

SAFETY DATA SHEET (SDS)

Carbon steel flux cored welding wire

Please ensure that this SDS is received by the appropriate persons



Review Date: 28/08/2023 v01

Emergency: 0860 02 02 02

Document Number: AFX-SDS-0088

1. PRODUCT AND COMPANY IDENTIFICATION	
Product Synonym	CARBON STEELWIRE FLUX CORED WIRE
Product Specification	AWS/ASME SFA 5.20
Product Classification and Brands & Product Code	The following Afrox flux cored wires are covered by this SDS: W081229 COREMAX 71 PLUS 1.0MM 15KG SPOOL W081230 COREMAX 71 PLUS 1.2MM 15KG SPOOL
Recommended use:	Flux Cored Arc Welding (FCAW) of Carbon steel
Company Identification	African Oxygen Limited Grayston Office Park, Building 7 128 Peter Road Sandown, Sandton, 2196 Tel. No: (011) 490-0400 Fax No: (011) 490-0530 Email: customer.service@afrox.linde.com www.afrox.com
Emergency Numbers	0860 02 02 02 (Afox)

2. HAZARD IDENTIFICATION	
Classification	Classification under South African Hazardous Chemical Substances Regulations subsequently amended. (HCS) Classification under the Globally Harmonized System of classification and labelling of chemicals (GHS)
<p>There are no recognised hazards associated directly with unused welding consumables prior to welding. Packaged consumables may be heavy and should be handled and stored with care. Follow manual handling regulations. Wire wound on reels or spools or supplied in bulk packages can be coiled under tension. Take care to avoid the wire uncoiling rapidly when released. Wear gloves and eye protection. When using these consumables as part of the welding process additional potential hazards are likely:</p> <p>Electric shock from the welding equipment or electrode. This can be fatal. Hot metal spatter and heat from the electric arc and the welding flame, which can cause burns to the hand and body, and may cause fire if in contact with combustible materials. UV, IR and light radiation from the arc, which can produce 'arc eye' and possible eye damage to unprotected eyes. Wear suitable protective equipment. Fumes produced from the welding consumable, material being welded, the arc radiation and the welding flame:</p> <ul style="list-style-type: none"> Particulate fume such as complex metal oxides and silicates from the weld materials. 	

<ul style="list-style-type: none"> Gaseous fume such as ozone and nitrogen oxides from the action of arc radiation on the atmosphere, and carbon monoxide and dioxide from oxidation of carbon in the components, and from the flame combustion products. Short term inhalation of these fumes and gases may lead to irritation of the nose, throat and eyes. Long term overexposure or inhalation of high levels of fumes may result in harmful effects to the respiratory system, central nervous system and lungs. Local extraction and /or ventilation should be used to ensure that all hazardous ingredients in the fume are kept below their individual occupational exposure standards in the welder's and other workers' breathing zones. <p>NOTE: If welding is performed on plated or coated materials such as galvanised steel, excessive fume may be produced which contains additional hazardous components, and may result in metal fume fever and other health effects.</p>	
Emergency Overview	Colour: silver metal Odour: None Taste: None Physical State: metal solid Form: wire
Adverse Health Effects	Welding fumes will cause irritation
Chemical Hazards	None
Biological Hazards	None
Vapour Inhalation	Welding fumes will cause irritation
GHS Classification (for preparation components)	Specific target organ toxicity — Repeated exposure - Hazard category 1 Skin corrosion/irritation - Hazard category 2 Eye damage/eye irritation - Hazard category 2A Flammable solids - Hazard category 1 Self-heating substances and mixtures - Hazard category 1 Substances and mixtures that, on contact with water, emit flammable gases - Hazard category 2 Skin corrosion/irritation - Hazard category 1B Eye damage/eye irritation - Hazard category 1 Specific target organ toxicity — Single exposure - Hazard category 3
GHS Pictogram (for preparation components)	 


