

# Nickel Metal

## Section 1. Identification of the Substance and Company

### 1.1 Product Identification:

*Product Name:* Nickel; massive forms

*Synonyms:*

FSC	Cut Cathode (Strip)	Pellets
1X1	4X4	S-Pellets
OSC	R-Rounds	P-Pellets
S-Rounds	Discs	Chips
Melt Rounds	Jumbos	Slab

*Chemical Family:* Metal.

*EC No:* 231-111-4

*CAS No:* 7440-02-0

**REACH Registration number: see Section 15**

### 1.2 Uses

Identified Uses:

- Stainless, special steels and special alloys manufacturing
- Integrated steel and iron
- EAF carbon steel manufacturing
- Powder metallurgy
- Metal surface treatment
- Production of nickel salts from nickel metal
- Manufacturing of batteries using positive nickel electrodes
- Ni catalyst production from NiO-containing catalyst precursor
- Use of pre-reduced nickel containing catalyst
- Production of magnets
- Production of nickel-containing products (electronics)
- Production of brazing alloys
- Use of brazing alloys
- Production of silver-nickel contact materials
- Use of silver-nickel contact materials
- Sputtering deposition
- Thin film deposition by evaporation technique
- Machining of nickel alloys and nickel-coated metal objects
- Use of Nickel metal for Thermal Spraying
- Use of Nickel metal and Nickel containing alloys for the production of steel and other alloys powder by atomisation
- Use of Ni-containing alloys for blasting

Uses Advised Against:

- Use of nickel in articles intended for direct and prolonged contact with the skin where the release of nickel exceed the limit set out in Directives 94/27/EC and 2004/6/EC and REACH regulation 1907/2009 (Annex XVII).

- Use of nickel in nickel-containing food contact materials for which migration into foodstuff would exceed more than 0.1 mg/kg of nickel in accordance with the Council of Europe Guidelines on metals and alloys used as food contact materials
- Use of nickel in immersion-type kettles which would release more than 0.05 mg/l of nickel into the water in accordance with the Council of Europe Guidelines on metals and alloys used as food contact materials
- Use of nickel in commercially available "do-it-yourself" home electroplating kits.

### 1.3 Company Identification

*Manufactured by:*

In Canada:

1. Vale Canada Limited  
Manitoba Operations  
Thompson, MB  
Canada R8N 1P3
2. Vale Canada Limited  
Ontario Operations  
Sudbury, ON  
Canada PoM 1No

3. Vale Newfoundland and Labrador  
Long Harbour Processing Plant  
Long Harbour, NL  
Canada AoB 2Jo

In the UK:

4. Vale Europe Limited  
Clydach Refinery  
Clydach Swansea  
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U.S.A.

In Asia (Except India, & Pakistan):

Vale Base Metals Asia Pacific PTE. LTD.  
One Temasek Avenue #39-01  
Millenia Tower  
Singapore, 039192

In Europe, Middle East, Africa, India, & Pakistan:

Vale International SA  
Route de Pallatex 29  
1162 Saint-Prex  
Switzerland

**For Fire, Spill, or chemical emergency call CHEMTREC: +1 703 527-3887**

for Europe call CHEMTREC: +(44) 870 8200418

## Section 2. Hazards Identification

### 2.1 Classification of the Substance:

- Skin Sensitization – Category 1
- Carcinogenicity – Category 2
- Specific Target Organ Toxicity, Repeated exposure – Category 1

Hazard Pictograms: GHS07 - Exclamation mark, GHS08 - Health Hazard

Signal Word: Danger

Hazard Statements: H317 - May cause an allergic skin reaction.  
 H351 - Suspected of causing cancer by inhalation  
 H372 - Causes damage to lungs through prolonged or repeated inhalation exposure

Precautionary Statements: P201, P202, P260, P261, P272, P280, P264, P270, P302+P352, P308+P313, P333+P313, P314, P321, P362+P364, P405, P501

### 2.2: Label elements

Product identifier: Nickel  
 CAS #: 7440-02-0

Symbols: GHS07 - Exclamation mark, GHS08 - Health Hazard



Signal Word: Danger

Hazard Statements: H317, H351, H372

Precautionary Statements: P202, P261, P280, P302+352, P501  
 (NOTE: P-statements have been reduced, the full list can be found in Section 15).

