1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name: Magnesium Alloy
Product shape: sheets, plates, foils
Product form: Mixture (Alloy)

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses: Solid Product, Various Forms and Uses.
Uses advised against: Not applicable.

1.3 Details of the supplier of the safety data sheet

Company name: NIPPON KINZOKU CO., LTD.
Address: 5-30-7 Shiba, Minato-ku, Tokyo 108-0014
Responsible Dept.: Development Department
Tel: +81-3-5765-8104 (only available during office hours)
Fax: +81-3-5765-8135
Web Page: https://www.nipponkinzoku.co.jp/en/

1.4 Emergency Telephone Number

Contact: Same as the above

2. Hazards identification

The product in their solid state presents no inhalation, ingestion or contact health hazard. However, inhaling dusts and/or fumes which may be generated during certain manufacturing procedures such as burning, melting, welding, sawing, brazing, grinding and machining may irritate the mucous membranes of the respiratory organs, eyes, etc. Dusts may have combustion/explosion.
Regarding the elemental components contained in steel materials, there is the following hazard information.

2.1 Classification of the substance or mixture (GHS classification)

HEALTH HAZARDS

Hazard class	Classification	Hazard statement
Skin corrosion/irritation	Category 1	H314: Causes severe skin burns and eye damage
	Category 2	H315 : Causes skin irritation.
	Category 3	-
Serious eye damage/eye irritation	Category 1	H318 : Causes serious eye damage
	Category 2A	H319 : Causes serious eye irritation.
	Category 2B	H320 : Causes eye irritation.
Reproductive toxicity	Category 1B	H360 : May damage fertility or the unborn child.
Specific target organ toxicity - Single exposure	Category 1	H370 : Causes damage to organs (respiratory system)
	Category 2	H371 : May cause damage to organs (respiratory system)
	Category 3	H335 : May cause respiratory irritation (respiratory tract irritation)
Specific target organ toxicity - Repeated exposure	Category 1	H372 : Causes damage to organs through prolonged or repeated exposure (respiratory organs, nervous system)

ENVIRONMENTAL HAZARDS

Hazardous to the aquatic environment (Acute)	Category 1	H400 : Very toxic to aquatic life
Hazardous to the aquatic environment (Long-term)	Category 1	H410 : Very toxic to aquatic life with long lasting effects
	Category 4	H413 : May cause long lasting harmful effects to aquatic life.

2.2 Label elements (GHS Labeling)

<Pictograms>

<Signal word>

Danger, warning

<Precautionary statements>

(Prevention precautionary statement)

- P202: Do not handle until all safety precautions have been read and understood.
- P223: Keep away from any possible contact with water, because of violent reaction and possible flash fire.
- P233: Keep container tightly closed.
- P260: Do not breathe dust/fume/gas/mist/vapours/spray.
- P261: Avoid breathing dust/fume/gas/mist/vapours/spray.
- P264: Wash hands thoroughly after handling.
- P270: Do not eat, drink or smoke when using this product.
- P271: Use only outdoors or in a well-ventilated area.
- P273: Avoid release to the environment.
- P280: Wear protective gloves/protective clothing/eye protection/face protection.

(Response precautionary statement)

- P301 +P330 + P331: IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
- P302+P352: IF ON SKIN: Wash with plenty of soap and water.
- P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P304+P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
- P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P308+P311: IF exposed or concerned: Call a POISON CENTER/doctor.
- P310: Immediately call a POISON CENTER/doctor.
- P312: Call a POISON CENTER/doctor if you feel unwell.
- P314: Get medical advice/attention if you feel unwell.
- P332+P313: If skin irritation occurs: Get medical advice/attention.
- P337+P313: If eye irritation persists: Get medical advice/attention.
- P362+P364: Take off contaminated clothing and wash it before reuse.
- P391: Collect spillage.

(Storage precautionary statement)

- P403+P233: Store in a well-ventilated place. Keep container tightly closed.
- P405: Store locked up.

(Disposal precautionary statement)

- P501: Dispose of contents/container in accordance with local/regional/national/international regulation to be specified.

3. Composition/ information on ingredients

3.1 Chemical identity : Mixture (alloy based on iron and chemically stable solid substance)

3.2 Composition / information Ingredients

Chemical Name	Weight %	CAS Number	EC Number
Magnesium [Mg]	bal	7439-95-4	231-104-6
Aluminum [Al]	0 - 10	7429-90-5	231-072-3
Zinc [Zn]	0 - 3	7440-66-6	231-175-3
Manganese [Mn]	0 - 3	7439-96-5	231-105-1
Lithium [Li]	0 - 10	7439-93-2	231-102-5

Note 1) The component values differ depending on the steel grade standard within the range shown in the above table.
Note 2) In addition to the main components in the above table, trace elements such as iron [Fe], silicon [Si], copper [Cu], and nickel [Ni] are included.
Note 3) See section 15.1 for Japanese law

4. First-aid measures

In case of inhalation of, ingestion of, or skin contact with the dust or fumes generated during processing of the product, immediately give first aid described below, and then seek medical attention or treatment if necessary.

