



SAFETY DATA SHEET

OSHA HAZCOM STANDARD 29 CFR 1910.1200(G) AND GHS REV 03.

Welder's First Choice

ISSUE DATE 12/23/2019

REVIEWED ON 12/23/2019

SECTION – 1 IDENTIFICATION

- **Product Identifier**
- **Trade Name:** : Low-Alloy Steel Electrodes and Rods for Gas Shielded arc welding
- **Product Number:**
Specification: A5.28
Classification: E100C-K3, E110C-K4, E90C-D2, ER100S-1, ER100S-G, ER110S-1, ER120S-1, ER70S- A1, ER70S-B2L, ER80S-B2, ER80S-B3L, ER80S-B6, ER80S-B8, ER80S-D2, ER80S-G, ER80S-Ni1, ER80S- Ni2, ER80S-Ni3, ER90S-B3, ER90S-B9, ER90S-D2,ER90S-G
Low-alloy steel electrodes and rods for gas shielded arc welding.
- **Relevant identified uses of the substance or mixture and uses advised against:**
For professional use only. Use according to manufacturer's specification.
- **Product Description:** Low-alloy steel electrodes and rods for gas shielded arc welding.
- **Application of the substance/the mixture :** Industry specific application.
- **Details of the Supplier of the Safety Data Sheet:**
- **Manufacturer/Supplier:**
ROYALE WELDWELL PVT LTD
No.02, Uthiramerur Road, Malaipalayam Post, Maduranthagam, Chengelpet, Dist. Tamilnadu-603303 (INDIA)
- **Telephone:**+91-9840441459
- **Emergency telephone number:** +91-9840441459

SECTION – 2 HAZARD(S) IDENTIFICATION

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



Health hazard

- | | | |
|------------------|-------------|---|
| Carc. 1A | H350 | May cause cancer. |
| STOT RE 1 | H372 | Causes damage to organs through prolonged or repeated exposure. |



Corrosion

- | | | |
|-------------------|-------------|--------------------------------|
| Eye Dam. 1 | H318 | Causes serious eye irritation. |
|-------------------|-------------|--------------------------------|



- | | | |
|----------------------|-------------|--------------------------------------|
| Skin Irrit. 2 | H315 | Causes skin irritation. |
| Skin Sens. 1 | H317 | May cause an allergic skin reaction. |
| STOT SE 3 | H335 | May cause respiratory irritation. |

- **Label elements:**
- **Hazard pictograms:**



- **Signal word: Danger**
- **Hazard-determining components of labeling:**
 - Iron
 - Titanium Dioxide
 - Nickel
 - Cobalt
 - Titanium



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TRADE NAME: LOW-ALLOY STEEL ELECTRODES AND RODS FOR GAS SHIELDED ARC WELDING

- **Hazard statements:**

- H315** Causes skin irritation.
- H319** Causes serious eye irritation.
- H334** May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- H317** May cause an allergic skin reaction.
- H350** May cause cancer.
- H335** May cause respiratory irritation.
- H372** Causes damage to organs through prolonged or repeated exposure.

- **Precautionary statements:**

- P201** Obtain special instructions before use.
- P202** Do not handle until all safety precautions have been read and understood.
- P260** Do not breathe dust/fume/gas/mist/vapors/spray.
- P264** Wash thoroughly after handling.
- P270** Do not eat, drink or smoke when using this product.
- P271** Use only outdoors or in a well-ventilated area.
- P272** Contaminated work clothing must not be allowed out of the workplace.
- P280** Wear protective gloves/protective clothing/eye protection/face protection.
- P302+P352** If on skin: Wash with plenty of water.
- P304+P312** IF INHALED: Call a POISON CENTER/doctor if you feel unwell.
- P304+P340** IF INHALED: Remove person to fresh air and keep comfortable for breathing.
- P305+P351+P338** If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P308+P313** IF exposed or concerned: Get medical advice/attention.
- P321** Specific treatment (see supplementary first aid instructions on this Safety Data Sheet).
- P362+P364** Take off contaminated clothing and wash it before reuse.
- P333+P313** If skin irritation or rash occurs: Get medical advice/attention.
- P337+P313** If eye irritation persists: Get medical advice/attention.
- P342+P311** If experiencing respiratory symptoms: Call a poison center/doctor.
- P363** Wash contaminated clothing before reuse.
- P403+P233** Store in a well-ventilated place. Keep container tightly closed.
- P405** Store locked up.
- P501** Dispose of contents/container in accordance with local/regional/national/international regulations.

- **Unknown acute toxicity:**

This value refers to knowledge of known, established toxicological or ecotoxicological values. 23 % of the mixture consists of component(s) of unknown toxicity.

- **Hazard description:**

Lithium may explode when in contact with water. Exposure to moist air may result in fire. Lithium can react with water to produce flammable hydrogen gas, which may create a fire and explosion hazard. Spontaneous ignition can occur if Lithium is heated to its melting point. Lithium dusts may ignite spontaneously in moist air. Lithium can react with moisture to produce corrosive compounds. NEVER purge open drums with nitrogen before resealing. Store and transport under argon or mineral oil.

