



Project: 2nd Floor, 87 Southampton Street, Reading

Assessment: Part O: Overheating Assessment

SECTION			CHECKED		
REV	TITLE	BY	BY	DATE	SIGNED
00	Part O Overheating Assessment	CS	WNL	12.06.2024	

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Section 1.0 – Executive Summary

This assessment has been produced to address and satisfy the requirements of building regulations Part O: Overheating mitigation assessment to address the potential overheating risk in homes. This project and assessment relates to the new project located at 2nd floor, 87 Southampton Street, Reading, RG1 2QU.

In order to undertake this assessment, dynamic simulation modelling with approved software, IES Virtual Environment v2023.2.0.0 has been used to model the proposed development.

The current proposed design strategy is based upon a natural ventilation solution.

The acoustic report completed (by others) has highlighted a potential issue with excessive noise levels from the adjacent commercial building plant equipment and road noise. It has been advised that openable windows to the habitable spaces are not to be used to mitigate overheating due to excessive noise levels. The assessment and report have therefore been carried out, taking this into account with a view to mitigating overheating with a closed window solution.

To mitigate the potential overheating, the use of curtains/blinds (day & night), high efficiency glazing (secondary with low G-value), trickle ventilated windows, through wall ventilation units and continuous mechanical extract systems from the adjacent and adjoining bathrooms and kitchens has shown compliance in these rooms.

The analysis performed to date has therefore confirmed that all assessed, occupied rooms are shown to be **compliant** with regards to the TM59 domestic overheating criteria & Part O requirements.

Note: While curtains/blinds are not be utilised under the requirements of Part O methodology, this is acceptable under TM59 methodology and as such it is assumed that this will be an acceptable method to help show compliance under the circumstances – Results from both methodologies have been assessed and included within.

The drawings and specification have been provided via **Vorbild Architecture**.

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Section 1.1 - CIBSE TM59

This assessment considers the overheating criteria for occupied spaces during occupied hours as detailed CIBSE TM59: *Design methodology for the assessment of overheating risk in homes*.

Section 1.2 - Part O

In accordance with the general update to Building Regulations with regards to Part L (Energy Conservation), Part F (Ventilation) the UK government introduced a new Part O (Overheating) which took effect on 15th June 2022.

The requirements for compliance with the Building Regulations 2010 Part O are detailed in the approved document (ADO).

The aim of requirement O is to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures.

The ADO requires an assessment based on the TM59 methodology with some specific limits on operation of openings during the day and night with omission of internal blinds/curtains as a means of reducing solar gain.

Section 2.0 – Introduction

The project comprises of one new apartment situated on the existing second floor. The apartment contains two-bedrooms, open plan kitchen/living areas, bathroom and en-suite.

The dwelling has a total internal floor area of approximately **80m²**.

Section 2.1 – Software

IES version v2023.2.0.0 'ApacheSim' has been used to analyse the thermal comfort and fresh air supply rates likely to be experienced within the building.

The dynamic simulation software combines the effects of:

- **CIBSE Annual Example Weather Year** (Swindon DSY 2020 – High Emissions – 50th percentile) weather data.
- **Airflow** through external façade and internal openings.
- Casual, lighting and people **heat gains**.
- **Operational/occupation profiles**.
- **Thermal mass** of the building.
- **Solar** heat gain.

Section 2.2 – Weather File and Building Operation

The weather file selected for the project is **Swindon DSY 2020 – High Emissions – 50th percentile** as advised by the CIBSE guidance

The predicted internal temperatures and comfort levels are based on a number of variables which are only possible to approximate, and the actual use of the building may result in different outcomes. However, the thermal modelling process provides an understanding of the building behaviour under the specific conditions highlighted herein.

