The Environmental and Health Sheet of Declaration conformes to the NF P01-010 standard

THE ENVIRONMENTAL AND HEALTH DECLARATION COMPLIES WITH THE NF P 01-010 STANDARD

The masonry wall is of Monomur

Poncebloc blocks

ECOPONCE S.A.M

V3 - August 2010

Performed by:

S.A.R.L. Act Environnement au capital de 50 000€

Site du 11/19 Rue de Bourgogne

62750 Loos en Gohelle

03.21.75.54.03

www.actenvironnement.fr

This statement is presented based on the model sheet of the Environmental and Sanitary Statement validated by AIMCC (EPD's 2005Version)

SUMMARY

FOREWORD 3

READING GUIDE 4

1. CHARACTERISATION OF THE PRODUCT 5

1.1. DEFINITION OF THE FUNCTIONAL UNIT... 5

1.2. MASS AND BASIC DATA FOR THE CALCULATION OF THE FUNCTIONAL UNIT (UF)........ 5

1.3. USEFUL TECHNICAL SPECIFICATIONS CONTAINED IN THE DEFINITION OF THE FUNCTIONAL UNIT........ 5

2. INVENTORY AND OTHER DATA COMMENTARIES RELATIVE TO THE ENVIRONMENTAL AND HEALTH EFFECTS OF THE PRODUCT 6

2.1. CONSUMPTION OF NATUTRAL RESOURCES........ 6

2.2. EMISSIONS IN THE AIR, WATER AND SOIL 10

2.3. WASTE PRODUCTION........ 15

3. CONTRIBUTION OF THE PRODUCT TO THE ENVIRONMENTAL IMPACTS 17

4. PRODUCT CONTRIBUTION TO THE EVALUATION OF THE HEALTH RISKS AND THE QUALITY OF LİFE IN THE INTERIOR OF THE BUILDINGS 18

4.1. PRODUCT CONTRIBUTION TO THE EVALUATION OF HEALTH RISKS AND QUALITY OF LIFE INSIDE THE BUILDINGS 19

4.2. PRODUCT CONTRIBUTION TO THE QUALITY OF LIFE INSIDE THE BUILDINGS 19

5. OTHER CONTRIBUTIONS OF THE PRODUCT ESPECIALLY IN RELATION TO THE CONCERNS OF THE ECO-MANAGEMENT OF THE BUILDING, AND GLOBAL ECONOMICS AND ENVIRONMENTAL POLICY 20

5.1. ECOMANAGEMENTOF THE BUILDING 20

5.2. ECONOMICAL CONCERNS 20

5.3. GLOBAL ENVIRONMENTAL POLICY 21

6. APPENDIX : THE CHARACTERIZATION OF THE DATA FOR THE CALCULATION OF THE LIFE CYCLE INVENTORY (ICV)........22

6.1. DEFINITION OF THE LCA SYSTEM (LIFE CYCLE ANALYSIS) 22

6.2. DATA SOURCES 23

6.3. TRACEABILITY 24

FOREWORD

This fact sheet provides a framework adapted to the presentation of Environmental and Health characteristics of construction products persuant to the requirements of the standard NF P01-010 and to the provision of commentaries plus additional information useful in keeping with the spirit of this standards sincerity and clarity.
Any use, total or partial, of the information provided should atleast be consistently accompanied by full reference to the original declaration "full title, edition date, address of the transmitter" who can deliver an authentic copy.

Producer Data

The producer of the data presented in this report is the company Ecoponce Sat located at 9 Rue Ostande, 98000 Monaco.
The Environmental characteristics (Chapter 2 and 3 of this form) are derrived from an analysis of Life Cycle Assessment (LCA) carried out by the Environment ACT in 2009 on the stages of production, delivery, commissioning, implementation and the end of life of monomur blocks of pumice.
For this work, the calculation software SimaPro LCA ®, the information booklet FD P01-015 and the base ecoinvent data v2.0 Unit Processes ® (for data that have not been a specific collection) have been used.

Representativeness of the data

Location:

The data are considered representative of actual production in the factory located in the Provence Agglos Senas and plant Préfa of the Loire Valley in Saint Georges de Montaigu regarding the production of block monomur concrete stone of nominal size 450 x 250 x 350 mm.

Time:

The main data used are representative of the activity in 2008.

Technology:

The data presented here correspond to processes using current technology level.

Source of data:

Presented in Appendix

Mode of production data:

The data herein is derived for calculating the LCA conducted according to the ISO 14040 series. The main data were the subject of specific collections on the site of generation and among the company's suppliers.

Contacts Ziya Özalp

Ecoponce S.A.M., 9 Rue Ostande
98000 Monaco
00 377 97 97 79 80

READING GUIDE

Accuracy of the display data format:

Some values are displayed in scientific format in accordance with the following example:

5.43 E-04 = 5.43 x 10-4M

Display rules:

Display rules apply:

- All non-zero values will be expressed with three significant figures.

- It was verified that the values shown in these tables contribute to more than 99.9% of the environmental impact indicators of Chapter 3.

- For the sake of readability, all values less than 10–6 were not reported in the tables.

However, for each flow of inventory values to justify atleast 99.9% of the

value in the column "Total life cycle" is displayed even if they are less than 10-6.

Abbreviations used:

DVT: Typical Lifetime

UF: Functional Unit

1. Characterisation of the product

1.1 Definition of the Functional Unit

Providing a function of load bearing wall on a wall m² for an annuity, while ensuring the prescribed thermal performance of the product (thermal resistance of 2.94 K.m ². W-1). The assembly is used in the state of the art.

1.2 Mass and basic data for the calculation of the Functional Unit (UF)

The quantity of products and eventually complementary products and packaging distribution contained in the UF based on a typical lifetime (DVT) in 100 years.

The function is provided by a wall of concrete blocks of monomur pumice PONCEBLOC, with nominal dimension of 450 (length) x 250 (height) x 300 (thickness) mm.

