iReflex

Radiation Reflection Indoor & Outdoor

A member of ALTANA

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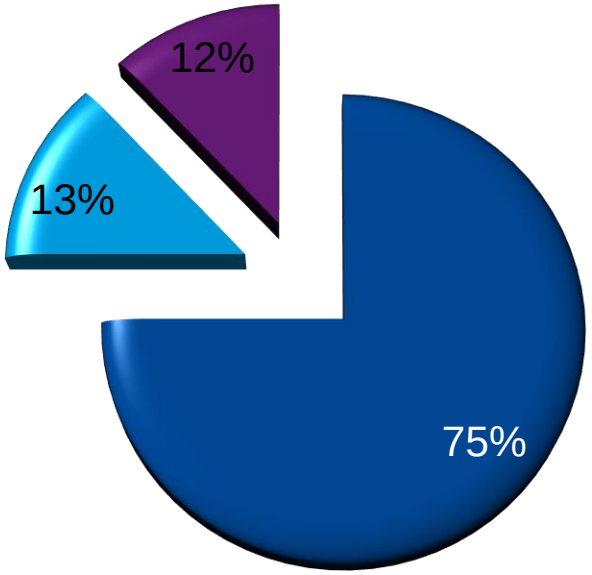
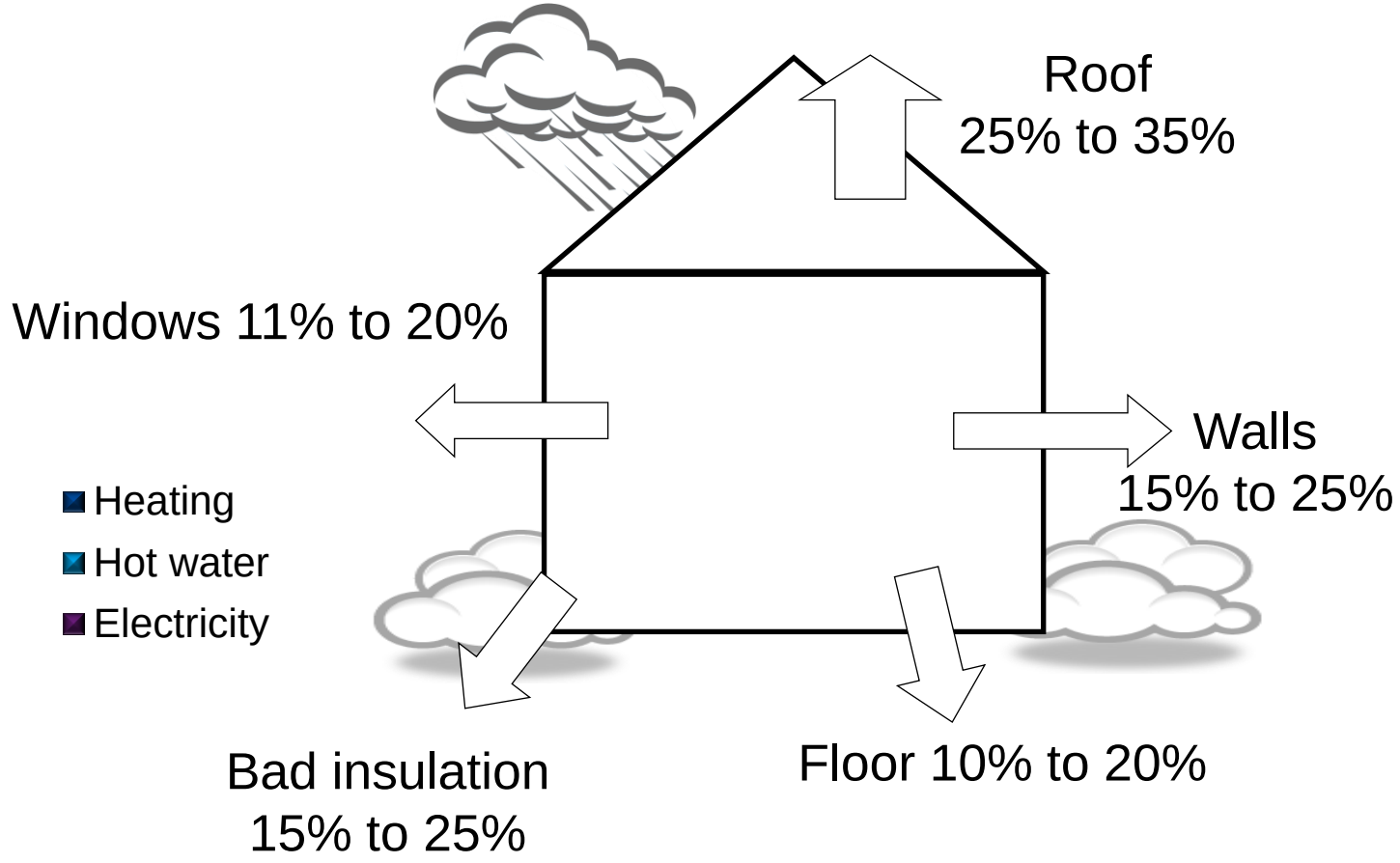
Energy Balance in Buildings