- **Inhalation:** Move victim to fresh air and keep at rest in position comfortable for breathing.
- **Skin contact:** Wash skin immediately with plenty of water and soap.
- **Eye contact:** Rinse carefully with water for several minutes. In case of using contact lenses, remove them if easy to do so. Continue rinsing.
- **Ingestion:** Rinse mouth out thoroughly with water.
- **Others:** In case of skin wound such as a cut from edge or chips of the product, keep wound clean. If skin becomes burned by arcs, etc., cool with water.

5. Fire-fighting measures

When heated in air to a temperature near its melting point, magnesium alloys ignite and burn with a white flame. Smother burning magnesium by covering with an extinguishing powder approved for use on magnesium fires. Consult national fire protection association standards for other extinguishing media which may be applicable to certain operations such as foundries or heat treat furnaces.

- **Suitable extinguishing media:** Class D fire extinguisher or smother with dry sand etc.
- **Unsuitable extinguishing media:** DO NOT use carbon dioxide or halogenated extinguishing agents. DO NOT use water or foam.

6. Accidental release measures

No available data to exposure prevention and protective measures for the product in solid state. However, with operations such as welding, sawing, brazing, grinding, machining etc. that might case dust/fume, follow the procedures shown below.

6.1 Personal precautions, protective equipment, and emergency procedures

Provide adequate ventilation. Wear appropriate protective equipment to prevent inhalation of or eye contact with dust or fumes. See section 8.

6.2 Environmental precautions

Promptly collect dust generated by processing such as cutting and polishing. Prevent their leakage.

6.3 Methods and materials for containment and cleaning up

Contaminated packages must be disposed of as waste according to section 13.

7. Handling and Storage

7.1 Precautions for safe handling

Wear appropriate protective equipment in case of generating dust or fumes during welding, weld cutting or grinding. Moreover, be sure to provide local or general ventilation system.

Promptly collect processing waste with a dust collector, store the collected processing waste in a steel container, and treat the waste by chemical treatment, etc.

For heavy weights, call for precautions in handling, against toppling, rolling and package-collapsing. Cut-ends and cutting chips with burr may be injurious. Fumes from welding and fine particles may cause fire injury. When cutting bundling and packaging hoops (bands), be careful about bouncing hoops and hoop-tips. Particularly with coils, be careful about their leading ends which, when unbundled, might spring up ward.

7.2 Conditions for safe storage, including any compatibilities

Avoid contact with water leakage, acid, alkali or substances containing them. Avoid environment with high temperature and high humidity. Pack them with sheets or covers to prevent products from getting rusty/rain water infiltrations, if needed.

8. Exposure Controls/ Personal Protection

No available data to exposure prevention and protective measures for the product in solid state. However, with operations such as welding, sawing, brazing, grinding, machining etc. that might case dust/fume, follow the exposure control/personal protection procedures shown below.

8.1 Concentration limit

	[Mg]	[Al]	[Zn]	[Mn]	[Li]
year classified	2005	2015	2007	2018	2005
ACGIH[*1] TLVs・TWA [mg/m^3]	not set	1(R)[*2]	not set	0.1(I)[*2] 0.02(R)[*2]	not set

*1. American Conference of Governmental Industrial Hygienists
(by https://anzeninfo.mhlw.go.jp/anzen_pg/GHS_MSD_FND.aspx)
*2. (I); Inhalable fraction (R); Respirable fraction

8.2 Exposure controls

If dust/fume occurs, use partial/whole ventilation.

8.3 Personal Protection

If dust/fume occurs, use suitable respiratory protective equipment/protective gloves/protective wear/safety shoes.

9. Physical and chemical properties

appearance: Silver-gray metallic solid form	upper/lower flammability or explosive limits: Not Applicable
odor: Odorless	
odor threshold: Not Applicable	vapor Pressure: Negligible
pH: Not Applicable	vapor density: Not Applicable
melting Point: about 580℃ and over	solubility (water): Insoluble
boiling range: about 1100℃ and over	n-octanol/water partition coefficient: Not Applicable
flash point: Non-flammable	auto-ignition temperature: Not Applicable
Density: 7 – 9 (g/cm3 at 20℃)	decomposition temperature: Not Applicable

