

IRON MANUFACTURE AND USES

December 2013 update: New uses or new use descriptor

Manufacture

Table 1. Manufacture

Identifiers	Use descriptors
<p>M-1: Iron Powders (Iron Powder made by sponge iron process, atomization processes (gas and water) and electrolysis)</p>	<p>Environmental release category (ERC):</p> <p>ERC 1: Manufacture of substances</p> <p>Process category (PROC):</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation</p> <p>PROC 21: Low energy manipulation of substances bound in materials and/or articles</p> <p>PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting</p> <p>PROC 25: Other hot work operations with metals</p> <p>PROC 26: Handling of solid inorganic substances at ambient temperature</p> <p>PROC 7: Industrial spraying</p> <p>PROC 27a: Production of metal powders (hot processes)</p> <p>PROC 27b: Production of metal powders (wet processes)</p> <p>PROC 3: Use in closed batch process (synthesis or formulation)</p> <p>PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature</p>

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Identifiers	Use descriptors
	<p>PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure</p>
<p>M-2: Carbonyl Iron Powders (Iron Powder uncoated, made by thermal decomposition of Iron pentacarbonyl)</p>	<p>Environmental release category (ERC): ERC 1: Manufacture of substances</p> <p>Process category (PROC): PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 6: Calendering operations PROC 7: Industrial spraying PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 10: Roller application or brushing PROC 12: Use of blowing agents in manufacture of foam PROC 13: Treatment of articles by dipping and pouring PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 15: Use as laboratory reagent PROC 16: Using material as fuel sources, limited exposure to unburned product to be expected PROC 17: Lubrication at high energy conditions and in partly open process PROC 18: Greasing at high energy conditions PROC 19: Hand-mixing with intimate contact and only PPE available. PROC 20: Heat and pressure transfer fluids in dispersive, professional use but closed systems PROC 21: Low energy manipulation of substances bound in materials and/or articles</p>

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Identifiers	Use descriptors
	PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles
M-3: Iron Furnace / Pig Iron	Environmental release category (ERC): ERC 1: Manufacture of substances Process category (PROC): PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 26: Handling of solid inorganic substances at ambient temperature PROC 27a: Production of metal powders (hot processes) PROC 27b: Production of metal powders (wet processes) PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 25: Other hot work operations with metals PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
M-4: Iron Furnace / DRI	Environmental release category (ERC): ERC 1: Manufacture of substances Process category (PROC): PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at

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Identifiers	Use descriptors
	<p>dedicated facilities</p> <p>PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation</p> <p>PROC 21: Low energy manipulation of substances bound in materials and/or articles</p> <p>PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting</p> <p>PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles</p> <p>PROC 26: Handling of solid inorganic substances at ambient temperature</p> <p>PROC 27a: Production of metal powders (hot processes)</p> <p>PROC 27b: Production of metal powders (wet processes)</p> <p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature</p> <p>PROC 25: Other hot work operations with metals</p>
M-5: Iron Furnace / HBI	<p>Environmental release category (ERC):</p> <p>ERC 1: Manufacture of substances</p> <p>Process category (PROC):</p> <p>PROC 2: Use in closed, continuous process with occasional controlled exposure</p> <p>PROC 3: Use in closed batch process (synthesis or formulation)</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation</p> <p>PROC 21: Low energy manipulation of substances bound in materials and/or articles</p> <p>PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting</p> <p>PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles</p> <p>PROC 26: Handling of solid inorganic substances at ambient temperature</p> <p>PROC 27a: Production of metal powders (hot processes)</p> <p>PROC 27b: Production of metal powders (wet processes)</p> <p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature</p> <p>PROC 25: Other hot work operations with metals</p>

