

3M Advanced Materials Division

3M™ Boron Nitride Cooling Filler Platelets

Product Description

3M Boron Nitride Cooling Filler Platelets (CFP) are powders of highly crystalline boron nitride single platelets.

Particle mean size ranges from 0.5 to 14 µm.

Features and Benefits

- Increases thermal conductivity while maintaining electrical insulation
- Compatible with standard polymers
- Low density

Typical Applications

- Adhesives
- Coatings
- Prepregs
- TIM foils
- Electronic overmoldings
- Housings
- Greases
- Heat sinks
- Gap fillers

Typical Physical Properties

(Not for specification purposes)

| | CFP 001 | CFP 003E | CFP 003 | CFP 003SF | CFP 006 | CFP 007HS | CFP 0075 | CFP 009 | CFP 012 | CFP 012P |
|-------------------------------|---------|----------|---------|-----------|---------|-----------|----------|---------|---------|----------|
| O | ≤ 1.2% | ≤ 1.1% | ≤ 1.0% | ≤ 1.1% | ≤ 0.5% | ≤ 0.6% | ≤ 0.5% | ≤ 0.5% | ≤ 0.5% | < 0.7% |
| C | ≤ 0.06% | ≤ 0.06% | ≤ 0.06% | ≤ 0.06% | ≤ 0.06% | ≤ 0.06% | ≤ 0.06% | ≤ 0.06% | ≤ 0.06% | ≤ 2.0% |
| B ₂ O ₃ | ≤ 0.2% | < 0.1% | < 0.1% | ≤ 0.2% | < 0.1% | < 0.1% | < 0.1% | < 0.1% | < 0.1% | < 0.1% |
| BN | ≥ 98.0% | ≥ 98.0% | ≥ 98.0% | ≥ 98.0% | >98.5% | >98.5% | >98.5% | >98.5% | >98.5% | ≥ 97.0% |

BN content is calculated as (100% minus B₂O₃, O, C, Si, Al, Fe, Ca, without loss on drying)

Powder Characteristics

(Not for specification purposes)

| Grade | Particle Size Distribution | | | Bulk Density, Scott (g/cm ³) | Bulk Density, DIN (g/cm ³) | Surface Area (m ² /g) |
|-----------|----------------------------|-----------|-----------|---|---|-------------------------------------|
| | d(0.1) µm | d(0.5) µm | d(0.9) µm | | | |
| CFP 001 | n.a. | 0.5** | 0.8** | <0.14 | – | <30 |
| CFP 003E | 0.5-2.5 | 1.3-8.8 | n.a.*** | – | <0.3 | <15 |
| CFP 003 | 1-2 | 2-5 | 8.5-22.5 | <0.15 | – | <18 |
| CFP 003SF | 0.5-2 | 2-6 | 6-14 | – | <0.15 | <20 |
| CFP 006 | 1.5-3 | 4.5-8 | 10-20 | <0.2 | – | <8.5 |
| CFP 007HS | 1.5-3 | 5-8 | 10-20 | <0.22 | – | <13 |
| CFP 0075 | 2-3.5 | 6-8.5 | 12-25 | <0.22 | – | <5.5 |
| CFP 009 | 2-3.5 | 6-12 | 14-32 | <0.22 | – | <5.5 |
| CFP 012 | 2-4.5 | 8-14 | 20-40 | <0.25 | – | <4.5 |
| CFP 012P* | 65-120 | 125-190 | 200-300 | – | 0.3-0.55 | <3.5 |

Bulk density determined according to ASTM B329/ISO 3923-2 (Scott density) and according to ISO 23145-2 (DIN density)

Particle size distribution measured by laser light scattering (Mastersizer 2000, dispersion in ethanol)

* Particle size distribution measured by laser light scattering (Mastersizer 2000, dry, 0.1 bar)

