



Title: Comfort’s evolution analysis of low-cost housing in Ciudad Valles, S.L.P.

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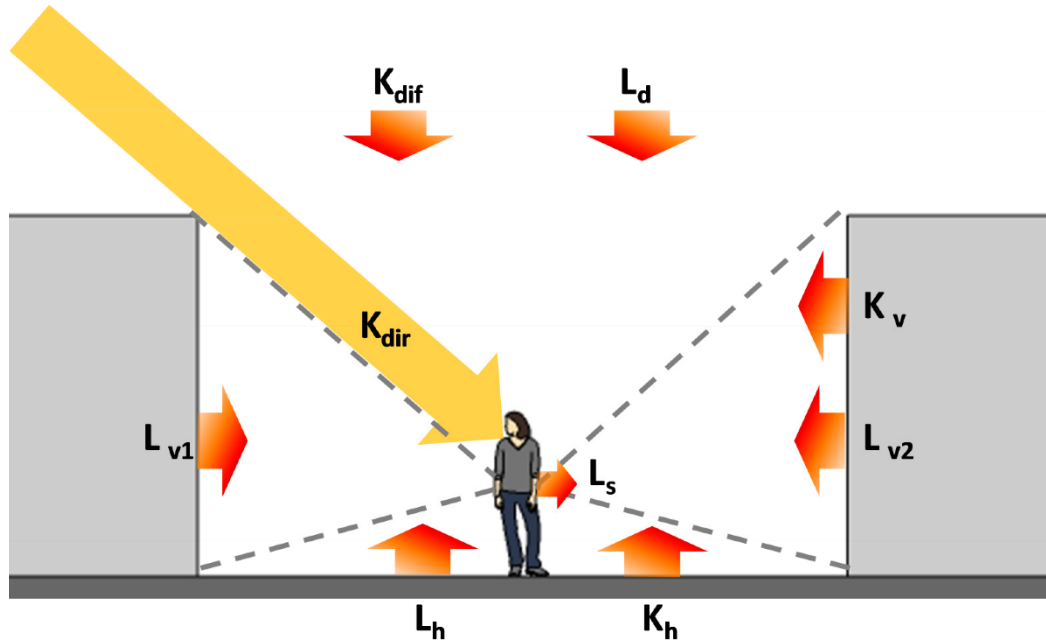
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Introduction.

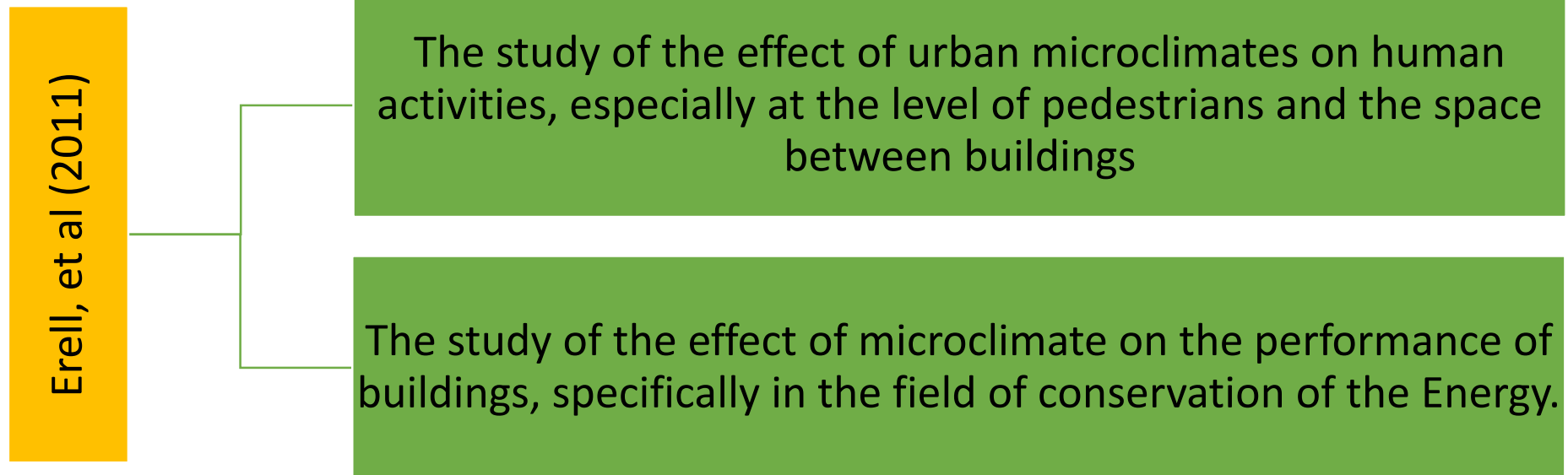
It is common to find environments created by man who are worse than the natural environment, this contrasts with the role of architecture and urban planning to give a man an environment according to his needs. A new architecture and good urban planning must necessarily relate man, architecture, and climate, achieving a conciliation between them. (Álvarez, 2004).

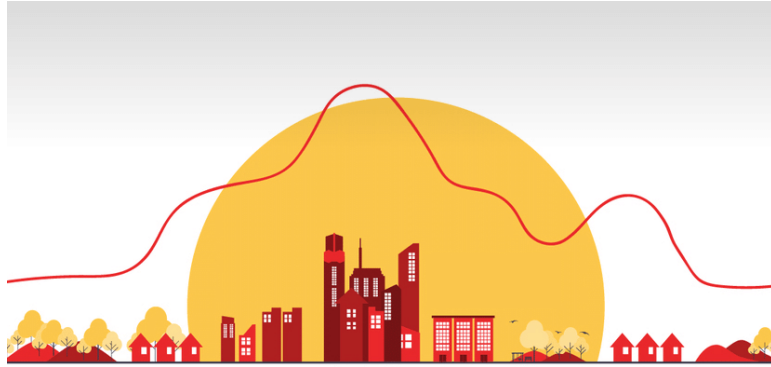




The applications of thermal comfort indicators in urban and regional planning and in urban design continue to be primary in developing countries, despite strong empirical evidence of the benefits provided by urban afforestation strategies, furniture, and urban morphology to the improvement of local and regional climatic conditions (Tornero et al, 2006).

Areas of study on urban microclimate's



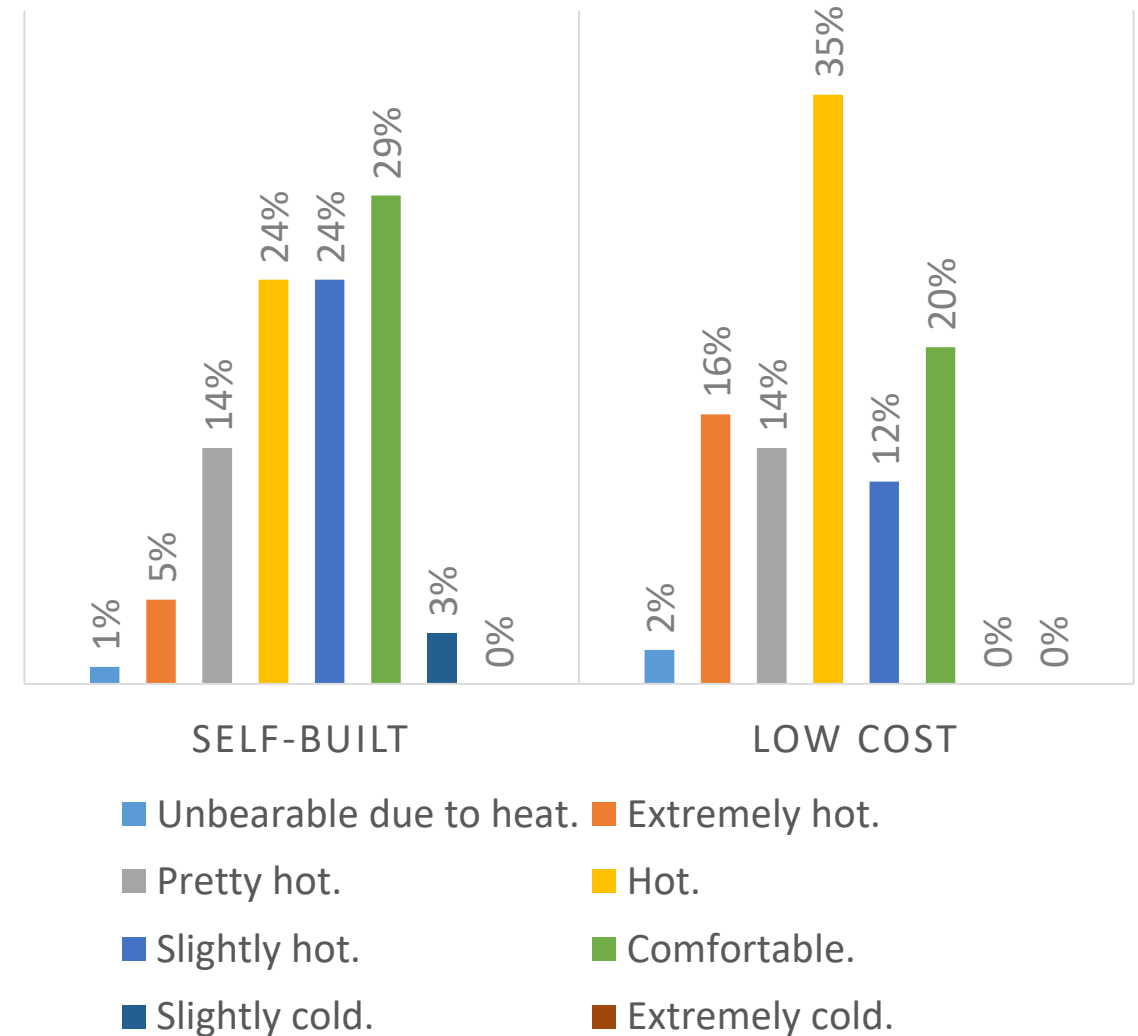


Regarding the first area, Erell (op. Cit.), points out that the conformation of urban fabrics and the climate created by them, influences how these spaces are used; for example, when it is desired that there is a greater pedestrian appropriation of the city, optimal external conditions of comfort must be created for this appropriation to occur. As an effect of the creation of climatically comfortable public spaces and their citizen appropriation, for example, a reduction in energy consumption can be expected by relying less on mechanical systems in homes, simply put, by spending more time in public space Household thermal conditioning systems are used less (Erell et al, 2011; p142).

While in the second area, the effect of the urban climate on the energy consumption of buildings is widely recognized, thus, for example, it has been shown that the increase in energy demand reaches significant levels in periods of extreme temperatures, thus it is associated that energy demand to achieve comfort levels inside buildings is directly correlated with outside temperatures (Santamouris et al, 2001).



The micro-urban-architectural-environmental scale of the study allows us to analyze the thermal process that social interest housing goes through to expose the lack and need for advances, research and studies on the construction materials used in mass building., as are the subdivisions of the public or private sector, where they prioritize urban growth over bioclimatic urban development, which contributes to the quality of life and comfort of the user.



