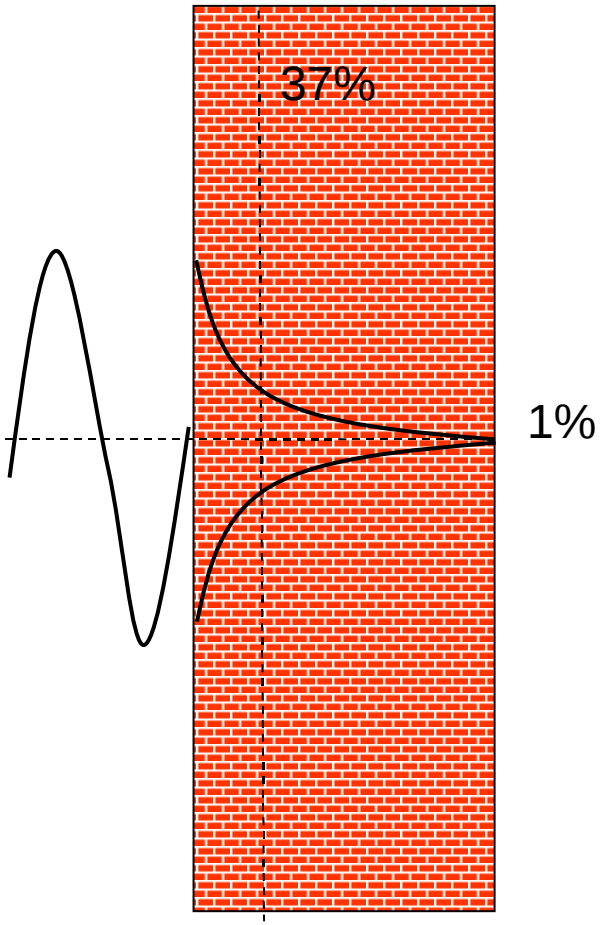
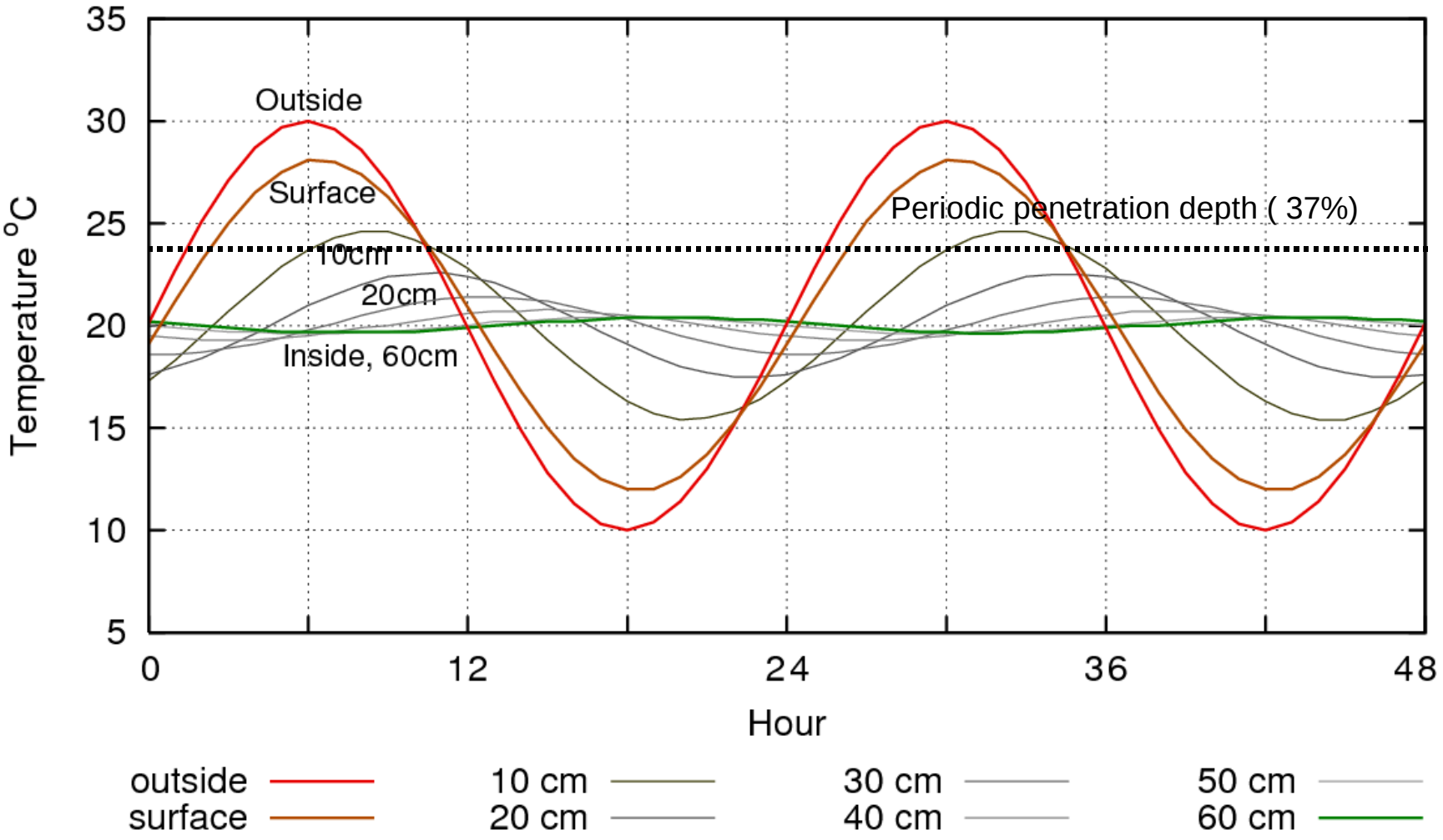
The use of building materials to moderate the climate

