



ArcelorMittal

## Safety Data Sheet (SDS)

### Zinc Coated Sheet Steel

#### Section 1 – Identification

1(a) Product Identifier used on Label: Zinc Coated Sheet Steel

1(b) Other means of identification: Galvanized, Galvanneal, Galvalume™, Galvalume Plus™

1(c) Recommended use of the chemical and restrictions on use: These products are sold to all steel-consuming industries including automotive, heavy machinery, pipes and tubes, construction, packaging and appliances. The main markets for these products are construction and mechanical engineering, as well as energy and automotive applications.

1(d) Name, address, and telephone number:

ArcelorMittal Dofasco, Inc. Phone number : 1-905-548-7200 x 3871  
 P.O Box 2460  
 Hamilton, Ontario, Canada L8N 3J5

1(e) Emergency phone number: 1-760-476-3962 (3E Company Code: 333211)

#### Section 2 – Hazard(s) Identification

2(a) Classification of the chemical: Zinc Coated Sheet Steel is considered a controlled product under the Hazardous Product Regulations (HPR). Therefore, the categories of Health Hazards as defined in "GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS), Fifth revised edition ST/SG/AC 10/30/Rev 5" United Nations, New York and Geneva, 2013 have been evaluated. Refer to Section 3, 8 and 11 for additional information.

2(b) Signal word, hazard statement(s), symbols and precautionary statement(s):

Hazard Symbol	Hazard Classification	Signal Word	Hazard Statement(s)
	Carcinogenicity - 2 Reproductive Toxicity - 2 Single Target Organ Toxicity (STOT) Repeat Exposure -1	Danger	Suspected of causing cancer. Suspected of damaging fertility or the unborn child. Causes damage to lungs and central nervous system through prolonged or repeated inhalation exposure. May cause an allergic skin reaction. May cause respiratory irritation. Causes eye irritation.
	Skin Sensitization - 1 STOT Single Exposure - 3		
NA	Eye Irritation - 2B		

Precautionary Statement(s):

Prevention	Response	Storage/Disposal
Do not breathe dusts / fume / gas / mist / vapor. Wear protective gloves / protective clothing / eye protection / face protection. Contaminated work clothing must not be allowed out of the workplace. Use only outdoors or in well ventilated areas. Wash thoroughly after handling. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not eat, drink or smoke when using this product.	If inhaled: Remove person to fresh air and keep comfortable for breathing. If exposed, concerned or feel unwell: Get medical advice/attention. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If on skin: Wash with plenty of water. If irritation or rash occurs: Get medical advice/attention. Take off and wash contaminated clothing before reuse. Call a poison center/doctor if you feel unwell.	Dispose of contents in accordance with federal, provincial/state and local regulations.

2(c) Hazards not otherwise classified: None Known

2(d) Unknown acute toxicity statement (mixture): None Known

#### Section 3 – Composition/Information on Ingredients

3(a-c) Chemical name, common name (synonyms), CAS number and other identifiers, and concentration:

Chemical Name	CAS Number	EC Number	% weight
Iron	7439-89-6	231-096-4	-95
Manganese	7439-96-5	231-105-1	≤2.225
Chromium	7440-47-3	231-157-5	≤ 0.65
Nickel	7440-02-0	231-111-4	≤ 0.25

EC - European Community

CAS - Chemical Abstract Service



# Zinc Coated Sheet Steel

## Section 3 – Composition/Information on Ingredients (continued)

### 3(a-c) Chemical name, common name (synonyms), CAS number and other identifiers, and concentration (continued):

Metallic Coating			
Chemical Name	CAS Number	EC Number	% weight
<b>Galvanized</b>			
Zinc	7440-66-6	231-175-3	99
Zn coating: Coating weights range from 15 to 500 g/m <sup>2</sup> per side or up to 20% total steel weight.			
<b>Galvaneal</b>			
Zinc	7440-66-6	231-175-3	88
Iron	7439-89-6	231-096-4	11
Annealed Zn-Fe coating: Coating weights range from 20 to 100 g/m <sup>2</sup> per side or up to 10% total steel weight.			
<b>Galvalume, Galvalume Plus</b>			
Aluminum	7429-90-5	231-072-3	55
Zinc	7440-66-6	231-175-3	43
Al-Zn coating: Coating weights range from 50 to 150 g/m <sup>2</sup> per side or up to 15% total steel weight.			

### Surface Treatments:

Constitutes less than 0.5% of total weight.

1. Passivation -Chromic acid solution leaving a total chromium residual of 11 to 27mg/m<sup>2</sup> per side. Chromate passivation treatment (when specifically ordered) contains hexavalent chromium as a portion of the protective coating. In these cases, the actual concentration of hexavalent chromium present varies with steel gauge and coating weight. A hexavalent chromium free passivation treatment (E-Passivation) is also available.
2. Slushing Oil - (Quaker Ferroco 61 MAL HCL-IG, Quaker Ferroco 61-AUS, PL-7105-A). Hydrotreated naphthenic oils or petroleum based lubricating oils containing sulphonates and anti-oxidants.
3. Vanishing Oil - (Rustilo DW 924) Mineral oil and isoparaffin petroleum distillate. Oil Coating weights range from 1.1 to 5.4 g/m<sup>2</sup> per side.
4. Pre Temper - (Quaker Qwerl 291DH, Tempershield 66D) White petroleum mineral oil.
5. Galvalume Plus - (Oakite PC4610) Acrylic resin - chromium co-polymer of polystyrene-acrylate containing 2-27 mg/m<sup>2</sup> per side.

