

HEAD OFFICE:

BAILEYGOMM Limited
39 High Street
Ware
Hertfordshire
SG12 9BA

Tel: 01920 468951

mail@baileygomm.co.uk

www.baileygomm.co.uk

OVERHEATING REPORT

FOR

**LAND ADJACENT TO 300 KINGS ROAD
KINGS ROAD
READING
RG1 4HP**

REVISION: 1

DATE: 19 APRIL 2018

**CLIENT: TITAN PROPERTY
DEVELOPMENTS**

NORTHERN OFFICE:

BAILEYGOMM Limited
Shotton Lane
Windmill Industrial Estate
Cramlington
NE23 3JU

Tel: 01670 593120

CONTENTS

PROJECT REVISION SHEET	3
1.0 EXECUTIVE SUMMARY	4
2.0 INTRODUCTION	5
2.1 BACKGROUND TO THE SCHEME.....	5
2.2 CRITERION 3 – APPROVED DOCUMENT L1A.....	5
3.0 CALCULATION METHOD.....	6
3.1 METHODOLOGY	6
4.0 THERMAL MODEL	8
4.1 GEOMETRY	8
4.2 BUILDING ENVELOPE	8
4.3 VENTILATION	9
4.3.1 PASSIVE VENTILATION.....	9
4.3.2 MECHANICAL VENTILATION.....	9
4.4 ROOM GAINS.....	10
4.4.1 LIGHTING GAINS.....	10
4.4.2 OCCUPANCY GAINS	10
4.4.3 EQUIPMENT GAINS.....	10
5.0 RESULTS.....	11
6.0 CONCLUSION	12
7.0 GAIN PROFILES.....	13
7.1 LIGHTING.....	13
7.2 OCCUPANCY	13
7.3 EQUIPMENT.....	14
8.0 LIST OF ACRONYMS	15
9.0 APPENDICES	16
9.1 APPENDIX A – CRITERIA 1 EVIDENCE	16
9.2 APPENDIX B – CRITERIA 2 EVIDENCE	18

PROJECT REVISION SHEET**Land Adjacent to 300 Kings Road, Kings Road, Reading RG1 4HP****Overheating Report****Revision: 1****Date of issue: 19 April 2018****Prepared by: BAILEYGOMM**

Revision	Details:	First issue	Author:	D Jackson
1	Date:	19.04.2018	Checked:	S Roberts-Eagles

Revision	Details:		Author:	
	Date:		Checked:	

1.0 EXECUTIVE SUMMARY

This report assesses the overheating risk for all occupied spaces in accordance with CIBSE TM59 and Criterion 3 of Approved Document L1A.

The Apartment overheating has been assessed using the weather files as stated in CIBSE TM59 Section 3.2: Weather Files, which have been adjusted to a correct percentile, or best guess, which changes the mean monthly dry bulb temperatures accordingly.

This is then used in order to calculate the frequency of an intense summer spell, where overheating may be an issue. The frequencies from the specified 2020 weather file are considered to be the most accurate representation of summer spells over the coming years.

All rooms throughout the Apartments pass the standard TM59 overheating calculation with no blinds.

To control summertime temperatures, we recommend Solar Glass is provided on all of the Rooflights and all windows, except on the north elevation, in order to reduce solar gains.

2.0 INTRODUCTION

2.1 BACKGROUND TO THE SCHEME

The project entails the construction of a new 14 Apartment Building, consisting of 1 Bed, 2 Bed & 3 Bed apartments. The new building will be located on an existing car park, between two existing buildings.

This report assesses the overheating risk for all occupied spaces in accordance with CIBSE TM59 and Criterion 3 of Approved Document L1A. Control measures will also be suggested in areas which are proven to overheat to aid the calculation, passive measures are preferred, as the calculation has to pass even if you were to have comfort cooling.

2.2 CRITERION 3 – APPROVED DOCUMENT L1A

Approved Document L1A – Criterion 3 details how to limit the effects of heat gains in summer.

The section discusses an approach of how to limit heat gains as required in parts L1(a)(i) & L1(a)(ii) in schedule 1 of the building regulations.

Solar gains can be beneficial during winter but can be an issue during summer. Limiting solar gains may be necessary during the summer periods to avoid overheating and discomfort.

