

ClimateCoating®

Reflective Membrane Technology



TSR = 91.4 %

SRI = 111.4

THE = 88 %

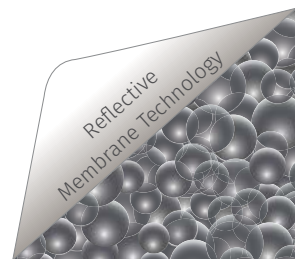


ThermoActive

Reflective roof coating with excellent cooling performance



GERMAN
INNOVATION
AWARD '18
WINNER



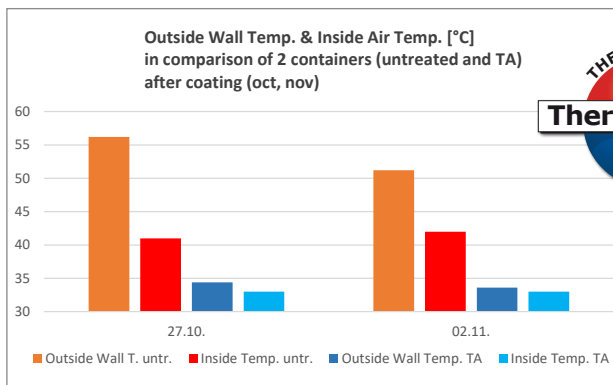
ThermoActive – the roof coating with cooling effect

ThermoActive extends the life of the roof structure and reduces the temperature inside the building. This protects the roof structure and reduces the energy demand of the air conditioning systems.

The innovative formula in combination with its high-quality materials ensure that a flexible and reflective membrane with excellent properties is formed after the coating is applied:

- very high sunlight reflection
- long-term material durability
- above-average elasticity and robustness
- waterproof and able to withstand heavy rainfall
- temperature resistance from -40 to + 150°C

ThermoActive acts like a passive air conditioner due to its properties and ensures cooler rooms under hot sun.



Container Test 2016, Doha, Qatar, by CLAVON ENGINEERING QATAR W.L.L

High reflection values – almost like snow

ThermoActive roof coating can reflect over 91% of the sunlight. This is a proven peak value. Pure snow reflects 100% of the sunlight.

Cost reduction through passive air conditioning

The reflective *ThermoActive* coating absorbs moisture, which evaporates and cools when exposed to sunlight. It works even if the roof is not coated in white. Relatively high cooling performance through evaporation is achieved even with darker colors.

