

STEEL PRODUCTS - SAFETY DATA SHEET

Version 1.1

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This Safety Data Sheet is for the Steel Products listed in Table 1. These materials share a common physical nature and many common constituents; the data presented are applicable to all products listed.



Physical Data			
Boiling Point	N/A	Evaporation Rate	N/A
Vapor Pressure	N/A	Appearance	Metallic Solid of Various Colors
Vapor Density	N/A		
Solubility in Water	Not Soluble	Volatiles by Volume	N/A
Specific Gravity	Approximately 8	Odor	No unique odor

Fire & Explosion Data			
Flammability Limits	N/A	General Reactivity	Stable
LEL & UEL	N/A	Hazardous Decomposition (Note 4.)	Will not Occur
Flash Point	N/A		
Auto-ignition Temperature	N/A	Polymerization	Will Not Occur
Unusual Fire & Explosion Hazards	N/A	Incompatibility	Acids Oxidizers

Special Fire Fighting Procedures: If these products are reduced to powder form, caution must be taken to prevent fire or explosion. To extinguish a metal powder fire use sand, dry graphite or other class "D" fire extinguishing powder.

Emergency & First-Aid Procedures
Inhalation: In case of overexposure, immediately move person area to fresh air. Give artificial respiration if breathing has stopped, or oxygen, if necessary. Seek medical attention if necessary
Skin: If irritation develops, remove contaminated clothing immediately, and wash contaminated skin with soap or mild detergent and water for five minutes. If irritation persists or reoccurs, seek medical attention.
Eyes: In case of contact, immediately wash eyes with large amounts of water for fifteen minutes, occasionally lifting the lower and upper lids. Seek medical attention, if necessary.
Ingestion: Seek medical attention, if necessary.

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Table 1.

PRODUCT NAME	COMPONENTS AND CONCENTRATION RANGE (% by Weight)											Epoxy Resin	Acrylic Resin			
	Fe	Al	Cr	Co	Cu	Mn	Mo	Ni	Pb	Si	Zn					
Low Carbon (Mild Steel) Note 1.	> 98	<2			<1	<2							<2			
Zinc, Nickel, or Lead Coated																
Durasteel (Note 3.)	94-99	<2			<1	0.1-5		<0.1 - <1					<2	0.1-5	<1	
Zinc-Coated	75-99	<2			<1	<2							<2	<1-25		
Electroplated Zinc Nickel	91-99	<2			<1	0.1-5		<0.1 - <1					<2	0.1-10		
Terne-Coated	90-99	<2			<1	<2							<2			
Nickel Terne-Coated	90-99	<2			<1	<2		<0.1					<2	<1-5		
Aluminum-Coated																
Type I	80-99	1-20			<1	<2							<2			
Type II	70-99	<1-30			<1	<2							<2			
409SS Type I	86-88	1-5	10-15		<1	<2		<0.5					<2			
409SS Type II	86-88	2-8	10-15		<1	<2		<2					<2			
Coil-Coated																
Low Carbon	> 98	<2			<1	<2							<2			
Aluminum-Coated Type I	80-99	<1-20			<1	<2							<2			
Aluminum-Coated Type II	70-99	<1-30			<1	<2							<2			
Terne-Coated	90-99	<2			<1	<2							<2			
Nickel Terne-Coated	90-99	<2			<1	<2							<2			
Zinc-Coated	70-99	<2			<1	<2							<2	<1-30		
Acrylic dry film coated																
Low Carbon	> 98	<2			<1	<2							<2			
Aluminum-Coated Type I	80-99	1-20			<1	<2							<2			
Electrogalvanized	75-99	<2			<1	<2							<2			
Zinc-Coated	80-90	<2			<1	0-2							<2	0-25	<1	

Table 2.

