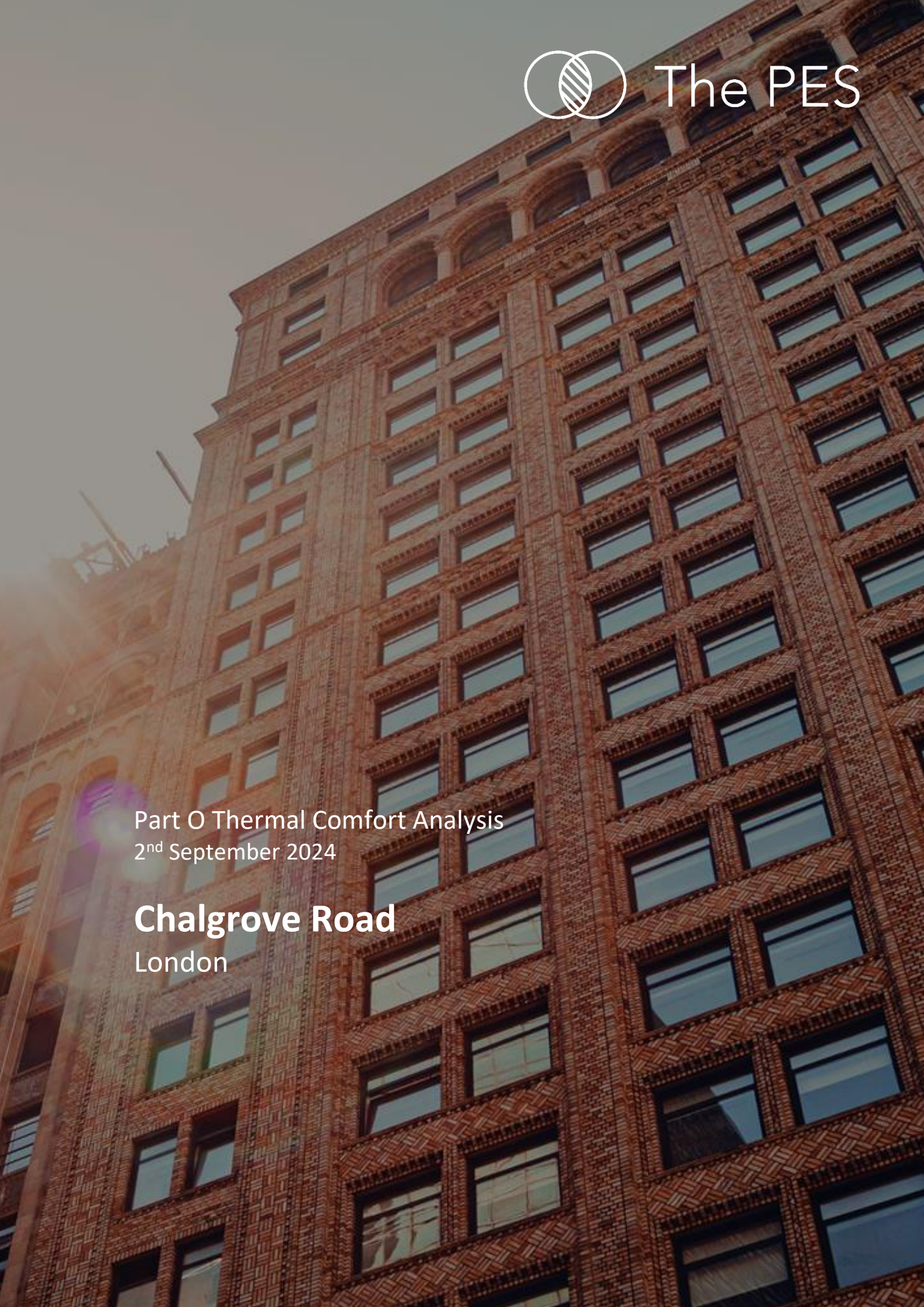
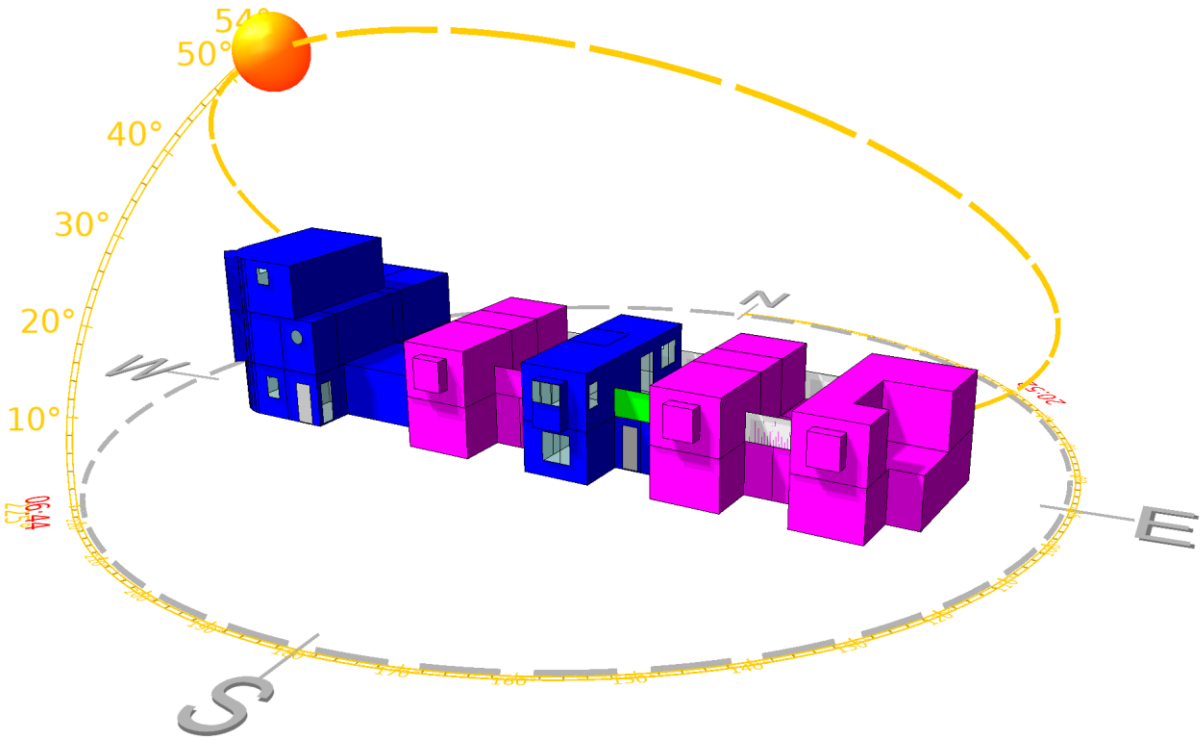


