

Statement on Specific Fan Power

The specific fan power of a fan coil unit (SFP_{fcu}) is defined as follows:

$$SFP_{fcu} = \frac{P_{mains}}{q_{fcu}}$$

where:

P_{mains} = power supplied to the fan coil unit, W
 q_{fcu} = airflow rate through the fan coil unit, l/s

Tables 35 and 36 of the *Non-Domestic Heating, Cooling and Ventilation Compliance Guide*^[1] (the second tier document referred to in Building Regulations Approved Documents L2A^[2] and L2B^[3]) limit specific fan power of fan coil units to a maximum of 0.8* W/(l/s), measured as the rating weighted average of the fan coil unit installation.

This is calculated by summing the product of the power supplied (P_{mains}), including ancillary items, and the specific fan power (SFP_{fcu}) for each fan coil unit in the installation, divided by the sum of the power supplied (P_{mains}) for all the fan coil units in the installation. This can be expressed thus:

$$\frac{(P_{mains(1)} \times SFP_{fcu(1)}) + (P_{mains(2)} \times SFP_{fcu(2)}) + (P_{mains(3)} \times SFP_{fcu(3)}) + \dots}{P_{mains(1)} + P_{mains(2)} + P_{mains(3)} + \dots}$$

For example, for four fan coil units, the rating weighted average SFP_{fcu} could be:

$$SFP(\text{rating weighted average}) = \frac{(85 \times 0.7) + (175 \times 0.75) + (80 \times 0.9) + (115 \times 0.65)}{85 + 175 + 80 + 115} = 0.74$$

Note that because the majority of fan coil units in this example installation have low specific fan powers the $SFP(\text{rating weighted average})$ of the installation is below 0.8 W/(l/s), despite the inclusion of a small fan coil unit with a high individual specific fan power.

The user guide for the Simplified Building Energy Model (SBEM)** calculation tool^[4], for calculating annual energy use, makes reference to an SFP_{fcu} of 0.8 W/(l/s) for fan coil unit systems. Notwithstanding this, designers may specify lower SFP_{fcu} than this in order to realise their required building services design.

* A new lower figure of 0.6 W/l/s will be imposed in the changes to Part L2 to be introduced in April 2010

** The SBEM has been developed by BRE for the Department for Communities and Local Government (DCLG) from the National Calculation Methodology (NCM)^[5], which is the annual energy use calculation for demonstrating compliance with approved documents ADL2A and ADL2B.

Motors used with many fan coil units are 4-pole AC, single phase induction, capacitor start/run, up to approximately 200W capacity with sealed-for-life ball or sleeve bearings. The specific fan power of fan

coil units fitted with these fan motors is typically below 0.8 W/(l/s) with the unit operating at its duty point and can be as low as 0.5 W/(l/s) for well designed fans. Some fans are available fitted with electronically commutated (EC) DC motors and associated speed control equipment to further promote energy efficiency. The specific fan power for fan coil units fitted with these fans can be below 0.4 W/(l/s), although there are additional costs involved and power factor could be an issue. There is a move away from 2-pole AC fans as the specific fan power of a fan coil unit fitted with these fans operating at its duty point can be higher than the limit set by current Building Regulations.

1. *Non-domestic heating, cooling and ventilation compliance guide: Compliance with Approved Document L2A: New buildings other than dwellings and L2B: Existing buildings other than dwellings* (London: NBS/Department for Communities and Local Government) (2006) (available from http://www.planningportal.gov.uk/uploads/br/BR_PDF_PTL_NONDOMHEAT.pdf)
2. *Conservation of fuel and power The Building Regulations 2000 Approved Document L2A. New buildings other than dwellings* (London: NBS/Department for Communities and Local Government) (2006) (available from <http://www.planningportal.gov.uk/england/professionals/en/1115314231806.html>)
3. *Conservation of fuel and power The Building Regulations 2000 Approved Document L2B. Existing buildings other than dwellings* (London: NBS/Department for Communities and Local Government) (2006) (available from <http://www.planningportal.gov.uk/england/professionals/en/1115314231813.html>)
4. *Simplified Building Energy Model (SBEM): Calculation tool for non-domestic buildings to demonstrate compliance with the National Calculation Methodology* (Garston: Building Research Establishment) (2005) (available from <http://www.ncm.bre.co.uk>)
5. *National Calculation Method* (webpage) (Garston: Building Research Establishment) (2005) (available from <http://www.ncm.bre.co.uk>)

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