



Old Hale Way Ickleford, SG5

TM59 Overheating Risk Analysis

Job No: 7208

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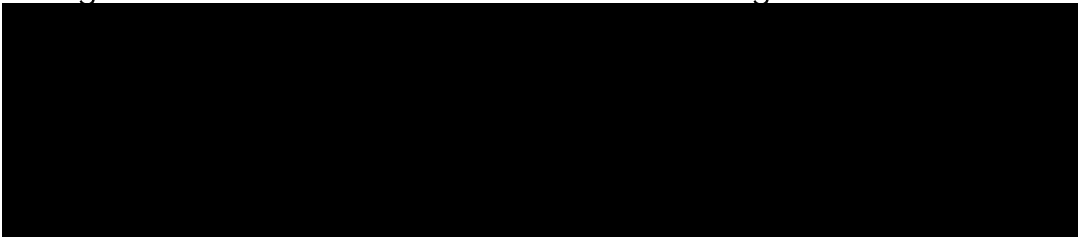
Dated:

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1.0 Introduction

- 1.1 T16 Design has been appointed to produce this Overheating Risk Analysis report for the proposed development Old Hale Way, Ickleford, Hitchin, SG5.
- 1.2 An assessment proposed dwelling has been undertaken using the parameters described in CIBSE TM59 guidance.
- 1.3 The purpose of the analysis is to demonstrate that suitable summertime indoor temperatures within the dwellings units will be met, in order to satisfy the requirements of thermal comfort metrics identified in the CIBSE TM59 guidance,
- 1.4 The assessment has been undertaken in line with national guidance and industry best-practice, using advanced computer simulation software (Design Builder with EnergyPlus Simulation module).
- 1.5 TM59 requires the use of location-specific modelling, and the assessment of the internal temperature at hourly intervals throughout the year.
- 1.6 It is therefore a more detailed and accurate assessment than those provided by, for example the Simplified Overheating Method.
- 1.7 The results show that all of the assessed rooms meet the CIBSE TM59 guidance.

2.0 Methodology

- 2.1 A dynamic thermal simulation of the proposed dwelling has been undertaken based upon data provided by the SAP assessment, and details provided by the Architect.
- 2.2 The criteria for compliance with TM59 are divided between dwellings which are predominately naturally ventilated and those which are mechanically ventilated.
- 2.3 The dwellings assessed within this report have been assessed as naturally ventilated.
- 2.4 Given the complexity of the factors (i.e., heat gains, occupancy patterns, orientation, layout, shading strategy and ventilation method). Which influence overheating, a standardised methodology is used to assess risk.
- 2.5 TM59 proposes the following steps for all overheating assessments for all residential building types:
- 2.6 Building constructions should be modelled as proposed, accurately reflecting thermal properties such as thermal mass, insulation and solar transmittance for glazing.
 - Standard profiles should be applied for occupancy, lighting and equipment gains.
 - Pipework and equipment should be included in the model.
 - Operable windows should be included in the model.
 - Any internal or external shading provision should be included in the model.
 - Air speed assumptions should be based on the guidance.
 - The weather file used for the methodology should be the CIBSE DSY1 (design summer year) file most appropriate for the site location for the 2020s, high emissions, 50% percentile scenario.
 - The assessment should be undertaken using hourly dynamic simulation modelling, which includes all the relevant features of the building

2.0 Methodology

2.7 The TM59 criteria for naturally ventilated buildings is as follows:

Criterion A:

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.

Criterion B:

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.

2.8 Where Delta T (ΔT) is defined as the difference in temperature between two measuring points.

2.0 Methodology

2.10 In addition to the targets set out within CIBSE TM59 Part O of the building regulations require additional criteria to limit choices available to the assessor when running the simulations these are as follows:

2.10.1 When the room is occupied during the day (8am-11pm), openings should be modelled to do the following:

- Start to open when the internal temperature exceeds 22°C.
- Be fully open when the internal temperature exceeds 26°C.
- Start to close when the internal temperature falls below 26°C
- Be fully closed when the internal temperature falls below 26°C
- At night (11pm to 8am openings should be modelled as fully open if both of the following apply:
 - The opening is on the first floor or above and not easily accessible.
 - The internal temperature exceeds 23°C at 11pm

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

- In the day, windows, patio doors, balcony doors, should be modelled as if this can be done securely, following the guidance in paragraph 3.7, Approved Document O.
- At night, windows, patio doors, and balcony doors should be modelled as closed
- An entrance door should be include, which should be shut all the time.

