

## Safety Data Sheet

## Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

## 1.1 Product Identifier:

**Product Name:** Manganese Iron Based Alloys

**Synonyms:** Mn steel; Super (X)

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

**Relevant identified use(s):** Cast ingots at varying weights and dimensions. Ingots are sold and distributed to downstream processors who remelt the superalloys into products used within various downstream applications.

## 1.3 Details of the supplier of the safety data sheet:

**Manufacturer:** Ross & Catherall.  
Forge Lane,  
Killamarsh,  
Sheffield,  
S21 1BA  
UK

**Telephone (General):** +44 (0) 114 248 6404 ext 345

**Telephone (Direct Dial):** +44 (0) 7990 442080

## 1.4 Emergency telephone number:

**Manufacturer:** +44 (0) 114 248 6404

## Section 2: Hazards Identification

## EU/EEC:

According to: Regulation (EC) No 1272/2008 (CLP)/REACH 1907/2006 [amended by 2022/586]

## 2.1 Classification of the substance or mixture:

**CLP:** Skin Sensitisation 1 - H317  
Eye Irritation 2 - H319  
Carcinogenicity 2 - H351  
Reproductive Toxicity 2 - H361fd  
Specific Target Organ Toxicity Repeated Exposure 1 - H372

## 2.2 Label Elements:

**CLP:** **DANGER**

**Hazard statements**

H317 - May cause an allergic skin reaction.  
H319 - Causes serious eye irritation.  
H351 - Suspected of causing cancer.  
H361fd - Suspected of damaging fertility. Suspected of damaging the unborn child.  
H372 - Causes damage to organs through prolonged or repeated exposure.

**Precautionary statements**

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<b>Prevention</b>	P201 - Obtain special instructions before use. P202 - Do not handle until all safety precautions have been read and understood. P260 - Do not breathe dust or fume. P264 - Wash thoroughly after handling. P270 - Do not eat, drink or smoke when using this product. P272 - Contaminated work clothing should not be allowed out of the workplace. P280 - Wear protective gloves/protective clothing/eye protection/face protection.
<b>Response</b>	P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. P342+P311 - If experiencing respiratory symptoms: Call Medical services. P302+P352 - IF ON SKIN: Wash with plenty of water. P321 - Specific treatment, see supplemental first aid information. P362+P364 - Take off contaminated clothing and wash it before reuse. P333+P313 - If skin irritation or rash occurs: Get medical advice/attention. P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P337+P317 - If eye irritation persists: Get medical advice/attention. P308+P313 - IF exposed or concerned: Get medical advice/attention. P314 - Get medical advice/attention if you feel unwell.
<b>Storage/Disposal</b>	P405 - Store locked up. P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

### 2.3 Other Hazards CLP:

May form combustible dust concentrations in air.  
Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation.  
The symptoms are shivering, fever, malaise, and muscular pain.  
According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

### United Kingdom (UK):

**According to: Regulation (UK) No 2015/21 (CLP)/REACH 2021/904 Excluding Northern Ireland (NI)**  
**Note: Under the Post Brexit Northern Ireland Protocol, EU CLP and REACH regulations apply to NI.**

#### 2.1 Classification of the substance or mixture:

**CLP:** Skin Sensitisation 1 - H317  
Eye Irritation 2 - H319  
Carcinogenicity 2 - H351  
Reproductive Toxicity 2 - H361fd  
Specific Target Organ Toxicity Repeated Exposure 1 - H372

#### 2.2 Label Elements:

**CLP:** **DANGER**



#### Hazard statements

H317 - May cause an allergic skin reaction.  
H319 - Causes serious eye irritation.  
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#### Precautionary statements

## SDS 267 – Manganese Iron Based Alloys

<b>Prevention</b>	P201 - Obtain special instructions before use. P202 - Do not handle until all safety precautions have been read and understood. P260 - Do not breathe dust or fume. P264 - Wash thoroughly after handling. P270 - Do not eat, drink or smoke when using this product. P272 - Contaminated work clothing should not be allowed out of the workplace. P280 - Wear protective gloves/protective clothing/eye protection/face protection.
<b>Response</b>	P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. P342+P311 - If experiencing respiratory symptoms: Call Medical services. P302+P352 - IF ON SKIN: Wash with plenty of water. P321 - Specific treatment, see supplemental first aid information. P362+P364 - Take off contaminated clothing and wash it before reuse. P333+P313 - If skin irritation or rash occurs: Get medical advice/attention. P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P337+P317 - If eye irritation persists: Get medical advice/attention. P308+P313 - IF exposed or concerned: Get medical advice/attention. P314 - Get medical advice/attention if you feel unwell.
<b>Storage/Disposal</b>	P405 - Store locked up. P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

### 2.3 Other Hazards CLP:

May form combustible dust concentrations in air.  
Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation.  
The symptoms are shivering, fever, malaise, and muscular pain.  
According to Regulation (UK) No. 2015/21 (CLP) this material is considered hazardous.