Analysis of the climatic conditions of Ciudad Valles, S.L.P.

Hour	Months of the year.											
	E	F	M	A	M	J	J	A	S	O	N	D
01:00	Red	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Blue
02:00	Red	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Blue
03:00	Red	Blue	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Red
04:00	Red	Red	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Red
05:00	Red	Red	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Red
06:00	Red	Red	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Red
07:00	Red	Red	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Red
08:00	Red	Blue	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Red
09:00	Blue	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Blue
10:00	Blue	Gray	Yellow	Yellow	Yellow	Red	Red	Red	Yellow	Yellow	Yellow	Blue
11:00	Gray	Gray	Yellow	Yellow	Red	Red	Red	Red	Yellow	Yellow	Yellow	Gray
12:00	Gray	Gray	Yellow	Yellow	Red	Red	Red	Red	Yellow	Yellow	Yellow	Gray
13:00	Gray	Gray	Yellow	Orange	Red	Red	Red	Red	Yellow	Yellow	Yellow	Gray
14:00	Gray	Yellow	Yellow	Orange	Red	Red	Red	Red	Red	Yellow	Yellow	Gray
15:00	Gray	Gray	Yellow	Orange	Red	Red	Red	Red	Yellow	Yellow	Yellow	Gray
16:00	Gray	Yellow	Yellow	Yellow	Red	Red	Red	Red	Yellow	Yellow	Yellow	Gray
17:00	Gray	Yellow	Yellow	Yellow	Red	Red	Red	Red	Yellow	Yellow	Yellow	Gray
18:00	Blue	Yellow	Yellow	Yellow	Red	Red	Red	Red	Yellow	Yellow	Yellow	Blue
19:00	Blue	Blue	Yellow	Yellow	Yellow	Red	Red	Red	Yellow	Yellow	Yellow	Blue
20:00	Blue	Blue	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Blue
21:00	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue
22:00	Blue	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue
23:00	Blue	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue
00:00	Blue	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue

Color Month	Hour	Recommendations
Red May to September.	11:00h to 19:00h	Control of solar radiation, relative humidity and radiant temperature. Mechanical ventilation is required.
Orange April.	13:00h to 15:00h	Control of solar radiation and radiant temperature. Generate wind.
Yellow March to November.	24 hours.	Reduce the relative humidity, the radiant temperature and the solar radiation of the day.
Gray December to January.	11:00h to 17:00h	It is not necessary to intervene while there are solar obstructions.
Gray February.	10:00h a 13:00h	It is not necessary to intervene while there are solar obstructions.
Blue November, December, January and February.	Antes de las 10:00h y despues de las 18:00h	Decrease the wind and increase the radiant temperature.
Purple January, February and December.	3:00h a 8:00h	Increase radiant temperature.

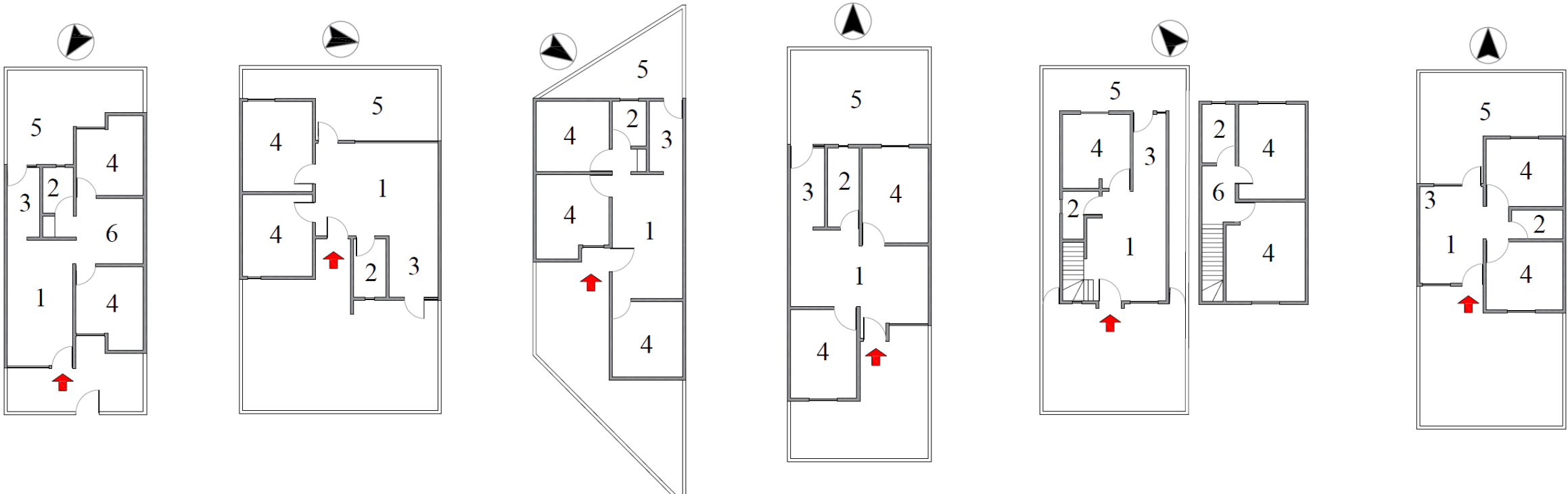
**Characteristics of the series
housing studied in Ciudad Valles,
S.L.P.**



Study cases

Case	Year	Geographical location	Orientation	Levels
C1	1985	22°0'51.93"N 99° 0'20.76"O	NW-SE	1
C2	1987	21°57'33.41"N 98°59'29.19"O	NE-SW	1
C3	1990	21°59'45.55"N 98°59'25.89"O	NE-SW	1
C4	1997	22°1'43.53"N 99°1'29.85"O	N-S	1
C5	2006	22°0'37.07"N 98°59'51.95"O	NE-SW	2
C6	2008	22°1'31.61"N 99°1'19.22"O	N-S	1

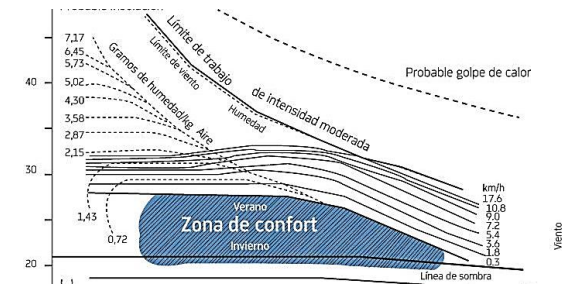
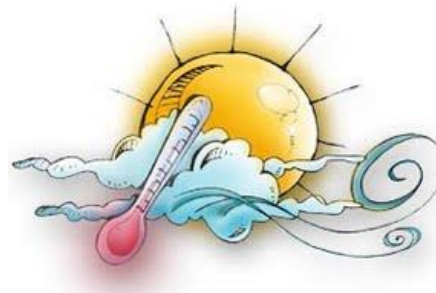
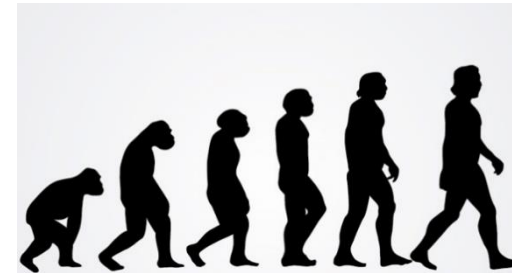
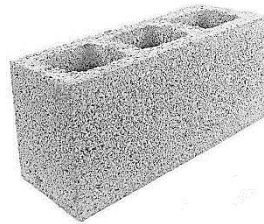
House layouts



1. Living room and Dining room.
2. Bathroom.
3. Kitchen.

4. Bedroom.
5. Service yard.
6. Lobby.

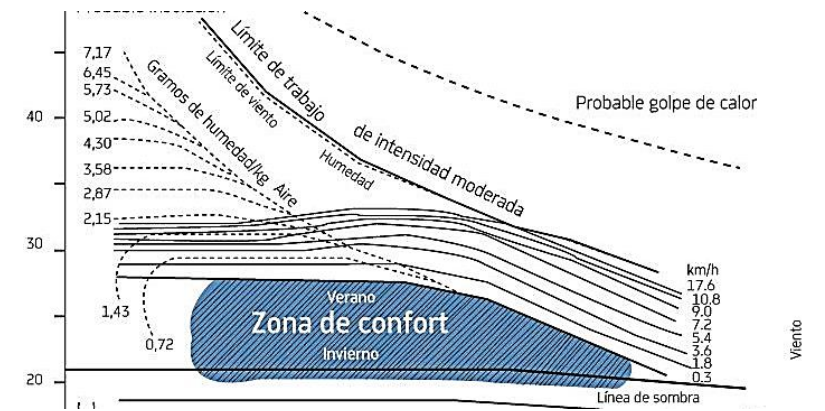
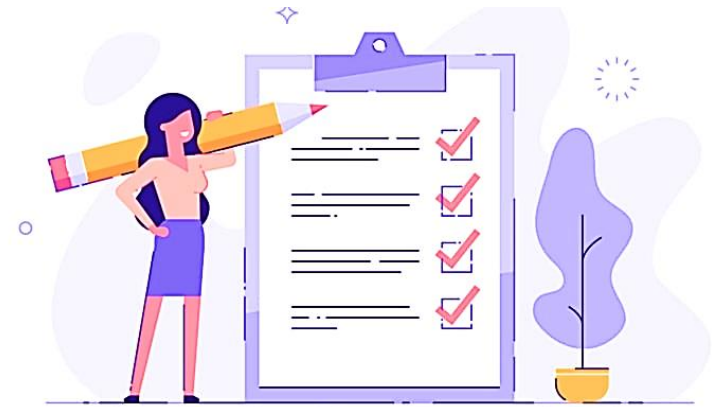
Objective.



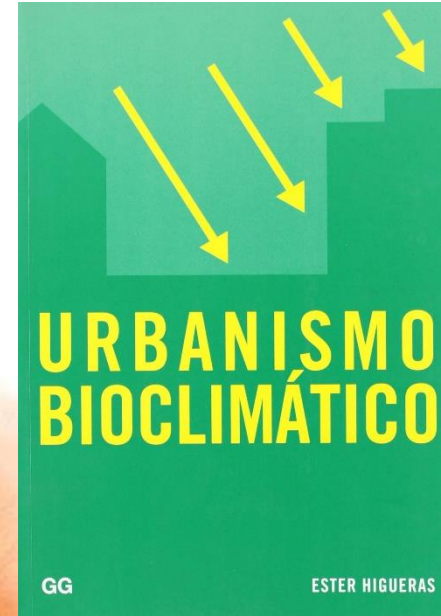
Specific objectives.



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Hypothesis.

