
JC Brennan Developments Ltd

AD Part O (Overheating) Compliancy Report

Church Lane, Middleton, M24 2UA

10 June 2025

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First Issue Date	Revision Issue Date	Issue Revision	Issued By
Tuesday, 10 June 2025	-	-	DK

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Appendix A - Part O Compliance Document



1 Executive Summary

Watt Energy & Consulting Engineers have been appointed to carry out the Approved Document Part O (Overheating) Dynamic Simulation Method assessment for the Development. The project was fully modelled using IES software following the Part O guidelines. The IES thermal model includes all the habitable occupied spaces i.e. - the kitchen-living rooms and bedrooms. All associated heat gains to non- habitable spaces, including communal risers, bathrooms, (HIU) Heat Interface Units' cupboards and communal corridors have been accounted for in the IES model as outlined in Part O.

The intention of this report is to assess the building against the overheating criteria set out in the Building Regulations Approved Document Part O (referred to as Part O). Part O is intended to limit excessive solar gains and if necessary, ensure means are provided to remove excess heat.

This report details the Dynamic Thermal Modelling approach used to assess the building for Part O compliance. The CIBSE TM59 modelling procedure is used, which models the indoor temperature of each room included in the analysis against set temperature limits, using CIBSE Design Summer Year (DSY) weather data. The results will determine at design stage if a passive cooling strategy will be successful or if mechanical cooling will be required.

The development has been modelled using the Dynamic Simulation Modelling (DSM) Software Integrated Environmental Solutions Limited, "Virtual Environment" (VE) version 2022.3.0.0. The software is fully compliant with the requirements of CIBSE guide AM11: *Building Performance modelling (2015b.)*

Following the DSM modelling, the dwelling was found to **comply with the overheating requirement of Part O** on the basis that all assumptions outlined in the methodology section (regarding building fabric performance, G-values of glazing, and ventilation rates) are incorporated into the design.

A compliant strategy has been provided for the development, and as such, Watt Energy are confident that thermal comfort is likely to be achieved for all bedrooms, living rooms and kitchens when employing the design variables contained within this report. The parameters required for Part O compliance are:

- Building fabric as outlined in Section 3
- 50% Openable Sash Windows when temperatures exceed 22°C and close when external temperatures exceed 26°C during daytime hours

- 90% Fully Openable Bi-folding Glazed Doors when temperatures exceed 22°C and close when external temperatures exceed 26°C during daytime hours
- 25-degrees openable Velux Roof lights when temperatures exceed 22°C and close when external temperatures exceed 26°C during daytime hours.
- Fixed Windows

This report serves to predict the internal temperature within the occupied areas based on the parameters set from the IES thermal modelling.

The report should not be used as an actual measurement of internal temperature but as a report that uses the appropriate modelling software to demonstrate the potential internal air temperatures of the assessed areas.

2 Methodology

2.1 Weather Data

The site is located off Church Lane, Middleton, M24 2UA, Manchester, therefore the weather file used within the model was the CIBSE Design Summer Year (DSY1) for Manchester, for the 2020s, high emissions, 50% percentile scenario as the most appropriate data set for the location of the development and makes allowance for future elevated temperatures due to climate change.

For this overheating analysis a DSY1 weather file was used for the year 2020 high emission scenario. Summers will have a 1 in 7 chance of being equal or hotter than this scenario.

2.2 CIBSE TM59

Following the final simulation results, the overheating is compared to CIBSE TM59 guidelines for the entire year (1st of January 31st of December).

TM59 provides a method of assessment for the risk of residential overheating, with separate methodologies for homes that are naturally ventilated, mechanically ventilated and extra criterion for communal corridors if applicable. The correct methodology is selected automatically within IESVE 2022 software to undertake the necessary calculations, which in this case is **naturally ventilated**.

Criterion A is based on the principals of TM52, which quantifies the percentage of hours that cannot exceed the target temperature, based on the running mean average.

Criterion B is based on CIBSE Guide A's number of hours exceeding 26 degrees Celsius in bedrooms at night (the temperature above which sleep patterns are likely to be CIBSE TM59 overheating methodology for predominately mech vent rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours).