- **Classification system:**

NFPA/HMIS Definitions: 0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme

- **NFPA ratings (scale 0 - 4)**



Health = 2
Fire = 0
Reactivity = 0



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• **HMIS-ratings (scale 0 - 4)**

HEALTH	*2
FIRE	0
REACTIVITY	0

Health= *2
Fire = 0
Physical Hazard= 0

• **Hazard(s) not otherwise classified (HNOC):** None known

SECTION -3 COMPOSITION/INFORMATION ON INGREDIENTS

• **Non-hazardous components:**

1317-61-9	Iron Oxide	0-12%
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• **Chemical characterization: Mixtures**

• **Description: Mixture of substances listed below with non-hazardous additions.**

• **Dangerous Components:**

CAS: 7439-89-6 RTECS: NO 4565500	Iron Flam. Sol. 2, H228; Skin Irrit.2, H315; STOT SE 3, H335; Eye Irrit. 2B, H320; Combustible Dust	70-98%
CAS: 7440-47-3 RTECS: GB 4200000	Chromium	0-11%
CAS: 7440-39-3 RTECS: CQ 8370000	Barium Water-react. 2, H261	0-10%
CAS: 13463-67-7	Titanium Dioxide Carc. 2, H351	0-10%
CAS: 7429-90-5 RTECS: BD 0330000	Lithium Water-react. 1, H260; Skin Corr. 1B, H314	0-9%
CAS: 7429-90-5 RTECS: BD 0330000	Aluminium Flam. Sol. 2, H228	0-5%
CAS: 7439-96-5 RTECS: OO 9275000	Manganese Pyr. Sol. 1, H250; Water-react. 1, H260	0-4%
CAS: 7440-02-0	Nickel Carc. 2, H351;STOT RE 1, H372; Skin Sens. 1, H317	0-4%
CAS: 1317-95-9	Silica Carc. 1A, H350; STOT SE 3, H335	0-3%
CAS: 7440-21-3	Silicon Flam. Sol.2, H228; Acute Tox.4, H302; Eye Irrit. 2B,H320; Combustible Dust	0-4%
CAS: 7439-95-4 RTECS: OM 2100000	Magnesium Pyr. Sol. 1, H250; Water-react. 1, H260	0-3%
CAS: 1344-28-1 RTECS: BD 1200000	Aluminium Oxide STOT SE 3, H335	0-1%



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CAS: 7439-98-7 RTECS: QA 4680000	Molybdenum	0-2%
CAS: 7440-50-8 RTECS: GL 5325000	Copper ----- Flam. Sol.1, H228; STOT SE 3, H335; Aquatic Acute 3, H402; Aquatic Chronic 4, H413	0-1%
CAS: 7440-67-7 RTECS: ZH 7070000	Zirconium ----- Pyr. Sol. 1, H250; Water-react. 1, H260	0-1%
CAS: 7440-32-6 RTECS: XR 1700000	Titanium ----- Skin Irrit. 2, H315; Skin Sens. 1, H317; Eye Irrit. 2B, H320	0-0.5%
CAS: 7440-03-1 RTECS: QT9900000	Niobium ----- Flam. Sol. 1, H228; Combustible Dust	0-0.3%
CAS: 7440-62-2 RTECS: YW 1355000	Vanadium	0-0.3%

Additional information:

The exact percentages of the ingredients of this mixture are considered to be proprietary and are withheld in accordance with the provisions of paragraph (i) of §1910.1200 of 29 CFR 1910.1200 Trade Secrets.

Note: Certain chemical constituents listed in Section 3 may vary depending upon the Classification of the Low- Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding products.

SECTION -4 FIRST-AID MEASURES

Description of first aid measures

General information:

Symptoms of poisoning may occur after exposure to dust, fumes or particulates; seek medical attention if feeling unwell.

After inhalation:

Supply fresh air. If required, provide artificial respiration. Consult doctor if symptoms persist. In case of unconsciousness place patient stably in the side position for transportation..

After skin contact:

Generally, the product does not irritate the skin. Immediately wash with water and soap and rinse thoroughly. If skin irritation occurs, consult a doctor.

After eye contact:

Do NOT rub eyes. Immediately rinse opened eye(s) for at least 15 minutes under running water, lifting upper and lower lids occasionally. If symptoms persist, consult a physician.

If easy to do so, remove contact lenses if worn.

After swallowing:

Rinse out mouth and then drink plenty of water. Do not induce vomiting without medical advice. If swallowed and symptoms occur, consult a doctor.

Information for doctor:

- o Most important symptoms and effects, both acute and delayed: No further relevant information available.
- o Indication of any immediate medical attention and special treatment needed: No further relevant information available.



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SECTION -5 FIRE-FIGHTING MEASURES

- **Extinguishing media**
- **Suitable extinguishing agents:** CO₂, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam. Use fire fighting measures that suit the environment.
- **For safety reasons unsuitable extinguishing agents:** No further relevant information.
- **Special hazards arising from the substance or mixture:**

Amorphous or crystalline silicon both react exothermically when heated with alkali-metal carbonates attaining incandescence and evolving carbon monoxide.

Material in powder form, capable of creating a dust explosion. Mixture of silicon, aluminium, and lead oxide explodes when heated.

Material in powder form, capable of creating a dust explosion. Mixture of silicon, aluminum, and lead oxide explodes when heated.

Material in powder form is capable of creating a dust explosion. Mixture of silicon, aluminum, and lead oxide explodes when heated.

Amorphous or crystalline silicon both react exothermically when heated with alkali-metal carbonates attaining incandescence and evolving carbon monoxide. Mixtures of silicon, aluminum, and lead explode when heated.

If incinerated, product will release the following toxic fumes: Oxides of iron, manganese, silicon, aluminum, nickel, niobium, magnesium, molybdenum, titanium, vanadium, barium, lithium, zirconium, carbon, copper, chromium, and fluorides and ozone.
- **Advice for firefighters**
- **Special protective equipment for firefighters:**

As in any fire, wear self-contained breathing apparatus pressure-demand (NIOSH approved or equivalent) and full protective gear to prevent contact with skin and eyes.
- **Additional information:**

At temperatures above 200°C Zirconium reacts exothermically with the following: fluorine, chloride, bromide, iodine, halocarbons, carbon tetrachloride, carbon, tetra fluoride and Freon's.