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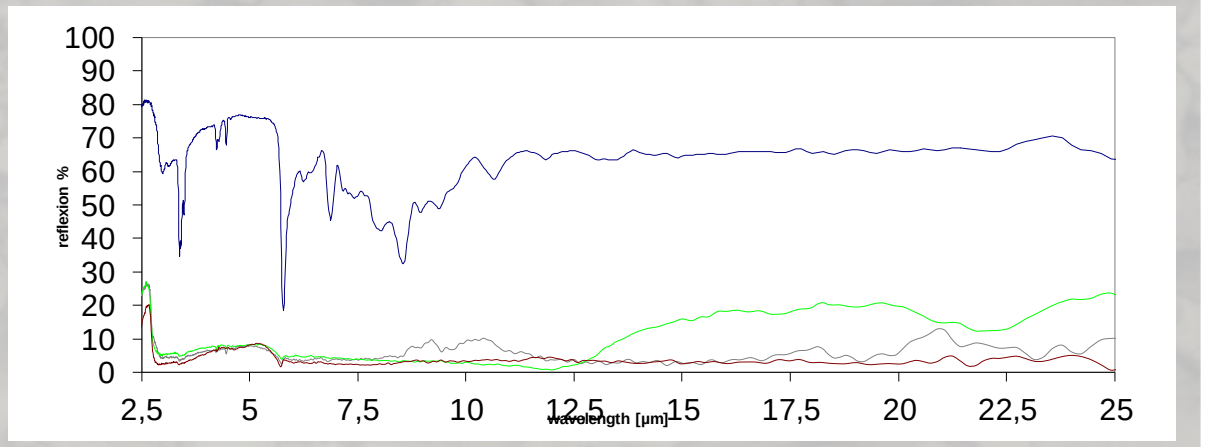
Aluminum Flakes as Reflectors

- Metal / aluminium provide high heat reflective properties
- The coarser the metal pigment, the better are reflective properties
- Flake shaped particles work like a mirror and best suitable
- STAPA Hydroxal E 212



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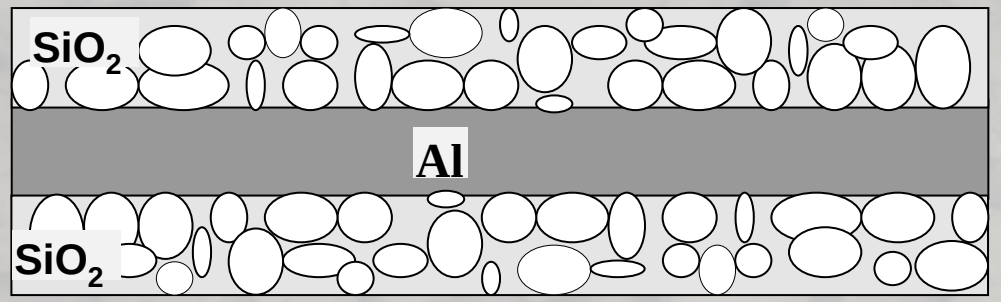
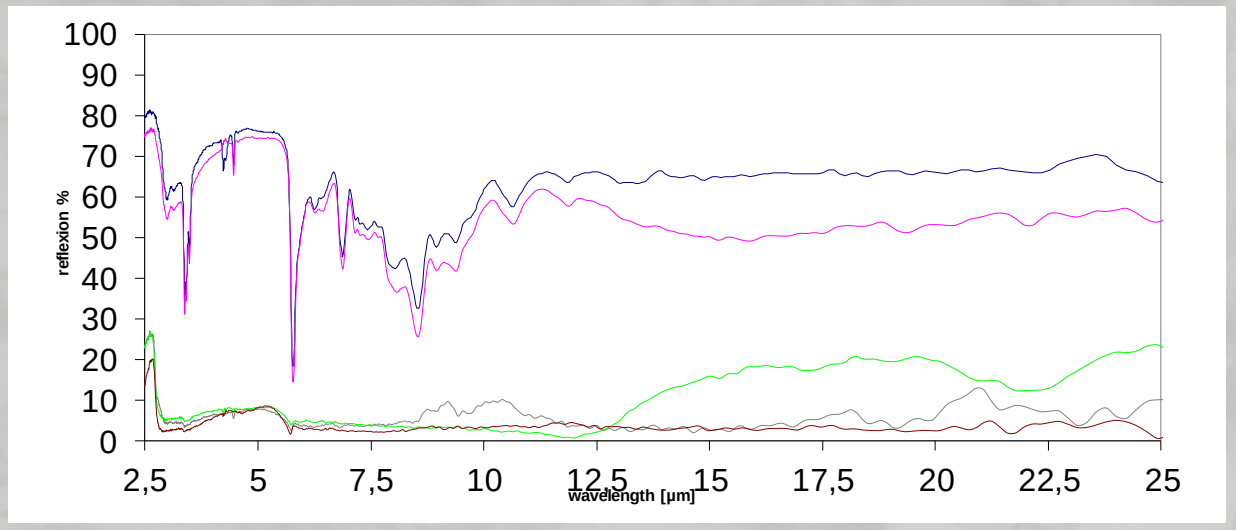
ECKART Solution: iReflex



