Reduced data Standard Assessment Procedure 10 (RdSAP10)

RdSAP10 is the latest iteration of the Reduced Data Standard Assessment Procedure, a simplified version of the Standard Assessment Procedure (SAP) tailored for evaluating the energy efficiency of existing homes. It employs standardised assumptions to reduce the volume of data required for assessments, making it practical for use in retrofit projects and property transactions.

Reduced Data Standard Assessment Procedure 10 (RdSAP10) in the UK House Building and Retrofit Sectors

Introduction to SAP and RdSAP in the UK Context

The energy performance of dwellings in the United Kingdom is a matter of significant national interest, driven by environmental targets, fuel poverty concerns, and the need to improve the quality of the housing stock. The cornerstone of assessing this performance is the Standard Assessment Procedure (SAP), a methodology approved by the UK government. SAP serves as the primary tool for evaluating the energy efficiency of homes, with two principal applications. Firstly, it is used to demonstrate that new dwellings comply with Part L of the Building Regulations, which sets standards for the conservation of fuel and power. Secondly, SAP underpins the generation of Energy Performance Certificates (EPCs) for all homes, providing crucial information to occupants, prospective buyers, landlords, and renters regarding a property's energy efficiency.

The development of SAP was undertaken by the Building Research Establishment (BRE) and is rooted in the BRE Domestic Energy Model (BREDEM), which was established in the 1980s. Since its initial publication in 1993, SAP has been subject to periodic updates to reflect advancements in building technology, energy-efficient practices, and evolving regulatory requirements. The current iteration, SAP 10.2, represents the latest stage in this ongoing development. It is important to note that a separate methodology, the Simplified Building Energy Model (SBEM), is employed for the assessment of non-domestic buildings. The significance of SAP extends beyond individual building assessments, as it plays a vital role in shaping, implementing, and monitoring governmental policies related to energy efficiency, fuel poverty alleviation, and the decarbonisation of heating. This highlights its strategic importance in the broader context of the UK's energy and environmental objectives.

Recognising the practical challenges of obtaining detailed construction information for existing dwellings, a simplified and more cost-effective method known as the Reduced Data SAP (RdSAP) was introduced in 2005. RdSAP is specifically designed for assessing the energy performance of existing homes in situations where the comprehensive dataset required for a full SAP calculation is not readily available. Instead of relying on detailed design specifications, RdSAP utilises default values and data collected during on-site visits conducted by qualified assessors. It is noteworthy that RdSAP can, however, deliver a full SAP calculation if all the necessary information is indeed accessible. The primary application of RdSAP is the generation of Energy Performance Certificates

(EPCs) for existing residential properties, providing valuable insights into their energy efficiency. The introduction of RdSAP acknowledges the trade-off between the high degree of accuracy achievable with a full SAP assessment and the practical realities of evaluating older buildings where detailed construction records may be absent or incomplete.

Reduced Data Standard Assessment Procedure 10 (RdSAP10): Definition and Purpose

Reduced data Standard Assessment Procedure 10 (RdSAP10) represents the most recent update to the UK's officially sanctioned methodology for evaluating the energy performance of existing residential properties and subsequently generating Energy Performance Certificates (EPCs). This updated version of RdSAP is an integral component of the SAP 10.2 specification, providing a specific data input framework designed for use with the overarching SAP 10.2 calculation engine. Furthermore, the methodology adheres to the requirements outlined in the Energy Performance of Buildings Directive (2018/844/EU), ensuring its alignment with European standards. The close integration of RdSAP10 with the latest version of SAP signifies a move towards greater consistency in how energy performance is assessed across both new and existing dwellings.

The fundamental purpose of RdSAP10 remains the assessment of existing residential buildings, particularly in circumstances where the complete and detailed information required for a full SAP assessment is not obtainable. It is crucial to understand that RdSAP10 is specifically intended for the evaluation of existing housing stock and should not be employed for the assessment of new dwellings, which must undergo a full SAP assessment using the dedicated SAP specification. This distinction underscores the tailored nature of RdSAP for the unique challenges associated with evaluating properties built under potentially different standards and with varying levels of available documentation.

