

# Nominee: Airedale International Air Conditioning Ltd

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## Nomination title: SmartCool™ Inverter Compressor 5-83kW – taking efficiency even further

### Introduction:

Engineered to perform, made in Britain and applied worldwide. The SmartCool™ i-drive has been developed to provide an ultra-high efficiency cooling solution in response to increased demand from the data centre industry and a desire to deliver exact capacity match.

SmartCool™ i-drive is an air-cooled, mechanical direct expansion (DX) inverter compressor precision air conditioning unit, designed for use in high density applications using elevated return air temperatures, and incorporates inverter compressors to enable exact control, superior efficiency and performance. The range is available with the option of high capacity compressors for extreme temperature applications.

Delivering precise supply air temperatures up to 26°C, under variable heat loads and wide outside ambient conditions of between -20°C and +50°C, the SmartCool™ i-drive provides up to 83kW of downflow cooling in a choice of four case sizes. SmartCool™ i-drive delivers excellent part-load efficiencies, very precise control and lower capacity turndown, providing a highly versatile, resilient cooling solution which can adapt to load requirements.

All units are single circuit DX air-cooled with various configurations of inverter driven and fixed speed compressors delivering excellent part load efficiencies and constant pressure control. A unique feature, an optional segregated evaporator coil, allows a high level of control over dehumidification and cooling capacity when operating under constant pressure control, helping to manage air distribution and prevent hot spots.

The SmartCool™ i-drive system also benefits from longer pipe runs for increased flexibility, allowing outdoor condensers to be situated up to 100 metres from any internal unit providing a great deal of flexibility for data centre architects without compromising efficiency and performance. Its innovative 'slab' hydrophobic epoxy coated, aluminium finned evaporator coil and fan arrangement reduces fan power input and airside pressure drop, whilst harnessing the part-load efficiencies of the variable speed compressors and other energy efficient components such as high efficiency, EC (electronically commutated) fans.

The inverter drive allows the compressors to ramp their capacity up to 120 rps, delivering extremely tight set point management to optimise system efficiency.

### Key features:

The high performance of the SmartCool™ i-drive is a factor of the following design features:

- **50-60Hz inverter compressors – Up to 45% more cooling kW/m<sup>2</sup> (compared to fixed speed compressors). React to system load fluctuations and exactly match cooling load**
- **EC backward curved fans with composite impellers – Up to 70% more efficient (than an AC at part load). Particularly at part load between 30% and 100%; EC fans respond seamlessly to load fluctuations**
- **Large surface area filters – Increased system efficiency. Reduced airside pressure drops and improved airflow resulting in increased performance and reduced fan power usage**
- **Oil separators – Increased system efficiency and reliability (particularly at part load). Enables long pipe runs up to 100m**

**Key differentiators:**

**In comparison with alternative cooling techniques traditionally adopted in data centres, SmartCool™ i-drive offers a number of major benefits compared with other high performance cooling technologies:**

**Exact Capacity Match – SmartCool™ i-drive range saves up to 17% on running costs compared to a fixed speed system (Based on London ambient profile – 22kW base load and 1kW variable – 24/7 operation)**

**Intelligent controls identify the optimised operating point for the system so that the inverter-driven compressor and variable speed fans are always running at the most efficient point for the room load. The inverter compressor also offers reduced sound levels during part load operation of the compressors and a starting current equivalent to 10% of a traditional fixed speed compressor ensuring increased reliability.**

**Market leading cooling density – SmartCool™ i-drive 5-83kW DX models typically offer up to 21% more cooling kW/m<sup>2</sup> (compared to similar leading competitor units)**

**Efficient dehumidification – no reheat required**

**The SmartCool™ i-drive removes moisture from the room via a segregated evaporator coil (option) which allows dehumidification while maintaining cooling capacity and operating under constant pressure control, helping manage air distribution and preventing hot spots.**

**When the segregated evaporator coil is operating in dehumidification mode, the evaporating temperature is reduced below the dew point of the air even at high return air temperature**

conditions, enabling precise humidity control in all modes of operation. This is especially useful when the SmartCool™ fans are being used for constant pressure control or air volume management.

The use of a variable speed compressor on i-drive units ensures that the supply air temperature is maintained at set-point during the dehumidification process.

For dryer climates, a re-humidification option is also available.

#### Optimised air flow and pressure management

The SmartCool™ i-drive delivers cold air through floor-mounted grilles directly to the front of the server racks. By presenting the right amount of air flow, at the correct temperature to the server inlet, the SmartCool™ Inverter Compressor ensures optimum air flow management and eliminates hot spots.

(773 words)

#### Useful links:

SmartCool™ inverter video: [https://youtu.be/Fsg\\_8Wh\\_4hQ](https://youtu.be/Fsg_8Wh_4hQ)

SmartCool™ inverter brochure: [http://www.airedale.com/web/file?uuid=f09e3bb9-f28b-43dd-80a4-f553a0c63b6e&owner=de3aa83e-cfaf-4872-8849-d5a40ddcd334&contentid=4120&name=%5C%5Cmodine.com%5Cuserdata%5CLEEDGB%5CMyDocuments%5Cbwood%5CDocuments%5CDocuments%5CF+Gas+updates%5CSmartCool-i-drive-Inverter-Compressor\\_5-83kW\\_SB\\_UK.pdf&title=SmartCool%20SV%20DX%20i-drive%205-83kW%20Sales%20Brochure](http://www.airedale.com/web/file?uuid=f09e3bb9-f28b-43dd-80a4-f553a0c63b6e&owner=de3aa83e-cfaf-4872-8849-d5a40ddcd334&contentid=4120&name=%5C%5Cmodine.com%5Cuserdata%5CLEEDGB%5CMyDocuments%5Cbwood%5CDocuments%5CDocuments%5CF+Gas+updates%5CSmartCool-i-drive-Inverter-Compressor_5-83kW_SB_UK.pdf&title=SmartCool%20SV%20DX%20i-drive%205-83kW%20Sales%20Brochure)

SmartCool™ website: [www.airedale.com/smartcoolinverter](http://www.airedale.com/smartcoolinverter)

Due to third party permissions, references are available on request

### Why nominee should win

- Engineered to perform. Conceptualised, designed, developed and manufactured in the UK, and applied Worldwide. With innovation, performance and efficiency at its core
- Market leading cooling density – SmartCool™ i-drive 5-83kW DX models typically offer up to 21% more cooling kW/m<sup>2</sup> (compared to similar leading competitor units)



- **Exact capacity match – The SmartCool™ i-drive range saves up to 17% on running costs compared to a fixed speed system. Based on London ambient profile – 22kW base load and 1kW variable – 24/7 operation**
- **Long pipe runs allows outdoor condensers to be situated up to 100m from internal units**