RIDGE

UXBRIDGE CO-LIVING AND HOTEL TM52 OVERHEATING RISK ASSESSMENT REPORT

28/10/2024

UXBRIDGE CO-LIVING AND HOTEL
DNA UXBRIDGE LTD

28/10/2024

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CONTENTS

1. EXECUTIVE SUMMARY

This report is presented to evaluate the overheating risk to occupied spaces within the Uxbridge Hotel and Retail spaces according to CIBSE Technical Memorandum 52 (TM52) - a methodology for predicting the likelihood of building overheating.

A sample of the building spaces with mechanical cooling will be assessed for sufficient thermal comfort using Predicted Mean Vote (PMV) and Percentage of People Dissatisfied (PPD) measures according to TM52. The sample of rooms selected are representative of rooms facing North, South, Eat and West with selection of a typical floor representing both, the Hotel and the Retail spaces.

The tables below present the TM52 pass rates for all spaces considered for this reporting.

Table 1 TM52 Hotel's Results.

WEATHER FILES	SPACE	NUMBER OF PMV / PPD COMPLIANCE
London_LHR_DSY1_2020High50	Hotel Bedrooms	24 / 24
London_LHR_DSY2_2020High50		24 / 24
London_LHR_DSY3_2020High50		24 / 24

Table 2 TM52 Retail's Results.

WEATHER FILES	SPACE	PMV / PPD CATEGORY PASS / FAIL
London_LHR_DSY1_2020High50	Retail Units	4 / 4
London_LHR_DSY2_2020High50		4 / 4
London_LHR_DSY3_2020High50		4 / 4

The Table 3 below presents those results of the notional cooling demand for the Hotel and the CoLiving, is better than the actual cooling demand of both building types. This is due to the improved heat retention obtained from the betterment in U-Values, and the increased solar gain obtained from the worse G-values, between the actual and notional buildings.

Table 6 of this document states the U-Values used and the Energy Strategy Report of this project details the reduced heat loss through the building envelope and optimized solar heat gain. This leads to a greater energy efficiency, lower heating requirements, and a more comfortable indoor environment, especially in a temperature climate like London.

Table 3 Total Cooling Demand for Uxbridge CoLiving and Hotel.

Building Type		Area weighted average non-residential cooling demand (MJ/m2)	Total area weighted non-residential cooling demand (MJ/yr)
Hotel	Actual	93.10	665638.43
	Notional	47.90	342462.32
CoLiving	Actual	29.30	427410.79
	Notional	18.89	275523.59

2. INTRODUCTION

The aim of this report is to evaluate the building spaces with mechanical cooling to have sufficient thermal comfort using PMV and PPD measures according to TM52. This analysis is performed according to the guidance described in CIBSE Technical Memorandum 52 (TM52) – The limits of thermal comfort: avoiding overheating in European buildings.

Over time due to climate change, urbanisation, and the introduction of winter energy efficiency measures, thermal discomfort from higher temperatures have become an issue in buildings. Occupant thermal discomfort happens in building through either poor design, poor management, or inadequate services. CIBSE TM52 is a methodology for predicting the likelihood of a building overheating.

The proposed development has been assessed through dynamic thermal modelling by using Integrated Solutions Virtual Environment (IES VE) 2023 v4.1.0 which complies with CIBSE AM11: Building performance modelling (2015b). IES VE is used by sustainable design experts around the globe as it is an in-depth suite of integrated analysis tools for the design and retrofit of buildings. The platform allows designers to test different options, identify passive solutions, compare low carbon & renewable technologies, and draw conclusions on energy use, CO_2 emissions and occupant comfort.

The model has been created based on the information received from the relevant parties at the time of this report's publication. This includes floor plans, building usage, u-values, ventilation strategies, weather, and site conditions.

