



ENERGIST

BEYOND BUILDING

AD-O (2021) Overheating Review

Kerswell Close

Date: 28th March 2024



Revision History

Revision	Issue Date	Description	Issued by	Checked by
01	28/02/2024	Report	OH	MK
02	01/03/2024	Revised Report	OH	MK
03	19/03/2024	Revised Report with NIBE	OH	MK

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Calculations contained within this report have been produced based on information supplied to Energist by the Client and the Design Team. Any alterations to the technical specification on which this report is based will invalidate its findings.

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This document acts as an explanation guide for how compliance can be proven against the new Approved Document Part O in England. The contents will be useful for those who have not dealt with overheating assessments for Building Regulation purposes before.

The accompanying Compliance Checklist follows the methodology requirements of Approved Document O and should be provided to the Building Control Body as evidence that the development complies with the new overheating targets.



1. EXECUTIVE SUMMARY

1.1 Review of this document

This Review shows how the design of the Kerswell Close will meet the requirements of [Approved Document O for overheating](#) in England.

This new regulation ensures newly built dwellings and dwelling-like buildings are comfortable for occupants to use during summer months without reliance on comfort cooling systems.

AD O considers solar gains, the incorporation of shading into the design, and the free area of air movement within buildings. It also includes guidance to protect against external noise and air pollution, security, and to ensure changes to the design for overheating purposes do not increase the risk of falling from height.

This report has concluded that:

These results meet the assessment requirements of AD O (2021) as seen in Appendix A.

1.2 Additional risks

This review has also considered the following points which may be valid reasons for restricting the opening of windows.

See Section 5 of this document for more information and refer to AD O (2021) Section 3 for the full guidance on these matters.

Noise: The Local Planning Authority considers external noise to be a concern for this development. This may impact the overheating mitigation strategy as opening windows at night could lead to a lack of sleep. The Dynamic simulation has taken this into consideration.

Pollution: There is no known risk that the development is located near to significant local pollution sources.

Security: Leaving upper-level bedroom windows open at night is not considered to cause additional security concerns for this development.

Protection from falling: All openings on upper levels are at least 1.1 metres above the floor finish. This is adequate protection from falling.

Protection from entrapment: There is no known risk of shutters, railings or grilles posing a risk of entrapment.



1.3 Additional documentation

If using the [Dynamic Approach](#), a single Compliance Checklist is acceptable, providing it is accompanied by a detailed CIBSE TM59 report.

This Report acts as an explanation guide for how compliance is proven against the targets outlined in the new Approved Document Part O.



2. WHAT IS AD-O (2021)

2.1 Background

Since [June 15th, 2022](#), an additional volume of Building Regulations has been applied to new building works in England.

Approved Document O (2021) considers the [overheating risk](#) of new dwellings, and other buildings which are used in a domestic manner.

As the development was registered after June 15th, AD O compliance is mandatory.

Selsdon Building Contractors has commissioned Energist UK to complete the relevant calculations to show how the design performs against the new targets.

As well as presenting results, this report also guides the reader through the process of AD-O, and how to recognise when a dwelling is meeting compliance.

The launch of AD-O ties in with rewrites for AD F (Ventilation) and AD-L (Conservation of Fuel and Power). These updates are collectively referred to by the UK Government as phase one of the [Future Homes Standard](#).

The Building Regulation Requirement of Approved Document O is:

Requirement O1(2)(a) of Schedule 1 to the Building Regulations 2010

Overheating mitigation

- 1) Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel ("residences") to–*
 - a. Limit unwanted solar gains in summer.*
 - b. Provide an adequate means to remove heat from the indoor environment*
- 2) In meeting the obligations in paragraph 1 –*
 - a. Account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence, and*
 - b. Mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.*



2.2 Scope of the assessment

The proposal is for the redevelopment of the car park, commercial unit, and open space at the junction of Kerswell Close and St. Ann's Road and provision of 25 new Council rent homes and an Adult Care Hub in two, four and five storey buildings. Provision of associated amenity space, including new landscaping, refuse/recycling stores and play space, cycle and refuse/recycling stores and wheelchair parking spaces, and enhancement of existing amenity space within the Kerswell Close Estate.



Figure 1: Façade identification of openable windows according to the acoustic report

As Seen in Figure 1 the acoustic report indicates that yellow and red façades will not have openable windows whilst blue and green façade will be able to. The scope of the assessment is to model the building dynamically with a sample approach, representing the most stringent flat types to provide a solution for all windows.



3. RESULTS – DYNAMIC THERMAL APPROACH

3.1 CIBSE TM59 Criteria

CIBSE TM59: Design methodology for the assessment of overheating risk in homes (2017) introduces two sets of compliance criteria for assessing overheating, based on the ventilation type of the dwelling.

Targets for houses which are [predominantly naturally ventilated](#):

- A) In living rooms, kitchens and bedrooms, the number of occupied hours when the internal temperature is at least one °C hotter than the external temperature should not exceed 3%. This is calculated from 1st May until 30th September. This requirement is also known as [CIBSE TM52 Criterion 1: Hours of exceedance](#).
- B) To guarantee comfort during sleeping hours, between 10pm and 7am, the temperature of bedrooms shall not exceed 26°C. Compliance is achieved with a result below 1%, or 33 hours, annually.

Targets for houses which are [predominantly mechanically ventilated](#):

- C) All occupied rooms should not exceed an operative temperature of 26°C for more than 3% of the annual occupied hours. This requirement is in line with [CIBSE Guide A \(2015\)](#).