- Off white
- Price level to be considered
- Tintable to a varity of colours



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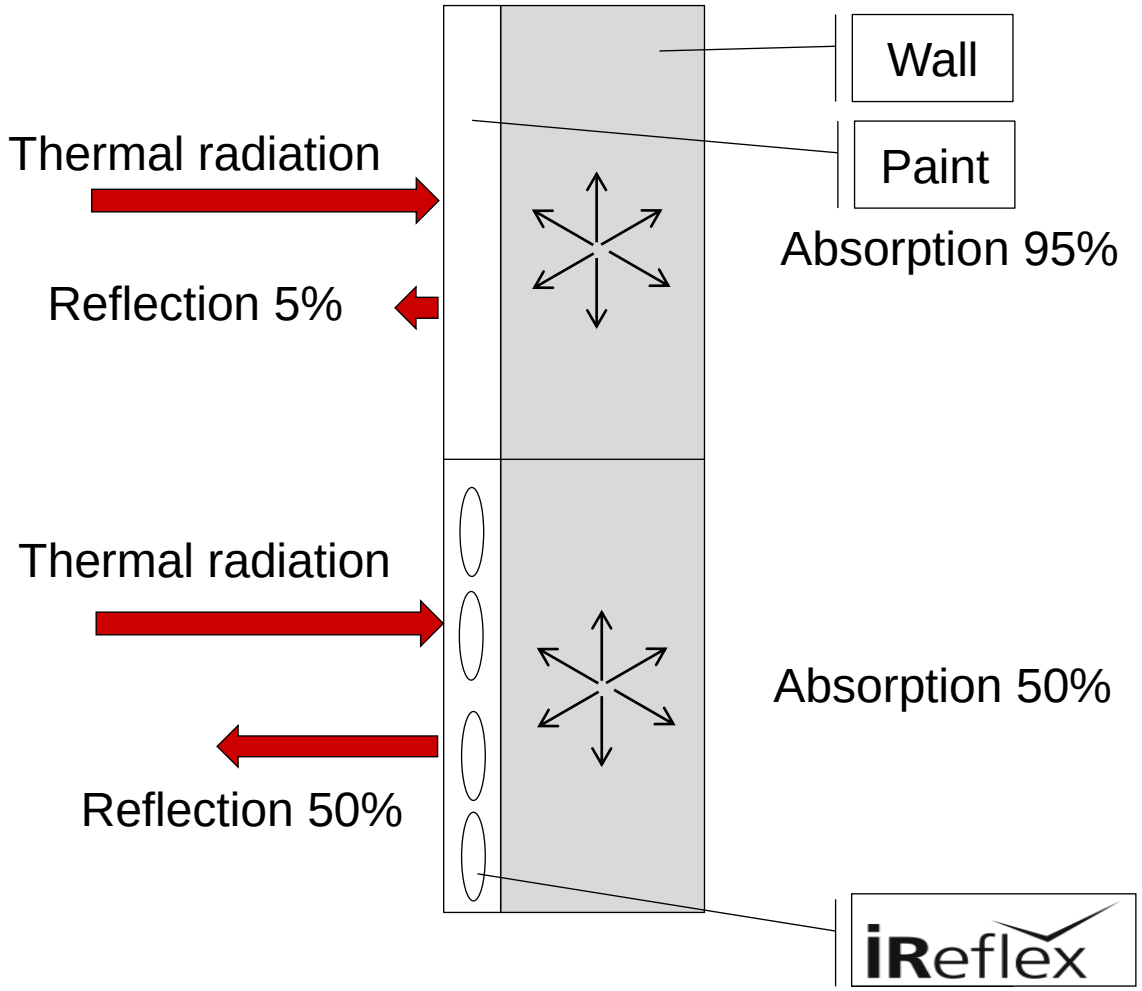
Reflectivity of Radiation: Interior

