i1

The Ministry of Water & Electricity
Welcomes you to...

www.saudihvacconfex.com

Bart Hinten
Managing Director
Resolco International BV



ARE YOU REALLY INSULATING?

Energy saving in Saudi is essential


Saudi Arabia needs to:

- Raise the minimum energy efficiency ratio (EER) for air conditioning units
- Effectively enforce Saudi Building Code standards for reducing energy consumption for new buildings:
- improved insulation and solar gain control to reduce the heat load

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Saudi Arabia needs to:

- **The demand for electrical power in the Kingdom of Saudi Arabia is very high compared to international and regional levels, exceeding an 8% growth annually**

- **Electrical services reached 7 million customers in 2012 with the production capacity has reaching 52,000 megawatt, a figure which is expected to reach 85,000 megawatts in the next 10 years.**

- **In Saudi Arabia in the summer time, about 80% of power consumption is residential, and about 70% of it is used to power heating, ventilation and air conditioning (HVAC) systems**

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Dubai Electricity and Water Authority

Managing Director's Statement on Thermal Insulation

- **The nature of the environment, high temperature and the need to use air-conditioning results in high consumption of electricity.**
- **The thermal insulation system will reduce the consumption of electricity in air-conditioning by 40%, which will benefit customers, proprietors and the general public.**

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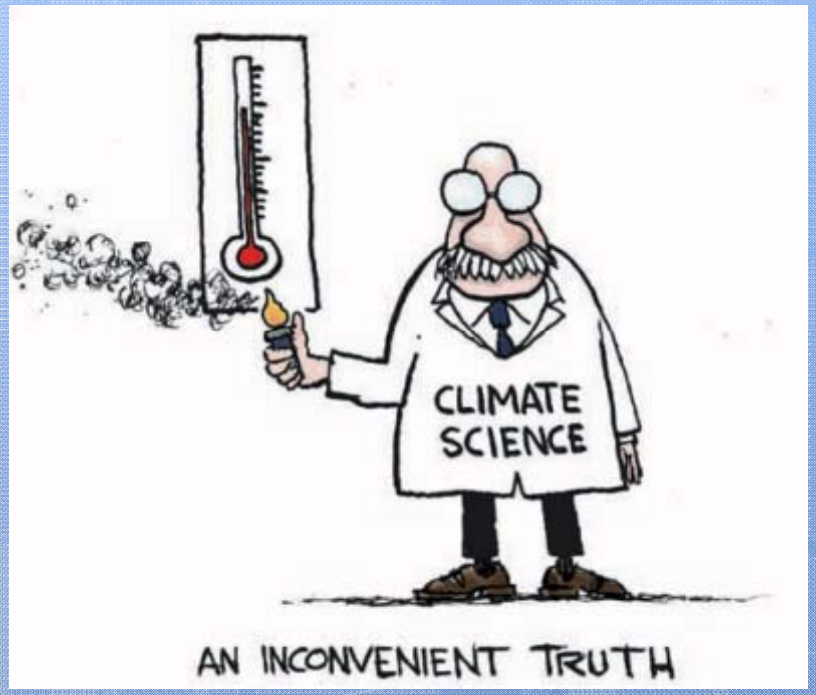

Technical Presentation

- ✓ Introduction
- ✓ K-value or thermal conductivity
- ✓ K value different
- ✓ Insulation materials
- ✓ Condensation
- ✓ Energy savings

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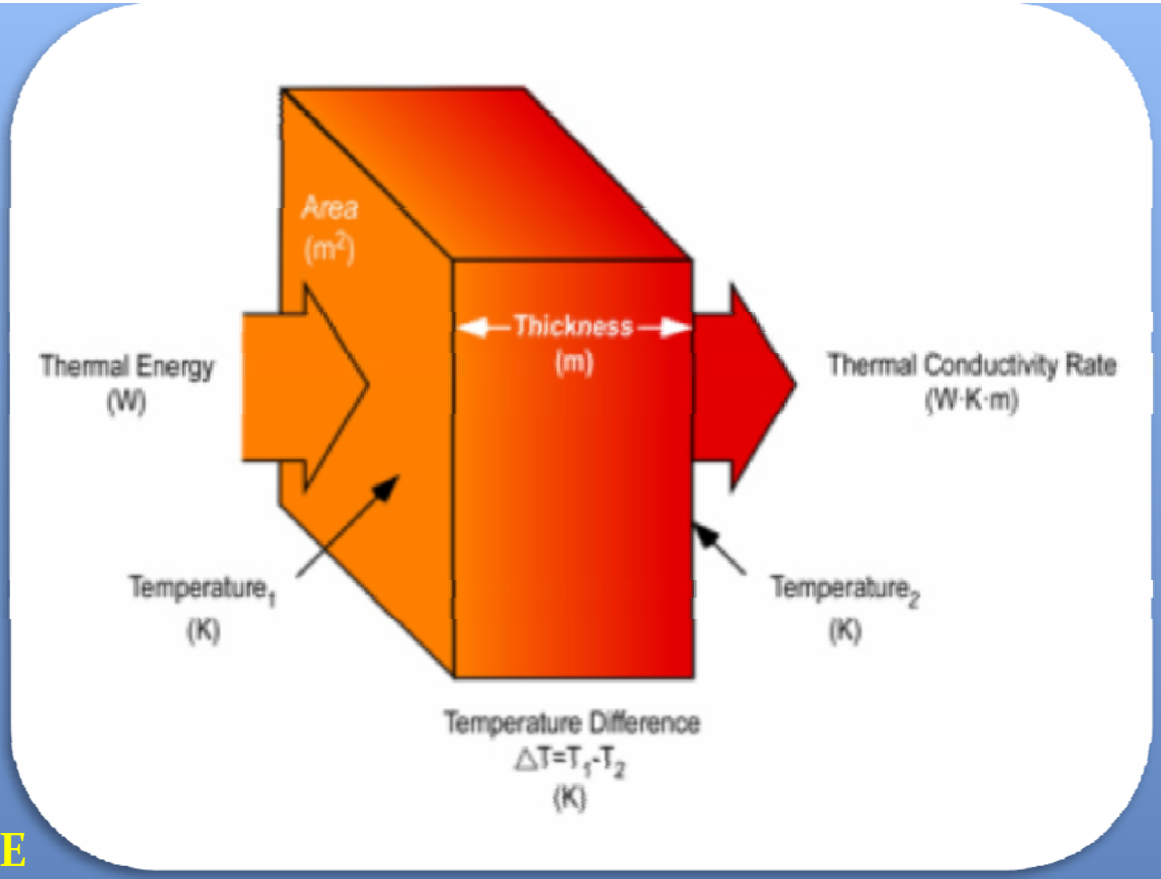

K VALUE

It indicates the amount of heat going trough the material Between both sides :

- **During 1 second**
- **Trough a surface of 1 m2**
- **with a thickness of 1 m**
- **At a temperature difference of 1 K (1K=1 °C)**

