



# correa

## NORMA, Bed-Type Milling Machines Range

### FIXED BED MILLING MACHINES RANGE

# HYPATIA

ENVIRONMENTAL PRODUCT DECLARATION



Registration date: 2017/10/30  
Valid until: 2020/10/16

ACCORDING TO

(ISO 14044:2006)  
ENVIRONMENTAL MANAGEMENT -  
- LIFE CYCLE ASSESSMENT --  
REQUIREMENTS AND GUIDELINES  
(2006)

(ISO 14025:2006)  
ENVIRONMENTAL LABELS AND  
DECLARATIONS-TYPE III  
ENVIRONMENTAL  
DECLARATIONS- PRINCIPLES AND  
PROCEDURES. (2006)

GPI, GENERAL PROGRAMME  
INSTRUCTIONS FOR THE  
INTERNATIONAL EPD® SYSTEM  
V2.5 (2015-05-11)

PCR 2012:02 V2.0, PRODUCT  
GROUP UN CPC 44214 MACHINE-  
TOOLS FOR DRILLING, BORING OR  
MILLING METAL (2018-01-25)


Hypatia GNC Accesorios, S.A  
C/Condado de Treviño, 53  
09001 Burgos (SPAIN)



Grupo Nicolás Correa  
C/ Alcalde Martín Cobos, 16  
09007 Burgos (SPAIN)

	<p>Summary</p> <p>Environmental Product Declaration</p>
<p>The International EPD® System</p> <div>  <p>THE GREEN YARDSTICK</p> </div> <p><a href="http://www.environdec.com">www.environdec.com</a></p> <p>EPD International AB Box 210 60 SE-100 31 Stockholm Sweden</p>	<p>Program holder</p>
<p><b>Hypatia GNC Accesorios S.A (Grupo Nicolás Correa)</b> C/Condado de Treviño, 53 Polígono Industrial de Villalonguejar 09001 Burgos (SPAIN) Tel: +34 947 298 528 Fax: +34 947 473 520 <a href="mailto:info@gnchypatia.com">info@gnchypatia.com</a> <a href="http://gnchypatia.com">http://gnchypatia.com</a></p> <div>  </div>	<p>Declaration holder</p>
<p>S-P-01100</p>	<p>Declaration number</p>
<p><b>Bed-type milling machine range</b></p> <p>This declaration is an environmental product declaration according to ISO 14025 and describes the specific environmental impacts of a range of milling machines. It is intended to foster the sustainable development of environmental and health friendly compatible processing operations in the metalworking sector.</p> <p>All relevant environmental data is contained in this validated declaration. The declaration is based on the PCR 2012:02 v2.0.</p>	<p>Declared Products</p>
<p>This validated declaration entitles the use of the label of the International EPD® System. This exclusively applies to the mentioned products; three years from the date of issue. The declaration holder is liable for the basic information and verifications.</p>	<p>Validity</p>
<p>This EPD is based on the modular rationalization of milling machine family; the machines are defined as the sum of the structural/functional modules and optional accessories. Aspects of end of life of the machines are not covered in this EPD. It contains in detail,</p> <ul style="list-style-type: none"> <li>• Product definition and physical data</li> <li>• Information about raw materials and origin</li> <li>• Specifications on building the machines</li> <li>• Notes on processing operations in use phase</li> <li>• LCA based on a declared unit, cradle-to-use</li> <li>• LCA results</li> <li>• Evidence and verifications</li> </ul>	<p>Content of the declaration</p>

					Summary																																						
2017-10-30					Registration date																																						
2020-10-16					Valid until																																						
Dr. Jordi Oliver i Solà					Verifier appoint by EPD®System																																						
					Signatures																																						
Dr. Jordi Oliver i Solà. External EPD Verifier		Fernando Huidobro General Manager- Hypatia GNC Accesorios S.A																																									
<p>A milling machine is a machine tool used to perform mechanical removal of material by means of a rotary tool movement.</p> <p>Milling machines range subject to declaration have horizontal ram, rotatory table and numerical control, structural reconfigurations are as follow:</p> <table><tr><th>CODIFICATION</th><th>MODULE/AXIS</th></tr><tr><td>MOD1</td><td>X20</td></tr><tr><td>MOD2</td><td>X25</td></tr><tr><td>MOD3</td><td>X35</td></tr><tr><td>MOD4</td><td>X45</td></tr><tr><td>MOD7</td><td>YZ NORMA U22</td></tr><tr><td>MOD8</td><td>YZ NORMA UGA</td></tr><tr><td>ACS1</td><td>Chip removal system</td></tr><tr><td>ACS2</td><td>ATC, tool changer</td></tr><tr><td>ACS3</td><td>Cutting oil injector (no MQL)</td></tr></table> <table><tr><th>CODIFICATION</th><th>RANGE OF MILLING MACHINE NORMA</th></tr><tr><td>RECONF9</td><td>MOD7+MOD1+ACS1+ACS2</td></tr><tr><td>RECONF10</td><td>MOD7+MOD2+ACS1+ACS2</td></tr><tr><td>RECONF11</td><td>MOD7+MOD3+ACS1+ACS2</td></tr><tr><td>RECONF12</td><td>MOD7+MOD4+ACS1+ACS2</td></tr><tr><td>RECONF13</td><td>MOD8+MOD1+ ACS1+ACS2+ACS3</td></tr><tr><td>RECONF14</td><td>MOD8+MOD2+ACS1+ACS2+ACS3</td></tr><tr><td>RECONF15</td><td>MOD8+MOD3+ACS1+ACS2+ACS3</td></tr><tr><td>RECONF16</td><td>MOD8+MOD4+ACS1+ACS2+ACS3</td></tr></table>					CODIFICATION	MODULE/AXIS	MOD1	X20	MOD2	X25	MOD3	X35	MOD4	X45	MOD7	YZ NORMA U22	MOD8	YZ NORMA UGA	ACS1	Chip removal system	ACS2	ATC, tool changer	ACS3	Cutting oil injector (no MQL)	CODIFICATION	RANGE OF MILLING MACHINE NORMA	RECONF9	MOD7+MOD1+ACS1+ACS2	RECONF10	MOD7+MOD2+ACS1+ACS2	RECONF11	MOD7+MOD3+ACS1+ACS2	RECONF12	MOD7+MOD4+ACS1+ACS2	RECONF13	MOD8+MOD1+ ACS1+ACS2+ACS3	RECONF14	MOD8+MOD2+ACS1+ACS2+ACS3	RECONF15	MOD8+MOD3+ACS1+ACS2+ACS3	RECONF16	MOD8+MOD4+ACS1+ACS2+ACS3	Product description
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<p>The Product range has been designed for machining of medium size pieces. Its design and structure allows facing operations that require heavy roughing as well as accuracy in the finished product. Together with the wide variety of available heads and accessories, these reconfigurations are the perfect option to carry out a great variety of works reliable and suitable safely and in an optimal way.</p>					Applications																																						

