

1. Title		Version 5, 2015
<b>GES 36 Use of Ni-containing alloys for blasting</b>		
Life cycle	DU of Ni metal	
Free short title	Use of Ni containing alloys for blasting	
Systematic title based on use descriptor	SU: SU 3 Industrial use of substances as such or in preparations at industrial sites. SU 15 Manufacture of fabricated metal products except machinery and equipment. PC: PC 7 Base metals and alloys ERC: ERC 4 -Industrial use of processing aids in processes and products, not becoming part of articles PROC: PROC 7 Industrial spraying. PROC 11 Non-industrial spraying. PROC 8a Transfer of substance in to vessels or large containers at non-dedicated facilities. PROC 0: Cleaning and Maintenance	
Processes, tasks, activities covered (environment)	Use of Ni-containing alloys in blasting operations.	
Processes, tasks, activities covered (workers)	ES 36.1: PROC 8 a: Raw material handling ES 36.2: PROC 7, PROC 11: Blasting operations. ES 36.3 PROC 0: Cleaning and Maintenance	
<b>2. Operational conditions and risk management measures</b>		
<b>2.1 Control of environmental exposure</b>		
Environmental related free short title	Use of Ni-containing alloys for blasting	
Systematic title based on use descriptor (environment)	ERC 4 -Industrial use of processing aids in processes and products, not becoming part of articles	
Processes, tasks, activities covered (environment)	Blasting, cleaning of a surface with projection of abrasive made of granules of nickel alloys (stainless steel).	
Environmental Assessment Method	Estimates based on the use-shape Metal SPERC used for calculation of air PEC	
<b>Product characteristics</b>		
Nickel alloys (stainless steel) granules. Concentration of Ni in the alloys used are FeCr (<1% Ni) and FeCrNi (<10% Ni).		
<b>Amounts used</b>		
Maximum daily use at a site	0.03 tonnes	
Maximum annual use at a site	7 tonnes	
<b>Frequency and duration of use</b>		
Pattern of release to the environment	Water: No discharge to water Air: 216 days per year per site	
<b>Environment factors not influenced by risk management</b>		
Receiving surface water flow rate	Not relevant	
Dilution capacity, freshwater	Not relevant	
Dilution capacity, marine	Not relevant	
<b>Other given operational conditions affecting environmental exposure</b>		
None		
<b>Technical conditions and measures at process level (source) to prevent release</b>		
None		
<b>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</b>		
<b>Waste water:</b>		
No waste water is produced		
<b>Air:</b>		
Treatment of air emission by use of fabric or bag filters, ceramic filters, wet scrubbers, dry or semi-dry scrubbers or electrostatic precipitation. Efficiency 95-99 % For the air a release factor of 2000 g/T is used. This is based on the "Industrial use: shaping" (Eurometaux, 2012). This SPERC is relevant for ERC12a processes and blasting is considered relevant also for ERC 12b. There is a factor 10 difference between ERC12a and ERC12b releases according to ECHA. Therefore a factor of 10 has been applied to the "Industrial use: shaping" SPERC value of 200 g/T.		

