High Performance Building Solutions

Specification for Greenhouse Membrane

Test Items	Measurements	Standard	Unit	Test Method
Width	2040	2040 ±2	mm	ASTM D 751
Total Mass	790	790 ±60	g/m²	ASTM D 751
Thickness	0.68	0.68 ±0.05	mm	ASTM D 751
Tensile Strength (Cut Strip) Wrap Fill	 2400 2200	 ≥2000 ≥1700	N/5cm	ASTM D 751
Tear Strength (Trapezoid) Wrap Fill	 200 200	 ≥100 ≥100	N	ASTM D 751
Tear Strength (Trapezoid) Wrap Fill	 330 330	 ≥200 ≥200	N	DIN 53363
Resistance to Water Penetration	1000 or more	≥1000	mm	ISO 811
Resistance to Water Absorption Wrap Fill	 1 1	 ≤20 ≤20	mm	MSAJ/M-03-2003 (Method A)
Temperature Resistance	-25℃ ~ +70℃			ASTM D2136 MSAJ/M-03-2003
Flame Retardancy	NFPA 701, ASTM E84, CAN/ULC-S-109, EN 13501			
Light Spectrum Testing	See below Testing Preformed at McGill University, November 19, 2019			

Sprung Greenhouse Membrane Light Spectrum Testing performed at McGill University

"The Sprung Greenhouse membrane is the most similar membrane to greenhouse glass that I have ever tested"

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Method: Optical properties (transmission, reflectance, and absorption) of Sprung Greenhouse Membrane, were examined sunlight and monochromatic light emitting diodes (LEDs). The intensities used under sunlight and LED light were ~1300 and 100 $\mu mol \cdot m^{-2} \cdot sec^{-1}$, respectively. The peak wavelengths of the LED used were 410 (UV, Edison Opto, Taiwan), 447.5 (royal-blue), 480 (blue), 560 (lime), 650 (deep-red) (Philips-Lumileds, San José, CA), and 735 (infra-red, Everlight, Taiwan). Optical properties of the tension films were obtained using a spectroradiometer (PS-300, Apogee, Logan, UT) and a 45° reflectance probe (AS-003, Apogee, Logan, UT) from 231 to 1100 nm at 0.5-nm intervals. The total transmitted and reflected irradiance levels were averaged and then compared to the incident light levels without a film in the beam path. Absorptance (A) at each peak wavelength was calculated by subtracting the summed transmittance (T) and reflectance (R) from the total measured intensity of the light source [A= 1- (T + R)]. The optical properties were averaged and presented as a percentage. A piece of 4 mm tempered greenhouse glass was used as a blank to compare transmission property with the tension films under sunlight.

Result: The graph shows transmission spectra of Sprung Translucent Greenhouse membrane versus greenhouse glass conducted under natural sunlight. Overall, the greenhouse glass had the highest transmission, followed by Sprung Greenhouse Membrane. Comparing the transmission property between Sprung Greenhouse Membrane and greenhouse glass, different tendencies were observed as the wavelength increased. As toward longer wavelength, the transmission for Sprung Greenhouse Membrane increased as opposed to the greenhouse glass. A sharp decline on transmission above 600 nm was observed on the greenhouse glass. Table below illustrates the optical properties (transmission, reflectance, and absorption) of the Sprung Greenhouse Membrane.