Section 1. Identification of the Substance and Company

1.1 Product Identification:
Product Name: Cobalt Metal
Synonyms: Cobalt rounds

EC No: 231-158-0
CAS No: 7440-48-4
REACH Registration number: see Section 15

1.2 Uses
Identified Uses:
Use at industrial sites; Use of cobalt in the manufacture of inorganic cobalt substances (intermediate use)
Use at industrial sites; Use of cobalt in the manufacture of cobalt carboxylates and resinates (intermediate use)
Use at industrial sites; Industrial use of cobalt containing catalysts
Use at industrial sites; Production and industrial use of cobalt containing alloys, steels and tools
Use at industrial sites; Industrial use of cobalt in the production of diamond tools
Use at industrial sites; Industrial use of cobalt metal in additive manufacturing (3D-printing)
Service life (worker at industrial site); Service life of cobalt containing alloys, steels and tools in industrial settings
Service life (worker at industrial site); Welding in industrial settings
Service life (professional worker); Welding in professional settings
Service life (professional worker); Service life of cobalt-containing tools in professional settings
Service life (professional worker); Service life of dental alloys containing cobalt in professional settings
Service life (consumers); dental alloys
Service life (consumers); diamond tools and other cobalt-containing tools other than hard metal
Use at industrial sites; Industrial use of cobalt in passivation processes in surface treatment
Use at industrial sites; Passivation processes in surface treatment at large industrial sites with continuous processes
Use at industrial sites; Industrial use of cobalt in plating processes in surface treatment
Use at industrial sites; Industrial use of cobalt in thermal spraying in surface treatment
Service life (worker at industrial site); Industrial handling of surface treated articles (passivated/plated/sprayed)
Service life (professional worker); Professional handling of surface treated articles (passivated/plated/sprayed)
Service life (consumers); heat and wear resistant vehicle parts
Use at industrial sites; Production of cobalt-containing batteries
Service life (worker at industrial site); Service life of cobalt-containing batteries in industrial settings
Service life (professional worker); Service life of cobalt-containing batteries in professional settings ES 27 - Use at industrial sites; Industrial use of cobalt in the production of varistors and magnets (calcination/sintering processes)
Use at industrial sites; Industrial use of cobalt in the manufacture of inorganic pigments, frits, ceramic ware, glass
Service life (worker at industrial site); Service life of cobalt-containing varistors and magnets in industrial settings
Service life (professional worker); Service life of cobalt-containing varistors and magnets in professional settings
Service life (consumers); cobalt being encapsulated in the internal part of the product
Use at industrial sites; Production of hardmetal powder
Use at industrial sites; Production of sintered hardmetal articles
Use at industrial sites; Production of hardmetal powder for surface technology
Service life (worker at industrial site); Service life of hardmetal articles in industrial settings
Service life (professional worker); Service life of hardmetal articles in professional settings
Service life (consumers); hard metal articles
Use at industrial sites; Use of cobalt as an intermediate in the manufacture of catalysts

Uses Advised Against
None identified

1.3 Company Identification
Manufactured by
Vale Canada Limited
Port Colborne Refinery
187 Davis Street
Port Colborne, ON
Canada,
L3k 5W2

Vale Canada Newfoundland & Labrador
1 Nickel Road, PO Box 39
Long Harbour, NL
Canada
A0B 2J0
Section 2. Hazards Identification

2.1 Classification of the Substance:

Carcinogenicity – Category 1B
Toxic to Reproduction – Category 2
Acute Toxicity, oral – Category 4
Respiratory Sensitization – Category 1
Skin Sensitization – Category 1;
Aquatic Chronic – Category 3

Hazard Pictograms: GHS07 – Exclamation Mark; GHS08 - Health Hazard

Signal Word: Danger

Hazard Statements: H350i – May cause cancer via inhalation
H361f – Suspected of damaging fertility. Specific effect: fertility impairment in males.
H302 – Harmful if swallowed
H334 – May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317 – May cause an allergic skin reaction.
H412 – Harmful to aquatic life with long lasting effects

2.2: Label elements
Product identifier: Cobalt
CAS #: 7440-48-4
Symbols:
GHS07 – Exclamation Mark
GHS08 - Health Hazard

Signal Word: Danger

Hazard Statements: H350i – May cause cancer via inhalation
H361f – Suspected of damaging fertility. Specific effect: fertility impairment in males.
H302 – Harmful if swallowed
H334 – May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317 – May cause an allergic skin reaction.
H412 – Harmful to aquatic life with long lasting effects