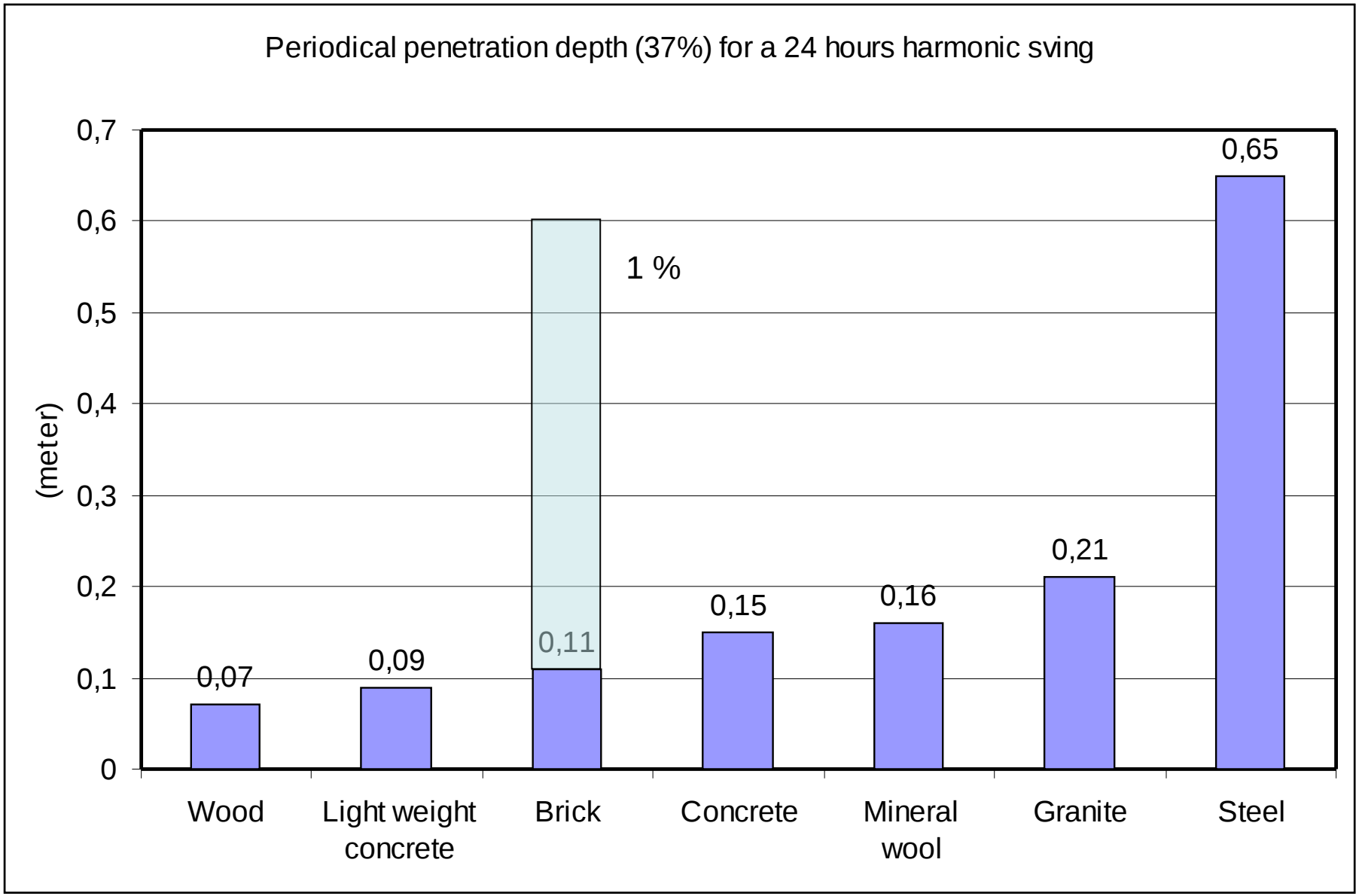
Temperature and humidity buffering

Harmonic cycles



Temperature within a 60 cm thick masonry wall subjected to a daily cycle of 10°C to 30°C

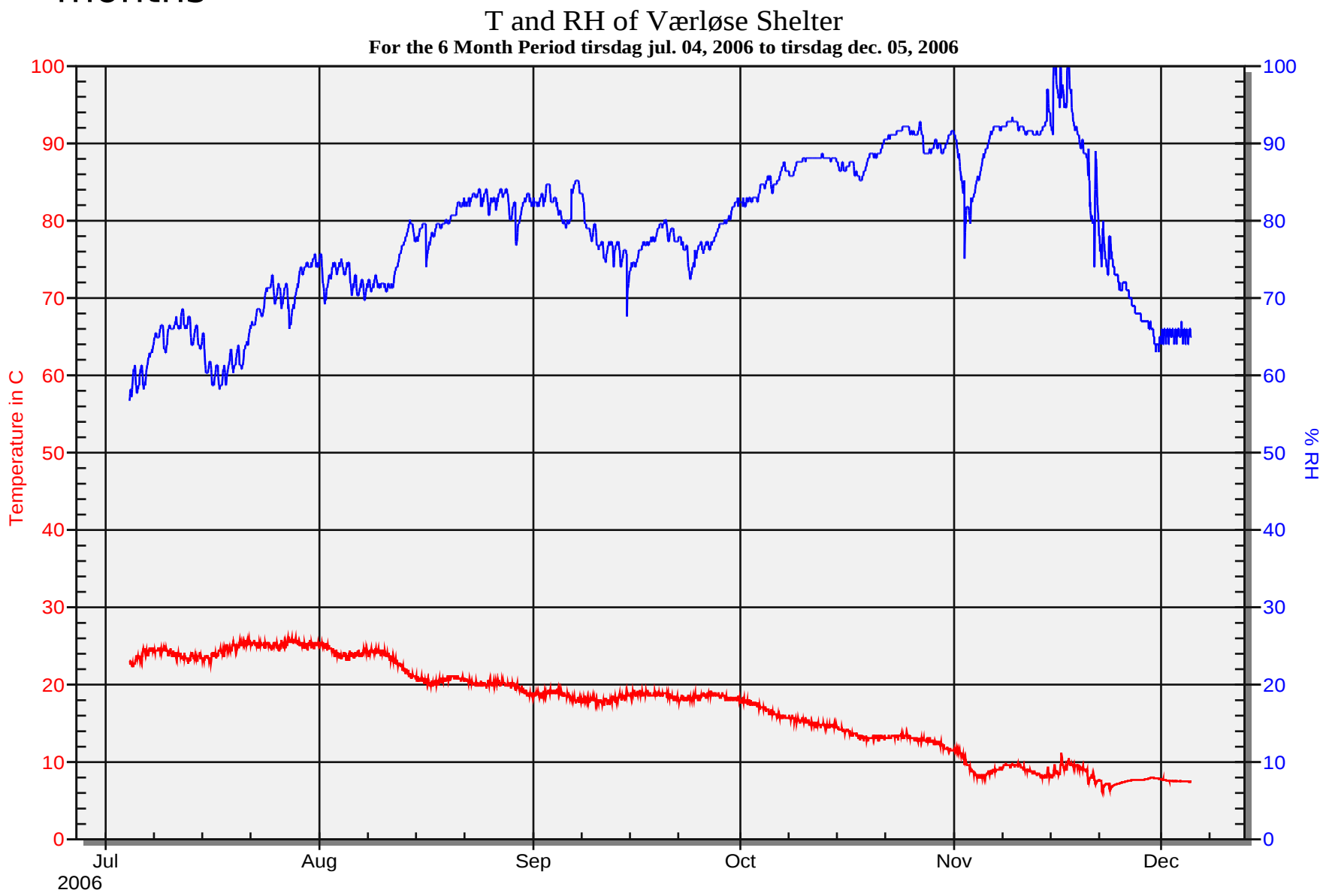



Periodical penetration depth (37%) for a 24 hours harmonic sving
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
(meter)
0,07
0,09
0,11
1 %
0,15
0,16
0,21
0,65
Wood
Light weight concrete
Brick
Concrete
Mineral wool
Granite
Steel

Airforce architecture. A shelter for fighter airplanes at Værløse Airfield.