Symbol	Component Name	Significant Hazardous Decomposition Products (Note 4.)	(CAS) Chemical Abstracts Service Number	ACGIH (mg/m ³)		OSHA (mg/m ³)			OSHA, NTP, IARC listed	Reportable Material by 49 CFR 313	
				TLV	STEL	PEL	CEILING	PEAK			
Al	Aluminum	Total Dust (as Al)	7429-90-5	10	-	15	-	-	-	Yes	
		Respirable fraction (as AL)	7429-90-5	5	-	5	-	-	-	-	
		Welding Fume									
		Aluminum Oxide	1344-28-1	10	-	-	-	-	-	-	
Co	Cobalt	Metal Dust & Fume	7440-48-4	0.02	-	0.1	-	Yes	Yes		
Cr	Chromium	Metal	7440-47-3	0.5	-	1	-	-	-	Yes	
		Chromium (II) Compounds as Cr				0.5	-	-	-	-	
		Chromium (III) Compounds as Cr				0.5	-	-	-	-	
		Chromates as CrO ₃				-	-	0.1	-	Yes	
		Water-Soluble Cr VI Compounds, NOC as Cr			0.05	-	-	-	-	Yes	
		Insoluble Cr VI Compounds, NOC as Cr			0.01	-	-	-	-	Yes	
Cu	Copper	Dust & Mist	7440-50-8	1	-	1	-	-	-	Yes	
		Fume	as Cu	0.2	-	0.1	-	-	-	-	
Fe	Iron	Metal	7439-89-6	-	-	-	-	-	-	No	
		Iron Oxide Dust & Fume	1309-37-1	5	-	10	-	-	-	-	
		Dust & Compounds	7439-96-5	-	-	5	-	-	-	Yes	
Mn	Manganese	Fume	as Mn	-	-	5	-	-	-	-	
		Elemental and inorganic compounds	as Mn	0.2	-	-	-	-	-	-	
Mo	Molybdenum	Soluble Compounds	7439-98-7	5	-	5	-	-	-	Yes	
		Insoluble Compounds	as Mo	10	-	15	-	-	-	-	
Ni	Nickel	Metal and Insoluble Compounds	7440-02-0	1	-	1	-	-	Yes	Yes	
		Soluble Compounds	as Ni	0.1	-	1	-	-	Yes	-	
Pb	Lead	Inorganic Dusts and Fume	7439-92-1	0.05	-	0.05	-	Yes	Yes		
Si	Silicon	Total Dust	7440-21-3	10	-	15	-	-	-	No	
		Respirable Fraction	7440-21-3	-	-	5	-	-	-	-	
Zn	Zinc	Metal	7440-66-6	-	-	-	-	-	-	Yes	
		Zinc Oxide Fume	1314-13-2	5	10	5	-	-	-	-	
		Zinc Oxide Dust	1314-13-2	10	-	-	-	-	-	-	
		Total Dust	1314-13-2	-	-	15	-	-	-	-	
		Respirable Fraction	1314-13-2	-	-	5	-	-	-	-	
	Epoxy Resin		38830-06-7	-	-	-	-	-	-	No	
	Acrylic resin		9003-01-4	-	-	-	-	-	-	No	

HEALTH HAZARD DATA (Note 4.):

Primary Routes of exposure: Inhalation, Skin Contact, and Hand-to-Mouth Contamination.

INHALATION effects of exposure to the following constituents:

Iron: 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. $TDL_0=506$ mg/kg (intratracheal, rat).

Aluminum: No known health effects. Generally considered to be in the nuisance dust category.

Aluminum Oxide (Al_2O_3): Acute exposure to this material may cause bronchial irritation. However, reports of pulmonary fibrosis and emphysema of alumina abrasive workers are no longer seen, owing to improved environmental control.

Chromium: The dusts of chromium metal are usually reported to be relatively non-toxic, although there are reports of a nodular type of pulmonary disease with impairment of lung function. Some insoluble chromium compounds are suspect carcinogens. 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. $TDL_0=2.2$ mg/kg (intravenous/rat).

Cobalt: May cause interstitial pneumonitis and sensitization of the respiratory system. Symptoms may include cough, dyspnea on exertion, decreased pulmonary function, wheezing and shortness of breath.

Copper: "Metal Fume Fever" - symptoms may include cough, headache, metal taste in mouth, nausea, fever, chilling, pain in muscles and joints. This condition is transitory, usually lasting one day or less. Persons with the following medical conditions may be more susceptible to the effects from exposures to copper: chronic respiratory disease, liver disease, kidney disease, skin disease, hematopoietic disorders, and Wilson's disease. $TDL_0=120$ mg/kg (oral/human).