A method of prevention can be as simple as window size and orientation or automatic blinds being included that drop depending on certain factors.

Consideration for daylight levels should be given, BS 8206-2: Lighting for Buildings. Code of Practice for Daylighting, this is a guide for maintaining the correct levels of daylight.

A SAP Calculation was run for a few generic rooms of this building, the results indicated that there was a high chance of overheating throughout the building, Therefore a further calculation was required.

3.0 CALCULATION METHOD

3.1 METHODOLOGY

The overheating calculation has been assessed using methodology within CIBSE TM59: Design Methodology for the Assessment of Overheating Risk in Homes.

The technical guide details two different criteria for passing, Section 4.3 for mechanically ventilated dwellings & section 4.2 for naturally ventilated dwellings. All dwellings in this development shall be naturally ventilated.

The criterion for CIBSE TM59: Section 4.2 are as follows:

Criterion (a) assess the building to Criterion 1 of CIBSE TM52, and relates to Living Rooms, Kitchens and Bedrooms. CIBSE TM52: Criterion 1 sets a limit of 3% as the number of hours the operative temperature can exceed the threshold comfort temperature by 1K or more during the occupied hours of a typical non-heating season (1 May to 30 September).

Criterion (b) only assesses Bedrooms, 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).

An occupied space fails the overheating check if it fails either of the CIBSE TM59 Criteria.

Overheating has been assessed using IES VE software and its dynamic simulation module in conjunction with CIBSE TM59 over heating criteria. To assess the overheating risk the weather file as specified in CIBSE TM59 has been used. The weather file used is 1989: a moderately warm summer.

This weather data, specific to Swindon, is for the 2020s, high emissions, 50% percentile as stated in CIBSE TM59: Section 3.2 Weather Files.

The overheating methodology, CIBSE TM52, assesses overheating within buildings using three criteria, taken from BS EN 15251, to determine whether a free running building is overheating.

The three criteria use the upper limit figures shown in the graph below as the upper comfort temperature for the calculation. I, II & III refer to the category of building. A Category I building is where the occupants may be sensitive or fragile. Category II is a newly constructed building and Category III is for an existing building.

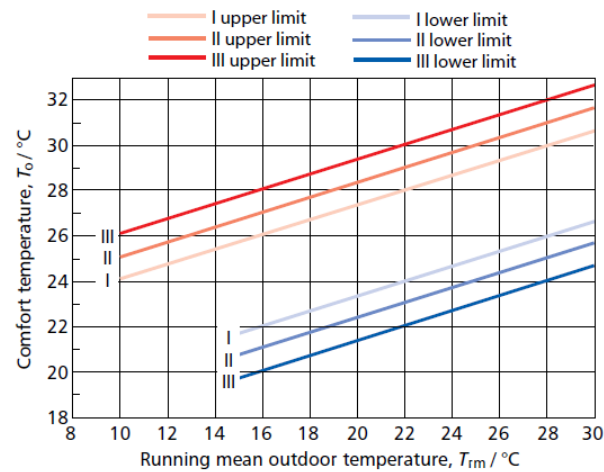


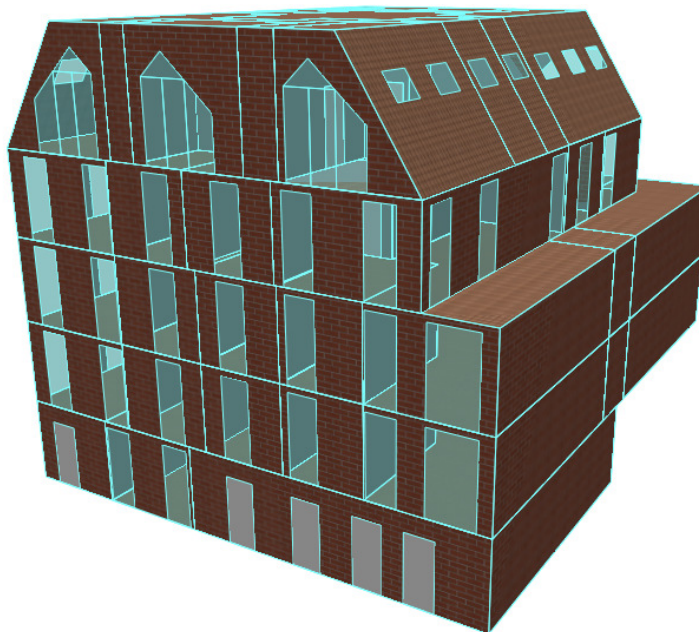
Figure 1 - Limiting values for operative temperatures in free running buildings as a function of the exponentially weighted running mean of the external temperature (CIBSE TM52, 2013)

For the new development we will be using Category II upper limit for the apartments.

