



A member of the Avesta Sheffield Group

MATERIAL SAFETY DATA SHEET

Submerged Arc Welding Flux

SECTION I - Manufacturer/Product Identification:

Manufacturer's (Distributor's) Name

Avesta Welding Products, Inc.
3176 Abbott Road
Orchard Park, NY 14127

Emergency Telephone Number
(800) 424-9300 [Chemtrec]

Information Telephone Number
(716) 837-4400

Trade Name: Avesta Flux 217, Avesta Flux 801, Avesta Flux 803, Avesta Flux 805

Classification: NA

Product Type: Submerged Arc Welding Flux for Stainless Steel

Date: 5/27/98

Revision: 1

Prepared By: *Daniel J. Sattafeld*

SECTION II - Hazardous Ingredients Information:

Welding consumables covered by this MSDS are shipped as non-reactive, non-flammable, non-explosive, and essentially non-hazardous materials until they are used in welding. The information in this Section covers the chemicals from which this product is manufactured. The fumes and gases that are produced as a by-product during normal use when welding with this product are discussed in Section V.

HAZARDOUS COMPONENTS¹:

Specific Chemical Identity; Common Name)	CAS Number	SARA ²	OSHA PEL ³ ACGIH TLV ⁴		NOTES	PERCENT ⁵ By Weight
			(mg/m ³)	(mg/m ³)		
Aluminum Oxide	1344-28-1	*	15	10	Total Dust	3-40
			5	NA ⁶	Resp. Dust	
Calcium Oxide	1305-78-8		5	2		3-25
Chromium	7440-47-3	*	1	0.5		<4-10
Fluorides	16984-48-8		2.5	2.5		10-40
Fluorspar	7789-75-5		2.5	2.5	(Fluorides)	10-40
Iron Oxide	1309-37-1		10	5		2-5
Magnesium Oxide	1309-48-4		15	10	Total Fume	10-40
Manganese Oxide	7439-96-5	*	5 ⁷	0.2		<8-10
Silica, Crystalline (Quartz) ⁸	14808-60-7		0.7-2.5 ⁹	NA	Total Dust	10-40
			0.2-0.8 ⁹	0.1	Resp. Dust	
Titanium Dioxide	13463-67-7		15	10	Total Dust	NA
Welding Fumes (NOC) ¹⁰	NA		5	NA		NA

Notes:

- The term "Hazardous" should be interpreted as defined and required in the OSHA Hazard Communication Standard (29 CFR 1910.1200) and does not necessarily imply the existence of any hazard. Any components at concentrations equal to or greater than 0.1 percent are listed in this section, according to OSHA 29 CFR 1910.1200.
- An asterisk (*) after the Chemical Abstract Service (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.
- These permissible exposure levels (PELs) are based on OSHA's rulemaking (29 CFR 1910 Subpart Z) adopted on May 29, 1971, and are the current regulatory limits.

SECTION II - Hazardous Ingredients Information (Continued):

Notes (continued):

4. These values are based on the American Conference of Governmental Industrial Hygienists (ACGIH) 1997 TLVs
5. Approximate percent by weight values.
6. NA = Not Applicable; Not Available.
7. Ceiling limit.
8. Crystalline silica is bound within the product. However, research indicates that silica is present in welding fumes in the amorphous (non-crystalline) form. As a precaution, monitor welder's potential exposure to crystalline silica.
9. The OSHA permissible exposure level for total and respirable mineral dusts containing silica are based on formulas established by OSHA in Table Z, Mineral Dusts, of 29 CFR 1910.1000.
10. NOC = Not Otherwise Classified.

