

SAFETY DATA SHEET

MAGNESIUM BARIUM ALLOY (Mg-Ba Master Alloy)

Standard Commercial Grades: MgBa10 (10% Ba) | MgBa20 (20% Ba) | MgBa30 (30% Ba)  
Conforms to OSHA Hazard Communication Standard 29 CFR 1910.1200 & UN GHS (Rev. 9)

| SECTION 1: PRODUCT AND COMPANY IDENTIFICATION |                                                                                                                                   |                       |                                                                                                                 |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------|
| Product Name:                                 | Magnesium Barium Alloy / Magnesium Barium Master Alloy                                                                            | Product Code / Model: | MgBa Series (MgBa10, MgBa20, MgBa30)                                                                            |
| Synonyms:                                     | Mg-Ba intermediate alloy, Mg-Ba master alloy ingots/lumps/granules                                                                | CAS Number:           | Mixture (Component CAS: 7439-95-4, 7440-39-3)                                                                   |
| Relevant Uses:                                | Metallurgical additive, grain refiner, deoxidizer/modifier for light alloys, battery/getter research, industrial foundry casting. | Uses Advised Against: | Not for domestic use. Prevent uncontained contact with water, steam, or high humidity.                          |
| Manufacturer / Supplier:                      | Heeger Materials Inc.<br>230 Steele St, Denver, CO 80206, United States                                                           | Contact Details:      | Phone: +1 (925) 385-8104 / +1 (833) 222-8587<br>Email: sales@heegermaterials.com   Web: www.heegermaterials.com |
| Emergency Telephone:                          | CHEMTREC (USA/Canada): 1-800-424-9300 (24 Hours)<br>CHEMTREC (International): +1 703-527-3887                                     | SDS Revision / Date:  | Revision 1.0   September 10, 2026                                                                               |

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the Substance or Mixture (OSHA 29 CFR 1910.1200 / GHS):

- Substances & mixtures which, in contact with water, emit flammable gases (Cat. 2), H261
- Flammable solids (Category 2, applicable to fines, shavings, chips, and dust), H228
- Acute toxicity, Oral (Category 4), H302
- Acute toxicity, Inhalation (Category 4), H332
- Skin irritation (Category 2), H315 | Serious eye irritation (Category 2A), H319

2.2 GHS Label Elements

Signal Word: **DANGER**

Hazard Statements:

- H261:** In contact with water releases flammable gases.
- H228:** Flammable solid (chips, shavings, dust, fines).
- H302:** Harmful if swallowed.
- H332:** Harmful if inhaled.
- H315:** Causes skin irritation.
- H319:** Causes serious eye irritation.

Precautionary Statements:

- P210:** Keep away from heat, hot surfaces, sparks, open flames. No smoking.
- P223:** Do not allow contact with water.
- P231+P232:** Handle and store under inert gas. Protect from moisture.
- P261:** Avoid breathing dust/fumes. | **P264:** Wash skin thoroughly.
- P280:** Wear protective gloves/clothing/eye protection/face protection.
- P301+P312+P330:** IF SWALLOWED: Call POISON CENTER/doctor. Rinse mouth.
- P302+P335+P334:** IF ON SKIN: Brush off loose particles. Immerse in cool water.
- P304+P340+P312:** IF INHALED: Remove to fresh air. Call doctor if unwell.
- P305+P351+P338:** IF IN EYES: Rinse cautiously with water. Remove lenses.
- P370+P378:** In case of fire: Use Class D dry powder or sand. **NO WATER.**
- P402+P404:** Store in a dry place. Store in a closed container.

2.3 Other Hazards (HNOC):

Massive monolithic ingots are stable under dry air. Fine dust or shavings generated during machining present severe water-reactive fire and combustible dust explosion hazards. Contact with water liberates flammable hydrogen gas and highly alkaline caustic hydroxides.