Product	***Value for the UF***	***Value for the DVT***
Monomur PONCEBLOC	1,684 kg	168,4 kg

Dispensing Package	***Values for the UF***	***Values for the DVT***
Range of distribution[1]	***7,88 E-05 Unit***	***7.88 E-03 Unit***
Polypropylene strapping	***9,36 E-05 kg***	***9,36 E-03 kg***

[1] With a turnover rate of 22.5 movements during the life span of the pallet

The complementary product to the implementation	***Values for the UF***	***Values for the DVT***
Fixing mortar	***6,32E-02 kg***	***6,32 kg***
Water	***8,65E-03 litres***	***8,65E-01 litres***

For the implementation, the sink rate of 5% is retained for the blocks and for the monomur mortar.

1.3. Useful technical data not contained in the definition of the Functional Unit

The wall is able to receive any type of coating and lining on the outside or the inside.

2. INVENTORY AND OTHER DATA COMMENTARIES RELATIVE TO THE ENVIRONMENTAL AND HEALTH EFFECTS OF THE PRODUCT

The inventory data lifecycle which are presented below have been calculated for the Functional Unit defined in 1.1 and 1.2

2.1 The usage of natural resources

2.1.1 The usage of natural resources

The usage of natural energy resources

Flow	Unit	Production	Transport	Setting work	Life Span	Expiry	Total Lifecycle For the UF_1	Total Lifecycle For the DVT[2]
Wood	kg	2,16E-03		4,74E-04		1,89E-05	2,65E-03	2,65E-01
Coal	kg	1,26E-02		1,61 E-03		4,17E-04	1,46E-02	1,46E+00
Lignite	kg	5,81E-03		3,38E-04		2,76E-04	6,42E-03	6,42E-01
Natural Gas	kg	2,84E-03	2,59E-05	3,36E-04		6,86E-04	3,88E-03	3,88E-01
Petroleum	kg	2,85E-02	1,13 E-03	3,64E-03		7,83E-03	4,11 E-02	4,11E+00
Uranium	kg	7,71E-07		8,11 E-08		2,32E-08	8,76E-07	8,76E-05

The Energy Indicator

Flow	Unit	Production	Transport	Setting work	Expiry	Total Lifecycle For the UF_1	Total Lifecycle For the DVT[2]
Total Primary Energy	MJ	2,22E+00	4,90E-02	2,67E-01	4,02E-01	2,94E+00	2,94E+02
Renewable Energy	MJ	7,04E-02	1,28E-05	1,28E-02	2,83E-03	8,61E-02	8,61E+00
Non-renewable Energy	MJ	2,15E+00	4,90E-02	2,54E-01	3,99E-01	2,85E+00	2,85E+02
Energy process	MJ	1,92E+00	4,90E-02	2,24E-01	4,02E-01	2,59E+00	2,59E+02
Energy Material	MJ	3,00E-01		4,30E-02		3,43E-01	3,43E+01
Electricity[3]	kWh	3,31E-02	3,20E-07	2,14E-03	1,71E-03	3,70E-02	3,70E+00

1 Values are for the Functional Unit which means, per square meter of wall per year.
2 Values are for one square meter of wall for the duration of its life.
3 The electricity consumption is already accounted for in previous energy flows (Total Primary Energy).

<u>Relative comments on the energy consumption of natural resources:</u>
Transportation is structured to minimize road transport. Thus, maritime transport and rail transport accounts for 95% of the total kilometers traveled during the life cycle. Moreover, drying of monomur blocks occurs naturally, this does not require any input of energy.
Finally, during the production of the cement in the composition of the block and

Monomur PONCEBLOC than in the bedding mortar, energy recovery from waste is carried to an economy of fuel called "noble" (coal, lignite, natural gas, oil, ...). The energy after this value is not reflected in this table but is shown in Table 2.1.4 in the flow "recovered energy".

2.1.2. Consumption of non-energy natural resources

Flow	Unit	Production	Transport	Setting work	Expiry	Total Lifecycle For the UF	Total Lifecycle For the DVT
Antimony (Sb)	kg						
Silver (Ag)	kg						
Clay	kg	5,80E-02		3,97E-02	8,04E-05	9,78E-02	9,78E+00
Arsenic (As)	kg						
Bauxite (Al^2O^3)	kg	5,81E-04		7,26E-05	6,33E-06	6,60E-04	6,60E-02
Bentonite	kg	1,46E-05		2,26E-06	4,95E-06	2,18E-05	2,18E -03
Bismuth (Bi)	kg						
Bore (B)	kg						
Cadmium (Cd)	kg	1,55E-09		7,80E-10	8,86E-09	1,12E-08	1,12E-06
Limestone	kg	1,54E-01		2,56E-02	2,26E-04	1,80E-01	1,80E+01
Sodium carbonate (Na^2CO^3)	kg						
Sodium Chloride (NaCl)	kg	3,27E-05		1,14E-05	1,99E-05	6,42E-05	6,42E-03
Chromium (Cr)	kg	5,05E-06		9,13E-07	8,21E-07	6,79E-06	6,79E-04
Cobalt (Co)	kg						
Copper (Cu)	kg	9,18E-06		1,74E-06	1,14E-06	1,21E-05	1,21E-03
Dolomite	kg	1,45E-06		2,62E-07	6,16E-07	2,33E-06	2,33E-04
Tin (Sn)	kg	5,58E-08		2,58E-08	8,39E-09	9,00E-08	9,00E-06
Feldspar	kg						
Iron (Fe)	kg	6,12E-04		1,12E-04	3,01E-04	1,03E-03	1,03E-01
Fluorite (CaF^2)	kg	2,08E-06		3,37E-07	3,94E-07	2,81E-06	2,81E-04
Gravel	kg	4,15E-03		1,38E-02	2,01E-01	2,19E-01	2,19E+01
Lithium (Li)	kg						
Kaolin (Al^2O^3, $2SiO^2$, $2H^2O$)	kg	1,55E-07		5,80E-07	5,33E-08	7,88E-07	7,88E-05
Magnesium (Mg)	kg	1,76E-05		2,75E-06	1,13E-06	2,14E-05	2,14E-03
Manganese (Mn)	kg	1,68E-06		4,60E-07	8,44E-07	2,99E-06	2,99E-04

