

MATERIAL SAFETY DATA SHEET

Prepared to U.S.OSH, CMA, ANSI and Canadian WHMIS Standards. This Material Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard (29 CFR 1910.1200). Other government regulations must be reviewed for applicability to these products.

WARNING: PRODUCT COMPONENTS PRESENT HEALTH AND SAFETY HAZARDS. READ AND UNDERSTAND THIS MATERIAL SAFETY DATA SHEET (M.S.D.S). ALSO, FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES. This product may contain Chromium or Nickel which are listed by OSHA, NTP, or IARC as being a carcinogen or potential carcinogen. Use of this product may expose you or others to fumes and gases at levels exceeding those established by the American Conference of Governmental Industries Hygienists (ACGIH) or the Occupational Safety and Health Administration (OSHA). The information contained herein relates only to the specific product. If the product is combined with other materials, all component properties must be considered.

SECTION I

1. IDENTIFICATION

TRADE NAME: PAL 308,308L,308LSi,309,309L,309LSi,309LMo,310,316,316L,316LSi,317L,347,410
 CHEMICAL NAME/CLASS: ER308, ER308L, ER308LSi,ER309, ER309L, ER309LSi,
 ER309LMo,ER310,ER316, ER316L, ER316LSi, ER317L, ER347,ER410

CLASSIFICATION: AWS A5.9

SUPPLIER/MANUFACTURER: KT Industries, Inc.

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2. COMPOSITION and INFORMATION OF THE PRODUCT

Class	C	Cr	Ni	Mo	Mn	Si	Cu	Fe	
ER308	.08	19.5-22.0	9.0-11.0	0.75	1.0-2.5	0.30-0.65	0.75	Balance	
ER308L	0.03	19.5-22.0	9.0-11.0	0.75	1.0-2.5	0.30-0.65	0.75	Balance	
ER308LSi	0.03	19.5-22.0	9.0-11.0	0.75	1.0-2.5	0.65-1.00	0.75	Balance	
ER309	0.12	23.0-25.0	12.0-14.0	0.75	1.0-2.5	0.30-0.65	0.75	Balance	
ER309L	0.03	23.0-25.0	12.0-14.0	0.75	1.0-2.5	0.30-0.65	0.75	Balance	
ER309LSi	0.03	23.0-25.0	12.0-14.0	0.75	1.0-2.5	0.65-1.00	0.75	Balance	
ER310	0.08-0.15	25.0-28.0	20.0-22.5	0.75	1.0-2.5	0.30-0.65	0.75	Balance	
ER312	0.12	28.0-32.0	8.0-10.5	0.75	1.0-2.5	0.30-0.65	0.75	Balance	

ER316	0.08	18.0-20.0	11.0-14.0	2.0-3.0	1.0-2.5	0.30-0.65	0.75	Balance	
ER316L	0.03	18.0-20.0	11.0-14.0	2.0-3.0	1.0-2.5	0.30-0.65	0.75	Balance	
ER316LSi	0.03	18.0-20.0	11.0-14.0	2.0-3.0	1.0-2.5	0.65-1.00	0.75	Balance	
ER317L	0.03	18.5-20.5	13.0-15.0	2.0-3.0	1.0-2.5	0.30-0.65	0.75	Balance	
ER347	0.08	19.0-21.5	9.0-11.0	0.75	1.0-2.0	0.30-0.65	0.75	Balance	
ER410	0.12	11.5-13.5	0.6	0.75	0.6	0.5	0.75	Balance	

Chemical Name	Cas#	EXPOSURE LIMITS IN AIR (mg/m3)	EXPOSURE LIMITS IN AIR (mg/m3)
		OSHA PEL (TWA)	ACGIH TLV (TWA)
Iron	7439-89-6	10	5
Manganese	7439-96-5	1	0.2
Silicon	7440-21-3	15 (dust),5 (respirable)	10
Molybdenum	7439-98-7	15	10
Niobium	7440-03-1	NE	NE
Phosphorus	7723-14-0	0.1	0.1
Sulfur	7704-34-9	NE	NE
Carbon	7440-44-0	15 (dust), 5 (respirable)	10 (inhalable)
Copper	7440-50-8	0.1 (fume),1 (dust)	0.2 (fume),1 (dust)
Chromium	7440-47-3	1.0,0.5 (Cr III)	0.5,0.5 (Cr III)
Nickel	7440-02-0	1	1.5 (inhalable fraction)

NE = Not Established Single values shown are maximum, unless otherwise noted.

Occupational Safety and Health Administration 29 CFR 1910.1000 Permissible Exposure Limit (PEL).
American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV).

