



**vega<sub>greenN</sub>** is a specially optimized high reflectance material for use in horticultural applications, such as discharge lamp reflectors for greenhouse lighting.

**vega<sub>greenN</sub>** is a modified version of the standard and well proven **vega95** material, which is already extensively used in lighting applications both indoor and outdoor. The physical and chemical properties of **vega<sub>greenN</sub>** are the same as those for **vega95**, but spectrum reflectance have been specially tuned to suit this specific application.

The light perceived by plants differs slightly from that used by the human eyes, which are most sensitive to green to yellow range of the spectrum (about 550 nm).

In contrast, the most efficient wavelengths for driving photosynthesis – the process mostly responsible for plant growth and yield – are located close to the red edge of the visible spectrum, at around 600 – 700 nm.

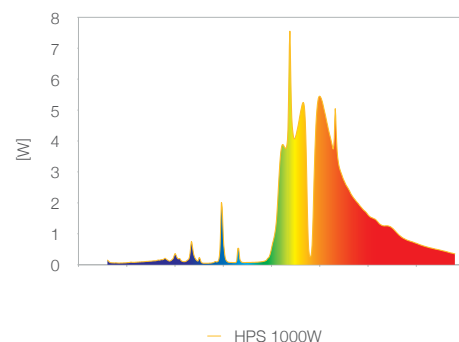
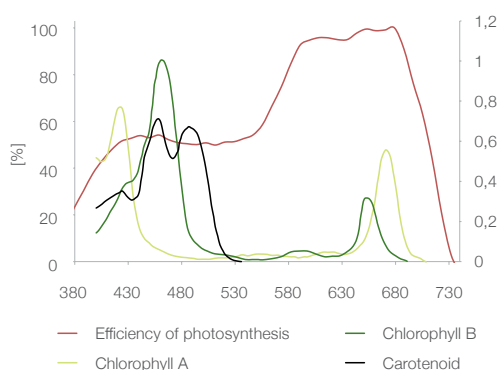
Most plants appear green due to the chlorophyll absorption maximum, found in the red zone of the spectrum. Consequently, the highest photosynthesis efficiency will be achieved by irradiation of plants with red. However there is also a need for broader spectrum radiation and light for a lesser absorption maximum in the blue zone which also contributes significantly to growth.

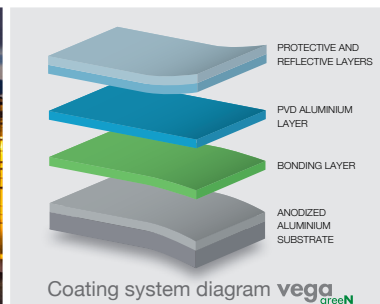
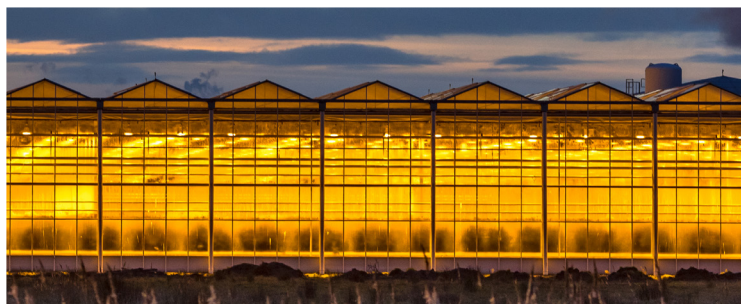
To promote the growth and yield of plants, artificial lamps are used in greenhouses to supplement sunlight and modify the hours of photosynthesis activity.

Various lamp types can be used, but the market preference for this application has been the commercially well established High Pressure Sodium vapor lamps due to their relatively high irradiation power and efficiency.

Such lamps emit light mostly in the orange and red spectral range. However, whichever lamps are used, through its specially modified reflectance spectrum, **vega<sub>greenN</sub>** permits the growers to get the highest PPF, up to 4% more if compared with standard **vega95** (within the PAR).

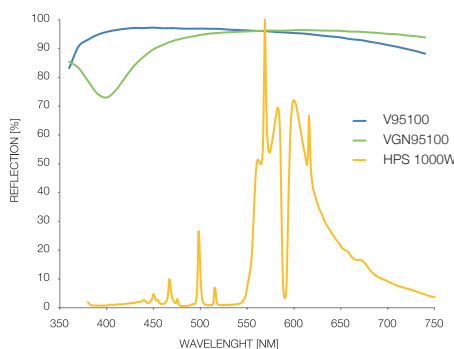
The recently developed **vega<sub>greenN</sub>** surface combines the growers' commercial demands with the natural demands of the plants to give an ideal solution for efficient growth.





The coating parameters of the **vega** greenN layers system are redefined (see below) to provide a strong shift of the maximum spectral reflectance to the orange and red zones most important for photosynthesis while maintaining high reflectance in the full visible light spectrum.

The higher reflectance at over 600nm may cause the product to have a slightly reddish colour.



#### OPTICAL PROPERTIES\*

	Typical	Standards
Total PAR reflectance	94 % ± 2 %	DIN 5036-3 (Ulbricht Globe)
Reflectance at 600nm	96 % ± 2 %	Internal
Reflectance at 650nm	95 % ± 2 %	Internal
Reflectance at 685nm	94 % ± 2 %	Internal
Diffuse reflectance	< 7 %	DIN 5036-3 (Ulbricht Globe)
Specular reflectance - along (60° head)	≥ 90 %	ISO 7668 (Glossmeter)
Specular reflectance - across (60° head)	≥ 90 %	ISO 7668 (Glossmeter)
Iridescence	G	Internal
Colour values – a*	-3 < a < 2	CIE Lab (D65 / 10°)
Colour values – b*	-3 < b < 2	CIE Lab (D65 / 10°)

**NOTES:**

PAR = Photosynthetically Active Radiation (weighted)

Iridescence internal classification: N = normal, L = low, V = very low, G = no iridescence

\*measurements before hammering

#### ENVIRONMENTAL STABILITY

Conditions	Time	Total visible reflectance change	Cross hatch test	Standards
Oven – 250°C	1000 h	< 1%	OK	Internal
Climate chamber 85°C – 85% r.H.	1000 h	< 1%	OK	Internal
Xenon lamp radiation UV 0.51W/m <sup>2</sup> @ 340nm	100 h	< 1%	OK	ISO 11341
Humidity test (40°C / r.H. 95%)	100 h	< 1%	OK	ISO 6270
2%w H <sub>2</sub> SO <sub>4</sub> in water – 20°C	24h	< 1%	OK	Internal
Mixed gas corrosion test	500 h	< 1%	OK	DIN EN 60068-2-60 method 4



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