Mercury (Hg)	kg					
Molybdenum (Mo)	kg	1,92E-06	5,13E-07	9,11E-07	3,34E-06	3,34E-04
Nickel (Ni)	kg	1,68E-05	3,31E-06	5,20E-06	2,53E-05	2,53E-03
Gold (Au)	kg					
Palladium (Pd)	kg					
Platinum (Pt)	kg					
Lead (Pb)	kg	2,13E-07	5,22E-08	6,32E-07	8,97E-07	8,97E-05
Potassium Chloride (KCl)	kg	4,88E-08	4,63E-08	1,55E-08	1,11E-07	1,11E-05
Rhodium (Rh)	kg					
Rutile (TiO^2)	kg	1,40E-06	2,34E-07	5,19E-07	2,15E-06	2,15E-04
Sand	kg	1,03E-05	1,26E-06	2,95E-08	1,16E-05	1,16E-03
Silica (SiO^2)	kg					
Sulphur (S)	kg					
Barium Sulphate (BaSO4)	kg	1,09E-04	1,45E-05	2,09E-05	1,44E-04	1,44E-02
Titan (Ti)	kg					
Tungsten (W)	kg					
Vanadium (V)	kg					
Zinc (Zn)	kg	1,68E-06	8,87E-07	1,13E-06	3,70E-06	3,70E-04
Zirconium (Zr)	kg					
Non-specified Raw Vegetables	kg					
Non-specified Raw Animal Materials	kg					
Not reassembled intermediates (total)	kg					
Pumice	kg	1,52E+00			1,52E+00	1,52E+02

Comments on the consumption of non-energy natural resources:

More than 99.9% by mass of natural resources consumed non-energy correspond to minerals extracted for the production of sand and aggregates of pumice (original volcanic) and cement production (clay, limestone and gravel). By themselves, the sand and aggregates of pumice represent almost 72% by mass.
Note:
Pumice is a volcanic rock abundant and perpetually renewed by volcanic activity on the surface of the earth.

2.1.3 Water Consumption

Flow	Unit	Production	Transport	Setting work	Expiry	Total Lifecycle For the UF	Total Lifecycle For the DVT
Water: Lake	lt	1,26E-02		3,29E-03	4,99E-04	1,64E-02	1,64E+00
Water: Sea	lt	3,99E-02		4,28E-03	6,12E-03	5,03E-02	5,03E+00
Water: Groundwater	lt	7,63E-02		1,00E-02	3,43E-03	8,98E-02	8,98E+00
Water: Source non-specified	lt	3,84E-01	4,64E-03	7,41E-02	2,94E-01	7,56E-01	7,56E+01
Water: River	lt	1,56E-01		2,08E-02	1,46E-02	1,92E-01	1,92E+01
Water: Potable (network)[1]	lt	6,14E-02		1,60E-02	2,45E-03	7,98E-02	7,98E+00
Water Consumed (Total)	lt	6,69E-01	4,64E-03	1,13E-01	3,18E-01	1,10E+00	1,10E+02

[1] Flow "Drinking Water" is purpose specified only. Indeed, drinking water is composed of a mixture of different water sources mentioned above, it does not constitute an additional water consumption and is therefore not integrated in the flow "Total Water Consumed" to avoid double counting.

Comments on water use (withdrawals):

Water consumption data in the table below corresponds to the water drawn from the natural environment.
Water is consumed upto 61% during the manufacturing process, to less than 1% during the step of transport, 10% during the step of implementation and 29% during the end step of life.
Note: Although the manufacturing process will be to the water consumer, the use of a loop circuit closed for cleaning pumice, in the long run, saves significant water ..

2.1.4. Energy and recovered Materials

Flow	Unit	Production	Transport	Setting work	Expiry	Total Lifecycle For the UF	Total Lifecycle For the DVT
Retrieved Energy	MJ	1,71E-01		2,59E-02		1,97E-01	1,97E+01
Retrieved Material (Total)	kg	8,42E-03				8,42E-03	8,42E-01
Retrieved Material (Steel)	kg						
Retrieved Material Metal (non specified)	kg						
Retrieved Material Paper / Cardboard	kg						
Retrieved Material Plastic	kg						
Retrieved Material Cullet	kg						
Retrieved Material Bio-mass	kg						
Retrieved Material Mineral	kg	8,42E-03				8,42E-03	8,42E-01
Retrieved Material Non-Specified	kg						

Comments on energy consumption and material recovered:

The energy recovered from the waste energy recovery in cement. The cement product thus enters into the composition of monomur blocks (production stage) and mortar installation (step implementation).

The mineral recovered from earlier falling pumice concrete production are reintroduced into the process.