HMIS RATING

|                     |   |
|---------------------|---|
| HEALTH              | 2 |
| FLAMMABILITY        | 2 |
| PHYSICAL HAZARD     | 2 |
| PERSONAL PROTECTION | E |

Product: Magnesium Barium Alloy (MgBa10, MgBa20, MgBa30) | Rev Date: Sept 10, 2026 | Doc ID: HM-SDS-MGBA

Page 1 of 4

## SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Characterization: Solid Metallic Alloy / Intermediate Master Alloy Mixture

| Component                         | CAS No.   | EC No.    | MgBa10 (wt%)                  | MgBa20 (wt%)                  | MgBa30 (wt%)                  | GHS Classification                                   |
|-----------------------------------|-----------|-----------|-------------------------------|-------------------------------|-------------------------------|------------------------------------------------------|
| Magnesium (Mg)                    | 7439-95-4 | 231-104-6 | 88.0 – 92.0%<br>(Nominal 90%) | 78.0 – 82.0%<br>(Nominal 80%) | 68.0 – 72.0%<br>(Nominal 70%) | Water-react. 2 (H261)<br>Flam. Sol. 1 (H228, powder) |
| Barium (Ba)                       | 7440-39-3 | 231-149-1 | 8.0 – 12.0%<br>(Nominal 10%)  | 18.0 – 22.0%<br>(Nominal 20%) | 28.0 – 32.0%<br>(Nominal 30%) | Water-react. 2 (H261)<br>Acute Tox. 4 (H302, H332)   |
| Trace Impurities (Fe, Si, Cu, Ni) | Various   | Various   | < 0.3% total                  | < 0.3% total                  | < 0.3% total                  | Not hazardous at concentration                       |

## SECTION 4: FIRST AID MEASURES

**General Advice:** Remove contaminated clothing immediately. Show this SDS to attending medical personnel.**Eye Contact:** Immediately flush eyes with plenty of water for at least 15 minutes, holding eyelids open. Remove contact lenses if easy to do. Seek immediate ophthalmological/medical attention.**Skin Contact:** Gently brush off loose particles from skin. Wash skin thoroughly with running water and mild soap. In case of thermal or chemical burns, seek medical attention. Do not apply ointments without medical advice.**Inhalation:** Move exposed individual to fresh air. If not breathing, perform CPR (avoid mouth-to-mouth). If breathing is labored, administer oxygen by qualified personnel. Seek immediate medical advice.**Ingestion:** Do NOT induce vomiting. Rinse mouth thoroughly with cold water. Never give anything by mouth to an unconscious person. Seek emergency medical care immediately.**Note to Physician:** Soluble barium ions cause severe hypokalemia by blocking cellular potassium channels, triggering cardiac arrhythmias, flaccid paralysis, and hypertension. Oral sodium sulfate or magnesium sulfate (Epsom salt) may be administered under medical supervision to precipitate barium into insoluble barium sulfate (BaSO<sub>4</sub>). Monitor serum potassium, ECG, and kidney function closely.

## SECTION 5: FIRE FIGHTING MEASURES

**Suitable Extinguishing Media:** Class D dry powder extinguishing agent, dry flux, dry sodium chloride, dry sand, or argon blanket. Smother burning alloy gently without dispersing dust.**Unsuitable Extinguishing Media:** DO NOT USE WATER, FOAM, HALON, OR CARBON DIOXIDE (CO<sub>2</sub>). Water reacts violently with burning magnesium and barium, liberating explosive hydrogen gas and causing steam explosions. Burning alloy reduces CO<sub>2</sub>, accelerating combustion.**Specific Hazards:** Burns with an intense, blinding white flame. Fine turnings or dust may ignite spontaneously or upon contact with moisture. Generates dense toxic fumes of Barium Oxide (BaO) and Magnesium Oxide (MgO).**Protective Equipment:** Firefighters must wear full bunker gear and positive-pressure SCBA. Wear specialized tinted eye protection (shade 4–6) to prevent retinal injury from intense UV/visible radiation.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