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Section 3.0 – Key Assumptions

Section 3.1 – TM59 Key Features

CIBSE TM59 Methodology	
Feature	Assessed Spaces
Compliance	TM59 Overheating Assessment
Temperature	Operative Temperature
Mechanically Ventilated	Operative Temperature not to exceed 26°C for more than 3% of occupied hours
Naturally Ventilated	<i>Living rooms, kitchens, bedrooms: TM52 Criterion 1: Threshold temperature not to be exceeded for more than 3% of occupied hours</i>
Naturally Ventilated	<i>Bedrooms: Operative Temperature >26°C for no more than 1% (max.32) of occupied hours (10pm-7am)</i>
Communal Corridors	Operative Temperature not to exceed 28°C for more than 3% of annual hours (not mandatory)
Occupancy Profile	TM59 Annual
Weather File	DSY01 2020, High, 50th percentile
Internal Shading	Curtains/Blinds shading coefficient - 0.30
Natural Ventilation	Natural via trickle & through wall ventilators
Opening Type	N/A
External Shading	N/A
Window Restrictor	N/A
Opening Profile	N/A

Section 3.2 – Part O Key Features

Building Regulations Part O - Overheating	
Feature	Assessed Spaces
Compliance	TM59 Overheating Assessment
Temperature	Operative Temperature
Mechanically Ventilated	Operative Temperature not to exceed 26°C for more than 3% of annual occupied hours
Naturally Ventilated	<i>Living rooms, kitchens, bedrooms: TM52 Criterion 1: Threshold temperature not to be exceeded for more than 3% of occupied hours</i>
Naturally Ventilated	<i>Bedrooms: Operative Temperature >26°C for no more than 1% (max.32) of occupied hours (10pm-7am)</i>
Communal Corridors	Operative Temperature not to exceed 28°C for more than 3% of annual hours (not mandatory)
Occupancy Profile	Annual occupied hours
Opening profile day (8am-11pm)	N/A
Opening profile night (11pm-8am)	N/A
External Shading	N/A
Internal shading (blinds/curtains)	Not permitted
External shading foliage/ tree cover	Not permitted
Fresh air ventilation	Natural via trickle & through wall ventilators
Opening Type	N/A
Window Restrictor	N/A

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Section 3.3 – Part O – Overheating

The requirement of Part O is to be met by designing and constructing the building to achieve both of the following.

- a. Limiting unwanted solar gains in summer.
- b. Providing an adequate means of removing excess heat from the indoor environment.

Compliance with requirement O1 can be demonstrated by using one of the following methods.

- a. The simplified method for limiting solar gains and providing a means of removing excess heat.
- b. The dynamic thermal modelling method.

To demonstrate compliance using the dynamic thermal modelling method, all of the following guidance should be followed.

- a. CIBSE's TM59 methodology for predicting overheating risk.
- b. Apply the following limits on the use of CIBSE's TM59 methodology:
 - I. When occupied during the day (8am-11pm) openings start opening at internal temperature 22°C and fully open at 26°C. Start to close below 26°C and fully closed at 22°C.
 - II. At night (11pm to 8am) openings modelled open only if; opening is on first floor or above and internal temperature exceeds 23°C at 11pm.
 - III. Ground floor or accessible room openings modelled openable during this day if done securely and modelled closed at night.
 - IV. Entrance doors closed at all times.
- c. The acceptable strategies for reducing overheating risk:

Limiting Solar Gains

- I. Fixed shading devices, comprising any of the following; shutters, external blinds, overhangs, awnings.
- II. Glazing design, involving any of the following solutions; size, orientation, g-value, depth of the window reveal.
- III. Building design – for example, the placement of balconies.
- IV. Shading provided by adjacent permanent buildings, structures or landscaping.

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Although internal blinds and curtains provide some reduction in solar gains, they should not be taken into account when considering whether requirement O has been met.

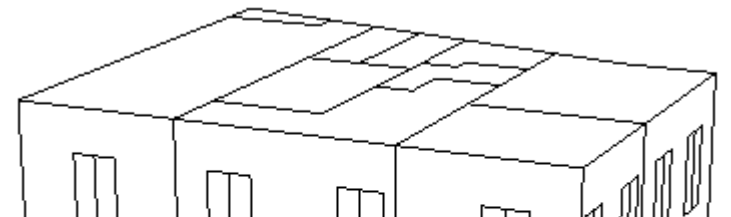
Foliage, such as tree cover, can provide some reduction in solar gains. However, it should not be taken into account when considering whether requirement O1 has been

Removing Excess

Heat should be removed from the residential building by any of the following means.

- I. Opening windows (the effectiveness of this method is improved by cross-ventilation).
- II. Ventilation louvres in external walls.
- III. A mechanical ventilation system.
- IV. A mechanical cooling system.

