20. ES 20: Use at industrial sites; Industrial use of cobalt in thermal spraying in surface treatment

20.1. Title section

Product category: Metal surface treatment products (PC 14)

Environment	
1: Industrial use of cobalt in thermal spraying in surface treatment ES1 STP Discharge	ERC 5
2: Industrial use of cobalt in thermal spraying in surface treatment ES2 Direct Discharge	ERC 5
3: Industrial use of cobalt in thermal spraying in surface treatment ES3 Marine Discharge	ERC 5
Worker	
4: Preparation of massive spraying materials (e.g. wires)	PROC 21
5: Preparation of dusty spraying materials	PROC 26
6: Thermal spraying – fully automated	PROC 1, PROC 7
7: Finishing of massive objects	PROC 24
8: Handling and packaging of finished massive objects	PROC 21
9: Cleaning & Maintenance	PROC 28
Subsequent service life exposure scenario(s)	
ES 21: Service life (worker at industrial site); Various articles; Industrial handling of surface treated articles (passivated/plated/sprayed)	
ES 22: Service life (professional worker); Various articles; Professional handling of surface treated articles (passivated/plated/sprayed)	
ES 23: Service life (consumers); Various articles; heat and wear resistant vehicle parts	

20.2. Conditions of use affecting exposure

20.2.1. Control of environmental exposure: Industrial use of cobalt in thermal spraying in surface treatment ES1 STP Discharge (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 0.025 tonnes/day
Annual amount per site <= 4 tonnes/year
Emission days >= 160 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 >= 2E3 m3/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
No discharge to marine water assumed
Local freshwater dilution factor 200

20.2.2. Control of environmental exposure: Industrial use of cobalt in thermal spraying in surface treatment ES2 Direct Discharge (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 0.025 tonnes/day
Annual amount per site <= 4 tonnes/year
Emission days >= 160 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
Assumed effluent discharge flow from site >= 2E3 m3/day
Local freshwater dilution factor 300

20.2.3. Control of environmental exposure: Industrial use of cobalt in thermal spraying in surface treatment ES3 Marine Discharge (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 0.025 tonnes/day
Annual amount per site <= 4 tonnes/year
Emission days >= 160 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
Assumed effluent discharge flow from site >= 2E3 m3/day
No discharge to freshwater assumed
Local marine water dilution factor 100

20.2.4. Control of worker exposure: Preparation of massive spraying materials (e.g. wires) (PROC 21)

Product (article) characteristics
Maximum emission potential covered in this ES: Very low.

Concentration of the substance in mixture is not restricted.
Physical form covered in this ES: Massive object.
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of exposure: Not restricted.
Technical and organisational conditions and measures
Process is carried out at ambient temperature.
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.
Use suitable eye protection.; For further specification, refer to section 8 of the SDS.
Wear respiratory protection providing a minimum assigned protection factor of 10 (a minimum efficiency of 90%) unless inhalation exposure to the substance can be excluded. For further specification, refer to section 8 of the SDS.

20.2.5. Control of worker exposure: Preparation of dusty spraying materials (PROC 26)

Product (article) characteristics
Maximum emission potential covered in this ES: Medium.
Concentration of the substance in mixture is not restricted.
Physical form covered in this ES: Solid.
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of exposure: Not restricted.
Technical and organisational conditions and measures
Use of an integrated local exhaust ventilation with an efficiency of at least 90% is required.
Process is carried out at ambient temperature.
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.
Use suitable eye protection.; For further specification, refer to section 8 of the SDS.
APF of RPE = 20 (95% respiratory protection).
Wear protective suit conforming to EN 13982 in cases where direct contact with the substance cannot be avoided.

20.2.6. Control of worker exposure: Thermal spraying – fully automated (PROC 1, PROC 7)

Product (article) characteristics
Maximum emission potential covered in this ES: High (temperature based).
Concentration of the substance in mixture is not restricted.
Physical form covered in this ES: Solid, powder / dust.
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of exposure: Not restricted.
Technical and organisational conditions and measures
Limit the process temperature during flame spraying to 3.1E3 °C.
Limit the process temperature during plasma spraying to 3E4 °C.
High pressure applied during plasma and high-velocity flame spraying.
Ensure full containment of the process.

Segregated enclosed space of the emission source is required.
Process has to be fully automated.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye 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.
Wear respiratory protection providing a minimum assigned protection factor of 10 (a minimum efficiency of 90%) unless inhalation exposure to the substance can be excluded. For further specification, refer to section 8 of the SDS.

