

H-1236-L

Revision Data:

11/1/89



INCO ALLOYS INTERNATIONAL

Material Safety Data Sheet

I. PRODUCT INFORMATION:

This MSDS covers all Inco Alloys International, Inc.'s welding products identified as:

NI-ROD^{*} Welding Electrodes and Cored Wire

INCO ALLOYS INTERNATIONAL, INC.

Welding Products Company

1401 Burris Road

Newton, NC 28858

EMERGENCY TELEPHONE NUMBER: (304) 526-5780

GENERAL INFORMATION: (704) 465-0352

II. HAZARDOUS INGREDIENTS: Aluminum (Al) Barium Carbonate (BaCO₃) Barium Fluoride (BaF₂) Calcium Carbonate (CaCO₃)
 Carbon (C) Calcium Fluoride (CaF₂) Copper (Cu) Iron (Fe) Ferrosuferric Oxide (Fe₃O₄) Manganese (Mn)
 Nickel (Ni) Silicon Dioxide (SiO₂) Sodium Fluoroaluminate (Na₃AlF₆) Sodium Silicate (Na₂SiO₃) Strontium Carbonate (SrCO₃)

TRADENAME AND CONCENTRATION RANGE (% WEIGHT)

Product Name	Al	BaCO ₃	BaF ₂	CaCO ₃	CaF ₂	C	Cu	Fe	Fe ₃ O ₄	Mn	Na ₃ AlF ₆	Na ₂ SiO ₃	Ni	SiO ₂	SrCO ₃
NI-ROD [*] W.E.**	1-5	1-5	1-5	1-5		1-5		1-5	1-5			1-5	60-100		7-13
NI-ROD [*] 44 W.E.**			1-5	1-5		1-5	1-5	30-60		7-13			30-60	.1-1	7-13
NI-ROD [*] 55 W.E.**			1-5	1-5		1-5		30-60	1-5				30-60		5-10
NI-ROD [*] 55K W.E.**			1-5	1-5		1-5	1-5	30-60		1-5			30-60		5-10
NI-ROD [*] 60 W.E.**			1-5	1-5		1-5		30-60					30-60		5-10
NI-ROD [*] 98K W.E.**			1-5	1-5		1-5	1-5	1-5		1-5			60-100		7-13
I-ROD [*] FC 55 Cored Wire					7-13	1-5		30-60		1-5	1-5		30-60		
NI-ROD [*] Duplex 55 W.E.**			1-5	1-5		1-5	1-5	30-60		1-5			30-60	.1-1	7-13

* Registered trademarks of the Inco family of companies.

** Welding Electrode

III. PHYSICAL DATA: Physical State: Solid Specific Gravity: 5-8 gm/cc Melting Point: >1000 °C Odor: Odorless
 Appearance: Welding electrodes are metallic silver colored wire with a flux coating or flux core.

IV. FIRE or EXPLOSION HAZARD: Nonflammable; however sparks from welding in user operations could ignite flammable or combustible liquids, vapors and solids.

V. REACTIVITY DATA: This material is non-reactive (stable) as shipped.

VI. TOXICOLOGICAL PROPERTIES: As shipped, these electrodes have no known (unless ingested) toxicological properties other than causing allergic reactions in individuals sensitive to the metal(s) contained in these welding products. The hazards of ingestion, if any, are discussed in the specific ingredient sections below. User generated dusts and fumes may on contact with the skin or eyes produce mechanical irritation. Chronic exposures could cause dermatitis (skin) or conjunctivitis (eyes). Excessive inhalation of user generated fumes from welding with these products may, depending on the specific features of the process used, pose a long term health hazard. The International Agency for Research on Cancer (IARC) has concluded that welding fumes are possibly carcinogenic to humans. The general PEL/TLV for Welding Fume (Not Otherwise Classified) is 5 mg/m³; however, individual constituents of fumes may have lower allowable exposure levels.

The ingredients of fumes and gases generated in user welding operations will depend on the electrode type and its flux, the base metal, and the specific process being used. Ingredients may include metals, metal oxides, chromates (if Cr is present in the base metal), fluorides, carbon monoxide, ozone, and oxides of nitrogen and other gases such as phosgene if chlorinated solvents are present.

The following information is primarily directed to the ingredients that makeup the complex electrodes listed in Section II. Although it is the user's responsibility to assess end products, intermediates or fugitive emissions arising out of the use of these electrodes, information is also provided for common fume ingredients.

