

Sistema DAPHabitat Environmental Declaration of Product

www.daphabitat.pt

[according to ISO 14025, EN 15804:2012+A1:2013 e EN 15942]



Número de registo: DAP 021:2022



Sanitary ware (Fine Fireclay – FC)

ISSUE DATE: 31/10/2022

VALID UNTIL: 30/10/2027

SANINDUSA – Indústria de Sanitários, S.A.



SANINDUSA



VERSION 1.1. EDITION MAY 2021

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1. GENERAL INFORMATION

1.1. The DAPHabitat System

Program operator:	Associação Plataforma para a Construção Sustentável www.centrohabitat.net centrohabitat@centrohabitat.net	
Address:	Department of Civil Engineering University of Aveiro 3810-193 Aveiro	
Email address:	deptecnico@centrohabitat.net	
Telephone number:	(+351) 234 401 576	
Website:	www.daphabitat.pt	
Logo:		

1.2. EPD Owner

Name of the owner:	Sanindusa – Indústria de Sanitários, S.A.
Production Site:	Zona Industrial Aveiro Sul, Rua Augusto Marques Branco, 84, 3810-783 Aveiro, Portugal
Address (head office):	Zona Industrial Aveiro Sul, Rua Augusto Marques Branco, 84, 3810-783 Aveiro, Portugal
Telephone number:	(+351) 234 940 250
Email address:	sanindusa@sanindusa.pt
Website:	www.sanindusa.pt
Logo:	SANINDUSA
Information concerning the applicable management Systems:	NP EN ISO 9001:2015 – Environmental Management Systems – Certifying entity APCER, Conformity certificate number PT – 1996/CEP.401 NP EN ISO 14001:2015 – Quality Management – Certifying entity APCER, Conformity certificate number PT – 2005/AMB.228 EMAS III – Community eco-management and audit scheme – Certifying entity APCER, register number PT-000105
Specific aspects regarding the production:	CAE 23420 – Manufacturing of ceramic articles for sanitary use
Organization's environmental policy:	The Sanindusa, S.A. commits to: <ul style="list-style-type: none"> • Innovate and improve the quality of its products and services by focusing on design and differentiation at competitive prices, increasing the confidence in the company and contributing to the loyalty of its customers; • Develop the best conditions regarding hygiene, health, and safety in the workplace for its collaborators through the reduction of the risks in the workplace; • Bet on the training and accountability as a vehicle for the integration and


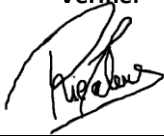
satisfaction of the collaborators;

- Minimize, in a sustainable way, the environmental impact of the organization, namely through the reduction of its wastes and liquid and gaseous emissions, by developing a preventative action for pollution and environmental protection;
- Sensitize regarding the best environmental practices promoting adequate management of the environment;
- Use the best technologies sharing synergies between manufacturing units as a way to reinforce the productivity, cost reduction, increase of profitability, reduction of the environmental impacts and health risks and safety for the collaborators;
- Apply continuous improvement to increase value to the relevant stakeholders;
- Continuous improvement of the quality and environmental management system, supporting the increase of performance, including in the environmental area;
- Based on the risk analysis, incorporate safety concerns in the action planning.

1.3. Information concerning the EPD

Authors:	1. Centro Tecnológico da Cerâmica e do Vidro 2. Sanindusa – Indústria de Sanitários, SA
Contact of the authors:	1. CTCV materials: habitat iParque – Parque Tecnológico de Coimbra - Lote 6 3040-540 Antanhol – Portugal (T) +351 239 499 200 Marisa Almeida: marisa@ctcv.pt 2. Sanindusa – Indústria de Sanitários, SA. Zona Industrial Aveiro Sul, Rua Augusto Marques Branco, 84, 3810-783 Aveiro, Portugal (T) +351 234 940 250 sanindusa@sanindusa.pt
Issue date:	31/10/2022
Registration date:	31/10/2022
Registration number:	DAP 021:2022
Valid until:	30/10/2027
Representativity of the EPD (location, manufacturer, group of manufacturers):	EPD of one (1) product class, produced in one plant, belonging to a single (1) producer (Sanindusa – Indústria de Sanitários, S.A.).
Where to consult explanatory material:	www.sanindusa.pt
Type of DAP:	EPD from cradle to gate (A1-A3)

1.4. Demonstration of verification

External independent verification, accordingly to the standard ISO 14025:2009 and EN 15804:2012+A1:2013	
Certification Body	Verifier
	
(CERTIF – Associação para a Certificação)	(Ricardo Mateus)

1.5. EPD Registration


Program Operator

(Sustainable Habitat Cluster)

1.6. PCR of reference

Name:	PCR – Sanitary ware [Sanitary installations and kitchens]
Issue date:	10/02/2014
Number of registration on the data base:	PCR005:2014
Version:	1.2
Identification and contact of the coordinator (s):	Cristina Rocha cristina.rocha@Ineg.pt Paula Duarte paula.duarte@Ineg.pt
Identification and contact of the authors:	Cristina Rocha cristina.rocha@Ineg.pt Marisa Almeida marisa@ctcv.pt Paula Duarte paula.duarte@Ineg.pt
Composition of the Sectorial Panel:	RMC – Revestimentos de Mármore Compactos, S.A. Sanindusa – Indústrias de Sanitários, S.A. Sanitana APICER – Associação Portuguesa da Indústria de Cerâmica
Consultation period:	11/09/2013 to 30/11/2013
Valid until:	December 2022
Name:	PCR – Base model for construction products and services
Issue date:	19/01/2016
Number of registration on the data base:	PCR006
Version:	2.1
Identification and contact of the coordinator (s):	Marisa Almeida marisa@ctcv.pt Luís Arroja arroja@ua.pt José Silvestre jose.silvestre@tecnico.ulisboa.pt
Identification and contact of the authors:	Marisa Almeida Luís Arroja José Silvestre Fausto Freire Cristina Rocha Ana Paula Duarte Ana Cláudia Dias Helena Gervásio Victor Ferreira Ricardo Mateus António Baio Dias
Composition of the Sectorial Panel:	–
Consultation period:	18/11/2015 to 18/01/2016
Valid until:	December 2022

1.7. Information concerning the product/product class

Identification of the product:	Sanitary ware (Fine Fireclay)																						
Illustration of the product:																							
Brief description of the product:	<p>The sanitary ware of <i>Fine Fireclay</i> ceramic are ceramic products manufactured for the architectural and interior design sector. To produce this product, a ceramic paste is introduced into moulds, that are subjected to drying, inspection, glazing and cooking. After these stages, the pieces are chosen and classified and can be sent to packaging, retouch or broken (refused material to be recycled).</p> <p>In this EPD the results are indicated per unit of mass (1 kg) of product. However, since the production process is the same, regardless of the shape of the product, it is possible to calculate the values corresponding to a single ceramic piece, by multiplying the values presented in this EPD by the weight of the respective piece. The weights of a specific ceramic piece are available, among others, in the product's technical characteristics datasheet (available on the Sanindusa website, at: www.sanindusa.pt).</p> <p>The following table presents the generic range of weights (Kg) of each product type:</p> <table border="1"> <thead> <tr> <th></th> <th>Minimum / Maximum</th> <th>Weighted average</th> </tr> </thead> <tbody> <tr> <td>Columns</td> <td>20.8 / 32.4</td> <td>29.7</td> </tr> <tr> <td>Clothes washer</td> <td>22.0 / 37.0</td> <td>26.0</td> </tr> <tr> <td>Sinks</td> <td>8.8 / 42.4</td> <td>26.5</td> </tr> <tr> <td>Urinal</td> <td>14.9</td> <td>14.9</td> </tr> <tr> <td>Washbasins</td> <td>8.2 / 45.8</td> <td>18.0</td> </tr> <tr> <td>Shower trays</td> <td>23.8 / 43.7</td> <td>33.0</td> </tr> </tbody> </table>			Minimum / Maximum	Weighted average	Columns	20.8 / 32.4	29.7	Clothes washer	22.0 / 37.0	26.0	Sinks	8.8 / 42.4	26.5	Urinal	14.9	14.9	Washbasins	8.2 / 45.8	18.0	Shower trays	23.8 / 43.7	33.0
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Main technical characteristics of the product:	<table border="1"> <thead> <tr> <th>Parameters</th> <th>FC Paste</th> <th>Test norm</th> </tr> </thead> <tbody> <tr> <td>Water absorption</td> <td>-</td> <td rowspan="4">The test norms applicable, for each product type, are listed in "Technical rules of the product" (page 6).</td> </tr> <tr> <td>Thermal shock resistance</td> <td>Pass</td> </tr> <tr> <td>Chemical resistance – acids, alkalis, spots, and chemical agents</td> <td>No attack</td> </tr> <tr> <td>Static charge</td> <td>Pass</td> </tr> <tr> <td>Crazing resistance</td> <td>Pass</td> <td>-</td> </tr> </tbody> </table>		Parameters	FC Paste	Test norm	Water absorption	-	The test norms applicable, for each product type, are listed in "Technical rules of the product" (page 6).	Thermal shock resistance	Pass	Chemical resistance – acids, alkalis, spots, and chemical agents	No attack	Static charge	Pass	Crazing resistance	Pass	-						
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Water absorption	-	The test norms applicable, for each product type, are listed in "Technical rules of the product" (page 6).																					
Thermal shock resistance	Pass																						
Chemical resistance – acids, alkalis, spots, and chemical agents	No attack																						
Static charge	Pass																						
Crazing resistance	Pass	-																					
Description of the products application:	The sanitary ware includes equipment connected to plumbing and diverse applications in bathrooms and kitchens. These include wash basins, columns, shower trays for bathrooms, sinks, and clothes washers.																						
Reference service life:	Unspecified (EPD from cradle to gate).																						
Placing on the market/Rules of application in the market/Technical	The following standards are the most relevant, the others applicable are in item 2.6: EN 14527 – Shower trays for domestic purposes; EN 14688 – Sanitary appliances – Wash basins – Functional requirements and test methods;																						

rules of the product:	EN 13310 – Kitchen sinks – Functional requirements and test methods; EN 13407 – Wall-hung urinals – Functional requirements and test methods; UNE 67001 – Ceramic sanitary ware. Technical specifications.
Quality control:	The Sanindusa defines goals and objectives for its quality and environmental system that are monitored throughout the year for continuous improvement. The Sanindusa presents a certified Quality and Environmental Management System according to the EN ISO 9001, for the development, production, and commercialization of sanitary ware and in the development, production, and commercialization of equipment for bathrooms and kitchens. The ceramic units and finished product storages are also certified according to the EN ISO 14001 and by EMAS in the development, production, and commercialization of sanitary ware and the development, production, and commercialization of equipment for bathrooms and kitchens.
Special delivery conditions:	Not applicable.
Components and substances to declare:	Not applicable.
History of LCA studies:	There are no previous LCA studies.

2. ENVIRONMENTAL PERFORMANCE OF THE PRODUCT

2.1. Calculation rules of the LCA

Declared unit:	1 kg of sanitary ware - Fine Fireclay (average product) for sanitary functions (including packaging)
Functional unit:	–
System boundaries:	EPD from cradle to gate
Criteria for the exclusion:	<p>For the LCA it was considered the production processes of the sanitary ware, auxiliary materials and energy consumed in the manufacturing for which inventory data is available. It is important to notice that processes not considered in this analysis are covered by the exclusion criteria defined in EN 15804:2012+A1:2015 since their mass is inferior to 1% of the total mass of the inputs.</p> <p>The following processes were excluded:</p> <ul style="list-style-type: none"> ▪ The environmental loads associated with the construction and maintenance of infrastructures and equipment (capital goods); ▪ The long-term emissions.
Assumption and limitations:	The data collected and the environmental impact results and remaining indicators presented in this EPD are referring to 2019.
Quality and other characteristics about the information used in the LCA:	<p>For the processes among which the producer has influence, namely the ceramic sanitary ware manufacturing, real and specific data were used.</p> <p>For processes that the Sanindusa, SA doesn't have total influence or specific information, such as the production of auxiliary materials (colourants, additives, glasses, lubricant oils, water disinfecting agents, packaging materials), fuel and electricity production, wastewater treatments, waste treatment and recovery and transports, generic data obtained by the Ecoinvent – version 3.7 database were used.</p> <p>The generic data used comply with the data quality requirements (time and geographic coverage, plausibility, completeness, source reliability and differences in the data and sensibility analysis).</p>
Allocation rules:	The allocation rules adopted were based on the mass annual production of Fine Fireclay of Sanindusa, S.A.
Comparability of EPD for construction products:	The EPDs of the construction products and services might not be comparable if they aren't produced according to EN 15804, EN 16485 and EN 15942 and according to the comparability conditions determined by ISO 14025.

2.1.1. Flow diagram of input and output of the processes

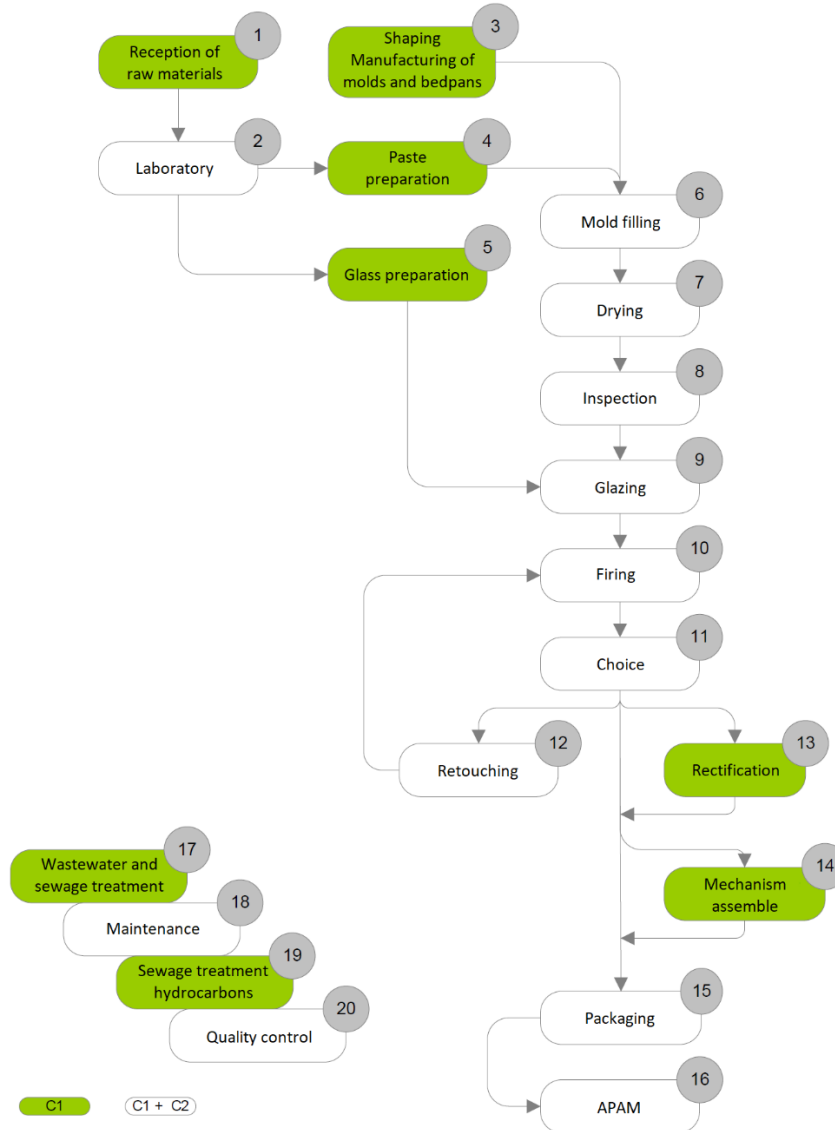


Figure 1: Scheme of the production process of the units Ceramic 1 (C1) and Ceramic 2 (C2), of the headquarters of the Sanindusa, S.A. (Aveiro Sul).

2.1.2. Description of the system boundaries

(✓= included; ✗= module not declared)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
Raw material supply	Transport	Manufacturing	Transport	Construction installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-constructions, demolition	Transport	Waste processing	Disposal	Re-use, recovery, recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗

The production process includes the stages of paste and glass preparation, mould production, ceramic piece conformation, drying glazing and cooking. Finally, it is performed the choosing/retouching and rectification. After these stages, the assembling and packaging of the products are performed.

The raw materials used for the formulation of the paste are inspected, classified, and stored in granaries being transferred to hoppers, from which the dosing occurs, being performed in a continuous canvas with automatic weighing. The “inert” hard raw materials are processed in three ball mills, while the plastic materials are prepared in two turbodiluters. These prepared materials are then stored in distinct wells being led to dosing tanks, from which a final working mixture (barbotine) is obtained. This working mixture is purified in vibrating sieves and stored in underground wells with slow agitation. The glass raw materials are also inspected, classified, and stored, being then grinded in a ball mill, and are then purified in vibrating sieves, passing through an iron and manganese remover, before being sent to tanks with agitation.

To produce the moulds, the cast is weighed and the correct amount of water is added; the agitation time is controlled in a vacuum environment. This mixture is used to fill the mould mother and, after the chemical transformations occur, the demoulding of the cast moulds is performed. The drying of these moulds occurs in ovens with humidity and drying air temperature control. The dry moulds are then sent to the pottery bench. The resin moulds that are produced in the unit in Tocha – Sanindusa 2 or acquired to a third party.

The ceramic pieces' conformation is performed by classic manual filling of low (cast mould) or high pressure (resin mould). The stored barbotine is sent to the bench supply tanks. After the opening of the moulds, the pieces are retrieved and remain in the pottery so that a first drying occurs; they are later sent to drying.

The drying is performed in dryers, with manual charge and discharge, with a drying cycle of around 14h at 70°C. After the drying, the pieces are retrieved from the drier and follow to the inspection/glazing booths to be inspected, finished, cleaned, and glazed. The non-conformed pieces are sent to the paste preparation zone to suffer a new turbodilution. After glazing, the pieces are cooked in two continuous tunnel ovens at around 1210°C. In this stage, the high fire logo is placed in the pieces. The return of the pieces (cooking of the pieces retouched in the choice) is assured by intermittent ovens, at a temperature of 1205°C and a cooking cycle of around 24h.


After cooking, there is a qualitative selection of all the pieces, being grouped into commercial (pieces without flaws and that comply with the requirements of the control plan and with the same colour as the pattern), retouch (pieces with possible repairable defects and that comply with the control plan requirements), broken ware (pieces with defects that can't be repaired or that don't comply with the control plan requirements).

Later on, but before the packaging of the pieces, these can be engraved by laser using sintered ceramic pigments, every time that is technically inviable the use of a high fire logo or if it is commercially solicited. They can also be rectified to have a plane settling surface (essentially in the case of sinks and dishwashers).

Finally, the pieces are packaged or placed in pallets according to the defined requirements and sent to the APAM (final product warehouse), where they are kept until they are shipped to the client.

2.2. Parameters describing environmental impacts


		Global warming potential, GWP kg CO ₂ equiv.	Depletion potential of the stratospheric ozone layer, ODP kg CFC 11 equiv.	Acidification potential of soil and water, AP kg SO ₂ equiv.	Eutrophication potential, EP kg (PO ₄) ³⁻ equiv.	Formation potential of tropospheric ozone, POCP kg C ₂ H ₄ equiv.	Abiotic depletion potential for non-fossil resources kg Sb equiv.	Abiotic depletion potential for fossil resources MJ, P.C.I.
Raw material supply	A1 –A3	2.07E+00	3.71E-07	4.53E-03	5.87E-04	3.50E-04	1.58E-06	2.69E+01
Transport								
Manufacturing								

LEGEND:
 Product stage

NOTES: P.C.I. – Net calorific value.
 Units expressed by declared unit (1 kg of sanitary ware in Fine Fireclay ceramic).

2.3. Parameters describing resource use

		EPR MJ, P.C.I.	RR MJ, P.C.I.	TRR MJ, P.C.I.	EPNR MJ, P.C.I.	RNR MJ, P.C.I.	TRNR MJ, P.C.I.	MS kg	CSR MJ, P.C.I.	CSNR MJ, P.C.I.	Net use of fresh water m ³
Raw material supply	A1 –A3	2.55E+00	1.96E+00	4.51E+00	3.07E+01	5.78E-02	3.08E+01	4.39E-01	0.00E+00	0.00E+00	8.57E-03
Transport											
Manufacturing											


LEGEND:
 Product stage

EPR = use of renewable primary energy excluding renewable primary energy resources used as raw materials; RR = use of renewable primary energy resources used as raw materials; TRR = total use of renewable primary energy resources (EPR + RR); EPNR = use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; RNR = use of non-renewable primary energy resources used as raw materials; TRNR = total use of non-renewable primary energy resources (EPNR + RNR); MS = use of secondary material; CSR = use of renewable secondary fuels; CSNR = use of non-renewable secondary fuels; Fresh water = use of the liquid value of fresh water.

NOTES: Units expressed by declared unit (1 kg of sanitary ware in Fine Fireclay ceramic).

2.4. Other environmental information describing different waste categories

		Hazardous waste disposed kg	Non-hazardous waste disposed kg	Radioactive waste disposed kg
Raw material supply				
Transport	A1 –A3	4.89E-05	1.10E-01	4.87E-05
Manufacturing				

LEGEND:
 Product stage

NOTES: Units expressed by declared unit (1 kg of sanitary ware in Fine Fireclay ceramic).

2.5. Other environmental information describing output flows

Parameters	Units*	Value
Components for re-use	kg	N.A.
Materials for recycling	kg	2.55E-01
Materials for energy recovery	kg	2.88E-03
Exported energy	MJ per energy carrier	N.A.

* expressed by functional unit or declared unit (1 kg of sanitary ware in Fine Fireclay ceramic)
 N.A. – not applicable

2.6. Additional information

Placing on the market/Rules of application in the market/Technical rules of the product applied:

NP EN 31 – Wash basins – Connecting dimensions;
 EN 80 – Wall-hung urinals – Connecting dimensions;
 EN 251 – Shower trays – Connecting dimensions;
 EN 695 – Kitchen sinks – Connecting dimensions;
 EN 997 – WC pans and WC suites with integral trap;
 NF D 11-101 – Sanitary appliances – Sanitary ceramic wash basins;
 NF D 14-601 – Sanitary appliances: Material enamelled – General specifications;
 NF D 11-124 – Sanitary appliances – Vitreous enamelled shower trays;
 NF D 14-501 – Sanitary appliances – Resistance to abrasion of enamelled surfaces – Test method;
 NF D 14-506 – Sanitary appliances – Resistance to acids at ambient temperature of enamelled surfaces – Conventional test method;
 NF D 14-507 – Sanitary appliances – Resistance to hot alkaline products of enamelled surfaces – Conventional test method;
 NF D 14-508 – Sanitary appliances – Resistance to domestic chemical agents and resistance to stains of enamelled surfaces – Test method;
 NF D 14-503 – Sanitary appliances – Resistance to thermal shock of enamelled surfaces – Test method.

REFERENCES

- ✓ **Direção-Geral de Energia e Geologia (DGEG)** – Energy in Portugal Report (2019);
- ✓ **Direção-Geral de Energia e Geologia (DGEG)** – Monthly Data of Electrical Energy (2019);
- ✓ **Ecoinvent database v3.7** (2019). (www.ecoinvent.org);
- ✓ **EN 15804:2012+A1:2013** - Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products;
- ✓ **EN 15942:2011** - Sustainability of construction works – Environmental product declarations – Communication format business-to-business;
- ✓ **Entidade Reguladora dos Serviços Energéticos (ERSE)** – Special Regime Production (PRE) (2019);
- ✓ **General Instructions of the DAPHabitat System**, Version 1.0, Edition March 2013 (in www.daphabitat.pt);
- ✓ **ISO 14025:2009 Environmental declarations and labels** – Type III environmental declarations – Principles and procedures;
- ✓ **PCR – basic module for construction products and services**. DAPHabitat System. Version 2.0, 2015 (in www.daphabitat.pt);
- ✓ **PCR – Sanitary ware [Sanitary installations and kitchens]**. DAPHabitat System. Version 1.2, 2020 (in www.daphabitat.pt);
- ✓ **Redes Energéticas Nacionais (REN) – Information Centre** – Monthly Statistics (2019). (in <http://www.centrodeinformacao.ren.pt/PT/InformacaoExploracao/Paginas/EstatisticaMensal.aspx>);
- ✓ **Sanindusa** (em www.sanindusa.pt).