Over Heating Report Part 0 building regulations

10 Kindersley Way, Abbots, Langley, WD5 0Q

Energy Calculations Ltd
SAP ◆ CODE ◆ SBEM ◆ DESIGN
Marine Avenue
Skegness
Lincolnshire
PE25 3ER
Tel: [redacted]
Email [redacted]
www.energycalculations.co.uk

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1: Introduction

Overheating risk has been a growing concern amongst the domestic design, construction, and provider community for at least a decade. Domestic overheating has not always been a problem in the UK but climate change, increased urbanisation, construction of high-rise apartment blocks and winter energy efficiency measures have all contributed in the amplification of high internal temperatures. Homes that overheat cause significant discomfort and stress to the occupants and can ultimately lead to litigation and costly mitigation measures for the owners/developers. Yet overheating is subjective — the point at which 'hot' becomes 'too hot' will vary from person to person and depend upon a variety of factors.

Whilst this means that not all occupants will be satisfied all the time and that, in a heatwave, it may still be very warm in a naturally ventilated dwelling, there should be a reasonable limit set on how much warmer a dwelling can be inside than outside. There should also be a standard that precludes the worst levels of overheating and enables designers to find cost effective options to limit overheating risk whilst also delivering all the other aspects occupants look for in their homes (e.g., daylight, insulation, view etc). The methodology described here attempts to define that threshold.

2: Regulations

The approved document O

The approved documents set out what, in ordinary circumstances, may be accepted as one way to comply with the Building Regulations. It remains the responsibility of those designing or undertaking building work to assess, on a case-by-case basis, whether specific circumstances
require additional or alternative measures to achieve compliance with the regulatory requirements. There are interactions between many of the requirements of the Building Regulations and the following paragraphs provide guidance on some key interactions.

Interaction with Part B
This approved document, Approved Document O, gives guidance on window openings for removing excess heat from residential buildings. Approved Document B gives guidance on the size of escape windows. Where escape windows are provided to comply with Approved Document B, any extra glazing will impact the risk of overheating.

Interaction with Part F
This approved document, Approved Document O, includes guidance on providing means of removing excess heat from residential buildings. Where openings are used, the amount of ventilation for removing excess heat is likely to be higher than the purge ventilation required for Part F. The higher amount of ventilation applies – see Section 1 or Section 2 of this approved document, depending on the method of compliance.

Interaction with Part J
Ventilation fans might cause combustion gases to spill from open-flued appliances and fill the room instead of going up the flue or chimney. This can occur even if the combustion appliance and fan are in separate rooms. The guidance in Approved Document J should be followed when installing and testing ventilation appliances and combustion appliances must operate safely whether or not fans are running.

Interaction with Part L
Solar gains in winter can reduce the amount of space heating required to be delivered by the heating system. Reducing summer overheating by limiting glazing areas will impact winter solar gains and therefore increase the need for space heating. Poorly insulated pipework, particularly in community heating schemes, can be a major contributor to overheating. Control of heat losses from pipework is dealt with under Part L of the Building Regulations and the guidance in Approved Document L should be followed.

Interaction with Part K and Part M
Where manual controls are provided, they should be within reasonable reach of the occupants, to comply with Approved Documents K and M.

Interaction with Part K
This approved document, Approved Document O, gives guidance on increased levels of protection from falling from openings compared to Part K.

Interaction with Part Q
This approved document, Approved Document O, gives guidance on security considerations when providing large openings for removing excess heat. The locking systems of windows and doors should also conform to guidance given in Approved Document Q on the security of doors and windows in dwellings.

3: Ensuring the overheating mitigation strategy is Usable

The standards in this section may mean that the standards of the simplified method cannot be met. For example, if external noise is an issue, it is unlikely that windows would be opened by an occupant and therefore the minimum free areas of the simplified method cannot be met. In such cases, dynamic thermal modelling should be used.

