



Titanium Wire

SAFETY DATA SHEET

This Safety Data Sheet (MSDS) is for welding consumables and related products and may be used to comply with OSHA's Hazard Communication standard, 29 CFR 1910.1200, and Superfund Amendments and Reauthorization Act (SARA) of 1986 Public Law 99-499 and Canadian Workplace Hazardous Material Information System (WHMIS) per Health Canada administrative policy. The OSHA standard must be consulted for specific requirements. This Safety Data Sheet complies with ISO 11014-1 and ANSI Z400.1

SECTION 1 – IDENTIFICATION

Manufacturer/Supplier Name: **Unibraze** Telephone: (713) 869-6000
 Address: **1050 Penner Crest Houston TX USA 77055** Emergency: (800)364-6900
 Website: **www.unibraze.com**
 Product Type: **Titanium Welding Wire**
 AWS Specification: **AWS A5.16 / ASME SFA 5.16**
 Trade Name AWS Classification: **ERTi-1, ERTi-2, ERTi-5(6Al/4V), ERTi-7, ERTi-12**

SECTION 2 – HAZARD(S) IDENTIFICATION

IMPORTANT: This section covers the hazardous material from which this product is manufactured. This data has been classified according to the criteria of the Global Harmonized System of Classification and Labeling of Chemicals (GHS) as required and defined in OSHA Hazard Communication Standard (29 CFR Part 1910.1200). The fumes and gases produced during welding with normal use are addressed in Section 8.

Hazard Classification: This product is not classified as hazardous according to applicable GHS hazard classification criteria.

Label Elements: Hazard Symbol – No symbol required Signal Word – No signal word required
 Hazard Statement – Not Applicable Precautionary Statement – Not applicable

Hazardous Ingredient	CAS#	EINCS ₇	Regulatory Hazard Classification/ Designation 67/548/EEC _Δ	IARC _ε	NTP _z	OSHA _H	65 _Θ
Aluminum	7429-90-5	231-072-3	F-R10, R15, R17	-	-	-	-
Chromium	7440-47-3	231-157-5	O - R9; Carc 1 Φ - R45; Muta 2 - R46; Repr 3 - R62; T+ - R26; T - R24/25, R48/23; C - R35, R42/43; N - R50, R53 _Ω	1 _{ΣΣ} , 3 _Σ	K _{ΣΣ}	X _{ΣΣ}	X _{ΣΣ}
Iron	7439-89-6	231-096-4	None	-	-	-	-
Molybdenum	7439-98-7	231-107-2	Xn - R48/20/22; Xi-R36/37x	-	-	-	-
Nickel	7440.02-0	231-111-4	Carc _{3Φ} -R40; T-R43, R48/23	1	K	X	X
Tantalum	7440-25-7	231-135-5	None	-	-	-	-
Tin	7440-31-5	231-141-8	None	-	-	-	-
Titanium	7440-32-6	231-142-3	None	-	-	-	-
Vanadium	7440-62-2	231-141-1	Xn - R20, R48/22; Xi - R41; N - R51, R53 _Ω	2B _{ΩΩ}	-	-	X _{ΩΩ}
Zirconium	7440-67-7	231-176-9	F - R15, R17	-	-	-	-

r-European Inventory of Existing Chemical Substances Number Δ-European Union Directive 67/548/EEC -Annex 1 E -International Agency for Research on Cancer (1 - Human Carcinogen, 2A - Probably Carcinogenic to Humans, 2B - Possibly Carcinogenic to Humans, 3 - Unclassifiable as to Carcinogenicity in Humans, 4 Probably Not Carcinogenic to Humans) Z - US National Toxicology Program (K-Known Carcinogen, S-Suspected Carcinogen) H-OSHA Known Carcinogen List Θ-California Proposition 65 (X - On Proposition 65 list) -- Dashes indicate the ingredient is not listed with the IARC, NTP, OSHA or 65 Φ-Carcinogen, Mutagen or Reproductive Category per European Council Directive 67/548/EEC Annex 1 Σ - Metal and Chromium III Compounds ΣΣ - Chromium VI Compounds ΣΣΣ - Chromium (VI) Trioxide EU 67/548/EEC Classification /Designation Y - Manganese Dioxide EU 67/548/EEC Classification/ Designation X - Molybdenum Trioxide EU 67/548/EEC Classification /Designation Ψ - Silica Crystalline α-Quartz Ω -Vanadium Pentoxide EU 67/548/EEC Classification/Designation ΩΩ - Vanadium Pentoxide

