

PRODUCT NAME HIGH CARBON FERROMANGANESE

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name SAMANCOR AG
Address Jochlerweg 2, 6340 Baar, Switzerland
Telephone 412-787-4700
Emergency (USA) +1 800 535 5053
Synonym(s) FERROMANGANESE • METALLOYS FERROMANGANESE
 HCFeMn • 76% HCFeMn - Metalloys (Manufactured at Metalloys) • HCFeMn - Temco (Manufactured at Temco)
Use(s) METAL ALLOYS • STEEL MANUFACTURE
MSDS Date 3 November 2009

2. HAZARDS IDENTIFICATION

AUSTRALIAN CLASSIFICATION: NOT CLASSIFIED AS HAZARDOUS ACCORDING TO ASCC CRITERIA
OSHA: NOT HAZARDOUS BY DEFINITION OF HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200)
EEC CLASSIFICATION: NOT DANGEROUS ACCORDING TO DIRECTIVE 67/548/EEC

3. COMPOSITION / INFORMATION ON INGREDIENTS

| Ingredient | EC No | CAS No. | Content | Classification |
|----------------|---------------|---------------|---------|-------------------|
| MANGANESE | 231-105-1 | 7439-96-5 | >60% | |
| PHOSPHORUS | 231-768-7 | 7723-14-0 | <1% | F; R11 R16 R52-53 |
| SILICON | 231-130-8 | 7440-21-3 | <1% | |
| CARBON | 231-153-3 | 7440-44-0 | <10% | |
| TRACE ELEMENTS | Not Available | Not Available | <1% | |
| IRON | 231-096-4 | 7439-89-6 | 10-20% | |

4. FIRST AID MEASURES

Eye If in eyes, hold eyelids apart and flush the eye continuously with running water. Continue flushing until advised to stop by a doctor/physician, or for at least 15 minutes.

Inhalation If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.

Skin If skin contact occurs, remove contaminated clothing and flush skin with running water.

Ingestion For advice, contact a doctor/physician. If swallowed, do not induce vomiting.

Medical Advice Treat symptomatically.

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5. FIRE FIGHTING MEASURES

| | |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flammability | Non flammable solid - combustible dust. Dust may form explosive mixture with air. May evolve manganese, carbon, silicon and iron oxides when strongly heated. |
| Fire and Explosion | Treat as per requirements for Surrounding Fires: Evacuate area and contact emergency services. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas. |
| Extinguishing | Dry agent. Prevent contamination of drains or waterways. |
| Hazchem Code | None allocated. |

6. ACCIDENTAL RELEASE MEASURES

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| Spillage | Collect and reuse where possible. Prevent product from entering drains and waterways. |
|-----------------|---------------------------------------------------------------------------------------|

7. STORAGE AND HANDLING

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| Storage | Store in a cool, dry, well ventilated area, removed from oxidising agents (eg. peroxides), acids (eg. nitric acid) and foodstuffs. Ensure product is adequately labelled. |
| Handling | Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas. |

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

| Exposure Standards | Ingredient | Reference | TWA | | STEL | |
|--------------------|-------------------------------------|--------------|-----|-------------------|------|-------------------|
| | | | ppm | mg/m ³ | ppm | mg/m ³ |
| | Manganese, dust & compounds (as Mn) | ASCC (AUS) | -- | 1 | -- | -- |
| | Manganese, dust & compounds (as Mn) | ACGIH (US) | -- | 0.2 | -- | -- |
| | Manganese, dust & compounds (as Mn) | WEL (UK) | -- | 1 | -- | -- |
| | Respirable dust (as Mn) | Manufacturer | -- | 0.1 | -- | -- |
| | Inhalable dust (as Mn) | Manufacturer | -- | 0.5 | -- | -- |

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| Biological Limits | No biological limit allocated. |
| Engineering Controls | No special precautions are required unless dust is generated. Where dust generation occurs, mechanical extraction ventilation is recommended. Maintain dust levels below the recommended exposure standard. |
| PPE | Wear leather gloves and safety glasses. When using large quantities or where heavy contamination is likely, wear coveralls. |



