MATERIAL SAFETY DATA SHEET (MSDS)
LOW ALLOY FLUX CORED WIRE
Please ensure that this MSDS is received by the appropriate person

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Ref. No.: MS044

1 PRODUCT AND COMPANY IDENTIFICATION

Product Name FLUX CORED WIRE

Product Specifications AWS/ASME SFA 5.4

Product Classification & Brands: The following Afrox products are covered by this MSDS:

- COREMAX 81K2

Recommended use Flux cored welding (MIG Process)

Supplier Afrox

Company Identification African Oxygen Limited
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Johannesburg, 2001
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EMERGENCY NUMBER **0860111185 or (011) 873 4382 (24 hours)**

2. DETAILS OF COMPOSITION

This section covers the hazardous materials from which this product is manufactured. The fumes and gases produced during welding with normal use of this product are also addressed in Section 5. The terms "hazardous" in this section should be interpreted as a term required and defined in OSHA Hazard Communication Standard (29 CFR Part 1910.1200).

SECTION - Hazardous Components/Identity Information

Hazardous Components (specific Chemical Identity): Common Name (S)		% By Weight	TLV(mg/m3)
1.Titanium Dioxides	13463-67-7	5	10
2.Iron	7439-89-6	<4	10
3.Manganese	7439-96-5	<5	5
4.Silicon alloys	7440-21-3	<1	10
5.Mineral Silicates	1332-58-7	<1	5
6.Fluorides	7789-75-5	<0.5	2.5
7.Magnesium alloys	7439-95-4	<0.5	10
8.Aluminium oxide	1344-28-1	<0.5	10
9.Nickel	7440-02-0	1.5	1.5
10.Carbon Steel Tube	7439-89-6	85	10

R* - Respirable Fraction. I* - Inhalable Fraction. ** - Ceiling Limit. *** - Short Term Exposure Limit.

+ - As a nuisance particulate covered under "Particulates Not Otherwise Regulated" by OSHA or "Particulates Not Otherwise Classified" per ACGIH. ++ - Crystalline silica is bound within the product as it exists in the package. However, research indicates silica is present in welding fume in the amorphous (noncrystalline) form. # - Reportable material under Section 313 of SARA. ## - Reportable material under Section 313 of SARA only in fibrous form. ### - Reportable material under Section 313 of SARA as dust or fume. {A1} - Confirmed Human Carcinogen per ACGIH. {A2} - Suspected Human Carcinogen per ACGIH. {A3} - Confirmed Animal Carcinogen with Unknown Relevance to Humans per ACGIH.

{A4} - Not Classifiable as a Human Carcinogen per ACGIH. {A5} - Not Suspected as a Human Carcinogen per ACGIH .

◆ - Listed under ACGIH Notice of Intended Changes in 2007. ◆◆ - ACGIH TLV limits changes for Cu I* and Cu R* withdrawn.

◆◆◆ - ACGIH TLV withdrawn in 2007 and replaced with Particles – Not Otherwise Specified level of 3 mg/m^3. ◆◆◆◆◆ - ACGIH TLV for all Al products changed to 1 mg/m^3 in 2007. ◆◆◆◆◆◆ - ACGIH TLV for all Fe products combined into Fe_2O_3 TLV.

The exposure limit for welding fume has been established at 5mg/m^3 with OSHA's PEL and ACGIH's TLV. The individual complex compounds within the fume may have lower exposure limits than the general welding fume PEL/TLV. An Industrial Hygienist, the OSHA Permissible Exposure Limits For Air Contaminants (29 CFR 1910.1000), and the ACGIH Threshold Limit Values should be consulted to determine the specific fume constituents present and their respective exposure limits

3 HAZARDS IDENTIFICATION

Welding fumes and gases cannot be classified simply. The composition and quality of both are dependant upon the metal being welded, the
Process, procedure and electrode used. Most fume ingredients are present as complex oxides and compounds and not as pure metals.
Other conditions which also influence the composition and quality of the fumes and gases to which workers may be exposed include: coatings
On the metal being welded (such as paint, plating or galvanizing), the number of welders and the volume of the work area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities). When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 2. Decomposition products of normal operation include those originating from the volatilization, reaction or oxidation of the materials shown in Section 2, plus those from the base metal and coating, ect., as noted above. Reasonably expected constituents of the fume would include; Primarily complex iron oxides and fluorides. Secondarily complex oxides of calcium, manganese, aluminium, chromium, nickel, silicon, molybdenum, magnesium, and titanium. Monitor for the materials identified in section2. Fumes from the use of this product may contain fluorides, manganese, calcium oxide, chromium and nickel compounds, mica, and amorphous silica fume whose exposure limits are lower than the 5 mg/m3 PEL/TLV for general welding fume.

