POSCO
포스코강판

MSDS (Material Safety Data Sheet)

[This data was prepared in consideration of Article 41 of Occupational Safety and Health Act.]

Product	Aluminum coated steel plate

1. Chemical Product and Company Identification

a. Product Name — Aluminum coated steel plate

b. Recommended use of the chemical and restrictions on use

Recommended use	Steel manufacturing
Restrictions on use	Do not use except for purpose

c. Information on manufacturer/importer/distributor

Company	POSCO Coated & Color Steel Co.,Ltd
Address	173 Cheolgang-ro, Nam-gu, Pohang-si, Gyeongsangbuk-do
Emergency tel.	82-54-280-6114

2. Hazard(s) Identification

a. Classification of hazards

Water soluble substance and mixture: classification 1
Pyrophoric solid: classification 1
Reproductive toxicity: classification 1B
Specific target organ toxicity (repeat exposure): classification 2
Chronic aquatic environment hazard: classification 1

b. Signal word, hazard statement(s), symbols and precautionary statement

Pictogram

Signal word — Danger

Health hazard statement

H250 Self ignited when exposed to air
H260 Generates self-igniting flammable gas when in contact with water
H360 May damage fertility or the unborn child
H373 May cause damage to organs through prolonged or repeated exposure
H410 Very toxic aquatic organisms due to long term effects

Precautionary statements

Prevention

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P222 Do not allow contact with air.
P223 Keep away from any possible contact with water.
P231+P232 Handle under inert gas and Protect from moisture.
P260 Do not breathe dust/fume/gas/mist/vapors/spray.
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing/eye protection/face protection.

Response

P308+P313 If exposed or concerned, get medical advice/attention.
P314 Get medical advice/attention if you feel unwell.
P335+P334 Brush off loose particles from skin and immerse in cool water/wrap in wet bandages.
P370+P378 In case of fire: Use CO2 to extinguish.
P391 Collect spillage.

Storage

P402 Store in a dry place.
P407 Maintain air gap between stacks/pallets.

Disposal

P501 Dispose of contents/container to related regulation.

c. Hazards not otherwise classified(NEPA)

Magnesium

Health	0
Fire	1
Reactivity	2
Aluminum	
Health	0
Fire	No data available
Reactivity	1
Manganese	
Health	0
Fire	No data available
Reactivity	1
Zinc	
Health	0
Fire	No data available
Reactivity	1

3. Composition/Information on Ingredients

Chemical name	Other name	CAS 번호	함유량(%)
Magnesium	MAGNESIUM METAL	7439-95-4	1.38 Max.
Aluminum		7429-90-5	94.41 Min.
Manganese		7439-96-5	1.86 Max.
Zinc		7440-66-6	2.35 Max.

※ This product is the finished solidified product and you are not supposed to be exposed to its chemical substances. But when it is molten for cutting or fusion, you may be exposed to its chemical substance.
※ It may contain mior amounts of other ingredients(Solvent naphtha, Titanium, Copper, Xylene, Silicone oxide Iron, Silicon and etc.)
※ In case of general chromium treatment, the product contains Cr6 as follows. - Max. 30mg/m2

4. First-aid Measures

a. Eye contact	Take emergency medical care. Rinse the skin or eye with the flowing water for more than 20 minutes if contacted with substance.
b. Skin contact	If irritation or rash occurs: Get medical advice/attention. Remove the contaminated clothing and shoes and segregate the contaminated area. In case of minor skin contact, prevent the contaminated area from expanding.
c. Inhalation	Take emergency medical care. If exposes to a lot of dusts or fumes, remove person to fresh air and If there is other symptom such as coughing, take the medical assistance.
d. Ingestion	If feel uncomfortable with swallowing, get the medical attention. If the substance is swallowed or inhaled, use the proper breathing apparatues instead of the mouth-to-mouth breathing
e. Other precautions	Make the medical personnel understand the substance and take the protective actions.