The PES

Part O Thermal Comfort Analysis
2nd September 2024

Chalgrove Road
London

Contents



1.0 Introduction

Proposed Development

The proposed development project at 46 Chalgrove Road involves the redevelopment of the existing site to provide a scheme of 5 new dwellings arranged over 2 and 3 floors.

Basis Of analysis

Dynamic Simulation Modelling (DSM) of the building has been carried out to appraise the thermal comfort likely to be experienced based on scheme design and the passive and active measures introduced to help regulate temperatures in the warmer months. The model follows the guidance of the Approved Document Part O of the building regulations 2021.

2.0 Part O Methodology

The aim of requirement O1 is to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures.
In the Secretary of State's view, requirement O1 is 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.

NOTE: The guidance and regulations are written for the purposes of protecting health and welfare. Following this guidance does not guarantee the comfort of building occupants.
In the Secretary of State's view, 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, as set out in Section 1 of AD Part O.
B. The dynamic thermal modelling method, as set out in Section 2 of AD Part O.

For this project we have looked at Method B – Dynamic Thermal Modelling.

The dynamic modelling has been undertaken in accordance with CIBSE Guidance using AM11 compliant modelling software: IES Virtual Environment 2024.0.0.0 - Apache.

The analysis has been carried out by Neil Ingham of The PES Ltd, who is suitably qualified as a Level 5 Low Carbon Energy Assessor with CIBSE accreditation – LCEA158593.

