

AMG Aluminum North America, LLC

MATERIAL SAFETY DATA SHEET

AMG Aluminum North America, LLC
 Suite 300
 435 Devon Park Drive
 Wayne, PA 19087

ALUMINUM TITANIUM BORON MASTER ALLOY

MSDS IDENTIFICATION NUMBER A161	DATE ISSUED 12/16/1986	ISSUED BY: AMG Aluminum North America, LLC	EMERGENCY PHONE NUMBERS:
	DATE REVISED 1/1/2013		AMG Aluminum North America, LLC 800-523-8457 CHEMTREC: 1-800-424-9300

I. Product Identification

CHEMICAL NAME: Aluminum Titanium Boron Master Alloy	CHEMICAL FAMILY: Metal Alloy
TRADE NAME: TiBor	FORMULA: Al + TiB ₂ + TiAl ₃

II. Hazardous Constituents

CONSTITUENT(S)	PERCENT	CAS NUMBER	NIOSH RTECS NUMBER	EXPOSURE LIMITS (as mg/m ³)	
				OSHA TWA	ACGIH TLV
Boron	0.1 - 3.0	7440-42-8	ED3750000	None	None
Titanium	1.5 - 11.0	7440-32-6	XR1700000	None	None
Aluminum	Balance	7429-90-5	BD0330000	Total Dust = 15.0; Respirable Fraction = 5.0	Dust 10.0; Fumes 5.0

* Many substances do not have a unique exposure limit. The absence of an exposure limit does not lessen consideration for exposure risk. In the absence of specific information, professional judgment may be required.

III. SARA TITLE III Reporting Requirements

ELEMENT	Boron	Titanium	Aluminum			
SUBJECT TO SECTION 313 REPORTING	NO	NO	Dust or Flume: YES			

IV. Physical Properties

FREEZING POINT: Not Applicable	VAPOR PRESSURE (mmHg): Not Applicable
MELTING POINT: 1156 - 2173°F	VAPOR DENSITY (AIR=1): Not Applicable
BOILING POINT: Not Applicable	DENSITY (H ₂ O = 1): 2.72 - 2.88
SUBLIMES @: Not Applicable	SOLUBILITY IN WATER: Not Applicable
EVAPORATION RATE: Not Applicable	% VOLATILES BY VOLUME: Not Applicable
APPEARANCE AND ODOR: Solid - Gray/Silver - No Odor	

V. Fire, Explosion, and Reactivity Information	
FLASH POINT (WITH TEST METHOD) None	FLAMMABLE (EXPLOSIVE) LIMITS V/ V% LEL: None UEL: None
EXTINGUISHING MEDIA	This alloy is noncombustible. Use extinguishing media appropriate to the surrounding fire.
SPECIAL FIRE FIGHTING PROCEDURES	If this material is reduced to powder form, caution must be used to prevent fire or explosion. To extinguish a metal powder fire use dry sand, dry graphite or other class"D" fire extinguishing powder.
UNUSUAL FIRE AND EXPLOSION HAZARDS	Water and other forms of surface contamination on metal that is added to a furnace can cause explosions in melting operations. Preheat material and keep dry prior to charging into a furnace.
GENERAL REACTIVITY	This alloy is a stable material.
INCOMPATIBILITY (MATERIALS TO AVOID)	Avoid contact with mineral acids and oxidizing agents that may generate hydrogen gas; the evolution of hydrogen may be an explosion hazard.
HAZARDOUS DECOMPOSITION PRODUCTS	Various elemental metals and metal oxides may be generated from melting or dross handling operations. Refer to Section II for permissible exposure limits.
VI. Health Hazard Information	
PRIMARY ROUTE(S) OF EXPOSURE	<p>INHALATION: Inhalation of metal dust, fume, or powder may result from melting, dross handling, casting, welding, grinding, crushing or similar operations which generate airborne metal particulate during use of this material.</p> <p>INGESTION: Hand, clothing, food and drink contact with metal dust, fume or powder can cause Ingestion of particulate during hand to mouth activities such as eating, drinking, smoking, nail biting, etc.</p> <p>SKIN: Skin contact with this material may cause, in some sensitive individuals, an allergic response. In the form of metal dust or powder, skin contact or abrasion may also cause irritation or dermatitis.</p> <p>EYE: Particulate metal (dust, fume or powder) may be dangerous to the eye and surrounding tissue. Airborne particulate (chips, dust or powder) is always a potential problem as well as inserting fingers into the eye socket if the hand or clothing is contaminated with metal particulate.</p>
TOXICITY	There is no information on the toxicity of this alloy. Under normal handling and use of the solid form of this material there are few health hazards. Cutting, welding, melting, grinding, etc., of this material will produce dust, fume or particulate containing the component elements of this material. Exposure to the dust, fume or particulate may present significant health hazards that are referable to the elemental constituents in Section II.
EFFECTS OF OVEREXPOSURE	<p>ACUTE: The metal dust and fumes of those elements in Section II can cause irritation to the skirt, eye and mucous membranes. As dust, powder or fume, exposure which abrades the skin can cause irritation and dermatitis. Injury to the eyes is generally a result of particulate irritation or mechanical injury to the cornea or conjunctiva by dust or particulate. Excessive inhalation of aluminum and various aluminum alloy dusts and fumes may cause respiratory irritation, cough and bronchitis.</p> <p>CHRONIC: Respiratory disease with symptoms ranging from shortness of breath and cough to permanent disability due to loss of lung function may be caused by excessive exposure to metal dust or fumes. Aluminum has been indicated to cause gastro-intestinal disorders and non-significant changes in the lung.</p>