<p>The Life Cycle Assessment (LCA) was performed according to ISO 14040 ff. corresponding to the requirements of the guidelines concerning Type III declarations. Specific industrial data from Hypatia GNC Accesorios S.A., data from the data base ecoinvent 3.3 and sector data are used in this LCA.</p> <p>The method applied for assessment is CML-IA baseline v4.2 (April 2013) EU25, included in SimaPro software version 8.3.0.</p>			Scope of the LCA																				
<table> <tr> <th>Environmental Indicator</th><th></th><th>NORMA</th><th>NORMA+ACS1+ACS2+ACS3</th></tr> <tr> <td>Global warming (GWP100)</td><td>kg CO<sub>2</sub>eq</td><td>486 000 ±3%</td><td>503 000</td></tr> <tr> <td>Acidification (AP)</td><td>kg SO<sub>2</sub> eq</td><td>2 450±2%</td><td>2 540</td></tr> <tr> <td>Eutrophication (EP)</td><td>kg PO<sub>4</sub><sup>3-</sup> eq</td><td>256±6%</td><td>275</td></tr> <tr> <td>Photochemical oxidation (POCP)</td><td>kg C<sub>2</sub>H<sub>2</sub> eq</td><td>118±6%</td><td>123</td></tr> </table>	Environmental Indicator		NORMA	NORMA+ACS1+ACS2+ACS3	Global warming (GWP100)	kg CO <sub>2</sub> eq	486 000 ±3%	503 000	Acidification (AP)	kg SO <sub>2</sub> eq	2 450±2%	2 540	Eutrophication (EP)	kg PO <sub>4</sub> <sup>3-</sup> eq	256±6%	275	Photochemical oxidation (POCP)	kg C <sub>2</sub> H <sub>2</sub> eq	118±6%	123			Results of the LCA
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<p>Issued by: Hypatia GNC Accesorios, S.A</p> <p>In cooperación with CTME,</p> <p>Fundación Centro Tecnológico de Miranda de Ebro</p>																							
<p>The Environmental Product Declaration gives evidence of the validation of the used data. Data quality requirements are declared.</p> <p>Furthermore, specific applied chemical substances are declared in accordance with Regulation (EC) n ° 1907/2006.</p>			Evidence and verifications																				

Product group: Machine-tools for drilling, boring, or milling metal  
 Declaration holder: Hypatia GNC Accesorios S.A  
 Declaration number: S-P-01100

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## 1. PRODUCT RELATED INFORMATION