4.0 THERMAL MODEL

4.1 GEOMETRY

The geometry has been created using the latest AutoCAD drawings from Titan Property Developments. All external shading has also been modelled to give a true representation of the building performance.



4.2 BUILDING ENVELOPE

The building has been modelled using notional U-Values, as below, but the glass has been improved by means of high performance solar shading glass.

U Values

Walls	0.18 W/m ² K
Roof	0.13 W/m ² K
Ground Floor	0.13 W/m ² K
Windows	1.4 W/m ² K

G Values

Windows on North Elevation	0.63
Windows with Solar Shading Glass	0.37

Air permeability

Apartments	5 m ³ /hr/m ² @ 50 Pa
------------	---

Table 1 – Building Envelope Performance

The air permeability figures listed above correspond to an infiltration rate of 0.35 Air Changes per Hour (ACH) for the Apartments.

To further reduce the solar gains into the building all windows, except on the north elevation, have been given high performance solar shading glass.

4.3 VENTILATION

4.3.1 PASSIVE VENTILATION

All rooms with external windows have at least one openable leaf to allow user controlled natural, passive ventilation. The Apartments have top hung windows or Juliet balconies with inward opening double doors.

There are no restrictors on the windows, therefore all Juliet balconies are modelled opening to an angle of 90° and all top hung windows are modelled opening to a maximum angle of 30°.

Openable windows and doors within the thermal model are set to open if the internal temperature is above 22°C, the room is occupied and if the internal temperature is greater than the external temperature. At all other times the openings will be closed.

4.3.2 MECHANICAL VENTILATION

All apartments are ventilated via extract fans, providing a continuous background ventilation rate to a number of rooms. Make up air is introduced into the bedroom via trickle vents built into the façade.

The flowrates of the extract fans have been taken from Approved Document F – Section 5: New dwellings, Table 5.1a:

Room	Flowrate
Kitchen	13 l/s
Utility Cupboard	8 l/s
Bathroom	8 l/s

Table 2 – Ventilation Flowrates

The flowrates from the systems mentioned above have been included in the overheating calculations.

4.4 ROOM GAINS

The following gains are taken CIBSE TM59. The daily profiles for each gain can be found in Section 7.0 Gain Profiles at the end of this document.

4.4.1 LIGHTING GAINS

The following gains shown in Table 3 have been used in the thermal model.

Room	Gain	Description
All Rooms	2W/m ²	From 6pm to 11pm

Table 3 – Lighting Gains

4.4.2 OCCUPANCY GAINS

Occupancies are based on one occupant for a single bedroom and two occupants for a double bedroom during set times. Living rooms within the Apartments are occupied with one person per bedroom, i.e. 3-Bed apartment will have a Kitchen/Living Room occupancy of 3 persons. The heat gain for a single occupant is taken from CIBSE TM59, Section 5.1.

Room	Occ	Gain	Description
Double Bedroom	2	150W	Full Gains from 8-9am & 10-11pm.
Single Bedroom	1	75W	70% Gains from 11pm-8am
1-Bed Kitchen/Living Room	1	75W	
2-Bed Kitchen/Living Room	2	150W	From 9am-10pm
3-Bed Kitchen/Living Room	3	225W	

Table 4 – Occupancy Gains

4.4.3 EQUIPMENT GAINS

Specific equipment gains have been taken from CIBSE TM59, Section 6: Supplementary Information on Profile Development, Table 2.