10. Stability and reactivity

10.1 Reactivity/Chemical stability: Stable and non-reactive under general condition.

10.2 Possibility of hazardous reactions:

- Magnesium reacts with carbon dioxide, sulfur dioxide, and moisture in the atmosphere to form oxides, sulfides, and hydroxide layers.
- Molten magnesium burns slowly emitting a flash of light when it reacts with oxygen in the atmosphere to form white magnesium oxide (MgO).
- Magnesium reacts with nitrogen in the atmosphere to form brown magnesium nitride (Mg_3N_2). Magnesium nitride will react violently with water to generate high heat. The amount of heat generated per mole corresponds to that generated per one mole of magnesium.
- When modest amount of water is exposed to the burning magnesium, water is decomposed, hydrogen and oxygen are generated, and it causes an explosion and accelerates the combustion of magnesium.
- Chips and fine dust from magnesium, including modest amount of water, are easily ignited by open flames, and burn strongly when exposed to the hydrogen and oxygen generated by the decomposition of water.
- If the iron oxide (e.g. oxidized scale resulting from iron pod) contacts the molten magnesium, a violent reaction (thermite reaction) occurs to form iron and magnesium fluoride.
- If the iron fluoride (reactant of iron and rich gas of sulfur hexafluoride) contacts the molten magnesium, a violent reaction (thermite reaction) occurs to form iron and magnesium fluoride.
- Magnesium is generally stable to water, but reacts with high temperature water or an aqueous solution containing chloride to form magnesium hydroxide ($Mg(OH)_2$) while generating hydrogen gas.
- Magnesium reacts violently with acids and simultaneously generates hydrogen gas. However, it is stable in a concentrated hydrofluoric acid or chromic acid aqueous solution because of forming a passive film.

For details, see “Safety guidelines for Handling” on the website of the Japan Magnesium Association. (Japanese only)

10.3 Conditions to be avoided: Keep away from environments of humidity, water, acid, etc.

10.4 Incompatible materials: Strong oxidizing agent, acid, etc.

10.5 Hazardous decomposition products: Inter-metallic compounds in fume at welding/fusing may exist.

11. Toxicological information

Hazard class	[Mg]	[Al]	[Zn]	[Mn]	[Li]
Classified year	2006	2015	2008	2006	2006
Acute toxicity	—	—	—	—	—
Skin corrosion/irritation	Category 2	—	—	Category 3	Category 1
Serious eye damage/eye irritation	Category 2A	—	Category 2B	Category 2B	Category 1
Respiratory sensitization	—	—	—	—	—
Skin sensitization	—	—	—	—	—
Carcinogenicity	—	—	—	—	—
Reproductive toxicity	—	—	—	Category 1B	—
Specific target organ toxicity - Single exposure	Category 3 (r.t.i.)	Category 1 (r.s.)	—	Category 1 (r.s.)	Category 2 (r.s.)
Specific target organ toxicity - Repeated exposure	—	Category 1 (r.s.)	—	Category 1 (r.s., n.s.)	—

note 1 NITE-CHRIP / NITE integrated version GHS classification result by the government
note 2 (r.t.i.): respiratory tract irritation (r.s.): respiratory system (n.s.): nervous system
note 3 "-" in the table indicates that the elements in question are classification not possible or was not conducted in the year.
note 4 See Section 2 (Hazard summary) for each category information

12. Ecological information

Hazard class	[Mg]	[Al]	[Zn]	[Mn]	[Li]
Classified year	2006	2015	2008	2006	2006
Hazardous to the aquatic environment (Acute)	—	—	Category 1	—	—
Hazardous to the aquatic environment (Long-term)	Category 4	—	Category 1	Category 4	—
Hazardous to the ozone layer	no information	—	no information	no information	no information

note 1 NITE-CHRIP / NITE integrated version GHS classification result by the government
note 3 "-" in the table indicates that the elements in question are classification not possible or was not conducted in the year.
note 3 See Section 2 (Hazard Summary) for each category information.

13. Disposal considerations

Waste disposal recommendations: Recycle where possible and/or dispose of spent material such as metals, metal-bearing waste and submerged arc welding (SAW) flux/slug appropriately.
Dispose of waste material in accordance with all local, regional, national, provincial, territorial and international regulations.

14. Transport information

International regulation: in accordance with IMDG, ICAO/ IATA-DGR

- Proper Shipping Name: MAGNESIUM or MAGNESIUM ALLOYS with more than 50 percent magnesium in pellets, turnings or ribbons.
- Identification Number: UN 1869
- ADR/ RID: Non-dangerous goods

15. Regulatory information

Regulation by law of Japan

- Industrial Safety and Health Act
- Act on the Assessment of Releases of Specified Chemical Substances in the Environment and the Promotion of Management Improvement
- Waste Management and Public Cleansing Act
- Fire Service Act (limited to powder and flakes)
- Ship Safety Act (limited to pellets, turnings or ribbons)
- aviation law (limited to pellets, turnings or ribbons)

16. Other information

References

- ISO 11014 ”Safety data sheet for chemical products - Content and order of sections”
- Globally Harmonized System of Classification and Labeling of Chemicals (GHS)
- NITE-CHRIP / NITE integrated version GHS classification result by the government
  (https://www.nite.go.jp/en/chem/chrip/chrip_search/systemTop)
- Safe Handling of Magnesium (International Magnesium Association)
- Website of the Japan Magnesium Association. (Japanese only)

This Safety Data Sheet is prepared on the basis of the materials and the information that are available at this time.
This is provided as reference information for businesses handling our products to ensure the safe handling chemically, and it is not a guarantee of safety.
Businesses handling please use this paper for reference, and it is necessary to take appropriate safety measures on your own responsibility according to your intended use and usage.

End of Safety Data Sheet