

# MATERIAL SAFETY DATA SHEET

## MATERIAL IDENTIFICATION AND USE

**MATERIAL NAME:** STEEL

**INCLUDES ALL SHEET PRODUCTS, PLATE, STRIP, BAR, SLAB, INGOTS, STRUCTURAL SHAPES AND TUBULAR PRODUCTS.**

**MATERIAL USE:** MANUFACTURE OF ARTICLES

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HAZARDOUS INGREDIENTS BASE METAL			(ALL VALUES ARE EXPRESSED AS WEIGHT PERCENT)					
COMPONENT *	CAS NUMBER	TLV ACGIH (mg/m <sup>3</sup> )	LD50	CARBON & H.S.L.A. STEELS	ELECTRIC STEELS	LEADED & LOW ALLOY STEELS	RAILS & TIE PLATES	TUBULAR PRODUCTS
IRON	7438-89-6	5 (Fume)	U	91-99	91-99	92-96	94.96	94-96
MANGANESE	7439-96-5	5	>9 gm/kg (oral-rat)	<2.0	<2.0	<2.2	<1.1	<1.7
CHROMIUM	7440-47-3	0.5	U	<0.1	<1.0	<1.7	<1.6	<0.7
NICKEL	7440-02-0	1	>9 gm/kg (oral-rat)	<1.0	<0.1	<2.1	<0.15	<0.5
COPPER	7440-50-8	1	U	<1.0	-	-	<0.1	<0.5
PHOSPHOROUS	7732-14-0	0.1	U	<1.25	-	-	-	<0.1
MOLYBDENUM	7439-9807	10	U	-	-	-	<0.12	<1.0
LEAD	7439-92-1	0.15	U	-	-	<0.35	-	-

\* AS REQUIRED BY WHMIS INGREDIENT DISCLOSURE LIST. FOR EXACT COMPOSITION REFER TO ANALYSIS OR SPECIFICATIONS.

## METALLIC AND NON-METALLIC COATINGS

<p><b>GALVANIZE - GALVANNEAL</b></p> <p>HOT DIPPED ZINC (CAS 7440-66-6) COATING. COATING WEIGHTS RANGE FROM 15 TO 500 g/m<sup>2</sup> PER SIDE. MAY BE CHEMICALLY PASSIVATED WITH A CHROMIUM COMPOUND WHICH LEAVES A RESIDUAL CHROMIUM LEVEL OF 11 TO 40 mg/m<sup>2</sup> PER SIDE. PETROLEUM BASED RUST PREVENTIVE OILS ARE APPLIED TO OILED PRODUCT. TYPICAL OIL COATING WEIGHTS RANGE FROM 1.1 TO 5.4 g/m<sup>2</sup> PER SIDE.</p>	<p><b>DRY-LUBE</b></p> <p>MIXTURE OF BORATE AND CARBONATE SOAP LUBRICANTS FOR METAL FORMING.</p>
<p><b>GALVALUME</b></p> <p>HOT DIPPED ZINC (CAS 7440-66-6) 43% AND ALUMINUM (CAS 7429-90-5) 55% COATING. COATING WEIGHTS RANGE FROM 50 TO 150 g/m<sup>2</sup> PER SIDE. MAY ALSO BE PASSIVATED OR OILED SIMILAR TO GALVANIZE MATERIAL.</p>	<p><b>PRE-LUBE</b></p> <p>PETROLEUM BASED OIL COATING USED FOR METAL FORMING.</p>
<p><b>TIN PLATE</b></p> <p>ELECTROPLATED WITH TIN (CAS 7440-31-5) COATING. COATING WEIGHTS RANGE FROM 0.9 TO 15 g/m<sup>2</sup> PER SIDE. TREATED WITH CHROMIUM PASSIVATION SOLUTION WHICH LEAVES A CHROMIUM RESIDUE OF .05 TO 7.5 mg/m<sup>2</sup> PER SIDE. MAY BE COATED WITH AN EDIBLE OIL TO PREVENT SCRATCHING, OIL COATING TYPICALLY 0.1 MICRO INCHES THICK.</p>	<p><b>LUBE OIL</b></p> <p>LUBRICATING PROTECTIVE PETROLEUM BASED OIL.</p>
<p><b>CHROMIUM</b></p> <p>ELECTROPLATED WITH CHROMIUM (CAS 7440-47-3) COATING. COATING WEIGHTS RANGE FROM 0.1 TO 0.17 g/m<sup>2</sup> PER SIDE. MAY BE COATED WITH EDIBLE OIL SIMILAR TO TIN PLATE.</p>	<p><b>SLUSHING OIL</b></p> <p>MINERAL OIL BASED PROTECTIVE COATING CONTAINING SMALL QUANTITIES OF ANTI-OXIDANTS.</p>
<p><b>C2 COATING-ELECTRICAL</b></p> <p>GLASS FILM COMPOSED OF MAGNESIUM ORTHO-SILICATE FORMED DURING HIGH TEMPERATURE ANNEAL.</p>	<p><b>VARNISHING OIL</b></p> <p>SOLVENT APPLIED PETROLEUM OIL PROTECTIVE COATING LEAVING A WAX-LIKE PROTECTIVE COATING.</p>
<p><b>C3 COATING-ELECTRICAL</b></p> <p>OIL MODIFIED POLYESTER RESIN VARNISH FILM.</p>	<p><b>PRECOATED</b></p> <p>CURED PAINT/RESIN FILM APPLIED TO SHEET STEEL, GALVANIZED OR GALVALUME COATED STEEL SHEET.</p>
<p><b>C5M COATING-ELECTRICAL</b></p> <p>AN INORGANIZ IRON-SILICATE COMPLEX THAT IS HEAT AND OIL RESISTANT WITH GOOD INSULATING PROPERTIES.</p>	<p><b>ZINCROMETAL</b></p> <p>PROTECTIVE COATING OF ZINC RICH PAINT OVER A CHROMATE BASED PRIMER COMPOUND. COATING IS APPLIED TO ONE SIDE OF STRIP, TYPICAL COATING WEIGHTS RANGE FROM 0.215 TO 0.325 g/m<sup>2</sup></p>