On this development, the apartments are predominantly naturally ventilated, so the first two criteria apply only.

3.2 Sample size

The [TM59 Dynamic Thermal Model](#) approach allows for a sample of dwellings to be modelled.

For the purposes of this assessment, 2 houses have been selected for assessment. This selection of dwellings has been based on the criteria set by CIBSE TM59 for dwellings being at a higher risk of overheating.

This may include dwellings which:

- Are on the top-most floor,
- Have large glazing areas that are sun facing,
- Have less shading,
- Are single aspect,
- Have limited or restricted openings.



3.3 Building Fabric Specification

Details of the building fabric specification and services have been taken from the SAP calculations¹, and are summarised below:

Element	U-Value
Ground Floor U-Value	0.10 W/m ² K
External Walls U-Value	0.16 W/m ² K
Roof U-Value plain	0.10 W/m ² K
Floor U-Value	0.10 W/m ² K
Windows details	U-Value 1.14 w/m ² k, G-value 0.50
Design air permeability	3.0

3.4 Occupants

For this exercise, standard occupancy has been assumed.

3.5 Simulation Weather Files

The Dynamic Thermal Model considers how site-specific weather patterns will affect the internal temperature of the building.

Design Summer Years models (DSY) are used in line with TM59 requirements. More extreme weather files can be used if specifically requested. This will make compliance more difficult and should only be considered on buildings of particular concern.

Design Summer Years (DSY) models	Description of weather files	Compliance
DSY-1	Generic 2020s.	Mandatory for AD-O Compliance

This Model has been assessed against DSY-1 only, specifically London Gatwick_DSY1_2020High50_.epw.

¹ SAP Calculations are completed for AD-L compliance and are separate to the assessments within this document. The SAP assessor can provide a Developer Statement or similar summary document to confirm the specification details used in their calculations.



3.6 Internal gains

As well as considering the impact of solar gains and the movement of air through the building during summer months, the TM59 calculation also considers three internal gains.

These are heat sources from within the building which can add to the problem of high internal temperatures.

Occupancy gains: This is the heat emitted from residents.

For residential areas, the maximum sensible and latent gains are modelled as 75 watts per person and 55 watts per person respectively in all living spaces, as shown in the following table.

Number of occupants	Description	Peak load (W)		Occupancy hours	Percentage of load
		Sensible	Latent		
1	Single bedroom	75	55	23:00 – 08:00	0.70
				08:00 – 23:00	1.00
2	Double bedroom	150	110	23:00 – 08:00	0.70
				08:00 – 09:00	1.00
				09:00 – 22:00	0.50
				22:00 – 23:00	1.00
1	1 Bed Living room / kitchen	75	55	09:00 – 22:00	1.00
	Living room			09:00 – 22:00	0.75
	Kitchen			09:00 – 22:00	0.25
2	2 Bed Living room / kitchen	150	110	09:00 – 22:00	1.00
	Living room			09:00 – 22:00	0.75
	Kitchen			09:00 – 22:00	0.25
3	3 Bed Living room / kitchen	225	165	09:00 – 22:00	1.00
	Living room			09:00 – 22:00	0.75
	Kitchen			09:00 – 22:00	0.25



Lighting gains: This is the heat generated from lighting systems.
For residential areas, lighting gains are assumed at 2 W/m^2 , during the hours of 6pm until 11pm.

Equipment gains: This is the heat generated from appliances.
For residential areas, equipment gains follow the guidance of CIBSE TM59, as summarised in the following table.

Description	Peak load (W)	Occupancy hours	Percentage of load
Single bedroom	80	23:00 – 08:00	0.13
		08:00 – 23:00	1.00
Double bedroom	80	23:00 – 08:00	0.13
		23:00 – 08:00	1.00
Living room / kitchen	450	00:00 – 09:00	0.19
		09:00 – 18:00	0.24
		18:00 – 20:00	1.00
		20:00 – 22:00	0.44
		22:00 – 00:00	0.24
Living room	150	00:00 – 09:00	0.23
		09:00 – 18:00	0.40
		18:00 – 22:00	1.00
		22:00 – 00:00	0.40
Kitchen	300	00:00 – 18:00	0.17
		18:00 – 20:00	1.00
		20:00 – 00:00	0.17

3.7 Ventilation

This development includes **Natural Ventilation** with **Mechanical ventilation for selected bedrooms (F.**

The building is provided with openable windows for natural ventilation located on the green and blue façades indicated by the acoustic report as seen in figure 1. The model also includes acoustic Louvres which made a significant difference to the model to allow it to pass. This is further elaborated in Section 4.2.



Mechanical ventilation will provide air tempering through the Nibe system which will provide 12l/s to bedrooms and 13l/s to living spaces according to NIBE specification. This will allow the following spaces to comply through night hours:

- Type A3 Centre Bedroom 01 L03
- Type B4 Bedroom 01 L03
- Type B3 Bedroom 02 L03
- Type B5 Bedroom 02 L03

In line with AD-O parameters, windows start to open when the internal temperature exceeds 22°C and open to a maximum angle when the internal dry bulb temperature reaches 26°C.

Start closing when the internal dry bulb temperature drops below 26°C and are fully closed when the internal dry bulb temperature drops below 22°C. This is only applicable at higher floors where there are no security concerns.

