



SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: 2% Thoriated Tungsten
Product Type: Tungsten Electrodes for Welding
Product Identifier: Color Code: Red
Relevant Identified Uses: Electrode for Gas Tungsten Arc Welding (GTAW)
Sizes: All Diameters

Supplier Name: Vanguard Steel Ltd.
Head Office Address: 2160 Meadowpine Blvd.
Mississauga, Ontario
L5N 6H6
Canada

Telephone: 905-821-1100
800-268-2169

2. HAZARD IDENTIFICATION

Important: This section covers the materials from which the product is manufactured.

The fumes and gases produced during welding with the normal use of this product are covered under Section 5 . Thorium dioxide is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40 CFR Part 372.

| Designation | | Approximate Concentrations % of Chemical Composition Impurities $\leq 0.1\%$ | | Tip Color |
|-------------|-----------|--|--------------|-----------|
| ISO 6848 | AWS A5.12 | Lanthanum Oxide | Tungsten | |
| WL2 | EWTh-2 | 1.70 – 2.20 | ≥ 97.30 | Red |

| | | |
|-------------------|-----------|-----------|
| CAS Number | 1312-81-8 | 7440-33-7 |
|-------------------|-----------|-----------|

*The term "HAZARDOUS MATERIALS" should be interpreted as a term required a defined in OSHA HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 however the use of this term does not necessarily imply the existence of any hazard.

3. PHYSICAL DATA

| | |
|--|---------------------------|
| Melting Point: Approximately 3400°C | Color: Silver-gray |
| Boiling Point: Approximately 5900°C | Odor: odorless |
| Solubility in Water: Insoluble | Vapor. Press: N/A at 25°C |
| Specific Gravity (H ₂ O= 1): Approximately 19.3 | Vapor. Density: N/A |
| Radioactive Isotope: Th-232 | |



SAFETY DATA SHEET

4. FIRE AND EXPLOSION HAZARD DATA

Non-Flammable: Welding arc and sparks can ignite combustibles. See Z-49.I referenced in Section 6.

| | |
|--|-----------------------------------|
| Means of Extinction: | Will not burn, use water to cool. |
| Flashpoint: | N/A |
| Upper Flammable Limit (% by volume): | N/A |
| Lower Flammable Limit (% by volume): | N/A |
| Auto ignition temperature: | N/A |
| Hazardous Combustion Products: | N/A |
| Explosion data-sensitivity to mechanical impact: | N/A |
| Explosion data-sensitivity to static discharge: | N/A |

5. REACTIVITY DATA

Hazardous Decomposition Products Welding fumes and gases cannot be classified simply. The composition and quantity of these fumes and gases are dependent upon the metal being welded, the procedures followed and the electrodes used.

Workers should be aware that the composition and quantity of fumes and gases to which they may be exposed, are influenced by: coatings which may be present 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, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing procedure).

When the electrode is consumed, the fumes and gas decomposition products generated are different in percent and form from the ingredients listed in Section 2. The composition of these fumes and gases are concerning matter and not the composition of the electrode itself.

Decomposition products include those originating from the volatilization, reaction, or oxidation of the ingredients shown in Section 2, plus those from the base metal, coating and the other factors noted above.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

One method of determining the composition and quantity of the fumes and gases to which the workers are exposed is to take an air sample from inside the welder's helmet while worn or within the worker's breathing zone. See ANSI/AWS F1.1 publication available from the American Welding Society 550 N.W. LeJeune Road, Miami, Florida 33126.



SAFETY DATA SHEET

6 HEALTH HAZARD DATA

Occupational Safety and Health Administration 29 CFR 1910.1000 Permissible Exposure Limit (PEL). American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV[R]).

Threshold Limit Value: The ACGIH recommended general limit for welding fume NOC (Not otherwise classified) is 5 mg/m³ ACGIH-1985 preface states: "The TLC-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations." See section V for specific fume constituents, which may modify this TLV. Common Entry Is by Inhalation.