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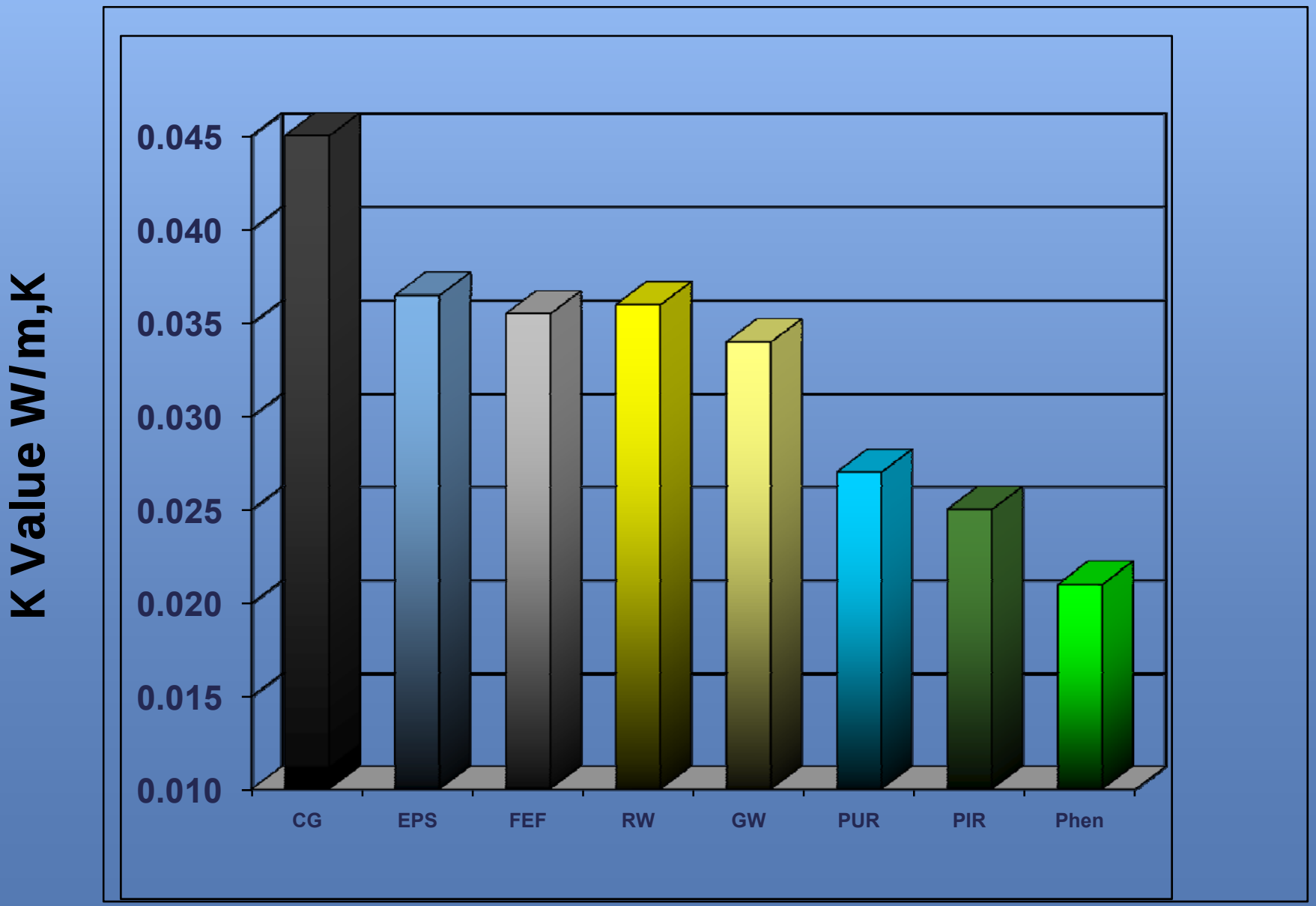

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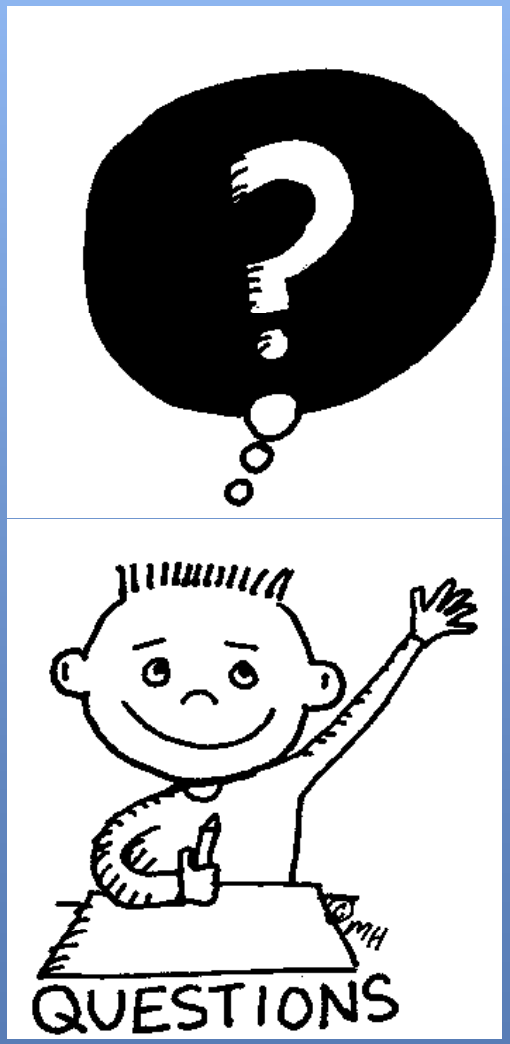
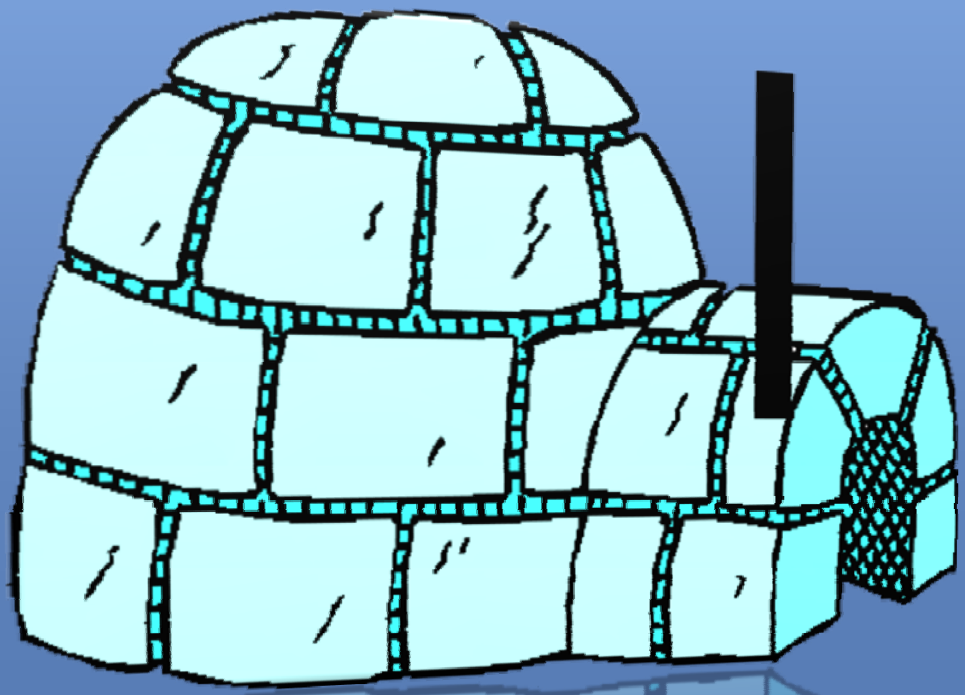


Is an Igloo made out of blocks of snow or ice ?



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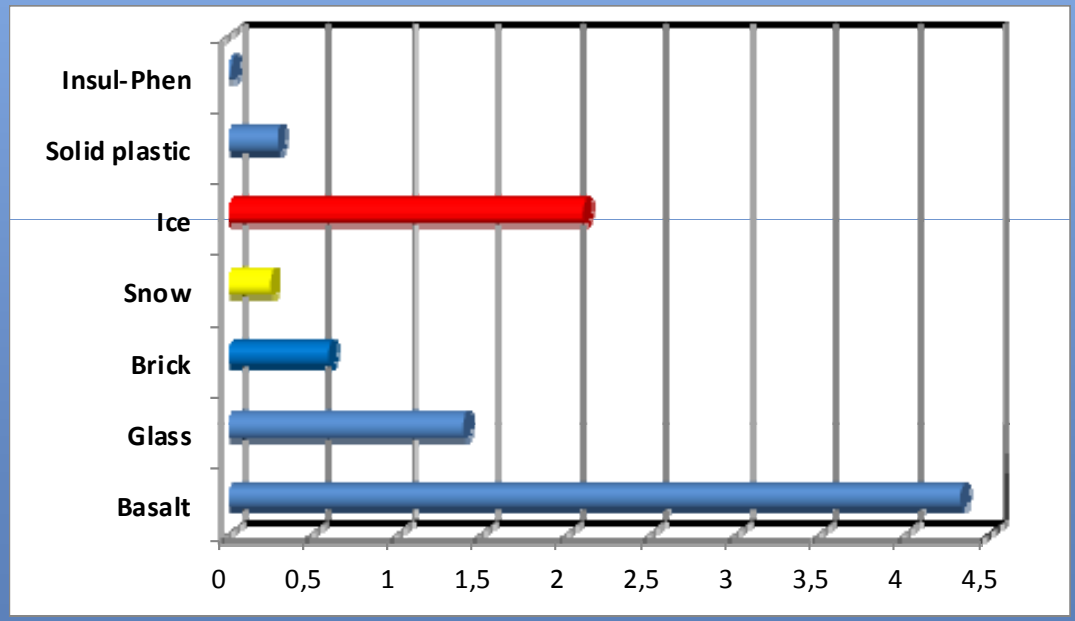
K-value

K VALUE OR THERMAL CONDUCTIVITY

This is a property of the material itself, the K-value does not calculate with the thickness of the material. Material with a higher K-value can reach the same insulation value as a better material with thicker insulation.