3.8 Modelling

As seen in Figures 1 below, the modelling of this development has been completed using IES-VE (2023). As required in CIBSE TM59, the air speed used in the model has been set to 0.1 m/s. Report of the Building has been processed through IESVE software, The report can be seen in Appendix B. As seen the most stringent sample plots were model to provide a solution which will allow the rest of the less severe plots to pass. This method will be satisfactory to relate to all plots of this building.

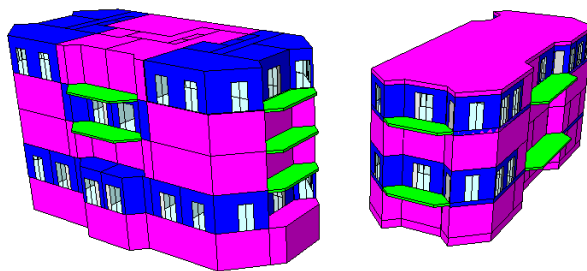


Figure 2: Northwest view of Kerswell Close with IES-VE Software

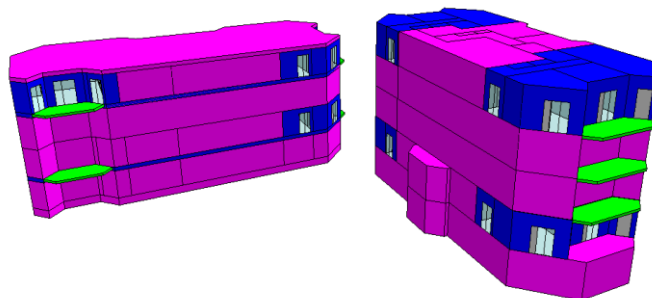


Figure 3: Southeast view of Kerswell Close with IES-VE Software



4. OCCUPANT WELLBEING

4.1 Other considerations

Aside from measuring the overheating performance of the building fabric, AD-O also sets requirements to protect the health and wellbeing of residents. These topics will not apply in all cases; however, the Developer should action any issues where appropriate as part of the overall overheating mitigation strategy.

- Night-time noise from external sources
- Local air pollution
- Building security
- Protection from falling
- Protection from entrapment

4.2 Noise

If the construction site is in a location where the local planning authority or developer believes external noise may be an issue for occupants, the overheating strategy should assume that all windows will remain closed during sleeping hours (11pm until 7am). In this scenario, the Dynamic Thermal Model approach should always be used.