The impetus behind the development and release of RdSAP10 is multifaceted. A primary objective is to enhance the accuracy and overall comprehensiveness of energy assessments conducted on residential properties. This involves a concerted effort to ensure that the methodology better reflects the performance characteristics of modern energy-saving technologies, the increasing prevalence of renewable energy sources, and contemporary insulation standards. By aligning with evolving energy efficiency practices and technological advancements, RdSAP10 aims to provide a more reliable and up-to-date evaluation of a property's energy performance. Ultimately, these improvements are intended to support the UK government's broader national objective of achieving net-zero carbon emissions by the year 2050, by providing a more accurate baseline and a clearer pathway for energy efficiency improvements in the existing housing sector.

The "Reduced Data" Aspect of RdSAP10

A defining characteristic of RdSAP10 is its reliance on a "reduced data" approach, which is most evident in its use of default values for certain data inputs when detailed property-specific information is not available. This stands in contrast to a full SAP assessment, which necessitates more granular and specific data regarding the building's materials, construction methods, and installed systems. The strategic use of default values in RdSAP10 acknowledges the practical difficulties often encountered when assessing older properties where original construction details may be undocumented or difficult to ascertain. While this approach allows for a more feasible assessment process, it inherently introduces a degree of assumption and a potential for reduced accuracy compared to a full SAP assessment that is based on precise and measured data.

To compensate for the limitations of relying solely on readily available information, RdSAP10 places significant emphasis on data collected during on-site visits conducted by accredited energy assessors. These assessors play a crucial role in physically examining various energy-related elements of the property, including the construction type, the levels of insulation present in the loft, walls, and floors, the characteristics of the heating and hot water systems, the type and condition of windows and doors, and the nature of the lighting installed. This on-site assessment is vital for gathering current and property-specific information that goes beyond general assumptions or historical records, thereby allowing for a more tailored and relevant energy performance evaluation. The combination of strategically employed default values and meticulously collected on-site data forms the foundation of the RdSAP10 methodology.

The fundamental distinction between RdSAP10 and a full SAP assessment lies in the scope and granularity of the data inputs required. RdSAP, by its very name, necessitates a “reduced data set” compared to the comprehensive information demanded by a full SAP assessment. A full SAP calculation typically involves more complex modelling and often requires detailed design specifications and precise construction details, which are generally accessible for newly constructed buildings but are frequently unavailable for existing properties. This difference in data requirements directly reflects the differing contexts in which each methodology is applied. For new builds, detailed plans and specifications are typically readily available, allowing for a more data-intensive and theoretically more accurate assessment. In contrast, for existing dwellings, a more pragmatic approach is needed, acknowledging the potential limitations in accessing such detailed information.

To illustrate the nature of “reduced data” inputs in RdSAP10, several examples can be considered.8 Instead of requiring precise specifications of the materials used in wall construction, an RdSAP assessment might categorise walls based on broader criteria such as the property’s age band and the general construction type, for instance, “solid brick” or “cavity wall.” Similarly, prior to the RdSAP10 update mandating measurements, the U-values of windows (a measure of their thermal transmittance) might have been estimated using default values associated with the age and glazing type of the windows, rather than requiring specific manufacturer data. Furthermore, the thickness of insulation in various parts of the building might be estimated based on visual inspection or general knowledge of common practices for properties of a certain age, rather than relying on precise construction records. These examples highlight the practical approach of RdSAP10, where broader classifications and readily observable characteristics often serve as proxies for more detailed and potentially unavailable data.

RdSAP10 and Energy Performance Certificates (EPCs) for Existing Dwellings

RdSAP10 serves as the officially endorsed methodology for the generation of Energy Performance Certificates (EPCs) for existing residential properties throughout the United Kingdom. An EPC is a crucial document that provides a standardised rating of a property’s energy performance, typically presented on a scale ranging from A (representing the most energy-efficient properties) to G (indicating the least energy-efficient). This certificate offers valuable insights to both homeowners and potential buyers or tenants, providing information about the property’s energy consumption, its associated carbon dioxide emissions, and importantly, identifying potential energy-saving improvements that could be implemented.9 Consequently, EPCs generated through the application of RdSAP10 act as a fundamental tool for informing decision-making processes related to property transactions, rental agreements, and the undertaking of energy efficiency upgrades.