9. PHYSICAL AND CHEMICAL PROPERTIES

| | | | |
|-------------------------|------------------------------|---------------------------------|---------------|
| Appearance | SOLID | Solubility (water) | INSOLUBLE |
| Odour | ODOURLESS | Specific Gravity | 5.9 - 6.5 |
| pH | NOT AVAILABLE | % Volatiles | NOT AVAILABLE |
| Vapour Pressure | NOT AVAILABLE | Flammability | NON FLAMMABLE |
| Vapour Density | NOT AVAILABLE | Flash Point | NOT RELEVANT |
| Boiling Point | NOT AVAILABLE | Upper Explosion Limit | NOT RELEVANT |
| Melting Point | 1280°C (2336°F) | Lower Explosion Limit | NOT RELEVANT |
| Evaporation Rate | NOT AVAILABLE | Autoignition Temperature | NOT AVAILABLE |
| Density | 6.3 g/cm ³ @ 20°C | | |

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10. STABILITY AND REACTIVITY

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| Stability | Stable under recommended conditions of storage. |
| Conditions to Avoid | Avoid heat, sparks, open flames and other ignition sources. Exposure to moist conditions may result in oxidization of material and possibly generation of fines. |
| Material to Avoid | Incompatible with oxidising agents (eg. peroxides) and acids (eg. nitric acid). |
| Decomposition | May evolve manganese oxide fume when heated to temperatures > 1300°C. |
| Hazardous Reactions | Polymerization will not occur. |

11. TOXICOLOGICAL INFORMATION

| | | |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Health Hazard Summary | Low to moderate toxicity. Chronic over exposure to manganese may result in manganese poisoning (manganism), a disabling, usually progressive disorder of the central nervous system with symptoms resembling Parkinsonism. Symptoms may include lack of appetite, fatigue and changes in speech, balance and personality. However due to product form, dust generation/inhalation is not anticipated with normal use. | |
| Eye | Due to product form and nature of use, an eye hazard is not anticipated. Product may only present a hazard if dust is generated. | |
| Inhalation | Due to product form / nature of use, an inhalation hazard is not anticipated with normal use. Chronic over exposure to manganese may result in manganese poisoning (manganism), a disabling, usually progressive disorder of the central nervous system with symptoms resembling Parkinsonism. | |
| Skin | Low irritant. Prolonged or repeated contact may result in mild irritation due to mechanical action. | |
| Ingestion | Low to moderate toxicity. Ingestion may result in gastrointestinal irritation. However, due to product form ingestion is considered unlikely. Maintain good personal hygiene standards. | |
| Toxicity Data | MANGANESE (7439-96-5) LD50 (Ingestion): 9000 mg/kg (rat) PHOSPHORUS (7723-14-0) LD50 (Ingestion): > 15,000 mg/kg (rat) | SILICON (7440-21-3) LD50 (Ingestion): 3160 mg/kg (rat) IRON (7439-89-6) LD50 (Ingestion): 20000 mg/kg (guinea pig) |

12. ECOLOGICAL INFORMATION

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| Environment | Manganese may exist in the environment as the more soluble (2+) form and/or the less soluble (3+) form. In acidic waters, high levels of dissolved manganese may occur. Occurs naturally (0.085% of earth's crust). |
| Ecotoxicity | Ecotoxicity Values for Manganese (EPA, 2002): LD50 (FRESHWATER) SILVERSIDE (<i>Basilichthys australis</i>): total Mn >50,000 mcg/L for 96 hours-static LC50 (FRESHWATER) EASTERN NARROW-MOUTHED TOAD (<i>Gastrophryne carolinensis</i>): total Mn 1,420 mcg/L for 7 days-renewal LC50 (FRESHWATER) RAINBOW TROUT, DONALDSON TROUT (<i>Oncorhynchus mykiss</i>): total Mn >170 - <15,610 mcg/L for 28 days-renewal |
| Persistence / Degradability | Biotransformation of manganese compounds by microorganisms is an important process in surface and groundwaters(1). Insoluble manganese 3+ and 4+ compounds in sediments may be reduced by manganese-reducing bacteria to soluble manganese 2+ compounds(1). Dissolved manganese 2+ is transported from the sediment to the water(1). Dissolved oxygen or manganese-oxidizing bacteria oxidize dissolved manganese 2+ in the aerobic layer to insoluble manganese 3+ or 4+ compounds. |
| Mobility | Soluble manganese 2+ compounds are relatively mobile and may potentially leach into surface and groundwater. |

