



eSDS Copper – massive

Annex

EXPOSURE SCENARIOS FOR COMMUNICATION

Substance Name: A1 Copper

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ES 5: Formulation or re-packing; Various products (PC 0, PC 7); F-3: Production of copper alloy shapes, and ingots

5.1. Title section

ES name: *F-3: Production of copper alloy shapes, and ingots*

Product category: Other (PC 0), Base metals and alloys (PC 7)

Environment	
1: <i>F-3: Production of copper alloy shapes or ingots</i>	ERC 2
Worker	
2: <i>Raw material and scrap handling of massive metal (#1)</i>	PROC 26
3: <i>Raw material and scrap handling of fines (#20LEV)</i>	PROC 26
4: <i>Raw material and scrap handling of fines (#20RPE)</i>	PROC 26
5: <i>Melting and casting (#23)</i>	PROC 23, PROC 21, PROC 22
6: <i>Particulate, powder handling, mixing blending and weighing, metal (#7)</i>	PROC 26, PROC 5, PROC 4, PROC 9, PROC 8b, PROC 8a

5.2. Conditions of use affecting exposure

5.2.1. Control of environmental exposure: *F-3: Production of copper alloy shapes or ingots* (ERC 2)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 700 tonnes/day
Annual amount per site $\leq 2.1E5$ tonnes/year
Technical and organisational conditions and measures
<i>Electrostatic precipitators or wet electrostatic precipitators or cyclones or fabric/bag filter or ceramic/metal mesh filter</i>
<i>Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange</i>
Conditions and measures related to external treatment of waste (including article waste)
External recovery and recycling of waste should comply with applicable local and/or national regulations.; External treatment and disposal of waste should comply with applicable local and/or national regulations.
Other conditions affecting environmental exposure
Receiving surface water flow $\geq 1.8E4$ m ³ /day
<i>Assumed effluent discharge flow from site $\geq 2E3$ m³/day</i>

5.2.2. Control of worker exposure: *Raw material and scrap handling of massive metal (#1)* (PROC 26)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel



operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.

Provide a good standard of controlled ventilation (5 to 10 air changes per hour).

Other conditions affecting workers exposure

Indoor use

Assumes process temperature up to 25 °C

5.2.3. Control of worker exposure: *Raw material and scrap handling of fines (#20LEV)* (PROC 26)

Product (article) characteristics

Covers concentrations up to 100 %

Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.

Amount used (or contained in articles), frequency and duration of use/exposure

Covers use up to 8 h/day

Technical and organisational conditions and measures

Provide enclosing hood with very high effectiveness (such as fume cupboard) or effective ventilation by spray booth according to EN 16985. Ensure effectiveness is at least 95%.

Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.

Provide a good standard of controlled ventilation (5 to 10 air changes per hour).

Other conditions affecting workers exposure

Indoor use

Assumes process temperature up to 25 °C

5.2.4. Control of worker exposure: *Raw material and scrap handling of fines (#20RPE)* (PROC 26)

Product (article) characteristics

Covers concentrations up to 100 %

Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.

Amount used (or contained in articles), frequency and duration of use/exposure

Covers use up to 8 h/day

Technical and organisational conditions and measures

Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.

Provide a good standard of controlled ventilation (5 to 10 air changes per hour).

Conditions and measures related to personal protection, hygiene and health evaluation

Wear a respirator which reduces the air impurities by at least a factor of 20 (APF $\geq$ 20). For further specification, refer to section 8 of the SDS

Other conditions affecting workers exposure

Indoor use

Assumes process temperature up to 25 °C

5.2.5. Control of worker exposure: *Melting and casting (#23)* (PROC 23, PROC 21, PROC 22)



Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
<i>Very limited manual intervention is required to run the process. Contact with the substance may be possible for a very limited duration of time.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
<i>Wear a respirator which reduces the air impurities by at least a factor of 20 (APF $\geq$ 20). For further specification, refer to section 8 of the SDS</i>
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 1.34E3 °C

5.2.6. Control of worker exposure: *Particulate, powder handling, mixing blending and weighing, metal (#7)* (PROC 26, PROC 5, PROC 4, PROC 9, PROC 8b, PROC 8a)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide enclosing hood with very high effectiveness (such as fume cupboard) or effective ventilation by spray booth according to EN 16985. Ensure effectiveness is at least 95%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
<i>Assumes that the process is completely enclosed for the vast majority of its duration. Limited manual intervention and controlled opening during operation may occur for maintenance or cleaning tasks (e.g. often required if solids are being handled).</i>
<i>Workers are only involved in supervision and control walks. Direct contact with the substance is not possible.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
<i>Wear a respirator which reduces the air impurities by at least a factor of 20 (APF $\geq$ 20). For further specification, refer to section 8 of the SDS</i>
Other conditions affecting workers exposure
Indoor use



Assumes process temperature up to 25 °C

5.3. Exposure estimation and reference to its source

5.3.1. Environmental release and exposure: *F-3: Production of copper alloy shapes or ingots (ERC 2)*

Release route	Release rate	Release estimation method
Water	0.01 kg/day	Measured release rate
Air	0.55 kg/day	Measured release rate
Soil	70 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	2.63E-3 mg/L (EUSES 2.1.2)	0.418
Sediment (freshwater)	10.41 mg/kg dw (EUSES manual calculations)	0.12
Marine water	1.53E-3 mg/L (EUSES 2.1.2)	0.295
Sediment (marine water)	46.34 mg/kg dw (EUSES 2.1.2)	0.069
Sewage Treatment Plant	0 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	40.70 mg/kg dw (EUSES 2.1.2)	0.626

5.3.2. Worker exposure: *Raw material and scrap handling of massive metal (#1) (PROC 26)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.6 mg/m ³ (Cu VRAR)	0.6
Inhalation, local, acute	0.6 mg/m ³ (Cu VRAR)	0.6
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

5.3.3. Worker exposure: *Raw material and scrap handling of fines (#20LEV) (PROC 26)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.13 mg/m ³ (Cu VRAR)	0.13
Inhalation, local, acute	0.13 mg/m ³ (Cu VRAR)	0.13
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

5.3.4. Worker exposure: *Raw material and scrap handling of fines (#20RPE) (PROC 26)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.13 mg/m ³ (Cu VRAR)	0.13
Inhalation, local, acute	0.13 mg/m ³ (Cu VRAR)	0.13
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

5.3.5. Worker exposure: *Melting and casting (#23) (PROC 23, PROC 21, PROC 22)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.012 mg/m ³ (Measured data)	0.012

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, acute	0.012 mg/m ³ (Measured data)	0.012
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Measured data)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Measured data)	< 0.01

5.3.6. Worker exposure: *Particulate, powder handling, mixing blending and weighing, metal (#7)* (PROC 26, PROC 5, PROC 4, PROC 9, PROC 8b, PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.51 mg/m ³ (Cu VRAR)	0.51
Inhalation, local, acute	0.51 mg/m ³ (Cu VRAR)	0.51
Dermal, systemic, long term	2.7E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.7E-3 mg/kg bw/day (Cu VRAR)	< 0.01

5.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance: If the producer/DU has Conditions of Use outside the Conditions of Use specifications in the above ES, then the producer/DU can evaluate whether he works inside the boundaries set by the ES through scaling. Scaling instructions: Environment: The following conditions of use can be scaled: daily amount per site, number of release days per year (to calculate annual amount per site), effluent discharge flow, receiving surface water flow, presence/absence of offsite municipal Sewage Treatment Plant and use of municipal sludge on agricultural soil. Human health: In the simple and easy-to-use DU-interface, site-specific measured inhalation and/or dermal values can be entered. An internal Cu concentration is then calculated and risk conclusion is given.

Scaling tool web link: Environment: <http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool>, Human health: <https://reach-copper-consortium.eu/substances/copper/>



ES 6: Use at industrial sites; Various products (PC 7, PC 14); IW-1: Use of copper and copper alloy shapes for the production of shapes, ingots and /or copper containing articles.

6.1. Title section

ES name: *IW-1: Use of copper and copper alloy shapes for the production of shapes, ingots and /or copper containing articles.*

Product category: Base metals and alloys (PC 7), Metal surface treatment products (PC 14)

Environment	
1: <i>IW-1: Use of copper and copper alloy shapes for the production of shapes, ingots and /or copper containing articles.</i>	ERC 5
Worker	
2: <i>Raw material and scrap handling of massive metal (#1)</i>	PROC 26
3: <i>Raw material and scrap handling of fines (#20LEV)</i>	PROC 26
4: <i>Raw material and scrap handling of fines (#20RPE)</i>	PROC 26
5: <i>Low energy mechanical processing of cold metal (#5)</i>	PROC 21
6: <i>Melting and casting (#23)</i>	PROC 23, PROC 21, PROC 22
7: <i>Surface treatment (#26)</i>	PROC 21, PROC 24, PROC 13
Subsequent service life exposure scenario(s)	
ES 26: Service life (worker at industrial site); Metal articles (AC 7)	

6.2. Conditions of use affecting exposure

6.2.1. Control of environmental exposure: *IW-1: Use of copper and copper alloy shapes for the production of shapes, ingots and /or copper containing articles.* (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site $\leq$ 334 tonnes/day
Annual amount per site $\leq$ 1E5 tonnes/year
Technical and organisational conditions and measures
<i>Electrostatic precipitators or wet electrostatic precipitators or cyclones or fabric/bag filter or ceramic/metal mesh filter</i>
<i>Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange</i>
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)
External recovery and recycling of waste should comply with applicable local and/or national regulations.; External treatment and disposal of waste should comply with applicable local and/or national regulations.
Other conditions affecting environmental exposure
Receiving surface water flow $\geq$ 1.8E4 m ³ /day

6.2.2. Control of worker exposure: *Raw material and scrap handling of massive metal (#1)* (PROC 26)



Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

6.2.3. Control of worker exposure: *Raw material and scrap handling of fines (#20LEV)* (PROC 26)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide enclosing hood with very high effectiveness (such as fume cupboard) or effective ventilation by spray booth according to EN 16985. Ensure effectiveness is at least 95%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

6.2.4. Control of worker exposure: *Raw material and scrap handling of fines (#20RPE)* (PROC 26)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).