20.2.7. Control of worker exposure: Finishing of massive objects (PROC 24)

Product (article) characteristics
Maximum emission potential covered in this ES: Low (abrasion based).
Concentration of the substance in mixture is not restricted (up to 90 %).
Physical form covered in this ES: Massive object.
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of exposure: Not restricted.
Technical and organisational conditions and measures
Process is carried out at ambient temperature.
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.
Use suitable eye protection.; For further specification, refer to section 8 of the SDS.
Wear respiratory protection providing a minimum assigned protection factor of 10 (a minimum efficiency of 90%) unless inhalation exposure to the substance can be excluded. For further specification, refer to section 8 of the SDS.

20.2.8. Control of worker exposure: Handling and packaging of finished massive objects (PROC 21)

Product (article) characteristics
Maximum emission potential covered in this ES: Very low.
Concentration of the substance in mixture is not restricted.
Physical form covered in this ES: Massive object.
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of exposure: Not restricted.
Technical and organisational conditions and measures
Process is carried out at ambient temperature.
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.
Use suitable eye protection.; For further specification, refer to section 8 of the SDS.
Wear respiratory protection providing a minimum assigned protection factor of 10 (a minimum efficiency of 90%) unless inhalation exposure to the substance can be excluded. For further specification, refer to section 8 of the SDS.

20.2.9. Control of worker exposure: Cleaning & Maintenance (PROC 28)

Product (article) characteristics

Maximum emission potential covered in this ES: High.
Physical form covered in this ES: Solid, powder / dust.
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of exposure: Not restricted.
Technical and organisational conditions and measures
Process is carried out at ambient temperature.
Process is carried out at ambient pressure.
Maintenance and repair work only at facilities which are not in operation. Minor cleaning tasks may be conducted under operation.
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.
Use suitable eye protection.; For further specification, refer to section 8 of the SDS.
APF of RPE = 40 (97.5% respiratory protection).
Wear protective suit conforming to EN 13982 in cases where direct contact with the substance cannot be avoided.

20.3. Exposure estimation and reference to its source

20.3.1. Environmental release and exposure: Industrial use of cobalt in thermal spraying in surface treatment ES1 STP Discharge (ERC 5)

Release route	Release rate	Release estimation method
Water	0.125 kg/day	Estimated release factor
Air	0.05 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	2.18E-4 mg/L (EUSES 2.1.2)	0.352
Sediment (freshwater)	8.81 mg/kg dw (PEC sediment calculation method for metals)	0.164
Sewage Treatment Plant	0.037 mg/L (EUSES 2.1.2)	0.101
Agricultural soil	1.292 mg/kg dw (EUSES 2.1.2)	0.119
Man via environment - Inhalation	6.09E-6 mg/m³ (EUSES 2.1.2)	< 0.01

20.3.2. Environmental release and exposure: Industrial use of cobalt in thermal spraying in surface treatment ES2 Direct Discharge (ERC 5)

Release route	Release rate	Release estimation method
Water	0.125 kg/day	Estimated release factor
Air	0.05 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	2.32E-4 mg/L (EUSES 2.1.2)	0.373
Sediment (freshwater)	9.32 mg/kg dw (PEC sediment calculation method for metals)	0.173

Protection target	Exposure estimate	RCR
Agricultural soil	0.239 mg/kg dw (EUSES 2.1.2)	0.022
Man via environment - Inhalation	6.09E-6 mg/m³ (EUSES 2.1.2)	< 0.01

20.3.3. Environmental release and exposure: Industrial use of cobalt in thermal spraying in surface treatment ES3 Marine Discharge (ERC 5)

Release route	Release rate	Release estimation method
Water	0.125 kg/day	Estimated release factor
Air	0.05 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Marine water	0.286 µg/L (Clocal calculation with Kp susp. matter marine)	0.121
Sediment (marine water)	38.02 mg/kg dw (PEC sediment calculation method for metals)	0.545
Agricultural soil	0.239 mg/kg dw (EUSES 2.1.2)	0.022
Man via environment - Inhalation	6.09E-6 mg/m³ (EUSES 2.1.2)	< 0.01

20.3.4. Worker exposure: Preparation of massive spraying materials (e.g. wires) (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	8.6 µg/m³ (Measured data)	0.215

20.3.5. Worker exposure: Preparation of dusty spraying materials (PROC 26)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	33.5 µg/m³ (Measured data)	0.838

20.3.6. Worker exposure: Thermal spraying – fully automated (PROC 1, PROC 7)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	10 µg/m³ (MEASE)	0.25

20.3.7. Worker exposure: Finishing of massive objects (PROC 24)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	23.6 µg/m³ (Measured data)	0.59

20.3.8. Worker exposure: Handling and packaging of finished massive objects (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	8.6 µg/m³ (Measured data)	0.215

20.3.9. Worker exposure: Cleaning & Maintenance (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	20.2 µg/m³ (Measured data)	0.505

20.4. 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”.
of this “ES for Communication”.