

II. Hazardous Ingredients*

IMPORTANT: This section covers the materials from which this product is manufactured. The fumes and gases produced during normal use of these products are covered in Section V. 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.

All applicable requirements for radioactive materials (including exposure limits) contained in 29 CFR 1910.96 (OSHA) and 10 CFR Parts 20 and 40 (NRC) should be met.

Material	(CAS No.)	Weight	Exposure Limits	
			1989 OSHA PEL-TWA	1993/1971 OSHA TWA
		%	(Revoked)	
Tungsten (W)	(7440-33-7)	98-100	1 mg/m ³ (3 mg/m ³ STEL)	None established
Thorium Dioxide (ThO ₂)	(1314-20-1)	0-2	None currently established	None currently established
Or				
Zirconium Oxide (ZrO ₂)	(1314-23-4)	0-1	5 mg/m ³ (10 mf/m ³ STEL)	5 mg/m ³
Or				
Cerium Dioxide (CeO ₂)	(1306-38-3)	0-2	None currently established	None currently established
Or				
Lanthanum Dioxide (LaO ₂)	(1312-81-8)	0-2	None currently established	None currently established

* The term "hazardous" should be interpreted as a term required and defined in the OSHA Hazard Communications Standard (29CFR 1910.1200) and does not necessarily imply the existence of any hazard. Some of the products listed may not contain all of the ingredients shown in Section II. Typical analyses can be found in the appropriate AWS Specification or from your supplier.

STATE RIGHT-TO-KNOW

CALIFORNIA Proposition 65

This product, when used for welding or 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 §25249.5 et. seq.)

Carbon Monoxide
Thorium Dioxide

MASSACHUSETTS Right-to-Know Substance List (MSL)

This product, contains the following substances on the MSL:
Hazardous Substances: Tungsten, Zirconium Oxide
Extremely Hazardous Substances: Thorium Dioxide
Carcinogenic Substances: Thorium Dioxide

NEW JERSEY Right-to-Know Substance List (NJHSL)

This product, contains the following substances on the NJHSL:
Hazardous Substances: Tungsten
Environmental Hazardous Substances: None
Special Health Hazards: Thorium Dioxide

PENNSYLVANIA Right-to-Know Substance List (MSL)

This product, contains the following substances whose level requires reporting:
Hazardous Substances: Tungsten
Special Hazardous Substances: Thorium Dioxide
Environmental Hazardous Substances: Thorium Dioxide

III. Physical and Chemical Characteristics

Boiling Point (°F @ 760 mm Hg):	5660°C	Freezing Point:	3410+/-20°C
Percent Volatiles by Volume:	N/A		
Evaporation Rate: (butyl acetate = 1)	N/A		
Solubility in Water:	Insoluble		
Specific Gravity (H ₂ O = 1):	19.3		
Odor and Appearance:	Gray metal rod, no odor.		

IV. Fire & Explosion Hazard

Non-flammable. Welding arc and sparks can ignite combustible and flammable products. See ANSI Z49.1 "Safety in Welding and Cutting" (referenced in Section VII) for fire prevention and protection information.

V. Reactivity Data

Hazardous Decomposition Products

Tungsten electrodes are non-consumable. However, some loss of electrode metal may occur depending on welding conditions. The composition and quantity of welding fumes and gases are dependent upon the metal being welded, the welding process, procedures, filler metals and electrodes used. Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coating on the metal being heated (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 used, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

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

One recommended way to determine the composition and quantity 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 "Method for Sampling Airborne Particles Generated by Welding and Allied Processes" available from the American Welding Society, P. O. Box 351040, Miami, FL 33135.

VI. Physical and Health Hazard Data

Threshold Limit Value: The ACGIH 1988-89 recommended limit for welding fume, not otherwise classified (NOC) is 5 mg/m³. TLV-TWA's should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV-TWA.

Pre-existing Medical Conditions Aggravated by Overexposure: Individuals with allergies or impaired respiratory function may have symptoms worsened by exposure to welding fumes. However, such reaction cannot be predicted due to the variation in composition and quantity of the decomposition products.

Effects of Overexposure: Electric arc welding or oxy-fuel gas processes may create one or more of the following hazards:

- **Fumes and Gases** can be dangerous to your health. Primary route of entry is by inhalation.
Short-term (acute) overexposure to welding fumes may result in discomfort such as dizziness, nausea, or dryness or irritation of the 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) overexposure to welding fumes can lead to siderosis (iron deposits in lung) and affect pulmonary function.
- **Arc Rays** can injure eyes and burn skin. **Heat Rays** (infrared radiation from flame or hot metal) can injure eyes.

- **Electric Shock** can kill.
- **Noise** can damage hearing.
- **Carcinogenic Assessment:** 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 medicine use.
- **Emergency First Aid Procedures:** Call for medical aid. Employ first aid techniques recommended by the American Red Cross. IF BREATHING IS DIFFICULT, give oxygen. Call a physician. IF NOT BREATHING, begin artificial respiration, preferably mouth-to-mouth. If no detectable pulse, begin external heart massage. Immediately call a physician.

VII. Precautions for Safe Handling and Use/Applicable Control Measures

Read and understand the manufacturer's instructions and the precautionary label on this product. See American National Standard Z-49.1, "Safety in Welding and Cutting," published by the American Welding Society, P. O. Box 351040, Miami, FL 33135 and OSHA Publication 2206 (29 C.F.R. 1910), U.S. Government Printing Office, Washington, D.C. 20402; and ESAB's publications 52-529 and 2035 for more details on many of the following:

Ventilation: Use enough ventilation, local exhaust at the arc or both, to keep the fumes and gases below TLV's in the worker's breathing zone and the general area. Train the welder to keep his head out of fumes. Use respirable fume respirator or air supplied respirator when welding in confined space or where local exhaust or ventilation does not keep exposure below TLV. Select as per OSHA 29 CFR 1910.134.

Eye Protection: Wear helmet, goggles or use face shield with filter lens. As a rule of thumb, start with a shade that is too dark to see the weld zone and then go to the next lighter shade (See ANSI Z49.1). Provide protective screens and flash goggles, if necessary, to shield others.

Protective Clothing and Equipment: Wear hand, head, and body protection which help to prevent injury from radiation, sparks. See ANSI Z49.1. At a minimum, this includes welder's gloves and may include arm protectors, aprons, hats, shoulder protection, as well as dark substantial clothing. Welder should be trained not to touch live electrical parts and to insulate himself from work and ground.

Waste Disposal Method: Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state, and local regulations..

The opinions expressed in this MSDS are those of qualified experts within **THE ESAB GROUP**. We believe that the information contained herein is current as of the date of this MSDS. Since the use of this information and these opinions and the conditions of use of these products are not within the control of **THE ESAB GROUP**, it is the user's obligation to determine the conditions of safe use of these products.