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Identifiers	Use descriptors
M-6: Elemental Iron - Production and use of steel and alloys in massive form	<p>Environmental release category (ERC):</p> <p>ERC 1: Manufacture of substances</p> <p>Process category (PROC):</p> <p>PROC 1: Use in closed process, no likelihood of exposure</p> <p>PROC 3: Use in closed batch process (synthesis or formulation)</p> <p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC 21: Low energy manipulation of substances bound in materials and/or articles</p> <p>PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting</p> <p>PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature</p> <p>PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles</p> <p>PROC 25: Other hot work operations with metals</p> <p>PROC 2: Use in closed, continuous process with occasional controlled exposure</p> <p>PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p>
M-8: Production of elemental iron in Hydrogen-Reduced Powder	<p>Environmental release category (ERC):</p> <p>ERC 1: Manufacture of substances</p> <p>Process category (PROC):</p> <p>PROC 2: Use in closed, continuous process with occasional controlled exposure</p> <p>PROC 3: Use in closed batch process (synthesis or formulation)</p> <p>PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting</p>
M-9: Manufacture of reduced iron catalysts	<p>Environmental release category (ERC):</p> <p>ERC 1: Manufacture of substances</p> <p>Process category (PROC):</p>

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Identifiers	Use descriptors
	<p>PROC 3: Use in closed batch process (synthesis or formulation)</p> <p>PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p>
M-7: Elemental Iron - Production of alloyed powder by atomisation	<p>Environmental release category (ERC):</p> <p>ERC 1: Manufacture of substances</p> <p>Process category (PROC):</p> <p>PROC 1: Use in closed process, no likelihood of exposure</p> <p>PROC 2: Use in closed, continuous process with occasional controlled exposure</p> <p>PROC 3: Use in closed batch process (synthesis or formulation)</p> <p>PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC 21: Low energy manipulation of substances bound in materials and/or articles</p> <p>PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting</p> <p>PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature</p> <p>PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles</p> <p>PROC 25: Other hot work operations with metals</p> <p>PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p>

2.2. Identified uses

Table 2. Formulation

Identifiers	Use descriptors	Other information
<p>F-1: Iron Powders (Iron Powder made by sponge iron process, atomization processes (gas and water) and electrolysis)</p>	<p>Environmental release category (ERC): ERC 2: Formulation of preparations</p> <p>Process category (PROC): PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 25: Other hot work operations with metals PROC 26: Handling of solid inorganic substances at ambient temperature PROC 7: Industrial spraying PROC 27a: Production of metal powders (hot processes) PROC 27b: Production of metal powders (wet processes) PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure</p> <p>Product Category formulated: PC 7: Base metals and alloys PC 14: Metal surface treatment products, including galvanic and electroplating products PC 24: Lubricants, greases, release products</p>	<p>Substance supplied to that use: As such</p>

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Identifiers	Use descriptors	Other information
	<p>PC 25: Metal working fluids PC 37: Water treatment chemicals PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products PC 20: Products such as ph-regulators, flocculants, precipitants, neutralisation agents</p>	
<p>F-2: Carbonyl Iron Powders (Iron Powder uncoated, made by thermal decomposition of Iron pentacarbonyl)</p>	<p>Environmental release category (ERC): ERC 2: Formulation of preparations ERC 3: Formulation in materials</p> <p>Process category (PROC): PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 6: Calendering operations PROC 7: Industrial spraying PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 10: Roller application or brushing PROC 12: Use of blowing agents in manufacture of foam PROC 13: Treatment of articles by dipping and pouring PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 15: Use as laboratory reagent PROC 16: Using material as fuel sources, limited exposure to unburned product to be expected PROC 17: Lubrication at high energy conditions and in partly open process PROC 18: Greasing at high energy conditions</p>	<p>Substance supplied to that use: As such</p>

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Identifiers	Use descriptors	Other information
	<p>PROC 19: Hand-mixing with intimate contact and only PPE available. PROC 20: Heat and pressure transfer fluids in dispersive, professional use but closed systems PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles</p> <p>Product Category formulated:</p> <p>PC 7: Base metals and alloys PC 8: Biocidal products (e.g. disinfectants, pest control) PC 9a: Coatings and paints, thinners, paint removes PC 9b: Fillers, putties, plasters, modelling clay PC 15: Non-metal-surface treatment products PC 17: Hydraulic fluids PC 18: Ink and toners PC 21: Laboratory chemicals PC 29: Pharmaceuticals PC 32: Polymer preparations and compounds PC 34: Textile dyes, finishing and impregnating products; including bleaches and other processing aids PC 35: Washing and cleaning products (including solvent based products) PC 37: Water treatment chemicals PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products</p>	
F-3: Iron Furnace / Pig Iron	<p>Environmental release category (ERC):</p> <p>ERC 3: Formulation in materials</p> <p>Process category (PROC):</p> <p>PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p>	Substance supplied to that use: As such