5. Fire-fighting Measures

a. Suitable (and unsuitable) Extinguishing	If the fire is to be extinguished with this substance, be sure to use the alcohol foam, carbon dioxide or water spray. In using the suffocation, use the dry sands or soil.
b. Specific Hazards arising from the chemical substance	When burned, toxic smoke, fume and vapor may be emitted. Some substances may be burned with the flame. Some substances may be burned but not easily set on fire. Some substance may be explosively decomposed in case of fire or heating. Non-flammable. The substance itself does not get burned but can emit the corrosive/toxic fume in heated.
c. Special protective equipment and precautions for fire-fighters	Fire fighters shall put on the proper protective gears. Keep a proper distance away from the fire area for fire fighting action. Move the container from the fire area if not dangerous.

If the fire fighting is not possible, protect the surrounding area and make the fire consume on its own.

6. Accidental Release Measures

a. Actions and protective equipment to protect the human	As the very miniscule particles can cause the fire or explosion, be sure to remove all sources of fire. Removal all source of fires. Do not touch the destroyed container or spill unless wearing the proper protective equipment. Do not make cleaning or handling without the supervision of supervisor. Prevent the formation of dust. Be cautious of the substance or conditions to be avoided.
b. Actions to protect the environment	Do not release the substance to the environment. Do not flow the substance into waterway, sewage, basement or confined area.
c. How to clean or remove	Collect the spillage.

7. Handling and Storage

a. Precautions for safe handling	Do not handle the product unless you fully read and understand all safety and precautionary statements. Be sure to fully clean the handling area after handling. Never eat, drink or smoke anything while using this product. Do not put pressure, cut, weld, solder, drill, grind or expose to heat, flame or static electricity or other source of fire. Take precaution to the handling/storage for use. Do not allow the prolonged or repetitive skin contact. Take precautions to the substance and conditions to be avoided.
b. Conditions for safe storage	Keep the product away from heat, spark, flame or heat. – No smoking. Keep away from the food or beverage. Store it in dry area. Keep the distance between cargoes.

8. Exposure Controls / Personal Protection

a. Exposure limit and chemical substance and biological exposure limit, etc.

Domestic regulations	
Magnesium,Zinc	No data available
Aluminum	TWA-2mg/m3(metal dust)
Manganese	TWA-1mg/m3 manganese and inorganic chemical, STEL-3mg/m3 Zinc fume
ACGIH regulations	
Magnesium,Zinc	No data available
Aluminum	TWA-1mg/m3
Manganese	TWA(inhalable) 0.2mg/m3, (respirable) 0.02mg/m3
Biological exposure limit	
Mg,Al,Mn,Zn	No data available

b. Appropriate Engineering Controls	If the dust or fume occurs, be sure to use the local ventilation and keep it below the exposure limits.
c. Personal protective equipment	
Respiratory protection	Wear respiratory protection which has been approved by Korean Occupational Safety and Health Administration in accordance with Physicochemical properies of the pariculate matter to be exposed
Hand protection	Be sure to wear the protective glove proper for the work..
Body protection	Be sure to wear the work clothing proper for the work.

9. Physical and Chemical Properties

a. Appearance

Physical state	Solid
Color	Color favored by the user
b. Odor	odorless
c. Odor threshold	No data available
d. pH	No data available
e. Melting point/freezing point	No data available
f. Initial boiling point and boiling range	No data available
g. Flash point	No data available
h. Evaporation rate	No data available
i. Flammability (solid. Gas)	No data available
j. Upper/lower flammability or explosoive limit	No data available
k. Vapor pressure	No data available
l. Solubility	No data available
m, Vapor density	No data available
n. Relative density	No data available
o. n-octanol/water	No data available
p. Auto-ignition temperature	No data available
q. Decomposition temperature	No data available
r. Viscosity	No data available
s. Molecular volume	No data available

