92 South Hill Park

Hampstead, London NW3 2SN

Part O

CIBSE TM59 Overheating Assessment

Elmstead Energy Assessments & Building Services
Suite 3 Aster House, Lanswoodpark
Elmstead Market, Colchester
Essex, CO7 7FD
Registered Company: 11606546

Document Issue Record

This document has been revised and issued as below:

Issue	Date	Comments
-	27.07.2023	Original

Disclaimer

This report has been prepared by EEABS (Elmstead Energy Assessments & Building Services Ltd), using all reasonable skill, care, and diligence using evidence supplied to us. We disclaim any responsibility for misinformation or inaccurate information supplied by a third party as part of this report. This report is confidential to the client and may not be copied or reproduced in whole or in part for any purpose, without express permission of EEABS.

EEABS does not accept any liability in negligence for any matters arising outside of the agreed scope of works. Unless otherwise agreed, the copyright of this document and all other Intellectual Property Rights always remain the property of EEABS.

Contents

Figures

Tables

Appendices

1.0 Executive Summary

A Dynamic Simulation Thermal Model has been created for the existing dwelling, 92 South Hill Park, Hampstead to determine if the Habitable rooms including Kitchen/Living and bedroom areas of the Dwelling satisfies a Part O CIBSE TM 59 Overheating Risk Assessment.

The overheating assessment has been carried out under the CIBSE TM59 Methodology and results have been produced for the years 2020.

Table 1 - Summary of CIBSE TM59 Overheating Assessment Results

Number of Rooms Assessed	Number of Rooms Passing CIBSE TM59
	DSY1 2020
10	10

The summary of results shows that none of the habitable rooms would satisfy the overheating criteria under the DSY1 2020 weather data, therefore failing the requirements of CIBSE TM59.

We therefore recommend having comfort cooling within the habitable rooms to help overcome the overheating.

2.0 Introduction

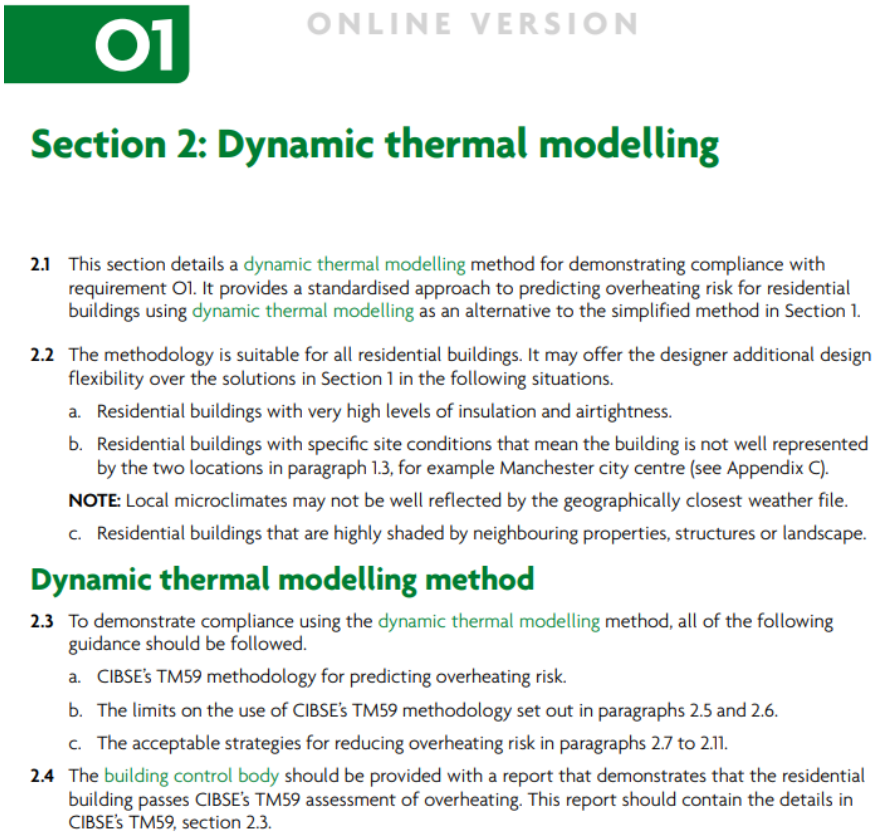
EEABS (Elmstead Energy Assessments & Building Services) were instructed to carry out a Part O CIBSE TM59 Overheating Risk Assessment for the existing dwelling, 92 South Hill Park, Hampstead

The purpose of the overheating assessment is to provide early-stage design advice as to the possibility of overheating occurring within the dwellings. A dwelling shown to be satisfying the CIBSE TM59 criteria can be described as providing a comfortable internal environment, within sensible limits, for the occupants.

