SAFETY DATA SHEET (SDS) — Tungsten Electrodes

SECTION I - IDENTIFICATION OF THE SUBSTANCE OR MIXTURE AND OF THE SUPPLIER

GHS product identifier: Tungsten Electrodes for Welding

Designation		Chemical Composition — Impurities ≤ 0.2%		Tip Color
ISO 6848	AWS A5.12	Oxide Additive, %	Tungsten, %	
WT20	EWTh-2	ThO_2: 1.70-2.20	Balance	Red
WP	EWP	-----	Balance	Green
WL15	EWLa-1.5	LaO_3: 1.30-1.70	Balance	Gold
WC20	EWCe-2	CeO_2: 1.80-2.20	Balance	Gray
WL10	EWLa-1	La_2O_3: 0.80-1.20	Balance	Black
WL20	EWLa-2	La_2O_3: 1.80-2.20	Balance	Sky-blue
WZ3	EWZr-1	ZrO_2: 0.15-0.50	Balance	Brown
	EWG	LaO_2, CeO_2 & Y_2O_3 : 1.80-2.20	Balance	Aqua

Other means of identification: Tungsten; Element
Recommended use of the chemical and restrictions on use: Welding; Metal-working Operations
Specification: AWS A5.12
Supplier's details: BAMSTC, Shayang Road, Shahe Township, Beijing, China, Tel: 010.6973.1880
Emergency phone number: BUSINESS HRS 630.882.2629, CHEMTREC 800.424.9300
Date of Preparation: Revised on February 6, 2013

SECTION II - HAZARDS IDENTIFICATION

General Hazard Statement: Solid metallic products are generally classified as "articles" and do not constitute as hazardous materials in solid form under the definitions of the OSHA Hazard Communication Standard (29 CFR 1910.1200). Any articles manufactured from these solid products would be generally classified as non-hazardous. However some hazardous elements contained in these products can be emitted during grinding prior to welding. Products in the solid state present no fire or explosion hazard. The fumes and gases produced during welding with the normal use of this product are covered under Section X. Among the electrodes, only large quantities of thoriated tungsten electrodes may pose a radioactive hazard, and the most serious hazards identified in this Section II relate only to thoriated tungsten electrodes. 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. The following classification information is for the hazardous elements which may be released during processing.

GHS Classification:

Serious Eye Damage/Irritation	Toxic to reproduction - Category 1B
Respiratory Sensitizer	Specific target organ toxicity - Single exposure - Category 1 (kidneys, respiratory system)
Skin Sensitizer	Specific target organ toxicity - Repeated exposure - Category 1 (respiratory system, skin)
Germ Cell Mutagenicity	Hazardous to aquatic environment - Acute Hazard - Category 1
Carcinogenicity - Category 2	Hazardous to aquatic environment - Chronic Hazard - Category 1

GHS LABEL ELEMENTS
Symbol(s)

Signal Word
Warning

Hazard Statements
Causes eye irritation
May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause an allergic skin reaction
Suspected of causing genetic defects
Suspected of causing cancer
Causes damage to organs (kidneys, respiratory system)
Causes damage to organs through prolonged or repeated exposure (respiratory system)
Very toxic to aquatic life
Very toxic to aquatic life with long lasting effects

Precautionary Statements
Prevention

Do not breathe dust/fume/gas/mist/vapours/spray
In case of inadequate ventilation wear respiratory protection
Contaminated work clothing should not be allowed out of the workplace
Wash thoroughly after handling
Wear protective gloves
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Do not eat, drink or smoke when using this product
Avoid release to the environment

Response
IF exposed or concerned: Seek medical advice/attention
IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so.
Continue rinsing. If eye irritation persists seek medical advice/attention.
If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Seek medical advice/attention. Wash contaminated clothing before reuse.
If exposed or concerned: Seek medical advice/attention. Collect spillage.

Storage:
Store in a closed container in a secure and dry location.

For thoriated tungsten electrodes, store in tightly closed containers in a cool and well-ventilated area. Nobody should remain permanently or longer than necessary in close proximity to the stored thoriated tungsten electrodes as they may emit beta and gamma radiation. Additional measures should be taken to protect from such possible beta and gamma radiation. Thoriated tungsten electrodes may be incompatible with some strong acids.

Disposal
Dispose of contents/container in accordance with local/regional/national/international regulations.

SECTION III - COMPOSITION/INFORMATION ON INGREDIENTS

See SECTION I for chemical composition of the mixtures.

