

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Product type: Solid wires for arc welding
Manufacturer: Metrode Products Ltd.
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Sizes: All

Names:	AWS A5.9:
308S92	ER308L
308S93/SUPERMIG 308LSi	ER308LSi
316S92	ER316L
316S93/SUPERMIG 316LSi	ER316LSi
347S96	ER347
308S96	ER308H
316S96	ER316H
ER16.8.2	ER16-8-2
ER308LCF	ER308L
ER316LCF	ER316L
ER317L	ER317L
318S96	ER318
ER347H	ER347
NAG 19.9.L	ER308L

II. HAZARDOUS MATERIALS

IMPORTANT: This section covers the materials from which this product is manufactured. The fumes and gases produced during normal use of these products are covered in Section V. The term HAZARDOUS should be interpreted as a term required and defined by Laws, Statutes or Regulations, and does not necessarily imply the existence of any hazard when the products are used as directed by Metrode.

Alloying element in wire	CAS No.	Wt. %	OSHA - PEL (mg/m ³)	ACGIH - TLV (mg/m ³)	STEL (mg/m ³)
* Manganese	7439-96-5	< 3	0.5 (fume)	0.2 (fume)	3
* Nickel	7440-02-0	7-15	1	1.5 (metal)	-
			-	0.2 (insol)	-
* Chromium (as Cr)	7440-47-3	14-22	1.0 (metal)	0.5 (metal)	-
			-	0.5 (Cr ^{III})	-
Molybdenum (as Mo)	7439-98-7	< 4	5 (sol)	5 (sol)	10
Iron	7439-89-6	50-60	10	5 (oxide)	10
Copper	7440-50-8	< 0.5	0.1 (fume)	0.2 (fume)	-
Niobium/columbium (as Nb/Cb)	7440-03-1	< 1	10	10	10

* Subject to the reporting requirements of sections 311, 312, 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

III. PHYSICAL DATA

As shipped, these welding consumables are non-explosive, non-reactive and non-hazardous. Physical state is solid and odourless.

IV. FIRE AND EXPLOSION HAZARD

Flammable/explosive: NO

Under what conditions: Only the packaging for this product will burn.

Extinguishing Media: This product will not burn. However, welding arcs and sparks can ignite combustible and flammable materials. 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 518 "Cutting and Welding Processes", published by the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269 for additional fire prevention and protection information.

V. REACTIVITY DATA

Stability: Stable

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 vapours 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 volatilisation, reaction or oxidation of the ingredients, plus those from the material being worked and the coatings etc. noted above.

Maximum fume exposure guideline and PEL is 3.1 mg/m³, based on Cr^(III) content of welding fume. The OSHA PEL (Permissible Exposure Limit) is a ceiling value that shall not be exceeded at any time.

Keep exposure as low as possible. Indoors, use local exhaust; outdoors, a respirator may be required. In confined spaces, displacement of air by the shielding gas should be taken into consideration. Negligible welding fume is generated by the tungsten inert gas welding process. Ozone and nitrogen oxides may be formed by the radiation from the arc.

Reasonably expected decomposition products from normal use of these products include a complex of the oxides of the material listed in Section II, ozone and nitrogen oxides (refer to "Characterisation of Arc Welding Fume" available from the American Welding Society). 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 Particle Generated by Welding and Allied Processes" available from the American Welding Society.

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 by Metrode Products Ltd., and ventilation monitors 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 oedema, 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 exposure. The changes 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 exposure to nickel fumes may also cause pulmonary fibrosis and oedema. 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 $5\text{mg}/\text{m}^3$. TLV-TWA's 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 Metrode Products Ltd., and the preventative 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.

VII. PRECAUTIONS FOR SAFE HANDLING AND USE/APPLICABLE CONTROL MEASURES

Read and understand the manufacturer's instructions and the precautionary label on this product. See American National Standards Z-49.1 "Safety in Welding and Cutting" published by the American Welding Society, P.O. Box 351040, Miami, FL 33135 and OSHA Publication 2206 (29 C.F.R. 1910) U.S. Government Printing Office, Washington, D.C. 20402 for more detail on many of the following:

Ventilation: Use enough ventilation, local exhaust at the arc, or both to keep the fumes and gases below the TLV's in 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 respirator or air supplied respirator when welding in confined space or where local exhaust ventilation does not keep exposure below TLV.

Eye Protection: Wear helmet or use face shield with filter lens. As a rule of thumb, start with a shade which is too dark to see the weld zone. Then go to the next light shade which gives sufficient view of the weld zone. Provide protective screens and flash goggles, if necessary, to shield others.

Protective Clothing: Wear head, hand and body protection which help to prevent injury from radiation, sparks and electrical shock. See ANSI Z-49.1. 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.

Procedure for Clean-up of Spills or Leaks: 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.

The opinions expressed in this MSDS are those of qualified experts within Metrode Products Ltd. We believe that the information contained herein is current as of the date of this MSDS. Since the use of this information and these opinions and the conditions of use of these products are not within the control of Metrode Products Ltd., it is the user's obligation to determine the conditions of safe use of these products.

MSDS: B-30/XS 08/09