JOSTEC

BUILDING REGULATIONS COMPLIANCE SERVICES

TM59 Thermal Analysis

Proposed Development at 26-28 Rochester Place, NW1 9JR

JosTec Ref: 25082
Date: 13/03/2025
Prepared for: Breeze Holdings Ltd

Version: TA2

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1. Introduction

JosTec has been instructed to produce a TM59 Thermal Analysis Report to show compliance with Approved Document Part O of the building regulations for a proposed residential new build development at 26-28 Rochester Place, NW1 9JR.

Design builder Energy Plus, a CIBSE AM11-compliant dynamic simulation modelling software, has been used to conduct dynamic thermal simulations for all habitable areas on the plot. These simulations accurately predict internal environments and temperatures to identify areas at risk of overheating. The resulting data is then utilised to evaluate compliance with the criteria specified in CIBSE TM59 and relevant criteria from Approved Document Part O. Proposed Development.

1.1. Results

Criteria for predominantly naturally ventilated homes					
Block	App	Zone	Criterion A (%)	Criterion B (hr)	Pass / Fail
Block 1	1	Bed1	0.74	32.52	Pass
Block 1	1	Kitchen Lounge	2.89	N/A	Pass
Block 1	2	Bed1	0.16	27.50	Pass
Block 1	2	Bed2	0.00	15.50	Pass
Block 1	2	Kitchen Lounge	2.83	N/A	Pass
Block 1	9	Bed1	0.11	25.67	Pass
Block 1	9	Bed2	0.38	29.00	Pass
Block 1	9	Kitchen Lounge	2.09	N/A	Pass
Block 1	7	Bed1	0.25	23.33	Pass
Block 1	7	Bed2	0.13	23.00	Pass
Block 1	7	Kitchen Lounge	0.21	N/A	Pass
Block 1	8	Bed1	0.06	23.67	Pass
Block 1	8	Bed2	0.11	21.00	Pass
Block 1	8	Kitchen Lounge	0.21	N/A	Pass

