INSTALLATION MANUAL

TECNO
CANAPA
BIOEDILIZIA

SENINI

ENVELOPE SYSTEM
BIOMATTONE®

NEW

NEW CONSTRUCTION | RETROFITTING AND RESTORATION | PLASTERS AND FINISHES

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HEMP-AND-LIME BIO-CONSTRUCTION

The construction sector is one of the leading contributors to land, energy and resource consumption, as well as a source of toxic emissions and a cause of illness for people. For several years it has been going through a deep crisis due to causes closely linked to the lack of balance between the social, environmental and economic aspects of building and living, with evident consequences including property speculation, sick building syndrome and poor quality of the materials used.

Senini promotes an alternative development model capable of turning the problem into a solution by creating building envelopes with natural materials, such as Hemp and Lime, which have a positive impact on the environment and maximize healthiness, comfort, energy efficiency and wellbeing for occupants.

The company operates in the field of bio-construction, natural building materials and energy efficiency technologies, aware that energy saving and indoor healthiness have become key factors for quality of living, as well as necessary conditions for a property to retain its value over time.
The hemp plant has a number of interesting properties from an environmental point of view, growing at any latitude from seed to four/six meters in height in just four months. It requires no pesticides, herbicides or fertilizers, regenerates the soil it grows in by adding nutrients instead of depleting them, and captures large amounts of CO_2 from the atmosphere, which is stored in its woody core.

Lime is obtained by firing limestone at much lower temperatures than those used for cement. The function of lime is to mineralize the plant component, protecting it from the possibility of decomposing, catching fire or being attacked by insects or rodents.

HEMP SHIV

Hemp shiv is chopped hemp, the woody part of the plant. It comes from the stem processing: the fibers (bark) are removed through a mechanical separation process, and the woody part is chopped and then refined to remove residual fibers and dust.

NATURAL DOLOMITIC BINDER

Natural Dolomitic Binder is an air lime binder free of chemical or cement additives, intended for the preparation of hemp-and-lime biocomposites in the Biomattone® and Biobeton range.
Natural Dolomitic Binder, together with hemp shiv, is highly hygroscopic, and therefore ensures excellent moisture management capacity. It is used in the restoration and renovation of buildings, in refurbishments, in new construction, as well as in the emerging needs of New Construction for building Zero Energy NZEB buildings.

PROBIOTIC ADDITIVE

The Probiotic Additive is a symbiotic blend of naturally occurring microorganisms capable of promoting the reversal and regeneration of oxidative and degenerative processes. Used in combination with hemp shiv (coarse or fine), natural dolomitic binder and water, it helps accelerate the carbonation process of the lime, leading to an increase in short-term mechanical performance and a reduction in the drying time of the biocomposites. The presence of active microbial cultures also helps prevent the onset of mold phenomena during the drying phase, thanks to the antagonistic action of the probiotics against the bacteria responsible for mold formation. The formulation consists of mineral salts, raw sugarcane molasses, water and non-pathogenic microbial consortia, including lactic acid bacteria, photosynthetic bacteria and yeasts.

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BIOMATTONE®

Biomattone® is a solid insulating material that combines insulation and thermal mass properties.

It is composed of coarse hemp shiv (CenC-certified hemp wood), natural dolomitic binder (a hydrated dolomitic lime binder) and probiotic additive (symbiotic microorganisms). In line with the principles of social and environmental sustainability, Biomattone® has all the qualities required of a building material aligned with sustainable development.

High insulating capacity, low embodied energy during production, and the ability to absorb CO2 from the atmosphere. The main characteristics of buildings built with Biomattone® are thermal, acoustic and hygrometric comfort. Biomattone® is permeable to water vapor, and is resistant to fire, frost, insects and rodents. The absence of toxic fumes in case of fire is guaranteed.

Applications are varied: insulating masonry combined with a load-bearing timber, steel or reinforced concrete frame; acoustically insulating internal partitions; internal or external inner linings.

Biomattone® is the solution to the needs of both New Construction and traditional building, offering high energy savings, combined with the sustainability of the materials and the product, while remaining, in shape and dimensions, very close to the building culture and system most familiar to industry professionals.

Although it has no structural properties, when combined with a load-bearing frame structure, Biomattone® is effective in building perimeter masonry, where it serves both an infill and an insulating function. The packaging and transport system, on-site handling and storage, cutting, installation, service chases, lintels and sub-frames, as well as anchoring, are all very similar to those normally used in construction
with other materials (except for a few minor precautions due to the insulating and moisture-management qualities of Biomattone®)

CHARACTERISTICS AND PERFORMANCE

DIMENSIONS

Biomattone® is a prefabricated block made of Biobeton: a hemp-and-lime biocomposite measuring 20x50 cm, available in thicknesses of 8, 12, 20, 25, 30, 36, 40, 50 cm.

