

Material Property Data Sheet
COMPACT | INTERIOR GRADE

Manufactured in Greece using a patented manufacturing process by PHEE Private Company

PHEE Board


PHEE Board is a bio-based decorative high-pressure compact laminate-according to EN 438-4 thicknesses 2 mm and greater-for interior surface solutions. Sheets consisting of layers of upcycled Posidonia Oceanica washed-up seagrass leaves and bio-based thermosetting resin system. These components are bonded together with simultaneous application of heat and high specific pressure to obtain a homogeneous non-porous material with increased density and integral decorative surface. The laminates below 4mm are normally intended for bonding to supporting substrate for producing finished panels.

Parameter	PHEE Board
Classification	CGS(Compact General Purpose)
Panel Dimensions	2800*700 mm & 2800*900 mm
Finish	Satine (30 % Gloss) *Surface can be sanded and varnished, using conventional spraying methods, with all types of coatings for different finishes.
Thickness	2mm $\pm$ 0.04mm, 4mm $\pm$ 0.055mm, 6 $\pm$ 0.065mm
Density	971.5 kg/m ³ - 1117.9 kg/m ³
Glass Transition Temperature	Tg (max) = 83°C
Bending Strength	21 $\pm$ 2 MPa (ASTM D790)
Bending Modulus	2.02 $\pm$ 0.25 GPa (ASTM D790)
Bio-based Content	54.74% of the total volume (ASTM D6866) Recycled Plant Derived Residues=38 % w/w

	Resin System: 62% w/w (volume of resin on composite) *27% w/w (Mixed Bio-Based Carbon Content on the resin system) =16,74 w/w %			
TGA under air	Four(4) degradation stages from 25 to 1000 °C. - maximum degradation rate of polysaccharides and cured epoxy resin at ~350 °C. - maximum degradation rates of lignin and cured epoxy fragments at ~495 °C. - remaining mass: ~4%			
DSC under air	Exothermic and endothermic reactions - 310 °C: exothermic, polysaccharides decomposition - 350 °C: exothermic, epoxy resin and cellulose decomposition - 370 °C: endothermic, cured epoxy resin decomposition - 465 °C, 495 °C: exothermic, lignin and cured epoxy fragments decomposition			
Fire Behavior	EN13501-1	2,0 ≤ t < 4,0mm	Class	The reaction to fire of PHEE Board semi-finished 2,0 ≤ t < 4,0mm is related to the final composite panel where the laminate is bonded to a substrate. Since the test results also depend on the substrate, the adhesive and the bonding techniques applied, the composite manufacturer is responsible for the correct execution of the test in accordance with the applicable standards and test methods required for the specific application field.
		4,0 ≤ t < 6,0mm metal frame		TBC
		6,0mm ≤ t		TBC
Surface Quality	EN 438-2:4	Spots, dirt, similar surface defects (mm²/m²)	≤ 3	
		Fibres, hairs & scratches (mm/m²)	≤ 10	
Applications*	Use Rating: Residential & Commercial Commercial Applications: Interior Paneling (Wall Covering, Ceilings, Dividers) & Furniture Substrate Type: Particleboard, Fiberboard & Plywood			
Below we present the materials’ characteristics separately, namely the resin system and the Posidonia Oceanica seagrass leaves filler				
Resin Matrix*	<i>Bio-Based Epoxy Thermosetting Resin System with 27% carbon from plant origin</i>			
Composition	The resin system does not contain substances classified as ‘Substances of Very High Concern’ (SVHC) >= 0.1% published by the European Chemicals Agency (ECHA) under article 57 of REACH. The system fulfils neither the PBT nor the vPvB criteria for mixtures in accordance with annexe XIII of the REACH regulations EC 1907/2006. All components of the system are CMR free. SDS of the system is available under written request			
Filler	<i>Upcycled Posidonia Oceanica Seagrass Leaves</i>			

Composition	Cellulose Inorganic compounds of NaCl, CaCO ₃ , SiO ₂ and gypsum Ca(SO ₄)(H ₂ O) ₂
TGA	5 degradation stages from 25 to 1200 °C. • maximum degradation rate of cellulose/lignin at 305 °C. • maximum degradation rate of char combustion (phenolic rings) at 476 °C. - remaining mass: ~19%
DSC	- < 100 °C: endothermic, moisture removal - 300-500 °C: exothermic reactions from volatilization and char combustion
FTIR	- 876 cm ⁻¹ : peak attributed to CaCO ₃ - 1112 cm ⁻¹ : stretching vibration of C-OH bond of polysaccharides - 1240 cm ⁻¹ : stretching vibration of C-O bond of polysaccharides - 1424 cm ⁻¹ : bending vibration of O-H and CH ₂ and stretching vibration of C=O bonds of polysaccharides - 1546-1800 cm ⁻¹ : vibrations of C=O and stretching vibration of C=C bonds of polysaccharides - 3400 cm ⁻¹ : stretching vibration of O-H bond

Other Properties/Emissions	
Release of Formaldehyde	Zero Formaldehyde emissions according to resin system manufacturer technical documentation *Available Under Request
VOCs	1. Resin System contain <u>no VOC compounds</u> according to resin system manufacturer technical documentation 2. Resin System is nonylphenol-free *Available Under Request

Disclaimer

The Product Technical Sheets provide all the technical information relevant to the performance of the product as tested by PHEE PC or certified testing agencies. PHEE PC maintains the right to change and alter the product composition and production process and thereby the performance characteristics of the product at all times, as reported on the phee.gr website. Customers using the product are requested to check for the latest technical information regarding the products performance on the phee.gr website before application. In any case, PHEE PC, in every contractual relationship will refer only to the technical information published on phee.gr . PHEE PC will not assume any liability if a customer refers to any other technical information of the product.