



RIDGE

**DEANSGATE SOUTH
TM59 REPORT
FUSION STUDENTS**

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DEANSGATE SOUTH FUSION STUDENTS

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VERSION CONTROL

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CONTENTS

1. EXECUTIVE SUMMARY	4
2. COMPLIANCE REQUIREMENT	7
3. THERMAL MODEL	8
3.1. Weather Files	8
3.2. Building Fabric Parameters	9
3.3. Room Input Data	10
3.4. Openings	11
4. RESULTS AND CONCLUSIONS	12
5. LIMITATIONS OF THIS REPORT	13
6. APPENDIX A	14

1. EXECUTIVE SUMMARY

An overheating analysis has been carried out on six sample bedrooms and two kitchen spaces at the proposed Fusion Student Deansgate South development to show compliance with the thermal comfort criteria as set out in CIBSE TM59:2017 “Design methodology for the assessment of overheating risk in homes”.

The two kitchens and the six sample bedrooms are located on Level 20 and comprise of five standard single bedrooms, one studio and two shared “twodio” kitchens, faced on the South, East and West representing the worst-case scenario due to the solar heat gains from the South and the West.

Based on the modelling conducted, the results show that all habitable rooms for the sample bedrooms and the kitchen spaces comply with the thermal comfort criteria as set out in CIBSE TM59:2017 “Design methodology for the assessment of overheating risk in homes”.

The proposed building design utilises a summer bypass mechanical ventilation heat recovery (MVHR) system.

The MVHR system will operate if the room air temperature is greater than 21degC and the outside air temperature is less than the room air temperature.

The opening panel does not have a window restrictor but is limited to opening from 7am – 11pm, and between these hours, when the internal room temperature exceeds 22degC and the space is occupied, the panel will open, as per CIBSE TM59: 2017

The building thermal model estimates the buildings environmental conditions, and the calculation results are based on the modelling inputs and parameters as detailed herein this report in Section 3. Section 3.2 includes fabric U-values, internal heat gains, occupancy patterns, air permeability rate, ventilation strategy and natural ventilation openings used for the thermal model. The required MVHR ventilation rate and the equivalent free area for each opening type to mitigate overheating has been included in this report.

This analysis has been performed using IES software which provides full dynamic thermal analysis and is a CIBSE certified Level 5 approved Dynamic Simulation Modelling Software. This analysis has been carried out in accordance with user instructions set out in IES manuals and CIBSE AM11 Building Energy and Environmental Modelling.

The relevant weather file is Manchester, and the most current CIBSE Design Summer Year (DSY) Weather File for Manchester was chosen for the simulation (Manchester CIBSE DSY 1 2020’s high emissions 50th percentile range weather file), in accordance with CIBSE TM59:2017 “Design methodology for the assessment of overheating risk in homes”.

The building occupancy profiles & parameters published in CIBSE TM59:2017 “Design methodology for the assessment of overheating risk in homes” has been used. Within the bedrooms thermal comfort has been assessed against the criteria identified within CIBSE TM59:2017.

Within the bedrooms and the kitchen space, the thermal comfort has been assessed against the criteria for ‘predominantly mechanically ventilated’, as there are restrictions on the period of time the windows can open.

Please note, a full simulation of all bedrooms and adjacent spaces of the proposed development is recommended (which would include adjacent heat gains from communal corridors and plant rooms) since initial observations on a small sample of bedrooms can only go so far in attributing probable overheating risks.

Figures 1 – 5 below show images of the thermal model.