3.0 Modelling & Data Sources

- 3.1 The first stage of the analysis is to create the analysis mode; this is done in Design Builder V 7.3.0.35. Design Builder is a fully dynamic analysis tool.
- 3.2 Each habitable room has been assessed.
- 3.3 A 3D thermal model is of the proposed development has been created based on the architectural drawings to ensure accurate layouts, orientation, opening sizes and aspect.
- 3.4 The 3D model is shown below.

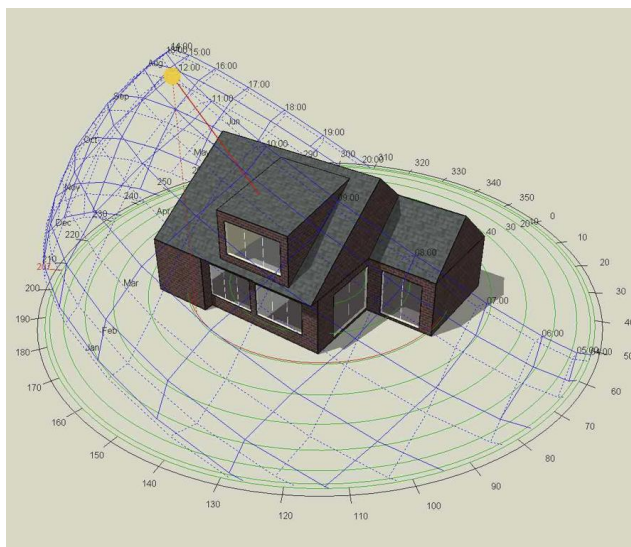


Figure 1 –Sun path Diagram

- 3.5 The majority of the glazing faces west and east.
- 3.6 Information on the properties has been provided to us by the design team in the form of drawings of the proposal along with details of the proposed construction and HVAC specification which have been agreed between the developer, Architect, and SAP assessor.

4.0 TM59 Input Data and Fabric Parameters

- 4.1 For this analysis, Dynamic Simulation Modelling (DSM) has been using CIBSE TM59 Methodology and CIBSE Guide A which sets out load profiles and occupancy patterns.
- 4.2 The occupancy and internal gain profiles are based up on methodology described in CIBSE TM59 according to usage, which can be seen below.