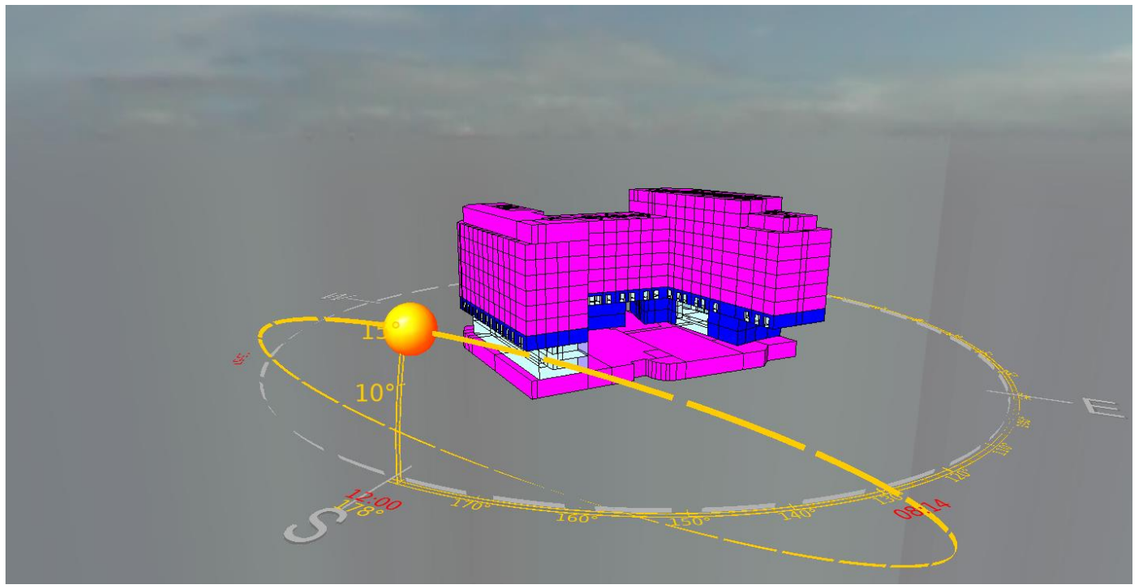

Figure 1 Thermal model of Uxbridge CoLiving and Hotel building showing building orientation.

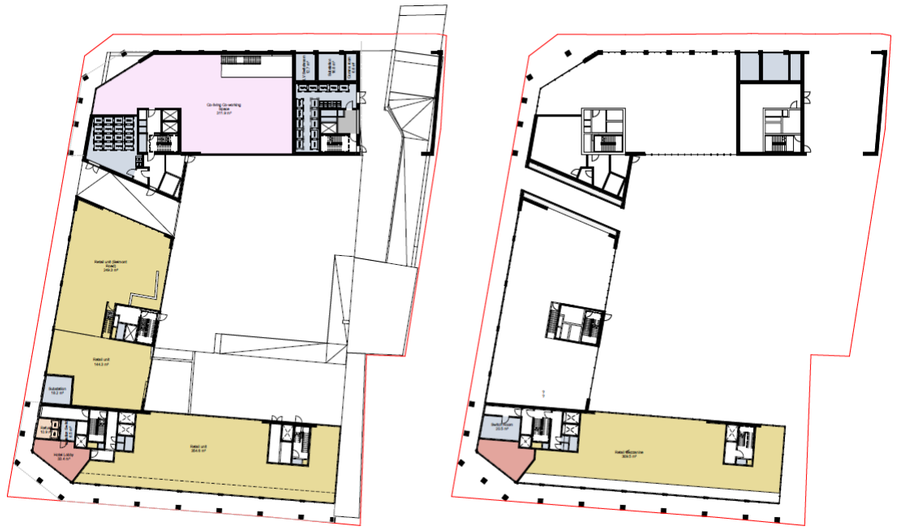

Figure 2 Lower floor plans of floor plates to be assessed (Retail).

Figure 3 Upper floor plans of floor plates to be assessed (Hotel).

3. APPROACH TO OVERHEATING MITIGATION

The aim of this overheating assessment is to show that the proposed development makes reasonable provisions to reduce unwanted solar gains in the summer and provides an adequate means to remove excess heat from the internal environment.

To predict whether a building will overheat, important physical parameters are considered within the simulations –

- air temperature,
- radiant temperature,
- humidity,
- air movement,
- clothing insulation levels and
- activity information levels.