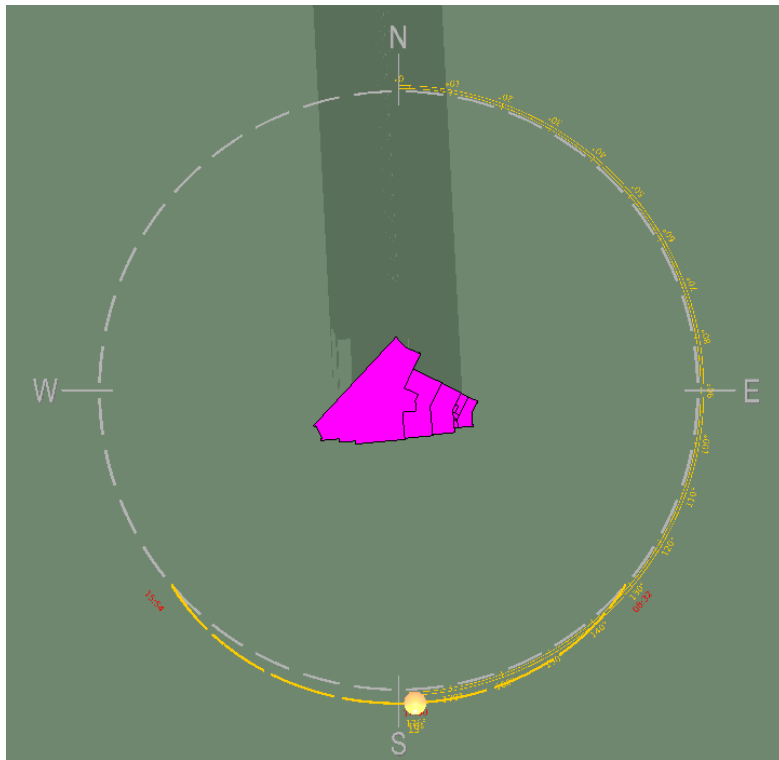


Figure 1: Image showing Plan view of thermal model.

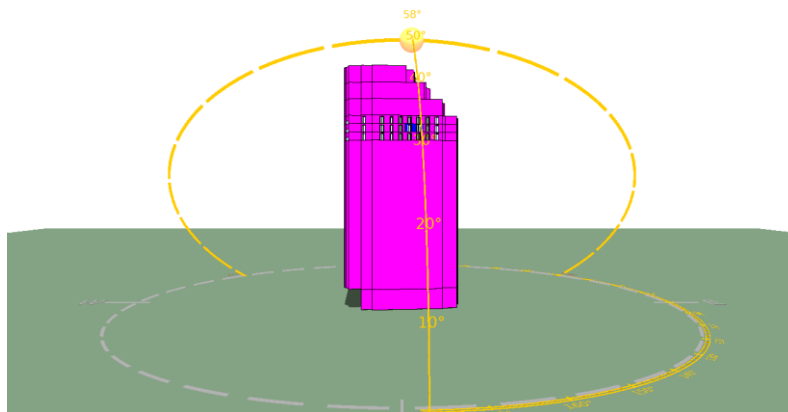


Figure 2: Image showing South elevation view of thermal model.

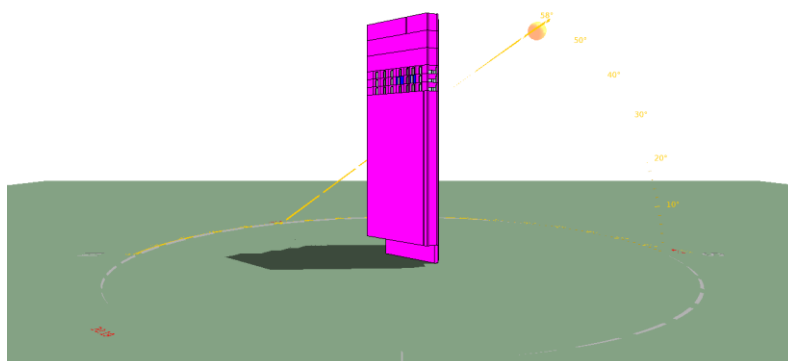


Figure 3: Image showing West elevation view of thermal model.

