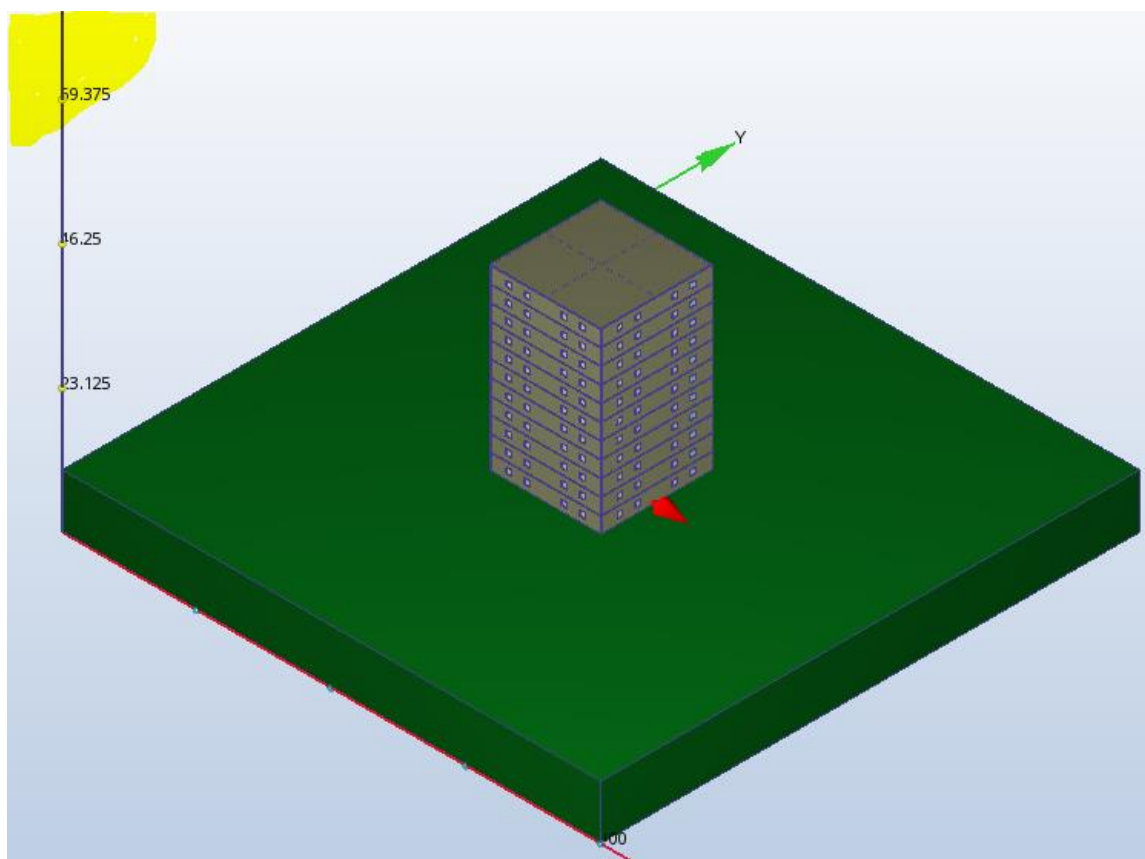


Report - Impact MIG 's paint



Conducted by:
Air Conditioning Eng. Eyal Niv
Mechanical Eng. Yuval Hirsch

Date: 20 July 2015

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1 General

Performing a simulation to examine the effect of MIG's paint on the temperatures in inside apartments in the building .

The thermal properties of the paint are in the appendices attached.

The tests conducted in accordance with Israeli Standard 1045.

Tests were conducted using with Autodesk CFD.

The temperature was simulated and tested by a team of engineers from Eyal Niv Consulting Engineers Ltd., headed by Engineer conditioning and ventilation Eyal Niv .

The achievements of these set of test represents great impact of using MIG paint.

2 Target and test method description

Purpose:

Simulate the temperature in 2 types of buildings (high rise and two-story) with 4 apartments (area of 100 sq.m.) on each floor.

Check the SUN influence on the building from all directions.

Method:

The Simulation will be done according the published temperature in 4 Climate areas' (Enclosed a map).

The Simulation will be done in a specific day as stated in the standard: 3 October and 27 March.

The Simulation will be done on regular Building (Regular wall thickness 24 cm (interior plaster + Brick + exterior plaster) $R = 0.74$

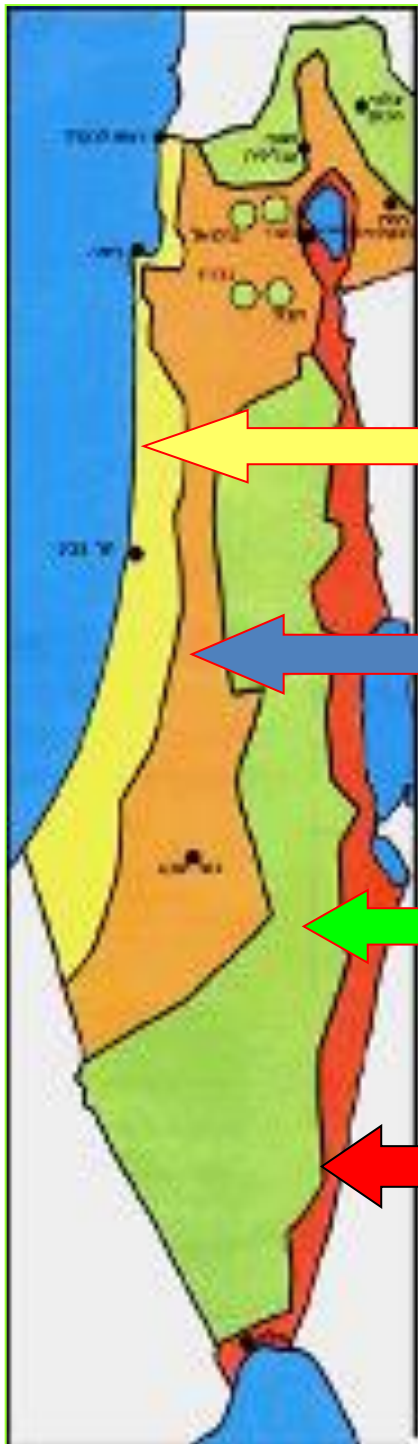
The Simulation will be done on painted Building (Painted wall thickness 22 cm (interior plaster + Brick + exterior plaster+ color) $R = 2.65$. Reflection =0.85%

Windows $U=5.88$, $SHGC = 0.82$, $VT=0.78$

The 2 separate tests are to eliminate any impact of heat transfer due to mix coating.

In this test a comparison was made between the building and the building painted with plain block wall.

Climate Zones Map According to Israeli Standard 1045



א' Zone

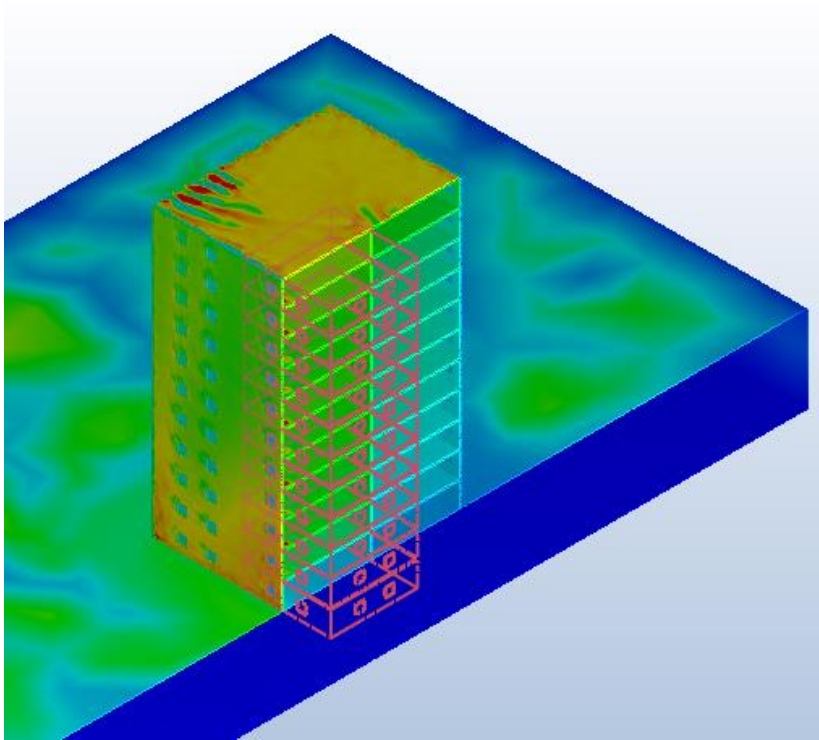
ב' Zone

ג' Zone

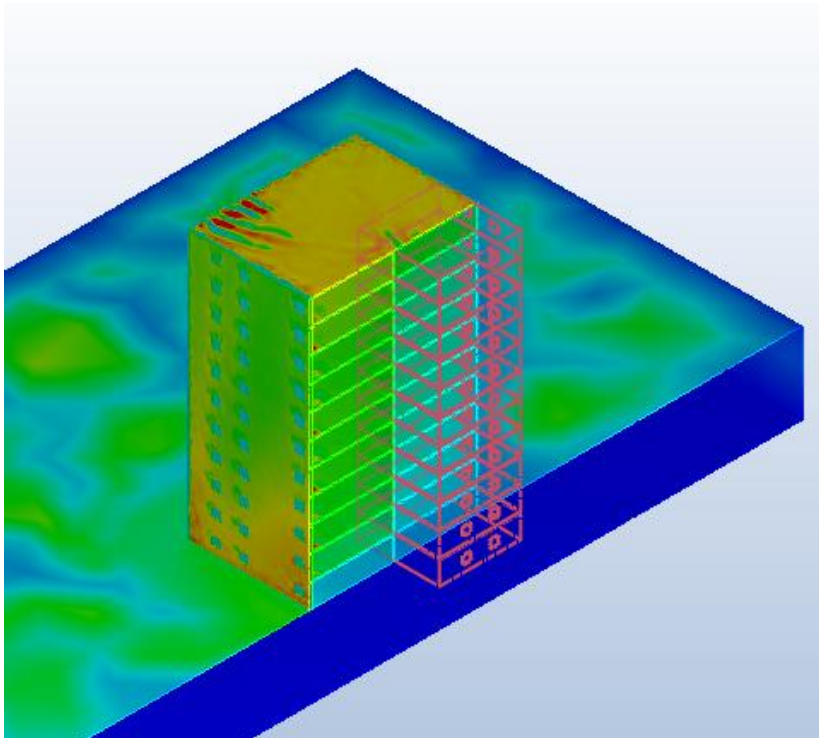
ד' Zone

- ✓ Each test scenario was done on the same method; the only difference is the boundary conditions.
- ✓ Defining the geometry structure of the building (walls, windows, etc...).
- ✓ Setting thermal properties of the ceiling, walls and windows.
- ✓ Setting up solar radiation conditions, according to the geographical location and date of the test.
- ✓ Setting preconditions to the environment, ambient temperature setting according to the published temperature.
- ✓ The apartment is closed no air ventilation, this will impact the overall temperature but will allow checking the differences between the scenarios.
- ✓ Setting up checkpoints in every apartment, the center of the apartment
- ✓ Performing Analysis, Compliance, running about 1000 iterations per scenario until convergence.
- ✓ Checking visually displaying and numeric results values.
- ✓ Verification of the analysis results.

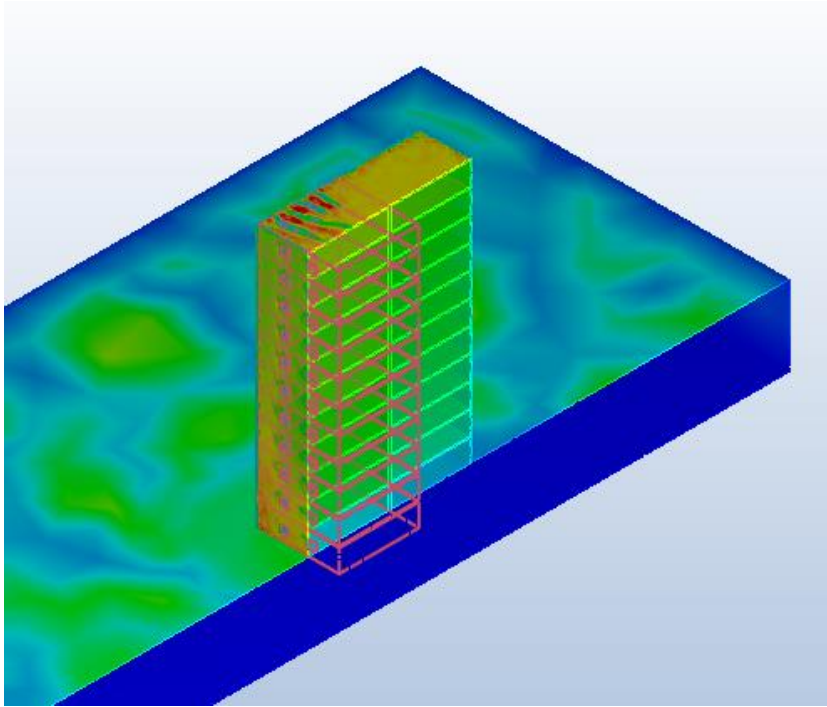
Check point in tower 1 (center of the volume on each floor)



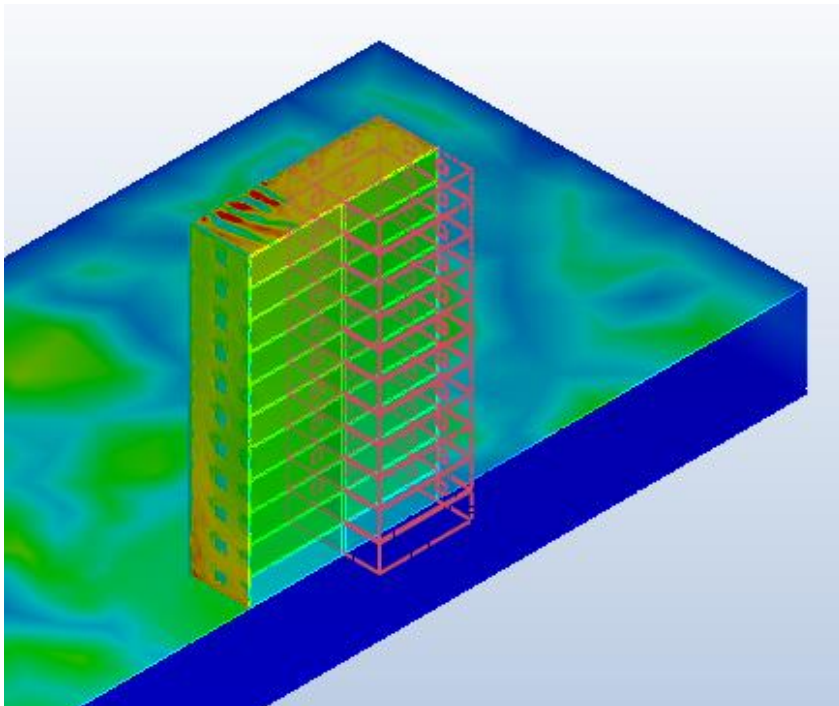
Check point in tower 2 (center of the volume on each floor)



Check point in tower 3 (center of the volume on each floor)



Check point in tower 4 (center of the volume on each floor)

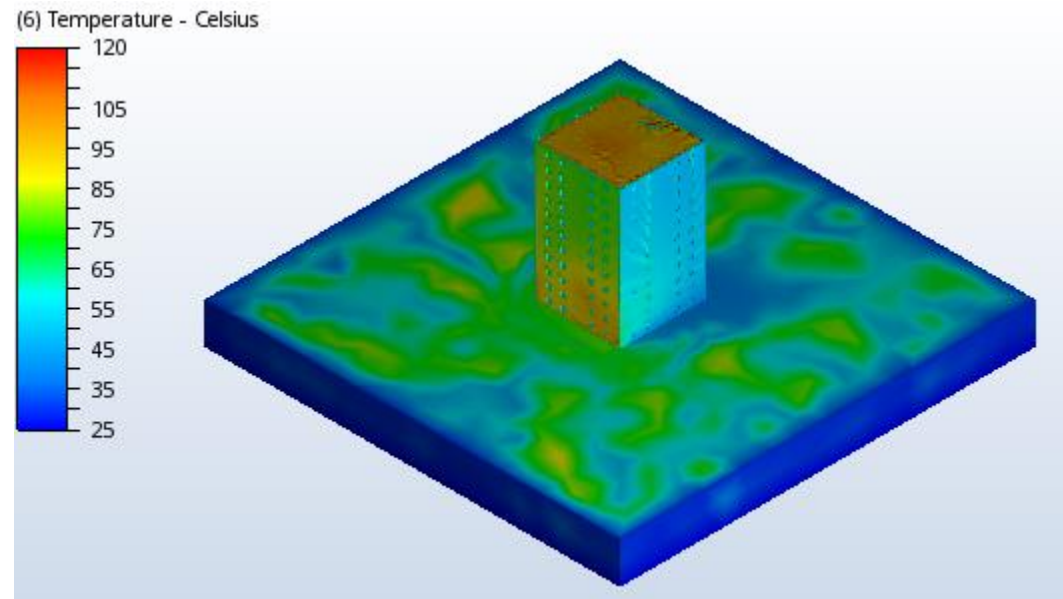


Ref Conditions

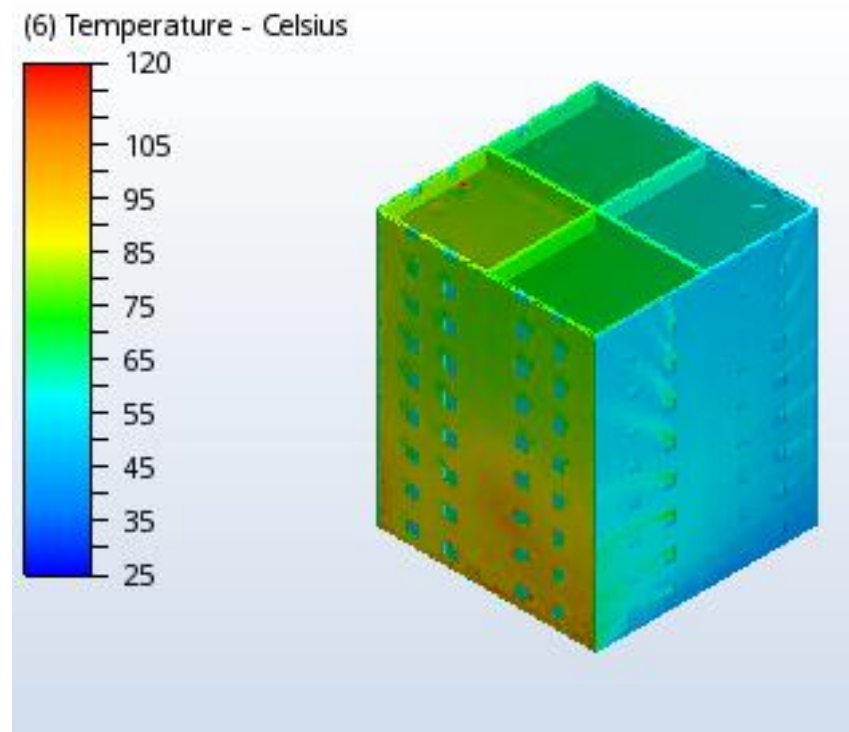
Ref temp	27-Mar'	3-Oct'
Zone κ	32.8	27.6
Zone ς	31.1	30.3
Zone λ	25.2	26.3
Zone τ	32.7	32.9

3 High rise (zone 8) 3rd Oct

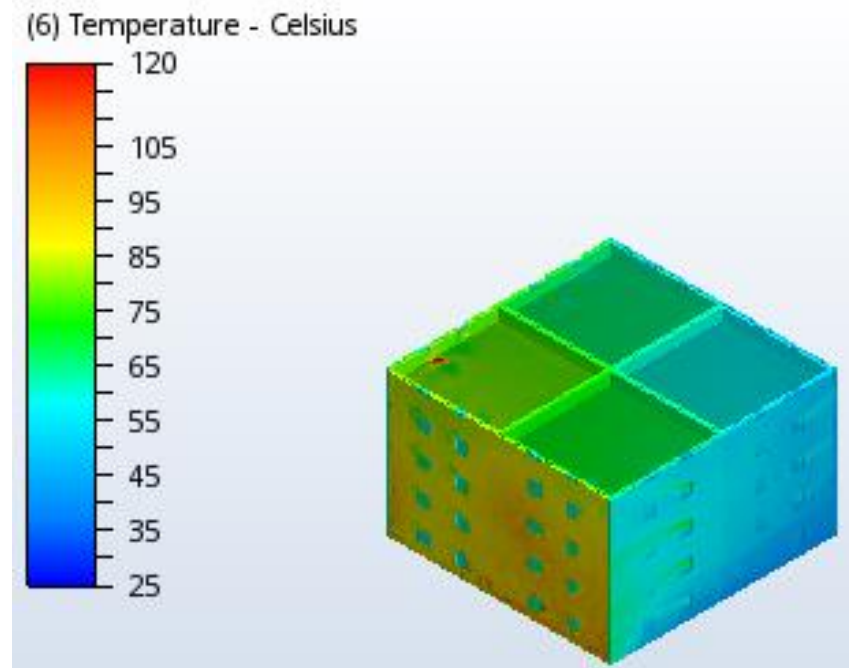
3.1 Normal building general view after analysis (building shade on the right side)



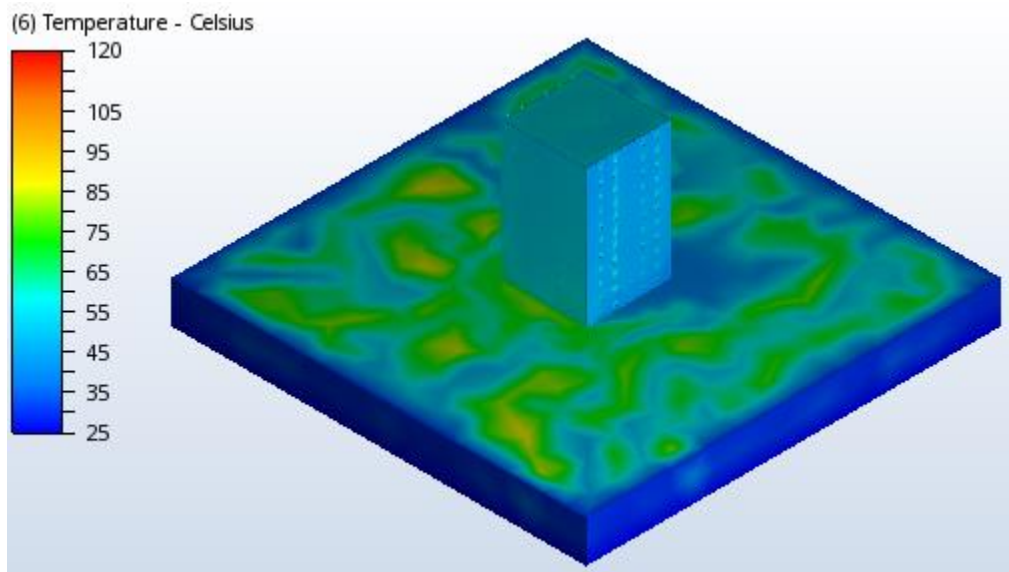
3.2 Normal building general view after analysis without roof



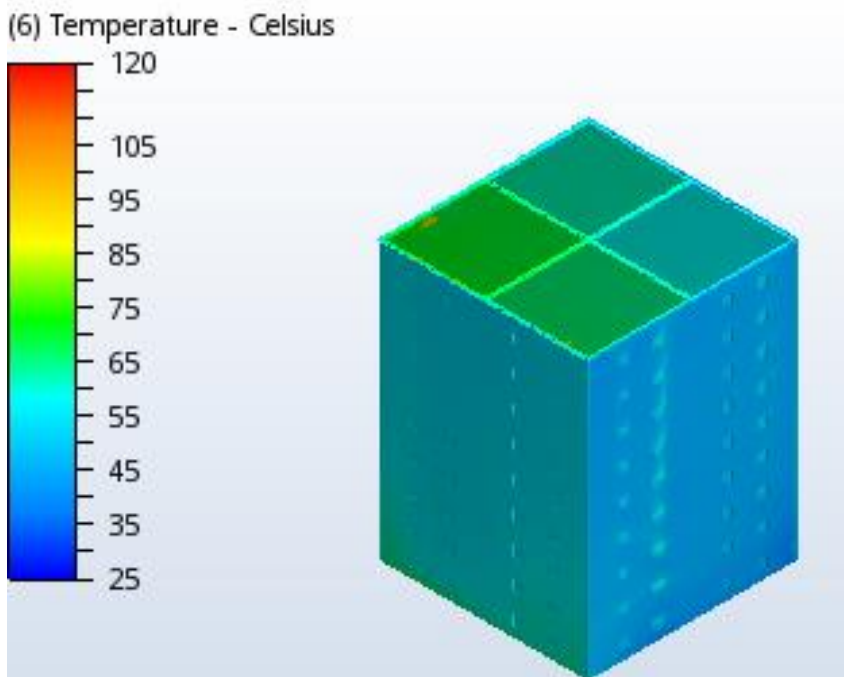
3.3 Normal building general view after analysis only few floors



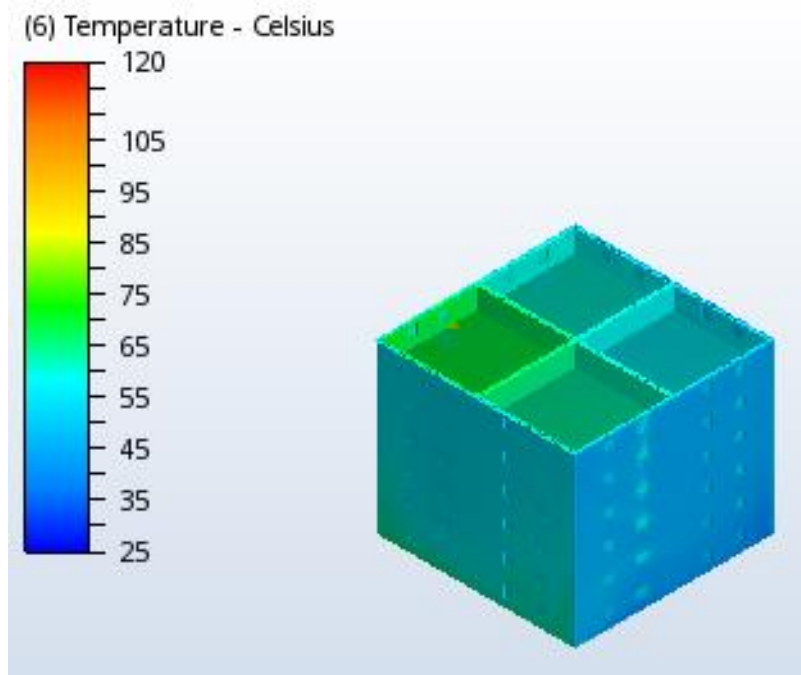
3.4 Painted building general view after analysis