In this report, the spaces with mechanical cooling through VRF or FCU systems will be assessed for sufficient thermal comfort using Predicted Mean Vote (PMV) and Percentage of People Dissatisfied (PPD) measures according to TM52.

4. THERMAL COMFORT CRITERIA

According to TM52, a building is providing an adequate internal thermal condition if the occupants are not conscious of the internal temperature.

Measures of overheating criteria differ depending on the space's air conditioning strategy.

Mechanically Cooled Spaces

For mechanically conditions spaces, TM52 considers a space as overheating if the value of the PMV index is above 0.5 (PPD≥10%).

PMV is an index that predicts the average value of votes from a group of representative occupants on a seven-point thermal sensation scale as shown below.

COLD	COOL	SLIGHTLY COOL	NEUTRAL	SLIGHTLY WARM	WARM	HOT
-3	-2	-1	0	+1	+2	+3

Under a dynamic simulation PMV is calculated using information on metabolic rates, clothing insulation, air temperature and air velocity.

PMV is used to calculate a PPD which is the quantitative prediction of the percentage of thermal dissatisfied people that are either too warm or too cold.

5. ASSESSMENT INPUTS AND ASSUMPTIONS

Weather File.

The proposed development is located in London. Therefore, the thermal assessment has been carried out using the following weather files according to CIBSE TM52:

- London_LHR_DSY1_2020High50.epw

Future weather files were also analysed on the thermal comfort assessment to prove compliance against CIBSE TM52. In this case, the future weather files used are:

- London_LHR_DSY2_2020High50.epw
- London_LHR_DSY3_2020High50.epw

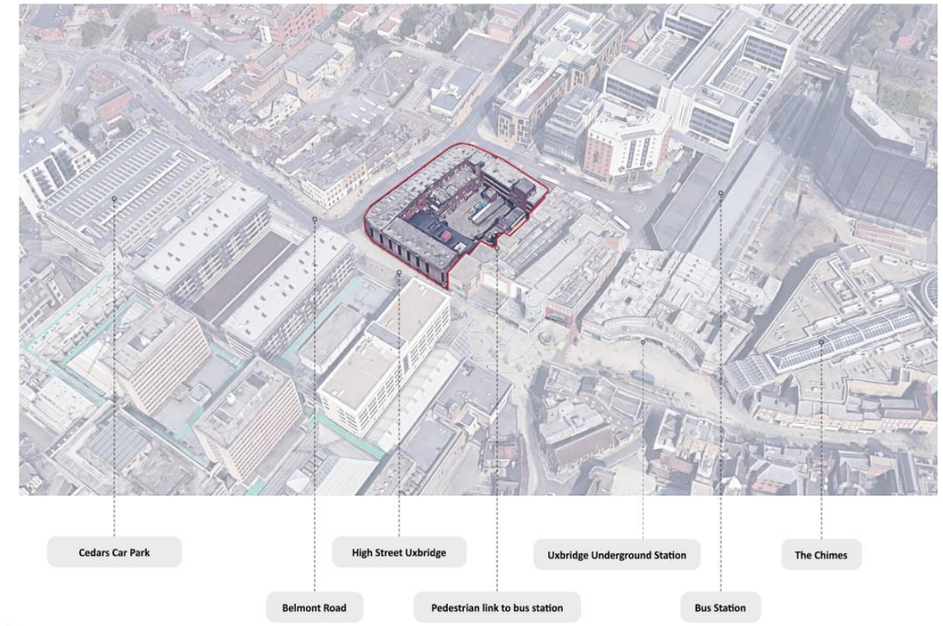

Figure 4 Location Plan.

Thermal Comfort Category.

Table 4 Selected thermal comfort category.

BUILDING CATEGORY	DESCRIPTION	CATEGORY USED
Category I / A	High level of expectation. Normally used for spaces occupied by young and infirm persons.	
Category II / B	Normal expectation. Normally used for most new builds.	☑
Category III / B	An acceptable moderate level of expectation. Normally used for existing buildings.	

Operational Profiles.

At this stage of analysis, internal gain profiles have been adapted from CIBSE Guide A Environmental Design, CIBSE TM59:2017 "Design methodology for the assessment of overheating risk in homes" and updated with design occupancies where available. Unless otherwise stated, all occupancies in the table below are from the calculations provided by the mechanical services design team.