2.2 Emissions in the air, water and soil

2.2.1 Emissions in the air

Flow	Unit	Production	Transport	Setting work	Expiry	Total Lifecycle For the UF	Total Lifecycle For the DVT
Hydrocarbons (Unspecified)[1]	g						
Hydrocarbons (Unspecified)[2] [except CH4]	g	1,51E-01	5,01E-03	2,29E-02	3,80E-02	2,17E-01	2,17E+01
Methane (CH4)	g	1,51E-01	5,01E-03	2,29E-02	3,80E-02	2,17E-01	2,17E+01
HAP[3] (Unspecified)	g	3,71E-05		7,09E-07	6,72E-06	4,45E-05	4,45E-03
Volatile organic compounds (acetone, acetate etc)[2]	g	8,89E-02		8,23E-03	2,89E-02	1,26E-01	1,26E+01
Carbon Dioxide (CO2)	g	2,03E+02	3,68E+00	2,98E+01	8,39E-01	2,23E+02	2,23E+04
Carbon Monoxide(CO)	g	2,77E-01	9,50E-03	3,17E-02	4,81E-02	3,66E-01	3,66E+01
Nitrogen Oxides (NOX as NO^2)	g	1,30E+00	4,36E-02	5,85E-02	1,60E-01	1,56E+00	1,56E+02
Nitrous oxide (N^2O)	g	3,71E-03	4,74E-04	1,60E-04	6,74E-04	5,02E-03	5,02E-01
Ammonia (NH3)	g	1,03E-02		7,40E-04	2,28E-04	1,13E-02	1,13E+00
Dust (Unspecified)	g	4,46E-01	2,52E-03	1,29E-02	1,65E-02	4,78E-01	4,78E+01
Sulphur Oxides (SOX as SO^2)	g	9,20E-01	1,59E-03	6,82E-02	2,03E-02	1,01E+00	1,01E+02
Sulphurous hydrogen (H^2S)	g	2,37E-04		3,55E-05	1,11E-05	2,83E-04	2,83E-02
Hydrogen Cyanide (HCN)	g	3,75E-08			4,49E-09	4,20E-08	4,20E-06
Hydrochloric Acid (HCl)	g	2,84E-03		2,42E-04	1,29E-04	3,21E-03	3,21E-01
Chlorinated organic compounds (in Cl)	g	1,11E-06		5,89E-07	2,94E-07	1,99E-06	1,99E-04
Chlorinated inorganic compounds (in Cl)	g	1,05E-05		2,39E-06	3,47E-06	1,64E-05	1,64E-03
Unspecified chlorinated compounds (in Cl)	g	4,81E-09		7,03E-10	0,00E+00	5,52E-09	5,52E-07
Fluorinated organic compounds (in F)	g	2,99E-05	2,31E-07	3,71E-06	9,81E-07	3,49E-05	3,49E-03

Flow	Unit	Production	Transport	Setting work	Expiry	Total Lifecycle For the UF	For the DVT
Fluorinated inorganic compounds (in F)	g	3,06E-04		1,60E-05	1,60E-05	3,38E-04	3,38E-02
Unspecified flourinated compounds (as F)	g						
Halogenated compounds (unspecified)	g	2,97E-05		2,19E-06	1,35E-06	3,33E-05	3,33E-03
Metals (unspecified)		2,42E-04	1,20E-06	3,43E-05	6,01E-06	2,83E-04	2,83E-02
Antimony and its compounds (as Sn)	g	6,85E-07		1,06E-07	4,85E-08	8,40E-07	8,40E-05
Arsenic and its compounds (as As)	g	1,11E-05		8,49E-07	4,75E-07	1,25E-05	1,25E-03
Cadmium and its compounds (as Cd)	g	3,46E-06	9,40E-08	4,43E-07	3,79E-07	4,38E-06	4,38E-04
Chromium and its compounds (as Cr)	g	2,00E-05		3,19E-06	3,30E-06	2,66E-05	2,66E-03
Cobalt and its compounds (as Co)	g	2,97E-06	4,16E-08	3,34E-07	3,14E-07	3,66E-06	3,66E-04
Copper and its compounds (as Cu)	g	3,25E-05		6,29E-06	8,71E-06	4,76E-05	4,76E-03
Tin and its compounds (as Sn)	g	1,81E-06		3,13E-07	1,05E-07	2,23E-06	2,23E-04
Manganese and its compounds (as Mn)	g	4,27E-06		9,33E-07	5,76E-07	5,79E-06	5,79E-04
Mercury and its compounds (as Hg)	g	6,76E-06		8,83E-07	4,84E-07	8,13E-06	8,13E-04
Nickel and its compounds (as Ni)	g	3,63E-04		4,28E-06	5,08E-06	3,73E-04	3,73E-02
Lead and its compounds (as Pb)	g	3,03E-05	3,06E-07	4,26E-06	3,40E-06	3,83E-05	3,83E-03
Selenium and its compounds (as Se)	g	7,79E-06		2,58E-07	2,19E-07	8,29E-06	8,29E-04
Silicon and its compounds (as Si)	g	3,42E-04		5,62E-05	6,42E-06	4,05E-04	4,05E-02
Tellurium and its compounds (as Te)	g					0,00E+00	0,00E+00
Vanadium compounds (as V)	g	7,66E-05	3,32E-06	7,52E-06	8,32E-06	9,57E-05	9,57E-03

Zinc and compounds (as Zn)	g	4,90E-04	1,42E-04	1,47E-05	1,17E-04	7,63E-04	7,63E-02

1. Already recognized in a stream "Hydrocarbons (unspecified, except methane)."

2. Some hydrocarbons can both appear in the stream "Hydrocarbons (unspecified, except CH4)" and "Compounds

Volatile organic "(eg, ethane, butane, ...) were retained in the flow" Hydrocarbons (unspecified, except CH4) "

3. PAH: Polycyclic Aromatic Hydrocarbons.

Commentaries relating to air emissions:

Carbon Dioxide:

CO2 emissions impacting mainly on global warming (97.5%). In addition, they represent more than 98 % of wt of total emissions to air.
80% of the emissions are related to the step of producing, 2. to the transporting step, 12% to the step of implementation and 6% to the end step of life.
In addition, shipping of pumice and the cement used in the manufacture of the block and monowall PONCEBLOC in the composition of the bedding mortar represents 21% and 52% of the emissions of carbon dioxide.
Nevertheless, during his life, the concrete present in the block reabsorbs carbon dioxide during the carbonation process. This reabsorption was counted and divided equally on the steps out of life and end of life because of their long duration. This explains the negative value for the emission of carbon dioxide over its life.

