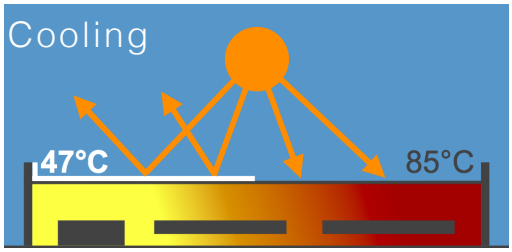
DAIKIN

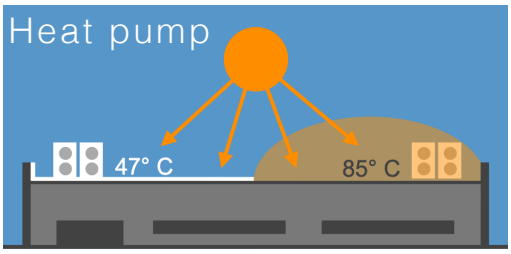
- COOLING
- DURABILITY
- ENERGY EFFICIENCY

THE CONCEPT

PROFLEXUM

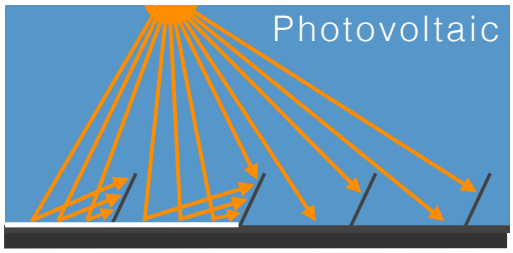
The combination of protecting (**pro**tect) and reflective (re**flex**) properties form the foundation of the **PROFLEXUM** concept. Additional elements derive from the overall analysis in combination with heat pumps and photovoltaic systems.

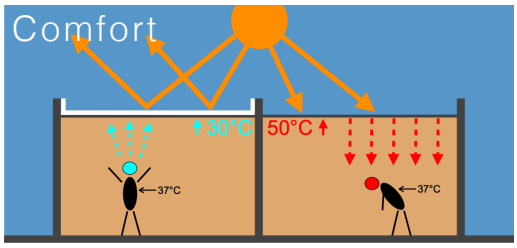


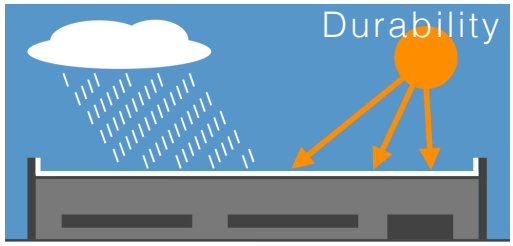


PROFLEXUM

is the sustainable concept for passive cooling, heat pumps, increased efficiency, reduced loads, improved power production levels and durable protection.







Buildings with **ZEFFLE IR** - coating on one hand achieve a passive cooling effect which reduces the cooling load. On the other hand **ZEFFLE IR** lowers the ambient air temperature, which reduces the power consumption of heat pumps in cooling mode.

In combination with photovoltaic modules, the **PROFLEXUM** concept comes to its full advantage. **ZEFFLE IR** - coating increased photovoltaic yields, typically coincidence with the operation of heat pumps in cooling mode, which allows cooling by renewable energy.

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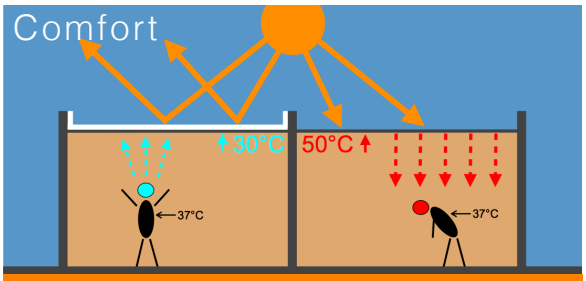
Passive cooling = Better Cooling

Drastic reduction in temperature on the roof skin

The characteristics of the roof surface have a crucial impact on the climate of the building underneath.

Conventional roof surfaces, such as bitumen, reach temperatures above 80°C when exposed to direct sun radiation, with the consequence that a pleasant working environment through the increased temperature is not possible.