## United Nations (UN) GHS Revision 9E:

### According to: UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS): Ninth Revised Edition

#### 2.1 Classification of the substance or mixture:

<b>UN GHS:</b>	Skin Sensitisation 1A - H317 Eye Irritation 2 - H319 Respiratory Sensitisation 1B – H334 Carcinogenicity 2 - H351 Reproductive Toxicity 2 - H361fd Specific Target Organ Toxicity Repeated Exposure 1 - H372
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#### 2.2 Label Elements:

**UN GHS:** **DANGER**



#### Hazard statements

H317 - May cause an allergic skin reaction.  
H319 - Causes serious eye irritation  
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled.  
H351 - Suspected of causing cancer.  
H361fd - Suspected of damaging fertility. Suspected of damaging the unborn child.

H372 - Causes damage to organs through prolonged or repeated exposure.

**Precautionary statements**

**Prevention**

P201 - Obtain special instructions before use.  
 P202 - Do not handle until all safety precautions have been read and understood.  
 P260 - Do not breathe dust or fume.  
 P264 - Wash thoroughly after handling.  
 P270 - Do not eat, drink or smoke when using this product.  
 P272 - Contaminated work clothing should not be allowed out of the workplace.  
 P280 - Wear protective gloves/protective clothing/eye protection/face protection.  
 P284 - In case of inadequate ventilation wear respiratory protection.

**Response**

P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.  
 P342+P311 - If experiencing respiratory symptoms: Call Medical services.  
 P302+P352 - IF ON SKIN: Wash with plenty of water.  
 P321 - Specific treatment, see supplemental first aid information.  
 P362+P364 - Take off contaminated clothing and wash it before reuse.  
 P333+P313 - If skin irritation or rash occurs: Get medical advice/attention.  
 P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
 P337+P317 - If eye irritation persists: Get medical advice/attention.  
 P308+P313 - IF exposed or concerned: Get medical advice/attention.  
 P314 - Get medical advice/attention if you feel unwell.

**Storage/Disposal**

P405 - Store locked up.  
 P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

**2.3 Other Hazards  
 UN GHS:**

May form combustible dust concentrations in air.  
 Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation.  
 The symptoms are shivering, fever, malaise, and muscular pain.  
 According to the Globally Harmonized System for Classification and Labelling (GHS) this product is considered hazardous.

**United States (US):**

According to: OSHA 29 CFR 1910.1200 HCS

**2.1 Classification of the substance or mixture:**

**OSHA HCS 2012:**

Skin Sensitisation 1A – H317  
 Eye Irritation 2 – H320  
 Respiratory Sensitisation 1B – H334  
 Carcinogenicity 2 – H351  
 Reproductive Toxicity 2 – H361fd  
 Specific Target Organ Toxicity Repeated Exposure 1 – H372  
 Combustible Dust  
 Hazards Not Otherwise Classified - Health Hazards - Metal fume fever

**2.2 Label Elements:**

**OSHA HCS 2012:**

**DANGER**



**Hazard statements**

H317 - May cause an allergic skin reaction.  
 H320 - Causes serious eye irritation.  
 H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled.  
 H351 - Suspected of causing cancer.  
 H361fd - Suspected of damaging fertility or the unborn child.  
 H372 - Causes damage to organs through prolonged or repeated exposure.  
 Not Coded - May form combustible dust concentrations in air.

**Precautionary statements**

**Prevention**

P201 - Obtain special instructions before use.  
 P202 - Do not handle until all safety precautions have been read and understood.  
 P260 - Do not breathe dust or fume.  
 P264 - Wash thoroughly after handling.  
 P270 - Do not eat, drink or smoke when using this product.  
 P272 - Contaminated work clothing should not be allowed out of the workplace.  
 P280 - Wear protective gloves/protective clothing/eye protection face protection.  
 P284 - In case of inadequate ventilation wear respiratory protection.

**Response**

P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.  
 P342+P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.  
 P302+P352 - IF ON SKIN: Wash with plenty of water.  
 P321 - Specific treatment, see supplemental first aid information.  
 P362+P364 - Take off contaminated clothing and wash it before reuse.  
 P333+P313 - If skin irritation or rash occurs: Get medical advice/attention.  
 P305 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
 P305 - If eye irritation persists: Get medical advice/attention.  
 P308+P313 - IF exposed or concerned: Get medical advice/attention.  
 P314 - Get medical advice/attention if you feel unwell.  
 P405 - Store locked up.  
 P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

**Storage/Disposal**

**2.3**

**Other Hazards  
 OSHA HCS 2012:**

May form combustible dust concentrations in air.  
 Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation.  
 The symptoms are shivering, fever, malaise, and muscular pain.  
 Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