The comments presented below relate to the emissions that contribute most to the indicator "air pollution". These emissions contribute to more than 90% for this indicator.

Dust:

93% of emissions take place during the manufacturing process, less than 1% during the transporting step, 3% during the steps of implementation and 4% at the end step of life. The quarrying of pumice, alone, represents 52% of dust emissions.

Carbon Monoxide:

76% of emissions occur during the manufacturing process, 3% during the transporting step, 9% during the step of implementation and 13% during the end step of life.
The maritime transport of pumice and cement production in the manufacture of the block and monowall PONCEBLOC in the composition of the bedding mortar represents 32% and 27% of the emissions of carbon monoxide.

Sulphur Oxides:
91% of the emissions occur during the manufacturing process, less than 1% during the step of conveying, 7% in the step of implementation and 2% during the end step of life. By itself, the maritime transport of pumice represents 77% of the emissions of sulphur oxides.

Nitrogen Oxides:
83% of emissions occur during the manufacturing process, 3% during the step of conveying, 4% during the step of implementation, and 10% during the end step of life. By itself, the maritime transport of pumice represents 54% of emissions of the nitrogen oxides.

Hydrocorbons:
72% of the emissions occur during the manufacturing process, 12% during the transporting step, 5% during the step of implementation, and 11% during the step of implementation.
The various road transport occurring during the production stage represent more than 36% of the hydrocarbon emissions.

2.2.2. Emissions in the water

Flow	Unit	Production	Transport	Setting work	Expiry	Total Lifecycle For the UF	Total Lifecycle For the DVT
CDO (Chemical Demand Oxygen)	g	3,08E-01	1,66E-04	4,18E-02	4,70E-02	3,97E-01	3,97E+01
BOD5 (Biochemical Oxygen Demand in 5 days)		2,89E-01	5,05E-06	3,86E-02	4,62E-02	3,74E-01	3,74E+01
SS Suspended Solids	g	2,13E-02	2,64E-05	2,99E-03	3,01E-03	2,73E-02	2,73E+00
Cyanide (CN)	g	2,40E-05	2,31E-07	3,75E-06	2,39E-06	3,03E-05	3,03E-03
AOX (Halogens of adsorbable organic compounds)	g	1,33E-06		4,97E-07	2,72E-07	2,10E-06	2,10E-04
Hydrocarbons (unspecified)	g	1,03E-01	1,72E-03	1,32E-02	1,62E-02	1,35E-01	1,35E+01
Nitrogen Compounds (as N)	g	1,61E-03	1,56E-04	2,40E-04	2,02E-04	2,21E-03	2,21E-01
Phosphorus Compounds (as P)	g	2,09E-05	4,65E-07	7,29E-06	4,78E-06	3,35E-05	3,35E-03

Flow	Unit	Production	Transport	Setting work	Expiry	Total Lifecycle For the UF	Total Lifecycle For the DVT
Fluorinated organic compounds (as F)	g	7,31E-06	1,17E-06	6,02E-07	8,61E-07	9,93E-06	9,93E-04
Fluorinated inorganic compounds (as F)	g	1,25E-04		1,78E-05	3,84E-05	1,81E-04	1,81E-02
Fluorinated unspecified compounds (as F)	g	5,72E-08		8,67E-09		6,59E-08	6,59E-06
Chlorinated organic compounds (as Cl)	g	1,33E-05		1,79E-06	2,68E-06	1,78E-05	1,78E-03
Chlorinated inorganic compounds (as Cl)	g	9,09E-01	5,74E-02	1,01E-01	2,25E-01	1,29E+00	1,29E+02
Chlorinated unspecified compounds (as Cl)	g	2,43E-05	9,76E-07	2,74E-06	7,27E-07	2,87E-05	2,87E-03
PAHs (unspecified)	g	1,26E-05		1,80E-06	1,95E-06	1,63E-05	1,63E-03
Metals (unspecified)	g	1,30E-02	9,60E-04	1,43E-03	2,10E-03	1,74E-02	1,74E+00
Aluminium and its compounds (as Al)	g	4,87E-04		6,66E-05	3,51E-05	5,89E-04	5,89E-02
Arsenic and its compounds (as As)	g	1,87E-05		1,79E-06	1,99E-06	2,25E-05	2,25E-03
Cadmium and its compounds (as Cd)	g	1,27E-06	7,79E-08	1,57E-07	1,53E-07	1,66E-06	1,66E-04
Chromium and its compounds (as Cr)	g	6,79E-06	2,68E-07	8,08E-07	1,26E-06	9,13E-06	9,13E-04
Hexavalent chromium (Cr VI)	g	3,30E-05		5,47E-06	1,22E-05	5,07E-05	5,07E-03
Copper and its compounds (as Cu)	g	4,89E-06	1,58E-07	6,66E-07	8,33E-07	6,55E-06	6,55E-04
Tin and its compounds (Sn)	g	2,52E-05			1,51E-07	2,54E-05	2,54E-03
Iron and its compounds (as Fe)	g	9,78E-03	1,37E-05	5,99E-04	4,87E-04	1,09E-02	1,09E+00
Mercury and its compounds (as Hg)	g	8,03E-08		1,29E-08	7,05E-09	1,01E-07	1,01E-05
Nickel and its compounds (as Ni)	g	6,61E-06	2,69E-07	8,39E-07	7,34E-07	8,45E-06	8,45E-04

Flow	Unit	Production	Transport	Setting work	Expiry	Total Lifecycle For the UF	Total Lifecycle For the DVT
Lead and its compounds (as Pb)	g	2,07E-05		2,46E-06	1,90E-06	2,51E-05	2,51E-03
Zinc and its compounds (as Zn)	g	3,53E-04		4,72E-05	6,22E-05	4,63E-04	4,63E-02
water discharged	lt	2,32E-02	1,91E-04	3,40E-03	1,41E-04	2,70E-02	2,70E+00

Comments relating to emissions to water:

Water discharged:

The manufacturing process of monomur PONCEBLOC blocks produces no direct discharge of water. Water discharged during the production stage comes from various industrial processes occurring upstream of the block manufacturing the monomur.