ZEFFLE IR reduces the temperature of the roof surface dramatically, creating an effective passive cooling effect.



- Remove awful indoor climate
- No more sweating
- 100% comfort increase: your body releases heat easily when surface temperature is below body temperature
- High concentration & work efficiency
- Good climate at your working place

Cooling means reducing the temperature

It is easy to actively cool through an air conditioning system, which means dissipating heat under the current use of electricity.

Passive cooling is a big challenge. It means dissipating heat from the inside, and avoiding the induction of heat from the outside, without device-related expenses.

Passive cooling with ZEFFLE IR

- No heat induction due to reflection

- Dissipation of internal heat sources, as ZEFFLE IR enables the transmission of heat to the outside. Well-insulated buildings instead would block heat transmission (effect of a thermos bottle).

The reduced temperature of the roof, forms the foundation for effective passive cooling!

The roof... The buildings protection shield

Each roof is designed to protect against rain, wind and snow. To keep these basic qualities, it is necessary to protect from UV-radiation, reduce weathering influences and stress for the roof construction, which leads to material exhaustion. Especially extreme temperatures on the roof are causing eternal expansion and contraction of the different materials. This implies a thermal load on the waterproof membrane and affects the layers of the roof structure, especially at corners, edges and joints.

By lowering the temperature of the roof surface, as a result of the ZEFFLE IR - coating, the protective qualities of the roof will be preserved permanently. The protective properties of the ZEFFLE IR - coating are augmented by its corrosion- and chemical resistance, and are preserved by **EasyClean** - the systematic avoidance of adhesions.

- *Highly Reflective - SRI=113* *(Solar Reflectance Index)*
- *UV protection*
- *Weatherproof*
- *EasyClean - no adhesions*
- *Corrosion Resistant*
- *Chemical Resistant*
- *Extreme durability*
- *Lifetime of 20 to over 25 years*

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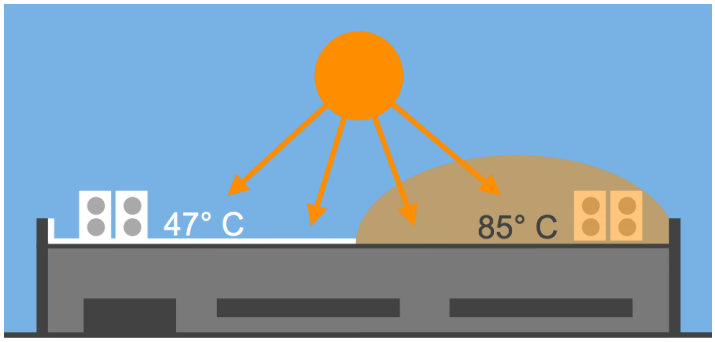
Efficiency enhancement of heat pumps

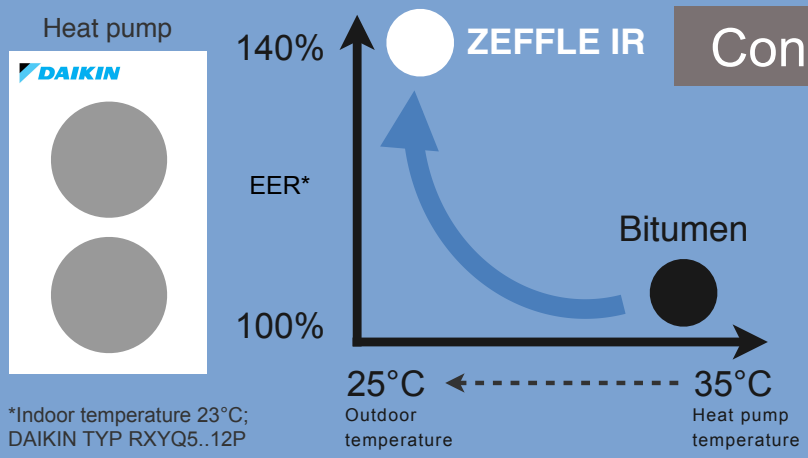
In cooling mode, heat pumps are directing heat from the building to the environment, such as outdoor air. The heat output must be at a higher temperature level in comparison to the outdoor air temperature.

The higher the outdoor air temperature, the more energy effort is required to transport the heat. Consequently, on a hot day operating costs for cooling are higher.