<b>Organizational measures to prevent/limit release from site</b>	
None	
<b>Conditions and measures related to municipal sewage treatment plant</b>	
<b>Municipal Sewage Treatment Plant (STP)</b>	Not relevant
<b>Discharge rate of the Municipal STP</b>	Not relevant
<b>Incineration of the sludge of the Municipal STP</b>	Not relevant
<b>Conditions and measures related to external treatment of waste for disposal</b>	
<p>Hazardous wastes from onsite risk management measures and solid or liquid wastes from production, use and cleaning processes should be disposed of separately to hazardous waste incineration plants or hazardous waste landfills as hazardous waste. Releases to the floor, water and soil are to be prevented. If the nickel content of the waste is elevated enough, internal or external recovery/recycling might be considered.</p> <p><b>Fraction of daily/annual use</b> expected in waste:</p> <ul style="list-style-type: none"> <li>- Nickel producers = 0.05 %</li> <li>- DU: stainless steel and alloy steels = 0.6 %</li> <li>- DU: nickel alloys, copper alloys, foundry, batteries, catalysts, chemicals, dyes and others = 0.5 %</li> <li>- DU: Plating = 3%</li> </ul> <p><b>Appropriate waste codes:</b></p> <p>01 03 07*, 02 01 10*, 06 03 13*, 06 03 15*, 06 04 05*, 06 05 02*, 10 08 04, 10 08 08*, 10 08 09, 10 08 15*, 10 08 16, 10 10 03, 10 10 05*, 10 10 07*, 10 10 09*, 10 10 10, 10 10 11*, 11 02 07*, 12 01 03*, 12 01 04, 15 01 04*, 15 01 10*, 16 01 04*, 16 01 06*, 16 01 08*, 16 06 02*, 16 06 05, 16 08 02*, 16 08 03*, 17 04 07*, 17 04 09*, 19 09 04*, 19 10 02*, 19 12 03*</p> <p><b>Suitable disposal:</b> Keep separate and dispose of to either</p> <ul style="list-style-type: none"> <li>- Hazardous waste incineration operated according to Council Directive 2008/98/EC on waste, Directive 2000/76/EC on the incineration of waste and the Reference Document on the Best Available Techniques for Waste Incineration of August 2006.</li> <li>- Hazardous landfill operated under Directive 1999/31/EC.</li> </ul>	
<b>Conditions and measures related to external recovery of waste</b>	
<p>Shredders pre-treating metal wastes should have a maximum release factors to air of 0.0015 after RMM and no releases to water and soil.</p> <p>Qmax, local(shredding)=26kg Ni/day</p> <p>(Note: This Qmax, local for shredders is based on the existing information at the moment of the update. It will be reviewed when new information is available from the BREF for shredding)</p>	
<b>2.2 Control of workers exposure for contributing exposure scenario 36.1</b>	
Raw Material Handling.	
<b>Workers related free short title</b>	Use of Ni -containing alloys for blasting
<b>Use descriptor covered</b>	PROC 8a Transfer of substance in to vessels or large containers at non-dedicated facilities.
<b>Processes, tasks, activities covered</b>	Raw material handling includes transfer of Ni alloy into small containers, sampling, and transfer of Ni alloy abrasive to blasting equipment.
<b>Assessment Method</b>	Exposure estimated using Tier 1 model
<b>Product characteristic:</b>	
Solids, medium grade Ni alloy granules (grit) and dust ranging from <0.001 mm – 1.0 mm in size. Concentration of Ni in alloy (FeCr and FeCrNi) powder and pellets <10%	
<b>Amounts used</b>	
Not relevant	
<b>Frequency and duration of use/exposure</b>	
<p>All production workers generally work 8 hour shifts.</p> <p>The actual pattern of exposure is determined by activity patterns, use of control rooms and level of automation and mechanisation of activities.</p>	
<b>Human factors not influenced by risk management</b>	
Respiration volume under conditions of use	Light to medium level work, 10 m <sup>3</sup> /d
Room size and ventilation rate	Not relevant