**NOTE: INDIVIDUAL COATING COMPONENTS ARE PRESENT AT VALUES BELOW THE REPORTING REQUIREMENTS OF THE WHMIS INGREDIENT DISCLOSURE LIST. □**

**FIRE AND EXPLOSION HAZARDS**

-- NOT APPLICABLE --

**REACTIVITY DATE**

**CHEMICAL STABILITY:** YES

**CONDITIONS OF REACTIVITY:** na

**HAZARDOUS DECOMPOSITION PRODUCTS:** na

**INCOMPATIBILITY TO OTHER SUBSTANCES:** YES

CONTACT WITH MINERAL ACIDS WILL RELEASE HYDROGEN GAS

**PAGE -1- LEGEND: na NOT APPLICABLE, U UNKNOWN**

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS OBTAINED FROM THE USE THEREOF.

# MATERIAL NAME: STEEL

## PHYSICAL DATA

PHYSICAL STATE: SOLID ODOUR: na EVAPORATION RATE: na BOILING POINT: na  
VAPOUR PRESSURE: na VAPOUR DENSITY: na FREEZING POINT: 1530 C DENSITY: 7.86  
COEFFICIENT WATER/OIL DISTRIBUTION: na pH: na ODOUR THRESHOLD: na  
APPEARANCE: SILVER GREY METALLIC (STEEL) SOLUBILITY IN WATER: na

## PREVENTIVE MEASURES

### PERSONAL PROTECTIVE EQUIPMENT:

DEPENDENT UPON PROCESS BEING PERFORMED ON MATERIAL.  
EACH OPERATION MUST BE ADDRESSED FOR SUITABLE EQUIPMENT.

GLOVES (Specify): LEATHER-FACED

EYE (Specify): na

CLOTHING (Specify): na

FOOTWEAR (Specify): na

RESPIRATORY (Specify): na

OTHER (Specify): FUME FILTER RESPIRATOR, GLOVES & EYEWEAR REQUIRED DURING WELDING.

ENGINEERING CONTROLS (e.g. ventilation, enclosures, specify)

GENERAL OR LOCAL EXHAUST VENTILATION DURING WELDING.

LEAK AND SPILL PROCEDURES: na

WASTE DISPOSAL: na

STORAGE REQUIREMENTS:

KEEP STORED MATERIAL DRY TO PREVENT CORROSION.

SPECIAL SHIPPING INFORMATION: na

## TOXICOLOGICAL PROPERTIES OF MATERIAL

ROUTE OF ENTRY: PROLONGED SKIN CONTACT WITH COATED STEEL MAY CAUSE SKIN IRRITATION IN SENSITIVE INDIVIDUALS. INHALATION OF METAL PARTICULATE OR ELEMENTAL, OXIDE FUMES GENERATED DURING WELDING, BURNING, GRINDING OR MACHINING MAY POSE ACUTE OR CHRONIC HEALTH EFFECTS.

