APPROVED DOCUMENT L AND ROOFLIGHTS

CONSERVATION OF FUEL AND POWER - A SPECIFIER'S GUIDE

GLAZING VISION

INTRODUCTION

In 2021, changes were made to Building Regulations: Approved Document L – Conservation of Fuel and Power which affects building work on both new and existing buildings in England from 15th June 2022. In the shift towards a Future Buildings Standard planned to come into effect in 2025, the government announced a number of changes to the Building Regulations to help the UK deliver net zero, including a mandatory 30% cut in carbon for all new homes, and a 27% cut for other buildings, including offices and shops. These changes have meant necessary amendments have had to be made to the Approved Document.

It is worth noting that these changes do not apply to work subject to a building notice, full plans application or initial notice submitted before 15th June 2022, provided the work for each building was started before 15th June 2023. (The transitional arrangements)

One important change is that Approved Document L now consists of 2 volumes rather than the previous 4. These are now separated into Volume 1: Dwellings, which focuses on self-contained units designed to accommodate a single household, and Volume 2: Buildings other than dwellings. Each Approved Document now applies to both new build and alterations to existing buildings in the same volume.

WHAT IS APPROVED DOCUMENT L?

Approved Document L - Conservation of Fuel and Power (2021 Edition), supports Part L of Schedule 1 to the Building Regulations 2010, and takes effect on 15th June 2022 for use in England.

Approved Document L, Volume 1: Dwellings, gives guidance on how to comply with Part L of Schedule 1 to the Building Regulations and the energy efficiency requirements for dwellings, and Document L, Volume 2: Buildings other than dwellings, should be used as guidance when referring to non-domestic buildings.

This document will focus on the requirements for rooflights and roof windows in relation to Approved Document L in dwellings and buildings other than dwellings, and will cover:

VOLUME 1 – DWELLINGS: ROOFLIGHTS AND ROOF WINDOWS

1. Calculating the target primary energy rate, target emission rate and target fabric energy efficiency rate in dwellings
2. Limiting heat gains and losses in rooflights and roof windows in dwellings
3. New rooflights and roof windows in existing dwellings, including extensions
4. Work to rooflights and roof windows in existing dwellings

VOLUME 2 – BUILDINGS OTHER THAN DWELLINGS: ROOFLIGHTS AND ROOF WINDOWS

5. Calculating the target primary energy rate and target emission rate in buildings other than dwellings
6. Limiting heat gains and losses in rooflights and roof windows in buildings other than dwellings
7. New rooflights and roof windows in existing buildings, including extensions
8. Work to rooflights and roof windows in existing buildings

VOLUME 1 – DWELLINGS: ROOFLIGHTS AND ROOF WINDOWS

1. CALCULATING THE TARGET PRIMARY ENERGY RATE, TARGET EMISSION RATE, AND TARGET FABRIC ENERGY EFFICIENCY IN DWELLINGS

A new dwelling must be built to a minimum standard of total energy performance which is evaluated by comparing calculations of the performance of the 'actual dwelling' against calculations of the performance of a theoretical dwelling called the 'notional dwelling'. This must be carried out both at the design stage and when work is complete.

The notional dwelling is the same size and shape as the actual dwelling and has standardised properties for fabric and services. Full properties of the notional dwelling can be found in the Government's Standard Assessment Procedure (SAP) for energy rating of dwellings.

The best insulating materials have a U-value of close to zero, and so the lower the U-value, the better thermal the performance. The reference U-values for target setting for roof windows in the notional dwelling is U = 1.2 W/(m^2·K) when in a vertical position, and U = 1.7 W/(m2·K) when in horizontal position for rooflights. The reference value used for air permeability for both rooflights and roof windows is 5m3/h.m2. For more information please refer to SAP 10.

