

## Utilization of synthetic silica and cross-linked polymethyl methacrylate (PMMA) as anti-block agents and evaluating their influence on desirable physical properties of power cables

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A cable is composed of three major components, namely, conductor, insulation, and jacket. Copper and aluminium are widely employed as conductors in cables. PVC is a popular insulating material, which offers outstanding resistance to a wide range of corrosive fluids, flame, moisture, and abrasion. The adhesion between the insulation and jacket (blocking) is one of the major problems associated with the production process of power cables. To overcome this problem, a talc bath is used in the conventional cable production process. However, the conventional method is not an efficient way to prevent blocking. Surface modification using anti-blocking agents can be employed as an effective way of preventing blocking. Anti-blocking agents function by creating microscopic imperfections on the surface of the polymer layer. In this study, a surface modification was done for both the insulation and jacket using

synthetic silica and cross-linked PMMA. However, the addition of the above anti-blocking additives should not negatively affect the other desired physical properties of cables. Effects of these two anti-blocking agents on other physical properties, such as heat stability, tensile strength, elongation at break, insulation resistance, and pressure stability at high temperatures, were evaluated. A system of synthetic silica and cross-linked PMMA provided better separation of layers and good quality of surface as anticipated, due to their synergistic effect. Also, the insulation resistance had significantly improved upon the addition of these two anti-blocking agents. However, higher levels of PMMA might soften the final polymer, and hence, it reduces the tensile strength of the insulation and jacket.

**Keywords:** Blocking, Cable, Anti-blocking, polymethyl methacrylate (PMMA), synthetic silica