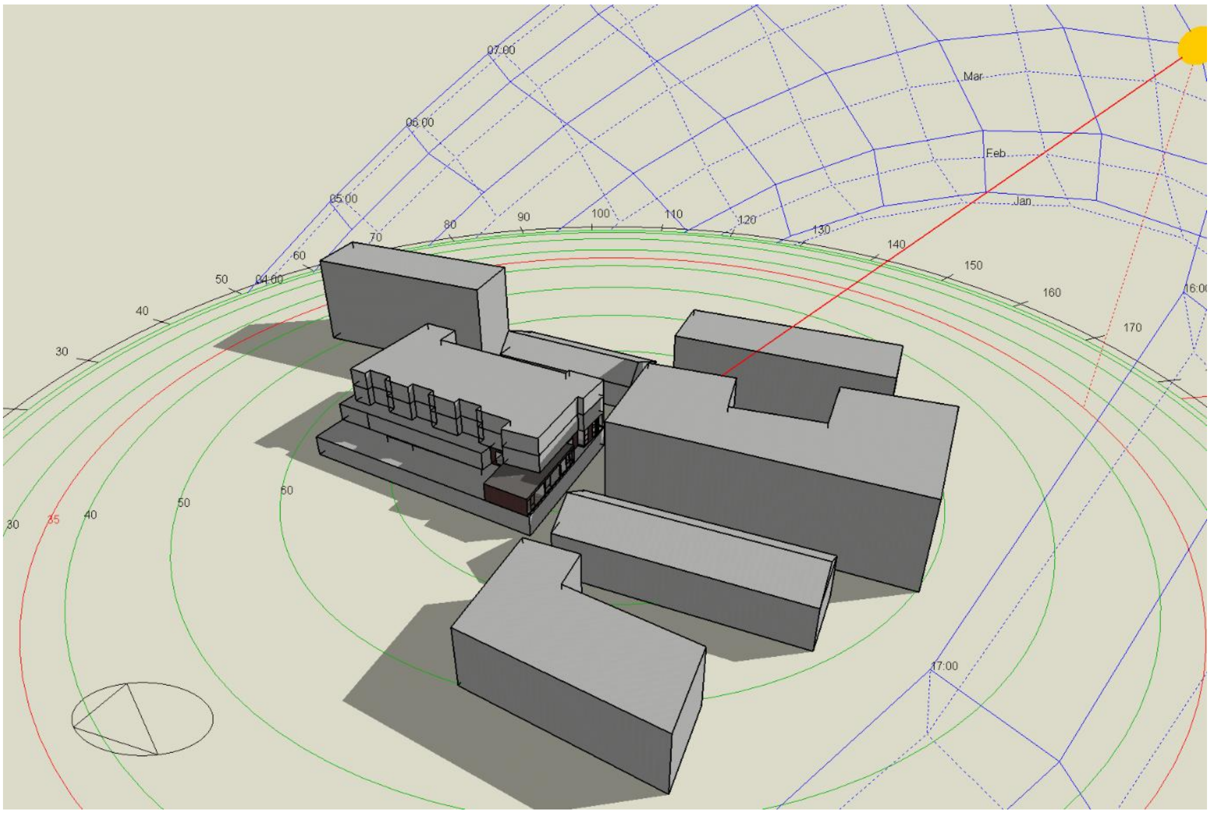
Contents

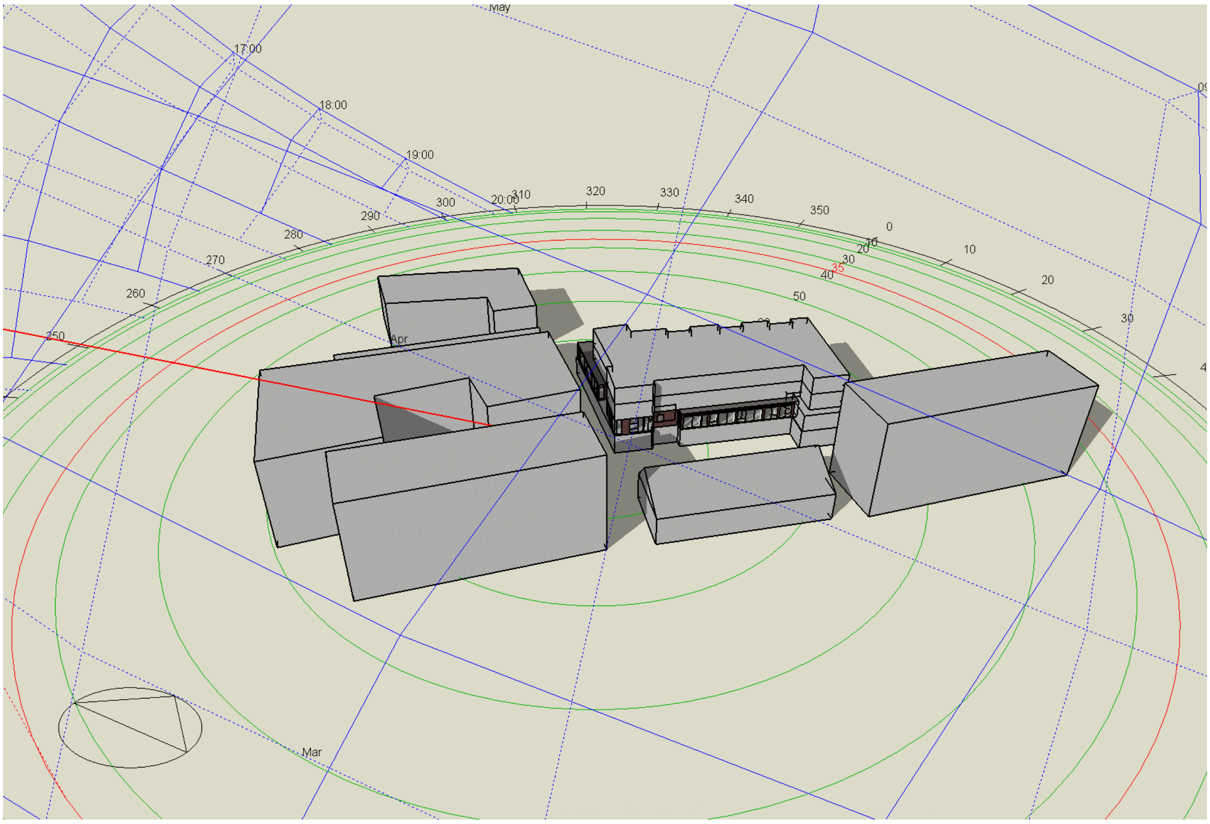
2. Quality Management

Prepared by		Checked by
Jon Stone		Mohamed Egal Msc
Energy & Sustainability Manager		Senior Energy Consultant
Date: 24/02/2025		**Date: 24/02/2025**
File reference:	25082 – Rochester Place – TA1	

Version	Status	Date	Amendments
TA1	First Issue	24/02/2025	-
TA2	Second Issue	13/03/2025	Inclusion of Flats 7 & 8

3. Design Builder Model





2.1. Software Details

This TM59 Dynamic thermal model simulation was carried out using the Designbuilder Energy Plus package.
Calculation Engine/Version: Design Builder Energy Plus Version 7.2.0.32

2.2. Weather File

In accordance with CIBSE Technical Memorandum 59, the development is required to pass the overheating criteria using the DSY1 weather file for the most appropriate location nearest to the development.

The DSY represents warmer than typical year and is used to evaluate overheating risk within buildings.

In London 3 options are available for weather data.
London Gatwick (LGW) – for rural parts of London
London Heathrow (LHR) – for suburban areas of London
London Weather Centre (LWC) – for inner urban (central) areas of London

The specific weather location chosen for this assessment was London Weather Centre DSY1.

4. TM59 Methodology For Approved Document Part O

CIBSE TM59 is an overheating methodology used specifically for residential developments. TM59 provides a methodology for how to construct an overheating assessment and draws upon guidance previously given in TM52 and CIBSE Guide A.

The assessment for the residential development at proposed development at 26 – 28 Rochester Place, has been run using the defined profiles and gains as described in Section 6 of this report.

The criteria for TM59 are determined by the type of ventilation the space receives, either predominantly naturally ventilated or predominantly mechanically ventilated. Homes that are predominantly naturally ventilated including homes that have mechanical ventilation with heat recovery (MVHR), with good opportunities for natural ventilation in the summer should assess overheating using the adaptive method based on CIBSE TM52 (2013), as described in "Criteria for Predominantly naturally ventilated homes" below.