### 1.1 SPECIFICATION OF THE MANUFACTURING COMPANY

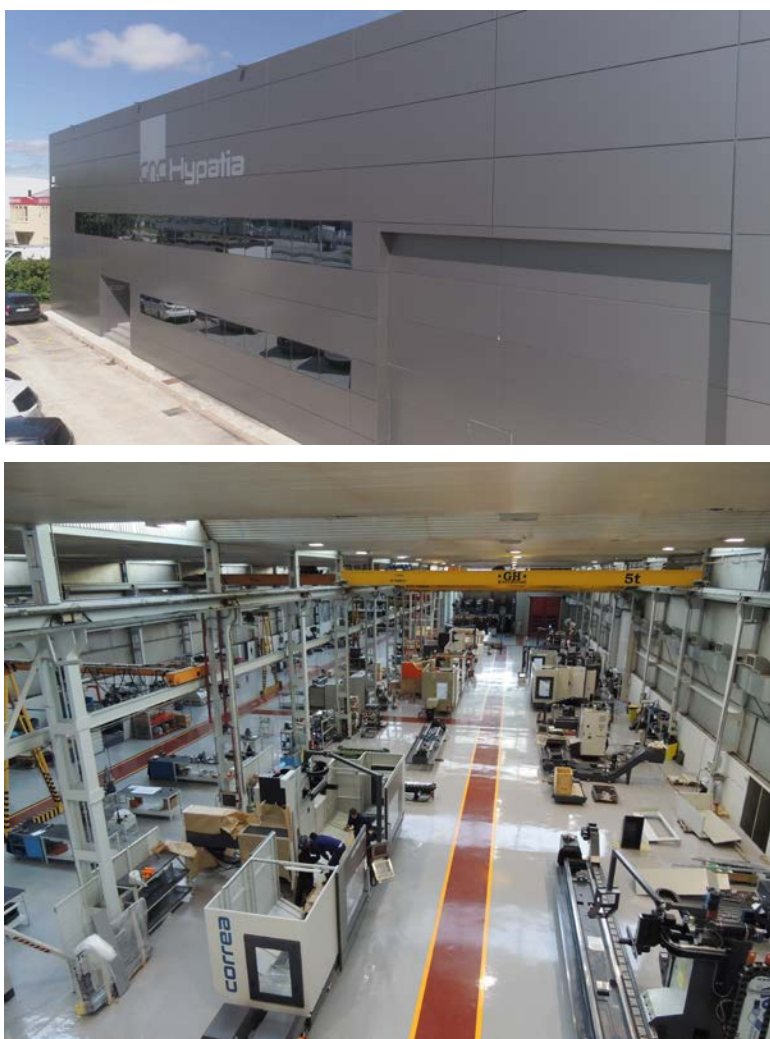
Hypatia GNC Accesorios, S.A company founded in 1997 designs, manufactures and supplies internationally milling machines as well as high technology accessories for the machine tool industry (automatic heads, automatic tool changers, etc.). Our equipment is manufactured entirely in Europe and with European components, always using the first brands of the market which gives an extra reliability to our product.

Its facilities are located in the industrial estate of Villalonquéjar (Burgos), where it has a 400 m<sup>2</sup> office and 4,000 m<sup>2</sup> industrial area dedicated to the manufacture and assembly of milling machines and accessories, they have all the necessary means to efficiently carry out this activity, from the design process through the collection of materials, assembly and marketing of all its products.

The vision of the company is oriented towards the development of a product of high technological value and maximum reliability. For this Hypatia GNC Accesorios, S.A maintains a policy of continuous investment in research and technological development.

Hypatia GNC Accesorios, S.A belongs to the industrial Group Nicolás Correa (CNG), one of the industrial groups of reference in Europe, both for size and innovation, in the design, design and manufacture of milling machines for the machining of medium and large dimension pieces. With a workforce of over 400 employees and an export volume of over 80%, it is the European leader in offering milling solutions perfectly adapted to the most demanding production environments, such as the manufacture of dies and large molds, elements monolithic aerospace, railway, energy and general mechanics sectors.

Nicolás Correa S.A., founded in 1947, is the parent company of the Nicolás Correa Group. Thousands of customers throughout the world continue to place their trust in our range of milling machines CORREA. Nicolás Correa currently exports around 90% of its production to over 20 different countries. To this end, it has a broad network of distributors and trading subsidiaries which ensure direct, personal contact with customers.



**Picture 1:** Facilities of Hypatia GNC Accesorios, S.A in Pol. Ind. de Villalonquéjar, Burgos (Spain)

The Nicolás Correa Group is made up by industrial subsidiaries linked to the machine tool sector and, under the umbrella of the parent company, constitute an integrated and synergetic network:

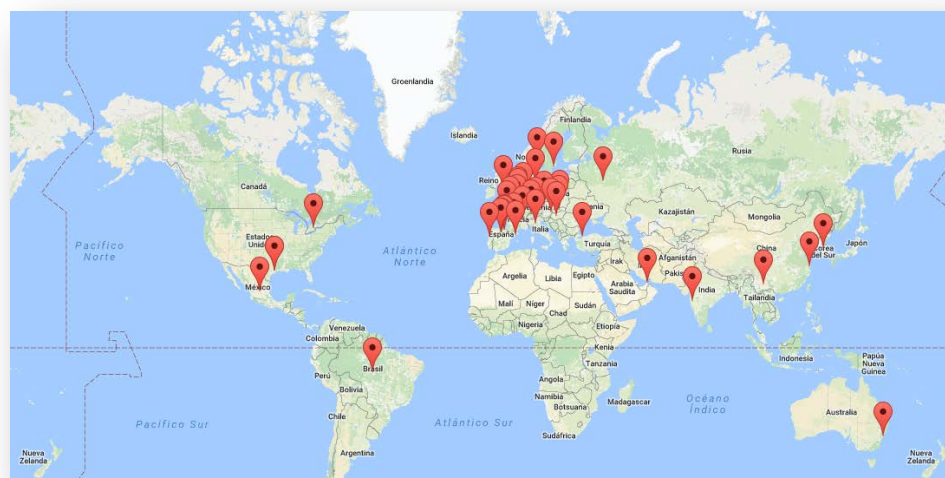
- GNC HYPATIA. Design and construction of CORREA milling machines of small size, and accessories for machine tools like ATCs and milling heads.
- GNC KUNMING. Manufacture and distribution of milling machines for the Chinese local market.
- ELECTRONIC GNC. Design and construction of electrical assemblies.
- GNC BOILERY. Mechano-welded structures, sheet metal parts and machinery protection systems.