MAIN CHARACTERISTICS:

- Thermal, acoustic and hygrometric comfort: Biomattone® is permeable to water vapor (breathable);
- Resistant to fire, frost, insects and rodents;
- No toxic fumes in case of fire;
- Low energy consumption during manufacturing;
- Recyclable at end of life.

TECHNICAL SPECIFICATIONS

NB. [height] +/- 1 cm	BA8	NEW BA12	BA20	BA25	BA30	NEW BA36	NEW BA40	BA50
Dimensions - Length Height Thickness - cm	50x20x8	50x20x12	50x40x20	50x20x25	50x20x30	40x20x36	50x20x40	40x20x50
Density - dry Kg/m³	310	310	310	310	310	310	310	310
Thermal conductivity - W/mK LAMBDA λ	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
Thermal transmittance - W/m²K U	0.5	0.34	0.21	0.17	0.14	0.12	0.11	0.09
Total thermal resistance (Rt) - m²K/W	1.99	2.9	4.71	5.85	6.99	8.35	9.01	11.53
Thermal phase shift without plaster	3h 00'	5h 44'	11h 19'	14h 46'	18h 14'	22h 23'	25h 08'	32h 04'
Specific heat - J/KgK	1280	1280	1280	1280	1280	1280	1280	1280
Vapor resistance - μ	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Acoustic absorption (aw)	1 - CLASS A	1 - CLASS A	1 - CLASS A	1 - CLASS A	1 - CLASS A	1 - CLASS A	1 - CLASS A	1 - CLASS A
Sound reduction (Rw) - dB					40	42	43	45
Compressive strength - N/mm²	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Shear tensile strength with embedded anchor - kN	2.067	2.067	2.067	2.067	2.067	2.067	2.067	2.067
Orthogonal tensile strength with embedded anchor - kN	2.734	2.734	2.734	2.734	2.734	2.734	2.734	2.734
Reaction to fire	B - s1, d0	B - s1, d0	B - s1, d0	B - s1, d0	B - s1, d0	B - s1, d0	B - s1, d0	B - s1, d0
Fire resistance without plaster - min		EI60			EI180	EI180	EI180	EI180
Total GWP - kg CO_2eq/m³	-44.2	-44.2	-44.2	-44.2	-44.2	-44.2	-44.2	-44.2

ON-SITE HANDLING

Fast handling, optimized dimensions, fire resistance, and unappeal to insects and rodents are characteristics that make storage of the biocomposite easier and facilitate its installation.
About 3 times lighter than traditional bricks, but with insulating capacity comparable to synthetic insulants, Biomattone® represents an optimal solution for achieving high energy performance while at the same time ensuring particularly advantageous site logistics.

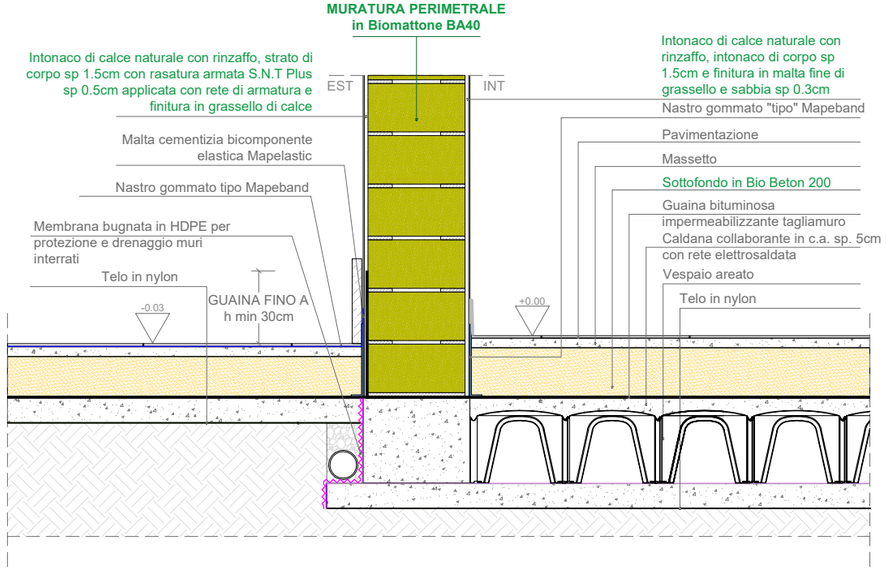
APPLICATIONS

Biomattone® is a masonry block that combines insulation and thermal mass properties, in line with the principles of social and environmental sustainability.