In order to allow the occupants to 'adapt', each habitable room needs operable windows with a minimum free area that satisfies the purge ventilation criteria set in Part F of the Building Regulations for England, and equivalent regulations in other countries, i.e. the window opening area should be at least 1/20th of the floor area of the room (different conditions exist for windows with restricted openings, and the same requirement applies for external doors). Control of overheating may require accessible, secure, quiet ventilation with a significant openable area.

Homes that are predominantly mechanically ventilated because they have either no opportunity or extremely limited opportunities for opening windows (e.g. due to noise levels or air quality) should be assessed for overheating used the fixed temperature method based on CIBSE Guide A (2015a), as described in "Criteria for Predominantly mechanically ventilated homes" on the following page.

3.1. Criteria for Predominantly naturally ventilated homes;

5.1.1. Criterion One: Hours of Exceedance for Living Rooms, Kitchens & Bedrooms:
The number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3% of occupied hours. (CIBSE TM52 Criterion 1: Hours of exceedance).

5.1.2. Criterion Two: Night time comfort in bedrooms only:
To guarantee comfort during the sleeping hours the operative temperature in the bedroom shall not exceed 26ºC for than 1% of the occupied hours, defined as 10pm to 7am.
1% of annual hours between 10pm to 7am is 32 hours, failure of Criterion 2 occurs when the space experiences 33 hours or more when the above conditions are met.

3.2. Criteria for Predominantly mechanically ventilated homes;

For homes with restricted window openings, the CIBSE fixed temperature test must be followed, i.e. all occupied rooms should not exceed an operative temperature of 26 ºC for more than 3% of the annual occupied hours (CIBSE Guide A (2015a).

