

**NOCTIS  
THERMO**

**HEAT YOU FEEL,  
SAVINGS THAT ARE REAL!**



**Phormium**

Supporting growers since 1977

# NOCTIS THERMO SCREEN: SIGNIFICANT ENERGY SAVINGS AT AN ATTRACTIVE PRICE

With the outbreak of the energy crisis in 2022, horticulture was hit hard. Although energy prices have since fallen sharply, it has become clear that (fossil) energy will never be as cheap as in the past.

Also, the pursuit of CO<sub>2</sub>-neutral horticulture results in more expensive energy through taxation and other measures. To remain profitable in the future, the horticulture sector must reduce its energy consumption, which can be done via insulation. Highly energy-saving, affordable screens can help growers with achieving this.



In light of these challenges, Phormium introduces a new type of aluminum night screen: **Noctis Thermo**. Aluminum night screens are frequently cited in papers about research on energy saving and in the principles of Plant Empowerment. However, until now, such aluminum night screens were not commercially available at an affordable price. This is where Noctis Thermo makes a difference as it offers significant energy savings at an attractive price.

**Noctis Thermo has more to offer than just energy savings. This screen ensures lower heat emission, higher plant temperature, and a reduced risk of diseases. Additionally, the screen is well-suited for combined use with LED lighting and can be used in greenhouses where variable shading is practiced.**

## TESTIMONIAL

## FACHJAN PROJECT PLANTS



Fachjan cultivates a wide range of green plants for day trading, interior, and project planting. Fachjan has 10 hectares of greenhouses spread over four locations. At the location in 's-Gravenzande, Phormium spoke with Ron van der Knaap. As one of the first, Fachjan replaced the top screen here in 2023 with the innovative Noctis Thermo.

In 's-Gravenzande, cultivation is done with SON-T lamps and a daily temperature of 20°C. Additionally, the PAR light quantity is controlled by means of a variable shading system, which benefits the growth of the plants. The facilities in the greenhouse, including the screens, are adapted to this cultivation strategy.


The high average day temperature leads to a demand for energy savings. The lighting regime requires a solution for light emissions and controlling the PAR light quantity in the greenhouse calls for a - preferably variable - screening system. Noctis Thermo meets all three of these requirements.

There were several options considered for energy savings at Fachjan, but this is the most suitable. ***“The extra energy savings we achieve with Noctis Thermo are noticeable,”*** says Ron. ***“The minimum pipe temperature can be 5 degrees lower with the screen, which corresponds to about 10% of energy savings,”*** he explains.

Ron further explains, ***“I mainly use Noctis Thermo to save energy, but also as a night screen in the sense of a light restriction screen. We illuminate at night and early in the morning. Regardless of the lighting, the Noctis Thermo screen is always closed at night.”***

At higher radiation levels the screen is also used for variable shading in combination with the diffuse screen. At Fachjan, Noctis Thermo, which shades 99%, is used to adjust the amount of incoming light to the needs of the crop.

## LIT CROPS



Noctis Thermo, thanks to the presence of aluminum, also has excellent light-blocking properties (99%). For lit crops, Noctis Thermo can therefore also be used as a light restriction screen with improved energy-saving properties (72%). **This is a two-in-one benefit: light restriction + significant energy saving.**


Noctis Thermo is of increasingly more interest for those greenhouses where LED lighting is used. The excellent energy efficiency and optimized light spectrum make LED the lighting technology of the future. It is therefore not surprising that more and more growers are investing in lighting installations that consist partially or entirely of LEDs.

For the same PAR sum, however, an LED lamp supplies less radiant energy to the crop, resulting in a lower crop temperature. To compensate, the pipe temperature can sometimes be increased by one or more degrees. Thanks to the insulating effect of aluminum, Noctis Thermo itself achieves a **higher crop temperature** than conventional assimilation screens. Therefore, a higher pipe temperature is less of a necessary requirement.