VI. Health Hazard Information (continued)			
CARCINOGENIC REFERENCES	Neither product nor its ingredients are listed as a carcinogen by the National Toxicology Program, International Agency for Research on Cancer, or United States Occupational Safety and Health Administration.		
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE	Persons with impaired pulmonary function, airway diseases and conditions such as asthma, emphysema, chronic bronchitis, etc., may incur further disability if excessive concentrations of dust or fume are inhaled. If prior damage or disease to the Neurologic (nervous), Circulatory, Hematologic (blood) or Renal (kidney) systems has occurred, proper screening or examinations should be conducted on individuals who may be exposed to further risk if handling and use of this material causes excessive exposure.		
VII. Emergency First Aid and Procedures			
INHALATION	Breathing difficulty caused by inhalation of dust or fume requires removal to fresh air. If breathing has stopped, perform artificial respiration and obtain medical assistance at once. If over-exposure to metal fume produces chills, muscle aches or fever, move the exposed person to fresh air and obtain medical assistance at once.		
INGESTION	Swallowing metal powder or dust can be treated by having the affected person swallow large quantities of water and attempting to induce vomiting if conscious. Obtain medical assistance at once.		
SKIN	Skin cuts and abrasions can be treated by standard first aid. Skin contamination with dust or powder can be removed by washing with soap and water. If irritation persists obtain medical assistance at once.		
EYES	Dust or powder should be flushed from the eyes with copious amounts of clean water. If irritation persists obtain medical assistance. Contact lenses should not be worn if working with metal dusts and powders.		
VIII. Industrial Hygiene Control Measures			
VENTILATION	Local exhaust ventilation should be used to control exposure to airborne dust and fume whenever possible.		
RESPIRATORY PROTECTION	Use NIOSH approved respirators as specified by an Industrial Hygienist or qualified Safety Professional. Lung function tests are recommended for users of negative pressure devices.		
PROTECTIVE GLOVES	Wear gloves to prevent metal cuts and skin abrasions particularly during handling of wrought forms, solid metal, sheet, strip or tube.		
EYE PROTECTION	Wear safety glasses when risk of eye injury is present particularly during machining, grinding, welding, powder handling, etc.		
OTHER PROTECTIVE EQUIPMENT	Protective clothing such as uniforms, disposable coveralls, safety shoes, etc., may be required during metal handling operations as appropriate to the circumstances of exposure.		
RECOMMENDED MONITORING PROCEDURES	<table border="0"> <tr> <td>ENVIRONMENTAL SURVEILLANCE: Exposure to the elements identified in Section II can be best determined by having air samples taken in the employee breathing zone, work area or department.</td> <td>MEDICAL SURVEILLANCE: Lung function tests, chest x-rays and routine physical examinations may be useful to determine effects of dust or fume exposure.</td> </tr> </table>	ENVIRONMENTAL SURVEILLANCE: Exposure to the elements identified in Section II can be best determined by having air samples taken in the employee breathing zone, work area or department.	MEDICAL SURVEILLANCE: Lung function tests, chest x-rays and routine physical examinations may be useful to determine effects of dust or fume exposure.
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IX. Environmental Protection Information	
STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	In solid form this material poses no special clean-up problems. If this material is in powder or dust form, clean-up should be conducted with a vacuum system utilizing a high efficiency particulate air filtration system. Caution should be taken to minimize airborne generation of powder or dust and avoid contamination of air and water. Properly label all material collected in waste container.
WASTE DISPOSAL METHOD	Prior to disposal consider if the material has recovery value. State or federal regulations may require specific labeling, packing, storage, transportation and disposal procedures. Contact an Environmental Engineer or consultant familiar with waste disposal regulations
ENVIRONMENTAL HAZARDS	In solid form this material poses no special environmental problems. Metal powders or dusts may have significant impact on air and water quality. Airborne emissions, spills and releases to the environment (discharge to streams, sewer systems, groundwater, surface soil, etc.) should be controlled immediately. If such potential for a spill or release exists it is advisable to develop an emergence spill response plan.
X. Special Precautions	
HANDLING PRECAUTIONS	This product must be handled accordingly to the size, shape and quantity of material involved. Solid metal may require use of hoists, cranes, etc. Powders should be moved or transported to minimize spill or release potential.
STORAGE PRECAUTIONS	In solid form this material poses no special storage problems. Store metal and metal powder in a dry area. Do not store adjacent to mineral acids. Fine metal powder should be kept away from flames and sources of ignition.
Additional Information	
<p>The following is the label text which accompanies this product during shipment:</p> <p style="text-align: center;">ALUMINUM TITANIUM BORON MASTER ALLOY (TiBor)</p> <p>CAUTION! INHALATION OF DUST OR FUME MAY CAUSE IRRITATION TO THE LUNG AND MUCOUS MEMBRANES. EYE IRRITATION MAY OCCUR.</p> <ul style="list-style-type: none"> • This product contains Aluminum, Titanium and Boron. • Exposure to Aluminum and Titanium is not generally associated with adverse health effects on the lung or other organ systems. Boron dust and Boron oxide are regarded as nuisance dusts although Boron oxide has been reported to cause skin rash, eye and nasal irritation. • Avoid breathing dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls and/or personal protective equipment. For additional information refer to the Matenal Safety Data Sheet (MSDS) for this product. <p>WARNING! WATER AND OTHER FORMS OF SURFACE CONTAMINANTS HAVE CAUSED EXPLOSIONS IN MELTING OPERATIONS.</p> <ul style="list-style-type: none"> • Inspect material before furnace addition and remove surface contamination such as water, ice, grease, oil, etc. • Preheat material and keep dry prior to charging into a furnace. 	

