

## 1. Identification of the Product and Supplier

Product name:	<b>Elkem MgFeSi Alloys</b> <b>Elmag<sup>®</sup>, Lamet<sup>®</sup> and Remag<sup>®</sup> Nodularisers,</b> <b>CompactMag<sup>®</sup> Alloy</b>
Product application:	Additive to liquid metal in foundries for production of cast iron.
Address/Phone No.:	<b>Elkem AS</b> <b>Foundry Products</b> P.O. Box 334 Skøyen, N-0213 Oslo, Norway Telephone: + 47 22 45 01 00 Telefax: + 47 22 45 01 11 <a href="http://www.foundry.elkem.com">http://www.foundry.elkem.com</a> <a href="mailto:sds.efp@elkem.no">sds.efp@elkem.no</a>
REACH registration numbers:	01-2119485286-28-0033 (FeSi) 01-2119537203-49-0046 (Mg)
REACH and CLP helpdesk:	<a href="http://echa.europa.eu/support/helpdesks/">http://echa.europa.eu/support/helpdesks/</a>
Emergency Phone No.:	<a href="https://poisoncentres.echa.europa.eu/home">https://poisoncentres.echa.europa.eu/home</a>

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## 2. Hazards Identification

Classification:	The product does not meet the criteria for hazard classification in accordance with Regulation (EC) No 1272/2008 (CLP) and the UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS), 6 <sup>th</sup> revision.
Hazard pictogram:	N/A (not applicable)
Signal word:	N/A (not applicable)
Hazard statements:	N/A (not applicable)
Precautionary statements:	N/A (not applicable)

Flammable and noxious gases may be formed in contact with moisture, acids or bases. See section 10 and 11.  
Dust from the product if suspended in air may under certain conditions cause dust explosions. See section 10.

### 3. Composition/Information on Ingredients

Synonyms/Trade names: Ferrosilicon magnesium, Magnesium alloy.  
CAS No. Ferrosilicon: 8049-17-0  
CAS No. Magnesium: 7439-95-4  
REACH registrations: Elkem MgFeSi is a mixture of FeSi and Mg and has for hazard classification purposes been assessed as an entity in accordance with CLP.  
Mg is registered as a substance under REACH. See section 1.  
FeSi is registered under REACH as a "multi-constituent substance" as reaction mass of iron and iron disilicide and iron silicide and silicon" with a provisional list number 912-631-7. See section 1.

#### Chemical composition<sup>1)</sup>:

Element	Symbol	CAS No.	EINECS No.	Weight%
Silicon	Si	7440-21-3	231-130-8	44 – 49
Aluminium	Al	7429-90-5	231-072-3	0 – 1.5
Barium	Ba	7440-39-3	231-149-1	0 – 3.0*
Calcium	Ca	7440-70-2	231-179-5	0 – 5.0
Cerium	Ce	7440-45-1	231-154-9	0 – 5.0
Lanthanum	La	7439-91-0	231-099-0	0 – 2.5
Magnesium	Mg	7439-95-4	231-104-6	2.0 – 11
Zirconium	Zr	7440-67-7	231-176-9	0 – 5.0
Titanium	Ti	7440-32-6	231-142-3	0 – 0.2
Copper	Cu	7440-50-8	231-159-6	< 0.1
Chromium	Cr	7440-47-3	231-157-5	0 – 0.3
Carbon	C	7440-44-0	231-153-3	0 – 0.5
Iron	Fe	7439-89-6	231-096-4	Balance

1) See Product Data Sheet or product certificate for exact composition of individual products.  
\* According to XRD analysis barium is not present in its elemental form but as barium silicides.

### 4. First Aid Measures

Inhalation: Irritation caused by dust: Fresh air. See a physician on persistent feeling of discomfort.  
Phosphine/arsine intoxication: Seek medical attention. See section 11.  
Skin contact: Wash skin with water and/or a mild detergent.  
Eye contact: Rinse eyes with water/saline solution. See a physician on persistent feeling of discomfort.  
Ingestion: Remove the person affected from dust-exposed area. See inhalation.

### 5. Fire Fighting Measures

Extinguishing media: Dry sand, CO<sub>2</sub> or dry powder.