PERIMETER MASONRY

Biomattone® can be used to build insulating perimeter infill masonry as a single-block solution (fig.1) or with a cavity-wall formation, with insulation inserted between the leaves. The installation method is the same; what changes, of course, is the thermal-acoustic performance depending on the thicknesses chosen at the design stage

Fig. I



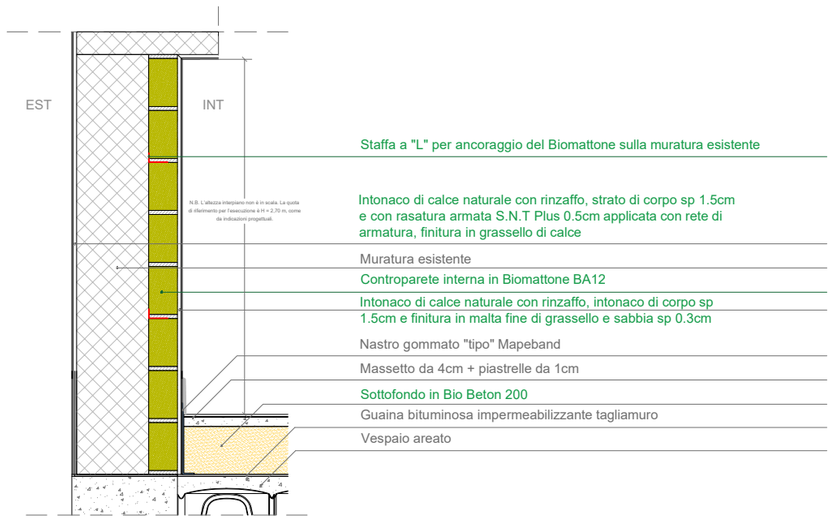
APPLICATIONS

INSULATING INNER LINING

The Biomattone® is used as an insulating cladding for existing masonry as part of the energy retrofitting of buildings (fig. 2). Anchors must be obtained by fixing L-brackets into the Biomattone®. The bracket leg fixed to the existing masonry must be at least 40mm long, the other must extend at least to half the thickness of the Biomattone®, and the width must be at least 20mm. Fixing can be done with a 40mm anchor in the existing masonry and a 60 mm nail (or screw) in the Biomattone®. Anchors must be installed running every 150cm and every three courses of blocks in height, i.e. 60cm. (fig. 3)

Fig.2

Fig.3



APPLICATIONS

INNER LINING WITH CAVITY

Creating a cavity between the existing masonry and the Biomattone® inner lining can be done on either side, external or internal, relative to the existing masonry. This solution makes it possible to even out the surface while achieving high performance. The variable-thickness gap can be filled with a low-density, highly insulating material (Biobeton).

Inner lining in Biomattone® with cavity filled with Biobeton

POINT ANCHORING TO THE LOAD-BEARING STRUCTURE:

Wall panels built in Biomattone® must be anchored to the building's load-bearing structure through point anchors on alternating courses, at beams and columns of the facade. Anchoring must be done using L-shaped galvanized metal brackets fixed to the load-bearing structure with anchors and with nails or screws at least 6 cm long into the Biomattone®.

For inner linings, insert a bracket with an anchor every 120 cm along the horizontal running line, with the pattern staggered upward by one course every 3. Example: two empty courses, the third anchored, 2 empty courses, the 6th anchored, and so on going up. Closing/sealing the top part of the wall built in Biomattone® must be done using wooden wedges fitted and firmly secured to the structural beams or slabs, all sealed with ready-mix mortar (lime and hemp mix, 4 to 1 ratio) and left to rest for at least 12 hours.

Walls or inner linings in Biomattone® can bear their own weight, depending on thickness, up to heights of about 4m. Beyond this height, the walls must transfer their weight onto a lintel or intermediate floor slab. Where this is not possible (external inner lining or cavity walls), a steel or timber lintel must be specifically anchored to the load-bearing structure to support the overlying portion of the Biomattone® wall.

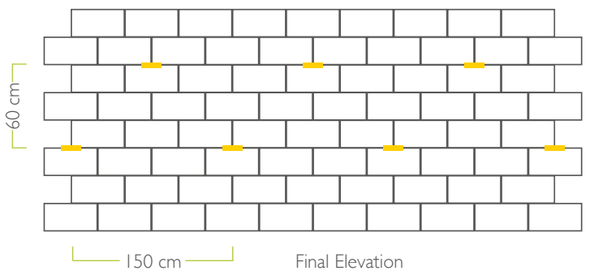


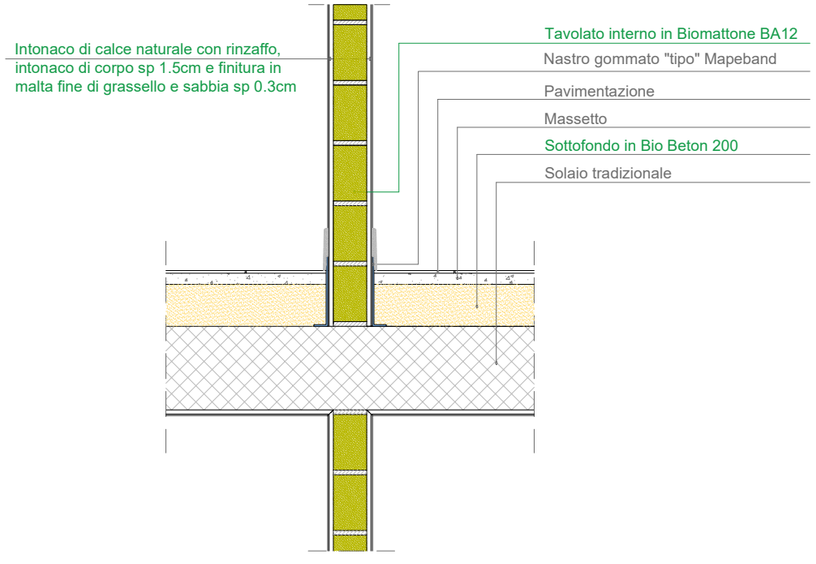
Fig.4 Detail of Biomattone anchors against existing walls