DO A 061456
 CONFIDENTIAL

Aluminum (Al): Exposure Limits ⁽¹⁾: TLV: 10 mg/m³ (Metal dust); 5 mg/m³ (Welding fumes)
PEL: 15 mg/m³ (Total metal dust); 5 mg/m³ (Metal dust - respirable fraction)
CAS No. ⁽²⁾: 7429-90-5 LD₅₀: Not Available

Aluminum is not readily absorbed through the skin or the GI tract and only poorly through the lungs. Foreign literature between 1958 and 1962 reported cases of severe and sometimes fatal pulmonary fibrosis in workers exposed to aluminum dust. In one of the fatal case, the worker developed fibrosis and encephalopathy after 13.5 years of exposure to aluminum dust. In rodent studies and currently in US industry no fibrosis or encephalopathy have been reported from the inhalation of aluminum powder. Acute exposure to alumina fume may cause bronchial irritation, however reports of pulmonary fibrosis and emphysema in alumina abrasive workers are no longer seen, owing to improved environmental control.

Barium Carbonate (BaCO₃): Exposure Limits ⁽¹⁾: TLV: 0.5 mg/m³ (Soluble compounds, as Ba)
PEL: 0.5 mg/m³ (Soluble compounds, as Ba)
CAS No. ⁽²⁾: 513-77-9 LD₅₀: 418 mg/kg, rat, oral

Excessive inhalation can produce a benign pneumoconiosis called Baritosis. Ingestion can cause excessive salivation, vomiting, colic, violent diarrhea, convulsive tremors progressing to muscular paralysis, increased blood pressure, internal hemorrhages in the kidneys and G.I tract, and possible hypokalemia.

Barium Fluoride (BaF₂): Exposure Limits ⁽¹⁾: TLV: 0.5 mg/m³ (Soluble compounds, as Ba)
PEL: 0.5 mg/m³ (Soluble compounds, as Ba)
CAS No. ⁽²⁾: 7787-32-8 LD₅₀: 250 mg/kg, rat, oral

Inhalation may cause irritation of the respiratory tract. Ingestion can cause severe gastrointestinal distress with vomiting, diarrhea, and abdominal pain. Barium and fluoride absorption can result in muscle (including cardiac) and nerve irregularities with potassium and calcium deficiencies. Chronic exposures may cause Fluorosis (Chronic fluoride intoxication) with symptoms of digestive disturbances such as vomiting, loss of appetite, diarrhea, or constipation.

Calcium Carbonate (CaCO₃): Exposure Limits ⁽¹⁾: TLV: 10 mg/m³
PEL: 15 mg/m³ (Total dust); 5 mg/m³ (Respirable fraction)
CAS No. ⁽²⁾: 1317-65-3 LD₅₀: 6,450 mg/kg, rat, oral

This compound is considered non-toxic. Inhalation of particulates could cause mild irritation of the respiratory tract. Though used as an antacid, ingestion of large amounts could lead to intestinal blockage.

Calcium Fluoride (CaF₂): Exposure Limits ⁽¹⁾: TLV: 2.5 mg/m³ (Fluorides as F)
PEL: 2.5 mg/m³ (Fluorides as F)
CAS No. ⁽²⁾: 7789-75-5 LD₅₀: 4,250 mg/kg, rat, oral

Inhalation of welding fumes containing calcium fluoride can cause irritation of the respiratory tract. Ingestion of soluble fluorides can produce symptoms of vomiting, abdominal pain, diarrhea, convulsions, muscular weakness and other signs of neurological problems. Chronic exposures may cause Fluorosis (Chronic fluoride intoxication) with symptoms of digestive disturbances such as vomiting, loss of appetite, diarrhea, or constipation.

Carbon (C): Exposure Limits ⁽¹⁾: TLV: 3.5 mg/m³ (As carbon black)
PEL: 3.5 mg/m³ (As carbon black)
CAS No. ⁽²⁾: 7440-44-0 LD₅₀: 440 mg/kg, mouse, intravenous

Inhalation that is prolonged and repeated at excessive levels may lead to benign pneumoconiosis. No effects have been found for ingestion.

Copper (Cu): Exposure Limits ⁽¹⁾: TLV: 1 mg/m³ (Dusts & mists, as Cu), 0.2 mg/m³ (Fume)
PEL: 1 mg/m³ (Dusts & mists, as Cu), 0.1 mg/m³ (Fume as Cu)
CAS No. ⁽²⁾: 7440-50-8 LD₅₀: 35 mg/kg, mouse, intraperitoneal

Copper metal dust and fume may be irritating to the respiratory tract. In user operations where copper fume is generated, inhalation of the fume can result in symptoms of "Metal Fume Fever" such as chills, fever and sweating. A few instances of allergic skin rashes have been reported in workers with skin exposure to metallic copper. In the eyes, copper metal as a foreign body can provoke an inflammatory reaction resulting in pus formation in the conjunctiva, cornea or sclera. Ingestion of copper metal may cause gastrointestinal upset. Wilson's disease can occur in certain individuals with a rare, inherited metabolic disorder characterized by retention of excessive amounts of copper in the liver, brain, kidneys and corneas. These deposits eventually lead to tissue necrosis and fibrosis, causing a variety of clinical effects, especially liver disease, neurologic changes. Wilson's disease is progressive and, if untreated, leads to fatal liver failure.

