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Material Safety Data Sheet

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I. Material Identification

CHEMICAL NAME: Non-resulfurized and Resulfurized Carbon and Alloy Steels
 SYNONYMS: Various steel products such as reinforcing bar (rebar), angles, smooth rounds, square sections, flats, channels, special AT≡ shapes, studded AT≡ steel fence post stock, etc.
 CHEMICAL FAMILY: Metal

II. Ingredients and Hazards ^{a,c}

Constituent	CAS ^b #	%	OSHA PEL ^c (mg/m ³)	ACGIH TLV-TWA ^d (mg/m ³)
Aluminum	7429-90-5	0-<0.1	5 (resp frac) 15 (total dust)	10 (dust) 5 (welding fumes)
Boron	7440-42-8	0-<0.01	Not Established	Not Established
Carbon (in solution with Iron)	7440-44-0	<1	3.5	3.5
Chromium	7440-47-3	0.05-<1.5	0.5 (Chromium II and III) 1 (metal)	0.5 (metal and Cr III) 0.05 (water-soluble Cr VI) 0.01 (insoluble Cr VI)
Columbium	7440-03-1	0-<0.1	Not Listed	Not Listed
Copper	7440-50-8	0.01-<1	0.1 (dust and mist)	0.2 (fume) 1 (dusts and mists)
Iron	1309-37-1	BALANCE	10 (oxide dust and fume)	5 (oxide dust and fume)
Manganese	7439-96-5	0.5-<2	5	0.2
Molybdenum	7439-98-7	0-<0.5	5 (soluble compounds) 15 (metal)	5 (soluble compounds) 10 (metal and insoluble)
Nickel	7440-02-0	0.05-<0.5	1	1.5 (metal) 0.1 (soluble compounds) 0.2 (insoluble compounds)
Phosphorous (yellow)	7723-14-0	0-<0.1	0.1	0.05
Silicon	7440-21-3	0-<0.5	15	10
Sulfur	7446-04-95	0-<0.5	13 (sulfur dioxide)	5.24 (sulfur dioxide)
Tin	7440-31-5	0-<0.1	2 (metal) 0.1 (organic compounds)	2 (metal and oxide) 0.1 (organic compounds)
Titanium	13463-67-7	0-<0.1	15	10
Vanadium	1314-62-1	0-<0.1	0.1 (pentoxide fume) 0.5 (pentoxide dust)	0.05 (pentoxide dust or fume)
Welding fumes	NA	NA	5	5

Notes:

- (a) This listing is a summary of elements used in alloying steel. Various grades of steel will contain different combinations of these elements. Trace elements may be present in minute amounts. No permissible exposure limits (PELs) or threshold limit values (TLVs) exist for steel. Values shown are applicable to component elements.
- (b) Chemical Abstract Number
- (c) Occupational Safety and Health Administration, Permissible Exposure Limit- time-weighted average that must not be exceeded during any 8-hour work shift of a 40-hour work week.
- (d) American Conference of Governmental Industrial Hygienists, Threshold Limit Value, Time-Weighted Average - the time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect.
- (e) Non-resulfurized and Resulfurized Carbon and Alloy Steels contain a toxic chemical or chemicals subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

III. Physical Data

BOILING PT. At 1 atm., deg. F:	5420	EVAP. RATE (NA=1):	NA
VAPOR PRESSURE at (mm Hg):	NA	VOLATILES, % Volume:	NA
VAPOR DENSITY (Air=1):	NA	MOLECULAR WT.:	NA
WATER SOLUBILITY:	Insoluble	APPEARANCE AND ODOR:	Odorless gray solid with metallic luster.
SPECIFIC GRAVITY (H2O=1):	8.0		

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IV. Fire and Explosion Data

EXTINGUISHING MEDIA: NA
 SPECIAL FIRE FIGHTING PROCEDURES: NA
 UNUSUAL FIRE OR EXPLOSION HAZARDS: NA

Note: Steel products in the solid state present no fire or explosion hazard.