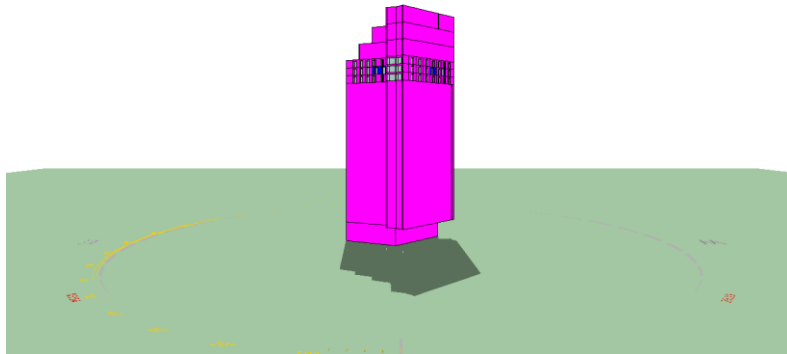


Figure 4: Image showing North elevation view of thermal model

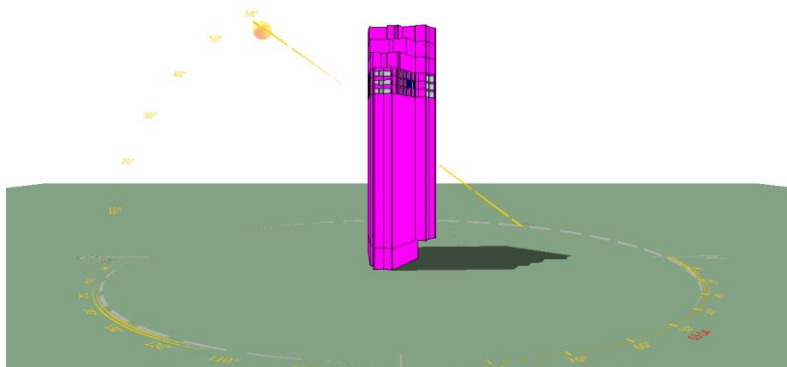


Figure 5: Image showing East elevation view of thermal model.

2. COMPLIANCE REQUIREMENT

The bedrooms and the kitchen spaces thermal comfort has been assessed against the criteria identified within CIBSE TM59:2017 'Design methodology for the assessment of overheating risk in homes'.

Because the bedrooms within the proposed development utilise a mechanical ventilation strategy due to a time restriction on when the windows can open, Section 4.3 of CIBSE TM59:2017 applies, which requires the following criteria to be met:

4.3 Criteria for homes predominantly mechanically ventilated –

For homes with restricted window openings, the CIBSE fixed temperature test must be followed, i.e., all occupied rooms should not exceed an operative temperature of 26 °C for more than 3% of the annual occupied annual hours (CIBSE Guide A (2015a)).

3. THERMAL MODEL

The thermal modelling is based on the design information made available to Ridge & Partners LLP on the 16th June 2022 and on 26th September 2022, comprising of drawings and elevation details.

3.1. Weather Files

The relevant weather file is Manchester and the most current CIBSE Design Summer Year (DSY) Weather File for Manchester was chosen for the simulation (Manchester CIBSE DSY 1 2020's high emissions 50th percentile range weather file), in accordance with CIBSE TM59:2017 "Design methodology for the assessment of overheating risk in homes" guidelines.

Figures 6 and 7 below illustrate the summertime temperature range (May – September) for both the dry bulb and wet bulb temperature for Manchester DSY 1 from the weather file.