APPLICATIONS

INTERNAL PARTITION WALL

Installing an internal partition increases thermo-hygrometric storage capacity and improves acoustic and environmental comfort levels.

Internal partition wall in Biomattone®



INSTALLATION

STORAGE AND HANDLING:

Biomattone® is delivered on standard wooden pallets. The lightness and insulating capacity of Biomattone® result from its lower density compared to traditional blocks. Biomattone blocks must therefore be handled with care, using both hands. This does not compromise the solidity of the bedded and plastered masonry, which will have compressive strength characteristics equal to traditional masonry. Should a Biomattone® block break during transport or on-site handling, it should not be discarded. It can instead be safely used with the help of bedding mortar on the broken portions, cut into special pieces, or crumbled and mixed together with the bedding mortar.

PREPARATION:

Given the material's high hygroscopic capacity, waterproof the starting substrate before laying the block, by inserting a continuous horizontal barrier (bituminous damp-proof course), in order to prevent capillary rise of water through the foundation.

Provide for a bituminous membrane under the first course of blocks, suitably continuous and well adhered to the substrate, to be turned up along the external wall for at least 15–20 cm, so as to protect the block from splash water and ensure complete coverage of the foundation ring beam.

Insulation of the first course of Biomattone® with waterproof membrane

INSTALLATION

MORTARS FOR BIOMATTONE:

Use a mortar with chemical-physical characteristics, in terms of expansion and elastic modulus, similar to those of Biomattone®. For this purpose, it is recommended to use mortars developed by us and specifically formulated for laying Biomattone®, so as to ensure full performance compatibility between the materials.
Wall panels can be built up to a height of about 3 m without particular issues. For greater heights, especially with reduced thicknesses of Biomattone®, it is advisable to proceed in stages of about 1.5–2 m, waiting for the mortar to set before continuing with the following courses.

MALTA E CANAPA

Malta e Canapa is a pre-mixed powder mortar based on fine hemp shiv (0–6 mm), designed for building masonry in Biomattone® made of hemp and lime. It ensures excellent workability, color uniformity and limited efflorescence formation thanks to its bulk water-repellent properties; it is suitable for internal and external walls and is classified M5 according to EN 998-2. For laying, the blocks must be clean and, in hot conditions, slightly dampened; the mortar is mixed with about 5.0–6.0 liters of water per 25 kg bag, keeping the water/product ratio constant, and can be used within 2 hours. It is applied with a trowel by placing the mortar on the sides of the biomattone, leaving the center free (fig.4), so as to ensure correct masonry performance; for reduced thicknesses (BA8 and BA12), on the other hand, the mortar must be spread over the entire surface of the block (fig.5). Alignment, removal of excess material and joint finishing follow. Indicative consumption is about 0.75 bags/m² for the BA8 and BA12 sizes, while for blocks from BA20 upward it is about 1 bag/m².

MALTA PRONTA

Malta Pronta is a highly breathable natural mortar composed of coarse hemp shiv, natural dolomitic binder and symbiotic microorganisms, free of hydraulic binders and mineral aggregates. This composition makes it possible to achieve monolithic hemp-and-lime masonry, eliminating thermal bridges and ensuring high energy efficiency and indoor healthiness. The product is ready to use and is applied by hand: before laying, the biomattone blocks must be dampened by misting. The mortar must be spread over the entire surface of the biomattone with a thickness of about 1 cm (fig.6), so as to level the plane for the following course; once the wall is completed, the joints are struck to even out the surface and improve thermal performance. Laying can proceed continuously up to about 3 m in height, while for greater heights it is advisable to proceed in successive stages, waiting for the material to set. Consumption varies according to the thickness of the biomattone and can be expressed simply as proportional to the thickness: starting from about 0.53 buckets/m² for BA8 and increasing progressively (0.8 buckets/m² for BA12, 1.33 buckets/m² for BA20, 1.67 buckets/m² for BA25, 2 buckets/m² for BA30, 2.4 buckets/m² for BA36, 2.67 buckets/m² for BA40 and 3.33 buckets/m² for BA50).

fig.4

fig.5

fig.6

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CUTTING BIOMATTONE:

Cutting Biomattone® is extremely easy. Where necessary, the blocks can be cut using a suitable electric “alligator”-type or chain saw, or ideally a vertical band saw for masonry blocks.
Biomattone® is 100% recyclable, so all waste material, whether from demolition or from grooving or cutting, can easily be crumbled and re-mixed by adding water and lime in a concrete mixer to produce sub-base fill, cavity insulation, or ready-mix mortar and plaster.