For full text of Precautionary Statements see section 15.

## Section 3. Composition

Substance  Mixture

Hazardous Ingredients	Typical Composition	C.A.S. Number	EINECS/EC Label No.
Nickel Metal (Ni)	>99%	7440-02-0	231-111-4

#### Section 4. First Aid Measures

<i>Ingestion:</i>	No specific first aid required.
<i>Inhalation:</i>	No specific first aid required.
<i>Skin:</i>	Remove contaminated clothing, and wash affected areas thoroughly with water. If skin irritation or rash occurs: Get medical advice/attention. Show label if possible.
<i>Eyes:</i>	Irrigate eyeball thoroughly with water for at least 10 minutes. If discomfort persists, seek medical attention.
<i>Most important symptoms &amp; affects, both acute/ delayed</i>	Skin contact: Rash Eye contact: Redness
<i>Indication of immediate medical attention and special treatment needed</i>	No special requirements

#### Section 5. Fire Fighting Measures

<i>Suitable extinguishing media:</i>	Any, type to be selected according to materials stored in the immediate neighbourhood.
<i>Special risks:</i>	Non-flammable. May oxidize to Nickel Oxide if exposed to high temperatures within a fire. Keep containers cool with water spray.
<i>Special protective equipment for fire fighting:</i>	None needed. Wear protective equipment if required for other materials within the immediate vicinity.

#### Section 6. Accidental Release Measures

<i>Person related precautionary measures:</i>	Avoid generation of dusty atmospheres. Do not inhale dusts. Contaminated work clothing should not be allowed out of the workplace. Use personal protective equipment as required. Wash hands, and face thoroughly after handling.
<i>Environmental Protection measures:</i>	No specific measures needed.
<i>Procedures for cleaning/absorption:</i>	Pick up and replace in original container. Nickel-containing material is normally collected to recover nickel values.

#### Section 7. Handling and Storage

<i>7.1 Precautions for Safe Handling:</i>	Prevent the generation of inhalable dusts e.g. by the use of suitable ventilation. Do not inhale dust. Wear appropriate nationally approved respirators if handling is likely to cause the concentration limits of airborne nickel to exceed the locally prescribed exposure limits. Wear suitable protective clothing and gloves. Contaminated work clothing should not be allowed out of the workplace
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7.2 *Conditions for Safe Storage:* Keep in the container supplied, and keep container closed when not in use. Local regulations should be followed regarding the storage of this product.

## Section 8. Exposure Controls / Personal Protection

### 8.1.1 Exposure Limits:

Nickel Metal (Ni) – CAS 7440-02-0		
	Exposure Limit (mg/m <sup>3</sup> )	Year
ACGIH TLV-TWA <sup>1</sup>	1.5 *	2008
UK WEL <sup>2</sup>	0.5	2006
Japan	1	1968
Korea	1	2006
China	1	2007

\* - as Ni in inhalable fraction

### Environmental Limits:

#### PNEC's

Compartment	Unit	PNEC
Freshwater	µg Ni/L (bioavailable)	7.1
Marine	µg Ni/L	8.6
Terrestrial	mg Ni/kg	29.9

#### DNEL's

	Unit	DNEL
Dermal		
Long-term local	mgNi/cm <sup>2</sup> /day	0.035
Inhalation		
Acute local	mgNi/m <sup>3</sup>	4.0
Long-term systemic	mgNi/m <sup>3</sup>	0.05
Long-term local	mgNi/m <sup>3</sup>	0.05

### 8.2.1 Occupational exposure controls:

As supplied, this product does not pose a health hazard by inhalation. Mechanical extraction ventilation may be required if user operations change it to other physical or chemical forms, whether as end products, intermediates or fugitive emissions, which are inhalable. Maintain airborne nickel levels as low as possible. Avoid repeated skin contact.

### PPE

- Respiratory protection:** If required, use an approved respirator with particulate filters.
- Eye protection:** None
- Hand & Skin Protection:** Wear suitable protective clothing and gloves, which should be selected specifically for the working place, depending on concentration and quantity of the hazardous material (overalls and leather/rubber gloves). Wash skin thoroughly after handling and before eating, drinking or smoking. Change contaminated clothing frequently. Launder clothing and gloves as needed. Use of skin-protective barrier cream advised.