Precautionary Statements: P261 - Avoid breathing dust
P273 - Avoid release to the environment
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P284 - In case of inadequate ventilation wear respiratory protection
P302+P352 - IF ON SKIN: Wash with plenty of water
P501 - Dispose of contents/container in accordance to local, regional, national and international regulations

(Note: P-statements have been reduced)
For full text of Precautionary, statements see section 15.
Section 3. Composition

- Substance
- Mixture

<table>
<thead>
<tr>
<th>Hazardous ingredient(s)</th>
<th>Typical Composition (%)</th>
<th>CAS No.</th>
<th>EC No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>&gt;99</td>
<td>7440-48-4</td>
<td>231-158-0</td>
</tr>
</tbody>
</table>

Section 4. First Aid Measures

**Ingestion:**
IF SWALLOWED: Rinse mouth. Call a POISON CENTRE/doctor if you feel unwell.

**Inhalation:**
IF INHALED: Remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.

**Skin:**
IF ON SKIN: Wash with plenty of water. Take off contaminated clothing and wash it before reuse. If skin irritation or rash occurs: Get medical advice/attention.

**Eyes:**
Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. If eye irritation persists: Get medical advice/attention.

Most important symptoms and affects, both acute and delayed

- **Inhalation:** Cough, sore throat, wheezing, increased difficulty in breathing.
- **Ingestion:** Abdominal pain, vomiting.
- **Eye Contact:** Redness.

**Indication of immediate medical attention and special treatment needed**

IF exposed or concerned: Get medical advice/attention.

Section 5. Fire Fighting Measures

**Suitable extinguishing media:**
As appropriate for surrounding fire. Extinguish with dry chemical, carbon dioxide or halones.

**Special risks:**
Decomposes in a fire giving off toxic fumes: Cobalt oxide dust, acrid smoke, metal fumes.

**Special protective equipment for fire-fighting:**
Fire fighters should wear complete protective clothing including self-contained breathing apparatus. Dike fire control water for later disposal. Do not allow to enter drains, sewers or watercourses.
Section 6. Accidental Release Measures

**Person related precautionary measures:**
Ensure adequate ventilation. Avoid breathing dust. Wear appropriate personal protective equipment, avoid direct contact.

**Environmental Protection measures:**
Spillages or uncontrolled discharges into watercourses must be alerted to the appropriate regulatory body.

**Procedures for cleaning/absorption:**
Sweep spilled substances into containers if appropriate moisten first to prevent dusting. Use vacuum equipment for collecting spilt materials, where practicable. Transfer to a lidded container for disposal or recovery.

**Reference to other sections**
See also Section 7, & 8.

Section 7. Handling and Storage

**Precautions for Safe Handling:**
Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Provide adequate ventilation. Avoid breathing dust. Contaminated work clothing should not be allowed out of the workplace. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. Wear protective gloves, protective clothing, eye protection, and face protection. See Section: 8.

**Conditions for Safe Storage**
Store locked up. Stable under normal storage conditions. Incompatible with acids, and strong oxidizing agents.

Section 8. Exposure Controls / Personal Protection

8.1.1 Exposure Limits:

<table>
<thead>
<tr>
<th>Cobalt Metal (Co) – CAS 7440-48-4</th>
<th>Exposure Limit (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH TLV-TWA, USA¹</td>
<td>0.02</td>
</tr>
<tr>
<td>UK WEL²</td>
<td>0.1</td>
</tr>
<tr>
<td>NOHSC, Australia</td>
<td>0.05</td>
</tr>
</tbody>
</table>

**DNEL’s**

<table>
<thead>
<tr>
<th>DNEL</th>
<th>Oral</th>
<th>Inhalation</th>
<th>Dermal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry - Long Term – Local effects</td>
<td>-</td>
<td>40 µg/m³</td>
<td>-</td>
</tr>
<tr>
<td>Industry - Long Term - Systemic effects</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Industry - Short term - Local effects</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Industry - Short term - Systemic effects</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
8.1.2 Environmental Limits:
PNEC’s

<table>
<thead>
<tr>
<th>Compartment</th>
<th>PNEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic - Freshwater Compartment</td>
<td>0.62 µg Co/L</td>
</tr>
<tr>
<td>Aquatic - Marine Compartment</td>
<td>2.36 µg Co/L</td>
</tr>
<tr>
<td>Sediment - Freshwater Compartment</td>
<td>53.8 mg Co/kg sediment dry wt</td>
</tr>
<tr>
<td>Sediment - Marine Compartment</td>
<td>69.8 mg Co/kg sediment dry wt</td>
</tr>
<tr>
<td>Terrestrial Compartment (soil)</td>
<td>10.9 mg/kg Soil dw.</td>
</tr>
<tr>
<td>Sewage Treatment Plant</td>
<td>0.37 µg Co/L</td>
</tr>
<tr>
<td>Atmospheric Compartment</td>
<td>No hazard identified</td>
</tr>
</tbody>
</table>

8.2.1 Occupational exposure controls:
Provide adequate ventilation.

**PPE:**

*Respiratory protection:* A suitable dust mask or dust respirator with filter type P (EN143 or EN405) may be appropriate.