EFFECTS OF ACUTE EXPOSURE TO MATERIAL: INHALATION OF OVEREXPOSURE TO MANGANESE, COPPER OR ZINC (COATED PRODUCTS) MAY CAUSE METAL FUME FEVER CHARACTERIZED BY FEVER AND CHILLS (i.e. FLU-LIKE SYMPTOMS) APPEARS 4-6 HOURS AFTER EXPOSURE WITH NO LONG-TERM EFFECTS.

EFFECTS OF CHRONIC EXPOSURE TO MATERIAL: PROLONGED INHALATION OVEREXPOSURE TO METAL FUME FROM PRODUCT MAY CAUSE THE FOLLOWING EFFECTS: BENIGN PNEUMONOCYTOSIS (SIDEROSIS) WITH FEW OR NO SYMPTOMS (IRON OXIDE); CERTAIN NICKEL AND CHROMIUM COMPOUNDS HAVE BEEN LISTED WITH IARC AS NASAL AND LUNG CARCINOGENS. COBALT DUST MAY RESULT IN AN ASTHMA-LIKE CONDITION (COUGH/SHORTNESS OF BREATH).

IRRITANCY OF MATERIAL: na SENSITIZATION TO MATERIAL: na  MUTAGENICITY OF MATERIAL: na

REPRODUCTIVE EFFECTS: na TERATOGENICITY OF MATERIAL: na  SYNERGISTIC MATERIALS: na

CARCINOGENICITY OF MATERIAL: IARC LISTS CERTAIN HEXAVALENT CHROMIUM COMPOUNDS UNDER ITS GROUP 1 CATEGORY -- "CONFIRMED HUMAN CARCINOGEN".  
IARC LISTS NICKEL AND CERTAIN NICKEL COMPOUNDS UNDER ITS GROUP 2A CATEGORY -- "SUSPECTED HUMAN CARCINOGEN".

NOTE: IRON CONTAINING WELDING FUME HAS AN EXPOSURE LIMIT OF 5mg/m<sup>3</sup> (ACGIH-TLV's 1988-89). WELDING FUME MAY ALSO CONTAIN CONTAMINANTS FROM FLUXES OR WELDING CONSUMABLES.

## FIRST AID MEASURES

SKIN: MAINTAIN GOOD PERSONAL HYGIENE, WASH WITH SOAP AND WATER, SEEK MEDICAL ATTENTION IF NECESSARY.

INHALATION: REMOVE TO FRESH AIR, SEEK MEDICAL ATTENTION IF NECESSARY.

## PREPARATION OF MATERIAL SAFETY DATA SHEET

PREPARED BY: CSSCI

Preparation Date: January 3, 2012

NOTE: CONTACT SUPPLIER FOR ADDITIONAL PRODUCT INFORMATION.

# STEEL and WHMIS

## **WHMIS OVERVIEW**

WHMIS (Workplace Hazardous Materials Information System) is the result of a consultative process involving labor, industry and federal and provincial governments. The process began in the early 1980's and resulted in the law which was implemented starting October 31, 1988. The law is aimed at giving Canadian workers the "right-to-know" more about the safety and health hazards of the materials they use in the workplace. This law applies nationally in every province and territory.

The three components of the information delivery system in WHMIS are:

- i) Warning labels on containers of hazardous materials
- ii) Material Safety Data Sheets for each product which details information about the hazardous material
- iii) Employee training on what WHMIS is and how to work safely with hazardous materials

## **STEEL IN RELATION TO WHMIS**

Steel in its natural state poses no health hazard. Operations such as welding, burning or grinding may pose acute or chronic health effects through the release of controlled products from the steel substrate or from the coating material itself.

The attached Material Safety Data Sheets describe various grades of steel and the health effects which could result from overexposure to fumes or dust generated from welding, burning or grinding; preventive measures to take to prevent exposure; and emergency procedures to follow.

## **STEEL COATINGS**

Steel can be coated with a variety of metallic and non-metallic materials. The concentration of these materials is such that they need not be disclosed on the Material Safety Data Sheet. A general description of the health effects and precautionary measures to follow are presented below for both metallic and non-metallic coatings.