SECTION III - Physical/Chemical Characteristics:

BOILING POINT:	NA	VAPOR DENSITY (Air = 1):	NA
MELTING POINT:	1300-1400°C	VAPOR PRESSURE (mm Hg):	NA
SPECIFIC GRAVITY:	NA	EVAPORATION RATE	NA
pH:	NA	(Butyl Acetate = 1):	NA
SOLUBILITY IN WATER:	Insoluble	APPEARANCE AND ODOR:	Ceramic Granules, Normally Gray, Color Varies, Odorless

SECTION IV - Fire and Explosion Hazard Data:

FLASH POINT (Method Used):	NA
FLAMMABLE LIMITS:	LEL: NA UEL: NA
EXTINGUISHING MEDIA:	No specific media recommended for welding consumables.
SPECIAL FIRE FIGHTING PROCEDURES:	None

UNUSUAL FIRE AND EXPLOSION HAZARDS: This product is not reactive, flammable, combustible or explosive. Weld arc and sparks can ignite combustibles and flammables. Use the extinguishing media for the burning materials and the situation. Refer to ANSI Z49.1 and NFPA 51B standards for additional fire prevention information for welding procedures.

SECTION V - Reactivity Data:

STABILITY:	Stable: <u> X </u>	Unstable: <u> </u>
Conditions To Avoid:	None known	
INCOMPATIBILITY (Materials to Avoid):	None known	
HAZARDOUS POLYMERIZATION:	May Occur: <u> </u>	Will Not Occur: <u> X </u>
Conditions To Avoid:	None known	

HAZARDOUS DECOMPOSITION OR BYPRODUCTS: Welding fumes and gases produced during the welding process cannot be simply classified. The composition and quantity of both are dependent upon the metal being welded, and the process procedures and welding consumables being 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, glazing or galvanizing and phosphate coatings); the number of welders and welding operations and the volume of the work area; the quantity of welding consumables used; the design, quality and amount of ventilation; the position of the welder's head with respect to the fume plume; and the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from solvent, cleaning, degreasing and painting activities.) which may decompose by the arc into toxic gases such as phosgene.

When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section II. Decomposition products from welding operations will include those originating from the volatilization, reaction, or oxidation of the ingredients listed in Section II plus those from the base metal and coating, etc as noted above. Reasonably expected decomposition products from the normal use of this welding consumable include fluorides and complex oxides of the ingredients listed in Section II. Fumes from the use of this product contain chromium compounds, including hexavalent chromium (Cr VI); nickel; manganese; iron; copper; and zirconium compounds. Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by radiation from the arc.

The employer is required by OSHA to limit the worker's exposure to chemicals for which OSHA has established a PEL in 29 CFR 1910 Subpart Z. The only way to determine a worker's exposure to welding decomposition products is by sampling and analysis using accepted industrial hygiene techniques. The composition and quantity of fumes and gases to which a worker is exposed can be established from air sample(s) obtained from inside the welder's helmet, if worn, or in the worker's breathing zone. Review ANSI/AWS F1.1 and F1.3 standards for further information on air sampling for welding decomposition products.

SECTION VI - Health Hazard Data:

Electric arc welding may create one or more of the following 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.
- Spatter, melting metal and arc rays can cause burn injuries and start fires.

ROUTE(S) OF ENTRY: Inhalation: X Skin/Eye Contact: X Skin Absorption: X Ingestion: Unlikely

HEALTH HAZARDS (Acute and Chronic):

Acute (Short-Term Effects): Welding fumes may result in discomfort such as dizziness; nausea; and dryness or irritation of the eyes, lungs, nose, and throat. Metal fume fever, a flu-like illness lasting about 24-48 hours with chills, aches, cough, fever, upset stomach, vomiting and irritation of the throat can be caused by overexposure to metal fumes, including chromium, copper, magnesium, magnesium oxide and manganese. Inhalation of fume with chromium (VI) compounds can cause irritation of the respiratory tract, lung damage and asthma-like symptoms. Ingestion of chromium (VI) salts can cause severe injury or death. Chromium (VI) dust can form skin ulcers. Chromium (VI) may cause allergic reactions in some people. Fluoride compounds may cause skin and eye burns, pulmonary edema and bronchitis. Silica (amorphous and crystalline) dust and fumes may cause irritation of the respiratory system, skin and eyes.