GHS-US Classification

Skin Sens. 1: H317 Muta. 2: H341 Cars. 1B: H350 Repr 2: H361. STOT RE 2: H373 Aquatic Chronic: H412

GHS=US Labeling



GHS07



GHS08

Signal Word (GHS-US): Danger

Hazard Statements (GHS-US):

H317 - May cause an allergic skin reaction
 H341 - Suspected of causing genetic defects
 H350 - May cause cancer H361 - Suspected of damaging fertility or the unborn child
 H373 - May cause damage to organs through prolonged or repeated exposure
 H412 - Harmful to aquatic life with long lasting effects

Precautionary statements (GHS-US):

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
 P261 - Avoid breathing dust/fume/gas/mist/vapors/spray
 P272 - Contaminated work clothing should not be allowed out of the workplace
 P273 - Avoid release to the environment
 P280 - Wear protective gloves/protective clothing/eye protection/face protection
 P302+P352 - IF ON SKIN: Wash with plenty of soap and water
 P308+P313 - IF exposed or concerned: Get medical advice/attention
 P314 - Get medical advice and attention if you feel unwell
 P333+P313 - If skin irritation or rash occurs: Get medical advice/attention
 P362+P364 - Take off contaminated clothing and wash it before reuse
 P405 - Store locked up
 P501 - Dispose of contents/container in accordance with local/regional/national/international regulations.

Warning! Avoid breathing welding fumes and gases, they may be dangerous to your health.
Always use adequate ventilation.
Always use appropriate personal protective equipment.

Primary Routes of Entry: Respiratory System, Eyes and/or Skin.

Arc Rays: The welding arc can injure eyes and burn skin.

Electric Shock: Arc welding & associated processes can kill. See Section 8.

Fumes and Gases: Can be dangerous to your health.

Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedures and electrodes used. Most fume ingredients are present as complex oxides and compounds and not as pure metals. When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 3. Decomposition products of normal operation include those originating from the volatilization, reaction or oxidation of the materials shown in this section, plus those from the base metal and coating, etc., as noted above. Monitor for the materials identified in the list within this section.

Fumes from the use of this product may contain complex oxides or compounds of the following elements and molecules: amorphous silica fume, beryllium, chromium, manganese and nickel. Other reasonably expected constituents of the fume would also include complex oxides of iron and silicon. Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc. Other conditions which also influence the composition and quantity of the 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 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). 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, available from the "American Welding Society", PO. Box 351040, Miami, FL 33135. Also, from AWS is F1.3 "Evaluating Contaminants in the Welding Environment – A Sampling Strategy Guide", which gives additional advice on sampling.

SECTION 3 - COMPOSITION/INFORMATION ON INGREDIENTS

Element	CAS#	EINECS	% Weight
Aluminum	7429-90-5	231-072-3	0-8
Chromium	7440-47-3	231-157-5	0-11
Iron	7439-89-6	231-096-4	0-2
Molybdenum	7439-98-7	231-107-2	0-11.5
Nickel	7440-02-0	231-111-4	0-9
Tantalum	7440-25-7	231-135-5	0-1
Tin	7440-31-5	231-141-8	0-4.5
Titanium	7440-31-5	231-142-3	73-99
Vanadium	7440-62-2	231-171-1	0-13
Zirconium	7440-67-7	231-176-6	0-6

SECTION 4 – FIRST AID MEASURES

Inhalation: If breathing is difficult provide fresh air and contact physician

Eye/Skin injuries: For radiation burns, see physician.