K value	W/mK
Basalt	4,34
Glass	1,4
Brick	0,6
Snow	0,25
Ice	2,1
Solid plastic	0,3
Insul-Phen	0,021



25 mm Insul-phen = 714 mm Brick

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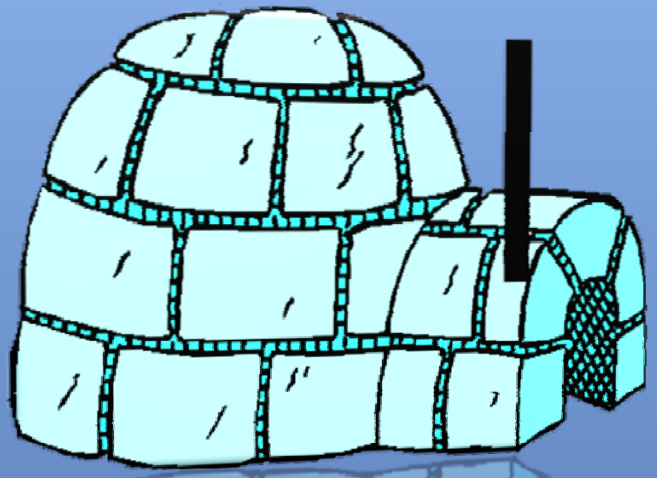
K-value

Blocks of ice are not appropriate as ice is a solid material and thus a *good* conductor of heat.



The structure of snow consists of crystals, with an innumerable amount of air filled canals between.

25 cm Snow = 210 cm Ice

An igloo is made from blocks of snow

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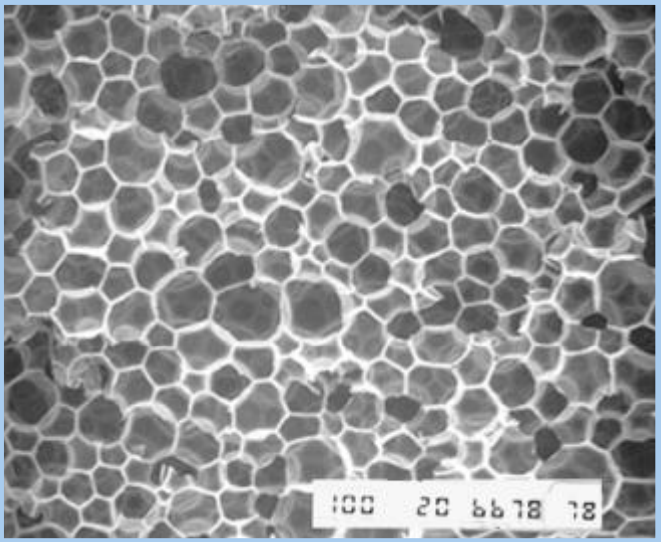
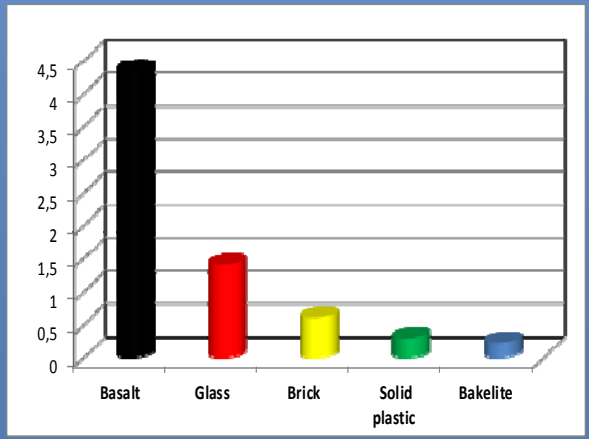


conduction

K- solid calculation based on K value polymer

K value	W/mK
Basalt	4,34
Glass	1,4
Brick	0,6
Solid plastic	0,3
Bakelite	0,23



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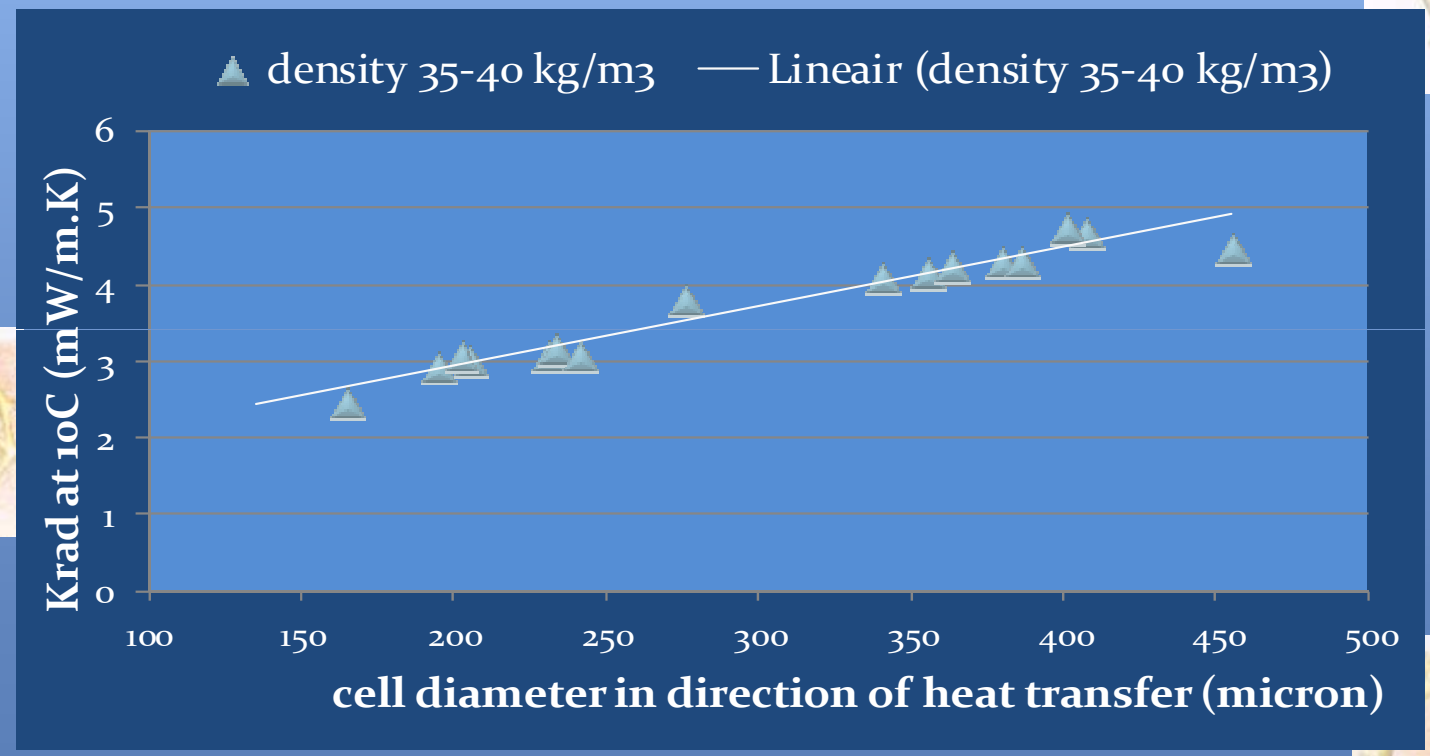
Radiation and convection



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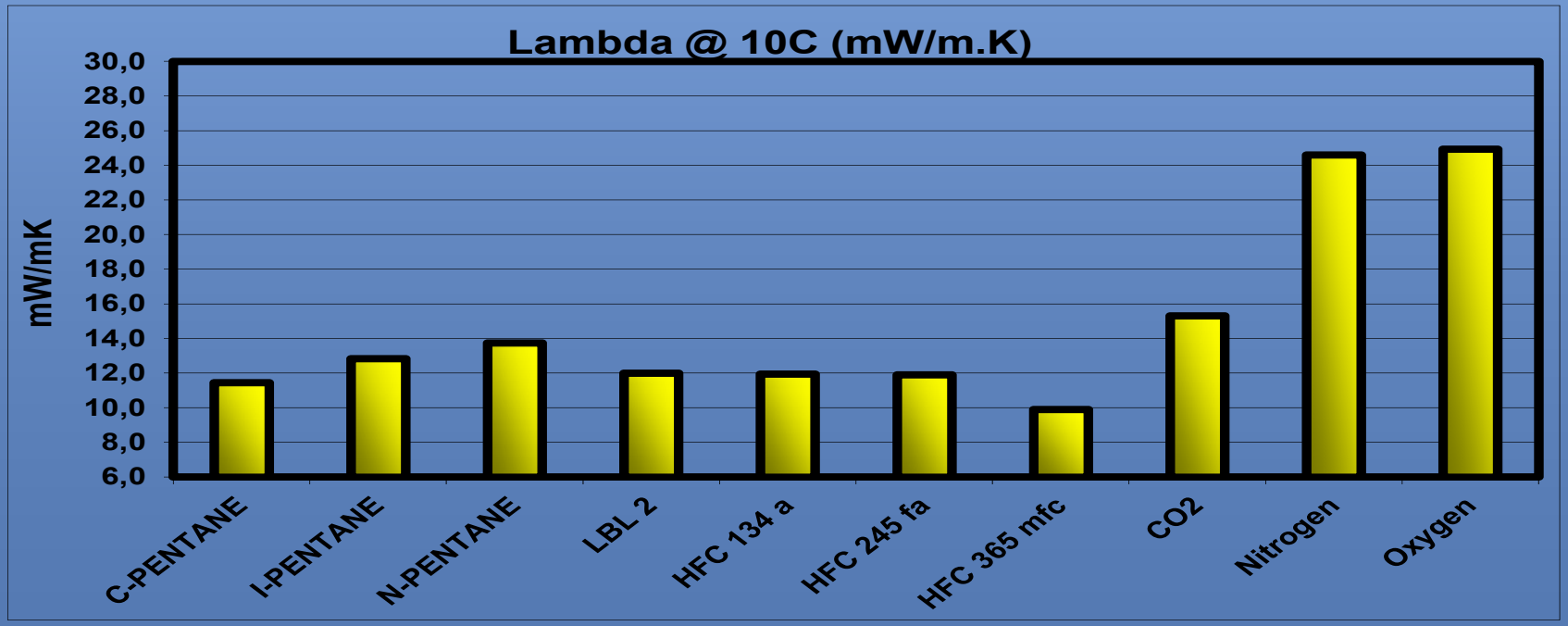

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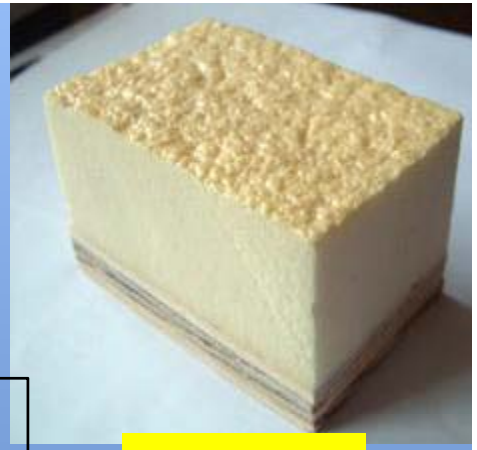
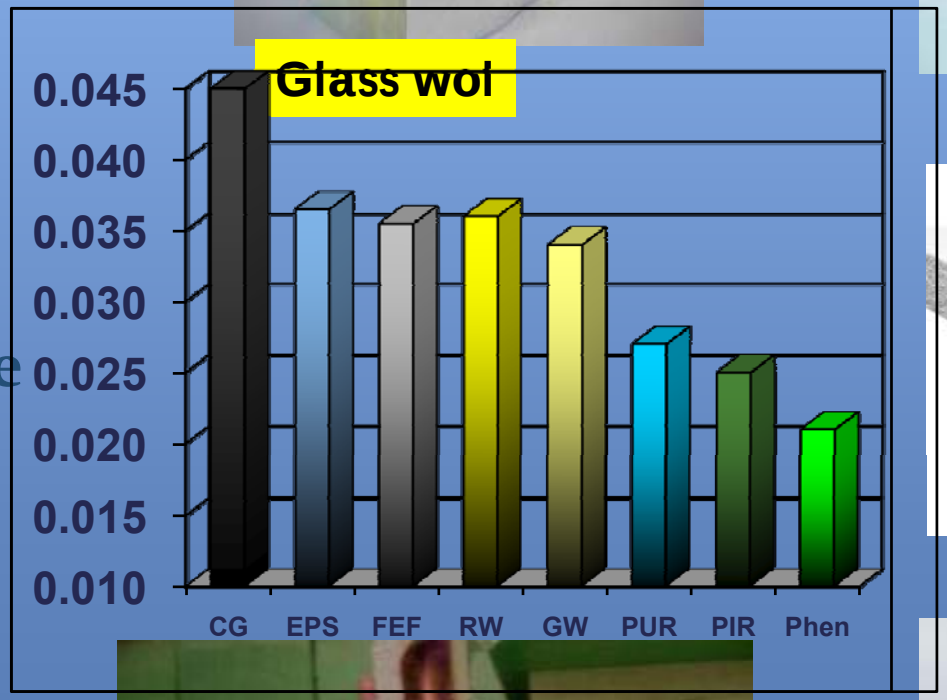
Rock wol

Glass wol



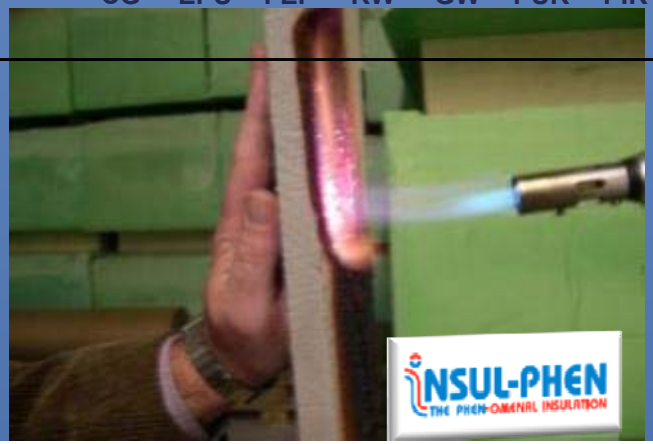
PUR / PIR

- Why insulation materials have different K- values



EPS

Foam glass



Rubber FEF

Dew Point

The dew point is the temperature to which humid air must be cooled, at constant barometric pressure , for water vapor to condense into liquid water

The dew point is a saturation temperature

If the water vapor contents exceeds a particular limit the water molecules will combine together and condense

The temperature at which this occurs is called the dew point

The dew point is associated with relative humidity (RH)

- A high RH indicates that the dew point is closer to the current air temperature
- A RH of 100 % indicates the dew point is equal to the current temperature and the air is maximally saturated with water
- When the dew point remains constant and temperature increases, relative humidity will decrease

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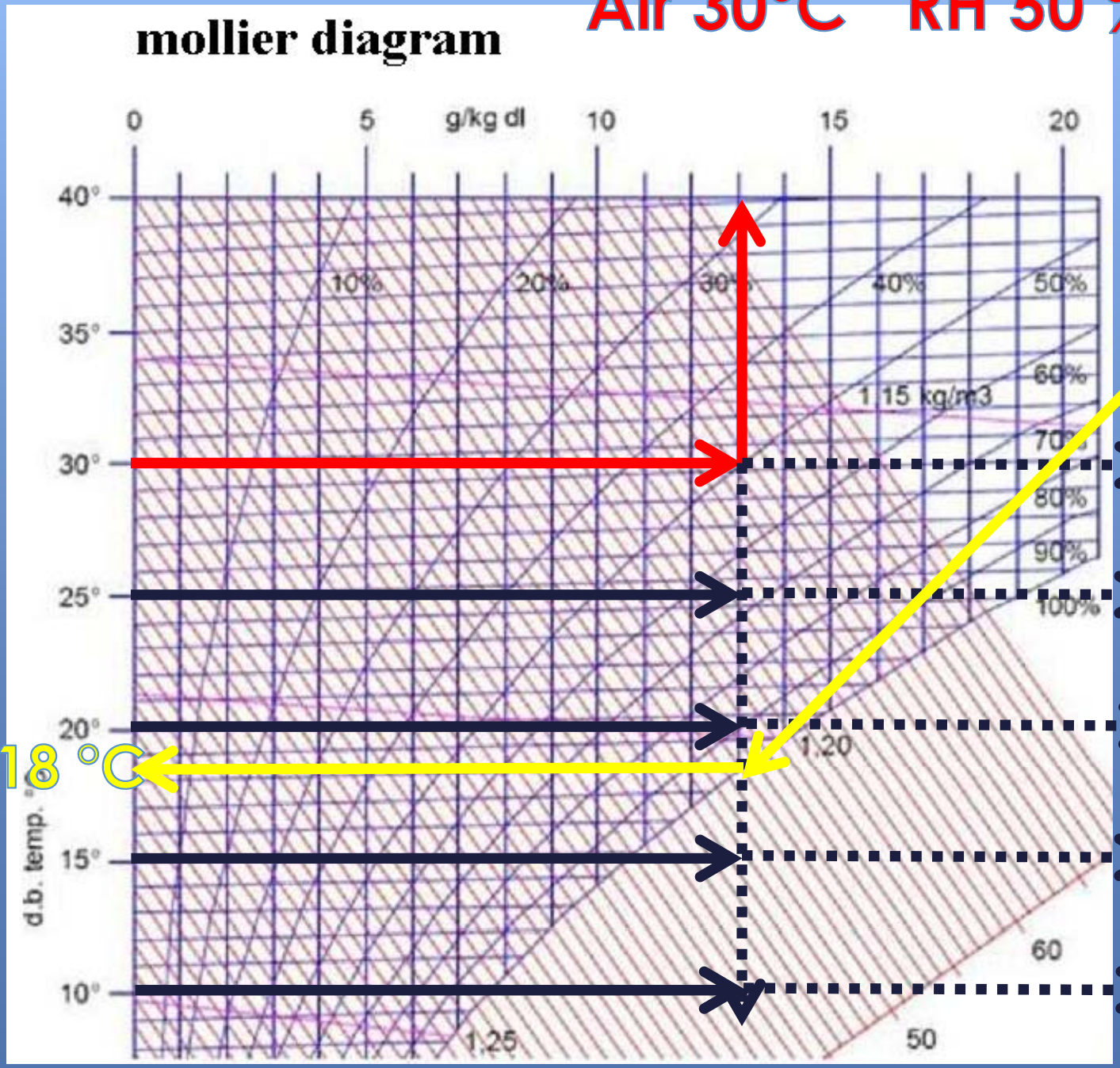
Air 30°C RH 50 % 13 g/kg



DEW POINT
18 °C

50 % RH

70 % RH

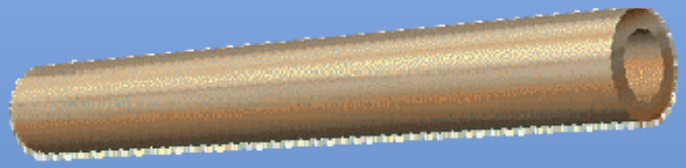
90 % RH

>100 % RH

>100 % RH

Ambient 30 °C humidity 50% dew point temp 18°C

Temp > 18°C



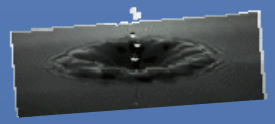
No condensation

Temp = 18°C

Start condensation

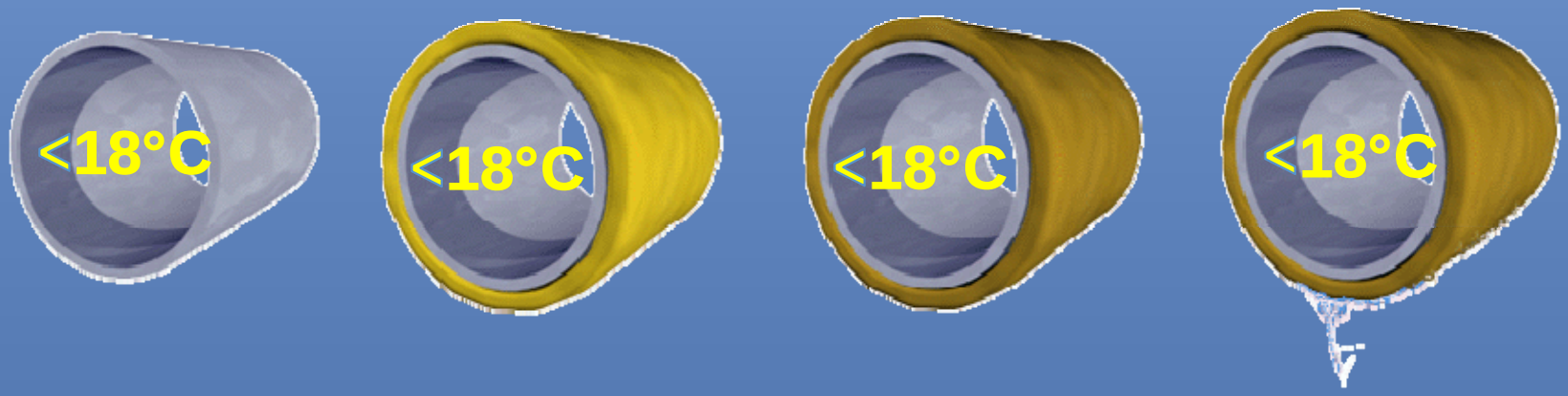
Temp < 18°C

Dripping water



Ambient 30 °C humidity 50% dew point temp 18°C

- If pipework is insulated with an open cell structure material, such as fiberglass, the material will become saturated with water.
- The water will then start to drip from the material.



Steel pipe | Fiberglass | Water saturation | Excess water drips

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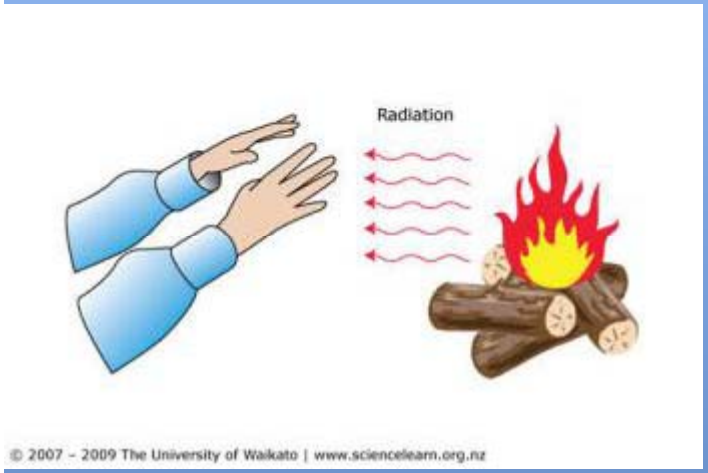
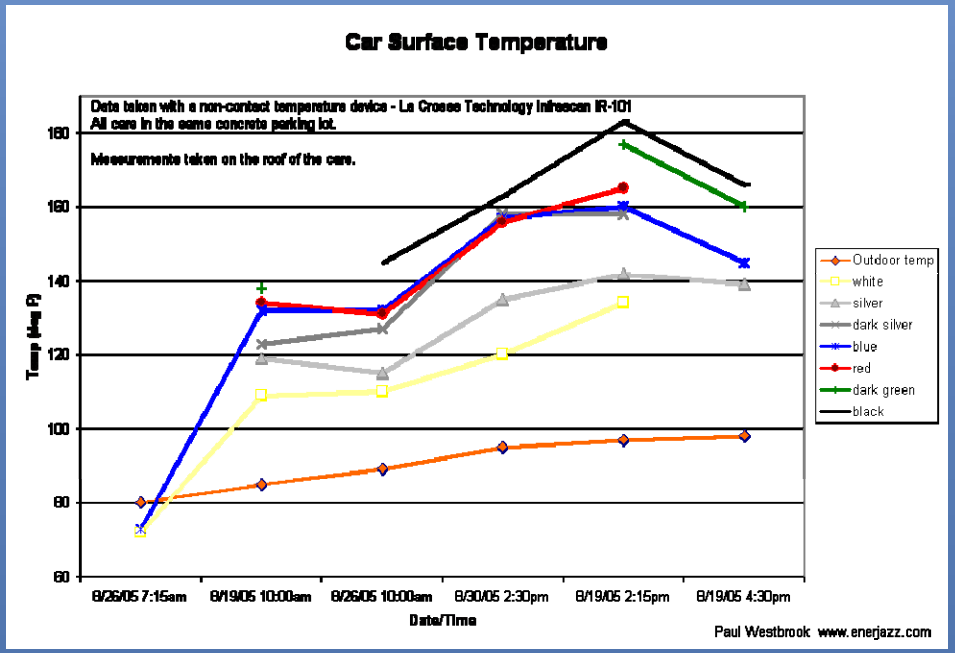
RADIATION AND EMISSIVITY



DOES THE COLOUR OF THE GLOVES MAKES A DIFFERANCE ?



Surface Temp Car

Black gives 180 F = 82 °C
Silver shiny 135 F = 57 °C

Ambiant 90 F = 32 °C

Air 30 °C RH 50 % DEW Point 18 °C

Rubber/FEF and emissivity

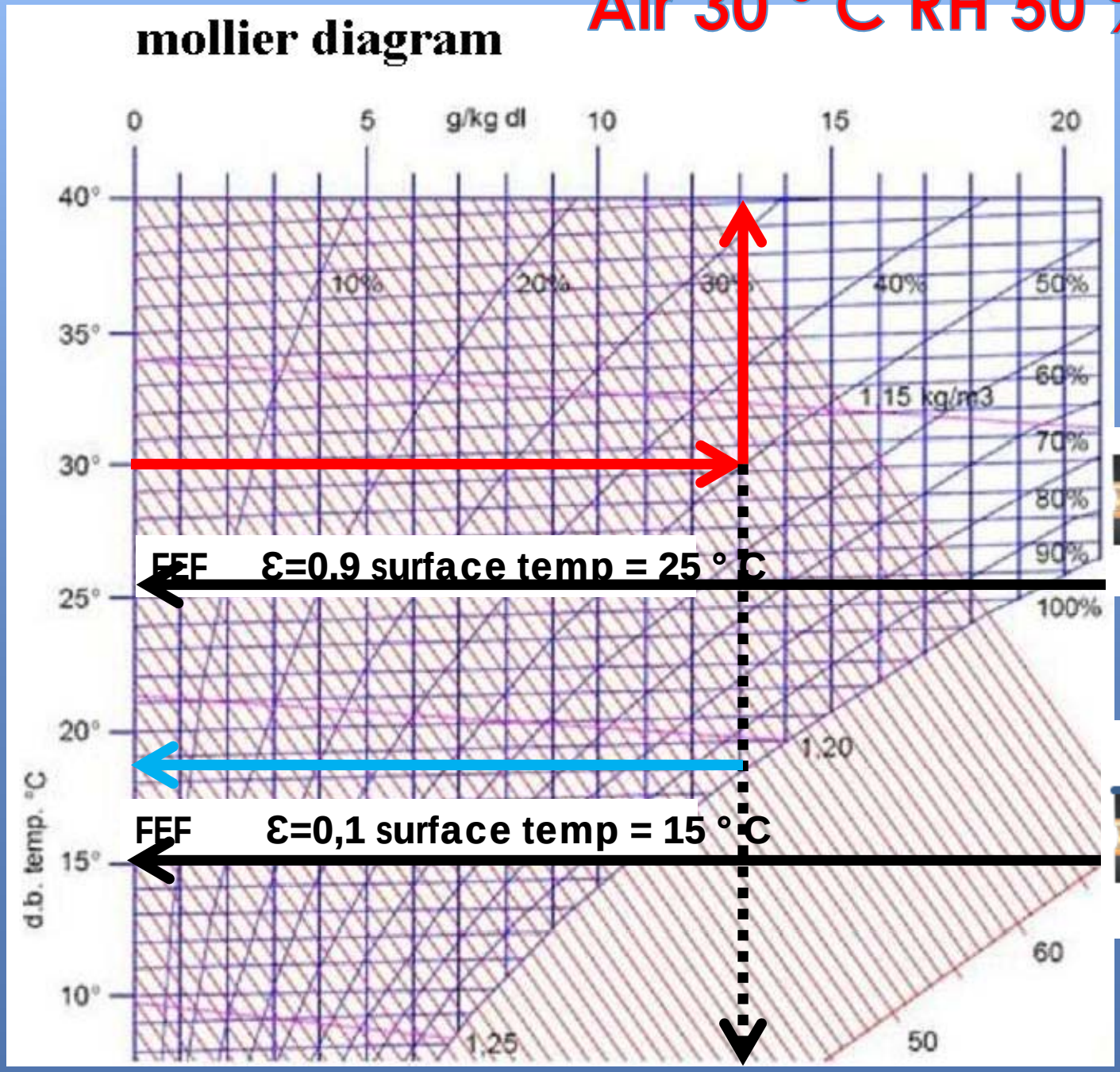
Ε=0,9 Surf. Temp = 25 ° C

BLACK High emissivity absorption and a higher surface temperature.

Ε=0,1 Surf.Temp = 15 ° C

Aluminium foil low emissivity absorption and a lower surface temperature.

Air 30 ° C RH 50 % 13 g/kg

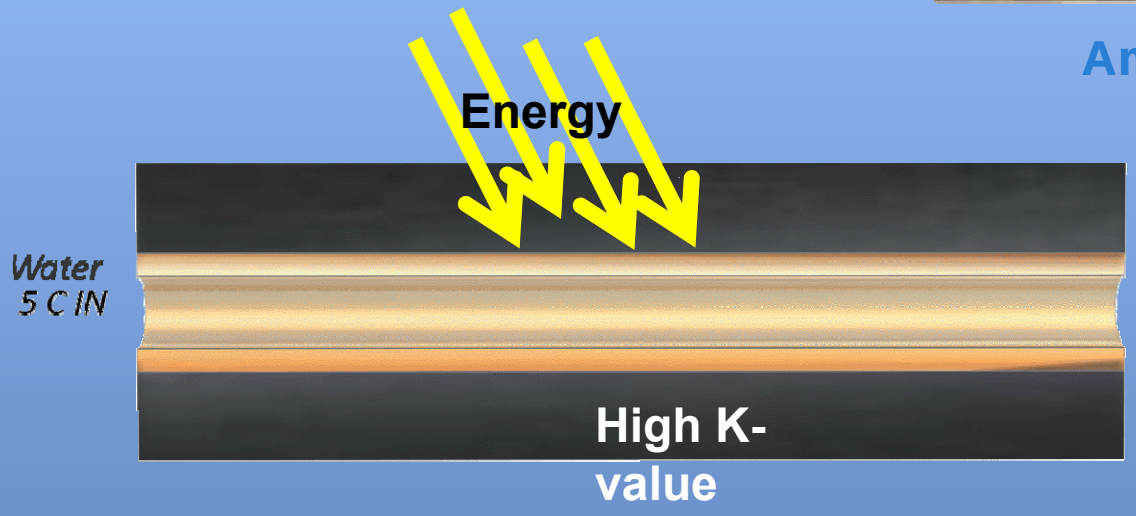


Ε=0,9 Temp = 25 ° C

Ε=0,1 Temp = 15 ° C

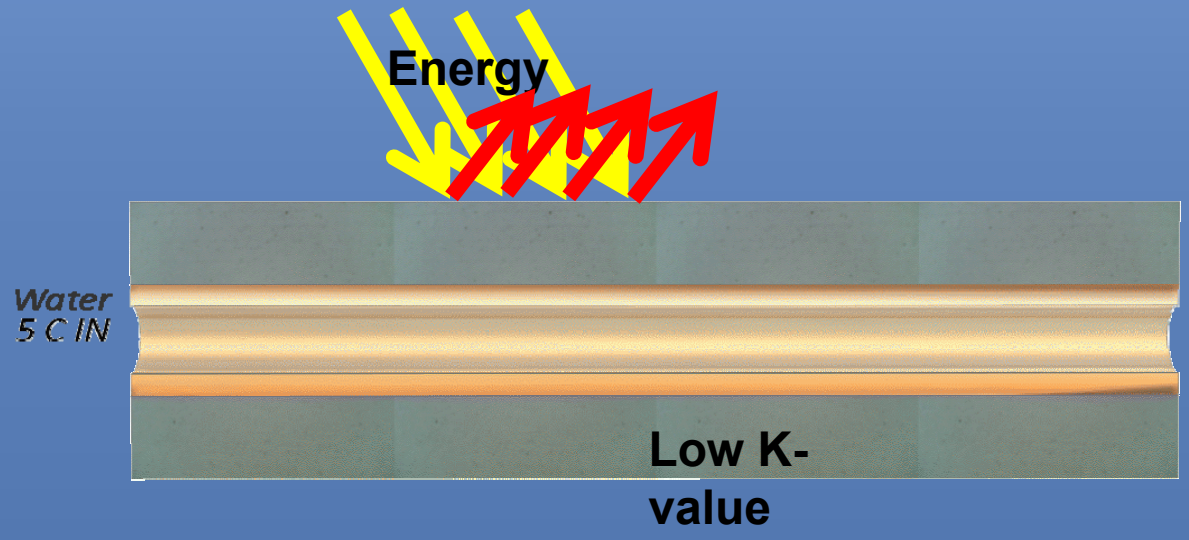
Insulation and temperature loss

Ambient 25 °C



Rubber

BLACK High emissivity absorption and a higher surface temperature.



Insul-Phen

ALUMINIUM Low emissivity reflection and a lower surface temperature.

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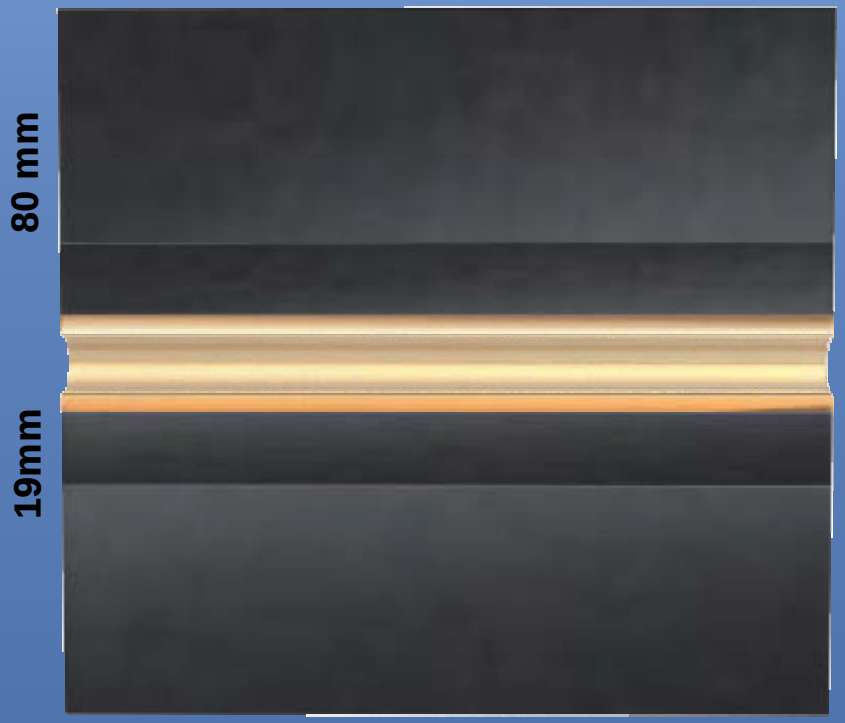
Insul-phen