4 FIRST AID MEASURES

No first aid measures should be required for the unused consumables.

During welding

Inhalation

If breathing is difficult, bring the patient in fresh air; breathe in fresh air deeply.

For skin burns

Submerge affected area in cold water until burning sensation ceases and refer for immediate medical attention.

For eye effects such as arc eye and dusts

Irrigate eye with sterile water, cover with damp dressing and refer for immediate medical attention if irritation persists.

Ingestion

Ingestion is considered unlikely due to product form. However, if swallowed do not induce vomiting. Seek medical attention. Advice to doctor: treat symptomatically.

Electric shock

If necessary resuscitate and seek immediate medical attention.

5. FIRE FIGHTING MEASURES

No specific measures required for the welding consumable prior to welding.

During welding

Welding should not be carried out in the presence of flammable materials, vapours, tanks, cisterns and pipes and other containers which have held flammable substances unless these have been checked and certified safe.

6. ACCIDENTAL RELEASE MEASURES

No specific actions for welding consumable prior to use.

Welding in proximity to stored or used halogenated solvents may produce toxic and irritant gases. Prohibit welding in areas where these solvents are used.

7. HANDLING AND STORAGE

No special precautions are required for these welding consumables.

Welding wires are dense materials and can give rise to a handling hazard when multiple packages of the electrodes are lifted or handled incorrectly or with poor lifting posture.

Good practice for handling and storage should be adopted to prevent physical injuries.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Effects of Overexposure:

Arc Rays can injure eyes and burn skin. **Electric Shock** can kill. See Section7. **Fumes and Gases** can be dangerous to your health. **Primary Routes of Entry** as the respiratory system, eyes and / or skin.

Short Term (Acute) Overexposure Effects:

Welding Fumes May result in discomfort such as a dizziness, nausea or dryness of irritation of nose, throat or eyes. **Iron, Iron Dioxide** None are known. Treat as nuisance dust or fume. **Manganese** Metal fume fever characterized by chills, fever, upset stomach, vomiting, irritation of the throat and aching or body. Recovery is generally complete within 48 hours of the over exposure. **Aluminium Oxide** irritation of the respiratory system. **Calcium Oxide** Dust or fumes may cause irritation of the respiratory system, skin and eyes. **Mica** Dust may cause irritation to the respiratory system. **Silica (Amorphous)** Dust and fumes may cause irritation of the respiratory system, skin and eyes. **Titanium Dioxide** irritation of respiratory system. **Fluorides** Fluoride compounds evolved may cause skin and eye burns, pulmonary edema and bronchitis. **Chromium** Inhalation of fume with chromium (VI) compounds can cause irritation of the respiratory tract, lung damage and asthma-like symptoms. Swallowing chromium (VI) salts can cause severe injury or death. Dust on skin can form ulcers. Eyes may be burned by chromium (VI) compounds, Allergic reactions may occur in some people. **Nickel, Nickel Compounds** Metallic taste, nausea, tightness in the chest, metal fume fever, allergic reaction. **Molybdenum** Irritation of eyes, nose and throat. **Magnesium, Magnesium Oxide** Overexposure to the oxide may cause metal fume fever characterized by metallic taste, tightness of the chest and fever. Symptoms may last 24 to 48 hours following exposure.

Long Term (Chronic) Overexposure Effects:

Welding Fumes Excess levels may cause bronchial asthma, lung fibrosis, pneumoconiosis or "siderosis." **Iron, Iron Oxide Fumes** Can cause siderosis (deposits of iron in the lungs) which some researchers believe may effect pulmonary function. Lungs will clear in time when exposure to iron and its compounds cease. Iron and magnetite (Fe3o4) are regarded s fibrogenic materials. **Manganese** Long-term overexposure to manganese compounds may affect the central nervous system. Symptoms may be similar to Parkinson's disease and can include slowness, changes in handwriting, gait impairment, muscle spasms and cramps and less commonly, tremor and behavioral changes. Employees who are overexposed to manganese compounds should be seen by a physician for early detection of neurological problems. **Aluminium Oxide** Pulmonary fibrosis and emphysema. **Calcium Oxide** Prolonged overexposure may cause ulceration of the sin and perforation of the nasal septum, dermatitis and pneumonia. **Mica** Prolonged overexposure may cause searing of the lungs and pneumoconiosis characterized by cough, shortness of breath, weakness and weight loss. **Silica (Amorphous)** Research indicates that silica is present in welding fume in the amorphous form. Long term overexposure may cause pneumoconiosis. Nonerystalline forms of silica (amorphous silica) are considered to have little fibrotic potential. **Titanium Dioxide** Pulmonary irritation and slight fibrosis. **Chromium** Ulceration and perforation of nasal seprum. Respiratory irritation may occur with symptoms resembling asthma. Studies have shown that chromate production workers exposed to hexavalent chromium compounds have an excess of lung cancers. Chromium (VI) compounds are more readily absorbed through the skin than chromium (III) compounds. Good practice requires the reduction of employee exposure to chromium (III) and (VI) compounds. **Nickel, Nickel Compounds** Lung fibrosis or pneumoconiosis. Studies of nickel refinery workers indicated a higher incidence of lung and nasal cancers. **Molybdenum** Prolonged overexposure may result in loss of appetite, weight loss, loss of muscle coordination, difficulty in breathing and anemia. **Magnesium, Magnesium Oxide** No adverse long term health effects have been reported in the literature.

