

Nickel Metal

(In accordance to Regulation (EC) No. 1907/2006, Annex II, as amended by Regulation (EU) 2015/830)

Section 1. Identification of the Substance and Company

1.1 Product Identification:

Product Name: Nickel

Synonyms:

Pellets	P-Pellets	S-Pellets
Discs	Chips	Plating Rounds
Melt Rounds	Premium Melt Rounds	Assorted Melt Rounds

EC No: 231-111-4

CAS No: 7440-02-0

REACH Registration number: see Section 15

1.2 Relevant Identified Uses of the Substance or mixture and Uses Advised Against

Identified Uses:

Formulation or re-packing; Use of nickel metal in the production of stainless, special steels and special alloys

Formulation or re-packing; Use of nickel metal in the production of integrated steel and iron

Formulation or re-packing; Use of nickel metal in electric arc furnace carbon steel manufacturing

Formulation or re-packing; Use of nickel metal in the production of brazing alloys

Formulation or re-packing; Use of nickel metal for the production of silver-nickel contact materials

Formulation or re-packing; Use of nickel metal and nickel containing alloys for the production of steel and other alloy powders by atomisation

Use at industrial sites; Use of nickel metal containing powders in additive manufacturing (3D-printing)

Use at industrial sites; Use of nickel-containing stainless, special steels and special alloys

Use at industrial sites; Use of nickel-containing integrated steel and iron

Use at industrial sites; Use of nickel-containing carbon steel

Use at industrial sites; Use of nickel powder or nickel alloy powder in powder metallurgy

Use at industrial sites; Use of nickel-containing brazing alloys in industrial settings

Widespread use by professional workers; Use of nickel-containing consumables for welding/brazing by professionals

Use at industrial sites; Use of silver-nickel contact materials

Use at industrial sites; Use of nickel-containing steel and other alloy powders

Use at industrial sites; Use of nickel-containing alloys for sand blasting in industrial settings

Formulation or re-packing; Use of nickel metal in formulating and repackaging of surface treatment products

Use at industrial sites; Use of nickel metal in metal surface treatment (nickel electroplating and nickel electroforming technologies)

Use at industrial sites; Use of nickel metal in sputter deposition techniques

Use at industrial sites; Use of nickel metal in thin film deposition by evaporation technique

Use at industrial sites; Use of nickel metal for thermal spraying

Formulation or re-packing; Use of nickel metal powder in the formulation of micronutrient additives for biogas production
 Use at industrial sites; Use of nickel metal-derived micronutrient powder in biogas production
 Widespread use by professional workers; Use of nickel metal-derived micronutrient in compostable bags in biogas production
 Use at industrial sites; Use of pre-reduced nickel-containing catalyst
 Use at industrial sites; Intermediate use of nickel metal for the manufacture of other substances in catalyst or catalyst precursor manufacture
 Use at industrial sites; Use of nickel metal in the production of abrasive tools
 Use at industrial sites; Production of batteries using nickel electrodes
 Use at industrial sites; Use of nickel metal in the production of nickel-containing electronics
 Use at industrial sites; Intermediate use of nickel metal for the manufacture of nickel-containing inorganic pigments
 Use at industrial sites; Use of nickel metal powder in the production of magnets
 Use at industrial sites; Intermediate use of nickel metal for the manufacture of nickel salts
 Use at industrial sites; Use of nickel containing anti-seize lubricant
 Service life (worker at industrial site); Service life of nickel alloys and nickel-coated metal objects (machining and handling) in industrial settings
 Service life (professional worker); Service life of nickel alloys and nickel-coated metal objects (machining and handling) in professional settings
 Service life (worker at industrial site); Service life of nickel-containing electronic parts and batteries in industrial settings
 Service life (professional worker); Service life of nickel-containing electronic parts and batteries in professional settings
 Service life (worker at industrial site); Service life of abrasive tools containing nickel in industrial settings
 Service life (professional worker); Service life of abrasive tools containing nickel in professional settings
 Consumer use: Use of nickel-containing alloys for welding/brazing by consumers

Uses Advised Against:

Use of nickel-containing High Sulphur stainless steel for surgical implants (AISI grade 303 or ISO 7153-1 reference grade N)
 Use of nickel and nickel compounds in tattoo inks or permanent makeup products.
 Use of nickel containing food contact materials for which release into foodstuff would exceed more than 0.14mg/kg food of nickel

1.3 Details of the Supplier of the Safety Data Sheet

Manufactured by:

In Canada:

Vale Canada Limited
 Ontario Operations
 Sudbury, ON
 Canada PoM 1No

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

In the UK:

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Vale Americas Inc.
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In Asia (Except India, & Pakistan)

Vale Base Metals 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

1.4 Emergency Telephone Number

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:

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, 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 - May cause an allergic skin reaction.

