

# MATERIAL SAFETY DATA SHEET #1

TRADE NAME (Common or Synonym):

Carbon and Alloy Steel

CHEMICAL NAME:

AISI/SAE 10xx thru 93xx

## 1. INGREDIENTS

Material or Compound	CAS Number	% Weight	Exposure Limits	
			OSHA PEL (mg/m <sup>3</sup> )	ACHIG-TLV (mg/m <sup>3</sup> )
Aluminum (Al)	7429-90-5	<0.01 - 0.5	15	10
Bismuth (Bi)	7440-69-9	<0.2 - 0.5	n/a	n/a
Boron (B)	7440-42-8	<0.01 - 1.0	15	10
Carbon (C)	7440-44-0	<0.1 - 1.5	10	10
Chromium (Cr)	7440-47-3	<0.4 - 10	1.0	0.5
Columbium (Cb)	7440-03-1	<0.15 - 0.35	n/a	n/a
Copper (Cu)	7440-50-8	<0.3 - 1.9	1	1
Iron (Fe)	7439-89-6	86.5 - 99.5	10	5
Lead (Pb)	7439-92-1	0.15 - 0.35	0.05	0.05
Manganese (Mn)	7439-96-5	<0.04 - 0.7	5	5
Molybdenum (Mo)	7439-98-7	<0.15 - 1.10	15	10
Nickel (Ni)	7440-02-0	<0.10 - 10	1	1
Phosphorous (P)	7723-14-0	<0.04 - 0.12	0.1	0.1
Silicon (Si)	7740-21-3	<0.15 - 2.0	15	10
Sulfur (S)	7704-34-9	<0.05 - 0.35	13 (Sulfur Dioxide)	5 (Sulfur Dioxide)
Vanadium (V)	7440-62-2	<0.01 - 0.15	0.5	0.5

NOTE: The above is a summary of elements used in alloying steel. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts.

## 2. PHYSICAL DATA

Material is (at normal conditions):	Vapor Density:	Specific Gravity (H <sub>2</sub> O - 1):
F LIQUID	N/A	Approximately 7
M SOLID		
F GAS	Acidity/Alkalinity	Solubility In Water:
F OTHER	pH - N/A	N/A
Appearance and Odor:	Melting Point (approximate):	Vapor Pressure (mm Hg @ 20° C):
Silvery - Grey, Odorless	2800° F	N/A
Volatile By Volume:	Boiling Point:	
N/A	N/A	

## 3. PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection:  
Appropriate dust/mist/fume respirator should be used to avoid excessive inhalation of particulates. If exposure limits are reached or exceeded, use NIOSH approved equipment.

Eyes and Face:  
Safety glasses should be worn when grinding or cutting. Face shields should be worn when welding or cutting.

Hands, Arms and Body:  
Protective gloves should be worn as required for welding, burning or handling operations.

Other Clothing and Equipment:  
As required depending upon operations and safety codes.

## 4. EMERGENCY MEDICAL PROCEDURES

Inhalation:  
Remove to fresh air; if condition continues, consult a physician.

Eye Contact:  
Flush thoroughly with running water to remove particulate; obtain medical attention.

Skin Contact:  
Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.

Ingestion:  
If significant amounts of metal are ingested, consult a physician.

## 5. HEALTH AND SAFETY INFORMATION

### HEALTH

Steel products in their solid state present no inhalation, ingestion, or contact health hazard. Operations such as burning, welding, sawing, 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 or overexposure to fume and dust are as follows:

Acute:

Excessive inhalation of metallic fumes and dust may result in irritation of eyes, nose and throat. High concentrations of fumes and

dust of iron-oxide, manganese, copper, zinc and lead may result in metal fume fever. Typical symptoms last from 12 to 48 hours and consist of a metallic taste in the mouth, dryness and irritation of the throat, chills and fever.

Chronic:

Chronic and prolonged inhalation of high concentrations of fumes or dust of the following elements may lead to the conditions listed.

**Aluminum:**

May initiate fibrotic changes to lung tissue, nausea, nervous disorder.

**Bismuth:**

No chronic debilitating symptoms indicated.

**Boron:**

No chronic debilitating symptoms indicated.

**Chromium:**

Lesions of the skin and mucous membranes, possible cancer of the nose or lungs-bronchogenic carcinoma.

**Copper:**

No chronic debilitating symptoms indicated.

**Iron:**

Siderosis, pulmonary effects.

**Lead:**

Anemia, urinary dysfunction, weakness, constipation.

**Manganese:**

Bronchitis, pneumonitis, lack of coordination.

**Molybdenum:**

Respiratory tract irritation, possible liver and kidney damage, bone deformity.

**Nickel:**

Lesions of the skin and mucous membranes, possible cancer of the nose or lungs-bronchogenic carcinoma.

**Phosphorous:**

Necrosis of the mandible.

**Sulfur:**

No chronic debilitating symptoms indicated.

**Vanadium:**

Emphysema, pneumonia.

**Medical Conditions Aggravated by Exposure:** Individuals with chronic respiratory disorders (i.e. asthma, chronic bronchitis, emphysema, etc) may be adversely affected by any fume or airborne particulate matter exposure.

**Occupational Exposure Limits:** See Products Ingredients Section 1. 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.

## FIRE AND EXPLOSION

Flash Point:

N/A

## 6. ENVIRONMENTAL

Auto Ignition Temperature:

N/A

Flammable Limits in Air:

Lower: N/A

Upper: N/A

Extinguishing Media:

For molten metal use dry powder or sand.

Extinguishing Media **NOT TO BE USED:**

Do not use water on molten metal.

Fire and Explosion Hazards:

Steel 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.

## REACTIVITY

**Stability:**

! Stable

" Unstable

**Incompatibility** (materials to avoid):

Reacts with strong acids to form hydrogen gas.

**Conditions to Avoid:**

Steel at temperatures above the melting point may liberate fumes containing oxides of iron and alloying elements. Avoid generation of airborne fume and dust.

**Hazardous Decomposition Products:**

Metallic dust or fumes may be produced during welding, burning, grinding and possible machining.  
Refer to ANSI Z49.1

**Spill or Leak Procedures:**

Fine turnings and small chips should be swept or vacuumed. Scrap metal can be reclaimed for reuse.

**Waste Disposal Method\*:**

Used or unused product 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.

## 7. 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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