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Section 3: Composition/Information on Ingredients					
<b>3.1 Substances:</b>		Material does not meet the criteria of a substance.			
<b>3.2 Mixtures:</b>					
Composition					
Chemical Name	Identifiers	%	LD50/LC50	Classifications According to Regulation/Directive	Comments
Iron	<b>CAS:</b> 7439-89-6 <b>EC Number:</b> 231-096-4	20% TO 90%	NDA	<b>EU CLP:</b> Acute Tox. 4, H302; Aquatic Chronic 4, H413 <b>UK CLP:</b> Acute Tox. 4, H302; Aquatic Chronic 4, H413 <b>UN GHS Revision 9:</b> Acute Tox. 4 (Orl); Aquatic Chronic 4 <b>OSHA HCS 2012:</b> Acute Tox. 4 (Orl)	NDA
Manganese (powder)	<b>CAS:</b> 7439-96-5 <b>EC Number:</b> 231-105-1	10% TO 30%	Ingestion/Oral- Rat LD50 • 9 g/kg	<b>EU CLP:</b> Flam. Sol. 2, H228; Eye Irrit. 2, H319; Repr. 2, H361 (Orl); STOT RE 1 (CNS, Lungs / Inhl) <b>UK CLP:</b> Flam. Sol. 2, H228; Eye Irrit. 2, H319; Repr. 2, H361 (Orl); STOT RE 1 (CNS, Lungs / Inhl) <b>UN GHS Revision 9:</b> Flam. Sol. 2; Skin Irrit. 3; Eye Irrit. 2; Repr. 2 (Orl); STOT RE 1 (CNS, Lungs/ Inhl) <b>OSHA HCS 2012:</b> Flam. Sol. 2; Skin Irrit. 3; Eye Irrit. 2; Repr. 2 (Orl); STOT RE 1 (CNS, Lungs/ Inhl); Hazard Not Otherwise Classified - Health Hazard - Metal fume fever	NDA
Chromium, massive	<b>CAS:</b> 7440-47-3 <b>EC Number:</b> 231-157-5	2% TO 25%	NDA	<b>EU CLP:</b> Not Classified <b>UK CLP:</b> Not Classified <b>UN GHS Revision 9:</b> Not Classified <b>OSHA HCS 2012:</b> Comb. Dust	NDA
Nickel, massive, ≥ 1 mm	<b>CAS:</b> 7440-02-0 <b>EC Number:</b> 231-111-4	0.5% TO 20%	NDA	<b>EU CLP:</b> Annex VI, Table 3.1: Skin Sens. 1, H317; Carc. 2, H351 (Inhl); STOT RE 1, H372 (Lungs / Orl/Dermal/Inhl); Aquatic Chronic 3, H412 <b>UK CLP:</b> MCL: Skin Sens. 1, H317; Carc. 2, H351 (Inhl); STOT RE 1, H372 (Lungs / Orl/Dermal/Inhl); Aquatic Chronic 3, H412 <b>UN GHS Revision 9:</b> Flam. Sol. 1; Resp. Sens. 1B; Skin Sens. 1A; Carc. 2 (Inhl); STOT RE 2 (Lungs / Orl, Inhl); Aquatic Acute 3; Aquatic Chronic 3 <b>OSHA HCS 2012:</b> Flam. Sol. 1; Comb. Dust; Resp. Sens. 1B; Skin Sens. 1A; Carc. 2 (Inhl); STOT RE 2 (Lungs / Orl, Inhl)	NDA
Niobium	<b>CAS:</b> 7440-03-1 <b>EC Number:</b> 231-113-5	0% TO 6%	NDA	<b>EU CLP:</b> Not Classified <b>UK CLP:</b> Not Classified <b>UN GHS Revision 9:</b> Not Classified <b>OSHA HCS 2012:</b> Not Classified	NDA
Titanium, massive	<b>CAS:</b> 7440-32-6 <b>EINECS:</b> 231- 142-3	0% TO 2%	NDA	<b>EU CLP:</b> Pyr. Sol. 1, H250 <b>UK CLP:</b> Pyr. Sol. 1, H250 <b>UN GHS Revision 9:</b> Pyr. Sol. 1 <b>OSHA HCS 2012:</b> Pyr. Sol. 1; Comb. Dust	NDA

See Section 16 for full text of H-statements.

**Section 4: First Aid Measures****4.1 Description of first aid measures:**

<b>Inhalation:</b>	Move victim to fresh air. Give artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. If signs/symptoms continue, get medical attention.
<b>Skin:</b>	Wash skin with soap and water. If skin irritation occurs: Get medical advice/attention.
<b>Eye:</b>	In case of contact with substance, immediately flush eyes with running water for at least 20 minutes. If eye irritation persists: Get medical advice/attention.
<b>Ingestion:</b>	Rinse mouth. Do not give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

**4.2 Most important symptoms and effects, both acute and delayed:**

Refer to Section 11 - Toxicological Information.