Noise
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).
Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.
a. 40dB LAeq,T, averaged over 8 hours (between 11pm and 7am).
b. 55dB LAFmax, more than 10 times a night (between 11pm and 7am).

Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use.
NOTE: Guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020).

Pollution
Buildings located near to significant local pollution sources should be designed to minimise the intake of external air pollutants. Guidance is given in Section 2 of Approved Document F, Volume 1: Dwellings.

Security
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.
a. Ground floor bedrooms.
b. Easily accessible bedrooms.
Open windows or doors can be made secure by using any of the following.
a. Fixed or lockable louvred shutters.
b. Fixed or lockable window grilles or railings.

Protection from falling.
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. Openings that can be opened wider than 100mm may form part of the overheating mitigation
strategy where they meet all of the following conditions.
a. 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.
b. Guarding meets the minimum standards in Table 3.1.
c. Guarding does not allow children to easily climb it. For example, horizontal bars should generally be avoided.
Guarding for large openings could include, but is not limited to, either of the following.
a. Shutters with a child-proof lock.
b. Fixed guarding.

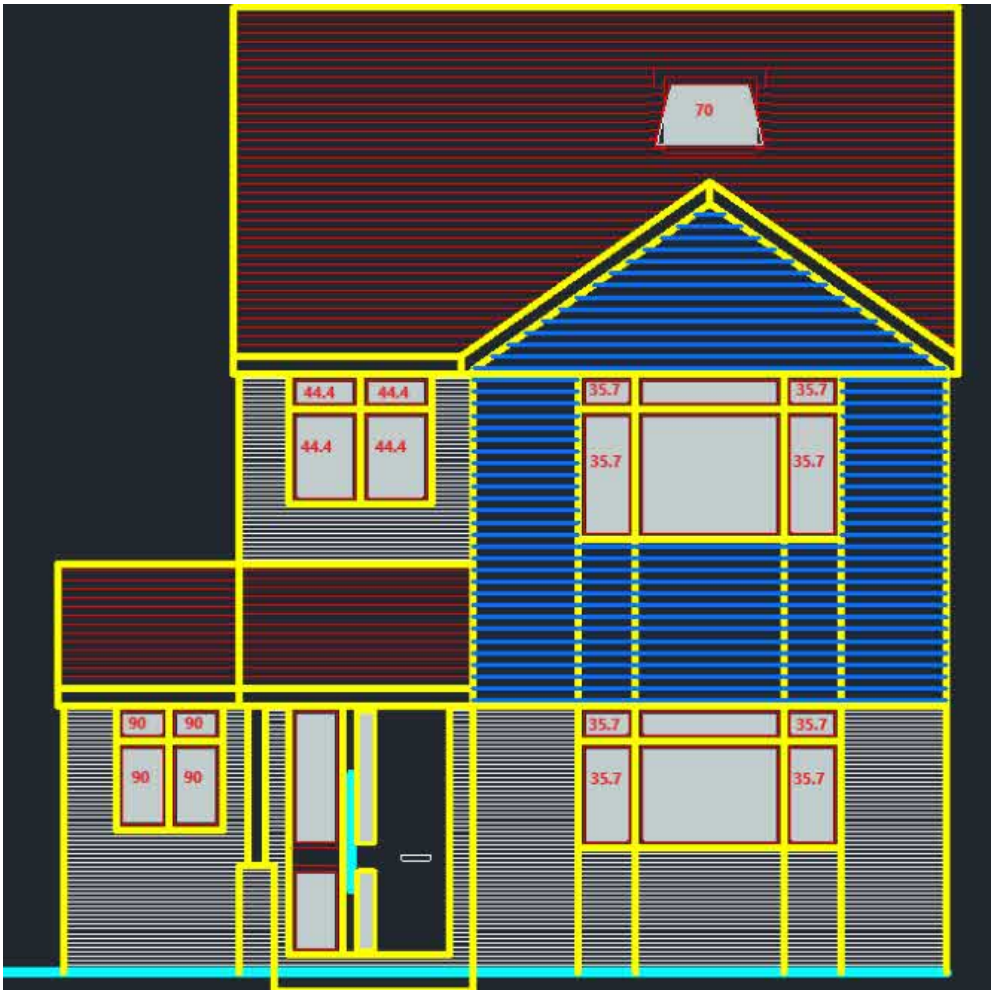
Protection from entrapment
Louvered shutters, window railings and ventilation grilles should not allow body parts to become trapped. They should comply with all of the following.
a. Not allow the passage of a 100mm diameter sphere.
b. Any hole which allows the passage of an 8mm diameter rod should also allow the passage of a 25mm diameter rod. Such holes should not taper in a way that allows finger entrapment.
c. Any looped cords must be fitted with child safety devices