CONTENT AND DESCRIPTIONS OF AMG Aluminum North America, LLC. MATERIAL SAFETY DATA SHEETS

These definitions are intended for use with Material Safety Data Sheets supplied by AMG Aluminum North America, LLC. Questions concerning these sheets should be directed to:

AMG Aluminum North America, LLC
Suite 300
435 Devon Park Drive
Wayne, PA 19087

SECTION I - PRODUCT IDENTIFICATION

Chemical Name: A name consistent with the nomenclature system of the International Union of Pure & Applied Chemistry (UPAC) or the Chemical Abstracts Service (CAS).

Trade Name: The name the product is sold by, i.e., the product name.

Chemical Name: A general designation for a group of elements or compounds.

Formula: The scientific designation for an element or compound.

SECTION II - HAZARDOUS CONSTITUENTS

Constituent(s): The chemical component(s) of the product. A hazardous constituent is a chemical which is a physical hazard or health hazard.

Percent: The amount of component or range present in the product and expressed on a weight basis.

CAS Number: A specific chemical identification number assigned by the Chemical Abstracts Service. The lack of a CAS Number for any given chemical or mixture indicates that a number may not have been assigned.

NIOSH RTECS Number: The National Institute for Occupational Safety & Health (NIOSH) Registry of Toxic Effects of Chemical Substances (RTECS) Access Number for a specific element or compound's toxicological data.

OSHA PEL: The Occupational Safety & Health Administration (OSHA) Permissible Exposure Limit (PEL) - usually a time weighted average (TWA) ceiling limit (C) or maximum peak exposure limit (P) expressed as PPM (parts per million) or as Mg/M3 (milligrams per cubic meter).

ACGIH TLV: The American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) - In many cases, identical to the OSHA PEL. ACGIH also recommends a short term exposure limit (STEL) for certain substances that should not be exceeded at any time.

SECTION III - SARA TITLE III

Section 313 of Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 requires reporting of information relating to the release of certain chemicals. The chemicals contained in corporation products may be subject to reporting and are identified in this section. Refer to 40 CFR Part 372 - **Toxic Chemical Release Reporting; Community Right to Know** to determine if your facility is subject to these reporting requirements. This information may not be deleted from the Material Safety Data Sheet, and must be copied and redistributed whenever this material is redistributed. This requirement is imposed by Federal regulation.

SECTION IV - PHYSICAL PROPERTIES

Freezing Point: The temperature at which a liquid changes to a solid. A range may be given.

Melting Point: The temperature at which a solid changes to a liquid. A range may be given.

Boiling Point: The temperature at which a liquid changes to a vapor. Usually expressed at sea level pressure (760mm-Hg).

Sublimes @: The temperature at which a solid changes directly to vapor.

Evaporation Rate: Indicated as faster or slower than Ethyl Ether unless stated.

Appearance and Odor: A description of the product in terms of form, color, odor, etc.