Approved Document Part O of the 2021 building regulations states that the dynamic modelling process should be carried out in accordance with CIBSE TM59, with the following limitations as set out in Section 2.6:

A. When a room is occupied during the day (8am to 11pm), openings should be modelled to do all of the following:
    I. Start to open when the internal temperature exceeds 22°C.
    II. Be fully open when the internal temperature exceeds 26°C.
    III. Start to close when the internal temperature falls below 26°C.
    IV. Be fully closed when the internal temperature falls below 22°C.
B. At night (11pm to 8am), openings should be modelled as fully open if both of the following apply.
    I. The opening is on the first floor or above and not easily accessible.
    II. The internal temperature exceeds 23°C at 11pm.
C. When a ground floor or easily accessible room is unoccupied, both of the following apply.
    I. 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
    I. At night, windows, patio doors and balcony doors should be modelled as closed.
D. An entrance door should be included, which should be shut all the time.

Weather File

Part O refers to CIBSE TM59 which states that developments should refer to the latest CIBSE design summer year (DSY) weather files and be required to pass using the DSY file most appropriate to the site location, for the 2020s, high emissions, 50% percentile scenario.

The proposed development at Chalgrove Road, within the boundaries of London, however not within the central activity zone. Following the guidance set out in TM49: Design Summer Years for London, this falls under the scope of London Heathrow weather data.

Sampling Approach

CIBSE TM59 indicates that a sample of the overall number of dwellings can be used in order to interpret the overheating risk of the overall development.

This should, however, be based on the assessor's interpretation of the dwellings that are most likely to be at risk of overheating. When trying to identify an appropriate sample, dwellings with the following criteria should be considered:

A) Large, glazed areas
B) The topmost floor
C) Less shading
D) Large, sun-facing windows
E) Single aspect
F) Limited opening windows

3.0 Project Design and Mitigation

The construction u values used for the assessment are shown below:

Construction values

Building Elements	Design Parameters
Roof	0.11 W/m^{2}k.
Exposed Floor	0.14 W/m^{2}k.
External Wall	0.14 W/m^{2}k.
Windows	1.2 W/m^{2}k.
Glazing G Value	0.57

The types of opening windows used within the assessment are detailed below:

Window Openings

Opening Type	Opening Area %	Max Opening Angle°
Side Hung GF	90	60
Hinged Door	90	90
Bifold Door	90	NA
Rooflight	90	45

In accordance with Part O the ground floor windows have been scheduled as open throughout the day with the limitations described in Section 2 of this report and closed throughout the night from 23:00 for security purposes in line with Part O.

Openable windows, have been modelled as able to open unrestricted on the basis that the design incorporates protection from falling in line with Part O.

Given the inability to open ground floor windows overnight for security purposes, the design team have included a mechanical ventilation system to supplement the opening windows throughout the day if necessary and allow for mechanical purge ventilation overnight.

Room Type	Mechanical Flow Rates	Supply Temp
Bedrooms	4ach/h	External Air
Kitchen / Living	0.3l/s/m^2	External Air
Circulation	0.3l/s/m^2	External Air
Other	0.3l/s/m^2	External Air

Part O provides suggestions for mitigation measures that are acceptable to reduce the risk of overheating; they are separated into two key categories:

<u>Limiting solar gains</u>

Solar gains in summer should be limited by any of the following means.

A. Fixed shading devices, comprising any of the following.
    I. Shutters.
    II. External blinds.
    III. Overhangs.

IV. Awnings.

B. Glazing design, involving any of the following solutions.
   I. Size.
   II. Orientation.
   III. g-value.
   IV. Depth of the window reveal.
C. c. Building design – for example, the placement of balconies.
D. d. Shading provided by adjacent permanent buildings, structures or landscaping.

Removing excess heat

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

A. Opening windows (the effectiveness of this method is improved by cross-ventilation).
B. Ventilation louvres in external walls.
C. A mechanical ventilation system.
D. A mechanical cooling system

The results show that the low g value, external shading, and large areas of openable windows with the ability to cross-ventilate, with additional mechanical ventilation is successful in limiting solar gains and removing excess heat such that the development, according to its current design is compliant with both criteria of Part O of the building regulations.

