FEBRUARY 2022

AN 08 THE BUILDING (AMENDMENT) REGULATIONS 2021 INTERIM GUIDANCE

1.0 INTRODUCTION

On the 24th December 2021, the Secretary of State for Levelling Up, Housing, and Communities (DLUHC) announced important amendments to Building Regulations and Approved Document L Conservation of Energy for England. The key amendments which relate to external wall and roof constructions for relevant residential and institutional buildings are considered below.

Changes to the Building Regulations and other government regulations for the construction industry which are currently under revision, are expected to impose and regulate better levels of quality control and performance by the design team, product manufacturers, main contractor and sub-contractors, including sheeting and cladding installers.

The new Approved Document AD-L however includes some ambiguities when compared with previous versions, which the Metal Cladding and Roofing Manufacturers Association (MCRMA) has identified and offers interim comments below until clarified by the relevant regulators.

For works after 15th June 2022, subject to transition regulations until June 2023, the current Approved Documents 2013: + 2016 amendments,

- AD-L1A and AD-L1B have been replaced with **Approved Document L: 2021 Volume 1 Dwellings** and
- AD-L2A and AD-L2B have been replaced with **Approved Document L: 2021 Volume 2: Buildings other than dwellings**.

NOTE:

The replacement Approved Documents cover both new construction and refurbishment which were previously subject to separate parts B.

2.0 APPROVED DOCUMENT L: 2021 VOLUME 2: BUILDINGS OTHER THAN DWELLINGS

MCRMA members are mainly but not exclusively concerned with buildings other than dwellings which are regulated by Volume 2 and the National Calculation Methodology (NCM), using either DSM or iSBEM software. The following design criteria has been extracted and comments added where appropriate:

- 1.1 U-values for new and replacement elements of the roof and wall cladding.
- 1.2 U-values used in the NCM for the notional building
- 1.3 Threshold for U-values to be improved for renovation, subject to some conditions
- 1.4 Calculation of element U-values
- 1.5 Continuity of insulation and thermal bridging
- 1.6 Air permeability
- 1.7 Other guidance on elements

2.1 U-values for the main elements

Limiting U-values for new or replacement elements in new and existing buildings (Extract Table 4.1 AD-L 2021: Volume 2 – Buildings other than dwellings).

Element		U-value from June 2022	Previous U-value 2016	Notes
Roof (flat roof)		0.18		New element category which are not defined in the AD-L, see Building Fabric note below table.
Roof (pitched roof)		0.16		
Roof			0.25	
Wall		0.30	0.35	
Windows		1.6	2.2	
Rooflights		2.2	2.2	
All other roof windows		1.6		New element category
Pedestrian doors		1.6	2.2	
Vehicle access doors		1.3	1.5	
High-usage entrance doors		3.0	3.5	
Roof ventilators including smoke vents		3.0	3.5	
Air permeability (for new buildings)		$8.0m^3/(h.m^2)$ @ 50Pa	$10.0m^3/(h.m^2)$ @ 50Pa	

Table 1: U values for the main elements

NOTE:

Building Fabric - The new element category for roofs of *flat roof* and *pitched roof* which replace the generic term *roof* is not defined in the footnotes to Table 4.1. The Approved Document does however, refer to BR 443: 2019 Convention for U-value calculations, rooflight chapter updated 2021, see item 2.

2.2 U-values used in the NCM for the notional building

The AD-L Volume 2 Buildings other than dwellings does not contain a table of the U-values used in the NCM compliance checking software, unlike table 1.1 in Volume 1 Dwellings. The NCM modelling guide: 2021 for Buildings other than Dwellings in England includes the notional building values as reproduced in the table below.

Element	U-value		Notes
	Side-lit and unlit activities	Top-lit activities	
Roof irrespective of pitch	0.15	0.18	
Exposed wall	0.18	0.26	
Windows	1.4		
Rooflights		2.1	
Pedestrian doors	1.9		
Vehicle access doors	1.3		
Air permeability (for new buildings) NCM :2021 Table 3.	3 $m^3/(h.m^2)$ @ 50Pa	5 $m^3/(h.m^2)$ @ 50Pa	

Table 2: Construction element U-values for the notional building (Extracts of NCM guide table 1)

2.3 Threshold for U-values to be improved for renovation

Approved Document AD-C has stated for many years that 0.35 U-value is the worst case for roofs to avoid the risk of condensation (in an enclosed space).

AD-L volume 2 states that existing elements that are being renovated should meet the limiting standards in Table 4.2. Retained elements with a U-value that is worse than the threshold value in column (a) should be upgraded to achieve the U-value in column (b).