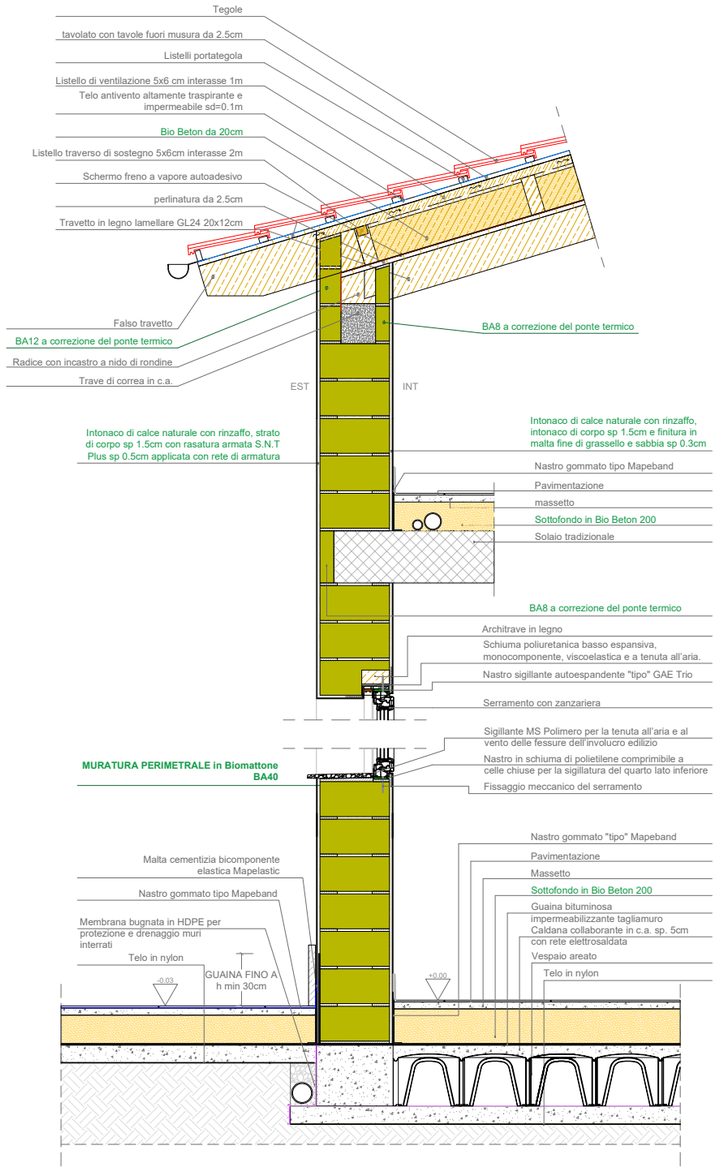
Example of shaped Biomattone® (1)

Example of shaped Biomattone® (2)

Cutting Biomattone® with a band saw

Shaped Biomattone® used to resolve a thermal bridge at the structural frame

CONSTRUCTION DETAILS



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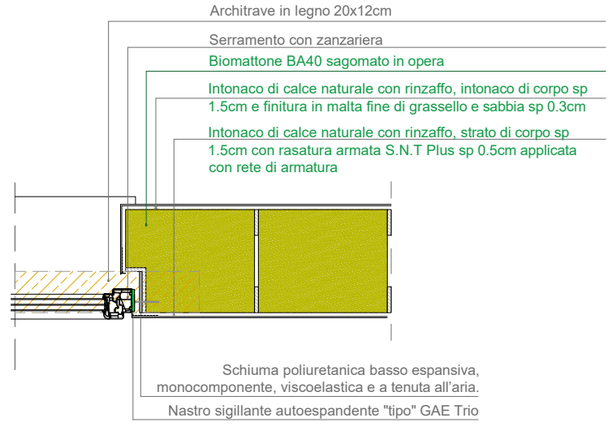
CONSTRUCTION DETAILS

WINDOW SUB-FRAMES:

IT is essential that these be sufficiently rigid to withstand the stress movements that form at the corners of the openings. Installation follows the classic method used for other types of masonry. Sub-frames must be anchored to the masonry using turbo screws and cramps closed with ready-mix mortar. Reveals can be formed on site, after the wall is laid, using an angle grinder or “alligator”-type electric saw, or, for more precise work, a pre-shaped Biomattone® block can be laid.