2. LIMITING HEAT GAINS AND LOSSES IN ROOFLIGHTS AND ROOF WINDOWS IN DWELLINGS

U-VALUES

U-values should be assessed using the methods and conventions set out in the Building Research Establishment's BR 443, published in 2019, with contributions from Glazing Vision's Technical Director, Jeremy Dunn. U-values should be assessed for the whole fabric element (any structure, surface, fixture or fitting associated internally or externally with a building), which in the case of a rooflight or roof window would be the combined performance of the glazing and the frame.

To correctly assess whether an element meets the U-value, it must be calculated for the element in the appropriate plane. For windows and roof windows, U-values should be calculated based on a vertical position, and for rooflights, U-values should be calculated based on a horizontal position. If the data available for the element is in the incorrect plane, it should be adjusted according to the guidance in the Building Research Establishment's BR 443.

This does not apply to Standard Assessment Procedure calculations, where the U-value of each element is calculated based on the plane in which it is constructed or installed.

LIMITING STANDARDS IN NEW DWELLINGS

Insulating fabric elements (such as rooflights) in new dwellings should meet the standards in Table 1.

Element Type	Maximum U-Value(1) W/ (m2·K)
All roof types(2)	0.16
Wall(2)	0.26
Floor	0.18
Party wall	0.20
Swimming pool basin(3)	0.25
Window(4)(5)	1.6
Rooflight(6)(7)	2.2
Doors (including glazed doors)	1.6
Air permeability	8.0m3/(h·m2) @ 50Pa 1.57m3/(h·m2) @ 4Pa

Table 1 Limiting U-values for new fabric elements and air permeability in new dwellings

Table 1 Notes

1. Area-weighted average values.
2. For dormer windows, 'roof' includes the roof parts of the windows and 'wall' includes the wall parts (cheeks).
3. The U-value of a swimming pool basin (walls and floor) calculated according to BS EN ISO 13370.
4. If performance requires thicker glass to be used, an equivalent window unit with standard thickness (6mm) glazing should be shown to meet the required standard.
5. Including roof windows and curtain walling.
6. U-values for rooflights or rooflight-and-kerb assemblies should be based on the developed surface area of the rooflight (Ud-values), which is often greater than the area of the roof opening. Further guidance on Ud-values is given in the Building Research Establishment's BR 443 and the National Association of Rooflight Manufacturers' Technical Document NTD02.
7. The limiting value for rooflights also applies to kerbs that are supplied as part of a single rooflight-and-kerb assembly sourced from the same supplier and for which the supplier can provide a combined Ud-value for the assembly. An upstand built on site should not exceed a U-value of 0.35W/(m2·K).

It should be noted that Approved Document L, Volumes 1 & 2 2021 refer to Ud. This term was used in older versions of Approved Document L, Volume 1A, 1B, 2A and 2B, as well as the 2010 version of NTD02. In these cases, the developed area was based on the internal surface area and the U-value being calculated in a vertical orientation, i.e., horizontal heat flow.

The 2021 version of Approved Document L, Volume 1 and 2, now base rooflight U-values being calculated in a horizontal orientation, i.e., vertical heat flow, and where the developed area is based on the external developed area as defined in BR443 2019. In this instance, the product U-value should be referred to as Ur for rooflights only, or Urc for rooflights with kerbs to align with the product standard for rooflights EN1873. Therefore, where Approved Document L refers to Ud, NTD02 2022 will refer to Ur or Urc. Any older references to Ud should be ignored as the definition of Ud for calculation purposes is not the same as Ur or Urc.

3. NEW ROOFLIGHTS AND ROOF WINDOWS IN EXISTING DWELLINGS, INCLUDING EXTENSIONS

LIMITING STANDARDS IN EXISTING DWELLINGS

Rooflights in existing dwellings should meet the limiting maximum U-value of 2.2 W/(m2·K). U-values for rooflights or rooflight-and-kerb assemblies should be based on the outer developed surface area, which is often greater than the area of the roof opening. Further guidance on U-values can be found in the Building Research Establishment's BR 443 and the National Association of Rooflight Manufacturers' Technical Document NTD02.