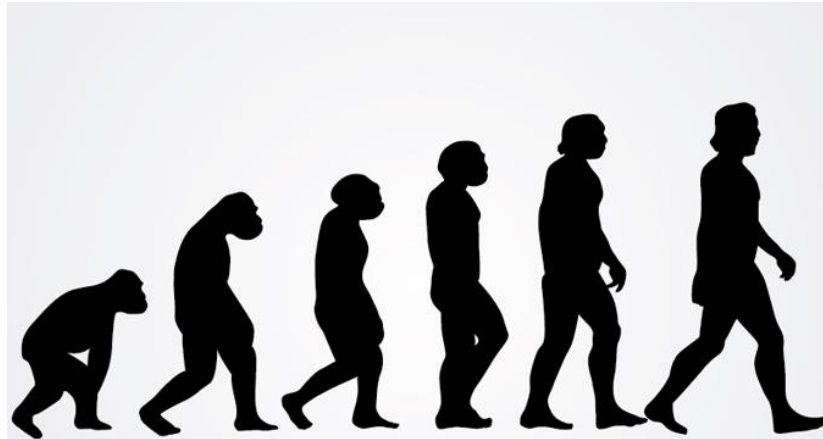


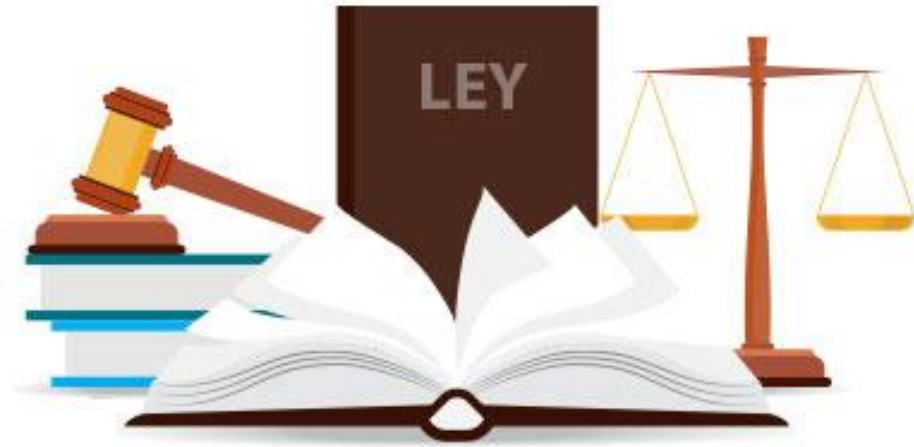
Problematic.





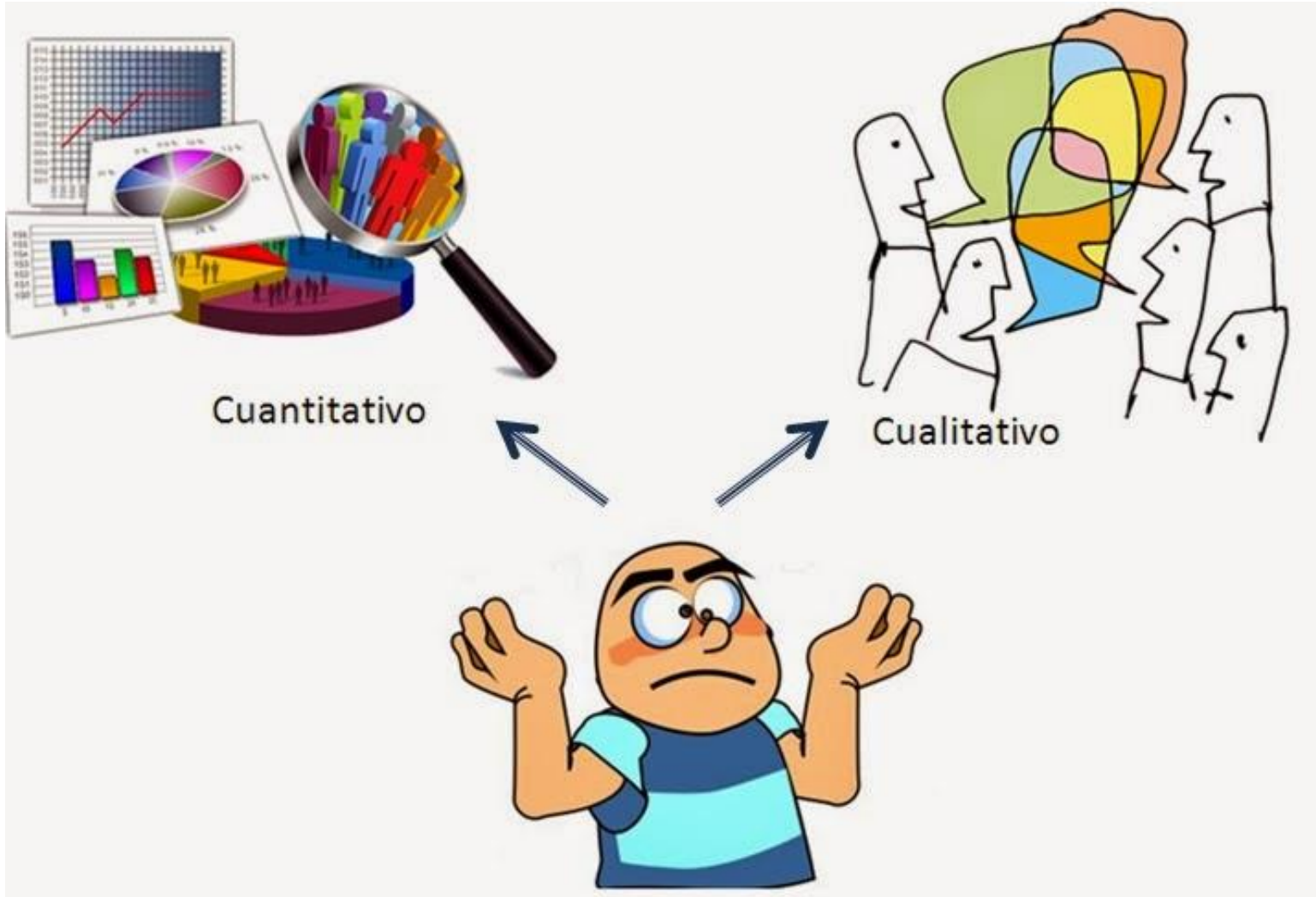
Justification



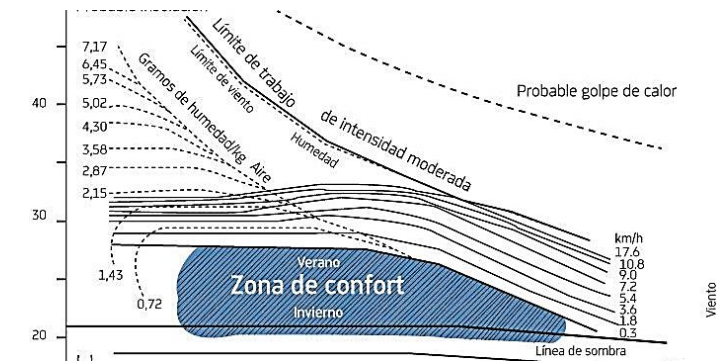


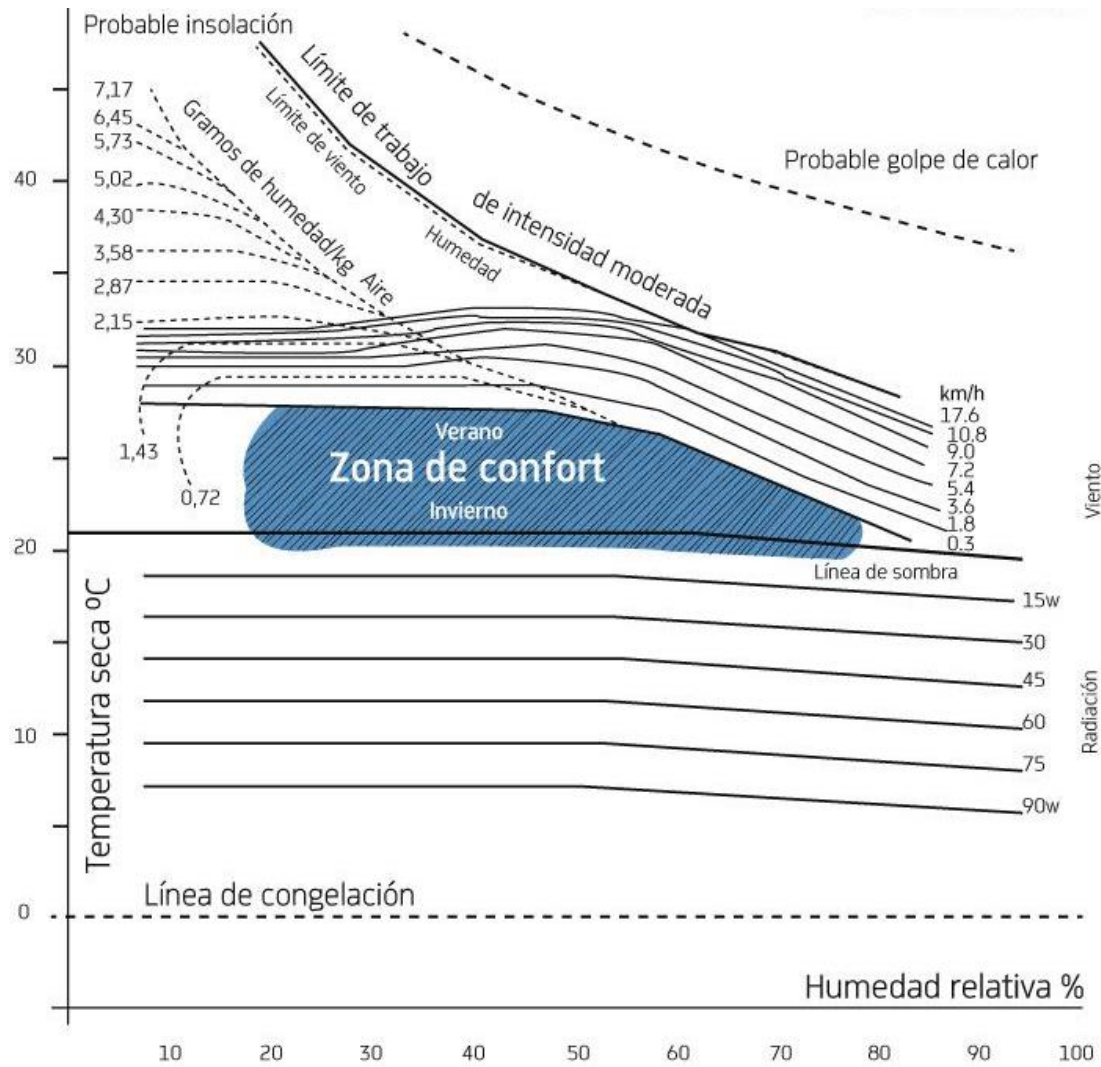


F o c u s .

