SAFETY DATA SHEET
Flameless Ration Heater (FRH)
NSN 8970-01-321-9153

Section 1. Identification of the substance/mixture and of the company/undertaking
1.1 Product Identifier: Ration Supplement, Flameless Heater
1.2 Relevant identified uses of the substance or mixture and uses advised against: Heating Meals-Ready-To-Eat without use of a flame
1.3 Details on the supplier of the Safety Data Sheet: Luxfer Magtech Inc., Cincinnati Plant, 2940 Highland Ave., Unit 210, Cincinnati, OH 45212 (800) 503-4483
1.4 Emergency telephone number: (703) 527-3887

Section 2. Hazards Identification
2.1 Classification of the substance or mixture:  GHS02 Flammable: Substance and mixtures which, in contact with water, emit flammable gas (Category 2).
2.2 Label elements:  Signal word: Danger Hazard statement: In contact with water releases flammable gas. Precautionary statements: Prevention: Keep away from any possible contact with water, because of violent reaction and possible flash fire. Protect from moisture. In case of exposure to enclosed powder, wear protective gloves, eye protection and dust mask. Response: In case of fire involving magnesium, use dry agents, such as melting flux, dry sand, dry talc, MET-L-X powder, Purple-K powder or other suitable extinguishing agents by gently covering burning material to smother fire. If dry agents are not available, flood with large amounts of water with fog nozzle (not a solid stream). Storage: Store in a dry place. Disposal: Dispose of contents/container in accordance with local/regional/national/international regulations.
2.3 Other hazards: In case of fire, water can act as an accelerant - resulting in flare-ups and spreading of the fire.

Section 3. Composition/information on ingredients	
3.1 Substances	CAS # (if known)
Magnesium-5% Iron Alloy:	
Magnesium	7439-95-4
Iron	7439-89-6
Silicon Dioxide	7631-86-9
Sodium Chloride	7647-14-5
Sodium Tripolyphosphate	7758-29-4
Wetting Agent	proprietary

3.2 Mixture

Substances are combined in the product, except the wetting agent.

Section 4. First aid measures

4.1 Description of first aid measures

IF SWALLOWED: If conscious, rinse mouth with water and give large amounts of water. Consult physician to determine if vomiting should be induced.
IF ON SKIN: Wash with soap and water to thoroughly remove any loose particles. Get medical attention if irritation develops, persists or worsens. Pad will become very hot when reacting with water – to prevent burns, avoid contact while pad is reacting.
IF IN EYES: Flush with plenty of water for at least 15 minutes, lifting upper and lower lids. Get medical attention if irritation persists or worsens.
IF INHALED (applies to dust creation): Move to fresh air. If breathing difficult, give oxygen. If not breathing, give artificial respiration. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

No symptoms or effects under conditions of normal usage. Low toxicity and not considered to be a hazard to health.
In cases of exposure, dermatitis of the skin, irritation of the eyes, nose or throat may be experienced.

4.3 Indication of any immediate medical attention and special treatment needed

No specific treatment or antidote. Supportive care recommended. Treatment to be based on reactions of the patient.

Section 5. Firefighting measures

5.1 Extinguishing media

Smother burning magnesium alloy powder by gently covering with DRY agents such as melting flux, dry sand, dry talc, MET-L-X powder, Purple-K powder or other suitable extinguishing agents.

If fire is detected before magnesium alloy powder starts to burn (that is, before any intense fire with white sparks), extinguishing agents intended for Type A, B or C fires may be used.

If dry agents are not available, flood with large amounts of water using a fog nozzle (not a solid stream). The use of wet extinguishing agents could cause the release of hydrogen and could cause an explosion.

5.2 Special hazards arising from the substance or mixture

May produce toxic fumes of carbon oxides, iron oxides, hydrogen gas, magnesium oxide, sodium oxide.

Magnesium alloy powder in air can auto-ignite at temperatures below its melting point. The presence of moisture increases this risk.
Once ignited, magnesium alloy powder burns vigorously with an intense white flame, and can only be

extinguished by smothering and allowing it to cool.