3.5 Painted building general view after analysis without roof

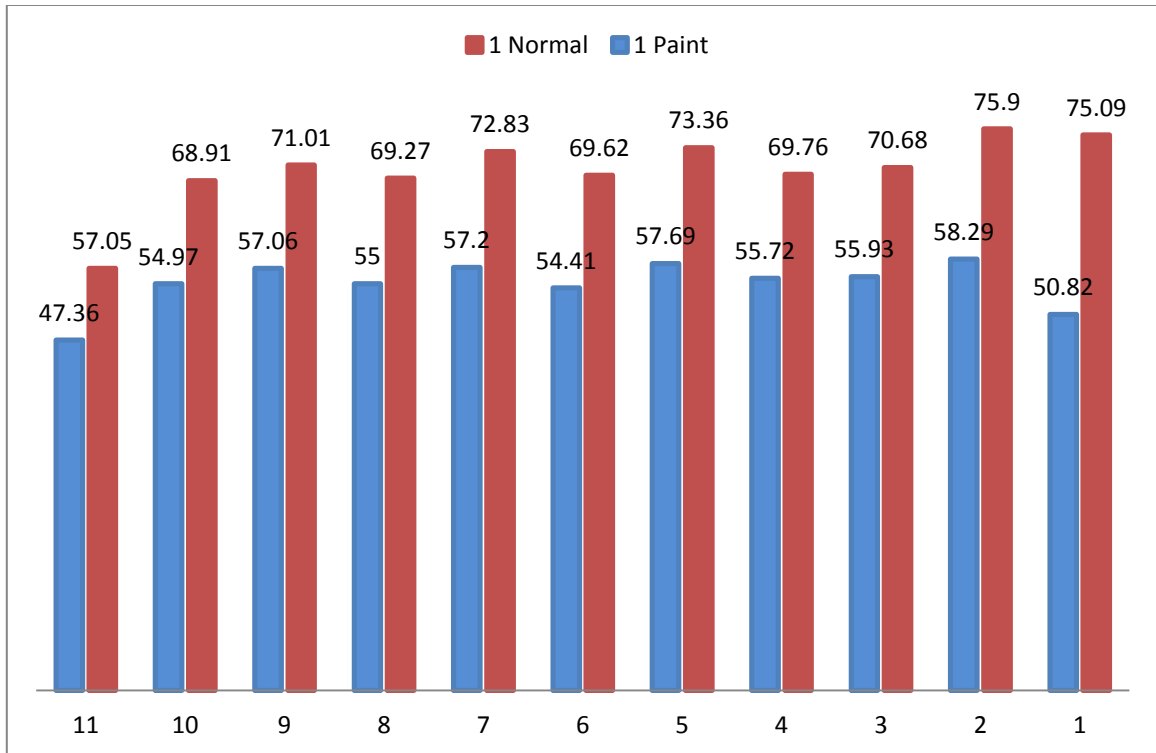


3.6 Painted building general view after analysis few floors

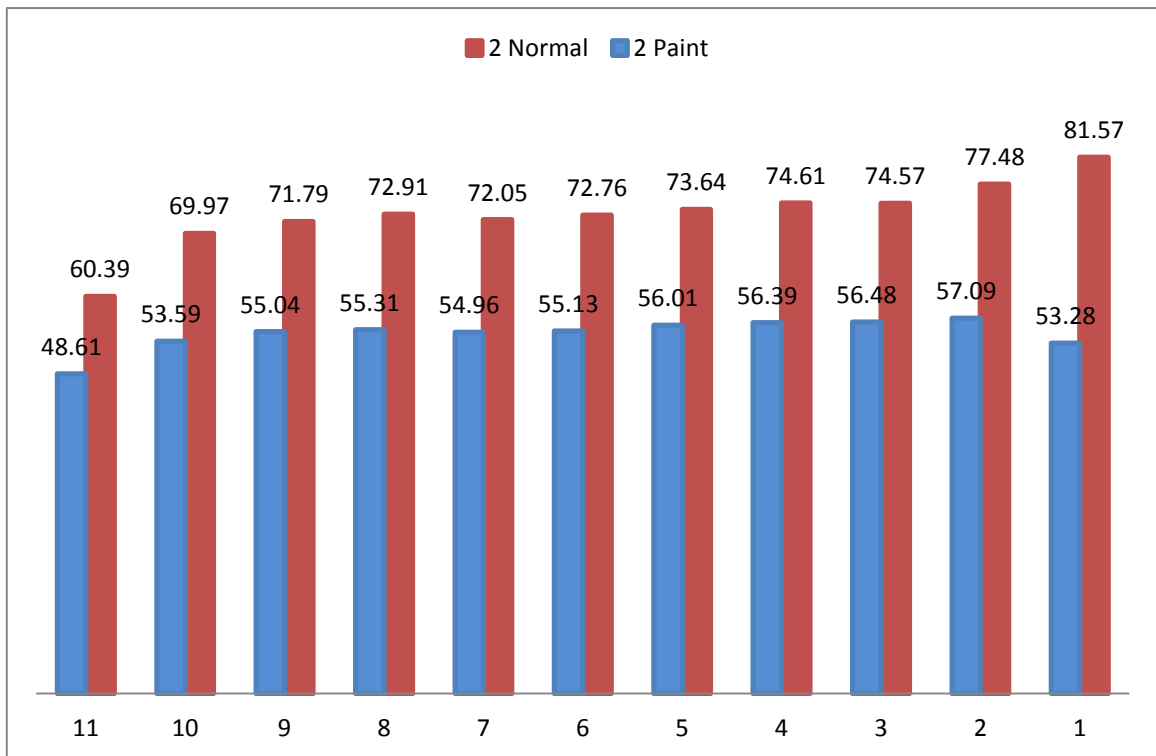


3.7 Comparison between the 2 buildings in the same floors and the same apartment.

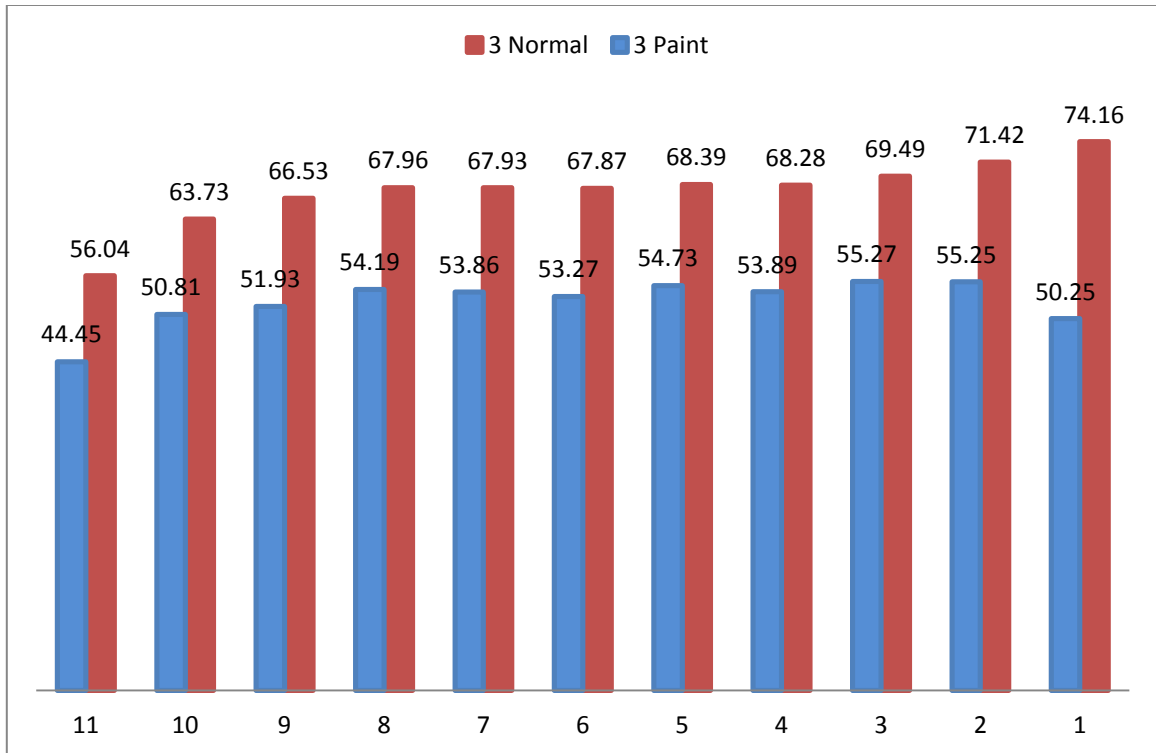
Tower 1



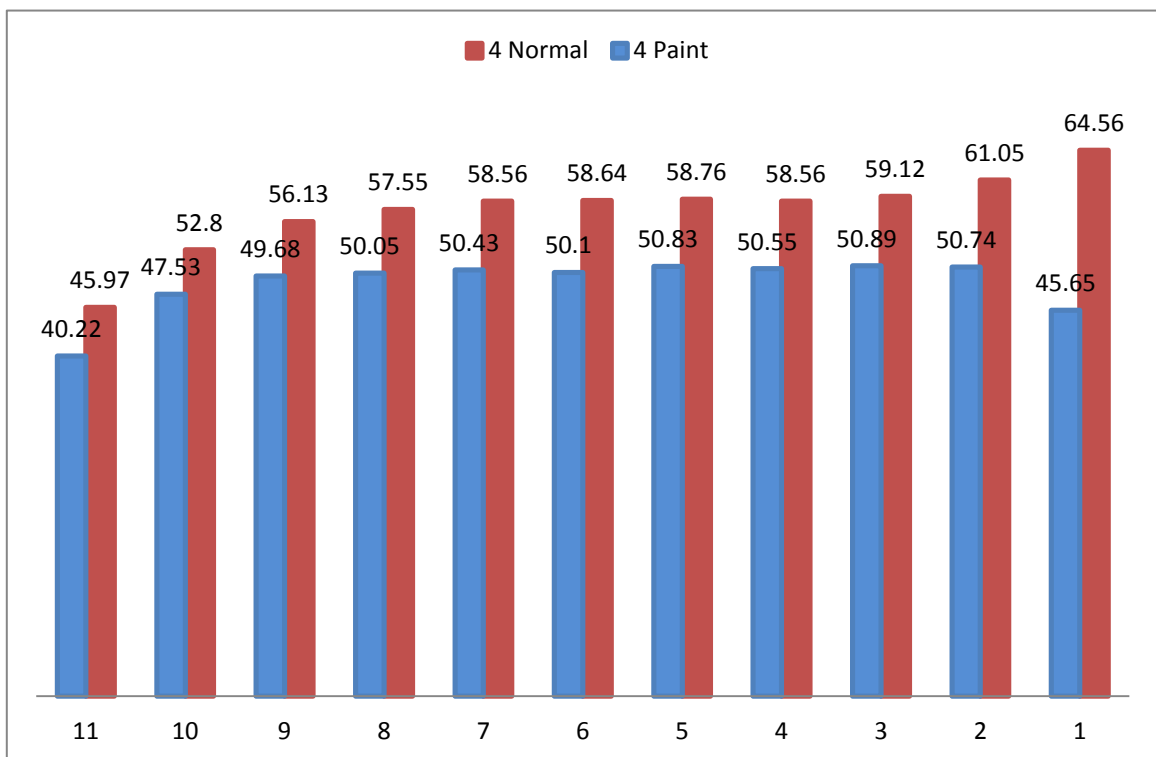
Tower 2



Tower 3



Tower 4



Conclusions:

The effect of paint in all floors and all apartments is well marked.

It is vary per floor and direction to the sun.

The effect of color on the lower floors is higher due to ground reflection.

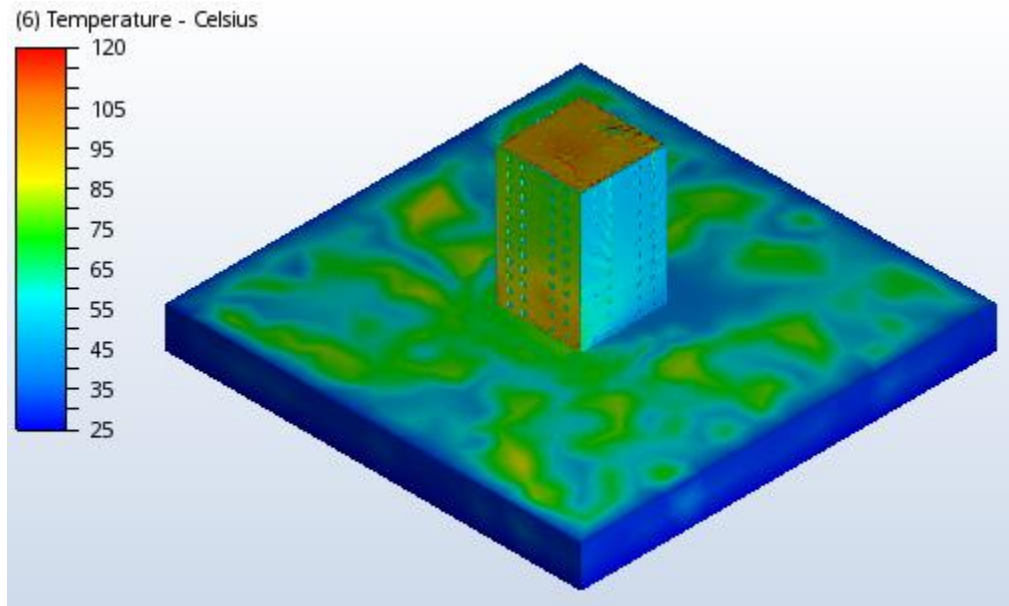
While the apartment is facing the wall to the sun the impact is bigger.

As side effect in painted buildings, due to smaller difference between the comfort temperature and the actual temperature there is less moisture inside the building walls, reduce Fungi / mold initially bad smell.

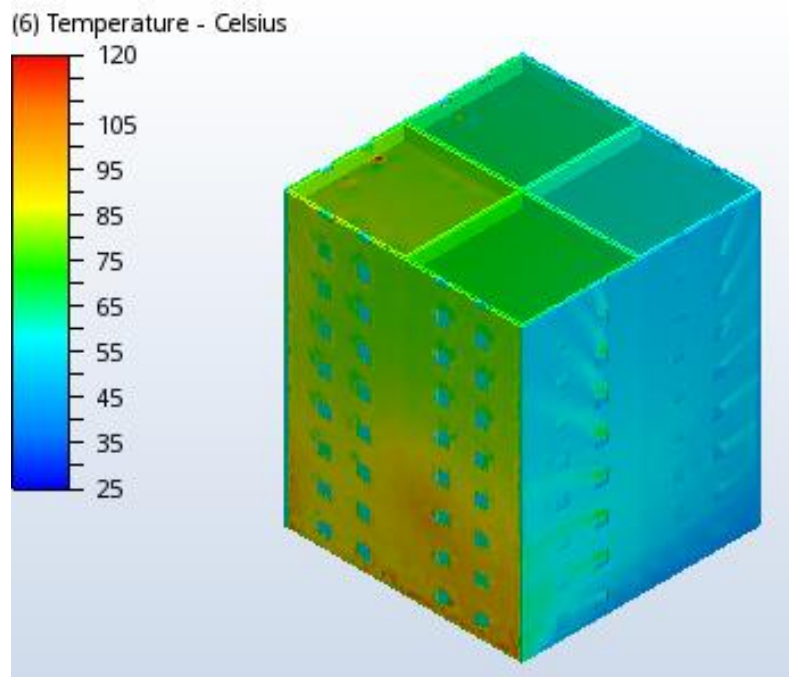
Less weight on the wall, May use thin normal plaster + paint rather than thick thermal plaster.

4 High rise (zone 8) 27th Mar

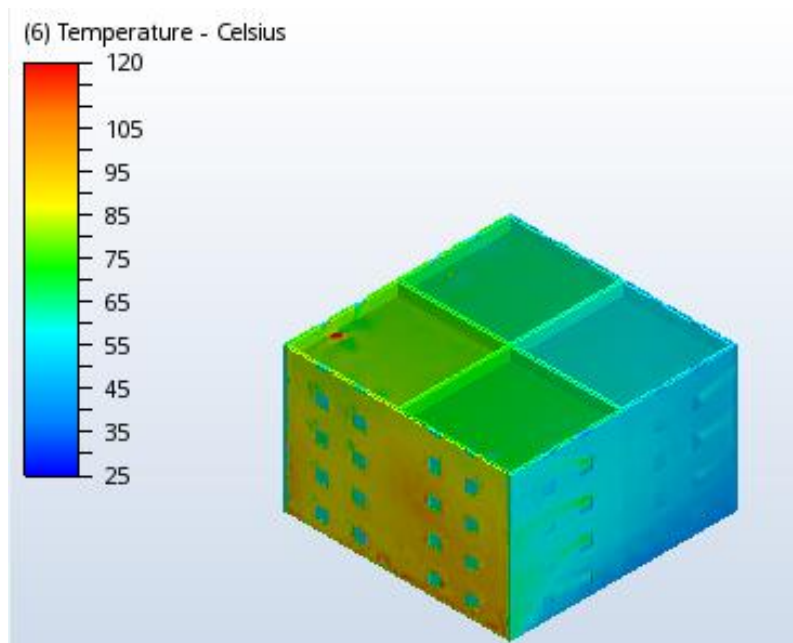
4.1 Normal building general view after analysis (building shade on the right side)



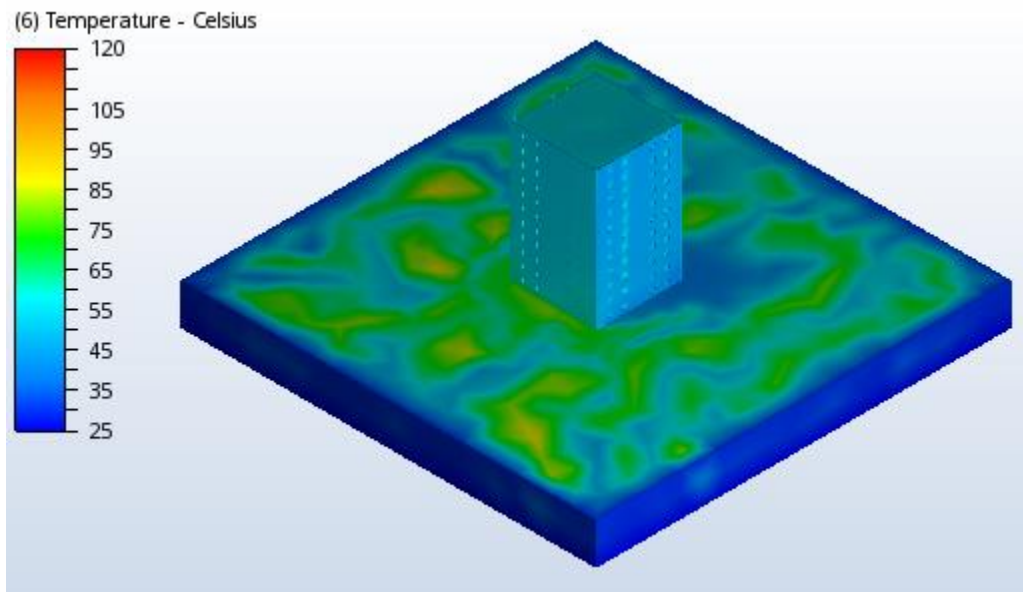
4.2 Normal building general view after analysis without roof



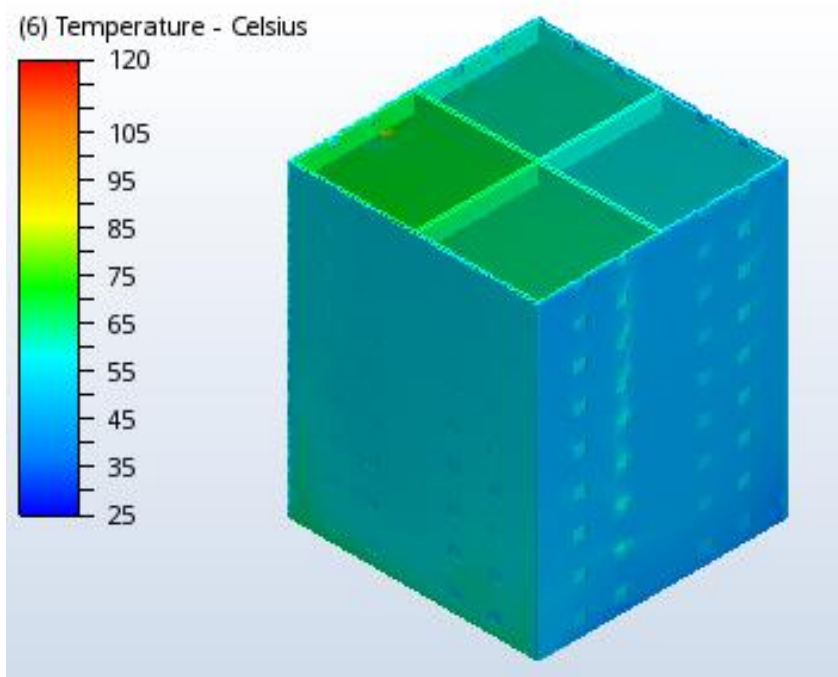
4.3 Normal building general view after analysis only few floors



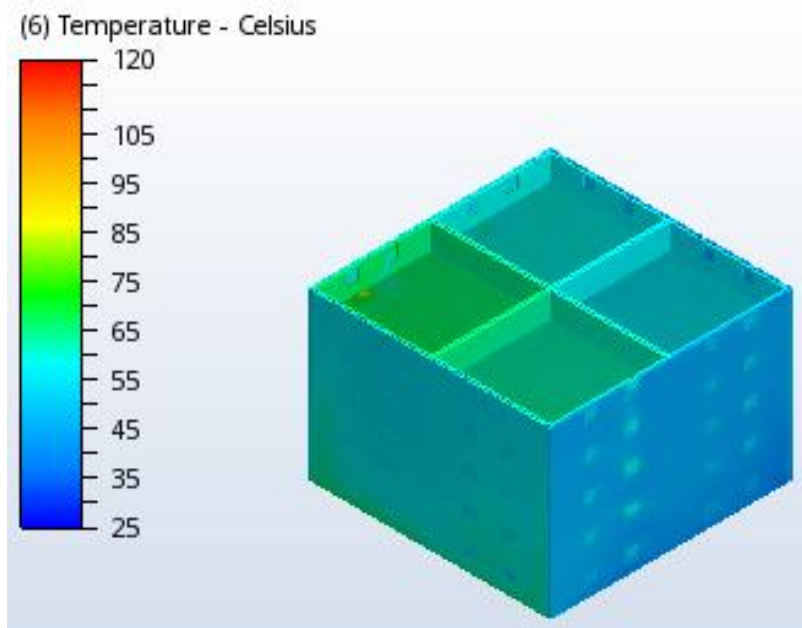
4.4 Painted building general view after analysis