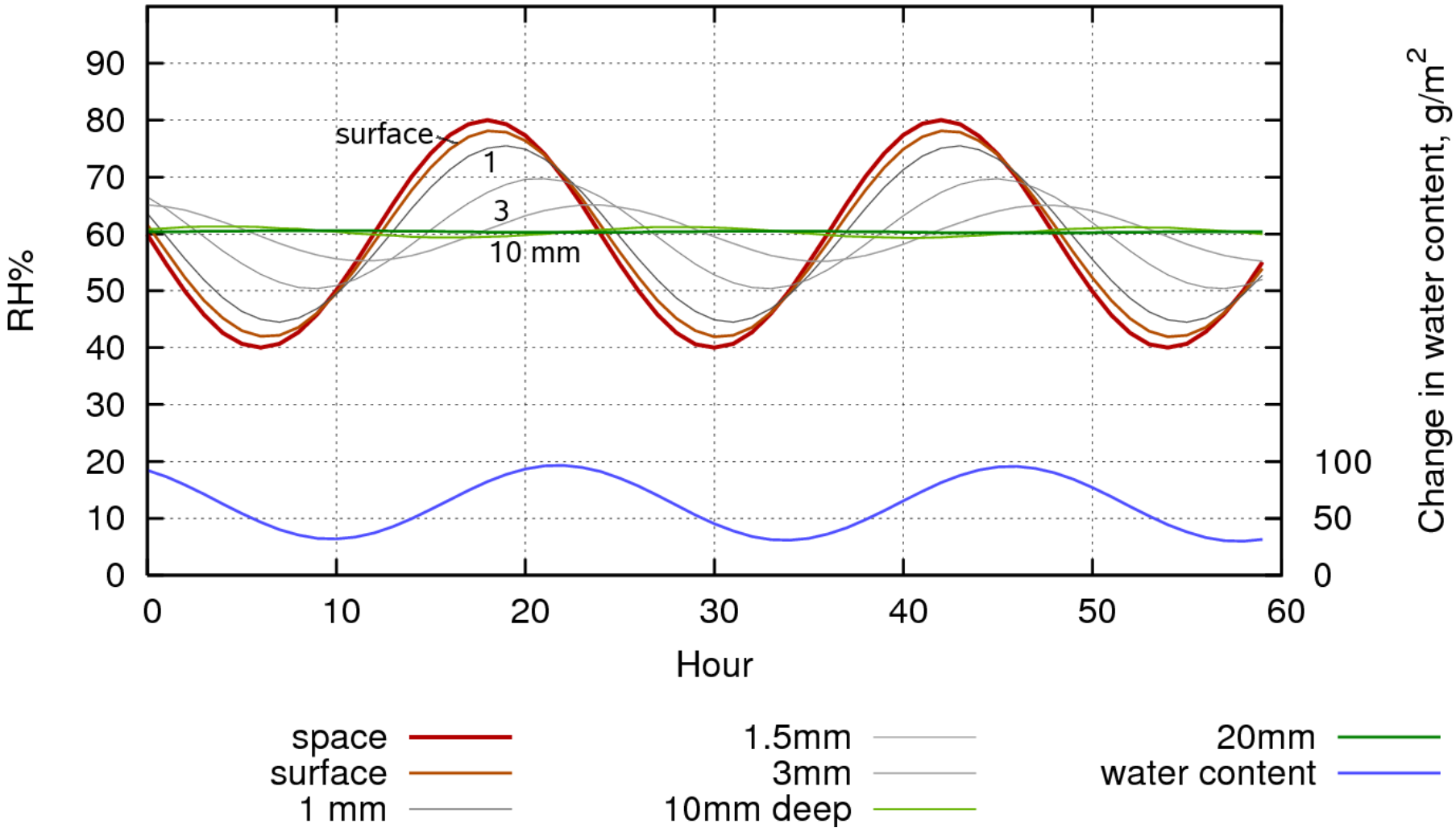
The roof is 50 cm solid concrete covered with plastic paint

