Utility Nickel

(ACCORDING TO EC-REGULATION 1907/2006 (REACH) & 1272/2008 (CLP))

1. Identification of the Substance and Company

1.1 Product Identification:
Product Name: Utility Nickel
Synonyms: UNi
Chemical Family: Metal.

EC No: 231-111-4
CAS No: 7440-02-0
REACH Registration number: see Section 3

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

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 then 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.

Exposure Scenarios: See Annex 1

1.3 Company Identification

Vale Europe Limited
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Telephone Number: +44 (0) 1792 842501
For Fire, Spill, or chemical emergency call CHEMTREC: +44 (0) 2033 180470

2. Hazards Identification

2.1 Classification of the Substance:

2.1.1 Classification according Regulation (EC) No. 1272/2008

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
H372 - Causes damage to lungs through prolonged or repeated inhalation exposure

Precautionary Statements: P201, P202, P260, P261, P272, P280, P281, P264, P270, P302+P352, P308+P313, P333+P313, P314, P321, P363, P405, P501

2.1.2. Classification according to Directive 67/548/EEC
Carc. Cat. 3; R40
T, R48/23
R43

2.2: Label elements

Labeling according to Regulation (EC) No 1272/2008

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, P281, P302+352, P501
(NOTE: P-statements has been reduced as per CLP regulation, the full list can be found in Section 15).

For full text of R-Statements and Precautionary, statements see section 15.

3. Composition

☒ **Substance** ☐ **Mixture**

Hazardous Ingredients	Typical Composition	C.A.S.	EINECS/EC Label No.
Nickel	96 % min	7440-02-0	231-111-4
Cobalt	1.4 - 1.8 %	7440-48-4	231-158-0
Iron	0.7 - 1.2 %	7439-89-6	231-096-4
Copper	0.5 - 0.9 %	7440-50-8	231-159-6
Sulphur	0.13 - 0.16 %	7704-34-9	231-722-6

REACH Registration #'s:
01-2119438727-29-0000 – LR; Vale Europe Limited
01-2119438727-29-0007 – OR; Vale Canada Limited
01-2119438727-29-0008 – OR; Vale Inco Pacific Limited
01-2119438727-29-0012 – OR; Vale Japan Limited

4. First Aid Measures

Ingestion: No specific first aid required.

Inhalation: No specific first aid required.

Skin: Remove contaminated clothing, and wash affected areas thoroughly with water. If skin irritation or rash occurs: Get medical advice/attention. Show label if possible.

Eyes: Irrigate eyeball thoroughly with water for at least 10 minutes. If discomfort persists seek medical attention.

Most important symptoms and affects, both acute and delayed: Skin contact: Rash
Eye contact: Redness

Indication of immediate medical attention and special treatment needed: No special requirements

5. Fire Fighting Measures

Suitable extinguishing media: Any, type to be selected according to materials stored in the immediate neighborhood.

Special risks: Non-flammable. May oxidize to Nickel Oxide if exposed to high temperatures within a fire. Keep containers cool with water spray.

Special protective equipment for fire fighting: None needed. Wear protective equipment if required for other materials within the immediate vicinity.

6. Accidental Release Measures

Person related precautionary measures: 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.

Environmental Protection measures: No specific measures needed.

Procedures for cleaning/absorption: Pick up and replace in original container. Nickel-containing material is normally collected to recover nickel values.

7. Handling And Storage

7.1 Precautions for Safe Handling: 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

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.

8. Exposure Controls / Personal Protection

8.1.1 Exposure Limits:

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

* - as Ni in inhalable fraction

8.1.2 Environmental Limits:

PNEC's

Compartment	Unit	PNEC
Freshwater	µg Ni/L (bioavailable)	3.55
Marine	µg Ni/L	8.6
Terrestrial	mg Ni/kg	29.9

DNEL's

	Unit	DNEL
Dermal		
Acute systemic	mgNi/kg/day	-
Acute local	$mgNi/cm^2/day$	-
Long-term systemic	mgNi/kg/day	-
Long-term local	$mgNi/cm^2/day$	0.015
Inhalation		
Acute systemic	$mgNi/m^3$	816
Acute local	$mgNi/m^3$	1.6[1]
Long-term systemic	$mgNi/m^3$	0.05[2]
Long-term local	$mgNi/m^3$	0.05[2]

1. Based on MMAD of 1.5 um, increases with increasing MMAD (estimated as ≥6.4 mg Ni/m^3 for exposures to particles with a MMAD of ≥30 µm.

2. When exposure are solely to metallic and oxidic nickel dusts (without exposure to soluble nickel or sulfidic nickel) and the mean particle size of the aerosol is greater than 10 μ m aerodynamic diameter (≤10% of aerosol mass in respirable fraction), inhalable exposure levels up to 0.2 mg Ni/m^3 could be reasonably assumed to be safe.

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.

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^3 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: 98% 3~80mm
Stability in organic solvents and identity of relevant degradation products	Not applicable
Dissociation constant	Not applicable
Viscosity	Not applicable
Magnetic Properties	Ferromagnetic

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	Conditions to avoid	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, $Ni(CO)_4$, a toxic gas. Metal powders when heated in reducing atmospheres may become pyrophoric.
10.5	Incompatible materials	Acids, Strong oxidising agents.
10.6	Hazardous Decomposition Product(s)	Nickel carbonyl gas

11. Toxicological Information [3]

Nickel

Acute Toxicity:

a) Oral: Non toxic - LD_{50} 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 nickel damages the l ung. 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.

12. Ecological Information

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

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.

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.

15. Regulatory Information

Europe:
Classification according to Dangerous Substance Directive 67/548/EEC
T- Toxic- Category 3 carcinogen
R48/23 - Toxic: danger of serious damage to health by prolonged exposure through inhalation.
R40 – Limited evidence of a carcinogenic effect
R43 - May cause sensitization by skin contact.

S36/27/39 - Wear suitable protective clothing, gloves and eye/face protection
S45 - In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

All components are listed on EINECS. (European Inventory of Existing Chemical Substances)

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

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
P272 - Contaminated work clothing should not be allowed out of the workplace.
P280 - Wear protective gloves and protective clothing
P281 - Use personal protective equipment as required
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 advise/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 P363 - Wash contaminated clothes 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)

16. Other Information

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 available online at http://nickel.vale.com/

Note:
Vale Canada believes that the information in this Material 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 EH40/00.
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 or 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 13 - Ni catalyst production from NiO-containing catalyst precursor
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