

# **Building Envelope System**

## **“The insulated house”**

Green Building Conference – 25<sup>th</sup> & 26th June 2008 – AUD – Thorsten Schneider



# Agenda

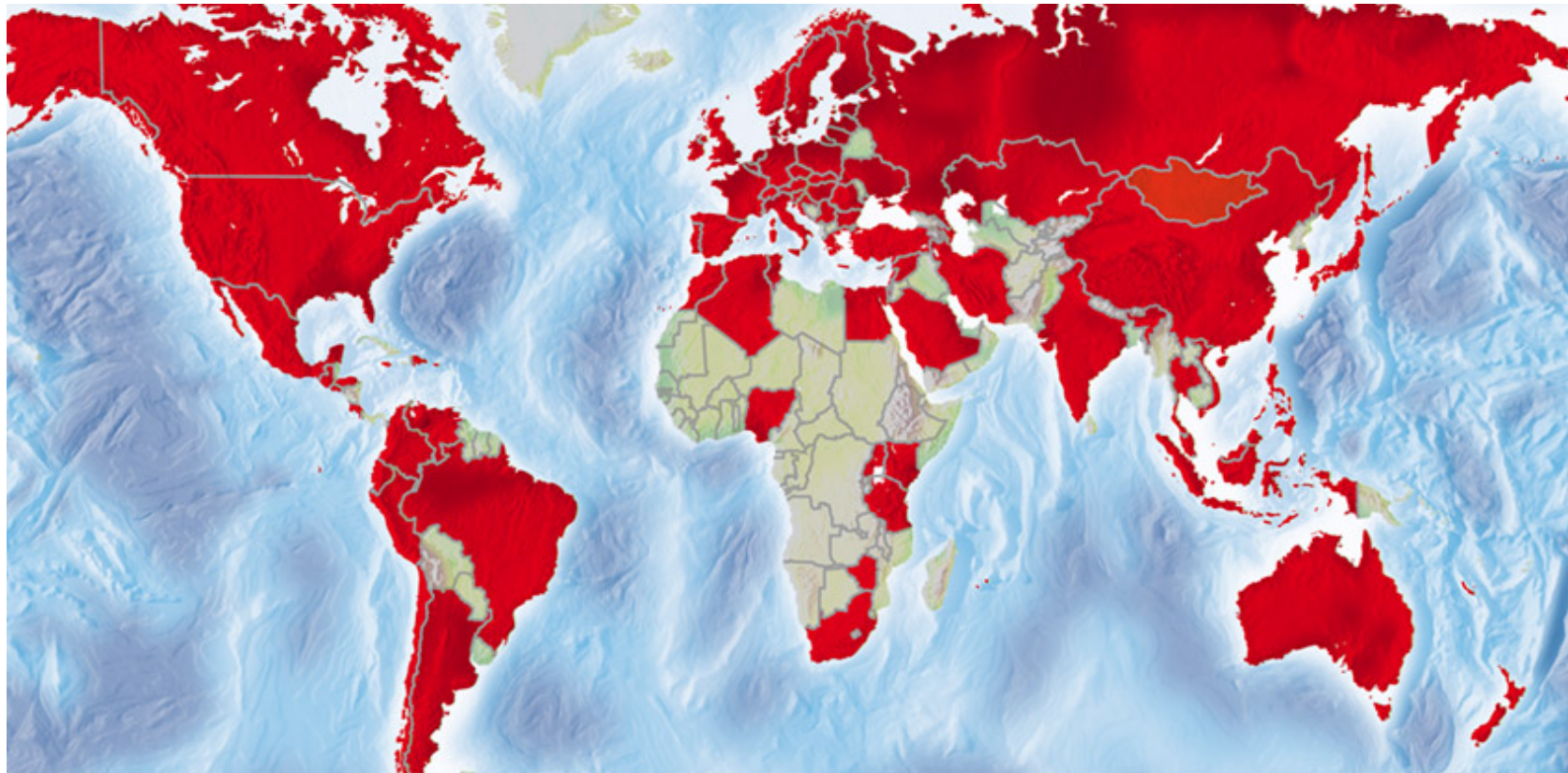
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- **Introduction**
- **What means Building Envelope System?**
- **1<sup>st</sup> Element – Foundation Protection Systems**
- **2<sup>nd</sup> Element – Window and Façade Insulation Systems**
- **3<sup>rd</sup> Element – Roof Protection System**
- **Conclusion**



