

NICKEL AND HIGH NICKEL BARE WELDING WIRE

MATERIAL SAFETY DATA SHEET

02/05/00

MSDS PROVIDED BY:

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MILITARY EMERGENCY RESPONSE NUMBER 1 (800) 851-8061

IN COMPLIANCE WITH OSHA'S HAZARD COMMUNICATION STANDARD 29CFR 1910.1200

HAZARD RATING

4 = EXTREME

3 = HIGH

2 = MODERATE

1 = SLIGHT

0 = INSIGNIFICANT

This Material Safety Data Sheet (MSDS) provides information on a specific group of manufactured metal products.
The following alloys can be found on this MSDS: See Section II and Section VI for important health hazard data.

SECTION I — MATERIAL IDENTIFICATION

TRADE NAME	APPROXIMATE CHEMICAL COMPOSITION - % (Single figures are maximum)										
	C	Cr	Co	Cu	Fe	Mn	Mo	Ni	Si	V	W
Electrode Hastalloy® B..... (ENIMo-1)	0.07	1.00	2.50	0.50	4.00-7.00	1.00	28.0-30.0	Balance	1.00	0.60	1.00
Electrode Hastalloy® B-2..... (ENIMo-7)	0.02	1.00	1.00	0.50	2.00	1.75	26.0-30.0	Balance	0.20	--	1.00
Electrode Hastalloy® C..... (ENICrMo-5)	0.10	14.5-16.5	2.50	0.50	4.00-7.00	1.00	15.0-17.0	Balance	1.00	0.35	3.00-4.50
Electrode C-278 (ENICrMo-4)	0.20	14.5-16.5	2.50	0.50	4.00-7.00	1.00	15.0-17.0	Balance	0.20	0.36	3.00-4.50
Electrode Hastalloy® W..... (ENIMo-3)	0.12	2.50-5.50	2.50	0.50	4.00-7.00	1.00	23.0-27.0	Balance	1.00	0.60	1.00
Electrode Hastalloy® X..... (ENICrMo-2)	0.05-0.15	20.5-0.15	0.50-2.50	0.50	17.0-20.0	1.00	8.00-10.0	Balance	1.00	--	0.20-1.00

TRADE NAME	APPROXIMATE CHEMICAL COMPOSITION - % (Single figures are maximum)										
	C	Cr	Co	Cb	Cu	Fe	Mn	Mo	Ni	Si	W
Electrode A..... (ENICrFe-2)	0.10	13.0-17.0	--	0.50-3.00	0.50	12.0	1.00-3.50	0.50-2.50	62.0 Min	0.76	--
Electrode G (ENICrMo-1)	0.05	21.0-23.5	2.50	1.75-2.50	1.50-2.50	18.0-21.0	1.00-2.00	5.50-7.50	Balance	1.00	1.00
Electrode 112 (ENICrMo-3)	0.10	20.0-23.0	--	3.15-4.15	0.50	7.00	1.00	5.00-10.0	55.0 Min	0.75	--
Electrode 132 (ENICrFe-1)	0.05	13.0-17.0	--	1.50-4.00	0.50	11.0	3.50	--	62.0 Min.	0.75	--

TRADE NAME	APPROXIMATE CHEMICAL COMPOSITION - % (Single figures are maximum)										
	Al	C	Cr	Cb	Cu	Fe	Mo	Ni	Si	Ti	V
Electrode 141 (ENI-1)	1.00	0.10	--	--	0.25	0.75	0.75	92.0 Min	1.25	1.00-4.00	--
Electrode 162 (ENICrFe-3)	--	0.10	13.0-17.0	1.00-2.50	0.50	10.0	5.00-9.50	59.0 Min.	1.00	1.00	--
Electrode 190 (ENICu-7)	0.75	0.15	--	--	Balance	2.50	4.00	52.0-59.0	1.50	1.00	--
Electrode Nickel 55..... (ENIFo-CI)	1.00	2.00	--	--	2.50	Balance	2.50	45.0-80.0	4.00	--	--
Electrode Nickel 99..... (ENI-CI)	1.00	1.00	--	--	2.50	5.00	2.50	55.0 Min.	4.00	--	--

(a) Plus Tantalum

(b) Plus Cobalt

(c) Included Incidental Cobalt

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SECTION II — HAZARDOUS CONSTITUENTS

IMPORTANT — Welding electrodes are a non-hazardous solid at ambient temperatures. This section covers the materials from which these products are manufactured. The fumes and gases produced while welding during normal use of these products are covered in Sections V and VI.

