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Material datasheet

Kebony SYP

General Wood Quality

	Kebony properties	Reporting source	Notes
Wood Species	KEBONY – Southern yellow pine (Pinus spp. (P. echinata, P. palustris, P. taeda & P. elliotii)).		
Wood Quality	J10 or better for thickness 25mm and below For thickness from 25mm: J10 or better on 3 sides, J30 or better on one side	Purchasing specifications EN 942	Classification according to EN 942

Production Principles

	Kebony properties	Reporting source	Notes
Principles	KEBONY – Wood materials are impregnated with a water-based furfuryl alcohol solution in a full-cell impregnation procedure. After impregnation the furfuryl alcohol is polymerized inside the wood cell walls by heating the material to between 160 and 250 oF , thus giving the treated wood a permanently altered and more rigid cell wall structure. The Kebony wood obtained by this process has a dark brown colour due to the formed polymer, and is harder and denser than the untreated wood.	KEBONY – Chemical wood modification with furfuryl alcohol polymerised inside wood cell walls. Lande S., Westin M. and Schneider M., Scand. J. For. Res. 19(suppl. 5): 22-30, 2004.	
Change from parent wood	Strong darkening of the wood due to chemical reaction of the furfuryl alcohol		No impairment of properties or workability.
Quality Assurance		Kebony Internal quality assurance system	

External Method for Determination of Treatment	Determination of equilibrium moisture content, at 68 oF and 65% RH, should yield values lower than 7.5% when determined on samples that are first dried and then equilibrated at 65% RH

Physical Material Properties

	Kebony properties	Reporting source	Notes
Durability	Kebony SYP: Durability class 2 (or better) Southern Yellow Pine: Durability class: 3-4 *Assessment according to EN-350*	Source: D3.5_DurableWood_SP Trätek_fin, p. 17. Source: Kebony Report EN 113_SYP1 Cp, Cv, Gt. Source: Kebony Report EN 113_SYP1 Pp. Source: SHR_rep8565_EN1113_Jan2010, p. 8. Source: DTI EN 113 480564 Tests also performed by Norwegian Forest and Landscape Institute, EN 113 report by A. Treu, 04.10.2010.	Durability testing according to EN 113
Density at 68°F/65% RH	Kebony SYP: 42...53 lb/ft³ Southern Yellow Pine: 38...44 lb/ft³	Report / Prüfbericht 2010-108 from Buckhardt Institut der Georg August Universität Göttingen, Abteilung Holzbiologie und Holzprodukte, 37077 Göttingen	
Moisture content testing	Moisture content is determined by oven dry / weighing method (EN13183-1)		Standard moisture testing by electrical resistance is not suitable

	Kebony properties	Reporting source	Notes
Shrinking and Swelling	Maximum volumetric swelling ca 6 % %. % swelling from dry to 95% RH / Kebony SYP / Southern Yellow Pine radial: 2.2 .. 4.4 / 2.7 .. 4.1 tangential: 2.5 .. 4.3 / 6.1 .. 7.3 longitudinal: 0.2 / 0.3	Report / Prüfbericht 2010-111 from Buckhardt Institut der Georg August Universität Göttingen, Abteilung Holzbiologie und Holzprodukte, 37077 Göttingen	
Fire Class	NFPA/IBC CLASS B Flame spread 65 Smoke developed 300	ASTM Designation E84-14	
Capillary Water Uptake	% swelling from dry to 95% RH / Kebony SYP / Southern Yellow Pine radial: -- / -- tangential: 0.01 .. 0.016 / 0.04 .. 0.14 longitudinal: 0.06 .. 0.2 / 0.05 .. 0.7	Report / Prüfbericht 2010-115 from Buckhardt Institut der Georg August Universität Göttingen, Abteilung Holzbiologie und Holzprodukte, 37077 Göttingen.	
Thermal conductivity Thermal resistivity R-value, 1" product U-value, 1" product	0,16 W/mK 6,25 mK/W 0.159 m2K/W = 0.90 h ft2 °F/Btu 6.29 W/m2K = 0.90 Btu/ h ft2 °F	Determination of thermal conductivity, November 2010, tested by SP Technical Research Institute of Sweden acc. to EN 12667. SP report P705370-02 I.	Previous test by Danish Technological Institute gave same result.
Bending Strength (MOR) Small Samples:	13,800 psi (mean) 9000 ... 17,700 psi	Ecobinders project, deliverables report D3.5_DurableWood _SP	
Decking Boards: 22x142 mm	7,100 psi – characteristic value (lower 5% quantile)	Trätek_fin, p. 12. NTI report 310190-uk; Testing of MOE and MOR SP Report 4P05099A	