3.3. Approved Document Part O Deviations from TM59 Methodology

CIBSE's TM59 method requires the modeller to make choices. The dynamic thermal modelling method Part-O applies limits to these choices, which are detailed in paragraph 2.6 below. These limits should be applied when following the guidance in CIBSE's TM59.

All the following limits on CIBSE's TM59, section 3.3, apply.

5.3.1. When a room is occupied during the day (8am to 11pm), openings should be modelled to do all of the following.

a. Start to open when the internal temperature exceeds 22ºC.

b. Be fully open when the internal temperature exceeds 26ºC.

c. Start to close when the internal temperature falls below 26ºC.

d. Be fully closed when the internal temperature falls below 22ºC.

5.3.2. At night (11pm to 8am), openings should be modelled as fully open if both of the following apply.

a. The opening is on the first floor or above and not easily accessible.

b. The internal temperature exceeds 23ºC at 11pm.

5.3.3. When a ground floor or easily accessible room is unoccupied, both of the following apply.

a. In the day, windows, patio doors and balcony doors should be modelled as open, if this can be done securely, following the guidance in paragraph 3.7 below.

b. At night, windows, patio doors and balcony doors should be modelled as closed.

5.3.4. An entrance door should be included, which should be shut all the time.

5. TM59 Model Inputs

4.1.Heat Gain Parameters & Occupancy Profiles

Table 2 and Figure 1 in CIBSE TM59 provide details on occupant densities and heat gain parameters for the rooms that require assessment. This reference material has been utilized to perform thermal comfort calculations for the rooms evaluated under the TM59 criteria.

In some cases, rooms may be labelled in a manner that differs from the terminology used in CIBSE TM59, but may exhibit similar usage and occupancy patterns. In such instances, the consultant in charge of the overheating analysis will determine the most relevant room type based on their perception of usage, occupancy, and heat gain patterns. For instance, a snug may be evaluated under the criteria for living rooms. If a dwelling has more than the standard 3 bedrooms specified in CIBSE TM59, occupancy levels in the relevant areas will be adjusted accordingly. For instance, a 3-bedroom dwelling assumes an occupancy of 3 people within a living space. However, if a dwelling is determined to have 4 bedrooms, the occupancy will be modified to 4 people within that space, but only if the room is primarily identifiable within the CIBSE TM59 profiles.

Figure 1 Heat gain profile

Number of people	Description	Peak load (W) Sensible	Peak load (W) Latent	Period 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
	Hour ending			1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00
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	0.7
2	Double bedroom cccupancy	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	1	0.7
2	Studio occupancy	150	110	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	0.7
1	1-bedroom 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	0	0
1	1-bedroom 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	0
1	1-bedroom 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	0
2	2-bedroom 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	0	0
2	2-bedroom 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	0
2	2-bedroom 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	0
3	3-bedroom 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	0	0
3	3-bedroom 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	0
3	3-bedroom 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	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	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	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	1	1	0.44	0.44	0.24	0.24
	Living/litchen 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	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	0

Table 2 Occupancy and equipment gain descriptions

Unit/ room type	Occupancy	Equipment load
Studio	2 people at 70% gains from 11 pm to 8 am 2 people at 100% gains from 8 am to 11 pm	Peak load of 450 W from 6 pm to 8 pm*. 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and 10 pm to 12 pm Base load of 85 W for the rest of the day
1-bedroom apartment: living room/kitchen	1 person from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
1-bedroom apartment: living room	1 person at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
1-bedroom apartment: kitchen	1 person at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
2-bedroom apartment: living room/kitchen	2 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
2-bedroom apartment: living room	2 people at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
2-bedroom apartment: kitchen	2 people at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
3-bedroom apartment: living room/kitchen	3 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
3-bedroom apartment: living room	3 people at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
3-bedroom apartment: kitchen	3 people at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm base load of 50 W for the rest of the day
Double bedroom	2 people at 70% gains from 11 pm to 8 am 2 people at full gains from 8 am to 9 am and from 10 pm to 11 pm 1 person at full gains in the bedroom from 9 am to 10 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during the sleeping hours
Single bedroom (too small to accommodate double bed)	1 person at 70% gains from 11 pm to 8 am 1 person at full gains from 8 am to 11 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during sleeping hours
Communal corridors	Assumed to be zero	Pipework heat loss only; see section 3.1 above

* All times in GMT

6. Building Specification

The tables below detail the inputs for the fabric and the HVAC used when running the simulation in Design Builder.