4.5 Painted building general view after analysis without roof

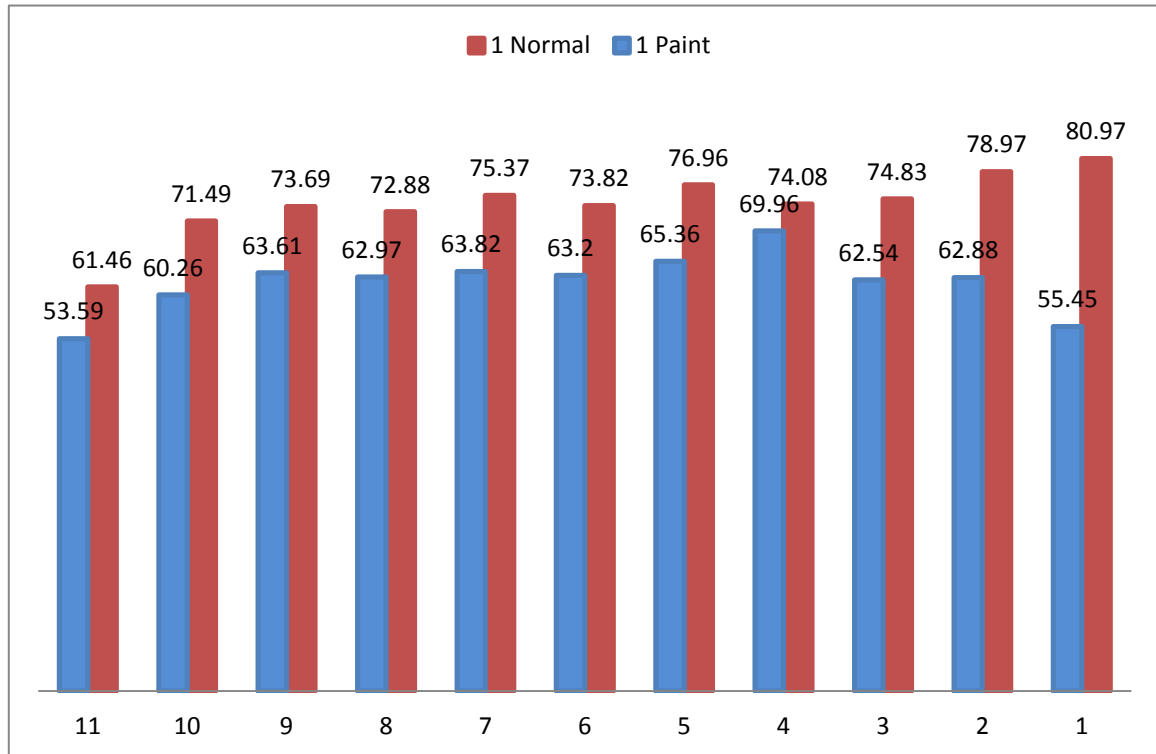


4.6 Painted building general view after analysis few floors

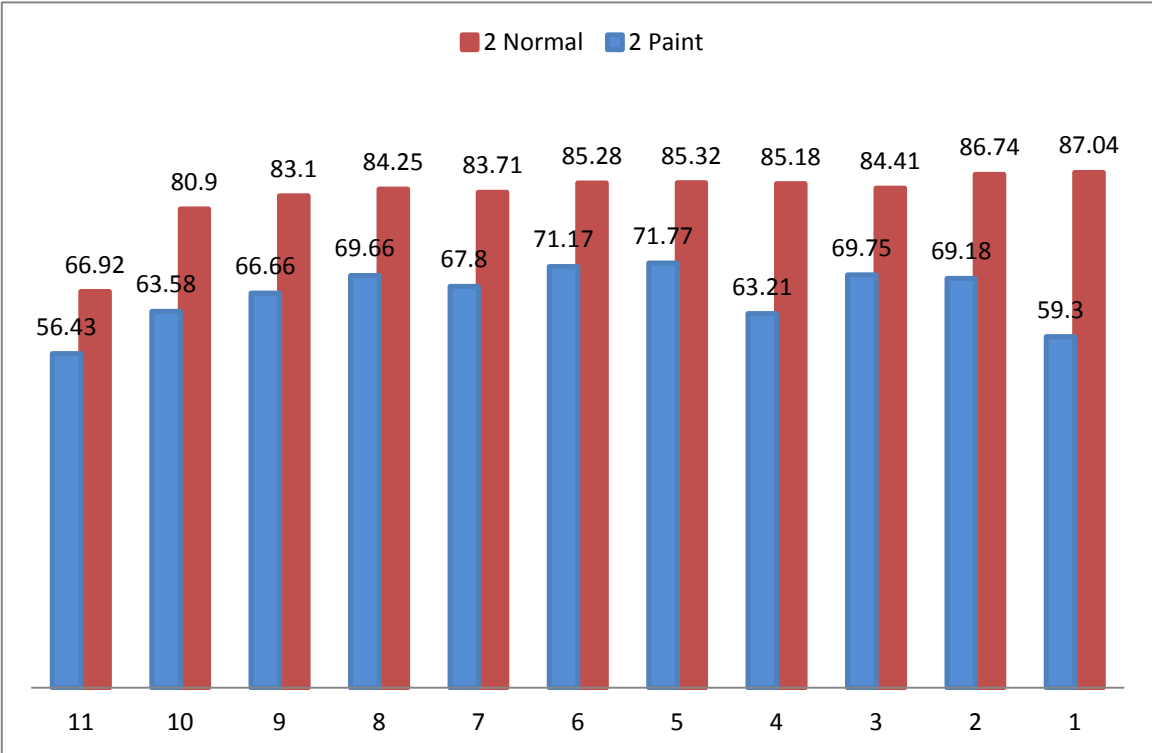


4.7 Comparison between the 2 buildings in the same floors and the same apartment.

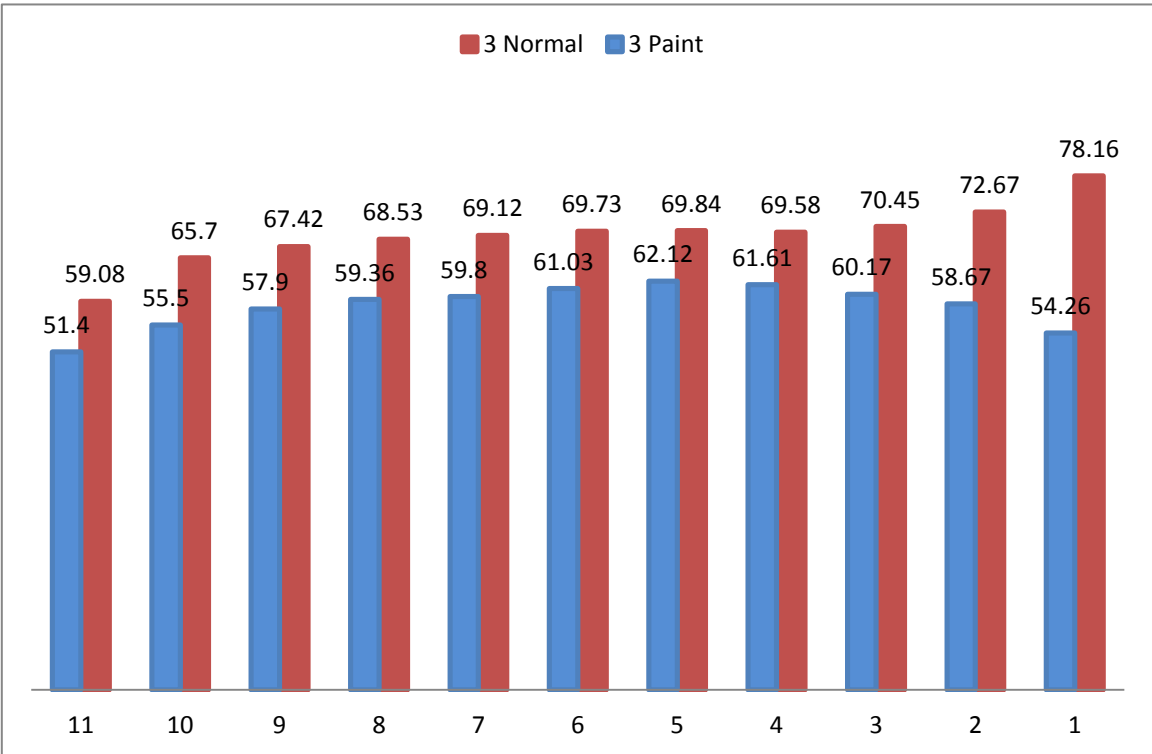
Tower 1



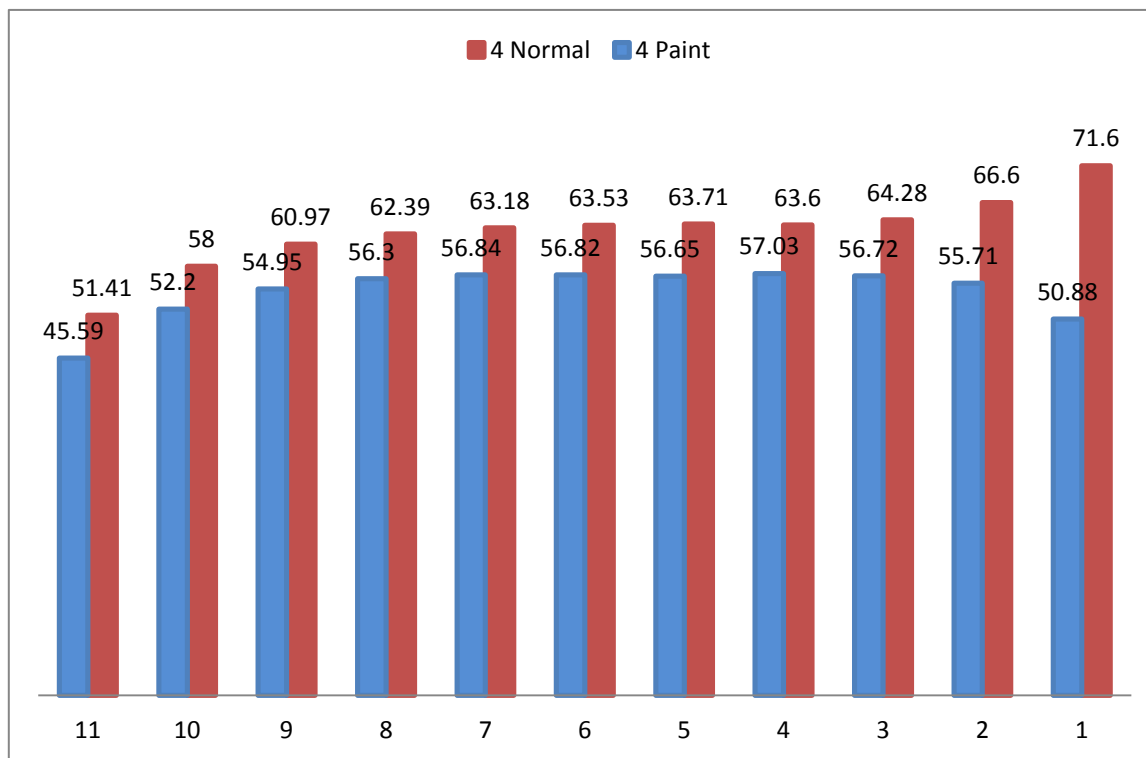
Tower 2



Tower 3



Tower 4



Conclusions:

The effect of paint in all floors and all apartments is well marked.

It is vary per floor and direction to the sun.

The effect of color on the lower floors is higher due to ground reflection.

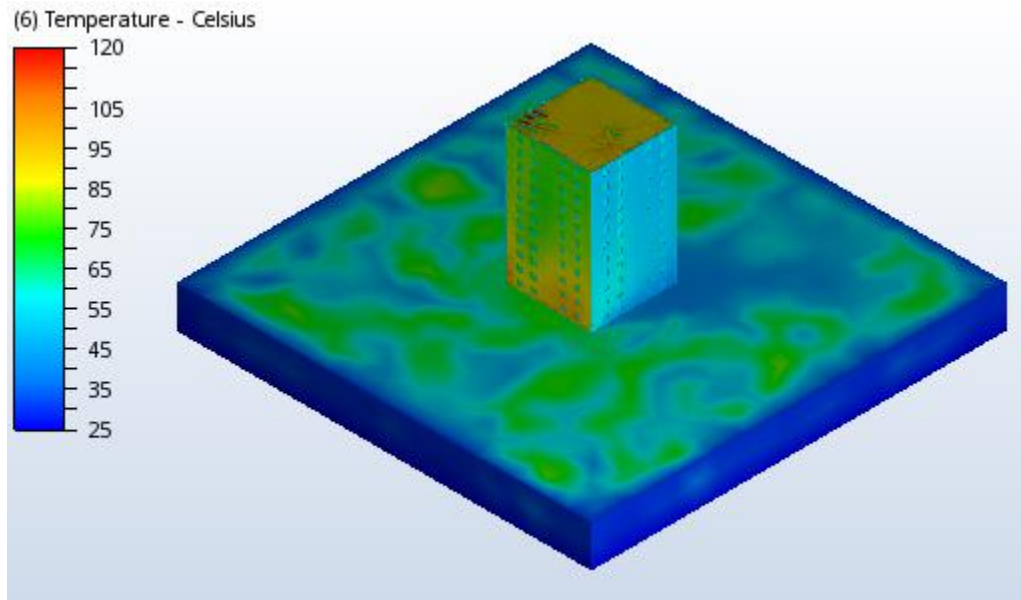
While the apartment is facing the wall to the sun the impact is bigger.

As side effect in painted buildings, due to smaller difference between the comfort temperature and the actual temperature there is less moisture inside the building walls, reduce Fungi / mold initially bad smell.

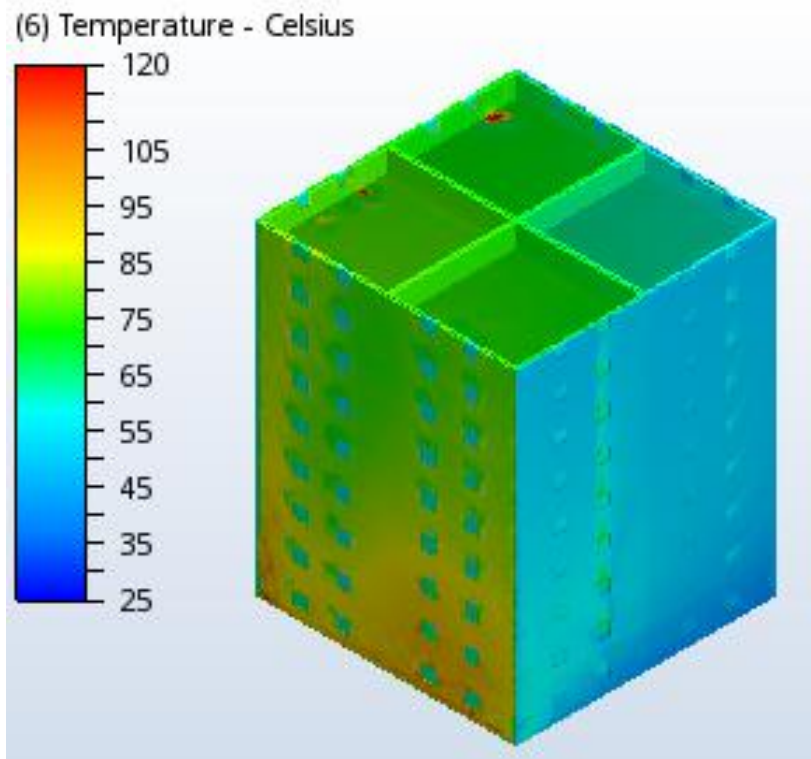
Less weight on the wall, May use thin normal plaster + paint rather than thick thermal plaster.

5 High rise (zone ב) 3rd Oct

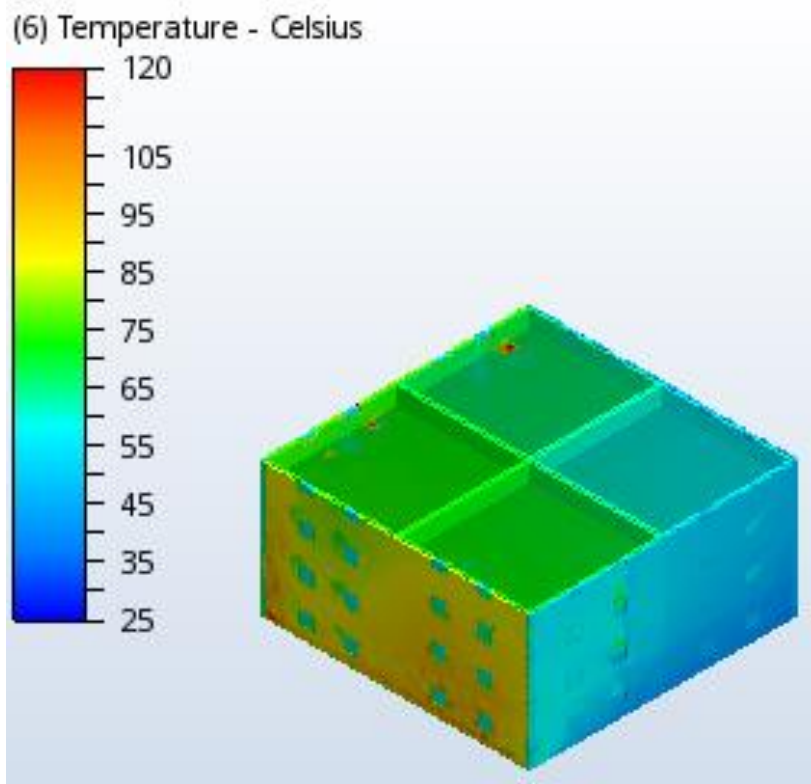
5.1 Normal building general view after analysis (building shade on the right side)



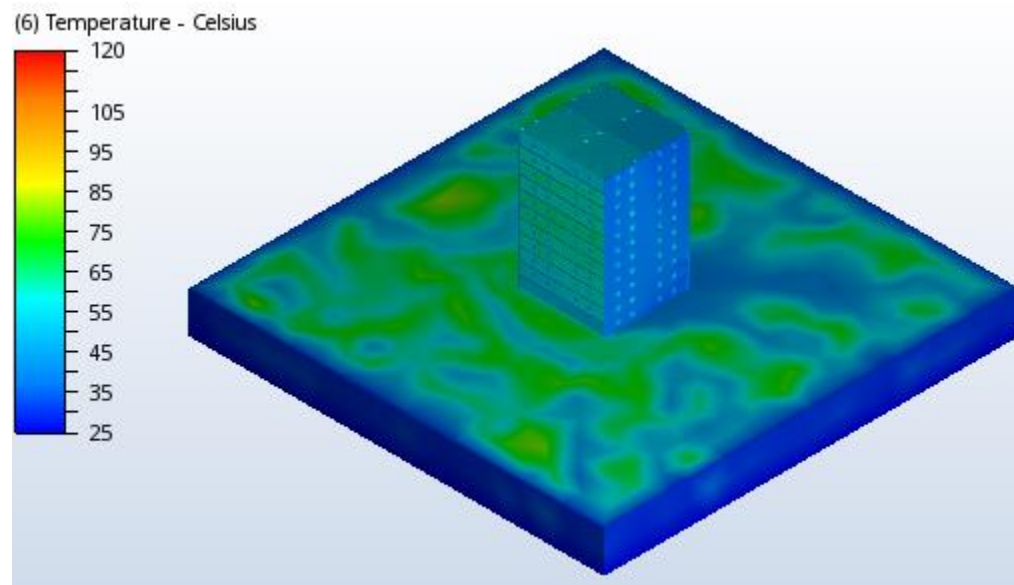
5.2 Normal building general view after analysis without roof



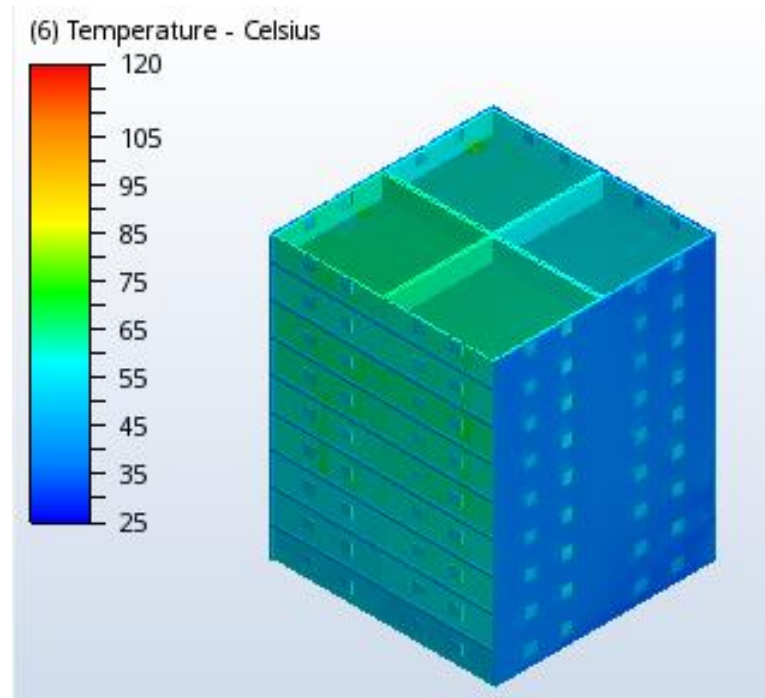
5.3 Normal building general view after analysis only few floors



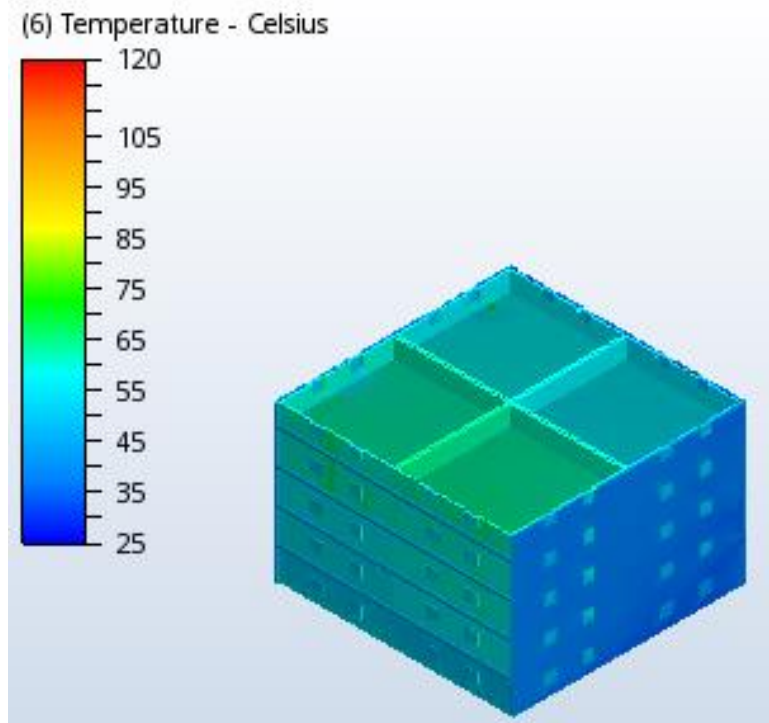
5.4 Painted building general view after analysis



5.5 Painted building general view after analysis without roof

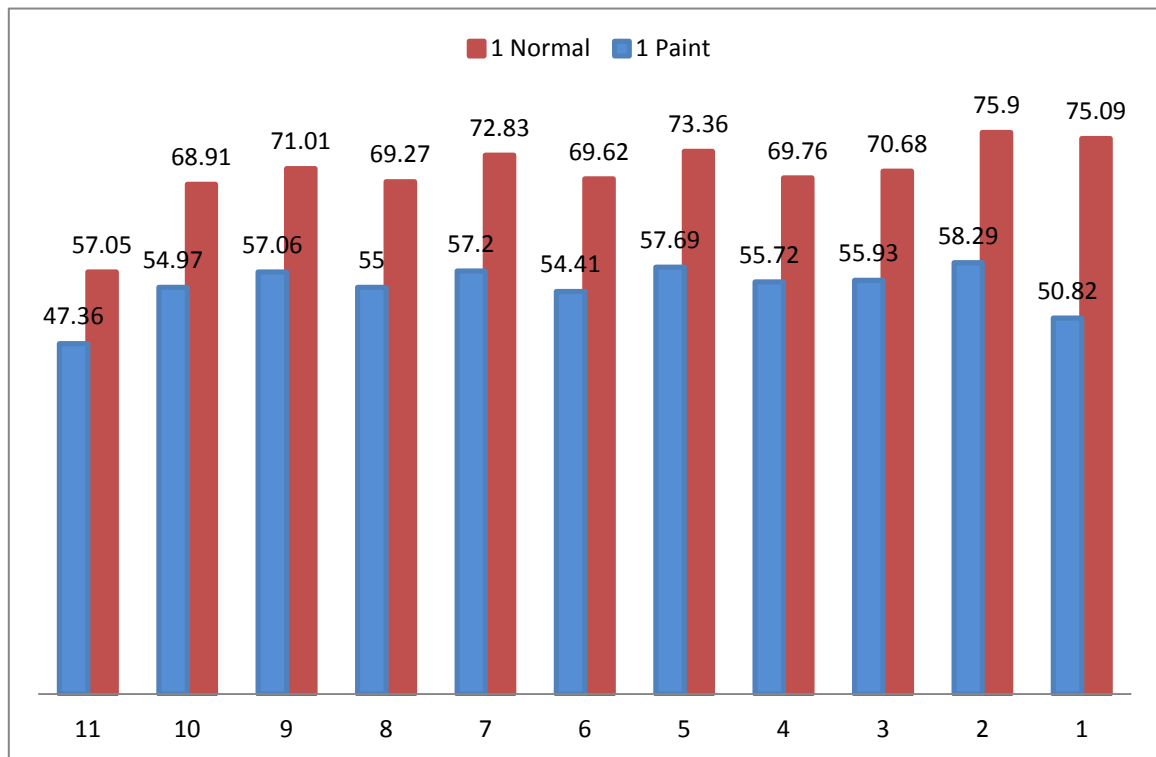


5.6 Painted building general view after analysis few floors

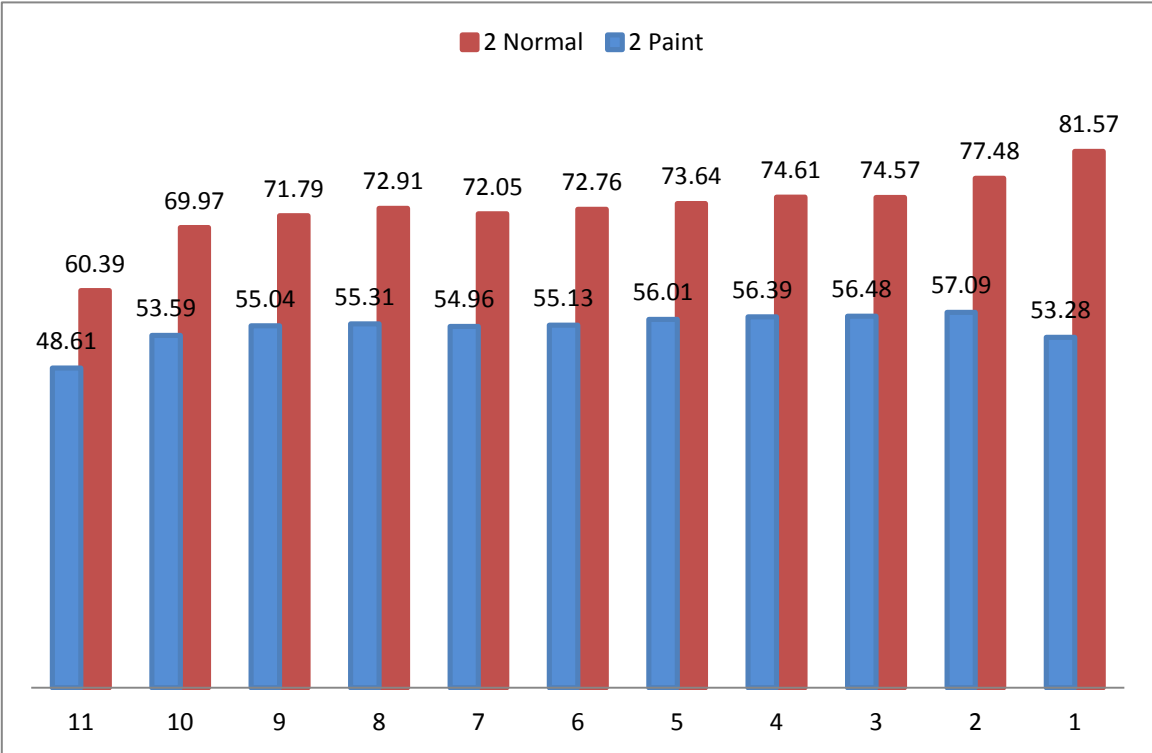


5.7 Comparison between the 2 buildings in the same floors and the same apartment.

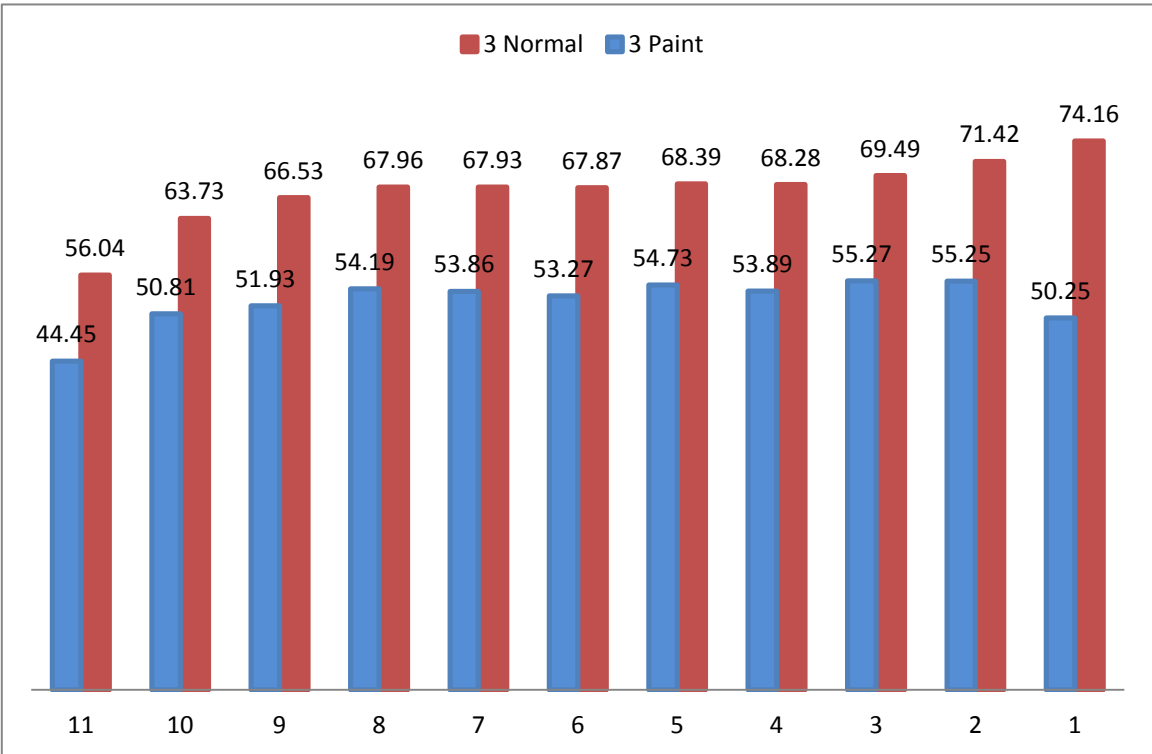
Tower 1



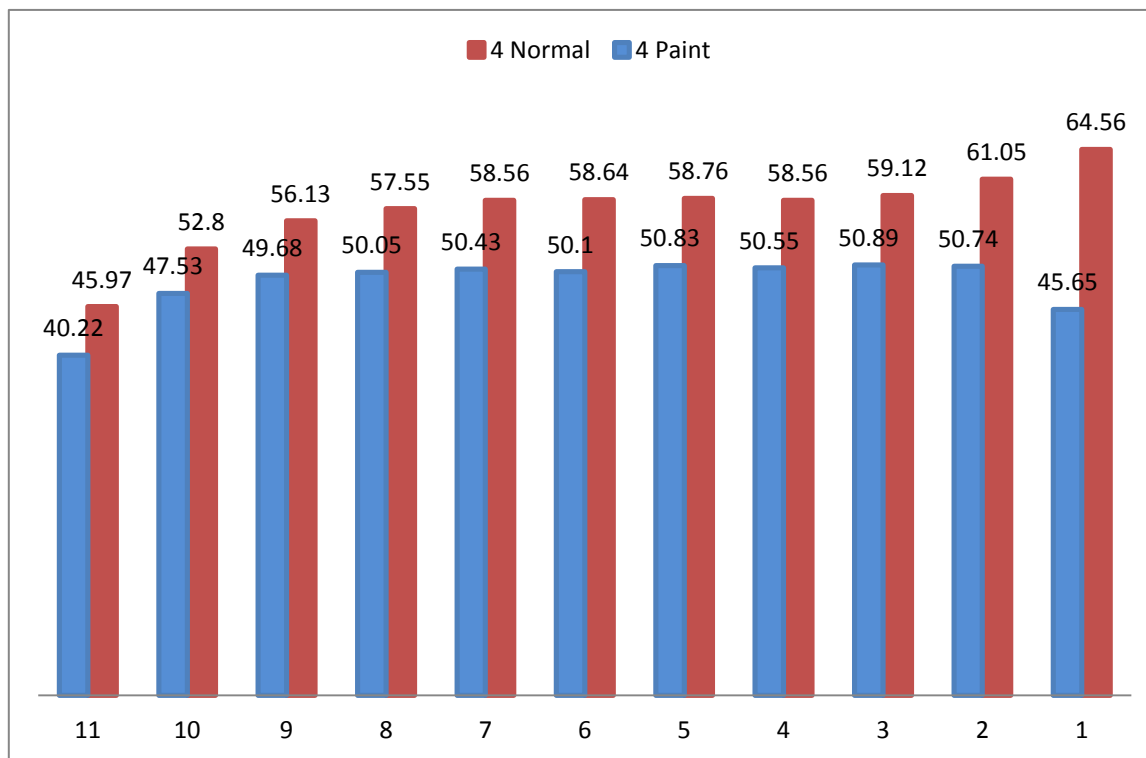
Tower 2



Tower 3



Tower 4



Conclusions:

The effect of paint in all floors and all apartments is well marked.

