THERMAL PERFORMANCE

Onduline Classic DR stands out for its thermal performance, as tested in September 2024 by SIGMA, an Indian research center.
The material's thermal conductivity (λ), measured at 0.0403 W/m.K, represents its ability to conduct heat—the lower the value, the better the insulation.
Additionally, the R-Value, calculated at 0.0744 m^2.K/W, indicates the material's resistance to heat flow—higher values mean better insulation performance.
While the U-Value (13.4409 W/m^2K) suggests moderate insulation when used alone, Onduline Classic DR excels as part of a complete roofing system, contributing significantly to heat management.
These features ensure year-round thermal comfort, lower energy costs, and ease of installation, making it an ideal solution for homeowners seeking both energy efficiency and practicality.

1- THERMAL PERFORMANCE MEANING

What is the thermal performance for a roof?

The thermal performance of a roof refers to its ability to keep the temperature inside a building comfortable. A well-designed roof prevents heat from entering in summer and keeps warmth inside during winter, helping to save energy and making the home/annexes (barns, stables, outbuildings, garden offices) more comfortable. This depends on insulation, the materials used, and how the roof manages heat.

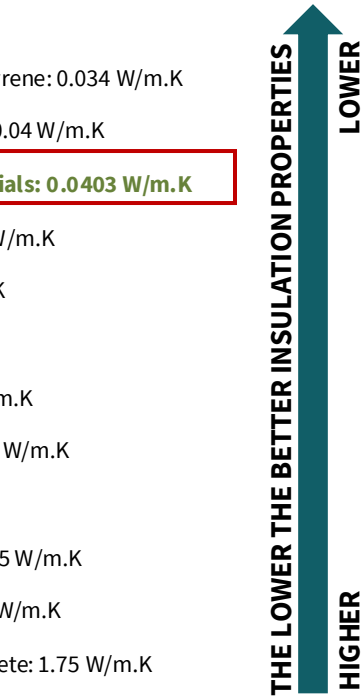
What are the benefits of having a roof with good thermal performance for homeowners?

Lower energy bills: It helps keep your home warmer in winter and cooler in summer, reducing the need for heating or air conditioning.
Better comfort: The roof keeps the indoor temperature more stable, so you're more comfortable year-round.
Eco-friendly: Less energy use means a smaller environmental impact, helping reduce your carbon footprint.

Thermal solutions

There is a variety of materials available in the market offering different thermal properties.

- Expanded Polystyrene: 0.034 W/m.K
- Cellulose: 0.035–0.04 W/m.K
- **ONDULINE Materials: 0.0403 W/m.K**
- Hempcrete: 0.06W/m.K
- Straw: 0.08 W/m.K
- Cork: 0.1 W/m.K
- Bitumen: 0.17 W/m.K
- Wood (Pine): 0.36 W/m.K
- *LPE: 0.3 W/m.K*
- Fiber Cement: 0.95 W/m.K
- Brick (Clay): 1.15 W/m.K
- Reinforced Concrete: 1.75 W/m.K
- Iron (Metal): 52–80 W/m.K



Cellulose fibres | Onduline

2- THERMAL TEST RESULTS MADE IN SEPTEMBER 2024 IN INDIA

How Does the Thermal Test Assess Onduline's bitumen sheet Energy Efficiency?

In Sep. 2024, SIGMA, an Indian test & research center conducted a test to measure the insulating properties of the material of Onduline Classic DR (Sigma test & research - **Report No. : 21013244/B)**. The testing was carried out following ASTM C518 standards to evaluate the material's ability to retain heat, which means maintaining interior temperatures and minimizing heat loss. These tests are crucial to ensure that materials meet energy efficiency standards, thereby providing comfort and energy savings for users

Onduline
Lightweight roofing systems

MORE ABOUT THERMAL PERFORMANCE

What are the results of the Thermal Test on Onduline Classic DR?

The report highlights three key measures to assess the thermal performance of the material:
Thermal Conductivity (λ-Value/K-Value): The measured value is 0.0403 W/m.K.
This figure indicates the material conducts heat well. The lower the number, the better the material is at preventing heat transfer.
A result of 0.0403 shows that Onduline Classic DR is a good insulator, effectively limiting the passage of heat.

TEST RESULTS

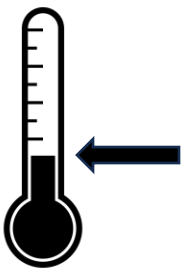
S.No.	Test Parmeters	Test Result	Test Method
Chemical Testing-Others			
1	Thermal Conductivity (Lambda-Value/K-Value) (W/m.K)	0.0403	ASTM C518
2	Resistance to Heat Transmittance (R-Value) (m^2.K/W)	0.0744	ASTM C518
3	Thermal Transmittance (U-Value), (W/m^2K)	13.4409	ASTM C518
	Test Sample Dimensions (mm)	100*100	--
	Thickness, (meter)	0.003	--
	Test Density, (Kg/m3)	1086	--
	Mean Temperature of Test (°C)	25.0	--
	Orientation of Test Samples	Horizontal	--

What does the R-value tell us about Onduline classic DR's insultation performance?