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: These products consist of solid metal rods that are odorless. There are no immediate health hazards associated with these products. The Nickel and Chromium components of some of these products are suspect carcinogens. These products are not flammable nor reactive. If involved in a fire, these products may generate irritating iron fumes, a variety of iron compounds, carbon dioxide, carbon monoxide, and metal oxides. Emergency responders must wear personal protective equipment suitable for the situation to which they are responding.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: During welding operations, the most significant routes of exposure are via inhalation of fumes.

INHALATION: Inhalation is not anticipated to be a significant route of over-exposure to the coated rods. Inhalation of large amounts of particulates generated by this product during metal processing operations may result in pneumoconiosis (a disease of the lungs). Repeated over-exposures, via inhalation, to the dusts

or fumes generated by this product during welding operations may have adverse effects on the lungs with possible pulmonary edema and emphysema (life-threatening lung injuries). Nickel (a component of some of these products) can cause pulmonary asthma in hypersensitive individuals. Damage to lungs can occur. Inhalation of dusts and fumes of Iron can also cause metal fume fever. Inhalation of copper oxide fumes, which may be generated by some of these products during welding operations, can cause metal fume fever and chronic over-exposure to Copper dust may cause tiredness, stuffiness, diarrhea, and vomiting. Symptoms of metal fume fever can be delayed 24-48 hours. Refer to Section 10 (Stability and Reactivity) for information on the specific composition of welding fumes and gases.

CONTACT WITH SKIN or EYES: Contact of the rod form of these products with the skin is not anticipated to be irritating. Contact with the rod form of these products can be physically damaging to the eye. Fumes generated during welding operations can be irritating to the skin and eyes. Contact with the hot rods will burn contaminated skin or eyes. Due to the presence of Nickel, prolonged exposure of the eyes may result in sensitization resulting in conjunctivitis (inflammation of the mucous membranes of the eyes). Symptoms of skin over- exposure may include irritation and redness; prolonged or repeated skin over-exposures may lead to allergic contact dermatitis. Contact with the hot electrodes or rods will burn contaminated skin or eyes.

SKIN ABSORPTION: Skin absorption is not a significant route of over-exposure for any component of these products.

INGESTION: Ingestion is not anticipated to be a route of occupational exposure for these products.

INJECTION: Though not a likely route of occupational exposure for these products, injection (via punctures or lacerations in the skin) may cause local reddening, tissue swelling, and discomfort.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Symptoms associated with over-exposure to this product and the fumes generated during welding operations are as follows: **ACUTE:** The chief acute health hazard associated with these products would be the potential for irritation of contaminated skin and eyes when exposed to fumes during welding operations. Inhalation of large amounts of particulates generated by these products during metal processing operations can result in pneumoconiosis (a disease of the lungs). Inhalation of copper oxide fumes can cause metal fume fever. Rare cases of allergic contact dermatitis have been reported in people working with copper dust. Severe ingestion overexposure to copper (a component of some of these products) may be fatal. In extreme cases, burns may occur from contact that are generated during thermal decomposition. Contact with the molten material will burn contaminated skin or eyes.

CHRONIC: Chronic skin over-exposure to the fumes generated during welding operations may produce dermatitis (red, inflamed skin). Repeated over-exposures to the fumes generated by these products via inhalation can have adverse effects on the lungs (e.g., pulmonary edema and emphysema). Repeated or prolonged ingestion exposures to > 50-100 mg of Iron per day can result in deposition of iron in the body tissues, which can cause disease. Hypersensitivity to Nickel is common and can cause allergic contact dermatitis, pulmonary asthma, conjunctivitis and inflammatory reactions. Chronic over- exposure to Copper dust may cause tiredness, stuffiness, diarrhea, vomiting, discoloration of the skin and eyes, and kidney and liver disorder. Repeated over-exposures to the fumes generated by these products via inhalation can have adverse effects on the lungs (e.g., pulmonary edema and emphysema).

TARGET ORGANS: For fumes: **ACUTE:** Skin, eyes, respiratory system. **CHRONIC:** Skin, respiratory system, pancreas and liver.

SECTION II

4. FIRST-AID MEASURES

Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of label and MSDS to health professional with victim.

SKIN EXPOSURE: If fumes generated by welding operations involving these products contaminate the skin, begin decontamination with running water. If molten material contaminates the skin, immediately begin decontamination with cold, running water. Minimum flushing is for 15 minutes. Victim must seek medical attention if any adverse reaction occurs.

EYE EXPOSURE: If fumes generated by welding operations involving these products enter the eyes, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Victim must seek immediate medical attention.

INHALATION: If fumes generated by welding operations involving these products are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions.

INGESTION: If swallowed call physician immediately! Do not induce vomiting unless directed by medical personnel. Rinse mouth with water if person is conscious. Never give fluids or induce vomiting if person is unconscious, having convulsions, or not breathing.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Skin, respiratory, pancreas, and liver disorders may be aggravated by prolonged over-exposures to the dusts or fumes generated by this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not flammable.