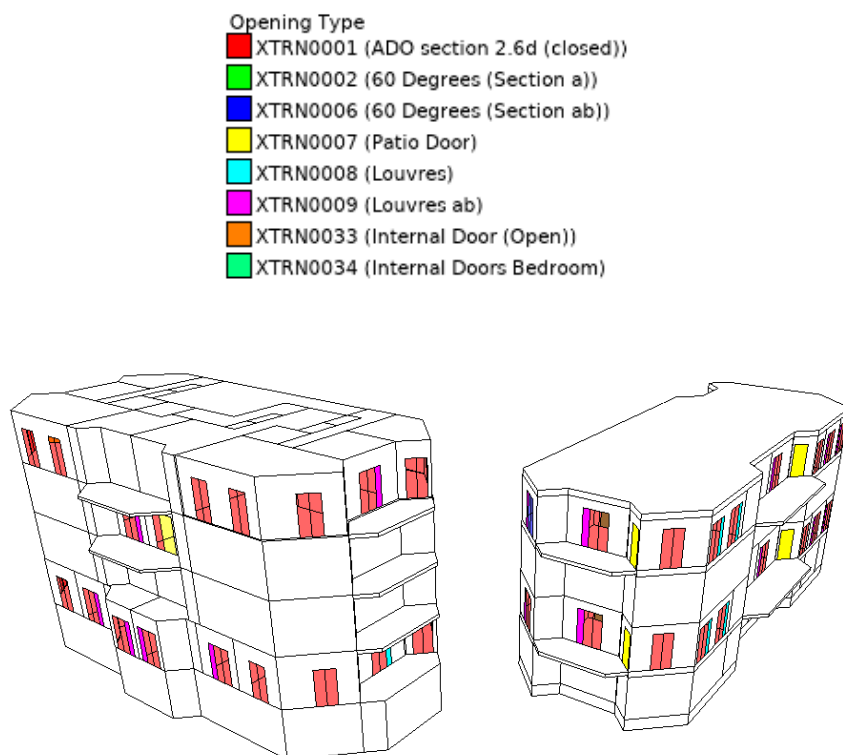


Figure 4: Model of Southeast View of Kerswell Close on Macroflo

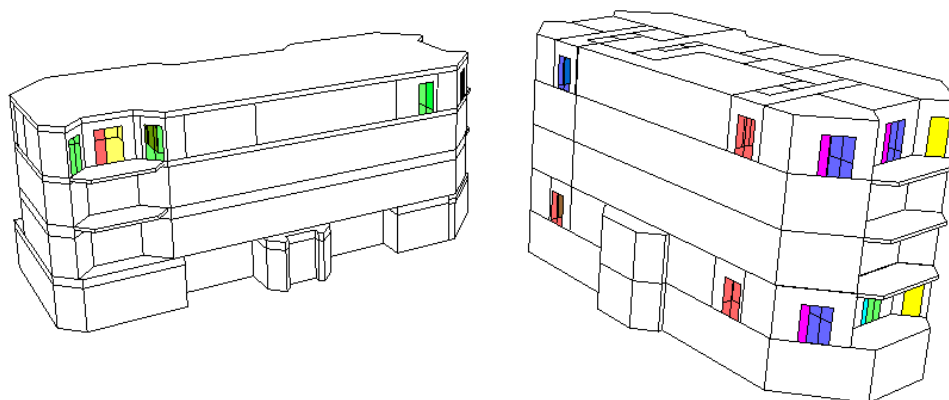


Figure 5: Model of Northwest View of Kerswell Close on Macroflo

In this scenario, there is a noise report given which indicates that many elevations will require restricted windows, As seen in figures 4 and 5. The South/East Facades are more stringent than the North/West. The use of acoustic louvres provided a significant impact on the model. Although Windows on the North/West elevations were closed. The rooms were still achieving fresh air into rooms through the Louvres. This implementation allowed the rooms to comply with the acoustic report but also provided a solution to negate any use of large mechanical systems needed to pass. Results can further be seen in appendix B

4.3 Pollution

If the construction site is in a location where air pollution is considered a concern, the design of the building needs to follow the guidance given in Approved Document F (2022) Section 2.

Reasons for concerns regarding air pollution include (but not limited to) construction sites near the following:

- Busy roads and car parks
- Combustion plant rooms or industrial activity
- Where carbon monoxide levels have been tested and exceed an average of 100mg/m² over an 8-hour period.

4.4 Security

Windows of ground floor and easily accessible bedrooms are assumed to be open at a minimum opening angle with restrictors at night as a good practice security measure. A security risk will affect the 'Type A1 East Bedroom 02 L01 and Type B5 Bedroom 01 L01 due to the windows categorised as easily accessible according to approved document O.

The Developer may wish to consider the following additional measures to improve the free area of air movement overnight without increasing the risk of burglary.

- Fixing lockable, louvred shutters to all easily accessible windows
- Installing lockable window grilles or railings to all easily accessible window



4.5 Protection from falling

Openings which may be open for long periods to reduce overheating risk may pose a higher risk of falling from height.

Where higher-risk windows can be opened wider than 100mm, the following safety measures must be included.

- Window handles that open outwards are not more than 650mm from the inside face of the wall when the window is at its maximum openable angle
- Guarding with a height at least 1.1m should be installed
- Guarding should be designed so children cannot easily climb it

Approved Document K may also apply in this situation. The higher standard of the two Building Regulations should be followed.

4.6 Protection from entrapment

Where louvered shutters, window railing and ventilation grilles are installed, they should not allow body parts to become trapped.

- They should not allow the passage of a 100mm diameter sphere
- Small holes should allow for a 25mm diameter (to prevent finger entrapment)
- Looped cords must be fitted with child safety devices



5. Conclusion

This document has reviewed the performance of Kerswell Close, against [Approved Document O \(2022\) for England](#).

The TM59 Dynamic assessment has shown that all assessed spaces comply.

These results meet the assessment requirements of AD O (2021).



Appendix A: Model Specifications

ENERGIST UK
Thermal Model ADO Specification Summary

CLIENT: Selsdon
PROJECT: Kerswell Close
SOFTWARE: IESVE Overheating Analysis
VERSION: 2023.2.1.0
SITE LOCATION: London
WEATHER FILE: London Gatwick_DSY1_2020High50_epw
DATE: 28.02.2024
REVISION: A

INTERNAL GAINS - ADO Profiles			
EXTERNAL ELEMENT	U VALUE (W/m2K)	G VALUE (Glass Only)	Notes
External Glazing	1.14	0.50	
EXTERNAL ELEMENT	U VALUE (W/m2K)	THERMAL MASS (KJ/m2K)	Notes
External Walls	0.16	230.00	
Roof	0.10	98.75	
Ground Floor	0.10	85.00	
Personnel Doors	1.40	3.50	
INTERNAL ELEMENT	U VALUE (W/m2K)	THERMAL MASS (KJ/m2K)	Notes
Intermediate Floor	n/a	141.78	

INTERNAL GAINS - ADO Profiles				
Room	ADO Activity Assigned	Lighting Gain (W/m2)	Occupancy Gain (W/person)	Equipment Gain (W)
Double Bedrooms	Approved Doc O Double Bed	2.00	75.00	80.00
Single Bedrooms	Approved Doc O Single Bed	2.00	75.00	80.00
Kitchen - 3 bed	Approved Doc O 3 Bed Kitchen	2.00	75.00	300.00
Kitchen - 2 bed	Approved Doc O 2 Bed Kitchen	2.00	75.00	300.00
Living - 3 bed	Approved Doc O 3 Bed Living	2.00	75.00	300.00
Living - 2 bed	Approved Doc O 2 Bed Living	2.00	75.00	300.00
Living/Kitchen - 2 bed	Approved Doc O 2 Bed Living/Kitchen	2.00	75.00	450.00
Living/Kitchen - 3 bed	Approved Doc O 3 Bed Living/Kitchen	2.00	75.00	450.00

