

Revised 7/2/2004

MATERIAL SAFETY DATA SHEET

For Welding Consumable and Related Products
 Essentially Similar to U.S. Department of Labor Form OSHA 20
 (to comply with OSHA Hazard Communication Standard 29 CFR 1910,1200)

SECTION I – IDENTIFICATION

Manufactured For: FREEDOM ALLOYS
Address: P.O. BOX 1478
 CYPRESS, TX 77410-1478
Emergency Phone: CHEM-TEL, INC. (800) 255-3924

Trade Name	Specification	Product Type
TYPE I: E70T-3, E70T-4, E71T-GS, E71T-11	AWS A5.20	Carbon steel electrodes for flux cored arc welding without external gas shielding
TYPE II: E70T-1, E71T-1, E70T-2, E71T-9, E70T-9 E80T1-B2, E81T1-A1, E81T1-B2, E81T1-k2, E81T1-NiJ, E81T1-Ni2, E90T-B3, E90T1-B3 E90T1-D3, E90T5-K2, E91T1-B3, E91T1-K2 E91T1-Ni2, E100T1-K3, E101T1-K3, E110T1-K3 E110T5-K3, E111T1-K3, E120T5-K4	AWS A5.20 AWS A5.29	Carbon steel electrodes for flux cored arc welding with external gas shielding Low alloy steel electrodes for flux cored arc welding with external gas shielding
TYPE III: E70C-3M, E70C-6M E80C-G, E90C-B3, E100C-G, E110C-G	AWS A5.18 AWS A5.28	Carbon steel solid and composite metal cored electrodes for gas shielded arc welding Low alloy steel composite metal cored electrodes for gas shielding arc welding
TYPE IV: EC409, EC409Cb, 439	AWSA5.9	Stainless steel solid and composite metal cored electrodes for gas shielded arc welding

SECTION II – HAZARDOUS INGREDIENTS/Identity Information

This section covers the materials from which the product is manufactured. The fumes and gases produced during welding with normal use of this product are covered in Section 5. The term "Hazardous Ingredients" should be interpreted as a term required and defined in OSHA Hazard Communication Standard (29 CFR 1910. 1200). **The following chemicals are subject to reporting under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986: aluminum (fume or dust), and compounds of barium, chromium, copper, manganese and nickel.** Refer to this section for the presence and concentration of these chemicals for a particular product.

Ingredient	% Weight	CAS No.	OSHA PEL (mg/m3)	ACGIH TLV (mg/m3)
TYPE I:				
Iron	80-95	7439-89-6	5 (Respirable Fraction)	10
Manganese	0.5-2	7439-96-5	6 (Ceiling Limit)	0.2
Titanium Dioxide	0-3	13463-67-7	5 (Respirable Fraction)	10
Silicon	0-2	7440-21-3	5 (Respirable Fraction)	10
Fluorspar	2-12	7789-75-5	2.5 (as F)	2.5 (as F)
Aluminum	1-5	7429-90-5	5 (Respirable Fraction)	10
Magnesium	1-3	7439-95-4	5 (Respirable Fraction)	10
Barium Fluoride (present only in 701 & 700GS)	1-5	7787-32-8	0.5 (as Ba)	0.5 (as Ba)