Conditions and measures related to personal protection, hygiene and health evaluation
<i>Wear a respirator which reduces the air impurities by at least a factor of 20 (APF $\geq$ 20). For further specification, refer to section 8 of the SDS</i>
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

6.2.5. Control of worker exposure: *Low energy mechanical processing of cold metal (#5)* (PROC 21)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 100 °C

6.2.6. Control of worker exposure: *Melting and casting (#23)* (PROC 23, PROC 21, PROC 22)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
<i>Very limited manual intervention is required to run the process. Contact with the substance may be possible for a very limited duration of time.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
<i>Wear a respirator which reduces the air impurities by at least a factor of 20 (APF $\geq$ 20). For further specification, refer to section 8 of the SDS</i>
Other conditions affecting workers exposure

Indoor use
Assumes process temperature up to 1.34E3 °C

6.2.7. Control of worker exposure: *Surface treatment (#26) (PROC 21, PROC 24, PROC 13)*

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

6.3. Exposure estimation and reference to its source

6.3.1. Environmental release and exposure: *IW-1: Use of copper and copper alloy shapes for the production of shapes, ingots and /or copper containing articles. (ERC 5)*

Release route	Release rate	Release estimation method
Water	0.1 kg/day	Measured release rate
Air	0.29 kg/day	Measured release rate
Soil	3.34E3 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	2.98E-3 mg/L (EUSES 2.1.2)	0.473
Sediment (freshwater)	21 mg/kg dw (EUSES manual calculations)	0.241
Marine water	1.57E-3 mg/L (EUSES 2.1.2)	0.302
Sediment (marine water)	47.38 mg/kg dw (EUSES 2.1.2)	0.07
Sewage Treatment Plant	0.01 mg/L (EUSES 2.1.2)	0.043
Agricultural soil	42.38 mg/kg dw (EUSES 2.1.2)	0.652

6.3.2. Worker exposure: *Raw material and scrap handling of massive metal (#1) (PROC 26)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.6 mg/m ³ (Cu VRAR)	0.6
Inhalation, local, acute	0.6 mg/m ³ (Cu VRAR)	0.6
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

6.3.3. Worker exposure: *Raw material and scrap handling of fines (#20LEV)* (PROC 26)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.13 mg/m ³ (Cu VRAR)	0.13
Inhalation, local, acute	0.13 mg/m ³ (Cu VRAR)	0.13
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

6.3.4. Worker exposure: *Raw material and scrap handling of fines (#20RPE)* (PROC 26)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.13 mg/m ³ (Cu VRAR)	0.13
Inhalation, local, acute	0.13 mg/m ³ (Cu VRAR)	0.13
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

6.3.5. Worker exposure: *Low energy mechanical processing of cold metal (#5)* (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.33 mg/m ³ (Cu VRAR)	0.33
Inhalation, local, acute	0.33 mg/m ³ (Cu VRAR)	0.33
Dermal, systemic, long term	0.024 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	0.024 mg/kg bw/day (Cu VRAR)	< 0.01

6.3.6. Worker exposure: *Melting and casting (#23)* (PROC 23, PROC 21, PROC 22)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.012 mg/m ³ (Measured data)	0.012
Inhalation, local, acute	0.012 mg/m ³ (Measured data)	0.012
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Measured data)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Measured data)	< 0.01

6.3.7. Worker exposure: *Surface treatment (#26)* (PROC 21, PROC 24, PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.33 mg/m ³ (Cu VRAR)	0.33
Inhalation, local, acute	0.33 mg/m ³ (Cu VRAR)	0.33
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

6.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance: If the producer/DU has Conditions of Use outside the Conditions of Use specifications in the above ES, then the producer/DU can evaluate whether he works inside the boundaries set by the ES through scaling. Scaling instructions: Environment: The following conditions of use can be scaled: daily amount per site, number of release days per year (to calculate annual amount per site), effluent discharge flow, receiving surface water flow, presence/absence of off)site municipal Sewage Treatment Plant and use of municipal sludge on



agricultural soil. Human health: In the simple and easy-to-use DU-interface, site-specific measured inhalation and/or dermal values can be entered. An internal Cu concentration is then calculated and risk conclusion is given.

Scaling tool web link: Environment: <http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool>,
Human health: <https://reach-copper-consortium.eu/substances/copper/>

ES 7: Use at industrial sites; IW-2 Use of copper as intermediate for production of copper containing substances

7.1. Title section

ES name: *IW-2 Use of copper as intermediate for production of copper containing substances*

Environment		SPERC
1: <i>IW-2 Use of copper as intermediate for production of copper containing substances</i>	ERC 6a	<i>Eurometaux SPERC 6a.1.v3</i>
Worker		SWED
2: <i>Raw material and scrap handling of massive metal (#1)</i>	PROC 26	
3: <i>Raw material and scrap handling of fines (#20LEV)</i>	PROC 26	
4: <i>Raw material and scrap handling of fines (#20RPE)</i>	PROC 26	
5: <i>Melting and casting (#23)</i>	PROC 23, PROC 21, PROC 22	
6: <i>Surface treatment (26)</i>	PROC 13, PROC 21, PROC 24	
7: <i>Low energy mechanical processing of cold metal (#5)</i>	PROC 21	

7.2. Conditions of use affecting exposure

7.2.1. Control of environmental exposure: *IW-2 Use of copper as intermediate for production of copper containing substances* (ERC 6a)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 0.2 tonnes/day
Annual amount per site ≤ 36.4 tonnes/year
Technical and organisational conditions and measures
<i>Electrostatic precipitators or wet electrostatic precipitators or cyclones or fabric/bag filter or ceramic/metal mesh filter</i>
<i>Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange</i>
Conditions and measures related to external treatment of waste (including article waste)
External recovery and recycling of waste should comply with applicable local and/or national regulations.; External treatment and disposal of waste should comply with applicable local and/or national regulations.
Other conditions affecting environmental exposure
<i>Assumed effluent discharge flow from site $\geq 2E3$ m³/day</i>

7.2.2. Control of worker exposure: *Raw material and scrap handling of massive metal (#1)* (PROC 26)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.



Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

7.2.3. Control of worker exposure: *Raw material and scrap handling of fines (#20LEV)* (PROC 26)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide enclosing hood with very high effectiveness (such as fume cupboard) or effective ventilation by spray booth according to EN 16985. Ensure effectiveness is at least 95%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

7.2.4. Control of worker exposure: *Raw material and scrap handling of fines (#20RPE)* (PROC 26)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
<i>Wear a respirator which reduces the air impurities by at least a factor of 20 (APF >= 20). For further specification, refer to section 8 of the SDS</i>
Other conditions affecting workers exposure



Indoor use
Assumes process temperature up to 25 °C

7.2.5. Control of worker exposure: *Melting and casting (#23)* (PROC 23, PROC 21, PROC 22)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
<i>Very limited manual intervention is required to run the process. Contact with the substance may be possible for a very limited duration of time.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
<i>Wear a respirator which reduces the air impurities by at least a factor of 20 (APF $\geq$ 20). For further specification, refer to section 8 of the SDS</i>
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 1.34E3 °C

7.2.6. Control of worker exposure: *Surface treatment (26)* (PROC 13, PROC 21, PROC 24)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

7.2.7. Control of worker exposure: *Low energy mechanical processing of cold metal (#5)* (PROC 21)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 100 °C

7.3. Exposure estimation and reference to its source

7.3.1. Environmental release and exposure: *IW-2 Use of copper as intermediate for production of copper containing substances (ERC 6a)*

Release route	Release rate	Release estimation method
Water	0.08 kg/day	SPERC
Air	0.06 kg/day	SPERC
Soil	0.02 kg/day	SPERC

Protection target	Exposure estimate	RCR
Fresh water	5.04E-3 mg/L (EUSES 2.1.2)	0.8
Sediment (freshwater)	83.2 mg/kg dw (EUSES manual calculations)	0.956
Marine water	1.78E-3 mg/L (EUSES 2.1.2)	0.341
Sediment (marine water)	53.61 mg/kg dw (EUSES 2.1.2)	0.079
Sewage Treatment Plant	0 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	40.7 mg/kg dw (EUSES 2.1.2)	0.626

7.3.2. Worker exposure: *Raw material and scrap handling of massive metal (#1) (PROC 26)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.6 mg/m ³ (Vu VRAR)	0.6
Inhalation, local, acute	0.6 mg/m ³ (Vu VRAR)	0.6
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Vu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Vu VRAR)	< 0.01

7.3.3. Worker exposure: *Raw material and scrap handling of fines (#20LEV) (PROC 26)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.13 mg/m ³ (Cu VRAR)	0.13
Inhalation, local, acute	0.13 mg/m ³ (Cu VRAR)	0.13

Route of exposure and type of effects	Exposure estimate	RCR
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

7.3.4. Worker exposure: *Raw material and scrap handling of fines (#20RPE) (PROC 26)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.13 mg/m ³ (Cu VRAR)	0.13
Inhalation, local, acute	0.13 mg/m ³ (Cu VRAR)	0.13
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

7.3.5. Worker exposure: *Melting and casting (#23) (PROC 23, PROC 21, PROC 22)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.012 mg/m ³ (Measured data)	0.012
Inhalation, local, acute	0.012 mg/m ³ (Measured data)	0.012
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Measured data)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Measured data)	< 0.01

7.3.6. Worker exposure: *Surface treatment (26) (PROC 13, PROC 21, PROC 24)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.33 mg/m ³ (Cu VRAR)	0.33
Inhalation, local, acute	0.33 mg/m ³ (Cu VRAR)	0.33
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

7.3.7. Worker exposure: *Low energy mechanical processing of cold metal (#5) (PROC 21)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.33 mg/m ³ (Cu VRAR)	0.33
Inhalation, local, acute	0.33 mg/m ³ (Cu VRAR)	0.33
Dermal, systemic, long term	0.024 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	0.024 mg/kg bw/day (Cu VRAR)	< 0.01

7.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance: If the producer/DU has Conditions of Use outside the Conditions of Use specifications in the above ES, then the producer/DU can evaluate whether he works inside the boundaries set by the ES through scaling. Scaling instructions: Environment: The following conditions of use can be scaled: daily amount per site, number of release days per year (to calculate annual amount per site), effluent discharge flow, receiving surface water flow, presence/absence of offsite municipal Sewage Treatment Plant and use of municipal sludge on agricultural soil. Human health: In the simple and easy-to-use DU-interface, site-specific measured inhalation and/or dermal values can be entered. An internal Cu concentration is then calculated and risk conclusion is given.

