

Wolfson College Oxford – Overheating Study on Student Accommodation (Block B and C)

The thermal model of Block B and C of the Wolfson College development has been built using IES VE 2019 modelling software to assess the students’ bedrooms against the risk of overheating. The study undertaken makes a comparison between two scenarios: the **EXISTING** conditions of the bedrooms as they currently are and the **NEW** conditions following the proposed works to the fabric. The aim is to understand the effect of the measures proposed (which include the replacement of the window and the addition of insulation to fabric elements) in terms of overheating of the spaces. The criteria used to test the comfort conditions of the bedrooms is **CIBSE TM59**. This assessment evaluates summer comfort levels (May-Sept) of occupied spaces during occupied hours for domestic buildings. The existing and proposed design have been assessed using CIBSE current weather file for the area of Swindon-Brize-Norton (DSY1 2020high50).

ASSUMPTIONS

Fabric		EXISTING	NEW
U-VALUE			
Windows	W/m ² K	5.0	0.85
Walls	W/m ² K	1.4	0.6
Roof	W/m ² K	1.4	0.3
G-VALUE windows		0.8	0.4
AIR PERMEABILITY	m ² /m ² /h @50Pa	20	10

Internal Gains

Lighting Gain: Standard CIBSE TM59 profile for single bedroom
Small Power: Standard CIBSE TM59 profile for single bedroom
Occupancy: Standard CIBSE TM59 profile for single bedroom

Natural Ventilation – Student Bedroom Window’s Free Area

Open (only if indoor temp. T>22°C)
 from 8am-11pm @40% of the total glazing area
 from 8pm-8am @8% of the total glazing area

ASSESSMENT

The worst case scenario, from an overheating point of view, occurs for the bedrooms located on the top floor (2nd floor).

Considering the different orientations of the bedrooms within Block B and C, 4no. bedrooms in total have been analysed (2no. per block).

BLOCK B: Room **B404** (S-E), Room **B411** (S)

BLOCK C: Room **C408** (S-E), Room **C418** (N-E)



CIBSE TM59

Compliance to TM59 is based on passing **BOTH** of the following two criteria:

- A) The number of hours during which the temperature in the space exceeds 26°C shall not be more than 3% of the occupied hours during the period May to September;
- B) To ensure comfort during sleeping hours, the operative temperature from 10pm to 7am shall not exceeds 26 °C for more than 1% of the annual hours.

RESULTS and CONCLUSIONS

	EXISTING			NEW		
	Cr. A (%)	Cr. B (%)	TM59 RESULT	Cr. A (%)	Cr. B (%)	TM59 RESULT
B404	2.67	0.91	PASS	0.22	0.85	PASS
B411	2.61	0.85	PASS	0.11	0.76	PASS
C408	2.3	0.82	PASS	0.25	0.88	PASS
C418	2.5	0.94	PASS	0.44	0.91	PASS

The table on the left shows the four rooms fully pass the CIBSE TM59 Overheating Assessment under both EXISTING and NEW scenarios.

The three main factors which play a significant role in the overall positive result of the assessment are deemed to be:

- The thermally massive building envelope
- The shading providing by the overhang to the bedrooms
- The large openable area of the bedrooms’ window

The NEW scenario improves over the EXISTING especially for what concerns the day-time occupied hours (Criteria A). The % of occupied hours in which the temperature exceeds 26°C decreases considerably for all the rooms (e.g. Room B404 - from 2.7% to 0.22%).

Comfort conditions during sleeping hours are met under both scenarios and, for three rooms out of four, they also improves slightly.

The measures proposed and incorporated in the “NEW” scenario include:

- Replacing all the windows with new high quality, thermally broken triple-glazed windows. The new glazing will improve the airtightness of the building;
- The concrete and block reveals around the glazing will be insulated to avoid thermal bridges.

The overheating study carried out has ascertained the proposed works to the fabric would improve the comfort conditions of the student bedrooms during the summer period over the EXISTING situation.