

3M Advanced Materials Division

# 3M™ 11B Enriched Boron Trifluoride

## Introduction

Ceradyne, Inc., a 3M company, supplies high-purity boron materials to the semiconductor market. The boron-11 isotope is used as an additive to semiconductor grade silicon as a “doping” agent, and in other semiconductor processes where ultra high purity boron is required.

3M™ 11B Enriched Boron Trifluoride is an isotopically enriched material used for doping. It is produced to >99.99% purity and >99.8% enrichment, with 25% more boron-11 than naturally occurring materials.

3M 11B enriched boron trifluoride is packaged in U.S. DOT certified cylinders. Customer cylinders may be filled upon request. Valves are CGA330 or DISS642. A minimum product order of 50 g applies.

## Typical Physical Properties

(Not for specification purposes)

Isotopic Enrichment*	High Purity Grade
<sup>11</sup> B (atomic %)	>99.8%
Chemical Purity**	
BF <sub>3</sub>	>99.99%
N <sub>2</sub>	<15 ppmv
O <sub>2</sub> /Ar	<15 ppmv
CO <sub>2</sub>	<15 ppmv
SO <sub>2</sub>	<15 ppmv
HF	<15 ppmv
SiF <sub>4</sub>	<15 ppmv

\* The boron-11 ratio is determined by inductively coupled plasma mass spectrometry (ICP-MS).

\*\* Determined by GC-DID and FTIR.

## Boron Enrichment Capabilities

Ceradyne 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>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).

## Analytical Services

As a manufacturer of specialty, high purity chemical and isotopic products, Ceradyne maintains sophisticated analytical and testing capabilities at its manufacturing facility in Quapaw, OK. Our analytical laboratories support on-site production activities and

## Standard Cylinder Properties (Not for specification purposes)

Cylinder	O.D. Inch (mm)	Length Inch (mm)	Gross Weight Lbs. (kg)	Wall Inch (mm)	Volume Cubic Inch (Liters)	Service Pressure (psi)	Test Pressure (psi)	Fitting (NGT)	Maximum Fill <sup>11</sup> BF <sub>3</sub> (grams)
0.44L	1.94 (49.28)	11.88 (302)	2.3 (1.04)	0.095 (2.41)	25.5 (0.418)	1800	3000	3/4	150
8.4L	7.00 (178)	17.40 (442)	25.0 (11.3)	0.160 (4.06)	525 (8.60)	2015	3360	3/4	1600
49L	9.25 (235)	55 (1397)	139 (63)	0.224 (5.7)	2990 (49)	2400	4000	3/4	20,000

provide our customers with data and evidence that the products they receive meet or exceed their requirements. Our laboratories are fully equipped with current-generation instruments to perform a full range of testing procedures, including: inductively coupled plasma mass spectrometry; atomic absorption spectroscopy; ion and gas chromatography; carbon/sulfur and oxygen/nitrogen analysis; particle size analysis and BET surface area measurement.

## Product Storage, Handling and Safety

**Storage:** Keep container tightly closed to prevent contamination with water or air. If contamination is suspected, do not reseal container. Protect from sunlight. Store in a well-ventilated place. Store away from heat. See product Safety Data Sheet (SDS) for additional information.

**Handling:** Do not use in a confined area with minimal air exchange. Do not handle until all safety precautions have been read and understood. Do not breathe dust/fume/gas/mist/vapors/spray. Do not get in eyes, on skin, or on clothing. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Wash contaminated clothing before reuse. See SDS for additional information.

**Safety:** Handling of this material may be hazardous. Do not breathe dust/fume/gas/mist/vapors/spray. Use only outdoors or in a well-ventilated area.

Wear respiratory protection. Wear protective gloves, protective clothing, and eye/face protection. Wash thoroughly after handling. See SDS for additional information.

## Regulatory Summary

See SDS for additional information.

Product is manufactured and sold by Ceradyne, Inc., a 3M company.

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

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



Ceradyne, Inc., a 3M company

3250 S. 614 Road  
Quapaw, OK 74363 USA

Phone 918-673-2201  
Email boron@mmm.com  
Web 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 2016.  
All rights reserved. Issued: 9/16 11340HB  
98-0050-0306-0 Rev C