## Section 4 – First-aid Measures

### 4(a) Description of necessary measures:

- **Inhalation:** Zinc Coated Sheet Steel as sold/shipped is not a likely form of exposure. However during further processing (welding, grinding, burning, etc.), if inhaled: Remove person to fresh air and keep comfortable for breathing. If exposed, concerned or feel unwell: Get medical advice/attention.
- **Eye Contact:** Zinc Coated Sheet Steel as sold/shipped is not a likely form of exposure. However during further processing (welding, grinding, burning, etc.), if in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue Rinsing. If eye irritation persists: Get medical advice attention. If exposed, concerned or feel unwell: Get medical advice/attention.
- **Skin Contact:** If on skin: Wash thoroughly after handling. Wash with plenty of water. If irritation or rash occurs: Get medical advice/attention. Take off and wash contaminated clothing before reuse. If exposed, concerned or feel unwell: Get medical advice/attention.
- **Ingestion:** Zinc Coated Sheet Steel as sold/shipped is not a likely form of exposure. However during further processing (welding, grinding, burning, etc.), if exposed, concerned or feel unwell: Get medical advice/attention.

### 4(b) Most important symptoms/effects, acute and delayed (chronic):

- **Inhalation:** Zinc Coated Sheet Steel as sold/shipped is not likely to present an acute or chronic health effect.
  - **Eye:** Zinc Coated Sheet Steel as sold/shipped is not likely to present an acute or chronic health effect.
  - **Skin:** Zinc Coated Sheet Steel as sold/shipped is not likely to present an acute or chronic health effect.
  - **Ingestion:** Zinc Coated Sheet Steel as sold/shipped is not likely to present an acute or chronic health effect.
- However during further processing (welding, grinding, burning, etc.), individual components may illicit an acute or chronic health effect. Refer to Section 11-Toxicological Information.

### 4(c) Immediate Medical Attention and Special Treatment: None Known

## Section 5 – Fire-fighting Measures

**5(a) Suitable (and unsuitable) Extinguishing Media:** Not Applicable for Zinc Coated Sheet Steel as sold/shipped. Use extinguishers appropriate for surrounding materials.

**5(b) Specific Hazards arising from the chemical:** Not Applicable for Zinc Coated Sheet Steel as sold/shipped. When burned, toxic smoke, fume and vapor may be emitted.

**5(c) Special protective equipment and precautions for fire-fighters:** Self-contained NIOSH approved respiratory protection and full protective clothing should be worn when fumes and/or smoke from fire are present. Heat and flames cause emittance of acid smoke and fumes. Do not release runoff from fire control methods to sewers or waterways. Firefighters should wear full face-piece self-contained breathing apparatus and chemical protective clothing with thermal protection. Direct water stream will scatter and spread flames and, therefore, should not be used.

# Zinc Coated Sheet Steel

  
**ArcelorMittal**  
 Revision: 03/26/2015

## Section 6 - Accidental Release Measures

**6(a) Personal Precautions, Protective Equipment and Emergency Procedures:** Not Applicable for Zinc Coated Sheet Steel as sold/shipped. For spills involving finely divided particles, clean-up personnel should be protected against contact with eyes and skin. If material is in a dry state, avoid inhalation of dust.

**6(b) Methods and materials for containment and clean up:** Not Applicable for Zinc Coated Sheet Steel as sold/shipped. Collect material in appropriate, labeled containers for recovery or disposal in accordance with federal, state, and local regulations.

## Section 7 - Handling and Storage

**7(a) Precautions for safe handling:** Not Applicable for Zinc Coated Sheet Steel as sold/shipped, however further processing (welding, burning, grinding, etc.) with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use only outdoors or in well ventilated areas. Practice good housekeeping. Avoid breathing metal fumes and/or dust. Do not eat, drink or smoke when using this product. Cut resistant gloves and sleeves should be worn when working with steel products.

**7(b) Conditions for safe storage, including any incompatibilities:** Store away from acids and incompatible materials.

## Section 8 - Exposure Controls / Personal Protection

**8(a) Occupational Exposure Limits (OELs):** Zinc Coated Sheet Steel as sold/shipped in its physical form does not present an inhalation, ingestion or contact hazard, nor would any of the following exposure data apply. However, operations such as burning, welding (high temperature), sawing, brazing, machining, grinding, etc. may produce fumes and/or particulates. The following exposure limits are offered as reference for an experienced industrial hygienist to review.

Ingredients	OSHA PEL <sup>1</sup>	ACGIH TLV <sup>2</sup>	NIOSH REL <sup>3</sup>	MOL <sup>4</sup>
Iron	10 mg/m <sup>3</sup> (as iron oxide fume)	5.0 mg/m <sup>3</sup> (as iron oxide dust and fume)	5.0 mg/m <sup>3</sup> (as iron oxide dust and fume)	5.0 mg/m <sup>3</sup> (as iron oxide) Respirable fraction
Chromium	0.5 mg/m <sup>3</sup> (as Cr II & III, inorganic compounds) 1.0 mg/m <sup>3</sup> (as Cr, metal) 0.005 mg/m <sup>3</sup> (as Cr VI, inorganic compounds & certain water insoluble) *AL* 0.0025 mg/m <sup>3</sup> (as Cr VI, inorganic compounds & certain water insoluble)	0.5 mg/m <sup>3</sup> (as Cr III, inorganic compounds) 0.5 mg/m <sup>3</sup> (as Cr, metal) 0.05 mg/m <sup>3</sup> (as Cr VI, inorganic compounds) 0.01 mg/m <sup>3</sup> (as Cr VI, inorganic compounds & certain water insoluble)	0.5 mg/m <sup>3</sup> (as Cr II & III, inorganic compounds) 0.5 mg/m <sup>3</sup> (as Cr, metal) 0.001 mg/m <sup>3</sup> (as Cr VI, inorganic compounds & certain water insoluble)	0.5 mg/m <sup>3</sup> (as Cr III, inorganic compounds and Cr, metal) 0.05 mg/m <sup>3</sup> (as Cr VI, water soluble compounds) 0.01 mg/m <sup>3</sup> (as Cr VI, insoluble compounds)
Manganese	(C) 5.0 mg/m <sup>3</sup> (as Fume & Mn compounds)	0.2 mg/m <sup>3</sup> (as Fume & Mn compounds) 0.2 mg/m <sup>3</sup> (as respirable fraction <sup>5</sup> Mn and inorganic compounds) 0.1 mg/m <sup>3</sup> (as inhalable fraction Mn inorganic compounds)	(C) 5.0 mg/m <sup>3</sup> 1.0 mg/m <sup>3</sup> (as fume) (STEL) 3.0 mg/m <sup>3</sup>	0.2 mg/m <sup>3</sup> (as Mn and inorganic compounds)
Nickel	1.0 mg/m <sup>3</sup> (as Ni metal & insoluble compounds)	1.5 mg/m <sup>3</sup> (as inhalable fraction <sup>6</sup> Ni metal) 0.2 mg/m <sup>3</sup> (as inhalable fraction Ni inorganic only insoluble and soluble compounds)	0.015 mg/m <sup>3</sup> (as Ni metal & insoluble and soluble compounds)	1.0 mg/m <sup>3</sup> (as inhalable fraction Ni metal) 0.2 mg/m <sup>3</sup> (as inhalable fraction Ni insoluble compounds) 0.1 mg/m <sup>3</sup> (as inhalable fraction Ni soluble compounds)
Zinc	5.0 mg/m <sup>3</sup> (as zinc oxide fume) 15 mg/m <sup>3</sup> (as total dust) 5.0 mg/m <sup>3</sup> (as respirable fraction)	2.0 mg/m <sup>3</sup> (as zinc oxide)	10 mg/m <sup>3</sup> (as total dust) 5.0 mg/m <sup>3</sup> (as respirable dust)	2.0 mg/m <sup>3</sup> (as zinc oxide, respirable fraction) STEL: 10 mg/m <sup>3</sup> (as zinc oxide, respirable fraction)
Aluminum	15 mg/m <sup>3</sup> (total dust, PNOR <sup>7</sup> ) 5.0 mg/m <sup>3</sup> (as respirable fraction, PNOR)	1.0 mg/m <sup>3</sup>	10 mg/m <sup>3</sup> (as total dust) 5.0 mg/m <sup>3</sup> (as respirable dust)	1.0 mg/m <sup>3</sup> (Al and insoluble compounds, respirable fraction)