13. DISPOSAL CONSIDERATIONS

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|-----------------------|------------------------------------------------------------------------------------------------------------------|
| Waste Disposal | Collect and reuse where possible. Minimize dust generation. Contact the manufacturer for additional information. |
| Legislation | Dispose of in accordance with relevant local legislation. |

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14. TRANSPORT INFORMATION

NOT REGULATED FOR TRANSPORT PURPOSES

ROAD AND RAIL (ADG / ADR / RID / US DOT / TDG)

Proper Shipping Name None Allocated

UN No. None Allocated **DG Class** None Allocated **Subsidiary Risk(s)** None Allocated

Pkg Group None Allocated **Hazchem Code** None Allocated

SEA (IMDG / IMO)

Proper Shipping Name None Allocated

UN No. None Allocated **DG Class** None Allocated **Subsidiary Risk(s)** None Allocated

Pkg Group None Allocated **Hazchem Code** None Allocated

AIR (IATA / ICAO)

Proper Shipping Name None Allocated

UN No. None Allocated **DG Class** None Allocated **Subsidiary Risk(s)** None Allocated

Pkg Group None Allocated **Hazchem Code** None Allocated

15. REGULATORY INFORMATION

REACH

| Pre-Registered Substance | EC No | CAS Number | Non-EU Asset | Pre-Registration Number |
|--------------------------|-----------|------------|--------------|-------------------------|
| MANGANESE | 231-105-1 | 7439-96-5 | Temco | 05-2114484698-26-0000 |
| SILICON | 231-130-8 | 7440-21-3 | Temco | 05-2114484724-39-0000 |
| CARBON | 231-153-3 | 7440-44-0 | Temco | 05-2114484760-43-0000 |
| IRON | 231-096-4 | 7439-89-6 | Temco | 05-2114484662-41-0000 |
| MANGANESE | 231-105-1 | 7439-96-5 | Metalloys | 05-2115481912-41-0000 |
| SILICON | 231-130-8 | 7440-21-3 | Metalloys | 05-2115481914-37-0000 |
| CARBON | 231-153-3 | 7440-44-0 | Metalloys | 05-2114484760-43-0000 |
| IRON | 231-096-4 | 7439-89-6 | Metalloys | 05-2115481917-31-0000 |

AUSTRALIA

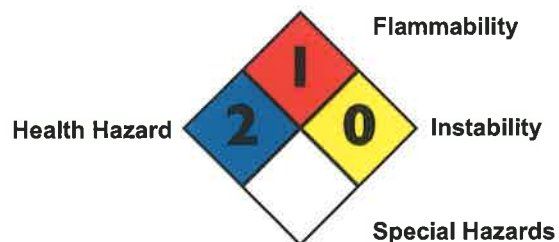
Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

UNITED STATES

HMIS

| | |
|---------------------|---|
| Health | 2 |
| Flammability | 1 |
| Physical Hazard | 0 |
| Personal Protection | |

NFPA



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15. REGULATORY INFORMATION

US EPCRA and CAA Regulatory Information

The following components are subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the Clean Air Act (CAA):

| Ingredient Name | CAS No | Sara 302 (TPQ) | Sara 304 (RQ) | CERCLA (RQ) | Sara 313 | RCRA Code | CAA (TQ) |
|-----------------|-----------|----------------|---------------|-------------|----------|-----------|----------|
| MANGANESE | 7439-96-5 | | | | 313 | | |
| PHOSPHORUS | 7723-14-0 | 100 | 1 | 1 | | | |

Refer to Section 16 - Summary of Codes

Carcinogenicity

The following components are reported to be carcinogenic:

None of the components of this product are listed on the NTP/IARC/OSHA lists.