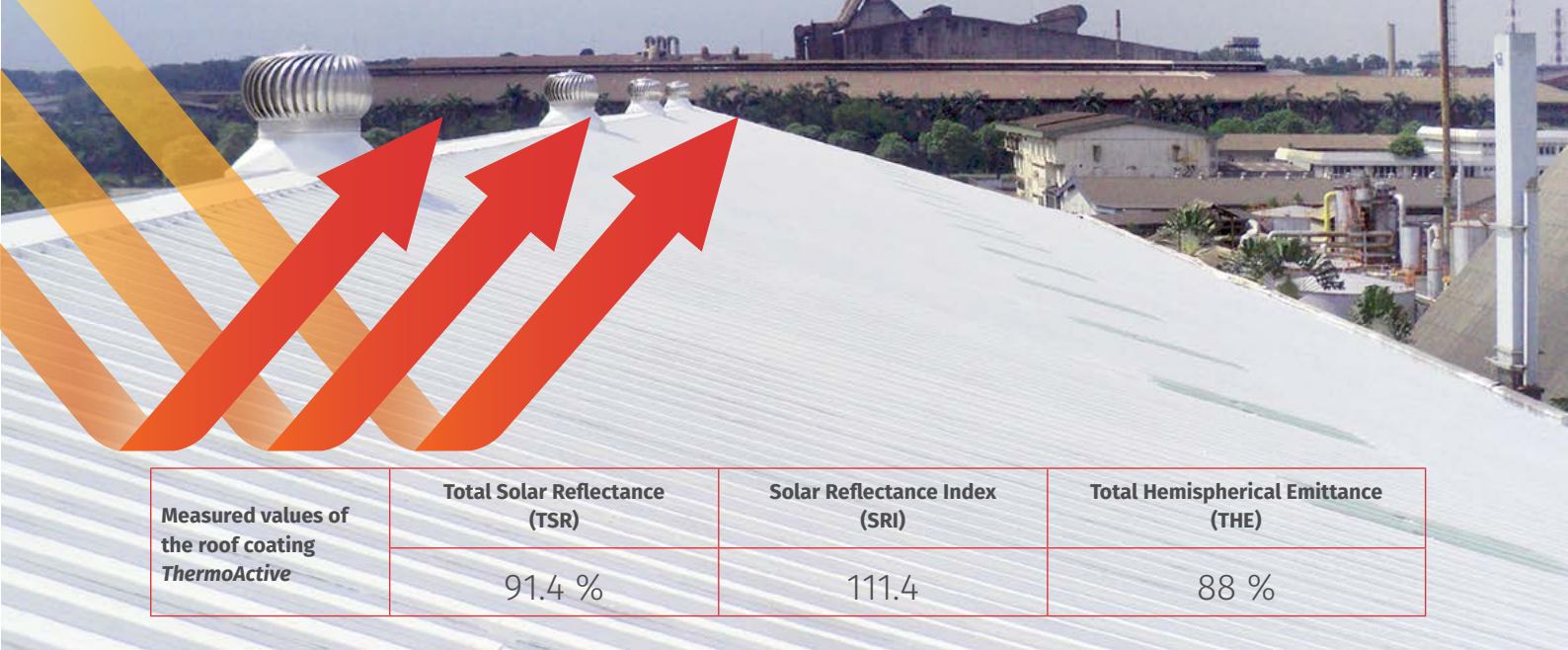
This leads to a reduction in cooling related energy consumption and consequently in a reduction in CO₂ emissions.

Extended service life of the roof construction

The excellent elasticity of *ThermoActive* makes it possible to bridge roof cladding joints without any problems and that at temperatures from -40°C to +150°C. The roof remains waterproof.

The coating is extremely robust and can resist environmental influences such as acids, alkalis, ozone, nitrogen- and sulfur oxides. The coating is also extremely UV-resistant and has an excellent long-term stability. The coating doesn't brittle, flake or weather.

All together this extends the life of the roof construction and reduces maintenance costs.



Measured values of the roof coating <i>ThermoActive</i>	Total Solar Reflectance (TSR)	Solar Reflectance Index (SRI)	Total Hemispherical Emittance (THE)
	91.4 %	111.4	88 %

The problem with heating up and cooling

The urban heat island effect

Cities have their own climate, which is characterized by urban development and emissions. The temperature in the city is generally higher than in rural areas. The difference reaches up to 10 degrees Celsius. The temperature is among other things impacted by the thermal properties of the building material and the radiation properties of its surfaces. Further influencing factors include the geographical location and build up of cities, their geometry and the distribution of its buildings, as well as traffic, industry and human behaviour. It creates an urban island heat effect which impacts human health and nature:

- thermal stress on the human body
- higher energy consumption of air conditioning systems
- higher number of warm days and hot nights

Air conditioning systems emit warm air into the environment during the cooling process and consume electrical energy. The International Energy Agency (iea, France) estimates that the energy consumption of air conditioning

