Air-cooled Heat recovery chillers
In many applications there often exists a simultaneous cooling and heating demand requirement alongside one another. To benefit from this, Daikin offer the full range of R-407C EWTP110-540MBYN chillers with the option of heat recovery. This option further increases the application flexibility and extends possibilities in the hotel and leisure industry as well as the industrial and process sectors.

By energetically recovering useful heat from the cooling cycle that would otherwise be rejected to outside COPs of up to 5.62 can be realised in heat recovery mode. The heat recovery unit aims to achieve an optimum balance between cooling and heat recovery to maximize the unit efficiency and offer savings in hot water production.

**Heat recovery concept**

An additional stainless steel brazed plate heat exchanger is mounted in series between the compressor and air-cooled condenser. Depending on the temperature requirement for the hot water production this exchanger will act either as a desuperheater for partial heat recovery (30%) or as a condenser for full heat recovery (85%).

As a desuperheater the sensible heat from the hot discharge gas will be recovered, while the latent heat exchange will occur in the air-cooled condenser. The units efficiency is maintained as condensing pressure can be reduced due to air-cooled condenser becoming oversized. Hot water temperatures up to 70°C can be achieved.

For full heat recovery both sensible and latent heat exchange will occur in the recovery exchanger. Inverter fans will be used to control the recovery outlet water temperature, by throttling back the airflow and maintaining the required condensing temperature.
Heat recovery control

A heat recovery unit must operate at high condensing temperature to have a high amount of heat recovered. Operation at high condensing temperature penalizes chiller efficiency due to the higher power input required.

A conventional unit has no temperature control on the hot water side and will operate at a fixed high condensing temperature. Even during periods of no or low heat request, the unit will remain operating at high condensing pressure. This will reduce the efficiency of the unit a lot.

The Daikin heat recovery unit can be equipped with a control on the hot water temperature. Thanks to its inverter driven fans, it will be able to change its target condensing temperature depending on whether there is heat requested or not. If there is no heat requested, the unit will operate in ‘cooling mode’ and the condenser fans will run at higher speed as to lower the condensing pressure. If there is heat requested, the unit will operate in ‘heat recovery’ mode and the fans will run at lower speed as to achieve a higher condensing temperature. In this way, the condensing pressure is optimized for highest efficiency at all times.

Explanation:
From t0 to t1 there is a lot of heat requested. Both the Daikin unit and the conventional unit run at high condensing temperature. In point t1 the required hot water temperature is reached.

At this moment, the conventional unit will keep however operating at its fixed condensing temperature even if the heat demand is low. The hot water temperature will keep rising until the temperature difference with the condensing temperature is so low that no heat is anymore transferred to the water.

The Daikin unit however will, once the required hot water temperature is reached, reduce its condensing pressure. The power input of the unit is reduced and the water is not unnecessary heated. Compared to the conventional unit, this will result in major energy savings.

Electronic control

Units fitted with heat recovery are compatible with the Daikin Integrated Chiller Network. DICN enables any 4 chillers of similar or different sizes, to operate simultaneously as if they were a single unit. By giving priority to the heat recovery unit, generation of hot water is reliable at part load conditions.

Thanks to the standard DICN, simultaneous operation of up to 4 chillers is allowed. This function enables a Daikin 2MW chiller plant to be operated via a single controller.
1. Nominal cooling capacity at Eurovent conditions: evaporator 12°C/7°C; ambient 35°C

2. Nominal cooling power input at Eurovent conditions: evaporator 12°C/7°C; ambient 35°C

3. Minimum required water volume for standard thermostat settings and at nominal conditions

4. Nominal cooling capacity and heat recovery capacity during heat recovery mode according to EN14511

5. Values between brackets including installation space of delivered kit

Notes:
- 1, 3 and 4: The certified data of certified models are listed in the Liquid Chilling Packages (LCP) and Fan Coil Units (FC);
- 2: Certification Programme for Air Conditioners (AC), Domestic Air Conditioning (DAC), Commercial Solutions (CS), and/or interpretation of this publication. All content is copyrighted by Daikin Europe N.V. and/or its licensor.
- 5: The present publication supersedes EPLE 05-40A.

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Daikin units comply with the European regulations that guarantee the safety of the product.

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