Any room that maybe initially failing the criteria can have mitigating methods for reducing the amount of overheating investigated, these can then be incorporated early in the design stage of the project to ensure that a pass is achieved.

CIBSE TM59 is one way of complying with Part O of the building regulations and is recommended by The Good Homes Alliance as one method of providing overheating guidance within new homes.

As CIBSE TM59 requires the use of Dynamic Simulation Modelling (DSM) software capable of simulating the temperature every hour in a year and as it uses location specific CIBSE DSY (Design Summer Year) weather data, it is thought to be far more accurate than other types of overheating assessments such as SAP, PHPP, or the Home Quality Mark.



O1 ONLINE VERSION

Section 2: Dynamic thermal modelling

2.1 This section details a dynamic thermal modelling method for demonstrating compliance with requirement O1. It provides a standardised approach to predicting overheating risk for residential buildings using dynamic thermal modelling as an alternative to the simplified method in Section 1.

2.2 The methodology is suitable for all residential buildings. It may offer the designer additional design flexibility over the solutions in Section 1 in the following situations.

a. Residential buildings with very high levels of insulation and airtightness.

b. Residential buildings with specific site conditions that mean the building is not well represented by the two locations in paragraph 1.3, for example Manchester city centre (see Appendix C).

NOTE: Local microclimates may not be well reflected by the geographically closest weather file.

c. Residential buildings that are highly shaded by neighbouring properties, structures or landscape.

Dynamic thermal modelling method

2.3 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. The limits on the use of CIBSE's TM59 methodology set out in paragraphs 2.5 and 2.6.

c. The acceptable strategies for reducing overheating risk in paragraphs 2.7 to 2.11.

2.4 The building control body should be provided with a report that demonstrates that the residential building passes CIBSE's TM59 assessment of overheating. This report should contain the details in CIBSE's TM59, section 2.3.

Figure 1 – Part O Section 2 Building Regulations

2.1 Development Proposal

The proposed dwelling is located at 92 South Hill Park, Hampstead.

2.2 Architectural Information Provided

This assessment has been based on drawings and information provided to us by our client. Location plan of the development can be seen below, please see the architects' submitted drawings for full details of the development.