Scaling tool web link: Environment: <http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool>, Human health: <https://reach-copper-consortium.eu/substances/copper/>

ES 8: Use at industrial sites; Various products (PC 7, PC 38); IW-3: Use of copper /copper containing alloys for the fabrication of copper containing articles by mechanical processes (such as rolling, extrusion)

8.1. Title section

ES name: *IW-3: Use of copper /copper containing alloys for the fabrication of copper containing articles by mechanical processes (such as rolling, extrusion)*

Product category: Base metals and alloys (PC 7), Welding and soldering products, flux products (PC 38)

Environment	
1: <i>IW-3: Use of copper /copper containing alloys for the fabrication of copper containing articles by mechanical processes (such as rolling, extrusion)</i>	ERC 5
Worker	
2: <i>Raw material and scrap handling of massive metal (#1)</i>	PROC 26
3: <i>low energy mechanical processing of cold metal (#5)</i>	PROC 21
4: <i>High energy workup of metal (#9)</i>	PROC 24
5: <i>surface treatment (#26)</i>	PROC 21, PROC 24, PROC 13
6: <i>Welding (#12)</i>	PROC 25
7: <i>Hot processes (#14)</i>	PROC 24
8: <i>Etching (#16)</i>	PROC 13
Subsequent service life exposure scenario(s)	
ES 26: Service life (worker at industrial site); Metal articles (AC 7)	
ES 22: Service life (professional worker); Metal articles (AC 7)	
ES 23: Service life (consumers); Metal articles (AC 7)	
ES 25: Service life (consumers); Metal articles (AC 7)	

8.2. Conditions of use affecting exposure

8.2.1. Control of environmental exposure: *IW-3: Use of copper /copper containing alloys for the fabrication of copper containing articles by mechanical processes (such as rolling, extrusion)* (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 1E3 tonnes/day
Annual amount per site <= 3E5 tonnes/year
Technical and organisational conditions and measures
<i>Electrostatic precipitators or wet electrostatic precipitators or cyclones or fabric/bag filter or ceramic/metal mesh filter</i>
<i>Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange</i>
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)
External recovery and recycling of waste should comply with applicable local and/or national regulations.;



External treatment and disposal of waste should comply with applicable local and/or national regulations.

Other conditions affecting environmental exposure

Receiving surface water flow $\geq 1.8E4$ m³/day

8.2.2. Control of worker exposure: *Raw material and scrap handling of massive metal (#1)* (PROC 26)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

8.2.3. Control of worker exposure: *low energy mechanical processing of cold metal (#5)* (PROC 21)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 100 °C

8.2.4. Control of worker exposure: *High energy workup of metal (#9)* (PROC 24)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure

Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 800 °C

8.2.5. Control of worker exposure: *surface treatment* (#26) (PROC 21, PROC 24, PROC 13)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

8.2.6. Control of worker exposure: *Welding* (#12) (PROC 25)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected



with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.

Other conditions affecting workers exposure

Indoor use

Assumes process temperature up to 25 °C

8.2.7. Control of worker exposure: *Hot processes* (#14) (PROC 24)**Product (article) characteristics**

Covers concentrations up to 100 %

Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.

Amount used (or contained in articles), frequency and duration of use/exposure

Covers use up to 8 h/day

Technical and organisational conditions and measures

Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.

Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.

Provide a good standard of controlled ventilation (5 to 10 air changes per hour).

Other conditions affecting workers exposure

Indoor use

Assumes process temperature up to 1E3 °C

8.2.8. Control of worker exposure: *Etching* (#16) (PROC 13)**Product (article) characteristics**

Covers concentrations up to 100 %

Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.

Amount used (or contained in articles), frequency and duration of use/exposure

Covers use up to 8 h/day

Technical and organisational conditions and measures

Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.

Provide a good standard of controlled ventilation (5 to 10 air changes per hour).

Assumes that the process is completely enclosed for the vast majority of its duration. Limited manual intervention and controlled opening during operation may occur for maintenance or cleaning tasks (e.g. often required if solids are being handled).

Very limited manual invention is required to run the process. Contact with the substance may be possible for a very limited duration of time.

Conditions and measures related to personal protection, hygiene and health evaluation

Wear a respirator which reduces the air impurities by at least a factor of 10 (APF $\geq$ 10). For further specification, refer to section 8 of the SDS

Other conditions affecting workers exposure

Indoor use

Assumes process temperature up to 25 °C

8.3. Exposure estimation and reference to its source

8.3.1. Environmental release and exposure: *IW-3: Use of copper /copper containing alloys for the fabrication of copper containing articles by mechanical processes (such as rolling, extrusion) (ERC 5)*

Release route	Release rate	Release estimation method
Water	0.1 kg/day	Measured release rate
Air	0.47 kg/day	Measured release rate
Soil	1E4 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	2.98E-3 mg/L (EUSES 2.1.2)	0.473
Sediment (freshwater)	20.83 mg/kg dw (EUSES manual calculations)	0.239
Marine water	1.57E-3 mg/L (EUSES 2.1.2)	0.302
Sediment (marine water)	47.38 mg/kg dw (EUSES 2.1.2)	0.07
Sewage Treatment Plant	0.01 mg/L (EUSES 2.1.2)	0.043
Agricultural soil	42.38 mg/kg dw (EUSES 2.1.2)	0.652

8.3.2. Worker exposure: *Raw material and scrap handling of massive metal (#1) (PROC 26)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.6 mg/m ³ (Cu VRAR)	0.6
Inhalation, local, acute	0.6 mg/m ³ (Cu VRAR)	0.6
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

8.3.3. Worker exposure: *low energy mechanical processing of cold metal (#5) (PROC 21)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.33 mg/m ³ (Cu VRAR)	0.33
Inhalation, local, acute	0.33 mg/m ³ (Cu VRAR)	0.33
Dermal, systemic, long term	0.024 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	0.024 mg/kg bw/day (Cu VRAR)	< 0.01

8.3.4. Worker exposure: *High energy workup of metal (#9) (PROC 24)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.2 mg/m ³ (Measured data)	0.2
Inhalation, local, acute	0.2 mg/m ³ (Measured data)	0.2
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Measured data)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Measured data)	< 0.01

8.3.5. Worker exposure: *surface treatment (#26) (PROC 21, PROC 24, PROC 13)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.33 mg/m ³ (Cu VRAR)	0.33
Inhalation, local, acute	0.33 mg/m ³ (Cu VRAR)	0.33

Route of exposure and type of effects	Exposure estimate	RCR
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

8.3.6. Worker exposure: *Welding* (#12) (PROC 25)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.2 mg/m ³ (MEASE)	0.2
Inhalation, local, acute	0.2 mg/m ³ (MEASE)	0.2
Dermal, systemic, long term	0 mg/kg bw/day (MEASE)	< 0.01
Dermal, systemic, acute	0 mg/kg bw/day (MEASE)	< 0.01

8.3.7. Worker exposure: *Hot processes* (#14) (PROC 24)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.2 mg/m ³ (Measured data)	0.2
Inhalation, local, acute	0.2 mg/m ³ (Measured data)	0.2
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Measured data)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Measured data)	< 0.01

8.3.8. Worker exposure: *Etching* (#16) (PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.01 mg/m ³ (MEASE)	0.01
Inhalation, local, acute	0.01 mg/m ³ (MEASE)	0.01
Dermal, systemic, long term	6.8E-3 mg/kg bw/day (MEASE)	< 0.01
Dermal, systemic, acute	6.8E-3 mg/kg bw/day (MEASE)	< 0.01

8.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance: If the producer/DU has Conditions of Use outside the Conditions of Use specifications in the above ES, then the producer/DU can evaluate whether he works inside the boundaries set by the ES through scaling. Scaling instructions: Environment: The following conditions of use can be scaled: daily amount per site, number of release days per year (to calculate annual amount per site), effluent discharge flow, receiving surface water flow, presence/absence of off-site municipal Sewage Treatment Plant and use of municipal sludge on agricultural soil. Human health: In the simple and easy-to-use DU-interface, site-specific measured inhalation and/or dermal values can be entered. An internal Cu concentration is then calculated and risk conclusion is given.

Scaling tool web link: Environment: <http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool>, Human health: <https://reach-copper-consortium.eu/substances/copper/>

ES 9: Use at industrial sites; Various products (PC 7, PC 14); Various sectors (SU 1, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 20, SU 23); IW-4: Use of copper/ copper containing alloys for the fabrication of wire rod

9.1. Title section

ES name: *IW-4: Use of copper/ copper containing alloys for the fabrication of wire rod*

Product category: Base metals and alloys (PC 7), Metal surface treatment products (PC 14)

Sector of use: Agriculture, forestry, fishery (SU 1), Manufacture of basic metals, including alloys (SU 14), Manufacture of fabricated metal products, except machinery and equipment (SU 15), Manufacture of computer, electronic and optical products, electrical equipment (SU 16), General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment. (SU 17), Manufacture of furniture (SU 18), Building and construction work (SU 19), Health services (SU 20), Electricity, steam, gas water supply and sewage treatment (SU 23)

Environment	
1: <i>IW-4: Use of copper/ copper containing alloys for the fabrication of wire rod</i>	ERC 5
Worker	
2: <i>Raw material and scrap handling of massive metal (#1)</i>	PROC 26
3: <i>Melting and casting (#23)</i>	PROC 23, PROC 21, PROC 22
4: <i>Low energy mechanical processing of cold metal (#5)</i>	PROC 21
5: <i>Surface treatment (#26)</i>	PROC 21, PROC 24, PROC 13
6: <i>Wire rod production (#13)</i>	PROC 13
Subsequent service life exposure scenario(s)	
ES 26: Service life (worker at industrial site); Metal articles (AC 7)	
ES 22: Service life (professional worker); Metal articles (AC 7)	
ES 23: Service life (consumers); Metal articles (AC 7)	
ES 25: Service life (consumers); Metal articles (AC 7)	

9.2. Conditions of use affecting exposure

9.2.1. Control of environmental exposure: *IW-4: Use of copper/ copper containing alloys for the fabrication of wire rod* (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 600 tonnes/day
Annual amount per site <= 1.8E5 tonnes/year
Technical and organisational conditions and measures
<i>Electrostatic precipitators or wet electrostatic precipitators or cyclones or fabric/bag filter or ceramic/metal mesh filter</i>
<i>Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange</i>
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)



External recovery and recycling of waste should comply with applicable local and/or national regulations.;
External treatment and disposal of waste should comply with applicable local and/or national regulations.

Other conditions affecting environmental exposure

Receiving surface water flow $\geq 1.8E4$ m³/day

9.2.2. Control of worker exposure: *Raw material and scrap handling of massive metal (#1)* (PROC 26)**Product (article) characteristics**

Covers concentrations up to 100 %

Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.

Amount used (or contained in articles), frequency and duration of use/exposure

Covers use up to 8 h/day

Technical and organisational conditions and measures

Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.