NE - None Established

- OSHA Permissible Exposure Limits (PELs) are 8-hour TWA (time-weighted average) concentrations unless otherwise noted. A (C) designation denotes a ceiling limit, which should not be exceeded during any part of the working exposure unless otherwise noted. A Peak is defined as the acceptable maximum peak for a maximum duration above the ceiling concentration for an eight-hour shift. A skin notation refers to the potential significant contribution to the overall exposure by the cutaneous route, either by contact with vapors or, of probable greater significance, by direct skin contact with the substance. A Short Term Exposure Limit (STEL) is defined as a 15-minute exposure, which should not be exceeded at any time during a workday. An Action level (AL) is used by OSHA and NIOSH to express a health or physical hazard. They indicate the level of a harmful or toxic substance/activity, which requires medical surveillance, increased industrial hygiene monitoring, or biological monitoring. Action Levels are generally set at one half of the PEL but the actual level may vary from standard to standard. The intent is to identify a level at which the vast majority of randomly sampled exposures will be below the PEL.
- Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted. A Short Term Exposure Limit (STEL) is defined as the maximum concentration to which workers can be exposed for a short period of time (15 minutes) for only four times throughout the day with at least one hour between exposures. A "skin" notation refers to the potential significant contribution to the overall exposure by the cutaneous route, either by contact with vapors or, of probable greater significance, by direct skin contact with the substance. ACGIH-TLVs are only recommended guidelines based upon consensus agreement of the membership of the ACGIH. As such, the ACGIH TLVs are for guideline use purposes and are not legal regulatory standards for compliance purposes. The TLVs are designed for use by individuals trained in the discipline of industrial hygiene relative to the evaluation of exposure to various chemical or biological substances and physical agents that may be found in the workplace.

### Section 8 - Exposure Controls / Personal Protection (continued)

#### 8(a) Occupational Exposure Limits (OELs) (continued):

3. The National Institute for Occupational Safety and Health Recommended Exposure Limits (NIOSH-REL)- Compendium of Policy and Statements. NIOSH, Cincinnati, OH (1992). NIOSH is the federal agency designated to conduct research relative to occupational safety and health. As is the case with ACGIH TLVs, NIOSH RELs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes.
4. Ontario Ministry of Labour. Employers are required under section 4 of Regulation 833. Control of Exposure to Biological or Chemical Agents (the "Regulation"), to limit the exposure of workers to specified hazardous biological or chemical agents in accordance with the values set out in the "Ontario Table" (which is Table 1 in the Regulation) or, if the agent is not listed in the Ontario Table, the ACGIH Table that is incorporated by reference in the Regulation.
5. Respirable fraction. The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in ACGIH 2014 TLVs \* and BEIs \* Appendix D, paragraph C.
6. Inhalable fraction. The concentration of inhalable particulate for the application of this TLV is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH 2014 TLVs \* and BEIs \* (Biological Exposure Indices) Appendix D, paragraph A.
7. PNOR (Particulates Not Otherwise Regulated). All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by a limit which is the same as the inert or nuisance dust limit of 15 mg/m<sup>3</sup> for total dust and 5 mg/m<sup>3</sup> for the respirable fraction.

**8(b) Appropriate Engineering Controls:** Use controls as appropriate to minimize exposure to metal fumes and dusts during handling operations. Provide general or local exhaust ventilation systems to minimize airborne concentrations. Local exhaust is necessary for use in enclosed or confined spaces. Provide sufficient general/local exhaust ventilation in pattern/volume to control inhalation exposures below current exposure limits.

#### 8(c) Individual Protection Measures:

- **Respiratory Protection:** Seek professional advice prior to respirator selection and use. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. Concentration in air of the various contaminants determines the extent of respiratory protection needed. Half-face, negative-pressure, air-purifying respirator equipped with P100 filter is acceptable for concentrations up to 10 times the exposure limit. Full-face, negative-pressure, air-purifying respirator equipped with P100 filter is acceptable for concentrations up to 50 times the exposure limit. Protection by air-purifying negative-pressure and powered air respirators is limited. Use a positive-pressure-demand, full-face, supplied air respirator or self-contained breathing apparatus (SCBA) for concentrations above 50 times the exposure limit. If exposure is above the IDLH (Immediately dangerous to life or health) for any of the constituents, or there is a possibility of an uncontrolled release or exposure levels are unknown, then use a positive-demand, full-face, supplied air respirator with escape bottle or SCBA.