**Personal Precautions:** Evacuate unprotected personnel. Eliminate all ignition sources. Avoid generating airborne dust. Wear full PPE (safety goggles, flame-resistant clothing, nitrile/leather gloves, particulate respirator).**Environmental Precautions:** Prevent material from entering sewers, ditches, waterways, and groundwater. Barium is toxic to aquatic life.**Clean-Up Methods:** DO NOT USE WATER FOR CLEANUP. Sweep, scoop, or vacuum using clean, non-sparking, grounded conductive tools into clean, dry, tightly sealable metal drums. Maintain container under dry inert gas or airtight seal. Treat residues with dry sand or inert absorbent.

## SECTION 7: HANDLING AND STORAGE

**Handling Precautions:** Handle only under dry conditions. Protect from moisture and humidity. Avoid generating dust or fine turnings. Machining must be performed with approved dry lubricants or under inert cover with spark-proof, explosion-proof dust extraction. Smoking and open flames strictly prohibited. Ground all processing equipment. Wash thoroughly after handling.**Storage Conditions:** Store in original, tightly sealed, clearly labeled steel drums in a cool, dry, well-ventilated dedicated storage area. Store on pallets off concrete floors. Avoid areas with overhead water sprinklers. Maintain under inert gas (argon) cover wherever possible.**Incompatibilities:** Water, moisture, mineral acids, strong oxidizers, halogens, chlorinated solvents, sulfur, and carbon dioxide.

## SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

| Component                                        | CAS No.   | OSHA PEL                                                              | ACGIH TLV                             | NIOSH REL                  |
|--------------------------------------------------|-----------|-----------------------------------------------------------------------|---------------------------------------|----------------------------|
| Barium (Ba) (metal and soluble compounds, as Ba) | 7440-39-3 | TWA: 0.5 mg/m <sup>3</sup>                                            | TWA: 0.5 mg/m <sup>3</sup>            | TWA: 0.5 mg/m <sup>3</sup> |
| Magnesium (Mg) (as oxide fume / nuisance dust)   | 7439-95-4 | TWA: 15 mg/m <sup>3</sup> (total)<br>TWA: 5 mg/m <sup>3</sup> (resp.) | TWA: 10 mg/m <sup>3</sup> (inhalable) | No established REL         |

**Engineering Controls:** Provide dedicated local exhaust ventilation designed for combustible/reactive metal dusts (explosion-proof, spark-free). Eyewash stations and safety showers must be readily accessible.

**Eye/Face Protection:** ANSI Z87.1 chemical goggles and full-face shield. Tinted face shields when handling molten material.

**Skin/Body Protection:** Flame-resistant, static-dissipative work clothing. Heavy-duty leather or impervious nitrile gloves. Safety boots with metatarsal protection.

**Respiratory Protection:** Where dust or fumes are generated, wear a NIOSH-approved particulate respirator with P100 / HEPA filters. Use SCBA in emergency or high-concentration scenarios.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

|                              |                                                        |                            |                                           |
|------------------------------|--------------------------------------------------------|----------------------------|-------------------------------------------|
| <b>Appearance:</b>           | Solid ingots, lumps, waffle, or pieces                 | <b>Odor:</b>               | Odorless                                  |
| <b>Color:</b>                | Silvery-gray metallic luster                           | <b>pH:</b>                 | Not applicable (solid); alkaline in water |
| <b>Melting Point:</b>        | 580 °C – 640 °C (approx. eutectic range)               | <b>Boiling Point:</b>      | ~1090 °C (Mg) to 1640 °C (Ba)             |
| <b>Density (MgBa10):</b>     | ~1.85 – 1.95 g/cm <sup>3</sup>                         | <b>Density (MgBa20):</b>   | ~2.00 – 2.12 g/cm <sup>3</sup>            |
| <b>Density (MgBa30):</b>     | ~2.18 – 2.30 g/cm <sup>3</sup>                         | <b>Flash Point:</b>        | Not applicable (solid metal)              |
| <b>Flammability (solid):</b> | Bulk solid is flame-resistant; fines/chips flammable   | <b>Auto-ignition Temp:</b> | > 500 °C (dust cloud: ~460 °C)            |
| <b>Water Solubility:</b>     | Insoluble; reacts with water generating H <sub>2</sub> | <b>Vapor Pressure:</b>     | Negligible at ambient temperatures        |
| <b>Partition Coeff:</b>      | Not applicable (inorganic alloy)                       | <b>Decomposition Temp:</b> | Not established                           |