5.3. Advice for firefighters

If a case of Flameless Ration Heaters catches fire, fiberboard and plastic will burn initially as a Class A fire, but will transition to a Class D flammable solid fire if not brought under control in the initial stages.

If the fire becomes a Class D fire, move burning product outdoors (if achievable in a safe manner), then spread material out if possible before attempting to extinguish. Individual pads are self-extinguishing.

Wear self-contained breathing apparatus and protective clothing. Wear fire-fighting glasses (burning magnesium alloy powder produces a very bright white flame).

Section 6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Wear suitable protective equipment.
Remove ignition sources.

6.2 Environmental precautions

Flameless Ration Heaters are not suspected of being highly harmful to the environment.

6.3 Methods and materials for containment and cleaning up

Collect dropped FRH product and inspect polyethylene bag and pad: if bag is punctured or torn, remove FRH pad and discard polyethylene bag as ordinary household waste. If not, repackage with the FRH pad inside. Inspect dropped FRH pad: if pad is wetted, discard as waste as described below under Waste Disposal Method. If not, check pad for leaks. If pad is leaking powder, sweep up spilled powder as described below under Waste Disposal Method, and cut open pad to reuse the remaining powder. If not, reinsert pad into a new polyethylene bag for repackaging.

Waste Disposal Method: Used FRH product (wetted pad, reacted with water) is approved for disposal as ordinary houshold waste. Unused FRH in bulk pack must be managed as a RCRA hazardous waste when disposed. Spilled FRH powder should be promptly swept up using natural fiber brushes or brooms and a non-sparking dust pan. If dry, it should be placed in a covered steel drum, and re-used if possible.

In all circumstances, FRH product must be disposed of in accordance with all applicable local, state and federal regulations.

6.4 Reference to other sections

See section 8 (Exposure controls/personal protection).

Section 7. Handling and storage

7.1 Precautions for safe handling

Avoid getting FRH powder on skin or in eyes. Wash thoroughly after handling.
Warehouses where large quantities of Flameless Ration Heaters are stored should provide:

- Protection against physical damage, especially puncturing of cases during operation of forklifts.
- Protection against water including leaks, snow, rain or flooding.
- Wrapping of FRH pallets to prevent water damage.
- Coverings (i.e. tarps, polyethylene sheets, etc.)
- Storage in a general purpose warehouse dry goods storage area.
- End bays reserved for the storage of FRHs, where possible. Stacks of FRHs should be arranged for access to the stack's interior and/or removal to the outdoors for fire- fighting.
- Equipment for fighting Class-D and Class-A fires.
- Quick response fire detection and fire- fighting capabilities.
- Segregation from strong oxidizers, flammable materials or munitions.

7.2 Conditions for safe storage, including any incompatibilities

Water-activated. Keep from moisture and/or excessive heat. Keep away from sparks or flame.

Incompatibilities (specifically with respect to the magnesium inside the FRH pad): Acids, acid chlorides, strong oxidizing agents.

Reacts violently with halogens, chlorinated solvents, ammonium nitrate, carbonates, arsenic, cupric oxide, cupric sulfate, mercuric oxide, inorganic phosphates.

7.3 Specific end use(s)

Heating Meals-Ready-To-Eat without use of a flame.

Section 8. Exposure controls/personal protection

8.1 Control parameters

Under conditions of normal usage, no special personal protection measures are necessary.

FRH ingredients and byproducts (after reaction with water) are non-toxic:

- Magnesium hydroxide (milk of magnesia) is a common antacid and FDA-listed food additive
- Iron (food enrichment grade) is an FDA-listed food additive
- Silicon dioxide is an FDA-listed food additive
- Sodium Tripolyphosphate is an FDA-listed food additive.
- Wetting agent present in trace amounts only, if ingested in significant amount may cause diarrhea
- Hydrogen

In the case of a punctured FRH pad spilling its contents, a dust mask, protective gloves and safety glasses/goggles are recommended. Eyewash fountain should be available.