The comments presented below relate to the emissions that contribute most to the indicator "Water Pollution". These emissions actually contribute to more than 90% under this heading.

Metals (Total):

80% of emissions occur during the manufacturing process, 3% during the step of conveying, 7% in the step of implementation, and 9% during the end step of life.

Hydrocarbons:

77% of emissions occur during the production step, 1% during the transporting step, 10% in the step of implementation, and 12% during the end step of life.
The maritime transport of pumice represents 54% of hydrocarbon emissions.

Biochemical Oxygen Demand in 5 days (BOD5):

77% of emissions that contribute to BOD5, occur during the manufacturing process, 10% occurs in the step of implementation, and 12% occurs during the end step of life.

2.2.2. Emissions in the soil

Flow	Unit	Production	Transport	Setting work	Expiry	Total Lifecycle For the UF	Total Lifecycle For the DVT
Arsenic and its compounds (as As)	g	2,56E-07		3,42E-08	5,06E-08	3,41E-07	3,41E-05
Biocides[1]	g	1,60E-06		1,59E-06	4,55E-07	3,65E-06	3,65E-04
Cadmium and its compounds (as Cd)	g	1,15E-08		2,27E-09	8,52E-09	2,22E-08	2,22E-06
Chromium and its compounds (as Cr)	g	3,29E-06		4,39E-07	6,72E-07	4,40E-06	4,40E-04
Hexavalent chromium	g	1,78E-06		5,07E-07	7,93E-07	3,08E-06	3,08E-04
Copper and its compounds (as Cu)	g	1,33E-06		4,78E-07	1,02E-06	2,84E-06	2,84E-04
Tin and its compounds	g						
Iron and its compounds (as Fe)	g	4,12E-02		2,61E-04	3,60E-04	4,18E-02	4,18E+00
Mercury and its compounds (as Hg)	g						
Nickel and its compounds (as Ni)	g	5,69E-08		2,17E-08	1,04E-07	1,82E-07	1,82E-05
Lead and its compounds (as Pb)	g	1,09E-07		5,75E-08	3,16E-07	4,83E-07	4,83E-05
Zinc and its compounds (as Zn)	g	1,52E-05		5,03E-06	2,34E-05	4,36E-05	4,36E-03
Heavy Metals (unspecified)	g	3,87E-05		5,87E-06		4,46E-05	4,46E-03

Comments relating to the emissions to soil:

Iron and its compounds:

The iron emissions account for 95% of the weight of the total emissions to the ground and this represents 97% of the pollutant contribution to water.

99% of these emissions occur during the manufacturing process.

Rail transport of pumice represents 95% of the emissions of iron.

2.3. Waste Production

2.3.1. Waste Recycled

Flow	Unit	Production	Transport	Setting work	Expiry	Total Lifecycle For the UF	Total Lifecycle For the DVT
Retrieved Energy	kg						
Retrieved Material Total	kg	8,43E-03	1,33E-08	1,73E-03		1,02E-02	1,02E+00
Retrieved Material Steel	kg	3,94E-07		4,73E-08		4,41E-07	4,41E-05
Retrieved Material Metal (unspecified)	kg						
Retrieved material Paper/Cardboard	kg						
Retrieved material Plastic	kg						
Retrieved material Cullet	kg						
Retrieved Material Biomass	kg			1,73E-03		1,73E-03	1,73E-01
Retrieved Material Mineral	kg	8,42E-03				8,42E-03	8,42E-01
Retrieved Material Unspecified	kg	5,33E-06	1,33E-08	6,37E-07		5,99E-06	5,99E-04

Comments on the recycled waste:

The majority of the recovered material (83%) corresponds to falling of pumice concrete generated during the production of block monowall. Those fallen are reintroduced into the manufacturing process during the following productions.

The majority of the remaining material recovered (17%) corresponds to the wooden pallet that is reused after the step of implementation.

2.3.2. Waste Disposed:

Flow	Unit	Production	Transport	Setting work	Expiry	Total Lifecycle For the UF	For the DVT
Hazardous Waste	kg	8,03E-06	1,11E-06	7,27E-07	8,18E-07	1,07E-05	1,07E-03
Non-hazardous Waste	kg	1,82E-05		2,03E-04		2,21E-04	2,21E-02
Inert Waste	kg	2,90E-03		8,78E-02	1,66E+00	1,75E+00	1,75E+02
Radioactive Waste	kg	1,09E-05	7,86E-07	1,03E-06	7,50E-07	1,35E-05	1,35E-03

Comments regarding the production and arrangements for waste management:

Waste disposal is more than 99% by weight of inert waste of pumice concrete or of mortar generated during the implementation stage and the stage of end of life. Indeed, 94.9% by mass of waste reflects the elimination of the product at the end of life (masonry wall monomur blocks of pumice). If, during deconstruction, it is properly sorted, this type of waste can easily be recycled after treatment as secondary aggregate or as backfill. Within this document, this waste is considered as a starter fully central waste storage of class 3, and this is according to the standard NF P01-010. The majority of the remaining waste, 5% by mass, comes mainly from rockfalls of monomur PONCEBLOC and of laying of the mortar during the implementation. Radioactive waste listed in the table above is rooted in the process of generating electricity in nuclear power plants.

3. Product's contribution to environmental impacts

The table below summarizes the environmental impacts representative of the Functional Unit and of any DVT. These impacts were calculated according to the standard NF P01-010.

