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Compounding of flame retarded materials for the wire and cable industry

Dr Colin G. Richardson
Coperion Buss AG, 4133 Pratteln, Switzerland

The use of flame retarded compounds in wire and cable applications continue to grow at a regular and steady pace. These products can be based on a number of polymers and a diverse and varied range of formulations. The flame retarded wire and cable compound will typically call for a blend of characteristics, the most important of which are; FR properties, mechanical properties and electrical properties. Unfortunately these properties tend to be competitive rather than complementary and therefore present the formulator with an interesting challenge.

Development of a flame retardant compound requires formulating skill in order to address and meet these competing property requirements. However, between formulating and conversion onto cable, lies the extremely important step of mixing or compounding.

Compounding of flame retardant insulation and jacket formulations can require the addition and homogenisation of a large number of additives, some at high and even extremely high filler levels. Without accurate addition and efficient mixing the product can easily fail in one or more of its performance properties. Further, flame retardant compounds are costly materials that must be consistent in performance and reproducible in behaviour, The cable maker requires a compound that is both extrudable and stable during extrusion. For overall compound properties and ease of cable extrusion the compounding step can provide the key to success. This paper will review the requirements and explore the role of the compounding operation (both Kneader and Twin-Screw systems) and its importance in the wire and cable industry for highly performing flame retardant compounds.