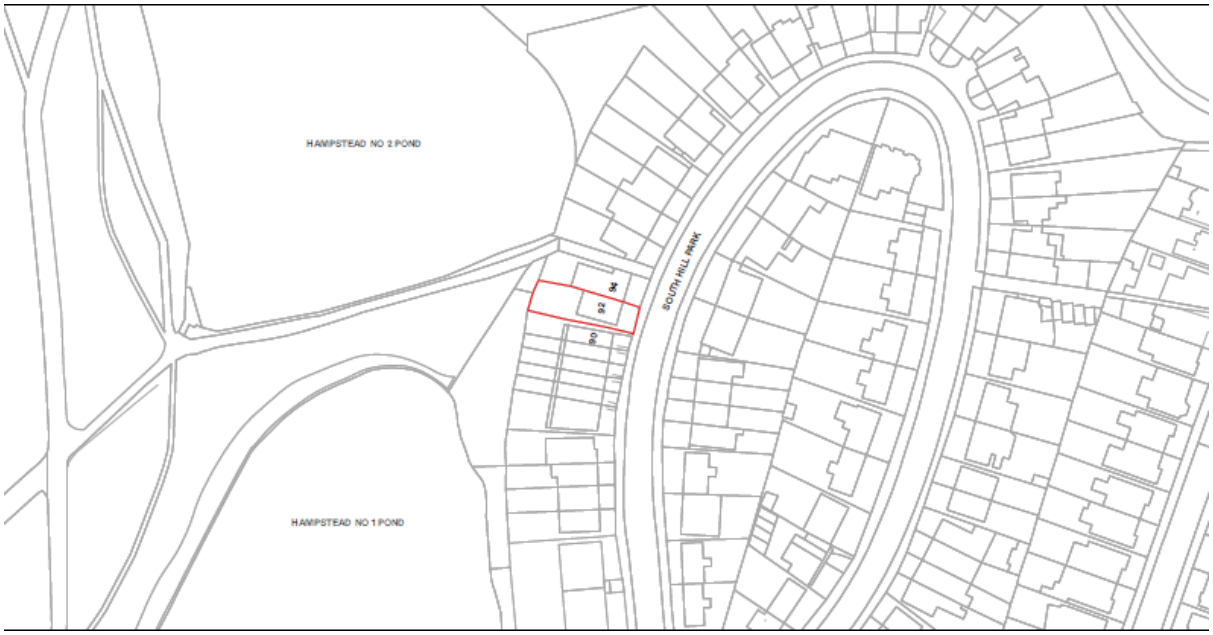


Figure 2 - Location Plan

2.3 Assessment Limitations

The appraisals within this report are based on the CIBSE TM59 methodology and should not be understood as an exact calculation of internal temperatures or overheating experienced. Passing of CIBSE TM59 criteria does not mean that the spaces will be comfortable all year round, but rather that the overheating risk is limited to an acceptable level when using pre-defined parameters.

Weather conditions at the site may be different to those within the weather data used and occupants may behave differently than suggested within this report, for example not opening windows when required or having higher internal heat gains than allowed for. With the impacts of climate change increasing, the occurrence of extreme heat wave events is also likely to escalate.

Overheating can be subjective with vulnerable occupants such as infants or the elderly more likely to be affected. If an occupant is suffering from the effects of overheating, please do not hesitate to seek medical help.

All details outlined in this assessment have been based, wherever possible, on those provided by the client or sensible design assumptions. These should nevertheless be reviewed in detail with any discrepancies highlighted by the design team.

3.0 Dynamic Simulation Modelling

EDSL TAS Dynamic Simulation Modelling software has been used for the CIBSE TM59 Overheating Assessment. The EDSL TAS software has been approved by the Department for Communities and Local Government (DCLG) for use as a Dynamic Simulation Model (DSM) software package.

As part of its approval process, the TAS software had to demonstrate that it satisfies all of the tests and other requirements defined within sections 2 and 3 of the documents “CIBSE TM33:2006, CIBSE standard tests for the assessment of building services design software”. The thermal modelling has also been carried out in accordance with CIBSE AM11 Building Energy and Environmental Modelling.

The following images are taken from the EDSL TAS software used for the overheating assessment.