Membership in the group enables the CORREA brand to have top-quality critical supplies and satisfy the flexibility requirements of our customers. The CORREA brand offers one of the widest ranges of milling solutions on the market covering bench, gantry, mobile column and T-configuration machines. The design and manufacture of the range are made entirely in Spain. Nicolás Correa, S.A. has been listed on Madrid stock exchange since 1989.

The mission of the Nicolás Correa Group is to help our clients optimally develop their value-added activities with reliable milling solutions, to ensure their loyalty, shareholder satisfaction and employee development

In order to achieve this mission, the management strategy, based on responsibility and the pursuit of excellence, has led Grupo Nicolás Correa to define Sustainable Design, as a necessary objective for our Company, to strengthen the competitiveness of our own activity and that of our customers through the development of eco-innovative products. The application of this strategy allows us to take into account criteria of reliability, safety, ergonomics and minimization of the environmental impact from the design to the end of life of our machines, thus optimizing the cost of the entire life cycle of the same. And support us in the environmental declarations of product as instruments of market differentiator that contributes environmental information of our machines CORREA.

In order to guarantee the service and the attention to our clients, we have a wide commercial and technical service network at the international level, being present directly or through agents in most of the countries.



**Picture 2:** Nicolás Correa Group sales network

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Picture 3: Nicolás Correa after sales-service network

## 1.2 SPECIFICATION OF THE PRODUCT

**Scope of validity:** This document applies to all NORMA structural reconfigurations (RECONF'S) identified in Table 1, including all its structural modules (MOD'S) and accessories (ACS), designed and manufactured in Hypatia GNC Accesorios, S.A, under the trademark CORREA.

TABLE 1: RECONFIGURATIONS OF NORMA MILLING MACHINES RANGE, (RECONF'S)

CODIFICATION	STRUCTURAL RECONFIGURATIONS
RECONF9	MOD7+MOD1+ACS1+ACS2
RECONF10	MOD7+MOD2+ACS1+ACS2
RECONF11	MOD7+MOD3+ACS1+ACS2
RECONF12	MOD7+MOD4+ACS1+ACS2
RECONF13	MOD8+MOD1+ACS1+ACS2+ACS3
RECONF14	MOD8+MOD2+ACS1+ACS2+ACS3
RECONF15	MOD8+MOD3+ACS1+ACS2+ACS3
RECONF16	MOD8+MOD4+ACS1+ACS2+ACS3



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TABLE 2: STRUCTURAL MODULES, (MOD'S)

CODIFICATION	MODULE/AXIS
MOD1	X20
MOD2	X25
MOD3	X35
MOD4	X45
MOD7	YZ NORMA U22
MOD8	YZ NORMA UGA

TABLE 3: OPTIONAL ACCESSORIES, (ACS')

CODIFICATION	ACCESSORIES
ACS1	Chip removal system
ACS2	ATC, tool changer
ACS3	Cutting oil injector (no MQL)

Data for all products has been used to develop the Environmental Product Declaration.

This EPD is intended to be used is in a Business to Business (B2B) communication, it is valid within the global geographical representativeness.

Picture 4 shows the product concept under study.

#### Product definition

The range of milling machines NORMA of horizontal ram, movable table and numerical control are machine-tools connected to the electric network in operation, consisting of fixed and movable parts and components. The assembly of which has the specific application of geometrically forming materials of different nature, through specific cutting tools, resulting in a product of reproducible geometry intended for professional use. It is a product of high technological value and maximum reliability. UN-CPC code: 44214.



Picture 4: NORMA milling machine

#### Application

NORMA has been designed for the machining medium size pieces. Its sturdy structure allows affording either heavy duty rough operations as well as accurate finishing. Together with the wide choice of heads and accessories available, makes this machine reliable and suitable for a great variety of works.

#### Delivery status

NORMA milling machines are manufactured in different reconfigurations which are indicated in the sales catalogue of the machines and on request.

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The process flow diagram under study is displayed in Figure 1.