## SECTION 10: STABILITY AND REACTIVITY

**Reactivity:** Water-reactive. Reacts with water, steam, moisture, and acids, producing flammable hydrogen gas (H<sub>2</sub>) and exothermic heat.

**Chemical Stability:** Stable under recommended conditions in dry, airtight containers under inert gas cover.

**Possibility of Hazardous Reactions:** Rapid exothermic reaction with water, acids, oxidizing agents, and halogens. Hydrogen buildup in enclosed vessels poses explosion hazard.

**Conditions to Avoid:** Exposure to moisture, water, steam, open flames, sparks, static discharge, and high temperatures.

**Incompatible Materials:** Water, moisture, strong oxidizers, mineral acids, halogens, chlorinated hydrocarbons, sulfur, carbon dioxide.

**Hazardous Decomposition Products:** Hydrogen gas (H<sub>2</sub>), toxic Barium Oxide (BaO) fumes, Magnesium Oxide (MgO) fumes.

## SECTION 11: TOXICOLOGICAL INFORMATION

**Acute Toxicity:**

• **Oral:** Harmful if swallowed. Soluble barium compounds have oral LD50 (rat) 118 – 300 mg/kg. Ingestion causes severe gastrointestinal irritation and systemic barium poisoning.

• **Inhalation:** Harmful if inhaled. Inhalation of dust or oxide fumes produces respiratory irritation, coughing, and systemic toxicity.

• **Skin / Eye:** Causes skin and serious eye irritation. Moisture on tissue reacts to generate caustic alkaline hydroxides.

**Systemic Effects:** Soluble barium causes severe hypokalemia, inducing cardiac arrhythmias, tremors, muscle paralysis, and hypertension.

**Chronic Toxicity:** Repeated dust exposure may cause baritosis (benign pneumoconiosis) and cardiovascular effects.

**Carcinogenicity:** No component ≥ 0.1% is identified as a probable, possible, or confirmed human carcinogen by IARC, ACGIH, NTP, or OSHA.

SECTION 12: ECOLOGICAL INFORMATION

**Ecotoxicity:** Soluble barium ions exhibit moderate to high toxicity to aquatic life (LC50 96h: 10 – 100 mg/L). Reaction with water raises local pH significantly. Do not discharge into surface waters or aquifers.

**Persistence / Degradability:** Not applicable to inorganic metallic substances. Metals oxidize into mineral carbonates, sulfates, and oxides.

**Bioaccumulation:** Low potential in aquatic and terrestrial food webs.

**Mobility in Soil:** In sulfate-bearing soils, barium precipitates as insoluble Barium Sulfate (BaSO4), immobilizing the element.

SECTION 13: DISPOSAL CONSIDERATIONS

**Waste Treatment Methods:** Segregate metallic scrap for metallurgical recycling or reclamation. Dispose of in accordance with Federal, State, and local environmental regulations. Do not dispose of in municipal trash or sewers.

**RCRA Hazardous Waste Status:** Unused waste may be classified as EPA Hazardous Waste D001 (Reactivity / Water-Reactive) and D005 (Toxicity Characteristic for Barium, regulatory level 100 mg/L by TCLP).