**4.3 Indication of any immediate medical attention and special treatment needed:**

<b>Notes to Medical Personnel:</b>	All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.
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**Section 5: Firefighting Measures****5.1 Extinguishing media:**

<b>Suitable Extinguishing Media:</b>	Use dry powder extinguishing agent.
<b>Unsuitable Extinguishing Media:</b>	No data available.

**5.2 Special hazards arising from the substance or mixture:**

<b>Unusual Fire and Explosion Hazards</b>	Metal powder dispersed in air may cause fire and explosion. Molten metal can ignite combustibles. Molten metal will react violently with water.
<b>Hazardous Combustion Products</b>	No data available.

**5.3 Advice for firefighters:**

Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection

**Section 6: Accidental Release Measures****6.1 Personal precautions, protective equipment and emergency procedures:**

<b>Personal Precautions:</b>	Ventilate enclosed areas. Do not walk-through spilled material. Wear appropriate personal protective equipment, avoid direct contact. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
<b>Emergency Procedures:</b>	ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. Keep unauthorised personnel away.

**6.2 Environmental precautions:**

Avoid run off to waterways and sewers.

**6.3 Methods and material for containment and cleaning up:**

<b>Containment/Clean-up Measures:</b>	Avoid generating dust. Solid ingot material should be picked up and recycled.
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Where possible allow molten material to solidify naturally.  
Residue from cutting or grinding should be swept or vacuumed and placed in suitable containers.  
Use clean non sparking tools to collect material.  
Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration.  
Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air).

### 6.4 Reference to other sections:

Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

## Section 7: Handling and Storage

### 7.1 Precautions for safe handling:

#### Handling:

Under normal conditions, exposure to cast ingots presents few health hazards in itself. Thermal cutting and melting of ingots may produce fumes and dust containing the component elements which may present potentially significant health hazards. Use only with adequate ventilation. Minimize dust generation and accumulation.  
Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Provide adequate precautions, such as electrical grounding and bonding, or inert atmospheres. Wear appropriate personal protective equipment, avoid direct contact. Do not breathe dust or fumes. Avoid contact with skin, eyes, and clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

### 7.2 Conditions for safe storage, including any incompatibilities:

#### Storage:

Store in a well-ventilated place. Keep container tightly closed. Keep away from incompatible materials.

### 7.3 Specific end use(s):

Refer to Section 1.2 - Relevant identified uses.

## Section 8: Exposure Controls/Personal Protection:

### 8.1 Control parameters:

#### Exposure Limits/Guidelines

	Result	ACGIH	Europe	NIOSH	OSHA	United Kingdom
Nickel, massive, $\geq 1$ mm (7440-02-0)	STELs	Not established	Not established	Not established	Not established	1.5 mg/m <sup>3</sup> STEL (calculated)
	TWAs	1.5 mg/m <sup>3</sup> TWA (inhalable fraction)	Not established	0.015 mg/m <sup>3</sup> TWA	1 mg/m <sup>3</sup> TWA	0.5 mg/m <sup>3</sup> TWA
Chromium, massive (7440-47-3)	TWAs	0.5 mg/m <sup>3</sup> TWA	2 mg/m <sup>3</sup> TWA	0.5 mg/m <sup>3</sup> TWA	1 mg/m <sup>3</sup> TWA	0.5 mg/m <sup>3</sup> TWA 0.025 mg/m <sup>3</sup> (process generated)
	STELs	Not established	Not established	Not established	Not established	Not Stated EH40
Manganese (powder) (7439-96-5)	STELs	Not established	Not established	3 mg/m <sup>3</sup> STEL	Not established	Not Stated EH 40
	TWAs	0.02 mg/m <sup>3</sup> TWA (respirable fraction). 0.1 mg/m <sup>3</sup> TWA (inhalable fraction)	Not established	1 mg/m <sup>3</sup> TWA (fume)	Not established	0.2 mg/m <sup>3</sup> TWA (as Mn) (Inhalable) 0.05 mg/m <sup>3</sup> TWA (as Mn) (respirable)
	Ceilings	Not established	Not established	Not established	5 mg/m <sup>3</sup> Ceiling (fume)	Not established



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<b>8.2 Exposure controls:</b>	
<b>Engineering Measures/Controls</b>	Use a local exhaust when cutting, grinding, welding, or melting. It is recommended that dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen-deficient environment. Ensure that dust handling systems (such as exhaust ducts, dust collectors, vessels and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is not leakage from the equipment). Use only appropriately classified electrical equipment.
<b>Personal Protective Equipment Respiratory</b>	For limited exposure, use P95 or N95 respirator. For prolonged exposure use an air-purifying respirator with high efficiency particulate air (HEPA) filters. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirators if exposure limits are exceeded or symptoms are experienced.
<b>Eye/Face</b>	Wear safety goggles.
<b>Skin/Body</b>	Wear appropriate gloves. Wear long sleeves and/or protective coveralls.
<b>Environmental Exposure Controls</b>	Follow best practice for site management and disposal of waste. Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.
<b>Key to abbreviations:</b>	<p>ACGIH = American Conference of Governmental Industrial Hygiene          NIOSH = National Institute of Occupational Safety and Health          OSHA = Occupational Safety and Health Administration          STEL = Short Term Exposure Limits are based on 15-minute exposures          TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures</p>

