Treatment of electrical panel heaters in SAP – all types

Introduction

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 The data will also remain in the Appendix Q database until obsolete versions of SAP have been withdrawn or where it is impractical to include it within the PCDB.

Product's data will be used in preference to any default value to determine the energy performance of the dwelling, providing the product is installed in the dwelling being assessed and can be recognised and identified by the Dwelling Assessor. Acceptance of product data as an input to the NCMs does not denote any form of endorsement, nor does it imply that the dwelling's energy performance rating is better than that obtained using alternative products.

The Appendix Q database and PCDB are provided solely to support the NCMs; they are not intended to support the marketing efforts of manufacturers. To this end, these Terms and Conditions outline how product data listed in the SAP Appendix Q database or PCDB can be referenced in marketing and promotional material.

The purpose of this paper is to outline the treatment of direct electric panel heaters of all types in SAP. There have been numerous SAP Appendix Q applications for this technology type with claimed energy savings based on either: 1) advanced control system, 2) the method of heat transfer, both of these approaches have been refused for the purposes of SAP.

1) Advanced control system

With reference to Table 4e of the SAP specification, available at:
http://www.bre.co.uk/filelibrary/SAP/2009/SAP-2009_9-90.pdf, credit is already awarded for installed control systems, whereas non-installation of a control system results in a temperature

penalty of 0.3°C to the mean internal temperature used within the SAP calculation to determine space heating demand, see Figure 1.

Table 4e: Heating system controls

1. Use Table 4a to select appropriate Group in this table.
2. 'Control' indicates the appropriate column to use in Table 9.
3. The 'Temperature adjustment' modifies the mean internal temperature and is added to worksheet $(92)_m$. Where there are two heating systems it applies to the controls on the system heating the living area.
4. Controls marked "rd" in the right-hand column are part of the reduced data set (see S10 in Appendix S)

Type of control	Control	Temperature adjustment, °C	Reference to other possible adjustments	Code	rd SAP
GROUP 6: ROOM HEATER SYSTEMS					
No thermostatic control of room temperature	2	+0.3	n/a	2601	rd
Appliance thermostats	3	0	n/a	2602	rd
Programmer and appliance thermostats	3	0	n/a	2603	rd
Room thermostats only	3	0	n/a	2604	rd
Programmer and room thermostats	3	0	n/a	2605	rd

Figure 1 – Table 4e excerpt from SAP specification

Clearly, this generic table of control types does not differentiate between technologies capable of delivering superior functionality, which is likely to result in more closely matching the thermal comfort requirements of specific individuals. However, the basis of SAP is delivery of a defined service, which in this instance is a temperature of 18 degrees for Zone 2 and 21 degrees for Zone 1 for specific hours of the day. Since many heating systems cannot control the two zones independently, the standard heating regime assumes that the Zone 1 heating times are applied throughout the dwelling, see Figure 2 and Figure 3. All heating controllers, whether for space heating provided by electrical, gas, oil fuels, etc. assume that a heating controller, if installed, can deliver the required service delivery pattern.
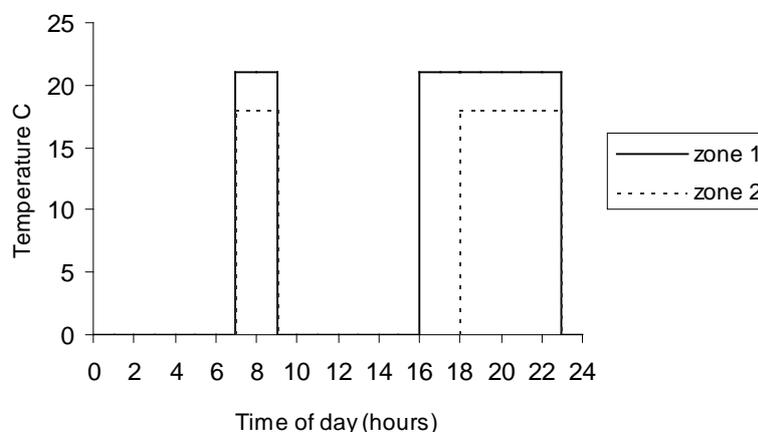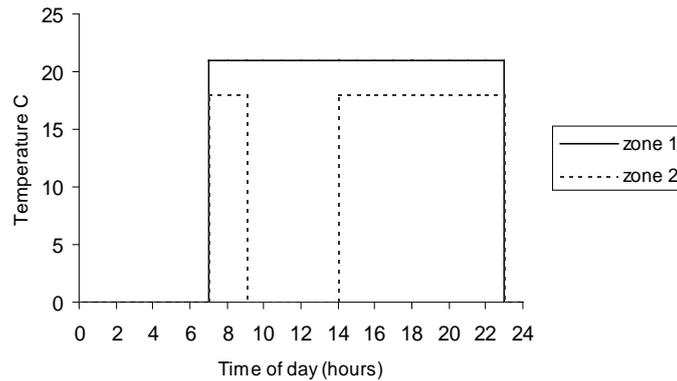

Figure 2 – Weekday heating pattern

Figure 3 – Weekend heating pattern

2) Method of heat transfer

As discussed previously, SAP assumes that all heating systems provide idealised space heating in accordance with the service delivery pattern shown in Figure 2 and Figure 3. The reported energy savings of electrical heating systems using unconventional heat transfer methods, such as infra-red, relate to improved thermal comfort and purported reductions in room temperature as a result. Any savings resulting from reported improvements in thermal comfort cannot be recognised within SAP as a result of its inherent ambiguity, a lack of robust data, and the principals of SAP which provides a clear service delivery profile.

It is also important to emphasise that all electrical heating is treated as having an efficiency of 100% (except for heat pumps), see Figure 4. It is the 'Responsiveness (R)' which changes based on heater type – all electrical direct acting systems have a responsiveness of 1.0, whilst storage types have a responsiveness of between 0.5 and 0.75 – therefore, there is clearly a benefit awarded to direct acting system in terms of energy use that is already reflected in SAP.

Table 4a: Heating systems (space and water)

1. *The table shows space heating efficiency. The same efficiency applies for water heating when hot water is supplied from a boiler system.*
2. *For independent water heaters see section at the end of table.*
3. *'Responsiveness (R) is used to calculate mean internal temperature (Table 9b).*
4. *Systems marked "rd" in the right-hand column are part of the reduced data set (see S10 in Appendix S)*
5. *Heating systems, heating controls and fuels are assigned a code number for identification purposes*

	Efficiency %	Heating type	Respon-siveness (R)	Code	Rd SAP
Electric (direct acting) room heaters:					
Panel, convector or radiant heaters	100	1	1.0	691	rd
Water- or oil-filled radiators	100	1	1.0	694	rd
Fan heaters	100	1	1.0	692	
Portable electric heaters	100	1	1.0	693	rd

Figure 4 – Table 4a excerpt from SAP specification