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3M™ Boron Nitride Cooling Fillers

Boosting Processing Guide

3M™ Boron Nitride Cooling Fillers (BNCF) are engineered to help improve thermal conductivity in polymers while helping maintain or improve electrical insulation. Their unique properties make these additives suitable for many thermoplastic, elastomer and thermoset resins used in a wide variety of 5G, electrical, electronic, and automotive applications. This processing guide will help you optimize the outcome of your final product.

What is boosting and why should it be considered?

Boosting is adding a small quantity of 3M BNCF in combination with other fillers to increase the thermal conductivity. Adding the 3M BNCF can decrease the total amount of filler needed, manage viscosity to meet final product requirements (i.e., potting resins, pads, etc.) and improve mechanical properties. Reducing the total amount of the filler needed can even help to reduce the overall costs of the compound.

How much to add to get boosting effect?

3M Boron Nitride Cooling Fillers as a secondary filler can give significant boosting in terms of thermal conductivity starting from only 1% weight (wt) up to 25% wt. Typically, 1% to 10% wt help improve thermal conductivity (TC) by 50-100%. Formulations are dependent on the polymer and other fillers being used. Contact 3M to help you define the best grades and loading level to optimize thermal conductivity.

What are the best grades for boosting?

3M BNCF creates high thermal conductivity bridges between isolated islands of other low TC fillers. These boosting bridges create a faster path for heat conduction. For most of the applications, flakes such as CFF 200-3 and CFF 500-3, agglomerates CFA50M or platelets CFP 007HS show the best results.

What else to consider optimizing thermal conductivity by boosting?

In order to get the boosting effect, you need to have a minimum loading of 30-40 wt% of other fillers. This allows 3M BNCF to create the bridging effect you need to improve thermal conductivity.

How should 3M BNCF be compounded or mixed as secondary fillers?

When compounding or mixing your polymer, use the last side feeder available and add the 3M BNCF as the very last component. Avoid adding 3M BNCF, before the feedstock temperature reached the nominal temperature. Doing so may damage the particles and reduce the thermal conductivity.

Safety

3M BNCF are powders which can be safely handled with gloves, safety glasses and a dust mask. Always wear PPE recommended by your equipment manufacturer. Refer to the Safety Data Sheet (SDS) for more information.

Contact your sales representative or our application support team (cpm.technical-ceramics@mmm.com) with questions.
For additional product information, visit our website at www.3m.com/thermalmanagement.

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