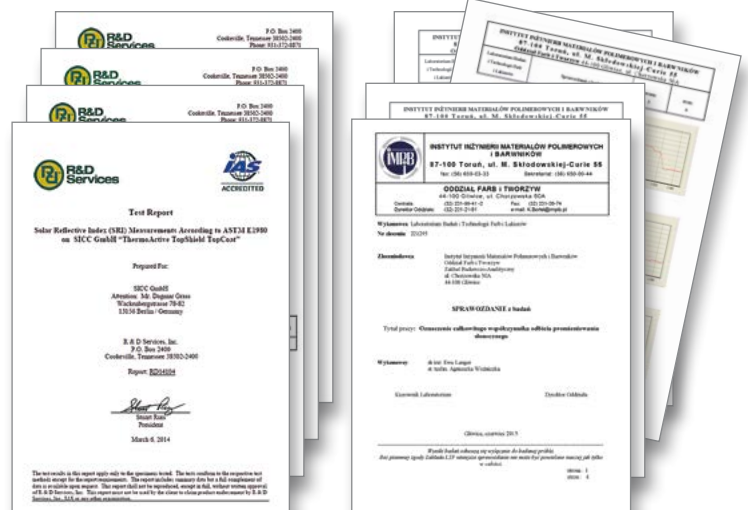
Table above: Reflective coatings with significant effect for roofs. The SRI is calculated according to the American standard (ASTM). Values above 110 are considered maximum values.

Figure on the right: R&D Services, Inc, Cookeville, TS (IAS accredited), Initial CRRC* Test Results Report, March 2014 (CRRC = Cool Roof Rating Council). IMPiB Test Report, Department of Paints and Plastics, Research and Analysis in Gliwice/Poland, June 2015.

systems is expected to triple worldwide by 2050. This requires solutions that smartly reduce power demand, minimize greenhouse gas emissions (CO₂) and limit the impact of the urban island heat effect.

Reflection as part of the solution

Part of the solution is to prevent the roofs from heating up by maximizing the reflection of solar radiation. The innovative *ThermoActive* roof coating was developed precisely for this purpose. It reflects 91.4% of the sunlight (see table above). The *ThermoActive* reflective membrane technology further provides additional cooling of the roof through an evaporation process.



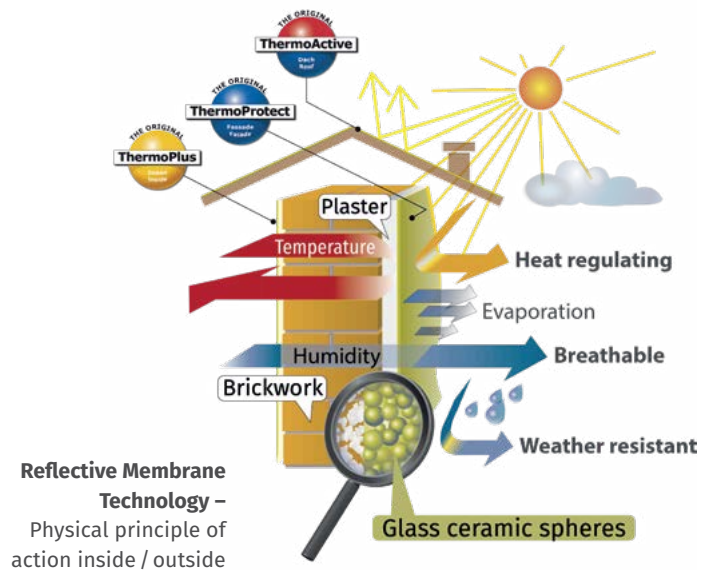
Reflective Membrane Technology

The secret lies in specially developed glass ceramic spheres which enclose a vacuum. Combining these glass ceramic spheres with a strong adhesive and specially developed dispersion as well as activators creates a „liquid ceramic heat shield tile” in the figurative sense, which forms a reflective membrane upon application.

The effect of the reflective membrane technology is better understood as part of the physical processes which typically apply various forms in buildings including reflection, directed evaporation, anti-electrostatics and material resistance. These special properties are combined in the *ThermoActive* roof coating and other products under the *ClimateCoating*® brand.