Provide a good standard of controlled ventilation (5 to 10 air changes per hour).

Other conditions affecting workers exposure

Indoor use

Assumes process temperature up to 25 °C

9.2.3. Control of worker exposure: *Melting and casting (#23)* (PROC 23, PROC 21, PROC 22)**Product (article) characteristics**

Covers concentrations up to 100 %

Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.

Amount used (or contained in articles), frequency and duration of use/exposure

Covers use up to 8 h/day

Technical and organisational conditions and measures

Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.

Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.

Provide a good standard of controlled ventilation (5 to 10 air changes per hour).

Very limited manual intervention is required to run the process. Contact with the substance may be possible for a very limited duration of time.

Conditions and measures related to personal protection, hygiene and health evaluation

Wear a respirator which reduces the air impurities by at least a factor of 20 (APF ≥ 20). For further specification, refer to section 8 of the SDS

Other conditions affecting workers exposure

Indoor use

Assumes process temperature up to 1.34E3 °C

9.2.4. Control of worker exposure: *Low energy mechanical processing of cold metal (#5)* (PROC 21)



Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 100 °C

9.2.5. Control of worker exposure: *Surface treatment (#26)* (PROC 21, PROC 24, PROC 13)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

9.2.6. Control of worker exposure: *Wire rod production (#13)* (PROC 13)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel

operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.

Provide a good standard of controlled ventilation (5 to 10 air changes per hour).

Other conditions affecting workers exposure

Indoor use

Assumes process temperature up to 25 °C

9.3. Exposure estimation and reference to its source

9.3.1. Environmental release and exposure: *IW-4: Use of copper/ copper containing alloys for the fabrication of wire rod (ERC 5)*

Release route	Release rate	Release estimation method
Water	0.07 kg/day	Measured release rate
Air	0.25 kg/day	Measured release rate
Soil	6E3 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	2.77E-3 mg/L (EUSES 2.1.2)	0.44
Sediment (freshwater)	14.59 mg/kg dw (EUSES manual calculations)	0.168
Marine water	1.55E-3 mg/L (EUSES 2.1.2)	0.298
Sediment (marine water)	46.76 mg/kg dw (EUSES 2.1.2)	0.069
Sewage Treatment Plant	7E-3 mg/L (EUSES 2.1.2)	0.03
Agricultural soil	41.88 mg/kg dw (EUSES 2.1.2)	0.644

9.3.2. Worker exposure: *Raw material and scrap handling of massive metal (#1) (PROC 26)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.6 mg/m ³ (Cu VRAR)	0.6
Inhalation, local, acute	0.6 mg/m ³ (Cu VRAR)	0.6
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

9.3.3. Worker exposure: *Melting and casting (#23) (PROC 23, PROC 21, PROC 22)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.012 mg/m ³ (Measured data)	0.012
Inhalation, local, acute	0.012 mg/m ³ (Measured data)	0.012
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Measured data)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Measured data)	< 0.01

9.3.4. Worker exposure: *Low energy mechanical processing of cold metal (#5) (PROC 21)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.33 mg/m ³ (Cu VRAR)	0.33
Inhalation, local, acute	0.33 mg/m ³ (Cu VRAR)	0.33
Dermal, systemic, long term	0.024 mg/kg bw/day (Cu VRAR)	< 0.01

Route of exposure and type of effects	Exposure estimate	RCR
Dermal, systemic, acute	0.024 mg/kg bw/day (Cu VRAR)	< 0.01

9.3.5. Worker exposure: *Surface treatment (#26)* (PROC 21, PROC 24, PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.33 mg/m ³ (Cu VRAR)	0.33
Inhalation, local, acute	0.33 mg/m ³ (Cu VRAR)	0.33
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

9.3.6. Worker exposure: *Wire rod production (#13)* (PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.1 mg/m ³ (MEASE)	0.1
Inhalation, local, acute	0.1 mg/m ³ (MEASE)	0.1
Dermal, systemic, long term	6.8E-3 mg/kg bw/day (MEASE)	< 0.01
Dermal, systemic, acute	6.8E-3 mg/kg bw/day (MEASE)	< 0.01

9.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance: If the producer/DU has Conditions of Use outside the Conditions of Use specifications in the above ES, then the producer/DU can evaluate whether he works inside the boundaries set by the ES through scaling. Scaling instructions: Environment: The following conditions of use can be scaled: daily amount per site, number of release days per year (to calculate annual amount per site), effluent discharge flow, receiving surface water flow, presence/absence of off-site municipal Sewage Treatment Plant and use of municipal sludge on agricultural soil. Human health: In the simple and easy-to-use DU-interface, site-specific measured inhalation and/or dermal values can be entered. An internal Cu concentration is then calculated and risk conclusion is given.

Scaling tool web link: Environment: <http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool>, Human health: <https://reach-copper-consortium.eu/substances/copper/>



ES 10: Use at industrial sites; Base metals and alloys (PC 7); IW-5: Use of copper/ copper containing alloys for the production of copper particulates and powders

10.1. Title section

ES name: *IW-5: Use of copper/ copper containing alloys for the production of copper particulates and powders*

Product category: Base metals and alloys (PC 7)

Environment	
1: <i>IW-5: Use of copper/ copper containing alloys for the production of copper particulates and powders</i>	ERC 5
Worker	
2: <i>Particulate, powder handling, mixing blending and weighing (#7)</i>	PROC 26, PROC 5, PROC 4, PROC 9, PROC 8b, PROC 8a
3: <i>Handling and use of particulate/powder in closed processes (#15)</i>	PROC 3, PROC 4, PROC 1, PROC 14, PROC 2
4: <i>Atomisation & Spray-Forming (#4)</i>	PROC 21, PROC 27a
5: <i>Particulates forming/tableting reduction, stabilisation (#21)</i>	PROC 14, PROC 5, PROC 3, PROC 4, PROC 8b, PROC 8a, PROC 1, PROC 2
6: <i>Raw material and scrap handling of fines (#20LEV)</i>	PROC 26
7: <i>Raw material and scrap handling of fines (#20RPE)</i>	PROC 26
Subsequent service life exposure scenario(s)	
ES 26: Service life (worker at industrial site); Metal articles (AC 7)	
ES 22: Service life (professional worker); Metal articles (AC 7)	
ES 23: Service life (consumers); Metal articles (AC 7)	

10.2. Conditions of use affecting exposure

10.2.1. Control of environmental exposure: *IW-5: Use of copper/ copper containing alloys for the production of copper particulates and powders* (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 15 tonnes/day
Annual amount per site $\leq 4.5E3$ tonnes/year
Technical and organisational conditions and measures
<i>Electrostatic precipitators or wet electrostatic precipitators or cyclones or fabric/bag filter or ceramic/metal mesh filter</i>
Conditions and measures related to external treatment of waste (including article waste)
External recovery and recycling of waste should comply with applicable local and/or national regulations.; External treatment and disposal of waste should comply with applicable local and/or national regulations.
Other conditions affecting environmental exposure
Receiving surface water flow $\geq 1.8E4$ m ³ /day
No water contact during use.



Assumed effluent discharge flow from site $\geq 2E3$ m³/day

10.2.2. Control of worker exposure: *Particulate, powder handling, mixing blending and weighing (#7)* (PROC 26, PROC 5, PROC 4, PROC 9, PROC 8b, PROC 8a)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
<i>Assumes that the process is completely enclosed for the vast majority of its duration. Limited manual intervention and controlled opening during operation may occur for maintenance or cleaning tasks (e.g. often required if solids are being handled).</i>
<i>Workers are only involved in supervision and control walks. Direct contact with the substance is not possible.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
<i>Wear a respirator which reduces the air impurities by at least a factor of 20 (APF $\geq$ 20). For further specification, refer to section 8 of the SDS</i>
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

10.2.3. Control of worker exposure: *Handling and use of particulate/powder in closed processes (#15)* (PROC 3, PROC 4, PROC 1, PROC 14, PROC 2)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
<i>Workers are only involved in supervision and control walks. Direct contact with the substance is not possible.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
<i>Wear a respirator which reduces the air impurities by at least a factor of 20 (APF $\geq$ 20). For further specification, refer to section 8 of the SDS</i>
Other conditions affecting workers exposure



Indoor use
Assumes process temperature up to 25 °C

10.2.4. Control of worker exposure: *Atomisation & Spray-Forming (#4)* (PROC 21, PROC 27a)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
<i>Assumes that the process is completely enclosed during standard operation including tasks such as transfer operations or sampling. Opening e.g. for charging or emptying of the system, is to be addressed in a separate assessment.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
<i>Wear a respirator which reduces the air impurities by at least a factor of 20 (APF $\geq$ 20). For further specification, refer to section 8 of the SDS</i>
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 1.35E3 °C

10.2.5. Control of worker exposure: *Particulates forming/tableting reduction, stabilisation (#21)* (PROC 14, PROC 5, PROC 3, PROC 4, PROC 8b, PROC 8a, PROC 1, PROC 2)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
<i>Assumes that the process is completely enclosed for the vast majority of its duration. Limited manual intervention and controlled opening during operation may occur for maintenance or cleaning tasks (e.g. often</i>



<i>required if solids are being handled).</i>
<i>Workers are only involved in supervision and control walks. Direct contact with the substance is not possible.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
<i>Wear a respirator which reduces the air impurities by at least a factor of 20 (APF $\geq$ 20). For further specification, refer to section 8 of the SDS</i>
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

10.2.6. Control of worker exposure: *Raw material and scrap handling of fines (#20LEV) (PROC 26)*

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
<i>Provide enclosing hood with very high effectiveness (such as fume cupboard) or effective ventilation by spray booth according to EN 16985. Ensure effectiveness is at least 95%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

10.2.7. Control of worker exposure: *Raw material and scrap handling of fines (#20RPE) (PROC 26)*

Product (article) characteristics
Covers concentrations up to 100 %
Solid; High dustiness: Handling the product in its dry form results in a dust cloud that is clearly visible for some time. For example, talcum powder.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
<i>Wear a respirator which reduces the air impurities by at least a factor of 20 (APF $\geq$ 20). For further specification, refer to section 8 of the SDS</i>
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

10.3. Exposure estimation and reference to its source

10.3.1. Environmental release and exposure: *IW-5: Use of copper/ copper containing alloys for the production of copper particulates and powders (ERC 5)*