	Kebony properties	Reporting source	Notes
Stiffness E-Module	2,130,000 psi (mean) 1,530,000 … 2,725,000 psi	Ecobinders project, deliverables report D3.5_DurableWood_SP Trätek_fin, p. 12. NTI report 310190-uk; Testing of MOE and MOR SP Report 4P05099A	Centre – centre distance of 0.60 m for support beams of under-structure is recommended for all Kebony SYP deck dimensions.
Pressure Perpendicular to Grain	3092 psi = 445 248 psf (max) 1965 psi = 282 960 psf (mean)	Report from Norsk Treteknisk Institutt (Norwegian Wood Technology Institute) October 2010.	
Loading Capacity Kebony SYP Decking 22x142 mm (0.86x5.60 inch)	Span Rating: Inches; Evenly Distributed Load: PSF; Point Load: PSF 16 — 1800 — 630 24 — 550 — 315	Source: SP Report 4P05099A	Calculations based on these values and limitations. Deflection limit, L/180 MOE: 2,230,000 psi MOR: 7,200 psi MOR is low 5% quantile value
Impact Bending Strength	4.68 Btu/ft2 (max) 2.35 Btu/ft2 (mean)	Report from Norsk Treteknisk Institutt (Norwegian Wood Technology Institute), October 2010.	
Surface Hardness	Brinell hardness number: 5.3 Janka hardness: 1708 lbf	Source: SP Report 4P05099A	
Slip Resistance	Dry: along grain 86; across grain 106 Wet: along grain 42; across grain 37 Guidance values for slip resistance on wet surfaces: > 35 non-slip 25 – 35 some risk of slipping < 25 slippery	Source: Ecobinders project, deliverables report D3.5_DurableWood_SP Trätek_fin, p. 14 Source: Tested by SP, Report PX02017, 27.05.2010	

	Kebony properties	Reporting source	Notes
Fastener Withdrawal Strength	**Head-pull through** and **withdrawal** strength of furfurylated SYP	Report: Testing and evaluation of furan resin impregnated wood, Virginia Tech, 2005	Screw used: Würth-ASSY: Length: 2.71" Thread Length: 1.93" Thread diameter: 0.161" Shank diameter: 0.116" Head diameter: 0.30"
	Kebony **withdrawal strength** in radial direction, 22 mm thickness samples.	Report: Prüfbericht 2010-112 from Buckhardt Institut der Georg August Universität Göttingen, Abteilung Holzbiologie und Holzprodukte, 37077 Göttingen	Screw used: Type 1: Length: 1.18" Thread diameter: 0.138" Dept inserted: 0.87" Type 2 Length: 1.57" Thread diameter: 3,5 Dept inserted: 22

	Head-Pull Through		Screw Withdrawal	
	Cont	FA	Cont	FA
Average (lbf)	606	718	718	734
Std Dev (lbf)	195	155	153	122
COV (%):	32	22	22	17

FA: Furfurylated SYP
Cont: Control samples of SYP

	Type 1 Screw		Type 2 Screw	
	Cont	FA	Cont	FA
Average (lbf)	989	1162	960	1290
Std Dev (lbf)	20	95	30	65
COV (%):	2	8	3	5

FA: Kebony SYP
Cont: Control samples of SYP

Values are 17 and 34% above the values for untreated SYP.

Gluing

	Kebony properties	Reporting source	Notes
Suitability for glued construction	Recommendations for D4 gluing: Kebony recommends one-component PUR type glues	IFT Rosenheim reports no 12-0032344-PR05 and 12-0032344-PR06	Gluing of finger joints and laminated structures

Surface coating

	Kebony properties	Reporting source	Notes
Compatibility with coating systems	In general all acrylic based paints show good adhesion to Kebony wood. Alkyd based paints may have longer curing times on Kebony than on untreated wood.	SHR – Machinability, windows and doors; test report 11.0187-D Report / Prüfbericht 2010-114 from Buckhardt Institut der Georg August Universität Göttingen, Abteilung Holzbiologie und Holzprodukte, 37077 Göttingen	
Compatibility with fasteners	Metal fasteners for external use should be made from alloys that can tolerate pH down to 4.5, for example aluminium or stainless steel. Zinc or galvanized steel should be avoided.		

Machining

	Kebony properties	Reporting source	Notes
Machining	Previous testing indicated excellent properties /behaviour with respect to machining.	SHR – Machinability, windows and doors; test report 11.0187-D	
Dust protection	Dust development Exposure to dust should be avoided through the use of good ventilation and protective measures	SHR – Machinability and dust formation; test report 11.0187-C	

Waste Disposal

	Kebony properties	Reporting source	Notes
Disposal	Disposal - If disposed of or discarded, handle as untreated wood. No other toxic compounds are developed during incineration than those for untreated wood (Smoke gas testing SP)		Ref.: Kebony MSDS