Table 5 Internal gain descriptions.

SPACE TYPE	GAIN TYPE	DETAILS
Hotel Bedrooms*	Lighting	2 W/m² Sensible Heat Gain with a 0.45 Radiant fraction has been applied between the hours of 1800-2300, this assumes good day light is available in the summer months where overheating is assessed.
	Occupancy	2 occupants, each generating 75W sensible, 55W latent heat gain with an occupancy profile of varying between a minimum of 70 & maximum of 100% throughout the day
	Equipment	Peak Sensible Gain of 450W between 09:00 to 23:00.
Retail Spaces*	Lighting	25 W/m² Sensible Heat Gain with a 0.45 Radiant fraction has been applied between the hours of 0900-1800
	Occupancy	5 m^2/person, each generating 75W sensible, 55W latent heat gain with an occupancy profile of varying between a minimum of 75 & maximum of 100% throughout 0900-1800
	Equipment	Peak Sensible Gain of 5W/m^2 between 09:00 to 18:00.

* Indicates where occupancies weren't specified by the design team. Maximum CIBSE Guide A and CIBSE TM59:2017 occupancy density values were used. More detailed outline of the relevant rooms can be found in the Appendices.

Fabric Specification.

The table below details a summary of the building fabric details used for the assessment. These inputs have been reviewed and confirmed with the design team. It is the responsibility of the design team to provide notice to the energy assessor if these performance figures have changed or are different to those specified.

Table 6 Uxbridge CoLiving and Hotel Fabric Specification

ELEMENT	FABRIC PARAMETERS
Walls	0.15 W/m^2K
Floor	0.15 W/m^2K
Roof	0.15 W/m^2K
Windows	1.40 W/m^2K (g-value: 0.40)
Personnel Doors	1.60 W/m^2K
Air Permeability	3 m^3/h/m^2

Ventilation Strategy

Whilst local extract is supplied to some spaces, the building is largely served by mechanical supply and extract ventilation systems with heat recovery.

Below is a summary of the specified ventilation rates applied to the spaces.

Table 7 Room level ventilation rates

SPACE	MAX VENTILATION RATE
Hotel Bedrooms	10 l/s/p
Retail Spaces	10 l/s/p

Ventilation profiles have been developed to match the internal gain profiles adapted from the National Calculation Methodology (NCM).

No specified flow rates have been provided by the design team, an NCM standard value of 10l/s/person has been assigned to the spaces.

Cooling Strategy

Where cooling is present, this is done by VRF units. The following spaces are cooled and will be assessed under the PMV/PPD measure, within brackets are their cooling setpoints.

Hotel Bedrooms (22˚C)
Retail Spaces (21˚C)

PMV/PPD Inputs

According to CIBSE Guide A Environmental Design most spaces within the building are assumed a clothing insulation of 0.7-1.6 in winter and 0.3-1.4 in summer. Where the simulation inputs differ from this due to an expected difference in room usage the selected values and their relevant spaces are presented in the table below.

Table 8 Clothing Insulation (CLO) levels

SPACE	MINIMUM CLO	MAXIMUM CLO
Hotel Bedrooms	1.0	1.3
Retail	0.6	1.0

This table below presents the associated metabolic rate (MET) of activity expected from the room occupants in different spaces.

Table 9 Occupant Activity Metabolic Rates

ACTIVITY	MET	SPACES APPLIED
Seated at rest	1.0	Bedrooms
Sedentary work, Standing	1.4	Circulation

Operative temperature calculation requires the modelled air speed in a space to be set at 0.1m/s.

6. RESULTS

Table 10 and 11 below presents the results of the thermal comfort assessment using Predicted Mean Vote (PMV) and Percentage of People Dissatisfied (PPD) measures according to TM52.

Table 10 Hotel's PMV/PDD Results.