The product in the form of dry granules is not combustible.  
Dust from the product suspended in air may under certain conditions cause dust explosions. See section 10.

### 6. Accidental Release Measures

Material in the form of dust should be collected in suitable containers. Damp product must be kept away from dry, and must not be collected and stored in closed containers. Dry dust can be vacuumed or swept up.

## 7. Handling and Storage

**Handling:** Avoid handling that generates dust build-up. Avoid inhalation of dust. See section 8. Avoid ignition sources (e.g. welding) in areas with high dust concentrations. Apply inert atmosphere (e.g. N<sub>2</sub>) during crushing. Addition of wet material to molten metal may cause explosions. See section 10.

**Storage:** The product must be kept in a dry and well-ventilated place, and away from acids and bases.

**Inadequate ventilated containers:**

It is advisable to allow 15 minutes of natural venting with fully open doors so that fresh air can freely enter the container before starting to unload/strip the containers.

Opening of containers should preferably be done outdoors, but only under conditions whereby the product is kept dry.

In case there is a need for immediate stripping (i.e. less than 15 minutes waiting), always wear a full face mask respirator with gas/vapour filter according to standard EN 14387 during the unloading period.

## 8. Exposure Controls/Personal Protection

### A. Occupational exposure controls

Eye protection, eye flushing facilities and protective gloves. Ensure good ventilation. Wear a particulate respirator according to EN 149 FFP2S or FFP3S in areas of inadequate ventilation. If exposure to phosphine and arsine is suspected (see section 10) in areas of poor ventilation (e.g. storage holds, bunkers etc.), a self-contained breathing apparatus or an air fed respirator should be worn.

For opening and immediate stripping of inadequate ventilated containers, always wear an rpe as stated in see section 7.



### Workplace Exposure Limits (HSE, EH40/2005),

Table 1: List of approved workplace exposure limits (as consolidated with amendments, December 2011):

Substance	CAS Number	8 hour TWA		15 minute STEL	
		ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
Inhalable dust	-	-	10	-	-
Respirable dust	-	-	4	-	-
Phosphine gas (PH <sub>3</sub> )	7803-51-2	0.1	0.14	0.2	0.28
Arsine gas (AsH <sub>3</sub> )	7784-42-1	0.05	0.16	-	-

### EU OEL: Commission Directive 2006/15/EC

Indicative occupational exposure limit values:

Substance	CAS number	8 hour		15 minute	
		ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
Phosphine	7803-51-2	0.1	0.14	0.2	0.28

Elkem has devised a "Procedure for sampling, measuring and reporting of phosphine (PH<sub>3</sub>), arsine (AsH<sub>3</sub>) and airborne particulates" of the workplace atmosphere (1994). The low occupational exposure limit for arsine gas is due to the evidence for carcinogenicity in humans of inorganic arsenic compounds in general (IARC). The OELs for dust does not cover possible arsine/phosphine absorption from dust deposited on mucous membranes.

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DNEL (Derived No Effect Level):

- 4 mg/m<sup>3</sup> proposal for inhalable FeSi particles (determined as Si).
- 0.3 mg/m<sup>3</sup> proposal for respirable FeSi particles (determined as Si).
- > 10 mg/m<sup>3</sup> for inhalable Mg (non-soluble inert powder) (REACH Mg CSR).
- > 3 mg/m<sup>3</sup> for respirable Mg (non-soluble inert powder) (REACH Mg CSR).

## B. Environmental exposure controls

Target value and limit value for PM<sub>10</sub> and PM<sub>2.5</sub> (Directive 2008/50/EC):

	Averaging period	Limit value	By date
PM <sub>10</sub>	One day	50 µg/m <sup>3</sup> ★	
PM <sub>10</sub>	Calendar year	40 µg/m <sup>3</sup>	
PM <sub>2.5</sub>	Calendar year	25 µg/m <sup>3</sup>	
PM <sub>2.5</sub>	Calendar year	20 µg/m <sup>3</sup>	1 January 2020

★Not to be exceeded more than 35 times a calendar year.