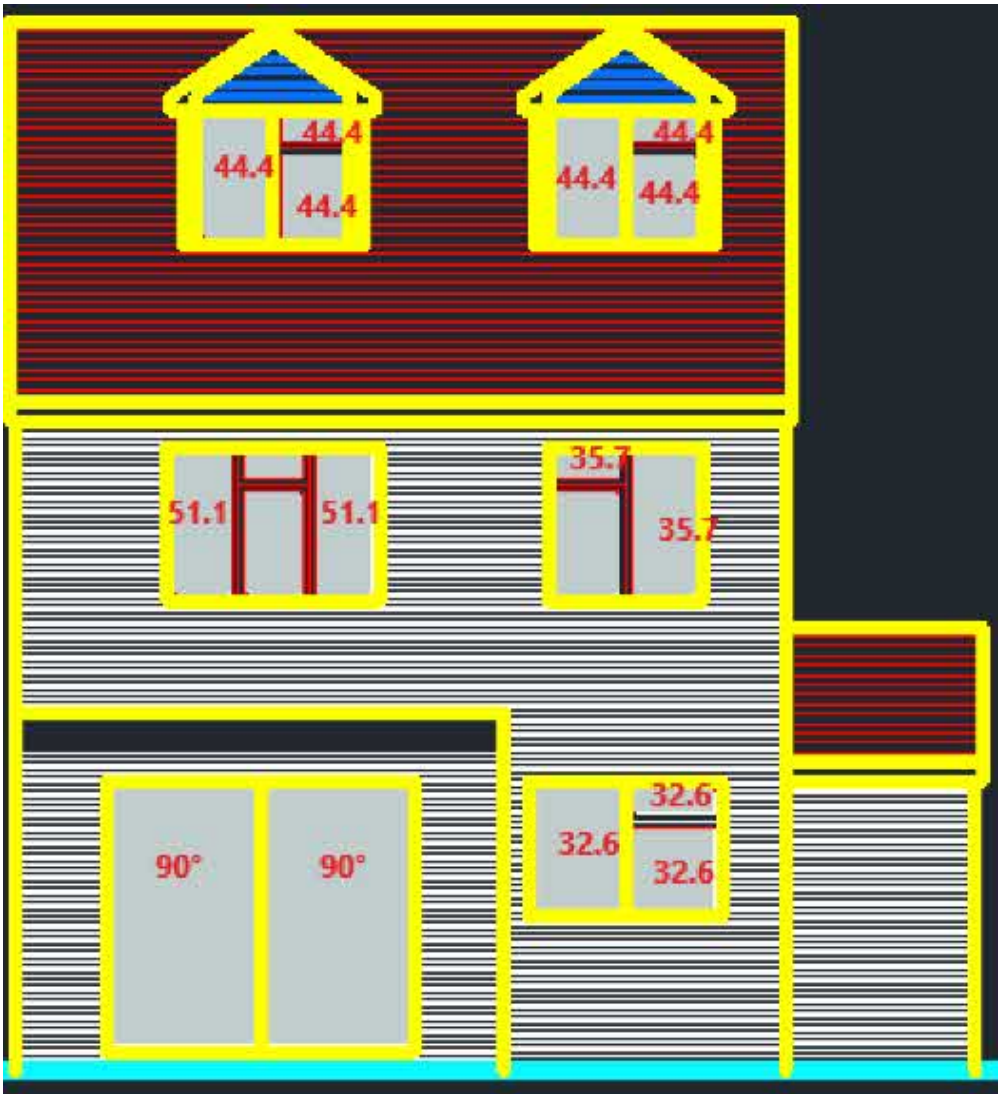
4 :0 Windows and Door openings

The free area of the windows has been calculated using appendix D in part O building regulations. (see free area calculations) at the end of the report ,and on the elevations as shown below.

The angle of opening are to be confirm by the architect / developer to ensure they are suitable for the development and compliance with the building regulations.

Guarding applied to bedroom windows with cill height less than 1.10m





5:0 Results / Recommendations

The calculations show the dwelling complies with the basic part O building regulations - confirmation of the window opening angles are required.

It is the responsibility of the designer / architect / developer to consideration of all other part of the building regulations, and ensuring the overheating mitigation strategy is usable and must be taken into account, including the angle opening of the windows.

Guarding applied to bedroom windows with cill height less than 1.10m

elmhurst energy

Dwellings with **cross ventilation** calculator tool - Moderate Risk Location

Section 1: Buildings or parts of buildings with cross-ventilation should not exceed the maximum glazing areas

Section 1a: Limiting solar gains - Maximum glazing area for the dwelling

1. Use 'Calculator 1a- Maximum glazing area for dwelling'
2. Select from the drop down list the orientation of the most glazed façade
3. This will highlight the cell in Table 1 you need to enter once calculated
4. Enter the floor area and glazing area
5. Take the calculated Area of glazing (% floor area) and put it into the now teal coloured box in Table 1.
6. If this stays teal with green front then it meets the standard, if it turns red the the value exceeds the standards (see reference table).

Calculator 1a- Maximum glazing area for dwelling	
Orientation of the façade that has the largest glazing area	South
Floor area of dwelling	139.00
Glazing area of the dwelling	19.96
Area of glazing (% floor area)	14.36

Section 1b: Limiting solar gains - Maximum glazing area in the most glazed room

1. Use 'Calculator 1b - Maximum glazing area for most glazed room'