It is vary per floor and direction to the sun.

The effect of color on the lower floors is higher due to ground reflection.

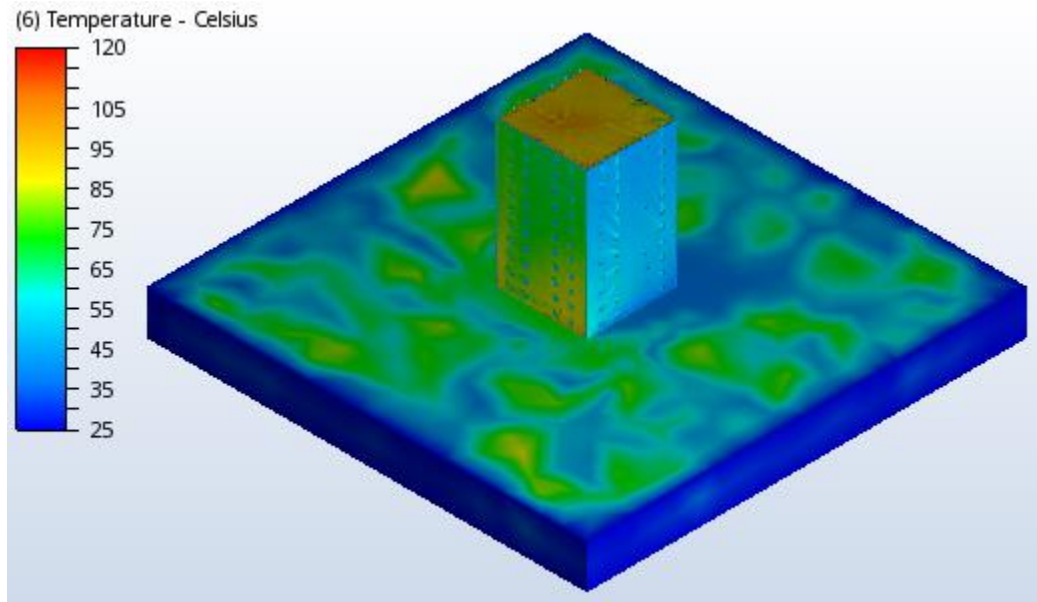
While the apartment is facing the wall to the sun the impact is bigger.

As side effect in painted buildings, due to smaller difference between the comfort temperature and the actual temperature there is less moisture inside the building walls, reduce Fungi / mold initially bad smell.

Less weight on the wall, May use thin normal plaster + paint rather than thick thermal plaster.

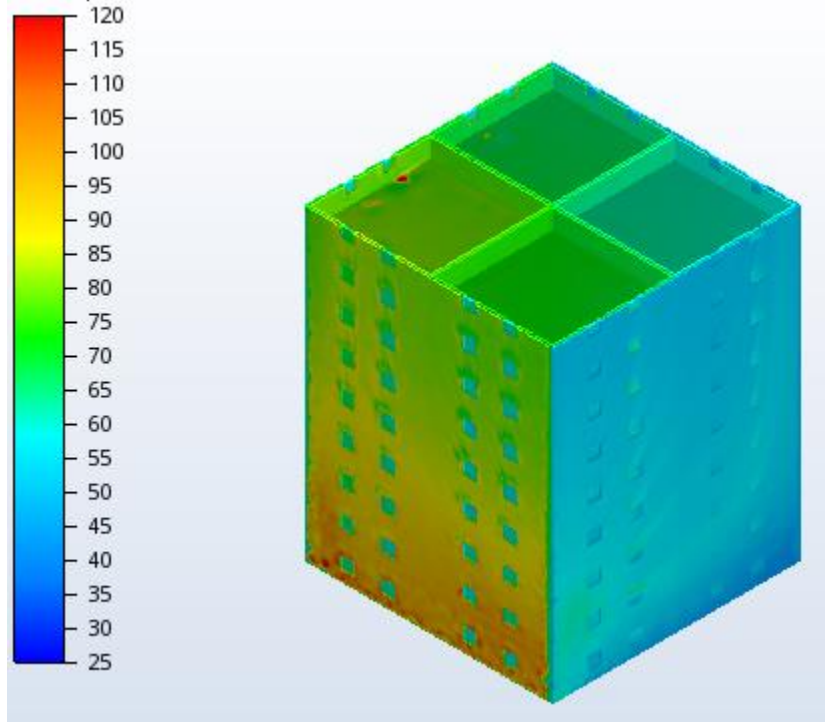
6 High rise (zone א) 27th Mar

6.1 Normal building general view after analysis (building shade on the right side)

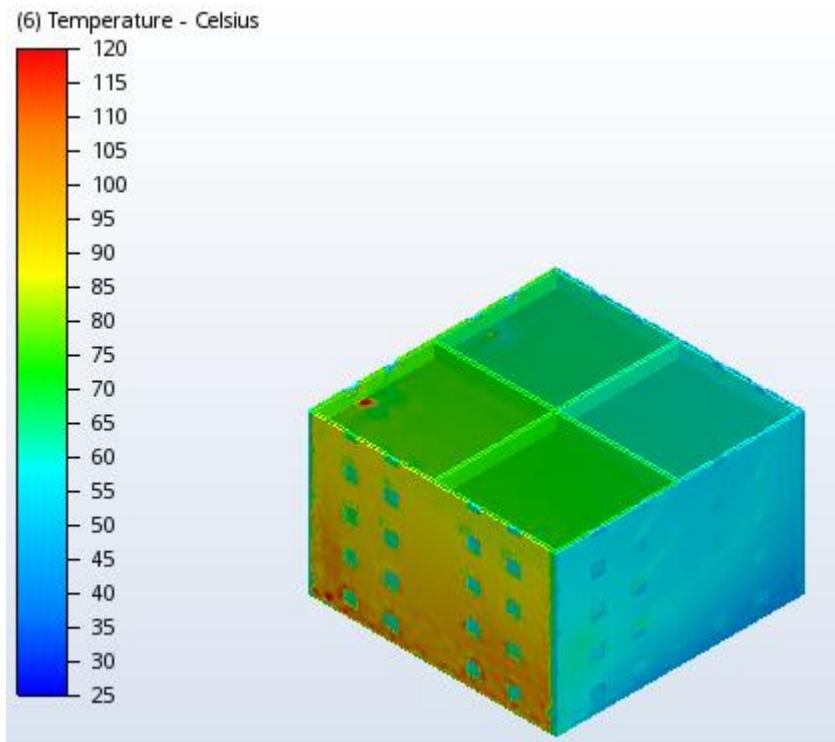


6.2 Normal building general view after analysis without roof

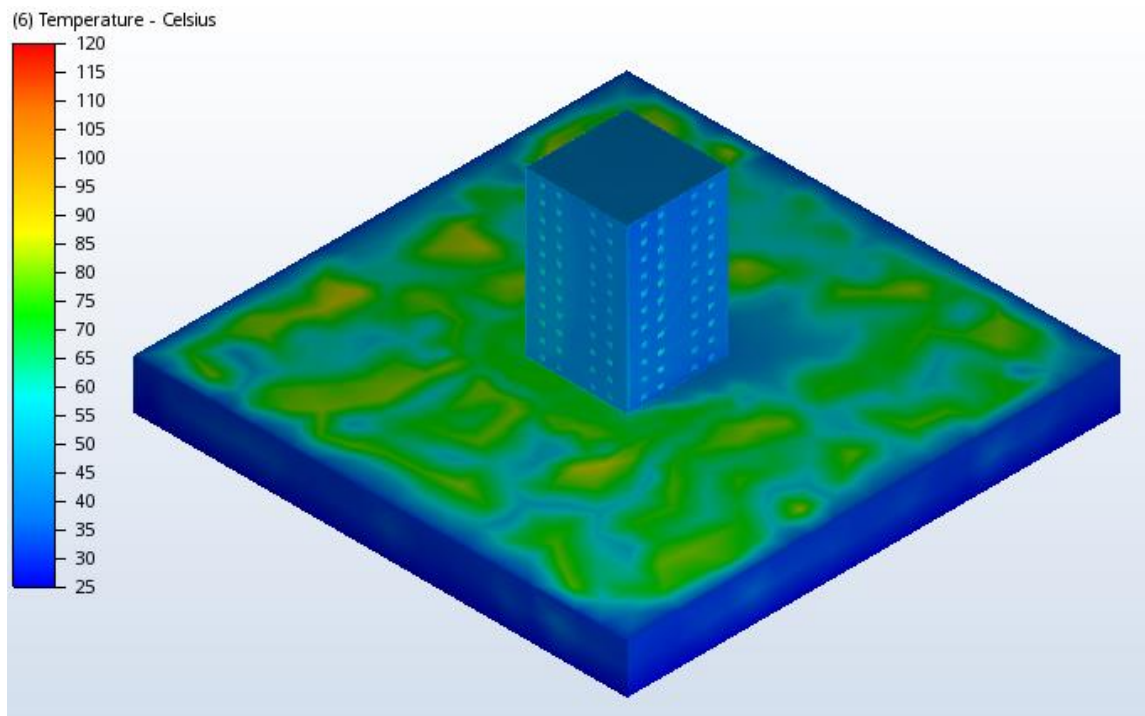
(6) Temperature - Celsius



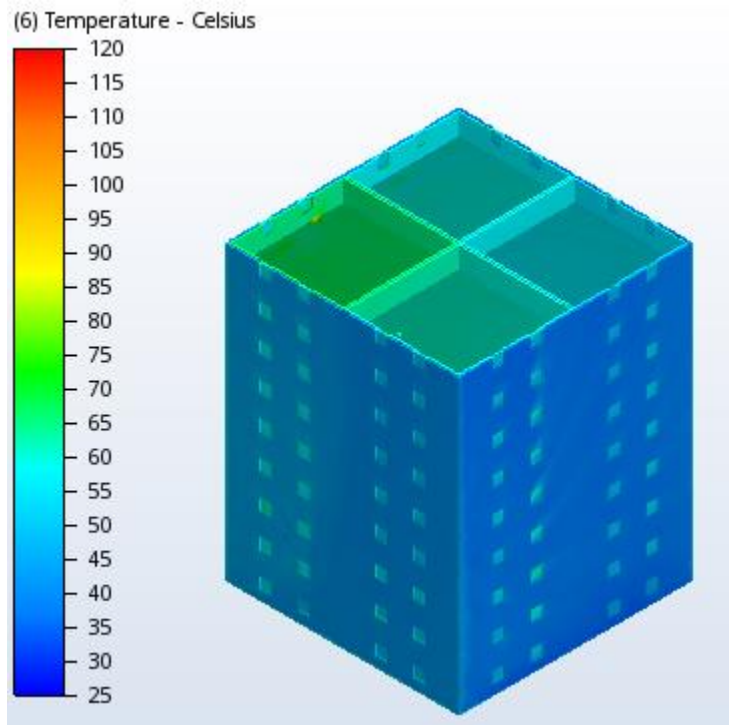
6.3 Normal building general view after analysis only few floors



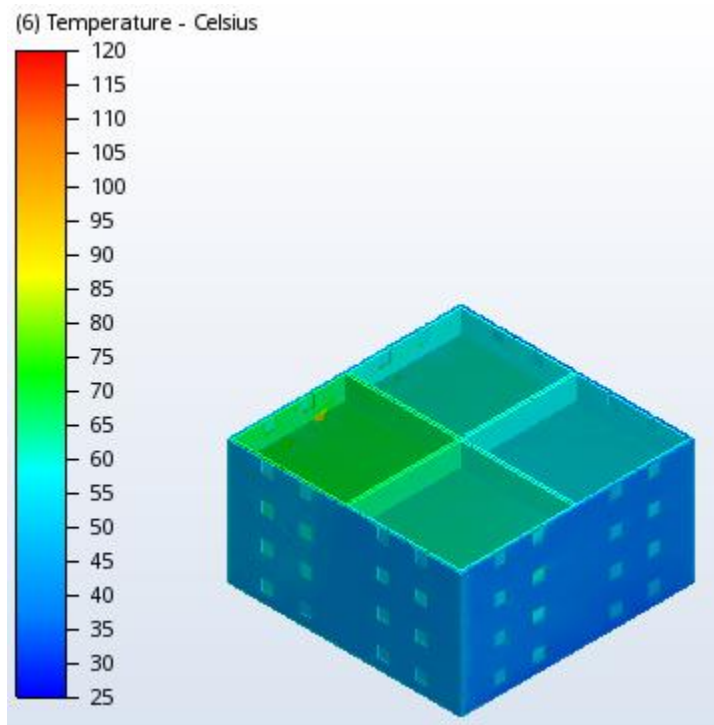
6.4 Painted building general view after analysis



6.5 Painted building general view after analysis without roof

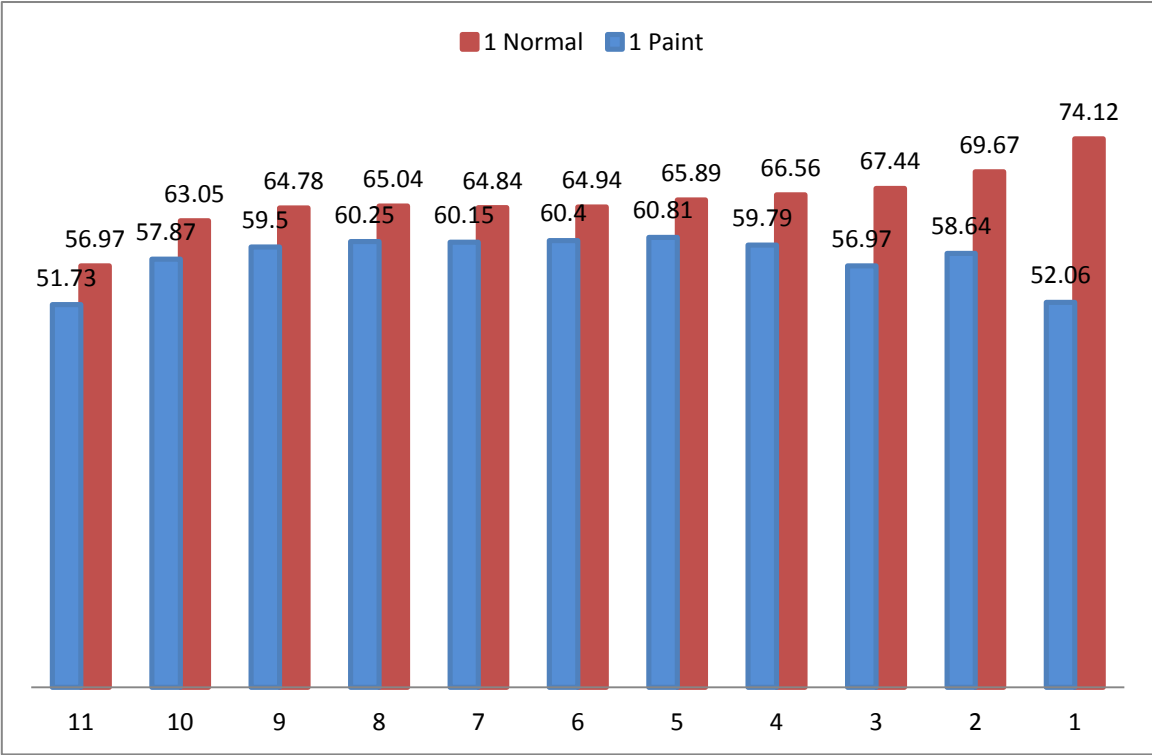


6.6 Painted building general view after analysis few floors

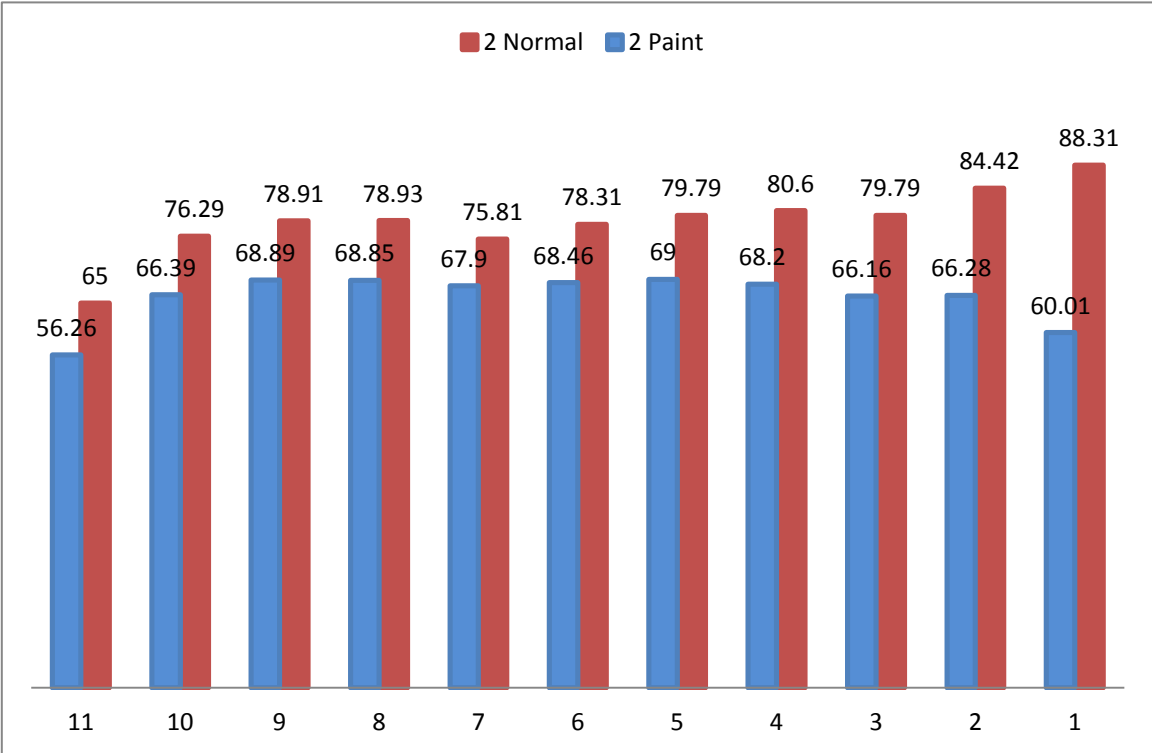


6.7 Comparison between the 2 buildings in the same floors and the same apartment.

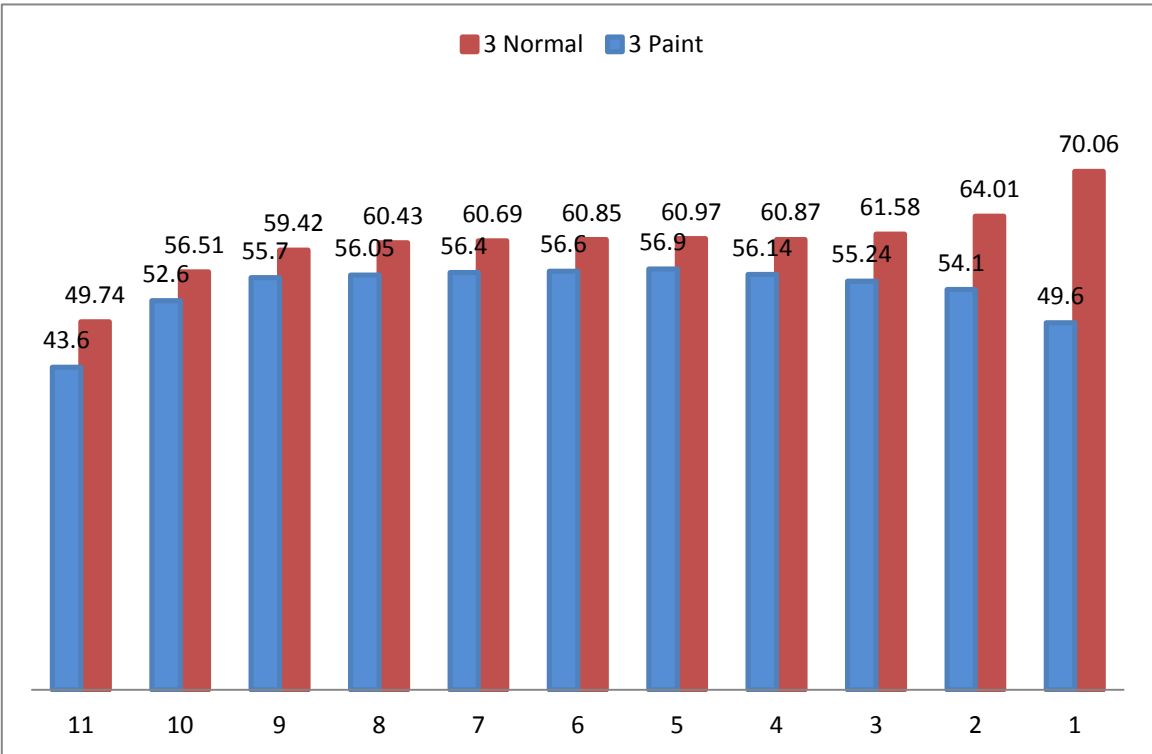
Tower 1



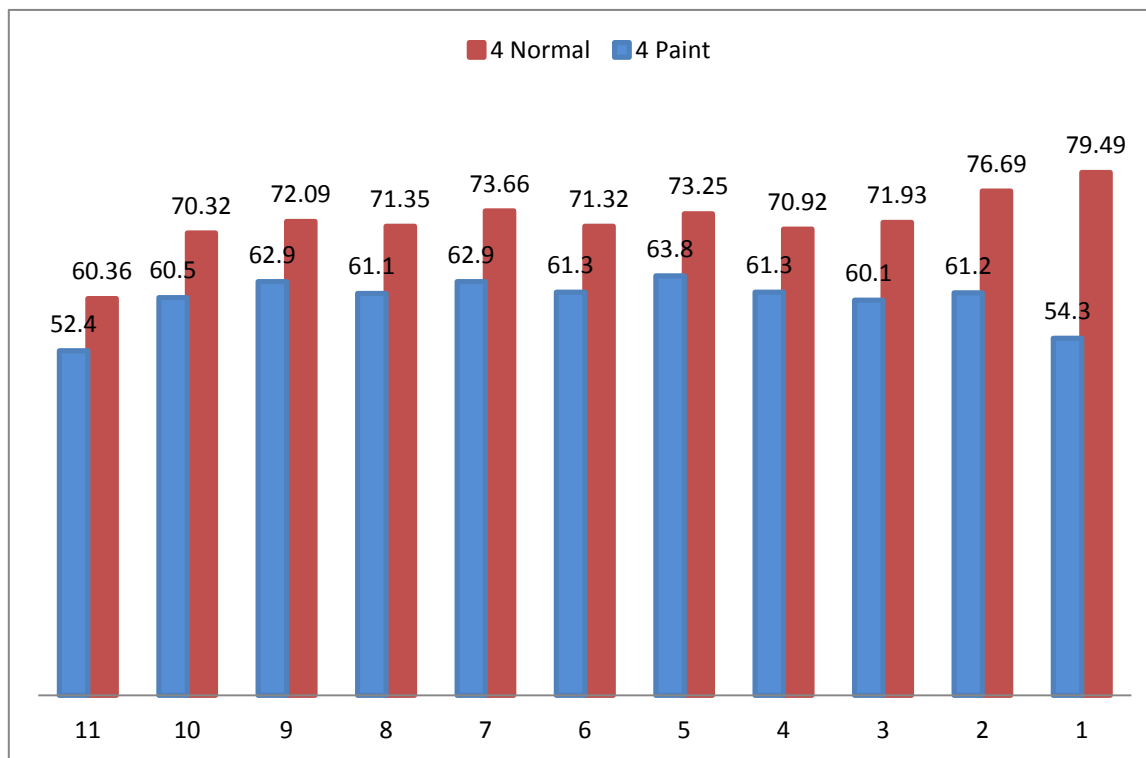
Tower 2



Tower 3



Tower 4



Conclusions:

The effect of paint in all floors and all apartments is well marked.

It is vary per floor and direction to the sun.

The effect of color on the lower floors is higher due to ground reflection.

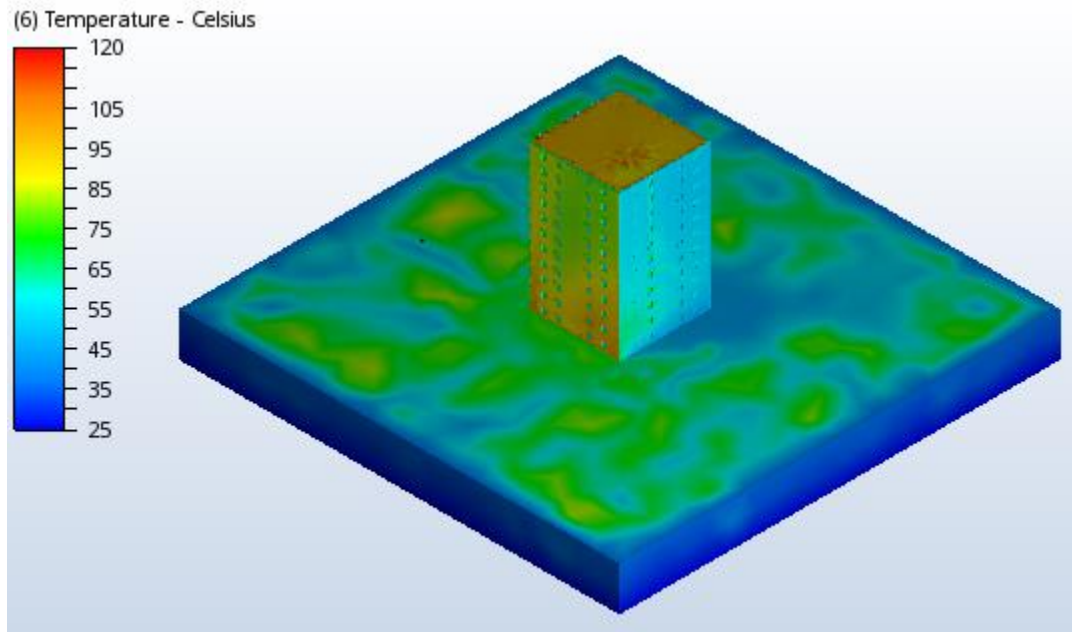
While the apartment is facing the wall to the sun the impact is bigger.

As side effect in painted buildings, due to smaller difference between the comfort temperature and the actual temperature there is less moisture inside the building walls, reduce Fungi / mold initially bad smell.