Chronic (Long-Term Effects): Long-term exposure to Welding fumes generated by welding with this product may lead to their accumulation in the lungs and may result in bronchial asthma, lung fibrosis, or pneumoconiosis. The severity of this condition is proportional to the length of exposure. Aluminum oxide can cause pulmonary fibrosis and emphysema. Titanium dioxide may cause pulmonary irritation and sight fibrosis. Prolonged overexposure to calcium oxide may cause ulceration of the skin and perforation of the nasal septum, dementia and pneumonia. Overexposure to iron oxide fumes can cause siderosis (deposits of iron in lungs) which may effect pulmonary function. Chromium can cause lung cancers. Overexposure to chromium compounds may cause respiratory irritation with symptoms including ulceration and perforation of nasal septum, and asthma. Chromium can cause skin allergy upon contact. Overexposure to fluorides can cause serious bone erosion and mottling of teeth. No adverse long term health effects have been reported in the literature for magnesium and magnesium oxide.. Manganese can cause central nervous system effects referred to as manganism including symptoms such as muscular weakness, tremors similar to Parkinson's Disease, behavioral changes and changes in handwriting. Research on silica indicates that silica is primarily present in welding fume in the amorphous form. However, crystalline forms of silica may also be released in the welding fume. Long term overexposure to amorphous silica may cause pneumoconiosis. Non-crystalline forms of silica (amorphous silica) have little fibrotic potential. Crystalline silica is considered a lung toxin causing fibrosis and cancer.

CARCINOGENICITY: NTP: Yes IARC: Yes OSHA REGULATED: Yes CAL. PROP. 65: Yes

* Chromium (with the exception of metallic chromium and chromium III) and crystalline silica are listed in the National Toxicology Program (NTP) Annual Report on Carcinogens and in the International Agency for Research on Cancer (IARC) Monographs and are also considered carcinogens by OSHA.

** **WARNING:** This product contains or produces a chemical known to the State of California and other states, if applicable, to cause cancer.

SIGNS AND SYMPTOMS OF EXPOSURE: Excessive inhalation of welding fumes may cause irritation of or damage to the lungs and asthma-like symptoms. Overexposure to metals in fumes can cause metal-fume fever which is a flu-like sickness including chills, fever, head and muscle ache, tightness of chest, nausea, diarrhea, dryness or irritation of the nose, throat or eyes. Symptoms occur within several hours of exposure lasting 6-24 hours. Extreme overexposure to welding fumes can cause death. Chromium dust can burn eyes and form ulcers on skin. Long-term exposure to fluorides can mottle teeth and erode bones. Manganese can produce behavioral changes and changes in hand writing.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Excessive inhalation of welding fumes may aggravate preexisting respiratory or allergic conditions in some workers. Some studies have shown a higher level of lung related problems among older welders who smoked than those who did not.

EMERGENCY AND FIRST AID PROCEDURES: Remove victim from exposure area and call for medical aid. Employ first aid techniques recommended by the American Red Cross.

Electrical shock: Turn off power. Remove from exposure area. Immediately call for medical assistance. Provide first aid.

Eyes: In case of arc burn or irritation, immediately call for medical assistance. In case of irritation from particulate/vapor, immediately flush with plenty of water for 15 minutes and call for medical assistance.

Skin: In case of arc burn or irritation, apply cold compresses and immediately call for medical assistance. In case of skin contact causing irritation, wash thoroughly with plenty of soap and water. If symptoms do not dissipate after first aid treatment, consult a physician.

Inhalation: If breathing is difficult, remove to fresh air and consult physician. Provide artificial respiration if qualified.

Ingestion: Accidental ingestion unlikely. If ingested, call a physician immediately.

SECTION VII - Control Measures:

Read and understand the manufacturer's instructions and the precautionary label on the product. See American National Standards Z49.1, Safety in Welding and Cutting, published by the American Welding Society, 550 N.W. LeJeune Road, Miami, Florida, 33126 and OSHA Publication 2206 (29) CFR 1910), U.S. Government Printing Office, Washington, D.C. 20402, for more details on many of the following:

VENTILATION: Use enough ventilation, local exhaust at the arc, or both to keep the fumes and gases below the PEL/TLV in the workers breathing zone and the general area. Train the welders to keep their head out of the welding plume. If the fumes are removed by filtration or some other means and the air-gas stream is put back into the room, gases may build up to toxic or asphyxiation levels. Gas build-up should be monitored and if excessive, should be removed or reduced to safe levels by some supplementary system and/or by general ventilation.