*Eye/face protection:* Wear eye protection with side protection (EN166).

*Hand & Skin protection:* Wear protective clothing and gloves: Butyl rubber, Neoprene, PVC.

### Section 9. Physical And Chemical Properties

Silver-grey odourless metal.

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state at 20°C and 101.3 kPa</td>
<td>solid</td>
</tr>
<tr>
<td>pH (Value)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Melting Point (°C)</td>
<td>1494°C @1013hPa</td>
</tr>
<tr>
<td>Boiling point/boiling range (°C):</td>
<td>2927°C @1013hPa</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Relative Density</td>
<td>8.89 @ 20°C</td>
</tr>
<tr>
<td>Vapour Pressure</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
Vapour Density | Not applicable
Surface tension | Not applicable
Water solubility | 2.94mg/l @ 20°C
pH | Not applicable
Evaporation rate | Not applicable
Partition Coefficient (n-Octanol/water) | Not applicable
Flash Point (°C) | Not applicable
Flammability (solid, gas) | Non-flammable
Explosive properties | Not applicable
Self -ignition temperature (°C) | Not applicable
Oxidising properties | Not oxidising
Granulometry | 8-12 mm thick, 18-24 mm dia
Stability in organic solvents and identity of relevant degradation products | Not available
Dissociation constant | Not applicable
Viscosity | Not applicable
Packaged density | See relative density

Section 10. Stability and Reactivity

Reactivity | Stable under normal conditions.
Chemical stability | Stable under normal conditions.
Possibility of hazardous reactions | Stable under normal conditions.
Conditions to avoid | Heat
Incompatible materials | Acids, Strong oxidising agents.
Hazardous Decomposition Product(s) | Cobalt oxide dust, Acrid smoke, Metal fumes

Section 11. Toxicological Information

Cobalt

Acute Toxicity

a) Oral: LD₅₀ ORAL RAT 550 mg/kg. Acute Tox. 4; Harmful if swallowed.
b) Inhalation: Low acute toxicity. Main Symptoms: cough, sore throat, wheezing, increased difficulty in breathing. See Section 15 for further information.
c) Dermal: LD₅₀(Dermal) >2000mg/kg. Low acute toxicity.

Corrosivity/Irritation

a) Respiratory Tract: None

b) Skin: No data. Not classified. See sensitization section.
c) **Eyes:** Low acute toxicity. Main Symptoms: Redness.

**Sensitization**

* a) **Respiratory tract:** Resp. Sens. 1; May cause allergy or asthma symptoms or breathing difficulties if inhaled.

* b) **Skin:** Skin Sens. 1; May cause an allergic skin reaction. Repeated contact with metallic cobalt can cause cobalt sensitivity and allergic skin rashes.

* c) **Pre-existing conditions:** Sensitized individuals may experience an allergic skin rash or asthma.

**Chronic Toxicity**

* a) **Oral:** No information available.

* b) **Inhalation:** No information available.

* c) **Dermal:** No information available.

**Mutagenicity / Reproductive Toxicity:** There is no evidence of mutagenic potential. Reproductive toxicity category 2; Suspected of damaging fertility. Specific effect: fertility impairment in males.

**Carcinogenicity**

* a) **Ingestion:** No data. Not classified.

* b) **Inhalation:** Carcinogenicity category 1B; May cause cancer by inhalation.

**Specific Target Organ Toxicity:**

* a) **Single Exposure:** None anticipated.

* b) **Repeated Exposure:** None anticipated.

**Aspiration Hazard:** None.

**Section 12. Ecological Information**

**Toxicity:** Aquatic Chronic 4; May cause long lasting harmful effects to aquatic life. By analogy with similar materials: Cobalt Dichloride. Fish: LC50 = 1.5mg/l (Fresh water)
Aquatic invertebrates: LC50 = 0.61mg/l (Fresh water); 2.32mg/l (Sea water)
Algae: LC50 = 144µg/l (Fresh water); 24.1µg/l (Sea water)
NOEC Fish = 351.4mg/l
NOEC Aquatic invertebrates = 5.47µg/l (Fresh water); 206µg/l (Sea water)
NOEC Algae = 4.9µg/l (Fresh water); 1.23µg/l (Sea water)

**Persistence and Degradability:**
The methods for determining the biological degradability are not applicable to inorganic substances.

