

# 3M™ Boron Nitride Cooling Fillers

## Extrusion Compounding 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.



### Process equipment

When compounding polymers with fillers, the various materials are melted, mixed and then pelletized. The use of 3M BNCF does not require any special equipment. Common equipment in the polymer industry like twin screw extruders, single-screw extruders and planetary extrusion can be used.



### What to mix?

Thermoplastic polymers (such as HDPE, TPE, PP, PA and PC), normally in pellet form, need to be melted prior to adding the boron nitride powder. Common 3M BNCF grades used in extrusion are CFA50M, CFF200-3, CFF500-3 and CFP 0075. 3M also provides boron nitride in granulate form, CFP 012P, with optimized flowability.



### How to mix 3M BNCF?

To achieve low shear and soft compounding, use low rotational speeds and correct mixing sequences. We do not recommend using kneading blocks on 3M BNCF flakes and agglomerates. Harsh mixing breaks up these grades and lowers the thermal conductivity of the compound.



### What is the right mixing sequence for BNCF?

Only feed 3M BNCF by a side feeder after having a homogenous mix of all other components and a stable feedstock temperature. Avoid adding 3M BNCF too soon. Doing so may damage the particles and reduce the thermal conductivity. As the filler content gets higher than 30 vol%, a second side feeder is recommended.



### What are the right compounding parameters?

Your base polymer, other fillers, 3M BNCF grade and BNCF loading strongly influence the optimum parameters for extrusion. With 3M BNCF, it is important to avoid air bubbles by using a vacuum and creating a homogenous mix by setting the right temperatures. Air bubbles create insulation pockets which are detrimental to 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.

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