

34. ES 34: Service life (worker at industrial site); Service life of nickel alloys and nickel-coated metal objects (machining and handling) in industrial settings

34.1. Title section

Article category: Machinery, mechanical appliances, electrical/electronic articles (AC 2), Metal articles (AC 7), Plastic articles (AC 13)

Environment	
1: Service life of nickel alloys and nickel-coated objects (machining and handling) in industrial settings - Discharge to fresh water via municipal sewage treatment plant	ERC 12b, ERC 12a
2: Service life of nickel alloys and nickel-coated objects (machining and handling) in industrial settings - Direct discharge to fresh water	ERC 12b, ERC 12a
3: Service life of nickel alloys and nickel-coated objects (machining and handling) in industrial settings - Direct discharge to marine water	ERC 12b, ERC 12a
Worker	
4: Low energy handling of massive objects	PROC 21
5: Abrasive processes	PROC 24
6: Other hot work operations	PROC 25
7: Rolling, milling or forging	PROC 24
8: Annealing and pickling	PROC 22

34.2. Conditions of use affecting exposure

34.2.1. Control of environmental exposure: Service life of nickel alloys and nickel-coated objects (machining and handling) in industrial settings - Discharge to fresh water via municipal sewage treatment plant (ERC 12b, ERC 12a)

Amount used, frequency and duration of use (or from service life)
Daily amount per site \leq 38.35 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 1.4E4 tonnes/year
Emission days \geq 365 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 biological sewage treatment plant
Assumed domestic sewage treatment plant flow \geq 2E3 m ³ /day
Municipal sewage treatment plant is assumed.
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 water dilution (fresh or marine) ≥ 25
Receiving surface water flow $\geq 4.8E4$ m ³ /day
No discharge to marine water assumed

34.2.2. Control of environmental exposure: Service life of nickel alloys and nickel-coated objects (machining and handling) in industrial settings - Direct discharge to fresh water (ERC 12b, ERC 12a)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 38.35 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 $\leq 1.4E4$ tonnes/year
Emission days ≥ 365 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 water dilution (fresh or marine) ≥ 100
Receiving surface water flow $\geq 1.98E5$ m ³ /day
No discharge to marine water assumed
Assumed effluent discharge flow from site $\geq 2E3$ m ³ /day

34.2.3. Control of environmental exposure: Service life of nickel alloys and nickel-coated objects (machining and handling) in industrial settings - Direct discharge to marine water (ERC 12b, ERC 12a)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 38.35 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 $\leq 1.4E4$ tonnes/year
Emission days ≥ 365 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 water dilution (fresh or marine) ≥ 100

No discharge to freshwater assumed

Assumed effluent discharge flow from site $\geq 2E3$ m ³ /day
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34.2.4. Control of worker exposure: Low energy handling of massive objects (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.

34.2.5. Control of worker exposure: Abrasive processes (PROC 24)

Product (article) characteristics
Physical form of product; Massive object
Maximum emission potential covered in this ES: High (abrasion based).
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
Use in closed process
Use of an integrated local exhaust ventilation with high efficiency is required.

34.2.6. Control of worker exposure: Other hot work operations (PROC 25)

Product (article) characteristics
Maximum emission potential covered in this ES: High.
Physical form of product: Molten.
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.

34.2.7. Control of worker exposure: Rolling, milling or forging (PROC 24)

Product (article) characteristics
Maximum emission potential covered in this ES: High (temperature based). Low to high level of abrasion possible.
Physical form of product; Solid
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).

34.2.8. Control of worker exposure: Annealing and pickling (PROC 22)

Product (article) characteristics
Maximum emission potential covered in this ES: Low.
Physical form of product; Massive object
Amount used (or contained in articles), frequency and duration of use/exposure
Covers exposure up to 180 minutes
Technical and organisational conditions and measures
Elevated temperature (process temperature may vary depending on the conducted process but is maintained well below the melting point of the substance).
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).

34.3. Exposure estimation and reference to its source

34.3.1. Environmental release and exposure: Service life of nickel alloys and nickel-coated objects (machining and handling) in industrial settings - Discharge to fresh water via municipal sewage treatment plant (ERC 12b)

Release route	Release rate	Release estimation method
Water	0.278 kg/day	Estimated release factor
Air	1.21 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	5.29E-3 mg/L (EUSES 2.1.2)	0.745
Sediment (freshwater)	96.5 mg/kg dw (PEC sediment calculation method for metals)	0.885
Sewage Treatment Plant	0.083 mg/L (EUSES 2.1.2)	0.253
Agricultural soil	18.68 mg/kg dw (EUSES 2.1.2)	0.625

34.3.2. Environmental release and exposure: Service life of nickel alloys and nickel-coated objects (machining and handling) in industrial settings - Direct discharge to fresh water (ERC 12b)

Release route	Release rate	Release estimation method
Water	0.278 kg/day	Estimated release factor
Air	1.21 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	3.9E-3 mg/L (EUSES 2.1.2)	0.549
Sediment (freshwater)	59.7 mg/kg dw (PEC sediment calculation method for metals)	0.548
Agricultural soil	16.34 mg/kg dw (EUSES 2.1.2)	0.547

34.3.3. Environmental release and exposure: Service life of nickel alloys and nickel-coated objects (machining and

handling) in industrial settings - Direct discharge to marine water (ERC 12b)

Release route	Release rate	Release estimation method
Water	0.278 kg/day	Estimated release factor
Air	1.21 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Marine water	1.3E-3 mg/L (EUSES 2.1.2)	0.151
Sediment (marine water)	42.3 mg/kg dw (PEC sediment calculation method for metals)	0.388
Agricultural soil	16.34 mg/kg dw (EUSES 2.1.2)	0.547

34.3.4. Worker exposure: Low energy handling of massive objects (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

34.3.5. Worker exposure: Abrasive processes (PROC 24)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	5E-3 mg/m ³ (Measured data)	0.1
Inhalation, local, long term	5E-3 mg/m ³ (Measured data)	0.1
Inhalation, local, acute	0.014 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.1

34.3.6. Worker exposure: Other hot work operations (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

34.3.7. Worker exposure: Rolling, milling or forging (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

Route of exposure and type of effects	Exposure estimate	RCR
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

34.3.8. Worker exposure: Annealing and pickling (PROC 22)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.037 mg/m ³ (Measured data)	0.74
Inhalation, local, long term	0.037 mg/m ³ (Measured data)	0.74
Inhalation, local, acute	0.11 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.74

34.4. 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".