6.1. Fabric Specifications

Construction	**U-Value**	
External Walls	0.18	W/m2K
Roof	0.14	W/m2K
Ground Floor	0.12	W/m2K
Glazing	1.3/0.63	W/m2K
HVAC	**Specification**	
Heating	Gas Boiler	
Ventilation	System 1 ventilation (Natural Ventilation)	
Air Tightness	The property has been simulated with a design score of 5.0	

7. Overheating Strategy

7.1. Noise

Approved Document O specifies that during sleeping hours (11 pm to 7 am), internal noise levels in bedrooms should not exceed:

- **Averaged over 40 dB over 8 hours:** This is the equivalent continuous sound level over an 8-hour period.
- **Exceeds 55 dB more than 10 times at night:** This is the maximum sound level not to be exceeded more than ten times per night.

If these noise levels are likely to be exceeded, relying solely on opening windows for cooling may not be appropriate. In such cases, alternative ventilation or cooling methods should be considered to maintain acceptable indoor noise levels.

7.2. Pollution

When ventilating a building, it's important to minimise the entry of outdoor pollutants to prevent overheating. Ventilation openings should be strategically placed away from pollution sources like busy roads or industrial areas. Incorporating filters or using mechanical ventilation with heat recovery can help improve indoor air quality by reducing the ingress of pollutants such as particulate matter and nitrogen dioxide.

7.3. Security

When designing for overheating mitigation through natural ventilation, it is crucial to ensure that openable windows and ventilation openings do not compromise the security of the property, especially for easily accessible areas. Approved Document O outlines specific requirements:

7.1.1. Easily Accessible Areas:

Windows and openings are considered easily accessible if they are:

- On the ground floor or basement levels.
- On any other level where the external sill height is less than 2 meters above the ground or adjacent surfaces (such as a flat roof or balcony).

7.1.2. Limitations on Openable Windows:

In these easily accessible areas, any openable parts of windows or ventilation openings must be designed to prevent unauthorized access. Acceptable solutions include:

- Lockable Openings: Windows should have lockable mechanisms that allow partial opening for ventilation but restrict full access from the outside.
- Secure Bars or Grilles: These can be installed to permit ventilation while physically barring entry.

- Louvered Panels or Shutters: These can provide ventilation without compromising security, especially if designed to resist forced entry.

These measures ensure that while providing effective natural ventilation for overheating mitigation, the building remains secure, safeguarding occupants and property.

7.4. Protection from Falling

Ventilation openings, particularly those located at higher levels, should be designed to prevent the risk of falls. This is crucial for windows that might be opened wide for cooling purposes. Safety features such as window restrictors, guardrails, or balustrades can be installed to ensure that openings cannot be used in a way that poses a falling hazard to occupants, especially children. The requirement for guarding states that window sills below 1100mm would need guarding to be in place; otherwise, these need to be excluded from the overheating strategy. Windows with guarding that open less than 100mm cannot be included in the mitigation strategy. Where guarding is present, this would need to meet the 1100mm standard. Where horizontal bars are used, they need to be sized to prevent passage of a 100mm sphere.

7.5. Protection from Entrapment

Design elements like louvres, shutters, or railings associated with ventilation openings should not pose a risk of entrapment. Openings should be designed to prevent fingers, limbs, or clothing from becoming caught. Adhering to safety standards regarding gap sizes and avoiding mechanisms that could trap or injure occupants is essential.

By carefully considering these factors, the overheating mitigation strategy will not only be effective in maintaining comfortable indoor temperatures but also ensure the safety, health, and well-being of building occupants.