<b>Section 9: Physical and Chemical Properties</b>			
<b>9.1 Information on Basic Physical and Chemical Properties:</b>			
<b>Material Description</b>			
Physical Form	Solid	Appearance/Description	Metallic grey solid with no odour.
Colour	Metallic grey.	Odour	Odourless
Odour Threshold	Data lacking		
<b>General Properties</b>			
Boiling Point	Data lacking	Melting Point/Freezing Point	2700 °F (1482.2222 °C)
Decomposition Temperature	Data lacking	pH	Data lacking
Specific Gravity/Relative Density	= 8 Water=1	Water Solubility	Negligible < 0.1 %
Viscosity	Data lacking	Explosive Properties	Data lacking
Oxidizing Properties:	Data lacking		
<b>Volatility</b>			
Vapour Pressure	Data lacking	Vapour Density	Data lacking
Evaporation Rate	Data lacking	Volatiles (Wt.)	0 %
Volatiles (Vol.)	0 %		
<b>Flammability</b>			
Flash Point	Data lacking	UEL	Data lacking
LEL	Data lacking	Autoignition	Data lacking
Flammability (solid, gas)	Data lacking		
<b>Environmental</b>			
Octanol/Water Partition coefficient	Data lacking		
<b>9.2 Other Information:</b>			
No additional physical and chemical parameters noted.			

Section 10: Stability and Reactivity:	
10.1 Reactivity:	No dangerous reaction known under conditions of normal use.
10.2 Chemical stability	Stable under normal temperatures and pressures.
10.3 Possibility of hazardous reactions	Hazardous polymerization will not occur.
10.4 Conditions to avoid	Avoid generating dust.
10.5 Incompatible materials	Cast Ingot is stable at ordinary temperature; however, caution should be taken with acids, bases, and oxidizers. Molten metal will react violently with water.
10.6 Hazardous decomposition products	Under normal conditions, exposure to cast ingots presents few health hazards in itself. Thermal cutting and melting of ingots may produce fumes containing the component elements and breathing those fumes may present potentially significant health hazards.

