TM59 Certificate of Assessment

Plot 007 - Fitzroy Hotel - East

Certificate Number: 60foDFjqkl-f4eL7Y-tZV2Nj2YexQ

Assessor Name: Luca Nicholls

Date of Assessment: 5th August 2024

Developer: KNT Development

Site: Fitzroy Hotel

Plot Orientation: East

Drawing Ref: 5320-113 (114, 115, 116)

Weather File Used: London_LWC_DSY1_2020High50

Software Used: DesignBuilder v7.2.0.032

Assessment Results

Room	Window Closure: Noise, Security, Pollution	Overheating Solution	Criterion A	Criterion B	Result
Studio 7	-	2.2 kW cooling Top Sash fully openable	1.79	4.67	Pass

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The password to access this data is: **9999508**

Briary Energy Ltd. has demonstrated competence in the field of TM59 and the use of DesignBuilder. While we acknowledge their expertise, Kaizen Certification does not accept responsibility or liability for the content, accuracy, or any other aspect of the information presented within this assessment.

Scope and Exclusions

Briary Energy Ltd has been commissioned by KNT Development to conduct an overheating analysis of Fitzroy Hotel. This analysis aims to provide design stage guidance and enhance occupant comfort levels. The adoption of thermal modelling, specifically TM59, is in line with the requirements of Part O of the UK Building Regulations. It is either because the simplified method was not deemed suitable, or there was a failure in compliance using the simplified method. Another rationale for adopting TM59 might include concerns related to noise, security, or pollution.

All conclusions and recommended approaches are directly shaped by the input data specified in this document. Variations to these inputs might result in differing outcomes.

It's vital to recognise that any modelling process necessitates certain assumptions and approximations. The details of these are provided in this report for transparency.

The findings are based on specialised computer modelling software that takes into account climatic conditions and typical usage patterns. However, these might not precisely mirror real-world scenarios. As such, the results should be seen as predictions following the TM59 methodology, rather than as definitive real-life outcomes.

Criteria for defining overheating - Natural Ventilation

According to the CIBSE TM59: 2017 – Design methodology for the assessment of overheating risk in homes, to reduce the risk of overheating the space has to comply with the following criteria:

- **Criterion A** For living rooms, kitchen and bedrooms: the number of hours during which ?T is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 per cent of occupied hours (Same as Criterion 1 of TM52).
- **Criterion B** For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26°C for more than 1% of the annual hours (1% of the annual hours between 22:00 and 07:00, equivalent to 32 hours).

Bedroom Window Considerations for TM59

For properties with bedrooms located on the ground floor or those with windows that can be easily accessed, adhere to the following guidelines:

- **Daytime:** Bedroom windows, patio doors, or balcony doors can be modelled as open, provided it's secure to do so.
- **Nighttime:** Due to concerns related to noise, security, or pollution, it's recommended to model ground floor bedroom windows, patio doors, and balcony doors as closed.

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Construction Details

External Walls: 2.1 W/m².K

Floor: 1.2 W/m².K

Roof: 0.74 W/m².K

Window U-Value: 5.1 W/m².K

Window G-Value: 0.85

Thermal Mass Details

Thermal Mass Construction Type	Area Applied	Thermal Mass
External Wall (masonry with plasterboard lining)	All	Lightweight
Internal walls (plasterboard partitions)	All	Lightweight
Internal ceiling (plasterboard)	All	Lightweight

Thermal Mass: In the context of building design, thermal mass refers to the capability of a material to absorb, store, and release heat energy. High thermal mass materials can absorb heat during the day and release it during the night, helping to naturally regulate indoor temperatures and reduce the demand on HVAC systems. Conversely, lightweight constructions typically have lower thermal mass and are less effective at storing and releasing heat.

In the provided table, the thermal mass characteristics of various construction types within the development are detailed. The constructions are labelled as 'Lightweight', indicating that they have a lower capacity for heat storage and release. Such lightweight constructions might have faster response times to heating or cooling, but they do not offer the benefits of heat storage and delayed release that heavyweight constructions do. Therefore, their impact on the building's overall thermal performance, especially in mitigating overheating, should be carefully considered in a TM59 assessment.

Model Details

Details of the occupancy profiles used: DesignBuilder TM59 Occupation Profiles

Details of the equipment profiles used: DesignBuilder TM59 Equipment Profiles

Details of the opening profiles used: DesignBuilder TM59 Opening Profiles

Infiltration Rates Assumed: Approx. 15 m³/h/m² @50pa

Free Area: Free Area has been calculated assuming a coefficient of discharge (Cd) of 0.62. Each openings free area is individually calculated.

Windows: Where windows are shown as openable these form part of the overheating mitigation strategy and are to meet the protection from falling guidance within Approved Document O.

Doors: Internal doors are modelled as being closed at night in line with CIBSE TM59.

Mechanical Supply/Extract: dMEV

Lighting: Part L compliant scheme.

