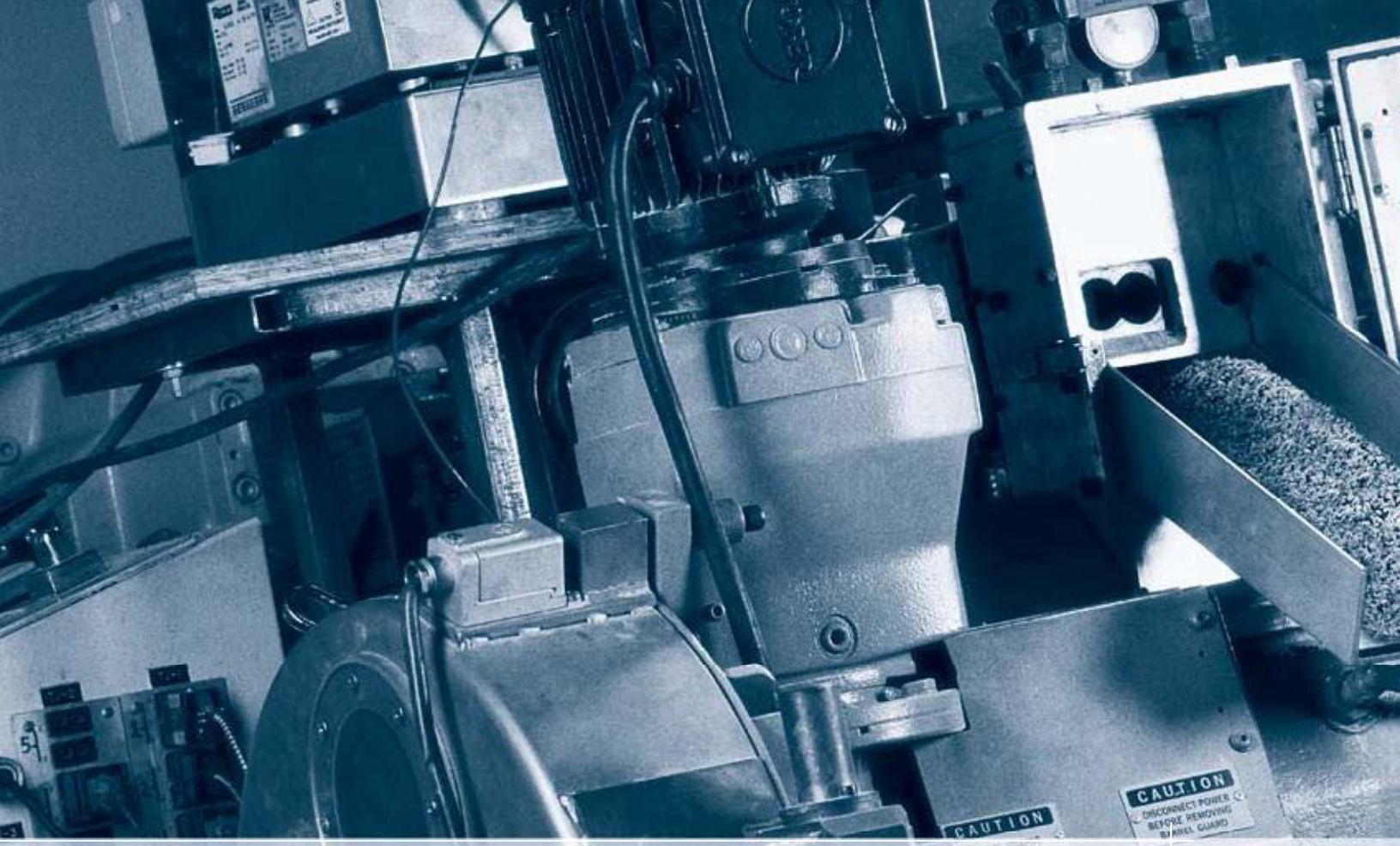
RENEWABLE, RECLAIMABLE, RESPONSIBLE — **FIBREX®**

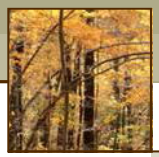


FIBREX® — ENGINEERED FOR STRUCTURAL PERFORMANCE

A SUPERIOR COMPOSITE

At a time when more and more industries are looking to alternative building materials, Andersen Corporation introduces Fibrex®, a revolutionary structural material composite technology that blends the very best attributes of thermoplastics and bio-fibers. Durable and versatile, you can count on Fibrex® material for strength, appearance and performance — in a wide variety of applications. Already in use for ten years in many Andersen® products, it performs extremely well in all weather and environmental conditions. Best of all, Fibrex® technology can utilize “reclaimed” wood fiber and vinyl from post production processes, helping to save on natural resources. Fibrex® is a strong cost-to-benefit option for your product needs.

