



MATERIAL SAFETY DATA SHEET

For Welding Consumables 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

Manufacturer/Supplier Name: UNIBRAZE CORP.
Address: 1050 PENNER CREST, HOUSTON, TX 77055
Emergency Phone: (713) 869-6000, 1-800-364-6900
Product Type: RG60, RG45, ER70S3, ER70S2, ER80SD2, ER70S6, ER70SB2, ER70SB2L (plus all AWS Classifications below)

Nominal Composition of Steel Wires and Rods

<u>C</u>	<u>Mn</u>	<u>Si</u>	<u>Cu</u>	<u>Mo</u>	<u>Cr</u>	<u>Ni</u>	<u>Ti</u>	<u>Al</u>	<u>Zr</u>	<u>V</u>	<u>Fe</u>	<u>AWS Classification</u>
<0.5	1-2	<0.5	--	--	--	--	--	--	--	--	Bal.	A5.2, R60
<0.5	<0.5	<0.1	<0.5	--	--	--	--	--	--	--	Bal.	A5.2, R45
<0.5	1-2	0.5	<0.5	--	--	--	--	--	--	--	Bal.	A5.17, EM13K; A5.18, ER70S-3
<0.5	1-2	0.5	--	--	<0.5	--	--	--	--	--	Bal.	A5.2, R65
<0.5	2	<0.1	<0.5	--	--	--	--	--	--	--	Bal.	A5.17, EH14; A5.25, EH14-EW
<0.5	2	<0.1	<0.5	0.5	--	--	--	--	--	--	Bal.	A5.23, EA3
<0.5	<1	<0.1	<0.5	0.5	--	--	--	--	--	--	Bal.	A5.23, EA1
<0.5	1-2	<0.1	<0.5	0.5	--	--	--	--	--	--	Bal.	A5.23, EA2
<0.5	2	<0.1	<0.5	0.5	--	<1	--	--	--	--	Bal.	A5.23, EF2
<0.5	1-2	<0.5	<0.5	--	--	--	--	--	--	--	Bal.	A5.17, EH12K
<0.5	1-2	0.5	<0.5	--	--	--	<0.1	<0.1	<0.1	--	Bal.	A5.18, ER70S-2
<0.5	<1.5	<1	<0.5	--	--	--	<0.2	--	--	--	Bal.	A5.23, EM14K
<0.5	<1.5	<1	<0.5	--	--	<1.2	--	--	--	--	Bal.	A5.23, ENi1K; A5.28, E80S-Ni1
<0.5	0.5	<0.1	<0.5	--	--	--	--	--	--	--	Bal.	A5.17, EL12; A5.23, EL12
<0.5	1	<0.5	<0.5	--	--	--	--	--	--	--	Bal.	A5.17, EM12K; A5.23, EM12K
<0.5	1-2	0.5	<0.5	--	--	--	--	--	--	--	Bal.	A5.17, EM13K; A5.18, ER70S-3
<0.5	1-2	<1	<0.5	0.5	--	--	--	--	--	--	Bal.	A5.23, EA3K; A5.28, ER80S-D2
<0.5	1-2	<1	<0.5	--	--	--	--	--	--	--	Bal.	A5.18, ER70S-4
<0.5	1-2	<1	<0.5	--	--	--	--	--	--	--	Bal.	A5.18, ER70S-6
<0.5	1-2	<1	<0.5	--	--	--	--	--	--	--	Bal.	A5.18, ER70S-7
<0.5	1-2	<0.5	<0.5	<0.5	0.1	1-2	<0.1	--	--	--	Bal.	A5.23, EM2; A5.28, ER100S-1
<0.5	2	0.1	<0.5	0.5	<0.5	2-3	--	--	--	--	Bal.	A5.23, EF5
<0.5	1-2	<0.5	<0.5	0.5	<0.5	2-3	<0.1	--	--	--	Bal.	A5.23, EM4; A5.28, ER120S-1
<0.5	1-2	<0.5	<0.5	<1	<1	2-3	<0.1	--	--	--	Bal.	NONE
<0.5	<1	0.5	<0.5	1	<1	--	--	--	--	--	Bal.	A5.23, EB5
<0.5	1-2	<0.5	<0.5	<1	--	2-3	<0.1	--	--	--	Bal.	NONE
<0.5	1-2	0.5	<0.5	--	--	--	--	--	--	--	Bal.	NONE
<0.5	<1	<0.5	<0.5	<0.5	--	1-2	--	--	--	--	Bal.	A5.23, ENi4
<0.5	1-2	<1	<0.5	0.5	--	--	<0.1	--	--	--	Bal.	A5.28, ER80S-D2
<0.5	<1.5	<1	<0.5	--	--	--	--	--	--	--	Bal.	A5.18, ER70S-3
<0.5	1-2	<1.2	<0.5	--	--	--	--	--	--	--	Bal.	A5.18, ER70S-6
<0.5	1-2	<1	--	0.1	<1	--	--	--	--	<0.1	Bal.	NONE
<0.5	<1	<0.5	<0.5	<1	1-2	--	--	--	--	--	Bal.	A5.23, EB2
<0.5	<1	<0.5	<0.5	1	2-3	--	--	--	--	--	Bal.	A5.23, EB3
<0.5	0.5	<0.5	<1	--	<1	<1	--	--	--	--	Bal.	A5.23, EW; A5.28, ER80S-G
<0.5	1-2	<1	<0.5	--	--	--	<0.1	--	--	--	Bal.	A5.18, ER70S-G
<0.5	<1.5	<0.5	--	1	8-10	<1	--	--	--	<0.5	Bal.	A5.23, EB9; A5.28, ER90S-B9

