SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and the company/undertaking

1.1. Product identifier  :  FERROMAXX 15

Refer to Section 3 for REACH information

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

Use of the Substance/Mixture  :  General Industrial

Restrictions on Use  :  No data available.

1.3 Details of the supplier of the safety data sheet

Air Products Plc
2 Millennium Gate
Westmere Drive
Crewe
Cheshire

Email Address – Technical Information  :  GASTECH@airproducts.com

Telephone  :  +44(0)3457 020202

1.4. Emergency telephone number

1. Cylinder 08085 020202 / +44 870 190 6874
2. Bulk 08085 020202
3. Medical 08085 020202

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Gases under pressure -  Compressed gas. H280:Contains gas under pressure; may explode if heated.

2.2. Label elements

Hazard pictograms/symbols
Signal Word: Warning

Hazard Statements:
H280: Contains gas under pressure; may explode if heated.

Precautionary Statements:
Storage: P403: Store in a well-ventilated place.

2.3 Other Hazards
High pressure gas.
Can cause rapid suffocation.
Self contained breathing apparatus (SCBA) may be required.

Environmental Effects
Not harmful.

SECTION 3: Composition/information on ingredients

<table>
<thead>
<tr>
<th>Substance/Mixture</th>
<th>Components</th>
<th>EINECS / ELINCS Number</th>
<th>CAS Number</th>
<th>Concentration (Volume)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oxygen</td>
<td>231-956-9</td>
<td>7782-44-7</td>
<td>2.5 %</td>
</tr>
<tr>
<td></td>
<td>Carbon dioxide</td>
<td>204-696-9</td>
<td>124-38-9</td>
<td>15 %</td>
</tr>
<tr>
<td></td>
<td>Argon</td>
<td>231-147-0</td>
<td>7440-37-1</td>
<td>82.5 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Components</th>
<th>Classification (CLP)</th>
<th>REACH Reg. #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td>Ox. Gas 1 ;H270</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Press. Gas (Comp.) ;H280</td>
<td></td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>Press. Gas (Comp.) ;H280</td>
<td></td>
</tr>
<tr>
<td>Argon</td>
<td>Press. Gas (Comp.) ;H280</td>
<td></td>
</tr>
</tbody>
</table>

If REACH registration numbers do not appear the substance is either exempt from registration, does not meet the minimum volume threshold for registration, or the registration date has not yet come due. Refer to section 16 for full text of each relevant R-phrase and H-phrases.

Concentration is nominal. For the exact product composition, please refer to Air Products technical specifications.

SECTION 4: First aid measures
4.1 Description of first aid measures

General advice: Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Eye contact: Not applicable.

Skin contact: Not applicable.

Ingestion: Ingestion is not considered a potential route of exposure.

Inhalation: Remove to fresh air. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. In case of shortness of breath, give oxygen.

4.2 Most important symptoms and effects, both acute and delayed


4.3 Indication of any immediate medical attention and special treatment needed

No data available.

SECTION 5: Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media: All known extinguishing media can be used.

Extinguishing media which must not be used for safety reasons: No data available.

5.2 Special hazards arising from the substance or mixture

Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently. Product is nonflammable and does not support combustion. Move away from container and cool with water from a protected position. Keep containers and surroundings cool with water spray.

5.3 Advice for fire-fighters


SECTION 6: Accidental release measures

6.1 Personal precautions, Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or
6.2 Environmental precautions

- Do not discharge into any place where its accumulation could be dangerous. Prevent further leakage or spillage if safe to do so.

- Ventilate the area.

6.3 Methods and material for containment and cleaning up

- If possible, stop flow of product. Increase ventilation to the release area and monitor oxygen level. If leak is from cylinder or cylinder valve, call the Air Products emergency telephone number. If the leak is in the user’s system, close the cylinder valve and safely vent the pressure before attempting repairs.

6.4 Reference to Other Sections

- For more information refer to Sections 8 & 13

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 50°C (122°F). Only experienced and properly instructed persons should handle compressed gases/cryogenic liquids. Before using the product, determine its identity by reading the label. Know and understand the properties and hazards of the product before use. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Use an adjustable strap wrench to remove over-tight or rusted caps. Before connecting the container, check the complete gas system for suitability, particularly for pressure rating and materials. Before connecting the container for use, ensure that back feed from the system into the container is prevented. Ensure the complete gas system is compatible for pressure rating and materials of construction. Ensure the complete gas system has been checked for leaks before use. Employ suitable pressure regulating devices on all containers when the gas is being emitted to systems with lower pressure rating than that of the container. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Open valve slowly. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Close valve after each use and when empty. Replace outlet caps or plugs and container caps as soon as container is disconnected from equipment. Do not subject containers to abnormal mechanical shock. Never attempt to lift a cylinder by its valve protection cap or guard. Do not use containers as rollers or supports or for any other purpose than to contain the gas as supplied. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. Do not smoke while handling product or cylinders. Never re-compress a gas or a gas mixture without first consulting the supplier. Never attempt to transfer gases from one cylinder/container to another. Always use backflow protective device in piping. When returning cylinder install valve outlet cap or plug leak tight. Never use direct flame or electrical heating devices to raise the pressure of a container. Containers should not be subjected to temperatures above 50°C (122°F).
7.2 Conditions for safe storage, including any incompatibilities

