

5. ES 5: Formulation or re-packing; Use of nickel metal for the production of silver-nickel contact materials

5.1. Title section

Product category: Base metals and alloys (PC 7)

Environment	
1: Use of nickel metal for the production of silver-nickel contact materials - Direct discharge to fresh water	ERC 3
2: Use of nickel metal for the production of silver-nickel contact materials - Direct discharge to marine water	ERC 3
Worker	
3: Powder handling and blending	PROC 26
4: Pressing	PROC 14
5: Sintering	PROC 22
6: Extrusion pressing	PROC 24
7: Production of non-wire forms by drawing, rolling, stamping, cladding, cutting, punching	PROC 24
8: Welding and brazing	PROC 25
9: Finishing and packaging	PROC 21
10: Wet cleaning	PROC 28
11: Cleaning/removal of dust	PROC 28

5.2. Conditions of use affecting exposure

5.2.1. Control of environmental exposure: Use of nickel metal for the production of silver-nickel contact materials - Direct discharge to fresh water (ERC 3)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 0.079 tonnes/day (All the amounts and concentrations are expressed as Ni as this is the driver for the environmental risk assessment.)
Annual amount per site ≤ 20 tonnes/year
Emission days ≥ 252 days/year
Technical and organisational conditions and measures
Electrostatic precipitator or wet electrostatic precipitator or cyclones or fabric/bag filter or ceramic/metal mesh filter or wet scrubber
Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.
Other conditions affecting environmental exposure
Receiving surface water flow $\geq 1.8E4$ m ³ /day
No discharge to marine water assumed
Receiving water dilution (fresh or marine) ≥ 10

Assumed effluent discharge flow from site $\geq 2E3$ m ³ /day
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5.2.2. Control of environmental exposure: Use of nickel metal for the production of silver-nickel contact materials - Direct discharge to marine water (ERC 3)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 0.079 tonnes/day (All the amounts and concentrations are expressed as Ni as this is the driver for the environmental risk assessment.)
Annual amount per site ≤ 20 tonnes/year
Emission days ≥ 252 days/year
Technical and organisational conditions and measures
Electrostatic precipitator or wet electrostatic precipitator or cyclones or fabric/bag filter or ceramic/metal mesh filter or wet scrubber
Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.
Other conditions affecting environmental exposure
No discharge to freshwater assumed
Receiving water dilution (fresh or marine) ≥ 100
Assumed effluent discharge flow from site $\geq 2E3$ m ³ /day

5.2.3. Control of worker exposure: Powder handling and blending (PROC 26)

Product (article) characteristics
Physical form of product; Solid, high dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers daily exposures up to 8 hours
Technical and organisational conditions and measures
Local exhaust ventilation
Semi-closed system
Conditions and measures related to personal protection, hygiene and health evaluation
APF of RPE = 10 (90% respiratory protection). For further specification, refer to section 8 of the SDS.
Wear suitable gloves tested to EN374.; For further specification, refer to section 8 of the SDS.

5.2.4. Control of worker exposure: Pressing (PROC 14)

Product (article) characteristics
Physical form of product; Solid, high dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers daily exposures up to 8 hours
Technical and organisational conditions and measures
Local exhaust ventilation
Ensure automation of the process as far as technically feasible
Semi-closed system

Conditions and measures related to personal protection, hygiene and health evaluation

APF of RPE = 10 (90% respiratory protection). For further specification, refer to section 8 of the SDS.

5.2.5. Control of worker exposure: Sintering (PROC 22)**Product (article) characteristics**

Maximum emission potential covered in this ES: High (temperature based).

Physical form of product: Solid, powder / dust.

Technical and organisational conditions and measures

Ensure automation of the process as far as technically feasible

Closed process with occasional opening

Use of an integrated local exhaust ventilation is required.

High temperature processes slightly below melting point / degradation temperature.

5.2.6. Control of worker exposure: Extrusion pressing (PROC 24)**Product (article) characteristics**

Physical form of product; Solid

Maximum emission potential covered in this ES: High. Low to high level of abrasion possible.

Amount used (or contained in articles), frequency and duration of use/exposure

Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).

Automated task

5.2.7. Control of worker exposure: Production of non-wire forms by drawing, rolling, stamping, cladding, cutting, punching (PROC 24)**Product (article) characteristics**

Physical form of product; Solid

Maximum emission potential covered in this ES: High. Low to high level of abrasion possible.

Amount used (or contained in articles), frequency and duration of use/exposure

Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).

Ensure automation of the process as far as technically feasible

5.2.8. Control of worker exposure: Welding and brazing (PROC 25)**Product (article) characteristics**

Physical form of product; Massive object

Maximum emission potential covered in this ES: High (temperature based).

Technical and organisational conditions and measures

High temperature

Conditions and measures related to personal protection, hygiene and health evaluation

Dermal contact with the substance has to be excluded.

5.2.9. Control of worker exposure: Finishing and packaging (PROC 21)**Product (article) characteristics**

Maximum emission potential covered in this ES: Very low.