On a clear day, roof surfaces are exposed to direct sun radiation. A heat pocket is formed above the roof surface with air temperatures significantly above the surrounding environment.

For safety, practical and optical reasons, outdoor heat pump units are placed, in the majority of cases, on the roof surface.

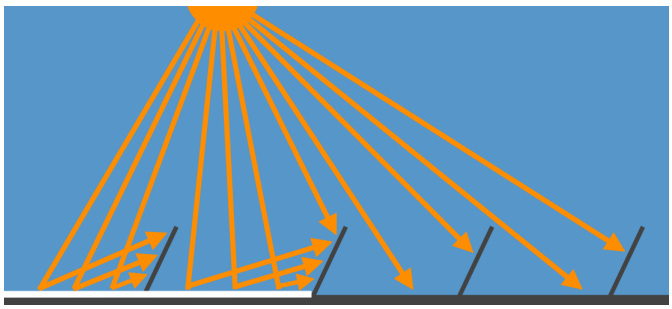


*Indoor temperature 23°C; DAIKIN TYP RXYQ5..12P

Consequence = 40%

A heat pump installed on a roof with bitumen surface has a much higher operating temperature, as the same heat pump installed on a roof surface with **ZEFFLE IR** - coating. Even if this difference in temperature is only 10°C, there is an enormous increase in efficiency of approximately 40%*.

More power for photovoltaic



Photovoltaic modules convert not only the direct sunlight radiated upon them into electricity, but also the indirect and diffuse radiation caused by the reflection of clouds and surrounding surfaces.

- ***Converting direct and diffuse radiation***
- ***Benefit for new and existing PV - systems***
- ***Increasing efficiency by lowering operating temperature of PV - modules***
- ***Increase of radiation on PV - modules to maximize power output***
- ***Increasing winter half-year yield without negatively affecting the profitable summer half-year***

It is known that the efficiency of converting light into electricity of a photovoltaic system will be affected negative the higher the operating temperature of the photovoltaic module. Therefore, the yield on days with high ambient temperature is lower. ZEFFLE IR reduces operation temperature and consequently increases the yield.

The durability and sustainability of ZEFFLE IR overlaps with the usual planning horizon of the photovoltaic investment range of 20 years.

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ZEFFLE

DAIKIN´s ZEFFLE IR - coating is successfully used since 2006 for example in the transport sector. Ships and other vessels are protected passively against excessive thermal warming.

The sustainable, efficient and extremely durable innovative product named ZEFFLE IR, was awarded in 2009 with the world's most prestigious Lloyd's Award.

DAIKIN has consistently and continuously developed and enhanced ZEFFLE™IR and starts now through the company TECNEXUM a targeted and customized application for buildings.

ZEFFLE IR is now ready for the application on the commonly used bitumen, metal and concrete construction components.

Lloyd's List GLOBAL 2009 AWARDS

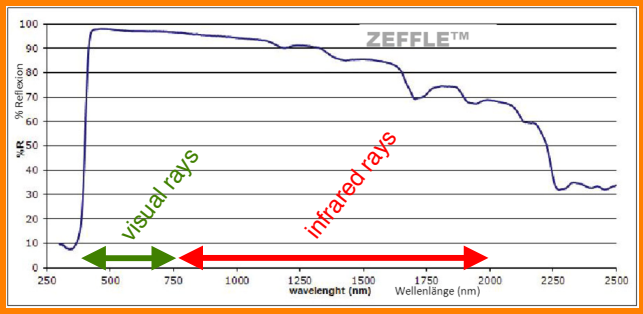
Which reflection properties define ZEFFLE IR?

Different surfaces have unique, sometimes higher, sometimes lower, reflective properties for a particular range of the light spectrum.

This knowledge has been used for centuries in the architecture of southern, warmer states.

ZEFFLE IR is specifically designed to maximize the reflection, and offers these effects in a single product.

- ***Highly efficient wideband reflection of sunlight***
- ***ZEFFLE IR treats 90% radiated light energy and includes the weightier infrared part of the light spectrum***
- ***Conventional bright surfaces reflect mainly the visible part of the light spectrum, which only makes about 40% of the energy input***



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