Full containers should be stored so that oldest stock is used first. Containers should be stored in a purpose build compound which should be well ventilated, preferably in the open air. Stored containers should be periodically checked for general condition and leakage. Observe all regulations and local requirements regarding storage of containers. Protect containers stored in the open against rusting and extremes of weather. Containers should not be stored in conditions likely to encourage corrosion. Containers should be stored in the vertical position and properly secured to prevent toppling. The container valves should be tightly closed and where appropriate valve outlets should be capped or plugged. Container valve guards or caps should be in place. Keep containers tightly closed in a cool, well-ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Full and empty cylinders should be segregated. Do not allow storage temperature to exceed 50°C (122°F). Return empty containers in a timely manner.

Technical measures/Precautions

Containers should be segregated in the storage area according to the various categories (e.g. flammable, toxic, etc.) and in accordance with local regulations. Keep away from combustible material.

7.3 Specific end use(s)

Refer to section 1 or the extended SDS if applicable

SECTION 8: Exposure controls / personal protection

8.1 Control parameters

<table>
<thead>
<tr>
<th>Exposure limit(s)</th>
<th>Time Weighted Average (TWA): EH40 WEL</th>
<th>5,000 ppm</th>
<th>9,150 mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide</td>
<td>Short Term Exposure Limit (STEL): EH40 WEL</td>
<td>15,000 ppm</td>
<td>27,400 mg/m³</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>Time Weighted Average (TWA): EU ELV</td>
<td>5,000 ppm</td>
<td>9,000 mg/m³</td>
</tr>
</tbody>
</table>

If applicable, refer to the extended section of the SDS for further information on CSA.

8.2 Exposure controls

Engineering measures

Provide natural or mechanical ventilation to prevent oxygen deficient atmospheres below 19.5% oxygen.

Personal protective equipment

Respiratory protection: Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmosphere. Air purifying respirators will not provide protection. Users of breathing apparatus must be trained.

Hand protection: Wear working gloves when handling gas containers. Standard EN 388 - Protective gloves against mechanical risk.

Eye/face Protection: Safety glasses recommended when handling cylinders. Standard EN 166 - Personal eye-protection.
Skin and body protection: Safety shoes are recommended when handling cylinders. Standard EN ISO 20345 - Personal protective equipment - Safety footwear.

Special instructions for protection and hygiene: Ensure adequate ventilation, especially in confined areas.

Environmental Exposure Controls: If applicable, refer to the extended section of the SDS for further information on CSA.

Remarks: Simple asphyxiant.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

(a/b) Physical state/Colour: Compressed gas. Colorless gas

(c) Odour: No odor warning properties.

(d) Density: 0.0017 g/cm³ (0.106 lb/ft³) Note: (as vapor)

(e) Relative Density: 2.2462 (water = 1)

(f) Melting point / freezing point: No data available.

(g) Boiling point/range: -173 °F (-114 °C)

(h) Vapor pressure: No data available.

(i) Water solubility: Not known, but considered to have low solubility.

(j) Partition coefficient (n-octanol/water): Not applicable.

(k) pH: Not applicable.

(l) Viscosity: Not applicable.

(m) Particle characteristics: No data available.

(n) Lower and upper explosion / flammability limits: No data available.

(o) Flash point: Not applicable.

(p) Autoignition temperature: No data available.

(q) Decomposition temperature: No data available.

9.2. Other information

Explosive properties: No data available.
Oxidizing properties : No data available.
Molecular Weight : 40.46 g/mol
Odor threshold : No data available.
Evaporation rate : Not applicable.
Flammability (solid, gas) : Refer to product classification in Section 2
Specific Volume : 0.5937 m³/kg (9.51 ft³/lb)
Relative vapor density : 1.4 (air = 1) Heavier than air.

SECTION 10: Stability and reactivity

10.1 Reactivity : Refer to possibility of hazardous reactions and/or incompatible materials sections.
10.2. Chemical stability : Stable under normal conditions.
10.3. Possibility of hazardous reactions : No data available.
10.4. Conditions to avoid : No data available.
10.5. Incompatible materials : No data available.
10.6 Hazardous decomposition products : No data available.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Likely routes of exposure

Effects on Eye : No adverse effect.
Effects on Skin : No adverse effect.
Inhalation Effects : Concentrations of 10% CO2 or more can produce unconsciousness or death. Unlike simple asphyxiants, carbon dioxide has the ability to cause death even when normal oxygen levels (20-21%) are maintained. Carbon Dioxide is physiologically active, affecting circulation and breathing. At concentrations between 2 and 10%, carbon dioxide can cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate. In high concentrations may cause asphyxiation.
Asphyxiation may bring about unconsciousness without warning and so rapidly that victim may be unable to protect themselves.

Ingestion Effects : Ingestion is not considered a potential route of exposure.


Acute toxicity

Acute Oral Toxicity : No data is available on the product itself.