3,2 W/m Heat Gain

Pipe 1,25 inch

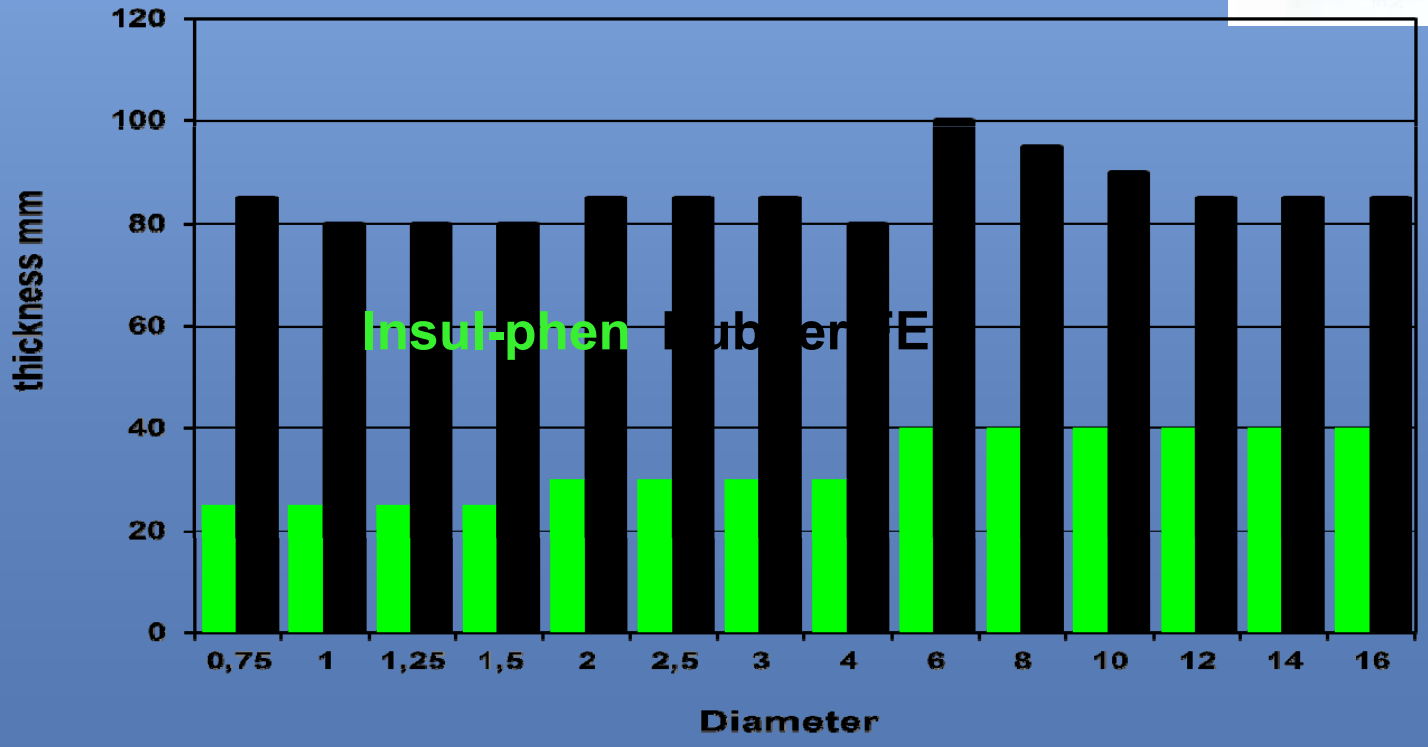
Rubber/FEF



7,2 W/m Heat Gain

3,2 W/m Heat gain

Rubber Insulation relies on its black surface to prevent condensation however insulation value and energy saving are critical!.....



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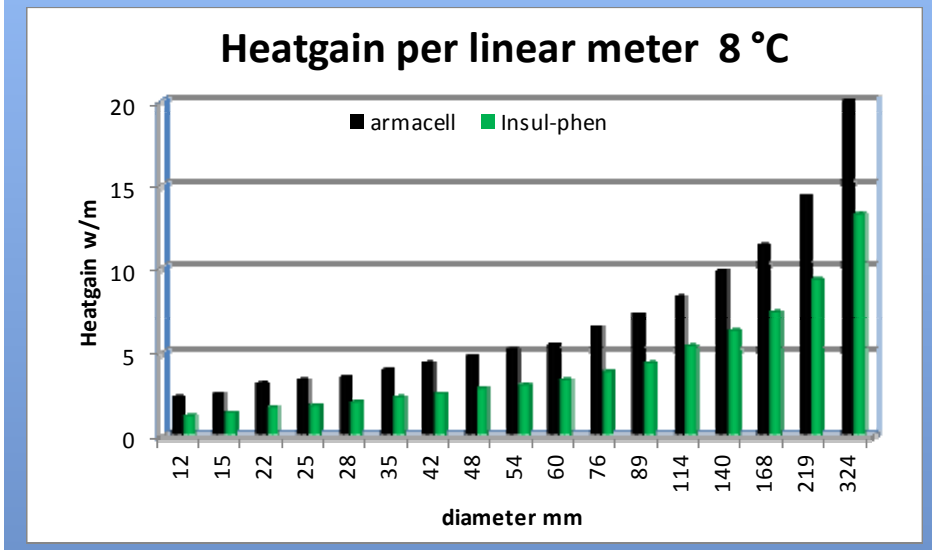