Magnesium

a. Appearance	
Physical state	Solid
Color	Gray
b. Odor	None
c. Odor threshold	No data available
d. pH	(Not applicable)
e.Melting point/freezing point	651℃
f. Initial boiling point and boiling range	1100℃
g. Flash point	No data available
h. Evaporation rate	(Not applicable)
i. Flammability (solid. Gas)	No data available
j. Upper/lower flammability or explosive limits	-/- (0.03kg/m3 (lower))
k. Vapor pressure	(4.24E-09 mmHg at 25℃ (estimate))
l. Solubility	32.5g/100ml (25℃ (estimate))
m, Vapor density	(Not applicable)
n. Relative density	1.7
o. n-octanol/water	-0.57 (estimate)
p. Auto-ignition temperature	473℃
q. Decomposition temperature	No data available
r. Viscosity	No data available
s. Molecular volume	24.3

Aluminum

a. Appearance	
Physical state	Solid(powder)
Color	Silvery white ~ gray
b. Odor	odorless
c. Odor threshold	No data available
d. pH	No data available
e.Melting point/freezing point	660℃
f. Initial boiling point and boiling range	2327~ ℃
g. Flash point	No data available
h. Evaporation rate	No data available
i. Flammability (solid. Gas)	No data available
j. Upper/lower flammability or explosive limits	-/-

k. Vapor pressure	No data available
l. Solubility	(Non soluble)
m, Vapor density	No data available
n. Relative density	2.7
o. n-octanol/water	No data available
p. Auto-ignition temperature	590℃
q. Decomposition temperature	No data available
r. Viscosity	No data available
s. Molecular volume	26.98

Manganese

a. Appearance	
Physical state	Solid(powder)
Color	Gray
b. Odor	No data available
c. Odor threshold	No data available
d. pH	No data available
e.Melting point/freezing point	1244℃
f. Initial boiling point and boiling range	1962 ~℃
g. Flash point	No data available
h. Evaporation rate	No data available
i. Flammability (solid. Gas)	Combustible
j. Upper/lower flammability or explosive limits	-/-
k. Vapor pressure	1Pa (955℃)
l. Solubility	(Non-soluble)
m, Vapor density	No data available
n. Relative density	7.47
o. n-octanol/water	No data available
p. Auto-ignition temperature	No data available
q. Decomposition temperature	No data available
r. Viscosity	No data available
s. Molecular volume	54.94

Zinc

a. Appearance	
Physical state	Solid (powder)
Color	Gray ~ blue
b. Odor	odorless
c. Odor threshold	(Not applicable)
d. pH	No data available
e.Melting point/freezing point	419℃
f. Initial boiling point and boiling range	907~℃
g. Flash point	No data available
h. Evaporation rate	No data available
i. Flammability (solid. Gas)	Inflammable
j. Upper/lower flammability or explosive limits	-/-
k. Vapor pressure	0.1kPa (487℃)
l. Solubility	(reactive)
m, Vapor density	No data available
n. Relative density	7.14 (water=1)
o. n-octanol/water	-0.47 (estimate)
p. Auto-ignition temperature	460℃ (applied to the minute powder.)
q. Decomposition temperature	No data available
r. Viscosity	No data available
s. Molecular volume	65.38

10. Stability and Reactivity

a. Chemical stability and hazardous reactivity

Magnesium	If exposed to the air, it automatically ignites. Unstable in room temperature. If contacted with water, it causes the combustible gas or corrosive solution.
Aluminum	If contacted with water, it causes the corrosieve solution.
Manganese,Zinc	No data available

b. Conditions to avoid

Magnesium,Zinc	Keep away from heat, spark, flame or high temperature. No smoking, humidity. As the product can naturally be set on fire if exposes to the room temperature or to the air with a little enhanced temperature, make sure to keep it under the proper upper level.
Aluminum,Manganese	Heat, Moisture, Spark, Flame, Friction

c. Incompatible materials

Magnesium	Do not contact the air. Handle it in inert gas and prevent the humidity.
Aluminum,Manganese,Zinc	Water

d. Hazardous decomposition products

Magnesium	During the burning, the irritating or very hazardous gas may occur due to the thermal decomposition or combustion.
Aluminum,Manganese,Zinc	Stimulating, Corrosive gas, Toxic gas