** Data determined by means of SEM pictures

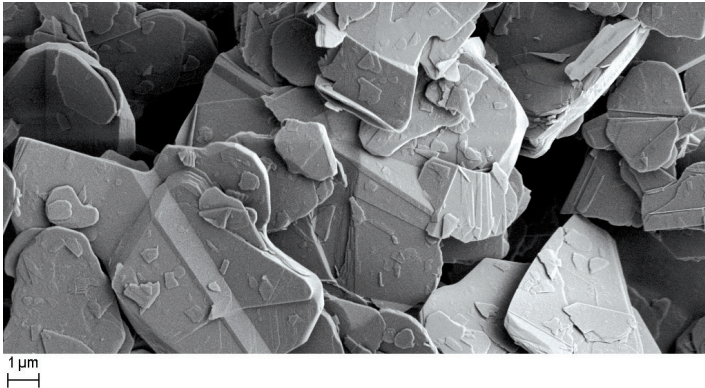
*** Can include soft agglomerates with 50-100 µm

For calculation purpose: Density of bulk hBN 2.25 g/cm³

3M™ Boron Nitride Cooling Filler Platelets - Grade Profiles

CFP 003E, 003, 006, 0075, 009 and 012

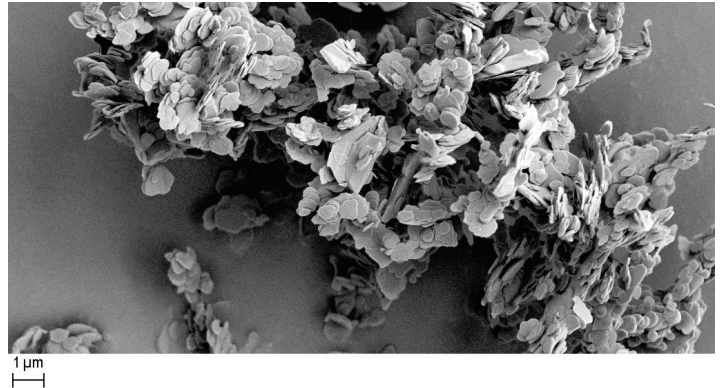
Optimal all-purpose grades for injection molded and potting resin parts.



SEM micrograph: Grade CFP 0075

CFP 001 and 003SF

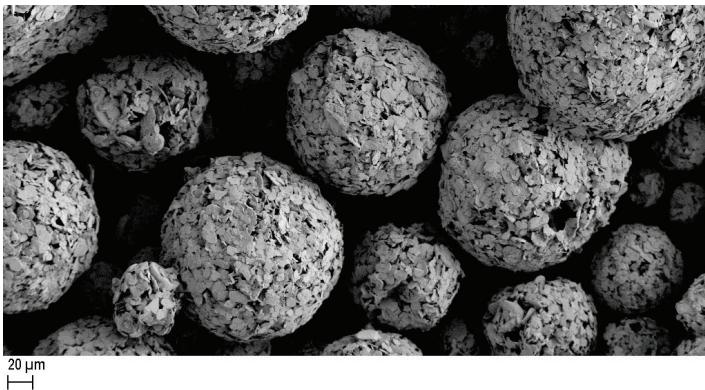
Preferred for thin films <25 µm and fibers, fine channels and windings. 3M CFP 003SF platelets have a controlled top size.



SEM micrograph: Grade CFP 003SF

CFP 012P

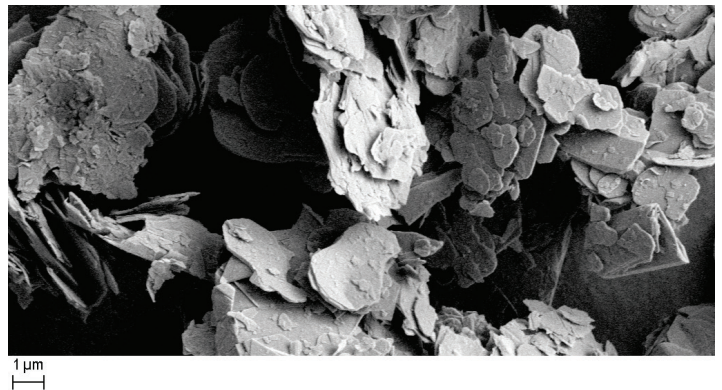
Boron nitride platelets spray-dried with organic binder for better processability (P). Intermediate granulates for high flowability and dosing velocities during feeding that disaggregate during compounding.