Any mechanical cooling (air-conditioning) is expected to be used only where requirement O cannot be met using openings.



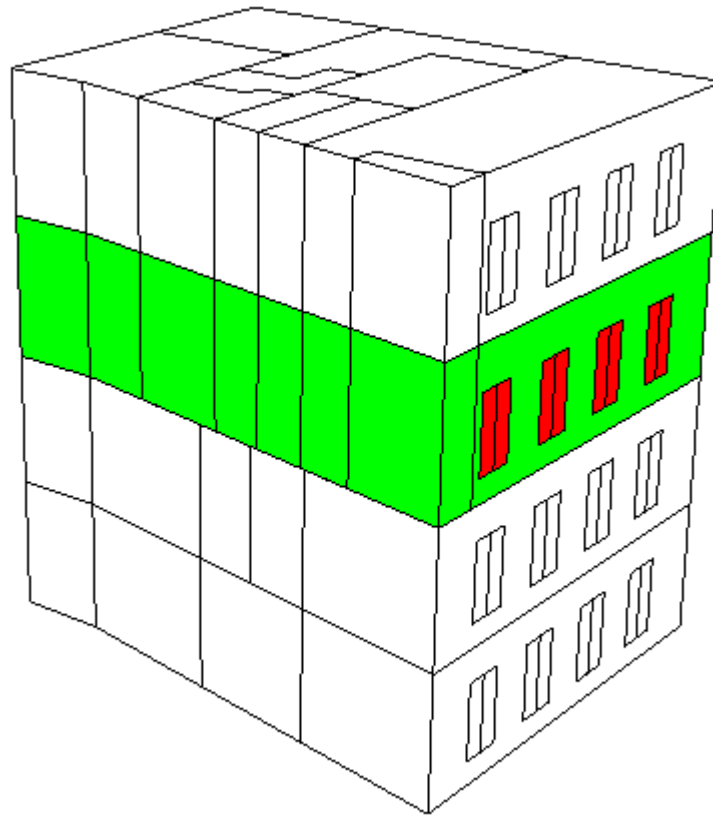
Section 3.4 – Constructions

Construction

- External Glazing - $U=2.4$ (STD_EXTW)
- External Wall - $U=0.30$ (STD_WAL1)
- Ground Floor - $U=0.20$ (STD_FLO1)
- Internal Ceiling/Floor (STD_CEIL)
- Internal Partition (STD_PART)
- Roof - $U=0.18$ (STD_ROOF)

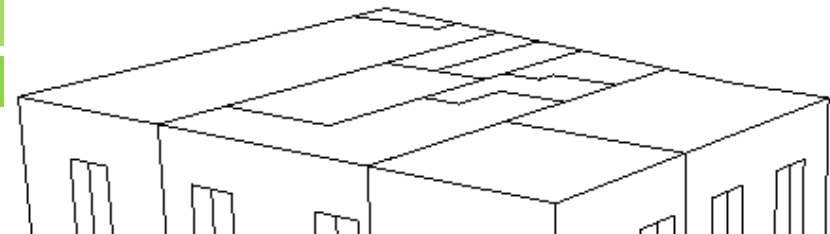
- Window G-value: 50%

Note: It has currently been assumed that the U-values will be updated to part L1B compliant standards.



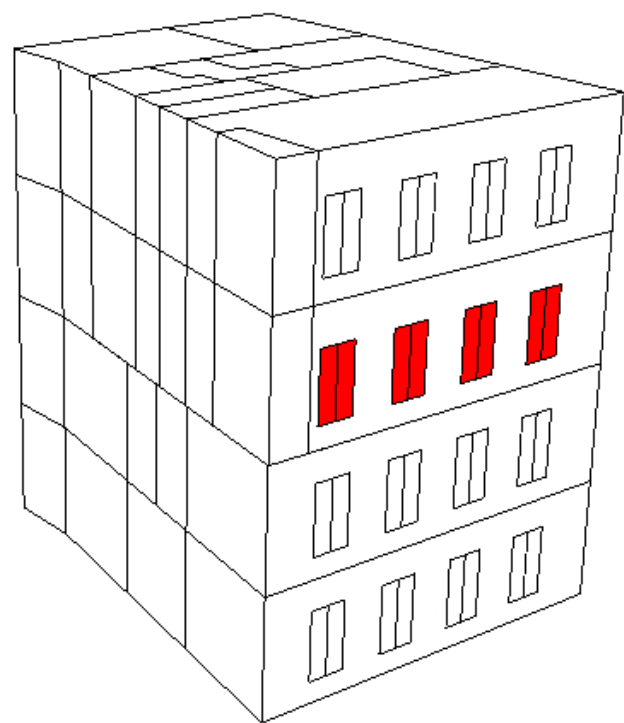
Note: To achieve compliance, it has been assumed that the secondary glazing system being installed will have a G-value of 0.4 (40%).