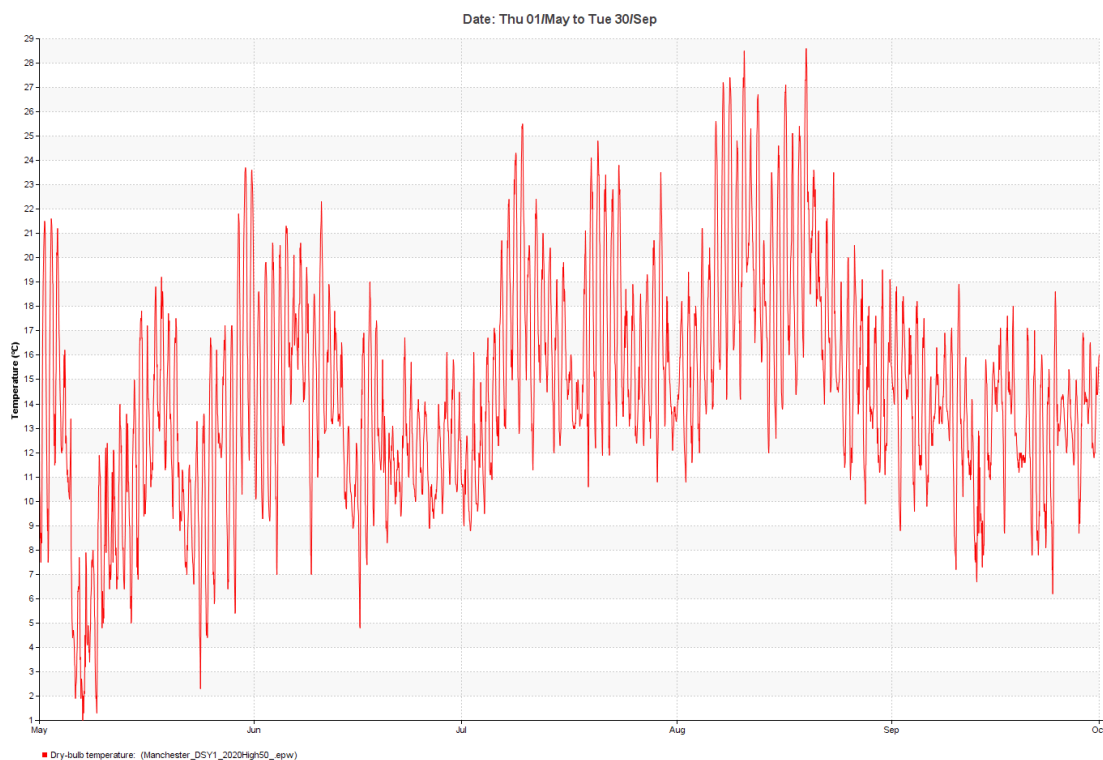


Figure 6: Graph showing summertime temperature range (May – September) for dry bulb temperature for Manchester DSY 1 from the weather file.

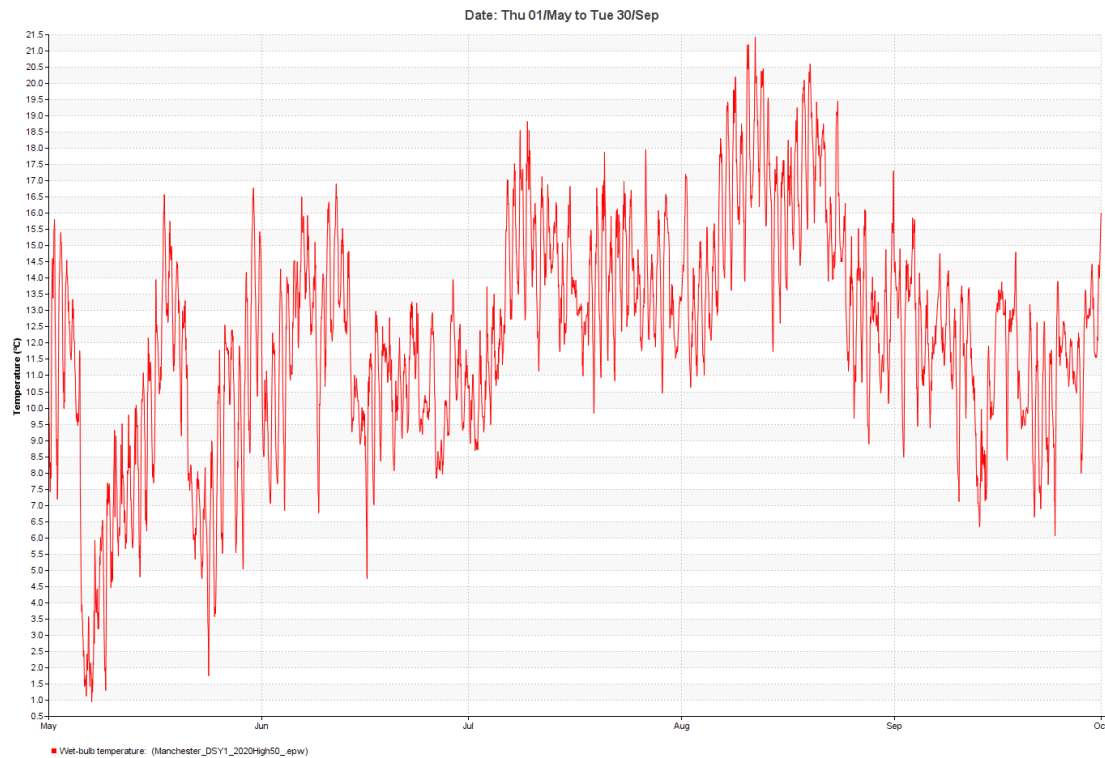


Figure 7: Graph showing summertime temperature range (May – September) for wet bulb temperature for Manchester DSY 1 from the weather file.