7.6. Strategy adopted

The free areas presented within this section are calculated based on the degree of the open portion of the window. The equivalent free area (or effective opening) considers the openable area, angle of opening and associated aerodynamic effects (coefficient of discharge).

The window design has been re-created within the thermal model and is based on the planning drawings. Windows are usually modelled to open as follows:

1. Designed: to the design of an opening schedule of windows if provided.
2. Standard: to 60 degrees', which is assumed if an opening schedule is not provided.
3. Restricted: to a maximum of 100mm, which aligns with restricted window openings.
4. Unrestricted: to fully open, which is a fully opened window for full free flow air allowance, where allowed.

For this project, we are able to apply unrestricted openings. This is because all of the windows/doors have guarding that exceeds the threshold in Part K. as there no environmental noise issues nor falling from height this unrestricted strategy is adequate.

Due to windows mostly being openable, especially patio/balcony windows, the dwelling will be assessed using predominantly naturally ventilated criteria.

7.7. Results

Criteria for predominantly naturally ventilated homes					
Block	App	Zone	Criterion A (%)	Criterion B (hr)	Pass / Fail
Block 1	1	Bed1	0.74	32.52	Pass
Block 1	1	Kitchen Lounge	2.89	N/A	Pass
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Block 1	7	Bed1	0.25	23.33	Pass
Block 1	7	Bed2	0.13	23.00	Pass
Block 1	7	Kitchen Lounge	0.21	N/A	Pass
Block 1	8	Bed1	0.06	23.67	Pass
Block 1	8	Bed2	0.11	21.00	Pass
Block 1	8	Kitchen Lounge	0.21	N/A	Pass

Window Design & MVHR Spec					
Block	Flat	Zone	Window Schedule	Additional Ventilation Required	Flow Rate m3/s
Block 1	1	Bed1	Unrestricted	N	-
Block 1	1	Kitchen Lounge	Unrestricted	N	-
Block 1	2	Bed1	Unrestricted	N	-
Block 1	2	Bed2	Unrestricted	N	-
Block 1	2	Kitchen Lounge	Unrestricted	N	-
Block 1	9	Bed1	Unrestricted	N	-
Block 1	9	Bed2	Unrestricted	N	-
Block 1	9	Kitchen Lounge	Unrestricted	N	-
Block 1	7	Bed1	Unrestricted	N	-
Block 1	7	Bed2	Unrestricted	N	-
Block 1	7	Kitchen Lounge	Unrestricted	N	-
Block 1	8	Bed1	Unrestricted	N	-
Block 1	8	Bed2	Unrestricted	N	-
Block 1	8	Kitchen Lounge	Unrestricted	N	-

8. Conclusion

Under the predominantly naturally ventilated criteria of the CIBSE TM59 methodology, allowing for the deviations in methodology for Approved Document Part O compliance, the assessed rooms within the development pass the overheating assessment for all scenarios calculated, subject to the appropriate use of double glazing and openable windows.

According to the TM59 methodology, these areas would not overheat. They may experience short periods of elevated temperatures; however, this is a low enough occurrence not to be considered overheating.

It should be noted that any changes to the openable areas of windows or the fabric thermal parameters will affect the results, and further assessment will be required.

9. Sampling strategy

Section 3 of CIBSE: 2017 TM59 methodology allows sampling to be applied. This means that it is down to the person deemed as suitably qualified to select the highest risk flats to be assessed. This development is highly glazed so the flats that are the most South & West facing have been assessed.

3 Guidance

3.1 Sample size

The assessment should try to identify all the dwellings that are at risk of overheating. These are likely to be those (*a*) with large glazing areas, (*b*) on the topmost floor, (*c*) having less shading, (*d*) having large, sun-facing windows, (*e*) having a single aspect, or (*c*) having limited opening windows.

The report should justify the sample of units chosen for the assessment and explain why this is appropriate. The number analysed will depend on the scale of the development, its geographical location and the results of the modelling as they emerge. In addition, lower risk dwellings can be included for illustration of performance to this.

At least one corridor should be included in the assessment if the corridors contain community heating distribution pipework.