These items are not reactive, flammable, or explosive and essentially not hazardous at ambient temperatures. Welding arcs and sparks can ignite combustibles and flammable products. If involved in a fire, these products may generate irritating aluminum fumes and a variety of metal oxides. Emergency responders must wear personal protection equipment suitable for the situation. Use the extinguishing media recommended for the burning materials and fire situation. See ANSI Z49.1 "Safety in Welding and Cutting" and "Safe Practices" Code: SP, published by the American Welding Society.

SECTION -6 ACCIDENTAL RELEASE MEASURES

- **Personal precautions, protective equipment and emergency procedures:**

Ensure adequate ventilation.

Avoid contact with skin, eyes and clothing.

Wear assigned protective equipment. Keep unprotected persons away.
- **Environmental precautions:** Do not allow product to reach sewage system or any water course.
- **Methods and material for containment and cleaning up:**

Pick up mechanically.

Dispose contaminated material as waste according to section 13.

Ensure adequate ventilation.

Dispose of the collected material according to regulations.
- **Reference to other sections:**

See Section 7 for information on safe handling.

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.



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• Protective Action Criteria for Chemicals

PAC-1:		
7439-89-6	Iron	3.2 mg/m ³
1317-61-9	Iron Oxide	21 mg/m ³
7440-47-3	Chromium	1.5 mg/m ³
7440-39-3	Barium	1.5 mg/m ³
13463-67-7	Titanium Dioxide	30 mg/m ³
7439-93-2	Lithium	3.3 mg/m ³
7439-96-5	Manganese	18 mg/m ³
7440-02-0	Nickel	4.5 mg/m ³
7439-95-4	Magnesium	18 mg/m ³
7440-21-3	Silicon	45 mg/m ³
1344-28-1	Aluminium Oxide	15 mg/m ³
7439-98-7	Molybdenum	30 mg/m ³
7440-44-0	Carbon Fiber	6 mg/m ³
7440-50-8	Copper	3 mg/m ³
7440-67-7	Zirconium	10mg/m ³
7440-32-6	Titanium	30mg/m ³
7440-03-1	Niobium	30 mg/m ³
7440-62-2	Vanadium	3 mg/m ³
PAC-2:		
7439-89-6	Iron	35 mg/m ³
1317-61-9	Iron Oxide	230 mg/m ³
7440-47-3	Chromium	17 mg/m ³
7440-39-3	Barium	180 mg/m ³
13463-67-7	Titanium Dioxide	330 mg/m ³
7439-93-2	Lithium	36 mg/m ³
7439-96-5	Manganese	5 mg/m ³
7440-02-0	Nickel	50 mg/m ³
7439-95-4	Magnesium	200 mg/m ³
7440-21-3	Silicon	100 mg/m ³
1344-28-1	Aluminium Oxide	170 mg/m ³
7439-98-7	Molybdenum	330 mg/m ³
7440-44-0	Carbon Fiber	330 mg/m ³
7440-50-8	Copper	33 mg/m ³
7440-67-7	Zirconium	83 mg/m ³
7440-32-6	Titanium	330mg/m ³
7440-03-1	Niobium	330 mg/m ³
7440-62-2	Vanadium	5.8 mg/m ³



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PAC-3:		
7439-89-6	Iron	150 mg/m ³
1317-61-9	Iron Oxide	1,400 mg/m ³
7440-47-3	Chromium	99 mg/m ³
7440-39-3	Barium	1,100 mg/m ³
13463-67-7	Titanium Dioxide	2,000 mg/m ³
7439-93-2	Lithium	220 mg/m ³
7439-96-5	Manganese	1,800 mg/m ³
7440-02-0	Nickel	99 mg/m ³
7439-95-4	Magnesium	1,200 mg/m ³
7440-21-3	Silicon	630 mg/m ³
1344-28-1	Aluminium Oxide	990 mg/m ³
7439-98-7	Molybdenum	2,000 mg/m ³
7440-44-0	Carbon Fiber	2,000 mg/m ³
7440-50-8	Copper	200 mg/m ³
7440-67-7	Zirconium	500 mg/m ³
7440-32-6	Titanium	2,000 mg/m ³
7440-03-1	Niobium	2,000 mg/m ³
7440-62-2	Vanadium	35 mg/m ³

SECTION -7 HANDLING AND STORAGE

- **Precautions for safe handling:**
Avoid creating and breathing dust/fume/gas/mist/vapors/spray. Ensure good ventilation/exhaustion at the workplace.
- **Information about protection against explosions and fires:** No special measures required.
- **Conditions for safe storage, including any incompatibilities:**
Store away from strong acids, strong bases, strong oxidizing agents and strong reducing agents.
- **Storage Requirements to be met by storerooms and receptacles:** Keep container tightly closed.
- **Information about storage in one common storage facility:** Not required.
- **Further information about storage conditions:** Keep receptacle tightly sealed.
- **Specific end use(s):** No further relevant information available.

SECTION -8 EXPOSURE CONTROLS/PERSONAL PROTECTION

- **Additional information about design of technical systems: No further data; see section 7.**
- **Control parameters:**
All ventilation should be designed in accordance with OSHA standard (29 CFR 1910.94). Use local exhaust at filling zones and where leakage and dust formation is probable. Use mechanical (general) ventilation for storage areas. Use appropriate ventilation as required to keep Exposure Limits in Air below TLV & PEL limits.
- **Components with occupational exposure limits:**
The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit.
- At this time, the other constituents have no known exposure limits.