### Section 9. Physical and Chemical Properties

Silver-grey odourless metal.

Physical state at 20°C and 101.3 kPa	solid
Melting / freezing point	1455°C
Boiling point	2730°C
Relative density	8.9 g/cm <sup>3</sup> at 25°C
Vapour pressure	1 mm Hg at 1810°C.
Surface tension	Not applicable
Water solubility	Not applicable
Partition coefficient n-octanol/water (log value)	Not applicable
Flash point	Not applicable
Flammability	Non-flammable
Explosive properties	Non-explosive
Self-ignition temperature	Autoflammability is not applicable to massive nickel metal.
Oxidising properties	Non-oxidising
Granulometry	Particle size distribution: <100 µm, <99%
Stability in organic solvents and identity of relevant degradation products	Not applicable
Dissociation constant	Not applicable
Viscosity	Not applicable
Packaged Density	<i>Pellets:</i> 5.4 – 6.0 g/cm <sup>3</sup> <i>Discs:</i> 5.4 – 6.0 g/cm <sup>3</sup> <i>Chips:</i> 4.5 – 6.0 g/cm <sup>3</sup>

### Section 10. Stability and Reactivity

- 10.1 *Reactivity* Stable under normal conditions.
- 10.2 *Chemical stability* Stable under normal conditions.
- 10.3 *Possibility of hazardous reactions* Stable under normal conditions.

10.4	<i>Conditions to avoid</i>	This product can react vigorously with acids to liberate hydrogen, which can form explosive mixtures with air. Under special conditions nickel can react with carbon monoxide in reducing atmospheres to form nickel carbonyl, Ni(CO) <sub>4</sub> , a toxic gas. Metal powders when heated in reducing atmospheres may become pyrophoric.
10.5	<i>Incompatible materials</i>	Acids, Strong oxidising agents.
10.6	<i>Hazardous Decomposition Product(s)</i>	Nickel carbonyl gas

### Section 11. Toxicological Information<sup>3</sup>

#### **Nickel**

##### *Acute Toxicity:*

a) *Oral:* Non toxic - LD<sub>50</sub> ORAL RAT >9000 mg/kg

b) *Inhalation:* No information available

c) *Dermal:* No information available.

##### *Corrosivity/Irritation:*

a) *Respiratory Tract:* None

b) *Skin:* See sensitization section.

c) *Eyes:* Mechanical irritation may be expected.

##### *Sensitization:*

a) *Respiratory tract:* Nickel metal induced asthma is very rare. 3 case reports are available; the data is not sufficient to conclude that nickel metal is classified as a respiratory sensitizer.

b) *Skin:* Nickel metal is a well-known skin sensitizer. Direct and prolonged skin contact with metallic nickel may induce nickel allergy and elicit nickel allergic skin reactions in those people already sensitized to nickel, so-called nickel allergic contact dermatitis.

c) *Pre-existing conditions:*

Individuals known to be allergic to nickel should avoid contact with nickel whenever possible to reduce the likelihood of nickel allergic contact dermatitis reactions (skin rashes). Repeated contact may result in persistent chronic palmar/hand dermatitis in a smaller number of individuals, despite efforts to reduce or avoid nickel exposure.

##### *Chronic toxicity:*

a) *Oral:* No information available

b) *Inhalation:* Animal studies (rats) show that repeated-dose inhalation of micron-sized metallic nickel powder damages the lung. Chronic inflammation, lung fibrosis and accumulation of nickel particles were observed.

*c) Dermal:* Direct and prolonged skin contact with nickel metal may cause nickel sensitization resulting in nickel allergic contact dermatitis /skin rash.

*Mutagenicity /  
Reproductive toxicity:* No data.

*Carcinogenicity:  
a) Ingestion:* The U.S. National Institute for Occupational Safety and Health (NIOSH) concluded that there is no evidence that nickel metal is carcinogenic when ingested.

*b) Inhalation:* To date, there is no evidence that nickel metal causes cancer in humans based on epidemiology data from workers in the nickel producing and nickel consuming industries. A recent animal (rat) inhalation study showed no increased respiratory cancer risk for nickel metal powder indicating that no carcinogen classification is warranted for nickel metal. The U.S. National Toxicology Program has listed metallic nickel as reasonably anticipated to be a human carcinogen.