H351 - Suspected of causing cancer

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

Precautionary Statements:

P202 - Do not handle until all safety precautions have been read and understood

P261 - Avoid breathing dust or fume. Wear respiratory protective equipment if fine dusts are generated.

P280 - Wear protective gloves and protective clothing

P302+352 - If on skin: Wash with plenty of soap and water.

P501 - Dispose of contents/container in accordance to local; regional; national and international regulations

2.3: Other hazards

The PBT and vPvB criteria of Annex XIII of the REACH regulation does not apply to inorganic substances, such as nickel metal.

2.4: Additional Information

For full text of Precautionary Statements see section 16.

Section 3. Composition

3.1 Substances

Substance Mixture

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

3.2 Mixtures

Not applicable

Section 4. First Aid Measures

4.1 Description of first aid measures

Inhalation	No specific first aid required. Get medical advice/attention if you feel unwell.
Skin Contact	Remove contaminated clothing, and wash affected areas thoroughly With soap and water. If skin irritation or rash occurs: Get medical advice/attention. Show label if possible.
Eye Contact	Irrigate eyeball thoroughly with water for at least 10 minutes. If discomfort persists, seek medical attention.
Ingestion	No specific first aid required. Get medical advice/attention if you feel unwell.

4.2 Most important symptoms and effects, both acute and delayed

Skin contact: rash; Eye contact: redness

4.3 Indication of any immediate attention and special treatment needed

If exposed or concerned: Get medical advice attention

Section 5. Fire Fighting Measures

5.1 Extinguishing media

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

Unsuitable extinguishing media None

5.2 Special hazards arising from the substance or mixture

Non-flammable. May oxidize to nickel oxide if exposed to high temperatures within a fire. Keep containers cool with water spray.

5.3 Advice for firefighters

Wear protective equipment if required for other materials within the immediate vicinity.

Section 6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

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.

6.2 Environmental precautions

No specific measures needed.

6.3 Methods and material for containment and cleaning up

Pick up and replace in original container. Nickel-containing material is normally collected to recover nickel values.

6.4 Reference to other sections

See also section 7 and 8.

Section 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, including any incompatibilities

Keep in the container supplied, and keep container closed when not use. Local regulations should be followed regarding the storage of this product.

7.3 Specific end uses

See section 1.2.

Section 8. Exposure Controls / Personal Protection

8.1 Control parameters

8.1.1 Exposure Limits:

Nickel Metal (Ni) – CAS 7440-02-0		
	Exposure Limit	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 Biological limit value

Not established

8.1.3 PNECs and DNELs

	Unit	DNEL
Dermal		
Long-term local	mgNi/cm ² /day	0.035
Inhalation		
Acute local	mgNi/m ³	11.9
Long-term systemic	mgNi/m ³	0.05
Long-term local	mgNi/m ³	0.05

Compartment	Unit	PNEC
Freshwater	µg Ni/L	7.1
Sediment	mg Ni/kg	109
Marine water	µg Ni/L	8.6

Sediment (marine)	mg Ni/kg	109
Agricultural soil	mg Ni/kg	29.9

8.2 Exposure Controls

8.2.1 Appropriate Engineering Controls

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.

8.2.2 Individual protection measures, such as personal protective equipment

Eye/face protection None specific, but recommended to wear eye protection.

Skin protection (Hand protection/ other) 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.

Respiratory protection If required, use an approved respirator with particulate filters.
Thermal hazards Not applicable.

8.2.3 Environmental exposure controls

No specific measures needed.

Section 9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Silver-grey, odourless metal powder.