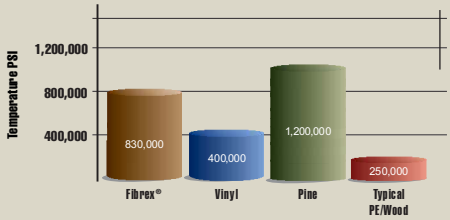
FIBREX®



STIFFNESS

Modulus is the scientific term for a material's stiffness. The higher the number, the stiffer the material. The average modulus for Fibrex® is over twice the average for vinyl, making it a far more stable and rigid material. And though wood's average stiffness is higher, it is far less predictable than Fibrex,® since wood has natural variations such as grain, knots and moisture content.

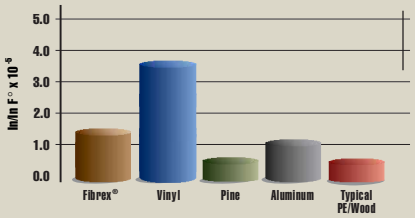
Stiffness



THERMAL EXPANSION

Thermal expansion is the degree to which a given material expands and contracts with changes in temperature. Pine has a very low thermal expansion rate. With a rate of 1.6, Fibrex,® like aluminum, expands and contracts very little. Vinyl, with a thermal expansion rate of 4.0, expands and contracts at a rate twice that of Fibrex,® resulting in bowing and cracking over time.

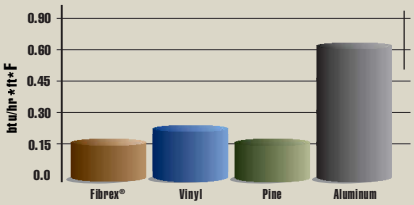
Coefficient of Thermal Expansion (CTE)



CONDUCTIVITY

Fibrex® has a very low thermal conductivity ratio. Its insulating properties can be put on par with pine or vinyl. Unlike aluminum, Fibrex® resists the transfer of heat or cold.

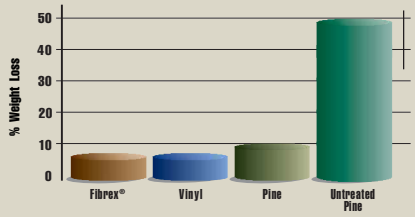
Thermal Conductivity



DECAY RESISTANCE

The special polymer formulations in Fibrex® surround, coat and fill the cell structure of each wood fiber in the manufacturing process, ensuring unsurpassed resistance to rot.

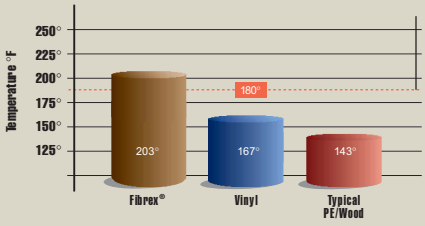
Decay Resistance



HEAT RESISTANCE

High temperatures can result in distortion. At high temperatures, vinyl can bow or sag. In tests, Fibrex® remains rigid and stable to a temperature of 93°C (199°F).

Heat Distortion Temperature



FIBREX®



Fibrex® Properties

The design versatility of Fibrex® material is enhanced by its exceptional physical properties. Parts made from Fibrex have a high flexural and tensile modulus, low moisture absorption, a higher heat distortion temperature than rigid PVC and a low coefficient of thermal expansion.

Fibrex® material can be extruded or injection molded into functional components. Extruded profiles can be solid or hollow, machined and joined using mechanical fastening, thermal welding and vibratory weld tacking. Profiles can be extruded with a weatherable capstock, enabling color options and color fastness and allowing the surface appearance to be optimized for a specific application.

Fibrex has been found to be an exceptional material when used for siding, decking, railing, fencing, molding, trim, furniture and packaging, to name a few.

Fibrex® decking

Fibrex® window sill

Fibrex® extrusion

FIBREX®

Fibrex® Mechanical Properties (Typical)