Vapor Pressure (mmHg): The pressure of a saturated vapor above a liquid expressed as mmHg at 20°C, unless stated at a different temperature.

Vapor Density (air=1): The relative density of a vapor or gas compared to an equal volume of air. Air is equivalent to 1.0.

Specific Gravity (H₂O=1): The ratio of the weight of a volume of material to the weight of an equal volume of water. Water is equivalent to 1.0 @ 4°C. The term "DENSITY" describes the concentration of matter as the mass per unit volume, e.g., pounds/cubic inch.

Solubility In Water: The degree to which a material is capable of dissolving in water.

% Volatiles By Volume: The volumetric percentage of volatile compounds in a product.

SECTION V - FIRE, EXPLOSION, AND REACTIVITY INFORMATION

Flash Point (With Test Method): The lowest temperature at which a vapor/air mixture will propagate a flame above the surface of the material being tested.

Flammable (Explosive) Limits V/V%:

LEL; LOWER EXPLOSION LIMIT: The lowest vapor concentration in air at which ignition by spark or flame will occur.

UEL; UPPER EXPLOSION LIMIT: The highest vapor concentration in air at which ignition by spark or flame will occur.

Extinguishing Media: The type of fire extinguishing media to be used taking into account the type of chemical and its flammable characteristics.

Special Fire Fighting Procedures: Indicates equipment to protect firemen from toxic products of combustion.

Unusual Fire and Explosion Hazards: Chemical changes that may occur under heat or fire conditions.

General Reactivity: The tendency of a material to undergo chemical reaction with the release of energy.

Incompatibility (Materials To Avoid): Materials which could cause dangerous reactions.

Hazardous Decomposition Products: The breakdown of a material into compounds or elements that may have specific hazard properties different than the original material.

SECTION VI - HEALTH HAZARD INFORMATION

Primary Routes of Exposure:

Inhalation: The breathing in of a gas/fume, vapor, or mist as a contribution to exposure.

Ingestion: The swallowing of a substance as a contribution to exposure.

Skin: The contribution to exposure by the cutaneous route, either skin absorption or skin contact.

Eyes: The effect of chemical exposure on the eye.

Toxicity: The available toxicological data usually expressed as lethal dose or lethal concentration of the material or its components. Most toxicity test results are from exposure tests conducted on animals such as rats or mice, and caution is recommended in making direct comparison to human beings.

Effect of Overexposure:

Acute: Rapid effects of exposure with severe symptoms.

Chronic: Effects due to exposure that develop slowly over a long period of time or which recur frequently.

Carcinogenic References: Available references which indicate the potential for a material to cause cancer in man or animals.

Medical Conditions Aggravated By Exposure: Medical conditions that warrant consideration regarding exposure to a toxic substance.

SECTION VII - EMERGENCY & FIRST AID PROCEDURES

Inhalation: Emergency action to address adverse effects due to inhalation of a hazardous material.

Ingestion: Emergency action to address adverse effects due to ingestion of a hazardous material.

Skin: Emergency action to address adverse effects due to skin contact or absorption of a hazardous material.

Eyes: Emergency action to address adverse effects or injury to the eye due to contact with a hazardous material.

SECTION VIII - INDUSTRIAL HYGIENE CONTROL MEASURES

Ventilation: Recommended type of ventilation for control of gases or particulate.

Respiratory Protection: General information on the type of respiratory protection recommended.

Protective Gloves: Recommendation for protection to prevent hand contact with the material.

Eye Protection: Recommendation to protect against eye injury.

Other Protective Equipment: Other personal protective equipment (PPE) such as clothing, safety shoes, etc. that may be appropriate to protect against injury or exposure.

Recommended Monitoring Procedures:

Environmental Surveillance: Personal air sampling or related procedures to evaluate exposure of an individual.

Medical Surveillance: Biological monitoring or related tests/examinations to evaluate the effects of exposure to an individual.

SECTION IX - ENVIRONMENTAL PROTECTION INFORMATION

Steps To Be Taken If Material Is Released Or Spilled: Specifically refers to containment, cleanup and control.

Waste Disposal Method: Refers to recommended disposal practices or applicable regulatory requirements when known.

Environmental Hazards: Refers to information such as aquatic or vegetative toxicity, ambient air pollution concerns, etc. which are available from regulatory or published technical services.

SECTION X - SPECIAL PRECAUTIONS

Handling Precautions: Safe movement of the product may require specific handling procedures.

Storage Precautions: Safe storage of the product may require specific storage procedures.

ADDITIONAL INFORMATION

The Information in this document is believed to be correct as of the data issued. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PURPOSE OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION, THE RESULTS TO BE OBTAINED FROM USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. This information and the product are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use thereof.