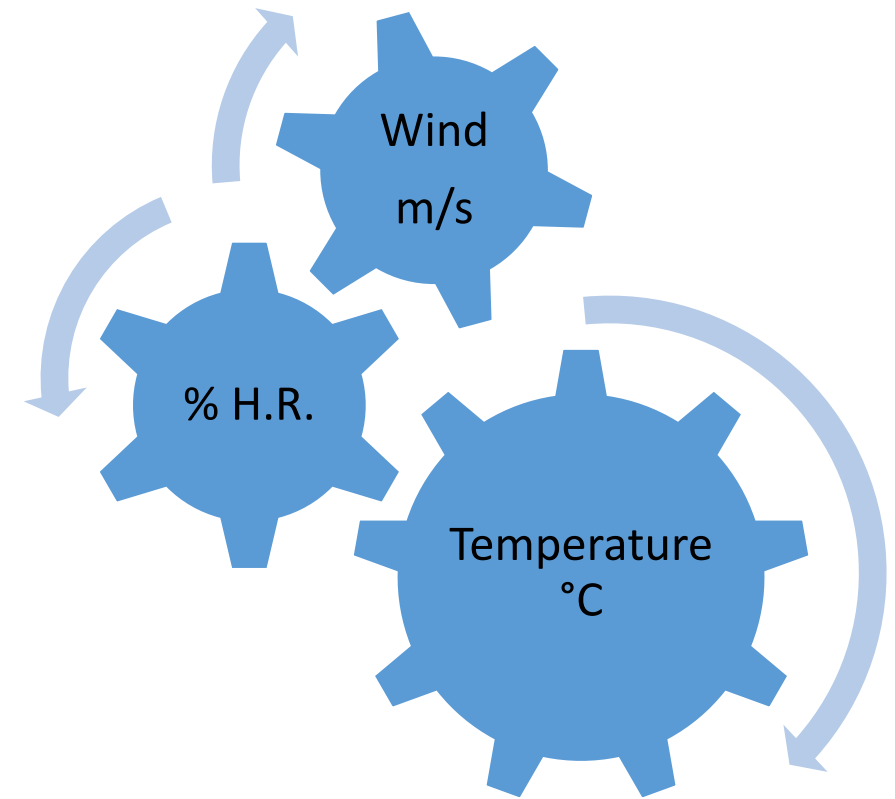


Materials and methods.



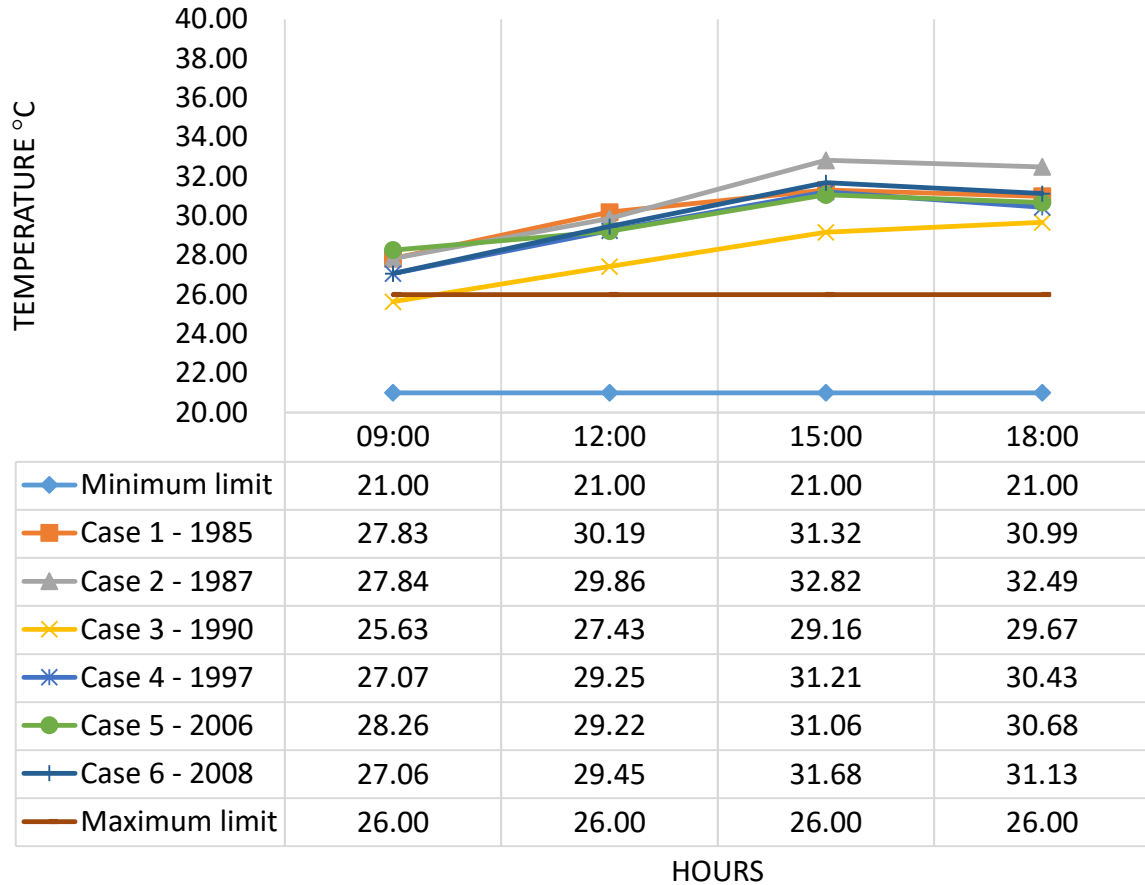


Hygrothermal environment



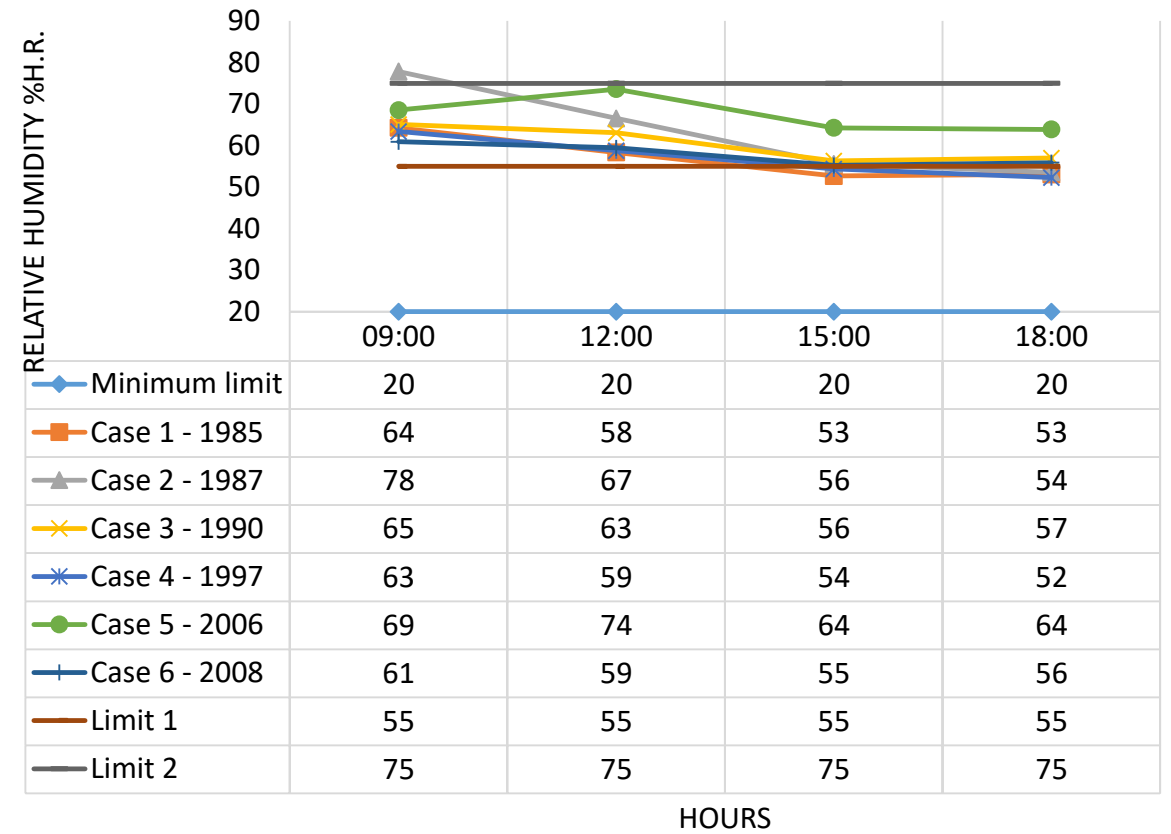
Results.

INDOOR AIR TEMPERATURES.



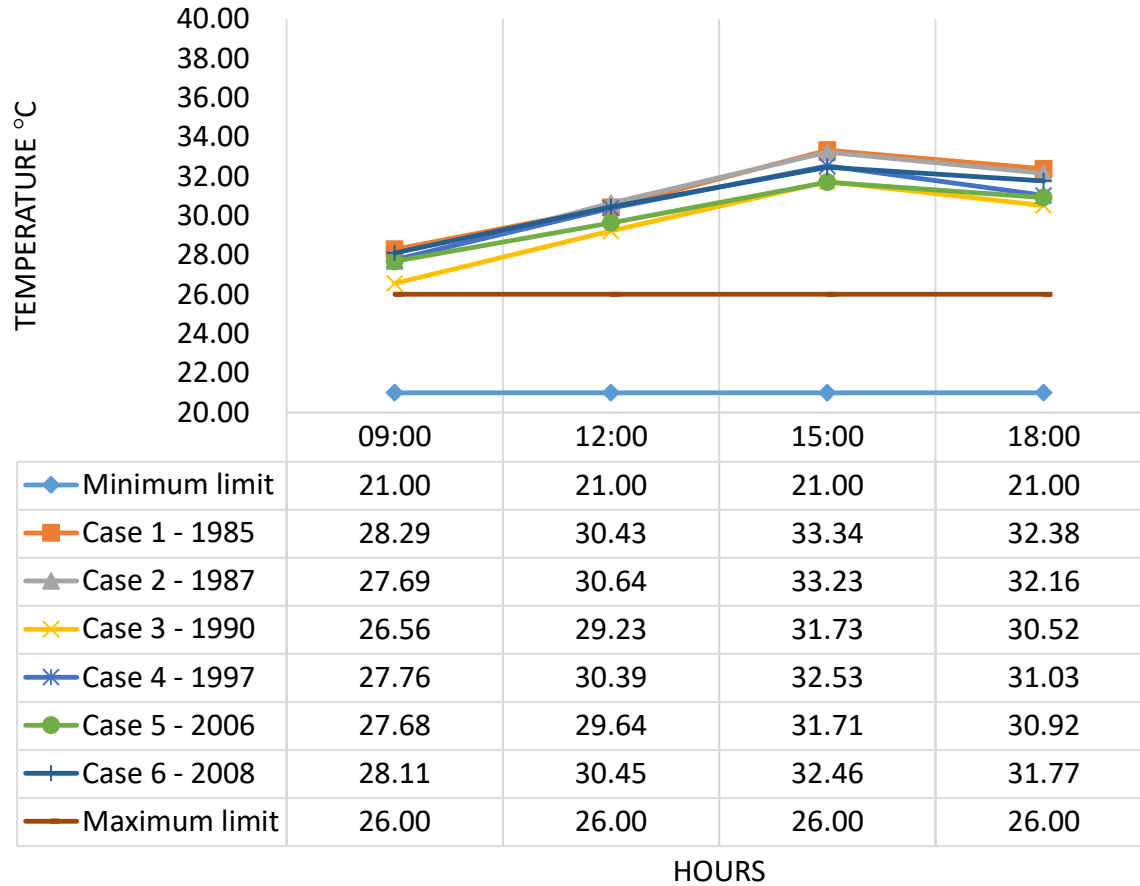
◆ Minimum limit ■ Case 1 - 1985 ▲ Case 2 - 1987 ✕ Case 3 - 1990
✱ Case 4 - 1997 ● Case 5 - 2006 ⊕ Case 6 - 2008 — Maximum limit

RELATIVE HUMIDITY OF INDOOR AIR.