Section at lintel height



Section at window height

CONSTRUCTION DETAILS

SERVICE CHASES:

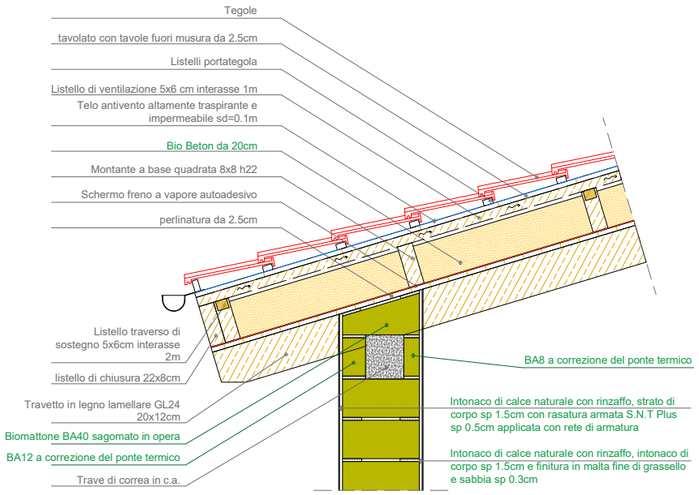
Cutting chases for electrical or plumbing systems in Biomattone® masonry is easily achieved using an “alligator”-type electric saw and/or a cup wheel grinder directly on the finished wall. The mortar used to close the chases must be obtained by mixing lime and hemp in a 4 to 1 ratio and left to rest for at least 12 hours.

Chase in Biomattone® for plumbing system

Chase in Biomattone® for electrical system

ROOF CONNECTION:

Biomattone® can be laid continuously up to the roof, adapting both to slim eave solutions and to cases with a through beam, ensuring continuity of the envelope and of thermo-hygrometric performance. Thanks to its workability, the block can easily be shaped on site to match the required thicknesses and effectively resolve thermal bridges, ensuring material and performance uniformity of the masonry.



CONSTRUCTION DETAILS

LINTELS AND SMALL ARCHES:

The lintel must rest on the Biomattone® masonry for at least one quarter of the width of the window opening per side, and in any case a minimum of 25cm per side. Commercially available lintels in hollow-tile-and-concrete or precast reinforced concrete, or in kiln-dried timber, can be used, possibly with a reduced thickness compared to the width of the Biomattone® in order to avoid a thermal bridge.

Installation of a kiln-dried timber lintel on a Biomattone® wall with thermal bridge resolved

CONSTRUCTION DETAILS

FIXING SHELVES, PICTURES, ETC.:

Loads can be hung on Biomattone® masonry using certain precautions, as illustrated in the images below.

Light load support detail

For heavy loads, drill holes of adequate depth (minimum 10 cm) in which to insert mechanical anchors or threaded rods embedded in epoxy resin or quick-setting cement.

Heavy load support detail

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CONSTRUCTION DETAILS

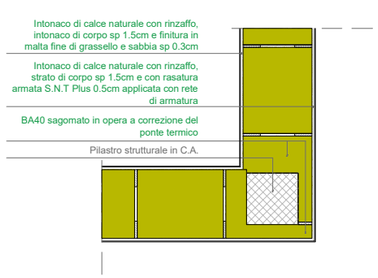
CORRECTING THERMAL BRIDGES AT STRUCTURAL FRAMES:

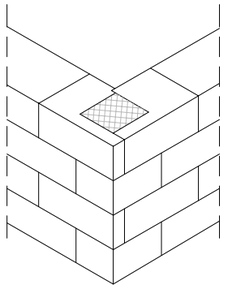
To correct thermal bridges generated by the load-bearing structure in reinforced concrete or steel, it is ideal to shape the Biomattone® so as to clad the frame with an appropriate thickness. Biomattone® in 36 and 40cm thicknesses makes it possible to build a wall panel that can run alongside columns and beams, cladding these thermal bridges with an appropriate thickness. In this way, in addition to correcting the thermal bridge, material continuity is ensured for the plaster that will be applied on the wall.

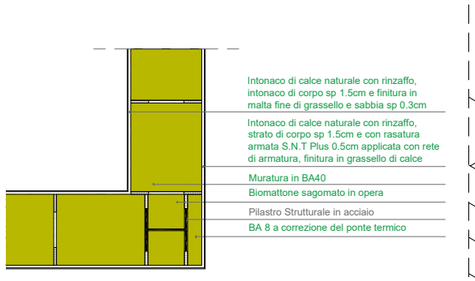
Steel frame:Thermal bridge resolved with shaped Biomattone® at the corner column

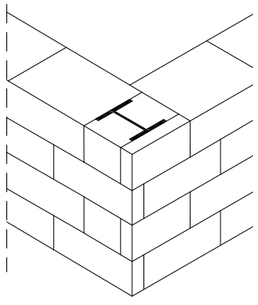
Where this is not possible, insulating panels made of other materials can be used at columns and beams, paying close attention to plastering and treating these materials as external thermal insulation (following their own installation and skim-coating methods).