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Identifiers	Use descriptors	Other information
	<p>PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 26: Handling of solid inorganic substances at ambient temperature PROC 27a: Production of metal powders (hot processes) PROC 27b: Production of metal powders (wet processes) PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 25: Other hot work operations with metals PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>Product Category formulated:</p> <p>PC 7: Base metals and alloys PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products</p>	
F-4: Iron Furnace / DRI	<p>Environmental release category (ERC):</p> <p>ERC 3: Formulation in materials</p> <p>Process category (PROC):</p> <p>PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles</p>	Substance supplied to that use: As such

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Identifiers	Use descriptors	Other information
	<p>PROC 26: Handling of solid inorganic substances at ambient temperature PROC 27a: Production of metal powders (hot processes) PROC 27b: Production of metal powders (wet processes) PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 25: Other hot work operations with metals</p> <p>Product Category formulated: PC 7: Base metals and alloys</p>	
F-5: Iron Furnace / HBI	<p>Environmental release category (ERC): ERC 3: Formulation in materials</p> <p>Process category (PROC): PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 26: Handling of solid inorganic substances at ambient temperature PROC 27a: Production of metal powders (hot processes) PROC 27b: Production of metal powders (wet processes) PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 25: Other hot work operations with metals</p>	Substance supplied to that use: As such

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Identifiers	Use descriptors	Other information
	<p>Product Category formulated: PC 7: Base metals and alloys</p>	
<p>F-6: Elemental Iron - Production and use of steel and alloys in massive form</p>	<p>Environmental release category (ERC): ERC 3: Formulation in materials ERC 2: Formulation of preparations</p> <p>Process category (PROC): PROC 1: Use in closed process, no likelihood of exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 25: Other hot work operations with metals PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>Product Category formulated: PC 7: Base metals and alloys PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products</p>	<p>Substance supplied to that use: In a mixture</p>
<p>F-7: Elemental Iron - Production and</p>	<p>Environmental release category (ERC): ERC 3: Formulation in materials</p>	<p>Substance supplied to that use:</p>

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Identifiers	Use descriptors	Other information
use of steel and alloys in powder form	<p>ERC 2: Formulation of preparations</p> <p>Process category (PROC):</p> <p>PROC 1: Use in closed process, no likelihood of exposure</p> <p>PROC 3: Use in closed batch process (synthesis or formulation)</p> <p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC 21: Low energy manipulation of substances bound in materials and/or articles</p> <p>PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting</p> <p>PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles</p> <p>PROC 25: Other hot work operations with metals</p> <p>PROC 27a: Production of metal powders (hot processes)</p> <p>PROC 27b: Production of metal powders (wet processes)</p> <p>PROC 2: Use in closed, continuous process with occasional controlled exposure</p> <p>PROC 26: Handling of solid inorganic substances at ambient temperature</p> <p>PROC 7: Industrial spraying</p> <p>PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature</p> <p>Product Category formulated:</p> <p>PC 7: Base metals and alloys</p> <p>PC 14: Metal surface treatment products, including galvanic and electroplating products</p> <p>PC 15: Non-metal-surface treatment products</p> <p>PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products</p>	In a mixture
F-8: Blending of elemental iron in Hydrogen-Reduced	<p>Environmental release category (ERC):</p> <p>ERC 2: Formulation of preparations</p> <p>ERC 3: Formulation in materials</p>	Substance supplied to that use: In a mixture

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Identifiers	Use descriptors	Other information
Powder	<p>Process category (PROC):</p> <p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>Product Category formulated:</p> <p>PC 7: Base metals and alloys</p>	
F-9: Manufacture of reduced iron catalysts	<p>Environmental release category (ERC):</p> <p>ERC 2: Formulation of preparations</p> <p>Process category (PROC):</p> <p>PROC 3: Use in closed batch process (synthesis or formulation) PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>Product Category formulated:</p> <p>PC 19: Intermediate PC 20: Products such as ph-regulators, flocculants, precipitants, neutralisation agents</p>	Substance supplied to that use: In a mixture

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Table 3. Uses at industrial sites