Weather File Used

London_LWC_DSY1_2020High50

Closest Weather Data Set London Weather Centre
2nd Closest Weather Data Set Heathrow- 22km

Thermal Comfort Category

Based on CIBSE TM52 (2013): Category II (Normal expectation)

Approved Document O: Overheating Regulations

Approved Document O sets out building regulation requirements for mitigating overheating within new build dwellings. It provides the following directives:

Requirement O1:

Requirement O1 is satisfied when a building is designed and constructed to accomplish both:

1. Limiting unwanted solar gains in summer.
2. Providing an adequate means of removing excess heat from the indoor environment.

NOTE: The guidance and regulations are drafted to safeguard health and welfare. Adhering to this guidance does not ensure the comfort of building occupants.

Compliance Methods:

In the Secretary of State's perspective, adherence to requirement O1 can be shown by employing one of these methods:

1. The simplified method for limiting solar gains and ensuring a means of heat removal.
2. The dynamic thermal modelling method.

For this development, the proposed assessment approach is the **dynamic thermal modelling**. According to Approved Document O, compliance through this method is realised by following the guidelines below:

Dynamic Thermal Modelling Guidelines:

To showcase compliance with the dynamic thermal modelling method, the subsequent guidelines must be observed:

1. CIBSE's TM59 methodology for predicting overheating risk.
2. The restrictions applied to CIBSE's TM59 methodology.
3. Recommended strategies for curtailing overheating risk.

The building control body should receive a report demonstrating that the residential structure meets CIBSE's TM59 criteria for overheating evaluation. This report encapsulates details as outlined in CIBSE's TM59, section 2.3.

Internal Conditions

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)	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

The table presented above outlines the internal gains associated with different living spaces, considering occupant activity patterns and appliance loads. This data is instrumental in predicting the thermal performance of residential units:

- **Living Spaces Classification:** The first column categorises the residential areas based on the space's intended function and capacity, ranging from studio apartments to communal corridors.
- **Occupant Activity:** The second column provides a detailed breakdown of anticipated human thermal gains. The gains differ during the day, considering typical occupancy patterns and varying metabolic rates.
- **Appliance Loads:** The third column lists the anticipated electrical loads from appliances and equipment in the living space. The information takes into account peak usage times and base loads, presenting a realistic scenario of energy consumption.

These gains are key in TM59 assessments to ensure thermal comfort and reduce overheating risks in living spaces.

KAIZEN CERTIFICATION

Results of Analysis

Room	Window Closure: Noise, Security, Pollution	Overheating Solution	Criterion A	Criterion B	Result
Studio 7	-	2.2 kW cooling Top Sash fully openable	1.79	4.67	Pass

Overall Assessment

Thermal Comfort Assessment & Compliance

The building, as designed, adheres to the TM59 thermal comfort criteria across all the evaluated zones. By adopting both passive and active design measures, the scheme effectively mitigates overheating risks. The simulation results affirm the scheme's full compliance with overheating requirements stipulated by CIBSE TM59 under the current weather conditions.

Key Design Measures:

Informed by the local context, the proposal integrates both passive and active design strategies:

- **Energy Efficiency:** The recommendation includes energy-efficient lighting and appliances, which help minimise internal heat gains.
- **Enhanced Building Fabric:** Insulation levels exceed Building Regulations standards, coupled with glazing solar factors as low as 0.85, curtailing solar gains.
- **Mechanical Ventilation:** Adequate Flow Rate and Air Changes per Hour (ACH) have been specified to ensure optimal indoor air quality.
- **Specialised Solutions:** dMEV are designated for all wet rooms.

Part O Compliance Details

2b.1 Modelling details	
Dynamic software name and version	DesignBuilder v7.2.0.032
Weather file location used, including any additional, more extreme weather files	London_LWC_DSY1_2020High50
Number of sample units modelled, including an explanation of why the size/selection has been chosen	1
2b.2 Modelled occupancy	
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6?	Yes
Details of the occupancy profiles used	DesignBuilder TM59 Occupation Profiles
Details of the equipment profiles used	DesignBuilder TM59 Equipment Profile
Details of the opening profiles used	DesignBuilder TM59 Opening Profiles
2b.3 Modelled overheating mitigation strategy	
Free areas	Free Area has been calculated assuming a coefficient of discharge (Cd) of 0.62. Each opening's free area is individually calculated.
Infiltration and mechanical flow rates	Wet Rooms - dMEV
Window g-value	0.85
Shading strategy	N/A
Mechanical cooling	N/A
2b.4 Modelling results	
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6?	Yes
2b.5 Designer's declaration	
Has the building construction proposal been modelled accurately?	Yes
Assessors name	Luca Nicholls
Assessors organisation	Briary Energy Ltd
Assessor's signature	Luca Nicholls
Registration number (if applicable)	KAZN000005
Date of design	05/08/2024