Section 11 covers the acute effects of overexposure to the various ingredients within the welding consumable. Section lists exposure limits and covers methods to protect yourself and others.

SECTION 5 - FIRE FIGHTING MEASURES

Welding consumable applicable to this sheet as shipped are nonreactive, nonflammable, nonexplosive and essentially nonhazardous until welded.

Welding arcs and sparks can ignite combustibles and flammable products. Unused welding consumables may remain hot upon completion of the welding process.

See American National Standard (ANSI) Z49.1 for additional safety information on the use and handling of welding consumables and associated procedures.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Solid objects can be picked up and placed into a container. Wear proper personal protective equipment while handling. No not deposit as general trash.

SECTION 7 - HANDLING AND STORAGE

Handling: No specific requirements in the form supplied. Handle with care to avoid cuts. Wear gloves when handling consumables. Avoid exposure to dust Do not ingest. Some individuals can develop an allergic reaction to certain materials. Retain all warning and product labels.

Storage: Keep separate from acids and strong bases to prevent possible chemical reaction.

SECTION 8 - EXPOSURE CONTROL AND PERSONAL PROTECTION

Read and understand the instructions and the labels on the packaging. Welding fumes do not have a specific OSHA PEL or ACGIH TLV>

The OSHA PEL for Particulate – Not otherwise classified (PNOC) is 5mg/m³ – Total Dust. The ACGIH TLV for Particles – Not otherwise specified (PNOC) is 3mg/m³

Respirable Particles, 10mg/m³-Inhalable particles. The individual complex compounds with the fume may have a lower OSHA PEL or ACGIH TLV that the OSHA Particulate – Not otherwise specified (PNOS). An Industrial hygienist, the OSHA Permissible Exposure Limits for Air Contaminants (29 CFR 1910.1000) and the ACGIH Threshold Limit Values should be consulted to determine the specific fume constituents present and the respective exposure limits.

Ingredient	CAS#	EINECS	OSHA PEL	ACGIH TLV	EU OEL
Aluminum###	7429-90-5	231-072-3	5 R* (dust)	1 R* {A4}	4I*; 5 R* - Germany
Chromium#	7440-47-3	231-157-5	1 (Metal) 0.5 (Cr II Cr III compounds) 0.005 (Cr VI compounds)	0.5 (Metal) {A4} 0.5 (Cr III compounds){A4} 0.05 (Cr VI Sol compounds) {A1} 0.01 (Cr VI Insol Compounds) {A1}	0.1 I* (Aerosol) Switzerland 0.005; 0.01*** - Denmark 0.0005 (Total Aerosol); 0.015*** (Total Aerosol)
Iron+	7439-89-6	231-096-4	5 R*	5 R* (Fe ₂ O ₃) {A4}	3 R* (Aerosol as Fe ₂ O ₃) – Switzerland 7*** (as Fe ₂ O ₃) - Denmark
Molybdenum	7439-98-7	231-107-2	5 R*	3 R*; 10 I* (Ele and Insol) 0.5 R* (Sol Compounds) {A3}	3 R* - Spain 4; 10*** - Poland
Nickel#	7440-02-0	231-111-4	1 (Metal) 1 (Sol. Compounds) 1 (Insol. Compounds)	1.5 I* (Ele) {A5} 0.1 I* Sol Compounds) {A4} 0.2 I* (Insol Compounds) {A1}	0.05; 0.1*** - Denmark
Tantalum	7440-25-7	231-135-5	5 mg/m ³		
Tin	7440-31-5	231-141-8	2 mg/m ³		
Titanium+	7440-31-5	231-142-3	5 R*	3 R*	1.5 R* (as TiO ₂) - Germany
Vanadium	7440-62-2	231-171-1	0.1 CL** (Fume as V ₂ O ₅) 0.5 R* (Fume as V ₂ O ₅)	.05 I* (as V) {A3}	0.5 I* (Aerosol) 1 I*** (Aerosol) – Austria 0.01 (as V ₂ O ₅); 0.03*** (as V ₂ O ₅) - Netherlands
Zirconium	7440-67-7	231-176-9	5 (Zr compounds)	5, 10 STEL*** {Zr Compounds} {A4}	1 I* (Aerosol); 0.1 I*** (Aerosol) Germany