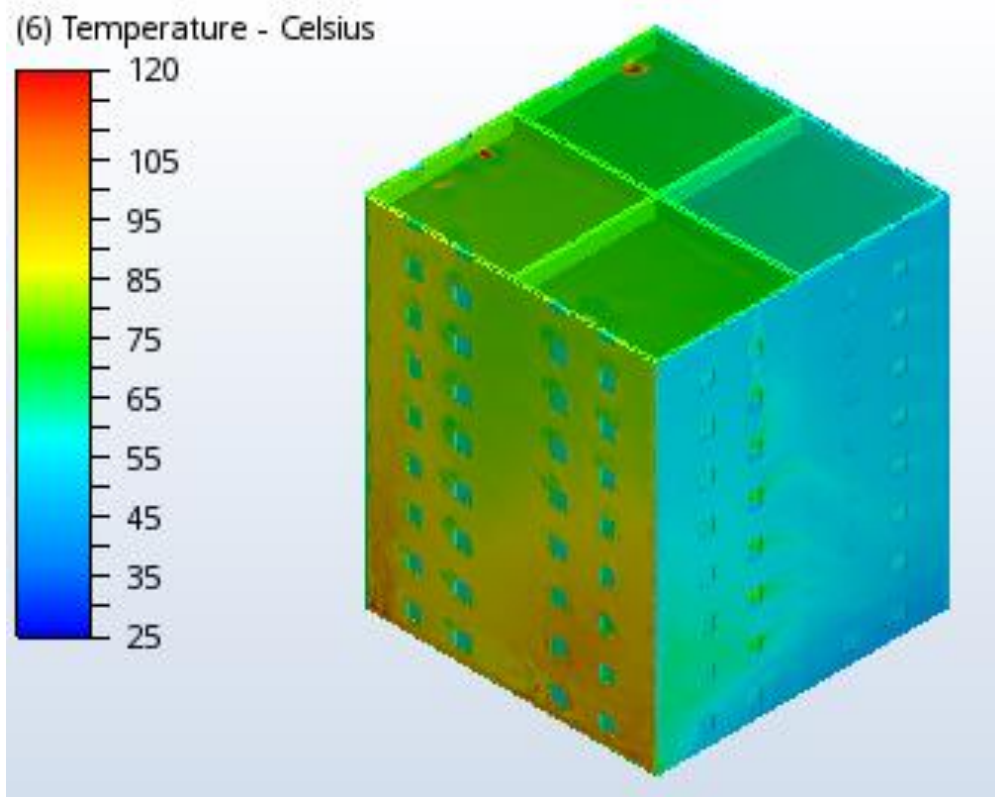
Less weight on the wall, May use thin normal plaster + paint rather than thick thermal plaster.

7 High rise (zone א) 3rd Oct

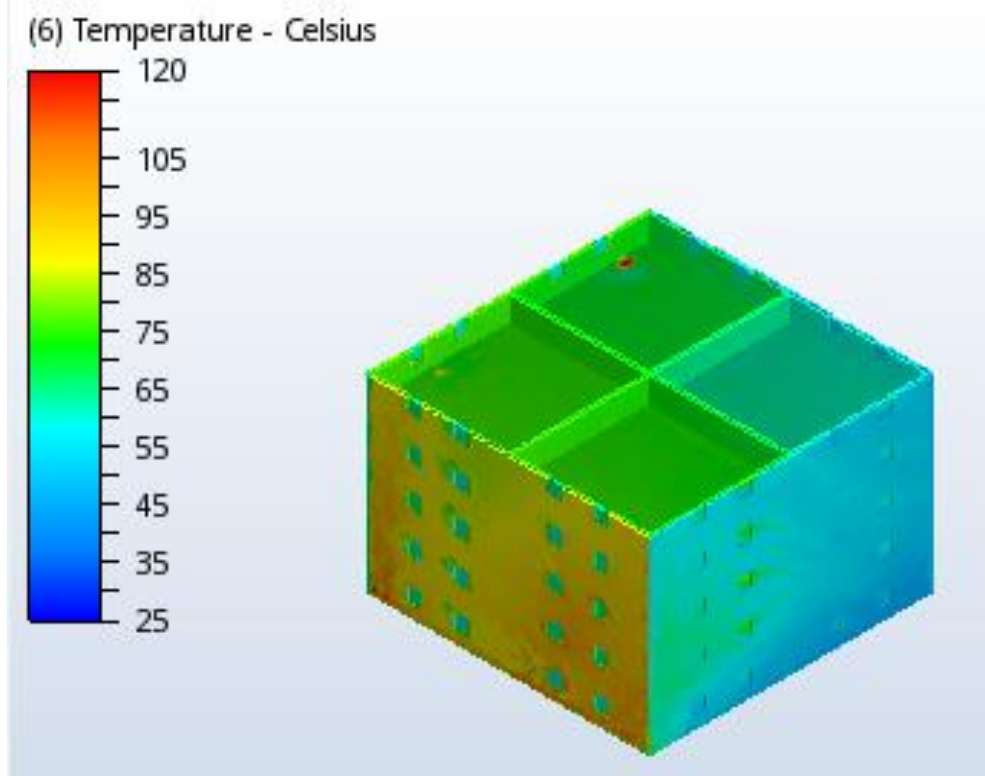
7.1 Normal building general view after analysis (building shade on the right side)



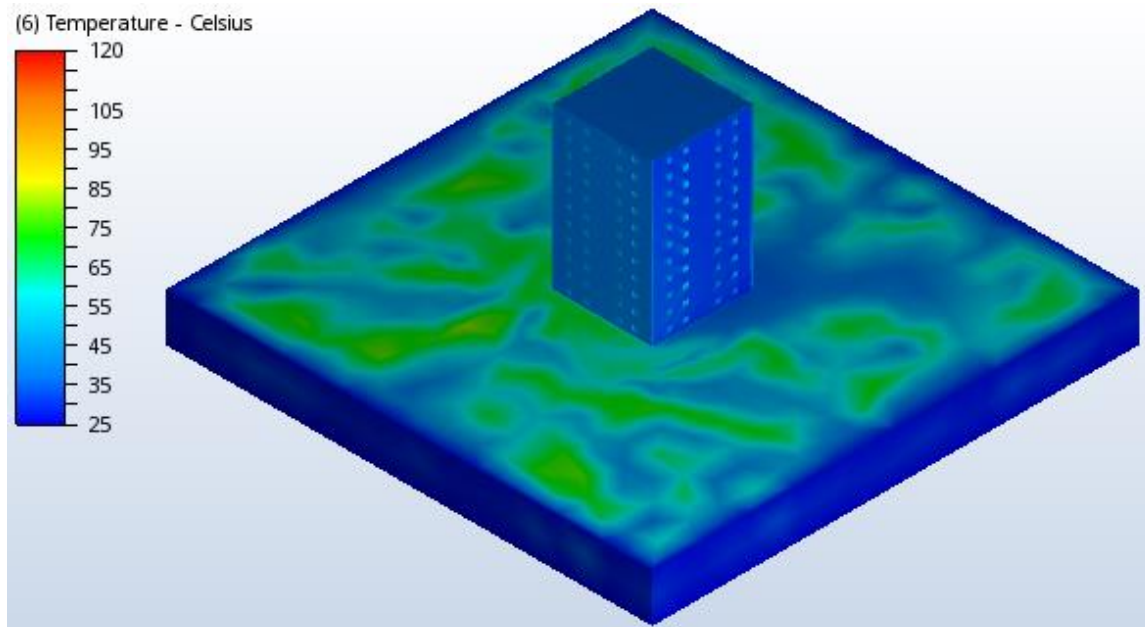
7.2 Normal building general view after analysis without roof



7.3 Normal building general view after analysis only few floors

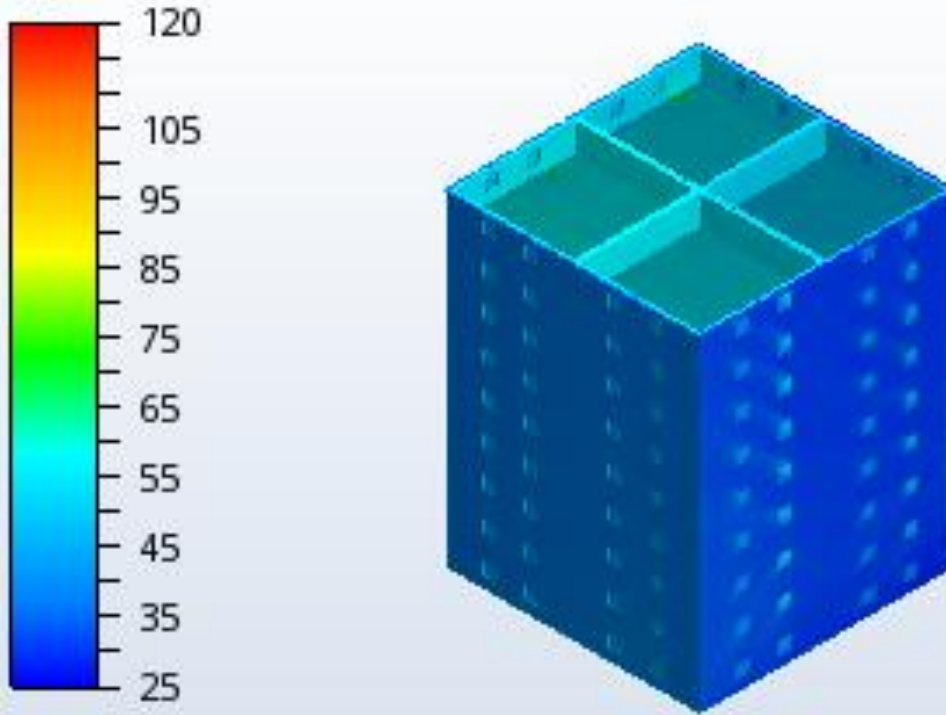


7.4 Painted building general view after analysis

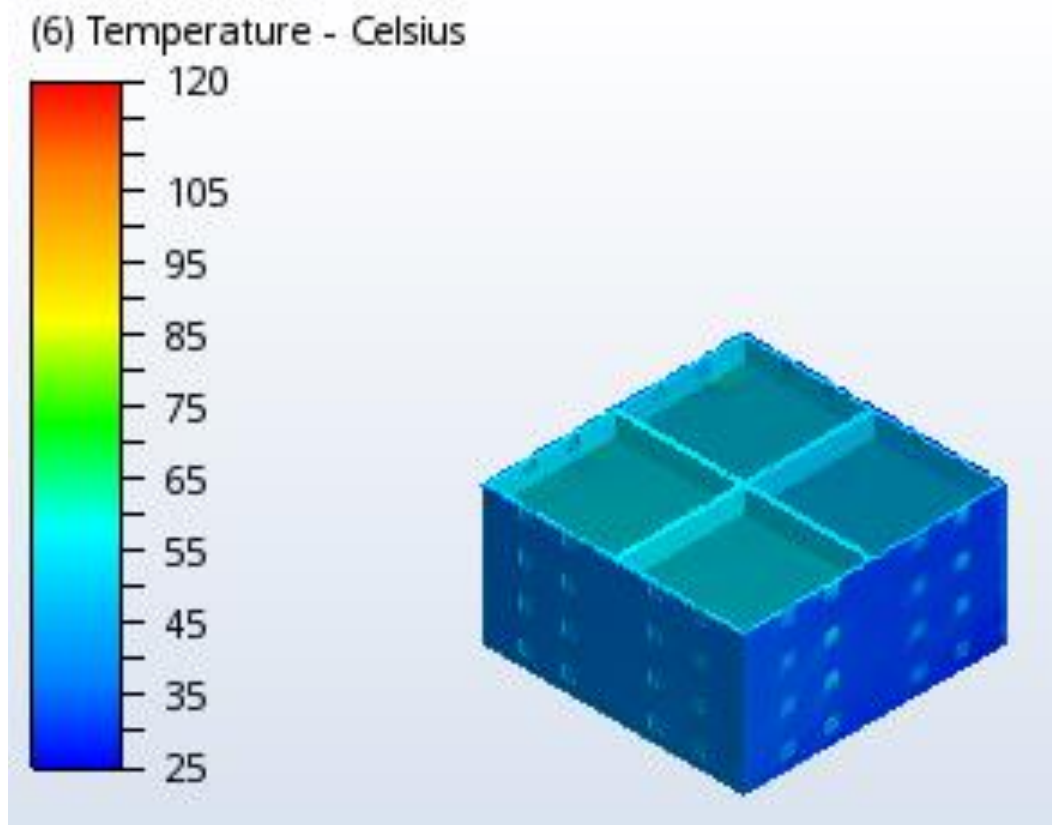


7.5 Painted building general view after analysis without roof

(6) Temperature - Celsius

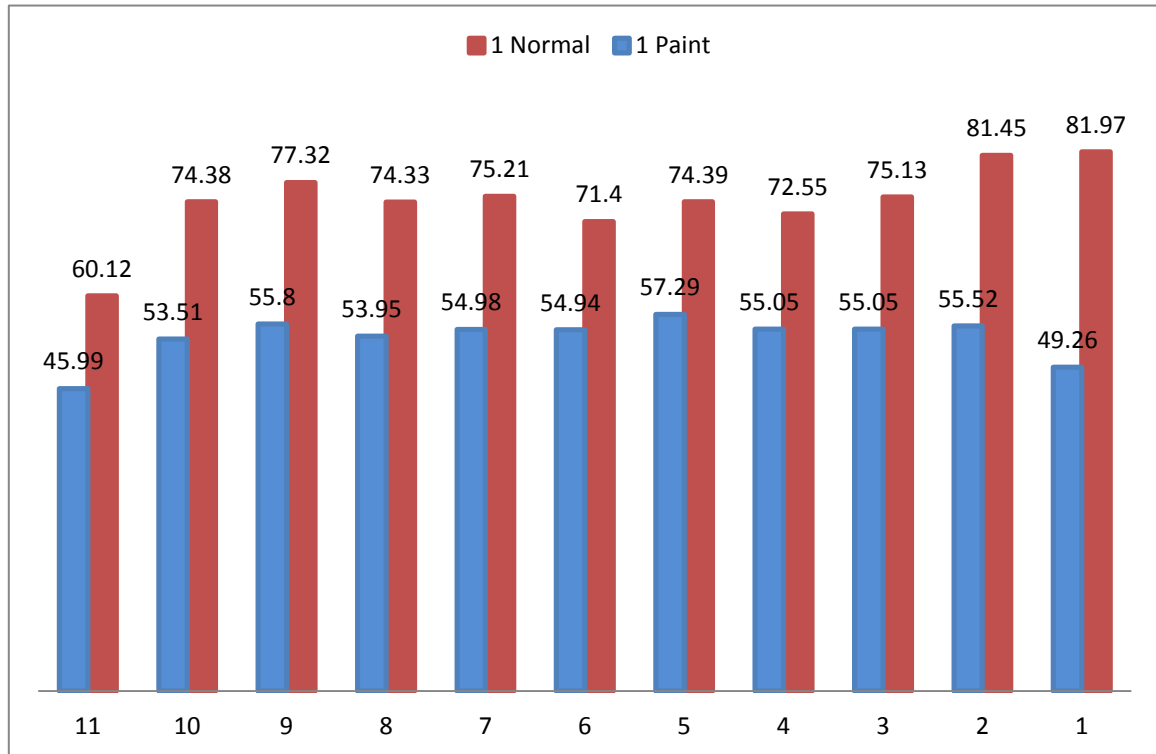


7.6 Painted building general view after analysis few floors

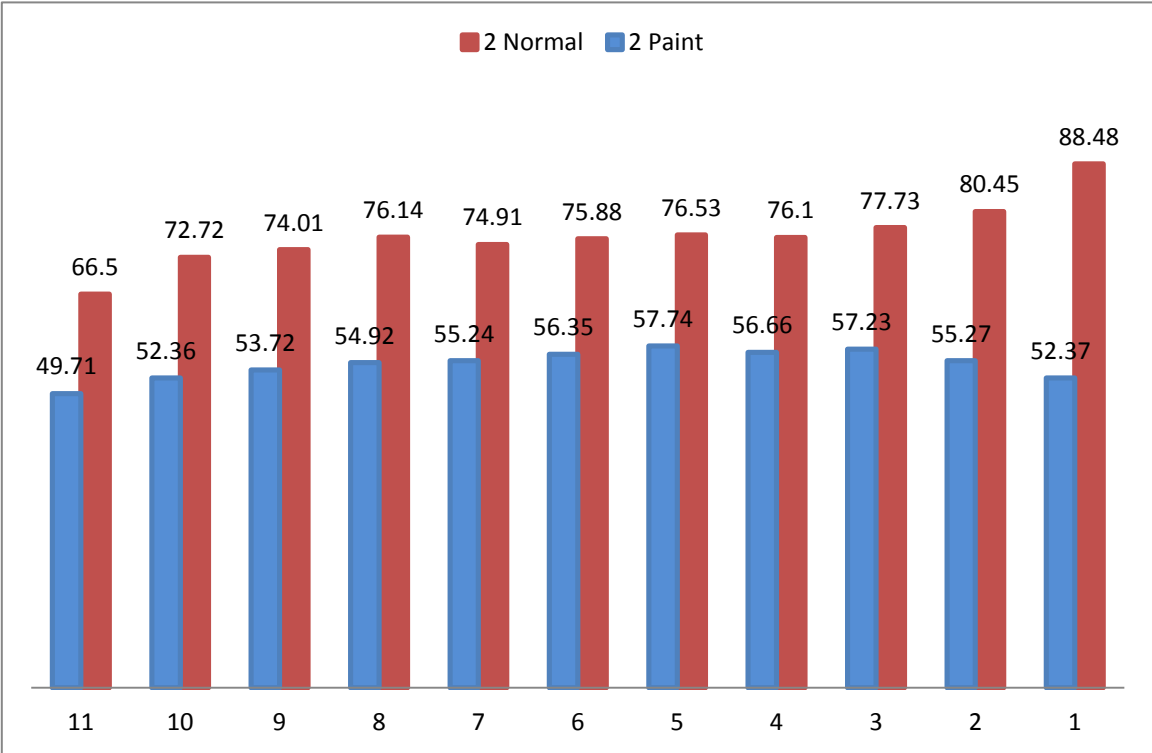


7.7 Comparison between the 2 buildings in the same floors and the same apartment.

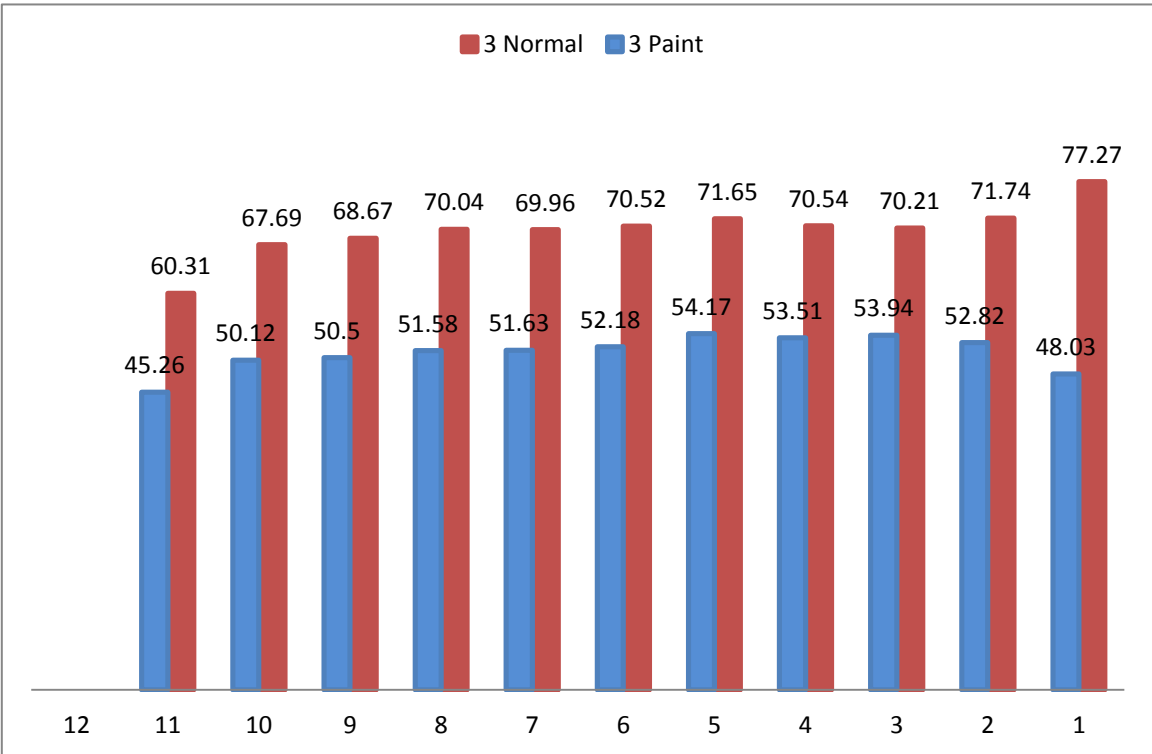
Tower 1



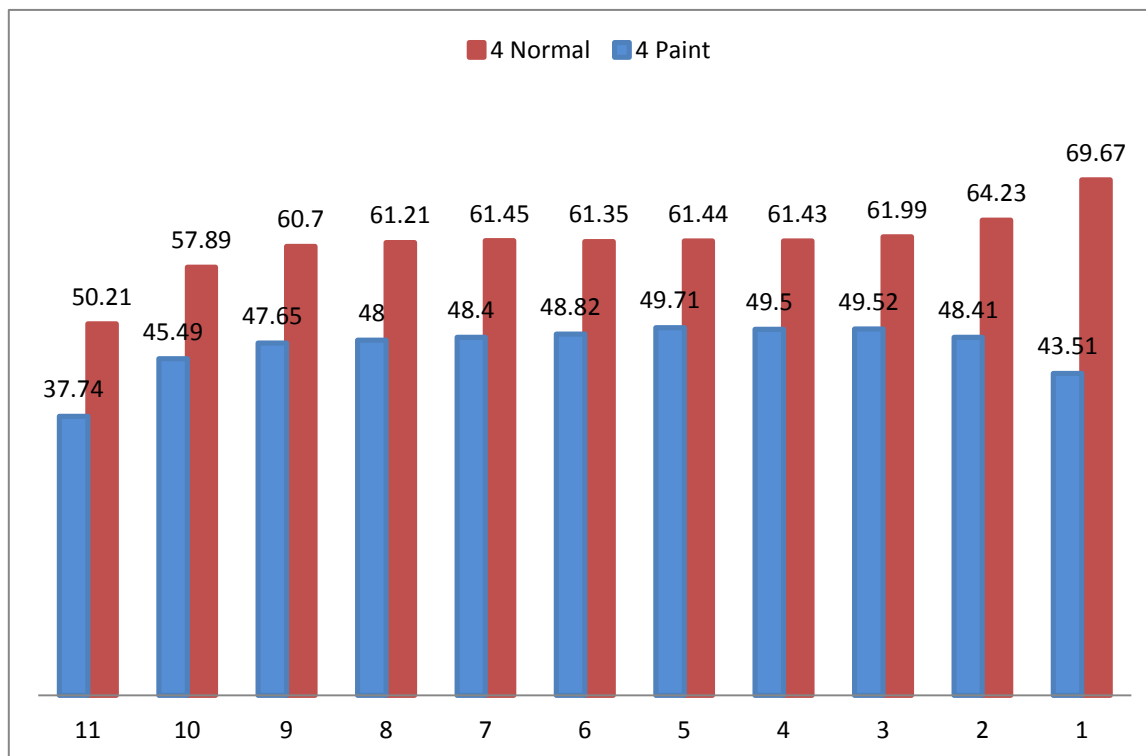
Tower 2



Tower 3



Tower 4



Conclusions:

The effect of paint in all floors and all apartments is well marked.

It is vary per floor and direction to the sun.

The effect of color on the lower floors is higher due to ground reflection.

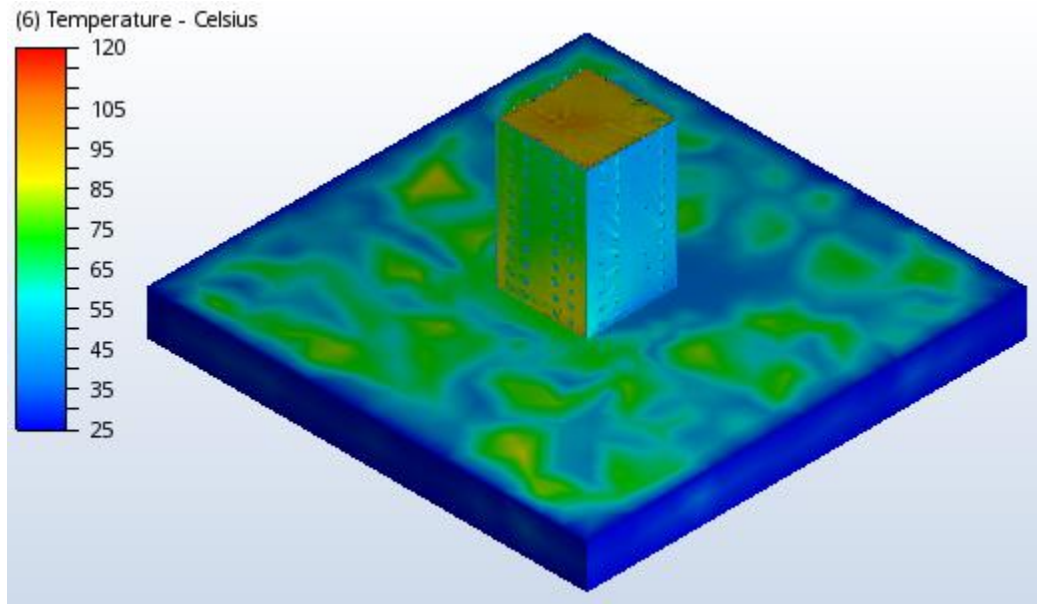
While the apartment is facing the wall to the sun the impact is bigger.

As side effect in painted buildings, due to smaller difference between the comfort temperature and the actual temperature there is less moisture inside the building walls, reduce Fungi / mold initially bad smell.

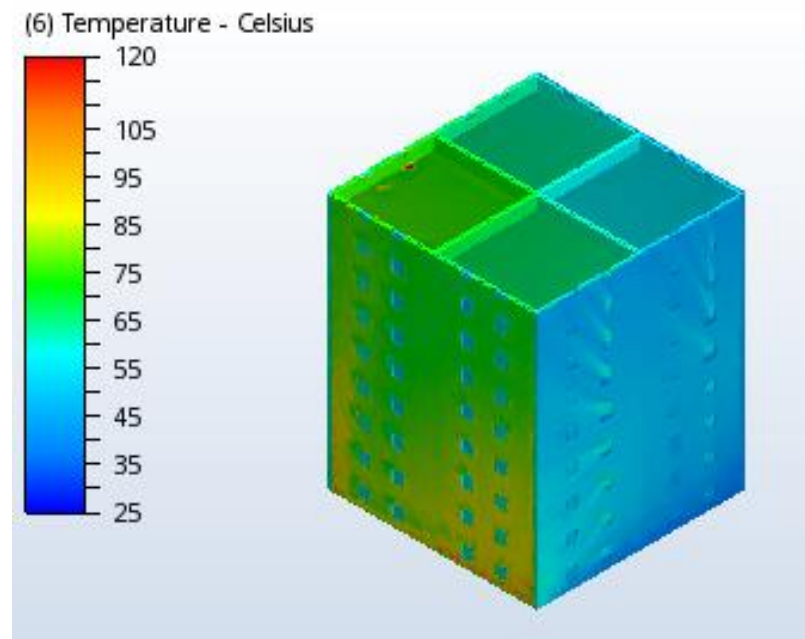
Less weight on the wall, May use thin normal plaster + paint rather than thick thermal plaster.