# Henkel worldwide 2007

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- Sales 15,974 mill. euros
- 72,000 employees
- 125 countries



# Henkel Polybit Industries Ltd.

- Established in 1995 as privately owned company in UAE.
- Henkel KGaA acquired 51% (Management) in 2005. Polybit Industries Ltd. is since then known as HENKEL POLYBIT INDUSTRIES LTD.

Henkel Polybit is known as the market leader in the UAE for waterproofing and innovative protection systems with the complete setup in the GCC region.

- Offices and productions in UAE, Qatar, Bahrain, Oman, Kuwait, Saudi Arabia and Egypt





# The Vision – The BES\*

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- A unique, one-source-system-concept which is able to deliver a protection system (like an envelope) for the whole building.
  - It includes waterproofing, surface protection, thermal wall and roof insulation - Starting from the foundation, to the wall up to the roof.
  - Ensures the whole moisture and thermal protection of the building.
- With this concept Henkel Polybit is committed to be the leading supplier for BES systems and products in the GCC region and want to market them for a good cause too...

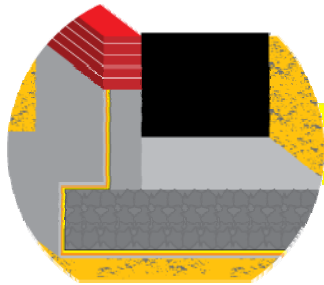
...“save Energy for next generation and deliver perfect quality made in Germany”



\* BES - The Building Envelope System

# The 3 elements of the BES

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Foundation Protection Systems



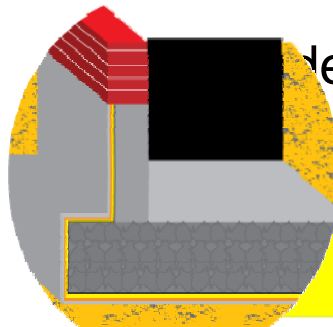
Window and Façade Insulation Systems



Roof Protection System

➤ **Foundation Protection Systems are designed to protect underground structures against several influences like:**

➤ Water penetration



➤ Chloride Attack

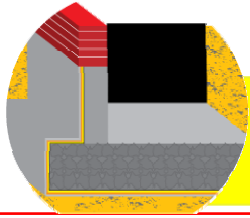
## Foundation Protection Systems

➤ Steel Corrosion

➤ Carbonization

➤ Etc.

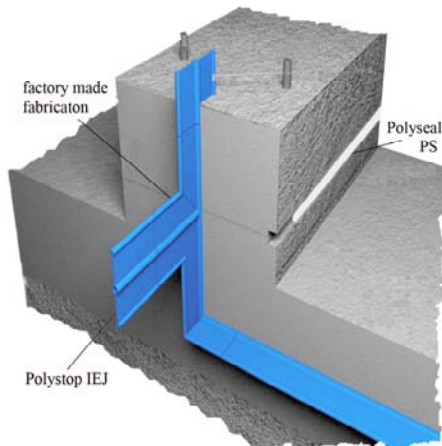
**... that your building is based on a long-lasting and safe structure!**



