

14. ES 14: Use at industrial sites; Use of nickel oxide for the production of nickel oxide-containing automotive catalysts

14.1. Title section

Product category: Other (PC 0)

Sector of use: General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment. (SU 17)

Environment	
1: Use of nickel oxide for the production of nickel oxide-containing automotive catalysts	ERC 5
Worker	
2: Handling/transfer of raw material from locked store to glove box	PROC 26
3: Handling of dusty raw material in glove box	PROC 3
4: Formulation into washcoat	PROC 4, PROC 5
5: Dosing of slurry	PROC 8b, PROC 9
6: Coating of catalytic monoliths/filters	PROC 13
7: Handling of coated parts	PROC 21
8: Drying and calcination	PROC 3
9: Equipment cleaning (wet)	PROC 28
10: Equipment cleaning (at closed systems)	PROC 28
Subsequent service life exposure scenario(s)	
ES 15: Service life (worker at industrial site); Vehicles covered by End of Life Vehicles (ELV) directive; Production of vehicle exhaust systems in industrial settings	
ES 16: Service life (professional worker); Vehicles covered by End of Life Vehicles (ELV) directive; Service life of vehicle exhaust systems in professional settings	

14.2. Conditions of use affecting exposure

14.2.1. Control of environmental exposure: Use of nickel oxide for the production of nickel oxide-containing automotive catalysts (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site \leq 0.038 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 10 tonnes/year
Emission days \geq 260 days/year
Technical and organisational conditions and measures
The substance should not be released to air
The substance should not be released to water
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.

14.2.2. Control of worker exposure: Handling/transfer of raw material from locked store to glove box (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 exposure up to 240 min
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.
In cases where direct contact with the substance cannot be avoided, a protective suit conforming to EN 13982 should be worn.
Wear suitable gloves tested to EN374.; For further specification, refer to section 8 of the SDS.

14.2.3. Control of worker exposure: Handling of dusty raw material in glove box (PROC 3)

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
Use of an integrated local exhaust ventilation is required.
Handle in gloves box or glove bag.
Conditions and measures related to personal protection, hygiene and health evaluation
APF of RPE = 40 (97.5% respiratory protection) (Airstream helmet). For further specification, refer to section 8 of the SDS.
In cases where direct contact with the substance cannot be avoided, a protective suit conforming to EN 13982 should be worn.
Wear suitable gloves tested to EN374.; For further specification, refer to section 8 of the SDS.

14.2.4. Control of worker exposure: Formulation into washcoat (PROC 4, PROC 5)

Product (article) characteristics
Maximum emission potential covered in this ES: Very low.
Physical form of product: Solution, suspension or slurry.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers exposure up to 240 min
Technical and organisational conditions and measures
Covers use at ambient temperatures.
Enclosed automated mixer or mixing in glove box.

14.2.5. Control of worker exposure: Dosing of slurry (PROC 8b, PROC 9)

Product (article) characteristics
Maximum emission potential covered in this ES: Very low.
Physical form of product: Solution, suspension or slurry.
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
Covers use at ambient temperatures.
Use in closed process
Ensure automation of the process as far as technically feasible

14.2.6. Control of worker exposure: Coating of catalytic monoliths/filters (PROC 13)

Product (article) characteristics
Maximum emission potential covered in this ES: Very low.
Physical form of product: Solution, suspension or slurry.
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
Covers use at ambient temperatures.
Use in closed process
Ensure automation of the process as far as technically feasible

14.2.7. Control of worker exposure: Handling of coated parts (PROC 21)

Product (article) characteristics
Maximum emission potential covered in this ES: Very low.
Physical form of product: Massive object (monolith/filter).
Technical and organisational conditions and measures
Ensure automation of the process as far as technically feasible.
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.

14.2.8. Control of worker exposure: Drying and calcination (PROC 3)

Product (article) characteristics
Maximum emission potential covered in this ES: Low.
Physical form of product: Massive object (monolith/filter).
Technical and organisational conditions and measures
Local exhaust ventilation
Use in closed process
Manufacturing and processing of minerals and/or metals at substantially elevated temperature (800 °C).

14.2.9. Control of worker exposure: Equipment cleaning (wet) (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
Covers use at ambient temperatures.
Automated task
Automated cleaning machines used, no manual cleaning.
Conditions and measures related to personal protection, hygiene and health evaluation
APF of RPE = 10 (90% respiratory protection).

14.2.10. Control of worker exposure: Equipment cleaning (at closed systems) (PROC 28)

Product (article) characteristics
Physical form of product: Solutions/Suspensions, 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
During cleaning use vacuum and/or (pressure) washing with water to remove dusts or powders. No direct handling (use of long-distance tools).

14.3. Exposure estimation and reference to its source

14.3.1. Environmental release and exposure: Use of nickel oxide for the production of nickel oxide-containing automotive catalysts (ERC 5)

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

14.3.2. Worker exposure: Handling/transfer of raw material from locked store to glove box (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)	0.432
Combined, systemic, long term		0.28

14.3.3. Worker exposure: Handling of dusty raw material in glove box (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	7E-4 mg/m ³ (Measured data)	0.014
Inhalation, local, long term	7E-4 mg/m ³ (Measured data)	0.014
Inhalation, local, acute	2.8E-3 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.06 µg/cm ² (Measured data)	< 0.01
Combined, systemic, long term		0.014

14.3.4. Worker exposure: Formulation into washcoat (PROC 4, PROC 5)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.012 mg/m ³ (Measured data)	0.24
Inhalation, local, long term	0.012 mg/m ³ (Measured data)	0.24
Inhalation, local, acute	0.047 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.063
Combined, systemic, long term		0.24

14.3.5. Worker exposure: Dosing of slurry (PROC 8b, PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.012 mg/m ³ (Measured data)	0.24
Inhalation, local, long term	0.012 mg/m ³ (Measured data)	0.24
Inhalation, local, acute	0.047 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.063
Combined, systemic, long term		0.24

14.3.6. Worker exposure: Coating of catalytic monoliths/filters (PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.012 mg/m ³ (Measured data)	0.24
Inhalation, local, long term	0.012 mg/m ³ (Measured data)	0.24
Inhalation, local, acute	0.047 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.063
Combined, systemic, long term		0.24

14.3.7. Worker exposure: Handling of coated parts (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

Route of exposure and type of effects	Exposure estimate	RCR
Dermal, local, long term	5.18 µg/cm ² (Measured data)	0.432
Combined, systemic, long term		0.18

14.3.8. Worker exposure: Drying and calcination (PROC 3)

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	0.016 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.063
Combined, systemic, long term		0.1

14.3.9. Worker exposure: Equipment cleaning (wet) (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)	0.063
Combined, systemic, long term		0.12

14.3.10. Worker exposure: Equipment cleaning (at closed systems) (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.027 mg/m ³ (Measured data)	0.54
Inhalation, local, long term	0.027 mg/m ³ (Measured data)	0.54
Inhalation, local, acute	0.16 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.063
Combined, systemic, long term		0.54

14.4. 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".