When combined with the existing windows, it is assumed that the overall average G-value of the glazing will be 0.5 (50%).



Section 3.5 – Window Openings

Opening Type
■ XTRN0001 (ADO section 2.6d (closed))



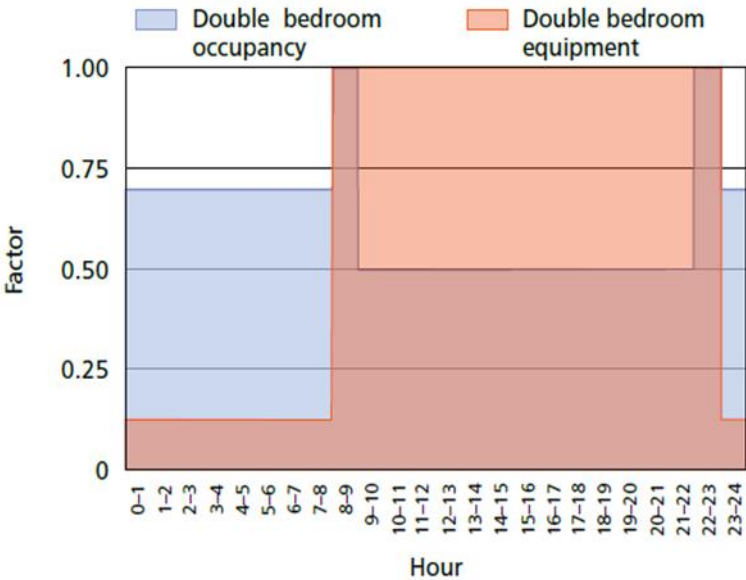
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Section 3.6 – Occupancy Profiles

The figures below indicate daily variable profiles for a combined living room/kitchen and single bedroom utilising the TM59 requirements.



Living room/Kitchen occupancy and equipment profile



Bedroom occupancy and equipment profile

Section 3.7 – Internal Heat Gain Summary

The following is a summary of the internal heat gains input to example room area based on the TM59 requirements:

Number of people	Description	Peak load (W)		Period																								
		Sensible	Latent	Hour-ending																								
				00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	
1	Single bedroom occupancy	75	55	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7
2	Double bedroom occupancy	150	110	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.7
2	Studio occupancy	150	110	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1-bed: living/kitchen occupancy	75	55	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
1	1-bed: living occupancy	75	55	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
1	1-bed: kitchen occupancy	75	55	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
2	2-bed: living/kitchen occupancy	150	110	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
2	2-bed: living occupancy	150	110	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
2	2-bed: kitchen occupancy	150	110	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
3	3-bed: living/kitchen occupancy	225	165	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
3	3-bed: living occupancy	225	165	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
3	3-bed: kitchen occupancy	225	165	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
	Single bedroom equipment	80		0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.13
	Double bedroom equipment	80		0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.13
	Studio equipment	450		0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	1	1	0.44	0.44	0.24	0.24
	Living/kitchen equipment	450		0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	1	1	0.44	0.44	0.24	0.24
	Living equipment	150		0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	1	1	1	1	0.4	0.4	
	Kitchen equipment	300		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	1	1	0.17	0.17	0.17	0.17	
	Lighting profile	2 (W/m2)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0

Section 3.8 – Mitigation Strategy

The acoustic report completed (by others) has highlighted a potential issue with excessive noise levels from the adjacent commercial building plant equipment and roads. It has been advised that openable windows to the habitable spaces are not to be used to mitigate overheating due to excessive noise levels. The assessment and report have therefore been carried out, taking this into account with a view to mitigating overheating with a closed window solution.