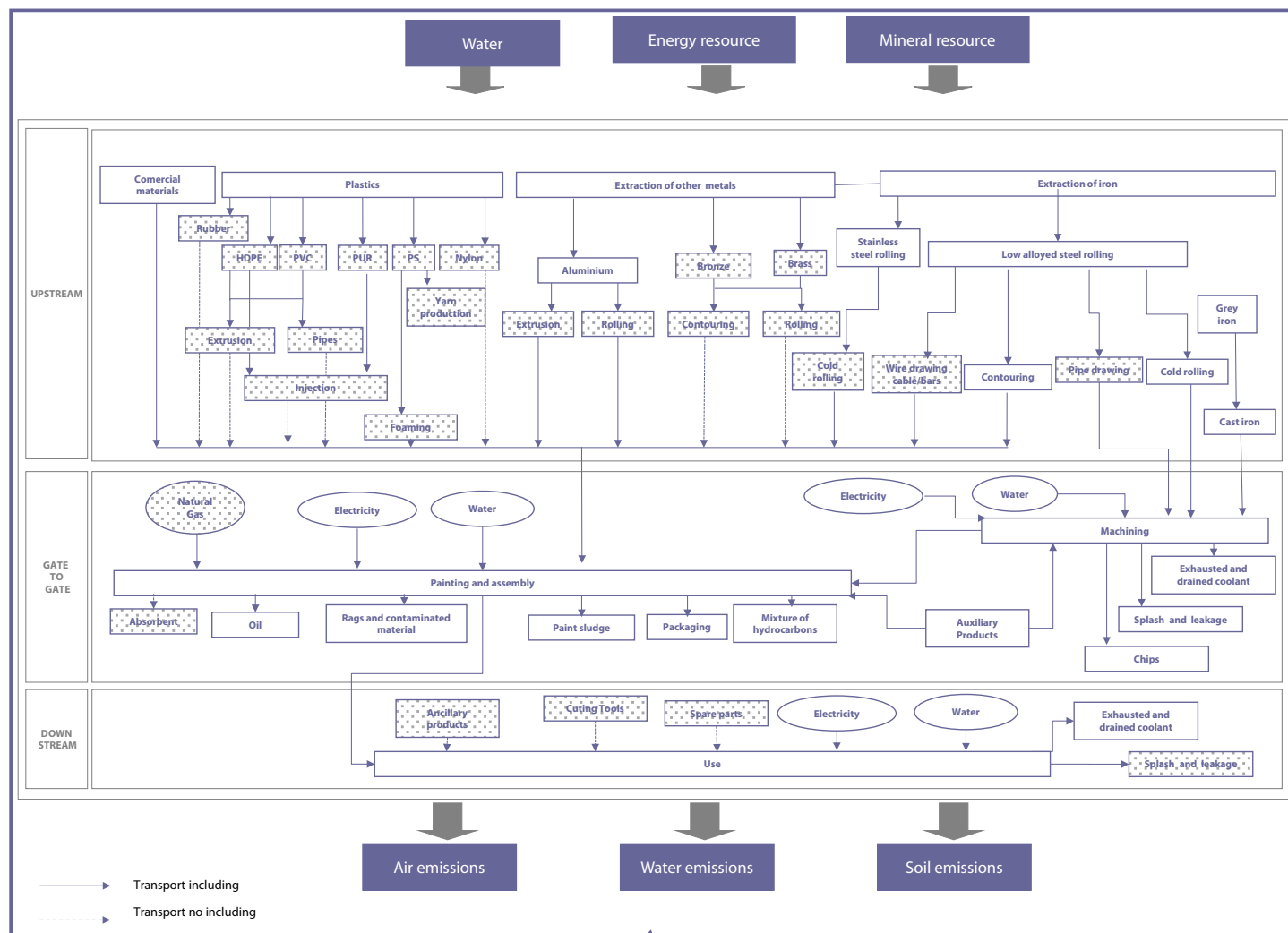


Figure 1: System boundaries of NORMA milling machine range. The figure represents all the unit processes considered in the scope, flows not included in the EPD are identified in shading.

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## Machines description

**TABLE 4: NORMA RECONFIGURATIONS FUNCTIONAL INFORMATION**

FUNCTIONAL INFORMATION	
FUNCTIONAL PERFORMANCE (kWh/m <sup>3</sup> ) <sup>1</sup>	158
PRODUCTIVITY (kWh/h) <sup>2</sup>	8.54
MILLING HEAD POWER (kW)	24-33
TOTAL POWER (kW)	35
CUTTING OIL CONSUMPTION (kg/h) <sup>3</sup>	0.0264
LUBRICATING OIL CONSUMPTION (kg/h) <sup>4</sup>	0.0270
WEAR TOOLS CONSUMPTION (kg/h) <sup>5</sup>	0.0064

## 1.3 DECLARED UNIT

### Declared Unit

For “Upstream” phase and “Gate to gate” phase of life cycle of product systems is a physical unit, one unit (1 unit) of every MOD and ACS.

The reference flow for the use phase of the life cycle of milling machines reconfigurations (RECONF's) is a functional unit, one working hour, 1h., during which, the machine is working with the light on continuously, and the auxiliary equipment: chip removal system, ATC and cutting oil injector enter into operation according to the accumulated time diagram indicated in PCR 2012: 02 v2.0.

The lifetime pattern applied in the declared unit for the stages of use is defined in the PCR 2012: 02 v2.0, 16 h / day x 260 day / year x 15 years = 62 400 h of useful life.

## 1.4 CONTENT OF MATERIAL AND CHEMICAL

### SVHC List

NORMA milling machine range does not contain any substance included in the Candidate List of Substances of very High Concern (SVHC) in concentrations greater than 0.1% by weight.

<sup>1</sup> Different advances and different sizes of tools.

<sup>2</sup> Includes head and lighting consumption.

<sup>3</sup> Generic data.

<sup>4</sup> Generic data.

<sup>5</sup> Generic data.