**Warning!** Air-purifying respirators both negative-pressure, and powered-air do not protect workers in oxygen-deficient atmospheres.

- **Eyes:** Wear appropriate eye protection to prevent eye contact. For operations which result in elevating the temperature of the product to or above its melting point or result in the generation of airborne particulates, use safety glasses to prevent eye contact. Contact lenses should not be worn where industrial exposures to this material are likely. Use safety glasses or goggles as required for welding, burning, sawing, brazing, grinding or machining operations.
- **Skin:** Wear appropriate personal protective clothing to prevent skin contact. Cut resistant gloves and sleeves should be worn when working with steel products. For operations which result in elevating the temperature of the product to or above its melting point or result in the generation of airborne particulates, use protective clothing, and gloves to prevent skin contact. Protective gloves should be worn as required for welding, burning or handling operations. Contaminated work clothing must not be allowed out of the workplace.
- **Other protective equipment:** An eyewash fountain and deluge shower should be readily available in the work area.

### Section 9 - Physical and Chemical Properties

9(a) Appearance (physical state, color, etc.): Solid, Metallic -  
Color as Customer Specified

9(b) Odor: Odorless

9(c) Odor Threshold: NA

9(d) pH: NA

9(e) Melting Point/Freezing Point: ~1530 C

9(f) Initial Boiling Point and Boiling Range: ND

9(g) Flash Point: NA

9(h) Evaporation Rate: NA

9(i) Flammability (solid, gas): Non-flammable, non-combustible

NA - Not Applicable

ND - Not Determined for product as a whole

9(j) Upper/lower Flammability or Explosive Limits: NA

9(k) Vapor Pressure: NA

9(l) Vapor Density (Air = 1): NA

9(m) Relative Density: 7.5-8 SG

9(n) Solubility(ies): Water Insoluble

9(o) Partition Coefficient n-octanol/water: ND

9(p) Auto-ignition Temperature: NA

9(q) Decomposition Temperature: ND

9(r) Viscosity: NA

### Section 10 - Stability and Reactivity

10(a) Reactivity: Not Determined (ND) for product in a solid form. Do not use water on molten metal.

10(b) Chemical Stability: Steel products are stable under normal storage and handling conditions.

10(c) Possibility of hazardous reaction: None Known

10(d) Conditions to Avoid: Storage with strong acids or calcium hypochlorite.






### Section 10 - Stability and Reactivity (continued)

**10(e) Incompatible Materials:** Will react with strong acids to form hydrogen. Iron oxide dusts in contact with calcium hypochlorite evolve oxygen and may cause an explosion.

**10(f) Hazardous Decomposition Products:** Thermal oxidative decomposition of steel products can produce fumes containing oxides of iron and manganese as well as other alloying elements.

### Section 11 - Toxicological Information

**11 Information on toxicological effects:** The following toxicity data has been determined for Zinc Coated Sheet Steel when further processed using the information available for its components applied to the guidance on the preparation of an SDS under the GHS requirements of OSHA and the EU CPL.

Hazard Classification	Hazard Category		Hazard Symbols	Signal Word	Hazard Statement
	EU	WHMIS 2015			
Eye Damage/ Irritation (covers Categories 1, 2A and 2B)	NA*	2B <sup>c</sup>	No Pictogram	Warning	Causes eye irritation - Rating due to iron particulate generated from further processing (welding, grinding, burning, etc.).
Skin/Dermal Sensitization (covers Category 1)	NA*	1 <sup>d</sup>		Warning	May cause an allergic skin reaction - Nickel is a skin sensitizer.
Carcinogenicity (covers Categories 1A, 1B and 2)	NA*	2 <sup>e</sup>		Warning	Suspected of causing cancer. - Rating due to nickel particulate or fume that can enter the body generated when further processed (welding, grinding, burning, etc.).
Toxic Reproduction (covers Categories 1A, 1B and 2)	NA*	2 <sup>h</sup>		Warning	Suspected of damaging fertility or the unborn child. - Rating due to nickel particulate or fume that can enter the body generated when further processed (welding, grinding, burning, etc.).
Specific Target Organ Toxicity (STOT) Following Single Exposure (covers Categories 1-3)	NA*	3 <sup>i</sup>		Warning	May cause respiratory irritation. Rating due to iron particulate or fume that can enter the body generated when further processed (welding, grinding, burning, etc.).
STOT following Repeated Exposure (covers Categories 1 and 2)	NA*	1 <sup>j</sup>		Danger	Causes damage to lungs and central nervous system through prolonged or repeated inhalation exposure. Rating due to nickel or manganese particulate or fume that can enter the body generated when further processed (welding, grinding, burning, etc.).

\* Not Applicable - Semi-formed steel products are considered articles under Reach regulation (REACH REGULATION (EC) No 1907/2006) and are not subject to classification under CLP regulation (REGULATION (EC) No 1272/2008).

Toxicological data listed below are presented regardless to classification criteria. Individual hazard classification categories where the toxicological information has met or exceeded a classification criteria threshold are listed above.

a. No LC<sub>50</sub> or LD<sub>50</sub> has been established for Zinc Coated Sheet Steel. The following data has been determined for the components:

- Iron: Rat LD<sub>50</sub> = 98.6 g/kg (REACH)  
Rat LD<sub>50</sub> = 1060 mg/kg (IUCLID)  
Rat LD<sub>50</sub> = 984 mg/kg (IUCLID)  
Rabbit LD<sub>50</sub> = 890 mg/kg (IUCLID)  
Guinea Pig LD<sub>50</sub> = 20 g/kg (TOXNET)
- Nickel: LD<sub>50</sub> > 9000 mg/kg (Oral/Rat)
- Manganese: Rat LD<sub>50</sub> > 2000 mg/kg (REACH)  
Rat LD<sub>50</sub> > 9000 mg/kg (NLM Toxnet)
- Aluminum: Rat LD<sub>50</sub> > 15.9 g/kg (REACH)

b. No Skin (Dermal) Irritation data available for Zinc Coated Sheet Steel as a mixture or its individual components.