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GHS Signal Words		Danger (for preparation components)		
GHS Hazard Statements		Electrodes and wire Not classified as a hazard		
The substances in the preparation are as follows:				
Name of the substance	Range of concentration	CAS	Hazard class	Hazard statements
Iron	88-95%	7439-89-6	-	-
Calcium fluoride	1 - 5 %	7789-75-5	STOT RE 1	H372
Strontium fluoride	1 - 5 %	7783-48-4	Skin Irrit. 2 Eye Irrit. 2	H315 H319
Aluminium	2 - 4 %	7429-90-5	-	-
Magnesium	0.5 - 2.0 %	7439-95-4	Flam. Sol. 1 Self-heat. 1 Water-react. 2	H228 H252 H261
Manganese	0.5 - 1.5 %	7439-96-5	-	-
Silicon	< 1 %	7440-21-3	-	-
Potassium silicate	< 1 %	1312-76-1	Skin Corr. 1B Eye Dam. 1 STOT SE 3	H314 H318 H335

GHS Precautionary Statements
(for preparation components)

Prevention:

P210 : Keep away from heat/sparks/open flames/hot surfaces. No smoking
P223 : Do not allow contact with water
P231 + P232 : Handle under inert gas. Protect from moisture
P241 : Use explosion-proof electrical/ventilating/lighting/equipment
P260: Do not breathe dust/fume/mist/vapours
P261: Avoid breathing dust/fume/vapours
P264: Wash exposed skin thoroughly after handling
P270: Do not eat, drink or smoke when using this product
P271: Use only outdoors or in a well-ventilated area
P280: Wear protective gloves/eye protection/face protection
P235 + P410 : Keep cool. Protect from sunligh
Response:
P314: Get medical advice/attention if you feel unwell

P302 + P352: IF ON SKIN: Wash with plenty water
P332 + P313 : If skin irritation occurs: Get medical advice/attention
P362 + P364 : Take off contaminated clothing and wash it before reuse
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 + P313 : If eye irritation persists: Get medical advice/attention
P370 + P378: In case of fire: Use CO2 to extinguish
P335 + P334 : Brush off loose particles from skin and immerse in cool water/wrap in wet bandages
P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P303 + P361 + P353 : IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
P363 : Wash contaminated clothing before reuse
P304 + P340 : IF INHALED: Remove person to fresh air and keep comfortable for breathing
P310 : Immediately call a POISON CENTRE/doctor/ for emergency medical advice
P321 : Specific treatment (see section4: first aid measures on this label)
P305 + P351 + P338 : IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P312 : Call a POISON CENTRE/doctor if you feel unwell
Storage:
P407 : Maintain air gap between stacks / pallets
P420 : Store away from other materials
P402 + P404 : Store in a dry place. Store in a closed container
P405: Store locked up
P403 + P233 : Store in a well-ventilated place. Keep container tightly closed
Disposal:
P501:Dispose of contents/container in accordance

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Other Hazards that do not result in classification	<p>with local/regional/national/international regulations</p> <p>Heat: spatter and melting metal can cause burn injuries. Radiation: UV, IR radiations. Arc ray can severely damage eyes or skin. Fumes: formation of dangerous fumes during use. Inhalation of welding fumes may cause respiratory irritation. Cough. Excessive or prolonged inhalation of fumes may cause metal fume fever. Electricity: electric shocks can kill. Magnetic fields: persons with a pacemaker should not go near welding or cutting operations until they have consulted their doctor and obtained information from the manufacturer of the device. Noise: Noises generated by welding equipment could damage auditory system</p>
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3. COMPOSITION OF INGREDIENTS

These wires and rods are made from solid Carbon steel alloys, either continuously wound on reels, spools or in bulk packs, or supplied in straight cut lengths. The composition of the alloys varies depending on the classification.
Details of the contents of the wire and rod consumables covered by this data sheet are given below.