## 9. Physical and Chemical Properties

Appearance:	Grey metallic granules in different size ranges within 0 - 32 mm.
Odour:	Odourless
Odour threshold:	N/A
pH:	See solubility
Melting point/freezing point:	1220 – 1400 °C (101.3 kPa)
Initial boiling point and boiling range:	N/A
Flash point:	N/A
Evaporation rate:	N/A
Flammability (solid, gas):	No ignition
Upper/lower flammability or explosive limits:	Lowest explosive limit is +/- 60 mg/m <sup>3</sup>
Vapour pressure:	N/A
Vapour density:	N/A
Relative density:	2.5 – 7.3 g/cm <sup>3</sup>
Solubility(ies):	- 15 µg Si/l (OECD 105, particle diameter < 1 mm, pH 5.8). - 61 mg Si/l, 22 µg Fe/l (particle diameter < 50 µm, PBS (Phosphate Buffered Saline):7 days).
Partition coefficient: n-octanol/water:	N/A
Auto-ignition temperature:	> 400 °C (EU Method A.16)
Viscosity:	N/A
Explosive properties:	N/A
Oxidising properties:	N/A

## 10. Stability and Reactivity

Conditions to avoid:

Avoid generating sparks and other ignition sources (e.g. welding) in areas with high dust concentrations. MgFeSi-particles suspended in air at concentrations above 100 g/m<sup>3</sup> can cause dust explosions. Deposits of MgFeSi-dust can propagate flames.

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Crushing of MgFeSi in air may cause powerful sparks that can initiate powder fires and dust explosions. Avoid dust accumulation in crushing equipment by regularly cleaning by water between campaigns, and before hot work operations.

For a given Si/Fe ratio and particle size, ignition sensitivity and the violence of the explosion increase with increasing content of Mg. Dust from MgFeSi alloys with Si/Fe ratio  $\leq 1.25$  where up to 30% of the dust has a particle diameter  $< 50 \mu\text{m}$ , the Mg content has to exceed 10% (w/w) if the dust is to be explosive.

Finer dust has a lower limit for the critical content of Mg with regards to danger of explosion.

Addition of wet material to molten metal may cause explosions.

Materials to avoid:

Water/humidity, acids and bases.

Hazardous decomposition products:

Highly flammable hydrogen gas ( $\text{H}_2$ ) and the highly flammable and very toxic gases phosphine ( $\text{PH}_3$ ) and arsine ( $\text{AsH}_3$ ) (garlic-like smell), may be formed if the product gets in contact with moisture, acids or bases. A prerequisite for phosphine and arsine gas formation is the presence of reactive phosphides or arsenides, such as  $\text{Ca}_3\text{P}_2$  or  $\text{Ca}_3\text{As}_2$  at the alloy phase-boundaries inside the alloy. Very low levels of P ( $< 0.02\%$ ) and As ( $< 0.0005\%$ , detection limit) in MgFeSi, in combination with rapid solidification that limits segregation of alloying elements, effectively minimize the formation of such compounds and thus the probability of gas formation.

Phosphine ( $\text{PH}_3$ ) and arsine ( $\text{AsH}_3$ ) are both heavier than air and may concentrate at the bottom of closed containers. Densities (25 °C, 1 atm),  $\text{PH}_3$ : 1.379 g/l,  $\text{AsH}_3$ : 1.321 g/l, air: 1.225 g/l.

Phosphine ( $\text{PH}_3$ ) gas may accumulate in inadequate ventilated/closed containers during shipment and storage, and in these cases special measures are needed during initial opening and unloading of containers (see sections 7 and 8).

A reaction with hydrofluoric acid ( $\text{HF}$ ) or nitric acid ( $\text{HNO}_3$ ) leads to the formation of toxic gases such as silicon tetrafluoride ( $\text{SiF}_4$ ) or nitrous gases ( $\text{NO}_x$ ).

Wet product will form highly flammable hydrogen gas if added to molten metal, due to decomposition of water.

## 11. Toxicological Information

The product does not meet the criteria for hazard classification according to Regulation (EC) No1272/2008 (CLP) and the UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS), 6<sup>th</sup> revision.

### Acute effects:

Inhalation: Finely divided dust may irritate and dehydrate mucous membranes.

Phosphine/arsine may be absorbed from dust deposited on mucous membranes.

Containers: Phosphine/arsine may be inhaled inside and close to newly opened inadequate ventilated containers.