11. Toxicological Information

a. Information on highly possible exposure route

Magnesium	It may cause skin disorders. It may cause the vomiting, diarrhea or stomachache.
Aluminum,Manganese,Zinc	No data available

b. Information on hazard to health

Acute toxicity

Oral

Magnesium	No data available
Aluminum	LD50 > 15900 ㎎/kg Rat (OECD TG 401)
Manganese	LD50 > 2000 ㎎/kg Rat (OECD TG 420, GLP)
Zinc	LD50 > 2000 ㎎/kg Rat (OECD TG 401, GLP)

Percutaneous

Mg,Al,Mn,Zn	No data available

Inhalation

Magnesium	No data available
Aluminum	Dust LC50> 0.888 ㎎/ℓ 4 hr Rat (OECD TG 403, GLP)
Manganese	Dust LC50> 5.14 ㎎/ℓ 4 hr Rat (OECD TG 403, GLP)
Zinc	Dust LC50> 5.41 ㎎/㎥ 4 hr Rat (OECD TG 403, GLP)

Skin corrosiveness or stimulating

Magnesium	Irritating to skin and eye
Aluminum,Manganese	The skin corrosiveness/stimulating test by using the rabbit shows that it is not stimulating.
Zinc	Human body/ non-stimulating

Serious eye damage or stimulating

Magnesium	Irritating to skin or eye
Aluminum,Manganese	The eye damage/stimulation test by using the rabbit shows that it is not stimulating.
Zinc	The eye damage/stimulation test by using the rabbit shows that there was very small stimulation which was not classified.

Oversensitivity of respiratory organ

Magnesium,Manganese,Zinc	No data available
Aluminum	The test of oversensitivity of respiratory organ by using the male mouse shows that there is no oversensitivity.

Oversensitivity of skin

Magnesium	No data availble

Aluminum	The skin sensitization - by using the male guinea pig that there is no oversensitivity.
Manganese	The in vivo test for skin sensitization test by using female mouse LLNA shows that there is no oversensitivity.
Zinc	There is no oversensitivity

Carcinogenicity

Occupational safety and health Act

Mg,Al,Mn,Zn	No data available

Publication of Ministry of Employment and Labor

Mg,Al,Mn,Zn	No data available

IARC/OSHA

Mg,Al,Mn,Zn	No data available

ACGIH

Magnesium,Zinc	No data available
Aluminum	A4 (Aluminum metal and insoluble compounds)
Manganese	A4

NTP/EU CLP

Mg,Al,Mn,Zn	No data available

Reproductive cell mutagenicity

Magnesium	No data available
Aluminum	The in-vitro DNA damage test shows that the negative similar substance of AlCl3 obtained from Sigma when there is no metabolic activity. The chromosome abnormality test by using the myelocyte for the mammal shows that the negative similar substance of AlCl3 obtained from Sigma OECD TG 475 when there is no metabolic activity. Aluminum leads to the change in the type of concentration dependent living things with respect to the sister chromosome and increases the unexpected integration of DNA.
Manganese	The in-vitro chromosome abnormality test by using the cultivated cell of mammals shows that it does not cause any abnormality in chromosome.
Zinc	The in-vitro genetic mutation test from the recombination of similar division shows that its effect is negative.

Reproductive toxicity

Magnesium	No data available
Aluminum	Oral reproductive toxicity test by using the rat shows NOAEL = 266 mg/kg bw/day
Manganese	Teratogenicity test by using the mouse shows the death or deformation of fetus and the dislocation of brain from the fetus.
Zinc	The development/deformity toxicity test by using the rabbits show that there was no effect on the adult and fetus of rabbit. Similar substance: 7733-02-0 NOAEL = 60 mg/kg bw/day

Specific target organ toxicity (1st exposure)

