

# Material Safety Data Sheet

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PRODUCT NAME FORGINGS—ROUGH STATE OR MACHINED		EXAMPLES OF MATERIALS USED Carbon Steel – SAE 1020, 1030, 1040, etc. Alloy Steel – SAE 4130, 4340, 8620, ASTM A-182-F11, etc. IN PRODUCING FORGINGS: Stainless Steel ASTM 182 – 304, 316, 410, etc.			
GENERAL INFORMATION: Steel products in their natural state do not present an inhalation, ingestion, or contact hazard. However, operations such as burning, welding, brazing, grinding, blasting, machining and etc. may result in health hazards by exposure to dust or fumes that exceed permissible limits as listed below. If in your continued processing of our products generates one of these conditions, employees should be notified of the hazard and necessary protection should be used.					
SECTION II— HAZARDOUS INGREDIENTS					SECTION III – PHYSICAL DATA
BASE METAL AND ALLOYING ELEMENTS/CAS NO.		% BY WEIGHT TYPICAL	EXPOSURE LIMITS		BOILING POINT – N/A
			OSHA PEL (mg/m <sup>3</sup> )	ACGIH TLV (mg/m <sup>3</sup> )	VAPOR PRESSURE – N/A
BASE METAL Iron 7439-89-6		Balance	10 (Fe <sub>2</sub> O <sub>3</sub> Fume)	5.0 (as Fe <sub>2</sub> O <sub>3</sub> Fume)	VAPOR DENSITY – N/A
ALLOYING ELEMENTS Aluminum 7429-90-5		0.10 - 1.8	None Listed	5.0 as welding fume	SOLUBILITY IN WATER – N/A
Carbon 7440-44-0		0.01 - 1.5	None Listed	None Listed	SPECIFIC GRAVITY – 7
Chromium 7440-47-3		0.01 - 12	1.0 as Chrome	0.5 as chrome	% VOLATILE – N/A
Cobalt 7440-48-4		8 Max.	0.1 as cobalt and fume	0.05 as fume	EVAPORATION RATE – N/A
Copper 7440-50-8		0.04 - 0.7	0.2 as copper; 1.0 as dust	0.2 as fume; 1.0 as dust	AUTO IGNITION TEMP. – N/A
Lead 7439-92-1		0.15 - 0.35	0.05 as fume and dust	0.15 as dust and fume	APPEARANCE AND ODOR GRAY – BLACK / ODORLESS
Manganese 7439-96-5		0.05 - 2.0	* 5 as manganese	* 5 as dust; 1 as fume	PHYSICAL STATE - SOLID
Molybdenum 7439-98-7		0.01 - 1.10	15 as insoluble compds	10 as insoluble compds	PH – N/A
Nickel 7440-02-0		0.01 - 10	1.0 as Nickel	1.0 as Nickel	SECTION IV
Phosphorous 7723-14-0		0.15 Max	0.1 as Phosphorous	0.1 as Phosphorous	FIRE AND EXPLOSION HAZARD
Silicon 7440-21-3		0.15 - 2.20	None Listed	10 total dust	Steel in the solid state presents no fire or explosion hazard.
Sulfur 7704-34-9		0.001 - 0.35	13 sulfur dioxide	5 sulfur dioxide	
Titanium 7440-32-6		0.70 Max	15 as TiO <sub>2</sub>	10 as total dust	
Tungsten 7440-33-7		0 - 18	None Listed	5 insoluble compds	
Vanadium 7440-62-2		0.01 - 1.0	* 0.5 dust; 0.1 fume	* 0.05 dust and fume	
* denote “ceiling limit” which is not to be exceeded at any time  All products contain small amounts of various elements in the steel used to produce forgings. These elements are in addition to those specified on the mill test report sent with each order. The small quantities, frequently referred to as “traces” or “residual” elements, generally originate in the raw material used to produce the steel. See MILLTEST REPORT furnished with each order for ingredients in each product and average percent. Remaining percentage not shown on MILL TEST REPORT will consist of base metal and trace elements. At temperatures above the melting point (over 2000 degrees F) may liberate fumes containing oxides of iron and alloying elements. Protective equipment should be used. If lead is in base metal, may liberate fumes above the melting point of lead (600 + degrees F) Coatings may be applied to machine products. Normal coatings used by Gulfco Forge & Machine will be a petroleum based product. If this may create a hazardous condition in your further processing, protective caution should be exercised, If a customer specifies a coating, caution should be taken by the customer to prevent a hazardous condition in further processing of the product. Rust or scale may be on forgings in their forged or machined state, care should be taken to avoid getting these in the eyes or mouth. Forgings or machined products have some sharp edges or burrs. Some of the above elements may not be in all products shipped to you. See Mill Test Report accompanying each shipment to identify elements in each product, if Mill Test Report shows elements not listed above please contact us prior to further processing for precautions and safety requirements relating to the element.					SECTION VI – REACTIVITY  Stable under normal conditions of use, storage and transport. Will react with strong acid to liberate hydrogen.  Hazardous polymerization will Not occur.
					SECTION VII – SPILL OR LEAKS  Not applicable to steel in normal state (solid).
SECTION V – HEALTH HAZARD		SEE REVERSE SIDE			
SECTION VIII – SPECIAL PROTECTION					
SECTION X – SPECIAL PRECAUTIONS					