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The limiting value for rooflights also applies to kerbs that are supplied as part of a single rooflight-and-kerb assembly sourced from the same supplier and where the supplier can provide a combined U-value for the assembly. An upstand built on site should have a maximum U-value of 0.35W/(m2·K).

AIRTIGHTNESS IN EXISTING DWELLINGS

When carrying out work in existing dwellings, care should be taken to reduce unwanted heat loss through air infiltration. When it comes to installing roof windows or rooflights which are deemed controlled fittings, they should be well fitted and reasonably draught-proof.

With new and replacement roof windows and rooflights, the units should be draught-proofed and should meet the minimum standards given previously, and insulated cavity closers should be installed where appropriate.

The area of roof windows and rooflights should not exceed 25% of the total floor area of the dwelling. If either exceeds this, compensating measures should be taken to improve the energy efficiency of the dwelling.

'Controlled fitting' refers to the entire unit of a roof window or rooflight, including the frame. Replacing glazing is not providing a controlled fitting, and so does not need to meet the energy efficiency requirements.

EXTENSION OF A DWELLING

When a dwelling is extended, new roof windows and rooflights should meet the standards in Table 2. The total area roof windows and rooflights in extensions should not exceed 25% of the floor area of the extension, as above.

Element Type	Maximum U-Value(1) W/ (m2·K)
All roof types(2)	0.16
Wall(2)	0.26
Floor	0.18
Party wall	0.20
Swimming pool basin(3)	0.25
Window(4)(5)	1.6
Rooflight(6)(7)	2.2
Doors (including glazed doors)	1.6
Air permeability	8.0m3/(h·m2) @ 50Pa 1.57m3/(h·m2) @ 4Pa

Table 2 Limiting U-values for new fabric elements in existing dwellings

Table 2 Notes

1. Area-weighted average values, except for windows, doors, roof windows and rooflights.
2. For dormer windows, 'roof' includes the roof parts of the windows and 'wall' includes the wall parts (cheeks).
3. If meeting such a standard would reduce the internal floor area of the room bounded by the wall by more than 5%, a lesser provision may be appropriate.
4. If meeting such a standard would create significant problems in relation to adjoining floor levels, a lesser provision may be appropriate.
5. The U-value of the floor of an extension may be calculated using the exposed perimeter and floor area of the whole enlarged dwelling.
6. The U-value of a swimming pool basin (walls and floor) calculated according to BS EN ISO 13370.
7. If other performance (e.g. wind load, safety, security or acoustic attenuation) requires thicker glass to be used, an equivalent window unit with standard thickness (6mm) glazing should be shown to meet the required standard.
8. Including roof windows and curtain walling.

For timber windows, a maximum U-value of 1.6W/(m2·K) is permissible.

10. The methods for calculating Window Energy Rating and Doorset Energy Rating are set out in the Glass and Glazing Federation's Glazing Manual Data Sheet 2.3, Guide to the Calculation of Energy Ratings for Windows, Roof Windows and Doors.
11. U-values for rooflights or rooflight-and-kerb assemblies should be based on the outer developed surface area, which is often greater than the area of the roof opening. Further guidance on Ud-values is given in the Building Research Establishment's BR 443 and the National Association of Rooflight Manufacturers' Technical Document NTD02.
12. The limiting value for rooflights also applies to kerbs that are supplied as part of a single rooflight-and-kerb assembly sourced from the same supplier and for which the supplier can provide a combined Ud-value for the assembly. An upstand built on site should have a maximum U-value of 0.35W/(m2·K).
13. For external fire doorsets, as defined in Appendix A of Approved Document B, Volume 1, a maximum U-value of 1.8W/(m2·K) is permissible.

CONSERVATORIES AND PORCHES

A conservatory or porch must have thermal separation from the existing dwelling. If the thermal separation is removed or the dwelling's heating system is extended into the conservatory or porch, then it should be treated as an extension.

If the conservatory or porch is not exempt from the energy efficiency requirements, new roof windows and rooflights should meet the minimum standards.