8 High rise (zone 3) 27th Mar

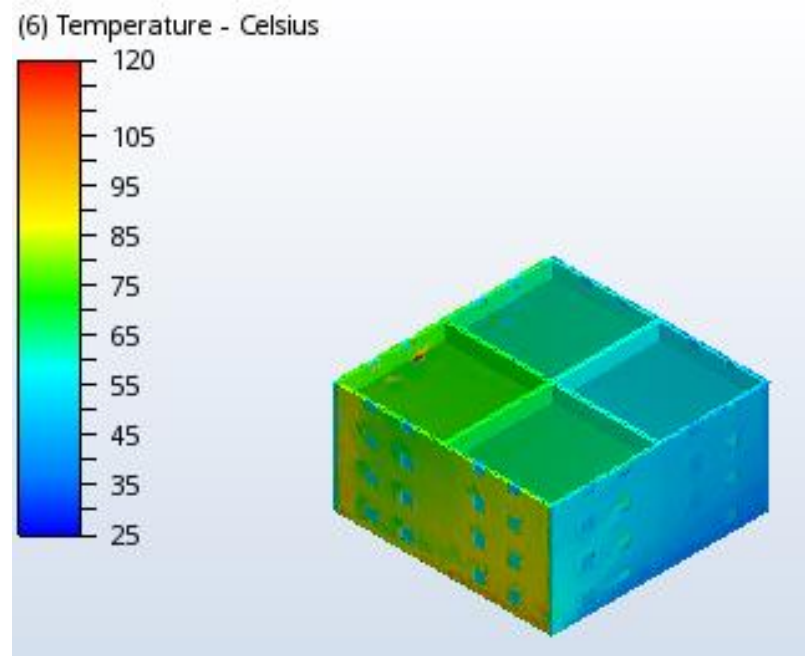
8.1 Normal building general view after analysis (building shade on the right side)



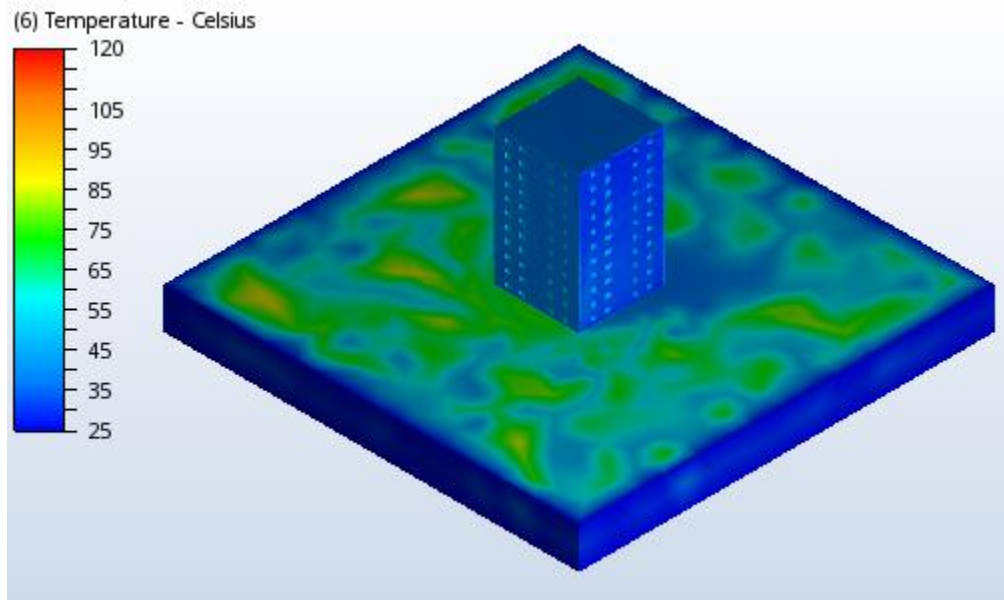
8.2 Normal building general view after analysis without roof



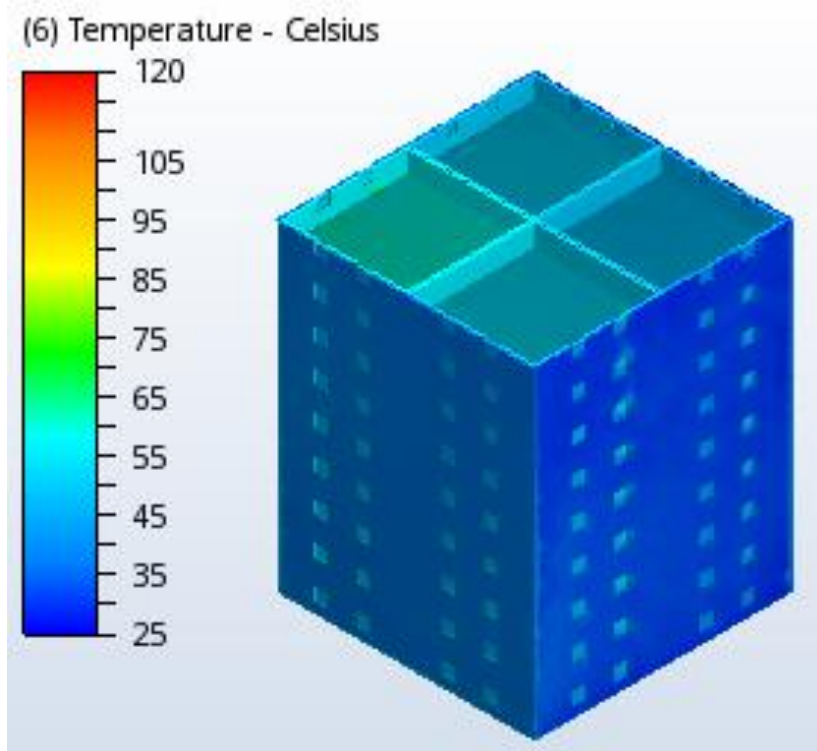
8.3 Normal building general view after analysis only few floors



8.4 Painted building general view after analysis

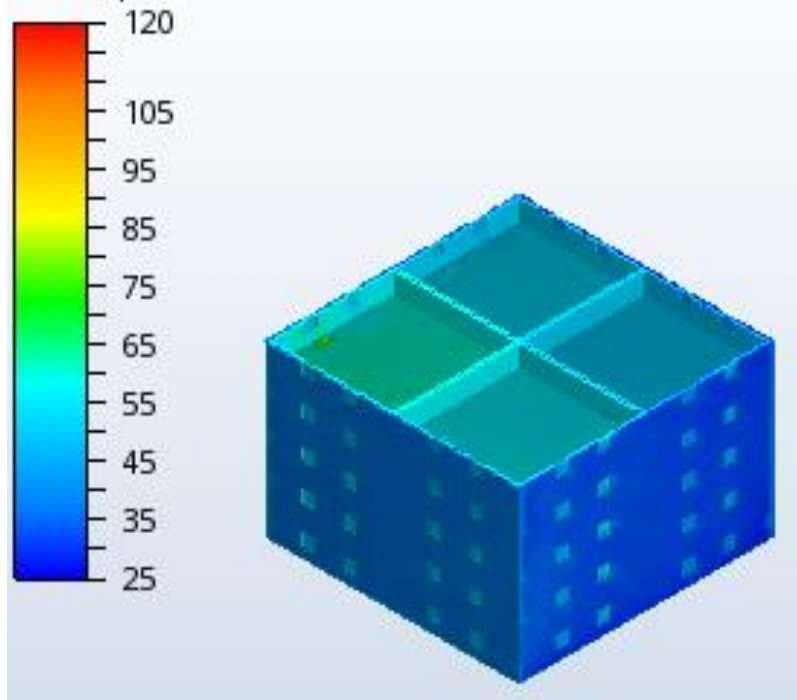


8.5 Painted building general view after analysis without roof



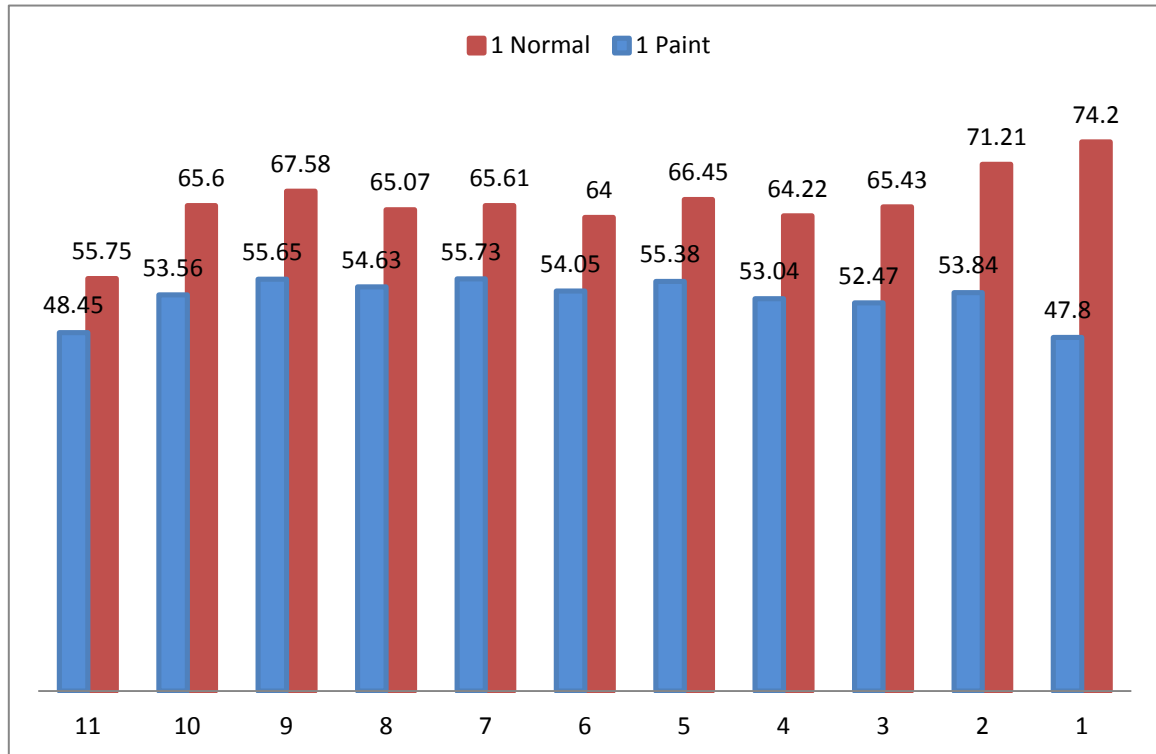
8.6 Painted building general view after analysis few floors

(6) Temperature - Celsius

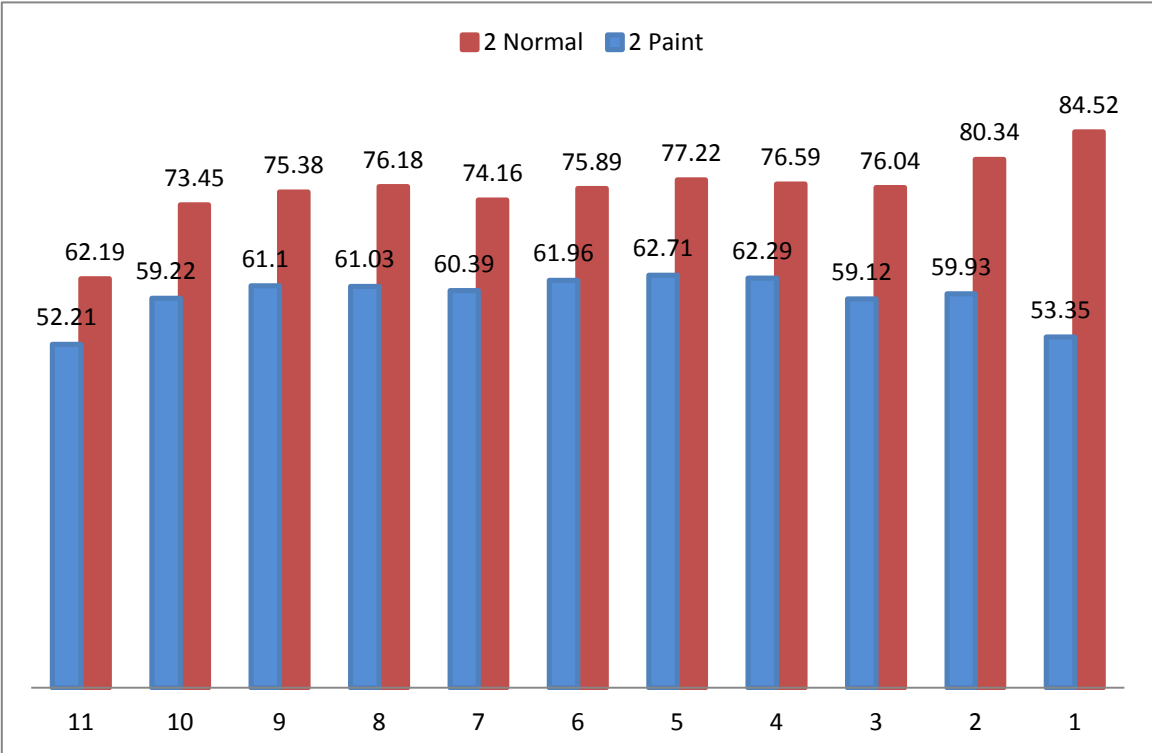


8.7 Comparison between the 2 buildings in the same floors and the same apartment.

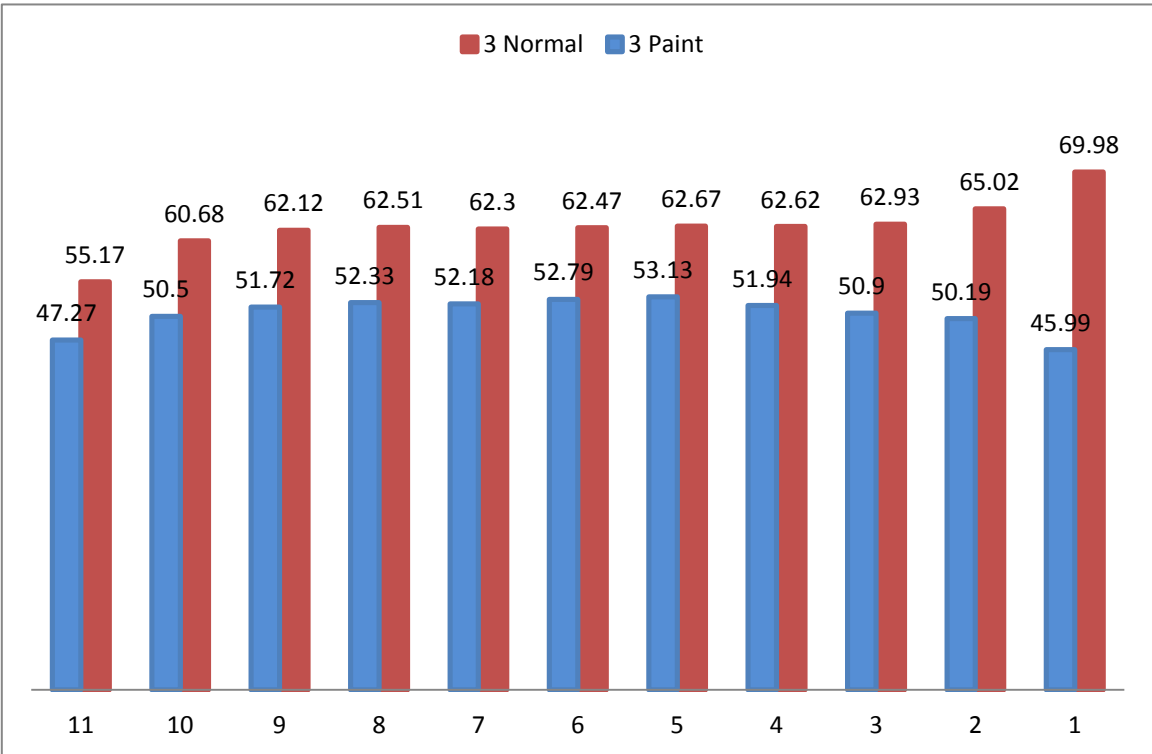
Tower 1



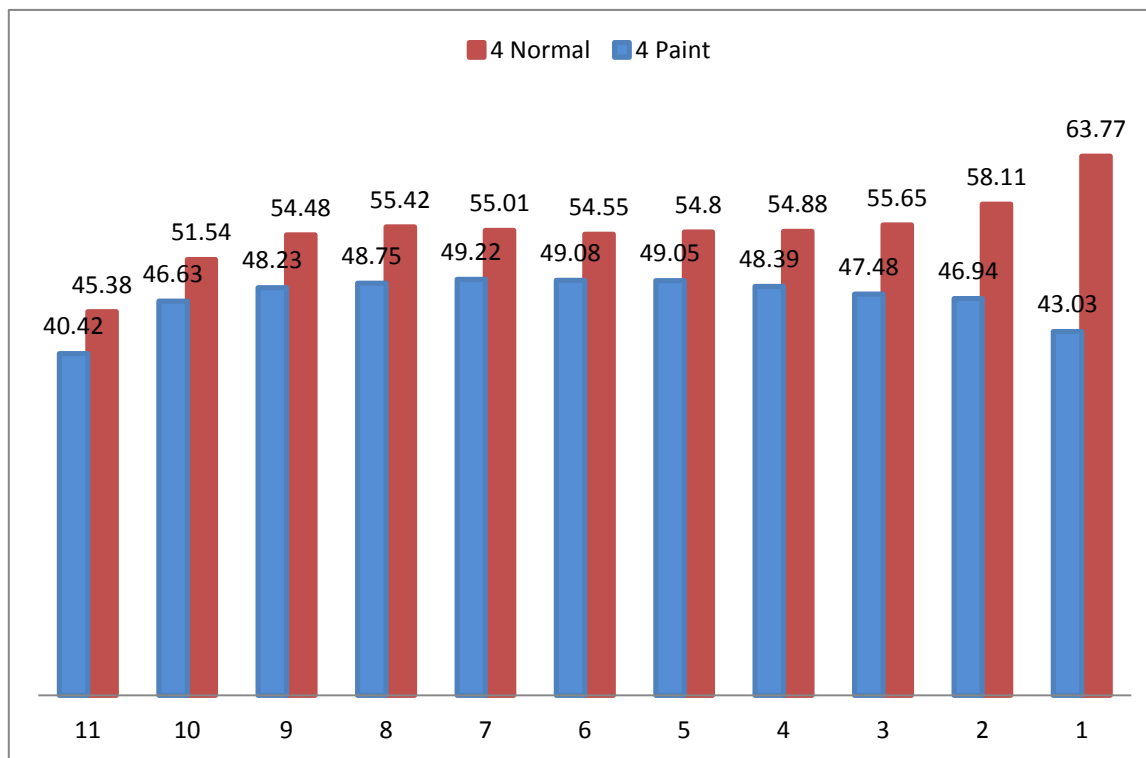
Tower 2



Tower 3



Tower 4



Conclusions:

The effect of paint in all floors and all apartments is well marked.

It is vary per floor and direction to the sun.

The effect of color on the lower floors is higher due to ground reflection.

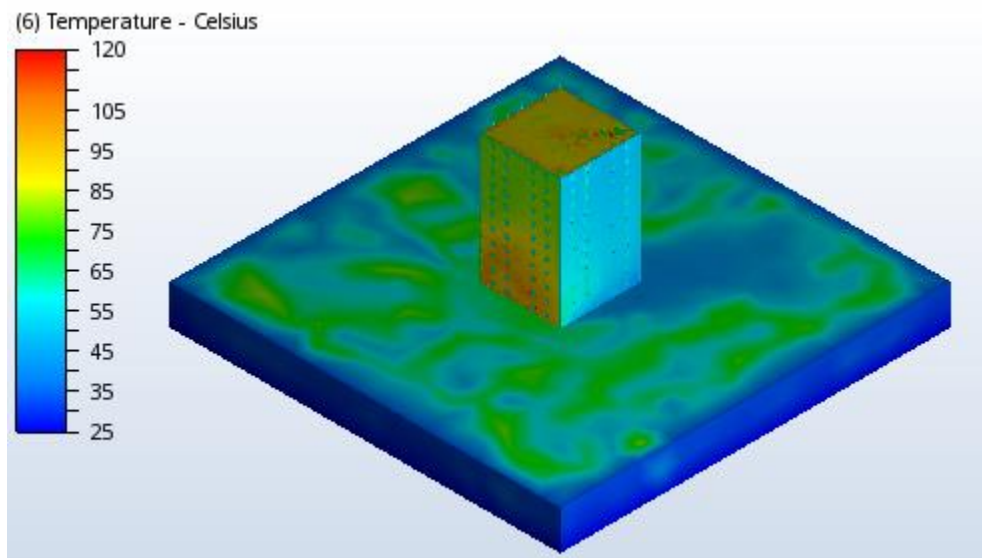
While the apartment is facing the wall to the sun the impact is bigger.

As side effect in painted buildings, due to smaller difference between the comfort temperature and the actual temperature there is less moisture inside the building walls, reduce Fungi / mold initially bad smell.

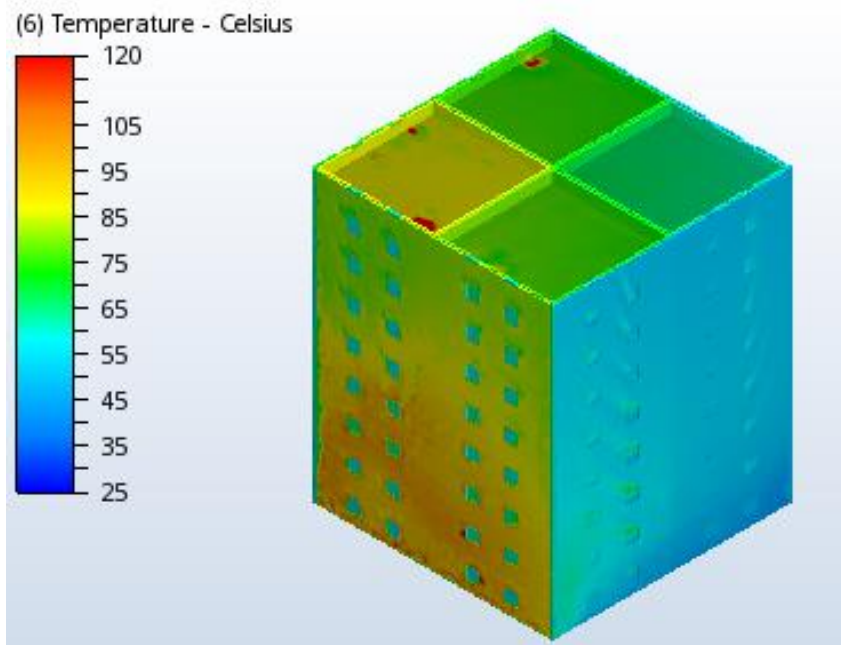
Less weight on the wall, May use thin normal plaster + paint rather than thick thermal plaster.

9 High rise (zone 7) 3rd Oct

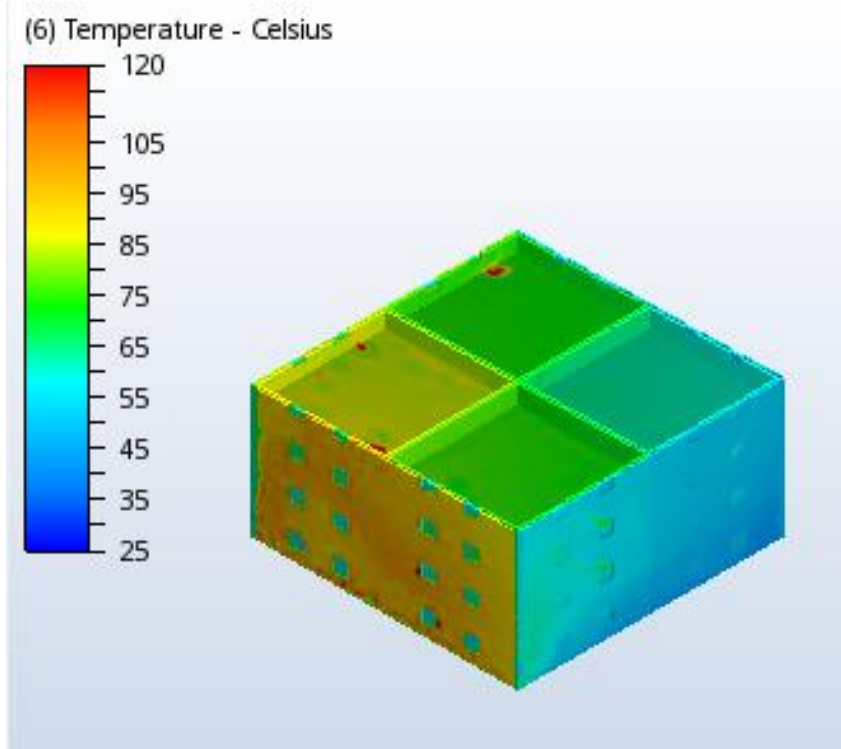
9.1 Normal building general view after analysis (building shade on the right side)



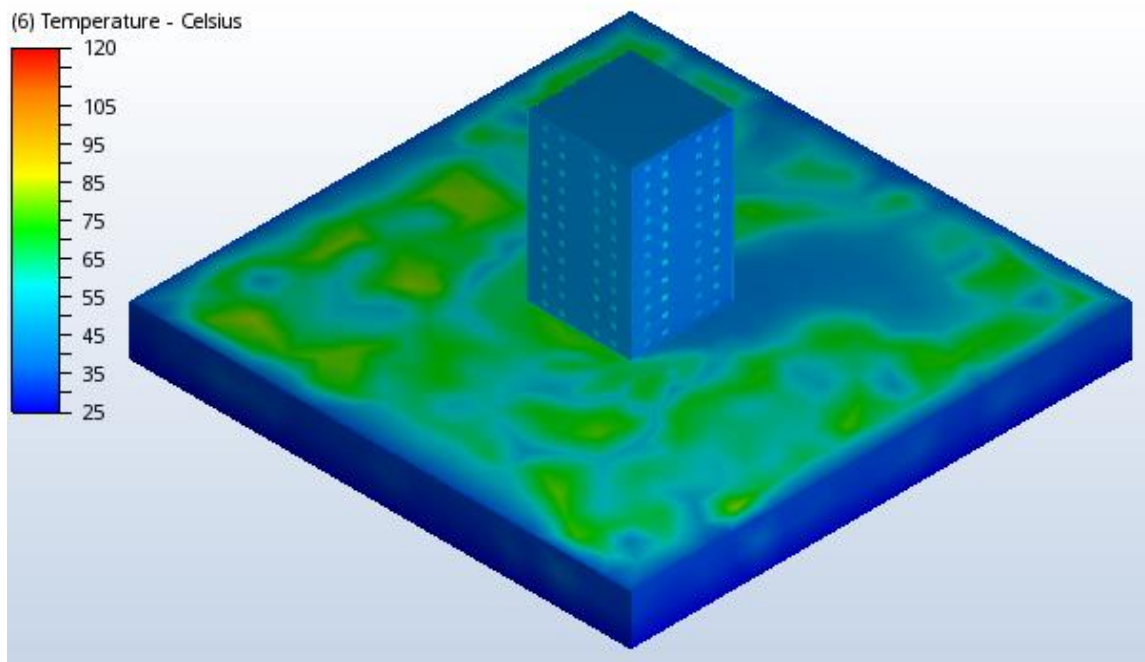
9.2 Normal building general view after analysis without roof



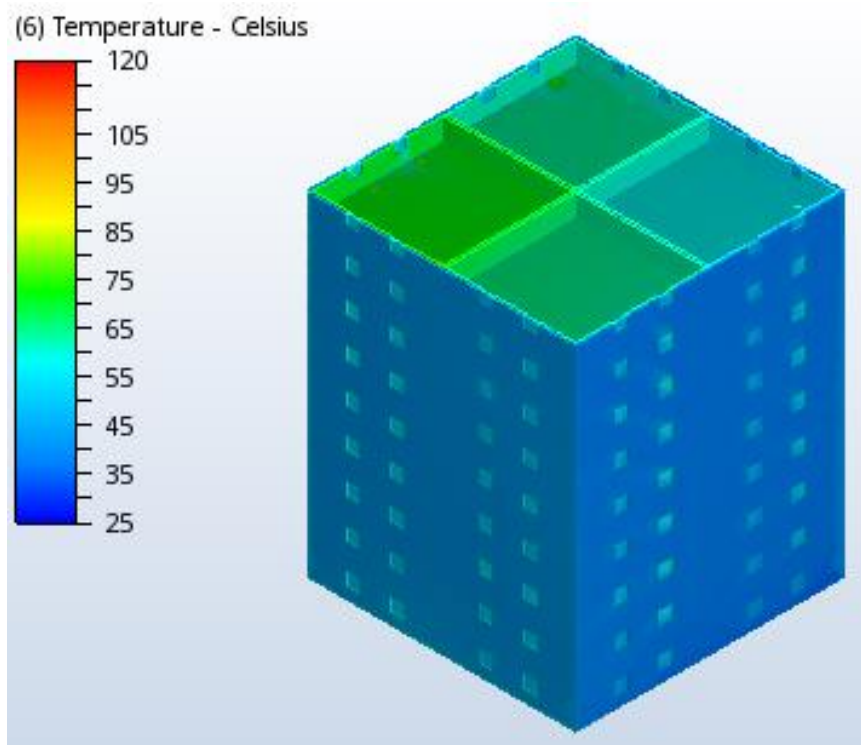
9.3 Normal building general view after analysis only few floors