Release route	Release rate	Release estimation method
Water	0 kg/day	Measured release rate
Air	0.2 kg/day	Measured release rate
Soil	150 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	2.29E-3 mg/L (EUSES 2.1.2)	0.363
Sediment (freshwater)	0 mg/kg dw (EUSES manual calculations)	< 0.01
Marine water	1.5E-3 mg/L (EUSES 2.1.2)	0.288
Sediment (marine water)	45.30 mg/kg dw (EUSES 2.1.2)	0.067
Sewage Treatment Plant	0 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	40.70 mg/kg dw (EUSES 2.1.2)	0.626

10.3.2. Worker exposure: *Particulate, powder handling, mixing blending and weighing (#7) (PROC 26, PROC 5, PROC 4, PROC 9, PROC 8b, PROC 8a)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.51 mg/m ³ (Cu VRAR)	0.51
Inhalation, local, acute	0.51 mg/m ³ (Cu VRAR)	0.51
Dermal, systemic, long term	2.7E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.7E-3 mg/kg bw/day (Cu VRAR)	< 0.01

10.3.3. Worker exposure: *Handling and use of particulate/powder in closed processes (#15) (PROC 3, PROC 4, PROC 1, PROC 14, PROC 2)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	1 mg/m ³ (MEASE)	1
Inhalation, local, acute	1 mg/m ³ (MEASE)	1
Dermal, systemic, long term	3E-4 mg/kg bw/day (MEASE)	< 0.01
Dermal, systemic, acute	3E-4 mg/kg bw/day (MEASE)	< 0.01

10.3.4. Worker exposure: *Atomisation & Spray-Forming (#4) (PROC 21, PROC 27a)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.97 mg/m ³ (Measured data)	0.97
Inhalation, local, acute	0.97 mg/m ³ (Measured data)	0.97
Dermal, systemic, long term	0 mg/kg bw/day (Measured data)	< 0.01
Dermal, systemic, acute	0 mg/kg bw/day (Measured data)	< 0.01

10.3.5. Worker exposure: *Particulates forming/tableting reduction, stabilisation (#21) (PROC 14, PROC 5, PROC 3, PROC 4, PROC 8b, PROC 8a, PROC 1, PROC 2)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.33 mg/m ³ (Cu VRAR)	0.33
Inhalation, local, acute	0.33 mg/m ³ (Cu VRAR)	0.33
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

10.3.6. Worker exposure: *Raw material and scrap handling of fines* (#20LEV) (PROC 26)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.13 mg/m ³ (Cu VRAR)	0.13
Inhalation, local, acute	0.13 mg/m ³ (Cu VRAR)	0.13
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

10.3.7. Worker exposure: *Raw material and scrap handling of fines* (#20RPE) (PROC 26)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.13 mg/m ³ (Cu VRAR)	0.13
Inhalation, local, acute	0.13 mg/m ³ (Cu VRAR)	0.13
Dermal, systemic, long term	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	2.4E-3 mg/kg bw/day (Cu VRAR)	< 0.01

10.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance: If the producer/DU has Conditions of Use outside the Conditions of Use specifications in the above ES, then the producer/DU can evaluate whether he works inside the boundaries set by the ES through scaling. Scaling instructions: Environment: The following conditions of use can be scaled: daily amount per site, number of release days per year (to calculate annual amount per site), effluent discharge flow, receiving surface water flow, presence/absence of off-site municipal Sewage Treatment Plant and use of municipal sludge on agricultural soil. Human health: In the simple and easy-to-use DU-interface, site-specific measured inhalation and/or dermal values can be entered. An internal Cu concentration is then calculated and risk conclusion is given.

Scaling tool web link: Environment: <http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool>,
Human health: <https://reach-copper-consortium.eu/substances/copper>

ES 14: Use at industrial sites; Various products (PC 9a, PC 14); General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment. (SU 17); IW-9: Coating and electroplating

14.1. Title section

ES name: *IW-9: Coating and electroplating*

Product category: Coatings and Paints, Thinners, paint removers (PC 9a), Metal surface treatment products (PC 14)

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

Environment	SPERC
1: <i>IW-9: Coating and electroplating</i>	ERC 5 <i>Eurometaux SPERC 5.1.v3</i>
Worker	SWED
2: <i>Coating & Electroplating (#11)</i>	PROC 13
3: <i>Electrodeposition (#25)</i>	PROC 27b
Subsequent service life exposure scenario(s)	
ES 26: Service life (worker at industrial site); Metal articles (AC 7)	
ES 24: Service life (consumers); Metal articles (AC 7)	

14.2. Conditions of use affecting exposure

14.2.1. Control of environmental exposure: *IW-9: Coating and electroplating* (ERC 5)

Amount used, frequency and duration of use (or from service life)
Daily amount per site ≤ 0.08 tonnes/day
Annual amount per site ≤ 17.6 tonnes/year
Technical and organisational conditions and measures
<i>Electrostatic precipitators or wet electrostatic precipitators or cyclones or fabric/bag filter or ceramic/metal mesh filter</i>
<i>Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange</i>
Conditions and measures related to biological sewage treatment plant
Provide onsite wastewater treatment.
Assumed domestic sewage treatment plant flow $\geq 2E3$ m ³ /day
No application of sewage sludge to soil
Conditions and measures related to external treatment of waste (including article waste)
External recovery and recycling of waste should comply with applicable local and/or national regulations.; External treatment and disposal of waste should comply with applicable local and/or national regulations.

14.2.2. Control of worker exposure: *Coating & Electroplating* (#11) (PROC 13)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day



Technical and organisational conditions and measures
<i>Provide specifically designed and maintained LEV (fixed capturing hood type, on-tool extraction or enclosing hood type). Ensure effectiveness is at least 90%.</i>
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

14.2.3. Control of worker exposure: *Electrodeposition (#25) (PROC 27b)*

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
<i>Assumes that the process is completely enclosed during standard operation including tasks such as transfer operations or sampling. Opening e.g. for charging or emptying of the system, is to be addressed in a separate assessment.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

14.3. Exposure estimation and reference to its source

14.3.1. Environmental release and exposure: *IW-9: Coating and electroplating (ERC 5)*

Release route	Release rate	Release estimation method
Water	0.4 kg/day	SPERC
Air	0.16 kg/day	SPERC
Soil	0.8 kg/day	SPERC

Protection target	Exposure estimate	RCR
Fresh water	5.04E-3 mg/L (EUSES 2.1.2)	0.8
Sediment (freshwater)	83 mg/kg dw (EUSES manual calculations)	0.954
Marine water	1.78E-3 mg/L (EUSES 2.1.2)	0.341
Sediment (marine water)	53.61 mg/kg dw (EUSES 2.1.2)	0.079

Protection target	Exposure estimate	RCR
Sewage Treatment Plant	0.04 mg/L (EUSES 2.1.2)	0.174
Agricultural soil	40.70 mg/kg dw (EUSES 2.1.2)	0.626

14.3.2. Worker exposure: *Coating & Electroplating* (#11) (PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.1 mg/m ³ (MEASE)	0.1
Inhalation, local, acute	0.1 mg/m ³ (MEASE)	0.1
Dermal, systemic, long term	6.8E-3 mg/kg bw/day (MEASE)	< 0.01
Dermal, systemic, acute	6.8E-3 mg/kg bw/day (MEASE)	< 0.01

14.3.3. Worker exposure: *Electrodeposition* (#25) (PROC 27b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.05 mg/m ³ (MEASE)	0.05
Inhalation, local, acute	0.05 mg/m ³ (MEASE)	0.05
Dermal, systemic, long term	0 mg/kg bw/day (MEASE)	< 0.01
Dermal, systemic, acute	0 mg/kg bw/day (MEASE)	< 0.01

14.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance: If the producer/DU has Conditions of Use outside the Conditions of Use specifications in the above ES, then the producer/DU can evaluate whether he works inside the boundaries set by the ES through scaling. Scaling instructions: Environment: The following conditions of use can be scaled: daily amount per site, number of release days per year (to calculate annual amount per site), effluent discharge flow, receiving surface water flow, presence/absence of off-site municipal Sewage Treatment Plant and use of municipal sludge on agricultural soil. Human health: In the simple and easy-to-use DU-interface, site-specific measured inhalation and/or dermal values can be entered. An internal Cu concentration is then calculated and risk conclusion is given.

Scaling tool web link: Environment: <http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool>, Human health: <https://reach-copper-consortium.eu/substances/copper/>

ES 17: Widespread use by professional workers; Welding and soldering products, flux products (PC 38); Various sectors (SU 2a, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 23, SU 24); PW-3: Professional use of copper solder

17.1. Title section

ES name: *PW-3: Professional use of copper solder*

Product category: Welding and soldering products, flux products (PC 38)

Sector of use: Mining (without offshore industries) (SU 2a), Manufacture of basic metals, including alloys (SU 14), Manufacture of fabricated metal products, except machinery and equipment (SU 15), Manufacture of computer, electronic and optical products, electrical equipment (SU 16), General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment. (SU 17), Manufacture of furniture (SU 18), Building and construction work (SU 19), Electricity, steam, gas water supply and sewage treatment (SU 23), Scientific research and development (SU 24)

Environment	
1: <i>PW-3: Professional use of copper solder</i>	ERC 8f
2: <i>PW-3: Professional use of copper solder</i>	ERC 8c
Worker	
3: <i>Welding (#12)</i>	PROC 25
Subsequent service life exposure scenario(s)	
ES 26: Service life (worker at industrial site); Metal articles (AC 7)	
ES 22: Service life (professional worker); Metal articles (AC 7)	
ES 23: Service life (consumers); Metal articles (AC 7)	
ES 25: Service life (consumers); Metal articles (AC 7)	
ES 24: Service life (consumers); Metal articles (AC 7)	

17.2. Conditions of use affecting exposure

17.2.1. Control of environmental exposure: *PW-3: Professional use of copper solder* (ERC 8f)

Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.

17.2.2. Control of environmental exposure: *PW-3: Professional use of copper solder* (ERC 8c)

Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.