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7440-47-3 Chromium

PEL	Long-term value: 1 mg/m ³ as F
REL	Long-term value: 0.5* mg/m ³ *metal+inorg.compds.as Cr; See Pocket Guide App. C
TLV	Long-term value: 0.003* 0.5**mg/m ³ inh. fraction, *as Cr(III), **metal

7440-39-3 Barium

PEL	Long-term value: 0.5 mg/m ³ as Ba
REL	Long-term value: 0.5 mg/m ³ as Ba
TLV	Long-term value: 0.5 mg/m ³ as Ba

13463-67-7 Titanium Dioxide

PEL	Long-term value: 15* mg/m ³ *total dust
REL	See Pocket Guide App. A
TLV	Long-term value: 10 mg/m ³

7429-90-5 Aluminium

PEL	Long-term value: 15*; 5** mg/m ³ *Total dust; ** Respirable fraction
REL	Long-term value: 10* 5** mg/m ³ as Al*Totaldust**Respirable/pyro powd./welding f.
TLV	Long-term value: 1* mg/m ³ as Al; *as respirable fraction

7439-96-5 Manganese

PEL	Ceiling limit value: 5 mg/m ³ as Mn
REL	Short-term value: 3 mg/m ³ Long-term value: 1 mg/m ³ fume, as Mn
TLV	Long-term value: 0.02* 0.1** mg/m ³ as Mn; *respirable **inhalable fraction

7440-02-0 Nickel

PEL	Long-term value: 1 mg/m ³
REL	Long-term value: 0.015 mg/m ³ as Ni; See Pocket Guide App. A
TLV	Long-term value: 1.5* mg/m ³ elemental, *inhalable fraction



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1317-95-9 Silica

PEL	Long-term value: 0.05* mg/m ³ *resp. dust; 30mg/m ³ /%SiO ₂ +2
REL	Long-term value: 0.05* mg/m ³ *respirable dust; See Pocket Guide App. A
TLV	TLV withdrawn

7440-21-3 Silicon

PEL	Long-term value: 15* 5** mg/m ³ *total dust **respirable fraction
REL	Long-term value: 10* 5** mg/m ³ *total dust **respirable fraction
TLV	TLV withdrawn

1344-28-1 Aluminium Oxide

PEL	Long-term value: 15* 5** mg/m ³ *Total dust; ** Respirable fraction
REL	Long-term value: 10* 5** mg/m ³ as Al*Totaldust**Respirable/pyro powd./welding f.
TLV	Long-term value: 1* mg/m ³ as Al; *as respirable fraction

7439-98-7 Molybdenum

PEL	Long-term value: 15* mg/m ³ *Total dust, as Mo
TLV	Long-term value: 10* 3** mg/m ³ as Mo; *inhalable fraction ** respirable fraction

7440-50-8 Copper

PEL	Long-term value: 1* 0.1** mg/m ³ as Cu *dusts and mists **fume
REL	Long-term value: 1* 0.1** mg/m ³ as Cu *dusts and mists **fume
TLV	Long-term value: 1* 0.2** mg/m ³ *dusts and mists; **fume; as Cu

7440-67-7 Zirconium

PEL	Long-term value: 5 mg/m ³ as Zr
REL	Short-term value: 10 mg/m ³ Long-term value: 5 mg/m ³ as Zr
TLV	Short-term value: 10 mg/m ³ Long-term value: 5 mg/m ³ as Zr



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- **Additional information:** The lists that were valid during the creation of this SDS were used as basis.
- **Exposure controls:**
Personal protective equipment
- **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed. Immediately remove all soiled and contaminated clothing and wash before reuse. Wash hands before breaks and at the end of work. Store protective clothing separately. Avoid contact with the eyes and skin. Store protective clothing separately.
- **Breathing equipment:**



Suitable respiratory protective device recommended

Use NIOSH approved or equivalent fume respirator or air supplied respirator when welding, brazing, cutting, grinding, or soldering in a confined space or general work area where local exhaust and/or ventilation does not keep exposure below the limits outlined in Section 8. Monitor the air quality inside the welder's helmet, and/or worker's breathing zone to determine if a respirator is required and the type needed.

• **Protection of hands:**



Protective gloves

Material of gloves:

The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.

Penetration time of glove material:

The exact break-through time has to be determined and observed by the manufacturer of the protective gloves.

• **Eye protection:**



Goggles with face-shield

Wear a helmet or face shield with a filter lens around shade number 14. Adjust if needed by selecting the next lighter or darker shade number. See ANSI/ASC Z49.1 Section 4.2 or publication F2.2. Shield other workers by providing screens and flash goggles.



Protective work clothing

Body protection:

Wear approved head, hand, and body protection, which help to prevent injury from radiation, sparks, and electrical shock. This would include wearing welder's gloves and a protective face shield and may include arm protectors, apron, hats, shoulder protection, as well as dark, non-synthetic, substantial clothing. See ANSI Z49.1. Welders should be trained not to allow electrically live parts to contact the skin or wet clothing and gloves. The welders should insulate themselves from the work and ground and should not touch live electrical parts. Welders should not wear short sleeve shirts or short pants.

• **Limitation and supervision of exposure into the environment:**

Keep away from drains, surface and ground waters. Avoid release into the environment.



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SECTION -9 PHYSICAL AND CHEMICAL PROPERTIES

• Information on basic physical and chemical properties

• General Information

• Appearance:

- **Form:** Solid Wire/Rod or Metal Cored Wire/Rod
- **Color:** Copper or silver/gray metallic color

• Odor:

Odorless until used

• Odor threshold:

Not determined.