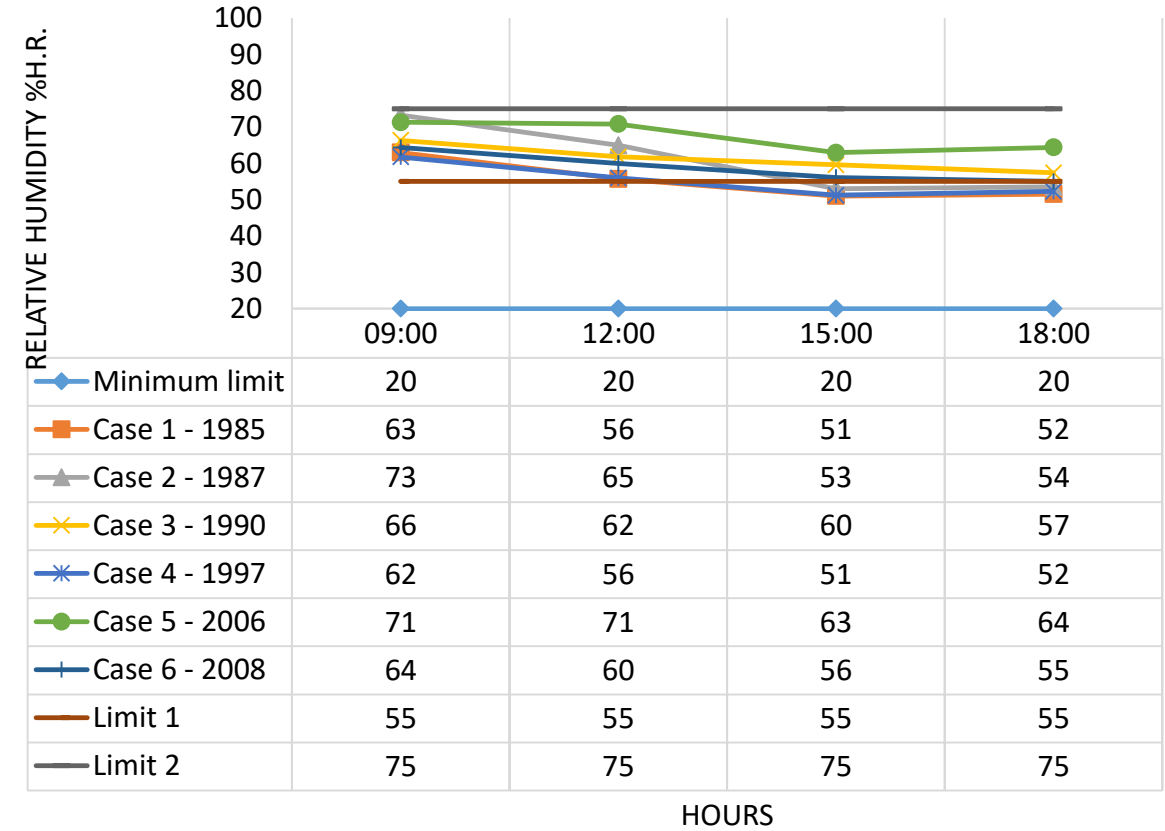


◆ Minimum limit ■ Case 1 - 1985 ▲ Case 2 - 1987
✕ Case 3 - 1990 ✱ Case 4 - 1997 ● Case 5 - 2006
⊕ Case 6 - 2008 — Limit 1 — Limit 2

OUTDOOR AIR TEMPERATURES.



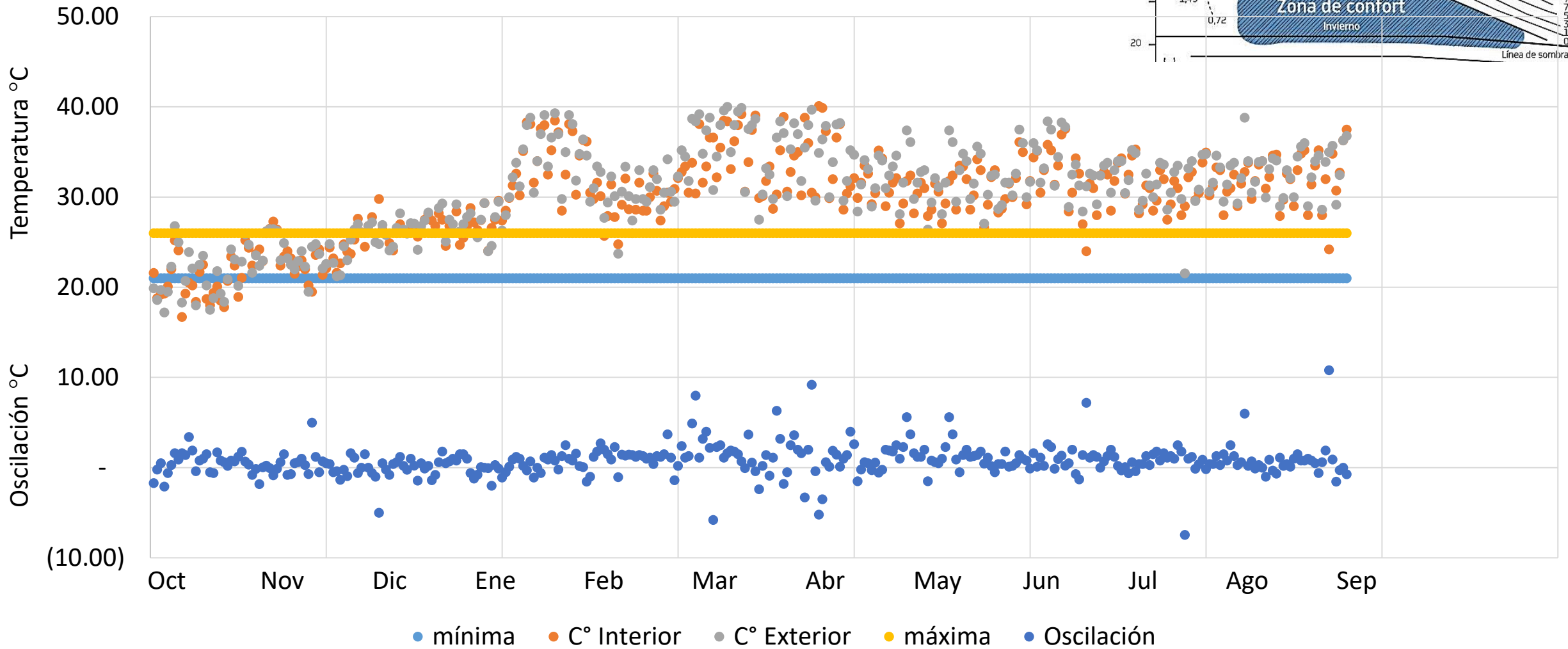
RELATIVE HUMIDITY OF THE OUTSIDE AIR.



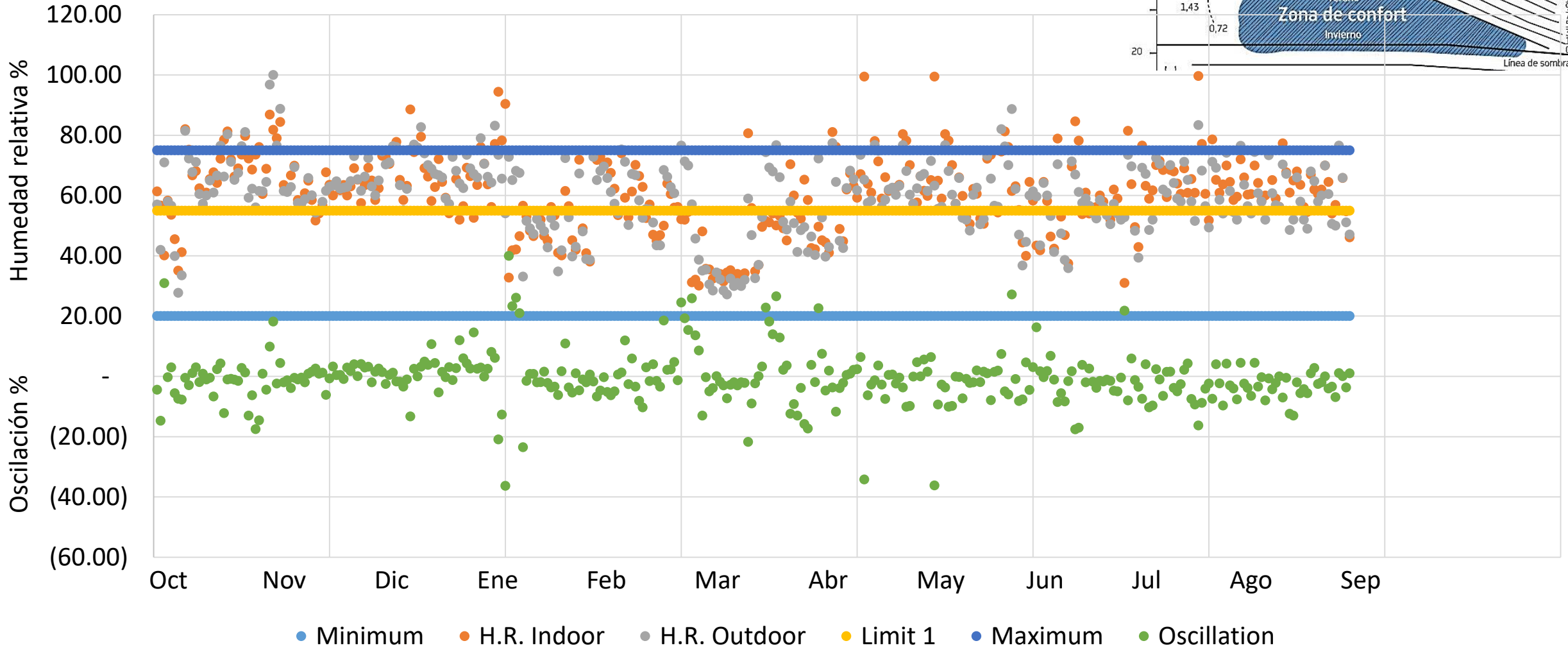
◆ Minimum limit ■ Case 1 - 1985 ▲ Case 2 - 1987 ✕ Case 3 - 1990
✱ Case 4 - 1997 ● Case 5 - 2006 ⊕ Case 6 - 2008 — Maximum limit