Area of skin contact with the substance under conditions of use	960 cm <sup>2</sup>
Body weight	70 kg
<b>Other given operational conditions affecting workers exposure</b>	
Raw material handling includes transfer of Ni-containing alloy into small containers, sampling, and transfer of Ni alloy abrasive to blasting equipment.	
<b>Technical conditions and measures at process level (source) to prevent release:</b>	
Dermal: design workplace and work process to minimize direct contact with materials by increasing level of automisation where appropriate.	
Inhalation: design workplace and process to minimize exposure by increasing the level of automisation when appropriate.	
<b>Technical conditions and measures to control dispersion from source towards the worker</b>	
LEV shall be used to reduce exposure	
<b>Organizational measures to prevent /limit releases, dispersion and exposure</b>	
None.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Use of RPE (APF 20) and appropriate gloves is required.	
<b>2.3 Control of workers exposure for contributing exposure scenario 36.2</b>	
Blasting operations	
<b>Workers related free short title</b>	Use of Ni-containing alloys for blasting
<b>Use descriptor covered</b>	PROC 7 Industrial spraying. PROC 11 Non-industrial spraying.
<b>Processes, tasks, activities covered</b>	Blasting the surface of a substrate using a Nickel metal-containing alloy abrasive in blasting rooms.
<b>Assessment Method</b>	Exposure estimated using Tier 1 model
<b>Product characteristic</b>	
Solids, medium grade Ni alloy granules (grit) and dust ranging from <0.001 mm – 1.0 mm in size. Concentration Ni in alloy (FeCr and FeCrNi) powder and pellets < 10%	
<b>Amounts used</b>	
Not relevant	
<b>Frequency and duration of use/exposure</b>	
All production workers generally work 8 hour shifts. Duration of blasting operation: Maximum 4 hours/shift. The actual pattern of exposure is determined by activity patterns, use of control rooms and level of automation and mechanisation of activities.	
<b>Human factors not influenced by risk management</b>	
Respiration volume under conditions of use	Light to medium level work, 10 m <sup>3</sup> /d
Room size and ventilation rate	Not relevant
Area of skin contact with the substance under conditions of use	960 cm <sup>2</sup>
Body weight	70 kg
<b>Other given operational conditions affecting workers exposure</b>	
Blasting operation involves projecting granules of Nickel metal containing alloys on to a substrate in order to clean its surface. Abrasive material is projected by turbines at high velocities (50 to 100 m/s) by the application of centrifugal force. Depending on the size and volume of substrate pieces, blasting equipment may involve drums, rotary tables, monorail, and tunnels. Abrasive material is recycled during the blasting operation by collecting the grit through a vibrating floor or in a reservoir and transferred back to the centre of the turbine. Blasting operations are performed in a blasting room equipped with filtration and exhaust systems. The operation of blasting equipment is automated.	
<b>Technical conditions and measures at process level (source) to prevent release</b>	
Blasting operations shall take place in closed system.	
Dermal: design workplace and work process to minimize direct contact with materials.	
Inhalation: design workplace and process to minimize exposure.	
<b>Technical conditions and measures to control dispersion from source towards the worker</b>	
Use of LEV is required.	
<b>Organizational measures to prevent /limit releases, dispersion and exposure</b>	
None.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Use of RPE (APF 40) and appropriate gloves is required.	
<b>2.4 Control of workers exposure for contributing exposure scenario 36.3</b>	
Cleaning and maintenance	

<b>Workers related free short title</b>	Use of Ni -containing alloys for blasting						
<b>Use descriptor covered</b>	PROC0 – Cleaning and maintenance						
<b>Processes, tasks, activities covered</b>	Cleaning and maintenance of blasting equipment and work area.						
<b>Assessment Method</b>	Exposure estimated using Tier 1 model						
<b>Product characteristic</b>							
Solids, medium grade Ni alloy granules (grit) and dust ranging from <0.001 mm – 1.0 mm in size. Concentration Ni in alloy (FeCr and FeCrNi) powder and pellets < 10%							
<b>Amounts used</b>							
Not relevant							
<b>Frequency and duration of use/exposure</b>							
All production workers generally work 8 hour shifts. The actual pattern of exposure is determined by activity patterns, use of control rooms and level of automation and mechanization of activities.							
<b>Human factors not influenced by risk management</b>							
Respiration volume under conditions of use	Light to medium level work, 10 m <sup>3</sup> /d						
Room size and ventilation rate	Not relevant						
Area of skin contact with the substance under conditions of use	960 cm <sup>2</sup>						
Body weight	70 kg						
<b>Other given operational conditions affecting workers exposure</b>							
Regular maintenance of blasting equipment and cleaning of work area.							
<b>Technical conditions and measures at process level (source) to prevent release</b>							
None.							
<b>Technical conditions and measures to control dispersion from source towards the worker</b>							
Dermal: design workplace and work process to minimize direct contact with materials Inhalation: design workplace and process to minimize exposure.							
<b>Organizational measures to prevent /limit releases, dispersion and exposure</b>							
None.							
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>							
Use of RPE (APF 20) and appropriate gloves is required.							
<b>3. Exposure and risk estimation</b>							
<b>Environment</b>							
ERC4 Use of Ni-containing alloys for blasting							
Compartment	Unit	PNEC	PEC <sub>Regional</sub>	C <sub>local</sub>	PEC	RCR	Methods for calculation of environmental concentration and PNEC
Freshwater	µg/L	-	-	-	-	-	No emission to water
Marine	µg/L	-	-	-	-	-	No emission to water
Sediment	mg/kg	-	-	-	-	-	No emission to water
Terrestrial	mg/kg	29.9	16.2	< 0.01	16.20	0.54	Estimates based on the use-shape Metal SPERC
STP	mg/L	0.33	-	-	-	-	No emission to water
<b>Workers</b>							
<b>ES 36.1</b> PROC 8 a: Raw material handling							
	Unit	DNEL	Exposure concentration	RCR	Methods for calculation of exposure		
Dermal							
Acute systemic	mgNi/kg/day	-	NR				
Acute local	mgNi/cm <sup>2</sup> /day	-	NR				
Long-term systemic	mgNi/kg/day	-	NR				
Long-term local	mgNi/cm <sup>2</sup> /day	0.035	0.00003	< 0.001	Exposure calculated using MEASE for PROC 8a (medium dustiness, 5 – 25% composition,		