To mitigate the potential overheating, the use of curtains/blinds (day & night), high efficiency glazing (secondary with low G-value), trickle ventilated windows and through wall ventilation systems with continuous mechanical extract from the adjacent and adjoining bathrooms and kitchens has been proposed.

Section 4.0 – Results

The tables below provides a room-by-room results summary of the TM59 overheating compliance criteria based on the naturally ventilated metric.

Target Overheating	
Mechanically Ventilated	Operative Temperature not to exceed 26°C for more than 3% of occupied hours
Naturally Ventilated	Living rooms, kitchens, bedrooms: TM52 Criterion 1: Threshold temperature not to be exceeded for more than 3% of occupied hours
	Bedrooms: Operative Temperature >26°C for no more than 1% (max.32) of occupied hours (10pm-7am)
Communal Corridors	Operative Temperature no to exceed 28°C for more than 3% of annual hours (not mandatory)

Based on the detailed mitigation strategy, the results of the current design proposal indicate that **all assessed rooms demonstrate compliance** of TM59 overheating criteria.

The results of the current design proposal indicate that rooms comply with TM59 overheating criteria by not exceeding the target temperature for more than 3% of occupied hours.

Section 4.1 – Occupied Rooms with Natural Ventilation (TM52: Criterion 1)

TM52 Criterion 1: Threshold temperature not to be exceeded for more than 3% of occupied hours				
Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)			
	TM59 (inc blinds)	Result	Part O (no blinds)	Result
Kitchen / Living / Dining	2.8	Pass	3.1	Fail
Bedroom 1	2.6	Pass	2.9	Pass
Bedroom 2	2.5	Pass	2.8	Pass

Section 4.2 – Bedrooms with Natural Ventilation (22:00 – 07:00)

Operative temperature (°C) - % hours exceeding target (Summer)				
Room Name	No more than 1% occupied hours >26°C			
	TM59 (inc blinds)	Result	Part O (no blinds)	Result
Bedroom 1	0.8	Pass	1.0	Pass
Bedroom 2	0.7	Pass	0.9	Pass

Section 5.0 – Conclusion

This assessment considers the overheating criteria for occupied spaces during occupied hours as detailed CIBSE TM59: Design methodology for the assessment of overheating risk in homes.

Section 5.1 – Overheating

The analysis performed to date confirms that all assessed living areas & bedrooms are shown to be **compliant** with regards to the TM59 domestic overheating criteria.

In addition to minimum overheating compliance, this report has assessed the design proposals in line with the proposed changes highlighted in Building Regulation Part O. The modelling results indicate that based on the current design there should be no issues with overheating.

Note: Curtains/blinds have been included and utilised in the Part O assessment for the affected bedrooms in line with the Noise survey report carried out.

Compliance is heavily reliant on the high-performance secondary glazing being installed along with the through wall and trickle ventilation units linked to the continuous extract system which will help continuously circulate fresh air to the occupied spaces.

Section 5.2 - Disclaimer

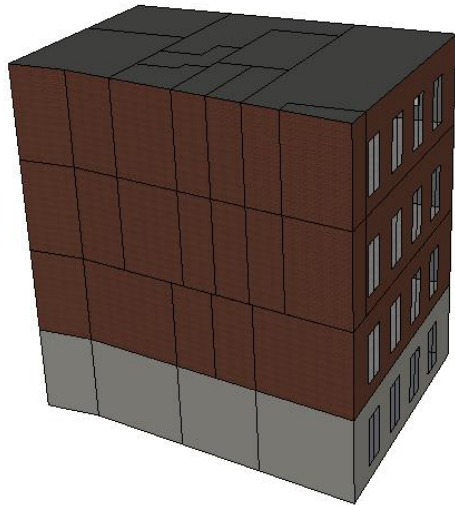
The assessment carried out to date is based upon the provided architectural drawings, specification and a number of assumptions for a 'design stage' assessment.

The predicted internal temperatures and comfort levels are based on a number of variables which are only possible to approximate, and the actual use of the building may result in different outcomes. However, the thermal modelling process provides an understanding of the building behaviour under the specific conditions highlighted herein.

Compliant EPC hold no responsibility for the outcome and performance of the actual building.

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Section 6.0 - 3D Model & Orientation



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