

Abstract

The work is related to manufacture of lightweight particleboard using virgin expanded polystyrene (EPS) as a partial substitute of wood particles. The general objective of this study was reducing 30 percent of the panel weight while the most important properties have been kept. The three parameters including polystyrene content, press temperature and type of adhesive (urea, phenol and melamine formaldehyde) was organized to make experimental panels. The analyses of collected data from physical and mechanical tests (flexural strength, modulus of elasticity, internal bonding, thickness swelling and water absorption) which made based on EN standard, has been ended to the results that follow: Generally, it was proved EPS was a compatible polymer with the most common adhesive in particleboard industry and the interfacial bonding between wood particles and expanded polymer was formed as well. Removing a partial of wood particles from middle layer and replacement of EPS to make available reducing weight with keeping physical characteristics was successful. The results clearly showed increasing of press temperature and EPS content caused flexural strength and modulus of elasticity were improved. Comparatively, Urea formaldehyde resin was a better result on these properties to other resin. Increasing press temperature and EPS content had a negative effect on internal bonding (IB). Besides, there was a correlation between adhesive type and IB as urea formaldehyde showed a best result on this strength. The results from physical tests showed increasing EPS content can influence on water absorption in 24 hours and improve it. The maximum level of water absorption and thickness swelling was on the panels made by urea formaldehyde, higher EPS content in minimum temperature. No significant difference was found on the effect of press temperature on screw withdrawal strength while the highest of this strength was found on the panels made with 1 percent EPS content.

Keywords: Lightweight Particleboard, Expanded Polystyrene, Resin type, Pressing Temperature, Panel properties



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