2. Select from the drop down list the orientation of the most glazed façade (does not have to be the same orientation as calculation 1a)
3. This will highlight the cell in Table 1 you need to enter once calculated
4. Enter the floor area and glazing area
5. Take the calculated area of glazing (%floor area) and put it into the now teal coloures box in Table 1,
6. If this stays teal with green front then it meets the standard, if it turns red the the value exceeds the standards (see reference table).

Calculator 1b- Maximum glazing area for most glazed room	
Orientation of the façade that has the largest glazing area in most glazed room	South
Floor area of most glazed room	34.60
Glazing area of most glazed room	7.16
Maximum area of glazing in the most glazed room (% floor area of room)	20.69

Table 1: Enter your dwellings data (see instructions)

Section 1: Buildings or parts of buildings with cross-ventilation should not exceed the maximum glazing areas

Largest glazed façade orientation	Area of glazing for the whole dwelling (% floor area)	Area of glazing in the most glazed room (% floor area of room)
North		
East		
South	14.36	20.69
West		
Pass/ Fail?	Pass	Pass
Section 1 maximum glazed area (pass/fail?)		Pass

Reference Table 1: Limits taken from Approved Document O

Section 1: Buildings or parts of buildings with cross-ventilation should not exceed the maximum glazing areas

Largest glazed façade orientation	Maximum area of glazing (% floor area)	Maximum area of glazing in the most glazed room (% floor area of room)
North	18	37
East	18	37
South	15	30
West	11	22

Section 2: Buildings or parts of buildings with cross-ventilation should be equal to or exceed the minimum free areas

Section 2a: Removing excess heat - Minimum free area for whole dwelling

1. Use 'Calculator 2a - Minimum Free Area for Whole Dwelling'
2. Calculate the equivalent area of all the openings in the dwelling (to do this you can use tab 'Free Eqv Area')
3. Enter the floor area and glazing area
4. Table 2 will then calculate the minimum free area and compare this to the equivalent area
5. If it meets requirements the cell will go green and if does not meet the requirements the cell will go red.