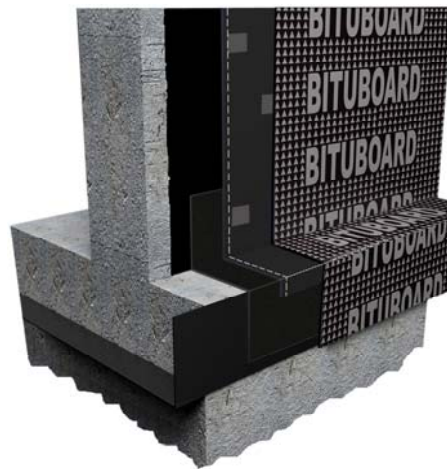
## Foundation Protection Systems



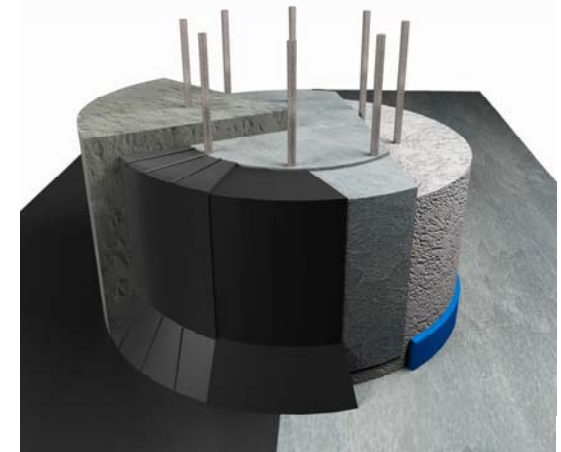
- **Different systems for different requirements can be:**
  - Self adhesive membranes and torch applied membranes
  - Spray and liquid applied special coatings
  - Sealants
  - Protective coatings and industrial flooring
  - Water stops and further special products



**Waterstop**



**Foundation**

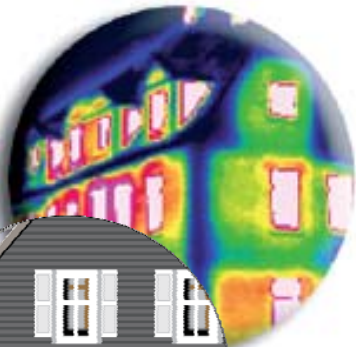


**Pile Head Treatment**





- **Facades and Windows face always three critical planning issues:**



## Window and Façade Insulation Systems

inside the building

- **Henkel Polybit tackles these issues with 2 Systems:**
  - 1. Ceretherm ETIC System (ETICS) or Combo Wall**
  - 2. Window sealant and insulation system WINTeQ**





## Window and Façade Insulation Systems



Energy Loss

- Determines the monthly operating costs.
- Effects the building's market value.
- Influences the living comfort due to a less constant room climate.
- "Ignores" environmental consequences.



Humidity

- Inside humidity causes structural damages of the building.
- Causes the development of moulds effecting our health and immunity system (*allergies, asthma, respiratory problems...*).
- *Decrease of property value.*



Noise

- Noise above 65 dB(A) like Aircraft, Construction work and traffic noise can already create serious health problems, for adults and especially for children.
- Can cause sleep disorders.
- Can lower the ability to concentrate.
- Can over all lower the quality of life



