



DESIGNING INNOVATIVE SOLUTIONS

United Technologies

# COMMERCIAL OFFICES



Three high performance Carrier AquaEdge™ 23XRV screw chillers helped PwC's Embankment Place building achieve what is believed to be the highest-ever Building Research Establishment Environmental Assessment Method (BREEAM) rating for both new-build and existing buildings.

Customer

**CONTRACTOR:  
MICHAEL J LONSDALE  
CLIENT: PWC**

Location

**LONDON,  
UNITED KINGDOM**

Project running since

**October 2013**



## Carrier chillers contribute to 'highest ever BREEAM rating' at PwC's refurbished London headquarters

Project

Carrier chillers were selected to achieve optimal energy-efficiency and deliver a high BREEAM rating to comply with PwC's corporate environmental policy. Following the project, the nine-storey, 42,000sq m commercial office building scored 96 out of a maximum of 100, giving it an equivalent BREEAM rating of Outstanding.

## Project summary

# KEY ADVANTAGES

**Contributed to highest ever BREEAM rating**

**Significant ongoing energy savings**

**High quality indoor environment**

**Compact chiller footprint overcame internal space constraints**

**Low start-up current, protects building electrical supply**

**Excellent resilience: full back-up in case CHP goes offline**

# TECHNOLOGIES

**3 x Carrier AquaEdge™ 23XRV water-cooled screw chillers, equipped with Greenspeed® Intelligence**

## Contact

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PwC's iconic London headquarters building, alongside the Thames in central London.



The entrance to PwC's Embankment building



With a SEER in excess of 10, the Carrier AquaEdge™ 23XRV chiller is among the most efficient in the world.



The chiller is based on Carrier's high efficiency, high performance tri-rotor screw compressor.

## Background

Designed by consultant ChapmanBDSP Limited, the building services solution for PwC's refurbished London headquarters is based on a biofuel-powered combined cooling, heating and power (CCHP) plant. Cooling is supplied by three Carrier AquaEdge™ 23XRV 1.4MW water-cooled inverter screw chillers, plus adsorption units by another manufacturer.

The AquaEdge™ 23XRV chiller was the world's first integrated variable speed, water-cooled screw chiller. Equipped with Greenspeed® Intelligence, they were selected for their high cooling capacity, compact footprint and exceptional energy-efficiency. With a SEER rating in excess of 10.0, they are among the most efficient chillers in the world. To provide resilience, the chillers are sized to allow two machines to meet the anticipated total load for the building, enabling one machine to remain on standby. They also provide full back-up in case the CCHP plant has to be taken offline for maintenance.

Chilled water is used to cool the building via chilled beams, with boilers providing heating to augment the low grade hot water circuit from the CCHP system. In addition, high quality comfort conditions are supported throughout the building with a combination of air handling units and fan coil units.

Andrew Keogh, Carrier's UK Technical Director, says: "The compressors used by the chillers are based on a tri-rotor screw design, rather than the conventional twin-rotor. A tri-rotor delivers a much more balanced compression process, enabling tighter tolerances to be maintained. The result is lower parasitic losses and even better overall efficiency."

The chillers are water-cooled, enabling a much higher capacity to be achieved for a given external plant footprint. Moreover, being based on an evaporative process, they are inherently more efficient. This, together with use of variable speed tri-rotor screw compressors, results in the system's exceptional efficiency and performance.

## Challenges and solutions

The refurbishment project required close collaboration between Carrier and all parties, as the overall building re-fit took more than 40 months to complete. This required excellent communication and close management of delivery timescales to ensure plant and equipment was available when required.

## Perspectives

Gavin Dunn, Director of the UK Building Research Establishment BREEAM programme, said: "The impressive BREEAM score for this iconic building shows just how much can be accomplished. The project is a fantastic testament to PwC's determination to achieve a high rating and to the project's innovative and highly committed delivery team."



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