Iron (Fe): Exposure Limits ⁽¹⁾: TLV: No limit set (For Fe₂O₃ fume the TLV is 5 mg/m³ as Fe)
PEL: No limit set (For Fe₂O₃ dust and fume the PEL is 10 mg/m³ as Fe)
CAS No. ⁽²⁾: 7439-89-6 LD₅₀: Not Available

Inhalation of the excessive oxide fumes or dusts can lead to irritation of the respiratory tract. Prolonged inhalation of iron oxide for periods of 5 to 10 years is known to cause siderosis which appears to be a benign pneumoconiosis. Prolonged eye contact with the metal dust could cause rust brown colored spots forming around the particles and if left for several years, permanent damage could result.

Ferrosuferric Oxide (Fe₃O₄): Exposure Limits ⁽¹⁾: TLV: No limit set (For Fe₃O₄ fume the TLV is 5 mg/m³ as Fe)
PEL: No limit set (For Fe₃O₄ dust and fume the PEL is 5 mg/m³ as Fe)
CAS No. ⁽²⁾: 1317-61-9 LD₅₀: Not Available

Inhalation of excessive amounts can lead to irritation of the respiratory tract. Chronic inhalation of iron oxide for periods of 5 - 10 years is known to cause siderosis which seems to be a benign pneumoconiosis. No data found on ingestion.

Manganese (Mn): Exposure Limits ⁽¹⁾: TLV: 5 mg/m³ Dust & compounds, as Mn; 1 mg/m³ Fume, as Mn; STEL 3 mg/m³ Fume, as Mn
PEL: 5 mg/m³ Ceiling, as Mn compounds; 1 mg/m³ Fume, as Mn; STEL 3 mg/m³ Fume, as Mn
CAS No. ⁽²⁾: 7439-96-5 LD₅₀: 9,000 mg/kg, rat, oral

Excessive inhalation or ingestion of manganese can produce manganese poisoning. Chronic exposures can lead to neurological problems such as apathy, drowsiness, weakness, spastic gait, paralysis, and other neurological problems resembling Parkinsonism. These symptoms can become progressive and permanent if not treated. Excessive inhalation of fumes may cause "Metal Fume Fever" with its flu like symptoms, such as chills, fever, body aches, vomiting, sweating, etc.

Sodium Fluoroaluminate (Na₃AlF₆): Exposure Limits ⁽¹⁾: TLV: No limit set
PEL: No limit set
CAS No. ⁽²⁾: 15096-52-3 LD₅₀: 200 mg/kg, rat, oral

Excessive inhalation of dust may cause irritation of the nose, throat and respiratory tract. Ingestion causes severe gastrointestinal distress with salivation, nausea, vomiting, diarrhea, and pain. Also may cause muscular weakness, tremors, convulsions, loss of consciousness, and death. Prolonged exposure to fluorides can cause skeletal abnormalities and digestive tract disturbances. Prolonged or repeated skin contact can produce dermatitis.

Sodium Silicate (Na₂SiO₃): Exposure Limits ⁽¹⁾: TLV: Not Established
PEL: Not Established
CAS No. ⁽²⁾: 1344-09-8 LD₅₀: 1153 mg/kg, oral, rat

Silicates are generally considered to have low systemic toxicity, however due to their alkaline nature they may cause corrosive effects on mucous membranes. Eye exposure can cause severe irritation, redness, tearing and blurred vision. Skin exposure may cause slight irritation. Inhalation of mist or fume can cause irritation of the nasal and respiratory passages. Ingestion may produce gastrointestinal irritation, nausea, vomiting, diarrhea and abnormal kidney function. No known chronic effects have been noted.

Nickel (Ni): Exposure Limits ⁽¹⁾: TLV: 1 mg/m³ as metal
PEL: 1 mg/m³ for metal and insoluble compounds as Ni
CAS No. ⁽²⁾: 7440-02-0 LD₅₀: >9,000 mg/kg, rat, oral

The U.S. National Toxicology Program has listed nickel as reasonably anticipated to be a carcinogen based on the production of injection-site tumors. The International Agency for Research on Cancer (IARC) concluded there was sufficient evidence that nickel and nickel compounds, as a group but not necessarily as individual chemicals, were carcinogenic to humans. IARC could not state with certainty which specific nickel compounds are human carcinogens and which are not. Epidemiological studies of workers exposed to nickel powder and to dust and fume generated in the production of nickel alloys and of stainless steel have not indicated the presence of a significant respiratory cancer hazard.