R* - Respirable Fraction R*** - Respirable Fraction - Short Term Exposure Limit I' - Inhalable Fraction I*** - Inhalable Fraction, Short Term Exposure Limit** - Ceiling Limit *** - Short Term Exposure Limit + As a nuisance particulate covered under "Particulates Not Otherwise Regulated" by OSHA or "Particulates Not Otherwise Classified" by ACGIH +- Crystalline silica is bound within the product as it exists in the package. However, research indicates silica is present in welding fume in the amorphous (noncrystalline) form # - Reportable material under Section 313 of SARA ### - Reportable material under Section 313 of SARA as dust or fume ■ - NIOSH REL TWA and STEL *; Listed under ACGIH Nonce of Intended Changes for Mn in 2010 ♦♦ Limit of 0.02 mg/m³ is proposed for Respirable Mn in 2011 by ACGIH Ele - Element SOI- Soluble Insol-Insoluble Inorg -Inorganic Cpnds - Compounds NOS - Not Otherwise Specified {A1} - Confined Human Carcinogen per ACGIH {A2} - Suspected Human Carcinogen per ACGIH {A3} - Confirmed Animal Carcinogen with Unknown Relevance to Humans per ACGIH {A4} - Not Classifiable as a Human Carcinogen per ACGIH {A5} - Not Suspected as a Human Carcinogen per ACGIH (noncrystalline) form.

Ventilation: Use enough ventilation, local exhaust at the arc or both to keep the fumes and gases below the PEUTLV/OELs in the worker's breathing zone and the general area. Train the welder to keep his head out of the fumes.

Respiratory Protection: Use NIOSH approved or equivalent fume respirator or air supplied respirator when welding in confined space or where local exhaust or ventilation does not keep exposure below the regulatory limits.

Eye Protection: Wear helmet or use face shield with filter lens. As a rule of thumb begin with Shade Number 14. Adjust if needed by selecting the next lighter and/or darker shade number. Provide protective screens and Hash goggles, if necessary, to shield others from the weld arc Hash.

PROTECTIVE CLOTHING: Wear hand, head and body protection which help to prevent injury from radiation, sparks and electrical shock. See ANSI Z49.1. At a minimum this includes welder's gloves and a protective face shield, and may include arm protectors, aprons, hats, shoulder protection as well as dark nonsynthetic clothing. Train the welder not to touch live electrical parts and to insulate himself from work and ground.

Procedure for Cleanup of Spills or Leaks: Not applicable

Special Precautions (IMPORTANT): Maintain exposure below the PEL/TLV/OEL. Use industrial hygiene monitoring to ensure that your use of this material does not create exposures which exceed PEUTLV/OEL. Always use exhaust ventilation. Refer to the following sources for important additional information: American National Standard (ANSI) Z49.1; Safety in Welding and Cutting published by the American Welding Society, P.O. Box 351040, Miami, FL 33135 and OSHA Publication 2206 (29 CFR 1910), U.S. Government Printing Office, Washington, DC 20402.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Welding consumables applicable to this sheet as shipped are nonreactive, nonflammable, nonexplosive and essentially nonhazardous until welded.

Physical State: Solid wire

Odor: N/A

Color: Metallic

Form: Round Wire

SECTION 10 – STABILITY AND REACTIVITY

GENERAL: Welding consumable applicable to this sheet are solid and nonvolatile as shipped. This product is only intended for use per the welding parameters it was designed for. When this product is used for welding, hazardous fumes may be created. Other factors to consider include the base mater, base metal preparation and base metal coatings. All of these factors can contribute to the fume and gases generated during welding. The amount of fume varies with the welding parameters.

Stability: This product is stable under normal conditions. **Reactivity:** Contact with acids or strong bases may cause generation of gas.