Chemical name	Carbon steelwire flux cored wire
Chemical family	
CAS No	Not available
UN No	Not available
ERG No	Not available
Hazard class	Not applicable
Hazchem Warning	Not applicable

TABLE 1: APPROXIMATE COMPOSITION OF CONSUMABLES (WT %)

HAZARDOUS COMPONENTS	%WEIGHT	CAS NO.
Iron	95-98	7439-89-6
Manganese	<6	7439-96-5
Titanium Dioxide	<6	13463-67-7
Silicon+	<2	7440-21-3
Fluorspar	<1	7789-75-5
Calcium Carbonate	<2	1317-65-3
Aluminum###	<1	7429-90-5
Silica++	<1	14808-60-7
Copper#	<1	7440-50-8

4. FIRST AID MEASURES

Eye contact	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
Skin Contact	Skin contact with hot metal: Flush with plenty of water. Seek medical advice. Seek medical attention if burns develop. Take off immediately all contaminated clothing
Ingestion	Ingestion is considered unlikely due to product form.
Inhalation	Welding fumes-If breathing is difficult, bring the patient in fresh air; breathe in fresh air deeply. Submerge affected area in cold water until burning sensation ceases and refer for immediate medical attention
Electric shock	If necessary, resuscitate and seek immediate medical attention.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	Material will not burn. In case of fire in the surroundings: use appropriate extinguishing agent. Powder, Carbon dioxide
Unsuitable extinguishing media	Water
Specific Hazards	The product for arc welding process is not flammable
Special fire fighting procedures:	Do not enter fire area without proper protective equipment, including respiratory protection
Special protective equipment for firefighters	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces a self-contained breathing apparatus

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:	No specific measures required for the welding consumable prior to 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
Measures in case of unintentional release	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
Environmental Precautions	No environmental hazard known

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Methods and material for containment and cleaning up:	Solid product: collect with mechanical equipment's, sweep or shovel into suitable containers
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7. HANDLING AND STORAGE

Safe Handling	No specific requirements in the form supplied. Handle with care to avoid cuts. Wear gloves when handling welding consumables. Avoid exposure to dust. Do not ingest. Some individuals can develop an allergic reaction to certain materials. Retain all warning and product labels
Conditions for safe storage, including any incompatibilities	Keep dry Avoid the contact with chemical substances like acids or bases High-density solid product. Avoid storage in unstable positions Keep separate from acids and strong bases to prevent possible chemical reactions

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Occupational Exposure Hazards (HCS)		
Substance	CAS	OEL 8Hour - TWA
Fe oxides (powder and fumes as Fe)	1309-37-1	10 mg/m ³
Manganese and inorganic compounds (as Mn)	7439-96-5	0.2 mg/m ³
Manganese, fume or respirable dust	7439-96-5	0.2 mg/m ³
Silicon oxides (as Si fumes)	69012-64-1	-
Particles not otherwise classified (PNOC)		5 mg/m ³
Ozone (light work)	10028-15-6	0.2 ppm
Fluorides (inorganic as F)	16984-48-8	5 mg/m ³
Aluminum metal and insoluble compounds	7429-90-5	2 mg/m ³
Magnesium oxide, fume	1309-48-4	10 mg/m ³

General	Welders should not touch live electrical parts, and should insulate themselves from the work and the ground. Welders should not touch hot parts of the consumable, the torch assembly or the components being welded, and should avoid contact with the welding flame. Manufacturer's guidelines for the use of electrical welding machines, gas cylinders,
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	<p>gas control equipment and gas welding equipment should be observed at all times.</p> <p>Welders and co-workers should be educated about the health hazards associated with welding fume, and trained to keep their heads out of the fume plume.</p> <p>During welding, fumes and gases will be produced and emitted from the welding process. The content of the fume is dependent on the wire or rod type, shielding gas (if used) and base material being welded. The amount and concentration of fume generated is dependent on factors such as current, voltage (when electric arc welding), gas flow settings, flame size and type (when gas welding), welding practices and number of welders in a given area. By following recommended welding practices, fume production can sometimes be minimised.</p> <p>For the solid Carbon steelwires and rods covered by this data sheet, the main constituents of the fume will be Iron, manganese, magnesium and copper oxides and silicates, mainly in the form of complex compounds. There will also be smaller amounts of other complex metal oxides and silicates.</p> <p>Gaseous ozone and nitrous oxides are also formed by arc radiation, and carbon monoxide and carbon dioxide can also be present due to oxidation of carbon in the components, and from the flame combustion products. In some cases ozone levels can be high, and additional controls may be needed.</p> <p>Fume Composition data for the main solid Carbon steelwires and rods are given below. Fume exposure should be controlled to below the recognised exposure limit for each of the individual constituents, and to below 5 mg/m³ for the total particulate fume</p>
Engineering Control Measures	<p>Use enough ventilation, local exhaust at the arc or both to keep the fumes and gases below the PEL/TLV/OELs in the worker's breathing zone and the general area. Train the welder to keep his head out of the fumes</p> <p>A Risk assessment should be conducted to evaluate the suitability of PPE to the task being performed</p>
Personal Protection	Welders and co-workers in the vicinity should wear protective clothing and eye protection appropriate to the welding process being used, as specified by local standards.
Eyes	As appropriate for the welding process being used, welders should wear a welding helmet