WINDOW OPENINGS				
Room (Based on Acoustic Assessment)	Level	Opening Angles	Equivalent Orifice Area	Opening Profile
RED Façade Windows	L00-L04	Closed	Closed	n/a
GREEN Façade Windows (Living/Kitchen)	L00-L04	60 Degrees	84.19%	ADO. Section_26 ab
GREEN Façade Windows (Bedrooms)	L00-L04	60 Degrees	84.19%	ADO. Section_26 a
YELLOW Façade Windows	L00-L04	Closed	Closed	n/a
BLUE Façade Windows (Living/Kitchen)	L00-L04	60 Degrees	84.19%	ADO. Section_26 ab
BLUE Façade Windows (Bedrooms)	L00-L04	60 Degrees	84.19%	ADO. Section_26 a
Room	Opening Angle	Openable Area	Equivalent Orifice Area	Opening Profile
Living/Kitchen Patio Door	90.00 Degrees	90.00%	92.90%	ADO. Section_26 a
Acoustic Louvre (Bedroom)	n/a	n/a	35.48%	ADO. Section_26 ab
Acoustic Louvre (Living/Kitchen)	n/a	n/a	35.48%	ADO. Section_26 a
Bedroom Patio Door	90.00 Degrees	90.00%	92.90%	Internal Bedroom (08:00 - 23:00)

BUILDING SERVICES - AIR EXCHANGES		
Room	Flowrate (ac/hr)	Notes
Type A3 Centre Bedroom 01 L03	2.00	Through Purge Ventilation (Night Hours)
Type B4 Bedroom 01 L03	2.00	Through Purge Ventilation (Night Hours)
Type B3 Bedroom 02 L03	2.00	Through Purge Ventilation (Night Hours)
Type B5 Bedroom 02 L03	2.00	Through Purge Ventilation (Night Hours)



Appendix B: Model Results



Approved Document O report
Overheating risk in residential buildings
for

Building details

Project name:	Date: 02-04-2024 15:14:39
Location: Tottenham North London, United Kingdom	
Address:	
Building use:	
Are there any security, noise, or pollution issues:	

Designer's details

Designer's name:
Designer's organisation:
Designer's address:

Dynamic thermal model

Software: IESVE version 2023.2.1.0	
Weather file: London_GTW_DSY1_2020High50.epw	
Results file: NIBE system test balcony closed test 03.aps	
Number of rooms analysed: 28	
TM59: summer elevated air speed: 0.1	
TM59: occupant category: Category II (normal)	
Overheating mitigation strategy:	
Has the building construction proposal been modelled accurately?	YES
Have the analysed rooms passed the assessment for Approved Doc O Dynamic Thermal Modelling Method (CIBSE TM 59)?	YES
Designer's signature:	

Summary

CIBSE TM59 overheating methodology for predominantly naturally ventilated rooms assesses against two criteria, (a) and (b) (for Category I occupancy, T_{max} is reduced by 1K):

- Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours
- Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Approved document O applies limits to CIBSE TM59 section 3.3 (openings); these requirements are applied by appropriate assignment of MacroFlo types / scripted profiles in the model (see Modelled Openings Section).

CIBSE TM59 overheating methodology for predominantly mechanically ventilated rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

CIBSE TM59 also states that the inclusion of corridors in the overheating analysis is mandatory where community heating pipework runs through them. While there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of the total annual hours this should be identified as a significant risk.

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
Type A1 East Bedroom 01 L01	Pass	Pass	-	-
Type A1 East Bedroom 02 L01	Pass	Pass	-	-
Type A1 East Bedroom 03 L01	Pass	Pass	-	-
Type A1 East Kitchen/Living L01	Pass	N/A	-	-
Type A1 West Bedroom 01 L01	Pass	Pass	-	-
Type A1 West Bedroom 02 L01	Pass	Pass	-	-
Type A1 West Bedroom 03 L01	Pass	Pass	-	-
Type A1 West Kitchen/Living L01	Pass	N/A	-	-
Type A2 East Bedroom 01 L04	Pass	Pass	-	-
Type A2 East Bedroom 02 L04	Pass	Pass	-	-
Type A2 East Living/Kitchen/Dining L04	Pass	N/A	-	-
Type A2 West Bedroom 01 L04	Pass	Pass	-	-
Type A2 West Bedroom 02 L04	Pass	Pass	-	-
Type A2 West Living/Kitchen/Dining L04	Pass	N/A	-	-
Type A3 Centre Bedroom 01 L03	Pass	Pass	-	-
Type A3 Centre Kitchen L03	Pass	N/A	-	-

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
Type A3 Centre Living	Pass	N/A	-	-
Type B4 Bedroom 01 L03	Pass	Pass	-	-
Type B4 Kitchen/Living L03	Pass	N/A	-	-
Type B3 Kitchen/Living L03	Pass	N/A	-	-
Type B3 Bedroom 02 L03	Pass	Pass	-	-
Type B3 Bedroom 01 L03	Pass	Pass	-	-
Type B5 Bedroom 01 L03	Pass	Pass	-	-
Type B5 Bedroom 02 L03	Pass	Pass	-	-
Type B5 Kitchen/Living L03	Pass	N/A	-	-
Type B5 Bedroom 01 L01	Pass	Pass	-	-
Type B5 Bedroom 02 L01	Pass	Pass	-	-
Type B5 Kitchen/Living L01	Pass	N/A	-	-

Naturally ventilated rooms – criterion (a)

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.