V. Health Hazard Information

ROUTE OF ENTRY - SKIN: No
 ROUTE OF ENTRY - INHALATION: Yes (as dust)
 ROUTE OF ENTRY - INGESTION: No

HEALTH HAZARDS ACUTE AND CHRONIC: Steel products under normal conditions do not present an inhalation, ingestion, or contact health hazard. However, short term exposure to fumes/dust from operations such as burning, welding, sawing, brazing, grinding, etc. may produce irritation of eyes and respiratory system or metal fume fever. Chronic respiratory effects such as asthma, silicosis, or other pneumoconioses and chronic bronchitis occur among iron and steel industry workers.

EFFECTS OF OVEREXPOSURE: No toxic effects would be expected from inert solid form. Inhalation of metal dust and fumes may result from further processing of the material by the user, particularly during welding, burning, cutting, grinding and machining activities. Excessive exposure to fumes or dust may cause respiratory system irritation or effects such as pneumoconiosis (siderosis). Metal fume fever results in the appearance of delayed, flu-like symptoms including dyspnea, coughing, pains in muscles and joints, fever and chills. Exposure to manganese fumes may adversely affect the reproductive or central nervous system (Amanganism \equiv) with symptoms such as weakness in lower extremities, sleepiness, salivation, nervousness and apathy. Prolonged contact with certain non-metallic surface coating may cause dermatitis.

MEDICAL CONDITIONS AGGRAVATED: Chronic diseases or disorders of the respiratory system may be aggravated by dust or fumes.

CARCINOGENICITY - NTP: Yes (constituents)

EXPLANATION OF CARCINOGENICITY:

IARC 1987: Iron and steel founding entails exposures that are carcinogenic to humans. Elevated risk of cancers of the lung, stomach and genito-urinary system have been observed among iron and steel industry workers.

NTP 8th Annual Report on Carcinogens, 1998: Crystalline silica, beryllium, arsenic, nickel, lead acetate and cadmium reasonably anticipated to be human carcinogens. Hexavalent chromium known to be a human carcinogen. Inadequate data available to evaluate the carcinogenicity of chromium and trivalent chromium compounds.

FIRST AID:

Eye Contact: Flush well with running water to remove particles; obtain medical attention.
Skin Contact: Brush off excess dust; wash area well with soap and water.
Inhalation: Remove to fresh air; obtain medical attention.
Ingestion: Seek medical attention if large quantities of material have been ingested.

VI. Reactivity Data

STABILITY: Stable

INCOMPATIBILITY (Materials to Avoid): Reacts with strong acids to produce hydrogen gas.

HAZARDOUS DECOMPOSITION PRODUCTS: Hydrogen gas; metallic dust or fumes may be produced during welding, burning, grinding or machining.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Exposure to concentrated inorganic acids and/or hydrogen gas.

VII. Spill, Leak and Disposal Procedures

SPILLS, LEAKS (Steps to be taken): NA

WASTE DISPOSAL METHOD: Material should be reclaimed for re-use; follow local, state and federal waste disposal requirements.

VIII. Special Protection Information

RESPIRATORY PROTECTION: During welding, cutting/burning or grinding operations, precautions should be taken to control airborne particles and/or fumes; use general service or nuisance dust respirator of type approved by NIOSH/MSHA.

VENTILATION:

Local Exhaust: Recommended to control dust, fumes, etc. when grinding, cutting/burning.
 Mechanical (General): NA

PROTECTIVE GLOVES: Recommended for protection against skin abrasion as required for welding, burning or handling operations.

EYE PROTECTION: Safety glasses with sideshields of type approved by OSHA/MSHA.

OTHER PROTECTIVE EQUIPMENT AND PRECAUTIONS: As required depending on operations and safety codes.

IX. Special Precautions and Comments

STORAGE AND HANDLING INFORMATION: General good housekeeping practices are sufficient.

OTHER PRECAUTIONS: None

DOT CLASS: Nonhazardous