



MSDS Name	Titanium Alloys
Revised	July 2012

MATERIAL SAFETY DATA SHEET (MSDS)

For Welding Consumables and Related products
Conforms to OSHA Hazard Communication Standard 29CFR 191.1200
Standard Must Be Consulted for Specific Requirements

Section I – Identification

Supplier: Universal Wire Works Inc.	Telephone Number: 713-649-3828
Address: 15 Drennan St, Houston, TX 77003	Emergency Number: 713-649-3828
Classifications: ERTi-1, ERTi-2, ERTi-3, ERTi-4, ERTi-5, ERTi-5ELI, ERTi-6, ERTi-7, ERTi-9ELI, ERTi-12, ERTi-15	Specifications: AWS A5.16 AMS 4951, 4954, 4956, 4953, 4955

Section II – Hazardous Materials*

IMPORTANT: This section covers the materials for which the product was manufactured. The fumes and gases produced during welding with the normal use of this product are covered.

*The term "Hazardous Materials" should be interpreted as a term required and 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.

Flux or other Ingredients	% Of Weight	CAS No.	Exposure Limit (mg/m ³)	
			OSHA PEL	ACGIH TLV
Aluminum (Al) ^{a, c}	≤ 6.7	7429-90-5	15 T/5 R/ 5 F	5 R/ 10 T
Molybdenum (Mo) ^a	≤ 1.5	7439-98-7	5/ 15 T	5/ 15
Nickel (Ni) ^c	≤ 0.9	7440-02-0	.015	1
Tantalum (Ta) ^a	≤ 0.1	7440-25-7	5	5
Chromium (Cr) ^c	≤ 11.0	7440-47-3	.01 (as Cr VI)	0.05 (as Cr VI)
Tin (Sn)	≤ 3.0	7440-31-5	2	2
Iron (Fe) ^a	.01 - .05	7439-89-6	5 OF	10 T
Vanadium (V) ^a	≤ 4.5	7440-62-2	.5 T, F	.5 T, F
Titanium (Ti)	Balance	7440-32-6	NE	NE

a = Exposure limits for oxides, dust, fume and mists where applicable F=Fume R=Respirable fraction T=Total dust
OF=Oxide Fume * = Ceiling limit ^c = "WARNING: This product contains or produces a chemical known to the State of California to cause cancer or birth defects (or other reproductive harm). (California Health and Safety Code § 25249.5 et seq.)" NE=Not Established.

Section III – Physical

Welding consumables applicable to this sheet as shipped, consist of odorless, solid rods or wire, which have a metallic luster. As shipped, these products are nonflammable, non-explosive, non-reactive, and non-hazardous.

Section IV – Fire and Explosion Hazard

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, P.O. Box 351040, Miami, FL, 33135, and NFPA 51B “*Cutting and Welding Processes*,” published by the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269 for additional fire prevention and protection information.

Section V – Health Hazard Data

Welding fumes and gases can be dangerous to your health. Electric shock can kill you. Arc rays can injure eyes and burn skin. Noise can damage hearing.

Route of overexposure: The primary route of entry of the decomposition products is by inhalation. Skin contact, eye contact, and ingestion are possible.

Effects of Acute (Short-Term) Overexposure: Short-term (acute overexposure to the gases, fumes, and dusts may include irritation of the eyes, lungs, nose, and throat. Some toxic gases associated with welding may cause pulmonary edema, asphyxiation, and death. Acute overexposure may include signs and symptoms such as watery eyes, nose and throat irritation, headache, dizziness, difficulty in breathing, frequent coughing, or chest pain. The presence of chromium/chromate in fume can cause irritation of nasal membranes and skin. The presence of nickel compounds in fume can cause metallic taste, nausea, tightness of chest, fever, and allergic reaction.

Excessive inhalation or ingestion of manganese can produce manganese poisoning. Overexposure to manganese compounds may affect the central nervous system, symptoms of which are languor, sleepiness, muscular weakness, emotional disturbances, and spastic gait resembling Parkinsonism. These symptoms can become progressive and permanent if not treated. Excessive inhalation of fumes may cause “Metal Fume Fever” with Flu-like symptoms such as chills, fever, body aches, vomiting, seating, etc.