The result of 0.0744 m^2.K/W indicates the material's resistance to heat flow. A higher value would typically imply better insulation. Although modest, this value contributes to the overall thermal performance when used as part of a complete roofing system.

What does the U-value help us understand the material's thermal efficiency?

With a U-value of 13.4409 W/m^2K, the material shows how much heat can pass through it. A lower U-value is desirable, but this value suggests that while the material is not highly insulating on its own, it plays a significant role in heat management when combined with other roofing components. The thin thickness of our sheet, which is 3 mm, explains the value of U.



U-Value 13.4409 W/m^2K

3- ONDULINE THERMAL TEST IN BRAZIL

Why did we conduct these thermal tests?

The tests were conducted to compare the thermal performance of Onduline bitumen and metal materials to determine which offers better thermal comfort.

How were the temperature measured?

Three thermocouples were installed in each building: one outside to measure ambient temperature in the shade, one on the wall opposite the door, one under the roof, and one in the center of the room. Temperature were recorded every minute.
Data was collected from Dec 20, 2019, to Feb 8, 2020, in Brazil. Despite some sensor failures in mid-January, the overall data was not affected. A sample of two consecutive days were used to represent the results.

Thermocouples installed in building with Onduline roof

Thermocouples installed in building with metal roof

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MORE ABOUT THERMAL PERFORMANCE

What were the results of the thermal study?

- **Temperature under the roofs:** The average temperature under the Onduline roof was 21.3°C, while under the metal roof, it was 26.7°C.
- **Temperature in the center of the room:** The average temperature in the center of the room with the Onduline roof was 20.5°C, compared to 21.5°C with the metal roof.

How do the thermal performances of the two materials compare?

The Onduline roof offers better thermal comfort by reducing the indoor temperature by up to 5.4°C in the hottest parts (such as attics) and by about 1°C in the center of the room compared to the metal roof.

How does Onduline's thermal performance benefit countries with hot climates?

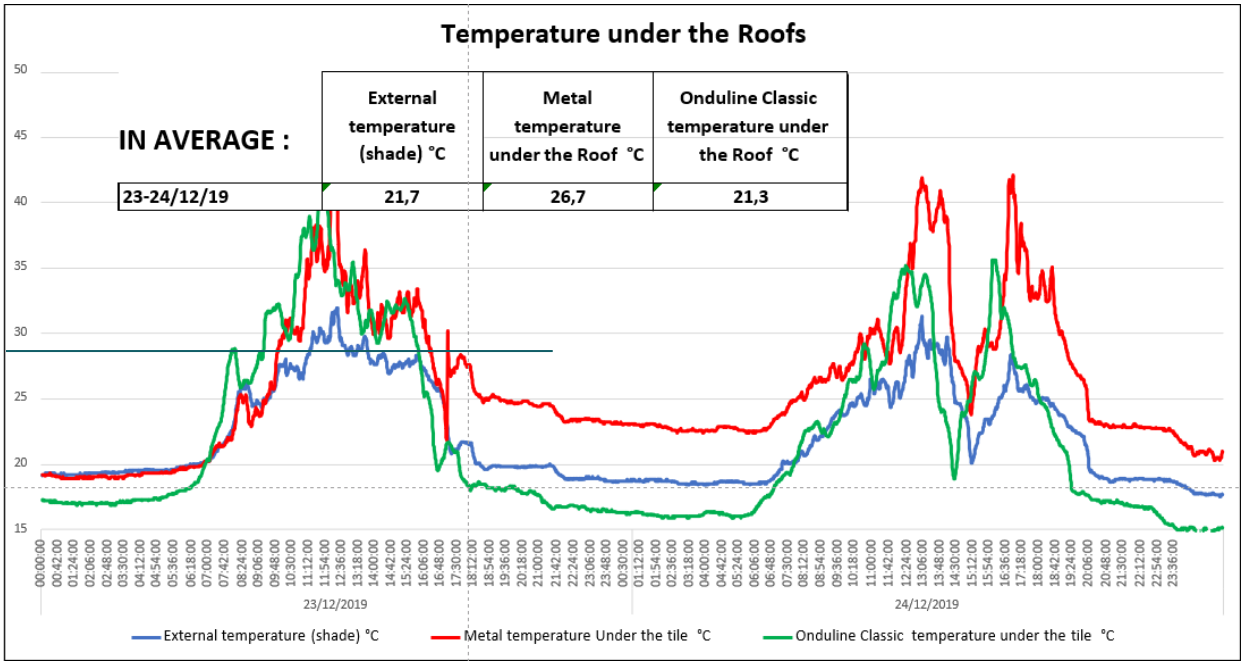
In countries like Indonesia, where air conditioner demand is high, Onduline's thermal performance is crucial. The panels reduce heat, which can lead to energy savings and improve indoor comfort. This directly addresses the growing need for efficient solutions to manage heat.

What are the advantages of Onduline compared to materials like XLPE foam panels or aluminum bought for insulation in tropical countries?

Onduline competes with Puff panels and materials like XLPE foam in terms of thermal performance while offering better durability and lightweight properties. Unlike XLPE, which is primarily used as an infill material and cannot serve as a main roof, Onduline can be used as the primary roofing material, offering both thermal performance and durability.

Thermal conductivity (λ-Value)

→ ***XLPE: 0.3 W/m.K***



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