c. No Eye Irritation data available for Zinc Coated Sheet Steel as a mixture. The following Eye Irritation information was found for the components:

- Iron: Causes eye irritation.
- Nickel: Slight eye irritation from particulate abrasion only.

d. No Skin (Dermal) Sensitization data available for Zinc Coated Sheet Steel as a mixture. The following Skin (Dermal) Sensitization information was found for the components:

- Nickel: May cause allergic skin sensitization.

e. No Respiratory Sensitization data available for Zinc Coated Sheet Steel as a mixture or its components.

f. No Germ Cell Mutagenicity data available for Zinc Coated Sheet Steel as a mixture. The following Mutagenicity and Genotoxicity information was found for the components:

- Iron: IUCLID has found some positive and negative findings *in vitro*.
- Nickel: EU RAR has found positive results *in vitro* and *in vivo* but insufficient data for classification.
- Aluminum: IUCLID; ATSDR have found this ingredient is not mutagenic *in vitro*; but has marginal effects *in vivo*.

### Section 11 - Toxicological Information (continued)

#### 11 Information on toxicological effects (continued):

g. Carcinogenicity: IARC, NTP, and OSHA do not list Zinc Coated Sheet Steel as carcinogens. The following Carcinogenicity information was found for the components:

- **Welding Fumes** - IARC Group 2B carcinogen, a mixture that is possibly carcinogenic to humans.
- **Chromium (as metal and trivalent chromium compounds)** - IARC Group 3 carcinogens, not classifiable as to their human carcinogenicity.
- **Nickel and certain nickel compounds** - Group 2B - metallic nickel Group 1 - nickel compounds ACGIH confirmed human carcinogen. Nickel - EURAR Insufficient evidence to conclude carcinogenic potential in animals or humans; suspect carcinogen classification Category 2 Suspected of causing cancer.

h. No Toxic Reproduction data available for Zinc Coated Sheet Steel as a mixture. The following Toxic Reproductive information was found for the components:

- **Nickel:** Effects on fertility.

i. No Specific Target Organ Toxicity (STOT) following a Single Exposure data available for Zinc Coated Sheet Steel as a mixture. The following STOT following a Single Exposure data was found for the components:

- **Iron:** Irritating to Respiratory tract.
- **Aluminum:** Repeated exposure associated with Asthma, fibrosis in lungs and encephalopathy in humans.

j. No Specific Target Organ Toxicity (STOT) following Repeated Exposure data was available for Zinc Coated Sheet Steel as a whole. The following STOT following Repeated Exposure data was found for the components:

- **Nickel:** Rat 4 wk inhalation LOEL 4 mg/m<sup>3</sup> Lung and Lymph node histopathology. Rat 2 yr inhalation LOEL 0.1 mg/ m<sup>3</sup> Pigment in kidney, effects on hematopoiesis spleen and bone marrow and adrenal tumor. Rat 13 Week Inhalation LOAEC 1.0 mg/m<sup>3</sup> Lung weights, and Alveolar histopathology.
- **Manganese:** Inhalation of metal fumes - Degenerative changes in human Brain; Behavioral: Changes in motor activity and muscle weakness (Whitlock *et al.*, 1966).
- **Aluminum:** Reviews have found chronic exposure to aluminum flake has been reported to cause pneumoconiosis in workers. Repeat oral exposure to aluminum results in decrements in neurobehavioral function and development.

The above toxicity information was determined from available scientific sources to illustrate the prevailing posture of the scientific community. The scientific resources includes: The American Conference of Governmental Industrial Hygienist (ACGIH) Documentation of the Threshold Limit Values (TLVs) and Biological Exposure indices (BEIs) with Other Worldwide Occupational Exposure Values 2009, The International Agency for Research on Cancer (IARC), The National Toxicology Program (NTP) updated documentation, the World Health Organization (WHO) and other available resources, the International Uniform Chemical Information Database (IUCLID), European Union Risk Assessment Report (EU-RAR), Concise International Chemical Assessment Documents (CICAD), European Union Scientific Committee for Occupational Exposure Limits (EU-SCOEL), Agency for Toxic Substances and Disease Registry (ATSDR), Hazardous Substance Data Bank (HSDB), and International Programme on Chemical Safety (IPCS), European Union Classification, Labeling and Packaging, (EU CPL), Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), International Uniform Chemical Information Database (IUCLID), TOXICOLOGY DATA NETWORK (TOXNET), European Risk Assessment Reports (EU RAR).

The following health hazard information is provided regardless to classification criteria and is based on the individual component(s) and potential resultant components from further processing:

#### Acute Effects:

- **Inhalation:** Excessive exposure to high concentrations of metal dust may cause irritation to the eyes, skin and mucous membranes of the upper respiratory tract. Excessive inhalation of fumes of freshly formed metal oxide particles sized below 1.5 micrometer and usually between 0.02-0.05 micrometers from many metals can produce an acute reaction known as "metal fume fever". Symptoms consist of chills and fever (very similar to and easily confused with flu symptoms), metallic taste in the mouth, dryness and irritation of the throat followed by weakness and muscle pain. The symptoms come on in a few hours after excessive exposures and usually last from 12 to 48 hours. Long-term effects from metal fume fever have not been noted. Freshly formed oxide fumes of manganese has been associated with causing metal fume fever.
- **Eye:** Excessive exposure to high concentrations of metal dust may cause irritation to the eyes.
- **Skin:** Skin contact with metal dusts may cause irritation or sensitization, possibly leading to dermatitis. Skin contact with metallic fumes and dusts may cause physical abrasion.
- **Ingestion:** Ingestion of harmful amounts of this product as distributed is unlikely due to its solid insoluble form. Ingestion of metal dust may cause nausea or vomiting.