Acute Inhalation Toxicity : Unlike simple asphyxiants, carbon dioxide has the ability to cause death even when normal oxygen levels (20-21%) are maintained. 5% CO2 has been found to act synergistically to increase the toxicity of certain other gases (CO, NO2). CO2 has been shown to enhance the production of carboxy- or met-hemoglobin by these gases possibly due to carbon dioxide’s stimulatory effects on the respiratory and circulatory systems.

Acute Dermal Toxicity : No data is available on the product itself.

Skin corrosion/irritation : No data available.

Serious eye damage/eye irritation : No data available.

Sensitization. : No data available.

Chronic toxicity or effects from long term exposures

Carcinogenicity : No data available.

Reproductive toxicity : No data is available on the product itself.

Germ cell mutagenicity : No data is available on the product itself.

Specific target organ systemic toxicity (single exposure) : No data available.

Specific target organ systemic toxicity (repeated exposure) : No data available.

Aspiration hazard : No data available.

SECTION 12: Ecological information
12.1 Toxicity

Aquatic toxicity: No data is available on the product itself.

Toxicity to fish - Components
Carbon dioxide LC50 (1 h) : 240 mg/l Species: Rainbow trout (Oncorhynchus mykiss).
Carbon dioxide LC50 (96 h) : 35 mg/l Species: Rainbow trout (Oncorhynchus mykiss).

Toxicity to other organisms: No data is available on the product itself.

12.2. Persistence and degradability

No data available.

12.3. Bioaccumulative potential

No data is available on the product itself.

12.4 Mobility in soil

No data available.

12.5 Results of PBT and vPvB assessment

If applicable, refer to the extended section of the SDS for further information on CSA.

12.6 Other adverse effects

When discharged in large quantities may contribute to the greenhouse effect.

Effect on the ozone layer
Ozone Depleting Potential: No data available.

Global Warming Potential: No data available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Contact supplier if guidance is required. Return unused product in original cylinder to supplier. Refer to the EIGA code of practice Doc. 30 "Disposal of Gases", downloadable at http://www.eiga.org for more guidance on suitable disposal methods. List of hazardous waste codes: 16 05 05: Gases in pressure containers other than those mentioned in 16 05 04.
Contaminated packaging : Return cylinder to supplier.

SECTION 14: Transport information

ADR

<table>
<thead>
<tr>
<th>UN/ID No.</th>
<th>UN1956</th>
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<tbody>
<tr>
<td>Proper shipping name</td>
<td>COMPRESSED GAS, N.O.S., (Argon, Carbon dioxide)</td>
</tr>
<tr>
<td>Class or Division</td>
<td>2</td>
</tr>
<tr>
<td>Tunnel Code</td>
<td>(E)</td>
</tr>
<tr>
<td>Label(s)</td>
<td>2.2</td>
</tr>
<tr>
<td>ADR/RID Hazard ID no.</td>
<td>20</td>
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<tr>
<td>Marine Pollutant</td>
<td>No</td>
</tr>
</tbody>
</table>

IATA

<table>
<thead>
<tr>
<th>UN/ID No.</th>
<th>UN1956</th>
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<tbody>
<tr>
<td>Proper shipping name</td>
<td>Compressed gas, n.o.s., (Argon, Carbon dioxide)</td>
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<td>Class or Division</td>
<td>2.2</td>
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<tr>
<td>Label(s)</td>
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<td>Marine Pollutant</td>
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IMDG

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<th>UN/ID No.</th>
<th>UN1956</th>
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<tr>
<td>Proper shipping name</td>
<td>COMPRESSED GAS, N.O.S., (Argon, Carbon dioxide)</td>
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<tr>
<td>Class or Division</td>
<td>2.2</td>
</tr>
<tr>
<td>Label(s)</td>
<td>2.2</td>
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<tr>
<td>Marine Pollutant</td>
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</table>

RID

<table>
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<th>UN/ID No.</th>
<th>UN1956</th>
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<tr>
<td>Proper shipping name</td>
<td>COMPRESSED GAS, N.O.S., (Argon, Carbon dioxide)</td>
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<tr>
<td>Class or Division</td>
<td>2</td>
</tr>
<tr>
<td>Label(s)</td>
<td>2.2</td>
</tr>
<tr>
<td>Marine Pollutant</td>
<td>No</td>
</tr>
</tbody>
</table>

Further Information
Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact an Air Products customer service representative.

SECTION 15: Regulatory information

<table>
<thead>
<tr>
<th>Country</th>
<th>Regulatory list</th>
<th>Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10/12</td>
</tr>
</tbody>
</table>

Air Products PLC

FERROMAXX 15
Other Regulations


15.2 Chemical safety assessment

If this product does not contain exposure scenarios, the components in this product are either exempt from REACH, do not meet the minimum volume threshold for a CSA, or the CSA has not yet been completed.

SECTION 16: Other information

Ensure all national/local regulations are observed.

Hazard Statements:
H270 May cause or intensify fire; oxidiser.
H280 Contains gas under pressure; may explode if heated.

Indication of Method:
Gases under pressure Compressed gas. Contains gas under pressure; may explode if heated. Calculation method

Abbreviations and acronyms:
ATE - Acute Toxicity Estimate
CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008