**Packaging Disposal:** Empty containers may contain hazardous reactive residues. Do not rinse with water. Purge with dry inert gas, seal tightly, and dispose of through an authorized hazardous waste contractor.

SECTION 14: TRANSPORT INFORMATION

| Regulation | UN Number | Proper Shipping Name                                                | Class | Packing Group | Special Provisions                                                                |
|------------|-----------|---------------------------------------------------------------------|-------|---------------|-----------------------------------------------------------------------------------|
| US DOT     | UN 3208   | Metallic substance, water-reactive, n.o.s. (Magnesium-Barium Alloy) | 4.3   | PG II         | Massive solid ingots without dust may be exempt per 49 CFR 173.124(c)             |
| IMDG (Sea) | UN 3208   | METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S. (Magnesium-Barium Alloy) | 4.3   | PG II         | EmS: F-G, S-N; Stowage Category E; Keep dry; Marine Pollutant: No                 |
| IATA (Air) | UN 3208   | Metallic substance, water-reactive, n.o.s. (Magnesium-Barium Alloy) | 4.3   | PG II         | Cargo Aircraft Only (CAO): 50 kg max. Passenger Aircraft: Forbidden or restricted |

SECTION 15: REGULATORY INFORMATION

**United States Federal Regulations:**

- **TSCA:** Components (Magnesium CAS 7439-95-4, Barium CAS 7440-39-3) are listed on the TSCA Chemical Substance Inventory.
- **SARA 302 (EHS):** No chemical in this product is subject to SARA Title III, Section 302.
- **SARA 313 (TRI): Barium (CAS 7440-39-3)** is subject to reporting under SARA Title III, Section 313.
- **SARA 311/312 Hazards:** Reactive Hazard, Fire Hazard, Acute Health Hazard. | **CERCLA RQ:** Barium: 1,000 lbs (454 kg).
- **OSHA:** Hazardous chemical under OSHA Hazard Communication Standard (29 CFR 1910.1200).

**State & International Regulations:**

- **California Proposition 65:** Contains no chemicals known to cause cancer, birth defects, or reproductive harm.
- **State Right-to-Know:** Listed on New Jersey, Pennsylvania, and Massachusetts RTK lists.
- **Canada DSL:** Listed on Canadian DSL. WHMIS: Class B6 (Reactive Solid), D1B (Toxic Material).
- **European Union:** REACH Regulation (EC) No 1907/2006 compliant; components listed on EINECS.

SECTION 16: OTHER INFORMATION

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NFPA 704 Rating:  | Health: <b>2</b> (Moderate)   Flammability: <b>2</b> (Moderate; 3 for powder)   Instability: <b>2</b> (Reactive)   Special: <b>W</b> (Water-reactive)                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| HMIS Rating:      | Health: <b>2</b>   Flammability: <b>2</b>   Physical Hazard: <b>2</b>   Personal Protection: <b>E</b> (Safety glasses, gloves, dust respirator)                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Product Coverage: | Covers all standard commercial grades of Magnesium-Barium Master Alloy: <ul style="list-style-type: none"><li>• <b>MgBa10:</b> Magnesium ~90 wt%, Barium ~10 wt% (Ingot / Lump / Granule)</li><li>• <b>MgBa20:</b> Magnesium ~80 wt%, Barium ~20 wt% (Ingot / Lump / Granule)</li><li>• <b>MgBa30:</b> Magnesium ~70 wt%, Barium ~30 wt% (Ingot / Lump / Granule)</li></ul>                                                                                                                                                                                                                         |
| Document Info:    | Issue Date: September 10, 2026   Revision: 1.0   Prepared By: Technical Compliance Team, Heeger Materials Inc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Disclaimer:       | The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. It is designed only as guidance for safe handling, use, processing, storage, transportation, and disposal, and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid when used in combination with any other materials or process. Heeger Materials Inc. assumes no legal responsibility for misuse or failure to adhere to recommended practices. |