

## 18. ES 18: Use at industrial sites; Use of nickel metal in metal surface treatment (nickel electroplating and nickel electroforming technologies)

### 18.1. Title section

Product category: Metal surface treatment products (PC 14)

Sector of use: Manufacture of fabricated metal products, except machinery and equipment (SU 15), General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment. (SU 17)

<b>Environment</b>	
1: Use of nickel metal in surface treatment (nickel electroplating, nickel electroforming and nickel electroless technologies) - Discharge to fresh water via municipal sewage treatment plant	ERC 5
2: Use of nickel metal in surface treatment (nickel electroplating, nickel electroforming and nickel electroless technologies) - Direct discharge to fresh water	ERC 5
3: Use of nickel metal in surface treatment (nickel electroplating, nickel electroforming and nickel electroless technologies) - Direct discharge to marine water	ERC 5
<b>Worker</b>	
4: Handling of low dusty materials	PROC 26
5: Handling of solutions as raw material	PROC 8b, PROC 9
6: Mixing and blending	PROC 5, PROC 4, PROC 3
7: Nickel electroplating, nickel electroforming and electroless nickel plating	PROC 13
8: Testing of solution composition	PROC 15
9: Wet cleaning	PROC 28
10: Cleaning/removal of dust	PROC 28

### 18.2. Conditions of use affecting exposure

#### 18.2.1. Control of environmental exposure: Use of nickel metal in surface treatment (nickel electroplating, nickel electroforming and nickel electroless technologies) - Discharge to fresh water via municipal sewage treatment plant (ERC 5)

<b>Amount used, frequency and duration of use (or from service life)</b>
Daily amount per site <= 0.033 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 <= 8 tonnes/year
Emission days >= 240 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) $\geq 10$

### 18.2.2. Control of environmental exposure: Use of nickel metal in surface treatment (nickel electroplating, nickel electroforming and nickel electroless technologies) - Direct discharge to fresh water (ERC 5)

<b>Amount used, frequency and duration of use (or from service life)</b>
Daily amount per site $\leq 8.96E-3$ 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 $\leq 2.15$ tonnes/year
Emission days $\geq 240$ 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>
Receiving surface water flow $\geq 1.23E4$ m <sup>3</sup> /day
No discharge to marine water assumed
Receiving water dilution (fresh or marine) $\geq 50$
Assumed effluent discharge flow from site $\geq 250$ m <sup>3</sup> /day

### 18.2.3. Control of environmental exposure: Use of nickel metal in surface treatment (nickel electroplating, nickel electroforming and nickel electroless technologies) - Direct discharge to marine water (ERC 5)

<b>Amount used, frequency and duration of use (or from service life)</b>
Daily amount per site $\leq 0.016$ 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 $\leq 3.8$ tonnes/year
Emission days $\geq 240$ 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 $\geq 250$ m <sup>3</sup> /day

#### 18.2.4. Control of worker exposure: Handling of low dusty materials (PROC 26)

<b>Product (article) characteristics</b>
Maximum emission potential covered in this ES: Low.
Physical form of product: Solid, pellet / pastille.
<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

#### 18.2.5. Control of worker exposure: Handling of solutions as raw material (PROC 8b, PROC 9)

<b>Product (article) characteristics</b>
Maximum emission potential covered in this ES: Very low.
Physical form of product: Solution.
<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>
Covers use at ambient temperatures.

#### 18.2.6. Control of worker exposure: Mixing and blending (PROC 5, PROC 4, PROC 3)

<b>Product (article) characteristics</b>
Maximum emission potential covered in this ES: Very low.
Physical form of product: Solution.
<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>
Covers use at ambient temperatures.

#### 18.2.7. Control of worker exposure: Nickel electroplating, nickel electroforming and electroless nickel plating (PROC 13)

<b>Product (article) characteristics</b>
Maximum emission potential covered in this ES: Very low.
Physical form of product: Solution.
<b>Technical and organisational conditions and measures</b>
Automated task
Use of a surfactant/wetting/foaming agent is required.
Use of a rim ventilation is required.