• pH-value:

Not applicable.

• Change in condition

- **Melting point/Melting range:** Not determined.
- **Boiling point/Boiling range:** Not determined.

• Flash point:

None

• Flammability (solid, gaseous):

Not determined.

• Ignition temperature:

Not Applicable

• Decomposition temperature:

Not determined.

• Auto igniting:

Product is not self-igniting

• Danger of explosion:

Product does not present an explosion hazard.

• Explosion limits:

- **Lower:** Not determined.
- **Upper:** Not determined.

• Vapor pressure:

Not applicable.

• Density:

- **Relative density:** Not determined.
- **Vapor density:** Not Applicable.
- **Evaporation Rate:** Not applicable.

• Solubility in / Miscibility with:

- **Water:** Insoluble

• Partition Co-efficient(n-octanol/water):

Not determined.

• Viscosity:

- **Dynamic:** Not applicable.
- **Kinematic:** Not applicable.

• Solvent content:

- **VOC content:** 0.00%
- **Solids content:** 100.0%

• Other Information:

No further relevant information available

SECTION -10 STABILITY AND REACTIVITY

- **Reactivity:** Stable under normal conditions.
- **Chemical stability:** Stable under normal conditions.
- **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
- **Possibility of hazardous reactions:** Contact with acids or strong bases may cause generation of gas.
- **Conditions to avoid:** Exposure to water, air, heat, flames and other sources of ignition, moisture, and incompatible chemicals
- **Incompatible materials:** Strong acids, strong bases, strong oxidizing agents and strong reducing agents.



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- **Hazardous decomposition products:**

Toxic chromium oxide fumes. Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the processes and procedures followed, and the welding consumables used. Other conditions that also influence the composition and quantity of 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 in operation 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, and the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapours from cleaning and degreasing procedures). When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 8. Fume and gas decomposition, and not the ingredients in the electrode, are important. The concentration of a given fume or gas component may decrease or increase by many times the original concentration. Also, new compounds not in the electrodes may form. The known gases and fumes that may form during welding or cutting and their exposure limits are noted in the list in Section 11 below. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section 8, plus those from the base metal and coating, etc. as noted above. Chlorinated solvents may be decomposed into toxic gases such as phosgene.

It is understood, however, that the elements and/or oxides to be mentioned are virtually always present as complex oxides and not as metals (See "Characterization of Arc Welding Fume", from the American Welding Society). The elements or oxides listed Section 8 correspond to the ACGIH categories found in "Threshold Limit Values for Chemical Substances and Physical Agents" listed in Section 8. Some products will also contain: carbon, chromium, copper, iron, manganese, molybdenum, nickel, niobium, silicon, tungsten and cobalt. Some elements or compounds may exceed their PELs/TLVs before the total fumes exceed 5 mg/m³.

SECTION -11 TOXICOLOGICAL INFORMATION

- **Information on toxicological effects:**

Effects of Over-Exposure: Electric arc welding may create one or more of the following health hazards:

- ARC RAYS can injure eyes and burn skin. Incidences of skin cancer have been reported.
- ELECTRIC SHOCK can kill.
- FUMES AND GASES GENERATED FROM WELDING can be dangerous to your health.
- PRIMARY ROUTES OF ENTRY are the respiratory system, eyes, skin, and/or indigestion.
- NOISE can damage hearing.

- **Short-term (acute) over-exposure effects:**

- WELDING FUMES may result in discomfort, such as dizziness, nausea, or dryness or irritation of the nose, throat, or eyes.
- ALUMINUM OXIDE may cause irritation of the respiratory system.
- FLUORIDES, FLUORIDE COMPOUNDS may cause skin and eye burns, pulmonary edema, and bronchitis.
- IRON, IRON OXIDE have no known effects. Treat as a nuisance dust or fume.
- MAGNESIUM, MAGNESIUM OXIDE overexposure may cause metal fume fever, characterized by metallic taste, tightness of chest, and fever. Symptoms may last 24-48 hours following over exposure.
- MANGANESE, MANGANESE COMPOUNDS may cause metal fume fever, characterized by irritation of the throat, vomiting, nausea, fever, body aches, and chills. Recovery is generally complete within 48 hours of overexposure.
- MOLYBDENUM may cause irritation of the eyes, nose, and throat.
- NICKEL, NICKEL COMPOUNDS may cause metallic taste, nausea, tightness in chest, fever, and allergic reactions.
- SILICA (amorphous) dust and fumes may cause irritation of the respiratory system, skin, and eyes.
- TITANIUM DIOXIDE may cause irritation of the respiratory system.
- COPPER may cause capillary damage, headache, cold sweat, weak pulse, and kidney and liver damage, central nervous system excitation followed by depression, jaundice, convulsions, paralysis, and coma. Death may occur from shock or renal failure.



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• **Long-term (chronic) over-exposure effects:**