An EPC report, generated using RdSAP10, typically comprises several key components, each designed to convey specific information about the property’s energy performance. The Energy

Efficiency Rating is a prominent feature, visually representing the property's performance on the A-G scale, offering an immediate overview of its energy efficiency. The Environmental Impact Rating complements this by illustrating the property's impact on the environment in terms of its carbon dioxide emissions. To provide a practical financial perspective, the report includes Estimated Energy Costs, projecting the likely costs for heating and powering the property over a three-year period. A Summary of Energy Performance Features offers a more detailed breakdown, outlining the current performance of key building elements such as the walls, roof, windows, heating system, and lighting. Perhaps most valuable for homeowners, the report concludes with Recommendations, suggesting specific improvements that could be made to enhance the property's overall energy efficiency and potentially lower energy bills. These components collectively provide a comprehensive yet accessible understanding of a dwelling's energy performance.

The application of RdSAP10 and the resulting EPCs have significant implications for the rental sector in the UK, particularly in relation to the Minimum Energy Efficiency Standards (MEES). Since April 2020, all properties rented out in the UK have been required to achieve a minimum EPC rating of E. This regulation places a direct obligation on landlords to ensure their properties meet this minimum standard. Furthermore, landlords are legally required to provide a copy of the EPC to prospective tenants before they enter into a tenancy agreement.9 Failure to comply with these MEES regulations can result in financial penalties for landlords. Therefore, RdSAP10 plays a critical role in ensuring adherence to energy efficiency standards within the rental market, directly impacting both the responsibilities of landlords and the rights of tenants to reside in properties meeting a certain level of energy performance.

It is important to note that Energy Performance Certificates generated using RdSAP10 typically have a validity period of 10 years from the date of issue. However, this validity is contingent on no significant changes being made to the property that could potentially affect its energy performance. Should substantial upgrades or modifications be undertaken that could improve the property's energy efficiency, it is advisable to obtain a new EPC to accurately reflect the enhanced performance. This validity period ensures that the information provided by the EPC remains reasonably current, while also allowing for reassessment following significant energy-related improvements.

RdSAP10 in Retrofit Projects

RdSAP10 plays a crucial role in the context of retrofit projects aimed at improving the energy efficiency of existing dwellings. It is employed to assess the energy performance of a property both before and after the implementation of retrofit measures. This allows for a quantifiable evaluation of the energy efficiency improvements achieved as a result of upgrades such as the installation of enhanced insulation, the replacement of old heating systems with more efficient models, or the installation of new, energy-efficient windows. By providing a standardised methodology for this assessment, RdSAP10 enables stakeholders to objectively evaluate the effectiveness of retrofit interventions, which is essential for justifying the initial investment, tracking progress towards energy efficiency targets, and potentially accessing funding or incentives for energy upgrades.

The application of RdSAP assessments, including the transition to RdSAP10, is particularly significant in government-backed retrofit schemes such as the Energy Company Obligation (ECO4) and the Great British Insulation Scheme (GBIS). In both of these schemes, RdSAP assessments are used to provide evidence of the initial and final SAP ratings of a property, thereby demonstrating the energy efficiency improvements resulting from the implemented measures. Current legislation is being updated to mandate the use of RdSAP10 for these evidencing purposes, replacing the previous reliance on RdSAP2012. To facilitate this transition, a temporary period may be in place where both

RdSAP versions are acceptable for a limited time.1 The mandatory adoption of RdSAP10 within these key national retrofit programs underscores its importance in the UK's strategy for improving the energy performance of its existing housing stock and achieving its broader climate change objectives.

Consider a practical example of how RdSAP10 might be applied in a retrofit scenario. A pre-retrofit assessment of a property, conducted using RdSAP10, might identify significant deficiencies such as inadequate loft insulation and an outdated, inefficient boiler. This initial assessment would likely result in a low EPC rating for the property. Following the implementation of retrofit measures, such as installing new loft insulation to the recommended depth and replacing the old boiler with a high-efficiency condensing model, a post-retrofit RdSAP10 assessment would be carried out. This subsequent assessment would likely demonstrate a substantial improvement in the property's energy efficiency rating, along with a reduction in the estimated energy costs. This example effectively illustrates how RdSAP10 can be used to quantify and demonstrate the tangible benefits of retrofit measures in terms of enhanced energy performance and potential cost savings for the homeowner.