Room	Gain	Description
Double Bedroom	80W	100% from 8am-11pm
Single Bedroom	80W	13% during sleeping hours
1-Bed Kitchen/Living Room	450W	100% from 6-8pm
2-Bed Kitchen/Living Room	450W	40% from 8-10pm
3-Bed Kitchen/Living Room	450W	24% from 9am-6pm & 10-12pm
		18% for rest of the day

Table 5 – Equipment Gains

5.0 RESULTS

As stated earlier in the report, Category II has been used for the Apartments, as the development is a new build.

Weather data Results

Apartments

- All Bedrooms pass
- All Kitchen/Living Rooms pass

The calculations have also been assessed in accordance with CIBSE TM59 Section 4 criteria as stated in the methodology.

Criteria 1

Bedrooms & Kitchen/Living Rooms

- All Rooms pass CIBSE TM52 Criterion 1: Hours of Exceedance. See Appendix A for full results.

Criteria 2

Bedrooms only

- All Bedrooms do not exceed 26°C for more than 1% of annual hours. 33 hours or above is considered a failure. See Appendix B for full results.

6.0 CONCLUSION

All rooms throughout the Apartments pass CIBSE TM59, with the additions listed below.

All windows, except on the north elevation, & rooflights have solar control glass, to reduce the solar gains and aid in the prevention of overheating.

Bedroom 4.03 had two rooflights, removing one reduces the solar gains sufficiently to allow the room to pass.

All windows open when the internal temperature is greater than the external temperature, or when the internal temperature exceeds 22°C. The ground floor windows have been limited in the area of openable window due to a security implication.

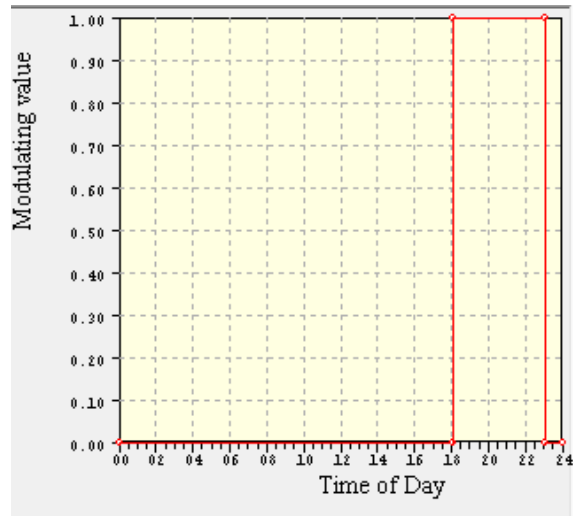
All rooms pass CIBSE TM59 Criterion (a) with the use of the additions listed above.

All bedrooms pass CIBSE TM59 Criterion (b) with the use of the additions listed above.