					industrial use, non-dispersive application, non-direct handling, incidental exposure, use of gloves).
<b>Inhalation</b>					
Acute local	mgNi/m <sup>3</sup>	4.0	6.8	1.7 excluding RPE  By use of RPE (APF 20): 0.085	10 x long-term exposure estimate. This allows for the extreme short term variability of exposure concentrations that is associated with handling powder.
Long-term systemic and local	mgNi/m <sup>3</sup>	0.05	0.68	13.6 excluding RPE  By use of RPE (APF 20): 0.68	Exposure calculated using MEASE for PROC 8a (medium dustiness, 5 – 25% composition, industrial use, non-dispersive application, non-direct handling, incidental exposure, use of LEV
<b>ES 36.2</b>					
PROC 7, PROC 11: Blasting operations.					
	Unit	DNEL	Exposure concentration	RCR	Methods for calculation of exposure
<b>Dermal</b>					
Acute systemic	mgNi/kg/day	-	NR		
Acute local	mgNi/cm <sup>2</sup> /day	-	NR		
Long-term systemic	mgNi/kg/day	-	NR		
Long-term local	mgNi/cm <sup>2</sup> /day	0.035	0.00002	< 0.001	Exposure calculated using MEASE for PROC 11 (medium dustiness, 5 – 25% composition, industrial use, maximum 4 hours of operation, closed system without breaches, non-direct handling, incidental exposure, use of gloves).
<b>Inhalation</b>					
Acute local	mgNi/m <sup>3</sup>	4	5.94	1.49 By use of RPE (APF 20): 0.07	3 x long-term exposure estimate.
Long-term systemic and local	mgNi/m <sup>3</sup>	0.05	1.98	39.6 excluding RPE  By use of RPE (APF	Exposure calculated using MEASE for PROC 11 (Medium dustiness, 5 – 25% composition, industrial use, maximum 4 hours of operation,