The manufacturer requests the users of these products to study this Material Safety Data Sheet (MSDS) and become aware of the product hazards and safety information. To promote the safe use of these products a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for these products, and (3) request that such customers notify their employees and customers, for these products, of the same product hazards and safety information.

SECTION II HAZARDOUS INGREDIENTS/Identity Information

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.**

Material	(CAS No.)	SARA	ACGIH TLV (1998)		OSHA - PEL (1993)		STEL (mg/m ³)
			TWA	(mg/m ³)	TWA	(mg/m ³)	
Aluminum	(7429-90-5)	*	5	(Welding Fume)	5	(Welding Fume)	--
Carbon	(7440-44-0)		3.5	(Carbon Black)	3.5	(Carbon Black)	--
Chromium	(7440-47-3)	*	0.5	(Metal)	1	(Metal)	--
			0.05	(Water Soluble Cr(VI))	C 0.1	(as Chromate)	
			0.01	(Insoluble Cr(VI))			
Copper	(7440-50-8)	*	0.2	(Fume)	0.1	(Fume)	--
Iron	(7439-89-6)		5	(Oxide Fume)	10	(Total Particulate)	--
Manganese	(7439-96-5)	*	0.2	(Fume) C 5 (STEL)	1	(Fume)	3
Molybdenum	(7439-98-7)		5	(Soluble)	5	(Soluble)	--
Nickel	(7440-02-0)	*	0.1	(Soluble)	0.1	(Soluble)	--
Silicon	(7440-21-3)		10	(Dust)	5	(Respirable)	--
Titanium	(7440-32-6)		10	(TiO ₂)	5	(TiO ₂ - Respirable)	--
Vanadium	(7440-62-2)	*	0.05	(V ₂ O ₅ , Fume)	0.05	(V ₂ O ₅ , Fume)	C 0.1
Zirconium	(7440-67-7)		5	(as Zr) 10 (STEL)	5	(as Zr)	10

NOTE: In the ingredients table, an asterisk (*) after the CAS number indicates a toxic chemical subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 (SARA) and 40 CFR Part 372.

Some of these products may not contain all of the materials listed. For details of composition, refer to the COMPOSITION TABLE in Section I.