Phosphine irritates exposed mucous membranes, depresses the central nervous system (CNS) and can cause oedema of the lungs. Acute, non-fatal poisoning with phosphine gives temporary effects, among others headache, malaise, vomiting, stomach pains, cough, and difficulty in breathing.

Skin contact: Dust may irritate the skin.

Eye contact: Dust may irritate and lead to dryness.

### Chronic effects:

No adverse chronic effects of this product is expected, based on both practical experience and review of available scientific literature. Historic, epidemiological studies covering cohorts of workers in the Norwegian ferro-alloy industry have been carried out as demonstrated by the list of reference literature, showing there is no cancer risk from this product.

## 12. Ecological Information

The product is not characterised as dangerous for the environment.

MOBILITY: The product has poor mobility under normal environmental conditions.  
PERSISTENCE: Not relevant.  
BIOACCUMULATION: Not relevant, due to low mobility and non-dispersive use.  
ECO-TOXICITY: The product does not meet the classification criteria for eco-toxicological endpoints in accordance with Regulation (EC) 1272/2008 (CLP) and the UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS), 6<sup>th</sup> revision.

PNEC (Predicted No Effect Concentration): N/A

## 13. Disposal Considerations

The material should be recovered for recycling where possible.  
Waste from the product is not classified as hazardous waste according to Directive 2008/98/EC "Waste Framework Directive" and Commission Decision 2000/532/EC as amended.  
Prior to disposal of large quantities of this material, advice should be sought from the nearest Environment Agency.

## 14. Transport Information

UN no. 1408  
IMO/BC-Code<sup>2), 3)</sup> (30-90)% Si, Class 4.3\* ( H<sub>2</sub>,PH<sub>3</sub> and AsH<sub>3</sub> mentioned in text),  
BC-no.: 022  
IMO/BC-Code<sup>2), 3)</sup>: (25-30 and >90)% Si, Class MHB (Material hazard in bulk)

(30-90)% Si		(25-30) and >90)% Si	
IMDG-code <sup>1)</sup>	Not assigned to class 4.3, Subs. 6.1	IMDG-code	Not hazard classified
ICAO/IATA <sup>1)</sup>	Not assigned to class 4.3, Subs. 6.1	ICAO/IATA	Not hazard classified
ADR/RID <sup>1)</sup>	Not assigned to class 4.3, Subs. 6.1	ADR/RID	Not hazard classified

1) Consignments of ferrosilicon with a chemical analysis as described in section 3 has been tested according to "United Nations Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria Part III - 33.4.1.4" and has passed the test. Consequently, the product is not classified as Class 4.3, subsidiary 6.1 (toxic/poisonous).

2) The shipment must be stored under cover, but in open air, in the particle size in which it is to be shipped, for no less than three days prior to shipment.

3) IMO's "Code of Safe Practice for Solid Bulk Cargoes".

\* Substances which in contact with water emit flammable gases.

FeSi is not considered to cause harm to aquatic organisms (Lillicrap, NIVA, 2011). FeSi is not a marine pollutant. The same considerations hold for MgFeSi.

## 15. Regulatory Information

The text of this Product Safety Information is prepared in compliance with:

- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) and subsequent amendments.
- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

A Chemical Safety Assessment according to REACH has been carried out for both Magnesium and the multi-constituent substance FeSi (see section 2).

## 16. Other Information

According to Chapter 1.5.2 of the UN Globally Harmonized System of classification and labelling of chemicals (GHS), Article 58 (2)(a), and Article 59(2)(b) of (EC) No 1272/2008 (CLP), which amends REACH article 31(1), safety data sheets (SDS) are only required for substances and mixtures that meet the harmonized criteria for physical, health or environmental hazards. Since this product does not meet these criteria, a SDS according to (EU) 2015/830 is not issued. In order to communicate relevant HSE-(health, safety and environmental-) information, this product safety information (PSI) is provided instead.

REACH article 31(7) requires relevant exposure scenarios from the Chemical Safety Report (CSR) to be annexed to the SDS. However, according to REACH Annex I, section 0. (Introduction), subsection 0.6. No 4 and 5, exposure scenarios are only required for hazard-classified substances or mixtures. Since this product is not hazard-classified according to CLP, there is no requirement for exposure scenarios.

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