Physical state at 20°C and 101.3 kPa	solid
Melting / freezing point	1455°C
Boiling point	2730°C
Decomposition temperature	Not applicable
Relative density	8.9 g/cm ³ at 25°C
Vapour pressure	1 mm Hg at 1810°C.

Vapour density	Not applicable
Surface tension	Not applicable
Water solubility	Not applicable
pH	Not applicable
Evaporation rate	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 um, <99%
Stability in organic solvents and identity of relevant degradation products	Not applicable
Dissociation constant	Not applicable
Viscosity	Not applicable
Magnetic properties	Ferromagnetic

9.2 Other information

None

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 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 oxidizing agents

10.6 Hazardous decomposition products

Nickel carbonyl gas.

[Section 11. Toxicological Information](#) ³

11.1 Information on toxicological effects

Acute toxicity

Ingestion	Non-toxic- LD ₅₀ Oral Rat >9000 mg/kg
Inhalation	Not classified
Skin contact	Not classified
Eye contact	No information available

Skin corrosion/irritation

Not classified

Serious eye damage/irritation

Not classified

Respiratory or skin sensitization

Skin Sens. Category 1. 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. 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). Nickel metal induced asthma is very rare. The data is not sufficient to conclude that nickel metal is classified as a respiratory sensitizer.

Germ cell mutagenicity

Not classified

Carcinogenicity

Carcinogenicity – Category 2. 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.

Reproductive toxicity

Not classified

STOT – single exposure

Not classified

STOT repeated exposure

STOT repeated Category 1. Causes damage to lungs through prolonged or repeated exposure. 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.

Aspiration hazard

None anticipated

11.2 Other information

None

[Section 12. Ecological Information](#)

12.1 Toxicity

Not classified as hazardous to the aquatic environment.

12.2 Persistence and degradability

The PBT and vPvB criteria of Annex XIII to the Regulation do 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 and therefore poorly mobile in soil.

12.5 Results of PBT and vPvB Assessment

Not applicable

12.6 Other adverse effects

None anticipated

Section 13. Disposal Considerations

13.1 Waste treatment methods

Product

Methods of Disposal

The generation of waste should be avoided or minimized wherever possible.

Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction.

Hazardous Waste

The classification of the product may meet the criteria for a hazardous waste.

Packaging

Methods of disposal

Generation of waste should be avoided or minimized wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Special precautions

Container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

13.2 Additional information

None

Section 14. Transport Information

	ADR/RID	ADN	IMDG	IATA
14.1 UN Number	None	None	None	None
14.2 UN proper shipping name	Not applicable	Not applicable	Not applicable	Not applicable
14.3 Transport classes	Not classified as dangerous for transport	Not classified as dangerous for transport	Not classified as dangerous for transport	Not classified as dangerous for transport
14. Packing group	Not applicable	Not applicable	Not applicable	Not applicable
14.5 Environmental hazards	Not applicable	Not applicable	Not applicable	Not applicable

14.6 Special precautions for user

Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

Not harmful to the marine environment (non HME).

Section 15. Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance

EU Regulation (EC) No. 1907/2006 (REACH)

Candidate List of SVHC for Not listed

Authorisation

Annex XIV List of substances Not listed

subject to Authorisation

Annex XVII List of substances Entry 27; Restriction on the use of nickel in jewelry and articles
subject to Restriction coming into direct/prolonged contact with skin.

Community Rolling Action Plan Not listed

REACH Registration #'s:

01-2119438727-29-XXXX – Vale Europe Limited

01-2119438727-29-XXXX – Vale Canada Limited (H2 Compliance acting as Only Representative)

15.2 Chemical Safety Assessment

Available. See Annex 1 for Exposure Scenarios.

Section 16. Other Information

Indications of Change:

- 1.0 – Original document
- 1.1 – Updated Only Representative for Vale Canada.
- 1.2 – Update of identified uses and Appendix 1-Exposure Scenarios. Removal of reference to Manitoba products.
- 1.3 – Update of identified uses and Appendix 1 – Exposure Scenarios.