INGREDIENT	CAS No.	OSHA PEL	ACGIH TWA	ACGIH STEL
Tungsten (W)	7440-33-7	-	5 mg/m^3	10 mg/m^3
Thorium Dioxide	1314-20-1	-	-	-
Cerium Dioxide	1345-13-7	-	-	-
Lanthanum Dioxide	1312-81-8	-	-	-
Zirconium Oxide	1314-23-4	5 mg/m^3	5 mg/m^3	10 mg/m^3
Yttrium Oxide	1314-36-9	1 mg/m^3	1 mg/m^3	

SECTION IV - FIRST AID MEASURES

No first aid measures should be required for the unused electrodes. The following first aids should be exercised during welding operations:

Inhalation - If breathing is difficult, bring the patient to area with fresh air; breathe in fresh air deeply.

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

Eye effects such as arc eye and dusts - Immediately flush with sterile water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. Consult a physician. Cover with damp dressing and refer for immediate medical attention if irritation persists.

Ingestion - Ingestion is considered unlikely due to product form, but measures should be taken to prevent the ingestion of dust resulting from the grinding of thoriated tungsten electrodes. However, if swallowed do not induce vomiting. Call a physician or Poison Control Center immediately. Drink plenty of water. Never give anything by mouth to an unconscious person.

Electric shocks - If necessary resuscitate and seek immediate medical attention.

SECTION V - FIRE FIGHTING MEASURES

The electrodes do not present fire or explosion hazards as shipped. However, welding arc and sparks can ignite combustibles. See Z-49.1 referenced in Section VIII. Welding should not be carried out in the presence of flammable materials, vapors, tanks, cisterns and pipes and other containers which have held flammable substances unless these have been checked and certified safe.

SECTION VI - ACCIDENTAL RELEASE MEASURES

No specific actions for electrodes 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.

SECTION VII - 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 under almost all normal conditions and environments. However, 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 and ingestion 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.

SECTION VIII - 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 heads 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 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 contact 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 regulations.

SECTION IX – PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties:

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_2O=1): Approximately 19.3	Vapor. Density: N/A
Radioactive Isotope: Th-232	Oxidizing properties: N/A

Other information: Volatile Organic Chemical (VOC) Content – Not available.

SECTION X – STABILITY AND REACTIVITY

There is no stability or reactivity hazards from welding electrodes as supplied. Hazardous decomposition products such as metal oxide fumes and gases (see Section VIII) are produced during grinding and welding. Welding fumes and gases cannot be classified simply. The composition and quantity of these fumes and gases are dependent on 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 percentage and form from the ingredients listed in Section II. The composition of these fumes and gases are the concerning matter, not the composition of the electrode itself.

Decomposition products include those originating from the volatilization, reaction, or oxidation of the ingredients shown in Section II, as well as 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.

SECTION XI – TOXICOLOGICAL INFORMATION

Welding fumes, if inhaled, can potentially produce several different 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 and welding 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 may be produced from these electrodes, (excluding fume from filler material and the components being welded).

Tungsten
Any fume or dust given off by these electrodes will consist mainly of tungsten and tungsten oxides. Exposure to tungsten and its compounds as a dust or fume generally shows low toxicity with no long term fibrotic effects on the lung. Some lung effects observed with exposure to tungsten carbide dust have been attributed more to cobalt than to tungsten compounds.

Thorium
Thoriated electrodes contain Thorium, which is radioactive. The exact amount of thorium in the fume depends on the grade of thoriated electrode used as well as the welding parameters. Under DC supply, fume levels from the tungsten electrode during welding are negligible, and hence any exposure to radioactivity is also negligible. However, during electrode grinding and AC welding, fume or dust containing thorium will be emitted and exposure to radioactivity will be higher. Under these circumstances, extract ventilation is required to control any fume/dust emissions. Thorium is a radioactive substance that emits beta radiation externally and alpha radiation internally. The latter radioactive properties can cause cancer of specific organs.

Cerium
Cerium is relatively non-toxic to humans and no adverse health effects would be expected from exposure to cerium dust or fume.

Lanthanum
Lanthanum is relatively non-toxic to humans and no adverse health effects would be expected from exposure to lanthanum dust or fume.

Zirconium
Zirconium is relatively non-toxic to humans and no adverse health effects would be expected from exposure to zirconium dust or fume.

Ozone and Nitrogen oxides
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

SECTION XII - ECOLOGICAL INFORMATION

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

SECTION XIII - DISPOSAL CONSIDERATIONS

Packaging and electrode stubs should be disposed of as general waste or recycled.

No special precautions are required for this product, except for the grinding dust and stubs of thoriated electrodes, which may require special disposal, especially if in large quantities.