7.0 GAIN PROFILES

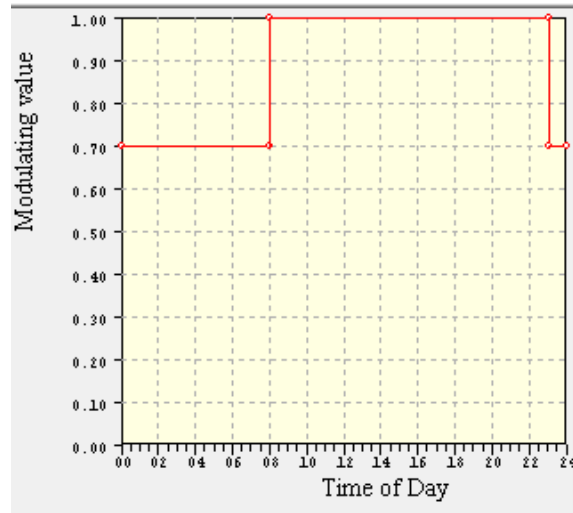
7.1 LIGHTING

All Lighting

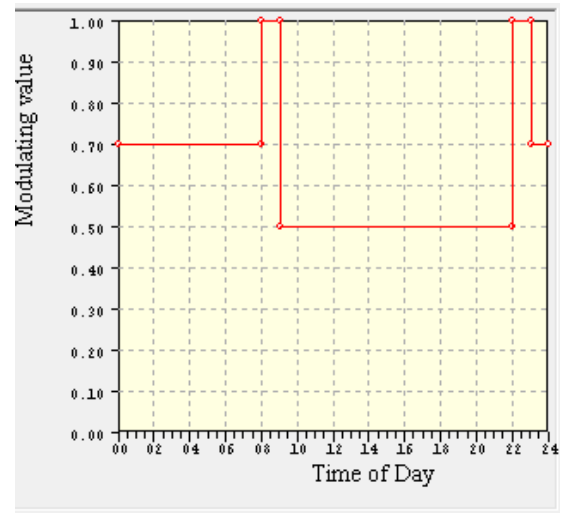


7.2 OCCUPANCY

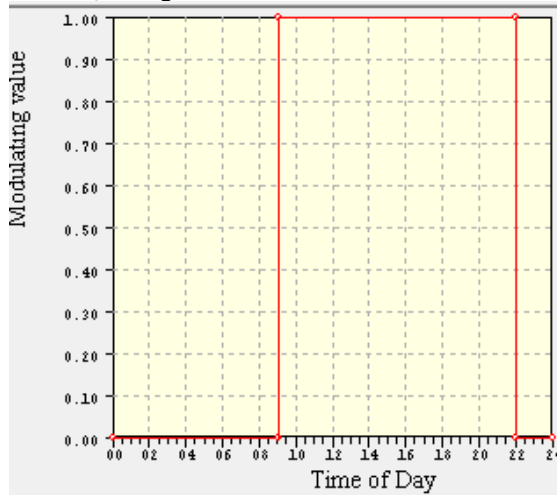
Single Bedroom



Double Bedroom

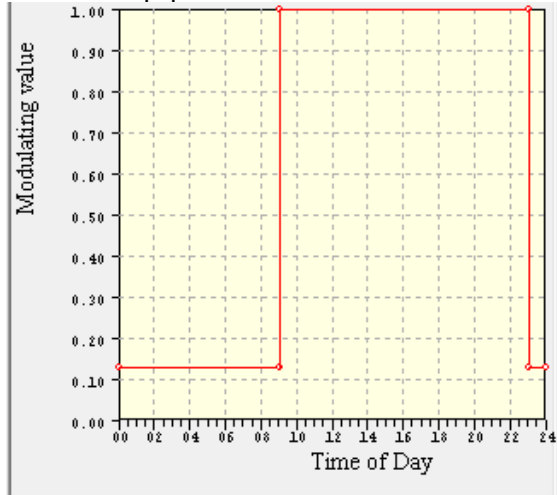


Kitchen/Living Room

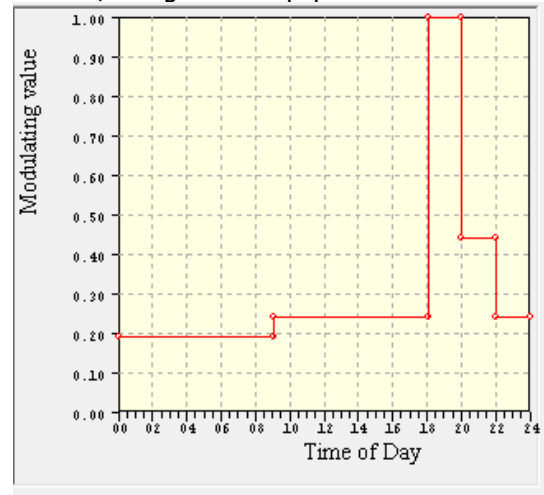


7.3 EQUIPMENT

Bedroom Equipment



Kitchen/Living Room Equipment



8.0 LIST OF ACRONYMS

CIBSE	Chartered Institute of Building Services Engineers
CIBSE TM59	Technical Memorandum 59 – Design Methodology for the Assessment of Overheating Risk in Homes
CIBSE TM52	Technical Memorandum 52 - The Limits of Thermal Comfort: Avoiding Overheating in European Buildings
IES VE	Integrated Environmental Solutions Virtual Environment (Modelling Software)
NCM	National Calculation Method (Standard Energy Modelling Software)
BS	British Standard
ACH	Air Changes per Hour
Part L1A	Approved Document L1A – Conservation of Fuel and Power in New Dwellings.