8.2 Exposure controls	OSHA PEL	ACGIH TLV
Magnesium-5% Iron Alloy:		
Magnesium	n/a	n/a
Iron	n/a	n/a
Silicon Dioxide	6 mg/m^3	10 mg/m^3
Sodium Chloride	n/a	n/a
Sodium Tripolyphosphate	15mg/ m^3	10 mg/m^3
Wetting Agent	n/a	n/a

Section 9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

n/a = not available, or not applicable.

Physical state: Solid. Appearance, Color, Odor: The heater consists of a grayish metallic powder sealed within a porous plastic enclosure (pad), which is in turn packaged in a green high density polyethylene bag. Odor threshold: n/a. pH: n/a. Relative evaporation rate, n-butyl acetate=1: n/a. Melting point/freezing point: 1202°F (magnesium). Boiling point: 2025°F (magnesium). Flash point: n/a. Auto-ignition temperature: n/a. Decomposition temperature: n/a. Flammability (solid, gas): n/a. Vapor pressure: n/a. Relative vapor density, air=1: n/a. Relative density: n/a. Solubility: n/a. Partition coefficient (Log P_{ow}): n/a. Viscosity (kinetic/dynamic): n/a. Upper/lower flammability or explosive limits: n/a.

9.2 Other information

Not applicable.

Section 10. Stability and reactivity

10.1 Reactivity

Reacts with water producing heat and hydrogen gas, which is flammable and explosive.

Reacts violently with halogens, chlorinated solvents, ammonium nitrate, carbonates, arsenic, cupric oxide, cupric sulfate, mercuric oxide, inorganic phosphates.

10.2 Chemical stability

Stable under dry conditions.

10.3 Possibility of hazardous reactions

Hazardous polymerization does not occur.

10.4 Conditions to avoid

Exposure to moisture, sparks/ignition sources and open flame. Exposure to incompatible materials.

10.5 Incompatible materials

Water, acids, acid chlorides, strong oxidizing agents.

10.6 Hazardous decomposition products

Other than hydrogen gas (maximum 9 liters), none under normal usage and storage.

Section 11. Toxicological information

11.1 Information on toxicological effects

Magnesium powder
Acute toxicity: no data available
Skin corrosion / irritation: no data available
Eye damage / irritation: no data available
Sensitization: no data available
Germ cell mutagenicity: no data available
Carcinogenicity: not listed by IARC, NTP or OSHA
Reproductive toxicity: no data available
Specific Target Organ Toxicity, single exposure: no data available
Specific Target Organ Toxicity, repeated exposure: no data available
Aspiration hazard: no data available

Iron powder
Acute toxicity: Oral LD50 (rat) 30000 mg/kg
Skin corrosion / irritation: no data available
Eye damage / irritation: no data available
Sensitization: no data available
Germ cell mutagenicity: no data available
Carcinogenicity: Not listed by IARC, NTP or OSHA
Reproductive toxicity: no data available
Specific Target Organ Toxicity, single exposure: no data available
Specific Target Organ Toxicity, repeated exposure: no data available
Aspiration hazard: no data available

Silicon Dioxide
Acute toxicity: Oral LD50 (rat) > 10000 mg/kg, Dermal LD50 (rabbit) > 5000 mg/kg
Skin corrosion / irritation: may cause irritation and drying of the skin.
Eye damage / irritation: dust may cause irritation and discomfort
Sensitization: not known to be sensitizing
Germ cell mutagenicity: not reported to produce mutagenic effects in humans
Carcinogenicity: IARC group 3 (unclassifiable for humans). Not listed by NTP or OSHA
Reproductive toxicity: not reported to cause reproductive effects in humans
Specific Target Organ Toxicity, single exposure: dust irritating to respiratory tract.
Specific Target Organ Toxicity, repeated exposure: may cause skin dryness
Aspiration hazard: no data available

Sodium Chloride
Acute toxicity: Oral LD50 (rat) 3 g/kg, Dermal LD50 (rabbit) >10 g/kg, Inhalation LC50 (rat, I hr) >42 g/m^3
Skin corrosion / irritation: contact may cause irritation
Eye damage / irritation: causes irritation
Sensitization: not a skin sensitizer
Germ cell mutagenicity: no evidence
Carcinogenicity: Not listed by IARC, NTP or OSHA
Reproductive toxicity: no evidence
Specific Target Organ Toxicity, single exposure: no data available
Specific Target Organ Toxicity, repeated exposure: no data available
Aspiration hazard: no data available

Section 12. Ecological information

12.1 Toxicity

Magnesium powder: no data available.