SECTION 11 – TOXICOLOGICAL INFORMATION

Short-Term (Acute) Overexposure Effects: Welding Fumes - May result in discomfort such as dizziness, nausea or dryness or irritation of nose, throat or eyes.

Aluminum Oxide -Irritation of the respiratory system.

Chromium -Inhalation of fume with chromium (VI) compounds can cause irritation of the respiratory tract, lung damage and asthma-like symptoms. Swallowing chromium (VI) salts can cause severe injury or death. Dust on skin can form ulcers. Eyes may be burned by chromium (VI) compounds. Allergic reactions may occur in some people.

Iron, Iron Oxide - None are known. Treat as nuisance dust or fume.

Molybdenum -Irritation of the eyes, nose and throat.

Nickel, Nickel Compounds - Metallic taste, nausea, tightness in chest, metal fume fever, allergic reaction.

Titanium Dioxide -Irritation of respiratory system.

Vanadium - Overexposure to the oxide causes green tongue, cough, metallic taste, throat irritation and eczema.

Zirconium - May cause irritation of the eyes, nose and throat due to mechanical effects.

Long-Term (Chronic) Overexposure Effects: Welding Fumes - Excess levels may cause bronchial asthma, lung fibrosis, pneumoconiosis or "siderosis."

Aluminum Oxide - Pulmonary fibrosis and emphysema.

Chromium - Ulceration and perforation of nasal septum. Respiratory irritation may occur with symptoms resembling asthma. Studies have shown that chromate production workers exposed to hexavalent chromium compounds have an excess of lung cancers. Chromium (VI) compounds are more readily absorbed through the skin than chromium (III) compounds. Good practice requires the reduction of employee exposure to chromium (III) and (VI) compounds.

Iron, Iron Oxide Fumes - Can cause siderosis (deposits of iron in lungs) which some researchers believe may affect pulmonary function. Lungs will clear in lime when exposure to iron and its compounds ceases. Iron and magnetite (Fe3O4) are not regarded as fibrogenic materials.

Molybdenum - Prolonged overexposure may result in loss of appetite, weight loss, loss of muscle coordination, difficulty in breathing and anemia.

Nickel, Nickel Compounds - Lung fibrosis or pneumoconiosis. Studies of nickel refinery workers indicated a higher incidence of lung and nasal cancers.

Titanium Dioxide - Pulmonary irritation and slight fibrosis.

Vanadium - Prolonged overexposure to vanadium pentoxide can cause nasal catarrh or nose bleeds and chronic respiratory problems.

Zirconium - May cause pulmonary fibrosis and pneumoconiosis.

Medical Conditions Aggravated by Exposure: Persons with pre-existing impaired lung functions (asthma-like conditions). Persons with a pacemaker should not go near welding and cutting operations until they have consulted their doctor and obtained information from the manufacturer of the device. Respirators are to be worn only after being medically cleared by your company designated physician.

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross. If irritation or flash burns develop after exposure, consult a physician.

Carcinogenicity: Beryllium, chromium VI compounds and nickel compounds are classified as IARC Group 1 and NTP Group K carcinogens. Chromium VI compounds and welding fumes must be considered as carcinogens under OSHA (29 CFR 1910.1200).

California Proposition 65: WARNING: These products contain or produce a chemical known to the State of California to cause cancer and birth defects (or other reproductive harm). (California Health & Safety Code Section 25249.5 et seq.)

SECTION 12 – ECOLOGICAL INFORMATION

Welding processes can release fumes directly to the environment. Welding wire can degrade if left outside and unprotected. Residues from welding consumables and processes could degrade and accumulate in the soil and groundwater.

SECTION 13 – DISPOSAL CONSIDERATIONS

Use recycling procedures if available. Discard any product, residue, packaging, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state and local regulations.

SECTION 14 – TRANSPORT INFORMATION

No international regulations or restrictions are applicable. No special precautions are necessary.

SECTION 15 – REGULATORY INFORMATION

Read and understand the manufacturer's instructions, your employer's safety practices and the health and safety instructions on the label and the material safety data sheet. Observe all local and federal rules and regulations. Take all necessary precautions to protect yourself and others.