Section 11: Toxicological Information:	
11.1 Information on toxicological effects	
Components	
Nickel, massive, ≥ 1 mm (0.5% TO 20%)	7440-02-0 <b>Acute Toxicity:</b> Ingestion/Oral-Rat TDLo • 200 mg/kg; Nutritional and Gross Metabolic: Gross Metabolite Changes: <b>Weight loss or decreased weight gain</b> ; Behavioural: <b>Somnolence (general depressed activity)</b> ; <b>Multi-dose Toxicity:</b> Ingestion/Oral-Rat TDLo 500 mg/kg 5 Day(s)-Intermittent; Lungs, Thorax, or Respiration: <b>Fibrosis, focal (pneumoconiosis)</b> ; Related to Chronic Data: <b>Death in the Other Multiple Dose data type field</b> ; Inhalation-Rabbit TCLo • 1 mg/m <sup>3</sup> 6 Hour(s) 13 Week(s)-Intermittent; Lungs, Thorax, or Respiration: <b>Other changes</b> ; Lungs, Thorax, or Respiration: <b>Changes in lung weight</b> ; <b>Blood: Haemorrhage</b> ; Inhalation-Rat TCLo • 0.4 mg/m <sup>3</sup> 40 Week(s)-Intermittent; Vascular: <b>Thrombosis distant from injection site</b> ; Lungs, Thorax, or Respiration: <b>Other changes</b> ; Related to Chronic Data: <b>Death in the Other Multiple Dose data type field</b> ; <b>Reproductive:</b> Ingestion/Oral-Rat TDLo • 158 mg/kg (multigeneration); Reproductive Effects: Effects on Embryo or Foetus: <b>Fetotoxicity (except death, e.g., stunted foetus)</b> ; Reproductive Effects: Effects on Embryo or Foetus: <b>Foetal death</b> ; <b>Tumorigenic / Carcinogen:</b> Inhalation-Guinea Pig TCLo • 15 mg/m <sup>3</sup> 91 Week(s)-Intermittent; Tumorigenic: <b>Equivocal tumorigenic agent by RTECS criteria</b> ; Lungs, Thorax, or Respiration: <b>Tumours</b> ; Lungs, Thorax, or Respiration: <b>Bronchogenic carcinoma</b>
Manganese (powder) (10% TO 30%)	7439-96-5 <b>Acute Toxicity:</b> Ingestion/Oral-Rat LD50 • 9 g/kg; <b>Irritation:</b> Eye-Rabbit • 500 mg 24 Hour(s) • Mild irritation; Skin-Rabbit • 500 mg 24 Hour(s) • Mild irritation. <b>Multi-dose Toxicity:</b> Inhalation-Human TCLo • 0.5 mg/m <sup>3</sup> 39 Week(s)-Intermittent; Brain and Coverings: <b>Other degenerative changes</b> ; Peripheral Nerve and Sensation: <b>Sensory change involving peripheral nerve</b> ; Behavioural: <b>Irritability</b> ; Inhalation-Mouse TCLo • 0.7 mg/m <sup>3</sup> 24 Hour(s) 22 Week(s)-Continuous; Lungs, Thorax, or Respiration: <b>Fibrosis (interstitial)</b> ; Immunological Including Allergic: <b>Decrease in cellular immune response</b> ; Inhalation-Rat TCLo • 0.3 mg/m <sup>3</sup> 5 Hour(s) 26 Week(s)-Intermittent; Lungs, Thorax, or Respiration: <b>Fibrosis (interstitial)</b> ; Immunological Including Allergic: <b>Decrease in cellular immune response</b> ; <b>Reproductive:</b> Ingestion/Oral-Mouse TDLo • 322.5 mg/kg (43D male); Reproductive Effects: Paternal Effects: <b>Spermatogenesis</b> ; Ingestion/Oral-Rat TDLo • 50 mg/kg (20D post); Reproductive Effects: Specific Developmental Abnormalities: <b>Central nervous system</b> ; Reproductive Effects: Effects on New-born: <b>Biochemical and metabolic</b> ; Reproductive Effects: Effects on New-born: <b>Behavioural</b> ; Ingestion/Oral-Rat TDLo • 90 mg/kg (18D post); Reproductive Effects: Effects on New-born: <b>Growth statistics (e.g., reduced weight gain)</b> ; Reproductive Effects: Effects on New-born: <b>Biochemical and metabolic</b> ; Reproductive Effects: Effects on New-born: <b>Other postnatal measures or effects</b> not listed.
Titanium, massive (0% TO 2%)	7440-32-6 <b>Reproductive:</b> Ingestion/Oral-Rat TDLo • 158 mg/kg (multigeneration); Reproductive Effects: Effects on Embryo or Foetus: <b>Fetotoxicity (except death, e.g., stunted foetus)</b> ; Reproductive Effects: Effects on Embryo or Foetus: <b>Foetal death</b>
Iron (20% TO 90%)	7439-89-6 <b>Acute Toxicity:</b> Ingestion/Oral-Rat LD50 • 750 mg/kg; Blood: <b>Changes in serum composition (e.g., TP, bilirubin cholesterol)</b> ; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: <b>Transaminases</b> ; Ingestion/Oral-Child TDLo • 77 mg/kg; behavioural: <b>Irritability</b> ; Gastrointestinal: <b>Nausea or vomiting</b> ; Blood: <b>Normocytic anaemia</b> . <b>Multi-dose Toxicity:</b> Ingestion/Oral-Rat TDLo • 105 mg/kg 5 Week(s)-Continuous; Liver: Tumours; Tumorigenic: Active as anti-cancer agent; Tumorigenic: <b>Protects against induction of experimental tumours</b>