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**TABLE 5: NORMA MILLING MACHINE RANGE DESCRIPTION**

		RECONF9	RECONF10	RECONF11	RECONF12	RECONF13	RECONF14	RECONF15	RECONF16	
COMMERCIAL NAME		NORMA 20	NORMA 25	NORMA 35	NORMA 45	NORMA 20	NORMA 25	NORMA 35	NORMA 45	
MILLING HEAD		U22 Universal Manual Head	U22 Universal Manual Head	U22 Universal Manual Head	U22 Universal Manual Head	UGA Universal autoindexing differential	UGA Universal autoindexing differential	UGA Universal autoindexing differential	UGA Universal autoindexing differential	
DIMENSION	X axis (mm)	6 800	7 800	9 800	11 920	6 800	7 800	9 800	11 920	
DIMENSION	Y axis (mm)	5 900	5 900	5 900	5 900	5 900	5 900	5 900	5 900	
DIMENSION	Z axis (mm)	3 680	3 680	3 680	3 680	3 680	3 680	3 680	3 680	
WEIGHT <sup>6</sup> (kg)		17 800	19 000	21 000	25 000	17 800	19 000	21 000	25 000	
TABLE	Surface (mm)	2 300 x 1 000	2 800 x 1 000	3 800 x 1 000	4 800 x 1 000	2 300 x 1 000	2 800 x 1 000	3 800 x 1 000	4 800 x 1 000	
	Maximum load on the table (kg)	4 500	6 500	9 000	10 500	4 500	6 500	9 000	10 500	
TRAVERSES	Longitudinal(mm)	2 000	2 500	3 500	4 500	2 000	2 500	3 500	4 500	
	Cross (mm)	1 250								
	Vertical (mm)	1 500								
MOVEMENT SYSTEM	Axis controlled by AC motor capacitors with frequency shifter (PWM), connected to ball spindles in the three axes									
	Selection of movements is carried out by means of pushbuttons located in the control panel or in the programed CNC									
	Linear ways on the linear axes									
	Milling head: transmission by companion flange and reduction gearboxes									
HYDARAULIC SYSTEM	Hydraulic mooring and unmooring of tools is carried out									
	Hydraulic counterbalance in the transverse movement									
COOLING SYSTEM						Electrical cabinet cooling by air				
		Cooling of tools is carried out with cutting oil								
LIGHTING		Work light								
SECURITY		Full enclosed guarding								
LUBRICATION SYSTEM	Lubrication automatic circuit for the parts that need it									
	Lifetime lubrication for the linear ways									
	Manual lubrication for the screws of the spindles									
	Lubrication by immersion of the gearbox ZF									

<sup>6</sup> Milling head, electrical cupboard, cutting oil removal, etc. are not included. It only contains structural elements (bed, table, framework, ram, column and guarding)

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Lubrication of head by means of mixture of air-oil

Hydraulic station maintenance

Hydraulic counterbalance maintenance

Vacuum pump

TOOL CHANGER

30 tools

TABLE 6: MATERIAL CONTENT PER RECONF

	RECONF9		RECONF10		RECONF11		RECONF12		RECONF13		RECONF14		RECONF15		RECONF16	
TRADE NAME	NORMA 20		NORMA 25		NORMA 35		NORMA 45		NORMA 20		NORMA 25		NORMA 35		NORMA 45	
HEAD	U22		U22		U22		U22		UGA		UGA		UGA		UGA	
MATERIALS	kg	%	kg	%	kg	%	kg	%	kg	%	kg	%	kg	%	kg	%
<b>Low alloyed steel</b>	<b>3 830</b>	<b>22</b>	<b>4 116</b>	<b>22</b>	<b>5 202</b>	<b>24</b>	<b>4 554</b>	<b>19</b>	<b>4 756</b>	<b>25</b>	<b>5 042</b>	<b>25</b>	<b>6 128</b>	<b>27</b>	<b>5 480</b>	<b>22</b>
Steel 42 Cr Mo 4	89.0	0.5	96.0	0.5	59.0	0.3	121	1	90.0	0.5	97.0	0.5	60.0	0.3	122	0.5
Aluminium	49.7	0.3	49.7	0.3	49.7	0.2	64.8	0.3	60.5	0.3	60.5	0.3	60.5	0.3	75.6	0.3
Bronze	1.40	0.0	1.40	0.0	1.40	0.0	1.0	0.0	1.40	0.0	1.40	0.0	1.40	0.0	1.40	0.0
Rubber	5.36	0.0	5.36	0.0	5.36	0.0	5.48	0.0	18.2	0.1	18.2	0.1	18.2	0.1	18.3	0.1
Copper	-	-	-	-	-	-	-	-	0.0705	0.0	0.07	0.0	0.35	0.0	0.0705	0.0
<b>Cast GG-30</b>	<b>13 084</b>	<b>75</b>	<b>14 138</b>	<b>75</b>	<b>15 941</b>	<b>74</b>	<b>18 611</b>	<b>79</b>	<b>971</b>	<b>69</b>	<b>025</b>	<b>70</b>	<b>828</b>	<b>69</b>	<b>18 498</b>	<b>74</b>
Brass	0.197	0.0	0.197	0.0	0.197	0.0	0.197	0.0	4.20	0.0	4.20	0.0	4.20	0.0	4.20	0.0
Commercial material: CRT	12.0	0.1	12.0	0.1	12.0	0.1	12.0	0.1	12.0	0.1	12.0	0.1	12.0	0.1	12.0	0.0
Commercial material: diode	-	-	-	-	-	-	-	-	0.00300	0.0	0.003	0.0	0.003	0.0	0.003	0.0
Commercial material: micro, issuer	2.60	0.0	2.60	0.0	2.60	0.0	2.60	0.0	6.16	0.0	6.16	0.0	6.16	0.0	6.16	0.0
<b>Commercial material: engines and pumps</b>	<b>261</b>	<b>2</b>	<b>261</b>	<b>1</b>	<b>261</b>	<b>1</b>	<b>266</b>	<b>1</b>	<b>725</b>	<b>4</b>	<b>725</b>	<b>4</b>	<b>725</b>	<b>3</b>	<b>730</b>	<b>3</b>
Commercial material: engines and pumps (AI)	-	-	-	-	-	-	-	-	3.00	0.0	3.00	0.0	3.00	0.0	3.00	0.0
Commercial material: fan	-	-	-	-	-	-	-	-	0.300	0.0	0.300	0.0	0.300	0.0	0.300	0.0
Nylon	3.50	0.0	3.50	0.0	3.50	0.0	3.50	0.0	3.50	0.0	3.50	0.0	3.50	0.0	3.50	0.0
Plastic (HDPE)	18.1	0.1	18.1	0.1	18.4	0.1	18.1	0.1	30.6	0.2	30.6	0.2	30.9	0.1	30.6	0.1
Polyester	10.4	0.1	10.4	0.1	10.4	0.0	10.4	0.0	10.4	0.1	10.4	0.1	10.4	0.0	10.4	0.0
Poliurethane	17.6	0.1	17.6	0.1	17.6	0.1	17.6	0.1	17.6	0.1	17.6	0.1	17.6	0.1	17.6	0.1
PVC	10.0	0.1	10.0	0.1	10.0	0.0	10.0	0.0	10.0	0.1	10.0	0.0	10.0	0.0	10.0	0.0
<b>TOTAL</b>	<b>17 395</b>	<b>100</b>	<b>18 741</b>	<b>100</b>	<b>21 594</b>	<b>100</b>	<b>23 698</b>	<b>100</b>	<b>18 721</b>	<b>100</b>	<b>20 067</b>	<b>100</b>	<b>22 920</b>	<b>100</b>	<b>25 024</b>	<b>100</b>