				20): 1.98 By use of RPE (APF 40): 0.1	closed system without breaches, non-direct handling, incidental exposure, use of LEV and gloves).
<b>ES 36.3</b>					
PROC 0: Cleaning and Maintenance					
	Unit	DNEL	Exposure concentration	RCR	Methods for calculation of exposure
Dermal					
Acute systemic	mgNi/kg/day	-	NR		
Acute local	mgNi/cm <sup>2</sup> /day	-	NR		
Long-term systemic	mgNi/kg/day	-	NR		
Long-term local	mgNi/cm <sup>2</sup> /day	0.035	0.00002	< 0.001	Exposure calculated using MEASE for PROC 10 (Medium dustiness, 5 – 25% composition, industrial use, wide-dispersive application, non-direct handling, incidental exposure, use of gloves).
Inhalation					
Acute local	mgNi/m <sup>3</sup>	4	4.0	1.0 excluding RPE By use of RPE (APF 20): 0.05	10 x long-term exposure estimate. This allows for the extreme short term variability of exposure concentrations that is associated with handling powder.
Long-term systemic and local	mgNi/m <sup>3</sup>	0.05	0.4	8 excluding RPE By use of RPE (APF 20): 0.4	Exposure calculated using MEASE for PROC 10 (medium dustiness, 5 – 25% composition, industrial use, wide-dispersive application, non-direct handling, incidental exposure, use of LEV
NR: Not Relevant					
<u>Acute local inhalation</u> DNEL based on respirable size aerosols. Equivalent inhalable fraction levels expected to be at least 3-fold higher					
<b>4. Guidance to evaluate whether the site works inside the boundaries set by the ES</b>					
<b>Environment</b>					
Scaling tool: Metals EUSES IT tool (free download: <a href="http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool">http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool</a> )					
Scaling of the release to air and water environment includes: Refining of the release factor to air and waste water and/or and the efficiency of the air filter and wastewater treatment facility.					
Scaling of the PNEC for aquatic environment by using a tiered approach for correction for bioavailability and background concentration (C <sub>local</sub> approach).					
Scaling of the PNEC for soil compartment by using a tiered approach for correction for bioavailability and background					

concentration ( $C_{\text{local}}$  approach).

#### Workers

Scaling considering duration and frequency of use

Collect process monitoring data with an inhalable sampler. The simultaneous use of a respirable sampler is encouraged.

Use aerosol particle size information, when available, to confirm the appropriate use of the inhalable DNEL of 0.05 mg Ni/m<sup>3</sup>.

Respirable fraction exposure levels should be kept below 0.01 mg Ni/m<sup>3</sup>.

For further information and guidance on exposure scenarios, available tools, and scaling options, please visit the Nickel Consortia exposure scenario library at the following link: <http://www.nickelconsortia.eu/exposure-scenario-library.html>

### Man via Environment exposure and risk characterisation assessments for the use of nickel-containing alloys for blasting

Inhalation is the critical exposure pathway for humans via the environment. The PEC for air at site neighbouring residential areas should be lower than the chronic inhalation DNEL for the general public of 20 ng Ni/m<sup>3</sup> as annual average in PM<sub>10</sub> in order to demonstrate adequate control of risk (RCR < 1) for Man via the Environment (MvE).

Hereto a Generic safe use Exposure Scenario for MvE was developed based on the EUSES model. The MvE GES is defined as the product of tonnage (T) and emission factor to air (EF) being lower than 18000 g Ni/year. The value of 18000 g Ni/year is derived by using EUSES model to back-calculate the product of T and EF that results in a local air concentration ( $C_{\text{local}}$ ) of 15.5 ng Ni/m<sup>3</sup>. The value of 15.5 is derived from the difference between the DNEL of 20 ng Ni/m<sup>3</sup> and the EU regional background concentration ( $C_{\text{regional}}$ ) of 4.5 ng Ni/m<sup>3</sup> (P90 annual concentration for 2012).

#### Generic safe use ES for all sectors according to Tier 1 (EUSES model)

Sector	Tonnage (Ni T /year)	Emission factor (g Ni/T)	Tonnage × emission factor (g /year)	$C_{\text{local}}$ (ng/m <sup>3</sup> )	$C_{\text{regional}}$ (ng/m <sup>3</sup> )	PEC <sub>local</sub> (ng/m <sup>3</sup> )	RCR = PEC/DNEL (DNEL= 20 ng/m <sup>3</sup> )
All	T	EF	T × EF < 18000	<15.5	4.5*	<20	<1

\*: EU average of country P90 annual Ni concentrations (2012)

If a site is not compliant with these conditions, meaning that the product of tonnage and emission factor is above 18000 g Ni/year, a tiered approach including site-specific modelling can be applied to demonstrate safe use