4. WORK TO ROOFLIGHTS AND ROOF WINDOWS IN EXISTING DWELLINGS

MATERIAL CHANGE OF USE AND CHANGE TO ENERGY STATUS

A material change of use, in relation to dwellings, is when a building is used as a dwelling, where previously it was not, contains a flat, where previously it did not, or contains a greater or lesser number of dwellings than it did, having previously contained at least one dwelling.

A change to energy status is when a dwelling was previously exempt from the energy efficiency requirements but now is not. The change to energy status applies to the building as a whole or to parts of the building that have been designed or altered to be used separately.

If there is a material change of use and/or a change to energy status, and they separate a conditioned space from an unconditioned space or the external environment, or they have a U-value higher than 3.30W/(m2·K) (roof windows), or 3.80W/(m2·K) (rooflights), they should be replaced to meet the limiting standards in Table 2.

New or replaced roof windows and rooflights should always meet the standards in Table 2.

VOLUME 2 – BUILDINGS OTHER THAN DWELLINGS: ROOFLIGHTS AND ROOF WINDOWS

5. CALCULATING THE TARGET PRIMARY ENERGY RATE AND TARGET EMISSION RATE IN BUILDINGS OTHER THAN DWELLINGS

The same approved calculation tool must be used to calculate the target primary energy rate, the target emission rate, the building primary energy rate and the building emission rate.

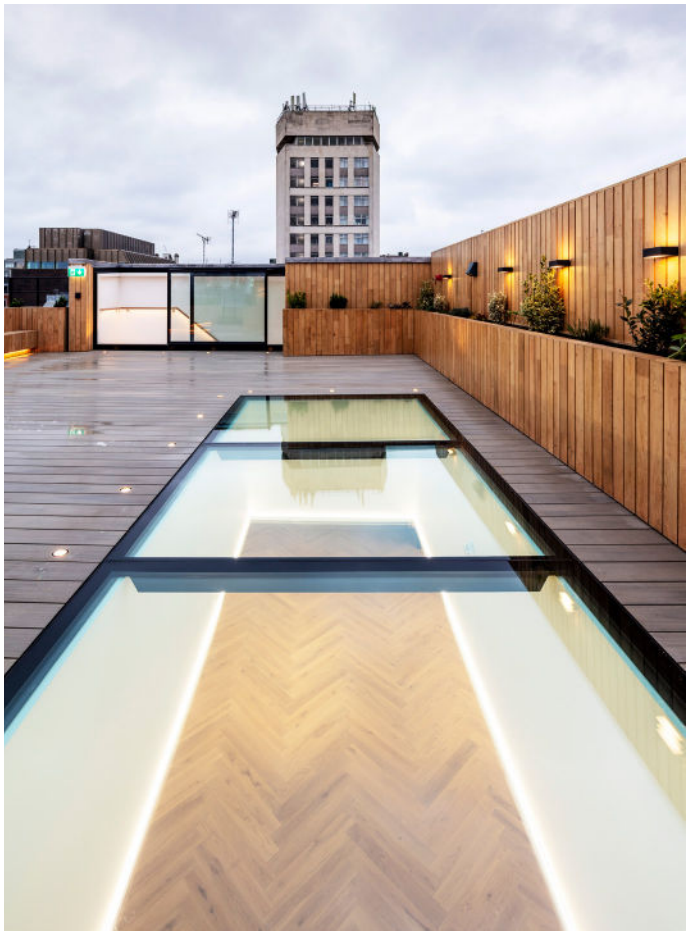
The building primary energy rate and the building emission rate must be calculated before work starts, using design values, and when work is complete, using figures for the building as constructed, and incorporating any changes that have been made during construction to the list of specifications, and the measured air permeability.

The notional building is the same size and shape as the actual dwelling and has standardised properties for fabric and services. Full properties of the notional building can be found in the Government's National Calculation Methodology NCM modelling guide for energy rating of buildings other than dwellings and which are used in the calculation tool sBEM.