- WELDING FUMES in excess levels may cause bronchial asthma, lung fibrosis, pneumoconiosis, or 'siderosis.' Overexposure to air contaminants may lead to their accumulation in the lungs, a condition which may be seen as dense areas on chest x-rays. The severity of the change is proportional to the length of exposure. The changes seen are not necessarily associated with symptoms or signs of reduced lung function or disease. In addition, the changes on X-rays may be caused by non-work factors such as smoking, etc.
- ALUMINUM OXIDE may cause pulmonary fibrosis and emphysema.
- FLUORIDES may cause serious bone erosion (osteoporosis) and mottling of teeth.
- IRON, IRON OXIDE may cause siderosis or deposits of iron in the lungs, which is believed to affect pulmonary function. Lungs will clear in time when exposure to iron fumes and its compounds ceases. Iron and magnetite (Fe3O4) are not regarded as fibro genic materials.
- MANGANESE, MANGANESE COMPOUNDS may cause central nervous system effects referred to as 'manganism.' Symptoms include languor, sleepiness, muscular weakness, emotional disturbances, spastic gait, and tremors. Behavioral changes and changes in handwriting may also appear. These effects are irreversible. Employees overexposed to manganese should receive regular medical examinations for early detection of manganism.
- MOLYBDENUM prolonged overexposure may result in loss of appetite, weight loss, loss of muscle coordination, difficulty in breathing, and anemia.
- NICKEL, NICKEL COMPOUNDS may lung fibrosis or pneumoconiosis. Studies of nickel refinery workers indicated a higher incidence of lung and nasal cancers.
- SILICA (respirable crystalline silica) overexposure may result in silicosis. Respirable crystalline silica is a known human carcinogen. SILICA (amorphous) long term overexposure may cause pneumoconiosis. Non-crystalline forms of silica (amorphous silica) are considered to have little fibrotic potential.
- TITANIUM DIOXIDE may cause pulmonary irritation and slight fibrosis.
- COPPER may cause hepatic cirrhosis, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson's disease. It has also been reported that copper poisoning has lead to hemolytic anemia and accelerates arteriosclerosis.

• **Acute toxicity:**

• **LD/LC50 values that are relevant for classification:**

7439-89-6 Iron

Oral	LD50	7,500 mg/kg (Rat)
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7440-47-3 Chromium

Inhalative	LC50/96 hours	14.3 mg/l (Cyprinus carpio)
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13463-67-7 Titanium Dioxide

Oral	LD50	>10,000 mg/kg (Rat)
Dermal	LD50	>10,000 mg/kg (Rabbit)
Inhalative	LC50/4 h	>6.82 mg/l (Rat)

7439-93-2 Lithium

Inhalative	LC50/4 h LC50/96 hours	18 mg/l (Trout) 62.21 mg/l (Trout)
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7429-90-5 Aluminium

Oral	LD50	>2,000 mg/kg (Rat)
Inhalative	LC50/4 h	888 mg/l (Rat)

7439-96-5 Manganese

Oral	LD50	9,000 mg/kg (Rat)
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7440-21-3 Silicon

Oral	LD50	3,160 mg/kg (Rat)
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1344-28-1 Aluminium Oxide

Oral	LD50	>10,000 mg/kg (Rat)
Inhalative	LC50/4 h	>2.6 mg/l (Rat)

7439-98-7 Molybdenum

Oral	LD50	>5,000 mg/kg (Rat)
Dermal	LD50	>2,000 mg/kg (Rat)
Inhalative	LC50/4 h	800 mg/l (Trout) >5.84 mg/l (Rat)

- **Primary irritant effect:**

- **On the skin:**

Irritant to skin and mucous membranes.
May cause an allergic skin reaction.

- **On the eye:**

Strong irritant with the danger of severe eye injury.
Causes serious eye irritation.

- **Sensitization:** Sensitization possible through skin contact.

- **Additional toxicological information:**

The product shows the following dangers according to internally approved calculation methods for preparations:
Irritant

Symptoms of systemic copper poisoning may include: capillary damage, headache, cold sweat, weak pulse, and kidney and liver damage, central nervous system excitation followed by depression, jaundice, convulsions, paralysis, and coma. Death may occur from shock or renal failure. Chronic copper poisoning is typified by hepatic cirrhosis, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson's disease. It has also been reported that copper poisoning has led to hemolytic anemia and accelerates arteriosclerosis.



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• **Carcinogenic categories:**

• **IARC (International Agency for Research on Cancer):**

(a) Although IARC has classified titanium dioxide as possible carcinogenic to human (2B), their summary concludes: "No significant exposure to titanium dioxide is thought to occur during the use of products which titanium dioxide is bound to other materials, such as in cosmetics or in paints."

(b) OSHA does not regulate Titanium Dioxide as a carcinogen. However, under 29 CFR 1910.1200 the SDS must convey the fact that Titanium Dioxide is a potential carcinogen to rats.

Group 1 - Carcinogenic to humans

Group 2A - Probably carcinogenic to humans Group 2B - Possibly carcinogenic to humans

Group 3 - Not classifiable as to its carcinogenicity to humans Group 4 - Probably not carcinogenic to humans

7440-47-3	Chromium	3
13463-67-7	Titanium Dioxide	2B
7440-02-0	Nickel	2B
1317-95-9	Silica	1

• **NTP (National Toxicology Program):**

7440-02-0	Nickel	R
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• **OSHA-Ca (Occupational Safety & Health Administration):**

None of the ingredients are listed.

SECTION -12 ECOLOGICAL INFORMATION

• **Toxicity:**

• **Aquatic Toxicity:**

13463-67-7 Titanium Dioxide

EC50	>1,000 mg/l (Water flea)
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7439-96-5 Manganese

EC50	40 mg/l (Water flea)
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7440-02-0 Nickel

EC50	1 mg/l (Water flea)
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7440-47-3 Chromium

EC50	0.07 mg/l (Water flea)
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7439-93-2 Lithium

EC50	153.44 mg/l (Green algae) 10 mg/l (Daphnia) (with pH-adjustment)
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7440-50-8 Copper

EC50	0.04-0.05 mg/l (Water flea)
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- **Persistence and degradability:**
No further relevant information available.
- **Behaviour in environmental systems:**
- **Bio accumulative potential:**
No further relevant information available.
- **Mobility in soil:**
No further relevant information available.
- **Additional ecological information:**
- **General notes:**
Do not allow undiluted product or product that has not been neutralized to reach ground water, water course or sewage system.
- **Results of PBT and vPvB assessment:**
 - PBT: Not applicable.
 - vPvB: Not applicable.
- **Other adverse effects:**
No further relevant information available

