

## 24. ES 24: Use at industrial sites; Production of cobalt-containing batteries

### 24.1. Title section

Sector of use: Manufacture of computer, electronic and optical products, electrical equipment (SU 16)

<b>Environment</b>	
1: Production of cobalt-containing batteries ES1 Direct Discharge	ERC 5
2: Production of cobalt-containing batteries ES2 Marine Discharge	ERC 5
<b>Worker</b>	
3: Raw material handling	PROC 26, PROC 4, PROC 3, PROC 8b
4: Mix preparation	PROC 5, PROC 3
5: Further processing	PROC 13, PROC 9, PROC 4, PROC 5, PROC 6, PROC 3
6: Final processing and handling	PROC 14, PROC 21
7: Cleaning & Maintenance	PROC 28
<b>Subsequent service life exposure scenario(s)</b>	
ES 25: Service life (worker at industrial site); Electrical batteries and accumulators; Service life of cobalt-containing batteries in industrial settings	
ES 26: Service life (professional worker); Electrical batteries and accumulators; Service life of cobalt-containing batteries in professional settings	

### 24.2. Conditions of use affecting exposure

#### 24.2.1. Control of environmental exposure: Production of cobalt-containing batteries ES1 Direct Discharge (ERC 5)

<b>Amount used, frequency and duration of use (or from service life)</b>
Daily amount per site <= 0.088 tonnes/day
Annual amount per site <= 28 tonnes/year
Emission days >= 319 days/year
<b>Technical and organisational conditions and measures</b>
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
<b>Conditions and measures related to external treatment of waste (including article waste)</b>
Dispose of waste product or used containers according to local regulations.
<b>Other conditions affecting environmental exposure</b>
Assumed effluent discharge flow from site >= 513 m <sup>3</sup> /day
No discharge to marine water assumed
Local freshwater dilution factor 100

### 24.2.2. Control of environmental exposure: Production of cobalt-containing batteries ES2 Marine Discharge (ERC 5)

<b>Amount used, frequency and duration of use (or from service life)</b>
Daily amount per site <= 0.088 tonnes/day
Annual amount per site <= 28 tonnes/year
Emission days >= 319 days/year
<b>Technical and organisational conditions and measures</b>
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
<b>Conditions and measures related to external treatment of waste (including article waste)</b>
Dispose of waste product or used containers according to local regulations.
<b>Other conditions affecting environmental exposure</b>
Assumed effluent discharge flow from site >= 513 m3/day
No discharge to freshwater assumed
Local marine water dilution factor 100

### 24.2.3. Control of worker exposure: Raw material handling (PROC 26, PROC 4, PROC 3, PROC 8b)

<b>Product (article) characteristics</b>
Maximum emission potential covered in this ES: Medium.
Concentration of the substance in mixture is not restricted.
Physical form covered in this ES: Solid, powder / dust.
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>
Duration of exposure: Not restricted.
<b>Technical and organisational conditions and measures</b>
Process is carried out at ambient temperature.
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>
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).
Wear protective suit conforming to EN 13982 in cases where direct contact with the substance cannot be avoided.

### 24.2.4. Control of worker exposure: Mix preparation (PROC 5, PROC 3)

<b>Product (article) characteristics</b>
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.
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>
Duration of exposure: Not restricted.
<b>Technical and organisational conditions and measures</b>

Process is carried out at ambient temperature.
Ensure enclosure of reaction vessel.
Level of automation should be semi-automated.
Use of an integrated local exhaust ventilation with an efficiency of at least 90% is required.
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>
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).

#### 24.2.5. Control of worker exposure: Further processing (PROC 13, PROC 9, PROC 4, PROC 5, PROC 6, PROC 3)

<b>Product (article) characteristics</b>
Maximum emission potential covered in this ES: Low.
Concentration of the substance in mixture is not restricted.
Physical form covered in this ES: Solid.
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>
Duration of exposure: Not restricted.
<b>Technical and organisational conditions and measures</b>
Process is carried out at ambient temperature.
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>
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).

#### 24.2.6. Control of worker exposure: Final processing and handling (PROC 14, PROC 21)

<b>Product (article) characteristics</b>
Maximum emission potential covered in this ES: Very low.
Limit the concentration of the substance in mixture to <= 25 %.
Cobalt is included in a sealed container (battery).
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>
Duration of exposure: Not restricted.
<b>Technical and organisational conditions and measures</b>
Process is carried out at ambient pressure.
Process is carried out at ambient temperature.

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

<b>Product (article) characteristics</b>
Maximum emission potential covered in this ES: High.
Physical form covered in this ES: Solid, powder / dust.
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>
Duration of exposure: Not restricted.
<b>Technical and organisational conditions and measures</b>

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.
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>
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.

## 24.3. Exposure estimation and reference to its source

### 24.3.1. Environmental release and exposure: Production of cobalt-containing batteries ES1 Direct Discharge (ERC 5)

Release route	Release rate	Release estimation method
Water	9.57E-3 kg/day	Estimated release factor
Air	1.03E-3 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)	0.351
Sediment (freshwater)	8.78 mg/kg dw (PEC sediment calculation method for metals)	0.163
Agricultural soil	0.239 mg/kg dw (EUSES 2.1.2)	0.022
Man via environment - Inhalation	2.5E-7 mg/m <sup>3</sup> (EUSES 2.1.2)	< 0.01

### 24.3.2. Environmental release and exposure: Production of cobalt-containing batteries ES2 Marine Discharge (ERC 5)

Release route	Release rate	Release estimation method
Water	9.57E-3 kg/day	Estimated release factor
Air	1.03E-3 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Marine water	0.095 µg/L (Clocal calculation with Kp susp. matter marine)	0.04
Sediment (marine water)	21.65 mg/kg dw (PEC sediment calculation method for metals)	0.31
Agricultural soil	0.239 mg/kg dw (EUSES 2.1.2)	0.022
Man via environment - Inhalation	2.5E-7 mg/m <sup>3</sup> (EUSES 2.1.2)	< 0.01

### 24.3.3. Worker exposure: Raw material handling (PROC 26, PROC 4, PROC 3, PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	15.3 µg/m <sup>3</sup> (Measured data)	0.383

**24.3.4. Worker exposure: Mix preparation (PROC 5, PROC 3)**

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

**24.3.5. Worker exposure: Further processing (PROC 13, PROC 9, PROC 4, PROC 5, PROC 6, PROC 3)**

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	2.4 µg/m <sup>3</sup> (Measured data)	0.06

**24.3.6. Worker exposure: Final processing and handling (PROC 14, PROC 21)**

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	1E-3 µg/m <sup>3</sup> (Qualitative assessment)	< 0.01

**24.3.7. Worker exposure: Cleaning & Maintenance (PROC 28)**

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	20.2 µg/m <sup>3</sup> (Measured data)	0.505

**24.4. 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".