Measurement	ASTM	Units	Material Value
Tensile Modulus, 77˚ (25˚C)	D3039	psi (MPa)	
Extrusion direction			950,000 (6,550)
Cross-extrusion direction			750,000 (5,200)
Tensile Yield Strength, 77˚ (25˚C)	D3039	psi (MPa)	3,000 (21)
Tensile Strength (UTS), 77˚ (25˚C) Extrusion direction Cross-extrusion direction	D3039	psi (MPa)	 5,500 (38) 3,800 (26)
Tensile Strain at Failure, 77˚ (25˚C) Extrusion direction Cross-extrusion direction	D3039	%	 1.3 0.9
Poisson's Ratio	D630	—	0.342 @ 70˚F 0.236 @ 160˚F
Flexural Modulus, 77˚ (25˚C)	D790	psi (MPa)	830,000 (5,700)
Compressive Modulus, 77˚ (25˚C)	D695	psi (MPa)	571,000 (3,900)
Modulus of Rupture, 77˚ (25˚C)	D790	psi (MPa)	10,000 (69)
Maximum Flexural Strain (E_{max})	D790	%	1.7
Impact Strength, Gardner, 77˚ (25˚C) 0.1" sample thickness	D3029	inch•lbs (J)	5.0 (0.56)
Izod Notched Impact, 77˚ (25˚C)	D256	inch•lbs/inch (J/m)	7.0 (28)
Maximum Allowable Dynamic Stress	*	psi (MPa)	16,000 (110)
Extrusion Shrinkage	D3679	%	0.2
Specific Gravity	D792	—	1.4
Hardness, Rockwell "L", 77˚ (25˚C)	D785	—	92
Hardness, Rockwell "M", 77˚ (25˚C)	D785	—	66
Static Coefficient of Friction vs. Neolite std. Extrusion direction	F1679-96	—	0.60 wet 0.85 dry

Fibrex® Environmental Properties

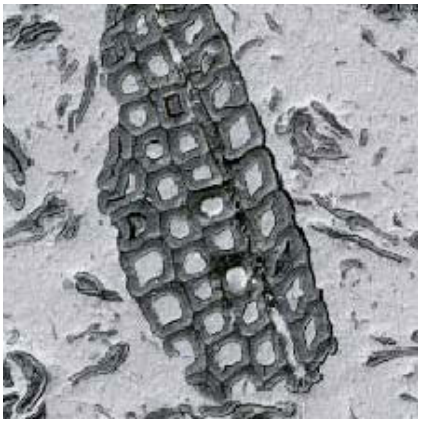
Measurement	ASTM	Units	Material Value
Moisture Absorption	D570-84	%	0.9
Termite Resistance C. formosanus R. flavipes	—	Weight Loss (g)	 0 0
Fungal Decay	D1413		None
Moisture Expansion	D1037	inch/inch/%ΔMC*	$1.14x10^{-3}$

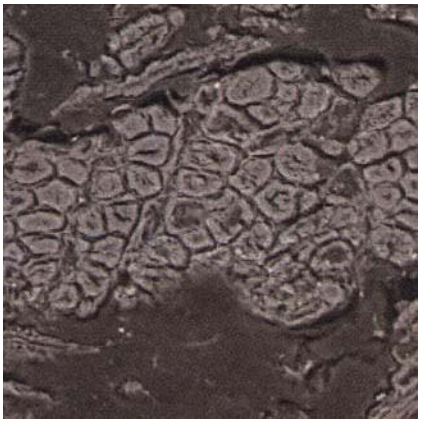
Fibrex® Thermal Properties

Measurement	ASTM	Units	Material Value
Heat Deflection Temperature, 264psi (1.82 MPa) 66 psi (0.46 MPa)	D648	˚F (˚C)	 173 (78) 221 (105)
Coefficient of Thermal Expansion	D696	inch/inch/˚F (m/m/˚C)	$1.6x10^{-5}$ ($2.9x10^{-5}$)
Thermal Conductivity	F433	Btu/hr•ft•˚F (W/m•K)	0.1 (0.17)
Specific Heat	—	Btu/lb•˚F (J/kg•K)	0.4 (1674)
Flash Ignition Temperature	D1929	˚F (˚C)	644 (340)
Self Ignition Temperature	D1929	˚F (˚C)	716 (380)
Flame Spread Index	E84-94		10
Smoke Developed Index	E84-94		580
Average Flame Spread Index	E162-94		22.73
Average Optical Density of Smoke Flaming mode Non-flaming mode	E662-94		 472.32 439.24
Average Time of Burn	D635-91	sec.	<5
Average Extent of Burn	D635-91	mm	<5
Final Oxygen Index	D2863	%volume	31.3



Fibrex® Material Advantage
Special polymer formulations surround and fill each wood fiber — ensuring top performance.


Fibrex®


Polyethylene Wood-Fiber Composite

Fibrex® Patents

5,205,102	6,210,792	5,985,429	5,827,607	5,486,553
6,357,197	6,122,877	5,981,067	5,773,138	5,441,801
6,346,160	6,054,207	5,948,524	5,695,874	5,406,768
6,342,172	6,015,612	5,932,334	5,539,027	
6,280,667	6,015,611	5,882,564	5,518,677	
6,265,037	6,004,668	D402,770	5,497,594	

*Additional patents pending