#### Acute Effects by component:

- **Iron and iron oxides:** Iron is harmful if swallowed, causes skin irritation, and causes eye irritation. Contact with iron oxide has been reported to cause skin irritation and serious eye damage. Particles of iron or iron compounds, which become imbedded in the eye, may cause rust stains unless removed fairly promptly.
- **Chromium, chromium oxides and hexavalent chrome:** Hexavalent chrome causes damage to gastrointestinal tract, lung, severe skin burns and eye damage, serious eye damage, skin contact may cause an allergic skin reaction. Inhalation may cause allergic or asthmatic symptoms or breathing difficulties.
- **Manganese and manganese oxides:** Manganese and Manganese oxide are harmful if swallowed.
- **Nickel and nickel oxides:** Nickel may cause allergic skin sensitization. Nickel oxide may cause an allergic skin.
- **Zinc and zinc oxides:** Not Reported/ Not Classified
- **Aluminum and aluminum oxides:** Not Reported/ Not Classified

### Section 11 - Toxicological Information (continued)

#### Delayed (chronic) Effects by component:

- **Iron and iron oxides:** Chronic inhalation of excessive concentrations of iron oxide fumes or dusts may result in the development of a benign pneumoconiosis, called siderosis, which is observable as an X-ray change. No physical impairment of lung function has been associated with siderosis. Inhalation of excessive concentrations of ferric oxide may enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens. Iron oxide is listed as a Group 3 (not classifiable) carcinogen by the International Agency for Research on Cancer (IARC).
- **Chromium, chromium oxides and hexavalent chromium:** The health hazards associated with exposure to chromium are dependent upon its oxidation state. The metal form (chromium as it exists in this product) is of very low toxicity. The hexavalent form is very toxic. Repeated or prolonged exposure to hexavalent chromium compounds may cause respiratory irritation, nosebleed, ulceration and perforation of the nasal septum. Industrial exposure to certain forms of hexavalent chromium has been related to an increased incidence of cancer. NTP (The National Toxicology Program) Fourth Annual report on Carcinogens cites "certain Chromium compounds" as human carcinogens. ACGIH has reviewed the toxicity data and concluded that chromium metal is not classifiable as a human carcinogen. Hexavalent chromium may cause genetic defects and is suspected of damaging the unborn child. Developmental toxicity in the mouse, suspected of damaging fertility or the unborn child.
- **Manganese and manganese oxides:** Chronic exposure to high concentrations of manganese fumes and dusts may adversely affect the central nervous system with symptoms including languor, sleepiness, weakness, emotional disturbances, spastic gait, mask-like facial expression and paralysis. Animal studies indicate that manganese exposure may increase susceptibility to bacterial and viral infections. Occupational overexposure (Manganese) is a progressive, disabling neurological syndrome that typically begins with relatively mild symptoms and evolves to include altered gait, fine tremor, and sometimes, psychiatric disturbances. May cause damage to lungs with repeated or prolonged exposure. Neurobehavioral alterations in worker populations exposed to manganese oxides include: speed and coordination of motor function are especially impaired.
- **Nickel and nickel oxides:** Exposure to nickel dusts and fumes can cause sensitization dermatitis, respiratory irritation, asthma, pulmonary fibrosis, edema, and may cause nasal or lung cancer in humans. Nickel causes damage to lungs through prolonged or repeated inhalation exposure. IARC lists nickel and certain nickel compounds as Group 2B carcinogens (sufficient animal data). ACGIH 2014 TLVs® and BEIs<sup>2</sup> lists insoluble nickel compounds as confirmed human carcinogens. Nickel is suspected of damaging the unborn child.
- **Zinc and zinc oxides:** Zinc dusts are a low health risk by inhalation and should be treated as a nuisance dust. Inhalation of zinc oxide fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count.
- **Aluminum and Aluminum oxides:** Chronic inhalation of finely divided powder has been reported to cause pulmonary fibrosis and emphysema. Repeated skin contact has been associated with bleeding into the tissue, delayed hypersensitivity and granulomas. Chronic exposure to aluminum flake has been reported to cause pneumoconiosis in workers. Repeat oral exposure to aluminum results in decrements in neurobehavioral function and development.

### Section 12 - Ecological Information

12(a) **Ecotoxicity (aquatic & terrestrial):** No Data Available for Zinc Coated Sheet Steel as sold/shipped. However, individual components of the product when processed have been found to be toxic to the environment. Metal dusts may migrate into soil and groundwater and be ingested by wildlife as follows:

- **Iron Oxide:** LC<sub>50</sub>: >1000 mg/L; Fish 48 h-EC<sub>50</sub> > 100 mg/L (Currenta, 2008k); 96 h-LC<sub>0</sub> ≥ 50,000 mg/L. Test substance: Bayferrox 130 red (95 – 97% Fe<sub>2</sub>O<sub>3</sub>; <4% SiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub>) (Bayer, 1989a).
- **Hexavalent Chrome:** EU RAR listed as category 1, found acute EC<sub>50</sub> and LD<sub>50</sub> to algae and invertebrates < 1 mg.
- **Nickel Oxide:** IUCLID found LC<sub>50</sub> in fish, invertebrates and algae > 100 mg/l.
- **Zinc Oxide:** EU RAR lists as Category 1 Very toxic to aquatic life with long lasting effects.

12(b) **Persistence & Degradability:** No Data Available for Zinc Coated Sheet Steel as sold/shipped or individual components.

12(c) **Bioaccumulative Potential:** No Data Available for Zinc Coated Sheet Steel as sold/shipped or individual components.

12(d) **Mobility (in soil):** No data available for Zinc Coated Sheet Steel as sold/shipped. However, individual components of the product have been found to be absorbed by plants from soil.

12(e) **Other adverse effects:** None Known

#### Additional Information:

Hazard Category: Category 1

Signal Word: Warning

Hazard Symbol:



Hazard Statement: Very Toxic to aquatic life with long lasting effects.

### Section 13 - Disposal Considerations

**Disposal:** Steel scrap should be recycled whenever possible. Product dusts and fumes from processing operations should also be recycled, or classified by a competent environmental professional and disposed of in accordance with applicable federal, provincial/state or local regulations.