#	ENVIRONMENTAL IMPACT		UNIT	VALUE of INDICATOR for THE Functional Unit[1]	VALUE of INDICATOR for THE whole DVT[2]
1	Consumption of energy resources: - Total Primary Energy		MJ	2.94E+00	2.94E+02
	- Renewable energy		MJ	8.61E-02	8.61E+00
	- Non-renewable energy		MJ	2.85E+00	2.85E+02
2	Indicator of resource depletion (ADP)		equivalent kg Antimony (Sb)	1,14E-03	1,14E-01
3	Water usage		Litres	1,10E+00	1,10E+02
	Solid waste recycled		kg	1,02E-02	1,02E+00
4	solid waste eliminated	Hazardous Waste	kg	1,07E-05	1,07E-03
		Non-hazardous Waste	kg	2,21E-04	2,21E-02
		Inert Waste	kg	1,75E+00	1,75E+02
		Radioactive Waste	kg	1,35E-05	1,35E-03
5	Climate Change		kg equivalent CO_2	2,29E-01	2,29E+01
6	Air Acidification		kg equivalent SO_2	2,13E-03	2,13E-01
7	Air Pollution		m3	2,54E+01	2,54E+03
8	Water Pollution		m3	6,08E-02	6,08E+00
9	Destruction of the stratospheric ozone layer		kg equivalent CFC-11	1,62E-11	1,62E-09
10	Photochemical ozone formation		kg equivalent ethylene (C_2H_4)	4,35E-05	4,35E-03

1 Values are for the functional unit that is to say, per square meter of wall for an annuity (with the basis for calculating a typical lifespan of 100 years).

2 Values are for one square meter of wall throughout the lifespan.

4. Product's contribution to health risk assessment and quality of life inside buildings

Product Contribution		paragraph concerned	Expression (Measured values, calculation, ...)
In evaluating health risks	Health quality of interior spaces	4.2.1	Dust: not measured Radioactivity: not measured for the block Mould: mineral matter is not conducive of mold growth
	Sanitary quality of water	4.2.2	not applicable
A quality of life	Hygrometric Comfort	4.3.1	A masonry wall = 2.94 K.m ². W-1 R block = 2.61 K.m ². W-1 (source: MPVA laboratory at Neuwied Germany, report of 16.08.2008 No. 601601/08 and amendment No. RO/60218/08 from 28/09/2009)
	Acoustic Comfort	4.3.2	Estimation of at 35 dB (see Pass Innovation 2009-014)
	Visual Comfort	4.3.3	Adaptable: Accommodates different coatings
	Olfactory Comfort	4.3.4	Not applicable.

4.1. Product's contribution to health risk assessment and quality of life inside the buildings

4.1.1. Contribution to the health quality of interior spaces

- **Dust emissions**

There are currently no measures relating to dust emissions taking place at the present. Nevertheless, it should be noted that the cut blocks Poncebloc on site can be done either by breaking or by sawing. In the case of breakage, there is no dust emission. In the case of lumber, it is recommended, to avoid formation of dust particles loaded with non-crystalline silica (amorphous silica), moisten the block in prior. The wetting limits the risk of dust inhalation.

- **Radioactivity**

Not measured for the block.

- **Occurance of mold**

Because of the isolation mode that characterizes the wall implemented and the opportunities for effective correction of the thermal bridges, the risk of surface condensation (sources for development of mold) appear limited. Moreover, the block is made up of minerals which, by definition, is not a growth medium for mold and fungus.

- **Normal condition of use**

The monomur Poncebloc is not intended to be in direct contact with the air inside buildings as it is coated with a coating or a plasterboard, which contributes to its neutrality vis-à-vis the problem of the indoor air quality.

4.1.2. Contribution to the sanitary quality of water

Not applicable.

4.2. Product's contribution to the quality of life inside the buildings

4.2.1. Product features involved in the creation of comfortable Hygrothermal conditions in the building

The monomur PONCEBLOC block contributes to the comfort inside. Due to its high thermal resistance (2.94 $K.m^2.W^{-1}$ and 2.61 $K.m^2.W^{-1}$ in masonry wall for one block), the monomur PONCEBLOC block ensures high insulation of the building.

(source: MPVA laboratory in Neuwied in Germany, report of 16.08.2008 No. 601601/08 and Addendum of 28/09/2009 No RO/60218/08)

Moreover, because of its high density (about 500 kg/m3), the monomur PONCEBLOC block brings inertia that allows:

- The regulation of the temperature inside and avoids the jolts to heat in winter,
- Reduces the indoor temperature in summer.

4.2.2. Product Features involved in creating acoustical comfort conditions in the building

The monomur Poncebloc allows its density and with its many air cells to reduce the transmission of noise inside and outside a building.
However, in the absence of testing, it can be formulated to assess the exact isolation against noise of the outdoor space that, in the case of facades, the performance depends a lot on the closures of the bays. However, we can estimate that with current closures of bays, this method can meet the regulations at this point when the required isolation is less than or equal to 35 dB. (source: see Pass Innovation Poncebloc MTh 11)

4.2.3. Product Features involved in creating visual comfort conditions in the building

The monomur PONCEBLOC can receive any type of coating, lining in the inside and on the outside.

4.2.4. Product Features involved in creating olfactory comfort conditions in the building

Not applicable.

5. Other contributions, in relation to the concerns of eco-management of the building, global economic and environmental policy, which include the product

5.1. Building eco-management

5.1.1. Energy management

The masonry wall block of PONCEBLOC monowall has a major thermal resistance: 2.942 $K.m^2.W^{-1}$. Therefore, it contributes significantly to the thermal insulation of the building.
Moreover, because of its large thermal inertia, the block monowall can:

- Storing solar heat in winter and in spring and autumn, significantly reducing heating needs,

- Reduce the temperature inside the hot summer days and thus help reduce the possible need for air conditioning.

5.1.2. Water Management

5.1.3. Care and Maintenance

Under normal use, the masonry wall block, monomur PONCEBLOC, requires no maintenance.

5.2. Economic Concern

Thanks to the thermal performance of the material, the implementation of the block monomur PONCEBLOC within a building can help reduce energy consumption while considering the comfort and health of its users.

