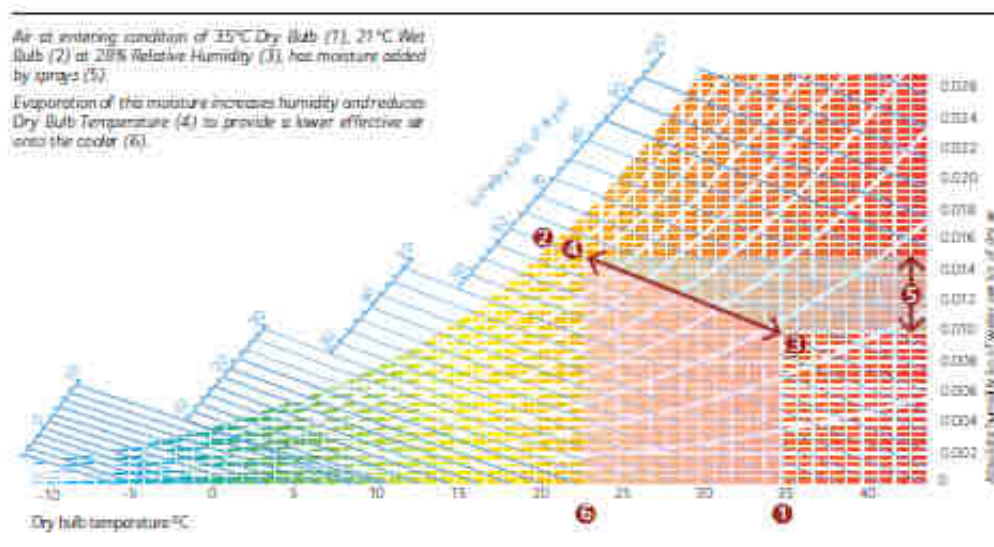


Figure 1. Example of reduction of inlet air temperature to the condenser with adiabatic system. Lower inlet air temperature means lower condensing temperature and so higher efficiency for the chiller