The TM59 Criterion definitions are as follows:

- **Criterion A** - 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.
- **Criterion B** - 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.

Requirements for residential areas with communal corridors calculates the number of annual hours for which an operative temperature of 28 C is exceeded.

There is no criterion or requirement to comply with this information, however if an operative temperature of 28 C is exceeded for more than 3% of total annual hours, the calculated corridor could be identified as being at high risk of overheating.

3 Specification

3.1 Fabric

As the results table demonstrates, all rooms have achieved compliance under Criterion A & B of the CIBSE TM59 guidelines. The following specification has been used within calculations:

- Windows – 1.3 W/m²K (Double-glazed), $\leq 0.69 - 0.7$ g-value.
- External Wall – 0.18 W/m²K
- Ground Floor – 0.12 W/m²K
- External Roof – 0.16 W/m²K
- Air test – 5.00 m³.ph.m² @ 50Pa

3.2 Infiltration and Ventilation

An infiltration rate of 0.25 air changes per hour (ACH) has been used in the model. This infiltration rate has been derived from CIBSE Guide A 2015 for a building with an air permeability of 5m³/hm² at 50Pa.

Purge ventilation through openable windows is shown to have significant effect in reducing internal temperatures as well as removing high concentrations of pollutants and water vapour. However, this cannot be accounted for in the overheating model due to the acoustic constraints on the site.

To maintain thermal comfort conditions, natural ventilation from windows opening is recommended when:

- External temperature is lower than the internal temperature: $T_{\text{outdoor}} < T_{\text{indoor}} > 22^{\circ}\text{C}$;
- During nighttime for periods with extremely hot weather, expected for a few days a year.

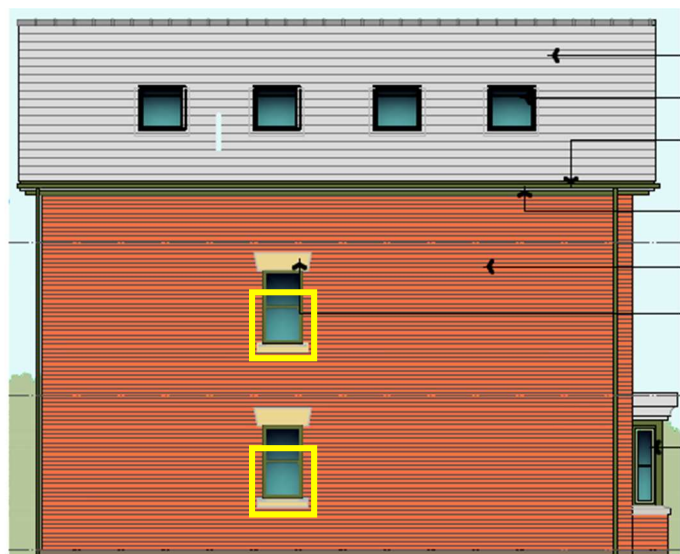
3.3 Window Openings

Apertures have been included for all windows; the frame percentage of openable windows has been set to 10%.

As part of the Part O modulating profiles for occupied rooms, windows are set to open when the internal temperature is above 22°C and be fully open once internal temperature exceeds 26°C. Similarly, the profile will start to close the windows once temperatures fall below 26°C and eventually be fully closed at 22°C.

The following window opening types have been modelled:

- Sash windows



- Fixed windowpanes



- Bifold Glazed Doors



- Velux Roof lights



4 Results Summary

This report outlines the parameters which have been included within the thermal model for the development, in order to achieve compliance with The Building Regulations 2010 Overheating Approved Document O (Part O).

A compliant strategy has been provided for all dwellings, and as such, Watt Energy are confident that thermal comfort is likely to be achieved for all bedrooms, living rooms and kitchens when employing the design variables contained within this report. The parameters required for Part O compliance are:

- Building fabric as outlined in section 3
- 50% Openable Sash Windows when temperatures exceed 22°C and close when external temperatures exceed 26°C during daytime hours
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