Medical conditions aggravated by exposure:

Persons with pre-existing impaired lung functions (asthma-like conditions).

Emergency and first aid procedures:

Call for medical aid. Employ first aid techniques recommended by the American Red Cross. Eyes and Skin: If irritation or flash burns develop after exposure, consult a physician.

Carcinogenicity:

Chromium VI and nickel compounds must be considered as carcinogens under OSHA (29 CFR 1910.1200). Chromium VI compounds are classified as IARC Group 1 and NTP Group 1 carcinogens. Nickel compounds are classified as IARC Group 1 and NTP Group 2 carcinogens. Welding fumes must be considered as possible carcinogens under OSHA (29 CFR 1910.1200).

California proposition 65:

For Group B and C products: WARNING: This product contains of produces a chemical known to the state of California to cause cancer and birth defects (or other reproductive harm). (California Health & Safety Code Section 25249.5 et. Seq.) For Group B and C products: WARNING: This product, when used for welding of cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and , in some cases cancer. (California Health & Safety Code Section 25249.5 et seq

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Protection of Body and Skin

Suitable clothes for welding should be worn such as non light reflective fireproof overalls, leather apron, welding helmet, leather boots spats and gloves

Protection of Hands

Welders should wear suitable hand protection such a welding gloves or gauntlets of a suitable standard. Co-worker should also wear suitable hand protection against hot metal, sparks and spatter.

Eye Protection

Welders should wear a welding helmet fitted with the appropriate optical welding filter for the operation. Suitable protective welding screens and goggles should be provided, and used by others working in the same area.

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9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	**Solid**
Colour	**Generally greyish but other colours may be present**
Form	**Metal wire with flux coating**
Odour	**Odourless**
pH	**Not available**
Vapour Pressure	**Not relevant**
Vapour Density	**Not relevant**
Boiling point/range	**Not relevant**
Melting point	**~1500°C**
Solubility in water	**Insoluble**
Density	**Not available**
Explosive/ignition point	**Non Flammable. No fire/explosion hazards exists**

10 STABILITY AND REACTIVITY

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc. One recommended way to determine the composition and quality of fumes and gases to which workers are exposed is to take an air sample inside the welder's helmet if worn or in the worker's breathing zone. (See ANSI/AWS F1.1, available from the "American Welding Society" , P.O. Box 351040, Miami, FL 33135. Also, from AWS is F1.3 "Evaluating Contaminants in the Welding environment A Sampling Strategy Guide", which gives additional advice on sampling.)

11 TOXICOLOGICAL INFORMATION

Welding fumes if inhaled can potentially produce several differing health effects caused by the metal containing particles and the gases produced during the welding process, both of which are present in the 'fumes'. The exact nature of any likely health effect is dependent on the consumable, material being welded, weld process, all of which affect fume quantity and composition, as well as the use of adequate ventilation, respirators, or breathing equipment as circumstances require.

Inhalation of the fumes/gases produced during welding may lead to irritation to the nose throat and eyes. The range of health effects include respiratory effects with symptoms such as asthma, impaired respiratory and lung function, chronic bronchitis, metal fume fever, pneumoconiosis, possible emphysema and acute pulmonary oedema. Other potential health effects at elevated levels of exposure include central nervous effects possible lung cancer, bone disease, skin and

fertility effects. Which of these health effects is potentially likely is related to the fume composition, and this needs to be consulted with the specific toxicity data below to assess the health risk when using any particular welding process.
Unprotected skin exposed to UV and IR radiation from the welding arc may burn or redden, and UV radiation is potentially a carcinogen. UV radiation can affect the unprotected eye by producing an acute condition known as 'arc eye'.
Specific effects relevant to major particulate and gaseous fume constituents produced when welding with these electrodes

Iron

One of the main components of fume generated by welding stainless steels is iron oxide. Iron oxide is generally considered a nuisance material and unlikely to cause any significant health effects. The fume particles however accumulate in the lungs and lead to a benign pneumoconiosis called siderosis.