**Container Cleaning and Disposal:** Follow applicable federal, provincial/state and local regulations. Observe safe handling precautions. European Waste Catalogue (EWC): 16-01-17 (ferrous metals), 12-01-99 (wastes not otherwise specified), 16-03-04 (off specification batches and unused products), or 15-01-04 (metallic packaging).

Please note this information is for Zinc Coated Sheet Steel in its original form. Any alterations can void this information.



# Zinc Coated Sheet Steel

## Section 14 - Transport Information

**14 (a-g) Transportation Information:**

**Transport Dangerous Goods (TDG) Classification:** Zinc Coated Sheet Steel does not have a TDG classification.

US Department of Transportation (DOT) under 49 CFR 172.101 does not regulate Zinc Coated Sheet Steel as a hazardous material. All federal, state, and local laws and regulations that apply to the transport of this type of material must be adhered to.

Shipping Name: Not Applicable (NA) Shipping Symbols: NA Hazard Class: NA UN No.: NA Packing Group: NA DOT/ IMO Label: NA Special Provisions (172.102): NA	<b>Packaging Authorizations</b> a) Exceptions: NA b) Group: NA c) Authorization: NA	<b>Quantity Limitations</b> a) Passenger, Aircraft, or Railcar: NA b) Cargo Aircraft Only: NA <b>Vessel Stowage Requirements</b> a) Vessel Stowage: NA b) Other: NA DOT Reportable Quantities: NA
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International Maritime Dangerous Goods (IMDG) and the Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID) classification, packaging and shipping requirements follow the US DOT Hazardous Materials Regulation.

Regulations Concerning the International Carriage of Dangerous Goods by Road (ADR) does not regulate Zinc Coated Sheet Steel as a hazardous material.

Shipping Name: Not Applicable (NA) Classification Code: NA UN No.: NA Packing Group: NA ADR Label: NA Special Provisions: NA Limited Quantities: NA	<b>Packaging</b> a) Packing Instructions: NA b) Special Packing Provisions: NA c) Mixed Packing Provisions: NA	<b>Portable Tanks &amp; Bulk Containers</b> a) Instructions: NA b) Special Provisions: NA
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International Air Transport Association (IATA) does not regulate Zinc Coated Sheet Steel as a hazardous material.

Shipping Name: Not Applicable (NA) Class/Division: NA Hazard Label (s): NA UN No.: NA Packing Group: NA Excepted Quantities (EQ): NA	<b>Passenger &amp; Cargo Aircraft Limited Quantity (EQ)</b> Pkg Inst: NA      Pkg Inst: NA Max Net Qty/Pkg: NA      Max Net Qty/Pkg: NA		<b>Cargo Aircraft Only</b> Pkg Inst: NA Max Net Qty/Pkg: NA	<b>Special Provisions:</b> NA <b>ERG Code:</b> NA
	Pkg Inst – Packing Instructions      Max Net Qty/Pkg – Maximum Net Quantity per Package      ERG – Emergency Response Drill Code			

## Section 15 - Regulatory Information

**Regulatory Information:** The following listing of regulations relating to an ArcelorMittal Dofasco, Inc product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities.

This product and/or its constituents are subject to the following regulations:

**OSHA Regulations:** Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-2, Z-3): The product, Zinc Coated Sheet Steel as a whole is not listed. However, individual components of the product are listed: Refer to Section 8, Exposure Controls and Personal Protection.

**EPA Regulations:** The product, Zinc Coated Sheet Steel is not listed as a whole. However, individual components of the product are listed:

Components	Regulations
Chromium	CERCLA, CWA, SARA 313, RCRA, SDWA
Manganese	CAA, SARA 313, SDWA
Nickel	CAA, CERCLA, CWA, SARA 313
Zinc Oxide (Zn Compounds)	CWA, SARA 313
Aluminum	SARA 313

**SARA Potential Hazard Categories:** Immediate Acute Health Hazard; Delayed Chronic Health Hazard.

**Regulations Key:**

- CAA Clean Air Act (42 USC Sec. 7412; 40 CFR Part 61 [As of: 8/18/06])
- CERCLA Comprehensive Environmental Response, Compensation and Liability Act (42 USC Secs. 9601(14), 9603(a); 40 CFR Sec. 302.4, Table 302.4, Table 302.4 and App. A)
- CWA Clean Water Act (33 USC Secs. 1311; 1314(b), (c), (e), (g); 136(b), (c); 137(b), (c) [as of 8/2/06])
- RCRA Resource Conservation Recovery Act (42 USC Sec. 6921; 40 CFR Part 261 App VIII)
- SARA Superfund Amendments and Reauthorization Act of 1986 Title III Section 302 Extremely Hazardous Substances (42 USC Secs. 11023, 13106; 40 CFR sec. 372.65) and Section 313 Toxic Chemicals (42 USC secs. 11023, 13106; 40 CFR Sec. 372.65 [as of 6/30/05])
- TSCA Toxic Substance Control Act (15 U.S.C. s/s 2601 et seq. [1976])
- SDWA Safe Drinking Water Act (42 U.S.C. s/s 300f et seq. [1974])

# Zinc Coated Sheet Steel

## Section 15 - Regulatory Information (continued)

**Section 313 Supplier Notification:** The product, Zinc Coated Sheet Steel contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-to-Know Act and 40 CFR part 372:

CAS #	Chemical Name	Percent by Weight
7440-47-3	Chromium	1.15 max
7439-96-5	Manganese	2.5 max
7440-02-0	Nickel	1.8 max
7440-66-6	Zinc	20 max
7429-90-5	Aluminum	8.25 max

**Pennsylvania Right to Know:** Contains regulated material in the following categories:

- Hazardous Substances: Chromium, Manganese Nickel, Aluminum and Zinc
- Environmental Hazards: Chromium, Manganese, Nickel, Aluminum and Zinc
- Special Hazardous Substance: Chromium and Nickel

**California Prop. 65:** Contains elements known to the State of California to cause cancer or reproductive toxicity. This includes Chromium compounds and Nickel.

