Recent developments in cure control for crosslinkable polyethylene (XLPE) power cable insulation

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Insulated power cables typically employ crosslinkable polyethylene compounds as a means to deliver increased service temperature. The most common technologies to deliver crosslinking are i) free-radical crosslinking initiated by thermal homolysis of organic peroxides and ii) the formation of siloxane crosslinks which result from hydrolysis and condensation of silane-containing ethylene polymers. Although these technology platforms have been utilized for many decades, advances in crosslinking chemistries have enabled new levels of performance in the rate of crosslinking and the resistance to scorch (premature crosslinking during cable extrusion). When compared to crosslinking of low-density polyethylene using dicumyl peroxide, new technologies are highlighted which demonstrate up to a two-fold increase in a characteristic scorch-time while preserving the ultimate cure potential. New formulation technology in radical crosslinking with low-density polyethylene has also been demonstrated to deliver crosslinking kinetics similar to that delivered by specialized ethylene polymers designed for high-cure speed. Within the silane-cure technology space, where the time for crosslinking of cables increases significantly as the insulation thickness increases, new technology enables crosslinking of thick sections in 24 - 48 hours without the need for external heat or moisture. These technology advances open up new opportunities in materials development for improved efficiencies in the cable manufacturing process.