Manganese

Manganese compounds are also found in stainless steel welding fumes. Manganese is mainly a systemic chronic toxin, although exposure to high particulate concentrations can cause some respiratory irritation.
Overexposure or inhalation of excessive amounts of manganese has been shown to affect pulmonary function, blood and may cause irreversible central nervous system damage (manganism) which resembles Parkinsons disease. Symptoms of manganism include tremors, impaired speech, facial expression changes, and slow clumsy movements and eventually impaired walking. The symptoms are typically not apparent for several years.

Fluorides

The main source of fluorides is from the flux coatings on some stainless steel electrodes, and this produces mainly fluoride particulate fume. Fluorides are respiratory irritants and if absorbed through inhalation can lead to bone disease known as fluorosis.

Silica

Silica is found in welding fumes produced by fluxes and flux coatings and is produced mainly as amorphous silica. This form of silica has not been associated to any significant degree with lung pneumoconiosis which is associated with crystalline forms of silica.

Rutile sand
Mainly present as Titanium dioxide which is a respiratory irritant but in effect mainly a nuisance material of low toxicity.

Chromium
Chromium can exist in differing forms in welding fumes and this can determine the potential health effects. Chromium can produce respiratory effects such as nasal ulceration and possible lung cancer. It can also cause contact skin dermatitis.
The most toxic form of chromium is hexavalent chromium (Cr6+) which is classified as a human carcinogen. The other main form of chromium found in welding fumes (Cr3+) is considerably less toxic and is not classified as a carcinogen. Both types of chromium are found in the fume from this product.

Nickel
The main health effects of nickel are skin dermatitis (nickel 'itch') and it being classified as a potential human lung carcinogen. It may also cause nasal cancer. Similar to chromium, nickel exists in the fume produced from stainless steel welding.

Molybdenum
Molybdenum is of low toxicity, and no specific health effects would be expected from exposure to it in welding fume.

Copper
Copper is one of the main causes of any metal fume fever observed during welding. Metal fume fever is a delayed respiratory effect produced by inhalation of fume. Symptoms include sweating, chills, fever, muscle aches and high temperature. These acute symptoms normally alleviate within 24-48 hours.

Ozone and Nitrogen oxides
These gases are formed due to interactions of the arc with the surrounding air of the welding arc .Both gases can produce eye, respiratory and lung irritation and also can produce longer term lung effects such as decreased lung capacity, chronic bronchitis, and emphysema. Of particular concern with both gases is that exposure to high levels (egg due to build up in confined spaces) can result in acute lung effects such as delayed pulmonary oedema.

Carbon monoxide and carbon dioxide
Carbon monoxide (CO) is a chemical asphyxiant and its toxicity is due to its affinity for oxygen carrying blood haemoglobin causing fatigue, weakness, dizziness and eventual unconsciousness and possible death. Carbon dioxide (CO2) is mainly an asphyxiant but can exert some toxic properties by increasing pulse and heart rate. These gases are mainly formed through decomposition of some electrodes' components (cellulose and carbonates).

11 ECOLOGICAL INFORMATION

The welding process produces particulate fumes and gases which may cause long term adverse effects in the environment if released directly into the atmosphere. Welding fumes from electrodes covered by this data sheet can produce carbon dioxide gas, which is dangerous to the ozone layer.

13 DISPOSAL CONSIDERATIONS

Packaging, stub ends and slag residue should be disposed of as general waste or recycled.
No special precautions are required for this product.

14 TRANSPORT INFORMATION

No special requirements are necessary in transporting these products

15 REGULATORY INFORMATION

- OHSAct No 85 0f 1993 General Safety Regulations 9.
- SABS 0238 (SANS 10238) Welding and Thermal Cutting Processes – Health and Safety

16 OTHER INFORMATION

The customer should provide this Materials Safety Data Sheet to any person involved in the materials use or further distribution. Afrox requests the users (or distributors) of this product to read this Materials Safety Data Sheet carefully before usage. Further information can be obtained from the American National Standard Z49.1 Safety in Welding and Cutting.
The information contained in this Material Safety Data Sheet relates only to the specific materials designated and may not be valid for such material used in combination with any other material or in any process.
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