Ingredient	% Weight	CAS No.	OSHA PEL (mg/m3)	ACGIH TLV (mg/m3)
TYPE II:				
Iron	75-95	7439-89-6	5 (Respirable Fraction)	10
Manganese	1-4	7439-96-5	5 (Ceiling Limit)	0.2
Titanium Dioxide	4-10	13463-67-7	5 (Respirable Fraction)	10
Silicon	0.5-3	7440-21-3	5 (Respirable Fraction)	10
Fluorspar	0-2	7789-75-5	2.5 (as F)	2.5 as (F)
Nickel	0-4	7440-02-0	1	1.5 (Metal)
Chromium	0-10	7440-47-3	1	0.5
Molybdenum	0-2	7439-98-7	5 (Respirable Fraction)	10
Copper	0-1	7440-50-9	1 (Dust)	1 (Dust)
TYPE III:				
Iron	80-98	7439-89-6	5 (Respirable Fraction)	10
Manganese	1-4	7439-96-5	5 (Ceiling Limit)	0.2
Silicon	0-3	7440-21-3	5 (Respirable Fraction)	10
Nickel	0-4	7440-02-0	1	1.5 (Metal)
Chromium	0-3	7440-47-3	1	0.5
Molybdenum	0-2	7439-98-7	5 (Respirable Fraction)	10
Copper	0-1	7440-50-8	1 (Dust)	1 (Dust)
TYPE IV:				
Iron	80-95	7439-89-6	5 (Respirable Fraction)	10
Manganese	<1	7439-96-5	5 (Ceiling Limit)	0.2
Chromium	11-20	7440-47-3	1	0.5
Titanium	<1.5	7440-32-6	5 (Respirable Fraction)	10
Silicon	<1	7440-21-3	5 (Respirable Fraction)	10
Nickel	0-5	7440-02-0	1	1.5 (Metal)
Molybdenum	<1	7439-98-7	5 (Respirable Fraction)	10
Titanium Dioxide	Present only in 410 & 410NiMo-T1	13463-67-7	5 (Respirable Fraction)	10 2.5 (as F)
Fluorspar	0-2	7789-75-5	2.5 (as F)	

SECTION III – PHYSICAL DATA
NOT APPLICABLE

SECTION IV – FIRE AND EXPLOSION HAZARD DATA

Welding arc and sparks can ignite combustibles and flammables. Refer to American National Standard Z149.1 for fire prevention during the use of welding and allied procedures.

SECTION V – HEALTH HAZARD DATA

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. 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). When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 2. Decomposition products of normal operation include those originating from the volatilization, reaction or oxidation of the materials shown in Section 2, plus those from the base metal and coating, etc, as noted above. It is understood, however, that the elements and/or oxides to be mentioned are virtually always present as complex oxides and not as metals (See Characterization of Arc Welding Fume, from the American Welding Society). The elements or oxides listed below correspond to the ACGIH categories found in the "Threshold Limit Values for Chemical Substances and Physical Agents" published by ACGIH. Reasonably expected constituents of the fume would include: complex oxides of iron, manganese, silicon and titanium. Types, I, II, Select 410 and 410NiMo-T1 may have fluorides present. Types II and III may also contain chromium and/or nickel. Type IV contains chromium and may contain nickel.