Practical problem solutions

ClimateCoating® products offer practical solutions to several problems and effectively eliminate, prevent and avoid mold, fungi, algae, mosses; brittle, dirty facades and moisture ingress due to hard rain on roofs. The heating load of e.g. roofs, interiors, containers, pipelines, or tanks is significantly reduced. This results in benefits related to e.g. time, reduced budgets, healthier living conditions and better protection of building structures. *ClimateCoating*® products are water-based and solvent-free.



The products, which are based on the unique reflective membrane technology, help to save material, energy and labour resources, sustainably protect expensive building materials, preserve values for future generations and protect the environment.



German Innovation Award 2018



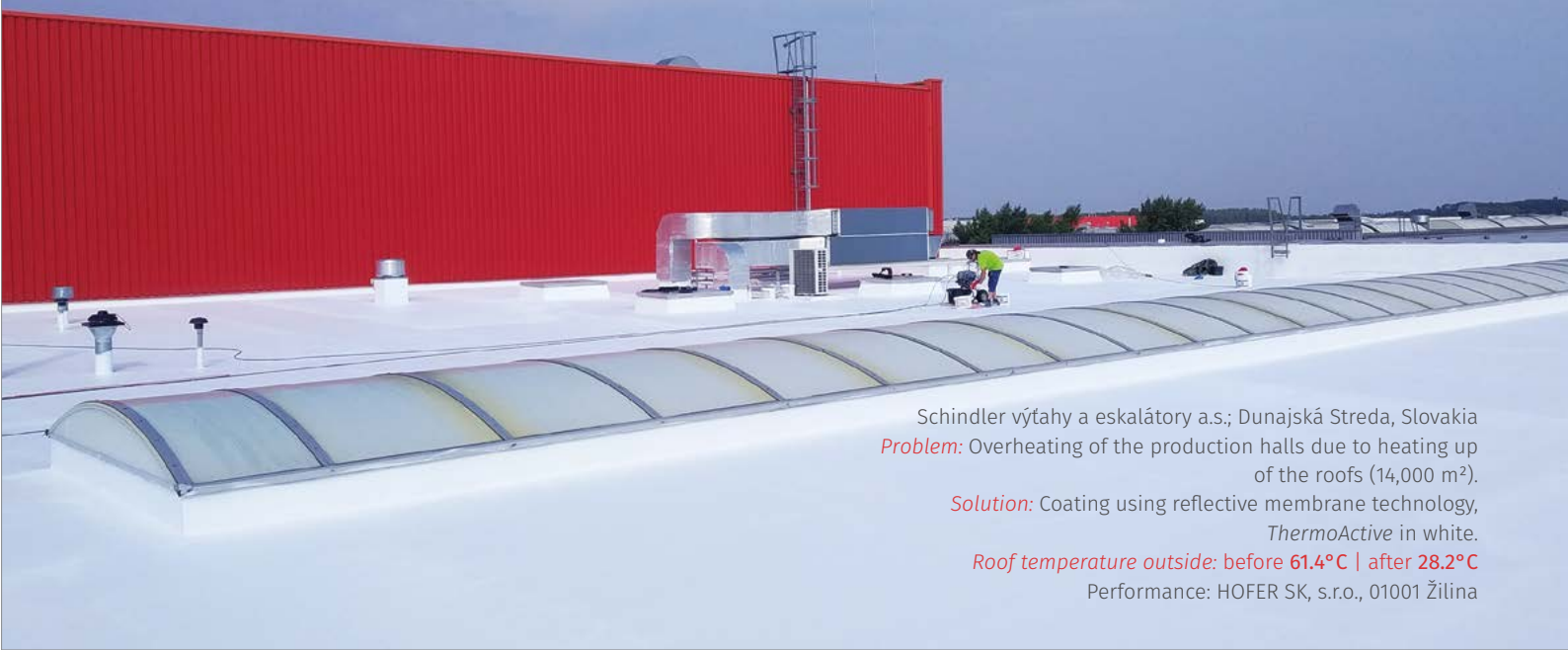
Singapore Energy Efficiency Award 2018



**Less energy consumption for cooling
= reduction of CO2 emissions = active
contribution to climate protection. >**

ThermoActive carries the „Greenguard” certificate in gold. This means that the product fulfils one of the world’s strictest standards for chemical emissions. *ThermoActive* also fulfils the requirements of the ANSI/CRRC S100 standard and the CRRC-1 programme manual of the Cool Roof Rating Council (CRRC).