Physical form of product; Massive object

Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable gloves tested to EN374.; For further specification, refer to section 8 of the SDS.

5.2.10. Control of worker exposure: Wet cleaning (PROC 28)**Product (article) characteristics**

Maximum emission potential covered in this ES: Very low.

Physical form of product: Solution and other liquid materials, e.g. suspensions are also covered.

Amount used (or contained in articles), frequency and duration of use/exposure

Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

Cleaning machines such as power sweeper, no direct manual cleaning.

Covers use at ambient temperatures.

Conditions and measures related to personal protection, hygiene and health evaluation

APF of RPE = 10 (90% respiratory protection).

5.2.11. Control of worker exposure: Cleaning/removal of dust (PROC 28)**Product (article) characteristics**

Physical form of product: Residual dust.

Amount used (or contained in articles), frequency and duration of use/exposure

Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

Cleaning is conducted using cleaning machines, in particular hovering is applied and the use of compressed air is omitted.

Conditions and measures related to personal protection, hygiene and health evaluation

APF of RPE = 20 (95% respiratory protection). For further specification, refer to section 8 of the SDS.

5.3. Exposure estimation and reference to its source**5.3.1. Environmental release and exposure: Use of nickel metal for the production of silver-nickel contact materials - Direct discharge to fresh water (ERC 3)**

Release route	Release rate	Release estimation method
Water	2.11E-4 kg/day	Estimated release factor
Air	1.45E-3 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	2.91E-3 mg/L (EUSES 2.1.2)	0.41
Sediment (freshwater)	33.7 mg/kg dw (PEC sediment calculation method for metals)	0.309
Agricultural soil	16.2 mg/kg dw (EUSES 2.1.2)	0.542

5.3.2. Environmental release and exposure: Use of nickel metal for the production of silver-nickel contact materials - Direct discharge to marine water (ERC 3)

Release route	Release rate	Release estimation method
Water	2.11E-4 kg/day	Estimated release factor
Air	1.45E-3 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Marine water	3.01E-4 mg/L (EUSES 2.1.2)	0.035
Sediment (marine water)	16.12 mg/kg dw (PEC sediment calculation method for metals)	0.148
Agricultural soil	16.2 mg/kg dw (EUSES 2.1.2)	0.542

5.3.3. Worker exposure: Powder handling and blending (PROC 26)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.014 mg/m ³ (Measured data)	0.28
Inhalation, local, long term	0.014 mg/m ³ (Measured data)	0.28
Inhalation, local, acute	0.071 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	5.18 µg/cm ² (Measured data)	0.148
Combined, systemic, long term		0.28

5.3.4. Worker exposure: Pressing (PROC 14)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	7E-3 mg/m ³ (Measured data)	0.14
Inhalation, local, long term	7E-3 mg/m ³ (Measured data)	0.14
Inhalation, local, acute	0.02 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	3.73 µg/cm ² (Measured data)	0.107
Combined, systemic, long term		0.14

5.3.5. Worker exposure: Sintering (PROC 22)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.015 mg/m ³ (Measured data)	0.3
Inhalation, local, long term	0.015 mg/m ³ (Measured data)	0.3
Inhalation, local, acute	0.044 mg/m ³ (Measured data)	< 0.01

Route of exposure and type of effects	Exposure estimate	RCR
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.3

5.3.6. Worker exposure: Extrusion pressing (PROC 24)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.024 mg/m ³ (Measured data)	0.48
Inhalation, local, long term	0.024 mg/m ³ (Measured data)	0.48
Inhalation, local, acute	0.096 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.48

5.3.7. Worker exposure: Production of non-wire forms by drawing, rolling, stamping, cladding, cutting, punching (PROC 24)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.024 mg/m ³ (Measured data)	0.48
Inhalation, local, long term	0.024 mg/m ³ (Measured data)	0.48
Inhalation, local, acute	0.096 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.48

5.3.8. Worker exposure: Welding and brazing (PROC 25)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.015 mg/m ³ (Measured data)	0.3
Inhalation, local, long term	0.015 mg/m ³ (Measured data)	0.3
Inhalation, local, acute	0.044 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.3

5.3.9. Worker exposure: Finishing and packaging (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	9E-3 mg/m ³ (Measured data)	0.18
Inhalation, local, long term	9E-3 mg/m ³ (Measured data)	0.18
Inhalation, local, acute	0.037 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	5.18 µg/cm ² (Measured data)	0.148
Combined, systemic, long term		0.18

5.3.10. Worker exposure: Wet cleaning (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	6E-3 mg/m ³ (Measured data)	0.12
Inhalation, local, long term	6E-3 mg/m ³ (Measured data)	0.12
Inhalation, local, acute	0.026 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.12

5.3.11. Worker exposure: Cleaning/removal of dust (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.032 mg/m ³ (Measured data)	0.64
Inhalation, local, long term	0.032 mg/m ³ (Measured data)	0.64
Inhalation, local, acute	0.189 mg/m ³ (Measured data)	0.016
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.64

5.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance: Please refer to Section 0.3 of this "ES for Communication".