The natural climate for a solid concrete structure over six months

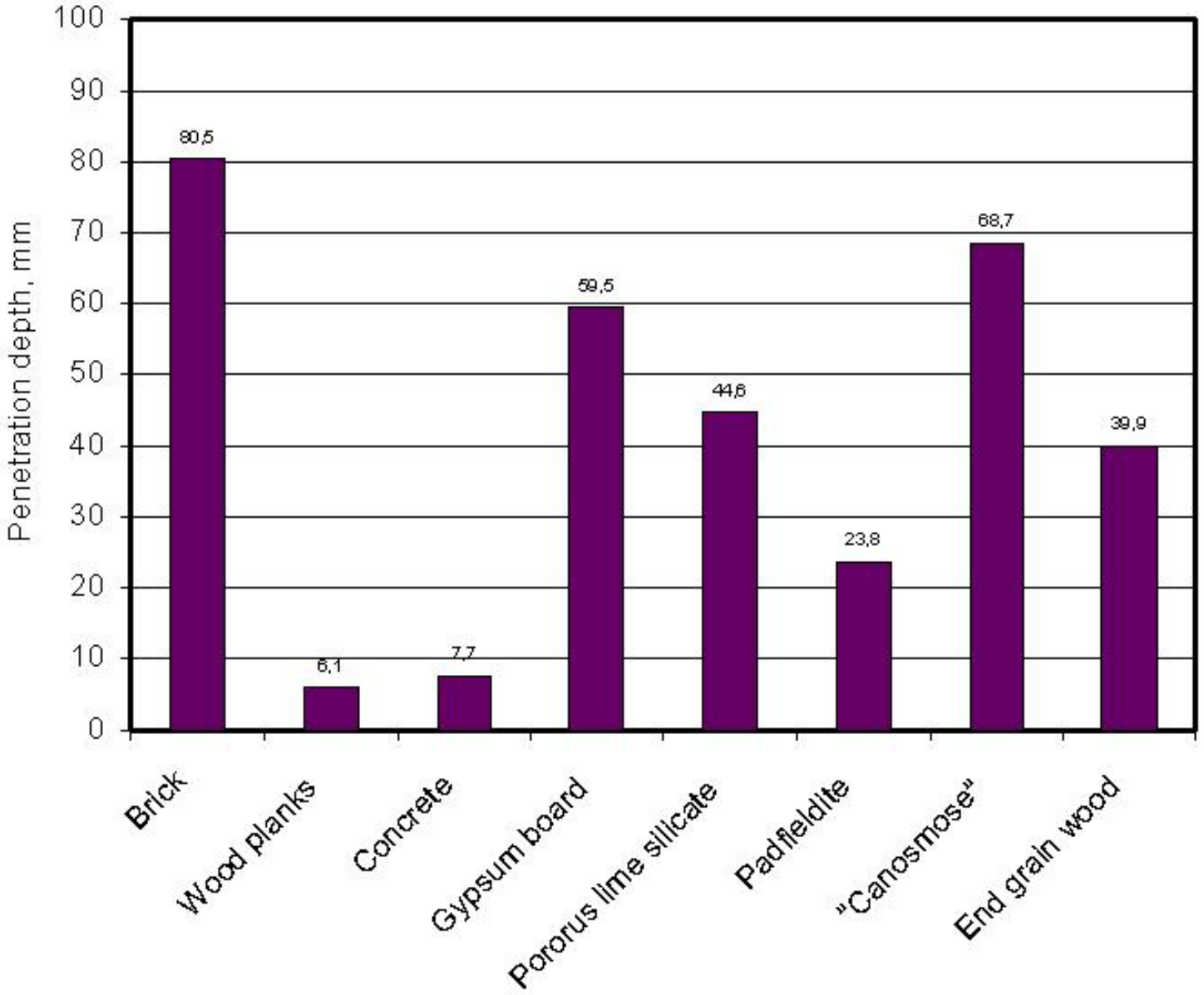


Temporary storage for collection of furniture

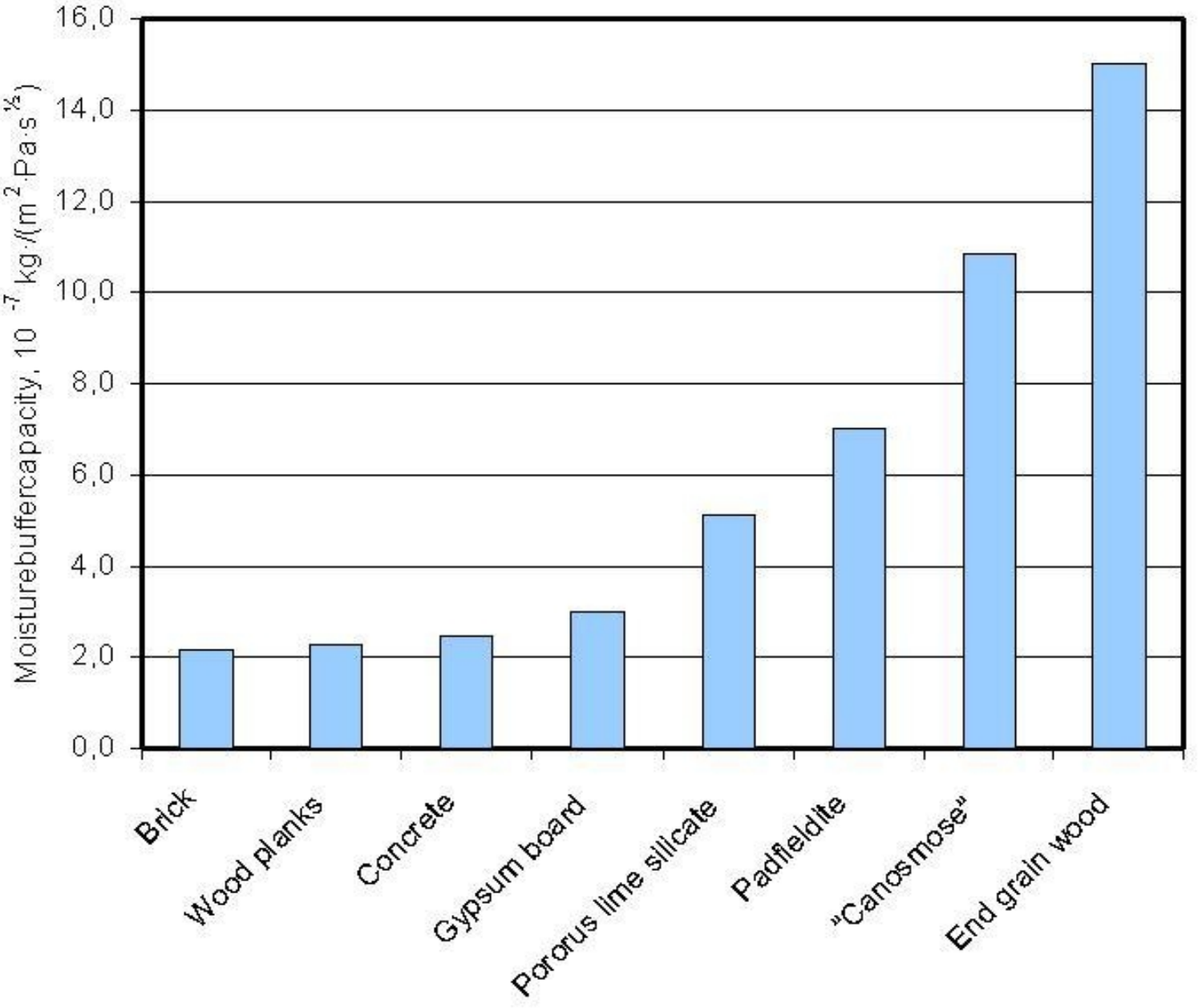
Change in relative humidity within a 20 mm thick stack of paper exposed to a daily cycle of 40%RH to 80%RH

