

Revised Date: February 7, 2019

MATERIAL SAFETY DATA SHEET

TRADE NAME (Common Name or Synonym)
Stainless Steels

CHEMICAL NAME
AISI/SAE Grades 300 Series, 400 Series, Special Alloys

I. INGREDIENTS

Material or Component	CAS Number	% Weight	EXPOSURE LIMITS	
			OSHA PEL (mg/m ³)	ACGIH TLV (mg/m ³)
Base Metal Iron (Fe)	7439-89-6	38.0-86.5	10 Oxide Fume	5 Oxide Fume
Alloying Elements Aluminum (Al)	7429-90-5	<.01-05	15 Dust	10 Dust/5 Fume
Carbon (C)	7440-44-0	<.03-2.0	Not Established	3.5 AS Carbon Black
Chromium (Cr)	7440-47-3	<.10-27	1.0 Chrome Metal	.05 Chrome Metal
Cobalt (Co)	7440-48-4	<.01-.75	0.1 Cobalt Metal	0.05 Cobalt Fume
Copper (Cu)	7440-50-8	<.18-4.5	0.1 Fume/1.0 Dust	0.2 Fume/1.0 Dust
Manganese (Mn)	7439-96-5	<.2-10	5o Dust/5o Fume	5o Dust/1 Fume
Molybdenum (Mo)	7439-98-7	<.04-5	15 Insoluble Compounds	10 Insoluble Compounds
Nickel (Ni)	7440-02-0	<.12-34	1 Nickel Metal	1 Nickel Metal
Phosphorous (P)	7723-47-0	<.01-.06	0.1 Phosphorous	0.1 Phosphorous
Selenium (Se)	7782-49-2	<.01-.03	0.2 Se Metal	0.2 Se Metal
Silicon (Si)	7440-21-3	<.15-2.0	15 Dust	10 Total Dust
Sulfur (S)	7704-34-9	<.01-.06	13 Sulfur Dioxide	5 Sulfur Dioxide
Titanium (Ti)	7440-32-6	<.01-.70	15 Ti Dioxide	10 Ti Dioxide
Columbium (Cb)	7440-03-1		Not Established	Not Established

Note: The above listing is a summary of elements used in alloying stainless steels. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minimal amounts. No permissible exposure limits (PEL) or thresholds limit values (TLV) exist for stainless steel. Values shown are applicable to component elements.

II. PHYSICAL DATA

MATERIAL IS (At Normal Conditions) <input type="checkbox"/> LIQUID <input checked="" type="checkbox"/> SOLID <input type="checkbox"/> GAS <input type="checkbox"/> OTHER	APPEARANCE AND ODOR Silvery-Grey, Odorless	% VOLATILE BY VOLUME N/A	VAPOR DENSITY N/A
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ACIDITY/ALKALINITY pH = N/A	Melting Point Approx. 2400-2800 °F Boiling Point N/A °F	Specific Gravity (H ₂ O)=1) Approx. 8 Solubility in water (% by weight) N/A	VAPOR PRESSURE (mm Hg at 20° C) N/A
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III. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION Appropriate dust/mist/fume respirator should be used to avoid excessive inhalation of particles. If exposure limits are reached or exceeded use NIOSH approved equipment.	HANDS, ARMS AND BODY Protective gloves should be worn as required for welding, burning or handling operations.
EYES AND FACE Safety glasses should be worn when grinding or cutting. Face shields should be worn when welding or cutting.	OTHER CLOTHING AND EQUIPMENT As required depending on operations and safety codes.