Manganese: Excessive inhalation of manganese can produce manganese poisoning and pneumonitis. Chronic exposures can lead to neurologic problems such as apathy, drowsiness, weakness, speech disorders; CNS involvement, including irritability, irritability in walking, spastic gait, paralysis; compulsive behavior, mask-like face and other neurological problems resembling Parkinsonism. $TDL_0=400$ mg/kg (intramuscular, rat). LD_{50} : 9,000 mg/kg, rat, oral.

Molybdenum: Molybdenum and its insoluble compounds are reported to have a low toxicity. Inhalation of fumes has caused kidney damage, respiratory irritation and liver damage in animals; irritation of the nose and throat, weight loss, and digestive disturbances in animals. Therefore, persons with chronic respiratory, kidney, or liver diseases may be more susceptible to the effects of molybdenum exposure. No industrial poisoning has been reported. $LDL_0=114$ mg/kg (intraperitoneal/rat). AK Steel Safety Data Sheet - Steel Products - V1.0

Nickel: 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.

(HEALTH HAZARD DATA Inhalation Continued)

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 installations 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. Inhalation of nickel powder produces respiratory irritation and pneumonitis; several nickel compounds, including nickel oxide, are suspect lung and nasal carcinogens. LDLo=12 mg/kg (intratracheal/rat).

Lead: Irritability, headaches, tremor, loss of memory, kidney damage, anemia, anorexia, dark line on gums, pale skin, abdominal pain, severe constipation, paralysis of the wrist joint, decreased hand-grip strength, and loss of teeth. May also adversely affect human reproductive functions and the developing fetus. TDLo=790 mg/kg (oral, rat).

Silicon: May produce X-ray changes in the lungs without disability.

Tungsten: Some evidence of pulmonary involvement, such as cough. LD₅₀=5000 mg/kg (intraperitoneal/rat).

Zinc: "Metal Fume Fever" - symptoms may include cough, headache, metallic taste in mouth, nausea, fever, chilling, pain in muscles and joints. This condition is transitory, usually lasting one day or less. TDLo=6846 mg/kg (oral, rat).

SKIN CONTACT effects of exposure to the following constituents:

Chromium: Fumes from welding chromium-containing stainless steel can trigger eczematous eruptions on the palms of the hands of chromium-sensitized individuals.

Molybdenum: Skin contact may cause irritation.

Nickel - Dermatitis due to sensitization may occur in some individuals. This often results in chronic eczema "Nickel itch," with lichenification resembling atopic or neurodermatitis. Persons with pre-existing skin disorders may be more susceptible to dermatitis from nickel compounds.

EYE CONTACT effects of exposure to the following constituents:

Iron: Prolonged eye contact with the metal dust could cause rust brown color spots forming around the particles and if left for several years, permanent damage could result.

Molybdenum: Eye contact may cause irritation.

Nickel - Irritants to the conjunctiva of the eye.

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INGESTION effects of exposure to the following constituents:

Lead: Ingestion of lead by hand-to-mouth contamination may be a significant contributor to total body burden. Irritability, headaches, tremor, loss of memory, kidney damage, anemia, anorexia, dark line on gums, pale skin, abdominal pain, severe constipation, paralysis of the wrist joint, decreased hand-grip strength, and loss of teeth. May also adversely affect human reproductive functions and the developing fetus. TDLo=790 mg/kg (oral, rat).

Manganese: Excessive ingestion of manganese can produce manganese poisoning. Chronic exposures can lead to neurologic problems, such as apathy, drowsiness, weakness, spastic gait, paralysis, and other neurological problems resembling Parkinsonism.

Molybdenum: High dietary intake may produce a gout disease and high blood uric acid.

RECOMMENDED MONITORING PROCEDURES:

Environmental Surveillance - Exposure to materials identified on this MSDS can best be determined by having representative air samples taken in the employee breathing zone, work area or department.