Iron powder: no data available.

Silicon Dioxide: Fish – EC0 (*Oncorhynchus mykiss*) > 10000 mg/L (4 days static study), Aquatic invertebrates – EC0 (*Daphnia magna*) > 1000 mg/L (24 hours acute immobilization test).

Sodium Chloride: Fish – LC50 (*Lepomis macrochirus*) 12946 mg/L (96 hours static study), Aquatic invertebrates – EC50 (*Daphnia magna*) 1000 mg/L (48 hours).

12.2 Persistence and degradability

Magnesium powder: no data available.

Iron powder: no data available.

Silicon Dioxide: no data available.

Sodium Chloride: dissolves into water.

12.3 Bioaccumulative potential

Magnesium powder: no data available.

Iron powder: no data available.

Silicon Dioxide: no data available.

Sodium Chloride: not expected to occur.

12.4 Mobility in soil

Magnesium powder: No data available.

Iron powder: no data available.

Silicon Dioxide: no data available.

Sodium Chloride: expected to have very high mobility in soil, it does not absorb on most soil types.

12.5 Results of PBT and vPvB assessment

For all substances: PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.

12.6 Other adverse effects

Not applicable.

Section 13. Disposal considerations

13.1 Waste treatment methods

Dispose in accordance with Federal, State, and Local regulations. See section 6.3.

Section 14. Transport information

14.1 UN Number

UN2813

14.2 UN Proper shipping name

Water Reactive Solid, N.O.S. (Magnesium-Iron Mixture)

14.3 Transport hazard class(es)

4.3 Dangerous When Wet

14.4 Packing group

PG I

14.5 Environmental hazards

None

14.6 Special precautions for user

Water activated. Note: In case of fire involving magnesium, use dry agents, such as melting flux, dry sand, dry talc, MET-L-X powder, Purple-K powder or other suitable extinguishing agents by gently covering burning material to smother fire. If dry agents are not available, flood with large amounts of water with fog nozzle (not a solid stream).

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable.

14.8 Shipment as part of Meal, Ready-to-Eat (MRE)

The U.S. Department of Transportation has determined that a single Flameless Ration Heater (FRH) device, containing a maximum of eight grams of magnesium powder, packaged in a tough plastic bag within a Meal, Ready-to-Eat (MRE), is in a quantity and form which does not pose a hazard in transportation and is not subject to the Hazardous Materials Regulation (HMR), regardless of the number of MREs in a package. This determination does not apply to FRH devices shipped separately from MRE's or FRH devices containing more than eight grams of magnesium powder, which must be shipped in conformance with the applicable requirements of the HMR. (DOT letter of 7JUL92)

Section 15. Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Magnesium powder: US Federal Regulations
SARA 302: no
SARA 311/312: Acute Health Hazard no, Chronic Health Hazard no, Fire Hazard no, Sudden Release of Pressure Hazard no, Reactivity Hazard yes
SARA 313: no

Iron powder: US Federal Regulations
SARA 302: no
SARA 311/312: Acute Health Hazard no, Chronic Health Hazard no, Fire Hazard yes, Sudden Release of Pressure Hazard no, Reactivity Hazard no
SARA 313: no

Silicon Dioxide: US Federal Regulations
SARA 302: no
SARA 313: no
CERCLA Reportable Quantity: no

Sodium Chloride: US Federal Regulations
SARA 302: no
SARA 313: no
CERCLA Reportable Quantity: no

15.2 Chemical safety assessment

Has not been carried out.

Section 16. Other information

Indication of changes: Revision 2, dated November 15, 2015.

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product. Although the information in this Safety Data Sheet was obtained from sources which we believe to be reliable, it cannot be guaranteed. In addition, this information may be used in a manner beyond our knowledge or control. The information is, therefore, provided without representation or warranty express or implied.