

## 4. ES 4: Formulation or re-packing; Use of nickel metal in the production of brazing alloys

### 4.1. Title section

Product category: Base metals and alloys (PC 7)

<b>Environment</b>	
1: Use of nickel metal in the production of brazing alloys - Discharge to fresh water via municipal sewage treatment plant	ERC 3
2: Use of nickel metal in the production of brazing alloys - Direct discharge to marine water	ERC 3
<b>Worker</b>	
3: Handling of powders	PROC 26
4: Handling of low dusty material	PROC 26
5: Melting and casting	PROC 22, PROC 23
6: Cutting and packaging	PROC 21
7: Wet cleaning	PROC 28
8: Cleaning/removal of dust	PROC 28

### 4.2. Conditions of use affecting exposure

#### 4.2.1. Control of environmental exposure: Use of nickel metal in the production of brazing alloys - Discharge to fresh water via municipal sewage treatment plant (ERC 3)

<b>Amount used, frequency and duration of use (or from service life)</b>
Daily amount per site $\leq 2.18E-3$ 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 $\leq 0.55$ tonnes/year
Emission days $\geq 252$ days/year
<b>Technical and organisational conditions and measures</b>
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
<b>Conditions and measures related to biological sewage treatment plant</b>
Municipal sewage treatment plant is assumed.
Assumed domestic sewage treatment plant flow $\geq 2E3$ m <sup>3</sup> /day
<b>Conditions and measures related to external treatment of waste (including article waste)</b>
Dispose of waste product or used containers according to local regulations.
<b>Other conditions affecting environmental exposure</b>
Receiving surface water flow $\geq 1.8E4$ m <sup>3</sup> /day
No discharge to marine water assumed
Receiving water dilution (fresh or marine) $\geq 10$

#### 4.2.2. Control of environmental exposure: Use of nickel metal in the production of brazing alloys - Direct discharge to marine water (ERC 3)

<b>Amount used, frequency and duration of use (or from service life)</b>
Daily amount per site $\leq 2.18E-3$ 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 $\leq 0.55$ tonnes/year
Emission days $\geq 252$ days/year
<b>Technical and organisational conditions and measures</b>
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
<b>Conditions and measures related to external treatment of waste (including article waste)</b>
Dispose of waste product or used containers according to local regulations.
<b>Other conditions affecting environmental exposure</b>
No discharge to freshwater assumed
Receiving water dilution (fresh or marine) $\geq 100$
Assumed effluent discharge flow from site $\geq 2E3$ m <sup>3</sup> /day

#### 4.2.3. Control of worker exposure: Handling of powders (PROC 26)

<b>Product (article) characteristics</b>
Physical form of product; Solid, high dustiness
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>
Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>
Local exhaust ventilation
Use in closed process
Ensure automation of the process as far as technically feasible
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>
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.

#### 4.2.4. Control of worker exposure: Handling of low dusty material (PROC 26)

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

Semi-closed system
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#### 4.2.5. Control of worker exposure: Melting and casting (PROC 22, PROC 23)

<b>Product (article) characteristics</b>
Physical form of product: Molten.
Maximum emission potential covered in this ES: High (temperature based).
<b>Technical and organisational conditions and measures</b>
Local exhaust ventilation
Semi-closed system
High temperature

#### 4.2.6. Control of worker exposure: Cutting and packaging (PROC 21)

<b>Product (article) characteristics</b>
Maximum emission potential covered in this ES: Low (abrasion based).
Physical form of product; Massive object
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>
Wear suitable gloves tested to EN374.; For further specification, refer to section 8 of the SDS.

#### 4.2.7. Control of worker exposure: Wet cleaning (PROC 28)

<b>Product (article) characteristics</b>
Maximum emission potential covered in this ES: Very low.
Physical form of product: Solution and other liquid materials, e.g. suspensions are also covered.
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>
Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>
Cleaning machines such as power sweeper, no direct manual cleaning.
Covers use at ambient temperatures.
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>
APF of RPE = 10 (90% respiratory protection).

#### 4.2.8. Control of worker exposure: Cleaning/removal of dust (PROC 28)

<b>Product (article) characteristics</b>
Physical form of product: Residual dust.
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>
Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>
Cleaning is conducted using cleaning machines, in particular hovering is applied and the use of compressed air is omitted.
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>
APF of RPE = 20 (95% respiratory protection). For further specification, refer to section 8 of the SDS.

### 4.3. Exposure estimation and reference to its source

#### 4.3.1. Environmental release and exposure: Use of nickel metal in the production of brazing alloys - Discharge to fresh water via municipal sewage treatment plant (ERC 3)

Release route	Release rate	Release estimation method
Water	1.09E-4 kg/day	Estimated release factor
Air	1.09E-4 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	2.9E-3 mg/L (EUSES 2.1.2)	0.409
Sediment (freshwater)	33.56 mg/kg dw (PEC sediment calculation method for metals)	0.308
Sewage Treatment Plant	3.27E-5 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	16.20 mg/kg dw (EUSES 2.1.2)	0.542

#### 4.3.2. Environmental release and exposure: Use of nickel metal in the production of brazing alloys - Direct discharge to marine water (ERC 3)

Release route	Release rate	Release estimation method
Water	1.09E-4 kg/day	Estimated release factor
Air	1.09E-4 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Marine water	3E-4 mg/L (EUSES 2.1.2)	0.035
Sediment (marine water)	16.11 mg/kg dw (PEC sediment calculation method for metals)	0.148
Agricultural soil	16.2 mg/kg dw (EUSES 2.1.2)	0.542

#### 4.3.3. Worker exposure: Handling of powders (PROC 26)

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

#### 4.3.4. Worker exposure: Handling of low dusty material (PROC 26)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.012 mg/m <sup>3</sup> (Measured data)	0.24

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.012 mg/m <sup>3</sup> (Measured data)	0.24
Inhalation, local, acute	0.035 mg/m <sup>3</sup> (Measured data)	< 0.01
Dermal, local, long term	1 µg/cm <sup>2</sup> (Measured data)	0.029
Combined, systemic, long term		0.24

#### 4.3.5. Worker exposure: Melting and casting (PROC 22, PROC 23)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.021 mg/m <sup>3</sup> (Measured data)	0.42
Inhalation, local, long term	0.021 mg/m <sup>3</sup> (Measured data)	0.42
Inhalation, local, acute	0.085 mg/m <sup>3</sup> (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm <sup>2</sup> (Measured data)	0.022
Combined, systemic, long term		0.42

#### 4.3.6. Worker exposure: Cutting and packaging (PROC 21)

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

#### 4.3.7. Worker exposure: Wet cleaning (PROC 28)

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

#### 4.3.8. 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 <sup>3</sup> (Measured data)	0.64
Inhalation, local, long term	0.032 mg/m <sup>3</sup> (Measured data)	0.64
Inhalation, local, acute	0.189 mg/m <sup>3</sup> (Measured data)	0.016
Dermal, local, long term	0.76 µg/cm <sup>2</sup> (Measured data)	0.022
Combined, systemic, long term		0.64

### 4.4. 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”.