Noctis Thermo makes it possible to fully exploit the savings potential of LED. This way, as a grower, you get the most out of it.

## VARIABLE SHADING

To optimize growing conditions, variable screening is increasingly used in ornamental horticulture. By using two screens the amount of light received by the crop is steered to the optimum. A first diffuse screen is placed on the lower wire bed, and a Noctis Thermo light restriction screen on the upper wire bed. By adjusting the position of the light restriction screen, **the amount of incoming light is regulated.** This light then falls on the diffuse screen, which will scatter the light evenly throughout the greenhouse, resulting in an equal light distribution with minimal shadow on the crop.




This double screen setup of two closed screens also offers energy-saving benefits. For the light restriction screen, traditionally, a white type is chosen. However, Noctis Thermo allows for **further optimization of energy efficiency.** Compared to traditional white light restriction screens, the improved thermal properties of Noctis Thermo with its energy saving of 72% will further reduce the energy loss of the greenhouse. Which is particularly welcome in energy-intensive crops such as ornamental plants.

A traditional white light emission screen has an emissivity of approximately 70%, whereas Noctis Thermo has an emissivity of 53%. This **lower emissivity** results in a lower radiative heat loss of the screen and the greenhouse, leading to higher energy savings.

## UNLIT CROPS

It is known that an extra screen significantly lowers the U-value (insulation value) of a greenhouse. The lower the U-value, the better insulated the greenhouse. A greenhouse with a single transparent screen has a U-value of approximately 3.6 W/m<sup>2</sup>/K, whereas a greenhouse with two transparent screens has a U-value of approximately 2.6 W/m<sup>2</sup>/K. By replacing a transparent screen with an aluminum screen, the gain in energy savings can be significantly increased as this combination lowers the U-value to approximately 2.1 W/m<sup>2</sup>/K (*de Zwart et al, 13-14*).

Therefore, when considering the installation of an extra energy saving screen in an unlit greenhouse, it is best to opt for an aluminum night screen to optimize energy savings. A second screen will never be closed during the day, even if it were transparent, as the light loss would be too big.



A second energy screen for an unlit crop is therefore better not to be transparent. Ultimately, a transparent energy screen is far from the best energy screen whereas aluminized screens are superior. **During the night, an aluminum night screen will save significantly more energy due to lower thermal radiation loss.**

In conclusion, those who choose Noctis Thermo as an extra screen instead of a conventional transparent energy screen truly get the most out of it.

“A screen (partially) made of aluminum strips or with an aluminum coating has a low transmission factor for longwave radiation. That means that such a screen, even if it is primarily installed for shading purposes can contribute to minimizing heat emission during the night.”

(*Plant Empowerment, Geelen et al. 112*)

The principles of Plant Empowerment emphasize the importance of lowering the crop's heat emission, where heat emission equates to energy loss. The lower the energy loss through heat emission, the higher the residual heat which can be used by the crop to maintain evaporation, attract nutrients, and grow.

Lower heat emission also means a higher plant temperature, which in turn reduces the risk of condensation on the top of the plant. Condensation must be avoided at all costs to prevent fungal diseases such as Botrytis.

The aluminum microparticles in Noctis Thermo reflect thermal radiation back to the crop. In other words, **the screen forms a barrier against radiative heat losses, resulting in less heat emission and a reduced chance of condensation on the crop.**

Due to its light-blocking properties, **Noctis Thermo makes a good combination with a (partial) LED lit crop, where a lower plant temperature is a known side effect due to the absence of radiative heat.**

## HIGHER PLANT TEMPERATURE

## UNIQUE TECHNOLOGY

Noctis Thermo with its unequalled energy saving features offers an affordable solution to the challenges growers face today. These challenges are the result of higher energy prices, the need for a sustainable industry, and the transition to new lighting technologies.