### 18.2.8. Control of worker exposure: Testing of solution composition (PROC 15)

<b>Product (article) characteristics</b>
Physical form of product: Solution.
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>
Amount per use < 1 kg
<b>Technical and organisational conditions and measures</b>
Use of an extraction hood is required.

### 18.2.9. 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).

### 18.2.10. 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.

## 18.3. Exposure estimation and reference to its source

### 18.3.1. Environmental release and exposure: Use of nickel metal in surface treatment (nickel electroplating, nickel electroforming and nickel electroless technologies) - Discharge to fresh water via municipal sewage treatment plant (ERC 5)

Release route	Release rate	Release estimation method
Water	0.126 kg/day	Estimated release factor
Air	0.038 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	5.61E-3 mg/L (EUSES 2.1.2)	0.79
Sediment (freshwater)	104.8 mg/kg dw (PEC sediment calculation method for metals)	0.961
Sewage Treatment Plant	0.038 mg/L (EUSES 2.1.2)	0.114
Agricultural soil	17.26 mg/kg dw (EUSES 2.1.2)	0.577

### 18.3.2. Environmental release and exposure: Use of nickel metal in surface treatment (nickel electroplating, nickel electroforming and nickel electroless technologies) - Direct discharge to fresh water (ERC 5)

Release route	Release rate	Release estimation method
Water	0.034 kg/day	Estimated release factor
Air	0.01 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	4.84E-3 mg/L (EUSES 2.1.2)	0.682
Sediment (freshwater)	84.6 mg/kg dw (PEC sediment calculation method for metals)	0.776
Agricultural soil	16.20 mg/kg dw (EUSES 2.1.2)	0.542

### 18.3.3. Environmental release and exposure: Use of nickel metal in surface treatment (nickel electroplating, nickel electroforming and nickel electroless technologies) - Direct discharge to marine water (ERC 5)

Release route	Release rate	Release estimation method
Water	0.06 kg/day	Estimated release factor
Air	0.018 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Marine water	2.02E-3 mg/L (EUSES 2.1.2)	0.234
Sediment (marine water)	61.2 mg/kg dw (PEC sediment calculation method for metals)	0.561

Protection target	Exposure estimate	RCR
Agricultural soil	16.20 mg/kg dw (EUSES 2.1.2)	0.542

#### 18.3.4. Worker exposure: Handling of low dusty materials (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
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

#### 18.3.5. Worker exposure: Handling of solutions as raw material (PROC 8b, PROC 9)

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
Inhalation, local, long term	0.012 mg/m <sup>3</sup> (Measured data)	0.24
Inhalation, local, acute	0.047 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		0.24

#### 18.3.6. Worker exposure: Mixing and blending (PROC 5, PROC 4, PROC 3)

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
Inhalation, local, long term	0.012 mg/m <sup>3</sup> (Measured data)	0.24
Inhalation, local, acute	0.047 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		0.24

#### 18.3.7. Worker exposure: Nickel electroplating, nickel electroforming and electroless nickel plating (PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	5E-3 mg/m <sup>3</sup> (Measured data)	0.1
Inhalation, local, long term	5E-3 mg/m <sup>3</sup> (Measured data)	0.1
Inhalation, local, acute	0.015 mg/m <sup>3</sup> (Measured data)	< 0.01
Dermal, local, long term	0.076 µg/cm <sup>2</sup> (Measured data)	< 0.01
Combined, systemic, long term		0.1

#### 18.3.8. Worker exposure: Testing of solution composition (PROC 15)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	3E-3 mg/m <sup>3</sup> (Measured data)	0.06
Inhalation, local, long term	3E-3 mg/m <sup>3</sup> (Measured data)	0.06
Inhalation, local, acute	0.01 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		0.06

### 18.3.9. 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

### 18.3.10. 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

## 18.4. 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".