

Development of a High Abrasion Resistance Shoe Sole Incorporating Four Different Silica Grades

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Silica used as active reinforcing filler to improve high abrasion resistance in Rubber. In this study, the effect of four different silica grades (silica MP BET 161-190, silica powder newsil micro peral, silica 355GR and silica BET higher grade) on the abrasion resistance and other properties of the shoe sole have been studied. In this study type of silica grades was changed while keeping all the other ingredients and their amounts constant. The abrasion resistance was determined using DIN 53516 test method and the hardness, specific gravity, tensile strength and elongation at break were determined by following the respective ISO and ASTM standards. The results of the study showed that all four silica grades incorporated shoe soles have achieved acceptable abrasion resistance values. Achieved abrasion resistance value for shoe sole is maximum 350mm³. However, silica MP BET 161-190 has 289 mm³ which is also a quite higher abrasion resistance with a minimum loss of rubber in abrasion compared to other three silica grades. When considering the effect of silica grade on the physical properties of rubber compound, both silica MP BET 161-190 and 355GR grades showed acceptable values for all tested hardness, specific gravity, tensile strength and elongation at break of silica MP BET 161-190 grade incorporate sample were 48 IRHD, 1.088,17 MPa and 676% respectively. While silica 355GR incorporated sample were 51 IRHD, 17.1MPa and 631% respectively. However, both silica powder newsil micro peral and silica BET higher grade incorporated samples showed poor performance for the tested physical properties. Therefore, it can be concluded that, silica MP BET 161-190 is better performing as an active reinforcing filler with the highest abrasion resistance and a minimum loss of rubber in abrasion compared to other three silica grades.

Keywords: Abrasion resistance; Physical properties; Shoe sole; Silica grades