The main features of Noctis Thermo are: **72% energy saving, 99% shading, fire class 1 according to NTA 8825, an 8-year warranty and significantly less expensive compared to traditional aluminum screens.** Phormium's unique weaving expertise and MEP™ technology make the combination of these properties possible.

### MEP™ TECHNOLOGY

MEP™ technology (micro encapsulated particles) allows microscopic aluminum particles to be encapsulated in the yarns of Noctis Thermo. The aluminum gives the screen a low transmission coefficient for thermal radiation (called FIR transmissivity). The FIR transmissivity is determined with the TNO device from WUR Lightlab. More information about the measurement protocol and the device can be found in the report:

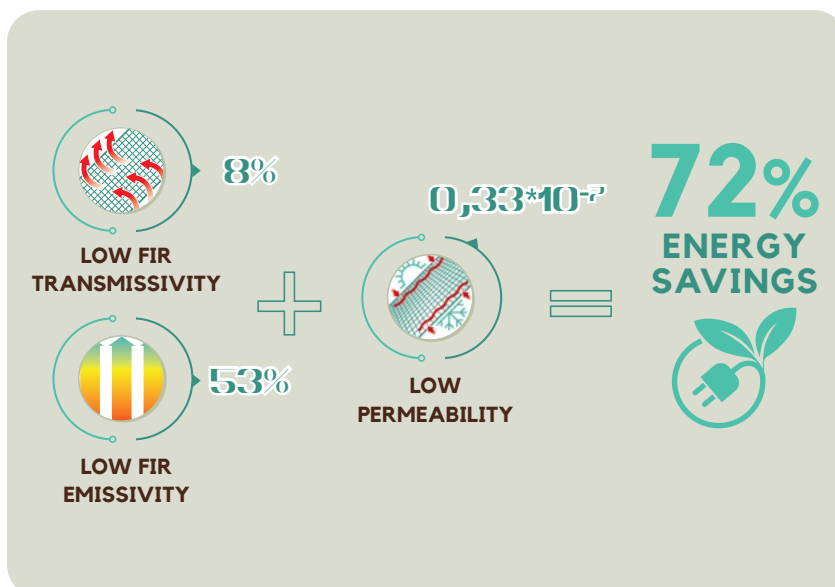


The FIR transmissivity value of Noctis Thermo, determined by WUR, is 8%. This is significantly lower than the FIR transmissivity value of a traditional energy screen of approximately 30%. Phormium introduces the aluminum particles during the extrusion step of its vertically integrated production process. The MEP™ technology allows Phormium to produce aluminum screens in a cost-effective way. Unlike certain coatings, encapsulation guarantees a strong mechanical bond over a longer period. Furthermore, the technology also allows aluminum screens to be made **fire retardant** as Noctis Thermo meets the requirements of the strictest class for fire retardancy: NTA 8825 class 1.

### WEAVING TECHNOLOGY

The weaving pattern selected by Phormium for Noctis Thermo gives the screen its **low** porosity (also known as **permeability**). Permeability determines how much energy can escape through a screen due to the passage of warm air. A screen with low permeability will therefore save more energy than a screen with high permeability.

The permeability of a screen is determined with the Permea device from WUR Lightlab. More information about the measurement protocol and the device can be found in the report:



The permeability value of Noctis Thermo, determined by WUR, is  $0,33 \cdot 10^{-7}$ . This value is significantly lower than the permeability value of a traditional energy screen of approximately  $0,6 \cdot 10^{-7}$ . **The combination of the low permeability, low FIR transmissivity and emissivity results in a screen that saves 72% energy.** The interwoven yarn pattern ensures the necessary removal of excess moisture.

Woven screens are also known for their strength and robustness. The crossing tapes in a woven screen provide a stable material structure. Like other woven screens, **Noctis Thermo retains its initial energy-saving properties for a long time.** Therefore, choosing Noctis Thermo is also a sustainable choice that will result in a lower carbon footprint over time.