Practical Applications and Examples of RdSAP10

The process of conducting an RdSAP10 assessment involves a detailed data collection phase. Accredited energy assessors gather information on various aspects of the property, including its overall dimensions, the materials used in its construction, the levels of insulation present in the loft, walls, and floors, and the characteristics of all windows and doors. A significant change in RdSAP10 is the mandatory requirement for assessors to measure all windows, moving away from previous practices that relied on assumed glazing areas based on the property's age. For properties with roof rooms, RdSAP10 necessitates additional measurements to accurately account for the different construction types of common walls and gable walls, leading to a more precise assessment of these often complex areas. Furthermore, the updated methodology now allows assessors to explicitly account for the presence of photovoltaic (PV) diverters and battery storage systems, reflecting the increasing adoption of these technologies in UK homes.

RdSAP10 is designed to be applicable to a wide spectrum of existing residential property types commonly found in the UK. This includes various forms of houses, such as detached, semi-detached, and terraced properties, as well as bungalows, flats, and maisonettes. This broad applicability makes RdSAP10 a versatile and essential tool for evaluating the energy performance of the vast majority of the UK's housing stock, regardless of its specific type or architectural style.

To provide a more concrete understanding of the data collected during an RdSAP10 assessment, consider a hypothetical example. For a typical 1930s semi-detached house in the UK, an assessor might record the following information: the wall construction as "cavity wall" with no insulation, the loft insulation thickness as 50mm, the primary heating system as a gas boiler connected to radiators, and the windows as double glazed (installed prior to 2023, meaning under older RdSAP versions default values might have been used, but now measurements are required). The assessor would also likely note the presence of a smart meter installed at the property. This illustrative example demonstrates the kind of readily observable data that forms the basis of an RdSAP10 assessment, highlighting the practical nature of the data collection process.

A notable advancement in RdSAP10 is its ability to incorporate and assess the impact of newer energy technologies that are becoming increasingly prevalent in UK homes. This includes technologies such as battery storage systems, which allow homeowners to store electricity generated by renewable sources, and PV diverters, which optimise the use of solar electricity for

heating water. Additionally, RdSAP10 places a greater emphasis on the recommendation of heat pumps as a low-carbon heating solution, particularly in properties that are already adequately insulated. The inclusion of these modern technologies in the RdSAP10 methodology ensures that the resulting EPCs offer a more contemporary and accurate reflection of a property's energy performance in the context of current energy-saving solutions.

Assumptions and Limitations of RdSAP10

While RdSAP10 represents a significant step forward in the assessment of existing dwellings, it is important to acknowledge its inherent assumptions and limitations. As previously discussed, the reliance on default values, while practical for assessing a large and diverse housing stock, can lead to inaccuracies in cases where a property's construction or features deviate significantly from what is typical for its age and type. This means that the EPC rating generated by RdSAP10 might not always perfectly reflect the actual energy performance of a unique or non-standard property.

Furthermore, RdSAP10, by its nature as a "reduced data" methodology, offers a simplified assessment compared to the more detailed and complex calculations involved in a full SAP assessment. Consequently, RdSAP10 might not capture the nuances of highly complex building designs or sophisticated energy systems with the same level of precision as a full SAP assessment. In such instances, particularly for properties with unusual architectural features or advanced energy technologies, a full SAP assessment might be more appropriate to provide a more detailed and accurate evaluation of energy performance.

Despite the efforts to standardise the assessment process, there remains a potential for some degree of variation in data collection and interpretation among different energy assessors. This inherent variability in human judgment underscores the importance of ongoing training, robust quality control measures, and clear guidance for assessors to ensure the reliability and comparability of EPCs generated using RdSAP10.

A historical limitation of energy performance assessment methodologies, including earlier versions of RdSAP, has been the use of outdated baseline assumptions, particularly concerning energy prices. While SAP 10 incorporated updated energy prices, RdSAP10 also aligns with this by using updated fuel price data.1 This update is crucial for ensuring that the estimated energy costs presented on the EPC are as accurate and relevant as possible to current economic conditions.