The International Agency for Research on Cancer (IARC)(Vol 49) found there was inadequate evidence that metallic nickel is carcinogenic to humans but since there was sufficient evidence that it is carcinogenic to animals, IARC concluded that metallic nickel is possibly carcinogenic to humans (Group 2B). In 1997, the ACGIH categorized elemental nickel as: A5 "Not Suspected as a Human Carcinogen". Epidemiological studies of workers exposed to nickel powder and to dust and fume generated in the production of nickel alloys and of stainless steel have not indicated the presence of a significant respiratory cancer hazard.

## Section 12. Ecological Information

- |      |   |  |
|------|---|--|
| 12.1 | <i>Toxicity</i>                           | Not classified as hazardous to the aquatic environment.  |
| 12.2 | <i>Persistence and degradability</i>      | The PBT and vPvB criteria of Annex XIII to the Regulation does not apply to inorganic substances, such as nickel metal.<br>The methods for determining the biological degradability are not applicable to inorganic substances |
| 12.3 | <i>Bioaccumulative potential</i>          | Nickel does not tend to bioaccumulate or biomagnify in aquatic or terrestrial systems.   |
| 12.4 | <i>Mobility in soil</i>                   | The substance is essentially insoluble in water and therefore poorly mobile in soil.   |
| 12.5 | <i>Results of PBT and vPvB assessment</i> | Not classified as PBT or vPvB.   |
| 12.6 | <i>Other adverse effects</i>              | None anticipated.  |

## Section 13. Disposal Considerations

- 13.1 *Waste treatment methods* Recover or recycle if possible. Dispose of contents in accordance with local, state or national legislation.
- 13.2 *Additional Information* No information available.

### Section 14. Transport Information

International Maritime Dangerous Goods Code	Not regulated.
International Civil Aviation Organization Technical Instructions for the Carriage of Dangerous Goods by Air	Not regulated.
U.S. Dept. of Transportation Regulations	Not regulated.
Canadian Transportation of Dangerous Goods Act	Not regulated.
European Agreement Concerning the International Carriage of Dangerous Goods by Road	Not regulated.

#### **MARPOL Annex V**

Under the 7 Criteria contained within the MARPOL Annex V, This material is classified as:

	<b>Harmful to the Marine Environment (HME)</b>
X	Not Harmful to the Marine Environment (non-HME)

### Section 15. Regulatory Information

Europe:

REACH Registration #'s:

01-2119438727-29-XXXX –Vale Europe Limited

01-2119438727-29-XXXX – Vale Canada Limited (Vale Europe Limited acting as Only Representative)

Exposure Scenarios: See Annex 1

Classification according to Part 3 of Annex VI of EU Regulation No. 1272/2008

Skin Sensitization – Category 1

Carcinogenicity – Category 2

Specific Target Organ Toxicity, Repeated exposure – Category 1

Symbols: GHS07 - Exclamation mark, GHS08 - Health Hazard



Signal Word:	Danger
Hazard Statements:	H317 - May cause an allergic skin reaction. H372 - Causes damage to lungs through prolonged or repeated inhalation exposure H351 - Suspected of causing cancer by inhalation
Precautionary Statements:	
Prevention:	P201 - Obtain special instructions before use P202 - Do not handle until all safety precautions have been read and understood P260 - Do not breathe dust or fume P261 - Avoid breathing dust or fume. Wear respiratory protective equipment if fine dusts are generated. P272 - Contaminated work clothing should not be allowed out of the workplace. P280 - Wear protective gloves and protective clothing P264 - Wash hands, and face thoroughly after handling. P270 - Do not eat, drink or smoke when using this product.
Response:	P302+P352 - If on skin: Wash with plenty of soap and water. P308+P313 - If exposed or concerned: Get medical advice/attention P333+P313 - If skin irritation or rash occurs: Get medical advice/attention. P314 - Get medical advice/attention if you feel unwell. P321 - See Safety Data Sheet for specific treatment P362+P364 - Take off contaminated clothing and wash it before reuse
Storage:	P405 - store locked up
Disposal:	P501 - Dispose of contents/container in accordance to local; regional; national and international regulations
Canada:	WHMIS Classification: D2A All components are listed on the Canadian Domestic Substances List (DSL)
United States of America:	Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200) This product contains <u>NICKEL</u> which is subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40 CFR 372. Refer to the Hazardous Ingredients section of this MSDS for the appropriate CAS numbers and percent by weight.  All components are listed on the US Toxic Substances Control Act (TSCA) inventory
Australia:	Classified as Hazardous according to ASCC criteria