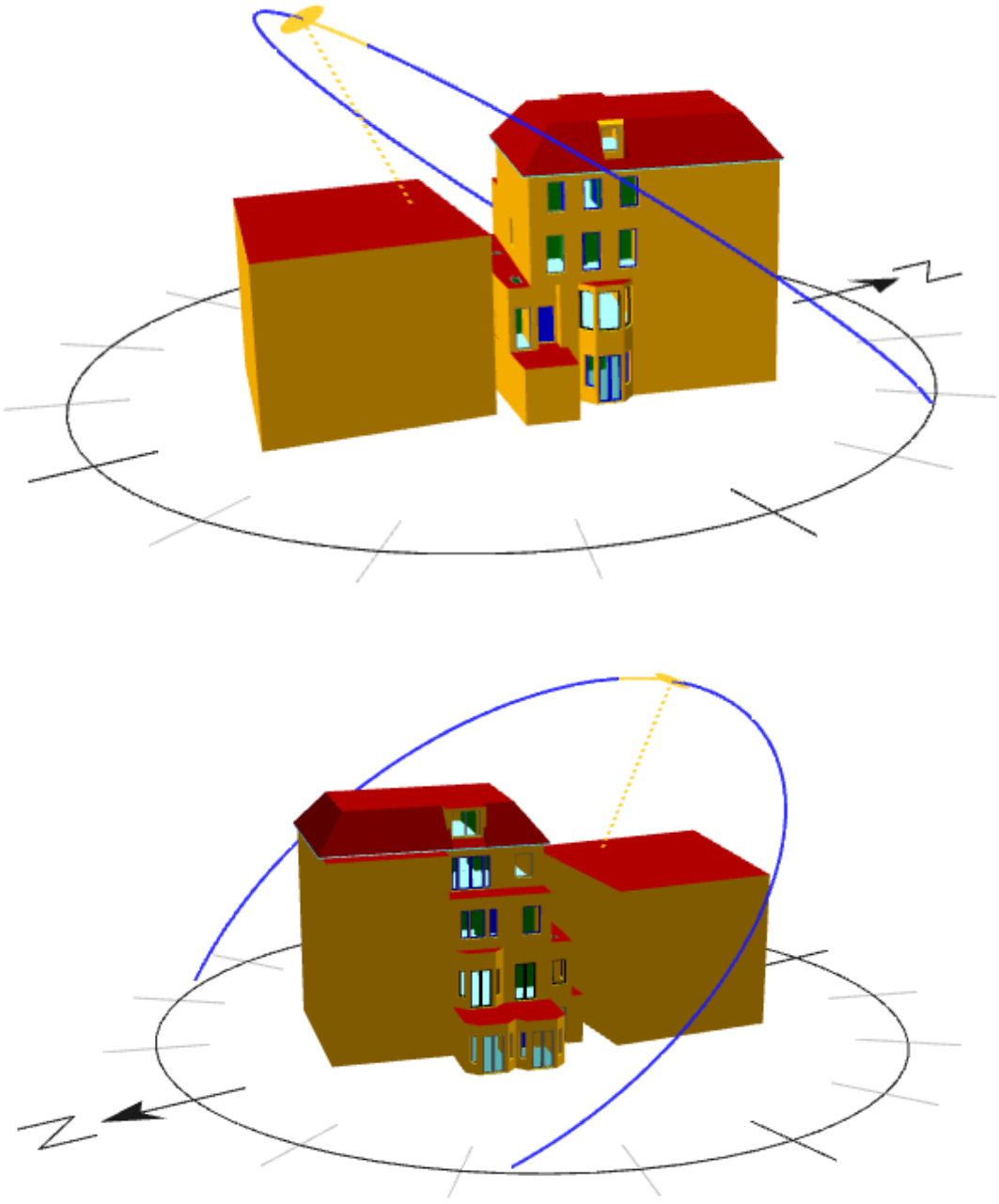


Figure 3 - Views of the EDSL TAS Dynamic Simulation Model

4.0 Model Details and Assumptions

The following construction, glazing, and building details have been used within the EDSL TAS computer model to achieve a pass under the CIBSE TM59 Assessment.

4.1 Weather Data

The proposed development is in Hampstead, NW3 2SN. CIBSE provide weather data for 14 different locations across the UK, with 3 separate weather files for London. We believe the most appropriate weather data to use for the proposed building would be London (Weather Central) weather data.

For the TM59 overheating assessment Design Summer Year (DSY1) High emissions, 50th Percentile weather data for the year 2020 must be used.

4.2 Constructions

Construction details for the building were assumed as below. For more information see architects' drawings.

Table 2 - Construction Details

Construction	U-Value (W/m^2.K)
New External Cavity Walls	0.18
New Roof	0.14-0.15
New Ground Floor	0.16

The existing house has masonry brick walls with 1x K118 Kooltherm insulated plasterboard 82.5mm (70mm rigid insulation with 12.5mm plasterboard) applied on external walls.

4.3 Glazing

Glazing U-Values for the development were also assumed as below.

Table 3 - Glazing Details

Element	Glazing Type	Overall U-Value (W/m^2.K)	Solar Gain G-Value
Glazing	Double Glazing	1.4	0.63
Roof Lights	Double Glazing	1.4	0.63

4.4 Infiltration

We have assumed an infiltration rate of 0.35 ACH.

4.5 Natural Ventilation

A summary of the natural ventilation openings and their profiles used within the model can be seen below.

- An infiltration rate of 0.35 ACH has been assumed in every room.
- All openable portions of the Living area sash windows have been modelled to open 50%.
- All openable portions of the Bedroom sash windows have been modelled to open 50%.
- All openable portions of the Sliding/Patio Doors have been allowed to open fully if required.
- Windows/Glazed doors serving Living/Kitchen/Dining areas were assumed to be openable when required during the hours of 8am - 11pm. Outside of these hours they would be closed for security purposes.
- At night (11pm to 8am), The Bedroom Windows are modelled as open if the internal temperature exceeds 23°C at 11pm.
- Openable Windows in all other rooms are assumed to start to open once the internal temperature reaches 22°C and fully open at 26°C during the hours of 8am - 11pm
- Internal Doors were assumed to be openable during the hours of 8am - 11pm to allow cross ventilation between rooms, outside of these hours they would be closed for privacy purposes.

4.6 Mechanical Ventilation

Local extract from wet rooms only.