17.2.3. Control of worker exposure: *Welding (#12)* (PROC 25)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.



Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.; If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands.; For further specification, refer to section 8 of the SDS.
<i>Wear a respirator which reduces the air impurities by at least a factor of 10 (APF $\geq$ 10). For further specification, refer to section 8 of the SDS</i>
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 25 °C

17.3. Exposure estimation and reference to its source

17.3.1. Environmental release and exposure: *PW-3: Professional use of copper solder (ERC 8f)*

Release route	Release rate	Release estimation method
Water	0.038 kg/day	Measured release rate
Air	0.165 kg/day	ERC
Soil	5.5E-3 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	2.55E-3 mg/L (EUSES 2.1.2)	0.405
Sediment (freshwater)	7.85 mg/kg dw (EUSES manual calculations)	0.09
Marine water	1.53E-3 mg/L (EUSES 2.1.2)	0.293
Sediment (marine water)	46.09 mg/kg dw (EUSES 2.1.2)	0.068
Sewage Treatment Plant	3.8E-3 mg/L (EUSES 2.1.2)	0.017
Agricultural soil	41.34 mg/kg dw (EUSES 2.1.2)	0.636

17.3.2. Environmental release and exposure: *PW-3: Professional use of copper solder (ERC 8c)*

Release route	Release rate	Release estimation method
Water	0.038 kg/day	Measured release rate
Air	0.165 kg/day	ERC
Soil	0 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	2.55E-3 mg/L (EUSES 2.1.2)	0.405
Sediment (freshwater)	7.85 mg/kg dw (EUSES manual calculations)	0.09
Marine water	1.53E-3 mg/L (EUSES 2.1.2)	0.293
Sediment (marine water)	46.09 mg/kg dw (EUSES 2.1.2)	0.068
Sewage Treatment Plant	3.8E-3 mg/L (EUSES 2.1.2)	0.017
Agricultural soil	41.34 mg/kg dw (EUSES 2.1.2)	0.636

17.3.3. Worker exposure: *Welding* (#12) (PROC 25)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.2 mg/m ³ (MEASE)	0.2
Inhalation, local, acute	0.2 mg/m ³ (MEASE)	0.2
Dermal, systemic, long term	0 mg/kg bw/day (MEASE)	< 0.01
Dermal, systemic, acute	0 mg/kg bw/day (MEASE)	< 0.01

17.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance: If the producer/DU has Conditions of Use outside the Conditions of Use specifications in the above ES, then the producer/DU can evaluate whether he works inside the boundaries set by the ES through scaling. Scaling instructions: Occupational scaling: In the simple and easy-to-use DU-interface, site-specific measured inhalation and/or dermal values can be entered. An internal Cu concentration is then calculated and risk conclusion is given.

Scaling tool web link: <https://reach-copper-consortium.eu/substances/copper/>

ES 20: Consumer use; Welding and soldering products, flux products (PC 38); C-3: Use of copper solder

20.1. Title section

ES name: *C-3: Use of copper solder*

Product category: Welding and soldering products, flux products (PC 38)

Environment	
1: <i>C-3: Use of copper solder</i>	ERC 8c
2: <i>C-3: Use of copper solder</i>	ERC 8f
Consumer	
3: <i>Welding (#12)</i>	PC 38
Subsequent service life exposure scenario(s)	
ES 26: Service life (worker at industrial site); Metal articles (AC 7)	
ES 23: Service life (consumers); Metal articles (AC 7)	
ES 25: Service life (consumers); Metal articles (AC 7)	
ES 24: Service life (consumers); Metal articles (AC 7)	

20.2. Conditions of use affecting exposure

20.2.1. Control of environmental exposure: *C-3: Use of copper solder* (ERC 8c)

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
Municipal sewage treatment plant is assumed.

20.2.2. Control of environmental exposure: *C-3: Use of copper solder* (ERC 8f)

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
Municipal sewage treatment plant is assumed.

20.2.3. Control of consumer exposure: *Welding (#12)* (PC 38)

Product (article) characteristics
Covers concentrations up to 100 %

20.3. Exposure estimation and reference to its source

20.3.1. Environmental release and exposure: *C-3: Use of copper solder* (ERC 8c)

Release route	Release rate	Release estimation method
Water	0.038 kg/day	Measured release rate
Air	0.165 kg/day	ERC
Soil	0 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	2.55E-3 mg/L (EUSES 2.1.2)	0.405
Sediment (freshwater)	7.8 mg/kg dw (EUSES manual calculations)	0.09
Marine water	1.53E-3 mg/L (EUSES 2.1.2)	0.293
Sediment (marine water)	46.09 mg/kg dw (EUSES 2.1.2)	0.068
Sewage Treatment Plant	3.8E-3 mg/L (EUSES 2.1.2)	0.017
Agricultural soil	41.34 mg/kg dw (EUSES 2.1.2)	0.636

20.3.2. Environmental release and exposure: *C-3: Use of copper solder* (ERC 8f)

Release route	Release rate	Release estimation method
Water	0.038 kg/day	Measured release rate
Air	0.165 kg/day	ERC
Soil	5.5E-3 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	2.55E-3 mg/L (EUSES 2.1.2)	0.405
Sediment (freshwater)	7.8 mg/kg dw (EUSES manual calculations)	0.09
Marine water	1.53E-3 mg/L (EUSES 2.1.2)	0.293
Sediment (marine water)	46.09 mg/kg dw (EUSES 2.1.2)	0.068
Sewage Treatment Plant	3.8E-3 mg/L (EUSES 2.1.2)	0.017
Agricultural soil	41.34 mg/kg dw (EUSES 2.1.2)	0.636

20.3.3. Consumer exposure: *Welding (#12) (PC 38)*

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.2 mg/m ³ (MEASE)	0.2
Inhalation, local, acute	0.2 mg/m ³ (MEASE)	0.2
Dermal, systemic, long term	0 mg/kg bw/day (MEASE)	< 0.01
Dermal, systemic, acute	0 mg/kg bw/day (MEASE)	< 0.01
Oral, systemic, long term	0 mg/kg bw/day (MEASE)	< 0.01
Combined, systemic, long term		< 0.01

20.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

ES 22: Service life (professional worker); Metal articles (AC 7)

22.1. Title section

ES name: *SL-1: Professional installation and maintenance or use of copper containing articles*

Article category: Metal articles (AC 7)

Environment		SPERC
1: <i>SL-1a: Professional installation and maintenance or use of copper containing articles (no release)</i>	ERC 11a	<i>Eurometaux SPERC 11A.3.v1</i>
2: <i>SL-1b: Professional installation and maintenance or use of copper containing articles (low release)</i>	ERC 10a, ERC 11a	
3: <i>SL-1c: Professional installation and maintenance or use of copper containing articles in vehicles (road border scenario)</i>	ERC 10a	
Worker		SWED
4: <i>Professional installation and maintenance or use of copper containing articles</i>	PROC 21, PROC 24	
Exposure scenario of the uses leading to the inclusion of the substance into the article		
ES 8: Use at industrial sites; Various products (PC 7, PC 38); IW-3: Use of copper /copper containing alloys for the fabrication of copper containing articles by mechanical processes (such as rolling, extrusion)		
ES 9: Use at industrial sites; Various products (PC 7, PC 14); Various sectors (SU 1, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 20, SU 23); IW-4: Use of copper/ copper containing alloys for the fabrication of wire rod		
ES 10: Use at industrial sites; Base metals and alloys (PC 7); IW-5: Use of copper/ copper containing alloys for the production of copper particulates and powders		
ES 12: Use at industrial sites; Various products (PC 7, PC 9a, PC 14, PC 15, PC 20, PC 24, PC 25); Various sectors (SU 1, SU 5, SU 7, SU 8, SU 9, SU 14, SU 15, SU 16, SU 17, SU 19, SU 20, SU 23, SU 24)		
ES 13: Use at industrial sites; Welding and soldering products, flux products (PC 38); Various sectors (SU 14, SU 15, SU 16, SU 17, SU 18, SU 19); IW-8: Use of copper/ copper containing alloys particulates and powders as brazing paste		
ES 16: Widespread use by professional workers; Various products (PC 7, PC 9a, PC 9b, PC 14, PC 15, PC 21, PC 24, PC 25, PC 26, PC 31, PC 32, PC 35, PC 39); PW-2: Use as spray coating agent (handling of preparation in sealed container)		
ES 17: Widespread use by professional workers; Welding and soldering products, flux products (PC 38); Various sectors (SU 2a, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 23, SU 24); PW-3: Professional use of copper solder		

22.2. Conditions of use affecting exposure

22.2.1. Control of environmental exposure: *SL-1a: Professional installation and maintenance or use of copper containing articles (no release)* (ERC 11a)

Conditions and measures related to external treatment of waste (including article waste)
Dedicated recollection infrastructure required for waste
Other conditions affecting environmental exposure
Indoor use



No water-contact during use. Avoid cleaning with water.

22.2.2. Control of environmental exposure: *SL-1b: Professional installation and maintenance or use of copper containing articles (low release)* (ERC 10a, ERC 11a)

Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Conditions and measures related to external treatment of waste (including article waste)
Dedicated recollection infrastructure required for waste

22.2.3. Control of environmental exposure: *SL-1c: Professional installation and maintenance or use of copper containing articles in vehicles (road border scenario)* (ERC 10a)

Conditions and measures related to external treatment of waste (including article waste)
Dedicated recollection infrastructure required for waste

22.2.4. Control of worker exposure: *Professional installation and maintenance or use of copper containing articles* (PROC 21, PROC 24)

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Conditions and measures related to personal protection, hygiene and health evaluation
<i>Wear a respirator which reduces the air impurities by at least a factor of 10 (APF >= 10). For further specification, refer to section 8 of the SDS</i>
Other conditions affecting workers exposure
Indoor use

22.3. Exposure estimation and reference to its source

22.3.1. Environmental release and exposure: *SL-1a: Professional installation and maintenance or use of copper containing articles (no release)* (ERC 11a)

Release route	Release rate	Release estimation method
Water	0 kg/day	SPERC
Air	0 kg/day	SPERC
Soil	0 kg/day	SPERC

Protection target	Exposure estimate	RCR
Fresh water	2.29E-3 mg/L (EUSES 2.1.2)	0.363
Sediment (freshwater)	0 mg/kg dw (EUSES manual calculations)	< 0.01
Marine water	1.5E-3 mg/L (EUSES 2.1.2)	0.288
Sediment (marine water)	45.30 mg/kg dw (EUSES 2.1.2)	0.067
Sewage Treatment Plant	0 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	40.7 mg/kg dw (EUSES 2.1.2)	0.626

22.3.2. Environmental release and exposure: *SL-1b: Professional installation and maintenance or use of copper containing articles (low release)* (ERC 10a)

Release route	Release rate	Release estimation method
Water	0.038 kg/day	Measured release rate
Air	0.825 kg/day	ERC
Soil	52.8 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	2.55E-3 mg/L (EUSES 2.1.2)	0.405
Sediment (freshwater)	7.8 mg/kg dw (EUSES manual calculations)	0.09
Marine water	1.53E-3 mg/L (EUSES 2.1.2)	0.293
Sediment (marine water)	46.09 mg/kg dw (EUSES 2.1.2)	0.068
Sewage Treatment Plant	3.8E-3 mg/L (EUSES 2.1.2)	0.017
Agricultural soil	41.34 mg/kg dw (EUSES 2.1.2)	0.636