CORE WIRE

HAZARDOUS COMPONENTS

	CAS. NO.	OSHA PEL mg/m ³	ACGIH TLV mg/m ³	STEL mg/m ³
*Chromium (VI)	7440-47-3	0.10	0.50	--
*Nickel (soluble)	7440-02-0	1.00	0.10	--
Molybdenum (soluble)	7439-98-7	5.00	5.00	--
Manganese	7439-96-5	5.00 (ceiling)	1.00 (fume)	3.00
Silicon (SiO ₂ , amorphous respirable)	60676-86-0	0.06	0.10	--
Copper (fume)	7440-50-8	0.10	0.20	--
Iron (oxide fume)	1309-37-1	10.0	5.00	--
Aluminum (welding fume)	7429-90-5	Not Listed	5.00	--
Titanium (dioxide)	13462-67-7	15.0	10mg/m ₃	--
Cobalt (dust and fume)	7440-48-4	0.10	0.05	--
Tungsten	7440-33-7	--	5.00	10.0

FLUX COATING

HAZARDOUS COMPONENTS

	CAS. NO.	OSHA PEL mg/m ³	ACGIH TLV mg/m ³	STEL mg/m ³
Graphite	7782-42-5	7.40	2.60	--
Barium Carbonate	613-77-9	0.50	0.50	--
Titanium Dioxide	13463-76-7	15.0	10.0	--
Calcium Carbonate	1317-65-3	5.00 (CaO)	10.0	--
Calcium Fluoride	14542-23-5	2.50 (fume)	2.50 (fume)	--
Cryolite	15096-52-3	2.50 (fume)	2.50 (fume)	--
Feldspar	68476-26-5	Not Listed	2.00	--
*Chromium Oxide	1308-38-9	0.50 (CR VI)	0.05 (CR VI)	--
Potassium Silicate	1312-76-1	Not Listed	5.00	--
Sodium Silicate	1344-09-8	Not Listed	5.00	--
Potassium Hydroxide	1310-50-3	Not Listed	2.00	--

SUBSTANCES OF VARIABLE COMPOSITION

HAZARDOUS COMPONENTS

	CAS. NO.	OSHA PEL mg/m ³	ACGIH TLV mg/m ³	STEL mg/m ³
Welding Fume	NOC	--	6.00	--

*SUBSTANCE IDENTIFIED BY OTHER SOURCES AS A SUSPECTED OR CONFIRMED HUMAN CARCINOGEN

SECTION III — PHYSICAL DATA

ELECTRODES are coated with flux for use with shielded metal arc (SMAW or stick) welding process.

SECTION IV — FIRE AND EXPLOSION DATA

FLASH POINT (WITH TEST METHOD): None **FLAMMABLE (EXPLOSIVE) LIMITS V/V%** **LEL:** None **UEL:** None

EXTINGUISHING MEDIA: This alloy is noncombustible. Use extinguishing media appropriate to the surrounding fire.

SPECIAL FIRE FIGHTING PROCEDURES: If this material is reduced to powder form, caution must be used to prevent fire or explosion. To extinguish a metal powder fire use dry sand, dry graphite or other class "D" fire extinguishing powder.

UNUSUAL FIRE AND EXPLOSION HAZARD: No unusual fire or explosion hazards are associated with this material.

INCOMPATIBILITY (MATERIALS TO AVOID): Avoid contact with mineral acids and oxidizing agents which may generate hydrogen gas: the evolution of hydrogen may be an explosion hazard.

HAZARDOUS DECOMPOSITION PRODUCTS: Various elemental metals and metal oxides may be generated from melting or gross handling operations. Refer to Section II for permissible exposure limits.

SECTION V — HEALTH HAZARD DATA — NICKEL AND HIGH NICKEL COATED ELECTRODES

Welding generates fumes, gases and electromagnetic radiation with known adverse health effects. The composition of welding emissions varies substantially with the welding process.