### **NON-METALLIC STEEL COATINGS**

#### **1) Dry Lubricants**

This class of coatings includes materials composed of borates and carbonates. These materials are skin, eye and respiratory irritants. The quantity of material which would appear on steel would not pose a high inhalation hazard. Protective measures for skin and eyes should be addressed.

#### **2) Petroleum Based Lubricants and Coatings**

This class of coatings are oils with varying viscosities and/or various additives as minor components. These components include:

- Corrosion Inhibitors (Sulphonates)
- Emulsifiers (Fatty Acids)
- Detergents (Sulphonates)
- Antioxidants (Amines)

These materials are eye, skin and respiratory irritants. The primary area of concern in regards to this class of coatings is skin contact. Lighter kerosene type materials may cause defatting of tissue, redness, and possibly dermatitis upon prolonged contact. Heavier type oils can block pores leading to an acne-like inflammation (oil acne).

Protective measures for skin and eyes should be taken. Good personal hygiene practices should be followed, i.e. washing of hands or other affected areas with mild soap and water.

### **METALLIC COATINGS**

This group of coatings would only pose a health hazard if welding, burning or grinding were to take place in an uncontrolled manner.

#### **ZINC**

-- Products which may have zinc as a coating include Galvanized, Galvalume, Galvanneal or Zincrometal.

Overexposure to zinc fumes generated during welding or burning may develop an acute condition known as "metal fume fever". This is characterized by flu-like symptoms such as fever, chills, nausea and vomiting. (The symptoms appear 4-6 hours after exposure and may last 12-18 hours).

No long-term (chronic) health hazards to zinc dust or fume have been documented.

#### **TIN**

-- Products which may have tin as a coating include Tin Mill Material or Tin Plate.

The fume or dust generated during welding or grinding may cause irritation to eyes, nose or throat, but generally metallic tin and inorganic tin compounds have low toxicity.

#### **CHROMIUM**

-- Products which may have chromium as a coating include Zincrometal, Tin Mill or Tin Plate material. Chromium may be found in a variety of forms. These include chromium metal, chromium III oxide and chromium VI compounds. Dust and fumes of chromium metal and chromium III oxide generated during welding and grinding are classed as respiratory irritants. Prolonged inhalation overexposure to certain hexavalent (chromium VI) compounds have been linked with an increased risk of cancer. The International Agency for Research (IARC) has listed certain chromium VI compounds as Group 1 compounds, i.e. carcinogenic to humans. The low chromium content of those steel grades referenced on the Material Safety Data Sheet would indicate that the chromium hazard would be minimal at best.

Chromium coated materials may cause skin irritation and/or dermatitis upon prolonged contact to sensitive individuals.

### **PRECAUTIONARY MEASURES FOR METALLIC COATINGS**

Since the primary hazard of metallic coatings results from the overexposure through inhalation of metal fumes or dusts during welding, burning or grinding, a brief overview of precautions to be taken, especially during welding or burning, is given.

Welding operations generally involve the melting of a metal in the presence of a flux or a shielding gas by means of a flame or metal arc. The composition of the welding fumes and gases formed are dependent upon the base metal, welding consumable and fluxes, and metal surface coatings.

Welding fumes are generated when the filler metal, and to a lesser extent, the base metal becomes vaporized and then rapid condensation of the metal vapor back into a fine particulate material, namely welding fumes.

The key precautions to investigate to protect welders as a result of welding fume generation is general or local ventilation and/or proper approved respiratory protection. Various sources may be consulted to obtain more information on these topics such as the Canadian Welding Institute, Ministry of Labour, Local Safety Association Office, or the texts listed at the end of this overview (the list is by no means exhaustive but is intended only for information).

Other hazards are created due to the welding process. These include ultraviolet radiation from the welding arc which could affect eyes and infrared radiation which generates heat. Thus, proper eye and skin protection will also be required. The type and degree of protection is dependent upon the welding process which is being carried out.

#### **Reference Sources**

- i) "Safety in Welding, Cutting & Allied Processes" (CAN/CSA-W117.2-M87)
  - Canadian Standards Association -- Rexdale, Ontario
- ii) "The Welding Environment" -- American Welding Society -- Miami, Florida
- iii) "Selection, Care and Use of Respirators" -- Z94.4-M1982
  - Canadian Standards Association -- Rexdale, Ontario
- iv) "Industrial Ventilation -- A Manual for Recommended Practice" --
  - American Conference of Governmental Industrial Hygienists