„Architects, civil engineers, energy consultants, politicians, please contribute to mitigate the urban heat island effect, optimize the energy efficiency and environmental compatibility of buildings. Use the potential of *ThermoActive*.”



Schindler výtahy a eskalátory a.s.; Dunajská Streda, Slovakia
Problem: Overheating of the production halls due to heating up of the roofs (14,000 m²).
Solution: Coating using reflective membrane technology, ThermoActive in white.
Roof temperature outside: before 61.4°C | after 28.2°C
 Performance: HOFER SK, s.r.o., 01001 Žilina

Areas of application, properties and processing

ROOF TYPES



- flat roof
- pointed roof
- pitched roof
- for industrial buildings,
- commercial real estate and
- private houses

MATERIALS



- ferrous metal
- non-ferrous metal
- plastics
- synthetic fibres
- old and new plaster
- intact old coatings

CLIMATE ZONES



- warm temperate climate
- subtropical climate
- tropical climate
- cold temperate climate

CUSTOMER GOALS



- saving of cooling energy
- surface robustness
- water tightness against driving rain
- reduction of thermal stresses



The reflective roof coating with excellent cooling performance.

- reflects solar radiation by more than 91%
- significantly reduces energy consumption
- acts as a passive air conditioning system
- extends the life of the roof construction
- reduces operating and maintenance costs



PROPERTIES

- sunlight reflecting
- high and durable UV-resistance
- weather-resistant
- elastic
- gab/joint bridging
- high resistance against acids, alkalis, ozone, nitrogen and sulfur oxides



COLOUR TONE

- 100,000 color shades
- high colour stability

PROCESSING

- paint roller
- brushing
- spraying method



PACKAGING UNITS

- 19.0 (= 5.02 gal) / 12.5 / 5.0 l
- Consumption: 600 ml/m² on smooth, not highly absorbent surfaces with 2 applications
- with additional fiber embedding up to 1,000 ml/m² with 2-fold application



ThermoActive – the robust and water-resistant roof coating that keeps rooms cool under hot sun. We would be pleased to help you solve your problem.

www.climatecoating.com/en/products/thermoactive



Practical example, Malaysia

Temperature reduction of more than 20 degrees Celsius through ceramic coating with simultaneous protection against water, corrosion and the effects of chemicals.

Malaysia, especially the western part, is exposed to a hot and humid climate all year round. Metal components are exposed to a far higher thermal and oxidative stress compared to Central Europe. This makes finding smart solutions related to water and heat all the more urgent.

Initial situation and problem

A 15,500 m² metal roof of a customer in the Pasir Gudang Industrial Area was rusty and leaking. Rust deposits trickled from the inside of the roof to the ground. When it rained, water penetrated the roof in several places and dripped into the hall. The inside temperature under the roof reached almost 60°C which was unbearable and exposed employees to a high heat load. Cooling costs were accordingly high.

Idea and solution

In a multi-stage process the roof was de-rusted and cleaned inside and outside. The fastening elements, screw holes and roof joints were closed with fleece. Then everything was coated with a rust-retardant primer and subsequently with *ThermoActive* by spraying.

These tasks had to be solved:

1. eliminate leaks in the roof
2. prevent rust and particle detachment
3. significantly reduce the internal temperature of the hall



Industrial hall in Malaysia.
Hall roof outside (before-after): The roof coating reduced the surface temperature by 24.7°C.