The best insulating materials have a U-value of close to zero, and so the lower the U-value, the better.

The reference value for target setting for rooflights in the notional dwelling is U = 2.1 W/(m^2·K) when in a horizontal position. The reference value used for air permeability for both rooflights and roof windows is 5m3/h. m2. For more information please refer to SAP 10.

At both of these points the building primary energy rate and building emission rate must not exceed the target primary energy rate and the target emission rate, respectively. The specification of the actual building may vary from that of the notional building if the building meets the target primary energy rate, target emission rate and the guidance in Approved Document L.



6. LIMITING HEAT GAINS AND LOSSES IN ROOFLIGHTS AND ROOF WINDOWS IN BUILDINGS OTHER THAN DWELLINGS

U-VALUES

U-values should be assessed using the methods and conventions set out in the Building Research Establishment's BR 443, as with dwellings. U-values should be assessed for the whole thermal element, which in the case of a rooflight or roof window would be the combined performance of the glazing and the frame.

New rooflights and roof windows should meet the limiting standards in Table 3. This includes rooflights and roof windows in new buildings, extensions to existing buildings, and in existing buildings.

Element Type	Maximum U-value(1) W/(m2·K) or air permeability
Roof (flat roof)(2)	0.18
Roof (pitched roof)(2)	0.16
Wall(2)(3)	0.26
Floor(4)(5)	0.18
Swimming pool basin(6)	0.25
Windows in buildings similar to dwellings(7)(8)	1.6 or Window Energy Rating(9) Band B
All other windows,(8)(10)(11) roof windows, curtain walling	1.6
Rooflights(12)(13)	2.2
Pedestrian doors (including glazed doors)(14)	1.6
Vehicle access and similar large doors	1.3
High-usage entrance doors	3.0
Roof ventilators (including smoke vents)	3.0
Air permeability (for new buildings)	8.0m3/(h·m2) @ 50Pa

Table 3 Limiting U-values for new or replacement elements in new and existing buildings and air permeability in new buildings

Table 3 Notes

1. Area-weighted average values, except for new windows, rooflights and doors in existing buildings.
2. For dormer windows, 'roof' includes the roof parts of the windows and 'wall' includes the wall parts (cheeks).
3. If meeting such a standard in an existing building would reduce by more than 5% the internal floor area of the room bounded by the wall, a lesser provision may be appropriate.
4. The U-value of the floor of an extension may be calculated using the exposed perimeter and floor area of either the whole enlarged building or the extension alone.
5. If meeting such a standard in an existing building, would create significant problems in relation to adjoining floor levels, a lesser provision may be appropriate.
6. The U-value of a swimming pool basin (walls and floor) calculated according to BS EN ISO 13370.
7. For example, student accommodation, care homes and similar uses where the occupancy levels and internal heat gains are essentially domestic in character.
8. If other performance (e.g. wind load, safety, security or acoustic attenuation) requires thicker glass to be used, an equivalent window unit with standard thickness glazing should be shown to meet the required standard.
9. The methods for calculating Window Energy Rating are set out in the Glass and Glazing Federation's Glazing Manual Data Sheet 2.3, Guide to the Calculation of Energy Ratings for Windows, Roof Windows and Doors.
10. No maximum U-value is set for display windows and similar glazing. There are no limits on the design of display windows and similar glazing, but for new buildings their impact must be taken into account in the calculation of primary energy and CO2 emissions.
11. In buildings with high internal heat gains, the average U-value for windows can be relaxed from the values given above if this can be shown to be an appropriate way of reducing overall CO2 emissions and primary energy. However, values should be no higher than 2.7W/(m2·K).
12. U-values for rooflights or rooflight-and-kerb assemblies should be based on the developed surface area of the rooflight (Ud values), which is often greater than the area of the roof opening. Further guidance on Ud-values is given in the Building Research Establishment's BR 443 and the National Association of Rooflight Manufacturers' Technical Document NTD02.
13. The limiting value for rooflights also applies to kerbs that are supplied as part of a single rooflight-and-kerb assembly sourced from the same supplier and for which the supplier can provide a combined Ud-value for the assembly. An upstand built on site should have a maximum U-value of 0.35W/m2·K.
14. For external fire doorsets, as defined in Appendix A of Approved Document B, Volume 2, in new and existing non-domestic buildings, a maximum U-value of 1.8W/(m2·K) is permissible.

