



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

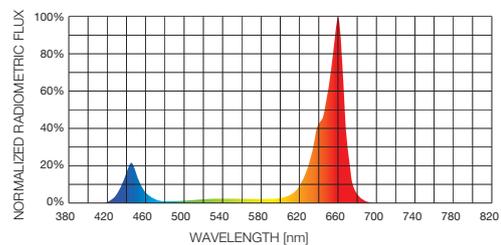
**vega<sub>green</sub>** is a modified version of the standard and well proven **vega95<sup>®</sup>** material, which is already extensively used in lighting applications both indoor and outdoor. The physical and chemical properties of **vega<sub>green</sub>** are the same as those for **vega95<sup>®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

**Efficiency of photosynthesis** The light required by plants slightly differs from the one used by the human eyes, which are most sensitive to the 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.

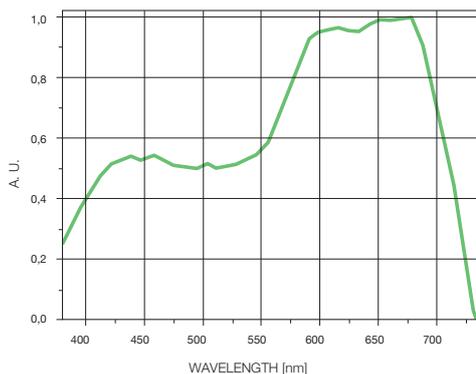
Most plants appear green due to the chlorophyll absorption maximum in the red range of the solar spectrum. Consequently, the highest photosynthesis efficiency will be achieved by irradiation of plants with red light. However there is also an absorption maximum in the blue range. So also blue light contributes significantly to growth. For this reason a reflector material with a high reflectance over a broad wavelength range is needed.

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

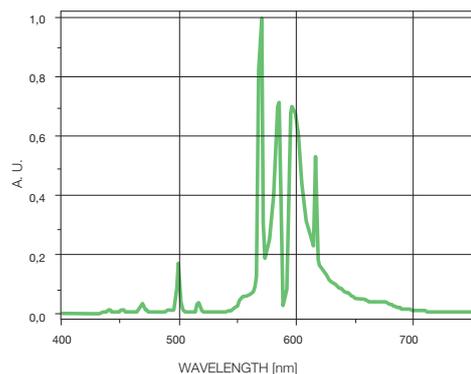
Various lamp types can be used but the market preference for this application stands in the well established High Pressure Sodium vapor lamps or Metal Halide lamps due to their relatively high irradiation power and efficiency. Such lamps emit light mostly in the orange and red spectral range. However, whichever lamps are used, through its specially modified reflectance spectrum, **vega<sub>green</sub>** permits the grower to get the most efficient photosynthesis and plant yield.



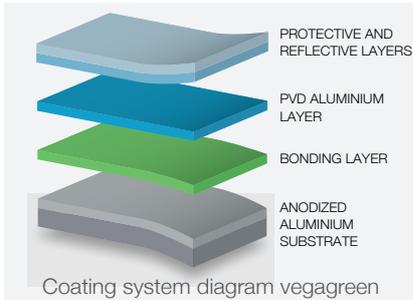
Normalized Radiometric Flux vs. Wavelength



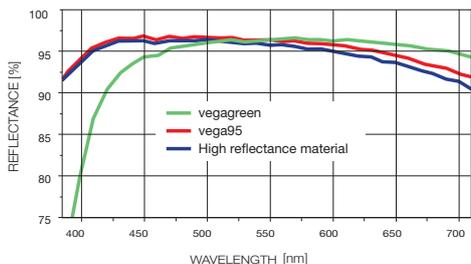
Efficiency of photosynthesis



High pressure sodium lamp spectrum. The strong broadened lines of sodium, responsible for yellowish light color of these lamps are easily seen.



vega<sub>green</sub>



Modified spectral reflectance function of vegagreen material compared to standard mirror materials

The recently developed **vega<sub>green</sub>** material combines the growers' commercial demands with the natural demands for the plants to give an ideal solution for an efficient growth. **Coating system**

The coating parameters of the **vega<sub>green</sub>** layer system are optimised (see below) to provide a strong shift of the maximum spectral reflectance to the orange and red range most important for photosynthesis while maintaining high reflectance in the also important blue range.

This increase of reflectance in the wavelength range over 600nm can be recognised by the reddish colour of **vega<sub>green</sub>**.

Product performance		
Coating adhesion cross hatch test 1mm pitch (EN ISO 2409)	no loss of adhesion	
Bend performance	Bend performance r equals 0.5mm No spalling of coating	
Reverse impact test	No spalling of coating	
Mechanical properties	Tensile strength 0.2% Proof stress Elongation	typical 140-180 MPa typical 130-170 MPa ≥ 2%
Total Reflectance DIN 5036-3 Integrating sphere	> 95%	
Total Reflectance ASMT E 1651 TR2 Reflectometer	> 95%	
Specular Reflectance ISO 7668 60°	> 86%	
Continuous condensing humidity test 40° C	More than 100hours, no change of reflectance	
Damp heat test 85°C/85%r.H	Greater than 1000hours no change of reflectance	
Product characteristics		
Base material	Pre-anodized aluminium, purity 99.85%	
Specification	UNI-EN 573:3:96	
Temper	Nominal H18 Specification UNI-EN 485:2:96	
Reflection coat	PVD coated multi layer reflection stack	
Availability		
Sheets or coils	max width 1,250mm	
Thickness	0.3 - 0.8mm	



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