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	or welding goggles fitted with the correct optical welding filter for the operation. Suitable protective welding screens and goggles should be provided, and used by others working in the same area.
Hands	Welders should wear suitable hand protection such a welding gloves or gauntlets of a suitable standard. Co-workers should also wear suitable hand protection against hot metal, sparks and spatter.
Body protection:	Suitable clothes for welding should be worn such as non light reflective fireproof overalls, leather apron, welding helmet (for arc welding), suitable head protection and welding goggles (for gas welding), leather boots spats and gloves.
Feet	Wear safety shoes while handling containers

**TABLE 2:
FUME COMPOSITION DATA (WT%)**

Classification	Al	Fe	Mn	Cr	Cu	Mg	Zn
	1.8	11.9-54.9	8.2	0.1	0.1	5.3	3.5

9. PHYSICAL AND CHEMICAL PROPERTIES

Chemical Name	Carbon Steel
Chemical Symbol	Fe
Physical state	Cored wire
Form:	Metal wire or rods
Colour:	Generally white metallic or light grey
Odour:	Odourless
Odour Threshold:	Not applicable
pH:	Not available
Melting Point:	~1500°C
Boiling Point:	Not relevant
Sublimation Point:	Not relevant
Critical Temp. (°C):	Not applicable
Flash Point:	Not applicable
Evaporation Rate:	Not applicable.
Flammability (gas):	Non-Flammable
Flammability limit - upper (%):	Not applicable
Flammability limit - lower(%):	Not applicable
Vapour pressure:	Not relevant
Vapour density (air=1)	Not relevant
Relative density:	-7 °C
Solubility in Water:	No data available
Partition coefficient (n-octanol/water):	Not applicable
Autoignition Temperature:	Not applicable
Decomposition Temperature:	Not applicable
Viscosity	
Kinematic viscosity:	No data available
Dynamic viscosity:	Not applicable

Explosive properties:	Non-flammable. No fire or explosion hazard exists
Oxidising Properties:	Not applicable
Density:	Not available
Molecular weight	Not available

10. STABILITY AND REACTIVITY

Reactivity & Stability	There are no stability or reactivity hazards from welding wires or rods as supplied
Chemical stability	Stable under normal conditions (< 300°C)
Possibility of hazardous reactions	Contact with acids or strong bases may cause generation of gas
Conditions to avoid	None under normal conditions
Incompatible Materials	Contact with chemical substances like acids or bases, this product could cause generation of gas
Hazardous Decomposition of Products	Metal dust and oxides of nitrogen Formation of dangerous fumes during use. Welding fumes are classified carcinogen by the IARC (International Agency for Research on Cancer): Group 2B Cancer suspected agent. The amount of fumes generated change with the welding parameters and the diameters of the consumable; it could be develop from the reaction of oxidation of the components listed in section 3 or included in the base material

11. TOXOLOGICAL 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

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effects relevant to major particulate and gaseous fume constituents produced when welding with these wires and rods

Aluminium

Aluminium has been associated with a type of lung pneumoconiosis named 'Shavers disease' and a possible causative agent of Alzheimer's disease. In both cases any association with this and welding fume exposure is unproven.