Standard white paint

Paint containing IReflex



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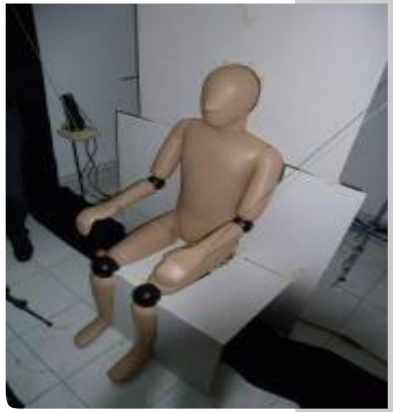
Independant Study

Bauhaus-Universität Weimar



Independent study conducted at BAUHAUS UNIVERSITY* in Weimar

*Faculty of Construction Physics.

- Inhouse application in air conditioned chamber
- "Feelix“ wired with 7 km of electrical cables and sensors to mimic human body`s thermal comfort
- Comparative testing
  standard white wall paint vs. IReflex containing wall paint

Test conditions:

- Underfloor heating
- Outside temperature: -5 °C
- Initial room temperature: +21 °C
- Painting: based on Shinedecor IReflex 5000 White with a 50% reflection value
- Feelix heat flow density: q = 70.2 W/m² - Comfort point of an average human body

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Independant Study:

Simulated room	Type of construction	Wall temperature of exterior wall inner side	Saving
two walls facing outside and ceiling	Old building	14,7 °C	**22 %**
	Building of the 1970	16,4 °C	19 %
	Passive House	**19,6 °C**	**16 %**
just a wall facing outside	Old building	14,7 °C	17 %
	Building of the 1970	16,4 °C	17 %

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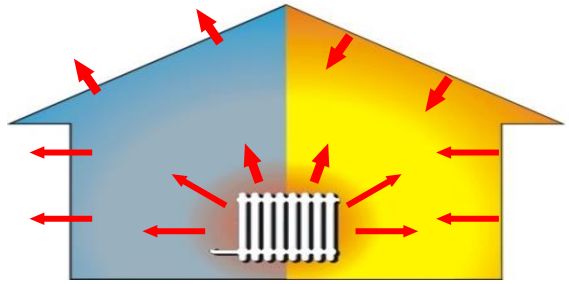
Radiation indoor vs. outdoor

Interior

Thermal radiation
Objects such as radiators, walls, and humans emit MIR (20-100°C)

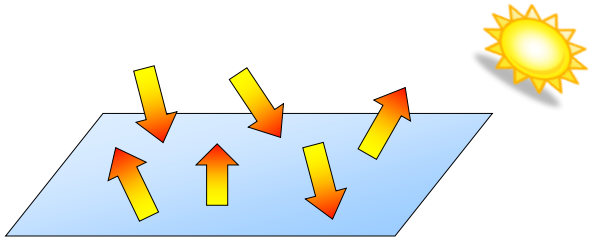
Desired functionality
-Reduction of energy consumption
reflection of heat inwards.
- Thermal comfort .



Outdoor

Solar radiation
Spectrum UV / Visible / NIR

Desired functionality
Reduction of heat inside the home through the reflection of heat towards the outside.