Local Exhaust: Provide source at fumes.

Mechanical: Use general mechanical ventilation to keep work area well vented.

Special: Hoods if necessary.

RESPIRATORY PROTECTION (Specific Type): Use a NIOSH approved respirator for fumes or an air supplied respirator where local exhaust or general dilution ventilation does not keep airborne exposures below the applicable PEL/TLV. Lung function tests [Pulmonary function tests (PFT)] are recommended for respirator users. Monitor the air quality inside the welder's helmet, if worn, and/or the worker's breathing zone to determine if a respirator is required and the type needed.

PROTECTIVE GLOVES: Wear protective gloves to prevent metal cuts and skin abrasions and to prevent injury from radiation sparks and electrical shock. A dry welder's glove is recommended.

EYE PROTECTION: Arcs produce ultraviolet and infrared radiation. Wear a welder's helmet or use face shield with protective filter lenses. As a rule start with a lens shade that is too dark to see the weld zone. Then go to a lighter shade (a lower number) which gives sufficient view of the weld zone (e.g., Shade Number 14). Do not go below the minimum recommended in ANSI standard Z49.1. Provide protective screens and flash goggles to shield others, if necessary. Select welding lens shades from the American Welding Society (AWS) publication F2.2.

PROTECTIVE CLOTHING: Wear hand, head, and body protection to help prevent injury from radiation, sparks and electric shock. Refer to ANSI Z-191 for more information. At a minimum, this includes hand protection and a protective face shield and may include arm protectors aprons, hard hats, shoulder protection as well as dark, substantial clothing.

OTHER PROTECTIVE EQUIPMENT: Protective clothing such as uniforms, disposable coveralls, safety shoes, etc. may be required during metal handling operations as appropriate to the circumstances of exposure.

ELECTRIC SHOCK: Welders should be trained to avoid electrical shock by maintaining a dry work area, insulating themselves from the workpiece and ground, and not touching live electrical parts.

WORK/HYGIENIC PRACTICES: Keep head out of fumes. Do not breathe the fumes and gases generated. Use adequate ventilation to control exposures. Do not touch live electrical parts. Wear protective equipment. Wear appropriate respiratory protection in confined spaces during welding and when the PEL/TLV may be exceeded. Do not eat, smoke or drink in areas where welding is performed. Utilize good personal hygiene including washing hands and face prior to eating and drinking.

SECTION VIII - Precautions for Safe Handling and Use:

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: In solid form this material poses no special clean-up problems. Clean spilled material with shovel or vacuum. If this material is in powder or dust form, clean up should be conducted with a vacuum system utilizing a high efficiency particulate filtration system. Place material in a suitable container and properly label all containers.

WASTE DISPOSAL METHOD: Prevent waste from contaminating surrounding environment. Dispose of product, residue, liners, and containers in an environmentally safe manner in accordance with federal, state and local regulations.

OTHER PRECAUTIONS: Use good personal hygiene and safe work practices. Keep out of reach of children. Always read and follow directions on product label and other product information.

ENVIRONMENTAL HAZARDS: In solid form this material poses no special environmental problems. Metal powders or dusts may have significant impact on air and water quality. Airborne emissions, spills and releases to the environment (discharge to streams, sewer systems, ground water, surface soil, etc.) should be controlled immediately. If such potential for a spill exists, it is advisable to develop an emergency spill response plan.

SECTION IX - California Proposition 65:

CALIFORNIA PROPOSITION 65: WARNING: This product contains or produces chemicals known to the State of California to cause cancer. [California Health and Safety Code §25249.5 ET SEQ.]

END OF MSDS.