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## 2. ENVIROMENTAL PERFORMANCE-RELATED INFORMATION

### 2.1 RULES FOR DECLARATION PER MODULE DERIVED FROM LCA

This EPD is based on information modules that not cover the aspects of end of milling machine life stage. It is a **“cradle to use”** EPD. It contains in detailed form, for upstream, core and downstream processes.

<b>Upstream</b>	Upstream processes, from cradle to gate. The acquisition, production of the material inflows for the MOD's and ACS'. Raw material extraction like metal, plastic, etc. and its secondary transformation: rolled, extruded, etc. and transportation into bargain are included in Upstream processes.
<b>Core</b>	Core processes, from gate to gate processes, manufacturing and building of NORMA milling machines. This process starts when the components and materials come into Hypatia's facilities and finishes when milling machines leave the plant. The Core processes include machining, painting, and mechanical assembly. However, the machining operations that are not performed in Hypatia's facilities, but the company has control over these operations, as they have been outsourced to a subsidiary form the same business group GNC. Production of chemicals, energy flows: natural gas and electricity, emissions into air solid and water waste are evaluated in core processes. Further, from gate to gate processes include transportation to the core process and external transport to waste disposal (in the case of waste flows). Shipping is based on the customer pool.
<b>Downstream</b>	From user gate to user gate, phase of use of milling machines. It includes the demand of electricity, cutting tools, spare parts, cutting oil, lubricating oils, waste management.

Figure 1 defines the modular scope of the declaration and the processes studied in each module.

### 2.2 ENVIRONMENTAL PERFORMANCE DECLARATION-MINIMUM SET OF PARMETERS FROM THE LCA STUDY

<b>Allocation</b>	The time (hours) of machining, painting and assembly was selected as physical property to separate the inputs and outputs associated with MOD's from the flows linked to the rest of equipment that are built in the facilities of Hypatia. In the upstream stage, allocation has been avoided because the elements of each MOD's and ACS have been listed item by item.
<b>Cut-off criteria</b>	Cutting rules have been conducted in upstream and downstream stages for each reconfiguration, leaving out of reach those flows that represent less than 1% by mass, energy and environmental impact criteria. 99% of total flows are evaluated environmental. In the gate to gate stage to include 99% of all evaluated impacts, it was necessary to readjust the cut off criteria to <1%. In Figure 1, flows not included in the EPD are identified in shading by the applied cutting rules.
<b>Data quality</b>	<p>Data are collected by Hypatia for the production year 2016 (specific operations of the analysed site). Also considered as primary data are those extracted from PCR document 2012: 02.</p> <p>Secondary/background data to account the production of materials and energy have been taken from ecoinvent 3.3 (October 2016) and sectoral sources: IHOBE, 1999 and Schischke K et al. 2012.</p>

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There is a contribution of 100% of primary data in the Upstream Processes.

13% of secondary data are used in the gate to gate stages. The environmental impact of secondary data is minor than 1% on all impact categories.

There is a contribution of 81% of primary data in the Downstream Processes. The contribution of generic data over the entire life cycle under study is <5% for all impact categories.

#### Electricity

Spanish power grid mix was used for the electrical demands of the Gate-Gate stage. The basic data in ecoinvent 3.3 was applied for electricity; this dataset describes the electricity inputs produced in Spain and from imports, as well as the transmission of electricity.

The global electric mix is applied for the electrical demands of the use phase. The global electrical profile included in ecoinvent 3.3 is taken.

#### Assumptions

The measurements and experimental data of electrical consumption of the phase of use have been determined through many machining in different machine models, but not in each and every one of the reconfigurations. The degrees of freedom of electric consumption are focus on: (i) the nature of the materials to be machined and (ii) the variability in the operational routes. So, it is assuming that the electrical demand in use of a milling machine does not depend to a greater extent on the size of the machine, but on the operational criteria demanded by the customer to reach the quality criteria of the final piece.

