



MATERIAL SAFETY DATA SHEET

Developers and Manufacturers of
Hydraulic Flanges & Components

TRADE NAME HR & CR CARBON, ALLOY & TOOL STEEL		CHEMICAL NAME STEEL	FORM HYDRAULIC COMPONENTS
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I. INGREDIENTS

MAT'L OR COMPONENT	CAS NO.	% WEIGHT	EXPOSURE LIMITS	
			OSHA PEL (mg/m ³)	ACGIH TLV (mg/m ³)
Base Metal				
Iron (Fe)	7439-89-6	Balance	10.0 as fume	5.0
Alloying Elements				
Aluminum (Al)	7429-90-5	0.10 - 1.8	15.0 as dust; 5.0 as fume	10.0 as dust; 5.0 as fume
Carbon (C)	7440-44-0	0.01 - 1.5	None Listed	None Listed
Chromium (Cr)	7440-47-3	0.01 - 12	1.0	0.5
Cobalt (Co)	7440-48-8	8 Max	0.1	0.02
Copper (Cu)	7440-50-8	0.04 - 0.7	1.0 as dust; 0.1 as fume	1.0 as dust; 0.2 as fume
Lead (Pb)	7439-92-1	0.15 - 0.35	0.05	0.05
Manganese (Mn)	7439-96-5	0.05 - 2.0	5.0	0.2
Molybdenum (Mo)	7439-98-7	0.01 - 1.10	15 as insoluble compds	10 as insoluble compds
Nickel (Ni)	7440-02-0	0.01 - 10	1.0	1.5
Phosphorous (P)	7723-14-0	0.15 Max	0.1	0.1
Silicon (Si)	7440-21-3	0.15 - 2.20	15.0 as dust; 5.0 as fume	10.0
Sulfur (S)	7704-34-9	0.001 - 0.35	None Listed	None Listed
Tungsten (W)	7440-33-7	0 - 18	None Listed	5 insoluble compds
Vanadium (V)	7440-62-2	0.01 - 1.0	0.1	0.05
Zinc (Zn)	7440-66-6	10 Max	10.0 as dust; 5.0 as fume	10.0 as dust; 5.0 as fume

Note: The above listing 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.

II. PHYSICAL DATA

MATERIAL IS (AT NORMAL CONDITIONS): SOLID		APPEARANCE AND ODOR GRAY-BLACK WITH METALLIC LUSTRE - ODORLESS			
ACIDITY/ALKALINITY ph = NA	MELTING POINT 2750 ⁰ F (approx)	BOILING POINT NA	SPECIFIC GRAVITY (H ₂ O = 1) 7	SOLUBILITY IN WATER NA	VAPOR PRESSURE NA

III. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION NIOSH approved dust/mist/fume respirator should be used during welding or burning if OSHA PEL or TVL is exceeded.	HAND, ARMS AND BODY Use appropriate protective clothing such as welders aprons & gloves when welding or burning. Check local codes.
EYES AND FACE Safety glasses should always be worn when grinding or cutting; face shields should be worn when welding or burning.	OTHER CLOTHING AND EQUIPMENT As required

IV. EMERGENCY MEDICAL PROCEDURES

INHALATION:	Remove to fresh air: if condition continues, consult physician.
EYE CONTACT:	Immediately flush well with running water to remove particulate; get medical attention.
SKIN CONTACT:	If irritation develops, remove clothing and wash well with soap and water. If condition persists, seek medical attention.
INGESTION:	If significant amounts of metal are ingested, seek medical attention.

V. HEALTH / SAFETY INFORMATION

HEALTH

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 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 all 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, & selenium may result in metal fume fever. Typical symptoms consist of a metallic taste in the mouth, dryness and irritation of the 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, central nervous system.
 - 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, nasal and paranasal sinus, skin and liver.
 - Vanadium – May affect lungs. May affect blood pressure as vanadium pentoxide.
 - 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 handgrip strength and adverse reproductive effects.
 - Zinc – None reported.

Medical conditions generally aggravated by exposure would be dermatitis and pulmonary disease of disorders.

Occupational Exposure Limits Chromium and nickel have been identified by the International Agency for Research on See Ingredients Section I. Cancer (IARC) and the National Toxicology Program (NTP) as potential carcinogens.

FIRE AND EXPLOSION

<i>Auto Ignition Temperature</i>	<i>Flammable Limits in Air</i>	<i>Extinguishing Media</i>
Flash Point NA Deg F	NA Deg F	Lower NA % Upper NA %
<i>Fire and Explosion Hazards</i>		<i>Extinguishing Media Not to be Used</i>
Steel products in their natural state do not present a fire or explosion hazard.		NA

REACTIVITY

<i>Stability</i>	<i>Incompatibility (Materials to Avoid)</i>
x Stable ___ Unstable	Stable under normal conditions of use, storage and transport. Reacts with strong acids to form hydrogen gas. At temperatures above melting point, metallic oxide fumes may be liberated.
<i>Conditions to Avoid</i>	KEEP AREA WELL VENTILATED
<i>Hazardous Decomposition Products</i>	Non-ventilated areas when cutting, welding, burning, or brazing; avoid generation of airborne dusts and fumes.
Metallic oxides.	

VI. ENVIRONMENTAL

<i>Spill or leak procedures</i>	NA	Special Precautions: Use good housekeeping practices to prevent accumulation of dust and to keep airborne dust to a minimum. Avoid breathing metal fumes or dust.
<i>Waste Disposal Method</i>	Dust, etc. – follow federal, state, and local regulations regarding disposal.	

VII. ADDITIONAL INFORMATION

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