Identifiers	Use descriptors	Other information
<p>IW-1: Iron Powders (Iron Powder made by sponge iron process, atomization processes (gas and water) and electrolysis)</p>	<p>Environmental release category (ERC):</p> <p>ERC 5: Industrial use resulting in inclusion into or onto a matrix ERC 6a: Industrial use resulting in manufacture of another substance (use of intermediates) ERC 6b: Industrial use of reactive processing aids</p> <p>Process category (PROC):</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 25: Other hot work operations with metals PROC 26: Handling of solid inorganic substances at ambient temperature PROC 7: Industrial spraying PROC 27a: Production of metal powders (hot processes) PROC 27b: Production of metal powders (wet processes) PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure</p> <p>Product Category used:</p> <p>PC 7: Base metals and alloys</p>	<p>Substance supplied to that use: As such</p> <p>Subsequent service life relevant for that use: yes</p> <p>Link to the subsequent service life: A-1: Iron Powders (Iron Powder made by sponge iron process, atomization processes (gas and water) and electrolysis)</p>

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Identifiers	Use descriptors	Other information
	<p>PC 14: Metal surface treatment products, including galvanic and electroplating products PC 24: Lubricants, greases, release products PC 25: Metal working fluids PC 37: Water treatment chemicals PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products PC 20: Products such as ph-regulators, flocculants, precipitants, neutralisation agents</p> <p>Sector of end use:</p> <p>SU 14: Manufacture of basic metals, including alloys SU 15: Manufacture of fabricated metal products, except machinery and equipment SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys) SU 8: Manufacture of bulk, large scale chemicals (including petroleum products) SU 9: Manufacture of fine chemicals</p>	
<p>IW-2: Carbonyl Iron Powders (Iron Powder uncoated, made by thermal decomposition of Iron pentacarbonyl)</p>	<p>Environmental release category (ERC):</p> <p>ERC 4: Industrial use of processing aids in processes and products, not becoming part of articles ERC 5: Industrial use resulting in inclusion into or onto a matrix ERC 6a: Industrial use resulting in manufacture of another substance (use of intermediates) ERC 6b: Industrial use of reactive processing aids</p> <p>Process category (PROC):</p> <p>PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 6: Calendering operations PROC 7: Industrial spraying PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large</p>	<p>Substance supplied to that use: As such</p> <p>Subsequent service life relevant for that use: yes</p> <p>Link to the subsequent service life: A-2: Carbonyl Iron Powders (Iron Powder uncoated, made by thermal decomposition of Iron pentacarbonyl)</p>

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Identifiers	Use descriptors	Other information
	<p>containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 10: Roller application or brushing PROC 12: Use of blowing agents in manufacture of foam PROC 13: Treatment of articles by dipping and pouring PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 15: Use as laboratory reagent PROC 16: Using material as fuel sources, limited exposure to unburned product to be expected PROC 17: Lubrication at high energy conditions and in partly open process PROC 18: Greasing at high energy conditions PROC 19: Hand-mixing with intimate contact and only PPE available. PROC 20: Heat and pressure transfer fluids in dispersive, professional use but closed systems PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles</p> <p>Product Category used:</p> <p>PC 7: Base metals and alloys PC 8: Biocidal products (e.g. disinfectants, pest control) PC 9a: Coatings and paints, thinners, paint removes PC 9b: Fillers, putties, plasters, modelling clay PC 15: Non-metal-surface treatment products PC 17: Hydraulic fluids PC 18: Ink and toners PC 21: Laboratory chemicals PC 29: Pharmaceuticals</p>	