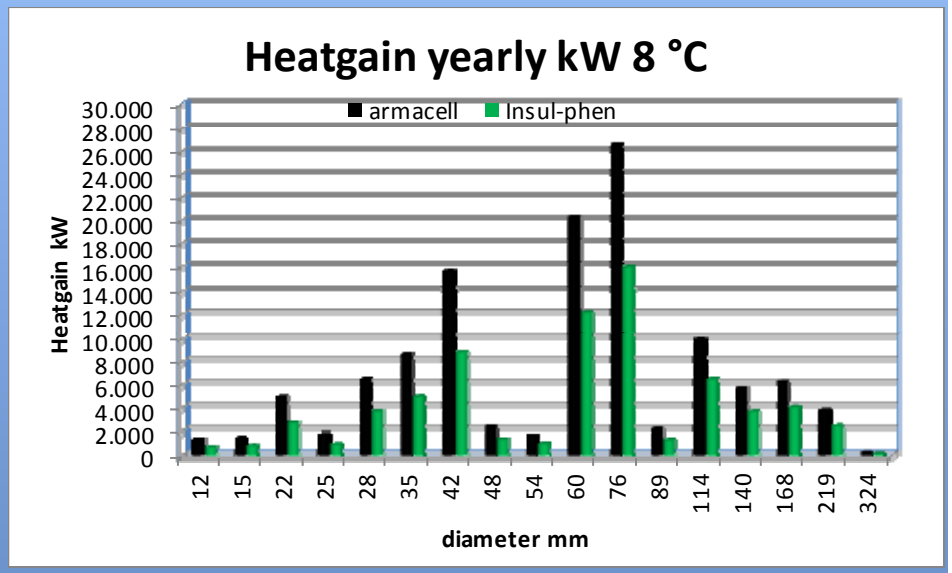

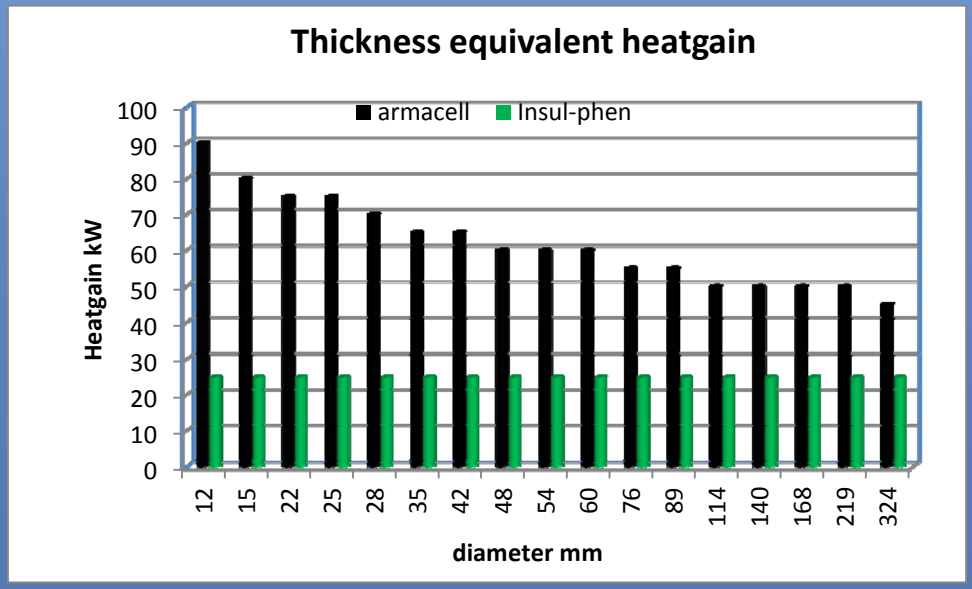

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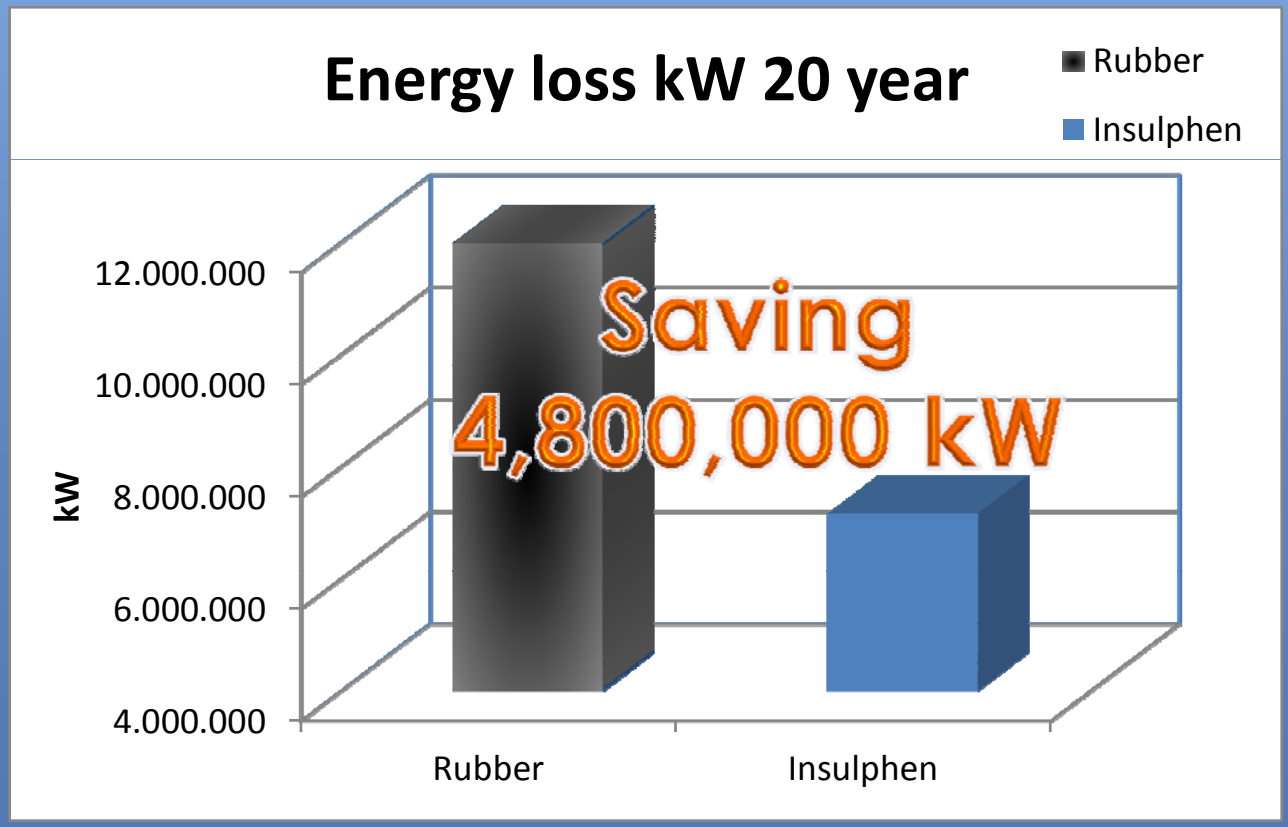
		Yearly energy loss kW	Yearly energy loss Euro	Yearly CO_2 Emission ton CO_2		20 Year energy loss kW	21 Year energy loss Euro	22 Year CO_2 Emission ton CO_2
Enschede	Rubber	599.733	€ 71.968	300		11.994.653	€ 1.439.358	5.997
	Insulphen	358.744	€ 43.049	179		7.174.875	€ 860.985	3.587
	Savings	240.989	€ 28.919	120		4.819.778	€ 578.373	2.410
	%	40%	40%	40%		40%	40%	40%



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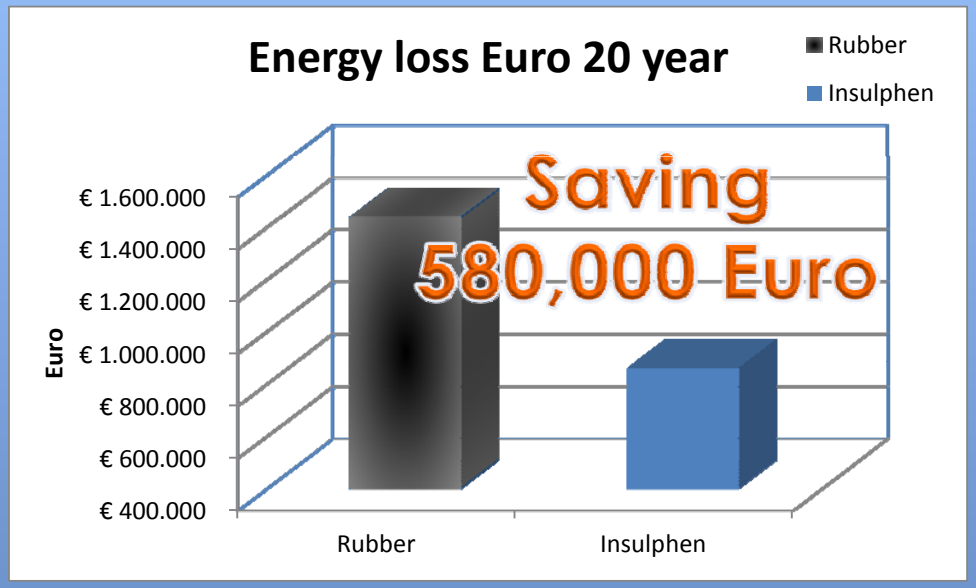

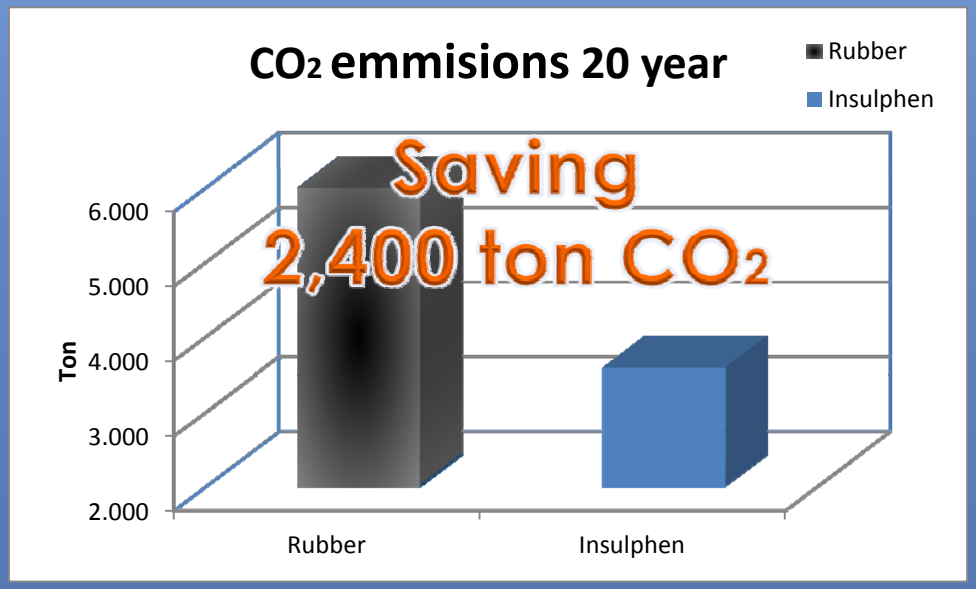

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THANKS FOR YOUR ATTENTION



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INSUL-PHEN THE PHEN-OMENAL INSULATION