Finally, it is worth noting that while previous versions of RdSAP did not explicitly account for the airtightness of a dwelling, a factor that can significantly impact heat loss, RdSAP10 now offers the option for assessors to input air pressure test results. This inclusion, even as an optional input, represents a positive step towards a more comprehensive and accurate assessment of a property's overall thermal performance, as it allows for a more direct measure of how much air (and thus heat) is unintentionally escaping from the building.

Regulatory Context of RdSAP10 in the UK

The use of RdSAP10 in the UK is firmly embedded within a framework of energy performance regulations. The primary legislative basis for Energy Performance Certificates (EPCs) is provided by the Energy Performance of Buildings (England and Wales) Regulations 2012, along with equivalent regulations in Scotland and Northern Ireland. These regulations explicitly mandate the use of the Standard Assessment Procedure (SAP) and the Reduced Data SAP (RdSAP) methodologies for the purpose of generating EPCs for both new and existing dwellings, respectively. This legal framework establishes the requirement for energy performance assessments and defines the methodologies that

must be employed.

While SAP is primarily used to demonstrate compliance of new homes with Part L of the Building Regulations, which focuses on the conservation of fuel and power, the updates to RdSAP for existing dwellings often align with the broader energy efficiency goals set out in these regulations. This alignment ensures a degree of consistency in the approach to improving energy performance across both new construction and the existing housing stock.

RdSAP10 is not merely a recommended tool; its use is mandated in various key scenarios across the UK. For instance, an EPC, generated using RdSAP10 for existing properties, is legally required whenever a property is offered for sale or rent.9 Furthermore, as previously discussed, RdSAP10 plays a central role in government-backed energy efficiency schemes such as ECO4 and the Great British Insulation Scheme (GBIS), where it is mandated for assessing properties and evidencing the impact of energy efficiency improvements. While RdSAP10 is the standard for existing dwellings, there might be specific circumstances, particularly involving more complex properties or for certain regulatory purposes, where a full SAP assessment is either recommended or even required for an existing building. However, for the vast majority of existing residential properties in the UK, RdSAP10 is the mandatory methodology for energy performance assessment and EPC generation.

Evolution of RdSAP: Key Differences in RdSAP10

The Reduced Data Standard Assessment Procedure has undergone a series of updates since its initial introduction in 2005 (based on SAP 2005), which coincided with the introduction of Energy Performance Certificates in 2007 (RdSAP 9.80). Following this initial version, several incremental updates were released, including versions 9.82, 9.83, 9.90 (which was based on SAP 2009), 9.91, 9.92 (aligned with SAP 2012), 9.93, and 9.94. The immediate predecessor to RdSAP10 was RdSAP 2012 version 9.94, which was aligned with the SAP 2012 methodology. RdSAP10 represents the latest and most significant update to the methodology. These successive updates reflect a continuous effort to refine the assessment process, incorporate new and more accurate data, and align with advancements in building technology and evolving energy efficiency standards and regulations.

RdSAP10 introduces a number of key changes compared to its predecessor, RdSAP2012. One of the most significant alterations is the requirement for assessors to measure all windows in a property, a departure from the previous practice of relying on assumed glazing areas based on the property's age. For properties with roof rooms, RdSAP10 now mandates additional measurements to account for the specific construction types of common walls and gable walls, leading to a more accurate assessment of these areas. A new age band has been introduced for properties constructed from 2023 onwards, allowing for a better representation of the improved energy efficiency standards in newer buildings. The geographical scope of RdSAP has been expanded to include the Isle of Man. RdSAP10 also now allows for the explicit accounting of PV diverters and battery storage systems when present in a property. There is an increased emphasis on recommending heat pumps as an improvement measure, particularly in well-insulated homes. The methodology also features revisions to the handling of thermal properties of insulation and includes updates to floor insulation details, with the addition of specific considerations for heated basements. The table of default window U-values has been expanded, and the default U-values for brick and stone walls have been revised to take into account wall thickness. A new "curtain wall" type has been added, and window shutters can now be included as a specific feature. Details regarding hot water tank size and insulation are now part of the data collected. The treatment of mechanical ventilation has been brought in line with the full SAP methodology, allowing for Product Characteristics Database (PCDB) entry. The calculation for photovoltaic (PV) systems is now consistent with SAP10.2. Furthermore, RdSAP10 allows for the input of air pressure test results (optional)and incorporates updated fuel prices and

CO2 emissions factors, aligning with SAP10.2.