Magnesium	Irritating to respiratory organ, lung or airway
Aluminum	The inhalation of the substance causes the bullous emphysema and bronchial pneumonia. In addition, the concentration of intercellular organs at the liver, brain or spleen. The inhalation of the substance worsens the pneumonia. The data is not enough for classification due to the lack of reliable data on the toxic effect.
Manganese	It causes the pneumonia. CICAD
Zinc	No data available

Specific target organ toxicity (repeat exposure)

Magnesium	No data available
Aluminum	The oral target long-term organ toxicity test for all body by using the male rats shows that NOEAL=302mg/kg diet. Similar substance: aluminum hydroxide OECD TG 407. If exposed in long term and repetitive way, the lung and the nerve system get affected.
Manganese	It affects the respiratory organ and nerve system. The 10-months inhalation repeat toxicity test by using the monkey shows increase in the lymph of pulmonary edema, accumulation of interstitial lung disease, necrosis of lung cell containing the dust, and the toxicity to the appearance of the secretion from bronchus, overly formed lung wall, emphysema and atelectasis. NOAEL = 0.7 mg/m3 NITE
Zinc	The oral repeat long-term toxicity test (total body) by using the rat showed that

	the animal showed the low level of food ingestion or delay in growth under high concentration and there were the pathological lesion and unmatured cell in the red blood cells found. NOEL = 3,000 ppm
Inhalation hazard	
Mg,Al,Mn,Zn	No data available

12. Ecological information

a. Biological toxicity	
Fish	
Magnesium,Aluminum	No data available
Manganese	LC50 > 3.6 ㎎/ℓ 96 hr Oncorhynchus mykiss (OECD TG 203, GLP)
Zinc	LC50 0.439 ㎎/ℓ 96 hr others
Crustacean	
Magnesium	LC50 64.7 ㎎/ℓ 96 hr Gammarus lacustris
Aluminum	NOEC > 100 ㎎/ℓ 48 hr Daphnia magna
Manganese	EC50 > 1.6 ㎎/ℓ 48 hr Daphnia magna (OECD TG 202, GLP)
Zinc	EC50 0.416 ㎎/ℓ 48 hr Ceriodaphnia dubia (OECD TG 202)
Bird	
Magnesium	No data available
Aluminum	NOEC ≥ 0.052 ㎎/ℓ 72 hr Selenastrum capricornutum (OECD TG 201, GLP)
Manganese	EC50 4.5 ㎎/ℓ 72 hr others (시험종: Desmodesmus subspicatus)
Zinc	NOEC 0.05 ㎎/ℓ 72 hr Selenastrum capricornutum (OECD TG 201, GLP)
b. Persistence and degradability	
Persistence	
Magnesium	log Kow -0.57 (estimated)
Aluminum,Manganese,Zinc	No data available
Degradability	
Mg,Al,Mn,Zn	No data available
c. Bioaccumulatoin	
Accumulation	
Magnesium,Aluminum	No data available
Manganese	01< 81 BCF
Zinc	600(fish)
Biodegradability	
Magnesium,Aluminum,Manganese	No data available
Zinc	(The biodegradbility test cannot be applied.)
d. Mobility in soil	
Mg,Al,Mn,Zn	No data available
e. Other hazards	
Magnesium	No data available
Aluminum	Crustacean Daphnia magna: NOEC = 0.076 mg/Reproduction, 0.137 mg/Limmobilisation 21d OECD TG 211, GLP
Manganese	Crustacean Ceriodaphnia dubia: NOEC = 1.7 mg/L 8d OECD TG 211, GLP Fish Oncorhynchus mykis: NOEC = 0.77 mg/L 100d Bird Ditylum brightwellii: EC50 = 1.5 mg/L 5d
Zinc	· Fish Cottus bairdii: NOEC = 0.169 - 0.172 mg/L 30d · Crustacean Daphnia magna: NOEC = 0.048 - 0.156 mg/L 21d · Bird Ceramium tenuicore: NOEC = 7.2 - 18 μg/L 7d

13. Disposal consideration

a. Disposal method	
	If specified in the Wastes Control Act, its contents and containers shall be disposed of according to the regulation.
b. Cautions in disposal	
	Dispose of the container according to the related laws and regulations.

