

The following is a brief summary of Exxon Mobil Chemical's comments on the performance of Metallocene crosslinked (mXL) resin and high performance linear resins in rotational molding applications (originally prepared March 30, 2000).

For general rotational molding applications where cost is the driving issue, high performance linear polyethylene is the appropriate resin. For most applications linear resins will give years of service with excellent performance.

For high performance storage applications where containment, environment, and safety are issues, PAXON[®] 7004 mXL polyethylene resin is the material of choice. If the consequences of a potential spill are significant, the performance margins offered by mXL resin are worth the price difference. The Chief advantages of crosslinked resin are superior stress cracking resistance, improved notched impact strength, and broad end use temperature capability.

Environmental Stress Cracking Resistance (ESCR)

The bent strip ASTM procedure is the established method for assessing plastic failure resistance under the combined mechanisms of stress, notching, and chemical environment. The usual testing condition for high-density polyethylene ESCR is Condition B, 50°C, 100% Igepal CO-630. This is an appropriate test for judging container performance in relatively low risk applications such as household chemical storage. Using these parameters, PAXON 7004 mXL polyethylene and most linear high performance resins show excellent results. Test coupons last more than 1000 hours.

For stringent industrial storage conditions, drum manufacturers and others recognize that a more severe ESCR test is necessary. Under activated 10% Igepal exposure one can estimate exposure resistance to more hostile environments. *In activated Igepal conditions, mXL resin coupons show no failures beyond the test endpoint at 1000 hours. High performance linear rotomolded coupons show 50% failure in 50 to 200 hours.* Under severe chemical environments, mXL polyethylene offers dramatic performance improvement compared to high performance linear rotational molding resins.

Notched Impact Strength

Under notched impact conditions linear resins fail like a zipper. Once a crack starts, the stress concentration at the endpoint of the notch tends to unravel the plastic to failure. Crosslinked resins are notch resistant. For example, if a fork truck bumps into a mXL tank creating a notch it is likely that the notch will terminate, and the stress will stabilize in a mXL tank. There is little zipper influence in a tank made with mXL resin. If a linear tank develops a notch, there is significant chance that the crack will unzip to failure.

Notched impact tests show the dramatic difference between linear and mXL resins. Typical notched Izod strength for mXL resin is 17 ft-lbs. The usual notched Izod performance for high performance linear rotational molding resin is 3 to 5 ft-lbs. PAXON 7004 mXL polyethylene provides a significant safety factor in real world storage environments.

End Use Temperature

Part design and exposure details have a strong influence on final end use temperature limitations. The mXL resins have a successful record in severe applications where linear resins are unsatisfactory. A notable example of successful high temperature exposure in mXL application is appropriately designed hydraulic oil reservoirs. The combination of broad end use temperature compatibility, excellent gel crosslinking, and high-level ultra-violet additive protection in PAXON 7004 assures a performance cushion in harsh environments compared to linear resins. For applications such as storage vessels, PAXON 7004 stands up to harsh environmental exposure in summer conditions in southern climates or in frigid exposure at northern latitudes.

Performance Choice

High performance linear resins are the best choice for many rotational molding applications, PAXON 7004 mXL polyethylene is a better choice for vessels exposed to severe environments, harsh chemicals, and rugged handling. PAXON 7004 mXL resin provides additional cushion against the costs of tank failure, injury, or environmental remediation.