SEM micrograph: Grade CFP 012P

CFP 007HS

Ideal for thin films down to 50 µm due to its controlled top size as well as for injection molded parts and pads with increased in-plane thermal conductivity.



SEM micrograph: Grade CFP 007HS

Regulatory

The substance boron nitride (CAS No. 10043-11-5, EC No. 701-292-9) which comprises the 3M™ Boron Nitride Cooling Fillers products (all grades) is designated as Active on the TSCA Inventory and complies with all REACH obligations (directives 1907/2006/EC) of manufacturers/importers/downstream users.

3M Boron Nitride Cooling Filler Platelets CFP 001 and CFP 003SF

The products may contain diboron trioxide (CASRN 1303-86-2) as an impurity at levels which may exceed 0.1 % by weight. diboron trioxide is listed as a Substance of Very High Concern (SVHC) identified according to Article 59 of REACH. To the best of 3M's knowledge, 3M Boron Nitride Cooling Filler products do not contain at greater than 0.1% by weight of any other substances on the candidate SVHC list. This declaration reflects the substances on the candidate SVHC list, effective June 2023.

All other 3M Boron Nitride Cooling Filler Grades

The products contain less than 0.1% by weight boron oxide (CASRN 1303-86-2), an unavoidable impurity which is a Substance of Very High Concern (SVHC) substance identified according to Article 59 of REACH. To the best of 3M's knowledge, 3M Boron Nitride Cooling Filler products do not contain at greater than 0.1% by weight of any other substances on the candidate SVHC list. This declaration reflects the substances on the candidate SVHC list, effective January 2023.

Expertise in Production and Customer Service

With over 50 years of boron nitride manufacturing experience in our German Center of Excellence, our experienced specialists will work with you to optimize your polymer performance. With our broad portfolio offering, 3M engineers will assist you in selecting the correct grade for your application.

Processing and handling

Factors such as melt temperature, compounding technique, injection rate and more can have a significant effect on the thermal and electrical insulative properties of parts made with boron nitride cooling fillers. That's why we have developed processing guidelines to help. Guidelines and additional processing information can be found at [3M.com/thermalmanagement](https://www.3m.com/thermalmanagement).

Refer to the 3M Boron Nitride Cooling Filler Safety Data Sheet for additional safety information.

Packaging

3M Boron Nitride Cooling Filler Platelets are available in 10kg or 20kg drums, depending on grade. Samples also available in 1kg packages.

| Product (Standard drums) | 10 kg | 20 kg | 25kg |
|-----------------------------|-------|-------|------|
| CFP 001 | X | | |
| CFP 003E | | X | |
| CFP 003 | | X | |
| CFP 003SF | X | | |
| CFP 006 | | X | |
| CFP 007HS | | X | |
| CFP 0075 | | X | |
| CFP 009 | | X | |
| CFP 012 | | X | |
| CFP 012P | | | X |

Warranty, Limited Remedy, and Disclaimer: Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. User is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application. User is solely responsible for evaluating third party intellectual property rights and for ensuring that user's use of 3M product does not violate any third party intellectual property rights. Unless a different warranty is specifically stated in the applicable product literature or packaging insert, 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY OF NON-INFRINGEMENT OR ANY IMPLIED WARRANTY OR CONDITION ARISING OUT OF A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE. If the 3M product does not conform to this warranty, then the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.

Limitation of Liability: Except where prohibited by law, 3M will not be liable for any loss or damages arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.

Technical Information: Technical information, recommendations, and other statements contained in this document or provided by 3M personnel are based on tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed. Such information is intended for persons with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. No license under any 3M or third party intellectual property rights is granted or implied with this information.



3M Technical Ceramics

Zweigniederlassung der 3M Deutschland GmbH
Max-Schaidhauf-Str. 25, 87437 Kempten, Germany

Web www.3M.de/bncf

3M Advanced Materials Division

3M Center
St. Paul, MN 55144 USA

Web www.3M.com/thermalmanagement

3M is a trademark of 3M Company.
Used under license by 3M subsidiaries
and affiliates.

© 3M 2023. All rights reserved.
Issued: 07/2023