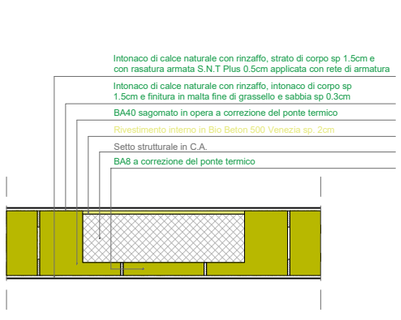
CONSTRUCTION DETAILS

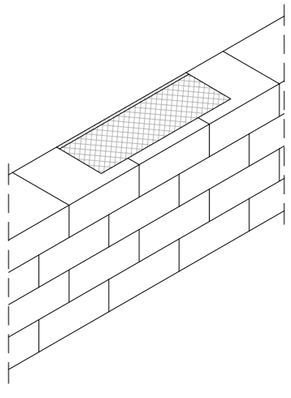












PLASTER AND BASE COAT

Given the breathability characteristics of Biomattone®, in order not to compromise this feature it is necessary to use equally breathable plasters, ideally lime-based. After a waiting period of about 20 days from laying Biomattone®, if weather conditions allow, plastering can proceed:

PREPARATION:

Wet the entire surface to run-off, as for any porous and absorbent surface. Pay particular attention especially in hot months, when the operation must be repeated several times if time is allowed to pass before plastering.

PREPARATION OF CRITICAL POINTS:

Preparation of areas where cracks may appear due to structural settlement or thermal expansion caused by discontinuity of materials on the wall:

Window sub-frames, reveals, roller shutter boxes, all material changeovers and generally anywhere there are panels of any kind (celenit board, XPS, reinforced concrete, wood, fiber-gypsum or cement boards, etc.) and/or pre-existing hairline cracks or cracks, must be treated with particular care. It is recommended to apply a double coat of Stabilitura Naturale Traspirante Plus with mesh, following this procedure:

1. Spread the **first coat** with a notched trowel, a mortar layer of at least 1-3 mm, and embed the ETICS mesh with a weight of 145 to 165 g/m² and a 5x5mm mesh size. Press flat with a smooth trowel until the mesh is hidden in the mortar. If necessary, overlap a new sheet of mesh by at least 5/10 cm.
2. After 12 hours, apply a **second coat** by spreading Stabilitura Naturale Traspirante Plus horizontally relative to the wall with a notched trowel, taking care to leave the resulting grooves visible to promote adhesion of the next plaster layer. Total 3-4mm for the two coats.

NOTE: at windows the mesh must be laid vertically and horizontally along the sides, and at 45° at corners, of adequate size both in length and width.

A. CIVIL PLASTER CYCLE (ICN + MINERAL FINISH)

CREATING THE BASE PLASTER AND CIVIL FINISH:

Finishes must be carried out exclusively with breathable materials in order to preserve the hygroscopic capacity of the lime-hemp substrate.

1. **First coat – scratch coat**
   Apply a first coat of Natural Lime Plaster, about 5 mm thick, to be carried out evenly over the entire surface by hand or machine application, after wetting the substrate with clean water.
2. **Second coat – plaster body**
   After at least 12 hours, create guide strips and then spread the Natural Lime Plaster to a thickness of about 15 mm, applied by hand or machine until the surface is completely leveled.
   ICN yield: 13 kg/m2 per cm of thickness.
3. **External finish – reinforced Stabilitura Naturale Traspirante**
   After at least 15-20 days, at temperatures between 5°C and 30°C, after wetting the base, apply a first coat of Stabilitura Naturale Traspirante Plus 1-2 mm thick with a notched trowel, then insert the ETICS reinforcing mesh (145–165 g/m², 5x5 mm mesh), with a minimum overlap of 5 cm, embedded in the skim coat layer.
   After 12-24 hours, apply the second coat of Stabilitura and finish in two passes using a stainless steel trowel, with subsequent working with a sponge float (manual or industrial) until achieving flatness and a professional finish.
   Overall thickness about 3-4 mm.
   SNT Plus yield: 3.0 – 5.0 kg/m2.
4. **Internal civil finish – Malta Fine**
   After at least 15-20 days, after wetting the substrate, apply the first coat of Malta Fine, in two coats for an overall thickness of about 1-3 mm.
   The finish will be carried out with a stainless steel trowel and subsequent working with a sponge float until achieving a perfectly flat and smooth surface, suitable for decorative finishes or breathable paints.
   Malta Fine yield: 3.0 – 4.0 kg/m2.