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GHS Properties	Classification
Acute toxicity	EU/CLP • Data lacking UK CLP • Data lacking UN GHS 9 • Data lacking OSHA HCS 2012 • Data lacking
Skin corrosion/Irritation	EU/CLP • Data lacking UK CLP • Data lacking UN GHS 9 • Data lacking OSHA HCS 2012 • Data lacking
Serious eye damage/Irritation	EU/CLP • Eye Irritation 2 UK CLP • Eye Irritation 2 UN GHS 9 • Eye Irritation 2 OSHA HCS 2012 • Eye Irritation 2
Skin sensitisation	EU/CLP • Skin Sensitiser 1 UK CLP • Skin Sensitiser 1 UN GHS 9 • Skin Sensitiser 1A OSHA HCS 2012 • Skin Sensitiser 1A
Respiratory sensitisation	EU/CLP • Respiratory Sensitiser 1 UK CLP • Respiratory Sensitiser 1 UN GHS 9 • Respiratory Sensitiser 1B OSHA HCS 2012 • Respiratory Sensitiser 1B
Aspiration Hazard	EU/CLP • Data lacking UK CLP • Data lacking UN GHS 9 • Data lacking OSHA HCS 2012 • Data lacking
Carcinogenicity	EU/CLP • Carcinogenicity 2; Suspected of causing cancer UK CLP • Carcinogenicity 2; Suspected of causing cancer UN GHS 9 • Carcinogenicity 2 OSHA HCS 2012 • Carcinogenicity 2
Germ Cell Mutagenicity	EU/CLP • Data lacking UK CLP • Data lacking UN GHS 9 • Data lacking OSHA HCS 2012 • Data lacking
Toxicity for Reproduction	EU/CLP • Toxic to Reproduction 2 UK CLP • Toxic to Reproduction 2 UN GHS 9 • Toxic to Reproduction 2 OSHA HCS 2012 • Toxic to Reproduction 2
STOT-SE	EU/CLP • Data lacking UK CLP • Data lacking UN GHS 9 • Data lacking OSHA HCS 2012 • Data lacking
STOT-RE	EU/CLP • Specific Target Organ Toxicity Repeated Exposure 1; Specific Target Organ Toxicity Repeated Exposure 2 UK CLP • Specific Target Organ Toxicity Repeated Exposure 1; Specific Target Organ Toxicity Repeated Exposure 2 UN GHS 9 • Specific Target Organ Toxicity Repeated Exposure 1 OSHA HCS 2012 • Specific Target Organ Toxicity Repeated Exposure 1
<p><b>Potential Health Effects</b></p> <p><b>Inhalation</b></p> <p><b>Acute (Immediate)</b> Exposure to dust may cause irritation. Processes such as cutting, grinding, crushing, or impact may result in generation of excessive amounts of airborne dusts in the workplace. Nuisance dust may affect the lungs but reactions are typically reversible.</p> <p><b>Chronic (Delayed)</b> Repeated and prolonged exposure may cause sensitisation of the respiratory system. Chronic exposure to Nickel can cause effects such as rhinitis, sinusitis, nasal septal perforations and asthma have been reported in nickel refinery and nickel-plating workers.</p> <p><b>Skin</b></p> <p><b>Acute (Immediate)</b> May cause skin sensitisation. Symptoms include redness, and skin rash. Contact allergy to nickel is very common in human beings.</p> <p><b>Chronic (Delayed)</b> No data available.</p>	

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### Eye

**Acute (Immediate)** Causes serious eye irritation. Excessive concentrations of nuisance dust in the workplace may reduce visibility and may cause unpleasant deposits in eyes.

**Chronic (Delayed)** No data available.

### Ingestion

**Acute (Immediate)** Excessive concentrations of nuisance dust in the workplace may cause mechanical irritation to mucous membranes.

**Chronic (Delayed)** No data available.

### Other

**Chronic (Delayed)** Chronic exposure to Manganese dust and fumes can cause Manganism (Parkinson like disease).

**Carcinogenic Effects** Repeated and prolonged exposure to fumes and dust created in processing this product may cause cancer.

### Carcinogenic Effects

	CAS	IARC	NTP
Nickel, massive, ≥ 1 mm	7440-02-0	Group 2B-Possible Carcinogen	Reasonably Anticipated to be Human Carcinogen

### Reproductive Effects

Repeated and prolonged exposure to fumes and dust created in processing this product may cause reproductive effects.

### 11.2 Other information:

Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain.

### Key to abbreviations

LD = Lethal Dose

TD = Toxic Dose

## Section 12: Ecological Information:

### 12.1 Toxicity:

#### Components

Nickel, massive, ≥ 1 mm (0.5% TO 20%)	7440-02-0	<b>Aquatic Toxicity-Fish:</b> 96 Hour(s) LC50 Oncorhynchus mykiss (Rainbow Trout) 0.06 mg/L 28 Day(s) NOEC Cyprinus carpio (Common Carp) 0.0035 µg/L <b>Aquatic Toxicity-Crustacea:</b> 7 Day(s) NOEC Americamysis bahia (Opossum Shrimp) 0.213 mg/L <b>Aquatic Toxicity-Algae and Other Aquatic Plant(s):</b> 96 Hour(s) EC50 Pseudokirchneriella subcapitata (Green Algae) 0.233 mg/L
Iron (20% TO 90%)	7439-89-6	<b>Aquatic Toxicity-Fish:</b> 96 Hour(s) LC50 Mudskipper (Periophthalmus waltoni) 0.00648 mg/L 7 Day(s) NOEC Brown Trout (Salmo trutta) 0.305 mg/L <b>Aquatic Toxicity-Crustacea:</b> 7 Day(s) NOEC Aquatic Sowbug, Isopod (Idotea balthica) 0.5 mg/L

The product is not expected to present an environmental hazard.

### 12.2 Persistence and degradability

Material data lacking.

### 12.3 Bio accumulative potential

Material data lacking.

### 12.4 Mobility in Soil

Material data lacking.

### 12.5 Results of PBT and vPvB assessment

No PBT and vPvB assessment has been conducted.

### 12.6 Other adverse effects

No studies have been found.

