

4 POLICIES & GUIDANCE

Dwellings that overheat pose a significant risk to the health and well-being of residents.

Higher average outdoor temperatures and modern housing design (such as large expanses of glazing, high levels of insulation and increasingly low thermal mass air-tight building envelopes) can result in excessively high internal temperatures during the summer months.

In response to the increasing risk of overheating in homes, CIBSE have developed the TM59 methodology to assess the predicted level of thermal comfort within a dwelling. This assessment should be carried out at the detailed design stage by way of Dynamic Simulation Model.

For predominantly naturally ventilated homes Approved Document O and CIBSE TM59 employ the adaptive method whereby two criteria are tested for compliance. A dwelling that fails either of the criteria is deemed to be at an unacceptable risk of overheating:

- **Criteria 1:**
For living rooms, kitchens and bedrooms: the number of hours during which DT 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. (CIBSE TM52 Criterion 1: Hours of exceedance).
- **Criteria 2:**
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 annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26 °C will be recorded as a fail).

For homes that are predominantly mechanically ventilated and include restricted window openings, the CIBSE fixed temperature test must be followed:

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

It has been concluded that all of the proposed dwellings across the site are predominantly naturally ventilated. There are good opportunities for natural ventilation, and therefore, the overheating mitigation strategy revolves around the use of natural ventilation in addition to a whole-house ventilation system (MVHR system) serving all habitable rooms.

Approved Document O: Overheating

The government released the Approved Document O: Overheating in 2021, which offers two methods of demonstrating compliance:

- Simplified method
- Dynamic simulation modelling (CIBSE TM59)

The proposed dwellings across the site have been assessed for compliance by way of following the dynamic simulation modelling method which also follows the CIBSE TM59 methodology which was last issued in 2017. Approved Document O places new limits on the CIBSE TM59 methodology in regard to:

- Operation of any openable windows
- Interaction with noise and pollution
- Dwelling security
- Protection from falling
- Acceptable strategies for reducing overheating risk

Operation of openable windows

During occupied hours (8AM to 11PM), windows are modelled to:

- 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 22°C.

During nighttime (11pm to 8am), windows are modelled to:

- Fully open when the internal temperature exceeds 23°C. providing that they are on the first floor and not easily accessible i.e. those which are at ground floor level or within 2 metres of any accessible level surface or a flat or sloping roof.

With regards to the proposed blocks and dwellings, all windows that have been indicated as being openable by the Architect have been modelled to the dictates of the above.

Interaction with noise and pollution

The overheating mitigation strategy must also take account of the likelihood that windows will be closed during sleeping hours (11PM to 7AM) if noise within bedrooms is likely to exceed:

- 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).
- 55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am).

If the building is located near to significant local pollution sources, the overheating mitigation strategy should also be designed to minimise the intake of external air pollutants.

Dwelling security

The overheating mitigation strategy must consider the risk of intrusion by a casual or opportunistic burglar.

For context, an easily accessible dwelling is one which falls into either of the following categories:

- A window or doorway, any part of which is within 2m vertically of an accessible level surface, such as the ground or basement level, or an access boundary.
- A window within 2m vertically of a flat or sloping roof (with a pitch of less than 30 degrees) that is within 3.5m of ground level.

To protect the occupier from such an event of intrusion, the ADO limits the operation of openable windows as follows:

- Ground and upper floor windows can be operated during the daytime (8AM to 11PM) whilst they are occupied.

- Ground floor windows which are easily accessible must be closed during the night (11PM to 7AM) unless they are secured by way of fixed lockable louvred shutters or window grilles/railings.
- First floor windows can be operated during the night (11PM to 8AM) if they are not easily accessible.

With regards to the proposed dwellings, all permissible openable windows have been modelled to the dictates of the above in regards daytime and nighttime operation. There are no bedrooms at first floor level (or above) which are considered to be a security risk and therefore are modelled to be open during the daytime and nighttime.

Protection from falling

Openable windows can be opened wider than 100mm to form part of the overheating mitigation strategy, however they must meet the following:

- Window handles on windows that open outwards must not exceed 650mm from the inside face of the wall when the window is at its maximum openable angle.
- Guarding of windows is required to the dictates of 1100 meters (+0/-100mm) to protect vulnerable people from the risk of falling from height.