◆ Minimum limit ■ Case 1 - 1985 ▲ Case 2 - 1987
✕ Case 3 - 1990 ✱ Case 4 - 1997 ● Case 5 - 2006
⊕ Case 6 - 2008 — Limit 1 — Limit 2

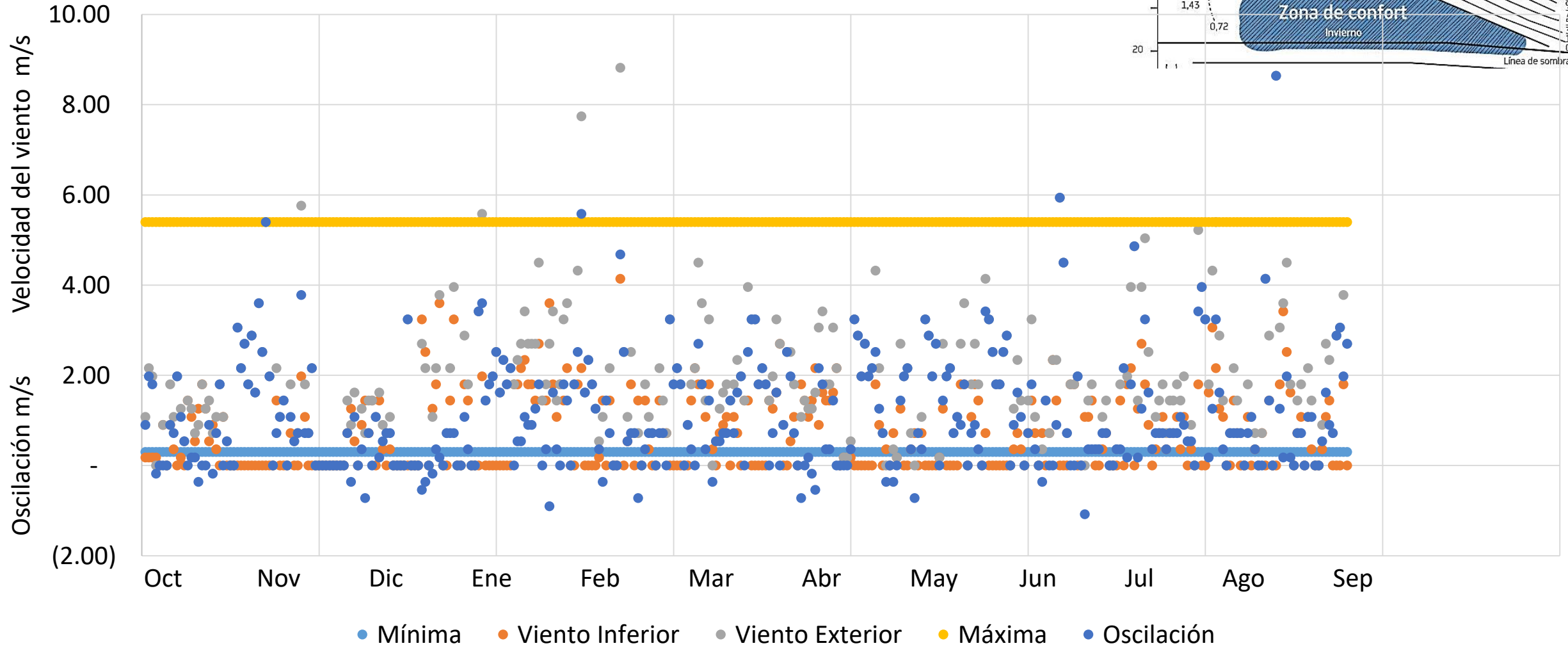
Maximum Temperature Oscillation °C - Indoor vs Outdoor



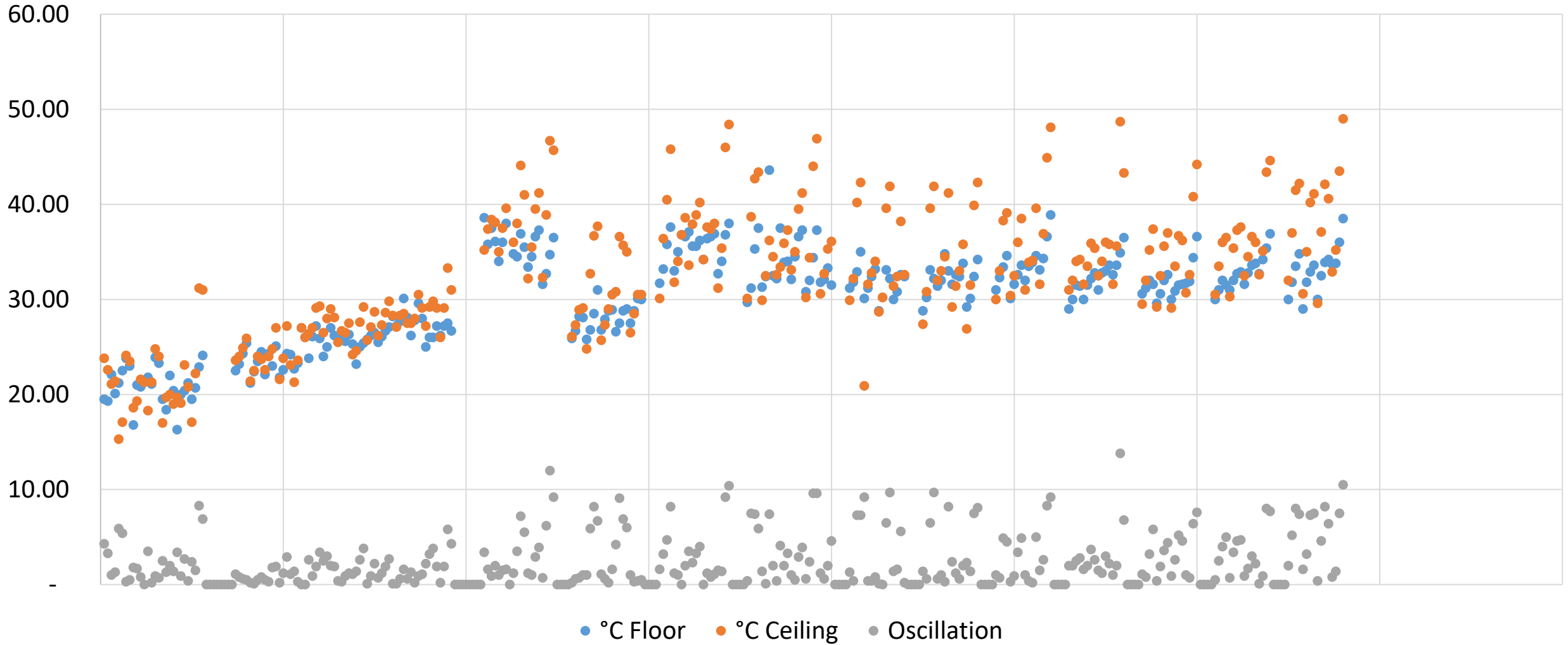
Maximum relative humidity oscillation% Indoor vs Outdoor



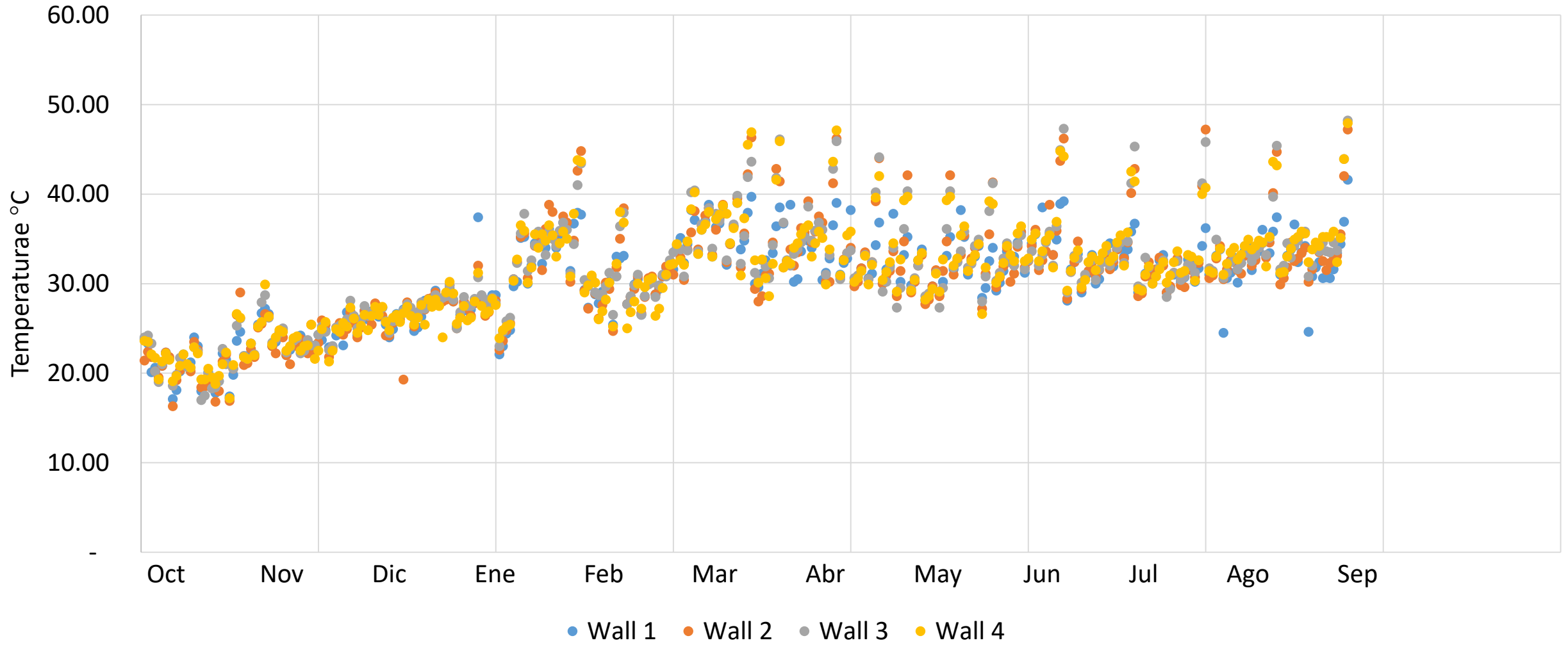
Wind speed oscillation in m/s inside vs outside