SPACE NAME	PMV / PPD CATEGORY PASS / FAIL
01-Hotel-Accessible-Bedroom-002	Pass
01-Hotel-Accessible-Bedroom-001	Pass
01-Hotel-Standard-Bedroom-008	Pass
01-Hotel-Standard-Bedroom-009	Pass
01-Hotel-Standard-Bedroom-010	Pass
01-Hotel-Standard-Bedroom-011	Pass
01-Hotel-Standard-Bedroom-012	Pass
01-Hotel-Standard-Bedroom-013	Pass
01-Hotel-Standard-Bedroom-014	Pass
01-Hotel-Standard-Bedroom-015	Pass
01-Hotel-Standard-Bedroom-016	Pass
01-Hotel-Standard-Bedroom-017	Pass
01-Hotel-Standard-Bedroom-018	Pass
01-Hotel-Family-Bedroom	Pass
01-Hotel-Family-Bedroom	Pass
01-Hotel-Standard-Bedroom-019	Pass
01-Hotel-Standard-Bedroom-020	Pass
01-Hotel-Standard-Bedroom-007	Pass
01-Hotel-Standard-Bedroom-006	Pass
01-Hotel-Standard-Bedroom-001	Pass
01-Hotel-Standard-Bedroom-002	Pass
01-Hotel-Standard-Bedroom-003	Pass
01-Hotel-Standard-Bedroom-004	Pass
01-Hotel-Standard-Bedroom-005	Pass

Table 11 Retail's PMV/PDD Results.

SPACE NAME	PMV / PPD CATEGORY PASS / FAIL
L00 Retail	Pass
L00 Retail Unit Belmont Road	Pass
L00 Retail Unit	Pass
LM Retail Mezzanine	Pass

Full results of the Hotel spaces can be viewed in Appendix A (Hotel: PMV/PPD London LHR DSY1_2020High50 Weather File), Appendix B (Hotel: PMV/PPD London LHR DSY2_2020High50 Weather File) and Appendix C (Hotel: PMV/PPD London LHR DSY3_2020High50 Weather File).

Full results of the Retail spaces can be viewed in Appendix D (Retail: PMV/PPD London LHR DSY1_2020High50 Weather File), Appendix E (Retail: PMV/PPD London LHR DSY2_2020High50 Weather File) and Appendix F (Retail: PMV/PPD London LHR DSY3_2020High50 Weather File).

Cooling Demand Analysis

According to the GLA's guidance (2022), the area weighted average (MJ/m2) and total (MJ/year) cooling demand for the actual and notional building should be provided and it should be demonstrated that the actual building's cooling demand is lower than the notional.

The Table 12 below presents those results of the notional cooling demand for the Hotel and the CoLiving, is better than the actual cooling demand of both building types. This is due to the improved heat retention obtained from the betterment in U-Values, and the increased solar gain obtained from the worse G-values, between the actual and notional buildings.

Table 6 of this document states the U-Values used and the Energy Strategy Report of this project details the reduced heat loss through the building envelope and optimized solar heat gain. This leads to a greater energy efficiency, lower heating requirements, and a more comfortable indoor environment, especially in a temperature climate like London.

Table 12 Total Cooling Demand for Uxbridge CoLiving and Hotel.

Building Type		Area weighted average non-residential cooling demand (MJ/m2)	Total area weighted non-residential cooling demand (MJ/yr)
Hotel	Actual	93.10	665638.43
	Notional	47.90	342462.32
CoLiving	Actual	29.30	427410.79
	Notional	18.89	275523.59

7. CONCLUSION

This thermal comfort report has presented the analysis procedures and results of a TM52 guided assessment of the Uxbridge CoLiving and Hotel development for the hotel and retail spaces.

Table 13 Hotel's PMV/PPD Results.

WEATHER FILES	SPACE	NUMBER OF PMV / PPD COMPLIANCE
London_LHR_DSY1_2020High50	Hotel Bedrooms	24 / 24
London_LHR_DSY2_2020High50		24 / 24
London_LHR_DSY3_2020High50		24 / 24

Table 14 TM52 Retail's Results.

WEATHER FILES	SPACE	PMV / PPD CATEGORY PASS / FAIL
London_LHR_DSY1_2020High50	Retail Units	4 / 4
London_LHR_DSY2_2020High50		4 / 4
London_LHR_DSY3_2020High50		4 / 4

From the results shown above, all spaces achieve their required criteria under TM52. This compliance is achieved using the current design conditions as outlined within this report where the building uses both mechanical ventilation and additional cooling to some spaces to mitigate overheating.