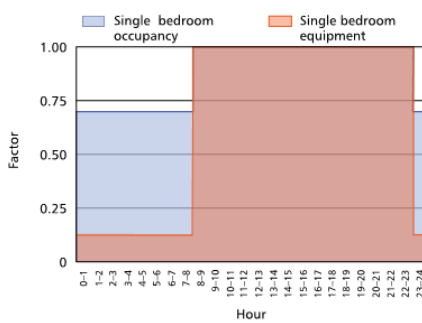


Figure 2 Heat gain profile: single bedroom

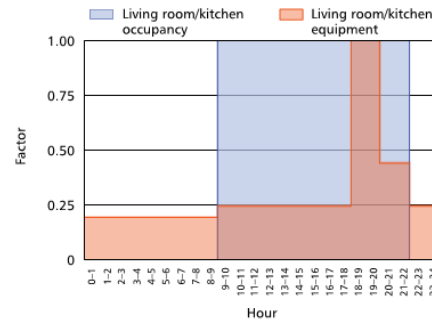


Figure 4 Heat gain profile: combined living room/kitchen

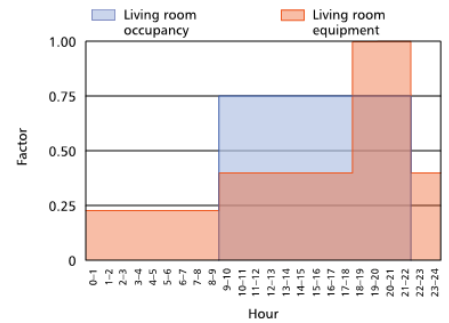


Figure 5 Heat gain profile: living room

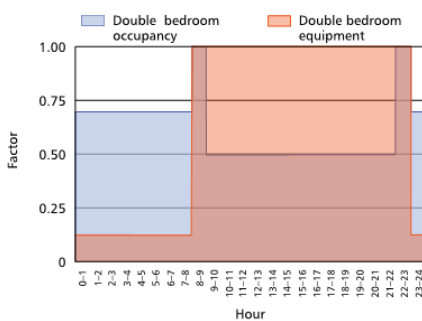


Figure 3 Heat gain profile: double bedroom

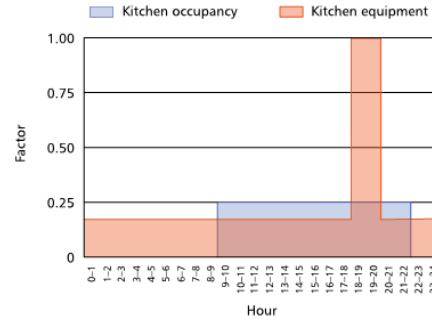


Figure 6 Heat gain profile: kitchen

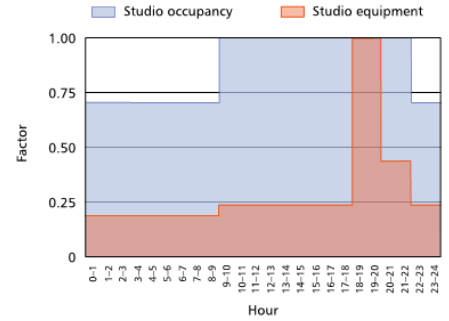


Figure 7 Heat gain profile: studio

4.0 TM59 Input Data and Fabric Parameters

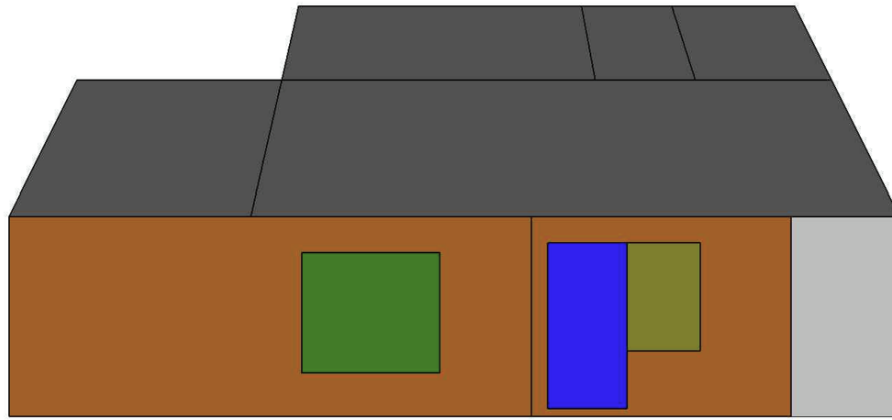
- 4.3 Based on information provided by the architectural drawings, the specification for windows and security concerns 5 opening types have been types modelled. These are detailed in the table below.

Opening Type	Opening Category	Openable Area (%)	Opening Angle	Window Key
Openable Windows side hung	ADO (Daytime Open – Security Restrictors for Nighttime Ventilation)	30	15	
Openable Windows side hung	ADO (Daytime Open – Nighttime Open)	60-85	90	
Bathroom Windows (Frosted)	ADO (Daytime Open – Nighttime Open)	40	35	
Glazed Bifold Doors	ADO (Daytime Open, following Occupancy)	95	Sliding	
Entrance Doors (Always Shut)	Always Shut	100	90	