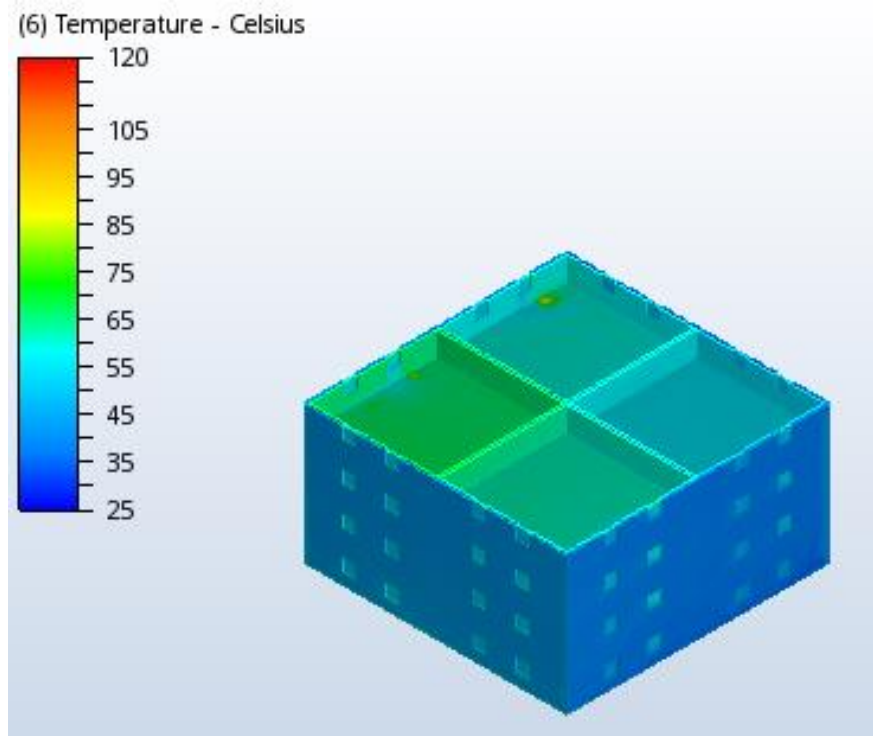
9.4 Painted building general view after analysis



9.5 Painted building general view after analysis without roof

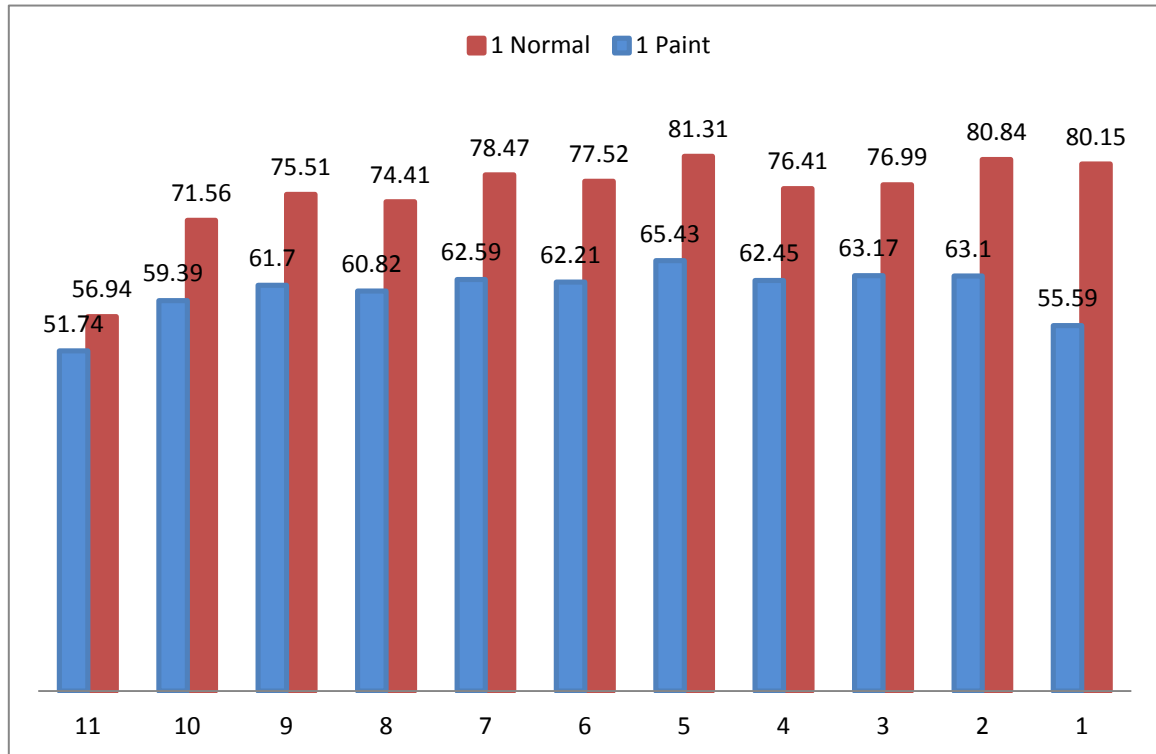


9.6 Painted building general view after analysis few floors

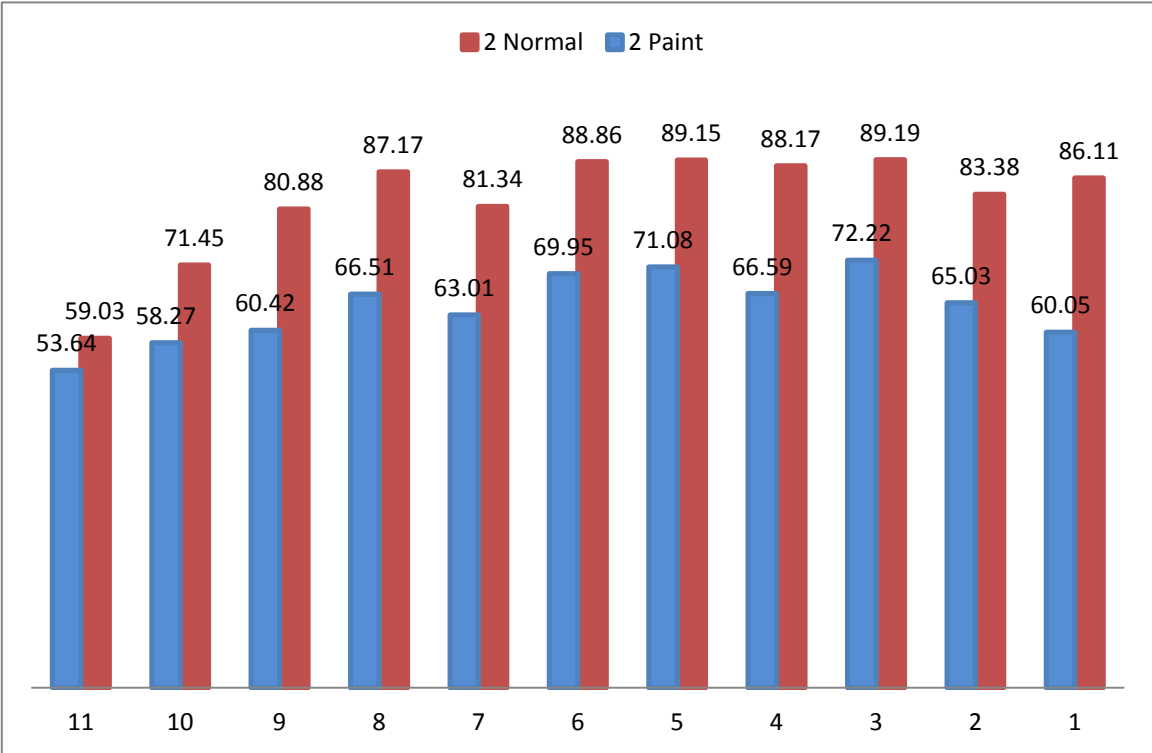


9.7 Comparison between the 2 buildings in the same floors and the same apartment.

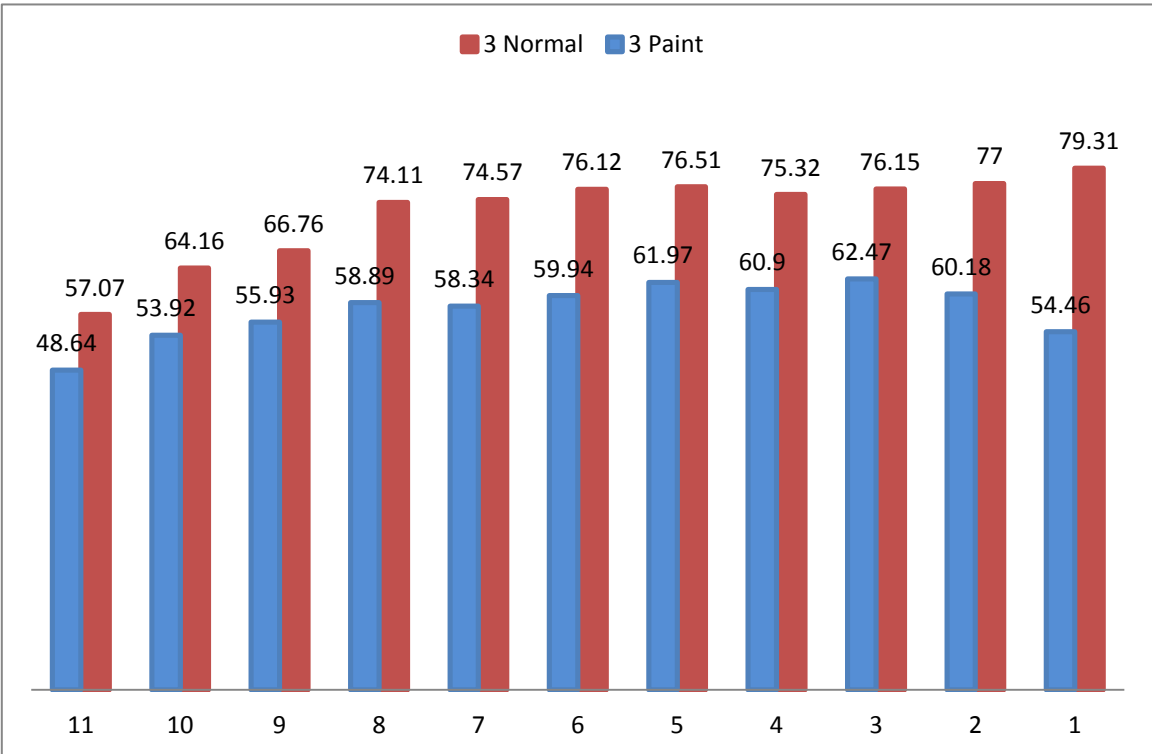
Tower 1



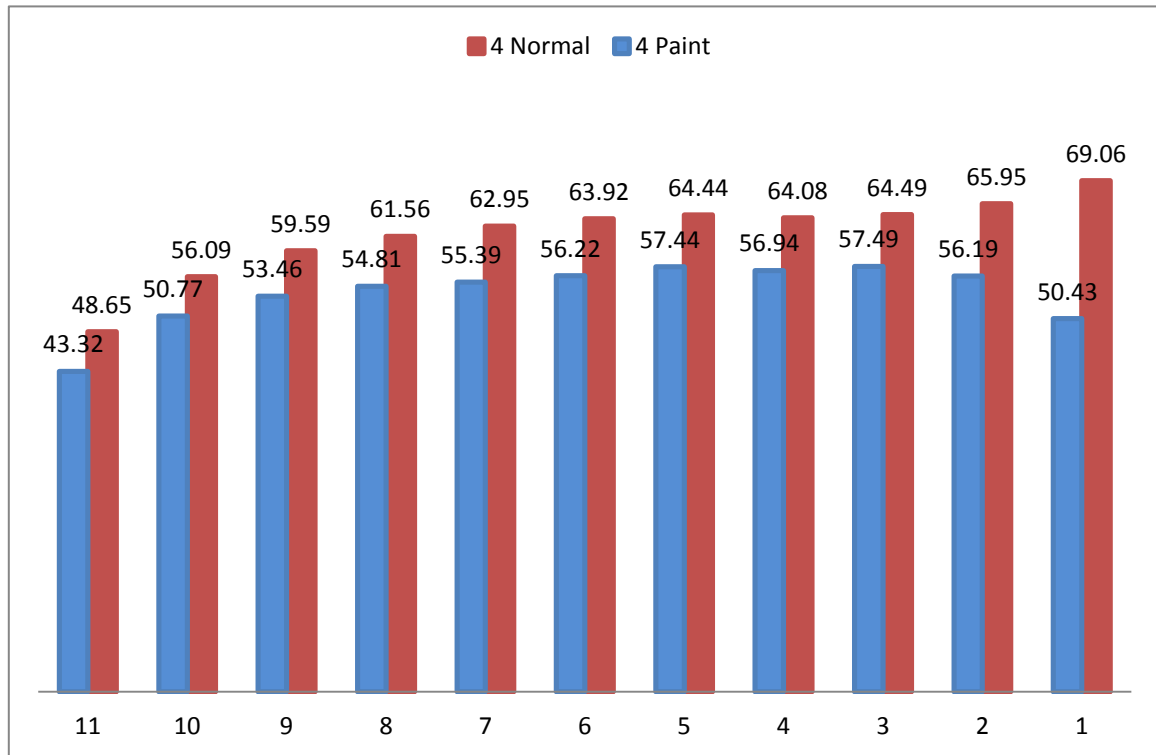
Tower 2



Tower 3



Tower 4



Conclusions:

The effect of paint in all floors and all apartments is well marked.

It is vary per floor and direction to the sun.

The effect of color on the lower floors is higher due to ground reflection.

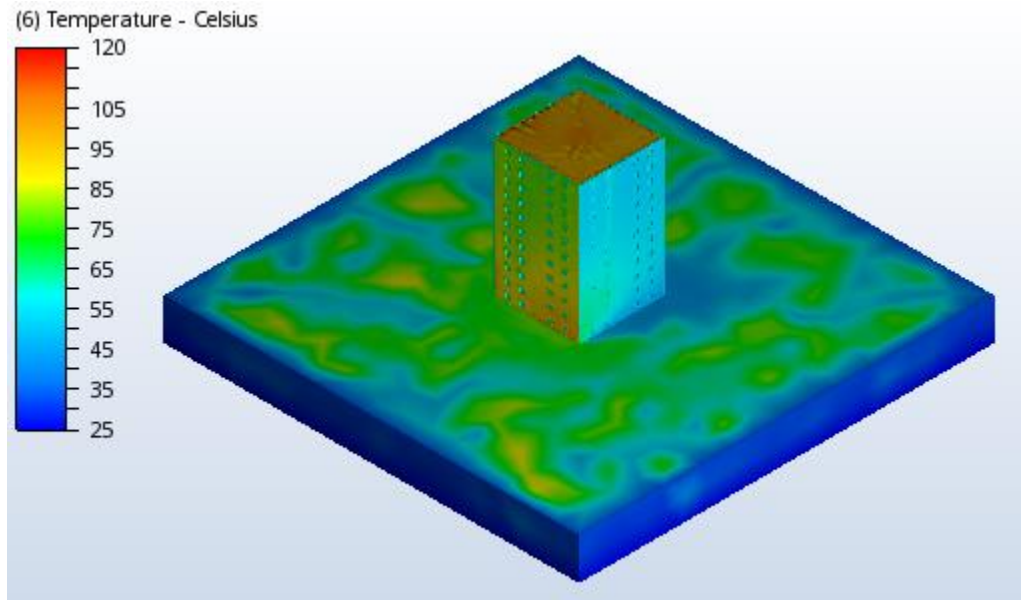
While the apartment is facing the wall to the sun the impact is bigger.

As side effect in painted buildings, due to smaller difference between the comfort temperature and the actual temperature there is less moisture inside the building walls, reduce Fungi / mold initially bad smell.

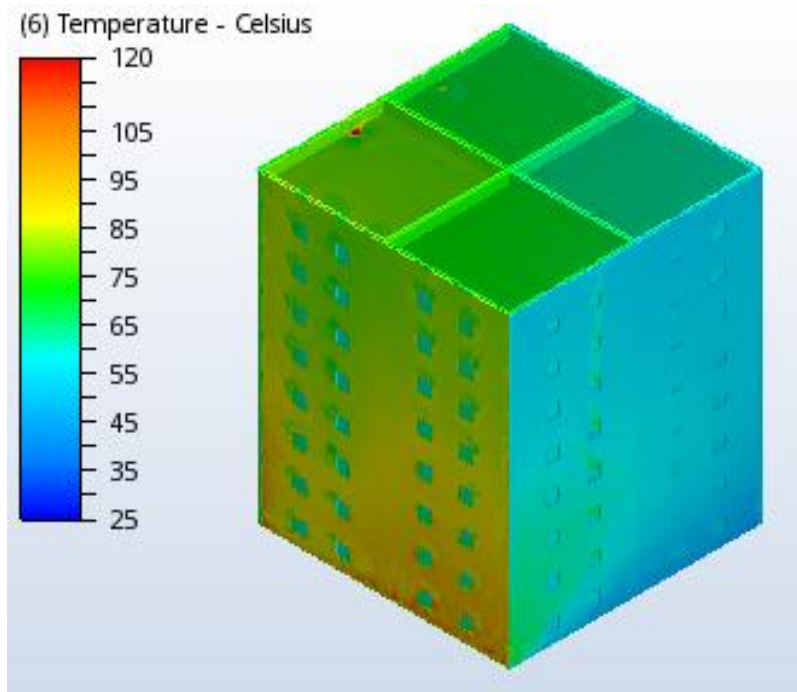
Less weight on the wall, May use thin normal plaster + paint rather than thick thermal plaster.

10 High rise (zone 7) 27th Mar

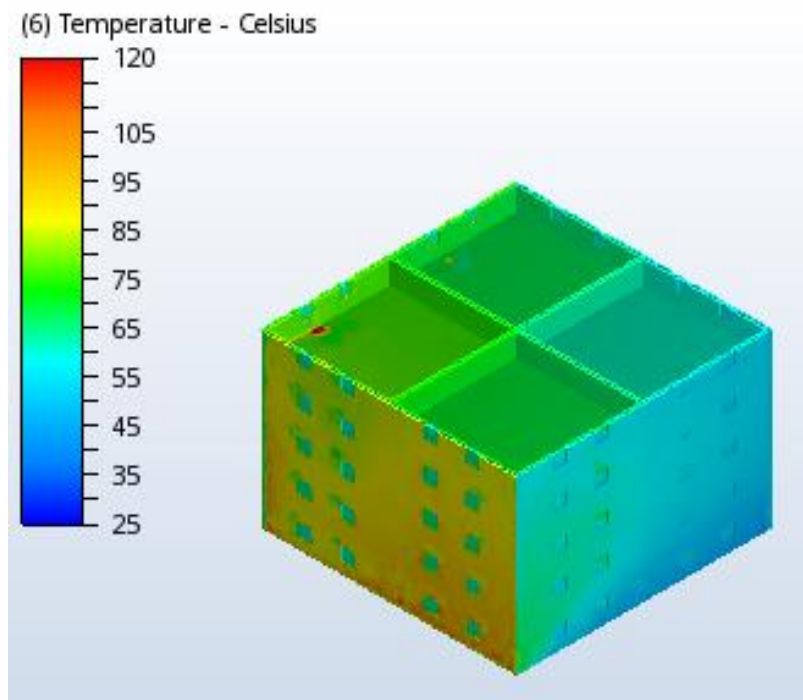
10.1 Normal building general view after analysis (building shade on the right side)



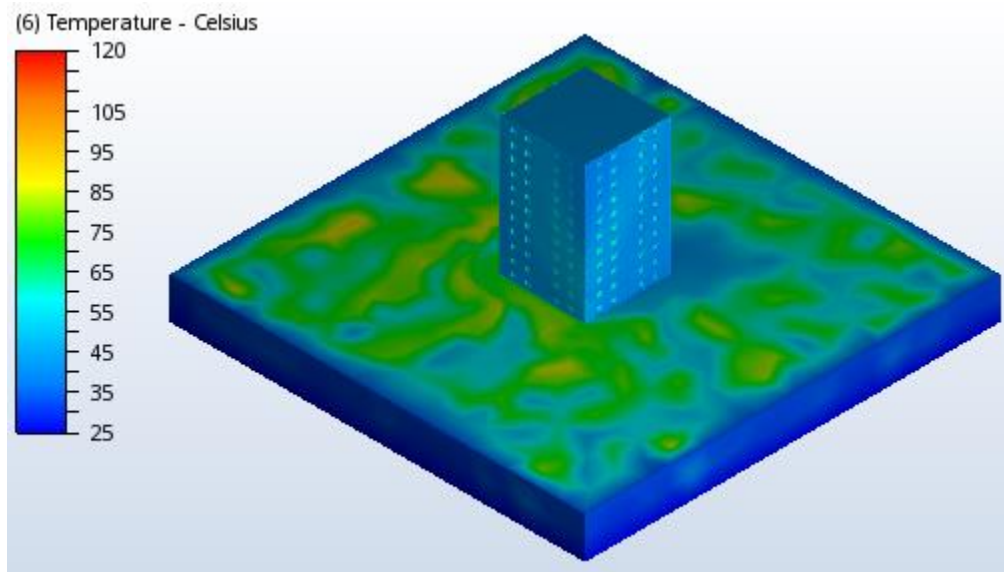
10.2 Normal building general view after analysis without roof



10.3 Normal building general view after analysis only few floors

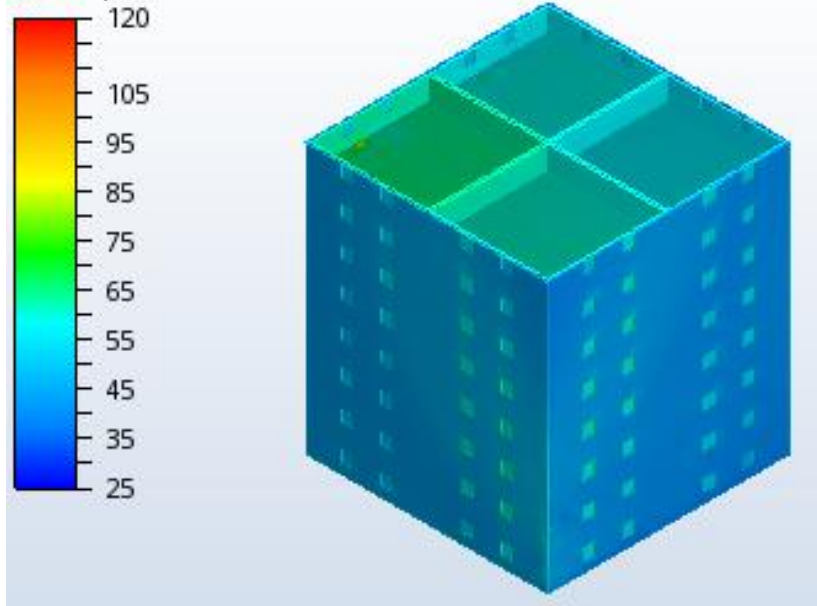


10.4 Painted building general view after analysis



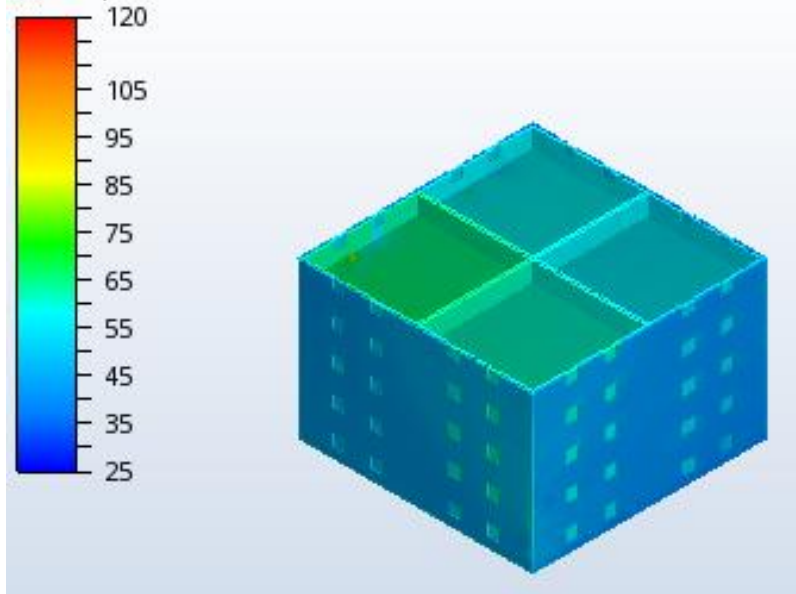
10.5 Painted building general view after analysis without roof

(6) Temperature - Celsius



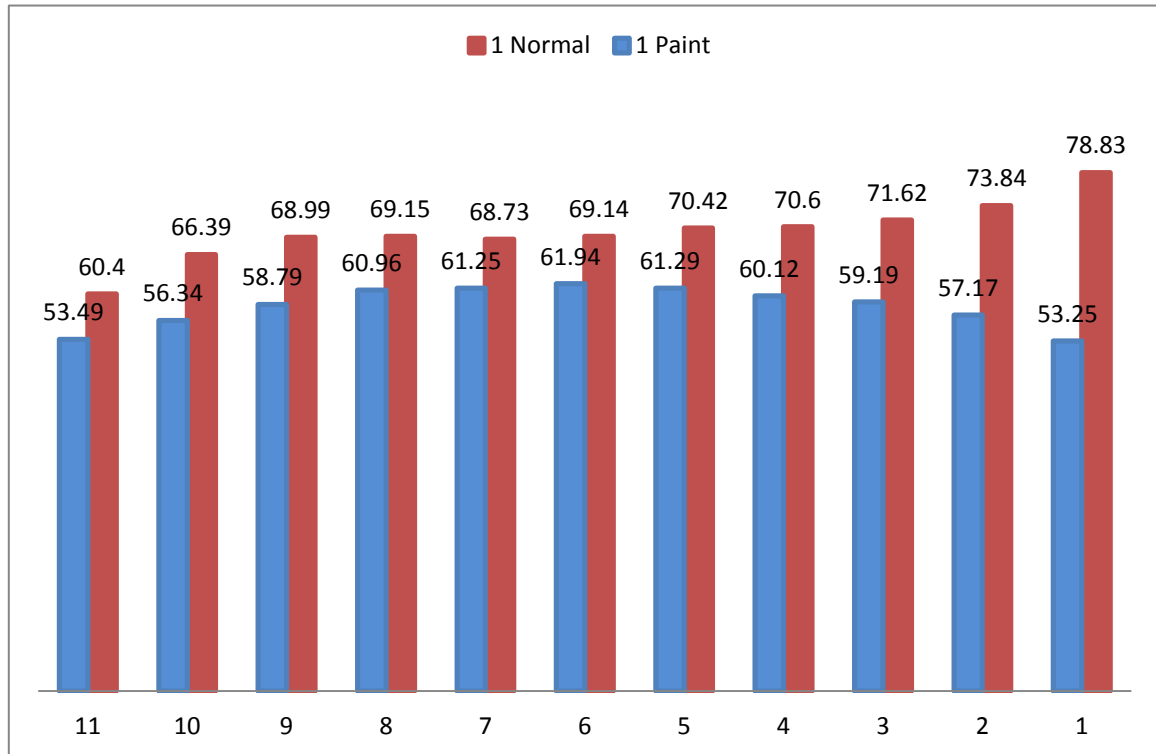
10.6 Painted building general view after analysis few floors