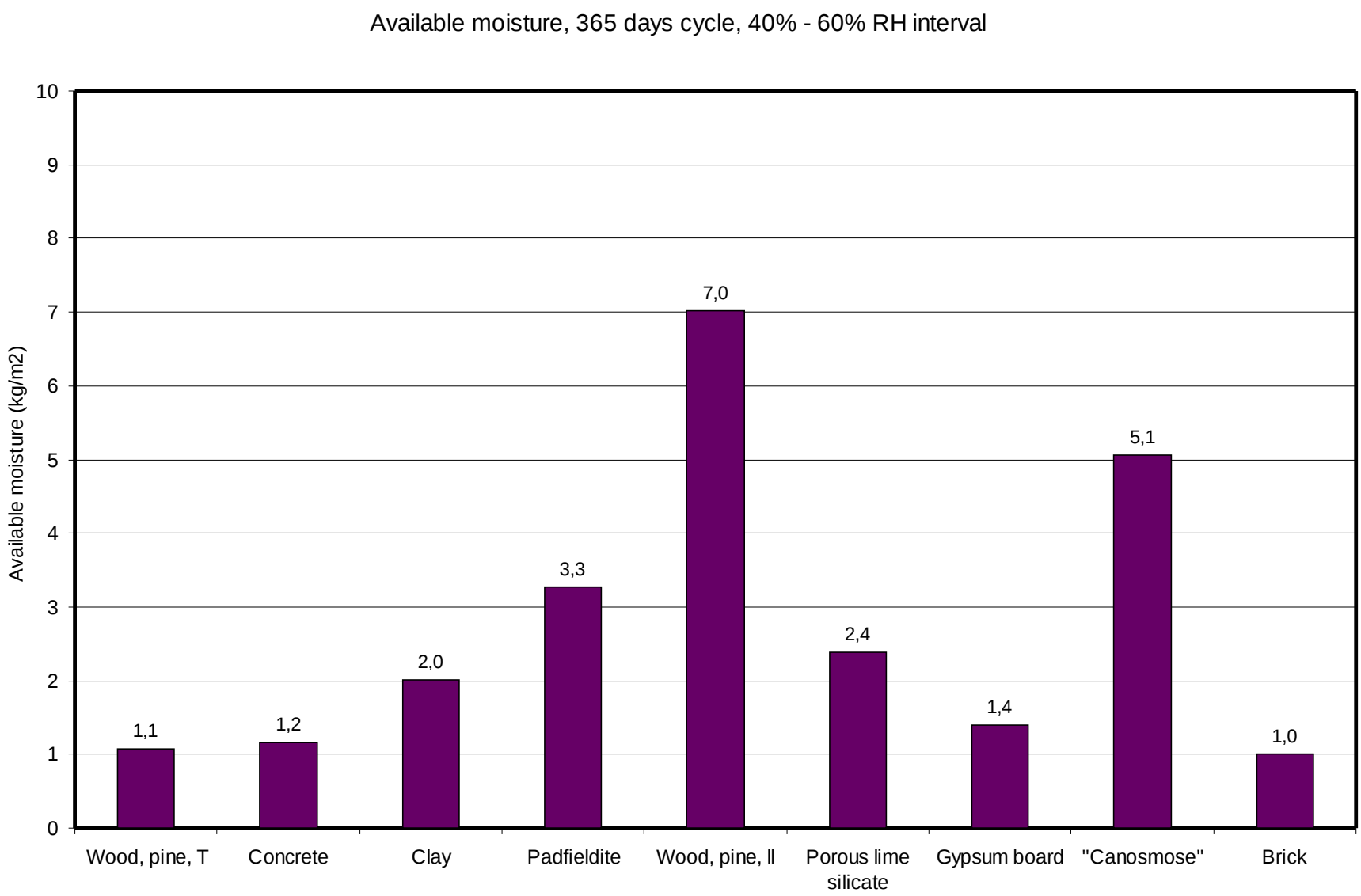


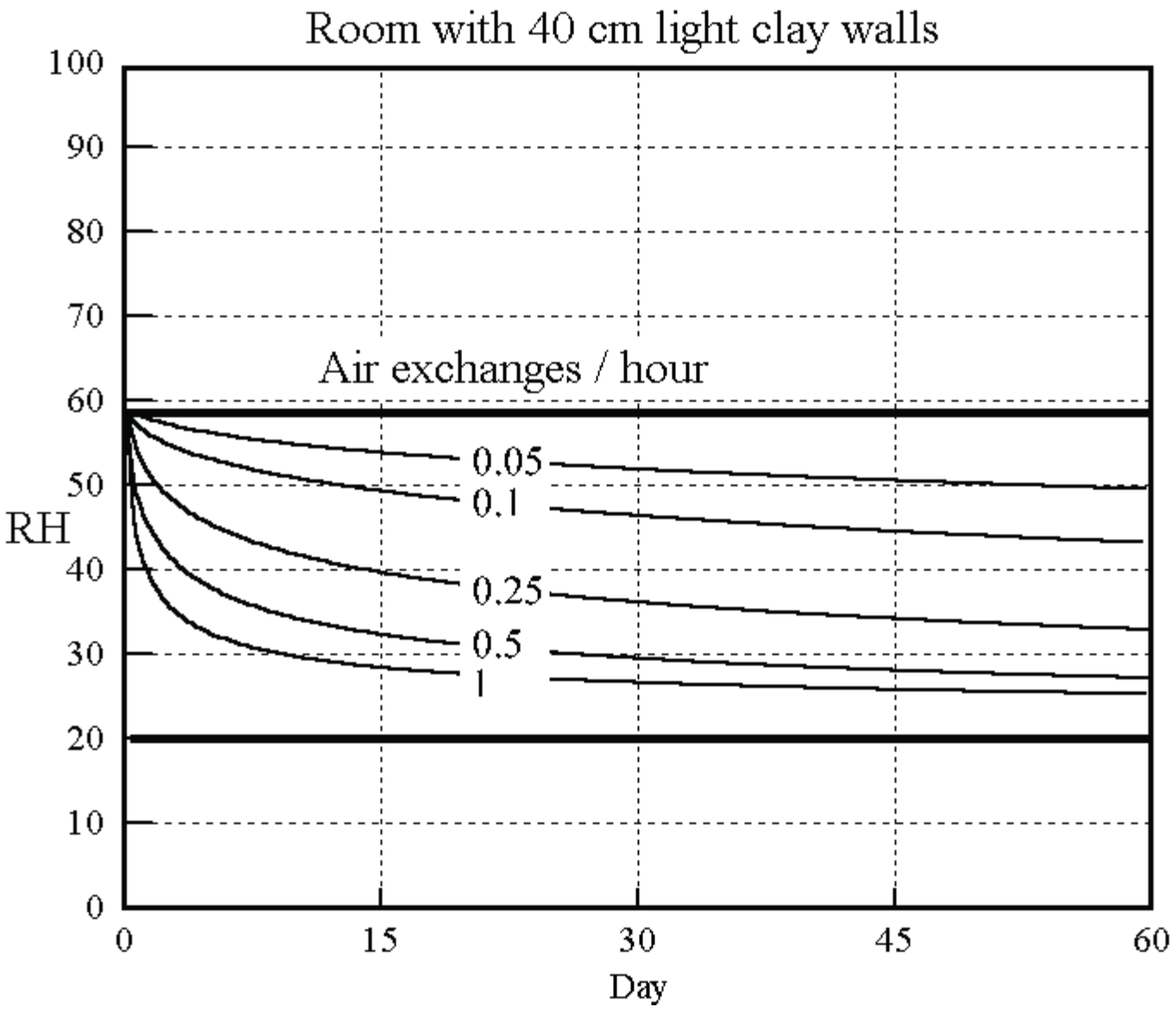
Periodic penetration depth (37%) for a 3 weeks cycle at 40% - 60% RH



Moisture buffer capacity for various material




Available moisture, 365 days cycle, 40% - 60% RH interval
Available moisture (kg/m2)
10
9
8
7
6
5
4
3
2
1
0
1,1
1,2
2,0
3,3
7,0
2,4
1,4
5,1
1,0
Wood, pine, T
Concrete
Clay
Padfieldite
Wood, pine, ll
Porous lime silicate
Gypsum board
"Canosmose"
Brick


Room with 40 cm light clay walls
100
90
80
70
60
50
40
30
20
10
0
RH
Air exchanges / hour
0.05
0.1
0.25
0.5
1
0
15
30
45
60
Day