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Identifiers	Use descriptors	Other information
	<p>PC 32: Polymer preparations and compounds PC 34: Textile dyes, finishing and impregnating products; including bleaches and other processing aids PC 35: Washing and cleaning products (including solvent based products) PC 37: Water treatment chemicals PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products</p> <p>Sector of end use:</p> <p>SU 2a: Mining (without offshore industries) SU 4: Manufacture of food products SU 5: Manufacture of textiles, leather, fur SU 6a: Manufacture of wood and wood products SU 6b: Manufacture of pulp, paper and paper products SU 7: Printing and reproduction of recorded media SU 9: Manufacture of fine chemicals SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys) SU 11: Manufacture of rubber products SU 12: Manufacture of plastics products, including compounding and conversion SU 13: Manufacture of other non-metallic mineral products, e.g. plasters, cement SU 14: Manufacture of basic metals, including alloys SU 15: Manufacture of fabricated metal products, except machinery and equipment SU 16: Manufacture of computer, electronic and optical products, electrical equipment SU 17: General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment SU 19: Building and construction work SU 20: Health services</p>	
IW-3: Iron Furnace / Pig Iron	<p>Environmental release category (ERC):</p> <p>ERC 5: Industrial use resulting in inclusion into or onto a matrix</p> <p>Process category (PROC):</p> <p>PROC 2: Use in closed, continuous process with occasional controlled exposure</p>	<p>Substance supplied to that use: As such</p> <p>Subsequent service life relevant for that use: yes</p>

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Identifiers	Use descriptors	Other information
	<p>PROC 3: Use in closed batch process (synthesis or formulation) PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 26: Handling of solid inorganic substances at ambient temperature PROC 27a: Production of metal powders (hot processes) PROC 27b: Production of metal powders (wet processes) PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 25: Other hot work operations with metals PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>Product Category used: PC 7: Base metals and alloys PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products</p> <p>Sector of end use: SU 14: Manufacture of basic metals, including alloys SU 9: Manufacture of fine chemicals</p>	<p>Link to the subsequent service life: A-3: Iron Furnace / Pig Iron</p>
<p>IW-4: Iron Furnace / DRI</p>	<p>Environmental release category (ERC): ERC 5: Industrial use resulting in inclusion into or onto a matrix</p> <p>Process category (PROC): PROC 2: Use in closed, continuous process with occasional controlled exposure</p>	<p>Substance supplied to that use: As such</p> <p>Subsequent service life relevant for that use: yes</p>

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Identifiers	Use descriptors	Other information
	<p>PROC 3: Use in closed batch process (synthesis or formulation) PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 26: Handling of solid inorganic substances at ambient temperature PROC 27a: Production of metal powders (hot processes) PROC 27b: Production of metal powders (wet processes) PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 25: Other hot work operations with metals</p> <p>Product Category used: PC 7: Base metals and alloys</p> <p>Sector of end use: SU 14: Manufacture of basic metals, including alloys</p>	<p>Link to the subsequent service life: A-4: Iron Furnace / DRI</p>
<p>IW-5: Iron Furnace / HBI</p>	<p>Environmental release category (ERC): ERC 5: Industrial use resulting in inclusion into or onto a matrix</p> <p>Process category (PROC): PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p>	<p>Substance supplied to that use: As such</p> <p>Subsequent service life relevant for that use: yes</p> <p>Link to the subsequent service life:</p>

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Identifiers	Use descriptors	Other information
	<p>PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation</p> <p>PROC 21: Low energy manipulation of substances bound in materials and/or articles</p> <p>PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting</p> <p>PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles</p> <p>PROC 26: Handling of solid inorganic substances at ambient temperature</p> <p>PROC 27a: Production of metal powders (hot processes)</p> <p>PROC 27b: Production of metal powders (wet processes)</p> <p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature</p> <p>PROC 25: Other hot work operations with metals</p> <p>Product Category used:</p> <p>PC 7: Base metals and alloys</p> <p>Sector of end use:</p> <p>SU 14: Manufacture of basic metals, including alloys</p>	<p>A-5: Iron Furnace / HBI</p>
<p>IW-6: Elemental Iron - Production and use of steel and alloys in massive form</p>	<p>Environmental release category (ERC):</p> <p>ERC 5: Industrial use resulting in inclusion into or onto a matrix</p> <p>Process category (PROC):</p> <p>PROC 1: Use in closed process, no likelihood of exposure</p> <p>PROC 3: Use in closed batch process (synthesis or formulation)</p> <p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC 21: Low energy manipulation of substances bound in materials and/or articles</p>	<p>Substance supplied to that use:</p> <p>In a mixture</p> <p>Subsequent service life relevant for that use: yes</p> <p>Link to the subsequent service life:</p> <p>A-6: Elemental Iron - Production and use of steel and alloys in massive form</p>