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### Section 13: Disposal Considerations:

#### 13.1 Waste treatment methods

<b>Product waste</b>	Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.
<b>Packaging waste</b>	Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

### Section 14: Transport Information:

	14.1 UN number	14.2 UN proper shipping name	14.3 Transport hazard class(es)	14.4 Packing group	14.5 Environmental hazards
DOT	Not Applicable	Not Regulated	Not Applicable	Not Applicable	NDA
TDG	Not Applicable	Not Regulated	Not Applicable	Not Applicable	NDA
IMO/IMDG	Not Applicable	Not Regulated	Not Applicable	Not Applicable	NDA
IATA/ICAO	Not Applicable	Not Regulated	Not Applicable	Not Applicable	NDA
<b>14.6 Special precautions for user</b>	None specified.				
<b>14.7 Transport in bulk according to Annex II of Marpol and the IBC Code</b>	Data lacking.				

### Section 15: Regulatory Information:

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

**SARA Hazard Classifications** Acute, Chronic, Pressure (Sudden Release of)

Inventory						
Component	CAS	UK MCL	UK SVHCs	EU EINECS	EU ELNICS	TSCA
Chromium, massive	7440-47-3	Yes	No	Yes	No	Yes
Iron	7439-89-6	Yes	No	Yes	No	Yes
Manganese (powder)	7439-96-5	Yes	No	Yes	No	Yes
Nickel, massive, ≥ 1 mm	7440-02-0	Yes	No	Yes	No	Yes
Niobium	7440-03-1	Yes	No	Yes	No	Yes
Titanium, massive	7440-32-6	Yes	No	Yes	No	Yes

#### United States

##### Labour

##### U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

Chromium, massive	7440-47-3	Not Listed
Manganese (powder)	7439-96-5	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed

##### U.S. - OSHA - Specifically Regulated Chemicals

Chromium, massive	7440-47-3	Not Listed
Manganese (powder)	7439-96-5	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed

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<b>Environment</b>		
<b>U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants</b>		
Chromium, massive	7440-47-3	Not Listed
Manganese (powder)	7439-96-5	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed
<b>U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities</b>		
Chromium, massive	7440-47-3	5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm)
Manganese (powder)	7439-96-5	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	100 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 45.4 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm)
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed
<b>U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities</b>		
Chromium, massive	7440-47-3	Not Listed
Manganese (powder)	7439-96-5	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed
<b>U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs</b>		
Chromium, massive	7440-47-3	Not Listed
Manganese (powder)	7439-96-5	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed
<b>U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs</b>		
Chromium, massive	7440-47-3	Not Listed
Manganese (powder)	7439-96-5	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed

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<b>U.S. - CERCLA/SARA - Section 313 - Emission Reporting</b>		
Chromium, massive	7440-47-3	1.0 % de minimis concentration
Manganese (powder)	7439-96-5	1.0 % de minimis concentration
Nickel, massive, ≥ 1 mm	7440-02-0	0.1 % de minimis concentration
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed
<b>U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing</b>		
Chromium, massive	7440-47-3	Not Listed
Manganese (powder)	7439-96-5	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed
<b>United States - California Environment</b>		
<b>U.S. - California - Proposition 65 - Carcinogens List</b>		
Chromium, massive	7440-47-3	Not Listed
Manganese (powder)	7439-96-5	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	carcinogen, 10/1/1989 (metallic)
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed
<b>U.S. - California - Proposition 65 - Developmental Toxicity</b>		
Chromium, massive	7440-47-3	Not Listed
Manganese (powder)	7439-96-5	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed
<b>U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)</b>		
Chromium, massive	7440-47-3	Not Listed
Manganese (powder)	7439-96-5	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed
<b>U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)</b>		
Chromium, massive	7440-47-3	Not Listed
Manganese (powder)	7439-96-5	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed
<b>U.S. - California - Proposition 65 - Reproductive Toxicity - Female</b>		
Chromium, massive	7440-47-3	Not Listed
Manganese (powder)	7439-96-5	Not Listed

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Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed
<b>U.S. - California - Proposition 65 - Reproductive Toxicity - Male</b>		
Chromium, massive	7440-47-3	Not Listed
Manganese (powder)	7439-96-5	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
Iron	7439-89-6	Not Listed
Titanium, massive	7440-32-6	Not Listed
Niobium	7440-03-1	Not Listed
<b>15.2 Incompatible materials</b>	No Chemical Safety Assessment has been carried out.	
<b>15.3 Hazardous decomposition products</b>	<b>WARNING:</b> This product contains a chemical known to the State of California to cause cancer.	

### Section 16: Other Information:

#### Relevant Phrases (code & full text)

H228 - Flammable solid  
H250 - Catches fire spontaneously if exposed to air  
H302 - Harmful if swallowed  
H412 - Harmful to aquatic life with long lasting effects  
H413 - May cause long lasting harmful effects to aquatic life  
07 November 2022

#### Revision Date

#### Preparation Date

#### Disclaimer/Statement of Liability

#### Key to abbreviations

The information herein is given in good faith but no warranty, expressed or implied, is made.  
NDA = No Data Available