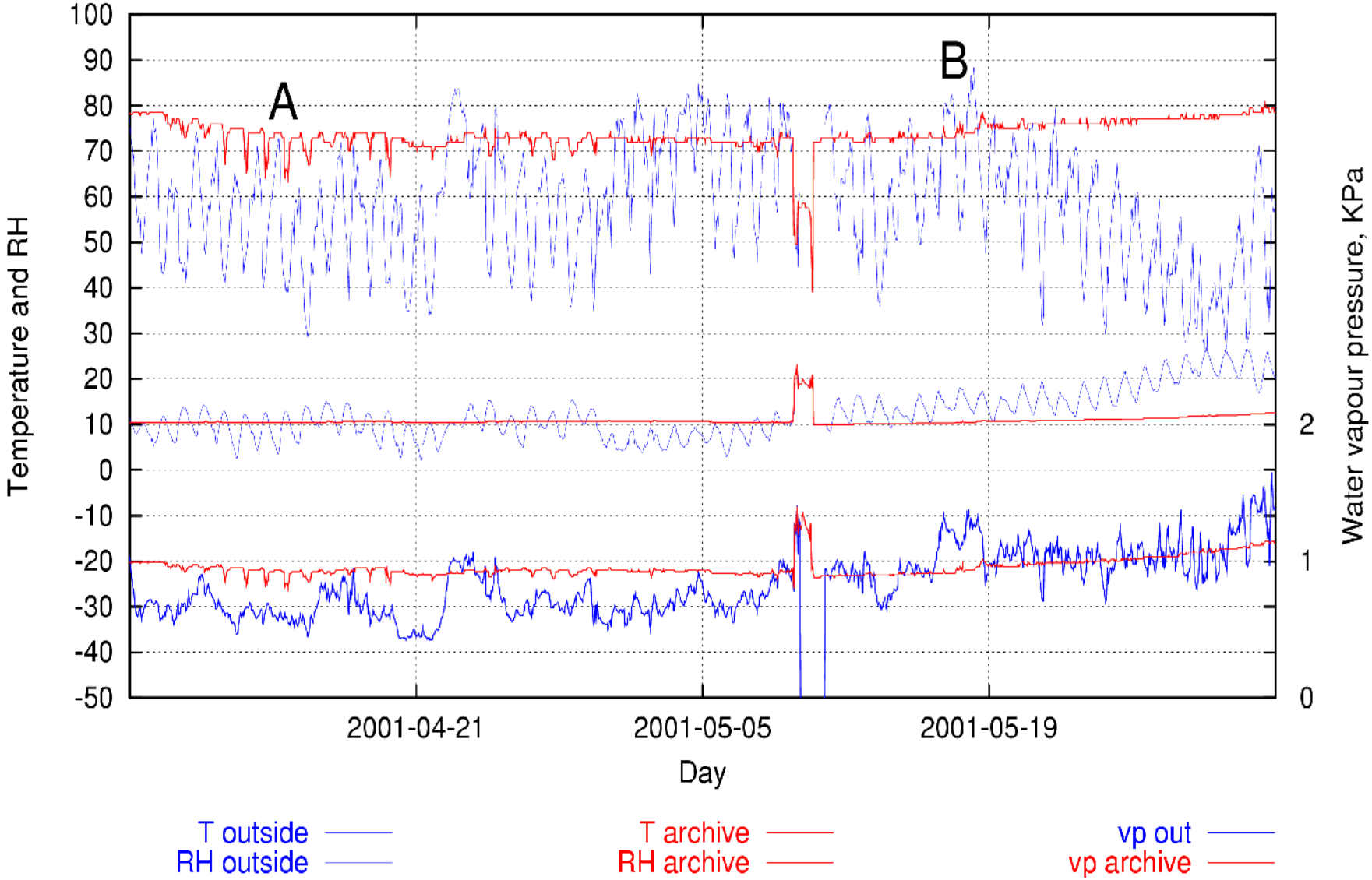
Humidity buffering properties at 365 days cycle 40 – 60%RH

Material	Dry density	Effective moisture penetration depth	Moisture accumulation ability	Available moisture	Flux amplitude	Effectivity
	kg/m^3	mm	10^{-7} kg·/(m^2·Pa·s½)	kg/m^2	g/m^2 day	
Wood, pine, T	450	80	2,3	1,1	0,56	0,70
Concrete	2300	100	2,5	1,2	0,61	0,60
Clay	2050	288	4,3	2,0	1,05	0,36
Padfieldite	876	311	7,0	3,3	1,72	0,55
Wood, pine, ll	450	522	15,0	7,0	3,68	0,70
Porous lime silicate	510	584	5,1	2,4	1,25	0,21
Gypsum board	900	779	3,0	1,4	0,74	0,09
Canosmose	456	900	10,8	5,1	2,65	0,29
Brick	1600	1054	2,2	1,0	0,53	0,05

Use perforated surfaces to increase the flux amplitude

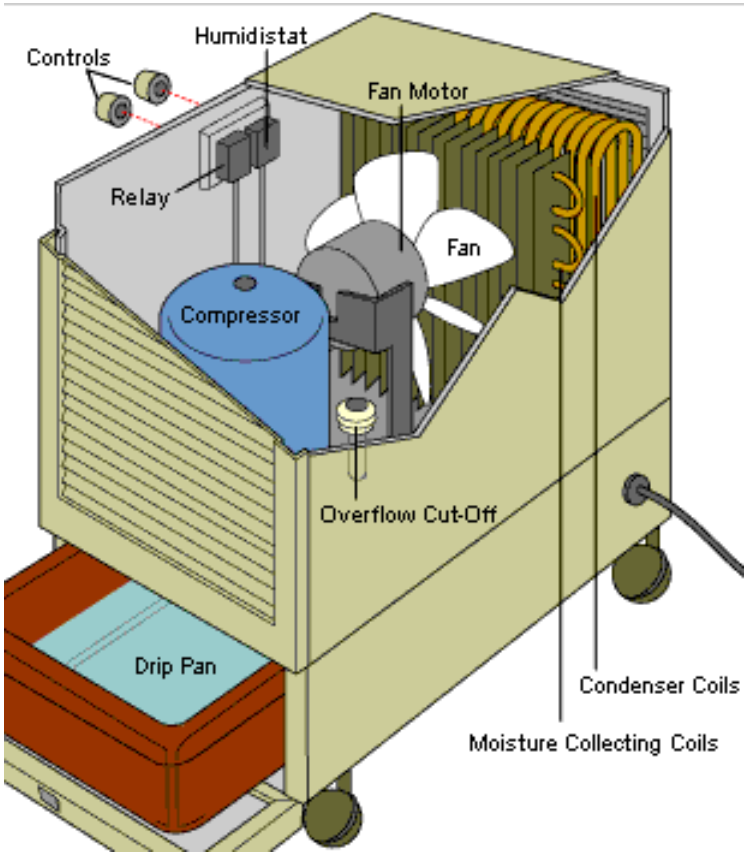
The Segovia castle, Spain. Military archive is in the basement