The inhalation of nickel powder has not resulted in an increased incidence of malignant tumors in rodents. Repeated intratracheal instillation of nickel powder produced an increased incidence of malignant lung tumors in rats, but did not produce an increased incidence in hamsters when administered at the maximum tolerated dose. However, single intratracheal instillations of nickel powder in hamsters at doses near the LD₅₀ have produced an increased incidence of fibrosarcomas, mesotheliomas and rhabdomyosarcomas. Inhalation of nickel powder at concentrations 15 times the PEL irritated the respiratory tract in rodents. Nickel is a known sensitizer and may produce allergic reactions.

Silica (SiO₂): Exposure Limits ⁽¹⁾: TLV: 0.1 mg/m³ (Respirable dust)
PEL: 5 mg/m³ as amorphous (Precipitated, gel, or diatomaceous earth); 0.1 mg/m³ as crystalline (quartz or tripoli) and fused respirable dust; 0.05 mg/m³ as

crystalline (cristobalite or tridymite) respirable dust.
CAS No. (2) : 60676-86-0 LD : 3,180 mg/kg, rat, oral in amorphous form

No information was found on the hazards of ingestion of crystalline silica as the material seems to be relatively inert. Acute exposures to this material will irritate the respiratory tract. Chronic inhalation (after 10 - 20 years) can produce silicosis (a pneumoconiosis of the lungs) with symptoms of dyspnea, cough, wheezing and repeated, non-specific chest illnesses. Impairment of pulmonary function may be progressive. The International Agency for Research on Cancer (IARC) has concluded there was limited evidence that crystalline silica was carcinogenic to humans and sufficient evidence that it was carcinogenic to animals. IARC states that a number of studies have shown that persons diagnosed as having silicosis have an increased risk of dying from lung cancer.

Strontium Carbonate (SrCO_3): Exposure Limits (1) : TLV: No value found.
PEL: No value found.

CAS No. (2) : 1633-05-2 LD : Not Available

There is very little toxicity and health data on this material. Excessive overexposure to the dust may ulcerate mucous membranes in the nose and may cause sneezing and coughing. No data found on ingestion problems.

VII. PREVENTIVE MEASURES:

Respiratory Protection:

Respiratory protection is necessary when exposure limits for airborne contaminants are exceeded during welding with these electrodes. Use air-supplied respirator in confined spaces. Use only NIOSH approved respirators in accordance with 29 CFR 1910.134 - Respiratory Protection.

Ventilation:

Use local exhaust when welding. Maintain exposures below acceptable exposure limits. Confined spaces require special attention to provision of adequate ventilation and/or air-supplied respirators.

Eye Protection and Protective Clothing:

Protective equipment is required when welding. Wear gloves, face protection and flame retardant clothing. Do not expose skin or eyes to the heat and radiation from welding operations. Select welding lens shade from the American Welding Society publication F2.2.

IMPORTANT

Maintain exposures below the acceptable exposure limits. Use industrial hygiene air monitoring to ensure that your use of this material does not create exposures which exceed the recommended exposure limits. Always use exhaust ventilation in user welding operations. Refer to the following sources for important additional information:

ANSI Z49.1

29 CFR 1910

The American Welding Society

OSHA - Dept. of Labor

P.O. Box 351040, Miami, FL 33135

Washington, D.C. 20210

VIII. FIRST AID MEASURES:

- Eye contact:** Flush particles from the eyeballs with clean water for at least 15 minutes. If irritation persists, seek medical help.
- Skin contact:** Wash skin with soap and water to remove any metallic particles. If a rash develops, seek medical attention.
- Inhalation:** Remove from exposure. If severe respiratory irritation persists, seek medical help. Excessive inhalation of some metal fumes can produce an acute reaction known as "Metal Fume Fever" with symptoms of chills and fever similar to flu symptoms. These symptoms appear within a few hours of exposure; however, long term effects have not been noted from isolated instances of excessive exposure.
- Ingestion:** If symptoms of ingestion arise, seek medical help.

IX. SPILL AND DISPOSAL PROCEDURES: Vacuum or shovel any spilled material into a suitable container. Alloy wastes are normally collected to recover metal values. However, if disposal is necessary, dispose in accordance with federal, state or local regulations.

X. SARA SECTION 313 SUPPLIER NOTIFICATION: Individual filler metals covered by this MSDS may contain the following toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372: Aluminum, Barium Carbonate, Barium Fluoride, Copper, Manganese, and Nickel. Refer to Section II of this MSDS for the filler metal name and the percent by weight, and Section VI for the CAS Number for each chemical.

Notes: (1) TLV = Threshold Limit Values - American Conference of Governmental Industrial Hygienists; PEL = Permissible Exposure Limit - OSHA 29 CFR 1910.1000; C = Ceiling value; STEL = Short Term Exposure Limit - a time-weighted 15-minute exposure limit, not to be exceeded at any time during a workday.

(2) CAS No. = Chemical Abstracts Services Number

DO A 061459
CONFIDENTIAL