

Specification requirements applicable to the utilisation of Rigid duct performance data within the Standard Assessment Procedure (SAP) for dwellings with Semi-Rigid duct systems fitted to balanced whole-house mechanical ventilation systems

Background

The UK Government's Standard Assessment Procedure for Energy Rating of Dwellings (SAP) and the incorporated version Reduced Data SAP (RDSAP) are the UK's National Calculation Methodologies (NCM) for dwellings. To assess a dwelling's energy performance data is needed that describes the dwelling in terms of the energy performance of the installed construction components and building services equipment. Such data is either generic, determined by the materials and type of product used ("type data") or specific, where validated individual branded product performance data has been made available ("product data").

Product data is held in either the SAP Appendix Q database or the Product Characteristics Database (PCDB). Since the incorporation of new technologies types in the PCDB can only be undertaken when new versions of SAP are issued, product data for new technology types are held initially in the SAP Appendix Q database.

Appendix Q of SAP provides a means whereby validated individual branded product performance information can be accessed and used as an adjunct to the SAP calculation. A product's performance information is determined by testing against a specification that has been agreed by DECC's NCM contractor, the relevant manufacturer(s) and industry sector representatives. Product data that is listed in the SAP Appendix Q database may migrate to the PCDB when a new version of SAP, incorporating the relevant calculation process, is released. The data will also remain in the Appendix Q database until obsolete versions of SAP have been withdrawn or where it is impractical to include it within the PCDB.

The latest revision of the Standard Assessment Procedure, SAP 2009, features a range of 'in-use factors' applied to all mechanical ventilation systems installed within dwellings and depends on the system type – refer to Table 4h below (taken from Table 4h of the SAP technical document).

These 'in-use factors' comprise an additional multiplication factor for system Specific Fan Power (W/L/s) depending on the specification of ductwork and currently categorised as: 'Flexible duct', 'Rigid duct' or 'No duct' (only applicable for decentralised Mechanical Extract Ventilation (MEV) and Positive Input Ventilation (PIV) systems). There are also two 'in-use factors' applied for system efficiency depending upon whether or not system ductwork features insulation.

Table 4h: In-use factors for mechanical ventilation systems

In-use factors are applied to the data for mechanical ventilation systems in all cases

Type of mechanical ventilation	Approved installation scheme	In-use factor for Specific fan power			In-use factor for Efficiency	
		Flexible duct	Rigid duct	No duct	Uninsulated ducts	Insulated ducts ^{c)}
Mechanical extract ventilation, centralised ^{a)}	No	1.70	1.40	-	-	-
	Yes	*	*	-	-	-
Mechanical extract ventilation or positive input ventilation from outside, decentralised ^{a)}	No	1.45	1.30	1.15	-	-
	Yes	*	*	*	-	-
Balanced whole house mechanical ventilation, without heat recovery ^{a)}	No	1.70	1.40	-	-	-
	Yes	*	*	-	-	-
Balanced whole house mechanical ventilation, with heat recovery ^{a)}	No	1.70	1.40	-	0.70	0.85
	Yes	*	*	-	*	*
Default data from Table 4g (all types) ^{b)}		2.5			0.70	

* Additional values may be added if an approved installation scheme for mechanical ventilation systems is put in place.

^{a)} Use these values for data from the database or from data sheets obtained from www.sap-appendixq.org.uk

^{b)} Use these values for data from Table 4g.

^{c)} This column applies when all ductwork is within the insulated envelope of the building even though ductwork is not itself insulated.

At the present time, it is not possible to categorise system ductwork known as ‘Semi-Rigid duct’, which features many of the benefits of Flexible duct in terms of installation, whilst aerodynamic performance is comparable to Rigid duct.

The purpose of this document is to define a technical specification for Semi-Rigid duct systems connected to balanced whole house mechanical ventilation systems (with and without heat recovery) in order that it may be substituted for Rigid duct within SAP calculations. In order for this to be possible, individual Semi-Rigid duct manufacturers or suppliers must demonstrate that their duct system, when installed in a variety of configurations, is at least equal in terms of aerodynamic performance to Rigid duct via an agreed third-party test.

A Semi-Rigid duct system is defined as a unique product supplied by a manufacturer or supplier and comprises the components required for assembly of that system. It is identified with a unique NCM (SAP) Identifier. If the design of any component within the product system is altered, a new NCM (SAP) Identifier and re-test will be required.

If a Semi-Rigid duct manufacturer or supplier successfully demonstrates their Semi-Rigid duct system against this specification, the duct system will be listed within SAP Appendix Q using a unique NCM (SAP) Identifier. In future, it is anticipated a ‘Semi-Rigid duct’ category would be created within a future revision of SAP, whereby Semi-Rigid duct systems will be listed in the Product Characteristics Database (PCDB).

This document should be read in conjunction with ‘*Terms and Conditions applicable to the listing of individual branded product performance data as an input to the National Calculation Methodologies for dwellings*’ (available at: www.sap-appendixq.org.uk).