4.7 Occupancy and Internal Heat Gains

As each room within a dwelling will be used differently depending on the occupant's requirements, CIBSE TM59 provides a mandatory set of occupancy profiles and internal heat gains to be used across all assessments. This ensures that each dwelling is assessed on a level basis and allows the merits of any overheating reduction techniques to be evaluated effectively.

Dependent on the type of unit (Studio, 1 Bedroom, 2 Bedroom or 3 Bedroom) and the type of room being assessed (Living Room, kitchen, Double or Single Bedroom), TM59 provides a full list of occupancy and heat gain profiles to use within the computer model.

Internal lighting gain is assumed to be 2 W/m2 in all occupied rooms.

Unit/ room type	Occupancy	Equipment load
Studio	2 people at all times	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 5% 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 gain 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

Figure 4 - Occupancy and Heat Gain Profiles from CIBSE TM59 Table 2

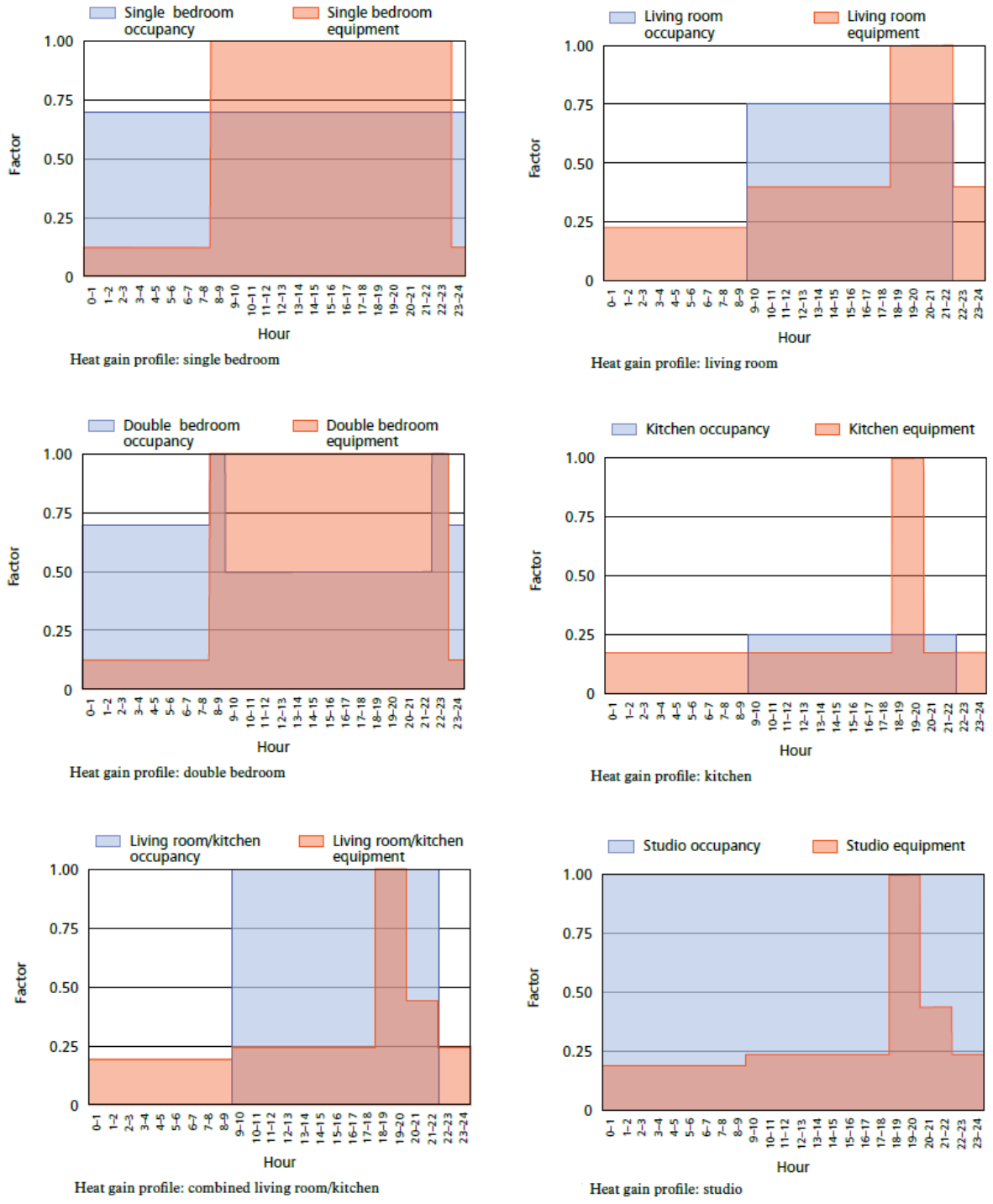


Figure 5 - Graphs of the CIBSE TM59 Heat Gain Profiles for Different Room Types

5.0 CIBSE TM59 Overheating Methodology

CIBSE TM59 is the very latest design methodology provided by CIBSE (Chartered Institute of Building Services Engineers) for the assessment of overheating risk in homes.