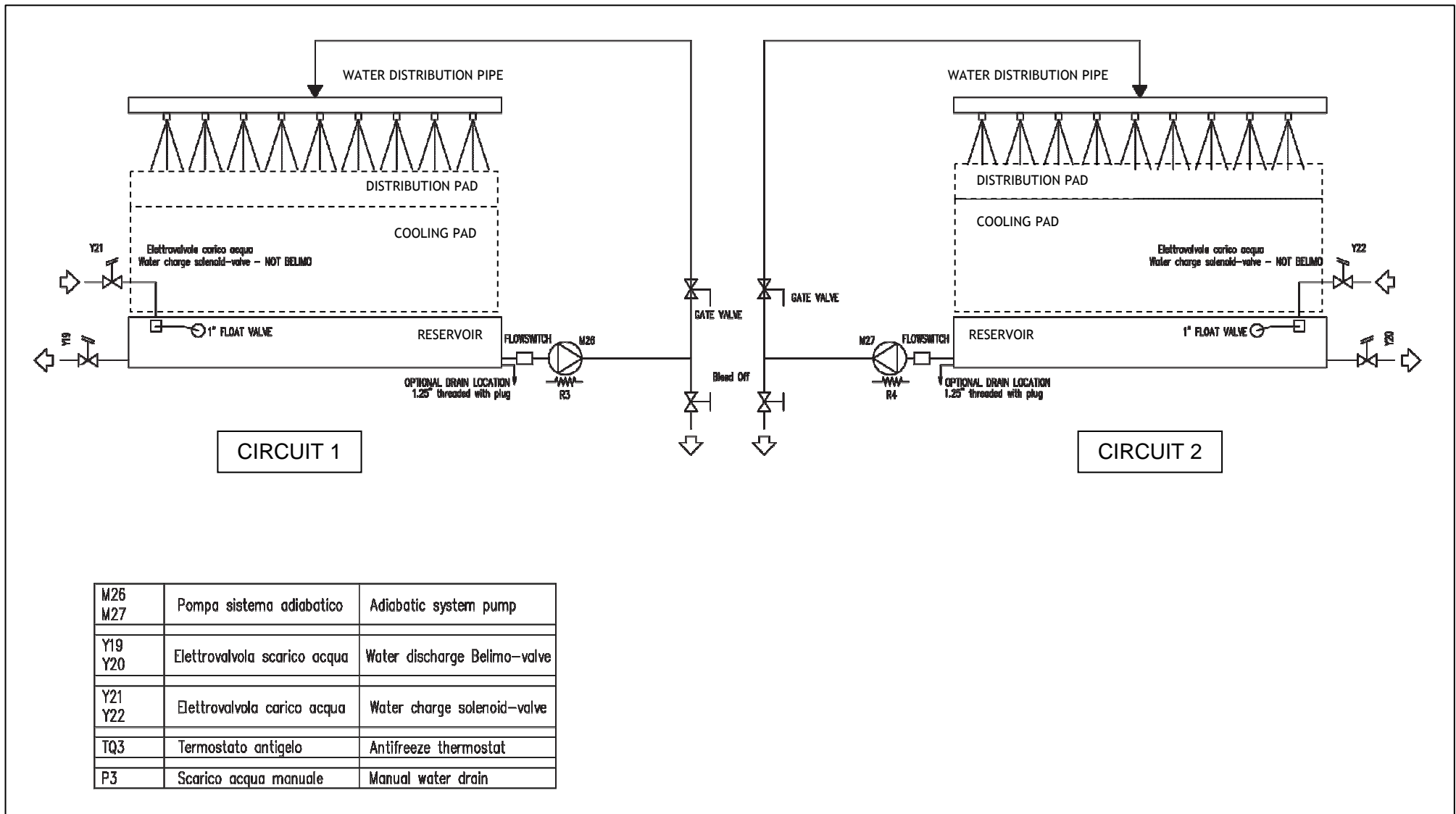


Figure 2. Process and instrumentation diagram of the adiabatic system

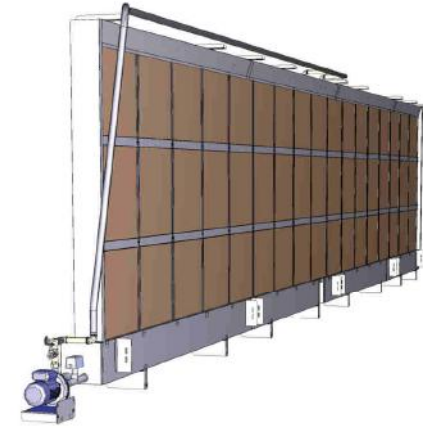
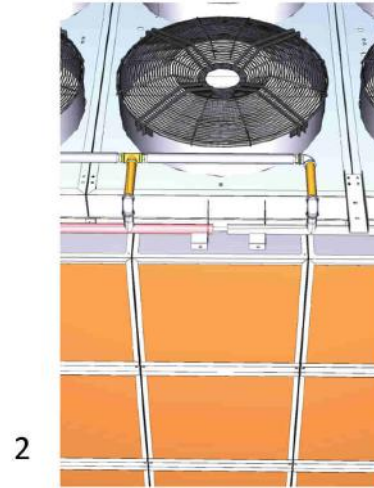


Figure 3

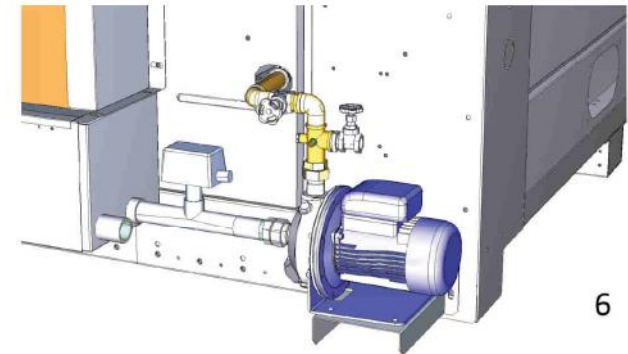
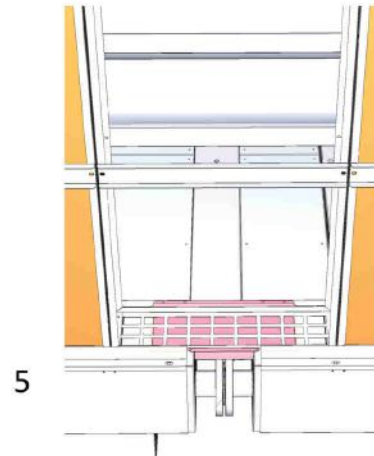
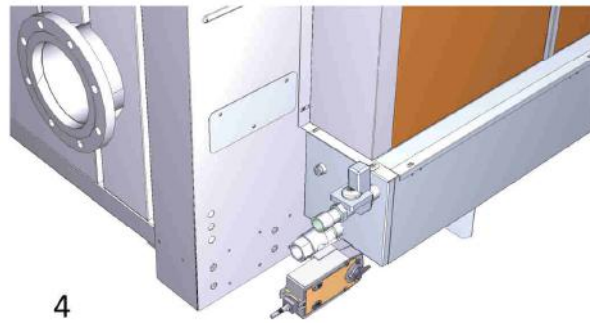
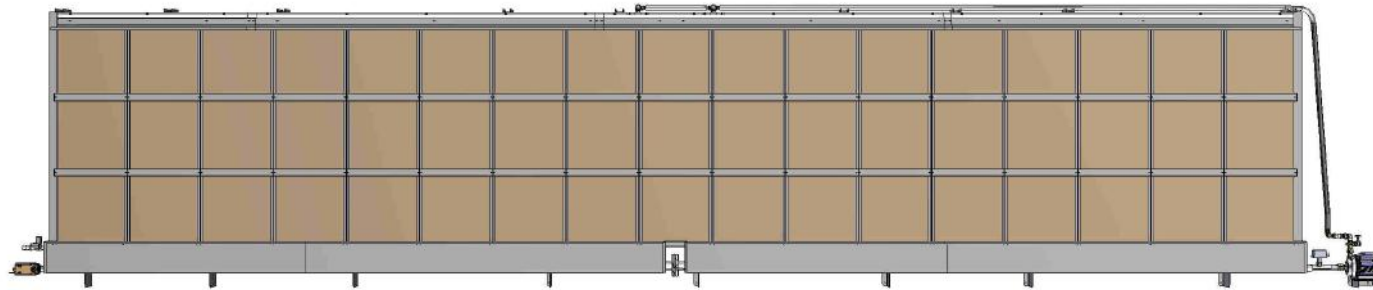




Figure 4. Air cooled screw chiller with adiabatic system mounted