5.3. Global Environmental Policy

5.3.1. Natural Resources

Pumice is a rock that forms while naturally expanding during volcanic eruption. Magmatic slag, in which there's high pressure and high temperature are ejected into the air where they will cool and have the pressure reduced. This pressure drop will then generate a degassing and thus form air bubbles. The sudden cooling will lead to the solidification of the form of the slag, thereby trapping air bubbles are in its core. After total cooling, the slag is then in the form commonly known as "Pumice".

Pumice has many uses. Thus, for its abrasive properties, it can be incorporated in some soaps or cosmetics, but it can also be used as a sanding or polishing agent (wood, metal, jeans, ...) in different forms (powder, cement, crushed stone, ...).

Pumice is also used for the properties of porosity and lightness, chemistry as an absorber of water or masonry for the design of concrete, mortar or light monomur block.

Pumice is an abundant material on Earth's surface due to existing volcanic activity. This also allows a steady supply of pumice reserve.

5.3.2. Additional information concerning the monomur block making

For its manufacture, the block monomur PONCEBLOC does not require a cooking process at high temperature and drying is carried out naturally.

5.3.3. Emissions to air and water

The air emissions are primarily related to extraction of pumice in quarries and to the transport phase.

The manufacture of the blocks is made of wet pumice stone, particulate emissions into the air are therefore limited.

The manufacturing process of monomur PONCEBLOC blocks produces no direct discharge of water. The water discharge during the manufacturing process comes from various industrial processes involved in the manufacture of upstream monomurs.

5.3.4. Waste

To reduce packaging, all raw materials are delivered in bulk to the manufacturing sites.

The packaging for delivery is minimized with the use of polypropylene strapping and wooden pallets. Moreover, these vanes are being recorded, re-use is guaranteed.

6. Appendix: Characterization data for the calculation of Life Cycle Inventory (LCI)

6.1. System Definition of LCA (Life Cycle Analysis)

6.1.1. Stages and flows included

Production

This step includes:

- The production / extraction of raw materials used in the composition of monomur blocks,
- The transport of these raw materials to the manufacturing sites,
- The manufacture of monomur blocks and their packaging for the transport step.

Transport

This step includes the transportation of the products by truck from the production site to the site of implementation.

Implementation

This stage includes the production ofthe components in mortar and preparing it all while its on-site transportation and packaging.

Life out

The Wall implemented requires no maintenance. No action is therefore considered during this step.

End of Life

This step includes:

- The demolition of the wall by mechanical shovel,
- The transportation of the demolition waste to a disposal facility,
- The removal of the concrete waste for landfills of inert waste of Class 3.

6.1.2 System Definition

Main steps included:

- Extraction and production of aggregates of pumice,
- Production of cement,
- Production of monomur PONCEBLOC blocks,
- Production and packaging of the bedding mortar,
- Production ofthe wooden pallet,
- Production of LDPE strip,
- Electricity production in France and Europe
- Production and usage of diesel,
- Road, railway and maritime
- Laying of blocks and preparation of the mortar,
- Carbonation of the cement,
- Demolition,
- Set the repository of inert waste of Class 3.

The Main steps excluded:

- The lighting, heating and cleaning workshops

- The administrative department,

- The transportation of employees,

- The manufacture, maintenance and end of life of the tool production and transport systems (machines, trucks, etc. .....).

6.1.3 The rule of cut

The standard NF P01-010 set the cutoff to 98% according to the paragraph 4.5.1 of the standard. As specified in the standard, non-integrated flux in the system boundaries do not correspond to substances classified as T, T +, Xn or N according to the order dated April 20, 1994 (relating to the declaration, classification, packaging and labeling of substances).
However, during this study, no evidence has been considered in the rule of cut.

6.2. Data Sources

6.2.1 Main Data

The main data were collected through questionnaires, telephone conversations and electronic exchange with the manufacturer of monomur PONCEBLOC blocks and the different suppliers.
These data are representative of production blocks of monomur PONCEBLOC 450 x 250 x 300 mm from the factories located in Provence Agglos Senas (13) and Préfa Pays de Loire in Saint Georges de Montaigu (85)

6.2.2 Key Assumptions

Implementation

The implementation is done according to rules of the art.
The mortar used was a light mortar from the ecoinvent database (mortar + packaging). Transport of the mortar to the site of implementation is estimated at 40 km (FMB study). The preparation of the mortar is carried out by means of a mixer considered to be 50% thermal and 50% electrical operating for a duration of 16.47 seconds.
The cutting tool is considered to be a disk saw table equipped with a vacuum cleaner with a particle power of 2.5 kW with a cutting time of 10 seconds.

Demolition

The demolition of the wall is with using a mechanical shovel (diesel engine output of 165 hp)

Landfill

The total waste of the wall at end of its life is put in landfills of Waste Class 3.

Carbonation

Because of the carbonation process, the pumice concrete reabsorbs carbon dioxide throughout its life. The assumption is that a reabsorption of a mass of carbon dioxide corresponding to 18% by mass of the cement present in the whole of the pumice concrete.

6.2.3 Transportation and Energy Data

Data on energy and road transport considered for the realization of this ESFD are the data from the documentation booklet FD P01-015 "Environmental quality of construction products - Issue of data and energy transport."

Data on maritime transport and rail transport are taken from the database ecoinvent v2.0 Process Unit.

6.2.4 Data non-ICV

Non-ICV data were collected by ACT Environment.

6.3 Traceability

This ESFD was performed according to the standard NF P01-010 in September 2009 by ACT Environment.

The aggregation of the data points from the calculations of the LCA software SimaPro ® 7.1.

Translation of Report into English on 31/03/2012 by;

Mr. Kaya M. Karacehennem
Civil & Environmental Eng. (Bosphorus University)
Telephone: +00 90 212 352 5225
Cell ph#   +00 90 531 309 5698
e-mail: kayakara@yahoo.com