## SECTION V— HEALTH HAZARD DATA

Steel products in the natural state do not present an inhalation, ingestion, or contact health hazard. However, operations such as welding, burning, sawing, brazing, grinding, and possibly machining, which results in elevating the temperature of the product to or above its melting point or results in the generation of airborne particulates or fumes may present hazards. The above operations should be performed in well ventilated areas. The major exposure hazard is inhalation.

Effects of overexposure are as follows:

Acute: Excessive inhalation of metallic fumes and dusts may result in irritation of eyes, nose, and throat. Also high concentrations of fumes and dusts of iron-oxide, manganese, copper, zinc, & lead may result in metal fume fever. Typical symptoms consist of metallic taste in mouth, dryness and irritation of throat, chills and fever, and usually last from 12 to 48 hours.

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:

Iron (Iron-oxide) . Pulmonary effects, siderosis.

Manganese. Bronchitis. pneumonitis, lack of coordination.

Chromium Various forms of dermatitis, inflammation and/or ulceration of upper respiratory tract, and possibly cancer of nasal passages and lungs. Based on available information, there does not appear to be any evidence that exposure to welding fume induces human cancer.

Nickel SAME AS CHROMIUM.

Copper Pulmonary effects.

Vanadium As vanadium pentoxide, dust and fume may cause irritation of the eyes, nose, throat, and respiratory tract. It may also cause bronchitis with wheezing and chest pain. A greenish color of the tongue may occur. Repeated exposures may cause chronic bronchitis, or allergic skin rash.

Cobalt Inhalation of cobalt dust may cause an asthma-like disease with cough and dyspnea.

Molybdenum Pain in joints, hands, knees and feet.

Tungsten Some evidence of pulmonary involvement such as cough.

Lead Prolonged exposures can cause behavioral changes, kidney damage, periphery neuropathy characterized by decreased hand-grip strength and adverse reproductive effects.

Titanium As Titanium Dioxide considered to be a "nuisance" particulate: can cause irritation of the eyes, nose, throat in high concentrations. Slight lung changes may occur.

EMERGENCY AND FIRST AID PROCEDURES: For overexposure to airborne fumes and particulates, remove exposed person to fresh air. If breathing is difficult or has stopped, administer artificial respiration or oxygen as indicated. Seek medical attention promptly. Workers who experience the symptoms of lead poisoning should be removed from exposure and receive medical care and guidance. If irritation to skin develops, remove clothing and wash well with soap and water. If condition persists, seek medical attention. If eye contact, immediately flush well with running water to remove particulate: seek medical attention.

## SECTION VIII— SPECIAL PROTECTION INFORMATION

RESPIRATORY: NIOSH/MSHA approved dust and fume respirators should be used to avoid excessive inhalation of particulates. Appropriate respirator selection depends on the magnitude of exposure. Respirators should be used in accordance with OSHA 29CFR 1910.134.

SKIN: Protective gloves should be worn as required for welding, burning or handling operations.

EYE: Use safety glasses or goggles as required for welding, burning, sawing, brazing, grinding or machining operations.

VENTILATION: Local exhaust ventilation should be provided when welding, burning, sawing, brazing, grinding or machining to prevent excessive dust or fume exposure.

OTHER PROTECTIVE EQUIPMENT: Provide clean coveralls or similar full-body protective clothing on a weekly basis to workers exposed to lead concentrations above 0.05 mg/m<sup>3</sup>. (Daily, if exposures exceed 0.2 mg/m<sup>3</sup>)

## SECTION IX— SPECIAL PRECAUTIONS

Operations with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Avoid breathing fumes and/or dust. Use protective equipment and clothes when necessary.

During welding type operations, precautions should be taken for airborne contamination and noxious gases that may originate from the welding process or from components of the welding rod.

Welding, grinding or burning type operations could be a source or ignition for combustible and flammable material protective caution should be taken.

Machining or grinding of the product may cause fumes, dust or chips. Protective caution should be taken.

Customers using products should review OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200) ACGIH'S Documentation of TLV's, NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards, National Toxicology Program (NTP) "Annual Report on Carcinogens" and International Agency for Research on Cancer (IARC). For additional information and training for their personnel.

Disposal of products should be in accordance with local, state and federal waste disposal regulations.

Work areas where potential hazards might exist should be well ventilated.

Although the information and recommendations set forth herein (hereinafter "information") are presented in good faith and believed to be correct as of the date hereof, Gulfco Forge & Machine makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Gulfco Forge & Machine be responsible for damages of any nature whatsoever resulting from the use of or reliance upon information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.