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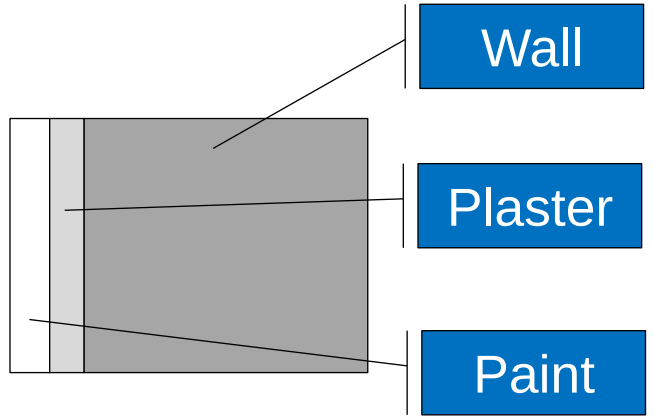
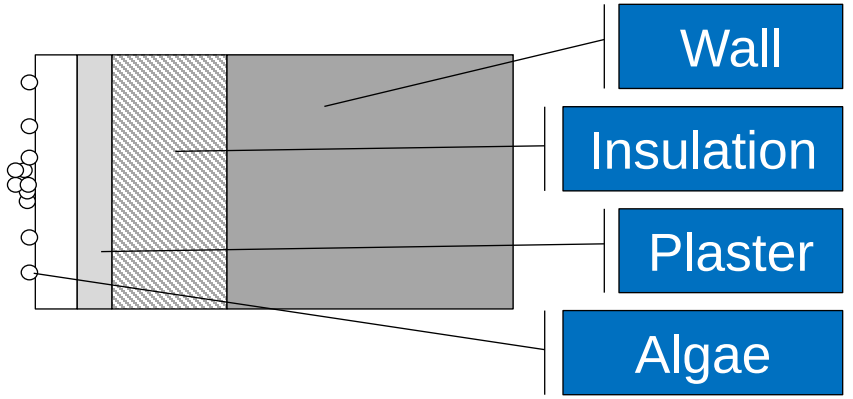
Outdoor: Growth of Algae and Mildew

Exterior wall without insulation (old buildings)
-> wall surface temperature higher than environment
-> no microbial attack



Energy efficient wall; perfectly insulated
-> wall surface temperature lower than environment
-> water condensation
-> microbial attack (algae / mildew formation)
and subsequent degradation



Use of toxic biocides is common (short term efficiency).

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IReflex in exterior applications:

- Preventing water condensation on the facade stops the growth of microorganisms.
- Exterior wall coat with low emission paint containing IReflex
- Low-emission paints retain more heat in the plaster and release it over a longer period of time.
- In this way the facade remains warmer reducing the formation of condensation water
- No formation of algae and mildew

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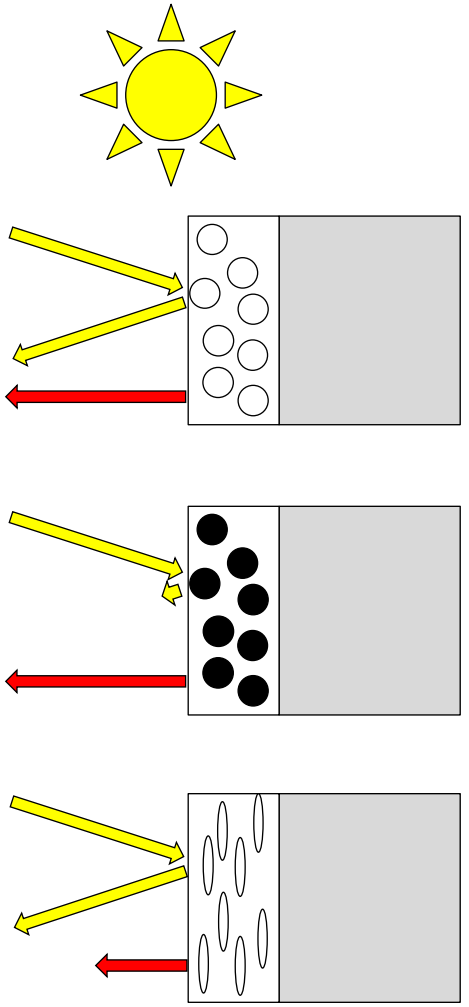
IReflex in exterior applications – mode of action

- Highly reflective (white) wall
  sunlight is reflected; high emissivity ε = 0,9
  wall gets cool

- High absorptive (black) wall
  sunlight is absorbed; heat build-up; high emissivity ε = 0,9
  cooling during night

- Low emissivity wall with IReflex
  low heat emission ε = 0,3 -0,7 (depending on formulation)
  no cooling; no algae / mildew



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Independant study

- Fraunhofer Institute for Construction Physics
- Holzkirchen (nearby Munich), a very rainy and windy area
- Initial results confirm for low emissivity paint with significantly reduces water condensation on exterior walls.
- After 3 ½ years of exposure: no growth of algae and mildew
  while “normal” exterior walls displayed algae and mildew growth

Thank you for your attention