SECTION -13 DISPOSAL CONSIDERATIONS

- Waste treatment methods
- **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system. Observe all federal, state and local environmental regulations when disposing of this material.
- **Waste disposal key:** D003 (Characteristic/Reactivity), applicable to wastes consisting only of this product.
- **Uncleaned packaging Recommendation :** Disposal must be made according to official regulations

SECTION -14 TRANSPORT INFORMATION

- **UN-Number:**
 - DOT, ADR/ADN, ADN, IMDG, IATA UN proper shipping name: Non-Regulated Material
 - DOT, ADR/ADN, ADN, IMDG, IATA Transport Hazard class(es): Non-Regulated Material
 - DOT, ADR/ADN, ADN, IMDG, IATA Class: Non-Regulated Material
- **Packing group:**
 - DOT, ADR/ADN, IMDG, IATA Environmental hazards: Non-Regulated Material
 - Special precautions for user: Not applicable
 - Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable
 - UN "Model Regulation": Not applicable
 - Non-Regulated Material



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SECTION -15 REGULATORY INFORMATION

- Safety, health and environmental regulations/legislation specific for the substance or mixture:
- SARA (Superfund Amendments and Reauthorization):
- **Section 355 (extremely hazardous substances):**
None of the ingredients are listed.
- **Section 313 (Specific toxic chemical listings):**

7440-47-3	Chromium
7440-39-3	Barium
7429-90-5	Aluminium
7439-96-5	Manganese
7440-02-0	Nickel
1344-28-1	Aluminium Oxide
7440-50-8	Copper
7440-62-2	Vanadium

- **TSCA (Toxic Substances Control Act):**

7440-47-3	Chromium	ACTIVE
7439-89-6	Iron	ACTIVE
1317-61-9	Iron Oxide	ACTIVE
7440-39-3	Barium	ACTIVE
13463-67-7	Titanium Dioxide	ACTIVE
7439-93-2	Lithium	ACTIVE
7429-90-5	Aluminium	ACTIVE
7439-96-5	Manganese	ACTIVE
7440-02-0	Nickel	ACTIVE
7439-95-4	Magnesium	ACTIVE
7440-21-3	Silicon	ACTIVE
1344-28-1	Aluminium Oxide	ACTIVE
7439-98-7	Molybdenum	ACTIVE
7440-44-0	Carbon Fiber	ACTIVE
7440-50-8	Copper	ACTIVE
7440-67-7	Zirconium	ACTIVE
7440-32-6	Titanium	ACTIVE
7440-03-1	Niobium	ACTIVE
7440-62-2	Vanadium	ACTIVE



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Hazardous Air Pollutants

7439-96-5	Manganese
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California Proposition 65



WARNING: This product can expose you to chemicals including the listed chemicals which are known to the State of California to cause cancer, birth defects and other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

Chemicals known to cause cancer

13463-67-7	Titanium Dioxide
7440-02-0	Nickel

Chemicals known to cause reproductive toxicity for females:

None of the ingredients are listed

Chemicals known to cause reproductive toxicity for males:

None of the ingredients are listed.

Chemicals known to cause developmental toxicity:

None of the ingredients are listed.

New Jersey Right-to-Know List:

7440-47-3	Chromium
7440-39-3	Barium
13463-67-7	Titanium Dioxide
7439-93-2	Lithium
7429-90-5	Aluminium
7439-96-5	Manganese
7440-02-0	Nickel
1317-95-9	Silica

7439-95-4	Magnesium
7439-98-7	Molybdenum
7440-50-8	Copper
7440-67-7	Zirconium
7440-32-6	Titanium
7440-62-2	Vanadium
7440-21-3	Silicon
1344-28-1	Aluminium Oxide

New Jersey Special Hazardous Substance List:

7440-47-3	Chromium	F3
7440-39-3	Barium	F3, R2
7439-93-2	Lithium	F2, R2
7429-90-5	Aluminium	F3, R1
7439-96-5	Manganese	F3, R1
7440-02-0	Nickel	CA
7440-21-3	Silicon	F3
1317-95-9	Silica	CA
7440-32-6	Titanium	F3, R1
7440-67-7	Zirconium	F4, R1



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• **Pennsylvania Right-to-Know List:**

7440-47-3	Chromium
7440-39-3	Barium
13463-67-7	Titanium Dioxide
7439-93-2	Lithium
7429-90-5	Aluminium
7439-96-5	Manganese
7440-02-0	Nickel
1317-95-9	Silica
7439-95-4	Magnesium
7440-21-3	Silicon
1344-28-1	Aluminium Oxide
7439-98-7	Molybdenum
7440-50-8	Copper
7440-67-7	Zirconium
7440-62-2	Vanadium

• **Pennsylvania Special Hazardous Substance List:**

7440-47-3	Chromium	ES
7440-39-3	Barium	E
7429-90-5	Aluminium	E
7439-96-5	Manganese	E
7440-02-0	Nickel	ES
1344-28-1	Aluminium Oxide	E
7440-50-8	Copper	E
7440-62-2	Vanadium	E

• **Carcinogenic categories:**

• **EPA (Environmental Protection Agency):**

7440-47-3	Chromium	D
7440-39-3	Barium	D, CBD(inh), NL(oral)
7439-96-5	Manganese	D
7440-50-8	Copper	D



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• **TLV (Threshold Limit Value established by ACGIH):**

7440-47-3	Chromium	A4
7440-39-3	Barium	A4
13463-67-7	Titanium Dioxide	A4
7429-90-5	Aluminium	A4
7440-02-0	Nickel	A5
1317-95-9	Silica	A2
1344-28-1	Aluminium Oxide	A4
7439-98-7	Molybdenum	A3
7440-67-7	Zirconium	A4

• **NIOSH-Ca (National Institute for Occupational Safety and Health):**

13463-67-7	Titanium Dioxide	A4
7440-02-0	Nickel	A5
1317-95-9	Silica	A2

• **GHS label elements**

The product is classified and labeled according to the Globally Harmonized System(GHS).

