

31. ES 31: Use at industrial sites; Use of nickel metal powder in the production of magnets

31.1. Title section

Product category: Base metals and alloys (PC 7)

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)

Environment	
1: Use of nickel metal powder in the production of magnets - Discharge to fresh water via municipal sewage treatment plant	ERC 5
2: Use of nickel metal powder in the production of magnets - Direct discharge to fresh water	ERC 5
3: Use of nickel metal powder in the production of magnets - Direct discharge to marine water	ERC 5
Worker	
4: Raw material handling and mixing	PROC 26, PROC 5
5: Compacting and pressing	PROC 14
6: Smelting and casting	PROC 23
7: Sintering	PROC 22
8: Sand blasting	PROC 24
9: Grinding	PROC 24
10: Packaging	PROC 21
11: Wet cleaning	PROC 28
12: Cleaning/removal of dust	PROC 28

31.2. Conditions of use affecting exposure

31.2.1. Control of environmental exposure: Use of nickel metal powder in the production of magnets - Discharge to fresh water via municipal sewage treatment plant (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 0.192 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 ≤ 45 tonnes/year
Emission days ≥ 235 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
Municipal sewage treatment plant is assumed.
Assumed domestic sewage treatment plant flow $\geq 2E3$ m ³ /day
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

31.2.2. Control of environmental exposure: Use of nickel metal powder in the production of magnets - Direct discharge to fresh water (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 0.192 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 ≤ 45 tonnes/year
Emission days ≥ 235 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 ≥ 199 m ³ /day
No discharge to marine water assumed
Receiving water dilution (fresh or marine) ≥ 200
Assumed effluent discharge flow from site ≥ 1 m ³ /day

31.2.3. Control of environmental exposure: Use of nickel metal powder in the production of magnets - Direct discharge to marine water (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 0.192 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 ≤ 45 tonnes/year
Emission days ≥ 235 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 ≥ 1 m ³ /day
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31.2.4. Control of worker exposure: Raw material handling and mixing (PROC 26, PROC 5)

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.

31.2.5. Control of worker exposure: Compacting and 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
Frequency of task: Once per shift.
Technical and organisational conditions and measures
Local exhaust ventilation
Use in closed process

31.2.6. Control of worker exposure: Smelting and casting (PROC 23)

Product (article) characteristics
Physical form of product: Molten.
Maximum emission potential covered in this ES: Medium.
Technical and organisational conditions and measures
Local exhaust ventilation
Semi-closed system
High temperature
Ensure automation of the process as far as technically feasible

31.2.7. Control of worker exposure: Sintering (PROC 22)

Product (article) characteristics
Maximum emission potential covered in this ES: Low (temperature based).
Physical form of product: Solids in various physical forms are possible (powders, pressed powders, pasted powders etc.).
Technical and organisational conditions and measures
Ensure automation of the process as far as technically feasible

Ensure closed vacuum furnace operation.
Use of an integrated local exhaust ventilation is required.
High temperature processes slightly below melting point / degradation temperature.

31.2.8. Control of worker exposure: Sand blasting (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.
Automated task

31.2.9. Control of worker exposure: Grinding (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.
Automated task

31.2.10. Control of worker exposure: 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.

31.2.11. 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).

31.2.12. 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.

31.3. Exposure estimation and reference to its source

31.3.1. Environmental release and exposure: Use of nickel metal powder in the production of magnets - Discharge to fresh water via municipal sewage treatment plant (ERC 5)

Release route	Release rate	Release estimation method
Water	4.1E-4 kg/day	Estimated release factor
Air	0.033 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)	33.73 mg/kg dw (PEC sediment calculation method for metals)	0.309
Sewage Treatment Plant	1.23E-4 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	16.20 mg/kg dw (EUSES 2.1.2)	0.542

31.3.2. Environmental release and exposure: Use of nickel metal powder in the production of magnets - Direct discharge to fresh water (ERC 5)

Release route	Release rate	Release estimation method
Water	4.1E-4 kg/day	Estimated release factor
Air	0.033 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	4.37E-3 mg/L (EUSES 2.1.2)	0.615
Sediment (freshwater)	72.2 mg/kg dw (PEC sediment calculation method for metals)	0.662
Agricultural soil	16.20 mg/kg dw (EUSES 2.1.2)	0.542

31.3.3. Environmental release and exposure: Use of nickel metal powder in the production of magnets - Direct discharge to marine water (ERC 5)

Release route	Release rate	Release estimation method
Water	4.1E-4 kg/day	Estimated release factor
Air	0.033 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Marine water	3.24E-3 mg/L (EUSES 2.1.2)	0.377
Sediment (marine water)	93.4 mg/kg dw (PEC sediment calculation method for metals)	0.857
Agricultural soil	16.20 mg/kg dw (EUSES 2.1.2)	0.542

31.3.4. Worker exposure: Raw material handling and mixing (PROC 26, PROC 5)

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

31.3.5. Worker exposure: Compacting and pressing (PROC 14)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.028 mg/m ³ (Measured data)	0.56
Inhalation, local, long term	0.028 mg/m ³ (Measured data)	0.56
Inhalation, local, acute	0.111 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.56

31.3.6. Worker exposure: Smelting and casting (PROC 23)

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

31.3.7. Worker exposure: Sintering (PROC 22)

Route of exposure and type of effects	Exposure estimate	RCR

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

31.3.8. Worker exposure: Sand blasting (PROC 24)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.031 mg/m ³ (Measured data)	0.62
Inhalation, local, long term	0.031 mg/m ³ (Measured data)	0.62
Inhalation, local, acute	0.157 mg/m ³ (Measured data)	0.013
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.62

31.3.9. Worker exposure: Grinding (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

31.3.10. Worker exposure: 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

31.3.11. Worker exposure: Wet cleaning (PROC 28)

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

31.3.12. 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

31.4. 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”.