## Window and Façade Insulation Systems



### Ceretherm ETIC System (ETICS) or Combo Wall



### Henkel Polybit's solution against energy loss and humidity damages



Energy Loss



Humidity

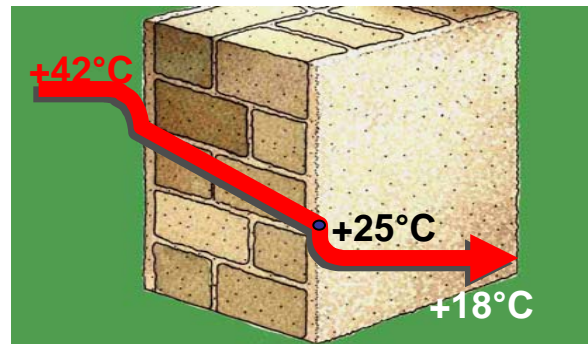


## Window and Façade Insulation Systems



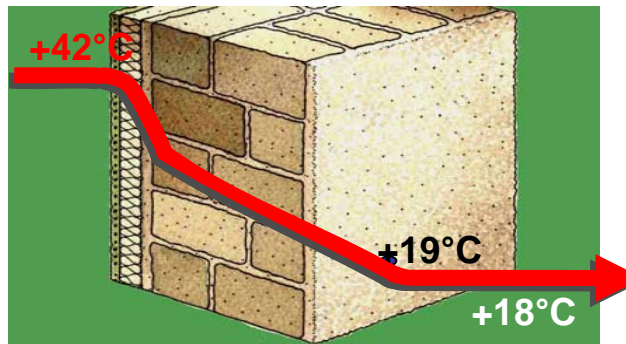
### Ceretherm ETIC System (ETICS) or Combo Wall

→ Wall Insulation against loss of energy through the wall



**Non-Insulation & thermal bridges**

→ blue areas indicate high energy loss



**Thermal Insulation with:**

**ETICS & WINTeQ**

→ red/orange areas indicate less energy loss



# Window and Façade Insulation Systems

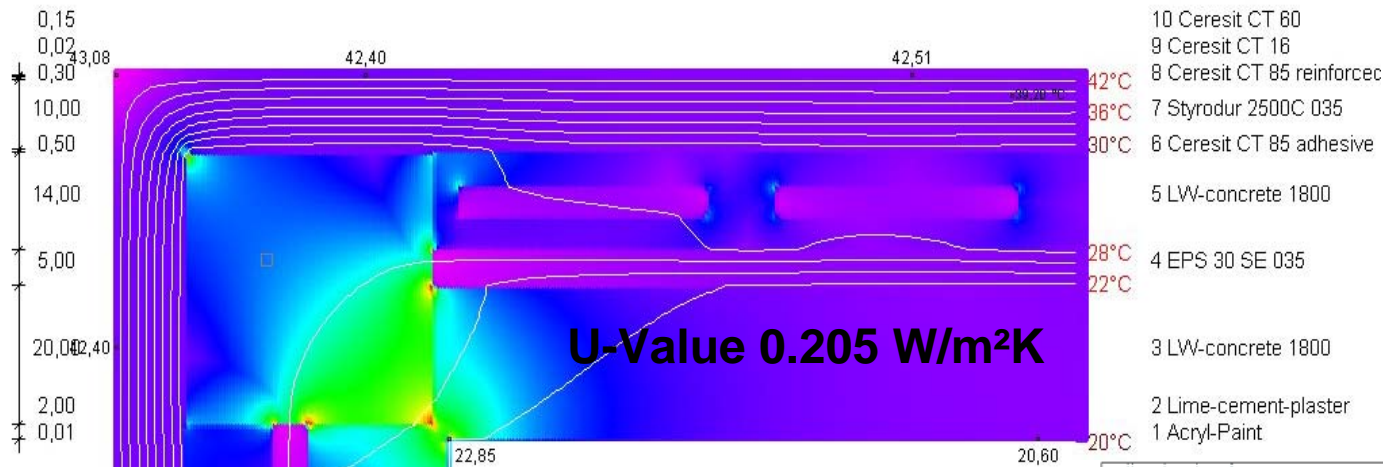


## Multi layer block wall with ETICS or COMBO Wall

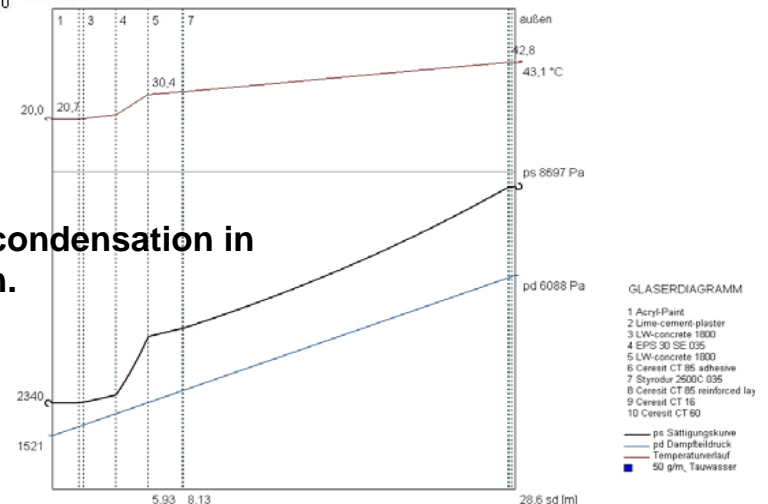
→ Wall Insulation to avoid vapour condensation