**Bioaccumulative Potential:**
Aquatic plants: Bioconcentration factor (BCF) > 100 – 5000.
Aquatic invertebrates: BCF < 300.
Fresh water, Fish: BCF/BAF < 10.
Marine, Fish: BCF/BAF < 10.
The substance has low potential for bioaccumulation.

**Mobility in soil:**
The substance is essentially insoluble in water.

**Results of PBT and vPvB Assessment:**
Not applicable

**Other Adverse Effects:**
Not anticipated

### Section 13. Disposal Considerations

**Waste treatment methods:**
Recover or recycle if possible. Dispose of contents in accordance with local, state or national legislation.

**Additional information:**
No information available

### Section 14. Transport Information

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Dept. of Transportation Regulations</td>
<td>Not regulated.</td>
</tr>
</tbody>
</table>
### MARPOL Annex V
Under the 7 Criteria contained within the MARPOL Annex V, This material is classified as:

<table>
<thead>
<tr>
<th>Harmful to the Marine Environment (HME)</th>
<th>Not Harmful to the Marine Environment (non-HME)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

### Section 15. Regulatory Information

**Additional toxicological information:**
The Acute Toxicity inhalation information represents the product as it is placed on the market. Downstream users should be aware that cobalt metal powder is classified as Acute Toxicity inhalation category 1; LC<sub>50</sub> 4hr ≤ 0.05 mg/L. If the downstream use produces finely divided particles of cobalt metal, additional respiratory protection may be required.

**Europe:**
REACH Registration #:
01-2119517392-44-xxxx – Vale Europe Limited
01-2119517392-44-xxxx – Vale Canada Limited (H2 Compliance acting as Only Representative)

**Exposure Scenarios:** See Annex 1

### Classification according to Part 3 of Annex VI of EU Regulation No. 1272/2008
- Carcinogenicity – Category 1B
- Toxic to Reproduction – Category 2
- Acute Toxicity, oral – Category 4
- Respiratory Sensitization – Category 1
- Skin Sensitization – Category 1
- Aquatic Chronic – Category 3

**Symbols:**
- GHS07 – Exclamation Mark
- GHS08 - Health Hazard

**Signal Word:** Danger
Hazard Statements:  
H350i – May cause cancer via inhalation.  
H361f – Suspected of damaging fertility. Specific effect: fertility impairment in males.  
H302 – Harmful if swallowed.  
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled.  
H317 - May cause an allergic skin reaction.  
H412 - Harmful to aquatic life with long lasting effects.

Precautionary Statements:  
Prevention:  
P201: Obtain special instructions before use.  
P202: Do not handle until all safety precautions have been read and understood.  
P261: Avoid breathing dust.  
P264: Wash hands thoroughly after handling.  
P270: Do not eat, drink or smoke when using this product.  
P272: Contaminated work clothing should not be allowed out of the workplace.  
P273: Avoid release to the environment.  
P280: Wear protective gloves/protective clothing/eye protection/face protection.  
P284: In case of inadequate ventilation wear respiratory protection.

Response:  
P330: Rinse mouth.  
P301+P312: IF SWALLOWED: Call a POISON CENTRE/doctor if you feel unwell.  
P302+P352: IF ON SKIN: Wash with plenty of water.  
P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.  
P308+P313: IF exposed or concerned: Get medical advice/attention.  
P333 + P313: If skin irritation or rash occurs: Get medical advice/attention.  
P342+P311: If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.  
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.
United States of America:
SARA Section 313 Supplier Notification
This product contains the following chemical(s) subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and 40 CFR 372: Cobalt

Refer to the Hazardous Ingredients section of this SDS for the appropriate CAS numbers and percent by weight.