AUTOIGNITION TEMPERATURE: Not flammable.

FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): Not applicable. Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES Carbon Dioxide: YES

Halon: YES Foam: YES

Dry Chemical: YES Other: Any "ABC" Class

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire, these products may decompose and produce iron fumes, a variety of nickel, iron, copper and a variety of metal compounds and metal oxides. The hot material can present a significant thermal hazard to firefighters.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Not applicable

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: These products are solid wire, with no spill or leak hazards.

SECTION III

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting these products ON YOU or IN YOU. Wash thoroughly after handling these products. Do not eat or drink while handling these products. Use ventilation and other engineering controls to minimize potential exposure to these products.

STORAGE AND HANDLING PRACTICES: All employees who handle these products should be trained to handle it safely. Use in a well-ventilated location. Avoid breathing fumes of these products during welding operations. Open containers on a stable surface. Packages of these products must be properly labeled. When these products are used during welding operations, follow the requirements of the Federal Occupational Safety and Health Welding and Cutting Standard (29 CFR 1910 Subpart Q) and the safety standards of the American National Standards Institute for welding and cutting (ANSI Z49.1). Store packages in a cool, dry location. Store away from incompatible materials.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Not applicable.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in Section 2 (Composition and Information on Ingredients). Prudent practice is to ensure eyewash/safety shower stations are available near areas where this product is used.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below guidelines listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed (i.e. a Weld Fume Respirator, or Air-Line Respirator for welding in confined spaces), U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the Canadian CSA Standard Z94.4-93 and applicable standards of Canadian Provinces. Respiratory Protection is recommended to be worn during welding operations. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-face piece pressure/demand SCBA or a full face piece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998). The following are NIOSH recommendations for respirator selection for Welding fumes, based on NIOSH REL:

CONCENTRATION

RESPIRATORY EQUIPMENT FOR WELDING FUMES

At Concentrations above the NIOSH REL, or where there is no REL, at any Detectable Concentration: Any self-contained breathing apparatus that has a full face piece and is operated in a pressure-demand or other positive-pressure mode; or any supplied-air respirator that has a full face piece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Escape: Any air-purifying, full-face piece respirator (gas mask) with a chin-style, front-or back-mounted organic vapor canister having a high-efficiency particulate filter; or any appropriate escape-type, self-contained breathing apparatus

NOTE: IDLH Concentration: Potential NIOSH carcinogen. [Not determined yet].

EYE PROTECTION: Safety glasses. When these products are used in conjunction with welding, wear safety glasses, goggles, welding helmet or face-shield with filter lens of appropriate shade number (per ANSI Z49.1-1988, "Safety in Welding and Cutting"). If necessary, refer to U.S. OSHA 29 CFR 1910.133, or appropriate Canadian Standards. If necessary, refer to U.S. OSHA 29 CFR 1910.138, or appropriate Standards of Canada.

HAND PROTECTION: Wear gloves for routine industrial use. When these products are used in conjunction with welding, wear gloves that protect from sparks and flame (per ANSI Z49.1-1988, "Safety in Welding and Cutting"). If necessary, refer to U.S. OSHA 29 CFR 1910.138, or appropriate Standards of Canada.

BODY PROTECTION: None normally needed for normal circumstances of use. Use body protection appropriate for task (i.e. apron, coveralls, chemically resistant boots). If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136.

9. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Iron fumes, a variety of iron compounds, carbon dioxide, carbon monoxide, metal oxides.

NOTE: The composition and quality of welding fumes and gases are dependent upon the metal being welded, the process, the procedure, and the filler used. Other conditions that could also influence the composition and quantity of fumes and gases to which workers may be exposed include the following: any coatings on metal being welded (e.g., paint, plating, or galvanizing), the number of welders and the volume of the work area, the quality of ventilation, the position of the welder's head with respect to the fume plume, and the presence of other contaminants in the atmosphere. When the filler is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 2 (Composition and Information on Ingredients). Fume and gas decomposition products, and not the ingredients in the filler, are important. Concentration of the given fume or gas component may decrease or increase by many times the original concentration. New compounds in the filler may form. Decomposition products of normal operations include not only those originating from volatilization, reaction, or oxidation of the product's components but also those from base metals and any coating (as noted previously). The best method to determine the actual composition of generated fumes and gases is to take an air sample from inside the welder's helmet if worn or in breathing zone. For additional information, refer to the American Welding Society Publication, "Fumes and Gases in the Welding Environment".

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids, strong oxidizers, halogens, phosphorous.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid uncontrolled exposure to extreme temperatures and incompatible materials.

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