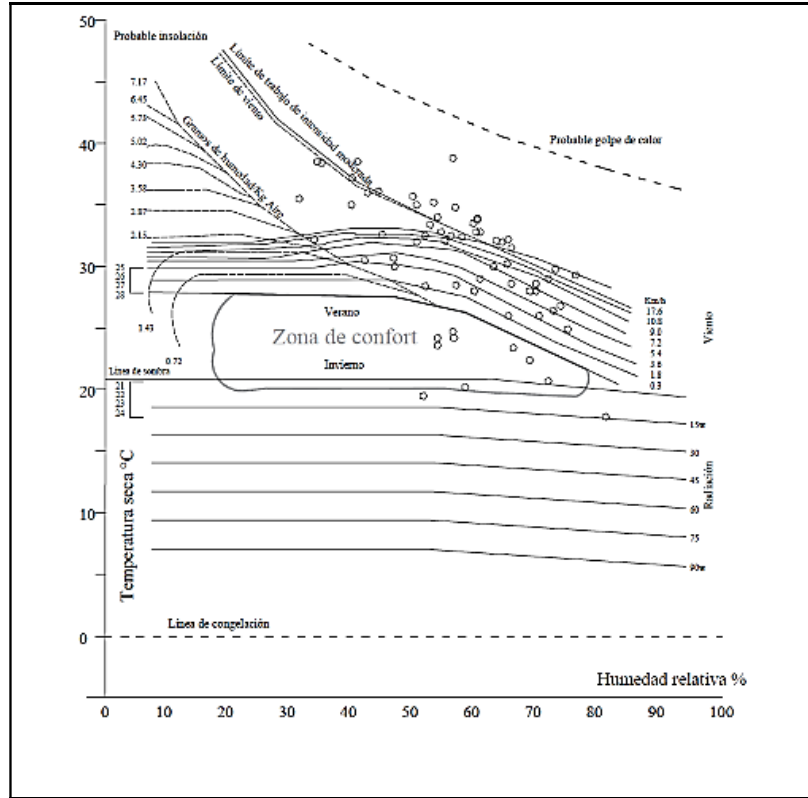
Floor vs roof temperatura oscillation °C (Indoor)



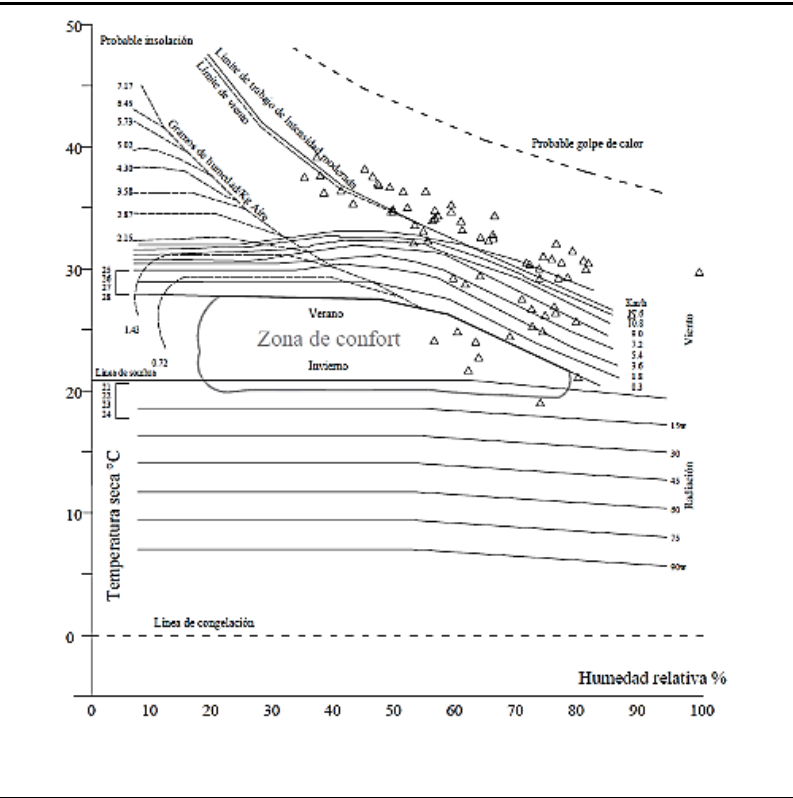
Wall temperature



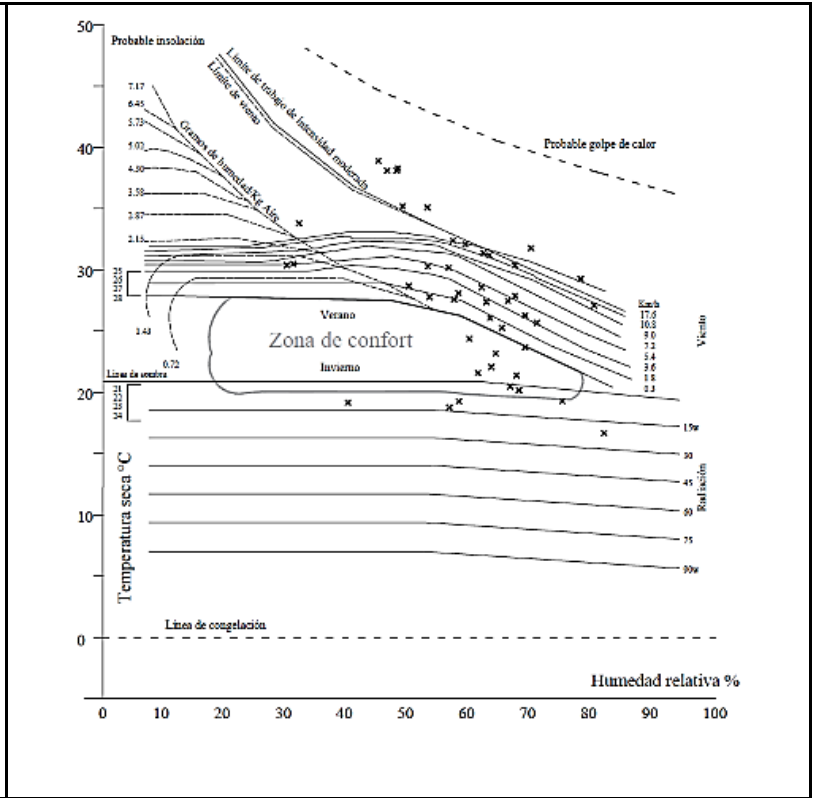
1985



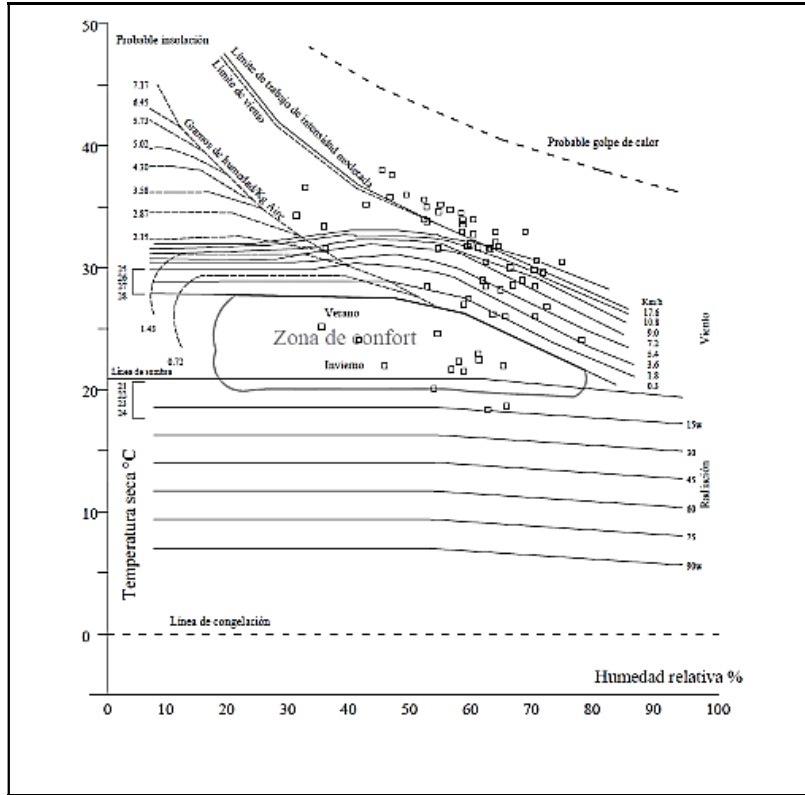
1987



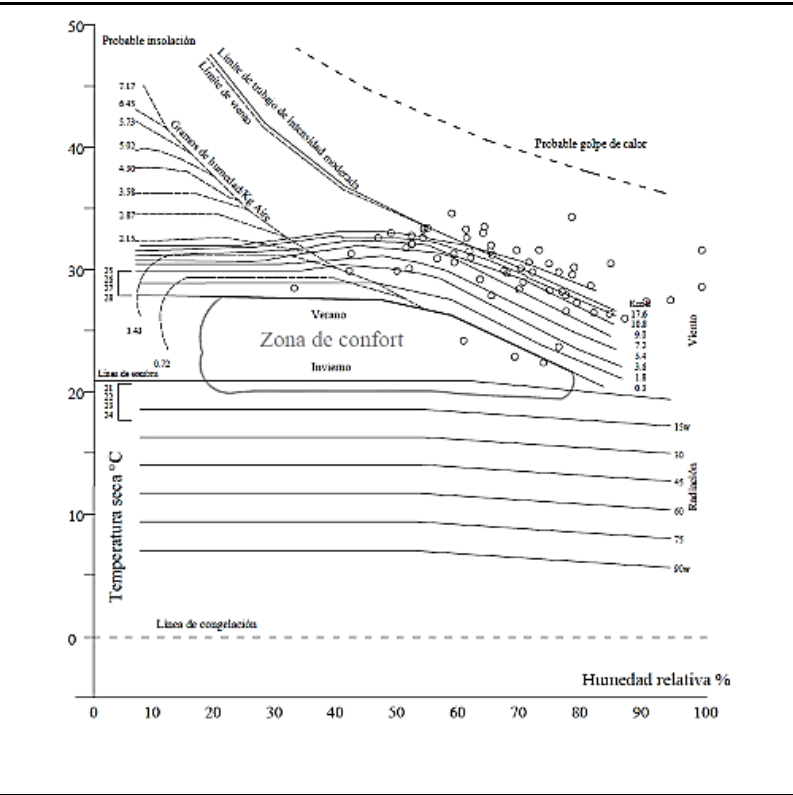
1990



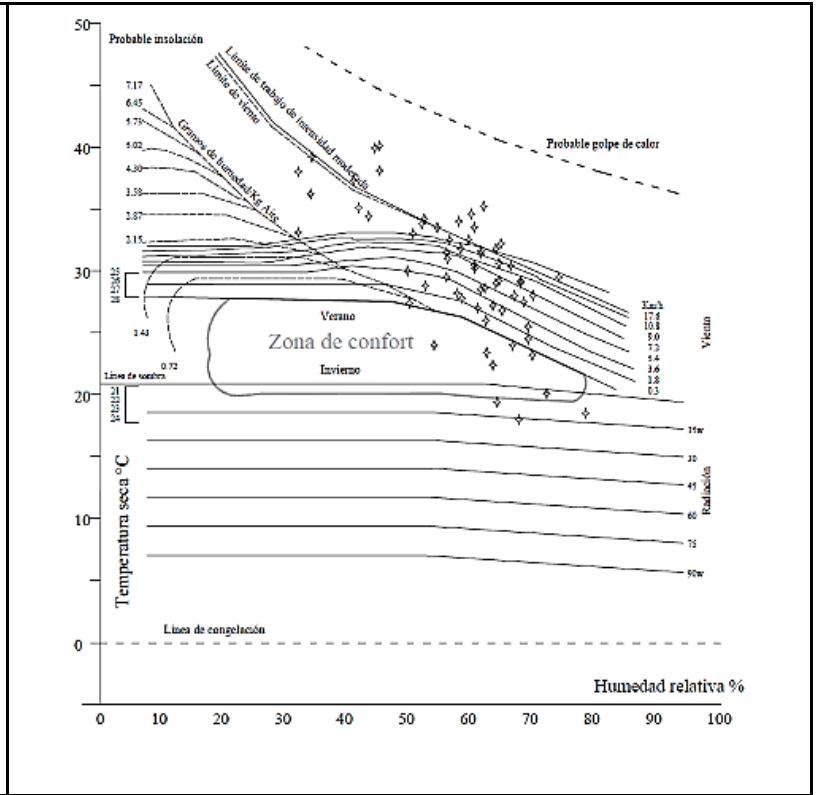
1996



2007



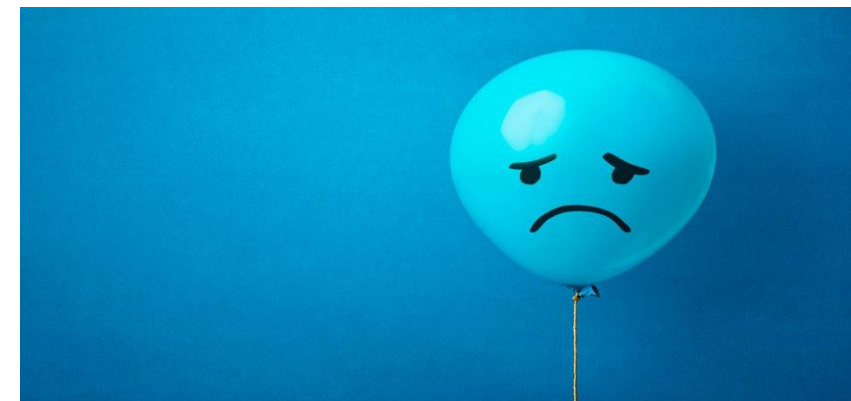
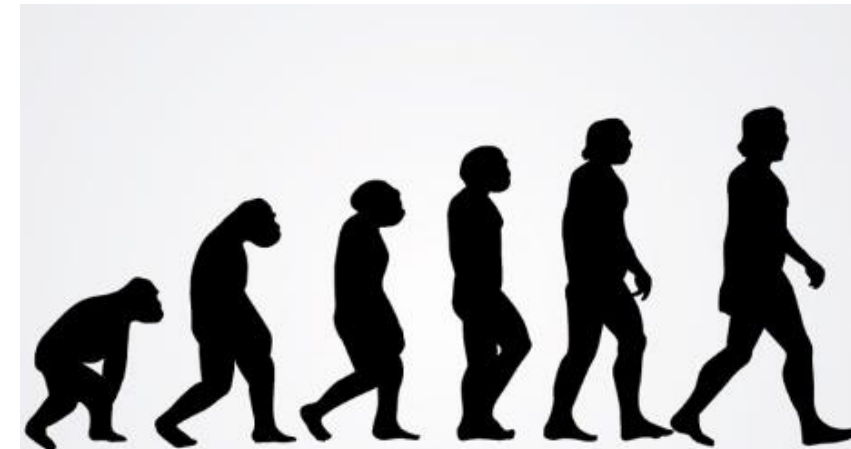
2008

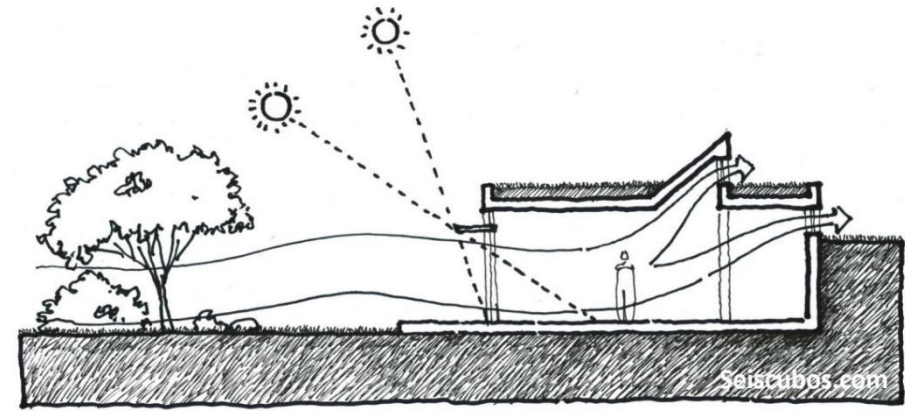
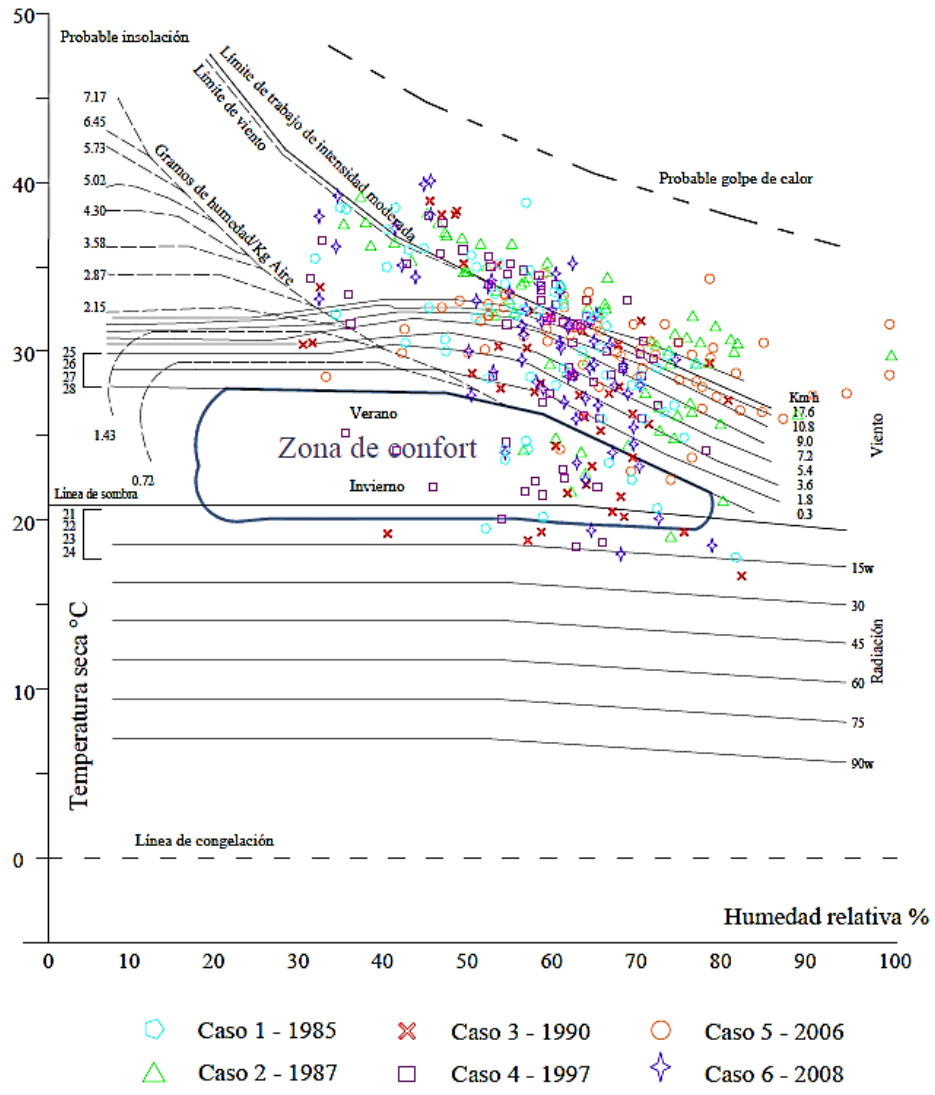


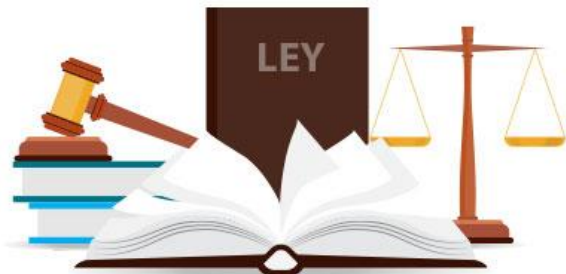
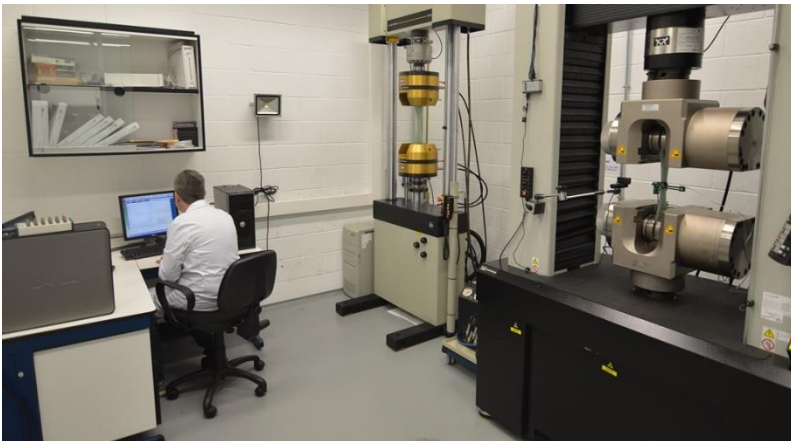
Conclusions.



Case	Building year	Spring	Summer	Autumn	Winter
Case 1	1985	✘	✘	✘	✔ *
Case 2	1987	✘	✘	✘	✔ *
Case 3	1990	✘	✘	✘	✔ *
Case 4	1997	✘	✘	✘	✔ *
Case 5	2006	✘	✘	✘	✔ *
Case 6	2008	✘	✘	✘	✔ *







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