As this methodology is a predictive exercise that uses assumptions to aid a dynamic simulation - it does not guarantee that people will always be comfortable in compliant spaces as it does not consider unusual space usage or future building management. The benefits of this analysis are to inform building design decisions and encourage best practice in design development. The presented results will need to be revised as changes are made to building design in future stages.

8. APPENDIX A TM52 RESULTS – HOTEL: PMV/PPD LONDON_LHR_DSY1_2020HIGH50 WEATHER FILE

SPACE NAME	% OCCUPIED HOURS MEETING PMV	PMV OCCUPIED HOURS MIN / MAX	PPD OCCUPIED HOURS MIN / MAX	PMV / PPD CATEGORY PASS / FAIL
01-Hotel-Accessible-Bedroom-002	100	-0.42 / 0.23	5.00 / 8.61	Pass
01-Hotel-Accessible-Bedroom-001	100	-0.41 / 0.23	5.00 / 8.55	Pass
01-Hotel-Standard-Bedroom-008	100	-0.41 / 0.23	5.00 / 8.57	Pass
01-Hotel-Standard-Bedroom-009	100	-0.41 / 0.23	5.00 / 8.57	Pass
01-Hotel-Standard-Bedroom-010	100	-0.41 / 0.23	5.00 / 8.57	Pass
01-Hotel-Standard-Bedroom-011	100	-0.41 / 0.23	5.00 / 8.57	Pass
01-Hotel-Standard-Bedroom-012	100	-0.41 / 0.23	5.00 / 8.57	Pass
01-Hotel-Standard-Bedroom-013	100	-0.41 / 0.23	5.00 / 8.57	Pass
01-Hotel-Standard-Bedroom-014	100	-0.41 / 0.23	5.00 / 8.57	Pass
01-Hotel-Standard-Bedroom-015	100	-0.41 / 0.23	5.00 / 8.57	Pass
01-Hotel-Standard-Bedroom-016	100	-0.41 / 0.23	5.00 / 8.57	Pass
01-Hotel-Standard-Bedroom-017	100	-0.41 / 0.23	5.00 / 8.57	Pass
01-Hotel-Standard-Bedroom-018	100	-0.41 / 0.23	5.00 / 8.57	Pass
01-Hotel-Family-Bedroom	100	-0.41 / 0.23	5.00 / 8.53	Pass
01-Hotel-Family-Bedroom	100	-0.41 / 0.23	5.00 / 8.59	Pass
01-Hotel-Standard-Bedroom-019	100	-0.42 / 0.23	5.00 / 8.59	Pass
01-Hotel-Standard-Bedroom-020	100	-0.41 / 0.23	5.00 / 8.56	Pass
01-Hotel-Standard-Bedroom-007	100	-0.41 / 0.23	5.00 / 8.49	Pass
01-Hotel-Standard-Bedroom-006	100	-0.41 / 0.23	5.00 / 8.53	Pass
01-Hotel-Standard-Bedroom-001	100	-0.41 / 0.23	5.00 / 8.52	Pass
01-Hotel-Standard-Bedroom-002	100	-0.41 / 0.23	5.00 / 8.53	Pass
01-Hotel-Standard-Bedroom-003	100	-0.41 / 0.23	5.00 / 8.53	Pass
01-Hotel-Standard-Bedroom-004	100	-0.41 / 0.23	5.00 / 8.53	Pass
01-Hotel-Standard-Bedroom-005	100	-0.41 / 0.23	5.00 / 8.54	Pass

