

SOME OF THE PROPERTIES OF REINFORCED RECYCLED COMPOSITE PANELS

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NOVEMBER 3, 2007

OBJECTIVES

- 1- TO MANUFACTURE EXPERIMENTAL PARTICLEBOARD PANELS FROM RECYCLED CARTOON, POLYETHYLENE, AND ALUMINUM.
- 2- TO REINFORCE SUCH PANELS WITH VENEER AND HIGH PRESSURE LAMINATE (HPL).
- 3- TO EVALUATE PHYSICAL AND MECHANICAL PROPERTIES OF SAMPLES IF THEY ARE SUITABLE FOR FURNITURE AND CABINET MANUFACTURE.





RAW MATERIAL

- 1- SHREDDED CARTOON FROM FOOD INDUSTRY WITH APPROXIMATELY 5 MM LENGTH. [80%]
- 2- POLYETHYLENE IN POWDER FORM. [20%]
- 3- ALUMINUM POWDER. [5%]

PRESS PARAMETERS

PRESSURE : 1.2 N/mm²

TEMPERATURE : 170°C

PRESS TIME : 12 min.

PANEL SIZE

125 cm by 250 cm by 1.5 CM

LAMINATING PROCESS

50 cm by 50 cm by 1.5 cm PANELS WERE OVERLAID BY,

ROTARY CUT VENEER OF EUROPEAN BEECH (*FAGUS ORIENTALIS LIPSKY.*) WITH A THICKNESS OF 1.5 mm.

BINDER.....: UREA FORMALDEHYDE (180 G/M²)

PRESSURE.....: 65 Bar

TEMPERATURE.....: 120 °C

TIME: 10 min.

HIGH DENSITY LAMINATE (HPL) WITH A THICKNESS OF 0.8 mm.

BINDER..... : PVA (UK 8103B&UK 5400)

PRESSURE.....: 65 Bar

TEMPERATURE.....: 60 °C

TIME.....: 10 min.











Test Type	Applied Standard	Sample Size (mm)
Air dry density (12% MC)	EN 323 (1993)	50 x 50
Thickness swell (24 hrs) (TS)	EN 317 (1993)	50 x 50
Water absorption (24 hrs) (WA)	EN 317(1993)	50 x 50
Modulus of rupture (MOR)	EN 310 (1993)	410 x 50
Modulus of elasticity (MOE)	EN 310 (1993)	410 x 50
Screw withdrawal resistance (SW)	EN 320 (1993)	50 x 50

Panel type	Physical properties			Mechanical properties		
	Air-dry Density (g/cm ³)	Thickness Swelling (%)	Water Absorption (%)	Modulus of Rupture (N/mm ²)	Modulus of Elasticity (N/mm ²)	Screw Holding Resistance (Face) (N)
Covered Panels	960 (0.03)	0.76 A* (0.14)	5.69 A (0.62)	53.2 A (5.80)	4866.7 A (334.17)	1522.5 A (79.5)
Uncovered Panels	1040 (0.007)	0.20 B (0.24)	2.75 B (0.14)	18.6 B (2.72)	2350.0 B (225.70)	1331.0 B (22.07)
Commercial particleboard (18 mm)	650	8	-	14.1	2815.7	731
EN 312 Type P7 (2005)	-	8 (max)	-	20 (min)	3100 (min)	-

CONCLUSIONS

Based on findings of this study such composite panels reinforced with wood veneer and high pressure laminate showed satisfactory physical and mechanical properties and they could be considered as alternative products to manufacture flooring, cabinets and other substrate panels.

It appears that using recycled material to manufacture such value-added panels may result in sustainable utilization of resources from the environmental perspective.

ACKNOWLEDGEMENT

Assistance of Yekas Recycling Inc. in panel manufacture is greatly appreciated.