Building Regulations Part O Briefing Note

Darwin court

Airspace Group Ltd
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1. OVERHEATING CONTEXT

1.1 Part Overheating is subjective, but the term 'Overheating' refers to discomfort to occupants caused by the accumulation of warmth within a building. It is considered to be a growing problem in the UK due to climate change, the urban heat island effect, electronic equipment and increasing amounts of glazing as part of building styles.

BUILDING REGULATIONS PART O

1.2 Part O of the Building Regulations 2010 (2021 edition) is the new Overheating legal requirement for the buildings to comply with section O1 of schedule 1 to the Building Regulations 2010 which came into effect on June 15th, 2022, as a part of the government's plan to deliver net zero. It deals with the growing issue of buildings being designed and constructed without due consideration to the buildings potential internal temperature, during our warmest months.

1.3 The requirements of O1 Overheating Mitigation (Part O schedule 1) of the Building Regulation 2010 states that;

1) Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel ("residences") to:

a. limit unwanted solar gains in summer;

b. provide an adequate means to remove heat from the indoor environment.

2) In meeting the obligations in paragraph (1)

c. account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence; and

d. mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.

1.4 The aim of the requirement O1 is to protect the 'Health and Welfare' of the Occupants of the building by reducing the occurrence of high indoor temperatures.

1.5 Approved Document O gives two approaches; a simplified method and dynamic thermal modelling method DSM.

1.6 For the simplified method, the strategy to reduce overheating risk should be selected according to the location of the new residential building and whether it has cross-ventilation. For the purposes of following the simplified method, the building's overheating risk category is determined by its location in one of the following areas.

- 'Moderate risk' location – England, excluding high risk parts of London.
- 'High risk' location – urban and some suburban parts of London

1.7 Under the DSM approach, it prescribes us to follow the CIBSE TM 59 methodology for predicting overheating. However, certain limits on TM59 methodology alongside the acceptable strategies for reducing overheating risk are laid out.

2. ASSESSMENT METHOD

2.1 The latest criteria for the assessment of overheating risk have been specified by the Chartered Institute of Building Services Engineers (CIBSE) in CIBSE TM59: Design methodology for the assessment of overheating risk in homes (2017). CIBSE TM59 is based on CIBSE TM52 and CIBSE Guide A guidance documents and provides a standardised approach to predicting overheating risk for both naturally and mechanically ventilated residential buildings.

2.2 The new CIBSE TM59 guidance requires the following two criteria must be met in order to demonstrate compliance:

- For living rooms, kitchens and bedrooms: the number of hours during which the operative temperature exceeds the comfort threshold temperature 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 TM59 Criterion 1: Hours of exceedance);
- 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. (CIBSE Guide A Fixed temperature threshold).

  (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32.85 hours, so 33 or more hours above 26 °C will be recorded as a fail).

Limits on CIBSE TM 59 Methodology

2.3 CIBSE TM 59 requires the modeller to make choices. The dynamic thermal modelling method in this section applies limits to these choices, which are detailed in section 2.7. These limits should be applied when following the guidance in CIBSE's TM59.

2.4 All of the following limits on CIBSE's TM59, section 3.3, apply.

a) When a room is occupied during the day (8am to 11pm), openings should be modelled to do all of the following.

i. Start to open when the internal temperature exceeds 22°C.

ii. Be fully open when the internal temperature exceeds 26°C.

iii. Start to close when the internal temperature falls below 26°C.

iv. Be fully closed when the internal temperature falls below 22°C.

b) At night (11pm to 8am), openings should be modelled as fully open if both of the following apply.

i. The opening is on the first floor or above and not easily accessible.

ii. The internal temperature exceeds 23°C at 11pm .

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

i. In the day, windows, patio doors and balcony doors should be modelled as open, if this can be done securely, following the guidance in paragraph 3.7 below.

ii. At night, windows, patio doors and balcony doors should be modelled as closed.

d) An entrance door should be included, which should be shut all the time.

2.5 Although internal blinds and curtains provide some reduction in solar gains, they should not be taken into account when considering if requirement O1 has been met.

2.6 Foliage, such as tree cover, can provide some reduction in solar gains, however, it should not be taken into account when considering whether requirement O1 has been met.

Fig 2.1 – Typical Dynamic Simulation Model

3. LIMITATION AND PREVENTION MEASURES

3.1 Due to the buildings size, orientation and proposed building fabric and services strategy, we have minimal overheating concerns with the proposed units. There is also a requirement under building regulations for an overheating assessment to take place, and it has been agreed with the project team that this assessment will take place prior to the construction phase.