Ingredient	CAS No.	OSHA PEL (mg/m3)	ACGIH TLV (mg/m3)
TYPE I: Iron Oxide Manganese Compounds (as Mn) Titanium Dioxide Silica Fluorides Magnesium Oxide Aluminum Oxide Barium Compounds (present only in 70I & 700 GS)	1309-37-1 7439-96-5 13463-67-7 60676-67-7 1309-48-4 1344-28-1 7440-39-3	10 (as Fe) 5 (Ceiling Limit, as Fume) 5 (Respirable Fraction) 0.1 2.5 (as F) 5 (Respirable Fraction) 5 (Respirable Fraction) 0.5 (soluble, as Ba)	5 (as Fe) 0.2 10 2 (Respirable, Fume) 2.5 (as F) 10 5 (Fume) 0.5 (as Ba)
TYPE II: Iron Oxide Manganese Compounds (as Mn) Titanium Dioxide Silica Fluorides Nickel Compounds (Soluble) Nickel Compounds (Insoluble) Chromium Oxide (as Cr II, Cr III) Chromium (insoluble, as Cr VI) Molybdenum Compounds (as Mo) Copper Compounds (as Cu)	1309-37-1 7439-96-5 13463-67-7 60676-67-7 7439-98-7 7440-50-8	10 (as Fe) 5 (Ceiling Limit, as Fume) 5 (Respirable Fraction) 0.1 2.5 (as F) 1 (as Ni) 1 (as Ni) 0.5 (as Cr II, Cr III) 0.1 (Ceiling Limit, as Cr VI) 5 (Respirable Fraction) 0.1 (Fume)	5 (as Fe) 0.2 10 2 (Respirable, Fume) 2.5 (as F) 0.1 (as Ni) 0.2 (as Ni), A1 0.5 (as Cr II, Cr III) 0.01, A1 10 0.2 (Fume)
TYPE III: Iron Oxide Manganese Compounds (as Mn) Silica Nickel Compounds (Soluble) Nickel Compounds (Insoluble) Chromium Oxide (as Cr II, Cr III) Chromium (insoluble, as Cr VI) Molybdenum Compounds (as Mo) Copper Compounds (as Cu)	1309-37-1 7439-96-5 60676-67-7 7439-98-7 7440-50-8	10 (as Fe) 5 (Ceiling Limit, as Fume) 0.1 1 (as Ni) 1 (as Ni) 0.5 (as Cr II, Cr III) 0.1 (Ceiling Limit, as Cr VI) 5 (Respirable Fraction) 0.1 (Fume)	5 (as Fe) 0.2 2 (Respirable, Fume) 0.1 (as Ni) 0.2 (as Ni), A1 0.5 (as Cr II, Cr III) 0.01, A1 10 0.2 (Fume)
TYPE IV: Iron Oxide Manganese Compounds (as Mn) Silica Nickel Compounds (Soluble) Nickel Compounds (Insoluble) Chromium Oxide (as Cr II, Cr III) Chromium (insoluble, as Cr VI) Molybdenum Compounds (as Mo) Titanium Dioxide Present only in 410 & Fluorides 410NiMo-T1	1309-37-1 7439-96-5 60676-67-7 7439-98-7 13463-67-7	10 (as Fe) 5 (Ceiling Limit, as Fume) 0.1 1 (as Ni) 1 (as Ni) 0.5 (as Cr II, Cr III) 0.1 (Ceiling Limit, as Cr VI) 5 (Respirable Fraction) 5 (Respirable Fraction) 2.5 (as F)	5 (as Fe) 0.2 2 (Respirable, Fume) 0.1 (as Ni) 0.2 (as Ni), A1 0.5 (as Cr II, Cr III) 0.01, A1 10 10 2.5 (as F)

A1 – Confirmed Human Carcinogen

Gaseous reaction products 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, available from the American Welding Society, PO Box 351040. Miami, FL 33135. Also available from AWS is F1.3, "Evaluating Contaminants in the Welding Environment – A Sampling Strategy Guide", which gives additional advice on sampling. At a minimum materials listed in this section should be analyzed.

SECTION VI – REACTIVITY DATA

The exposure level for welding fume has been established at 5 mg/m³ with ACGIH's TLV. See Section 5 for specific fume constituents which may modify the TLV.

Effects of overexposure – Electric arc welding may create one or more of the following health hazards: **ARC RAYS** can injure eyes and burn skin. **ELECTRIC SHOCK** can kill. See Section 7. **FUMES AND GASES** can be dangerous to your health.

PRIMARY ROUTES OF ENTRY are the respiratory system, eyes and/or skin.

Short-term (acute) overexposure effects Welding Fumes - May result in discomfort such as dizziness, nausea or dryness or irritation of the nose, throat or eyes. **Iron, Iron Oxide** – None are known. Treat as a nuisance dust or fume. **Manganese** – Metal fume fever characterized by chills, fever, upset stomach, vomiting, irritation of throat and aching of body. **Fluorides** – Fluoride compounds evolved may cause skin and eye burns, pulmonary edema and bronchitis. **Nickel, Nickel Compounds** – Metallic taste, nausea, tightness in chest, fever, allergic reactions. **Chromium** – Inhalation of fume with chromium VI compounds can cause irritation of the respiratory system, lung damage and asthma-like symptoms. Swallowing chromium VI salts can cause severe injury or death. Dust on the skin can form ulcers. Eyes may be burned by chromium VI compounds. Allergic reactions are likely in some people from chromium compounds. **Copper** – Metal fume fever can be caused by fresh copper oxide. **Barium** – Aching eyes, rhinitis, frontal headache, wheezing, laryngeal spasms, salivation or anorexia. **Silica** – None are known. Treat as nuisances dust or fume. **Molybdenum** – None are known. Treat as a nuisances dust or fume. **Titanium Dioxide** – None are known. Treat as a nuisances dust or fume. **Aluminum, Aluminum Oxide** – None are known. Treat as a nuisances dust or fume. **Magnesium, Magnesium Oxide** – None are known. Treat as a nuisances dust or fume.

