



MATERIAL SAFETY DATA SHEET

I. PRODUCT INFORMATION: This MSDS covers all Special Metals Welding Products Company's products identified as:

INCO-WELD[®] Filler Metals

Primarily for welding stainless steel alloys.

Special Metals Welding Products Company
A Division of Huntington Alloys
1401 Burris Road
Newton, NC, 28658 USA

EMERGENCY TELEPHONE NUMBER: (304) 526-5780
GENERAL INFORMATION: (800) 624-3411 (U.S.A.)
MSDS-S1 (828) 465-0352 (Canada)

II. HAZARDOUS INGREDIENTS:

NOMINAL COMPOSITION - PERCENT BY WEIGHT

Trade name:	Iron	Chromium	Nickel	Molybdenum	Manganese	Silicon	Copper
INCO-WELD [®] 307	60-70	19.5-22.0	8.0-10.7	0.5-1.5	3.3-4.75	0.30-0.65	0.75
INCO-WELD [®] 308H	60-70	19.5-22.0	9.0-11.0	0.5	1.0-2.5	0.30-0.65	0.75
INCO-WELD [®] 308L	60-70	19.5-22.0	9.0-11.0	0.75	1.0-2.5	0.30-0.65	0.75
INCO-WELD [®] 308LSI	60-70	19.5-22.0	9.0-11.0	0.75	1.0-2.5	0.65-1.00	0.75
INCO-WELD [®] 309L & 309H	58-64	23.0-25.0	12.0-14.0	0.75	1.0-2.5	0.30-0.65	0.75
INCO-WELD [®] 309LSI	58-64	23.0-25.0	12.0-14.0	0.75	1.0-2.5	0.65-1.00	0.75
INCO-WELD [®] 310 & 310L	45-54	25.0-28.0	20.0-22.5	0.75	1.0-2.5	0.30-0.65	0.75
INCO-WELD [®] 312	53-63	28.0-32.0	8.0-10.5	0.75	1.0-2.5	0.30-0.65	0.75
INCO-WELD [®] 316H	59-68	18.0-20.0	11.0-14.0	2.0-3.0	1.0-2.5	0.30-0.65	0.75
INCO-WELD [®] 316L	59-68	18.0-20.0	11.0-14.0	2.0-3.0	1.0-2.5	0.30-0.65	0.75
INCO-WELD [®] 316LSI	59-68	18.0-20.0	11.0-14.0	2.0-3.0	1.0-2.5	0.65-1.00	0.75
INCO-WELD [®] 317L	59-64	18.5-20.5	13.0-15.0	3.0-4.0	1.0-2.5	0.30-0.65	0.75
INCO-WELD [®] 318 & 318 SI	59-68	18.0-20.0	11.0-14.0	2.0-3.0	1.0-2.5	0.30-0.65	0.75
INCO-WELD [®] 347	60-70	19.0-21.5	9.0-11.0	0.75	1.0-2.5	0.30-0.65	0.75
INCO-WELD [®] 347SI	60-70	19.0-21.5	9.0-11.0	0.75	1.0-2.5	0.65-1.00	0.75
INCO-WELD [®] 409	83-89	10.5-13.5	0.6	0.5	0.8	0.8	0.75
INCO-WELD [®] 410	83-88	11.5-13.5	0.6	0.75	0.6	0.5	0.75
INCO-WELD [®] 410 NIM	80-85	11.0-12.5	4.0-5.0	0.4-0.7	0.6	0.5	0.75
INCO-WELD [®] 430	80-85	15.5-17.0	0.6	0.75	0.6	0.5	0.75
INCO-WELD [®] 309LMo	56-64	21.0-23.0	12.0-14.0	2.0-3.0	1.0-2.5	0.30-0.65	0.75
INCO-WELD [®] 2209	60-68	21.5-23.5	7.5-9.5	2.5-3.5	0.50-2.0	0.9	0.75
INCO-WELD [®] 904L	42-50	19.5-21.5	24.0-26.0	4.2-5.2	1.0-2.5	0.5	1.2-2.0

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III. PHYSICAL DATA: Physical State: Solid Specific Gravity: 7-8 gm/cc Melting Point: >1000 °C Odor: Odorless
Appearance: metallic silver colored wire.