Room name	Occupied hours	No. hours $\Delta T \geq 1^\circ\text{K}$	% Occupied hours $\Delta T \geq 1^\circ\text{K}$	Criterion a check
Type A1 East Bedroom 01 L01	3672	22	0.6	Pass
Type A1 East Bedroom 02 L01	3672	26	0.7	Pass
Type A1 East Bedroom 03 L01	3672	36	1.0	Pass
Type A1 East Kitchen/Living L01	1989	29	1.5	Pass
Type A1 West Bedroom 01 L01	3672	18	0.5	Pass
Type A1 West Bedroom 02 L01	3672	31	0.8	Pass
Type A1 West Bedroom 03 L01	3672	32	0.9	Pass
Type A1 West Kitchen/Living L01	1989	34	1.7	Pass
Type A2 East Bedroom 01 L04	3672	30	0.8	Pass
Type A2 East Bedroom 02 L04	3672	20	0.5	Pass
Type A2 East Living/Kitchen/Dining L04	1989	38	1.9	Pass
Type A2 West Bedroom 01 L04	3672	45	1.2	Pass
Type A2 West Bedroom 02 L04	3672	39	1.1	Pass
Type A2 West Living/Kitchen/Dining L04	1989	58	2.9	Pass
Type A3 Centre Bedroom 01 L03	3672	9	0.2	Pass
Type A3 Centre Kitchen L03	1989	21	1.1	Pass
Type A3 Centre Living	1989	23	1.2	Pass
Type B4 Bedroom 01 L03	3672	27	0.7	Pass
Type B4 Kitchen/Living L03	1989	34	1.7	Pass
Type B3 Kitchen/Living L03	1989	50	2.5	Pass
Type B3 Bedroom 02 L03	3672	36	1.0	Pass
Type B3 Bedroom 01 L03	3672	37	1.0	Pass
Type B5 Bedroom 01 L03	3672	39	1.1	Pass



Room name	Occupied hours	No. hours $\Delta T \geq 1^{\circ}\text{K}$	% Occupied hours $\Delta T \geq 1^{\circ}\text{K}$	Criterion a check
Type B5 Bedroom 02 L03	3672	56	1.5	Pass
Type B5 Kitchen/Living L03	1989	48	2.4	Pass
Type B5 Bedroom 01 L01	3672	22	0.6	Pass
Type B5 Bedroom 02 L01	3672	37	1.0	Pass
Type B5 Kitchen/Living L01	1989	34	1.7	Pass

Naturally ventilated rooms – criterion (b)

Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Any rooms that are not bedrooms are therefore not assessed, hence the corresponding N/A values.

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion b check
Type A1 East Bedroom 01 L01	12	12	24	Pass
Type A1 East Bedroom 02 L01	14	14	28	Pass
Type A1 East Bedroom 03 L01	13	11	24	Pass
Type A1 East Kitchen/Living L01	N/A	N/A	N/A	N/A
Type A1 West Bedroom 01 L01	11	12	23	Pass
Type A1 West Bedroom 02 L01	5	0	5	Pass
Type A1 West Bedroom 03 L01	12	10	22	Pass
Type A1 West Kitchen/Living L01	N/A	N/A	N/A	N/A
Type A2 East Bedroom 01 L04	13	8	21	Pass
Type A2 East Bedroom 02 L04	7	0	7	Pass
Type A2 East Living/Kitchen/Dining L04	N/A	N/A	N/A	N/A
Type A2 West Bedroom 01 L04	5	0	5	Pass
Type A2 West Bedroom 02 L04	5	0	5	Pass
Type A2 West Living/Kitchen/Dining L04	N/A	N/A	N/A	N/A
Type A3 Centre Bedroom 01 L03	14	12	26	Pass
Type A3 Centre Kitchen L03	N/A	N/A	N/A	N/A
Type A3 Centre Living	N/A	N/A	N/A	N/A
Type B4 Bedroom 01 L03	10	7	17	Pass
Type B4 Kitchen/Living L03	N/A	N/A	N/A	N/A
Type B3 Kitchen/Living L03	N/A	N/A	N/A	N/A
Type B3 Bedroom 02 L03	13	9	22	Pass
Type B3 Bedroom 01 L03	12	4	16	Pass
Type B5 Bedroom 01 L03	6	0	6	Pass

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion b check
Type B5 Bedroom 02 L03	14	7	21	Pass
Type B5 Kitchen/Living L03	N/A	N/A	N/A	N/A
Type B5 Bedroom 01 L01	12	10	22	Pass
Type B5 Bedroom 02 L01	13	6	19	Pass
Type B5 Kitchen/Living L01	N/A	N/A	N/A	N/A

Mechanically ventilated rooms

CIBSE TM59 overheating methodology for predominantly mech. vent. rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

Room name	No. hours > 26°C	% Annual hours > 26°C	Mechanically ventilated check
No mech vent rooms	N/A	N/A	N/A

Communal corridors

CIBSE TM59 states that whilst there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of annual hours, then this should be identified as a significant risk within the TM59 overheating report.

Room name	No. hours > 28°C	% Annual hours > 28°C	Corridor overheating risk check
No corridors	N/A	N/A	N/A

Modelled details & overheating mitigation strategy

Approved document O: Providing Information & Appendix B requires information about the model and the overheating mitigation strategy. The following tables detail the modelling method and mitigation strategies applied to each analysed room. Where multiple active openings per space (windows & louvres) exist they are all listed. Occupancy, equipment and lighting profiles for occupied rooms comply with TM59 section 5.