#### Transportation

Transport of materials, pre-products, ancillary products and wastes has been taken into account in base on "Transport, freight, lorry, unspecified {GLO}| market for | Alloc Rec, U (ecoinvent 3.3) for high-volume and long-distance transport, and "Transport, freight, light commercial vehicle {GLO}| market for | Alloc Rec, U" (ecoinvent 3.3) for small-scale transportation.

Provincial capitals were selected as representative locations in national transport country capitals were selected as representative locations in international road transport.

#### Recyclability

Recyclability chapter is only informative because this EPD is from cradle to use phase. The recycling and treatment quotas of the end-of life milling machine are declared according to PCR 2012: 02 v2.0. 95% of the final product, metal parts, is reused and recycled. 0.2% of the machine is deposited in controlled landfill, 80% of the plastics and PWB are incinerated, 18% of the plastic is recycled and 1% of the plastic is reused or recycled in a closed loop.

## 2.3 POTENCIAL ENVIRONMENTAL IMPACT-AGGREGATION INFORMATION MODULES

Table 7 gives the absolute and relative contribution from "cradle to use" of a NORMA bed-type milling machine range.

The life cycle assessment of NORMA milling machine range was carried out in accordance with PCR 2012:02 v2.0. Potential Environmental impacts have been declared under the aggregation factors CML-IA v4.2 (Abril 2013) EU25, included in SimaPro 8.3.0 software. Long-term emissions are excluded.

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**TABLE 7: RESULTS OF IMPACT ASSESSMENT FROM CRADLE TO USE OF NORMA MILLING MACHINE RANGE AND ITS ACCESORIES**

	GLOBAL WARMING (GWP100)		PHOTOCHEMICAL OXIDATION (POCP)		ACIDIFICATION (AP)		EUTROPHICATION (EP)	
	kg CO <sub>2</sub> eq	%	kg C <sub>2</sub> H <sub>4</sub> eq	%	kg SO <sub>2</sub> eq	%	kg PO <sub>4</sub> <sup>-3</sup> eq	%
NORMA RANGE <sup>7</sup>	486 000 ±3%	100	118±6%	100	2 450±2%	100	256±6%	100
Upstream processes	44 300	9	24.0	20	225	9	55.2	22
Core processes	7 050	1	2.75	2	39.7	2	3.59	1
Shipping	608	0	0.0906	0	0.479	0	0.479	0
Downstream processes	434 000	89	91.3	77	2 180	89	196	77
NORMA +ACS1	491 000		120		2 480		268	
NORMA +ACS2	488 000		119		2 460		258	
NORMA +ACS3	494 000		120		2 4692		260	
NORMA+ACS1+ACS2+ACS3	503 000		123		2 540		275	

## 2.4 USE OF RESOURCES

**TABLE 8: PARAMETER DESCRIBING USE OF RESOURCE**

PARAMETER <sup>8</sup>	UNIT	UPSTREAM PROCESSES	CORE PROCESSES	DOWNSTREAM PROCESSES	SHIPPING
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	25 200	11 900	480 000	146
Use of renewable primary energy resource used as raw materials	MJ	44 100	4 720	571 000	214
Total use of renewable primary energy resource (primary energy and primary resources used as raw materials)	MJ	69 300	16 600	1 050 000	360
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	585 000	155 000	5 950 000	50 900
Use of non-renewable primary energy resource used as raw materials	MJ	247 000	78.3	3 290	43.4
Total use of non-renewable primary energy resource (primary energy and primary resources used as raw materials)	MJ	832 000	155 000	6 000 000	5 1 000

<sup>7</sup> RECONF13 is taken as reference product because its values are closer to the central number of impact for each impact category.

<sup>8</sup> Evaluated using the Cumulative Exergy Demand method V1.05 / Cumulative exergy demand

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**TABLE 9: PARAMETER DESCRIBING USE OF WATER**

PARAMETER <sup>9</sup>	UNIT	UPSTREAM PROCESSES	CORE PROCESSES	DOWNSTREAM PROCESSES	SHIPPING
Total amount of water	m <sup>3</sup>	9 250	6 504	86 300	197
Direct amount of water used by core process	m <sup>3</sup>		0.320		

**TABLE 10: PARAMETER DESCRIBING WASTE PRODUCTION**

PARAMETER	UNIT	CORE PROCESSES
Total amount of waste production by core process	kg	1 528
Hazardous waste, in kg (as defined by regional directives)	kg	763
Non-hazardous wastes,	kg	481
Material addressed to recycling	kg	284

### 3. COMPARISONS OF EPDS

To be able to compare EPDs with this product category they have to be based on PCR 2012:02.

**“EPDs from different programmes may not be comparable”**

### 4. CONTACT INFORMATION

EPD OWNER

  
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<sup>9</sup> Evaluated using the AWARE V1.00 method

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## 5. VERIFICATION RELATED-INFORMATION

### PRODUCT CATEGORY RULES (PCR):

UN CPC 44214, Machine-tools for drilling, boring or milling metal PCR 2012:02 V2.0 (2014/07/11)

### PCR REVIEW WAS CONDUCTED BY:

Eva Martínez Herrero, CTME, evamtz@ctme.es

Independent verification of the declaration and data, according to ISO 14025:2006:

☐ EPD Process Certification (internal)

☒ EPD Verification (external)

### THIRD PARTY VERIFIER:

Jordi Oliver i Solà.

### ACCREDITED BY:

Approved by the International EPD System

## 6. REFERENCES

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