Full text of 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

Legend

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://www.vale.com/canada/en/business/mining/nickel/pages/default.aspx>

Note:

Vale Canada Limited believes that the information in this Material Safety Data Sheet is accurate. However, Vale Canada Limited 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. 2016
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:

<http://www.vale.com/canada/EN/business/mining/product-safety-information/reach-scenarios-metals-powder/Pages/default.aspx>

If you are unable to retrieve the document or have difficulties, please use the following email address for assistance:
msds@vale.com

- ES1 - Formulation or re-packing; Use of nickel metal in the production of stainless, special steels and special alloys
- ES2 - Formulation or re-packing; Use of nickel metal in the production of integrated steel and iron
- ES3 - Formulation or re-packing; Use of nickel metal in electric arc furnace carbon steel manufacturing
- ES4 - Formulation or re-packing; Use of nickel metal in the production of brazing alloys
- ES5 - Formulation or re-packing; Use of nickel metal for the production of silver-nickel contact materials
- ES6 - Formulation or re-packing; Use of nickel metal and nickel containing alloys for the production of steel and other alloy powders by atomisation
- ES7 - Use at industrial sites; Use of nickel metal containing powders in additive manufacturing (3D-printing)
- ES8 - Use at industrial sites; Use of nickel-containing stainless, special steels and special alloys
- ES9 - Use at industrial sites; Use of nickel-containing integrated steel and iron
- ES10 - Use at industrial sites; Use of nickel-containing carbon steel
- ES11 - Use at industrial sites; Use of nickel powder or nickel alloy powder in powder metallurgy
- ES12 - Use at industrial sites; Use of nickel-containing brazing alloys in industrial settings
- ES13 - Widespread use by professional workers; Use of nickel-containing consumables for welding/brazing by professionals
- ES14 - Use at industrial sites; Use of silver-nickel contact materials
- ES15 - Use at industrial sites; Use of nickel-containing steel and other alloy powders
- ES16 - Use at industrial sites; Use of nickel-containing alloys for sand blasting in industrial settings
- ES17 - Formulation or re-packing; Use of nickel metal in formulating and repackaging of surface treatment products
- ES18 - Use at industrial sites; Use of nickel metal in metal surface treatment (nickel electroplating and nickel electroforming technologies)
- ES19 - Use at industrial sites; Use of nickel metal in sputter deposition techniques
- ES20 - Use at industrial sites; Use of nickel metal in thin film deposition by evaporation technique
- ES21 - Use at industrial sites; Use of nickel metal for thermal spraying
- ES22 - Formulation or re-packing; Use of nickel metal powder in the formulation of micronutrient additives for biogas production
- ES23 - Use at industrial sites; Use of nickel metal-derived micronutrient powder in biogas production
- ES24 - Widespread use by professional workers; Use of nickel metal-derived micronutrient in compostable bags in biogas production
- ES25 - Use at industrial sites; Use of pre-reduced nickel-containing catalyst

- ES26 - Use at industrial sites; Intermediate use of nickel metal for the manufacture of other substances in catalyst or catalyst precursor manufacture
- ES27 - Use at industrial sites; Use of nickel metal in the production of abrasive tools
- ES28 - Use at industrial sites; Production of batteries using nickel electrodes
- ES29 - Use at industrial sites; Use of nickel metal in the production of nickel-containing electronics
- ES30 - Use at industrial sites; Intermediate use of nickel metal for the manufacture of nickel-containing inorganic pigments
- ES31 - Use at industrial sites; Use of nickel metal powder in the production of magnets
- ES32 - Use at industrial sites; Intermediate use of nickel metal for the manufacture of nickel salts
- ES 33- Use at industrial sites; Use of nickel containing anti-seize lubricant
- ES34 - Service life (worker at industrial site); Service life of nickel alloys and nickel-coated metal objects (machining and handling) in industrial settings
- ES35 - Service life (professional worker); Service life of nickel alloys and nickel-coated metal objects (machining and handling) in professional settings
- ES36 - Service life (worker at industrial site); Service life of nickel-containing electronic parts and batteries in industrial settings
- ES37 - Service life (professional worker); Service life of nickel-containing electronic parts and batteries in professional settings
- ES38 - Service life (worker at industrial site); Service life of abrasive tools containing nickel in industrial settings
- ES39 - Service life (professional worker); Service life of abrasive tools containing nickel in professional settings
- ES40 – Consumer use: Use of nickel-containing alloys for welding/brazing by consumers