Humidity



No vapour condensation in the partition.





# Window and Façade Insulation Systems

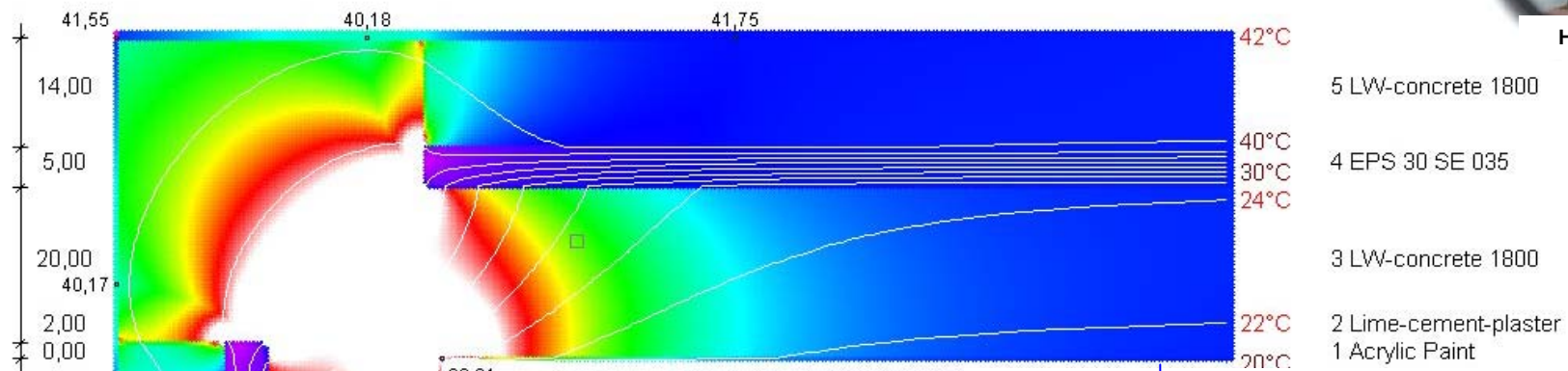


## Multilayer block wall (LW-Concrete with EPS-Insulation)

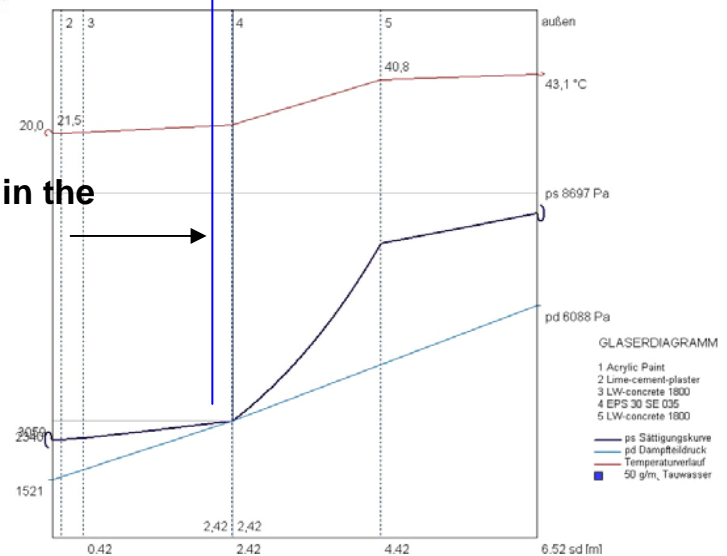
→ vapour condensation in the structure



Humidity



Vapour condensation in the partition: 99,1 g.  
Evaporation: 791,5 g.