Medical Surveillance - Lung functions tests, chest X-rays and routine physical examinations may be useful to determine effects of dust or fume exposure. Blood samples may be appropriate when working with material containing lead such as Terne-Coated and Nickel Terne-Coated Steel Products.

EPA SARA Title III Information:

Physical form - Solid, Mixture

Potential Hazard Categories - Immediate Acute, Delayed Chronic

313 Chemicals are listed in Table 2.

Special Handling Information

Ventilation: As described in the industrial Ventilation Manual produced by the American Conference of Governmental Industrial Hygienists (ACGIH), may be required in areas where exposures are above the OSHA Permissible Exposure Limits (PEL) or other federal, state or local regulations. Such situations could exist during welding, burning, cutting, grinding or other similar operations.

Respiratory protection: A properly fitted, NIOSH approved, dust/fume respirator should be worn during welding or burning whenever exposure limits are exceeded. Such protection must be provided in accordance with the OSHA Respiratory Protection Standard (29 CFR §1910.134)

Protective Clothing: use appropriate protective clothing, such as welder' aprons and gloves, when welding or burning. Impermeable gloves may be appropriate when contact with oil produces skin irritation. Special clothing may be required by the OSHA Lead Standard (29 CRF §1910.1025) when working with Terne-Coated and Nickel Terne-Coated steel products.

Eye Protection: Use face shield (8" minimum) and/or goggles when welding, burning or grinding.

Special Precautions and Additional Information

Actions to take for spills	N/A
Waste Disposal Method	N/A
Handling and Storage	N/A
DOT Hazardous Material Proper Shipping Name	N/A
DOT Hazard Class	N/A
DOT Identification Number	N/A
EPA Hazardous Waste Number	N/A

Version 1.1 of this Material Safety Data Sheet for Steel Products was prepared 22 December 1997.
 Compilation of information by J. Michael Sullivan, CIH, CSP

Additional Information Notes:
1. A coating of water-based drawing solution, petroleum-based oil or wax, mineral oil, rust preventative oil, white rust and stain preventative or acrylic polymer may be added as a surface treatment. This coating is less than 0.1% of the total product weight.
2. A coating of paint is applied to the metal surface. This coating is less than 0.1% of the total product weight.
3. A chromium-bearing primer/topcoat combination is coated on one side with a thickness of approximately 1 micron. A coating of petroleum-base oil is added to the non-painted side as a corrosion inhibitor or preventative. Each of these coatings are less than 0.1% of the total product weight.
4. Under normal handling and use of the solid form of the materials there are few health hazards. However, metal dust, fume, and particulate and metal oxides generated by welding, cutting, grinding, scraping or melting may cause adverse health effects.

While the information and recommendations set forth on this data sheet are believed to be accurate as of the present date, AK Steel Corporation makes no warranty with respect thereto and disclaims all liability from reliance thereon.

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The following Label is provided per CFR §1910.1200 (f)(2)(ii)

Steel Products

Warning! Under normal handling and use of the solid form of the materials there are few health hazards. However, metal dust, fume, and particulate and metal oxides generated by welding, cutting, grinding, scraping or melting may cause immediate or delayed damage to lung or other organs.

These products may be coated with materials with materials that could result in skin irritation with prolonged contact.

Terne-Coated, Nickel Terne-Coated, and Coil Coated Terne Coated products may also cause reproductive hazards through the inhalation or ingestion of lead.

Durasteel, Electroplated Zinc Nickel, Nickel Terne-Coated, and Aluminum Coated 409SS Type I and Type II may also present a cancer hazard from Nickel and/or Chromium.

Precautions: Avoid breathing or ingesting dust or fume. Adequate ventilation is required while welding, burning, melting, cutting, brazing, grinding and machining.

Avoid skin contact if material is coated.

First Aid: remove exposed person to fresh air. If breathing has stopped, administer artificial respiration or oxygen as indicated. Seek medical attention.

If product is coated and excessive skin contact occurs, wash with soap and water. If irritation develops, seek medical attention.

Additional Information: Refer to AK Steel Safety Data Sheet for Steel Products Version 1.1 for additional information.

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