22.3.3. Environmental release and exposure: *SL-1c: Professional installation and maintenance or use of copper containing articles in vehicles (road border scenario)* (ERC 10a)

Release route	Release rate	Release estimation method
Water	52.8 kg/day	ERC
Air	0.825 kg/day	ERC
Soil	52.8 kg/day	ERC

Protection target	Exposure estimate	RCR
Agricultural soil	58 mg/kg dw (Measured data)	0.892

22.3.4. Worker exposure: *Professional installation and maintenance or use of copper containing articles* (PROC 21, PROC 24)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.33 mg/m ³ (Cu VRAR)	0.33
Inhalation, local, acute	0.33 mg/m ³ (Cu VRAR)	0.33
Dermal, systemic, long term	0.024 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	0.024 mg/kg bw/day (Cu VRAR)	< 0.01

22.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

ES 23: Service life (consumers); Metal articles (AC 7)

23.1. Title section

ES name: *SL-2: Consumer use of articles with expected dermal exposure - indoors*

Article category: Metal articles (AC 7)

Environment		SPERC
1: <i>SL-2: Consumer use of articles - Indoors</i>	ERC 11a	<i>Eurometaux SPERC 11A.3.v1</i>
2: <i>SL-2: Incineration and/or landfill of copper containing articles</i>	ERC 11a	
Consumer		SCED
3: <i>SL-2: Consumer use of articles - Indoors</i>	AC 7	
Exposure scenario of the uses leading to the inclusion of the substance into the article		
ES 8: Use at industrial sites; Various products (PC 7, PC 38); IW-3: Use of copper /copper containing alloys for the fabrication of copper containing articles by mechanical processes (such as rolling, extrusion)		
ES 9: Use at industrial sites; Various products (PC 7, PC 14); Various sectors (SU 1, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 20, SU 23); IW-4: Use of copper/ copper containing alloys for the fabrication of wire rod		
ES 10: Use at industrial sites; Base metals and alloys (PC 7); IW-5: Use of copper/ copper containing alloys for the production of copper particulates and powders		
ES 12: Use at industrial sites; Various products (PC 7, PC 9a, PC 14, PC 15, PC 20, PC 24, PC 25); Various sectors (SU 1, SU 5, SU 7, SU 8, SU 9, SU 14, SU 15, SU 16, SU 17, SU 19, SU 20, SU 23, SU 24)		
ES 16: Widespread use by professional workers; Various products (PC 7, PC 9a, PC 9b, PC 14, PC 15, PC 21, PC 24, PC 25, PC 26, PC 31, PC 32, PC 35, PC 39); PW-2: Use as spray coating agent (handling of preparation in sealed container)		
ES 17: Widespread use by professional workers; Welding and soldering products, flux products (PC 38); Various sectors (SU 2a, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 23, SU 24); PW-3: Professional use of copper solder		
ES 18: Consumer use; Fillers, putties, plasters, modelling clay (PC 9b); C-1: Use of copper particulates and powders as brazing paste		
ES 19: Consumer use; Coatings and Paints, Thinners, paint removers (PC 9a); C-2: Use as spray coating agent		
ES 20: Consumer use; Welding and soldering products, flux products (PC 38); C-3: Use of copper solder		

23.2. Conditions of use affecting exposure

23.2.1. Control of environmental exposure: *SL-2: Consumer use of articles - Indoors* (ERC 11a)

Conditions and measures related to external treatment of waste (including article waste)
Dedicated recollection infrastructure required for waste
Other conditions affecting environmental exposure
Indoor use
<i>No water-contact during use. Avoid cleaning with water.</i>

23.2.2. Control of environmental exposure: *SL-2: Incineration and/or landfill of copper containing articles* (ERC 11a)

Other conditions affecting environmental exposure
Municipal sewage treatment plant is assumed.

23.2.3. Control of consumer exposure: *SL-2: Consumer use of articles - Indoors* (AC 7)

Product (article) characteristics
Covers concentrations up to 100 %

23.3. Exposure estimation and reference to its source

23.3.1. Environmental release and exposure: *SL-2: Consumer use of articles - Indoors* (ERC 11a)

Release route	Release rate	Release estimation method
Water	0 kg/day	SPERC
Air	0 kg/day	SPERC
Soil	0 kg/day	SPERC

Protection target	Exposure estimate	RCR
Fresh water	2.29E-3 mg/L (EUSES 2.1.2)	0.363
Sediment (freshwater)	0 mg/kg dw (EUSES manual calculations)	< 0.01
Marine water	1.5E-3 mg/L (EUSES 2.1.2)	0.288
Sediment (marine water)	45.30 mg/kg dw (EUSES 2.1.2)	0.067
Sewage Treatment Plant	0 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	40.7 mg/kg dw (EUSES 2.1.2)	0.626

23.3.2. Environmental release and exposure: *SL-2: Incineration and/or landfill of copper containing articles* (ERC 11a)

Release route	Release rate	Release estimation method
Water	0.825 kg/day	ERC
Air	0.825 kg/day	ERC
Soil	0 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	3.2 µg/L (Measured data)	0.508
Sediment (freshwater)	10.31 mg/kg dw (Measured data)	0.119
Agricultural soil	24.4 mg/kg dw (Measured data)	0.375

23.3.3. Consumer exposure: *SL-2: Consumer use of articles - Indoors* (AC 7)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0 mg/m ³ (Cu VRAR)	< 0.01
Inhalation, local, acute	0 mg/m ³ (Cu VRAR)	< 0.01
Dermal, systemic, long term	5.85E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	5.85E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Oral, systemic, long term	0 mg/kg bw/day (Cu VRAR)	< 0.01



Route of exposure and type of effects	Exposure estimate	RCR
Combined, systemic, long term		< 0.01

23.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

ES 24: Service life (consumers); Metal articles (AC 7)

24.1. Title section

ES name: *SL-3: Consumer use of articles with no expected dermal exposure - indoors*

Article category: Metal articles (AC 7)

Environment	SPERC
1: <i>SL-3: Consumer use of articles - Indoors</i>	ERC 11a <i>Eurometaux SPERC 11A.3.v1</i>
2: <i>SL-3: Incineration and/or landfill of copper containing articles</i>	ERC 11a
Consumer	SCED
3: <i>SL-3: Consumer use of articles - Indoors</i>	AC 7
Exposure scenario of the uses leading to the inclusion of the substance into the article	
ES 12: Use at industrial sites; Various products (PC 7, PC 9a, PC 14, PC 15, PC 20, PC 24, PC 25); Various sectors (SU 1, SU 5, SU 7, SU 8, SU 9, SU 14, SU 15, SU 16, SU 17, SU 19, SU 20, SU 23, SU 24)	
ES 13: Use at industrial sites; Welding and soldering products, flux products (PC 38); Various sectors (SU 14, SU 15, SU 16, SU 17, SU 18, SU 19); IW-8: Use of copper/ copper containing alloys particulates and powders as brazing paste	
ES 14: Use at industrial sites; Various products (PC 9a, PC 14); General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment. (SU 17); IW-9: Coating and electroplating	
ES 15: Widespread use by professional workers; Welding and soldering products, flux products (PC 38); Various sectors (SU 2a, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 23, SU 24); PW-1: Use of copper particulates and powders as brazing paste	
ES 16: Widespread use by professional workers; Various products (PC 7, PC 9a, PC 9b, PC 14, PC 15, PC 21, PC 24, PC 25, PC 26, PC 31, PC 32, PC 35, PC 39); PW-2: Use as spray coating agent (handling of preparation in sealed container)	
ES 17: Widespread use by professional workers; Welding and soldering products, flux products (PC 38); Various sectors (SU 2a, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 23, SU 24); PW-3: Professional use of copper solder	
ES 18: Consumer use; Fillers, putties, plasters, modelling clay (PC 9b); C-1: Use of copper particulates and powders as brazing paste	
ES 19: Consumer use; Coatings and Paints, Thinners, paint removers (PC 9a); C-2: Use as spray coating agent	
ES 20: Consumer use; Welding and soldering products, flux products (PC 38); C-3: Use of copper solder	

24.2. Conditions of use affecting exposure

24.2.1. Control of environmental exposure: *SL-3: Consumer use of articles - Indoors* (ERC 11a)

Conditions and measures related to external treatment of waste (including article waste)
Dedicated recollection infrastructure required for waste
Other conditions affecting environmental exposure
Indoor use
<i>No water-contact during use. Avoid cleaning with water.</i>

24.2.2. Control of environmental exposure: *SL-3: Incineration and/or landfill of copper containing articles* (ERC 11a)

Other conditions affecting environmental exposure
Municipal sewage treatment plant is assumed.

24.2.3. Control of consumer exposure: *SL-3: Consumer use of articles - Indoors* (AC 7)

Product (article) characteristics
Covers concentrations up to 100 %

24.3. Exposure estimation and reference to its source**24.3.1. Environmental release and exposure: *SL-3: Consumer use of articles - Indoors* (ERC 11a)**

Release route	Release rate	Release estimation method
Water	0 kg/day	SPERC
Air	0 kg/day	SPERC
Soil	0 kg/day	SPERC

Protection target	Exposure estimate	RCR
Fresh water	2.29E-3 mg/L (EUSES 2.1.2)	0.363
Sediment (freshwater)	0 mg/kg dw (EUSES manual calculations)	< 0.01
Marine water	1.5E-3 mg/L (EUSES 2.1.2)	0.288
Sediment (marine water)	45.30 mg/kg dw (EUSES 2.1.2)	0.067
Sewage Treatment Plant	0 mg/L (EUSES 2.1.2)	< 0.01
Agricultural soil	40.7 mg/kg dw (EUSES 2.1.2)	0.626

24.3.2. Environmental release and exposure: *SL-3: Incineration and/or landfill of copper containing articles* (ERC 11a)

Release route	Release rate	Release estimation method
Water	0.083 kg/day	ERC
Air	0.083 kg/day	ERC
Soil	0 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	3.2 µg/L (Measured data)	0.508
Sediment (freshwater)	10.31 mg/kg dw (Measured data)	0.119
Agricultural soil	24.4 mg/kg dw (Measured data)	0.375