Effects of Overexposure: Inhalation of welding fumes and gases can be dangerous to your health. Short-term (acute) overexposure to welding fumes may result in discomfort such as dizziness, nausea, or dryness or irritation of nose, throat, or eyes. Although the inhalation of Tungsten has the potential for causing transient or permanent lung damage, it is generally considered to exhibit a low degree of toxicity.

Thorium is a naturally occurring radioactive element. Its primary hazard lies in inhalation of dust/fumes. Normal handling of these electrodes is not expected to result in any significant radiation exposure. Considerable experience in refining and use of thorium has not revealed any adverse effects from industrial exposure. Long-term (chronic) over-exposure to welding fumes can lead to Siderosis (iron deposits in lung) and is believed to affect pulmonary function.

Arc Rays can injure eyes and burn skin, electric shock can kill - See Section 8.

Emergency and First Aid Procedures: Call for medical assistance. Use first aid procedures recommended by the American Red Cross. If breathing is difficult give oxygen. If not breathing use CPR (cardiopulmonary resuscitation). Carcinogenicity: Thorium dioxide has been identified as a carcinogen by NTP, IARC and others. Evidence for its ability to cause cancer has come solely from its internal medical use.

7 HANDLING AND STORAGE

Work Practices and Hygiene Practices: After the end of work shift, hands and other exposed skin should be thoroughly washed. Do not eat or drink during use of these products. Use ventilation and other engineering controls to minimize potential exposure to fumes during welding operations or to dusts if tips of electrodes are ground.

Follow good house-keeping practices to ensure powders or dusts from grinding operations do not accumulate which can be highly flammable and can pose special health hazards if from thorium-containing electrodes. Tungsten-Thorium Oxide alloys are generally safe to handle during use and almost all normal conditions and environments.

Special precautions must be taken during the grinding or machining of tips of electrodes that contain Thorium Oxide to avoid the generation and subsequent inhalation of dusts from these operations. Any dusts generated during these operations may be considered as "Source Material" as defined by the Nuclear Regulatory Commission, and therefore be subject to the requirements of 10 CFR, Parts 20 and 40. Routine wet mopping or vacuuming with an explosion-proof vacuum, fitted with a HEPA filter may be considered to reduce accumulation of dusts.

Storage and Handling Practices: All employees who handle these materials should be trained to handle it safely. Avoid breathing dusts or powders generated during grinding of electrode tips. Open packages and containers of these products slowly, on a stable surface. Packages and containers of these products must be properly labeled.



SAFETY DATA SHEET

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Read and understand the manufacturer's instructions and precautionary label on this product. See American Standard Z49.1 Safety in Welding and Cutting, published by the AMERICAN WELDING SOCIETY, 550 N.W. Lejenune Road, Miami, Florida 33126 and OSHA Publication 2206(29 CFR 1910), U.S. Government Printing Office, Washington D.C. 20402 for more details on the following topics.

Ventilation: Use plenty of ventilation and/or local exhaust at the arc, to keep the fumes and gases below the threshold limit value within the worker's breathing zone and the general work area. Welders should be advised to keep their head out of the fumes.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in a confined space or general work area where local exhaust and/or ventilation does not keep exposure below the threshold limit value. Eye Protection: Wear a helmet or face shield with a filter lens shade number 12-14 or darker. Shield other workers by providing screens and flash goggles.

Protective Clothing: Wear approved head, hand and body protection, which help to prevent injury from radiation, sparks and electrical shock. See ANSI Z-49.1. 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 substantial clothing. Welders should be trained not to allow electrically live parts to contract the skin or wet clothing and gloves. The welders should insulate themselves from the work and ground.

Waste Disposal Method: Discard any product, residue, disposal container, or liner in an environmentally acceptable manner approved by Federal, State and Local regulation.

The manufacturer believes this data to be accurate and to reflect qualified expert opinion regarding current research. However, the manufacturer cannot make any express or implied warranty as to this information.