

17. ES 17: Use at industrial sites; Industrial use of cobalt in passivation processes in surface treatment

17.1. Title section

Product category: Metal surface treatment products (PC 14)

| Environment | |
|--|----------------|
| 1: Industrial use of cobalt in passivation processes in surface treatment ES1 STP Discharge | ERC 5 |
| 2: Industrial use of cobalt in passivation processes in surface treatment ES2 Direct Discharge | ERC 5 |
| 3: Industrial use of cobalt in passivation processes in surface treatment ES3 Marine Discharge | ERC 5 |
| Worker | |
| 4: Raw material handling | PROC 21 |
| 5: Wet processes | PROC 2, PROC 1 |
| 6: Passivation | PROC 13 |
| 7: Packaging and handling of passivated articles | PROC 21 |
| 8: 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 | |

17.2. Conditions of use affecting exposure

17.2.1. Control of environmental exposure: Industrial use of cobalt in passivation processes 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) |

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| 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 |

17.2.2. Control of environmental exposure: Industrial use of cobalt in passivation processes in surface treatment ES2 Direct Discharge (ERC 5)

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| 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 $\geq 2E3$ m ³ /day |
| Local freshwater dilution factor 300 |

17.2.3. Control of environmental exposure: Industrial use of cobalt in passivation processes in surface treatment ES3 Marine Discharge (ERC 5)

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|--|
| 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 $\geq 2E3$ m ³ /day |
| No discharge to freshwater assumed |
| Local marine water dilution factor 100 |

17.2.4. Control of worker exposure: Raw material handling (PROC 21)

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| Product (article) characteristics |
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| 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. |

17.2.5. Control of worker exposure: Wet processes (PROC 2, PROC 1)

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| 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: Aqueous solution. |
| 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. |
| Ensure full containment of the process. |
| Level of automation should be semi-automated. |
| Use of an integrated local exhaust ventilation with an efficiency of at least 90% is required. |
| 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. |
| APF of RPE = 10 (90% respiratory protection). |

17.2.6. Control of worker exposure: Passivation (PROC 13)

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|---|
| Product (article) characteristics |
| Maximum emission potential covered in this ES: Very low. |
| Limit the concentration of the substance in mixture to <= 5 %. |
| Physical form covered in this ES: Aqueous solution. |
| Amount used (or contained in articles), frequency and duration of use/exposure |
| Duration of exposure: Not restricted. |
| 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. |

17.2.7. Control of worker exposure: Packaging and handling of passivated articles (PROC 21)

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|---|
| 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. |

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

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| Product (article) characteristics |
| Maximum emission potential covered in this ES: Medium. |
| Physical form covered in this ES: Dried splashes/overspill. |
| 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 pressure. |
| Process is carried out at ambient temperature. |
| 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 = 10 (90% respiratory protection). |

17.3. Exposure estimation and reference to its source

17.3.1. Environmental release and exposure: Industrial use of cobalt in passivation processes 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 |
|-------------------|-------------------|-----|
|-------------------|-------------------|-----|

| 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/m ³ (EUSES 2.1.2) | < 0.01 |

17.3.2. Environmental release and exposure: Industrial use of cobalt in passivation processes 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 |
| Agricultural soil | 0.239 mg/kg dw (EUSES 2.1.2) | 0.022 |
| Man via environment - Inhalation | 6.09E-6 mg/m ³ (EUSES 2.1.2) | < 0.01 |

17.3.3. Environmental release and exposure: Industrial use of cobalt in passivation processes 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/m ³ (EUSES 2.1.2) | < 0.01 |

17.3.4. Worker exposure: Raw material handling (PROC 21)

| Route of exposure and type of effects | Exposure estimate | RCR |
|---------------------------------------|---------------------------------------|-------|
| Inhalation, local, long term | 8.6 µg/m ³ (Measured data) | 0.215 |

17.3.5. Worker exposure: Wet processes (PROC 2, PROC 1)

| Route of exposure and type of effects | Exposure estimate | RCR |
|---------------------------------------|-------------------|-----|
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| Route of exposure and type of effects | Exposure estimate | RCR |
|---------------------------------------|---------------------------------------|-------|
| Inhalation, local, long term | 2.9 µg/m ³ (Measured data) | 0.072 |

17.3.6. Worker exposure: Passivation (PROC 13)

| Route of exposure and type of effects | Exposure estimate | RCR |
|---------------------------------------|-----------------------------|------|
| Inhalation, local, long term | 2 µg/m ³ (MEASE) | 0.05 |

17.3.7. Worker exposure: Packaging and handling of passivated articles (PROC 21)

| Route of exposure and type of effects | Exposure estimate | RCR |
|---------------------------------------|---------------------------------------|-------|
| Inhalation, local, long term | 8.6 µg/m ³ (Measured data) | 0.215 |

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

| Route of exposure and type of effects | Exposure estimate | RCR |
|---------------------------------------|--|------|
| Inhalation, local, long term | 16.8 µg/m ³ (Measured data) | 0.42 |

17.4. 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".