Die Taupunkttemperatur beträgt 16,7°C (20,0°C 65%)  
80% relative Luftfeuchte werden bei einer Abkühlung der Raumluft auf 16,7°C erreicht  
 $R_{si} / R_{se} = 0.13 / 0.04 \text{ m}^2\text{K/W}$      $\varphi_i / \varphi_e = 20.0 / 43.1 \text{ °C}$

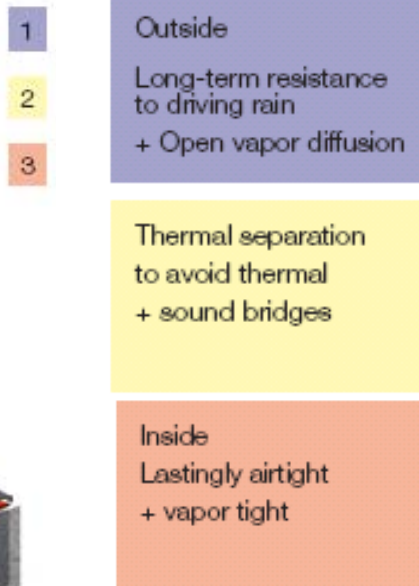
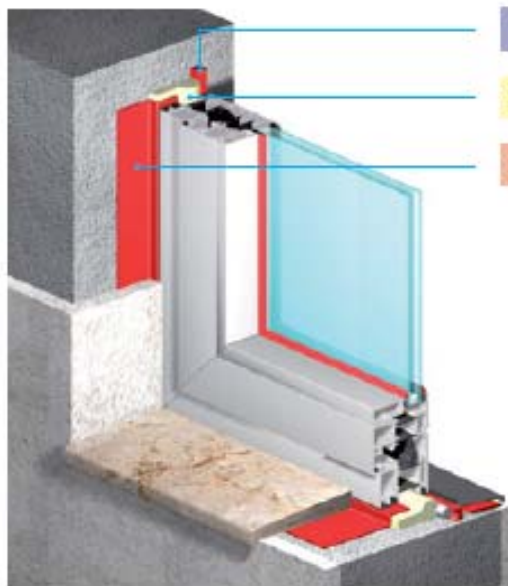


## Window and Façade Insulation Systems



### Window sealant and insulation system WINTeQ

- Joint sealing against energy loss due to convection through the joint between window and wall
- Joint sealing against humidity damages
- Thermal insulation against noise



Energy Loss



Humidity



Noise

**Keep in mind:** An open and unsealed gap of only 1 cm<sup>2</sup> between window and wall causes the same energy loss as 10 m<sup>2</sup> of non insulated outer wall!



## Window and Façade Insulation Systems



### **The main benefits of ETICS and WINTeQ:**

- Reduction of loss of energy and low primary energy consumption.  
→ Savings on the A/C-Bill of 30 to 40 percent possible!
- ROI is insured in between 4 to 5 years.
- Cut back of air pollution and CO<sub>2</sub>-Emissions.
- Protection of natural energy resources.
- Avoiding of thermal bridges and condensation in the construction.
- Comfortable and healthy room climate. No fungus, no climate changes.
- Easy to apply to both new and existing buildings (Re-modeling).
- Variety of finishes with architectural profiles available (like GRC).
- Resistant to hit, dampness, dirt, biological erosion and fire.
- Low emission during the application and usage.
- Long exploitation (min. 25 years according to ETAG 004).
- Light weight construction.



