

3M Advanced Materials Division

# 3M™ 10B Enriched Borated Aluminum

## Introduction

3M™ 10B Enriched Borated Aluminum is an alloy material incorporating enriched Boron <sup>10</sup>B in standard aluminum compositions. Because of its high thermal conductivity, 10B enriched borated aluminum is useful in a number of specialized spent fuel storage and transportation applications.

For nonstructural applications, Alloy 1100 Al + <sup>10</sup>B offers very efficient thermal neutron capture and is available in a variety of sheet and plate forms.

## Typical Physical Properties

(Not for specification purposes)

Properties	Alloy 1100 + B
Typical Total Boron	0.5 to 4.5%
Minimum <sup>10</sup> B Enrichment	95%
Equivalent Natural Boron	2.7 to 24.6%
Surface Finish	Ra = 125 μ in. (3.2 μm)
Dimensional Tolerances	Aluminum Association Standards

## Neutronic Properties

Real time neutron transmittance and radiography are used to determine product acceptance. The minimum areal density based on the customer's requirements and the material thickness is determined by the following formula:

$$A = W \rho ET$$

**Where:**

A = Areal Density, g <sup>10</sup>B/cm<sup>2</sup>

W = Weight % total Boron

ρ = Density, 2.7 g/cm<sup>3</sup>

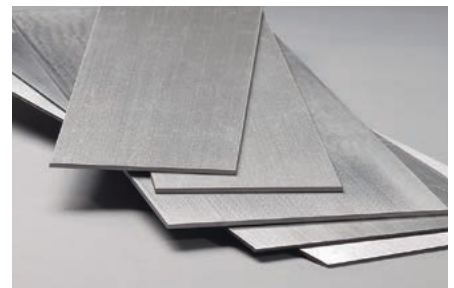
E = Enrichment, Weight % <sup>10</sup>B

T = Thickness, cm

Acceptance is based on direct comparison with established neutron transmittance standards.

## Boron Enrichment Capabilities

3M Technical Ceramics is a leading global commercial processor of enriched boron, and is one of the largest boron isotope enrichment facilities in the world today. We focus on manufacturing optimized materials with an emphasis on stable boron isotopes. Our proprietary manufacturing processes allow <sup>10</sup>B and <sup>11</sup>B enrichment from natural occurring ratios up to levels exceeding 99% isotopic purity. We offer secure supply, consistent product quality and the ability to custom engineer



products for your unique applications. Our specialists are experts at solving materials-related problems in the demanding nuclear and semiconductor industries. For more information, contact us at [boron@mmm.com](mailto:boron@mmm.com).

## Technical Services

Our ISO 9001:2008 and NQA-1 Quality Program is fully qualified, audited and approved by many worldwide customers. We control the entire value stream in the manufacture of these specialized materials, also offering qualification services for new designs and applications. Whether using natural boron carbide or enriched boron, we manufacture neutron absorber materials that meet or exceed stringent end user requirements. Under our ISO and NQA-1 programs, we provide best-in-class service to our customers covering all steps of neutron absorber manufacturing and processing.

## Product Storage, Handling and Safety

**Storage:** Store away from heat. Store away from acids. Store away from oxidizing agents.

**Handling:** Avoid contact with oxidizing agents (e.g. chlorine, chromic acid etc.).

**Safety:** May present a hazard under certain handling conditions. See Article Information Sheet for additional information.

For more information on storage, handling and safety, an Article Information Sheet (AIS) is available upon request. You may request this by contacting us at [boron@mmm.com](mailto:boron@mmm.com).

**Product is manufactured and sold by 3M Technical Ceramics Inc.**

**Warranty, Limited Remedy, and Disclaimer:** Many factors beyond 3M Technical Ceramics' control and uniquely within user's knowledge and control can affect the use and performance of a 3M Technical Ceramics product in a particular application. User is solely responsible for evaluating the 3M Technical Ceramics 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 Technical Ceramics product in user's product or process 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 Technical Ceramics warrants that each 3M Technical Ceramics product meets the applicable 3M Technical Ceramics product specification at the time 3M Technical Ceramics ships the product. 3M Technical Ceramics 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 Technical Ceramics product does not conform to this warranty, then the sole and exclusive remedy is, at 3M Technical Ceramics' option, replacement of the 3M Technical Ceramics product or refund of the purchase price.

**Limitation of Liability:** Except where prohibited by law, 3M Technical Ceramics will not be liable for any loss or damages arising from the 3M Technical Ceramics 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 Technical Ceramics personnel are based on tests or experience that 3M Technical Ceramics 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 Technical Ceramics or third party intellectual property rights is granted or implied with this information.

**Export Control.** The 3M Technical Ceramics product(s) listed here may be controlled commodities under applicable U.S. export control laws and regulations, including, but not limited to, the U.S. International Traffic in Arms Regulations (ITAR) and the Export Administration Regulations (EAR). These laws and regulations may, among other things, prohibit the export and/or reexport of controlled product(s) to any or all locations outside of the United States without prior U.S. Government export authorization, the sharing of export controlled technical data and services with those anywhere who are not U.S. citizens or U.S. permanent residents, dealings with U.S. Government, United Nations and other "Restricted Parties," and proliferation activities including those that further nuclear, chemical, or biological warfare, missile stockpiling/use, or the use of rockets or unmanned aerial vehicle systems. 3M Technical Ceramics and purchasers or prospective purchasers of the 3M Technical Ceramics product(s) shall comply with all applicable export control laws and regulations, which may require obtaining and maintaining applicable export control authorization or licenses, and understand that the ability of a party to obtain or maintain such authorization or license is not guaranteed. The exporter of record has the sole responsibility to determine whether the export or subsequent reexport of the 3M Technical Ceramics product(s) requires export authorization. An explicit condition to 3M Technical Ceramics selling or making available the 3M Technical Ceramics product(s) is the customer's agreement to comply with all applicable trade compliance laws and regulations.



**3M Technical Ceramics, Inc.**  
2702 boulevard Talbot  
Chicoutimi, Québec, Canada, G7H 5B1  
Phone 418-693-0227  
Email [boron@mmm.com](mailto:boron@mmm.com)  
Web [www.3M.com/boron](http://www.3M.com/boron)

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

Please recycle. Printed in USA © 3M 2020.  
All rights reserved. Issued: 12/20 16575HB  
98-0050-0318-5 Rev. C