Hall roof inside (before-after): The temperature was reduced by 19.3°C. Use: Improved working conditions, energy saving, cost reduction of roof maintenance.

Conclusion

The cooling effort could be reduced significantly. The thorough renovation and the special product properties of *ThermoActive* also save operating and maintenance costs in the long term.

Temperature °C	before	after	Temperature reduction by
Roof Outside	64.7°	40.0°	24.7° ↓
Roof Inside	57.1°	37.8°	19.3° ↓

Interdisciplinary research

Project to improve energy efficiency and increase the share of renewable energy sources using the example of a Polish agricultural project - BIOSTRATEG 1/269/056/5 / NCBR / 2015.

Extract from the original report. On the object of an agricultural stable for breeding and production, the application of modern and innovative solutions of heat-insulating and reflective coatings was evaluated.



Exemplary stable in Jaworz-Jasienica, Poland.



Source and copyright: Łukasiewicz Research Network, Institute of Engineering sciences of Polymer Materials and Dyes, Department of Colors and Plastics, Gliwice, Poland.

Initial situation and problem

The solar radiation on the outer surfaces of the building, especially on the roof surface, causes the interior of the building to heat up. The maintenance of an interior temperature of 18-25°C, especially in the summer months or at times of high solar irradiation was only possible with the help of cooling units. The usual methods of thermal protection to reduce the thermal conductivity coefficient, by using thermal insulation materials and by increasing the insulation thickness, had already reached its limits.

Idea and solution

Therefore, in this case an innovative approach to the problem of thermal insulation was chosen. This consisted of reducing the heat load penetrating from building surface or, respectively, of inhibiting the heat transfer from the outside to the inside as much as possible. This exact innovative solution approach was the application of a „thermally reflective paint“ to the roof and wall surfaces. The selected products with reflective membrane technology came from the manufacturer SICC Coatings GmbH in Berlin.

Table: Estimated total expenditure for thermal insulation of the test plant in Jaworz-Jasienica and the payback periods.	Costs for the insulation of side and end walls (Zł)				simple pay-back period for the measure
	Side area (m ²)	123.75	Roof area (m ²)	Total cost (Zł)	
	Front area (m ²)	117.60	554.40		
Energy savings in building ventilation 14,810 kWh resp. 8,145 Zł/year					
Insulation with thermally reflective paint		7,837	19,128	26,964	3.3 years
additional insulation – foamed polystyrene		36,367	47,398	83,765	10.3 years
additional insulation – mineral wool		22,426	29,229	51,655	6.3 years
additional insulation – closed-cell PU foam		16,424	21,406	37,829	4.6 years
additional insulation – open cell PU foam		24,636	32,108	56,744	7.0 years

Conclusion

The use of reflective coatings proved to be the most cost-effective solution, practically independent of the wall and roof design technology. The following should be highlighted:

- the positive influence on temperature stabilization in these stables
- the significant reduction of the ventilation required for cooling (from 300% air volume exchange per hour to 25%)

Project references worldwide



Spain: Residential house in Vera



Austria: Private house



Ghana: Hotel in Julikart



South Korea: Church in Seoul

Are you looking for a paintable solution for your roof?
Then please contact us. We would be pleased to provide
you with our worldwide practical experience.

thermoactive@sicc.de

Your authorized dealer:

ClimateCoating[®] – Intelligent coatings with added value.
For buildings, interiors and industrial applications.
Environmentally friendly. Powerful. Effective.

Made in Germany. Made for you.

SICC Coatings GmbH from Berlin is the leading specialist supplier of climate-active coatings with the longest experience in all climate zones and application areas. The functional coatings are based on the reflective membrane technology. For the energy-saving effect of the technology, SICC Coatings was awarded the „German Innovation Award“ in 2018 as well as with the „Energy Efficiency Award“ in Singapore, among others. SICC Coatings works according to the standards for quality management and environmental management in accordance with DIN EN ISO 9001:2015 and 14001:2015.

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