9.0 APPENDICES

9.1 APPENDIX A – CRITERIA 1 EVIDENCE

Passed:	38 rooms:
Failed:	0 rooms:
Unoccupied:	39 rooms:

Data:			
Building category:	Category II (new builds.)		
Days data=	153	01-May	30-Sep
Days (summer)=	153	01-May	30-Sep

Passed:	38 rooms:				
Room Name	Occupied days (%)	Criteria 1	Criteria 2	Criteria 3	Criteria failing
AP-00-01 Bedroom	100	0	0	0	-
AP-00-01 Kitchen/Living Room	100	0	0	0	-
AP-01-01 Bedroom 1	100	0	0	0	-
AP-01-01 Bedroom 2	100	0	0	0	-
AP-01-01 Kitchen/Living Room	100	0	0	0	-
AP-01-02 Bedroom	100	0	0	0	-
AP-01-02 Kitchen/Living Room	100	0	0	0	-
AP-01-03 Bedroom 1	100	0	0	0	-
AP-01-03 Bedroom 2	100	0	1	1	-
AP-01-03 Kitchen/Living Room	100	0	0	0	-
AP-01-04 Bedroom	100	0	0	0	-
AP-01-04 Kitchen/Living Room	100	0	0	0	-
AP-02-01 Bedroom 1	100	0	0	0	-
AP-02-01 Bedroom 2	100	0	1	1	-
AP-02-01 Kitchen/Living Room	100	0	0	0	-
AP-02-02 Bedroom	100	0	0	0	-
AP-02-02 Kitchen/Living Room	100	0.1	1	1	-
AP-02-03 Bedroom 1	100	0	0	0	-
AP-02-03 Bedroom 2	100	0.1	5	1	-
AP-02-03 Kitchen/Living Room	100	0.1	1	1	-
AP-02-04 Bedroom	100	0	0	0	-
AP-02-04 Kitchen/Living Room	100	0	0	0	-
AP-03-01 Bedroom 1	100	0.4	5	1	-

AP-03-01 Bedroom 2	100	0.2	3	1	-
AP-03-01 Kitchen/Living Room	100	1.4	12	3	2
AP-03-02 Bedroom	100	0.1	2	1	-
AP-03-02 Kitchen/Living Room	100	0.1	2	1	-
AP-03-03 Bedroom 1	100	0.1	3	1	-
AP-03-03 Bedroom 2	100	0.1	2	1	-
AP-03-03 Bedroom 3	100	0.3	7	1	2
AP-03-03 Kitchen/Living Room	100	0.2	3	1	-
AP-04-01 Bedroom 1	100	0.7	10	2	2
AP-04-01 Bedroom 2	100	0.5	7	1	2
AP-04-01 Kitchen/Living Room	100	0.2	3	1	-
AP-04-02 Bedroom 1	100	0.8	11	2	2
AP-04-02 Bedroom 2	100	0.4	6	1	-
AP-04-02 Bedroom 3	100	0.5	6	1	-
AP-04-02 Kitchen/Living Room	100	0.3	2	1	-

9.2 APPENDIX B – CRITERIA 2 EVIDENCE

	22:00-07:00
	Dry resultant temperature (°C) - hours in range
Location	> 26.00
AP-00-01 Bedroom	8
AP-01-01 Bedroom 1	11
AP-01-01 Bedroom 2	13
AP-01-02 Bedroom	13
AP-01-03 Bedroom 1	15
AP-01-03 Bedroom 2	16
AP-01-04 Bedroom	11
AP-02-01 Bedroom 1	11
AP-02-01 Bedroom 2	14
AP-02-02 Bedroom	13
AP-02-03 Bedroom 1	13
AP-02-03 Bedroom 2	14
AP-02-04 Bedroom	11
AP-03-01 Bedroom 1	15
AP-03-01 Bedroom 2	14
AP-03-02 Bedroom	14
AP-03-03 Bedroom 1	7
AP-03-03 Bedroom 2	12
AP-03-03 Bedroom 3	14
AP-04-01 Bedroom 1	8
AP-04-01 Bedroom 2	6
AP-04-02 Bedroom 1	6
AP-04-02 Bedroom 2	8
AP-04-02 Bedroom 3	6
Total hours	272