Product Identification

The identification of Semi-Rigid duct systems must follow the example below, with manufacturer/brand name included as appropriate, this is known as the ‘NCM (SAP) Identifier’ and is a mandatory requirement for correct system identification on-site by SAP assessors. The model name must be sufficient to fully define the product, including any scope for future variants, e.g. it is advisable to include ‘V1’ or ‘MK1’ in any event.

NCM (SAP) Identifier:

Technology type:	Ventilation
Technology category:	Semi-Rigid duct
Brand name:
Model name:
Model qualifier:	N/A

All Semi-Rigid duct manufacturers must insert an adhesive label into the plenum box of each duct system. The system installer must also affix a label to the air handling unit for the balanced whole house ventilation system, such as an MVHR air handling unit, and next to the unit’s NCM (SAP) Identifier. This label (NCM (SAP) Identifier) indicates that the system has been assessed as complying with the physical and performance specification defined within this document. Manufacturers affixing labels to non-compliant Semi-Rigid duct systems will be treated as outlined in *‘Terms and Conditions applicable to the listing of individual branded product performance data as an input to the National Calculation Methodologies for dwellings’* (available at: www.sap-appendixq.org.uk).

Semi-Rigid Duct Specification: System Characteristics/Physical Properties

Mechanical Properties:

Crushability: The ability to withstand external pressure:

- Circular ducts. Satisfy the requirements of: BS EN ISO 9969:2007. 5% deformation at $\geq 8,0 \text{ kN/m}^2$.
- Non circular ducts - Satisfy the requirements of BS EN 61386-24:2010. Deformation $\leq 10\%$ of the outer layer/diameter at 250N

Minimum radius: The ability to install without 90° fittings

- Circular ducts: 2 x diameter
- Non circular ducts:
 - horizontal bends = 3 x width
 - vertical bends = 3 x height

Design & Installation requirements:

Installation layout: The systems must use two (2) plenum boxes, one for supply and one for extract and radial duct layout.

Mechanical connections: Where connections are made between ducts, or between ducts and other components of the system, the connections are mechanical and the seal is also mechanical i.e. no tape is required to achieve an effective air seal.

Double-skin: The duct used in the system must have a double skin; the inner skin must be smooth.

Plenum boxes: Plenum boxes must have access panels for routine maintenance and must be installed in such a way to allow access.

Supply to and exhaust from plenum boxes: Plenum boxes should be connected to the air handling unit of the balanced system by ducting of no less than 150mm diameter. Smaller pipes of 100mm or 125mm are permissible but will be governed by the spigot size connection of the air handling unit. For example, if an air handling unit has a spigot diameter equal or greater than 150 mm, then the duct connected to the plenum must be 150mm. If the air handling unit has a spigot diameter smaller than 150 mm, then a smaller duct of equal size to the air handling unit spigot should be installed.

Material composition: The Semi-Rigid duct must contain no recycled material.

Aerodynamic performance:

It must be demonstrated that individual Semi-Rigid duct systems are at least equal to or better than Rigid duct in terms of aerodynamic performance at all levels of application, i.e. number of wet rooms appropriate for the balanced whole house mechanical ventilation system air handling unit being installed.

The test to determine the aerodynamic characteristics of a Semi-Rigid duct system must be undertaken following the air flow test as detailed in: *'Test method for Central mechanical supply and exhaust ventilation system packages with heat recovery used in a single dwelling'* (available at: www.sap-appendixq.org.uk). The measured Specific Fan Power (SFP) must be equal to or less for a Mechanical Ventilation and Heat Recovery (MVHR) unit when tested with Semi-Rigid duct, compared to a Rigid duct system of appropriate diameter for the MVHR unit used.

The following connection configurations and duct lengths of semi-rigid duct are specified for test comparison purposes:

