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A guide to passing your SAP Calculation

According to the 2022 Building Regulations

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DELIVERING BEYOND COMPLIANCE

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Navigating the complexities of Part L in the 2022 Building Regulations can be daunting, especially when faced with technical jargon and strict compliance standards. In this guide, we aim to simplify the SAP Calculation process and highlight key considerations to help you pass with confidence.

Understanding maximum and notional U-values

When working on your SAP Assessment, you'll frequently come across the term 'notional'. A notional value serves as a benchmark or target that the property or thermal element must meet or exceed. During the SAP assessment, the software generates notional values for fabric efficiency and emission rates, which the actual property must outperform.

On the other hand, the maximum U-values are specified in Approved Document L (ADL) and represent the highest allowable thermal transmittance for building elements. If any element exceeds this maximum, the property will be non-compliant. Although rare, it is possible for a building to pass the SAP Assessment but fail to comply with Part L if it doesn't meet these maximum values, particularly in conversions and extensions.

To pass your SAP Assessment, simply aiming for the maximum values won't suffice. You'll need to exceed these values significantly. Thankfully, Part L provides notional U-values on page 22 of ADL that serve as a guide. Sticking to these values will increase your chances of passing on the first attempt. It goes without saying that anything worse than these values will decrease your likelihood of passing. Before finalising your fabric specifications, consult with your SAP assessor to ensure compliance.

Summary of notional dwelling specification for new dwelling

Element	Reference value for target setting
Opening areas (windows, roof windows, rooflights and doors)	Same as for actual dwelling not exceeding a total area of openings of 25% of total floor area
External walls including semi-exposed walls	U = 0.18 W/(m²·K)
Party walls	U = 0
Floors	U = 0.13 W/(m²·K)
Roofs	U = 0.11 W/(m²·K)
Opaque door (less than 30% glazed area)	U = 1.0 W/(m²·K)
Semi-glazed door (30–60% glazed area)	U = 1.0 W/(m²·K)
Windows and glazed doors with greater than 60% glazed area	U = 1.2 W/(m²·K) Frame factor = 0.7
Roof windows	U = 1.2 W/(m²·K), when in vertical position (for correction due to angle, see specification in SAP 10 Appendix R)
Rooflights	U = 1.7 W/(m2·K), when in horizontal position (for correction due to angle, see specification in SAP 10 Appendix R)
Ventilation system	Natural ventilation with intermittent extract fans
Air permeability	5 m³/(h·m²) at 50 Pa
Main heating fuel (space and water)	Mains gas
Heating system	Boiler and radiators Central heating pump 2013 or later, in heated space Design flow temperature = 55 °C
Boiler	Efficiency, SEDBUK 2009 = 89.5%
Heating system controls	Boiler interlock, ErP Class V Either: – single storey dwelling in which the living area is greater than 70% of the total floor area: programmer and room thermostat – any other dwelling: time and temperature zone control, thermostatic radiator valves
Hot water system	Heated by boiler (regular or combi as above) Separate time control for space and water heating
Wastewater heat recovery (WWHR)	All showers connected to WWHR, including showers over baths Instantaneous WWHR with 36% recovery efficiency utilisation of 0.98
Hot water cylinder	If cylinder, declared loss factor = 0.85 (0.2 + 0.051 V2/3) kWh/day where V is the volume of the cylinder in litres
Lighting	Fixed lighting capacity (lm) = 185 total floor area Efficacy of all fixed lighting = 80 lm/W
Air conditioning	None
Photovoltaic (PV) system	For houses: kWp = 40% of ground floor area, including unheated spaces / 6.5 For flats: kWp = 40% of dwelling floor area / (6.5 number of storeys in block) System facing south-east or south-west

How to achieve the notional U-values

Modern building practices often align with or come close to achieving the notional values. For example:

- Masonry build-ups: Using 150mm cavity batts (0.032 W/m.K) can result in U-values between 0.17-0.19 W/m²K, depending on the blockwork used.
- PIR insulation: A 100mm PIR (0.022 W/m.K) in a 150mm cavity achieves similar results.
- Timber frame construction: Typically, 100mm PIR between studs, with an additional 25 mm-50 mm over the studs, will meet the required values.

Once you have your construction methodology and drawings ready, your SAP assessor can advise on the necessary insulation thicknesses. However, it's important to remember that SAP assessors are not designers, so early collaboration with your design team is essential.

Thermal bridging and unique construction methodologies

One of the significant changes in Part L is the removal of the Government's Accredited Construction Details (ACDs) for thermal bridging in SAP Assessments. Now, assessors must either use SAP default values or perform bespoke calculations.

Using SAP default values for thermal bridging will likely result in a failed assessment, regardless of how good the U-values are. The thermal bridging component significantly impacts the fabric efficiency result. Even if you're building to passive standards, bespoke values are required.

For traditional methods like brick and block or timber frame, you can often find free thermal bridging (PSI) values online. However, unique methods such as Insulated Concrete Formwork (ICF), steel frame, or custom variations to traditional build-ups will necessitate bespoke PSI value calculations. These calculations can be costly, ranging from £100 to £500 per value, and multiple junctions might need to be calculated. Although this can be an unexpected expense, it could be a worthwhile investment, as these values can be reused in future projects with similar specifications.

Heating systems and Part L compliance

The *easiest* way to pass Part L is by using an air source heat pump (ASHP) coupled with a water cylinder. Apart from ground source heat pumps, this is currently the most reliable method for achieving compliance. While gas and direct electric heating systems can be used, they will invariably require an array of photovoltaic (PV) panels to pass.

To reduce the amount of PV required, you could opt for combi boilers instead of separate cylinders for hot water, though this may not be feasible for larger properties.

A common question is, 'How much PV will I need to pass?' While it's difficult to provide a precise answer without an assessment, page 22 of ADL offers some guidance to estimate the necessary kW.

Photovoltaic (PV) system	For houses: kWp = 40% of ground floor area, including unheated spaces / 6.5 For flats: kWp = 40% of dwelling floor area / (6.5 number of storeys in block) System facing south-east or south-west

For example, in an assessment, we completed for a property with a ground floor area of 91m^2.

Calculation: (40% of 91 = 36.4) / 6.5 = 5.6kW.

The property required a minimum of 5.4kW to pass.

We generally use an average of 0.4kW per panel, meaning this property would need around 14 panels to meet the requirements.

Understanding EPC ratings

It's important to understand what EPC ratings for residential buildings represent. EPC ratings reflect the cost of living in the property rather than its environmental friendliness or efficiency. While a heat pump may be the most efficient heating system, it often results in EPCs of C or B. On the other hand, using gas might fail the SAP Assessment but still provide a baseline EPC rating of B. This is due to the running costs of these systems rather than their efficiency. Installing a high-efficiency heat pump and additional insulation doesn't automatically result in a higher EPC rating.

Conclusion

Successfully navigating Part L and passing your SAP Calculation requires careful planning and understanding of the latest regulations. By aiming for the notional values, considering the impact of thermal bridging, and selecting the right heating systems, you can increase your chances of passing on the first attempt. Always consult with your SAP assessor early in the process and consider any additional costs, such as bespoke thermal bridging calculations, as an investment in your project's compliance.

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ATSPACE LTD
0345 6465 454
sales@atspaceltd.com
atspaceltd.co.uk

Unit 3 & 4,
The Cokenach Estate
Barkway, Royston
Hertfordshire SG8 8DL