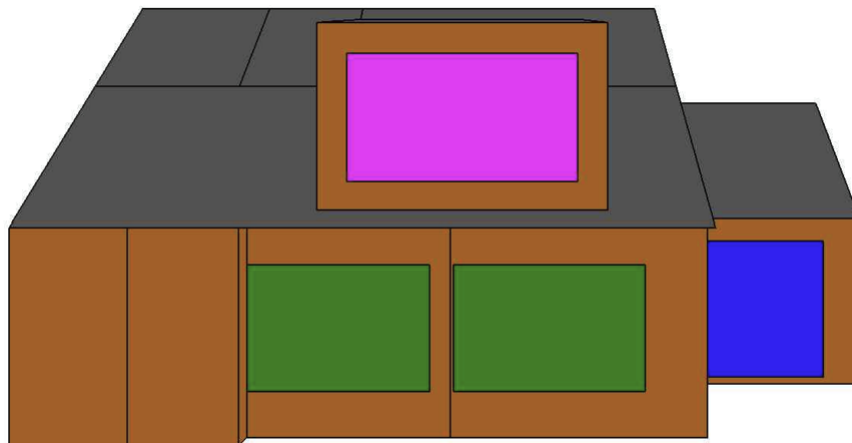
Table 1 – Window Opening Specification

- 4.4 The window openings are set using the openings mechanisms defined above. Window opening patterns were modelled to follow the recommendations set out in AD-O in response to internal temperatures during the day and at night.
- 4.5 As all the windows are on the ground floor bar they have been modelled to comply with the ADO requirements of section 3.6 security.
- 4.6 The images on the following page show the window schedule.

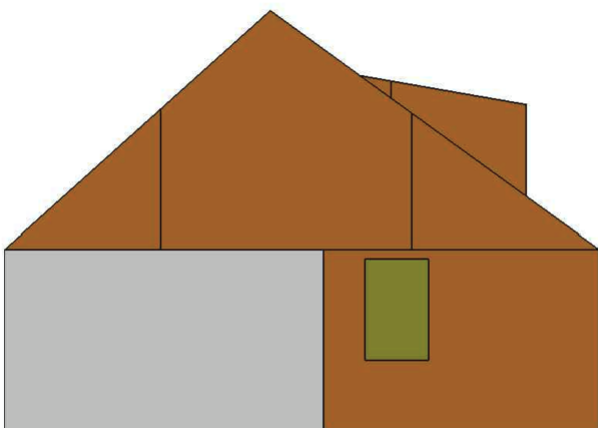
4.0 TM59 Input Data and Fabric Parameters



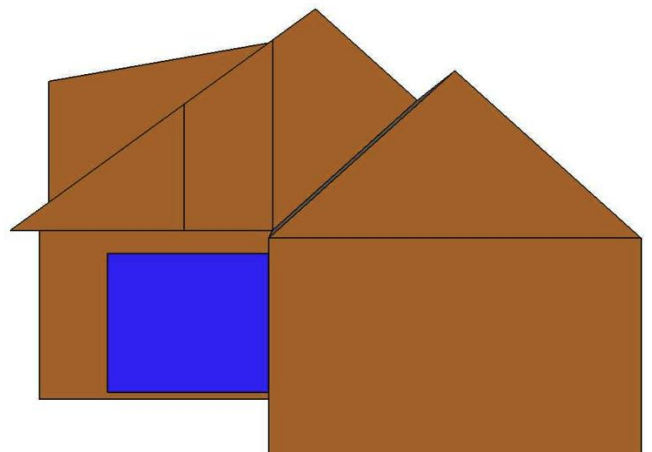
North elevation



South elevation



West elevation



East elevation

4.0 TM59 Input Data and Fabric Parameters

- 4.7 SAP calculations been undertaken for the proposal, and so parameters needed within these calculations have been taken from the SAP assessment, agreed between Architect, SAP assessor and Developer.
- 4.8 Where available, parameters are based on the Architect's specification and include:

Element	Value
External Walls	U Value - 0.15 W/m ² K
Roofs	U Value - 0.11 W/m ² K
Floors	U Value - 0.10 W/m ² K
Windows	U Value - 1.2 W/m ² K G Value, 0.43 Frame Factor 0.7
Boiler/Heating	ASHP
DHW	ASHP
Ventilation	Natural ventilation mechanical extract fans
Lighting	TM59 Standard lighting
Air Permeability	5.01 m ³ /hr/m ² @ 50Pa.
Infiltration Rate	0.25 air changes per hour (ach)
Thermal Bridging	Improved Values used

- 4.9 TM59 also gives a number of standardised parameters to use within the simulation with regard to heating, ventilation and occupancy which have been used within the assessment.
- 4.10 For the purposes of this assessment, no areas are currently proposed to have mechanical cooling systems.