Modelled occupancy

Room name	Floor area m ²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
Type A1 East Bedroom 01 L01	15.04	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type A1 East Bedroom 02 L01	14.55	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type A1 East Bedroom 03 L01	11.6	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type A1 East Kitchen/Living L01	31.41	TM59 - 3 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Type A1 West Bedroom 01 L01	15.21	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type A1 West Bedroom 02 L01	14.55	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type A1 West Bedroom 03 L01	11.6	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type A1 West Kitchen/Living L01	31.41	TM59 - 3 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Type A2 East Bedroom 01 L04	12.21	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type A2 East Bedroom 02 L04	13.41	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type A2 East Living/Kitchen/Dining L04	28.21	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Type A2 West Bedroom 01 L04	12.21	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type A2 West Bedroom 02 L04	13.41	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type A2 West Living/Kitchen/Dining L04	28.41	TM59 - 1 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Type A3 Centre Bedroom 01 L03	15.85	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type A3 Centre Kitchen L03	10.18	TM59 - 1 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Type A3 Centre Living	18.61	TM59 - 1 Bedroom - Living	Living Occupancy	Living Equipment	18-23h

Room name	Floor area m ²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
Type B4 Bedroom 01 L03	11.65	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type B4 Kitchen/Living L03	22.65	TM59 - 1 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Type B3 Kitchen/Living L03	24.5	TM59 - 2 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Type B3 Bedroom 02 L03	12.45	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type B3 Bedroom 01 L03	13.28	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type B5 Bedroom 01 L03	11.26	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type B5 Bedroom 02 L03	10.47	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type B5 Kitchen/Living L03	26.36	TM59 - 2 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Type B5 Bedroom 01 L01	11.26	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type B5 Bedroom 02 L01	10.47	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Type B5 Kitchen/Living L01	26.36	TM59 - 2 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h

Modelled openings

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Type A1 East Bedroom 01 L01	17.36	0.5013	0.87, 1.16, 1.15, 1.89, 1.89	100.0, 20.0, 20.0, 90.0, 20.0	22.68	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal Bedroom
Type A1 East Bedroom 02 L01	20.03	0.5013, 0.5013	0.89, 1.16, 1.15, 1.15, 1.16, 1.89	100.0, 20.0, 20.0, 20.0, 20.0, 90.0	24.16	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal Bedroom
Type A1 East Bedroom 03 L01	26.55	0.5013	0.82, 1.16, 1.15, 1.89	100.0, 20.0, 20.0, 90.0	25.72	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal Bedroom
Type A1 East Kitchen/Living L01	18.75	0.5013, 0.5013, 0.5013	1.16, 1.15, 1.16, 1.16, 0.79, 1.16, 1.16, 1.89, 1.89	20.0, 20.0, 20.0, 20.0, 100.0, 20.0, 20.0, 90.0, 95.0	18.07	ADO.AlwaysOff, ADO.Section_26a, on continuously
Type A1 West Bedroom 01 L01	17.17	0.5013	1.89, 1.89, 0.87, 1.16, 1.16	90.0, 20.0, 100.0, 20.0, 20.0	22.44	ADO.AlwaysOff, ADO.Section_26ab, Opening Internal Bedroom
Type A1 West Bedroom 02 L01	20.03	0.5013, 0.5013	0.89, 1.16, 1.15, 1.15, 1.16, 1.89	100.0, 90.0, 90.0, 90.0, 90.0, 90.0	46.38	ADO.Section_26ab, Opening Internal Bedroom
Type A1 West Bedroom 03 L01	26.55	0.5013	0.82, 1.16, 1.16, 1.89	100.0, 20.0, 20.0, 90.0	25.73	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal Bedroom
Type A1 West Kitchen/Living L01	18.75	0.5013, 0.5013, 0.5013	1.15, 1.15, 1.16, 1.16, 0.79, 1.16, 1.16, 1.89, 1.89	20.0, 20.0, 20.0, 20.0, 100.0, 90.0, 90.0, 90.0, 95.0	23.24	ADO.AlwaysOff, ADO.Section_26a, on continuously

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Type A2 East Bedroom 01 L04	20.81	0.5013	0.84, 1.16, 1.16, 1.89	100.0, 20.0, 20.0, 90.0	24.61	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal Bedroom
Type A2 East Bedroom 02 L04	20.85	0.5013, 0.5013	0.87, 1.16, 1.15, 1.15, 1.16, 1.89	100.0, 90.0, 90.0, 20.0, 20.0, 90.0	38.12	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal Bedroom
Type A2 East Living/Kitchen/Dining L04	20.86	0.5013, 0.5013	1.16, 1.16, 1.16, 1.16, 1.16, 1.15, 1.89, 1.89	20.0, 20.0, 20.0, 20.0, 20.0, 20.0, 90.0, 95.0	17.32	ADO.AlwaysOff, ADO.Section_26a, on continuously
Type A2 West Bedroom 01 L04	20.81	0.5013	0.84, 1.16, 1.16, 1.89	100.0, 90.0, 90.0, 90.0	37.91	ADO.Section_26ab, Opening Internal Bedroom
Type A2 West Bedroom 02 L04	20.85	0.5013, 0.5013	0.87, 1.16, 1.16, 1.16, 1.16, 1.89	100.0, 90.0, 90.0, 90.0, 90.0, 90.0	50.31	ADO.Section_26ab, Opening Internal Bedroom
Type A2 West Living/Kitchen/Dining L04	20.77	0.5013, 0.5013	1.16, 1.16, 1.15, 1.16, 1.16, 1.15, 1.89, 1.89	20.0, 20.0, 20.0, 20.0, 20.0, 20.0, 90.0, 95.0	17.19	ADO.AlwaysOff, ADO.Section_26a, on continuously
Type A3 Centre Bedroom 01 L03	16.55	0.5013	1.15, 1.15, 0.81, 1.89	20.0, 20.0, 100.0, 90.0	18.74	ADO.AlwaysOff, ADO.Section_26ab, Opening Internal Bedroom
Type A3 Centre Kitchen L03	N/A	0.871	0.8, 0.8, 1.89	95.0, 95.0, 95.0	32.57	on continuously
Type A3 Centre Living	32.51	0.5013, 0.5013	1.47, 2.1, 1.26, 1.89	20.0, 90.0, 20.0, 95.0	22.74	ADO.AlwaysOff, ADO.Section_26a, on continuously
Type B4 Bedroom 01 L03	22.49	0.5013	1.16, 1.15, 0.84, 1.89	90.0, 90.0, 100.0, 20.0	28.3	ADO.Section_26a, ADO.Section_26ab, ADO.AlwaysOff
Type B4 Kitchen/Living L03	25.35	0.5013, 0.871	1.89, 1.16, 1.15, 0.8, 0.8, 1.89	90.0, 20.0, 20.0, 95.0, 95.0, 95.0	24.19	ADO.Section_26a, on continuously, ADO.AlwaysOff