Possible Effects of Exposure: Short term exposure to welding fume may result in discomfort, dizziness, nausea and dryness or irritation of the throat. Long term exposure to welding fume, gases or dust may contribute to pulmonary irritation or pneumoconiosis. Long term exposure to iron fume may produce siderosis, which is generally regarded as benign. Nickel and chromium should be considered possible carcinogens per OSHA 29CFR 1910.1200. Certain nickel compounds have been implicated based on experience in some nickel refining operations. The specific compounds, however, have not been determined and a direct association between nickel in welding fume and cancer has not been demonstrated. Some compounds of hexavalent chromium have been reported to be carcinogenic. No clear association, however, has been established between chromium in welding fume and the development of cancer. Exposure limits should be maintained below the levels listed in Section II.

Routes of Entry: (1) Inhalation of Fume (2) Burns from Electromagnetic Radiation

Pre-existing Medical Condition: Individuals with impaired pulmonary function or illness may have symptoms exacerbated by irritants contained in welding fumes.

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SECTION VI — REACTIVITY DATA

Hazardous Decomposition Products

Exposure Limits: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedure 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 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 II. Fume and gas decomposition products and not the Ingredients in the electrode, are important. The concentration of a given fume or gas component may decrease or increase by many times the original concentration in the electrode. Also, new compounds not in the electrodes may form. Decomposition products of normal operation include those originating from the volatilization, reaction or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

SECTION VII — SPILL OR LEAK PROCEDURES

NOT APPLICABLE

SECTION VIII — SPECIAL PROTECTION INFORMATION

Ventilation: Use enough ventilation, local exhaust at the arc (or flame), or both, to keep the fumes and gases below PEL's, TLV's or STEL's in the worker's breathing zone and the general area. Train the employee to keep his head out of the fumes. See ANSI/ASC Z49.1 Section 5.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding, brazing or soldering in confined space or where local exhaust or ventilation does not keep exposure below **PEL, TLV or STEL**.

Eye Protection: Wear helmet or use face shield with filter lens of appropriate shade number (see ANSI/ASC Z49.1 Section 4.2). Provide protective screens and flash goggles, if necessary, to shield others.

Protective Clothing: Wear head and body protection which help to prevent injury from radiation, sparks, flame and electrical 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 employees not to touch live electrical parts and to insulate himself from work and ground. Welders should not wear short sleeve shirts, short pants or cutoffs.

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.

Emergency First Aid: Remove from dust or fume exposure. If breathing has stopped perform artificial respiration. Summon medical aid immediately.

Read and understand the manufacturer's instructions and the precautionary label on the product. See American National Standard Z49.1, *Safety in Welding and Cutting* published by the American Welding Society, P.O. Box 351040, Miami, FL 33155 and OSHA publication 2206 (29CFR 1910). U.S. Government Printing Office, Washington D.C. 20402 for more detailed information.

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 levels.

NOTE: For other precautions or additional safety information on welding and cutting, see American Standard Z49.1-1980, *Safety in Welding and Cutting*, and the *Welding Handbook*, Volume 1, Chapter 9, Safe Practices in Welding and Cutting, both available from the American Welding Society, Inc., 550 N.W. LaJeune Road, P.O. Box 351040, Miami, FL 33135, Telephone Number (305) 443-9353

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SECTION X— DISCLAIMER OF LIABILITY

As the conditions or methods of use are beyond our control, we do not assume any responsibility and expressly disclaim any liability for any use of this material. Information contained herein is believed to be true and accurate but all statements or suggestions are made without any warranty, expressed or implied, regarding accuracy of the information, the hazards connected with the use of the material or the results to be obtained from use thereof.

References:

Air Contaminants — Permissible Exposure Limits

Title 29 Code of Federal Regulations Part 1910.1000

Threshold Limit Values and Biological Exposure Indices for 1989 – 1990 Second Printing

American Conference of Governmental Industrial Hygienists

Code of Federal Regulations

Parts 1900 to 1910 Revised July 1, 1988

Operator's Manual for Oxyfuel Gas Cutting

ANSI/AWS C4.2-90 An American National Standard

Effects of Welding on Health — VI

Prepared for: Safety and Health Committee of the American Welding Society

OSHA: Employee Workplace Rights

U.S. Dept. of Labor, OSHA 3021 Revised 1988

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