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Identifiers	Use descriptors	Other information
	<p>PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 25: Other hot work operations with metals PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>Product Category used: PC 7: Base metals and alloys PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products</p> <p>Sector of end use: SU 14: Manufacture of basic metals, including alloys SU 15: Manufacture of fabricated metal products, except machinery and equipment SU 24: Scientific research and development SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)</p>	
<p>IW-7: Elemental Iron - Production and use of steel and alloys in powder form</p>	<p>Environmental release category (ERC): ERC 5: Industrial use resulting in inclusion into or onto a matrix</p> <p>Process category (PROC): PROC 1: Use in closed process, no likelihood of exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line,</p>	<p>Substance supplied to that use: In a mixture</p> <p>Subsequent service life relevant for that use: yes</p> <p>Link to the subsequent service life: A-7: Elemental Iron - Production and use of steel and alloys in powder form</p>

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Identifiers	Use descriptors	Other information
	<p>including weighing) PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 25: Other hot work operations with metals PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 26: Handling of solid inorganic substances at ambient temperature PROC 7: Industrial spraying PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature</p> <p>Product Category used:</p> <p>PC 7: Base metals and alloys PC 14: Metal surface treatment products, including galvanic and electroplating products PC 15: Non-metal-surface treatment products PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products</p> <p>Sector of end use:</p> <p>SU 7: Printing and reproduction of recorded media SU 14: Manufacture of basic metals, including alloys SU 15: Manufacture of fabricated metal products, except machinery and equipment SU 24: Scientific research and development SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)</p>	
IW-8: Use of elemental iron in Hydrogen-Reduced Powder	<p>Environmental release category (ERC):</p> <p>ERC 5: Industrial use resulting in inclusion into or onto a matrix</p> <p>Process category (PROC):</p> <p>PROC 5: Mixing or blending in batch processes for formulation of preparations and articles</p>	<p>Substance supplied to that use: In a mixture</p> <p>Subsequent service life relevant for that use: yes</p>

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Identifiers	Use descriptors	Other information
	<p>(multistage and/or significant contact) PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles</p> <p>Product Category used: PC 7: Base metals and alloys</p> <p>Sector of end use: SU 2a: Mining (without offshore industries) SU 14: Manufacture of basic metals, including alloys SU 15: Manufacture of fabricated metal products, except machinery and equipment SU 19: Building and construction work</p>	<p>Link to the subsequent service life: A-8: Use of elemental iron in Hydrogen-Reduced Powder</p>
IW-9: Use of reduced iron catalysts	<p>Environmental release category (ERC): ERC 6a: Industrial use resulting in manufacture of another substance (use of intermediates) ERC 6b: Industrial use of reactive processing aids</p> <p>Process category (PROC): PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p>	<p>Substance supplied to that use: In a mixture</p>

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Identifiers	Use descriptors	Other information
	<p>Product Category used:</p> <p>PC 19: Intermediate PC 20: Products such as ph-regulators, flocculants, precipitants, neutralisation agents</p> <p>Sector of end use:</p> <p>SU 8: Manufacture of bulk, large scale chemicals (including petroleum products) SU 9: Manufacture of fine chemicals</p>	

Table 4. Article service life

Identifiers	Use descriptors	Other information
SL-1: Iron Powders (Iron Powder made by sponge iron process, atomization processes (gas and water) and electrolysis)	<p>Article category related to subsequent service life (AC):</p> <p>AC 7: Metal articles</p> <p>Process category (PROC):</p> <p>PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 25: Other hot work operations with metals</p>	Article used by: workers
SL-2: Carbonyl Iron Powders (Iron Powder uncoated, made by thermal decomposition of Iron)	<p>Article category related to subsequent service life (AC):</p> <p>AC 1: Vehicles AC 2: Machinery, mechanical appliances, electrical/electronic articles AC 3: Electrical batteries and accumulators AC 5: Fabrics, textiles and apparel AC 8: Paper articles</p>	Article used by: workers