Acceptable strategies for reducing overheating risk

- Fixed shading devices, comprising any of the following:
 - Shutters
 - External blinds
 - Overhangs
 - Awnings
- Glazing design, involving any of the following solutions:
 - Size
 - Orientation
 - g-value
 - Depth of the window reveal
 - Building design – for example, the placement of balconies
 - Shading provided by adjacent permanent buildings, structures or landscaping

The proposed blocks and dwellings across the site have been designed to large openable windows increase the amount of natural ventilation available. In addition to openable areas, high performance solar control glazing (g-value of 0.45) has been included in order to limited solar gains into the habitable spaces.

5 DESIGN DATA

5.1 WEATHER DATA

London_LHR_DSY1_2020High50.epw

5.2 BUILDING GEOMETRY

The building has been modelled on MH Architects preliminary issue general arrangements and elevations.

- Architectural general arrangement/elevation/section drawings:
 - BLF-MHA-B1-ZZ-M3-A-0001-C01-Sheet - 0111 – Floor Plans
 - BLF-MHA-B2-ZZ-M3-A-0001-C01-Sheet - 0121 – Floor Plans
 - BLF-MHA-B3-ZZ-M3-A-0001-C01-Sheet - 0131 – Floor Plans
 - BLF-MHA-B4-ZZ-M3-A-0001-C01-Sheet - 0141 – Floor Plans
 - BLF-MHA-B5-ZZ-M3-A-0001-C01-Sheet - 0151 – Floor Plans
 - BLF-MHA-B1-ZZ-M3-A-0001-C01-Sheet - 0114 – Elevations
 - BLF-MHA-B2-ZZ-M3-A-0001-C01-Sheet - 0124 – Elevations
 - BLF-MHA-B3-ZZ-M3-A-0001-C01-Sheet - 0134 – Elevations
 - BLF-MHA-B4-ZZ-M3-A-0001-C01-Sheet - 0144 – Elevations
 - BLF-MHA-B5-ZZ-M3-A-0001-C01-Sheet - 0154 – Elevations
- Site plan:

BLF-MHA-A-XX-DR-A-0100_C01-External Works & Site Plan

5.3 BUILDING FABRIC

The following building fabric performance criteria has been used for the overheating assessment based on information received from the wider design team:

Element	U-Value (W/m ² K)	G-Value
External Walls	0.15	
Exposed Floors	0.11	
Exposed Roofs	0.10	
Glazing	1.20	0.45

Table 2 - Building Fabric Data

5.4 INFILTRATION RATES

The following infiltration rates have been applied to each of the blocks and dwellings across the site.

Room Type	Air Permeability (m ³ /(h m ²) at 50 Pa)	Adjacent Condition
Infiltration (2 Storey)	0.4 ACH	External ambient
Infiltration (3 Storey)	0.5 ACH	External ambient

Table 3 - Infiltration Rates

5.5 INTERNAL GAINS

Occupancy, equipment and lighting gains have been modelled based on the TM59 methodology:

Unit/ room type	Occupancy	Equipment load
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
2-bedroom: 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: 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: 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: 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

Unit/ room type	Occupancy	Equipment load
3-bedroom: 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: 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	Peak load of 80 W from 8 am to 11 pm
	2 people at full gains from 8 am to 9 am and from 10 pm to 11 pm	Base load of 10 W during the sleeping hours
	1 person at full gain in the bedroom from 9 am to 10 pm	
Single bedroom	1 person at 70% gains from 11 pm to 8 am	Peak load of 80 W from 8 am to 11 pm
		Base load of 10 W during sleeping hours

5.6 VENTILATION STRATEGY

The ventilation strategy consists of a mixed mode strategy (i.e. combination of natural and continuous mechanical ventilation with heat recovery and summer bypass).

Continuous whole house ventilation systems provide ventilation to all habitable rooms via mechanical ventilation units with heat recovery in accordance with the requirements stated in Building Regulations Approved Document Part F – Ventilation.

All spaces across the blocks and dwellings with openable windows are modelled as being open during occupied times (to varying restrictions as appropriate and to the dictates of the ADO).

5.7 WINDOW ARRANGEMENTS

The window arrangements have been derived from the Architect drawings and elevations with regards location and openability.