Table 1 below illustrates the maximum dry bulb and wet bulb temperature for Manchester DSY 1 from the weather file.

WEATHER FILE	MAX. DRY BULB TEMPERATURE	MAX. WET BULB TEMPERATURE
Manchester_DSY1_2020High50	28.60	21.42

Table 1: Table showing the maximum dry and wet bulb temperatures for Manchester DSY 1 from the weather file.

3.2. Building Fabric Parameters

Table 2 below shows a summary of fabric elements used in the thermal model for the proposed Deansgate South development

FABRIC ELEMENT	U-VALUE (W/M2.K)	G-VALUE
External Wall	0.26	-
Roof	0.18	-
Louvred Panel	1.6	-
Windows	1.6	0.32

Table 2: Table showing the fabric elements and U-values

3.3. Room Input Data

Table 3 below is a summary of room input data used for thermal modelling calculations. The building occupancy profiles & parameters published in CIBSE TM59:2017 "Design methodology for the assessment of overheating risk in homes" has been used as guidance.

ENVIRONMENTAL TYPE	ROOM	GAIN TYPE	DETAILS
2 Bedroom Kitchen	Lighting		2 W/m ² 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 a 25% occupancy between 0900 to 2200
	Equipment		Peak Sensible Gain of 300W between 1800 to 2000, with a base load of 51W for the rest of the day
	Ventilation		13l/s (4.2ac/hr) Mechanical Ventilation delivered by MVHR unit
Single Bedroom (including 'Twodio' bedrooms)	Lighting		2 W/m ² 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		1 occupant, generating 75W sensible, 55W latent heat gain with a modulating occupancy profile of 100% between 0800 to 2300 and 2300 to 0800 at 70%.
	Equipment		Peak Sensible Gain of 80W between 0800 to 2300, with a base load of 10W for the rest of the day
	Ventilation		8l/s (1.0ac/hr) Mechanical Ventilation delivered by MVHR unit. Natural Ventilation via opening windows as per section 1.
Studio	Lighting		2 W/m ² 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 100% for 24 hours a day
	Equipment		Peak Sensible Gain of 450W between 1800 to 2000, 200W Sensible Gain between 2000 to 2200, 110W Sensible Gain

		between 0900 to 1800 and 2200 to 2400, with a base load of 85W for the rest of the day
	Ventilation	13l/s (1.0ac/hr) Mechanical Ventilation delivered by MVHR unit. Natural Ventilation via opening windows as per section 1.

Table 3: Table showing the internal gains to different room types

3.4. Openings

The image below shows the window detail as seen in the “Elevation and Section study – Typical Level”, made available to Ridge & Partners LLP on the 16th June 2022:

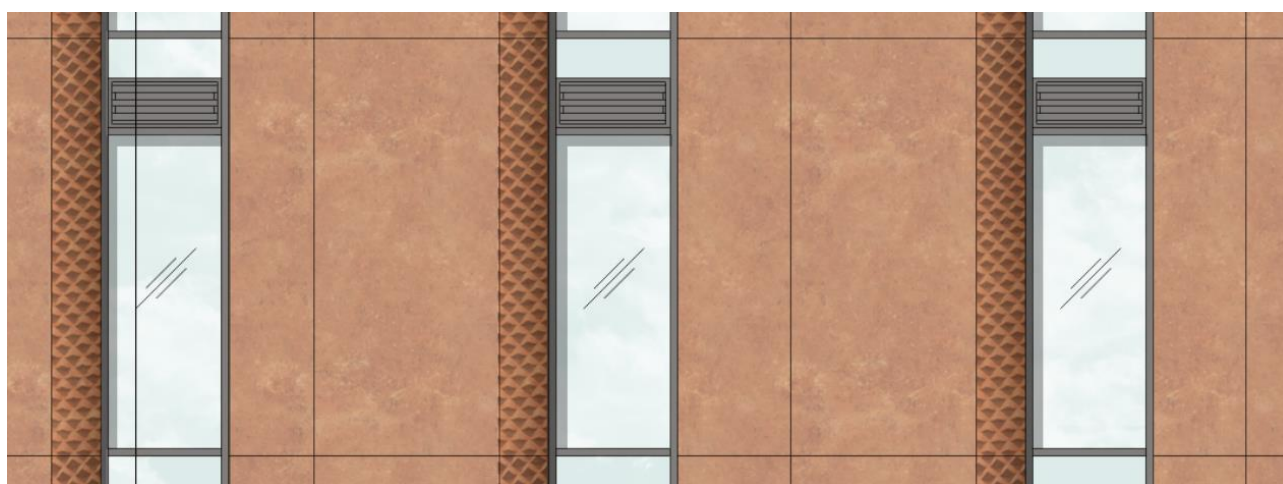


Table 4 below is a summary of openings and profiles used for thermal modelling calculations.

OPENING TYPE	DIMENSIONS	GLAZING AREA (M ²)	OPENABLE AREA (M ²)	OPENING PROFILE
Opening panel	0.38m W x 2.64m H	1.0	0.4	Between 7am-11pm, the opening panel is open when the internal temperature exceeds 22°C. At all other times, the opening panel is closed regardless of the internal temperature.
Window	0.87m W x 2.64m H	2.3	0	The windows are closed regardless of the internal temperature.

Table 4: Table showing the window openings and profiles

4. RESULTS AND CONCLUSIONS

As detailed within Section 2 of this report, for the bedrooms and kitchen spaces to achieve compliance with CIBSE TM59:2017, each habitable room must achieve compliance with:

4.3 Criteria for homes predominantly mechanically ventilated

For homes with restricted window openings, the CIBSE fixed temperature test must be followed, i.e., all occupied rooms should not exceed an operative temperature of 26 °C for more than 3% of the annual occupied annual hours (CIBSE Guide A (2015a)).

The table below shows the predicted thermal comfort results against the mechanical ventilation criteria for each of the assessed rooms within the proposed Deansgate South development using the Manchester CIBSE DSY 1 2020's high emissions 50th percentile range weather file.

ROOM NAME	OCCUPIED HOURS	NO. HOURS > 26°C	% ANNUAL HOURS > 26°C	PASS/FAIL
En-Suite Bedroom (West)	3672	1	0.03	Pass
Studio (West)	3672	4	0.11	Pass
Twodio Kitchen 001 (East)	1989	0	0	Pass
Twodio Bedroom 001a (East)	3672	0	0	Pass
Twodio Bedroom 001b (East)	3672	0	0	Pass
Twodio Kitchen 002 (South)	1989	22	0.6	Pass
Twodio Bedroom 002a (South)	3672	5	0.14	Pass
Twodio Bedroom 002b (South)	3672	5	0.14	Pass

Based on the modelling conducted, the results show that all habitable rooms assessed in the sample comply with the thermal comfort criteria as set out by CIBSE TM59:2017 "Design methodology for the assessment of overheating risk in homes".

5. LIMITATIONS OF THIS REPORT

The parameters used in this calculation are provided within Section 3 of this report and are deemed to be approved by the Client unless advised to the contrary. The required MVHR ventilation rate and the equivalent free area for each opening type to mitigate overheating has been included in this report.

It should be noted that as occupancy and building use is based on set parameters outlined in CIBSE TM59, there is no guarantee the temperatures estimated will match the actual building temperatures as the 'real' building may have differing operations and heat gain patterns with external weather conditions not normal to the historical data provided by the standard CIBSE weather files. It therefore should be noted that there is no guarantee that the thermal comfort assessment will match the occupied building

6. APPENDIX A

Appendix A shows the assessed rooms within the proposed development.

Level 20





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