Pre-existing Medical Conditions Aggravated by Overexposure: Individuals with allergies or impaired respiratory function may have symptoms worsened by exposure to welding fumes.

Effects of Chronic (Long-Term) Overexposure: Long-term (Chronic 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. Nickel and chromium are considered carcinogenic. Long-term overexposure to nickel fumes may also cause pulmonary fibrosis and edema. Overexposure to manganese compounds may affect the central nervous system, symptoms of which are languor, sleepiness, muscular weakness, emotional disturbances, and spastic gait.

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CARCINOGENICITY: Certain hexavalent chromium compounds, nickel metal and compounds and respirable crystalline silica are listed in the National Toxicology Program (NTP) Annual Report on Carcinogens, found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs, or listed by OSHA/ACGIH as potential.

California proposition 65: This product contains or produces a chemical known to the state of California to cause cancer and birth defects (or other reproductive harm). (California Health and Safety Code § 25249.5 et seq.)

EU RoHS: Welding wire and electrodes contain Chromium. When welded Welding Products will produce Cr VI (hexavalent chrome), however, the weld deposit does not contain Cr VI as it will all be in the zero valent state or as Cr II as an oxide. Finished products manufactured using welding wire and electrodes will not contain Cr VI.

VI – Reactivity Data

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedure and welding consumables 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 welded (i.e. paint, painting, galvanizing), the number of welder, the volume of the work area, the quality and the amount of ventilation, the position of the welders head with respect to the

fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from the cleaning and degreasing activities).

When an electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section II. Fume and gas composition, 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. Decomposition products of normal operation include those origination from the volatilization, reaction or oxidation of the material shown in Section II, plus those from the base metal coating, etc., as noted above.

Most welding, even with primitive ventilation, does not produce exposures within the welding helmet above 5mg/m³. That which does should be controlled.

Section VII – Spill or Leak Procedures

This product is not hazardous per 49 CFR 172.101 by the U.S. Department of Transportation

Section VIII – Special Protection Information

Ventilation: Use enough ventilation, local exhaust at the arc (or flame), or both, to keep the fumes and gases below the PEL's, TLV's and STEL's in the workers breathing zone and general area. Train the employee to keep his head out of the fumes. See ANSI/ASC Z49.1 Section 5.

Respirator Protection: Use respirable fume respirator or air-supplied respirator when welding in confined area, or where local exhaust or ventilation does not keep exposure below TLV/PEL. Respirator selection and use should be based on contaminant type, form and concentration. Follow OSHA 1910.134, OSHA 1910.1026, ANSI Z88.2 and good industrial Hygiene practice.

IMPORTANT: SPECIAL VENTILATION AND/OR EXHAUST REQUIRED: Overexposure to manganese can irreversibly affect the central nervous system resulting in impaired speech and movement. Fumes from the normal use of this product contain manganese compounds. The TLV (Threshold Limit Value) for manganese exposure, 0.2 mg/m³, may be exceeded. Use enough ventilation, local exhaust and respirators to keep the workers' breathing zone and general area below the TLV for exposure to manganese.

Eye Protection: Arc Rays can injure your eyes. Wear helmet or face shield with filter lens of appropriate shade number. See ANSI/ASC Z49.1 Section 4.2. Provide protective screens and flash goggles, if necessary, to shield others.

Protective Clothing: Wear head and body protection, which help to prevent injury from radiation, sparks, flame 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 substantial clothing. Train the employee not to touch live electrical parts and to insulate him/herself from work and ground. Welders should not wear short sleeve shirts or short pants.

Waste Disposal Method: Prevent waste for contamination surrounding environment. Discard any product of residue in a disposable container or liner in an environmentally approved manner under full compliance with federal, state and local regulations.

Emergency First Aid: Remove from dust of fume exposure immediately and seek medical attention. If breathing has stopped perform artificial respiration and summon emergency medical aid.

For other precaution or additional safety information on welding and cutting, see American Standard Z49.1-1980, *Safety in Welding and Cutting*, and the *Welding Handbook*, Volume 1, Chapter 9, Safe Practices in Welding and Cutting. Both available from the American Welding Society, Inc. 550 N.W. Le Jeune Road, P.O. Box 351040, Miami, FL 33135

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