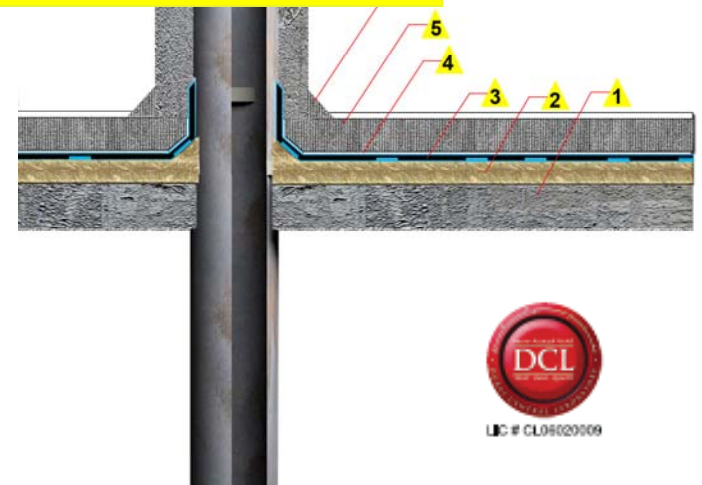


## What is the COMBO-ROOF System by Roofcare?

- Liquid spray-applied system with 4 waterproofing and 1 thermal insulation layer.
- Fully bonded and monolithic system to the structure.
- Special designed to carry loads of 2,5 tons per m<sup>2</sup> without damaging the waterproofing layer.
- Completely approved from Dubai Municipality and tested by DCL.
- Only supply and apply.



Roof Protection System



LIC # CL04020009



## Roof Protection System



### Application of the COMBO-Roof System by Roofcare?



**1. PU-Foam  
Application with  
Spraying gun**



**2. Ready applied  
PU-Foam**



**3. 2<sup>st</sup> layer of WP  
and UV Protection**



**4. Water test**



**5. Sloping and  
Concreting**



**6. Angle fillet and  
jointing**



**7. 3<sup>rd</sup> and 4<sup>th</sup> layer  
of sprayed applied  
WP**



**8. Finished Roof**



## Roof Protection System



### The benefits of the COMBO-Roof System:

- No thermal bridges.
- Supply & Apply Warranty of 25 years.
- U-Value of 0.077 W/m<sup>2</sup>K with Insulation thickness of 45mm (normal system 0.078 W/m<sup>2</sup>K with 100mm EPS instead of 45mm).
- 100 percent bonded system with 4 waterproofing layers.
- 20 percent less weight compared to common systems\*.
- 30 percent less time consuming in installation.
- Easy to separate to enhance a recycling in the future.
- Cost neutral compared to common system.

\* Common system is foam-concrete, WP Membrane, Geo Textile, Loose Foam-EPS, Geo Textile, Mortar bedding and Tiles



# Conclusion

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- **Henkel Polybit established the exclusive company concept for the GCC region which offers **ENERGY SAVING** systems & solutions combined with moisture protection and waterproofing.**
- **The BES can help to cut down the energy consumption and CO<sub>2</sub> emissions efficiently and improves the U-Value of the structure.**
- **The BES can contribute to you LEED certification as per the consultants calculation and customers requirements.**
- **The BES, (except waterproofing), is only applied by the own, best trained and skilled application teams (RoofCare) to insure highest quality in appearance and workmanship.**
- **Henkel is thinking “green” and innovates further...**
  - **Dust Free tile adhesives and levelling compounds**
  - **5 years anti-fungus sealant and grouting**



## Please keep also in mind...

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→ Nobody should anymore hesitate and start saving energy, reducing air pollution and CO<sub>2</sub>-emission for our all future.

**An Example:** A house with external wall area of **130m<sup>2</sup>** shows an **U-value** of **1,76 W/m<sup>2</sup>K**.

By using an **ETICS** the **U-value** is being improved to **U=0,28 W/m<sup>2</sup>K**.

→ The in 40 years saved energy would be enough to drive **830.000 km** with your car, **that means to 20 x around the world.**

→ Henkel is thinking **“green”** since decades and is supporting the **“Green Building Initiative”** of HH Sheikh Mohammed bin Rashid Al Maktoum since years.