Element	U-value (area-weighted average values)	
	(a) Threshold	(b) Improved
Pitched roof – insulation at ceiling level	0.35	0.16
Pitched roof – insulation at rafter level	0.35	0.18
Flat roof or roof with integral insulation	0.35	0.18
Wall – cavity insulation	0.70	0.55
Wall – external or internal insulation	0.70	0.30

Table 3: Threshold U-values for renovation and retained elements in new and existing buildings (Extract Table 4.2 AD-L 2021: Volume 2 – Buildings other than dwellings)

NOTE:

Flat roof or roof with integral insulation was the category applying to built-up metal and insulated composite panels in the AD-L2A 2000. MCRMA assumes, subject to confirmation, that *Wall – external or internal insulation* should apply to built-up metal and insulated composite panels although both have integral insulation and no cavity as found in masonry walls.

2.4 Calculation of element U-values

The Approved Document refers to BR 443: 2019 Convention for U-value calculations, with the rooflight chapter updated April 2021.

NOTE:

MCRMA would have expected BR 443 to use the same definitions of roof categories etc. as the Approved Documents, but Chapter 8 does not. Instead, Chapter 8 refers to pitched roofs sub-divided into three by position of ceiling and insulation; flat roofs which are clearly intended as membrane covered and various variations of flat techniques as detailed in BS 6229.

Metal-faced composite panel and twin skin metal cladding (built-up metal) should have the U-value determined by numerical analysis i.e., Finite Element Analysis which is normally carried out by the profile manufacturer. However, that does not help define which category of target U-value applies in Table 4.1, 4.2 and NCM.

2.5 Continuity of insulation and thermal bridging

MCRMA Technical Papers TP14, TP17 and TP 18 were published as guidance on thermal bridging when it was first regulated by Building Regulations. The papers explain how Psi values are calculated by Finite Element Analysis and F values used to assess condensation risks.

These were published when insulation was thinner to achieve the 2000 U-values and the numerical values are no longer applicable to thicker insulation for 2022 U-values, particularly at wall to ground floor and the corners of the walls.

The BRE generic reference IP01/06 assessing the effects of thermal bridging at junctions and around openings has not been updated for the improved U-values; in the opinion of MCRMA the values in Table 4 should not be used.

All reputable profilers now publish their own recommended construction details to minimise heat loss through junctions. Provided these are calculated by an approved method they can be used in NCM iSBEM calculations of the building's theoretical energy use. NCM iSBEM :2021 uses Psi values for the notional building involving metal cladding which are worse than those calculated for MCRMA and most profilers.

Where the design uses DSM software for demonstrating compliance with NCM, Psi values are not used, instead +10% energy loss is added to allow for junctions.

2.6 Air permeability

AD-L Volume 2 Buildings other than dwellings refers to the requirements for air permeability testing in section 7. The maximum permitted rates are quoted in Table 4.1 for new buildings $8.0 m^3/(h.m^2)$ @ 50Pa using fan pressure testing.

A new method for smaller buildings using a pressure pulse is being developed and guidance for its use is provided in CIBSE Technical Memorandum 23 *Testing buildings for air leakage* which was published after the revised Approved Documents.

This document states *the two main currently available test methods:*

- *Fan pressurisation method ('blower door' test method), which has been used for over 20 years*
- *Low-pressure pulse method ('pulse' method), which has been developed more recently.*

As the low pressure pulse (LPP) method is a relatively new technique, there is currently no existing national or international standard covering the method and associated calibration requirements, although such standards may be developed in the future. In the meantime, TM 23 seeks to provide consistency on the method and information reported.

NOTE:
The fan method at 50Pa and pulse at 4Pa do not give equal readings in some buildings. For larger metal clad buildings, it is uncertain that the pulse method will have enough capacity until a methodology for linking units is developed and certified.

2.7 Other guidance on elements

The notional building does not have curtain walling, even if there is curtain walling in the actual building, (NCM modelling guide for buildings other than dwellings in England: 2021 – notional building).

Any part of a roof having a pitch greater than 70° is considered a wall. (NCM modelling guide for buildings other than dwellings in England: 2021 – Building Fabric).

PVs and other on-site renewable sources of energy are mentioned but unlike AD-L Volume 1 for dwellings there is no minimum area of PV defined.

The National Association of Rooflight Manufacturers (NARM) will publish guidance on rooflights for the new AD-L volume 2: 2021.

3.0 REFERENCES

Approved Document C: Site preparation and resistance to contaminants and moisture

Approved Document L: 2021 Volume 2: Buildings other than dwellings

BR 443: 2019 Convention for U-value calculations, with the rooflight chapter updated April 2021

CIBSE Technical Memorandum 23: *Testing buildings for air leakage*

MCRMA Technical Paper No 14 *Guidance for the design of metal roofing and cladding to comply with Approved Document L2: 2001*

MCRMA Technical Paper No 17 *Design guide for metal roofing and cladding to comply with energy requirements of UK Building Regulations (2006)*

MCRMA Technical Paper No 18 *Conventions for calculating U values, f-values and Ψ-values for metal cladding systems using two and three-dimensional thermal calculations*

NCM modelling guide for buildings other than dwellings in England: 2021

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