• **Hazard pictograms:**



• **Signal word: Danger**

• **Hazard-determining components of labeling:**

- Iron
- Lithium
- Titanium
- Dioxide
- Nickel
- Titanium

• **Hazard statements:**

- H315 Causes skin irritation.
- H318 Causes serious eye damage.
- H317 May cause an allergic skin reaction.
- H350 May cause cancer.
- H335 May cause respiratory irritation.
- H372 Causes damage to organs through prolonged or repeated exposure.



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• **Precautionary statements:**

- P201** Obtain special instructions before use.
- P202** Do not handle until all safety precautions have been read and understood.
- P260** Do not breathe dust/fume/gas/mist/vapors/spray.
- P264** Wash thoroughly after handling.
- P270** Do not eat, drink or smoke when using this product.
- P271** Use only outdoors or in a well-ventilated area.
- P272** Contaminated work clothing must not be allowed out of the workplace.
- P280** Wear protective gloves/protective clothing/eye protection/face protection.
- P302+P352** If on skin: Wash with plenty of water.
- P304+P312** IF INHALED: Call a POISON CENTER/doctor if you feel unwell.
- P304+P340** IF INHALED: Remove person to fresh air and keep comfortable for breathing
- P305+P351+P338** If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P308+P313** IF exposed or concerned: Get medical advice/attention.
- P321** Specific treatment (see supplementary first-aid instructions on this Safety Data Sheet).
- P362+P364** Take off contaminated clothing and wash it before reuse.
- P333+P313** If skin irritation or rash occurs: Get medical advice/attention.
- P337+P313** If eye irritation persists: Get medical advice/attention.
- P342+P311** If experiencing respiratory symptoms: Call a poison center/doctor.
- P363** Wash contaminated clothing before reuse.
- P403+P233** Store in a well-ventilated place. Keep container tightly closed.
- P405** Store locked up.
- P501** Dispose of contents/container in accordance with local/regional/national/international regulations.

• **National regulations:**

None of the ingredients are listed.

• **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

SECTION -16 OTHER INFORMATION

ROYALE WELD WELL urges each end user and recipient of this SDS to study it carefully. If necessary, consult an industrial hygienist or other expert to understand this information and safeguard the environment and protect workers from potential hazards associated with the handling or use of this product. This information is believed to be accurate as of the revision date shown above. However, no warranty, expressed or implied, is given. Because the conditions or methods of use are beyond ROYALE WELDWELL's control, we assume no liability resulting from the use of this product. Regulatory requirements are subject to change and may differ between various locations. Compliance with all applicable Federal, State, Provincial, and Local laws and regulations remain the responsibility of the user.

• **Date of last revision/ revision number:** 12/23/2019 / 1

• **Abbreviations and Acronyms:**

- ADR:** The European Agreement concerning the International Carriage of Dangerous Goods by Road
- ADN:** The European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
- IMDG:** International Maritime Code for Dangerous Goods
- DOT:** US Department of Transportation
- IATA:** International Air Transport Association
- ACGIH:** American Conference of Governmental Industrial Hygienists
- EINECS:** European Inventory of Existing Commercial Chemical Substances
- ELINCS:** European List of Notified Chemical Substances
- CAS:** Chemical Abstracts Service (division of the American Chemical Society)
- NFPA:** National Fire Protection Association (USA)
- HMIS:** Hazardous Materials Identification System (USA)



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VOC: Volatile Organic Compounds (USA, EU)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

PBT: Persistent, Bioaccumulate and Toxic

vPvB: very Persistent and very Bioaccumulate

NIOSH: National Institute for Occupational Safety and Health

OSHA: Occupational Safety & Health Administration

TLV: Threshold Limit Value

PEL: Permissible Exposure Limit

REL: Recommended Exposure Limit

BEI: Biological Exposure Limit

Flam. Sol. 1: Flammable solids – Category 1

Flam. Sol. 2: Flammable solids – Category 2

Pyr. Sol. 1: Pyrophoric solids – Category 1

Water-react. 1: Substances and mixtures which in contact with water emit flammable gases – Category 1

Water-react. 2: Substances and mixtures which in contact with water emit flammable gases – Category 2

Acute Tox. 4: Acute toxicity – Category 4

Skin Corr. 1B: Skin corrosion/irritation – Category 1B

Skin Irrit. 2: Skin corrosion/irritation – Category 2

Eye Dam. 1: Serious eye damage/eye irritation – Category 1

Eye Irrit. 2B: Serious eye damage/eye irritation – Category 2B

Resp. Sens. 1: Respiratory sensitisation – Category 1

Skin Sens. 1: Skin sensitisation – Category 1

Carc. 1A: Carcinogenicity – Category 1A

Carc. 2: Carcinogenicity – Category 2

STOT SE 3: Specific target organ toxicity(single exposure) – Category 3

STOT RE 1: Specific target organ toxicity(repeated exposure) – Category 1

Aquatic Acute 3: Hazardous to the aquatic environment - acute aquatic hazard – Category 3

* Data compared to the previous version altered.

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