**New Jersey:** Contains regulated material in the following categories:

- Hazardous Substance: Chromium, Manganese, Nickel, Aluminum (dust or fume) and Zinc
- Environmental Hazards: Chromium, Manganese, Nickel and Zinc
- Special Hazardous Substance: Chromium, Manganese and Aluminum (dust or fume)

**Minnesota:** Chromium, Manganese, Nickel and Zinc

**Massachusetts:** Chromium, Manganese, Nickel, Aluminum (dust or fume) and Zinc

**WHMIS Classification (Canadian):** The product, Zinc Coated Sheet Steel is listed as D2A, D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

## Section 16 - Other Information

**Prepared By:** ArcelorMittal Dofasco, Inc.

**Original Issue Date:** 8/26/2002

**Revised Date:** 03/26/2015

**Additional Information:**

**Hazardous Material Identification System (HMIS) Classification**

Health Hazard	1
Flammability	0
Physical Hazard	0

**National Fire Protection Association (NFPA)**



**HEALTH= 1,** Denotes possible chronic hazard if airborne dusts or fumes are generated irritation or minor reversible injury possible.

**FIRE= 0,** Materials that will not burn.

**PHYSICAL HAZARD= 0,** Materials that are normally stable, even under fire conditions, and will not react with water, polymerize, decompose, condense, or self-react. Non-explosives.

**HEALTH = 1,** Exposure could cause irritation but only minor residual injury even if no treatment is given.

**FLAMMABILITY = 0,** Materials that will not burn.

**INSTABILITY = 0,** Normally stable, even under fire exposure conditions, and are not reactive with water.

**ABBREVIATIONS/ACRONYMS:**

<b>ACGIH</b>	American Conference of Governmental Industrial Hygienists	<b>NIF</b>	No Information Found
<b>BEIs</b>	Biological Exposure Indices	<b>NIOSH</b>	National Institute for Occupational Safety and Health
<b>CAS</b>	Chemical Abstracts Service	<b>NTP</b>	National Toxicology Program
<b>CERCLA</b>	Comprehensive Environmental Response, Compensation, and Liability Act	<b>ORC</b>	Organization Resources Counselors
<b>CLP</b>	Classification, Labelling and Packaging	<b>OSHA</b>	Occupational Safety and Health Administration
<b>CFR</b>	Code of Federal Regulations	<b>PEL</b>	Permissible Exposure Limit
<b>CNS</b>	Central Nervous System	<b>PNOR</b>	Particulate Not Otherwise Regulated
<b>GI, GIT</b>	Gastro-Intestinal, Gastro-Intestinal Tract	<b>PNOC</b>	Particulate Not Otherwise Classified
<b>HMIS</b>	Hazardous Materials Identification System	<b>PPE</b>	Personal Protective Equipment
<b>IARC</b>	International Agency for Research on Cancer	<b>ppm</b>	parts per million
<b>LC50</b>	Median Lethal Concentration	<b>RCRA</b>	Resource Conservation and Recovery Act
<b>LD50</b>	Median Lethal Dose	<b>REACH</b>	Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals
<b>LD<sub>50</sub></b>	Lowest Dose to have killed animals or humans	<b>RTECS</b>	Registry of Toxic Effects of Chemical Substances
<b>LEL</b>	Lower Explosive Limit	<b>SARA</b>	Superfund Amendment and Reauthorization Act

Zinc Coated Sheet Steel

**Section 16 - Other Information (continued)**

**ABBREVIATIONS/ACRONYMS (continued):**

LOEL	Lowest Observed Effect Level	SCBA	Self-contained Breathing Apparatus
LOAEC	Lowest Observable Adverse Effect Concentration	SDS	Safety Data Sheet
$\mu\text{g}/\text{m}^3$	microgram per cubic meter of air	STEL	Short-term Exposure Limit
$\text{mg}/\text{m}^3$	milligram per cubic meter of air	TLV	Threshold Limit Value
mppcf	million particles per cubic foot	TWA	Time-weighted Average
MSHA	Mine Safety and Health Administration	UEL	Upper Explosive Limit
NFPA	National Fire Protection Association		

**Disclaimer:** The information contained in this Safety Data Sheet is taken from sources and/or based upon data believed to be reliable as of the date of issue. Neither the above-named supplier nor any of its subsidiaries assumes any liability whatsoever in connection with the information contained herein. NO WARRANTIES ARE MADE, WHETHER EXPRESS OR IMPLIED, INCLUDING WITH RESPECT TO THE COMPLETENESS, ACCURACY OR SUFFICIENCY OF THE FOREGOING, OR ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM COURSE OF DEALING OR TRADE. The user is responsible for determining whether the product is fit for a particular purpose and suitable for user's method of use or application.

# Zinc Coated Sheet Steel

Signal Word: **DANGER**

Symbols:



## HAZARD STATEMENTS:

Causes eye irritation.  
May cause an allergic skin reaction.  
Suspected of causing cancer.  
Suspected of damaging fertility or the unborn child.  
May cause respiratory irritation.  
Causes damage to lungs and central nervous system through prolonged or repeated inhalation exposure.

## PRECAUTIONARY STATEMENTS

Do not breathe dusts / fume / gas / mist / vapor.  
Wear protective gloves / protective clothing / eye protection / face protection.  
Contaminated work clothing must not be allowed out of the workplace.  
Use only outdoors or in well ventilated areas.  
Wash thoroughly after handling.  
Obtain special instructions before use.  
Do not handle until all safety precautions have been read and understood.  
Do not eat, drink or smoke when using this product.  
If inhaled: Remove person to fresh air and keep comfortable for breathing.  
If exposed, concerned or feel unwell: Get medical advice/attention.  
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.  
Continue Rinsing.  
If on skin: Wash with plenty of water. If irritation or rash occurs: Get medical advice/attention. Take off and wash contaminated clothing before reuse.  
Call a poison center/doctor if you feel unwell.  
Dispose of contents in accordance with federal, provincial/state and local regulations.

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