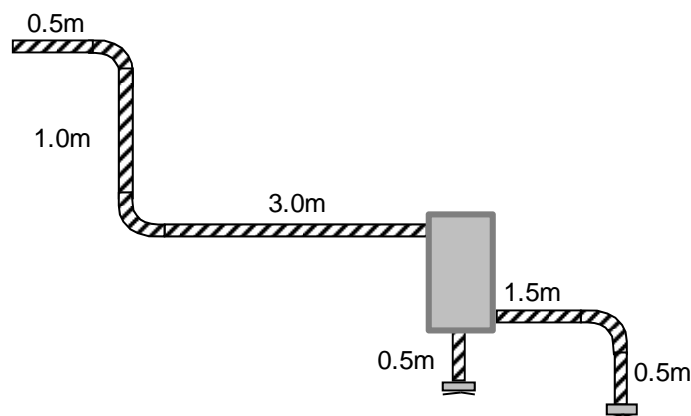


Figure 1 - Kitchen plus one wet room

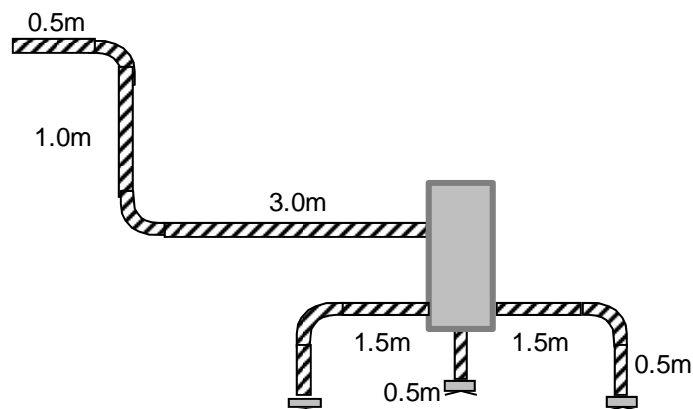


Figure 2 - Kitchen plus two wet rooms

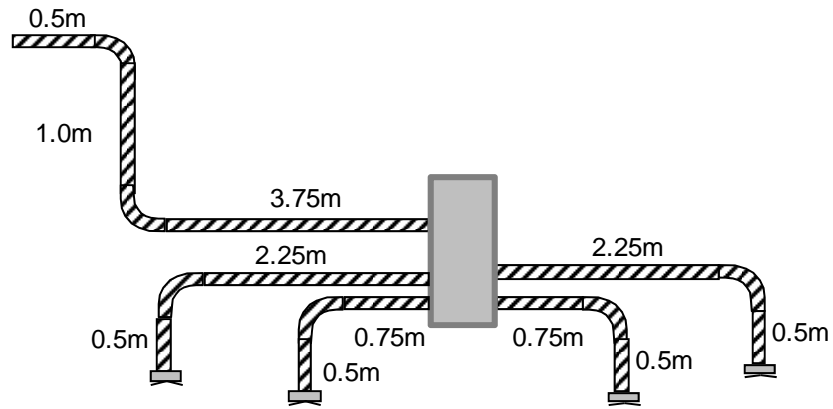


Figure 3 - Kitchen plus three wet rooms

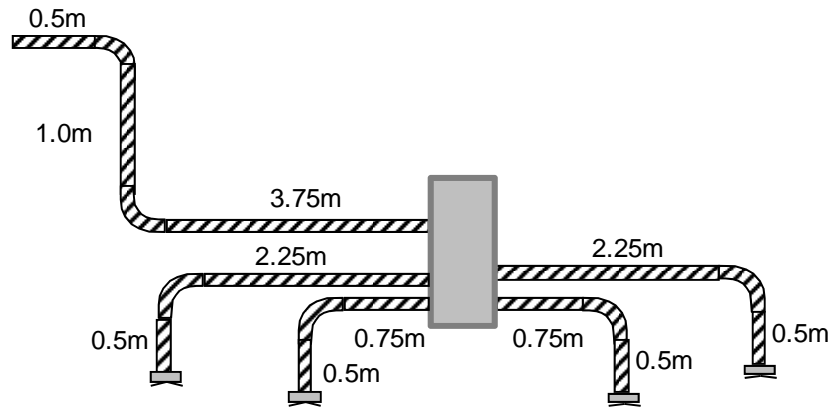


Figure 4 - Kitchen plus four wet rooms

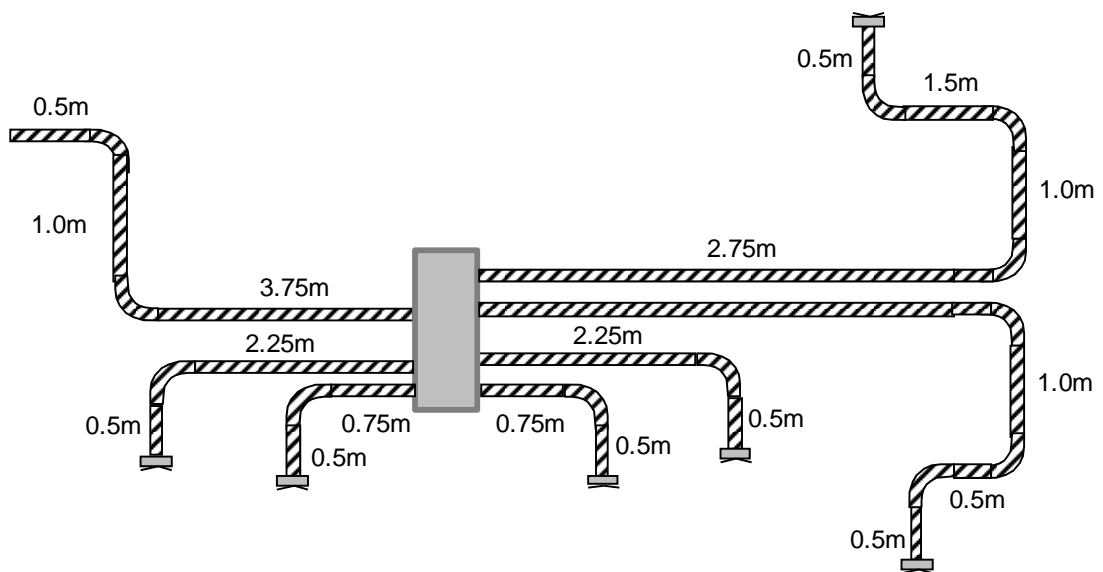


Figure 5 - Kitchen plus five wet rooms