SECTION XIV - TRANSPORT INFORMATION

The majority of the time, thoriated tungsten electrodes are properly shipped per limited quantity exceptions as described at 49 CFR 173.421. However, large quantity shipments may be fully regulated as Class 7 radioactive materials.

SECTION XV- REGULATORY INFORMATION

WARNING: This product contains a chemical known to the State of California to cause cancer.
Thorium Dioxide is a National Toxicology Program Known Carcinogen.

Australia inventory (AICS): All components are listed or exempted.
China inventory (IECSC): Not determined.
Japan inventory: Not determined.
Korea inventory: All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC): Not determined.
Philippines inventory (PICCS): Not determined.
WHMIS (Canada) Class D-2A: Material causing other toxic effects (Very toxic).
Canada:

- Thorium dioxide: Yes.
- Classification: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

CEPA Toxic substances: The following components are listed: Thoriated Tungsten Electrodes
Canadian ARET: None of the components are listed.
Canadian NPRI: The following components are listed: Thorium dioxide
Alberta Designated Substances: None of the components are listed.
Ontario Designated Substances: None of the components are listed.
Quebec Designated Substances: None of the components are listed.

United States
Connecticut Carcinogen Reporting: None of the components are listed.
Connecticut Hazardous Material Survey: None of the components are listed.
Florida substances: None of the components are listed.
Illinois Chemical Safety Act: None of the components are listed.
Illinois Toxic Substances Disclosure to Employee Act: None of the components are listed.
Louisiana Reporting: None of the components are listed.
Louisiana Spill: None of the components are listed.
Massachusetts Spill: None of the components are listed.
Massachusetts Substances: The following components are listed: Tungsten; Thorium oxide
Michigan Critical Material: None of the components are listed.
Minnesota Hazardous Substances: None of the components are listed.
New Jersey Hazardous Substances: The following components are listed: Tungsten; Thorium oxide
New Jersey Spill: None of the components are listed.
New Jersey Toxic Catastrophe Prevention Act: None of the components are listed.
New York Acutely Hazardous Substances: None of the components are listed.
New York Toxic Chemical Release Reporting: None of the components are listed.
Pennsylvania RTK Hazardous Substances: The following components are listed: Tungsten; Thorium oxide
Rhode Island Hazardous Substances: None of the components are listed.
Form R – Reporting requirements and Supplier notification (Thorium dioxide 1314-20-1)

- SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

TSCA 8(a) PAIR: Tungsten
United States inventory (TSCA 8b): All components are listed or exempted.
Clean Water Act (CWA) 307: No products were found.
Clean Water Act (CWA) 311: No products were found.
Clean Air Act (CAA) 112 accidental release prevention: No products were found.
Clean Air Act (CAA) 112 regulated flammable substances: No products were found.
Clean Air Act (CAA) 112 regulated toxic substances: No products were found.
SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: Tungsten; Thorium oxide
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Tungsten: Immediate (acute) health hazard, Delayed (chronic) health hazard; Thorium oxide: Delayed (chronic) health hazard

Health and Safety at Work Act 1974.
The Management of Health and Safety at Work regulations 1992.
L5 Control of substances hazardous to health. The Control of Substances Hazardous to Health Regulations 2002. Approved codes of practice and guidance. (ISBN 0717625346).
Guidance Note EH40 – Occupational Exposure Limits (ISBN 0717621944).
BS EN ISO 10882-1:2001 - health and safety in welding and allied processes - sampling of airborne particles and gases in the operator's breathing zone - part 1: sampling of airborne particles
HSG 37 – An Introduction to Local Exhaust Ventilation. (ISBN 0717610012).
L25 Personal protective equipment at work. Guidance on Regulations. Personal Protective Equipment at Work Regulations 1992. (ISBN 0717604152).
L23 Manual handling. Manual Handling Operations Regulations 1992 (as amended)
BS EN 169:2002 – Personal eye-protection - filters for welding and related techniques - transmittance requirements and recommended use
BS EN 379:2003 – Personal eye-protection - automatic welding filters.
BS EN 12477:2001 Protective Gloves For Welders.
HSG 118 – Electrical Safety in Arc Welding (ISBN 0717607046).

SECTION XVI - OTHER INFORMATION

The customer should provide this Safety Data Sheet to any person involved in the materials use or further distribution. Miller Electric requests the users (or distributors) of this product to read this Safety Data Sheet carefully before usage.

The information contained in this 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 other process.

Miller Electric believes that the information contained in this (SDS) Safety Data Sheet is accurate. However, Miller Electric does not express or imply any warranty with respect to this information.

The product is supplied on the condition that the user accepts the responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use. Freedom from patent rights must not be assumed.