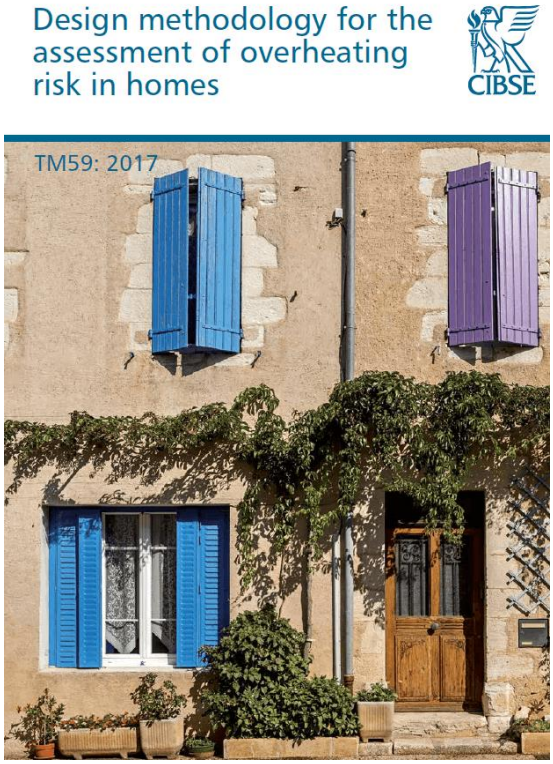


Figure 6 - CIBSE TM 59

In order to comply with the CIBSE TM59 Overheating Methodology the following two criteria need to be passed.

- For Living Rooms, Kitchens, and 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.
- For Bedrooms only – To guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10pm to 7am shall not exceed 26°C for more than 1% of annual hours.

For predominantly mechanically ventilated homes, the following criteria needs to be met.

- All occupied rooms should not exceed an operative temperature of 26°C for more than 3% of the annual occupied hours.

As the dwellings will be Predominantly naturally ventilated, these are the criteria that needs to be met. The above criteria must be passed using DSY1 2020 weather data, other weather data simulating different types of summers or future years can also be used but these are not required to show compliance with CIBSE TM59.

6.0 Overheating Assessment Results

The results of the CIBSE TM59 overheating assessments carried out, for the development as described throughout this report, can be seen below with more detailed results found within Appendices.

6.1 CIBSE TM59 Results

Table 4 - Summary of CIBSE TM59 Overheating Assessment Results

Number of Rooms Assessed	Number of Rooms Passing CIBSE TM59
	DSY1 2020
10	10

The summary of results shows that none of the habitable rooms would satisfy the overheating criteria under the DSY1 2020 weather data, therefore failing the requirements of CIBSE TM59.

We therefore recommend having comfort cooling within the habitable rooms to help overcome the overheating.

Appendices

Appendix A - CIBSE TM59 Overheating Results DSY1-2020

Zone Name	Room Use	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Annual Night Occupied Hours for Bedroom	Max Exceedable Night Hours	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms.	Result
LGF - Bar	Living	1989	59	70	N/A	N/A	N/A	Fail
LGF - Kids Room	Living	1989	59	72	N/A	N/A	N/A	Fail
LGF - Office / Guest Bedroom	Bedroom	3672	110	47	3285	32	33	Fail
GF - K/L/D	Living Room / Kitchen	1989	59	112	N/A	N/A	N/A	Fail
FF - Bed 1	Bedroom	3672	110	133	3285	32	30	Fail
FF - Bed 2	Bedroom	3672	110	125	3285	32	29	Fail
FF - Bed 3	Bedroom	3672	110	207	3285	32	69	Fail
FF - Bed 4	Bedroom	3672	110	96	3285	32	63	Fail
SF - Master Bed	Bedroom	3672	110	128	3285	32	9	Fail
TF - Office	Living	3672	110	143	N/A	N/A	N/A	Fail