→ **“Green” Technologies are “not only” efficient and environmentally friendly. They...**



# Please keep also in mind...

... protect the occupants and the structure!





# Please keep also in mind...

... look nice and are a part of the design!

**before**



**during application**



**after**





# Please keep also in mind...

... and are long lasting and stable!







Thank you for  
your attention



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## Window and Façade Insulation Systems

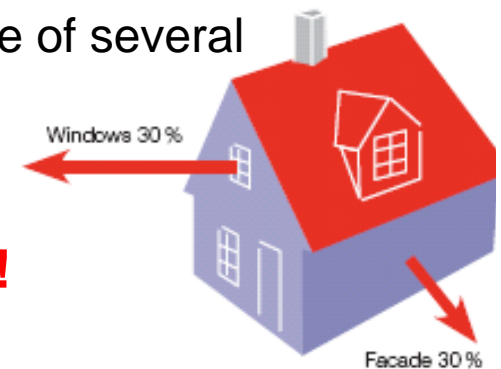


### Energy saving – a global issue:

- Development of Energy Consumption and Global Population 1990 to 2010.



- Extreme increase of energy costs in the last years because of several reasons.
  - Global decrease of fossil fuel reserves.
- ➔ **Increasing need and demand for Energy Saving!**



$\lambda$



## Thermal conductivity coefficient

The amount of energy flowing through the material with the thickness of 1 m and the area of 1 m<sup>2</sup> at the temperature difference of 1°C [W/mK]

0,04 W/mK for mineral wool

0,04 W/mK for Styrofoam FS 15

1,00 W/mK for cement-lime plaster

0,25 W/mK for aerated concrete wall „500“

$$R = \frac{d}{\lambda}$$

**Thermal resistance**



Resistance to energy flow through the material with the thickness  $d$  [m] and the area of  $1 \text{ m}^2$  [ $\text{m}^2\text{K}/\text{W}$ ]

2,5  $\text{m}^2\text{K}/\text{W}$  for mineral wool thickness 10 cm

2,5  $\text{m}^2\text{K}/\text{W}$  for Styrofoam thickness 10 cm

0,015  $\text{m}^2\text{K}/\text{W}$  for cement-lime plaster thickness 1,5 cm

0,96  $\text{m}^2\text{K}/\text{W}$  for aerated concrete wall „500“  
thickness 24 cm



$$U = \frac{1}{R_{si} + \sum R_{\lambda} + R_{se}} \quad \text{Heat transfer coefficient}$$

The amount of energy flow for 1 s through the partition with the area of 1 m<sup>2</sup> at the temperature difference 1°C [W/m<sup>2</sup>K]

1,0 W/m<sup>2</sup>K - thermal resistance 0,04 and 0,13 W/m<sup>2</sup>K

# Daily humidity gains in the flat:



(the flat area 55m<sup>2</sup>, height 2,5m, inhabited by 4 person family)

• humidity gains from occupants:	3,6 kg/d
• humidity gains from cooking and washing	2,8 kg/d
• humidity gains baths and showers	2,5 kg/d
• humidity gains from laundry	1,2 kg/d
• humidity gains from pot flowers	1,9 kg/d
• others	0,2 kg/d
<b>Total</b>	<b>12,2 kg/d</b>



~~$s_d = \mu \cdot d$  Relative diffusion resistance~~

Thickness of air layer which has the same diffusion resistance as that of the given material with the thickness  $d$  [m]

0,15 m for mineral wool - thickness 10 cm

5,90 m for Styrofoam – thickness 10 cm

0,24 m for cement-lime plaster -thickness 1,5 cm

0,65 m for aerated concrete wall „500” thickness 24 cm

Approx. 0,05 m for mineral plasters – thickness 2 mm

Approx. 0,5 m for resin plasters -thickness 2 mm



# Dependence between temperature and air humidity

