
*

(// : // :)

(HDPE)

g/cm³

%

(MAPP)

()

%

%

%

%

%

:

(Sjodin et al., 2004)

(WPC)

(Nakajima & Head, 2004)

–

(Rowel, 2008)

(Madhoushi et al., 2009b Madhoushi et al., 2008)

%

Adhikary et al., 2008)

(Kljsov, 2007

%

(Falk et al., 2001)

(%)

(Caulfield et al., 2005)

Madhoushi et Chaharmahali et al., 2007)

(Madhoushi, et al. 2011 al. 2009a

(Chaharmahali et al., 2007)

(%)

(Chow et al.,

(%)

.2002)

¹ Wood Plastic Composites

² Matrix

³ Reinforcer

⁴ Filler

⁵ Encapsulation

(Madhoushi et al. 2009a)

(Schenk 40 kN)

Noorbakhsh et al., Karimi et al., 2004)

(Adhikary et al., Shakeri & Omidvar, 2006 2005
.2008

(Falk et al., 2001)

(Madhoushi et al. 2009a)

± °C

h

1999 Romer & Winistorfer, 1999)

(Rangaraj,

(Falk et Adhikary et al., 2008)

g/cm³

al., 2001

(HDPE)

/

(MAPP)

min (MFI)

kg/m³

cm

(MAPP)

°C

g/

× ×

°C

bar

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bar

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bar

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(/ kg/m³)

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BS
cm × ×

(
(CEN/TS 15534-1:2007)

(kg/m³)

cm

(Madhoushi at

belak

al., 2011, Madhoushi et al., 2009a)

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± °C

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(ANOVA)

SPSS

Karimi et al.,

Shakeri & Noorbakhsh et al., 2005-2004)

(Adhikary et al., 2008 Omidvar, 2006

Falk et

() %

(Chow et al., 2002 al., 2001)

MAPP

%

%

()

(Madhoushi et al., 2009a)

Chaharmahali et al., 2007)

(Madhoushi et al., 2009a

(N/mm)					(N/mm)					(kg/m ³)
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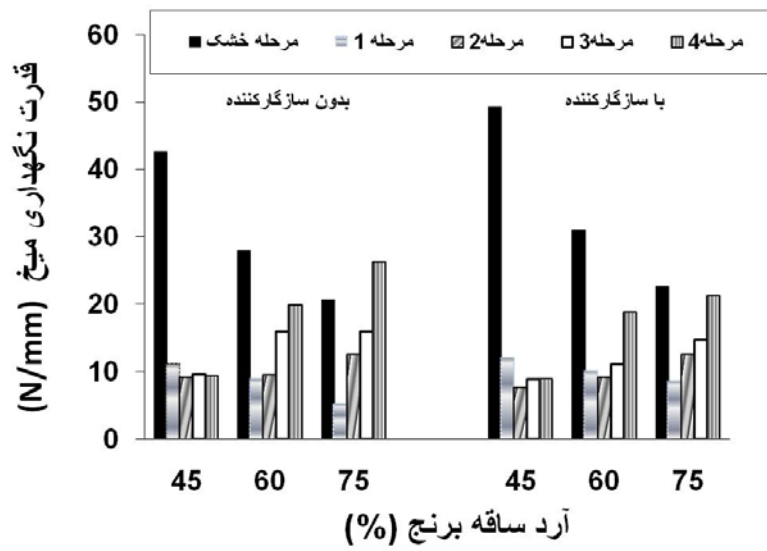
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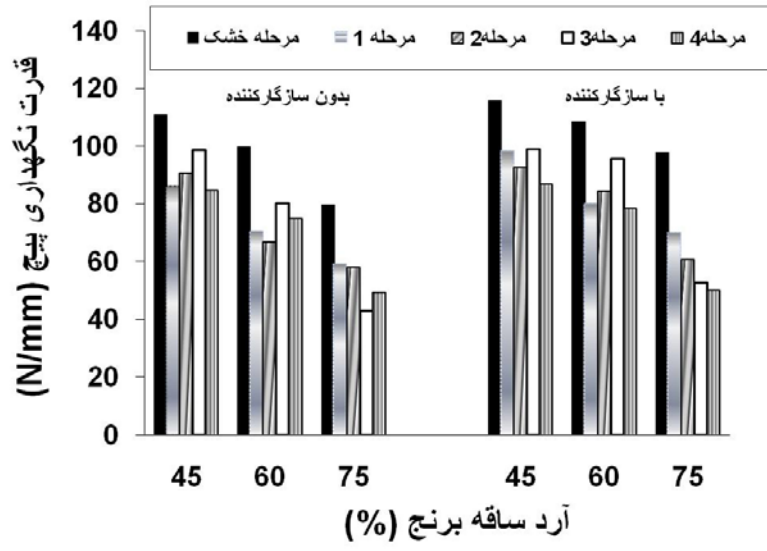
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(Rowell, 2008)



Romer & 1999)

(Sjodin et al., 2004 Winistorfer, 1999

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Withdrawal strength of fasteners in rice straw-HDPE composites under alternating wetting stages

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Abstract

The withdrawal strength of nail and screw fasteners was studied in rice straw fiber-thermoplastic composites. Virgin high-density polyethylene (HDPE) was selected as the composite matrix. Three levels of dry rice straw fiber, 45%, 60% and 75%, based on weight and passed through a 40-mesh size screen were mixed with the polymeric matrix without or with 2% (based on weight) maleic anhydride grafted polypropylene (MAPP) as coupling agent. A dry-blending method was used for compounding the materials. The 12 formulations for the polymer composites were used to prepare samples with dimensions of 25 cm by 15 cm by 1 cm. The final composites were made by pressing the prepared mats between the hot plates of a compression press by employing combinations of temperature and pressure in three stages. After keeping the composites at room temperature for 15 days, the withdrawal strengths of nails and screws were measured according to BS Standard for dry composites. Withdrawal strengths were also measured after immersion of the composites for 24 hours in distilled water (wet condition) (cycle 1). Wetting for 24 hours followed by drying for 24 hours was then repeated for the other 3 cycles. The results showed that the withdrawal strength of screws is more than that of nails. Also, rice straw fiber content may significantly influence the withdrawal strength of fasteners, especially at higher fiber to polymer ratios. Furthermore, it was found that the coupling agent slightly affected the withdrawal strengths of the fasteners. The results also showed that withdrawal strength of fasteners are significantly reduced at more wetting cycles.

Keywords: *Rice straw, High density polyethylene, Composite, Nail, Screw, Wetting*