These changes introduced in RdSAP10 have direct implications for the work of energy assessors. The mandatory measurement of all windows and the more detailed assessment of roof rooms will likely lead to increased time required for on-site assessments. Assessors will need to ensure they are proficient in accurately measuring windows and in understanding the various construction types encountered in roof rooms. They will also need to be knowledgeable about and able to account for new technologies such as PV diverters and battery storage. The increased emphasis on recommending heat pumps will require assessors to have a good understanding of their suitability in different property types. It is anticipated that the increased time and detail required for RdSAP10 assessments may lead to a revision of pricing structures for EPC surveys to reflect the added value and effort. Consequently, energy assessors will need to ensure they have updated knowledge and training on the new RdSAP10 methodology to implement it correctly and effectively.

Conclusion

Reduced Data Standard Assessment Procedure 10 (RdSAP10) represents a significant and necessary update to the methodology used for evaluating the energy performance of existing dwellings in the UK. The changes implemented in this version aim to enhance the accuracy and comprehensiveness of energy assessments, better reflect the impact of modern energy-saving technologies, and align with the UK's national goals for energy efficiency and carbon reduction. Understanding the intricacies of RdSAP10 is now more crucial than ever for a wide range of stakeholders, including building professionals involved in retrofit projects, accredited energy assessors responsible for conducting the assessments, and policymakers shaping the future of the UK's housing stock. While RdSAP10 offers considerable improvements over its predecessors, it is important to remain cognisant of its inherent assumptions and limitations, particularly when compared to the more detailed full SAP assessment. The regulatory context surrounding RdSAP10, along with its ongoing evolution, underscores its pivotal role in the UK's continuing efforts to create a more energy-efficient and sustainable built environment. The transition to RdSAP10 signifies a commitment to more accurate and relevant energy performance assessments, ultimately contributing to a greener and more sustainable future for the UK housing sector.

Table 1: Key Differences Between RdSAP10 and RdSAP2012

Feature/Aspect	RdSAP2012	RdSAP10
Window Measurements	Assumed based on property age	Mandatory measurement of all windows
Roof Room Assessment	Less detailed assessment	Additional measurements for common and gable walls
New Age Band	Properties up to 2012	Introduction of a new band for properties built from 2023 onwards
Isle of Man	Not included	Included as a region for assessment
PV Diverters/Battery Storage	Not explicitly accounted for	Can be accounted for in the assessment
Heat Pump Recommendation	Less frequent	More frequent recommendation under specific conditions
Thermal Properties	Handled with previous data	Revised handling of thermal properties of insulation
Floor Insulation	Previous methodology	Revisions and inclusion of heated basement details

Window U-Value Table	Previous version	Expanded and updated table of default U-values
Wall U-Values	Previous values	Revised values for brick and stone walls, accounting for thickness
Curtain Wall	Not a recognised wall type	Added as a new wall type
Window Shutters	Not a recognised feature	Can be included as a feature
Hot Water Tank	Size and insulation not always detailed	Size and insulation details now included
Mechanical Ventilation	Treated with default values	Treated as in full SAP, allowing PCDB entry
PV Calculation	Previous methodology	Calculation consistent with SAP10.2
Air Pressure Testing	Not explicitly considered	Option to input air pressure test results
Fuel Prices & CO2 Emissions	Based on older data	Updated to align with SAP10.2

Table 2: Key Components of an EPC Report

Component	Description
Energy Efficiency Rating	A visual representation of the property's energy performance on a scale from A (best) to G (worst).
Environmental Impact Rating	Shows the property's carbon dioxide emissions, indicating its environmental impact.
Estimated Energy Costs	Provides an estimate of the annual costs for heating, lighting, and hot water over a three-year period.
Summary of Energy Performance Features	Details the current performance of key elements like walls, roof, windows, heating, and hot water systems.
Recommendations	Suggests cost-effective improvements to enhance the property's energy efficiency and lower energy bills.