	All components are listed on the Australian Inventory of Chemical Substances (AICS)
P.R. Korea:	All components are listed in the Korean Toxic Substances Control Act inventory; KE-25818
Philippines:	All components are listed in the Philippine Inventory of Chemicals and Chemical Substances (PICCS)
Japan: Substances.	All components are listed in the Japanese Handbook of Existing and New Chemical Substances
P.R. China:	All components are listed in the Inventory of Existing Substances in China (IECSC).

## Section 16. Other Information

### Indications of change:

- 1.0 – original document
- 1.1 – Added Long Harbour Refinery

The following acronyms may be found in this document:

ACGIH	American Conference of Governmental Industrial Hygienists
DNEL	Derived No Effect Level
LTEL	Long Term Exposure Limit
LR	Lead Registrant
MMAD	Mass Median Aerodynamic Diameter
NIOSH	National Institute of Occupational Safety and Health
OEL	Occupational Exposure Limits
OR	Only Representative
OSHA	Occupational Safety and Health Administration
PBT	PBT: Persistent, Bioaccumulative and Toxic
PNEC	Predicted No Effect Concentration
STEL	Short Term Exposure Limit
STOT	Specific Target Organ Toxicity
TLV-TWA	Threshold Limit Value – Time Weighted Average
vPvB	very Persistent and very Bioaccumulative
WEL	Workplace Exposure Limit (UK HSE EH40)

Safety Data Sheet prepared by:  
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# SDS

SAFETY DATA SHEET

Product Stewardship (416) 361-7801

[msds@vale.com](mailto:msds@vale.com)

SDS available online at <http://www.vale.com/>

**Note:**

***Vale Canada believes that the information in this Safety Data Sheet is accurate. However, Vale Canada makes no express or implied warranty as to the accuracy of such information and expressly disclaims any liability resulting from reliance on such information.***

1. Threshold Limit Values of the American Conference of Governmental Industrial Hygienists. 2008.
2. Maximum Exposure Limit of the Health and Safety Executive in the U.K. in EH40/2005.
3. Describes possible health hazards of the product supplied. If user operations change it to other chemical forms, whether as end products, intermediates or fugitive emissions, the possible health hazards of such forms must be determined by the user.

### **ANNEX 1 – Exposure Scenarios**

Exposure Scenarios can be obtained by clicking on the following link: [Vale Nickel Exposure Scenarios](#). Exposure Scenarios are listed on the page according to GES # and by language.

If you are unable to retrieve the document or have difficulties, please contact one of the following email addresses for assistance: [REACH@vale.com](mailto:REACH@vale.com) or [msds@vale.com](mailto:msds@vale.com)

- GES 6 - Stainless, special steels and special alloys manufacturing
- GES 7 - Integrated steel and iron
- GES 8 - EAF carbon steel manufacturing
- GES 9 - Powder metallurgy
- GES 10 - Metal surface treatment
- GES 11 - Production of nickel salts from nickel metal
- GES 12 - Manufacturing of batteries using positive nickel electrodes
- GES 14 - Use of pre-reduced nickel containing catalyst
- GES 15 - Production of magnets
- GES 16 - Production of nickel-containing products (electronics)
- GES 17 - Production of brazing alloys
- GES 18 - Use of brazing alloys
- GES 19 - Production of silver-nickel contact materials
- GES 20 - Use of silver-nickel contact materials
- GES 21 - Sputtering deposition
- GES 22 - Thin film deposition by evaporation technique
- GES 33 - Machining of nickel alloys and nickel-coated metal objects
- GES 34 - Use of Nickel metal for Thermal Spraying
- GES 35 - Use of Nickel metal and Nickel containing alloys for the production of steel and other alloys powder by atomisation
- GES 36 - Use of Ni-containing alloys for blasting
- GES 37 – Formulation of surface treatment products
- GES 38 – Manufacture of micronutrient powder in biogas production
- GES 39 – Use of nickel metal-derived micronutrient powder in biogas production
- GES 40 – Use of nickel metal in surface treatment for the production of abrasive tools