9. APPENDIX B TM52 RESULTS – HOTEL: PMV/PPD LONDON_LHR_DSY2_2020HIGH50 WEATHER FILE

SPACE NAME	% OCCUPIED HOURS MEETING PMV	PMV OCCUPIED HOURS MIN / MAX	PPD OCCUPIED HOURS MIN / MAX	PMV / PPD CATEGORY PASS / FAIL
01-Hotel-Accessible-Bedroom-002	100	-0.42 / 0.22	5.00 / 8.72	Pass
01-Hotel-Accessible-Bedroom-001	100	-0.42 / 0.23	5.00 / 8.66	Pass
01-Hotel-Standard-Bedroom-008	100	-0.42 / 0.23	5.00 / 8.73	Pass
01-Hotel-Standard-Bedroom-009	100	-0.42 / 0.22	5.00 / 8.73	Pass
01-Hotel-Standard-Bedroom-010	100	-0.42 / 0.23	5.00 / 8.73	Pass
01-Hotel-Standard-Bedroom-011	100	-0.42 / 0.22	5.00 / 8.73	Pass
01-Hotel-Standard-Bedroom-012	100	-0.42 / 0.23	5.00 / 8.73	Pass
01-Hotel-Standard-Bedroom-013	100	-0.42 / 0.23	5.00 / 8.73	Pass
01-Hotel-Standard-Bedroom-014	100	-0.42 / 0.23	5.00 / 8.73	Pass
01-Hotel-Standard-Bedroom-015	100	-0.42 / 0.22	5.00 / 8.73	Pass
01-Hotel-Standard-Bedroom-016	100	-0.42 / 0.22	5.00 / 8.73	Pass
01-Hotel-Standard-Bedroom-017	100	-0.42 / 0.23	5.00 / 8.73	Pass
01-Hotel-Standard-Bedroom-018	100	-0.42 / 0.23	5.00 / 8.73	Pass
01-Hotel-Family-Bedroom	100	-0.42 / 0.23	5.00 / 8.70	Pass
01-Hotel-Family-Bedroom	100	-0.42 / 0.22	5.00 / 8.73	Pass
01-Hotel-Standard-Bedroom-019	100	-0.42 / 0.22	5.00 / 8.76	Pass
01-Hotel-Standard-Bedroom-020	100	-0.42 / 0.23	5.00 / 8.76	Pass
01-Hotel-Standard-Bedroom-007	100	-0.42 / 0.23	5.00 / 8.61	Pass
01-Hotel-Standard-Bedroom-006	100	-0.42 / 0.23	5.00 / 8.69	Pass
01-Hotel-Standard-Bedroom-001	100	-0.42 / 0.23	5.00 / 8.66	Pass
01-Hotel-Standard-Bedroom-002	100	-0.42 / 0.23	5.00 / 8.69	Pass
01-Hotel-Standard-Bedroom-003	100	-0.42 / 0.23	5.00 / 8.70	Pass
01-Hotel-Standard-Bedroom-004	100	-0.42 / 0.23	5.00 / 8.70	Pass
01-Hotel-Standard-Bedroom-005	100	-0.42 / 0.23	5.00 / 8.70	Pass