The archive has immense thermal inertia and moisture buffer capacity

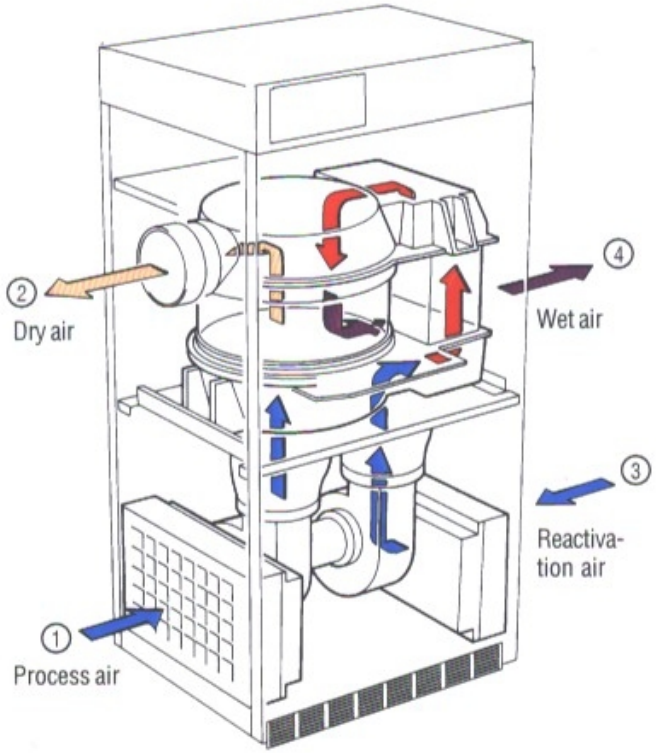


The climate in april and may is very stable, but too humid.