IV. EMERGENCY MEDICAL PROCEDURES

<p>INHALATION: Remove to fresh air; if condition continues, consult a physician.</p> <p>EYE CONTACT: Flush thoroughly with running water to remove particles; obtain medical attention.</p> <p>SKIN CONTACT: Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.</p> <p>INGESTION: If significant amounts of material are ingested, consult a physician.</p>
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V. HEALTH/SAFETY INFORMATION

Health	<p>Stainless steel products in their solid state present no inhalation, ingestion, or contact health hazard. Operations such as burning, welding, sewing, brazing, grinding, and machining, which result in elevating the temperature of the product to, or above its melting point, or result in the generation of airborne particulates may present hazards. The major exposure hazard is inhalation. Effects of overexposure to fume and dust are as follows:</p> <p>ACUTE: Excessive inhalation of metallic fumes and dust may result in irritation of eyes, nose and throat. High concentration of fumes and dust of iron-oxide, manganese, copper, zinc and lead may result in metal fume fever. Typical symptoms last 12 to 48 hours and consist of a metallic taste in the mouth, dryness and irritation of the throat chills and fever.</p> <p>CHRONIC: Chronic and prolonged inhalation of high concentrations of fumes or dust of the following elements may lead to the conditions listed opposite the element:</p> <p style="margin-left: 20px;">Aluminum: Irritation of the eyes, nose and throat. Chromium: Lesions of the skin and mucous membranes, possibly cancer of the nose or lungs-bronchogenic carcinoma Cobalt: Respiratory throat irritation, skin rash Copper: Irritation of the eyes, nose and throat, metal fume fever Iron: Pulmonary affects siderosis Manganese: Bronchitis, pneumonitis, lack of coordination Molybdenum: Respiratory throat irritation, possible liver and kidney damage, bone deformity Nickel: Lesions of the skin and mucous membranes; possibly cancer of the nose or lungs-bronchogenic carcinoma Phosphorous: Necrosis of the mandible Selenium: Nasal and bronchial irritation, gastrointestinal disturbances garlic breath odor Sulfur: (As sulfur dioxide) Edema of the lungs Titanium: No chronic debilitating symptoms indicated Columbium: No chronic debilitating symptoms indicated</p> <p>MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with chronic respiratory disorders (i.e.: asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fumes or airborne particulate matter exposure</p> <p>OCCUPATIONAL EXPOSURE LIMITS: See Products Ingredients Section I. Chromium and Nickel have been identified by the international Agency for Research on Cancer (IARC) and/or the National Toxicology Program (NTP) as potential cancer causing agents.</p>			
	Fire and Explosion	FLASH POINT N/A ° F	AUTO IGNITION TEMPERATURE N/A	FLAMMABLE LIMITS IN AIR Lower % Upper N / A %
Fire and Explosion	FIRE AND EXPLOSION HAZARDS Stainless tubular products do not present fire or explosion hazards under normal conditions. Fine metal particles such as produced in grinding or sawing can burn. High concentrations of metallic fines in the air may present an explosion hazard.			EXTINGUISHING MEDIA NOT TO BE USED Do not use water on molten metal or fires caused by fine metal particles.
Reactivity	STABILITY ■ Stable □ Unstable		INCOMPATIBILITY (MATERIALS TO AVOID) Reacts with strong acids from hydrogen gas.	
	CONDITIONS TO AVOID: Stainless steel at temperatures above the melting point may liberate fumes containing oxides of iron and alloying elements.			
	HAZARDOUS DECOMPOSITION PRODUCTS: Metallic dust or fumes may be produced during welding, burning, grinding and possibly machining. Refer to ANSI Z49.1.			

VI. ENVIRONMENTAL

SPILL OR LEAK PROCEDURES: Fine turnings and small chips should be swept or vacuumed. Scrap metal can be reclaimed for re-use
WASTE DISPOSAL METHOD: Used or unused products should be disposed of in accordance with Federal, State or Local Laws and Regulations. Disposer must comply with Federal, State and Local disposal or discharge laws.

VII. ADDITIONAL INFORMATION

In welding, precautions should be taken for airborne contaminants which may originate from components of the welding rod. Arc or spark generated when welding or burning could be a source of ignition for combustion and flammable materials.
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