Iron

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 found in aluminium alloy 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 Parkinson's disease. Symptoms of manganism include tremors, impaired speech, facial expression changes, slow clumsy movements and eventually impaired walking. The symptoms are typically not apparent for several years.

Silica

Silica is found in welding fumes produced by aluminium alloy wires and rods 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

Chromium

Chromium can exist in differing forms in welding fume 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 can be found in the fume from some of these wires and rods.

Copper and Zinc

Copper and zinc in welding fume is the main cause 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

In electric arc welding, these gases are formed due to interactions of the arc with the surrounding air. 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 (eg 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. During the normal uses of these wires and rods, these gases can be produced by oxidation of carbon in the components and from the flame combustion products.

11. TOXOLOGICAL INFORMATION

Acute Toxicity	Not classified
Skin & eye contact	Not classified
Chronic Toxicity	Not classified
Carcinogenicity	Chromium VI compounds, nickel compounds and silica (crystalline quartz) are classified as IARC Group 1 and NTP Group Kcarcinogens. Titanium dioxide, antimony trioxide compounds and cobalt compounds are classified as IARC Group 2B carcinogens. Chromium VI compounds, cobalt compounds, nickel compounds, silica (crystalline quartz) and welding fumes must be considered as carcinogens under OSHA (29 CFR 1910.1200)
Mutagenicity	Not classified
Reproductive Hazards	Not classified

12. ECOLOGICAL INFORMATION

Toxicity	The flux cored wire, in massive form, don't present hazards to the environment. Avoid the condition that can lead to their corrosion and the release of the metals in the environment
Persistence and degradability	The product is readily biodegradable
Bioaccumulative Potential Product	Product is not expected to bio-accumulate
Mobility in soil	The product is poorly absorbed onto soils or sediments. If released to water the product will float
Results of PBT and vPvB assessment	No data
Other adverse effects	The product is rated as non-hazardous to aquatic species
Effect on ozone layer	No data
Effect on the global warming (CO2=1)	No data

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13. DISPOSAL CONSIDERATIONS

Disposal Methods	Discard any product, residue, packaging, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state and local regulations
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14. TRANSPORT INFORMATION

Road Transportation

UN No.	Not available
Shipping Name	Carbon steelWire Electrode & Rods
ERG No.	Not specified
Class	Not specified
Subsidiary Risk	Not available
Hazchem Warning	Not available

Sea Transportation

IMDG	Not available
Shipping Name	Carbon steelWire Electrode & Rods
ERG No.	Not specified
Class	Not specified
Subsidiary Risk	Not specified
Label	Not specified

Air Transportation

ICAO/IATA Code	Not available
Class	Not specified
Packing Group:	Not specified
Packaging instructions	Cargo: not specified Passenger: not specified

15. REGULATORY INFORMATION

National legislation OHSact and Regulations 85 of 1993.

SANS 11014:2010 Edition 1	Safety data sheet for chemical products - Content and order of sections
SANS 10228:2012 Edition 6	The identification and classification of dangerous goods for transport by road and rail modes
SANS 10234:2019 Edition 2	Globally Harmonized System of classification and labelling of chemicals (GHS)
SUPPLEMENT TO SANS 10234 Edition 1	List of classification and labelling of chemicals in accordance with the Globally Harmonized System (GHS)
SABS 0238 (SANS 1238)	Welding and Thermal Cutting Process

16. OTHER INFORMATION

- Ensure all national/local regulations are observed.
- Ensure users and relevant persons understand the asphyxiation hazard
- Regularly check supplier's information sources for updated versions of SDS's

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Bibliography

Compressed Gas Association, Arlington, Virginia

Handbook of Compressed Gases - 3rd Edition
 Matheson Gas Data Book - 6th Edition
 SANS 11014 - Safety data sheet for chemical products:
 Content and order of sections
 SANS 10234 - List of classification and labelling of chemicals in accordance with the Globally Harmonized System (GHS)
 SANS 10265 – Classification and Labelling of Dangerous Substances

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