5.0 Policy Guidance

- 5.1 Approved Document Part O is the most useful and detailed source of policy relating to Overheating Risk.
- 5.2 Approved Document Part O 2022 (Overheating mitigation) requires developments to demonstrate the potential for overheating is reduced in accordance with the cooling hierarchy:
 - 5.2.1 Limiting Solar Gains – 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. Overhands
 - iv. Awnings
 - b) Glazing design, involving any of the following solutions
 - i. Size
 - ii. Orientation
 - iii. G-value
 - iv. Depth of window Reveal
 - c) Building design – E.g. placement of balconies
 - d) Shading provided by adjacent permanent building structures or landscaping
 - 5.2.2 Removing Excess Heat
 - a) Opening Windows
 - b) Ventilation louvres in external walls
 - c) A mechanical ventilation system
 - d) A mechanical cooling system
- 5.3 In line with this hierarchy, the building will be highly insulated, and have careful consideration of the levels of south-facing fenestration. Glazing will have a low G value, with fully openable windows.

6.0 Results

Criterion A Results				
Unit	Room	% Allowed Exceeding 26°C	% Hours Exceeding 26°C	Compliant with TM59?
Plot 1	KLD	3.0%	1.65%	Yes
Plot 1	Master Bedroom	3.0%	0.52%	Yes
Plot 1	Bedroom 2	3.0%	0.55%	Yes

Criterion B Results				
Unit	Room	Hours Allowed Exceeding 26°C between 10pm-7am	Hours Exceeding 26°C	Compliant with TM59?
Plot 1	Master Bedroom	32 (Hrs)	31.67 (Hrs)	Yes
Plot 1	Bedroom 2	32 (Hrs)	22.17 (Hrs)	Yes

7.0 Conclusions

- 7.1 This report has been produced to examine the likelihood of overheating risk for the proposed development at Old Hale Way, Ickleford, Hitchin SG5 has been assessed.
- 7.2 The dynamic overheating modelling analysis using the TM59 approved methodology has been carried out for all occupied residential areas in the new dwelling.
- 7.3 Based upon the specification as detailed in Section 4, the results of the primary weather data simulation confirmed that all occupied rooms pass Criteria 1 & 2 of CIBSE TM59.
- 7.4 Overall, the design proposal has also been assessed against the relevant guidance and it has been confirmed that compliance is achieved.



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Appendix A – Part O Checklist

Part(1) – Building Details and Declarations

1.1 Building and Site Details	
Residential building name/number	
Street	Old Hale Way
Town	Ickleford
County	Hertfordshire
Postcode	SG5
Proposed building use/type of building	House
Are there any security, noise or pollution issues?	
1.2 Designer's Details	
Designer's name	Samuel Westover
Company	T16 Design
Address Line 1	
Address Line 2	Colchester
Postcode	CO4 5WR
Telephone Number	
Sam@t16design.com	

Part(2) – Dynamic Thermal Modelling Method

2b.1 Modelling Details		
Dynamic software name and version	Design Builder V7.3.0.35	
Weather file location used, including any additional, more extreme weather files	CIBSE DSY1 2020 London Gatwick	
Number of samples 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	No
Details of occupancy profiles used	CIBSE TM59 - Occupancy	
Details of the equipment profiles used	CIBSE TM59 - Equipment	
Details of opening profiles used	CIBSE TM59 w/ ADO recommendations - security restricted windows	
2b.3 Modelled Overheating mitigation strategy		
Free areas	All rooms have openable windows	
Infiltration and mechanical flow rates	Infiltration = 0.25 air changes per hour (ach),	
Window G-value	0.4	
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 detail in paragraphs 2.5 and 2.6?	Yes	No
What is the overall overheating strategy (i.e what design features are key to the project passing)?	Cross Ventilation, fully openable windows,	
2b.4 Modelling Results		
Has the building construction proposal been modelled accurately?	Yes	No
Designer's name	Samuel Westover	
Designer's Organisation	T16 Design	
Designer's signature		
Registration number (if applicable)	N/A	
Date of Design	08.07.26	