In the table above, "C" indicates "Ceiling Limit."

SECTION III PHYSICAL DATA

As shipped, these products are nonflammable, non-explosive, non-reactive, and non-hazardous

Physical State: GAS () LIQUID () SOLID (X)

Odor and Appearance: Copper coated or bare, solid steel wire or rod, odorless.

SECTION IV FIRE AND EXPLOSION HAZARD DATA

Welding arc and sparks can ignite combustibles and flammables. Refer to American National Standard Z49.1 for fire prevention during the use of welding and allied procedures.

SECTION V REACTIVITY DATA

Stability: Stable (X) Unstable () Polymerization will not occur

Incompatible products: None currently known

Hazardous decomposition products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the material being worked, the process, procedures and consumables 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 material being worked (such as paint, plating or galvanizing), the number of welding operations and the volume of the work area, the quality and amount of ventilation, the position of the worker'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 or painting activities). When the materials are consumed, 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 ingredients, plus those from the material being worked and the coatings etc. noted above.

Reasonably expected decomposition products from normal use of these products include a complex of the oxides of the materials listed in Section II, as well as carbon monoxide, carbon dioxide, ozone and nitrogen oxides (refer to "Characterization of Arc Welding Fume" available from the American Welding Society). THE TLV FOR MANGANESE (0.2 mg/m³) WILL BE REACHED BEFORE THE GENERAL LIMIT FOR WELDING FUMES OF 5 mg/m³ IS REACHED. The only way to determine the true identity of the decomposition products is by sampling and analysis. The composition and quantity of the fumes and gases to which a worker may be overexposed can be determined from a sample obtained from inside the welder's helmet, if worn, or in the workers breathing zone. See ANSI/AWS F1.1 "Method for Sampling Airborne Particles Generated by Welding and Allied Processes," available from the American Welding Society.

SECTION VI Physical and Health Hazard Data

Electric arc working may create one or more of the following health or physical hazards. 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. Absorption by skin contact is unlikely. When these products are used as recommended, and ventilation maintains exposure to the decomposition products below the limits recommended in this section, overexposure is unlikely.

Effects of acute (short-term) 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.

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 chronic (long-term) 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 the 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 (in some products) 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.

Exposure limits for the ingredients are listed in Section II. The 1989 OSHA TWA for welding fume is 5 mg/m³. TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and excessive concentrations. When these products are used as recommended by, and the preventive measures taught in this MSDS are followed, overexposure to hazardous substances will not occur.

Emergency First Aid Measures: In case of emergency, call for medical aid. Employ first aid technique recommended by the Red Cross. **IF BREATHING IS DIFFICULT**, give oxygen and call for a physician. **FOR ELECTRIC SHOCK**, disconnect and turn off the power. If not breathing, begin artificial respiration, preferably mouth-to-mouth. If no detectable pulse, begin Cardio Pulmonary Resuscitation (CPR). Immediately call a physician. **FOR ARC BURN**, apply cold, clean compresses and call a physician.

Carcinogenic Assessment (NTP Annual Report, IARC Monographs, Other): Nickel and Chromium must be considered possible carcinogens under OSHA (29CFR1910.1200). IARC has indicated Nickel, Chromium and certain of their compounds are probably carcinogenic for humans, but the compounds cannot be specified precisely. Their conclusions were drawn from operations different from welding. Regardless, exposure level must be kept below those levels specified in Section II.

1 WARNING: 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.)

3 WARNING: 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 & Safety Code §25249.5 et seq.)

SECTION VII SPILL OR LEAK PROCEDURES NOT APPLICABLE

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 lime. *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. Then go, the next lighter 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 (See Note)

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 LeJeune Road, P.O. Box 351040, Miami, FL 33135, Tel. (305) 443-9353.

Unibraze Corporation believes that information set forth in this Material Safety Data Sheet is accurate. Unibraze Corp. makes no warranty, expressed or implied, with respect thereto and disclaims any liability from reliance therein.