(6) Temperature - Celsius

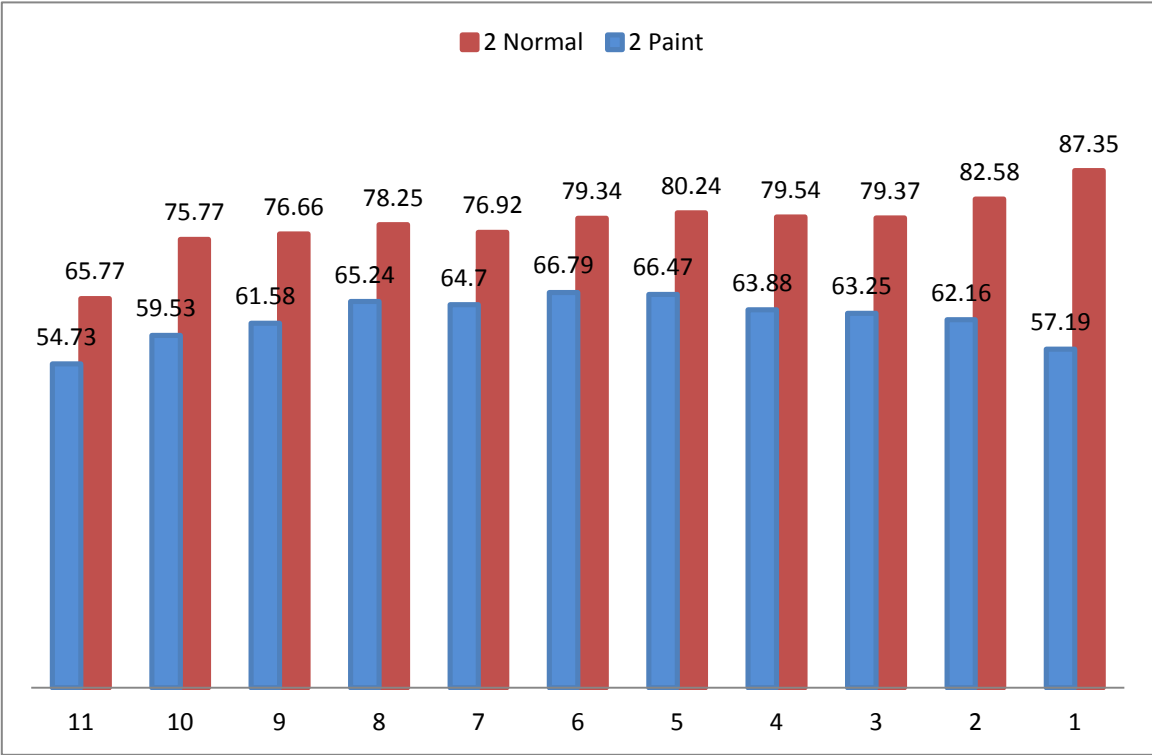


10.7 Comparison between the 2 buildings in the same floors and the same apartment.

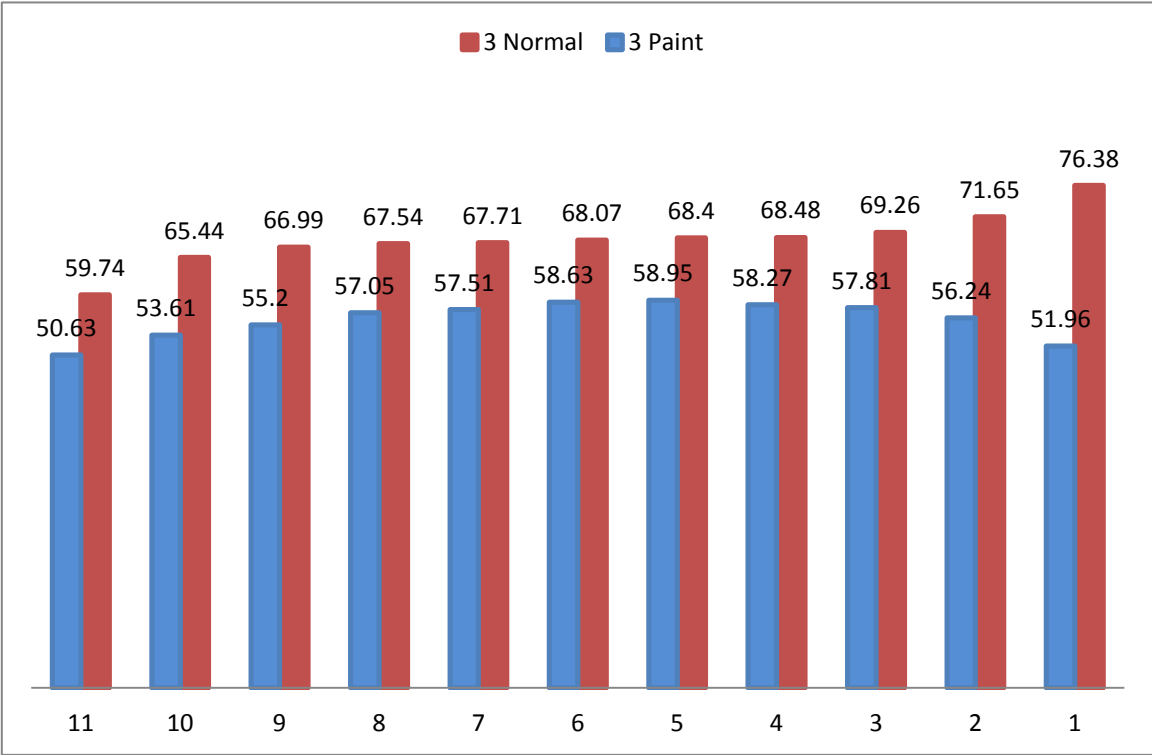
Tower 1



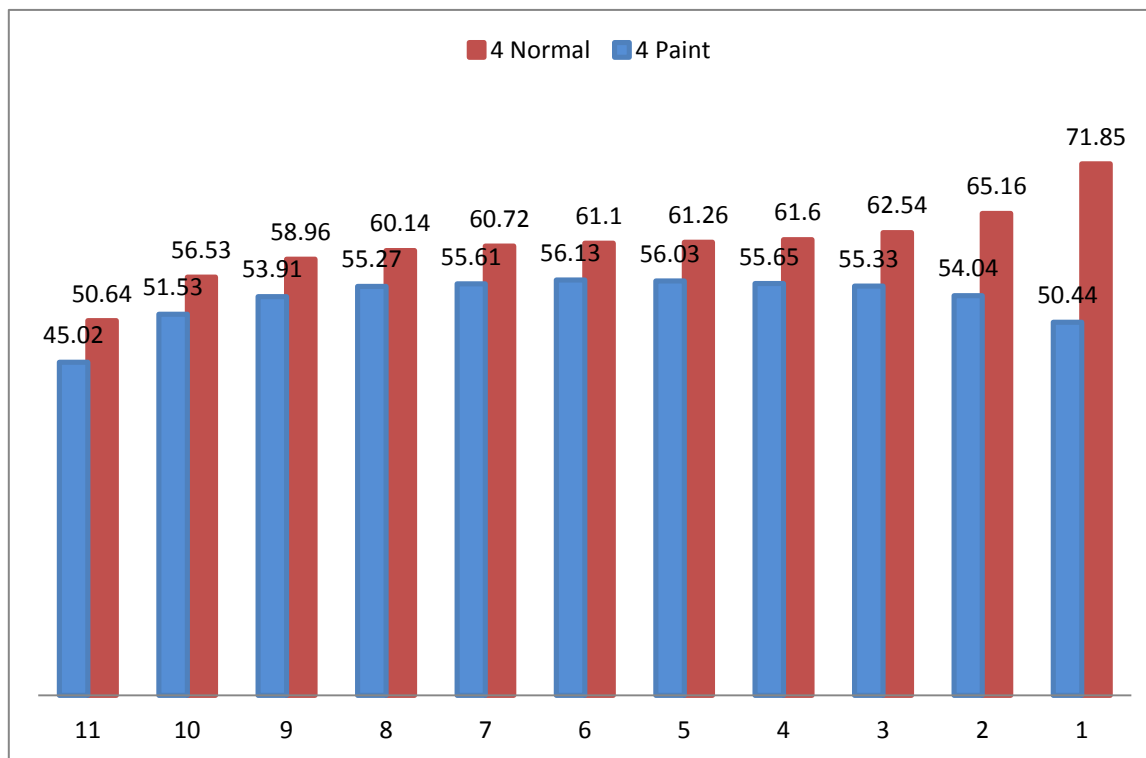
Tower 2



Tower 3



Tower 4



Conclusions:

The effect of paint in all floors and all apartments is well marked.

It is vary per floor and direction to the sun.

The effect of color on the lower floors is higher due to ground reflection.

While the apartment is facing the wall to the sun the impact is bigger.

As side effect in painted buildings, due to smaller difference between the comfort temperature and the actual temperature there is less moisture inside the building walls, reduce Fungi / mold initially bad smell.

Less weight on the wall, May use thin normal plaster + paint rather than thick thermal plaster.

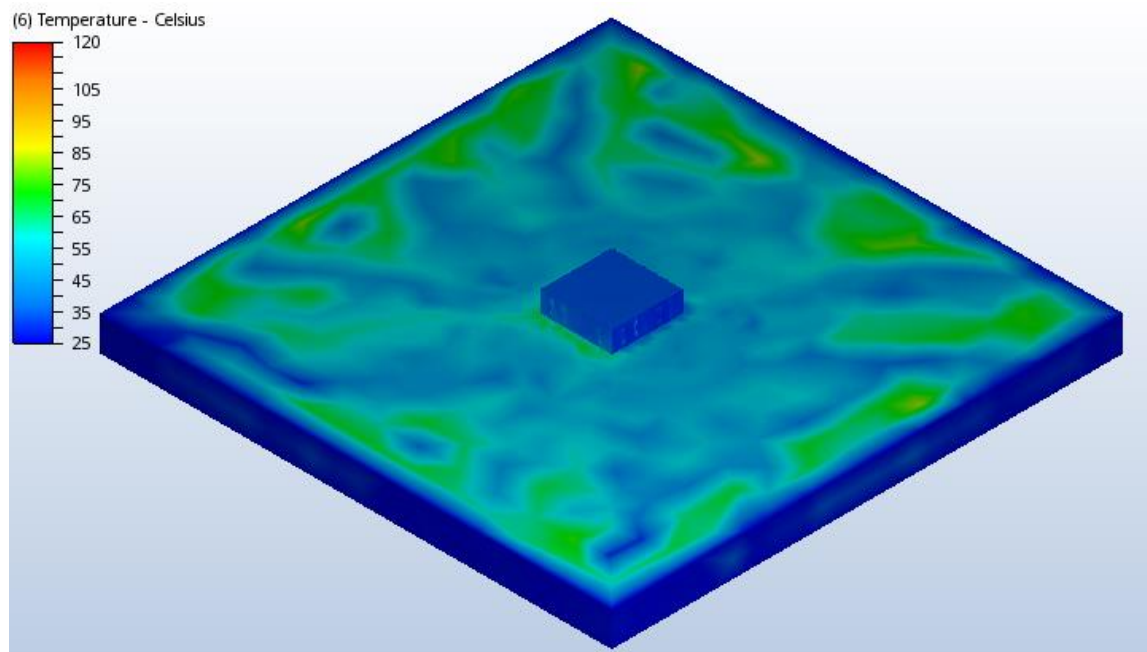
11 Small Building (zone 7) 27th Mar

4 different scenarios

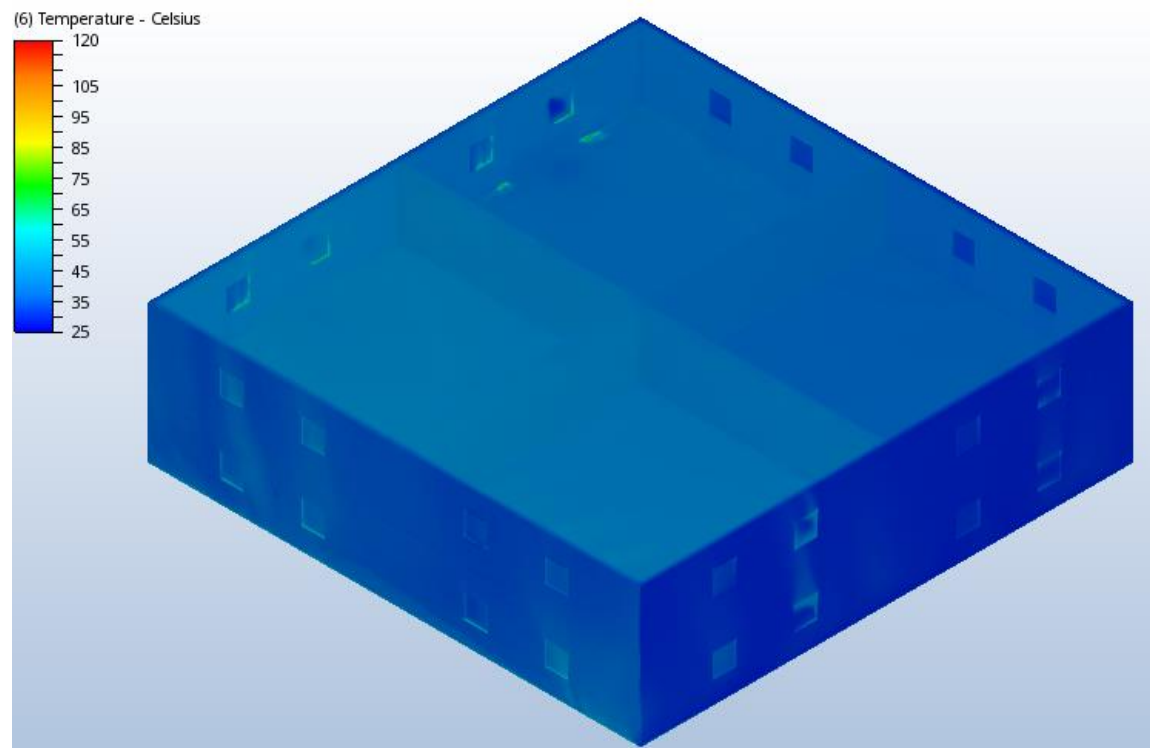
- 1) Regular building as before.
- 2) Painted building as before.
- 3) Itung wall
- 4) Itung wall + 1 fresh air circulation.
- 5) Itung wall parameters

- a. thickness 24 cm (interior plaster + Itung Brick + exterior plaster) $R = 1.41$

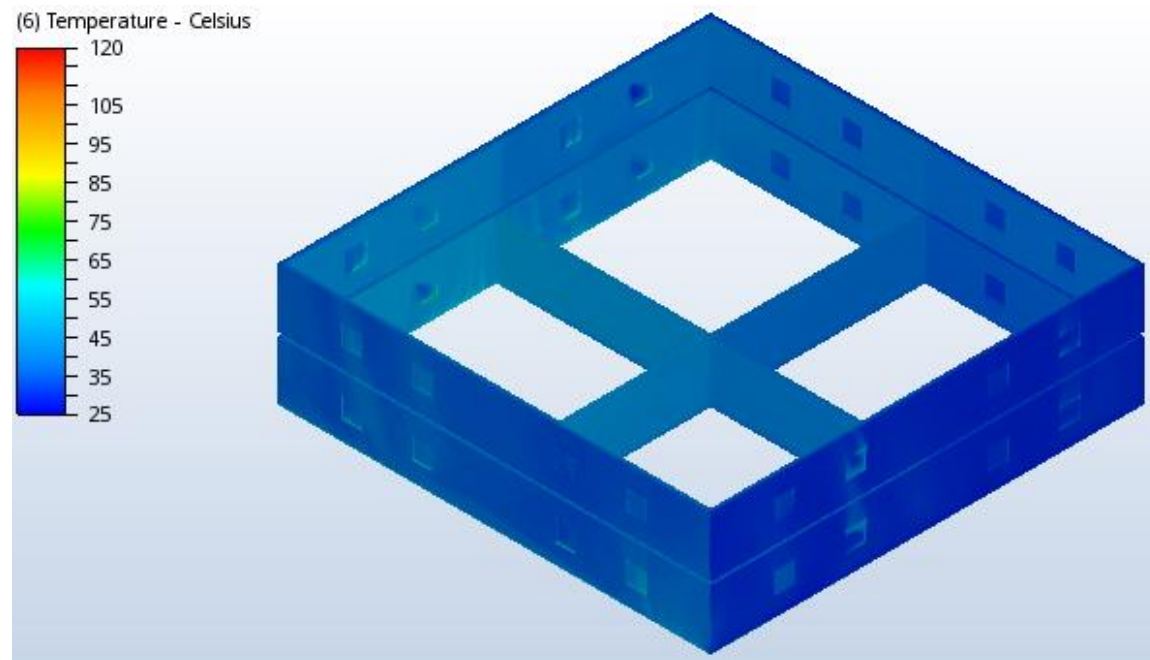
Painted building



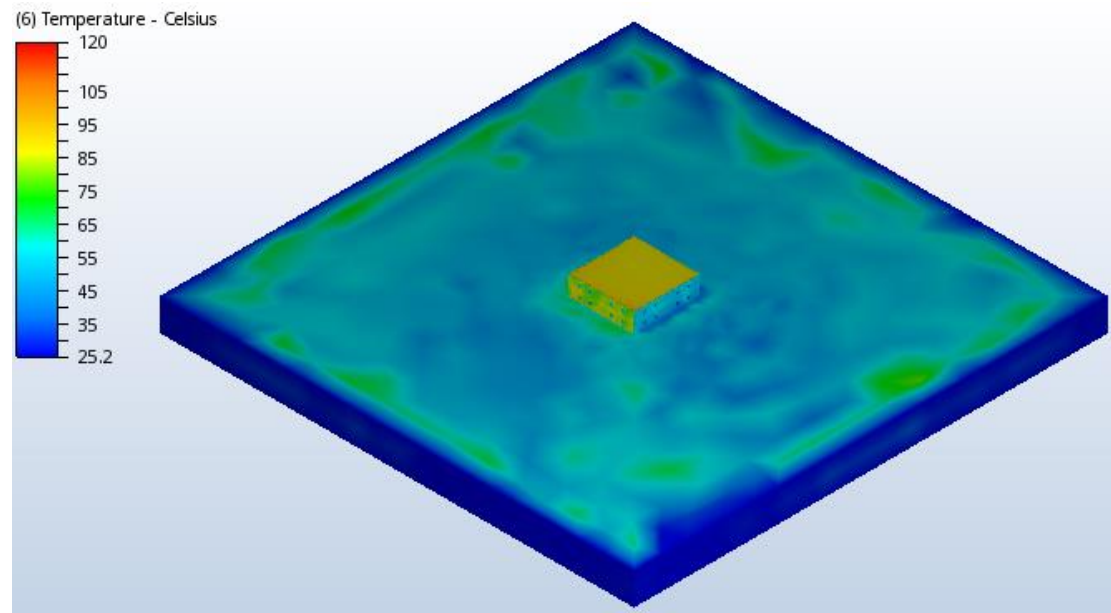
11.1 Painted building without roof



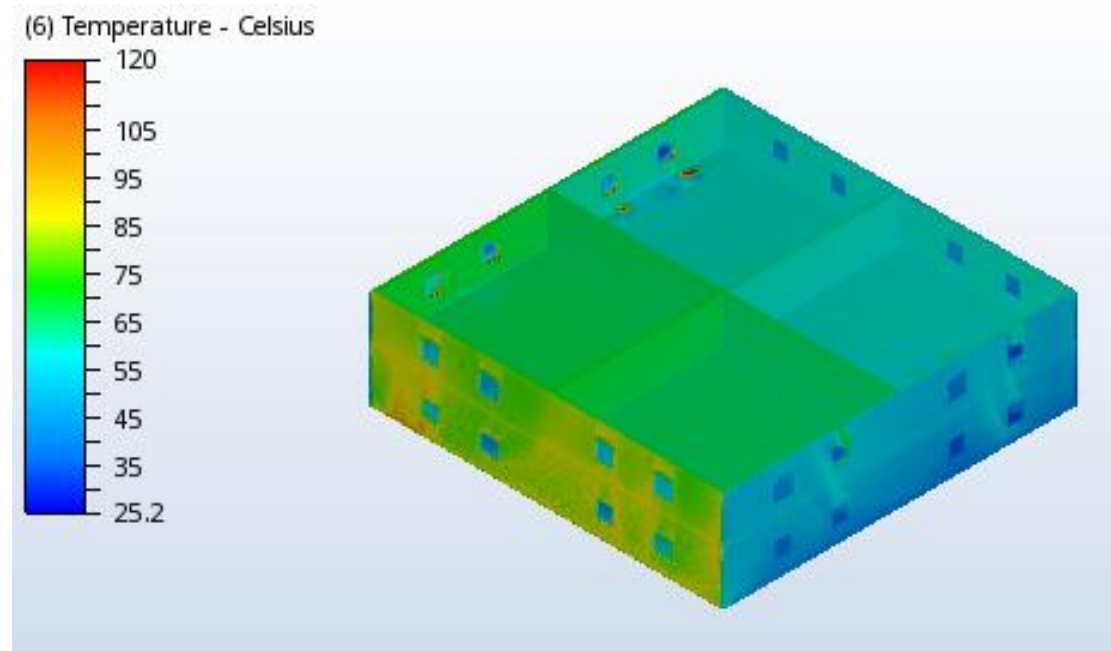
11.2 Painted building , only walls



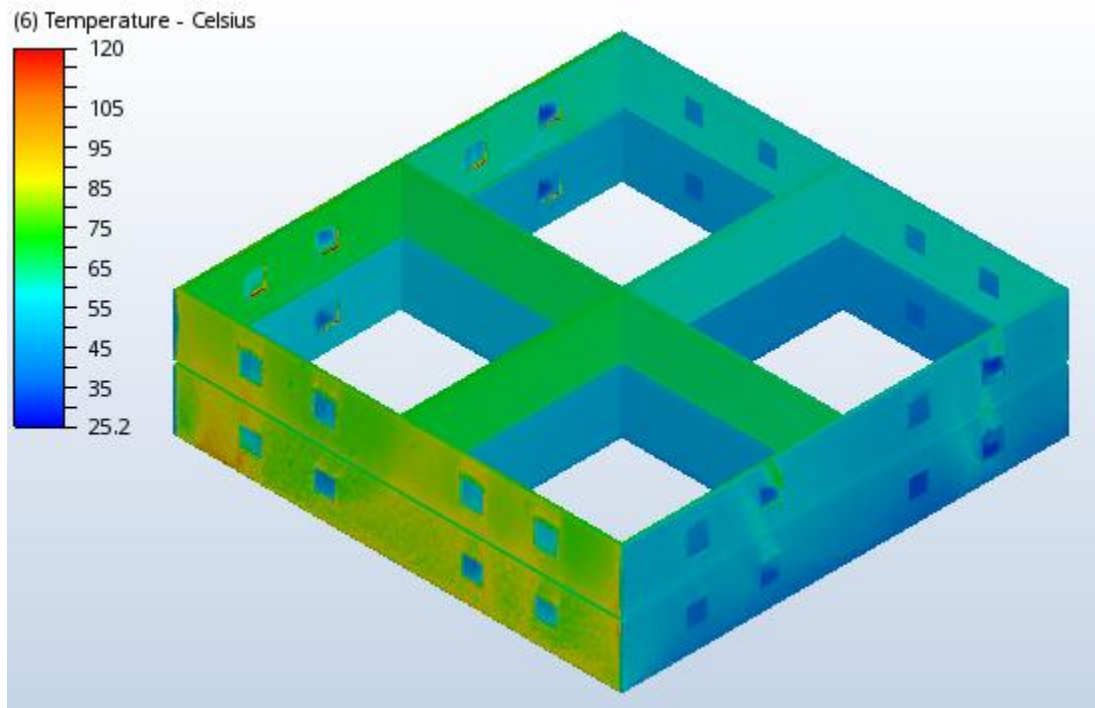
11.1 Itung building general view



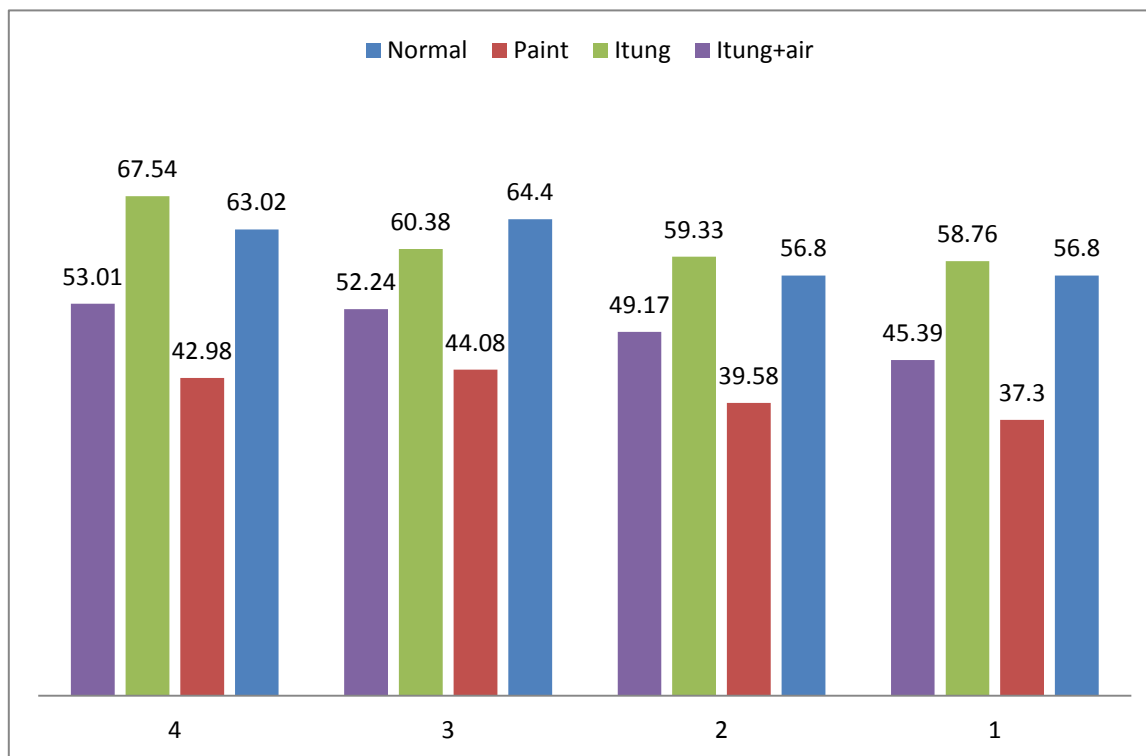
11.2 Itung building without roof



11.3 Itung building , only walls



11.4 Comparison between the 4 Scenarios in the same apartment per tower.



Conclusions:

The effect of paint in all floors and all apartments is well marked.

It is vary per floor and direction to the sun.

1 Air circulation/per hour effect is about 10C

The effect of color on the lower floors is higher due to ground reflection.

While the apartment is facing the wall to the sun the impact is bigger.

As side effect in painted buildings, due to smaller difference between the comfort temperature and the actual temperature there is less moisture inside the building walls, reduce Fungi / mold initially bad smell.

Less weight on the wall, May use thin normal plaster + paint rather than thick thermal plaster.

12 Annexes

- 1) Calculation of the heat coefficient
- 2) Calculation of the heat coefficient interior2
- 3) ECO-Label- Zertifikat (dt,eg,fr)
- 4) ESP fire behaviour test A2
- 5) Measuring the IR-reflective Properties of MIG-ESP
- 6) Reflection test ICT eng.
- 7) UV Test Report 130608