10. APPENDIX C TM52 RESULTS – HOTEL: PMV/PPD LONDON_LHR_DSY3_2020HIGH50 WEATHER FILE

SPACE NAME	% OCCUPIED HOURS MEETING PMV	PMV OCCUPIED HOURS MIN / MAX	PPD OCCUPIED HOURS MIN / MAX	PMV / PPD CATEGORY PASS / FAIL
01-Hotel-Accessible-Bedroom-002	100	-0.43 / 0.23	5.00 / 8.88	Pass
01-Hotel-Accessible-Bedroom-001	100	-0.43 / 0.23	5.00 / 8.81	Pass
01-Hotel-Standard-Bedroom-008	100	-0.43 / 0.23	5.00 / 8.83	Pass
01-Hotel-Standard-Bedroom-009	100	-0.43 / 0.23	5.00 / 8.83	Pass
01-Hotel-Standard-Bedroom-010	100	-0.43 / 0.23	5.00 / 8.83	Pass
01-Hotel-Standard-Bedroom-011	100	-0.43 / 0.23	5.00 / 8.83	Pass
01-Hotel-Standard-Bedroom-012	100	-0.43 / 0.23	5.00 / 8.83	Pass
01-Hotel-Standard-Bedroom-013	100	-0.43 / 0.23	5.00 / 8.83	Pass
01-Hotel-Standard-Bedroom-014	100	-0.43 / 0.23	5.00 / 8.83	Pass
01-Hotel-Standard-Bedroom-015	100	-0.43 / 0.23	5.00 / 8.83	Pass
01-Hotel-Standard-Bedroom-016	100	-0.43 / 0.23	5.00 / 8.83	Pass
01-Hotel-Standard-Bedroom-017	100	-0.43 / 0.23	5.00 / 8.83	Pass
01-Hotel-Standard-Bedroom-018	100	-0.43 / 0.23	5.00 / 8.84	Pass
01-Hotel-Family-Bedroom	100	-0.43 / 0.23	5.00 / 8.80	Pass
01-Hotel-Family-Bedroom	100	-0.43 / 0.23	5.00 / 8.85	Pass
01-Hotel-Standard-Bedroom-019	100	-0.43 / 0.23	5.00 / 8.86	Pass
01-Hotel-Standard-Bedroom-020	100	-0.43 / 0.23	5.00 / 8.82	Pass
01-Hotel-Standard-Bedroom-007	100	-0.42 / 0.23	5.00 / 8.75	Pass
01-Hotel-Standard-Bedroom-006	100	-0.43 / 0.23	5.00 / 8.80	Pass
01-Hotel-Standard-Bedroom-001	100	-0.43 / 0.23	5.00 / 8.78	Pass
01-Hotel-Standard-Bedroom-002	100	-0.43 / 0.23	5.00 / 8.80	Pass
01-Hotel-Standard-Bedroom-003	100	-0.43 / 0.23	5.00 / 8.80	Pass
01-Hotel-Standard-Bedroom-004	100	-0.43 / 0.23	5.00 / 8.80	Pass
01-Hotel-Standard-Bedroom-005	100	-0.43 / 0.23	5.00 / 8.80	Pass

11. APPENDIX D TM52 RESULTS – RETAIL: PMV/PPD LONDON_LHR_ DSY1_2020HIGH50 WEATHER FILE

SPACE NAME	% OCCUPIED HOURS MEETING PMV	PMV OCCUPIED HOURS MIN / MAX	PPD OCCUPIED HOURS MIN / MAX	PMV / PPD CATEGORY PASS / FAIL
L00 Retail	100	-0.35 / 0.33	5.00 / 7.54	Pass
L00 Retail Unit Belmont Road	100	-0.37 / 0.33	5.00 / 7.79	Pass
L00 Retail Unit	100	-0.38 / 0.33	5.00 / 7.98	Pass
LM Retail Mezzanine	100	-0.34 / 0.33	5.00 / 7.42	Pass

12. APPENDIX E TM52 RESULTS – RETAIL: PMV/PPD LONDON_LHR_ DSY2_2020HIGH50 WEATHER FILE

SPACE NAME	% OCCUPIED HOURS MEETING PMV	PMV OCCUPIED HOURS MIN / MAX	PPD OCCUPIED HOURS MIN / MAX	PMV / PPD CATEGORY PASS / FAIL
L00 Retail	100	-0.36 / 0.32	5.00 / 7.73	Pass
L00 Retail Unit Belmont Road	100	-0.37 / 0.32	5.00 / 7.83	Pass
L00 Retail Unit	100	-0.37 / 0.32	5.00 / 7.89	Pass
LM Retail Mezzanine	100	-0.37 / 0.32	5.00 / 7.83	Pass

13. APPENDIX F TM52 RESULTS – RETAIL: PMV/PPD LONDON_LHR_ DSY3_2020HIGH50 WEATHER FILE

SPACE NAME	% OCCUPIED HOURS MEETING PMV	PMV OCCUPIED HOURS MIN / MAX	PPD OCCUPIED HOURS MIN / MAX	PMV / PPD CATEGORY PASS / FAIL
L00 Retail	100	-0.38 / 0.32	5.00 / 8.03	Pass
L00 Retail Unit Belmont Road	100	-0.38 / 0.33	5.00 / 8.00	Pass
L00 Retail Unit	100	-0.39 / 0.32	5.00 / 8.17	Pass
LM Retail Mezzanine	100	-0.39 / 0.32	5.00 / 8.16	Pass

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