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⁽¹⁾ 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, fluorides, carbon monoxide, ozone, and oxides of nitrogen. Phosgene can be produced if chlorinated solvent vapors are present in user operations.

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.

The State of California requires the following warning: This product contains a chemical known to the state of California to cause cancer.

Chromium (Cr): Exposure Limits⁽¹⁾: TLV: 0.5 mg/m³ PEL: 1.0 mg/m³ (Metal as Cr) CAS No.⁽²⁾: 7440-47-3 LD₅₀: Not Available

Chromium metal is relatively nontoxic. Chromium metal and insoluble salts are said to be involved in fibrosis of the lungs. When the metal is heated to a high temperature, fumes produced may be damaging to the lungs if inhaled. The International Agency for Research on Cancer has concluded that the evidence for carcinogenicity in humans and animals is inadequate for chromium metal and trivalent chromium compounds, but sufficient for hexavalent chromium compounds. Fumes from welding chromium-containing stainless steel or certain chromium-containing rods can trigger eczematous eruptions on the palms of the hands of chromium sensitized individuals.

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 and 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 6 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.

Manganese (Mn): Exposure Limits⁽¹⁾: TLV: 0.2 mg/m³ elemental and inorganic compounds, 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.

Molybdenum (Mo): Exposure Limits⁽¹⁾: TLV: 10 mg/m³ (Insoluble compounds, as Mo) PEL: 10 mg/m³ (Insoluble compounds, total dust as Mo) CAS No.⁽²⁾: 7439-98-7 LD₅₀: Not Available

Molybdenum and its insoluble compounds are reported to have a low toxicity. High dietary intake may produce a gout-like disease and high blood uric acid. Inhalation of fumes has caused kidney damage, respiratory irritation and liver damage in animals. Skin and eye contact may cause irritation.

Nickel (Ni): Exposure Limits⁽¹⁾: TLV: 1.5 mg/m³ as metal (Inhalable Fraction) 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 and seven nickel compounds as reasonably anticipated to be a carcinogen based on the production of injection-site tumors in experimental animals. The International Agency for Research on Cancer (IARC) concluded that nickel compounds were carcinogenic to humans and that metallic nickel is possibly carcinogenic to humans. 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.

Silicon (Si): Exposure Limits⁽¹⁾: TLV: 10 mg/m³ PEL: 10 mg/m³ Total dust; 5 mg/m³ Respirable fraction CAS No.⁽²⁾: 7440-21-3 LD₅₀: 3,160 mg/kg, rat, oral in amorphous form

Silicon in dust form is considered a nuisance dust with no toxic effects when exposures are kept under control. However, like all dusts, high concentrations of silicon dust will cause some irritation to the nose and throat. Inhalation of crystalline silica (SiO₂) over a long period of time can cause silicosis. In 1997, the International Agency for Research on Cancer (IARC) concluded that crystalline silica is a class 1 carcinogen. IARC states that a number of studies have shown that persons diagnosed as having silicosis have an increased risk of dying from lung cancer.

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
The American Welding Society
P.O. Box 351040, Miami, FL 33135

In USA: 29 CFR 1910
OSHA - Dept. of Labor
Washington, D.C. 20210

In Canada: CAN/CSA - W17.2-M87
Canadian Standards Association
Toronto, Ontario

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.

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. OTHER REGULATORY INFORMATION (U.S.A. Only)

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: Chromium, 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.

X. PREPARATION INFORMATION:

Prepared By: Industrial Hygiene Department
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Date of Preparation:
January 2008

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

It is Special Metals Welding Products Company's belief that information set forth in this Material Safety Data Sheet is accurate. Special Metals Welding Products Company makes no warranty, expressed or implied, with respect thereto and disclaims any liability from reliance thereon.