Long term (chronic) overexposure effects Welding Fume – Excess levels may cause bronchial asthma, lung fibrosis, pneumoconiosis, or "siderosis". **Iron, Iron Oxide** – Siderosis or deposits of iron in lungs which is believed to affect pulmonary function. Lungs will clear in time when exposure to iron fumes and its compounds ceases. Iron and magnetite (Fe₃O₄) are not regarded as fibrogenic materials. **Manganese** – Central nervous system effects referred to as "manganism". Symptoms include muscular weakness and tremors. Behavioral changes and changes in handwriting may also appear. Employees overexposed to manganese should receive quarterly medical examinations for early detection of manganism. **Fluorides** – Serious bone erosion (Osteoporosis) and mottling of teeth. **Nickel, Nickel Compounds** – Lung fibrosis or pneumoconiosis. Studies of nickel refinery workers indicated a higher incidence of lung and nasal cancers. **Chromium** – Ulceration and perforation of the nasal septum. Respiratory irritation may occur with symptoms resembling asthma. Studies have shown that chromate production workers exposed to chromium VI 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. **Copper** – No adverse long-term health effects have been reported in the literature. **Barium** – Exposure to soluble barium compounds may cause nervous disorders and may have deleterious effects of the heart, circulatory and muscular system. **Silica** – Treat as nuisance dust. Little adverse effect on lungs. Does not produce significant organic disease or toxic effect when exposures are kept under reasonable control. **Molybdenum** – Treat as a nuisance dust. Little adverse effect on lungs. Does not produce significant organic disease or toxic effect when exposures are kept under reasonable control. **Aluminum, Aluminum Oxide** – Treat as a nuisance dust. Little adverse effect on lungs. Does not produce significant organic disease or toxic effect when exposures are kept under reasonable control. **Magnesium, Magnesium Oxide** – Treat as a nuisance dust. Little adverse effect on lungs. Does not produce significant organic disease or toxic effect when exposures are kept under reasonable control. Electric arc-welding may create one or more of the following health hazards: Fumes and gases can be dangerous to your health.

SECTION VII – SPILL OR LEAK PROCEDURES (See Note)

WASTE DISPOSAL METHOD: Prevent waste from contaminating surrounding environment. Discard any product residue, disposable container or liner in an environmentally acceptable manner, in full compliance with Federal, State and Local regulations.

SECTION VIII – SPECIAL PROTECTION INFORMATION (See Note)

"Read and understand the manufacturer's instructions and the precautionary label on the product. *Ventilation* – Use enough ventilation, local exhaust at the arc, or both, to keep the fumes and gases from the worker's breathing zone and the general area. Train the welder to keep his head out of the fumes. *Respiratory Protection* – Use respirable fume respiratory or air-supplied respirator when welding in a confined space or where local exhaust or ventilation does not keep exposure below a recommended exposure limit. *Eye Protection* – Wear helmet or use face shield with filter lens. Provide protective screens and flash goggles, if necessary, to shield others. As a rule of thumb start with a shade that is too dark to see the weld zone. The go, the next light shade, which gives sufficient view of the weld zone. *Protective Clothing* – Wear hand, head, and body protection that help to prevent injury from radiation, sparks, and electric 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 welder not to touch live electrical parts and to insulate himself from work and ground."

SECTION IX – SPECIAL PRECAUTIONS

OTHER PRECAUTIONS: use exhaust system to clear welding fumes. Make sure that inhaled air does not contain fume constituents above permissible exposure levels.

NOTE: Other precautions for additional safety information on welding and cutting, see American Standard Z49.1-1983, Safety in Welding and Cutting, and the Welding Handbook, Vol. 1, Chapter 9, Safe Practices in Welding and Cutting, both available from American Welding Society, Inc. 550 NW Le Jeune Road, P.O. Box 351040, Miami, FL 33135, Tel. (305) 443-9353.
