

High Melt Strength (HMS) PE-100 Pipe Resin

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Abstract

PE-100 pipe resins, through different molecular architecture, have significantly higher performance properties than traditional chrome (Cr) catalyzed products. Improvements in slow crack growth (SCG), rapid crack propagation (RCP) as well as excellent high temperature burst performance expand the performance capabilities of polyethylene pressure pipe making polyethylene pipe resins more attractive choices for various piping applications. However, the industry desires the manufacture of heavy wall pipes greater than 60 mm (2.4 inch) in thickness. The molecular architecture changes for PE-100 to improve the aforementioned pipe properties typically result in a sacrifice of low shear rate viscosity which translates into lower sag resistance. Typically PE-100 resins are inferior in sag resistance to the Cr-based counterparts which can produce pipes with wall thicknesses of up to 82 mm (3.3 inch). It is well understood that improvements in the low shear rate viscosity will translate into improved sag resistance. Systematic study of polyethylene molecular architecture resulted in PE-100 products with improved sag resistance for the manufacture of up to 100 mm (4.0 inch) thick pipe walls without sagging at normal production rates. This sag performance is even better than for the traditional Cr-based products. Additionally, this same resin provides further increase in slow crack growth resistance, excellent rapid crack propagation performance, and attractive high temperature burst performance capabilities providing the industry with a superior performing resin to expand polyethylene pipe applications. The combination of performance features of this PE-100 resin will be presented in this paper.