The results from the assessment are included at **Appendix A.**

Appendix A

Results

IES INTEGRATED ENVIRONMENTAL SOLUTIONS

VE 2024.0.0.0

Approved document O: overheating risk in residential buildings

Results file name:	ChalgroveRoad_PartO.aps	Summer Elevated Air Speed:	0.1m/s
Weather file:	London_LHR_DSY1.epw	Occupant category:	Category II (normal)

CIBSE TM59 overheating methodology for predominately nat vent rooms assesses against two criteria, (a) and (b) (for Category 1 occupancy criterion A Tmax is reduced by 1 ^{o}K):
- Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1^{o}K 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^{o}C for more than 1% of annual hours (33 hours is therefore recorded as a fail).
Approved document O section 2.6 applies limits to CIBSE TM 59 section 3.3 (openings); these requirements are applied by appropriate assignment of Macroflo types / scripted profiles in the model (see room data tab).
CIBSE TM59 overheating methodology for predominately mech vent rooms states the operative temperature of all rooms shall not exceed 26^{o}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^{o}C is exceeded for more than 3% of the total annual hours this should be identified as a significant risk.

Natvent room name	Natvent criterion (a) result	Natvent criterion (b) result	Pass/Fail
BEDROOM 1 - UNIT 1	Pass	Pass	Pass
BEDROOM 1 - UNIT 4	Pass	Pass	Pass
BEDROOM 2 - UNIT 4	Pass	Pass	Pass
BEDROOM 3 - UNIT 4	Pass	Pass	Pass
LKD1 - UNIT 1	Pass	NA	Pass
LKD3 - UNIT 4	Pass	NA	Pass

Mechvent room name	Pass/Fail

Corridor name	Significant overheating risk?
CIRCULATION - GF	No
CIRCULATION - FF	No

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VE 2024.0.0.0

Approved document O: overheating risk in residential buildings - Predominately nat vent rooms criterion (a)

ChalgroveRoad_PartO.aps
London_LHR_DSY1.epw

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1°K 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 ΔT ≥ 1°K	% Occupied hours ΔT ≥ 1°K	Pass/Fail
BEDROOM 1 - UNIT 1	3672	14.7	0.4	Pass
BEDROOM 1 - UNIT 4	3672	18.4	0.5	Pass
BEDROOM 2 - UNIT 4	3672	33.0	0.9	Pass
BEDROOM 3 - UNIT 4	1989	13.9	0.7	Pass
LKD1 - UNIT 1	1989	29.8	1.5	Pass
LKD3 - UNIT 4	1989	25.9	1.3	Pass

IES INTEGRATED ENVIRONMENTAL SOLUTIONS

VE 2024.0.0.0

Approved document O: overheating risk in residential buildings - Predominately nat vent rooms criterion (b)

ChalgroveRoad_PartO.aps
London_LHR_DSY1.epw

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 NA values.

Room Name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Pass/Fail
BEDROOM 1 - UNIT 1	10	13	23	Pass
BEDROOM 1 - UNIT 4	11	18	29	Pass
BEDROOM 2 - UNIT 4	9	15	24	Pass
BEDROOM 3 - UNIT 4	10	14	24	Pass
LKD1 - UNIT 1	NA	NA	NA	NA
LKD3 - UNIT 4	NA	NA	NA	NA

Approved document O: overheating risk in residential buildings - Predominately mech vent rooms

VE 2024.0.0.0

ChalgroveRoad_PartO.aps
London_LHR_DSY1.epw

CIBSE TM59 overheating methodology for predominately 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	Pass/Fail
No mech vent rooms to be analys	NA	NA	NA

Approved document O: overheating risk in residential buildings - Communal corridors

VE 2024.0.0.0

ChalgroveRoad_PartO.aps
London_LHR_DSY1.epw

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 the total annual hours, then this should be identified as a significant risk within the TM59 overheating report.

Corridor name	No. hours > 28°C	% Annual hours > 28°C	Significant overheating risk?
CIRCULATION - GF	19.0	0.2	No
CIRCULATION - FF	21.0	0.2	No