United States EPA Toxic Substance Control Act: All constituents of these products are on the TSCA inventory list or are excluded from listing.

CERCLAISARA TITLE III: Reportable Quantities (RQs) and/or Threshold Planning Quantities (TPQs):

• Ingredient Name	Rq (lb)	TPQ (lb)
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Products on this SDS are a solid solution in the form of a solid article.

Spills or releases resulting in the loss of any ingredient at or above its RQ require immediate notification to the National Response Center and to your Local Emergency Planning Committee.

Section 311 Hazard Class

As shipped: Immediate

In Use: Immediate delayed

EPCRA/SARA TITLE 111313 Toxic Chemicals: The following metallic components are listed as SARA 313 "Toxic Chemicals" and potentially subject to annual SARA 312 reporting: Beryllium, Chromium, Copper, Manganese and Nickel. See Section 3 for weight percentage.

Canadian WHMIS Classification: Class 0; Division 2, Subdivision A

Canadian Environmental Protection Act (CEPA): All constituents of these products are on the Domestic Substance List (DSL).

SECTION 16 – OTHER INFORMATION

The following Risk and Safety Phrase Texts and Hazard Statements correspond with the columns labeled - EU 67/548/EEC within Section 2 of This safety data sheet.

Take appropriate precautions and protective measures to eliminate or limit the associated hazard.

Cadmium Statement: Cadmium is not a normal contaminant in aluminum alloys and neither it nor any of its compounds are used in the manufacture of this product

EU Directive 67/548/EEC - Risk Phrase Texts

R9: Explosive when mixed with combustible material	R43: May cause sensitization by skin contact
R20/22: Harmful by inhalation and if swallowed	R45: May cause cancer
R24/25: Toxic in contact with skins and if swallowed	R46: May cause heritable genetic damage
R26: Very toxic by inhalation	R48/20: Harmful–danger of serious damage to health by prolonged exposure through inhalation
R35: Causes severe burns	R48/20/22: Harmful-danger of serious damage to health by prolonged exposure through inhalation and if swallowed
R36/37: Irritating to eyes and respiratory system	R48/23: Toxic-danger of serious damage to health by prolonged exposure through inhalation
R40: Limited evidence of a carcinogenic effect	R50: Very toxic to aquatic organisms
R40/20 Harmful-possible risk of irreversible effect through inhalation	R53: May cause long term adverse effect in the aquatic environment
R42/43: May cause sensitization by inhalation and skin contact	R62: Possible risk of impaired fertility

For additional information please refer to the following sources:

USA: American National Standard (ANSI) Z49.1 "Safety in Welding and Cutting", ANSI/American Welding Society (AWS) F1.5 "Methods for Sampling and Analyzing Gases from Welding and Allied Processes", ANSI/AWS F1.1 "Method for Sampling Airborne Particles Generated by Welding and Allied Processes", AWSF3.2M/F3.2 "Ventilation Guide for Weld Fume", American Welding Society, 550 North Le Jeune Road, Miami, Florida, 33135. Safety and Health Fact Sheets available from AWS at www.aws.org. OSHA Publication 2206 (29 C.F.R. 1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954. Threshold Limit Values and Biological Exposure indices, American Conference of Governmental Hygienists (ACGIH), 6500 Glenway Ave., Cincinnati, Ohio 45211, USA. NFPA 51 B "Standard for Fire Prevention during Welding, Cutting and Other Hot Work" published by the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169.

UK: WMA Publication 236 and 237, "Hazards from Welding Fume", "The arc welder at work, some general aspects of health and safety".

Canada: CSA Standard CAN/CSA-W112.2-01 "Safety in Welding. Cutting and Allied Processes".

LIABILITY-DISCLAIMER:

Unibraz does not assume liability whatsoever for the accuracy or completeness of the information contained in this MSDS.

The information contained is accurate to the best of our knowledge. The final suitability of any material is the responsibility of the user. Materials may present unknown hazards and are intended for use by qualified individuals experienced and trained in welding safety.