Measures

3.2 Excess heat should be removed from the residential building by any of the following means.

- Opening windows (the effectiveness of this method is improved by cross-ventilation).
- Ventilation louvres in external walls.
- A mechanical ventilation system.
- A mechanical cooling system

Building Fabric

3.3 U-Values, are used to measure how effective elements of a buildings fabric are as insulators. That is, how effective they are at preventing heat from transmitting between the inside and the outside of a building. Very broadly, the better (i.e. lower) the U-value of a buildings fabric, the less energy is required to maintain comfortable conditions inside the building. Standard u-values applied are as below.

Element	Proposed (W/m²K)	Comment
External Wall	0.19	As per design team inputs
Ground Floor	0.18	
External Roof	0.16	
Windows	1.4 , with 0.4 G value	

Air Permeability *(As-Proposed)*
3 m³/h.m² @ 50 Pa

Passive Design

3.4 Openings should be designed to achieve the free areas in the table below. The equivalent area of the opening should meet or exceed the free area of the opening. The equivalent area of the opening should be assessed by either of the following means.

- Measurement of the product to BS EN 13141-1.
- Calculation using Appendix D.

	High risk	Moderate Risk

Total minimum Free Area	The greater of the following: a. 10% of the floor area(2) b. 95% of the glazing area(3)	The greater of the following: a. 12% of the floor area(2) b. 80% of the glazing area(3)
Bedroom minimum free area	13% of the floor area of the room(4)	4% of the floor area of the room(4)

Table 3.1 – Free areas

3.5 A system for purge ventilation should be provided in each habitable room to demonstrate compliance with Part F of the Building Regulations. The guidance in Section 1 of Approved Document F, Volume 1: Dwellings gives minimum standards for purge ventilation. When following this simplified method, applying the guidance in paragraphs 1.10 to 1.12 will usually result in free areas that exceed the free areas in Approved Document F, Volume 1: Dwellings.

3.6 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

3.7 Buildings located near to significant local pollution sources should be designed to minimise the intake of external air pollutants.

3.8 When determining the free area available for ventilation during sleeping hours, only the proportion of openings that can be opened securely should be considered to provide useful ventilation. This particularly applies in the following locations, where openings may be vulnerable to intrusion by a casual or opportunistic burglar.

- Ground floor bedrooms.
- Easily accessible bedrooms.

3.9 Open windows or doors can be made secure by using any of the following.

- Fixed or lockable louvred shutters.
- Fixed or lockable window grilles or railings

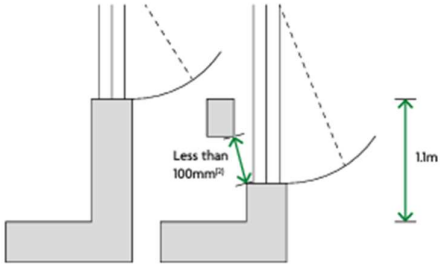
3.10 Openings which are intended to be open for long periods to reduce overheating risk might pose a higher risk of falls from height. Only the proportion of openings which can be opened with a very low risk of occupants falling from height should be considered to form part of the overheating mitigation strategy.

3.11 Openings that can be opened wider than 100mm may form part of the overheating mitigation strategy where they meet all of the following conditions.

- Window handles on windows that open outwards are not more than 650mm from the inside face of the wall when the window is at its maximum openable angle.
- Guarding meets the minimum standards in Table 3.1.
- Guarding does not allow children to easily climb it. For example, horizontal bars should generally be avoided.

Table 3.1 Guarding heights

Change in floor level between inside and outside	Guarding height[1]
Less than 600mm	See Approved Document K
More than 600mm	1.1m



NOTES:

1. This approved document has increased levels of protection from falling compared to Approved Document K. Where applicable, the higher standard applies.
2. Guarding should be sized to prevent the passage of a 100mm sphere.

Table 3.2 – Guarding heights

Mechanical Ventilation

3.12 Mechanical ventilation is the next measure to introduce in order to achieve higher air change rates within the space during high external temperatures.

3.13 The design of a whole house Mechanical ventilation and heat recovery system would allow an efficient solution in the winter, whilst also providing the option for a summer by pass to stop the fresh air being pre-heated by the exhaust.

3.14 Nuaire provide a whole house MVHR unit which would allow increased air changes within the space to help combat any instances of overheating. This unit can also be coupled with an add on DX coil which provides a small element of cooling to the incoming fresh air.

Image 3.1 – Typical Nuaire MVHR unit

Active cooling

3.15 The building should be constructed to meet requirement O1 using passive means as far as reasonably practicable. It should be demonstrated to the building control body that all practicable passive means of limiting unwanted solar gains and removing excess heat have been used first before adopting mechanical cooling.

3.16 Any mechanical cooling (air-conditioning) is expected to be used only where requirement O1 cannot be met using opening.