Calculator 2a - Minimum Free Area for Whole Dwelling	
Equivalent area of openings	12.71
Floor area of whole dwelling	139.00
Glazing area of whole dwelling	19.96

Section 2b: Removing excess heat - Minimum free area for bedrooms

1. Use 'Calculator 2b - Minimum free area for bedrooms'
2. Calculate the equivalent area of all the bedroom openings (to do this you can use tab 'Free Eqv Area')
3. Enter the floor area of the bedroom
4. Table 2 will then calculate the minimum free area and compare this to the equivalent area
5. If it meets requirements the cell will go green and if does not meet the requirements the cell will go red.

Calculator 2b - Minimum free area for bedrooms

Bedroom 1		*Bedroom 2 - Only enter if present*		*Bedroom 3 - Only enter if present*	
Free area or Equivalent area of windows for bedroom	1.44	Free area or Equivalent area of windows for bedroom	1.06	Free area or Equivalent area of windows for bedroom	0.54
Floor area of bedroom	11.60	Floor area of bedroom	9.80	Floor area of bedroom	7.70
Bedroom 4 - Only enter if present		*Bedroom 5 - Only enter if present*			
Free area or Equivalent area of windows for bedroom	1.08	Free area or Equivalent area of windows for bedroom			

Equivalent Area Calculation

The equivalent area of a window can be calculated using one of the following:

a. The discharge **coefficient calculator**

b. Tables D1 to D9 of **Approved Document O**

NOTE: Measurement of equivalent area to BS EN 13141-1 is also appropriate. Measurement of equivalent area is more accurate than calculation and is therefore preferable.

This sheet can be used to keep information on windows and calculate totals taken from the the above calculation methods. A copy of the Discharge Coefficient calculator can be found at the bottom of this sheet.

Whole Dwelling Equivalent Free Area							
	Window Reference	Window Location	Window Orientation	Opening Width	Opening Height	Opening Angle	Equivalent Area (tables D1-D9)
1	1	Study * 2	South	350	200	90	0.12
2		Study * 2	South	350	750	90	0.52
3	2	Lounge *2	South	600	800	35.7	0.74
4		Lounge *2	South	600	200	35.7	0.16
5	3	Landing *2	South	500	200	44.4	0.14
6		Landing *2	South	500	700	44.4	0.58
7	4	Bed 1 * 2	South	600	500	35.7	0.42
8		Bed 1 *2	South	600	1100	35.7	1.02
9	5 r light	Bed 4	South	600	600	70	0.31
10	6	Living *2	North	1200	2100	90	4.72
11	7	Dining	North	650	950	32.6	0.46
12		Dining	North	650	200	32.6	0.08
13		Dining	North	650	650	32.6	0.28
14	8	Bed 2 *2	North	450	1100	51.1	0.94
15		Bed 2 *2	North	550	300	39.5	0.12
16	9	Bed 3	North	600	300	35.7	0.12
17		Bed 3	North	600	900	35.7	0.42
18	10	En suite	North	500	950	44.4	0.4
19		En suite	North	500	250	44.4	0.09
20		En suite	North	500	700	44.4	0.29
21	11	Bed 4	North	500	950	44.4	0.4
22		Bed 4	North	500	250	44.4	0.09
23		Bed 4	North	500	700	44.4	0.29
							12.71