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Type B3 Kitchen/Living L03	21.24	0.5013, 0.5013	1.15, 1.16, 2.1, 1.26, 1.89	90.0, 90.0, 90.0, 20.0, 95.0	24.56	ADO.Section_26a, on continuously, ADO.AlwaysOff
Type B3 Bedroom 02 L03	26.75	0.5013	1.15, 1.16, 0.84, 1.89	20.0, 20.0, 100.0, 90.0	24.12	ADO.AlwaysOff, ADO.Section_26ab, Opening Internal Bedroom
Type B3 Bedroom 01 L03	26.56	0.5013, 0.5013	1.15, 1.16, 0.84, 1.16, 1.15, 0.84, 1.89	20.0, 20.0, 100.0, 20.0, 20.0, 100.0, 90.0	32.42	ADO.AlwaysOff, ADO.Section_26ab, Opening Internal Bedroom
Type B5 Bedroom 01 L03	13.1	0.5013	1.16, 1.16, 0.84, 1.89	90.0, 90.0, 100.0, 90.0	41.11	ADO.Section_26ab, Opening Internal Bedroom
Type B5 Bedroom 02 L03	24.88	0.5013	1.16, 1.16, 0.84, 1.89	20.0, 20.0, 100.0, 90.0	28.7	ADO.AlwaysOff, ADO.Section_26ab, Opening Internal Bedroom
Type B5 Kitchen/Living L03	27.12	0.5013, 0.5013	1.16, 1.16, 1.15, 1.16, 0.84, 0.84, 1.89, 1.16, 1.16, 1.89	20.0, 20.0, 20.0, 20.0, 100.0, 100.0, 90.0, 20.0, 20.0, 95.0	24.91	ADO.AlwaysOff, ADO.Section_26a, on continuously
Type B5 Bedroom 01 L01	13.1	0.5013	1.16, 1.16, 0.84, 1.89	20.0, 20.0, 100.0, 90.0	26.69	ADO.AlwaysOff, ADO.Section_26ab, Opening Internal Bedroom
Type B5 Bedroom 02 L01	24.88	0.5013	1.16, 1.16, 0.84, 1.89	20.0, 20.0, 100.0, 90.0	28.7	ADO.AlwaysOff, ADO.Section_26ab, Opening Internal Bedroom
Type B5 Kitchen/Living L01	27.12	0.5013, 0.5013	1.16, 1.16, 1.15, 1.16, 0.84, 0.84, 1.89, 1.16, 1.16, 1.89	20.0, 20.0, 20.0, 20.0, 100.0, 100.0, 90.0, 20.0, 20.0, 95.0	24.91	ADO.AlwaysOff, ADO.Section_26a, on continuously

Modelled ventilation

Room name	Infiltration rate ACH	Mech vent flow rate ACH
Type A1 East Bedroom 01 L01	0.2	1.2
Type A1 East Bedroom 02 L01	0.2	1.24
Type A1 East Bedroom 03 L01	0.2	1.55
Type A1 East Kitchen/Living L01	0.2	3.0
Type A1 West Bedroom 01 L01	0.2	1.18
Type A1 West Bedroom 02 L01	0.2	1.24
Type A1 West Bedroom 03 L01	0.2	1.55
Type A1 West Kitchen/Living L01	0.2	3.0
Type A2 East Bedroom 01 L04	0.2	1.47
Type A2 East Bedroom 02 L04	0.2	1.34
Type A2 East Living/Kitchen/Dining L04	0.2	2.13
Type A2 West Bedroom 01 L04	0.2	1.47
Type A2 West Bedroom 02 L04	0.2	1.34
Type A2 West Living/Kitchen/Dining L04	0.2	0.63
Type A3 Centre Bedroom 01 L03	0.2	0.91
Type A3 Centre Kitchen L03	0.2	1.77
Type A3 Centre Living	0.2	0.97
Type B4 Bedroom 01 L03	0.2	1.43
Type B4 Kitchen/Living L03	0.2	0.92
Type B3 Kitchen/Living L03	0.2	0.85
Type B3 Bedroom 02 L03	0.2	1.33
Type B3 Bedroom 01 L03	0.2	1.56
Type B5 Bedroom 01 L03	0.2	1.84
Type B5 Bedroom 02 L03	0.2	1.59
Type B5 Kitchen/Living L03	0.2	0.79
Type B5 Bedroom 01 L01	0.2	1.84
Type B5 Bedroom 02 L01	0.2	1.59
Type B5 Kitchen/Living L01	0.2	0.79