



Casonone

**FIRENZUOLA SERENA STONE CLADDING WITH NATURAL,
SANDBLASTED SURFACE AND TRIMMED EDGES
FIRENZUOLA (FI)**

in accordance with ISO 14025 e EN 15804

ENVIRONMENTAL PRODUCT DECLARATION

PROGRAM OPERATOR

EPDItaly

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COMPANY PROFILE

Casone Group s.r.l. is a company engaged in the processing of ornamental stone from both its own quarries (Pietra Forte Fiorentina) and other quarrying sites (marble, granite, onyx and travertine). Founded in 1962, Casone Group operates in Firenzuola (Florence), a quarrying area in the Tuscan-Emilian Appennines, with stone deposits also in Verona and Carrara districts. Internationally known, it has always collaborated with nationally and internationally renowned architects, managing all stages of processing up to the final project: from the extraction of the block to in-situ realization.



COMPANY CERTIFICATIONS

EPD Pietra Serena di Firenzuola
(Registration Number EPDItaly: EPDITALY0065)



1. GENERAL INFORMATION

1.1 Product	Grey coloured sandstone, commercially known as Pietra Serena di Firenzuola, with a sandblasted surface and trimmed edges.
1.2 Programme Holder	EPD Italy Via Gaetano De Castillia, 10 20124 - Milano (MI) email: info@epditaly.it
1.3 This declaration is based on the following product category rules (PCR):	PCR ICMQ-001/15 (rev.2) "Construction product and Construction service" Reference is made to the PCR-IBU-Part B (v. 1.6, 30.11.2017) "Requirements on the EPD for Dimension stone for roof, wall and floor applications".
1.4 CPC Code	37
1.5 Declared product / unit of measurment	Production of 1 tonne of Firenzuola Pietra Serena with a sandblasted surface and trimmed edges.
1.6 EPD developed by	Institut für Nachhaltigkeit im Bauwesen, RWTH
1.7 Verification	Independent verification performed by: ICMQ s.p.a., via Gaetano de Castillia 10, Milano (Mi), Italia. x Externally □ Internally
1.8 Declaration Owner	Casone Group srl via Toscana, 114 - 40035 Castiglione dei Pepoli (BO) Referente: Alberto Bartolomei email: info@casonegroup.com
1.9 Declared Unit	The declared unit is 1 tonne of Pietra Serena cladding, quarried in the Firenzuola district (Florence), with a honed surface in thicknesses between 2 and 6 cm.
1.10 Production Site	via Imolese, 98 - 50033 Firenzuola (FI) - Italia
1.11 Validity (from - to)	From 06.03.2019 To 06.03.2024
1.12 Comparability	Environmental declarations published within the same product category may not be comparable if they originate from different programmes. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804:2012+A1:2013.
1.13 Declaration	EPDItaly is excluded from liability for any failure to observe compliance with environmental legislation that has been independently declared by the manufacturer.

2. PRODUCT

2.1 Material Description	<p>Pietra Serena di Firenzuola is a clastic sedimentary stone belonging to the Marnoso-Arenacea formation, known in petrography as "sandstone light grey" (UNI EN 12440), and is quarried in the historic Brento Sanico district of Firenzuola. Depending on the quarry seam from which the block comes, sandstone products with quite different characteristics and quality are obtained. Starting from the lowest level of the stratigraphic scheme, the strata quarried in the quarrying basin to which the family of grey stones known as "Firenzuola Grey Stone" belongs, were in the past the "Contessa" stratum, the "Masso Grosso" and the "Filaretti", from which the relative arenites were obtained. Currently, only the "Filare", which is the lowest stratum, is mined.</p> <p>The process through which Firenzuola's Pietra Serena is extracted is subdivided into three macro-phases, summarised in Figure 1 showing Cultivation (in the quarry), Transport from the quarry to the Plant and Processing (in the plant). The first phase of cultivation is known as "Uncovering" and involves the removal of the topsoil (portion of the soil mantle) down to the so-called "cultivable" stratum. Once the earthy mantle has been eliminated using explosives, the material removed (earthy mantle and clayey, marly debris) is kept in the quarry for purposes. The actual extraction is carried out in that portion of the quarry where the material is free of alterations, impurities or discontinuities. Blocks extracted in this way are transported to the processing plant in Firenzuola about 15 km away.</p> <p>In the laboratory, the material undergoes the following production cycle:</p> <ul style="list-style-type: none"> - Sawing of the blocks into slabs of varying thickness between 2 and 6 cm depending on the application; - Surface sandblasting of the slab; - Cutting to size of the slabs
2.2 Product Description	The product is marketed in the form of slabs. It is a considerably smaller in thickness compared to its) width and length. This processing is carried out in the factory, together with edge finishing, resulting in a building product varying in thickness from 2 to 6 cm and generally used for cladding and/or flooring.
2.3 Use	Pietra Serena di Firenzuola slabs both without (natural) and with a (sandblasted) surface treatment are intended to be applied to either wall or floor coverings and to be installed either indoors or outdoors for residential, non-residential and commercial use.
2.4 Technical Data	Thickness: variable from 2 to 6 cm (area: variable from 20,5 m2 to 6,8 m2)

Characteristic	Standard of Reference	Value
Density	UNI EN 1936	2550 Kg/m ³
Water absorption at atmospheric pressure	UNI EN 13755	2,00 %
Compressive Strength	UNI EN 1926	110 MPa (perpendicular to the direction to the dry state)
Compressive Strength after Freezing/Thawing	UNI EN 12371	105 MPa (after 48 freezing cycles)

3. LCA: CALCULATION RULES

Characteristic	Standard of Reference	Value
Flexural Strength	UNI EN 12372	11 MPa (specimen size 180x60x30 mm distance between supports 150 mm)
Flexural Strength after Freezing/Thawing	UNI EN 12371	10 MPa (after 48 freezing cycles, specimen size 180x60x30 mm distance between supports 150 mm)
Freezing/Thawing	UNI EN 1341/1342/1343	Resistant (objective examination)
Abrasion Resistance	UNI EN 1341	21,00 mm
Slip Resistance	UNI EN 14231	65 USRV
Breakage of Fixing Holes	UNI EN 13364	1600 N

The product is not a SVHC (Substance of very high concern).

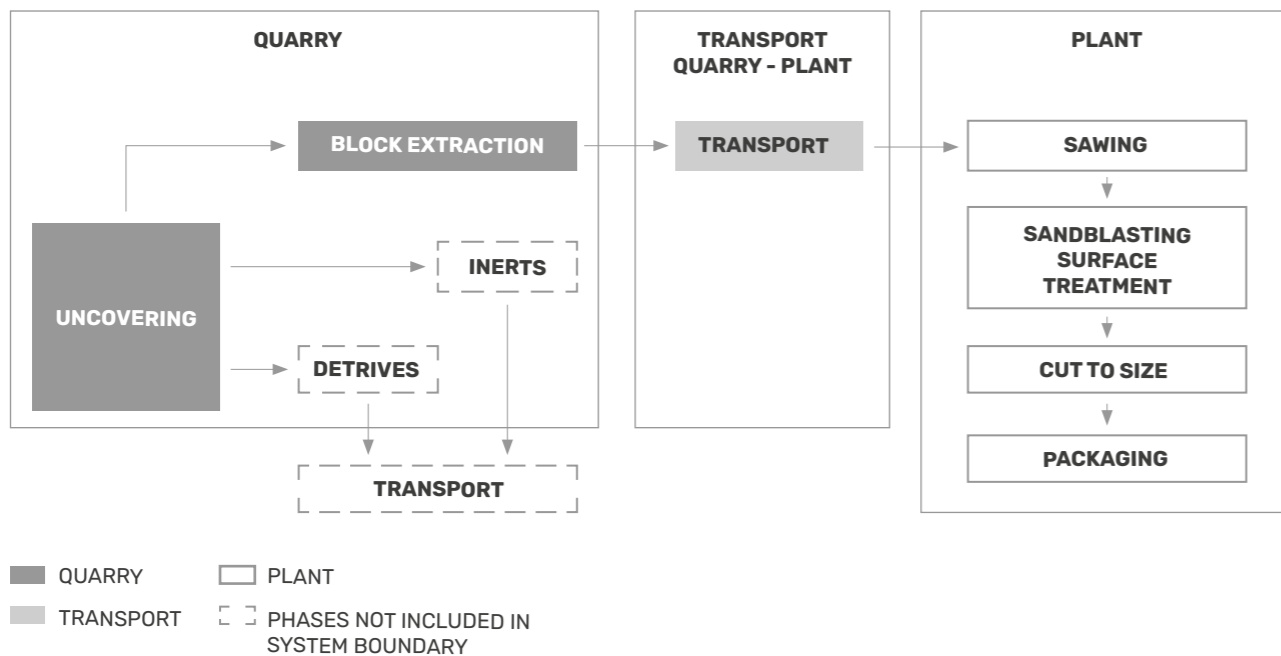


Fig. 1 Phases in the Firenzuola Pietra Serena production cycle LCA

3.1 Declared Unit

The declared unit is 1 tonne of Pietra Serena cladding quarried in the Firenzuola district, trimmed, with a honed surface in thicknesses between 2 and 6 cm.

3.2 System Boundaries

The LCA study is of the “cradle-to-gate” type. Therefore, modules A1 to A3 are considered, which respectively take into account the following phases: extraction of the raw material in the quarry (A1), transport of the material from the quarry to the production plant and back (A2) and processing of the product at the Firenzuola laboratory (A3), in the province of Florence.

More specifically:

- Module A1 considers all the steps necessary to extract the stone raw material in the quarry, contemplating the energy consumption, materials and air emissions produced by these operations;
- Module A2 analyses the transport of the stone material (in blocks) from the quarry to the plant;
- Module A3 considers all the phases related to the processing of the material in the plant, such as sawing the block into slabs, trimming into cladding elements, sandblasting surface treatment and final packaging.

3.3 Data Quality

The data for modules A1 and A3, from extraction of the raw material in the quarry, transport to the plant and final processing, are based on primary data collected at the processing site in Firenzuola (FI), referring to the year 2017 (except for emissions to air and water, which refer to the year 2018). The generic data refer to the Ecoinvent v.3.0 database, adopted in the simulation software SimaPro v8.5.

3.4 Cut Off Criteria

All significant raw materials, energy consumption and emissions were included in the analysis. Fluxes whose mass is below 1% of the total input flow at the process unit were excluded from the production process.

3.5 Allocation

Allocation by mass was used in the study. Energy, gas and water consumption related to the manufacturing phase were allocated to the product based on the mass of Pietra Serena cladding produced annually. The difference in the consumption of material, energy and waste produced in the production cycle of the different products (slabs, tiles, special elements, etc.) is considered marginal, as the production processes are almost identical.





4. LCA: SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

The information below describes the scenarios adopted in modules A1 to A3. All impacts are related to one tonne of Pietra Serena cladding, trimmed and with sandblasting surface treatment in various commercial thicknesses from 2 to 6 cm.

4.1a Transport from the quarry to the plant (A2)	All raw material is extracted in the Brento Sannico area in Firenzuola and is normally transported to the Firenzuola plant. A distance of approximately 15km is assumed as a calculation scenario, using a EURO 5 motorised lorry of >20t capacity.
4.1.b Characteristics of the vehicle of transport (A2)	The vehicle used to transport the blocks is a Euro 5 lorry with a load capacity of more than 20 tonnes.
4.2 Internal Handling (A3)	The vehicle used for the internal handling of the slabs is a Euro 3 forklift with a maximum load capacity of 4 tonnes.
4.3 Additional Information	The impact values of the tonne of stone per m2 of cladding can be obtained by multiplying the results by the thickness of the cladding in metres and the density of the material (2.45 t/m3). The thicknesses marketed vary from 2 to 6 cm. As an example, considering a thickness of 5 cm, the impact value for the GWP indicator (Kg CO2 equivalent) is 35.9 Kg CO2e/t x 0,05 m x 2,45 t/m3 = 4,40 Kg CO2e/m2 of sandblasted Serena Stone cladding.

Characteristic	Value	U.d.M.
Type	Lorry	-
Load factor (round trip)	80	%
Capacity	> 20	t
Motorisation	EURO5	-
Distance (round trip)	26	km

5. LCA: RESULTS

The results for phases A1 t A3 are broken down by surface treatment and commercial thickness.

System Boundaries (X = Included, MND = Module Not Declared)																
Production Stage			Construction Process Stage		Use Stage							End of Life Stage				Benefits and Loads beyond the System Boundaries
Raw Material Supply	Transport	Manufacturing	Transport from the Gate to the Site	Assembly	Use	Maintenance	Repair	Replacemnet	Refurbishment	Operational Energy Use	Operational Water Use	De-Construction/Demolition	Transport	Waste Processing	Disposal	Reuse-Recovery-Recycling Potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Environmental Impacts of 1 tonne of 2 cm thick trimmed, natural (NAT) and sandblasted (SAB) slabs						
PARAMETERS				PHASES		
ACRONYM	UM	A1-A3 nat	A1-A3 sab	B1-B7	C1-C4	D
GWP	[kgCO ₂ -eq]	5.94E+01	6.84E+01	MND	MND	MND
ODP	[kgCFC11-eq]	1.82E-05	1.92E-05	MND	MND	MND
POCP	[kgC ₂ H ₄ -eq]	1.68E-02	1.82E-02	MND	MND	MND
AP	[kgSO ₂ -eq]	3.05E-01	3.36E-01	MND	MND	MND
EP	[kgPO ₄ ³⁻ -eq]	7.53E-02	8.66E-02	MND	MND	MND
ADPM	[kgSb-eq]	7.60E-05	8.07E-05	MND	MND	MND
ADPE	[MJ]	1.73E+03	1.84E+03	MND	MND	MND

Environmental Impacts of 1 tonne of 5-6 cm thick trimmed and sandblasted slabs						
PARAMETERS				PHASES		
ACRONYM	UM	A1-A3 5 cm	A1-A3 6 cm	B1-B7	C1-C4	D
GWP	[kgCO ₂ -eq]	6.30E+01	6.24E+01	MND	MND	MND
ODP	[kgCFC11-eq]	1.86E-05	1.85E-05	MND	MND	MND
POCP	[kgC ₂ H ₄ -eq]	1.73E-02	1.72E-02	MND	MND	MND
AP	[kgSO ₂ -eq]	3.17E-01	3.15E-01	MND	MND	MND
EP	[kgPO ₄ ³⁻ -eq]	7.98E-02	7.90E-02	MND	MND	MND
ADPM	[kgSb-eq]	7.79E-05	7.75E-05	MND	MND	MND
ADPE	[MJ]	1.78E+03	1.77E+03	MND	MND	MND

Environmental Impacts for 1 tonne of trimmed and sandblasted slabs, thicknesses 3-4 cm						
PARAMETERS				PHASES		
ACRONYM	UM	A1-A3 3 cm	A1-A3 4 cm	B1-B7	C1-C4	D
GWP	[kgCO ₂ -eq]	6.54E+01	6.39E+01	MND	MND	MND
ODP	[kgCFC11-eq]	1.89E-05	1.87E-05	MND	MND	MND
POCP	[kgC ₂ H ₄ -eq]	1.77E-02	1.75E-02	MND	MND	MND
AP	[kgSO ₂ -eq]	3.26E-01	3.21E-01	MND	MND	MND
EP	[kgPO ₄ ³⁻ -eq]	8.28E-02	8.09E-02	MND	MND	MND
ADPM	[kgSb-eq]	7.91E-05	7.83E-05	MND	MND	MND
ADPE	[MJ]	1.80E+03	1.79E+03	MND	MND	MND

Use of resources of 1 tonne of 2 cm thick trimmed, natural (NAT) and sandblasted (SAB) slabs						
PARAMETERS				PHASES		
ACRONYM	UM	A1-A3 nat	A1-A3 sab	B1-B7	C1-C4	D
PERE	[MJ]	2.11E+02	2.21E+02	MND	MND	MND
PERM	[MJ]	1.13E+02	1.13E+02	MND	MND	MND
PERT	[MJ]	3.24E+02	3.30E+02	MND	MND	MND
PENRE	[MJ]	1.82E+03	1.96E+03	MND	MND	MND
PENRM	[MJ]	9.38E+01	9.38E+01	MND	MND	MND
PENRT	[MJ]	1.92E+03	2.05E+03	MND	MND	MND
SM	[kg]	0.00E+00	0.00E+00	MND	MND	MND
RSF	[MJ]	0.00E+00	0.00E+00	MND	MND	MND
NRSF	[MJ]	0.00E+00	0.00E+00	MND	MND	MND
FW	[m ³]	3.00E+00	3.00E+00	MND	MND	MND

ACRONYMS:

GWP = Global warming potential; **ODP** = Depletion potential of the stratospheric ozone layer; **AP** = Acidification potential of land and water; **EP** = Eutrophication potential; **POCP** = Formation potential of tropospheric ozone photochemical oxidants; **ADPE** = Abiotic depletion potential for non-fossil resources; **ADPF** = Abiotic depletion potential for fossil resources. **MND**: Module Not Declared.

ACRONYMS:

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PERM** = Use of renewable primary energy resources used as raw materials; **PERT** = Total use of renewable primary energy resources; **PENRE** = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; **PENRM** = Use of non-renewable primary energy resources used as raw materials; **PENRT** = Total use of non-renewable primary energy resources; **SM** = Use of secondary material; **RSF** = Use of renewable secondary fuels; **NRSF** = Use of non-renewable secondary fuels; **FW** = Use of net fresh water

Use of resources of 1 tonne of 3 and 4 cm thick trimmed, sandblasted slabs						
PARAMETERS				PHASES		
ACRONYM	UM	A1-A3 3 cm	A1-A3 4 cm	B1-B7	C1-C4	D
PERE	[MJ]	2.17E+02	2.16E+02	MND	MND	MND
PERM	[MJ]	1.13E+02	1.13E+02	MND	MND	MND
PERT	[MJ]	3.30E+02	3.28E+02	MND	MND	MND
PENRE	[MJ]	1.91E+03	1.89E+03	MND	MND	MND
PENRM	[MJ]	9.38E+01	9.38E+01	MND	MND	MND
PENRT	[MJ]	2.01E+03	1.98E+03	MND	MND	MND
SM	[kg]	0.00E+00	0.00E+00	MND	MND	MND
RSF	[MJ]	0.00E+00	0.00E+00	MND	MND	MND
NRSF	[MJ]	0.00E+00	0.00E+00	MND	MND	MND
FW	[m ³]	3.00E+00	3.00E+00	MND	MND	MND

Use of resources of 1 tonne of 5 and 6 cm thick trimmed, sandblasted slabs						
PARAMETERS				PHASES		
ACRONYM	UM	A1-A3 5 cm	A1-A3 6 cm	B1-B7	C1-C4	D
PERE	[MJ]	2.15E+02	2.14E+02	MND	MND	MND
PERM	[MJ]	1.13E+02	1.13E+02	MND	MND	MND
PERT	[MJ]	3.27E+02	3.27E+02	MND	MND	MND
PENRE	[MJ]	1.88E+03	1.87E+03	MND	MND	MND
PENRM	[MJ]	9.38E+01	9.38E+01	MND	MND	MND
PENRT	[MJ]	1.97E+03	1.96E+03	MND	MND	MND
SM	[kg]	0.00E+00	0.00E+00	MND	MND	MND
RSF	[MJ]	0.00E+00	0.00E+00	MND	MND	MND
NRSF	[MJ]	0.00E+00	0.00E+00	MND	MND	MND
FW	[m ³]	3.00E+00	3.00E+00	MND	MND	MND

ACRONYMS:

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PERM** = Use of renewable primary energy resources used as raw materials; **PERT** = Total use of renewable primary energy resources; **PENRE** = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; **PENRM** = Use of non-renewable primary energy resources used as raw materials; **PENRT** = Total use of non-renewable primary energy resources; **SM** = Use of secondary material; **RSF** = Use of renewable secondary fuels; **NRSF** = Use of non-renewable secondary fuels; **FW** = Use of net fresh water

OUTPUT FLOWS AND WASTE of 1 tonne of 2 cm thick trimmed, natural (NAT) and sandblasted (SAB) slabs						
PARAMETERS				PHASES		
ACRONYM	UM	A1-A3 nat	A1-A3 sab	B1-B7	C1-C4	D
HDW	[kg]	3.82E-06	3.82E-06	MND	MND	MND
NHWD	[kg]	1.30E+03	1.30E+03	MND	MND	MND
RWD	[kg]	0.00E+00	0.00E+00	MND	MND	MND
CRU	[kg]	INA	INA	MND	MND	MND
MFR	[kg]	1.17E+01	1.17E+01	MND	MND	MND
MER	[kg]	INA	INA	MND	MND	MND
EEE	[MJ]	INA	INA	MND	MND	MND
EET	[MJ]	INA	INA	MND	MND	MND

OUTPUT FLOWS AND WASTE of 1 tonne of 3 and 4 cm thick trimmed, sandblasted slabs						
PARAMETERS				PHASES		
ACRONYM	UM	A1-A3 nat	A1-A3 sab	B1-B7	C1-C4	D
HDW	[kg]	3.82E-06	3.82E-06	MND	MND	MND
NHWD	[kg]	1.30E+03	1.30E+03	MND	MND	MND
RWD	[kg]	0.00E+00	0.00E+00	MND	MND	MND
CRU	[kg]	INA	INA	MND	MND	MND
MFR	[kg]	1.17E+01	1.17E+01	MND	MND	MND
MER	[kg]	INA	INA	MND	MND	MND
EEE	[MJ]	INA	INA	MND	MND	MND
EET	[MJ]	INA	INA	MND	MND	MND

ACRONYMS:

HDW = Hazardous waste disposed; **NHWD** = Non-hazardous waste disposed; **RWD** = Radioactive waste disposed; **CRU** = Components for re-use; **MFR** = Materials for recycling; **MER** = Materials for energy recovery; **EEE** = Exported electrical energy; **EET** = Exported thermal energy **INA**=Indicator not assessed

OUTPUT FLOWS AND WASTE of 1 tonne of 5 and 6 cm thick trimmed, sandblasted slabs

PARAMETERS				PHASES		
ACRONYM	UM	A1-A3 nat	A1-A3 sab	B1-B7	C1-C4	D
HDW	[kg]	3.82E-06	3.82E-06	MND	MND	MND
NHWD	[kg]	1.30E+03	1.30E+03	MND	MND	MND
RWD	[kg]	0.00E+00	0.00E+00	MND	MND	MND
CRU	[kg]	INA	INA	MND	MND	MND
MFR	[kg]	1.17E+01	1.17E+01	MND	MND	MND
MER	[kg]	INA	INA	MND	MND	MND
EEE	[MJ]	INA	INA	MND	MND	MND
EET	[MJ]	INA	INA	MND	MND	MND

ACRONYMS:

HDW = Hazardous waste disposed; **NHWD** = Non-hazardous waste disposed; **RWD** = Radioactive waste disposed; **CRU** = Components for re-use; **MFR** = Materials for recycling; **MER** = Materials for energy recovery; **EEE** = Exported electrical energy; **EET** = Exported thermal energy **INA**=Indicator not assessed



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