

# Nominee: The SmartCool™ by Airedale International Air Conditioning Ltd

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## Nomination title: SmartCool™ CW SD/SN/SR dedicated chilled water PAC system

The SmartCool™ CW SD/SN/SR was developed to meet demand for a more energy-efficient, dedicated chilled water (CW) precision air conditioning (PAC) system that provides extremely quiet and accurate climate control for critical applications.

### The Challenge

Chilled water designs of PAC units have traditionally been derivatives of mechanical cooling (DX) systems. This approach had certain disadvantages in that internal unit space was not used as effectively as it could be, leaving space where DX components such as compressors would normally have been located.

A fresh approach was adopted in the development of the SmartCool™ CW with the objective of maximising the heat exchange area in order to deliver higher cooling capacities and efficiencies.

### Results and Differentiating Factors

With better use of internal space, the new unit design maximises cooling capacity, outperforming rival products on the market and delivering the following USPs:

- Industry-leading energy efficiency for footprint - EER up to 52.4, a 13% increase in EER when compared with leading competitor units
- Up to 30% more cooling kW/m<sup>2</sup> when compared with competitor units
- Up to 30% more cooling than previous generation CW product ranges without compromising efficiency
- Increased operational efficiencies
- Increased customer choice to meet varying applications from smaller computer rooms to large-scale data centres
- Design allows for common coil assemblies across all case sizes leading to economies of scale and associated price competition against comparable units

The high performance of the SmartCool™ CW SD/SN/SR is a factor of the following design features:

- SmartCool™ SN/SR units use an innovative V-frame heat exchanger arrangement (patent pending), positioned across the width rather than the depth of the unit. This

configuration provides a high coil face area on which the filters are placed, improving air flow through the unit and significantly reducing air-side pressure drop. Allowing more airflow to pass through the coil increases the total heat rejection and fan efficiency at both full and part-load and results in better performance and control particularly at part-load

- Fans integral to the case: Ideal for individual computer rooms as well as large data centres the SmartCool™ SN/SR delivers a high density cooling solution for environments where space or logistical constraints make it difficult to install fans within the floor void
- Fans in floor void: Where space and logistics permit, the SmartCool™ SD allows fans to be located below floor level. This design offers premium efficiency, enhances the air path, increases air flow and reduces noise. Each fan module can be configured to individual customer needs
- Slab coil arrangement: The location of fans in the floor void on the SmartCool™ SD allows for a larger slab coil arrangement which provides a 15% increase in surface area for improved air flow. Efficiency is further increased by locating the filters on the face of the coils, increasing the surface area and reducing air-side pressure drop when lowering fan power. The SmartCool™ SD also features both high and low flow coil options to suit different customer applications
- Cutting-edge EC fan technology: SmartCool™ SN and SR units feature fans within the case and offer a kW/m<sup>2</sup> ratio greater than any PAC unit of its size and type within the marketplace. The backward-curved centrifugal EC fans are up to 50% more efficient than their AC equivalents, and use variable speed control matched to load to eliminate unnecessary energy usage which can be further improved by integrating Airedale's intuitive controls. The fans allow units to be configured to customer needs according to whether they require high airflow/high capacity or low airflow/high efficiency. This makes units extremely competitive when considering both cooling capacity per footprint and efficiency
- Free-cooling for up to 95% of the year: In a 24/7 data centre with a typical room temperature of 24°C, total life cycle costs can be significantly reduced when SmartCool™ CW units are integrated with an Airedale free-cooling chiller
- In addition, the SmartCool™ provides numerous installation and maintenance benefits including:
  - Reduced requirement for commissioning: due to intelligent two-way valve system
  - Direct drive motors on EC fans: remove the need for belt replacement
  - Rapid and full access to components such as filters and coils: via 'saloon' style hinged doors with EMKA locks; removable internal mullion and internal panels (SmartCool™ SN/SR)

A further innovation, and a differentiating factor against the competition bidding for the Optimum Group Services (OGS) project (see 'Market acceptance'), was Airedale's ability to adapt the SmartCool™ to fit the existing footprint, simplifying installation and minimising installation costs. Further innovation was provided in the form of Airedale controls, in particular the ability to offer automatic set point adjustment.

### Market acceptance

Since launch, more than 100 units have been ordered, including an order for 68 systems from Optimum Group Services (OGS) for a major UK data centre (customer testimonial provided).

Airedale was one of four suppliers invited to submit proposals which were assessed on unit performance, cost, energy efficiency and space restrictions.

The Airedale solution produced the best results, with predicted savings against the existing system of 54% (£206,596). Subsequent witness testing, under robust laboratory conditions, produced even more impressive figures. Absorbed power to each PAC unit was lower than predicted by 0.67kW/unit, resulting in further reductions in power consumption and actual savings of 69% (£260,417) against the original system.

### Key features

- Nominal capacities from 11 to 233kW: SmartCool™ SN/SR (11kW–91kW); SmartCool™ SD (54kW- 233kW)
- 42 models
- 12 case sizes including a 600mm deep case for space-critical applications (SN)
- 3 power supplies as standard (400V/50Hz, 380V/60Hz & 220V/60Hz)
- High and low flow coil options - SD variants (54kW–233kW)

### Why nominee should win

The SmartCool™ CW SD/SN/SR:

- is the result of significant investment in New Product Development, the application of expertise based on 40 years in the cooling sector and a commitment to developing systems that maximise energy efficiency and reduce carbon footprint
- provides the market with class-leading operational efficiencies for competitive lifetime investment, taking into account capital and on-going energy costs. In this case, EER up to 52.4, a 13% increase in EER, and up to 30% more cooling kW/m<sup>2</sup> compared with competitor units
- provides customers with significant choice – from narrower units where space is limited - to premium efficiency units achieved by locating fans within the floor void