24.3.3. Consumer exposure: *SL-3: Consumer use of articles - Indoors* (AC 7)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0 mg/m ³ (Cu VRAR)	< 0.01
Inhalation, local, acute	0 mg/m ³ (Cu VRAR)	< 0.01
Dermal, systemic, long term	5.85E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	5.85E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Oral, systemic, long term	0 mg/kg bw/day (Cu VRAR)	< 0.01



Route of exposure and type of effects	Exposure estimate	RCR
Combined, systemic, long term		< 0.01

24.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

ES 25: Service life (consumers); Metal articles (AC 7)

25.1. Title section

ES name: *SL-4: Consumer use of articles - Outdoors*

Article category: Metal articles (AC 7)

Environment	
1: <i>SL-4: Consumer use of articles - Outdoors</i>	ERC 10a
Consumer	
2: <i>SL-4: Consumer use of articles - Outdoors</i>	AC 7
Exposure scenario of the uses leading to the inclusion of the substance into the article	
ES 8: Use at industrial sites; Various products (PC 7, PC 38); IW-3: Use of copper /copper containing alloys for the fabrication of copper containing articles by mechanical processes (such as rolling, extrusion)	
ES 9: Use at industrial sites; Various products (PC 7, PC 14); Various sectors (SU 1, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 20, SU 23); IW-4: Use of copper/ copper containing alloys for the fabrication of wire rod	
ES 12: Use at industrial sites; Various products (PC 7, PC 9a, PC 14, PC 15, PC 20, PC 24, PC 25); Various sectors (SU 1, SU 5, SU 7, SU 8, SU 9, SU 14, SU 15, SU 16, SU 17, SU 19, SU 20, SU 23, SU 24)	
ES 15: Widespread use by professional workers; Welding and soldering products, flux products (PC 38); Various sectors (SU 2a, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 23, SU 24); PW-1: Use of copper particulates and powders as brazing paste	
ES 16: Widespread use by professional workers; Various products (PC 7, PC 9a, PC 9b, PC 14, PC 15, PC 21, PC 24, PC 25, PC 26, PC 31, PC 32, PC 35, PC 39); PW-2: Use as spray coating agent (handling of preparation in sealed container)	
ES 17: Widespread use by professional workers; Welding and soldering products, flux products (PC 38); Various sectors (SU 2a, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 23, SU 24); PW-3: Professional use of copper solder	
ES 18: Consumer use; Fillers, putties, plasters, modelling clay (PC 9b); C-1: Use of copper particulates and powders as brazing paste	
ES 19: Consumer use; Coatings and Paints, Thinners, paint removers (PC 9a); C-2: Use as spray coating agent	
ES 20: Consumer use; Welding and soldering products, flux products (PC 38); C-3: Use of copper solder	

25.2. Conditions of use affecting exposure

25.2.1. Control of environmental exposure: *SL-4: Consumer use of articles - Outdoors* (ERC 10a)

Conditions and measures related to external treatment of waste (including article waste)
Dedicated recollection infrastructure required for waste
Other conditions affecting environmental exposure
Outdoor use
Municipal sewage treatment plant is assumed.

25.2.2. Control of consumer exposure: *SL-4: Consumer use of articles - Outdoors* (AC 7)

Product (article) characteristics
Covers concentrations up to 100 %

25.3. Exposure estimation and reference to its source

25.3.1. Environmental release and exposure: *SL-4: Consumer use of articles - Outdoors* (ERC 10a)

Release route	Release rate	Release estimation method
Water	0.038 kg/day	Measured release rate
Air	0 kg/day	Estimated release factor
Soil	3.437 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	2.55E-3 mg/L (EUSES 2.1.2)	0.405
Sediment (freshwater)	7.8 mg/kg dw (EUSES manual calculations)	0.09
Marine water	1.53E-3 mg/L (EUSES 2.1.2)	0.293
Sediment (marine water)	46.09 mg/kg dw (EUSES 2.1.2)	0.068
Sewage Treatment Plant	3.8E-3 mg/L (EUSES 2.1.2)	0.017
Agricultural soil	41.34 mg/kg dw (EUSES 2.1.2)	0.636

25.3.2. Consumer exposure: *SL-4: Consumer use of articles - Outdoors* (AC 7)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0 mg/m ³ (Cu VRAR)	< 0.01
Inhalation, local, acute	0 mg/m ³ (Cu VRAR)	< 0.01
Dermal, systemic, long term	5.85E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	5.85E-3 mg/kg bw/day (Cu VRAR)	< 0.01
Oral, systemic, long term	0 mg/kg bw/day (Cu VRAR)	< 0.01
Combined, systemic, long term		< 0.01

25.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

ES 26: Service life (worker at industrial site); Metal articles (AC 7)

26.1. Title section

ES name: *SL-5: Industrial and Professional use of copper containing semi- finished articles in the production or dismantling of finished articles or of “components” for other articles*

Article category: Metal articles (AC 7)

Environment	
1: <i>SL-5: Industrial and Professional use of copper containing semi- finished articles in the production or dismantling of finished articles or of “components” for other articles</i>	ERC 12c
Worker	
2: <i>Low energy mechanical processing of cold metal (#5)</i>	PROC 21
Exposure scenario of the uses leading to the inclusion of the substance into the article	
ES 6: Use at industrial sites; Various products (PC 7, PC 14); IW-1: Use of copper and copper alloy shapes for the production of shapes, ingots and /or copper containing articles.	
ES 8: Use at industrial sites; Various products (PC 7, PC 38); IW-3: Use of copper /copper containing alloys for the fabrication of copper containing articles by mechanical processes (such as rolling, extrusion)	
ES 9: Use at industrial sites; Various products (PC 7, PC 14); Various sectors (SU 1, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 20, SU 23); IW-4: Use of copper/ copper containing alloys for the fabrication of wire rod	
ES 10: Use at industrial sites; Base metals and alloys (PC 7); IW-5: Use of copper/ copper containing alloys for the production of copper particulates and powders	
ES 12: Use at industrial sites; Various products (PC 7, PC 9a, PC 14, PC 15, PC 20, PC 24, PC 25); Various sectors (SU 1, SU 5, SU 7, SU 8, SU 9, SU 14, SU 15, SU 16, SU 17, SU 19, SU 20, SU 23, SU 24)	
ES 13: Use at industrial sites; Welding and soldering products, flux products (PC 38); Various sectors (SU 14, SU 15, SU 16, SU 17, SU 18, SU 19); IW-8: Use of copper/ copper containing alloys particulates and powders as brazing paste	
ES 14: Use at industrial sites; Various products (PC 9a, PC 14); General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment. (SU 17); IW-9: Coating and electroplating	
ES 15: Widespread use by professional workers; Welding and soldering products, flux products (PC 38); Various sectors (SU 2a, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 23, SU 24); PW-1: Use of copper particulates and powders as brazing paste	
ES 16: Widespread use by professional workers; Various products (PC 7, PC 9a, PC 9b, PC 14, PC 15, PC 21, PC 24, PC 25, PC 26, PC 31, PC 32, PC 35, PC 39); PW-2: Use as spray coating agent (handling of preparation in sealed container)	
ES 17: Widespread use by professional workers; Welding and soldering products, flux products (PC 38); Various sectors (SU 2a, SU 14, SU 15, SU 16, SU 17, SU 18, SU 19, SU 23, SU 24); PW-3: Professional use of copper solder	
ES 18: Consumer use; Fillers, putties, plasters, modelling clay (PC 9b); C-1: Use of copper particulates and powders as brazing paste	
ES 19: Consumer use; Coatings and Paints, Thinners, paint removers (PC 9a); C-2: Use as spray coating agent	
ES 20: Consumer use; Welding and soldering products, flux products (PC 38); C-3: Use of copper solder	

26.2. Conditions of use affecting exposure

26.2.1. Control of environmental exposure: *SL-5: Industrial and*

Professional use of copper containing semi- finished articles in the production or dismantling of finished articles or of “components” for other articles (ERC 12c)

Amount used, frequency and duration of use (or from service life)
Daily amount per site $\leq 1.33\text{E}4$ tonnes/day
Annual amount per site $\leq 4\text{E}6$ tonnes/year
Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Assumed domestic sewage treatment plant flow $\geq 2\text{E}3$ m ³ /day
Conditions and measures related to external treatment of waste (including article waste)
Dedicated recollection infrastructure required for waste
Other conditions affecting environmental exposure
Receiving surface water flow $\geq 1.8\text{E}4$ m ³ /day

26.2.2. Control of worker exposure: *Low energy mechanical processing of cold metal (#5) (PROC 21)*

Product (article) characteristics
Covers concentrations up to 100 %
Solid; Low dustiness: Handling the product does not result in a visible dust cloud. For example, animal pellets.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers use up to 8 h/day
Technical and organisational conditions and measures
Assumes that activities are undertaken with appropriate and well maintained equipment by trained personnel operating under supervision.; Ensure regular inspection, cleaning and maintenance of equipment and machines.; Clear spills immediately.; Ensure daily cleaning of the equipment.
Provide a good standard of controlled ventilation (5 to 10 air changes per hour).
Other conditions affecting workers exposure
Indoor use
Assumes process temperature up to 100 °C

26.3. Exposure estimation and reference to its source

26.3.1. Environmental release and exposure: *SL-5: Industrial and Professional use of copper containing semi- finished articles in the production or dismantling of finished articles or of “components” for other articles (ERC 12c)*

Release route	Release rate	Release estimation method
Water	0.038 kg/day	Measured release rate
Air	0 kg/day	Estimated release factor
Soil	0 kg/day	ERC

Protection target	Exposure estimate	RCR
Fresh water	2.55E-3 mg/L (EUSES 2.1.2)	0.405
Sediment (freshwater)	7.8 mg/kg dw (EUSES manual calculations)	0.09
Marine water	1.53E-3 mg/L (EUSES 2.1.2)	0.293



Protection target	Exposure estimate	RCR
Sediment (marine water)	46.09 mg/kg dw (EUSES 2.1.2)	0.068
Sewage Treatment Plant	3.8E-3 mg/L (EUSES 2.1.2)	0.017
Agricultural soil	41.34 mg/kg dw (EUSES 2.1.2)	0.636

26.3.2. Worker exposure: *Low energy mechanical processing of cold metal* (#5) (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, local, long term	0.33 mg/m ³ (Cu VRAR)	0.33
Inhalation, local, acute	0.33 mg/m ³ (Cu VRAR)	0.33
Dermal, systemic, long term	0.024 mg/kg bw/day (Cu VRAR)	< 0.01
Dermal, systemic, acute	0.024 mg/kg bw/day (Cu VRAR)	< 0.01

26.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES