



ENVIRONMENTAL PRODUCT DECLARATION

**DIATHONITE Evolution,
DIATHONITE Acoustix,
DIATHONITE Deumix.
Cork-based, natural plasters for
thermal and acoustic insulation**



Declaration Holder	Diasen S.r.l.
Date of issue	26/01/2017
Rev.	02

Validity:	24/01/2022
CPC Code :	37410 - Plasters
Date of approval:	24/01/2017

Geographical scope:	Worldwide
Registration No:	S-P-00838

1 DIASEN S.R.L.

Diasen aims for PERFECTION. Since 1999 Diasen has oriented its business choices towards always more innovative PRODUCTS, with high quantity of natural elements as well as with high technology and quality content.

Our products improve life conditions of the environment closer to PEOPLE: their home, by protecting it from damp and temperature ranges, through the same principles that can be found in the nature.

PROTECT the environment means to love ourselves, for this reason we follow with PASSION the guidelines related to the continuous improvement of processes, of products and of relationship with people and PARTNER that belong to the world of Diasen ,as well as of the area in which we operate.

The respect of the legislation, of regulations and of all prescriptions applicable to the environmental protection as well as to the reduction and control of environmental impacts, are the basic principles that characterize each single PROJECT. Since 2007 we have carried out a certified Environmental Management System in compliance with the standard EN ISO 14001, in order to prevent pollutions and to minimise the environmental impacts of its own activities and its own products. We pay attention to each process and our meticulous internal organisation, which is always keep up with the **latest environmental laws**, allows us to pursue **LEED mapping** for 14 key products. The fulfilment of the present policy is eased through awareness, formative and training activities, planned at the beginning of the year and which involve operators, customers and partners. Specific attention is paid to the reduction of waste production that derives from its own production cycle, through a careful and effective activity of monitoring and control, by favouring, when possible, the production of recoverable waste. We also make sure that our suppliers perform their activities by respecting the applicable law, we identify environmental aspects on which we can exert influence and we dedicate ourselves to the awareness of the same to obtain a continuous improvement. Through Research and Development activity, we set the goal of using raw materials deriving from manufacturing waste or from recoverable waste. During the planning phases, we are always oriented to thermo-insulating products to reduce the energy use and consumption inside the house.

Every year goals of continuous improvement are established, defined by the Directorate General together with the Environmental Management Team, which are then documented and transmitted to the interested parties. The results of each single process, analysed through planned re-examinations, represent the basis for the definition of new goals and aims, directed to the improvement of processes management, that can have an impact on environmental respect and protection.

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1.1 DECLARATION OF GENERAL INFORMATION

This environmental product declaration in accordance with ISO 14025 and EN 15804 and the General Programme Instructions version 2.5

1.2 GEOGRAPHICAL SCOPE OF THE EPD

Worldwide

1.3 PRODUCTION SITES

DIASEN S.r.l.

Zona Ind. Berbentina, 5

60041 Sassoferrato (AN) - Italy

1.4 INFORMATION ON ENVIRONMENTAL MANAGEMENT SYSTEM/ ENVIRONMENTAL POLICY

Production site:	ISO 9001:2008	ISO 14001:2004	OHSAS 18001:2007	ISO 50001:2011
DIASEN S.r.l.	X	X	NEXT IMPLEMENTATION	-
X: certified	-: not certified			

2 SPECIFICATION OF PRODUCTS

Diasen undertook the first series of tests on cork based plaster as early 1985. The aim of our research was to obtain a unique product that would have the best thermal, dehumidifying, sound absorbent and long-lasting features (when exposed to cold, heat and salt) with easy applications. All of the materials used in Diathonite production have a life-span of at least 100 years; recent archaeological findings have even brought to light remains of Roman houses dating back to as far as 2000 years ago, which were insulated with cork. The diatomaceous and clay powders which form the basis of our product have accumulated in deposits for thousands of years on our planet. The natural hydraulic lime is also a binder characterized by high breathability.




Parameter	Unit				Test methodology	Technical specification
		Natural plaster, for external wall insulation, formulated with cork, natural hydraulic lime, clay and diatomaceous earth, with high thermal insulation power, sound-absorbing, breathable and dehumidifying	Premixed plaster to be used for the construction of sound-absorbing coatings, acoustic insulation of facades and partition walls. Composed by cork, clay, diathomeic powders and hydraulic binder.	Natural plaster with high-dehumidifying capacity, formulated with pure natural hydraulic lime, cork, clay and diathomeic powders. To be used for dehumidification and restoration of walls affected by rising damp.		
Declared Unit	kg	1	1	1	--	
<u>Thermal conductivity</u>	W/mK	$\lambda = 0,045$ (categoria T1)	$\lambda = 0,080$ W/mK	$\lambda = 0,083$	UNI EN 1745:2012	EN 998-1:2010
<u>Compression resistance</u>	N/mm ²	2,7 (categoria CS II)	3,11 (categoria CS II)	3,0 (categoria CS II)	UNI EN 1015-11:2007	
<u>Fire reaction</u>		class A1	class A1	class A1	UNI EN 13501-1:2009	
<u>Vapour permeability absorption</u>		$\mu = 4$ (Altamente traspirante)	$\mu = 4$	$\mu = 4$	UNI EN 1015-19:2009	
<u>Capillarity water absorption</u>	kg/m ² min ^{0,5}	0,40 (categoria W1)	0,63 (categoria W0)	0,35 (categoria W2)	UNI EN 1015-18:2004	
<u>Adhesion</u>	N/mm ²	0,10 – FP: B	0,258 – FP: C	0,258	UNI EN 1015-12:2002	
<u>Cl content</u>				0,018 ± 0,003%	UNI EN 1015-17:2008	
<u>Specific weight</u>	kg/m ³	360 ± 20	450 ± 45	470 ± 30	UNI EN 1015-10:2007	
<u>hazardous substances</u>	--	Calcium hydroxide; Potassium hydroxide; Sodium hydroxide	Calcium hydroxide; Potassium hydroxide; Sodium hydroxide	Calcium hydroxide Calcium silicate Calcium carbonate	Regolamento CE n. 1272/2008	

Figure 2-1 Technical properties of DIATHONITE PRODUCTS

2.1 DESCRIPTION PRODUCTS USES

Specifications for mortar for masonry – Part 1: Mortar for internal and external plaster. In accordance with EN 998-1 regulation. Product used on walls, columns, partition walls and ceilings.

2.2 CONTENT OF MATERIALS AND CHEMICAL SUBSTANCES

Raw materials	CAS	EINECS	Hazard phrases	Average Composition	Function
Cork			No	40-50%	Thermal properties
Clay			No	10-15%	Thermal and hygroscopic properties
Hydrated lime	1305-62-0	215-137-3	H318; H315; H335	25-40%	Binder and natural antibacterial
Hydraulic lime	1310-58-3	215-181-3	H318; H315; H335; H317		Natural binder
Diatomite	61790-53-2	310-127-6	No	<5%	Thermal properties
Polypropylene fibers	--	--	No	<1%	Flexural strength anti-cracking
Organic Additives	--	--	n.d.	<8%	Adhesion Workability Flexibility
Inorganic Additives	--	--	H228; H315; H318; H335	<1%	Air-entraining anti-shrinkage

Figure 2-2 Raw materials used in the production process of DIATHONITE PRODUCTS

Diathonite products are not classified as hazardous or dangerous for the environment in accordance with Directives 67/548/EEC and 1999/45/EC. There are not substances included in the Authorisation List (Attachment XIV) or the Candidate List of Substances of Very High Concern for Authorisation issued by the European Chemicals Agency, nor do they contain such substances. Under normal storage and use conditions, these products can be handled with no particular precautions or special protective equipment. Detailed composition of products is DIASEN S.r.l, know-how and cannot be published.

According to ISO 14021, the following materials have been considered "recycled materials":

Material	Category	Recycled content
Cork	<p>PRE-consumer recycled content</p> <p>PRE-consumer recycled content is defined as materials that are diverted from the manufacturing waste stream and used to make a new product. Normally, the materials are purchased from companies that collect discarded waste from other manufacturers. To qualify, the materials must be considered a waste product and not normally reused by industry within the original manufacturing process. Paper product scraps that must be re pulped can be considered PRE-consumer content</p>	85%

Figure 2-3 Recycled materials used in the production process of DIATHONITE PRODUCTS

3 PRODUCTION PROCESSES

DIATHONITE products are manufactured by DIASEN S.r.l. by using an innovative plant for powder premixed, that allows to reduce the waste production, before and after the production process, to optimize the movements and to minimise the environmental impacts.

3.1 DIATHONITE PRODUCTION PROCESS

The production plant, dedicated to the powder premixed, performs several applications in one machinery, by optimising the consumption of resources, working time and movements.

The main stages of the productive process are:

1. Selection of the recipe (dosage/ sampling), the machinery performs the transfer of raw materials from silos to the mixer, through screw elevator.
2. Product mixing.
3. Packaging.
4. Palletization / capping.

From the powder installation, the product is palletized and ready to be dispatched.

3.2 RELEASE OF DANGEROUS SUBSTANCES DURING USE

.TO BE COMPLETED BY DIASEN xxxx

3.3 USE AND DISPOSAL

Diathonite products are cork-based, natural plaster for thermal insulation and home energy retrofit. The products are applied to external and internal walls and ceilings.

4 ENVIRONMENTAL PERFORMANCE ASSESSMENT

Product environmental performance was assessed using the Life Cycle Assessment (LCA) method, in accordance with the EN ISO 14044:2006 standard, and the Life Cycle Impact assessment (LCIA) method, in accordance with standard UNI EN 15804:2014, served as the core PCR.

The study was conducted in accordance with Product Category Rules (PCRs) approved by the Technical Committee of the International EPD System, PCR CPC 54: CONSTRUCTION PRODUCTS AND CONSTRUCTION SERVICES 2012:01 Version 2.01. The PCR complies with the General Programme Instruction of the International EPD® System version 2.5 dated 2015-05-11, when applicable, as well as UNI EN 15804:2014.

The results of the estimated environmental impacts are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

4.1 DECLARED UNIT

Diathonite plasters are supplied in paper bags with weights that vary from 18 kg (Diathonite Evolution) to 20 kg (Diathonite Acoustix and Deumix). The declared/functional unit is 1 kg of plaster.

4.2 GENERAL SYSTEM BOUNDARIES

Type of EPD: cradle to factory gate.

In accordance with the UNI EN 15804:2014 standard and PCR CPC 54 2012:01 v.2.01, modules A1-A3 (Manufacturing Phase) have been considered. The product life cycle starts with the production and processing of the raw materials needed for manufacturing (Upstream: Raw Materials Supply A1) and their transport to the factory gate of Diasen S.r.l. (Core: Transport A2). All the company's internal processes and activities which contribute to the manufacture of the products covered by this EPD have been considered, including all the up-stream processes related to energy and utilities (Core: Manufacturing A3). Due to the modular nature of the system, in order to include phases A4 and A5 (Construction process), an additional study of the different types of application (external walls, internal walls and ceiling) would need to be carried out, as has been done for phase A3. All output flows (direct and indirect emissions) and waste disposal were taken into account, as shown in the following chart.

INFORMATION RELATED TO THE SYSTEM BOUNDARIES APPLIED IN THE STUDY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)						
Upstream		Core		Downstream		
A1-A3) Manufacturing Phase						
Raw Material Supply	Transport	Manufacturing	Transport	Construction/ Installation	Usage stage	End-of-life stage
A1	A2	A3	A4	A5	B	C
X	X	X	MND	MND	MND	MND

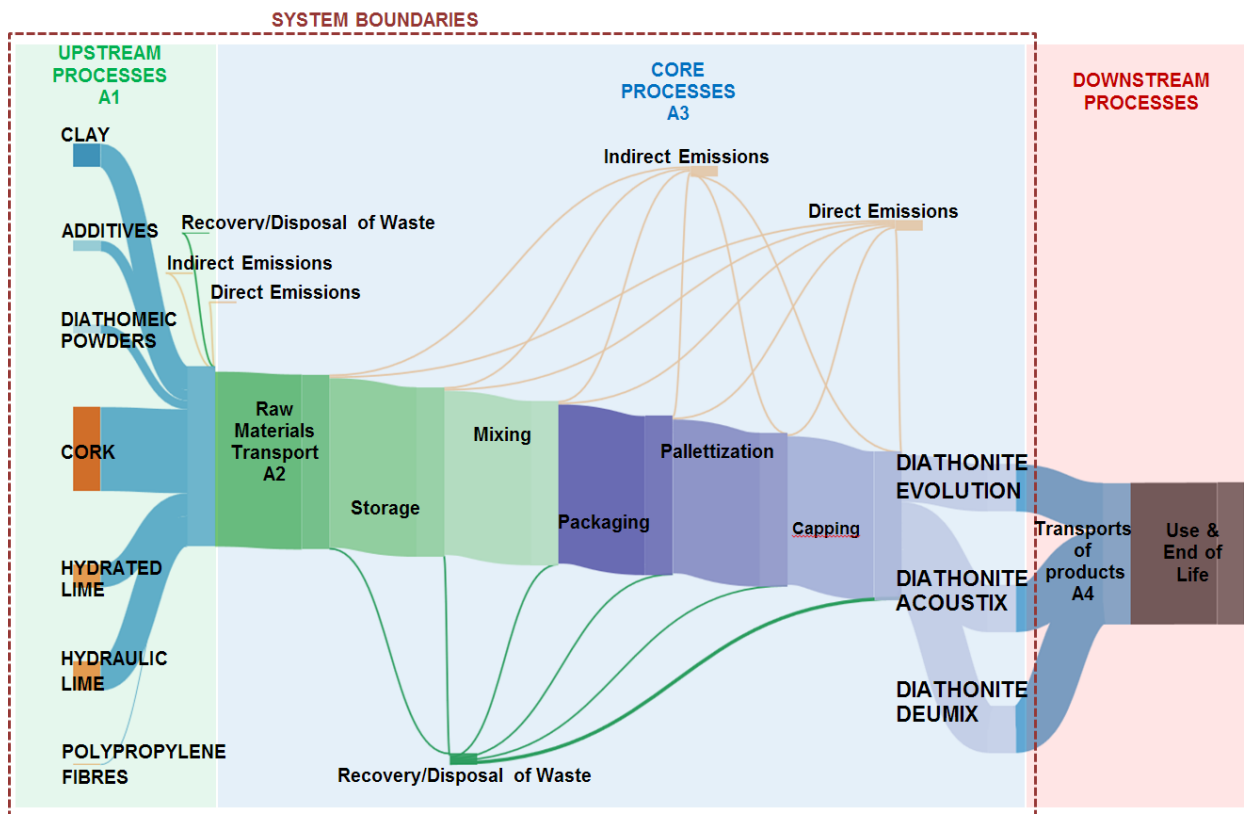
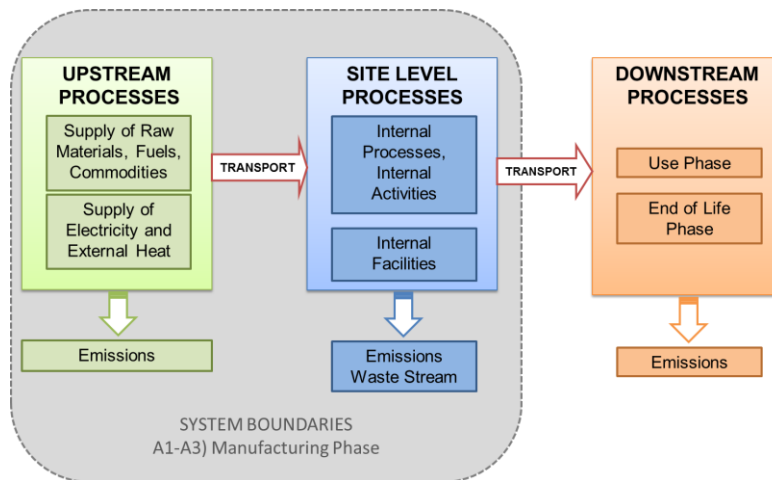


Figure 4-1 System Boundaries of EPD

4.3 REFERENCE SERVICE LIFE

This EPD does not indicate Reference Service Life (RSL).

4.4 ESTIMATES AND ASSUMPTIONS

In accordance with the *General Programme Instructions for the International EPD® System (2015)* and the reference PCR, secondary materials (Cork and Clays) used in the production system have been accounted adopting the following approach:

- the environmental impacts related to the "previous life cycle" have not been considered;
- secondary materials do not need to be processed before the new use
- the transports to the factory gate have been considered;
- the energy content associated to the secondary material which contains energy (Cork) has been estimated considering the gross calorific value (19,6 MJ/kg¹) and presented as secondary energy resource (feedstock energy from waste or scraps or similar);

Additives composition has been properly modelled using specific information. The only proxy data used are the ones related to the inorganic additives which constitute the 0.02% in mass of the receipt. Their contribution is below the 1% to the total impact amount of each environmental indicators.

4.5 CUT-OFF CRITERIA

Life Cycle Inventory Data for a minimum of 99% of total inflows (mass and energy) to the upstream and core module have been included. Thus the percentage of the total environmental impact that might have been omitted did not exceed 1%. Consumption of raw materials and energy related to ordinary and extraordinary maintenance operations was not included, since it was not considered relevant to environmental impact calculations.

4.6 BACKGROUND DATA

All the background data used in this EPD were retrieved from the Ecoinvent and ELCD databanks. For inventory modelling, SimaPro 8.2.0 software was used.

4.7 DATA QUALITY

Data collection included the analysis of internal production and environmental data from Diasen S.r.l. production site, the acquisition of relevant data (site specific data) for all the production processes included in the LCA and the disclosure of information about the energy sources used. For the electricity used in the process the company buys the energy from a specific supplier, thus the specific energy mix were used. Data from databases were selected in order to fulfil prescribed data quality characteristics for precision, completeness and representativeness. Concerning the background data used, the geographical reference was Italy, or, to the greatest extent, Central Europe, while the time period spanned the last 10 years.

4.8 REFERENCE TIME PERIOD FOR DATA COLLECTION

The reference time period for all the LCA data gathered by the company engaged in the study was the year 2015.

4.9 ALLOCATION

Diasen S.r.l. produces Diathonite Evolution, Diathonite Acoustix and Diathonite Deumix along with other products. In order to get product-based inventory data, all direct and indirect environmental stressors, inputs (raw materials, energy - heat and electricity - etc.) and outputs (emissions, waste, etc.) have been

¹ *Energy recovery from cork industrial waste: production and characterisation of cork pellets*, L.J.R. Nunes, J.C.O. Matias J.P.S. Catalão, 2013

mass-allocated to the selected Diathonite products. No co-product is produced, plasters wastes are disposed as waste coating powders (CER 08.02.01).

4.10 COMPARABILITY

All the data and results related to Diathonite products were collected and obtained based on the EN 15804 standard, in the context of their final use in the building manufacturing system. Thus, the environmental impacts associated with the Diathonite products are comparable with the environmental impacts of other similar products calculated according to the same UNI EN 15804 standard. EPDs of construction products may not be comparable if they do not comply with UNI EN 15804. Environmental product declaration within the same product category from different programs may not be comparable.

5 ENVIRONMENTAL PROFILES

Below are reported the environmental profiles of the products covered by this EPD using the LCA method.

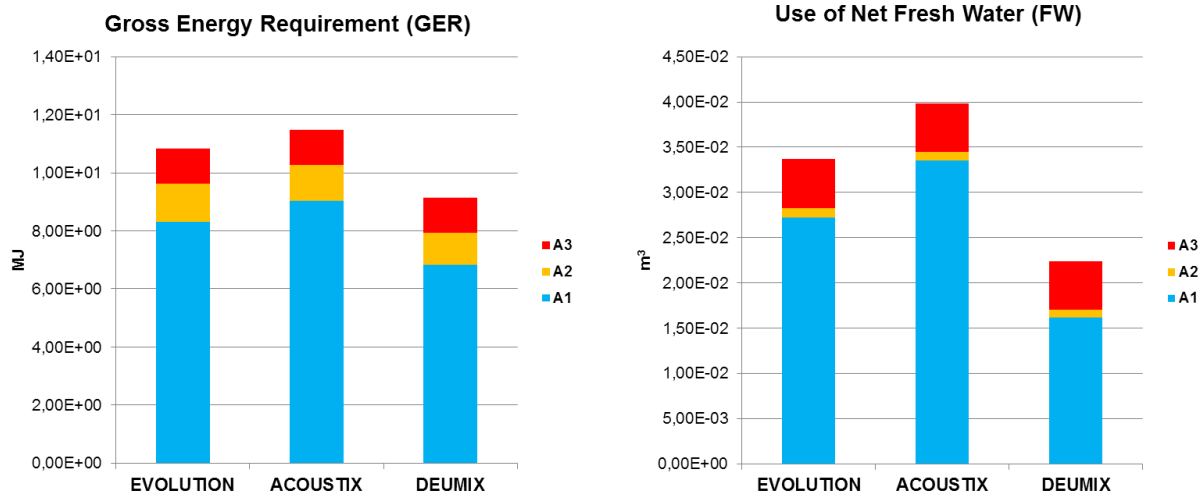
- Diathonite Evolution
- Diathonite Acoustix
- Diathonite Deumix

DIATHONITE Products		A1-3) MANUFACTURING PHASE		
PARAMETER	UNIT	DIATHONITE Evolution [1 kg]	DIATHONITE Acoustix [1 kg]	DIATHONITE Deumix [1 kg]
USE OF RESOURCES				
Use of renewable primary energy (PERE)	[MJ]	1,75E+00	1,64E+00	1,63E+00
Use of renewable primary energy resources used as raw materials (PERM)	[MJ]	1,38E+00	1,38E+00	1,32E+00
Total use of renewable primary energy (PERT)	[MJ]	3,14E+00	3,02E+00	2,95E+00
Use of non-renewable primary energy (PENRE)	[MJ]	7,70E+00	8,46E+00	6,20E+00
Use of non-renewable primary energy resources used as raw materials (PENRM)	[MJ]	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources (PENRT)	[MJ]	7,70E+00	8,46E+00	6,20E+00
Use of secondary material (SM)	[kg]	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels (RSF)	[MJ]	7,83E+00	7,83E+00	7,50E+00
Use of non renewable secondary fuels (NRSF)	[MJ]	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	[m³]	3,37E-02	3,99E-02	2,24E-02
POTENTIAL ENVIRONMENTAL IMPACT				
Global Warming Potential (GWP ₁₀₀)	[kg CO ₂ eq]	5,19E-01	5,23E-01	5,27E-01
Biogenic carbon storage in products	[kg CO ₂ eq]	1,18E-03	1,16E-03	1,35E-03
Ozone Depletion Potential (ODP)	[kg CFC-11 eq]	4,60E-08	4,56E-08	4,42E-08
Photochemical Oxidation Potential (POCP)	[kg C ₂ H ₄ eq]	1,05E-04	1,09E-04	9,69E-05
Acidification Potential (AP)	[kg SO ₂ eq]	1,64E-03	1,67E-03	1,52E-03
Eutrophication Potential (EP)	[kg PO ₄ ³⁻ eq]	1,15E-03	1,12E-03	1,09E-03
ADPE	[kg Sb eq]	8,04E-07	7,97E-07	6,64E-07
ADPF	[MJ]	6,22E+00	6,53E+00	5,48E+00
WASTE PRODUCTION				
Non-Hazardous waste disposal	[kg]	3,53E-03	3,53E-03	3,53E-03
Material for Energy Recovery (MER)	[kg]	1,17E-03	1,17E-03	1,17E-03
Radioactive waste disposed	[kg]	0,00E+00	0,00E+00	0,00E+00
Hazardous waste disposed	[kg]	0,00E+00	0,00E+00	0,00E+00

6 INTERPRETATION OF RESULTS – LIFE CYCLE IMPACT ASSESSMENT (LCIA)

Use of resources

The most relevant contribution to the *use of resources* associated to the production of Diathonite products is represented by A1 phase (raw materials and energy supply).



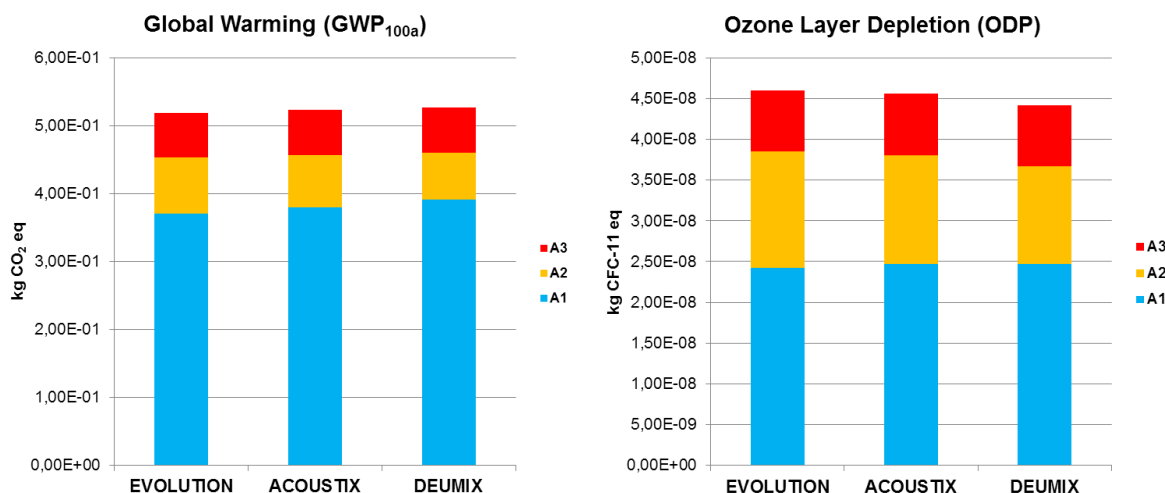
Environmental impact

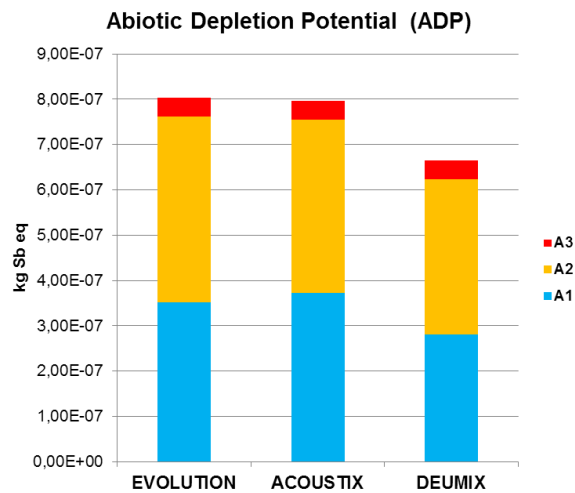
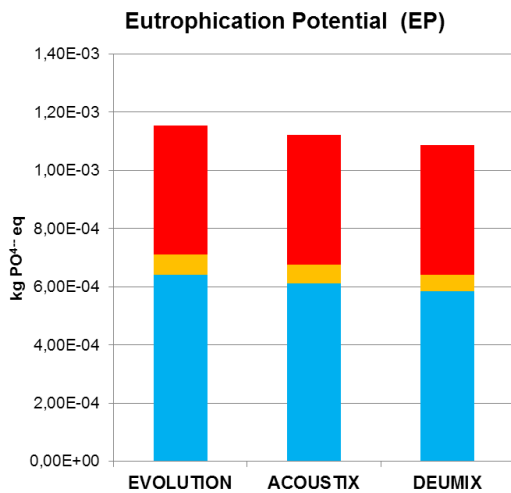
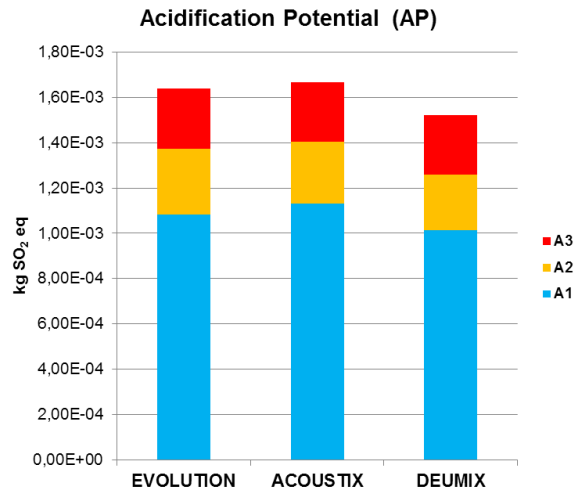
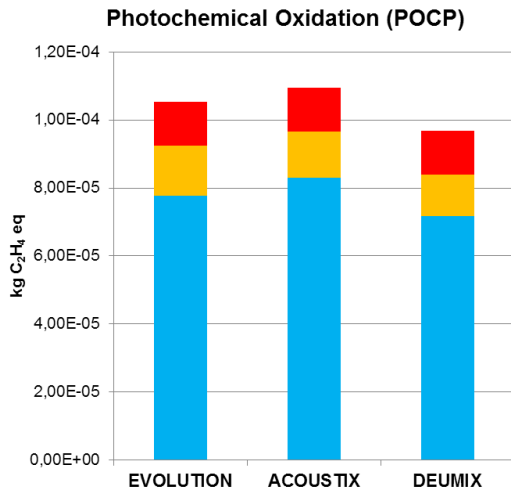
The most relevant contribution to the environmental impacts associated to the production of Diathonite products is represented by A1 phase (raw materials and energy supply).

The addition of ~6% of additives makes the environmental impacts of *Diathonite Acoustix* the most relevant on the impacts categories *Photochemical Oxidation Potential, Acidification Potential, Abiotic Depletion Fossil Resources, Gross Energy Requirements* and *Use of Net Fresh Water*.

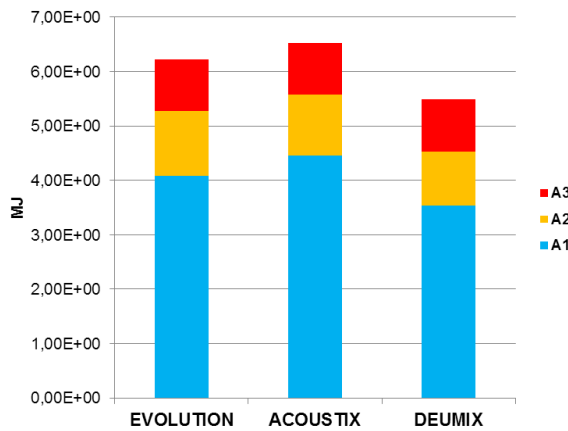
Diathonite Deumix shows the highest impact on *Global Warming Potential* because it contains more raw materials than other products (17% hydrated lime vs 12-12,5% and 19% hydraulic lime vs 17%).

Eutrophication Potential (EP) is extremely influenced by Packaging production. *Diathonite Evolution* is the most impactful since it is supplied in paper bags with weight of 18 kg, unlike the other products (packed in bags of 20kg). Furthermore, *Diathonite Evolution* has an higher content of diathomeic powders, which have, in spite of their amount, an high impact on A2 phase. This characteristic influences the impacts categories *Ozone Layer Depletion Potential* and *Abiotic Depletion Potential*.





Abiotic Depletion Fossil Resources (ADPF)



Output flows and waste

Wastes contribution on the different impact categories is not relevant ($\leq 0,1$).

ADDITIONAL INFORMATION

CONTACTS

ISSUER AND CONTACTS

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VERIFICATION AND REGISTRATION:

EPD Programme: The International EPD® System (www.environdec.com). Valhallavägen 81, SE-114 27 Stockholm Sweden;

CEN standard EN 15804 served as the core PCR	
PCR:	PCR 2012:01 Construction products and Construction services, Version 2.01 del 2016-03-09
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact via info@environdec.com
Independent verification of the declaration and data, according to ISO 14025:	<input type="checkbox"/> EPD process certification (Internal) <input checked="" type="checkbox"/> EPD verification (External)
Third party verifier:	Rina Services S.p.A. Via Corsica, 12 – 16128 – Genova (Italy). Tel: +39 010 53851 Fax: +39 010 5351000 website: www.rina.org .
Accredited or approved by:	ACCREDIA Accreditation number: 001H

Technical support: : ICA - Società di Ingegneria Chimica per l'Ambiente S.r.l. – Bergamo, Italy.

For further information on this Environmental Product Declaration (EPD), contact: www.environdec.com

REFERENCES

- THE INTERNATIONAL EPD® SYSTEM PCR CPC 54: CONSTRUCTION PRODUCTS AND CONSTRUCTION SERVICES 2012:01 Version 2.01.
- Sub-oriented PCR (Appendix to PCR 2012:01 version 2.1 Product Group Classification: UN CPC 264, 355 - Synthetic carpet yarn used for building purposes. Date 2015-08-14
- EPD International (2015) General Programme Instructions of the International EPD® System. Version 2.5, dated 2015-05-11.
- UNI EN 15804, 2014: Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
- UNI EN ISO 14044, 2007: Environmental management – Life cycle assessment – Requirements and guidelines.
- UNI EN ISO 14025, 2010: Environmental labels and declarations – Type III environmental declarations – Principles and procedures.
- PlasticsEurope (2014): Eco-profiles and environmental product declarations of the European Plastics Manufactures – Polyamide 6 (PA6).
- Relazione ICA - Società di Ingegneria Chimica per l'Ambiente S.r.l. – Bergamo (Italy): DIASEN Srl, Novembre 2016 "Valutazione del ciclo di vita (LCA) Produzione di intonaci e massetti Diathonite".
- *Energy recovery from cork industrial waste: production and characterisation of cork pellets*, L.J.R. Nunes a, J.C.O. Matias a, J.P.S. Catalãoa,b,c*, 2013