INTERNATIONAL CHEMICAL INVENTORY LISTINGS

UNITED STATES: TSCA (US Toxic Substances Control Act)

All components are listed on the TSCA inventory.

CANADA: DSL (Canadian Domestic Substances List)

All components are listed on the DSL.

AUSTRALIA: AICS (Australian Inventory of Chemical Substances)

All components are listed on AICS.

EUROPE: EINECS (European Inventory of Existing Chemical Substances)

All components are listed on EINECS.

JAPAN: MITI (Japanese Handbook of Existing and New Chemical Substances)

All components are listed in the Handbook.

KOREA: ECL (Korean Toxic Substances Control Act)

All components are listed on the Korean inventory.

CHINA: IECSC (Inventory of Existing Substances in China)

All components are listed in the IECSC.

PHILIPPINES: PICCS (Philippine Inventory of Chemicals and Chemical Substances)

All components are listed in the PICCS.

16. OTHER INFORMATION

Additional Information

ABBREVIATIONS:

BEI - Biological Exposure Indices

CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.

CNS - Central Nervous System.

EC No - European Community Number.

IARC - International Agency for Research on Cancer.

M - moles per litre, a unit of concentration.

mg/m³ - Milligrams per cubic metre.

pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).

ppm - Parts Per Million.

TWA/ES - Time Weighted Average or Exposure Standard.

16. OTHER INFORMATION

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|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional Information | <p>SUMMARY OF CODES: RQ - Reportable Quantity measured in pounds (304, CERCLA) TQ - Threshold Quantity measured in pounds (CAA) TPQ - Threshold Planning Quantity measured in pounds (302) ^ - Reporting threshold has changed since November 1998. + - Member of PAC category. # - Member of diisocyanate category. X - Indicates that this is a second name for a chemical already included on this consolidated list. May also indicate that the same chemical with the same CAS number appears on another list with a different chemical name. * - RCRA carbamate waste: statutory one-pound RQ applies until RQs are adjusted. ** - This chemical was identified from a Premanufacture Review Notice (PMN) submitted to EPA. The submitter has claimed certain information on the submission to be confidential, including specific chemical identity. *** - Indicates that no RQ is assigned to this generic or broad class, although the class is a CERCLA hazardous substance. See 50 Federal Register 13456 (April 4, 1985). Values in Section 313 column represent Category Codes for reporting under Section 313. c - Although not listed by name and CAS number, this chemical is reportable under one or more of the EPCRA section 313 chemical categories. s - Indicates that this chemical is currently under a administrative stay of the EPCRA section 313 reporting requirements, therefore, no Toxics Release Inventory reports are required until the stay is removed. ! - Member of the dioxin and dioxin-like compounds category.</p> |
| Report Status | <p>This document has been compiled by RMT on behalf of the manufacturer of the product and serves as the manufacturer's Material Safety Data Sheet ('MSDS').</p> <p>It is based on information concerning the product which has been provided to RMT by the manufacturer or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.</p> <p>While RMT has taken all due care to include accurate and up-to-date information in this MSDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this MSDS.</p> <p>The information contained in this MATERIAL SAFETY DATA SHEET (MSDS) is provided by (BHP Billiton) to assist in evaluating the safety characteristics of the (product/mineral/substance) in question. The information is provided in good faith, but a risk assessment for the proposed use of the (product/mineral/substance) should be undertaken prior to that use. All persons coming into contact with the (product/mineral/substance) should be made aware of the contents of this MSDS.</p> |
| Prepared By | <p>Risk Management Technologies 5 Ventnor Ave, West Perth Western Australia 6005 Phone: +61 8 9322 1711 Fax: +61 8 9322 1794 Email: info@rmt.com.au Web: www.rmt.com.au</p> |

MSDS Date: 3 November 2009

End of Report