As with dwellings, to correctly assess whether a rooflight or roof window meets the limiting U-value, it must be calculated for the element in the appropriate plane – either horizontal or vertical. For windows and roof windows, U-values should be calculated based on a vertical position, and for rooflights, U-values should be calculated based on a horizontal position. If the data available for the element is in the incorrect plane, it should be adjusted according to the guidance in the Building Research Establishment's BR 443.

7. NEW ROOFLIGHTS AND ROOF WINDOWS IN EXISTING BUILDINGS, INCLUDING EXTENSIONS

If the entire unit of roof windows or rooflights is replaced, the units should be draught-proofed and should meet the minimum standards in Table 3.

If a rooflight is enlarged or a new one is created, the area of roof windows and rooflights should not exceed the relevant percentage from Table 4, or, if the area exceeds the relevant percentage from Table 4, compensating measures should be taken to improve the energy efficiency of the building.

EXTENSION OF A BUILDING OTHER THAN DWELLINGS

When a building is extended, new roof windows and rooflights should meet the standards in Table 4. The area of openings in the extension should also not exceed that given in Table 4, if rooflights as a percentage of area of roof are greater than that of the existing building.

Building type	**Windows and pedestrian doors as % of exposed wall**	**Rooflights as % of area of roof**
Residential buildings where people temporarily or permanently reside	30	20
Places of assembly, offices and shops	40	20
Industrial and storage buildings	15	20

Table 4 Maximum area of openings in the extension

Table 4 Notes
Vehicle access doors, display windows and similar glazing and smoke vents can be as large an area of wall or roof as required for the purpose.

CONSERVATORIES AND PORCHES

A conservatory or porch must have thermal separation from the existing building. If the conservatory or porch has thermal separation from the existing building, and the existing building's heating system does not extend into it, and is not exempt from the energy efficiency requirements because of its size or another reason outlined in Approved Document L, Volume 2, new roof windows and rooflights should meet the minimum standards in Table 3.

Any walls, doors and windows should also be insulated and draught-proofed to at least the same extent as in the existing building.

8. WORK TO ROOFLIGHTS AND ROOF WINDOWS IN EXISTING BUILDINGS

MATERIAL CHANGE OF USE AND CHANGE TO ENERGY STATUS

A material change of use is when a building:

a. is used as a hotel or a boarding house, where previously it was not
b. is used as an institution, where previously it was not
c. is used as a public building, where previously it was not
d. is not described in classes 1 to 6 in Schedule 2, where previously it was
e. contains a room for residential purposes, where previously it did not
f. contains at least one room for residential purposes, having previously had a greater or lesser number of rooms for residential purposes
g. is used as a shop where previously it was not.

A change to energy status is when a building was previously exempt from the energy efficiency requirements but now is not. If there is a material change of use and/or a change to energy status and they separate a conditioned space from an unconditioned space or the external environment or they have a U-value higher than 3.30W/(m2·K) (roof windows), or 3.80W/(m2·K) (rooflights), they should be replaced to meet the limiting standards in Table 3.

New or replaced roof windows and rooflights should meet the standards in Table 3.

These changes to Approved Document L are a great step in the right direction for the industry with regards to reducing carbon emissions, and we can expect even more changes to be introduced in the years to come in an effort for the UK to reach net zero.

To find out more about the recent updates to Approved Document L with regards to rooflights and roof windows get in touch with our technical team, we will be happy to help.

You can download Approved Document L, Volume 1: Dwellings and Approved Document L, Volume 2: Buildings other than dwellings in full from the government website.

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