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Identifiers	Use descriptors	Other information
pentacarbonyl)	<p>AC 10: Rubber articles AC 7: Metal articles</p> <p>Environmental release category (ERC):</p> <p>ERC 10a: Wide dispersive outdoor use of long-life articles and materials with low release ERC 10b: Wide dispersive outdoor use of long-life articles and materials with high or intended release (including abrasive processing) ERC 11a: Wide dispersive indoor use of long-life articles and materials with low release</p> <p>Process category (PROC):</p> <p>PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles</p>	
SL-3: Iron Furnace / Pig Iron	<p>Article category related to subsequent service life (AC):</p> <p>AC 7: Metal articles</p> <p>Environmental release category (ERC):</p> <p>ERC 12a: Industrial processing of articles with abrasive techniques (low release) ERC 12b: Industrial processing of articles with abrasive techniques (high release)</p> <p>Process category (PROC):</p> <p>PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 25: Other hot work operations with metals</p>	Article used by: workers

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Identifiers	Use descriptors	Other information
SL-4: Iron Furnace / DRI	<p>Article category related to subsequent service life (AC): AC 7: Metal articles</p> <p>Environmental release category (ERC): ERC 12a: Industrial processing of articles with abrasive techniques (low release) ERC 12b: Industrial processing of articles with abrasive techniques (high release)</p> <p>Process category (PROC): PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 25: Other hot work operations with metals</p>	Article used by: workers
SL-5: Iron Furnace / HBI	<p>Article category related to subsequent service life (AC): AC 7: Metal articles</p> <p>Environmental release category (ERC): ERC 12a: Industrial processing of articles with abrasive techniques (low release) ERC 12b: Industrial processing of articles with abrasive techniques (high release)</p> <p>Process category (PROC): PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation PROC 21: Low energy manipulation of substances bound in materials and/or articles PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 25: Other hot work operations with metals</p>	Article used by: workers

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Identifiers	Use descriptors	Other information
SL-6: Elemental Iron - Production and use of steel and alloys in massive form	<p>Article category related to subsequent service life (AC):</p> <ul style="list-style-type: none">AC 7: Metal articlesAC 1: VehiclesAC 2: Machinery, mechanical appliances, electrical/electronic articles <p>Environmental release category (ERC):</p> <ul style="list-style-type: none">ERC 12a: Industrial processing of articles with abrasive techniques (low release)ERC 12b: Industrial processing of articles with abrasive techniques (high release) <p>Process category (PROC):</p> <ul style="list-style-type: none">PROC 21: Low energy manipulation of substances bound in materials and/or articlesPROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial settingPROC 23: Open processing and transfer operations with minerals/metals at elevated temperaturePROC 24: High (mechanical) energy work-up of substances bound in materials and/or articlesPROC 25: Other hot work operations with metals	Article used by: workers
SL-7: Elemental Iron - Production and use of steel and alloys in powder form	<p>Article category related to subsequent service life (AC):</p> <ul style="list-style-type: none">AC 7: Metal articlesAC 1: VehiclesAC 2: Machinery, mechanical appliances, electrical/electronic articles <p>Environmental release category (ERC):</p> <ul style="list-style-type: none">ERC 12b: Industrial processing of articles with abrasive techniques (high release) <p>Process category (PROC):</p> <ul style="list-style-type: none">PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisationPROC 21: Low energy manipulation of substances bound in materials and/or articlesPROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial settingPROC 23: Open processing and transfer operations with minerals/metals at elevated temperature	Article used by: workers

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Identifiers	Use descriptors	Other information
	PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles PROC 25: Other hot work operations with metals	
SL-8: Use of elemental iron in Hydrogen-Reduced Powder	Article category related to subsequent service life (AC): AC 7: Metal articles Exposure related description of article: Articles with foreseeable exposure to dust and fumes during maintenance and recycling processes, e.g. abrasive surface cleaning, dismantling and milling Environmental release category (ERC): ERC 12a: Industrial processing of articles with abrasive techniques (low release) ERC 12b: Industrial processing of articles with abrasive techniques (high release) Process category (PROC): PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles	Article used by: workers

Technical function of the substance:

Intermediates

Food/feedstuff additives

Pharmaceutical substance

Plating agents and metal surface treating agents

Processing aid, not otherwise listed

Laboratory chemicals

Fillers

Colouring agents, pigments

Alloying element

Iron Furnace is used as feedstock for crude steel production and ferrous casting. Iron is used as alloys, steels, metal castings, catalyst, powder metallurgy, extenders, nutritional supplements and pharmaceutical applications.