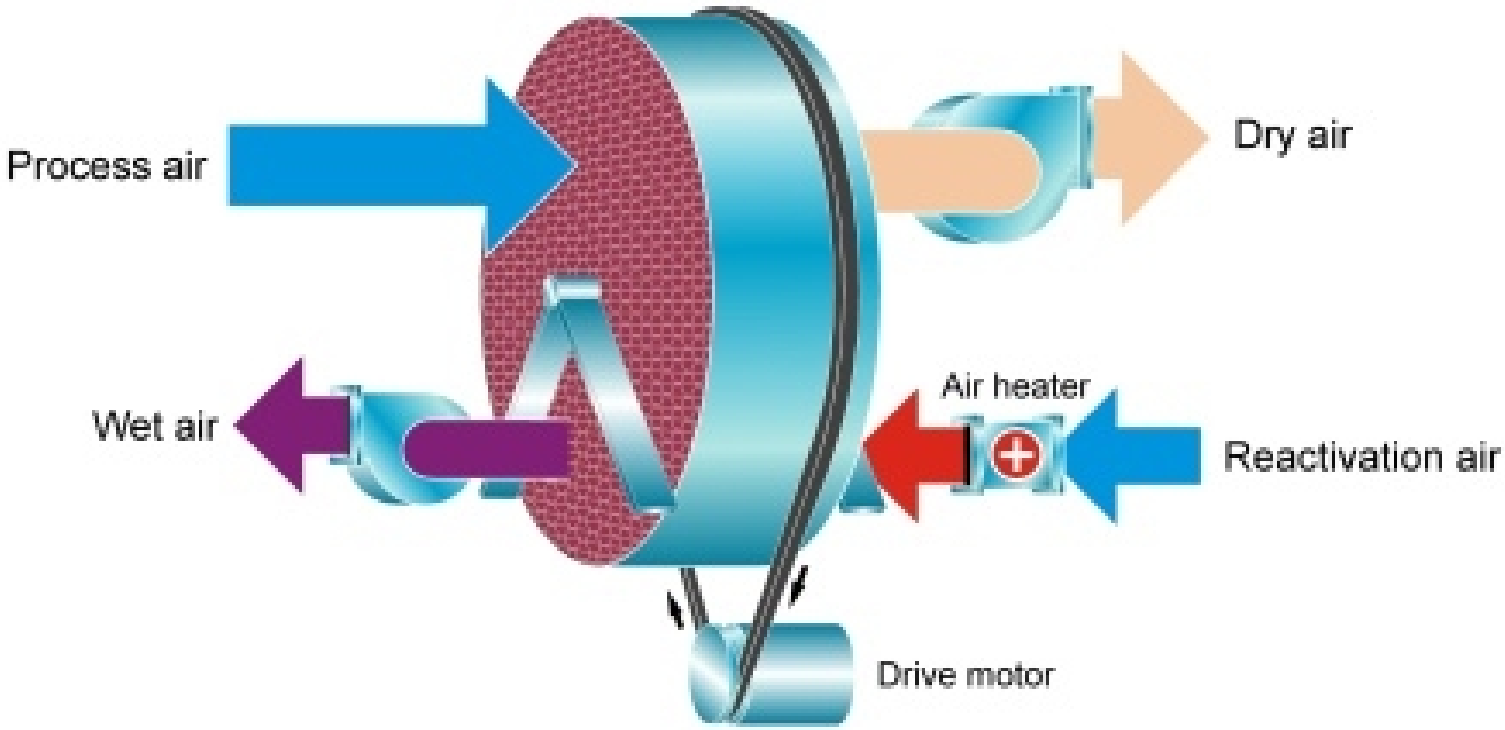
The condensating dehumidifier



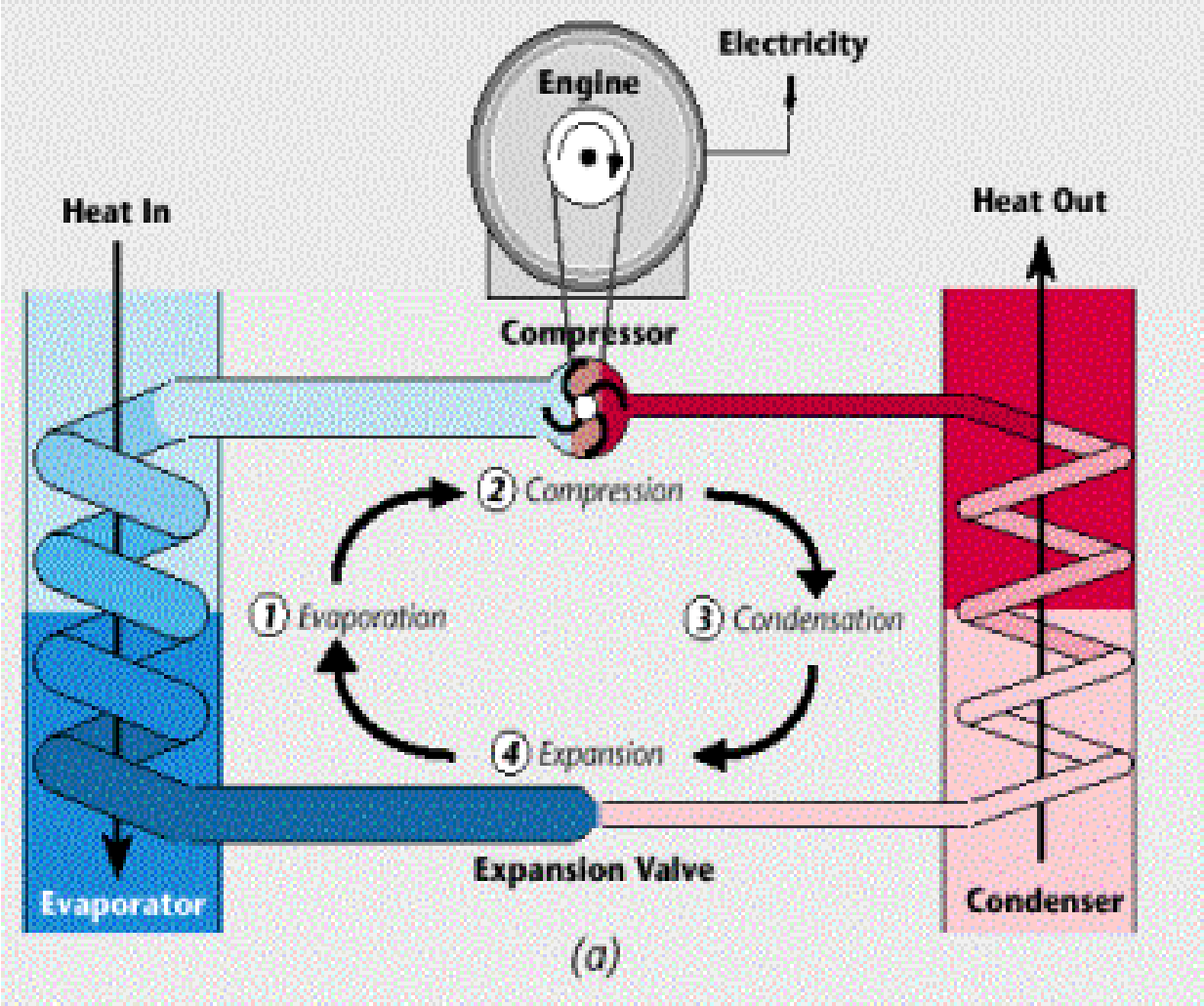
The absorbtion dehumidifier

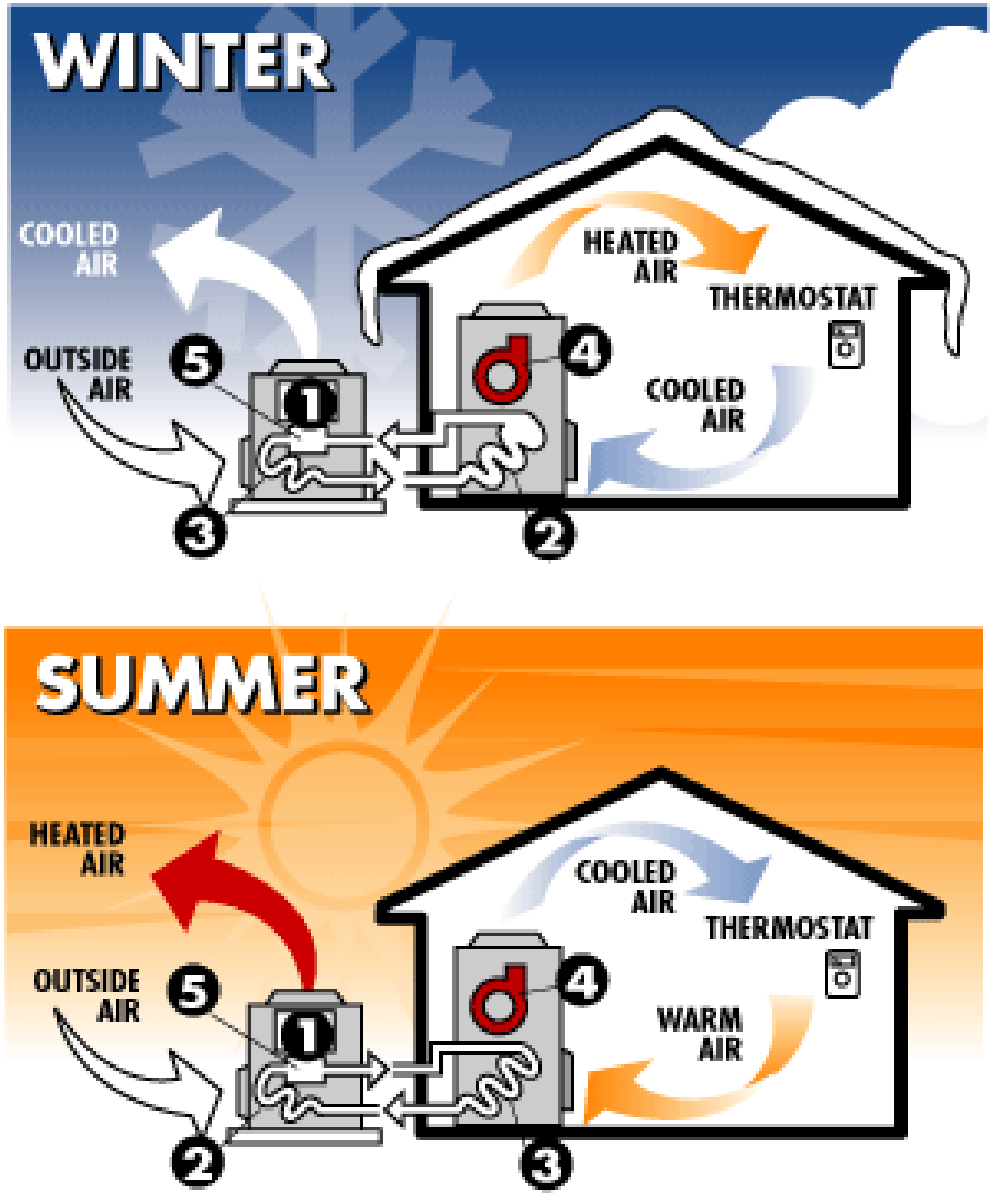


The revolving unit has a humidity absorbing interoir



The working principle of the heat pump




WINTER
COOLED AIR
HEATED AIR
THERMOSTAT
OUTSIDE AIR
COOLED AIR
5
1
4
3
2
SUMMER
HEATED AIR
COOLED AIR
THERMOSTAT
OUTSIDE AIR
WARM AIR
5
1
4
2
3