Canada:
WHMIS 2015 Classification:
Carcinogenicity – Category 1B
Toxic to Reproduction – Category 2
Acute Toxicity, oral – Category 4
Respiratory Sensitization – Category 1
Skin Sensitization – Category

All components are listed on the Canadian Domestic Substances List (DSL)

Section 16. Other Information

Indications of Change:
1.0 – Original document
1.1 – Added “Size” and “magnetic properties” in Section 9
1.2 – Added section 2.3 information
2.0 – Updated sections as a result of NTP study
2.2 - Updated PNECS and compliance with EU CLP
3.0 - Updated for WHMIS 2015
3.1 – Added manufacturer Vale Canada Newfoundland & Labrador
3.2 – Update to Aquatic Chronic Cat.3 classification, PNECS and update of Uses/Exposure Scenarios
3.3 – Updated Only Representative
3.4 – Updated Exposure Scenarios

The following acronyms may be found in this document:

ACGIH American Conference of Governmental Industrial Hygienists
Acute Tox. 4 Acute Toxicity Category 4
Aquatic Chronic 4 Hazardous to the aquatic environment Category 4
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
NOHSC   National Occupational Health & Safety Commission
OEL     Occupational Exposure Limits
OR      Only Representative
OSHA    Occupational Safety and Health Administration
PBT     PBT: Persistent, Bioaccumulative and Toxic
PNEC    Predicted No Effect Concentration
Resp. Sens 1B    Respiratory Sensitization Category 1B
Repr. 2   Reproductive toxicity Category 2
Repr. Cat 3  Reproductive toxicity Category 3
Skin Sens. 1  Skin Sensitization Category 1
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:
Vale Canada Limited
200 Bay St., Royal Bank Plaza
Suite 1600, South Tower, PO Box 70
Toronto, ON, Canada, M5J 2K2
Email: msds@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. 2016.
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:


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

ES 4 - Use at industrial sites; Use of cobalt in the manufacture of inorganic cobalt substances (intermediate use)
ES 5 - Use at industrial sites; Use of cobalt in the manufacture of cobalt carboxylates and resinares (intermediate use)
ES 6 - Use at industrial sites; Industrial use of cobalt containing catalysts
ES 7 - Use at industrial sites; Production and industrial use of cobalt containing alloys, steels and tools
ES 8 - Use at industrial sites; Industrial use of cobalt in the production of diamond tools
ES 9 - Use at industrial sites; Industrial use of cobalt metal in additive manufacturing (3D-printing)
ES 10 Service life (worker at industrial site); Service life of cobalt containing alloys, steels and tools in industrial settings
ES 11- Service life (worker at industrial site); Welding in industrial settings
ES 12- Service life (professional worker); Welding in professional settings
ES 13 - Service life (professional worker); Service life of cobalt-containing tools in professional settings
ES 14 Service life (professional worker); Service life of dental alloys containing cobalt in professional settings
ES 15 - Service life (consumers); dental alloys
ES 16 - Service life (consumers); diamond tools and other cobalt-containing tools other than hard metal
ES 17 – Use at industrial sites; Industrial use of cobalt in passivation processes in surface treatment
ES 18 - Use at industrial sites; Passivation processes in surface treatment at large industrial sites with continuous processes
ES 19 - Use at industrial sites; Industrial use of cobalt in plating processes in surface treatment
ES 20- Use at industrial sites; Industrial use of cobalt in thermal spraying in surface treatment
ES 21 Service life (worker at industrial site); Industrial handling of surface treated articles (passivated/plated/sprayed)
ES 22 - Service life (professional worker); Professional handling of surface treated articles (passivated/plated/sprayed)
ES 23 - Service life (consumers); heat and wear resistant vehicle parts
ES 24 - Use at industrial sites; Production of cobalt-containing batteries
ES 25 - Service life (worker at industrial site); Service life of cobalt-containing batteries in industrial settings
ES 26 - Service life (professional worker); Service life of cobalt-containing batteries in professional settings
ES 27 - Use at industrial sites; Industrial use of cobalt in the production of varistors and magnets (calcination/sintering processes)
ES 28 - Use at industrial sites; Industrial use of cobalt in the manufacture of inorganic pigments, frits, ceramic ware, glass
ES 29 - Service life (worker at industrial site); Service life of cobalt-containing varistors and magnets in industrial settings
ES 30 - Service life (professional worker); Service life of cobalt-containing varistors and magnets in professional settings
ES 31 - Service life (consumers); cobalt being encapsulated in the internal part of the product
ES 32 - Use at industrial sites; Production of hardmetal powder
ES 33 - Use at industrial sites; Production of sintered hardmetal articles
ES 34 - Use at industrial sites; Production of hardmetal powder for surface technology
ES 35 - Service life (worker at industrial site); Service life of hardmetal articles in industrial settings
ES 36 - Service life (professional worker); Service life of hardmetal articles in professional settings
ES 37 - Service life (consumers); hard metal articles
ES 38 - Use at industrial sites; Use of cobalt as an intermediate in the manufacture of catalysts