14. Transport information

a. UN No.

Magnesium	1418
Aluminum	1396
Manganese	3089
Zinc	1436

b. Proper ship name

Magnesium	Magnesium powder or Magnesium alloy powder
Aluminum	Aluminum powder (with no auto-ignition or no coating on the surface)
Manganese	Metal powder (inflammable) (except otherwise specified)
Zinc	ZINC POWDER or ZINC DUST

c. Danger class in transport

Magnesium,Aluminum,Zinc	4.3
Manganese	4

d. Container class

Magnesium,Aluminum,Manganese	Ⅱ
Zinc	Ⅰ

e. Marine contaminants

Magnesium	No data available
Aluminum	Applicable
Manganese	Not applicable
Zinc	Applicable (MP)

f. Special safety plan to be known by the user with respect to transport or transportation means

Emergency action in fire

Mg,Al,Mn,Zn	F-G

Emergency actions in spill

Magnesium, Aluminum, Zinc	S-O
Manganese	S-G

15. Regulatory information

a. Regulation by Korea's Occupational Safety and Health Act

Magnesium	No data available
Aluminum, Manganese	Controlled hazardous substance
	Substance subjet to the work enviromental measuring(period of measuring : 6months)
	Substance subjet to the special health diagnosis(period of measuing : 12months)
	Substance subject to the setting of exposure standard
Zinc	Controlled hazardous substance

b. Regulation by Toxic Chemicals Control Act

Mg,Al,Mn,Zn	No data available

c. Regulation by Act on the Safety Control of Hazardous Substances

Magnesium	Class 2 Magnesium 500kg
Aluminum, Manganese, Zinc	Class 2 metal powder 500kg

d. Regulation by Wastes Control Act

Magnesium, Manganese, Zinc	No data available
Aluminum	Designated waste

e. Regulation by other domestic and foreign laws or regulation

Domestic regulations

PERSISTENT ORGANIC POLLUTANTS CONTROL ACT

Mg,Al,Mn,Zn	Not applicable

Overseas regulations

US control information(OSHA regulation)

Mg,Al,Mn,Zn	Not applicable

US control information(CERCLA regulation)

Magnesium,Aluminum,Manganese	Not applicable

Zinc	453.599kg 1000lb

US control information(EPCRA 302 regulation)

Mg,Al,Mn,Zn	Not applicable

US control information(EPCRA 304 regulation)

Mg,Al,Mn,Zn	Not applicable

US control information(EPCRA 313 regulation)

Mg,Al,Mn,Zn	Not applicable

US control information(Rotterdam convention substance)

Mg,Al,Mn,Zn	Not applicable

US control information(Stockholm convention substance)

Mg,Al,Mn,Zn	Not applicable

US control information(Monteal Protocol substance)

Mg,Al,Mn,Zn	Not applicable

EU Classification information (confirmed classification results)

Magnesium	F; R15-17
Aluminum	Pyr. Sol. 1Water-react. 2
Manganese	Not applicable
Zinc	Pyr. Sol. 1Water-react. 1Aquatic Acute 1Aquatic Chronic 1

EU Classification information (danger statements)

Magnesium	R15, R17
Aluminum	H250, H261
Manganese	Not applicable
Zinc	H250, H260, H400, H410

EU Classification information (safety statements)

Magnesium	S2, S7/8, S43
Aluminum, Manganese, Zinc	Not applicable

16. Other information

a. Source of data

This MSDS was prepared based on KOSHA, NITE, ESIS, NLM, SIDS, IPCS, etc.

b. Date of first edition 05/09/2017

c. Revision no. and date of final revision

Revision no.	1
Date of final revision	14/01/2020

d. others

○ The prepared MSDS is prepared by referencing, editing and partially amending the MSDS provided by the Korea Occupational Safety & Health Agency