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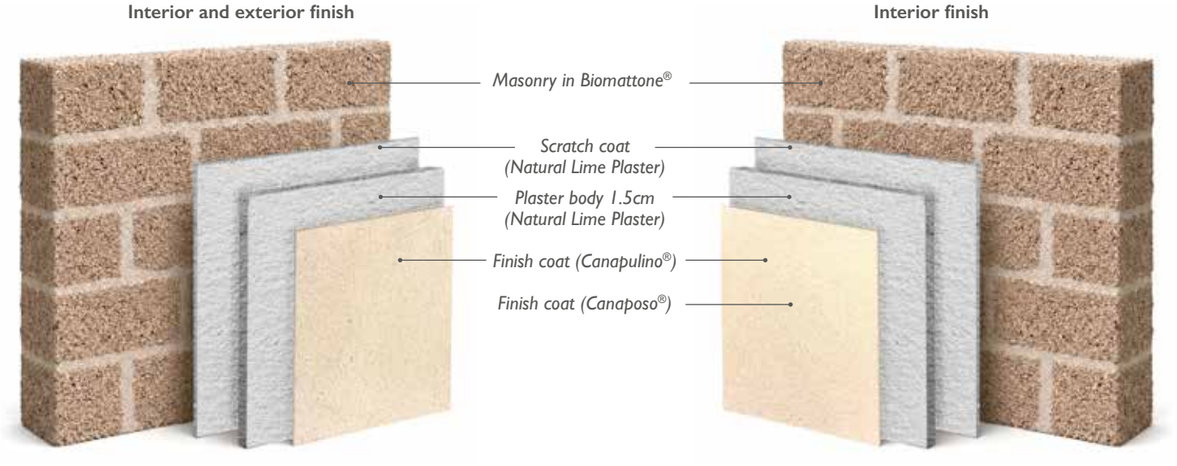
B. TEXTURED PLASTER CYCLE (ICN + TEXTURED FINISH)

Finishes must be carried out exclusively with breathable materials in order to preserve the hygroscopic capacity of the lime-hemp substrate.

1. **First coat – scratch coat**
   Apply a first coat of Natural Lime Plaster, about 5 mm thick, to be carried out evenly over the entire surface by hand or machine application, after wetting the substrate with clean water.
2. **Second coat – plaster body**
   After at least 12 hours, create guide strips and then spread the Natural Lime Plaster to a thickness of about 15 mm, applied by hand or machine until the surface is completely leveled.
   ICN yield: 13 kg/m2 per cm of thickness.
3. **External textured finish**
   After at least 15-20 days, at temperatures between 5°C and 30°C, after wetting the substrate, apply the Canapulino-type textured finish, in two coats for an overall thickness of about 4-5 mm.
   Working will be done with a stainless steel trowel and/or sponge float depending on the desired aesthetic effect.
   Canapulino yield: 3 m2 per bucket at 5mm thickness.
4. **Internal textured finish**
   After at least 15-20 days, at temperatures between 5°C and 30°C, after wetting the substrate, apply the Canapulino or Canaposo-type textured finish, in two coats for an overall thickness of about 4-5 mm.
   Working will be done with a stainless steel trowel and/or sponge float depending on the desired aesthetic effect.
   Canaposo yield: 5 m2 per bucket at 3mm thickness.



C. RUSTIC THERMAL PLASTER CYCLE (BIO BETON® 500 VENEZIA)

The cycle is carried out using a hemp-lime thermal plaster of the Bio Beton® 500 Venezia type, applied in multiple passes until the design thickness is reached. The material serves as scratch coat, plaster body and textured finish.
Work must be carried out exclusively with breathable materials in order to preserve the hygroscopic capacity of the lime-hemp substrate.

1. **First coat – scratch coat**
   After wetting the substrate with clean water, apply a first coat of Bio Beton 500 Venezia, evenly distributed, acting as a scratch coat, in order to ensure adhesion to the substrate.
2. **Second coat – forming the plaster body**
   About 1–3 hours after applying the first coat, once the material has begun to set, create guide strips and proceed with applying the second coat until the design thickness is reached.
   During the drying phase the material must be worked and monitored in order to avoid hairline cracking and to ensure proper surface cohesion.
   Canaposo yield: 1.5 m per bucket at 1 cm of thickness.
3. **Compacting and finishing**
   The finish is carried out directly on the final layer of Bio Beton 500 Venezia, worked while fresh or during hardening with suitable tools (trowel, spatula or hand working), until the desired effect is achieved; the material can be:
   • Lightly worked to achieve a more rustic, textured effect;
   • Compacted with the spatula for a more regular, even finish.
4. **Alternative single-coat application**
   Alternatively, the material can be applied in a single coat until the planned thickness is reached.
   In that case, you must wait for setting to begin and then proceed with surface working to define the finish.

Interior and exterior finish

Finish coat (Bio Beton 500 Venezia)

AIRTIGHTNESS

If you want to build a very low energy consumption or even passive building, it is essential to check its airtightness. At the design stage, particular attention must be paid to all junctions between different elements and materials (points where buildings can develop cracks that cause uncontrolled air exchange between inside and outside) and to all other critical points, such as fittings like electrical outlets, switches or lights.

WALL-COLUMN JUNCTION:

As with the ceiling junction, airtightness must also be ensured along all vertical uprights of the load-bearing structure; similarly to the case above, a vapor barrier must be fixed along the column and secured, for at least 1.5 cm per side, into the plaster of the Biomattone® infill wall.

SUB-BASE JUNCTION:

When using Biomattone® to insulate sub-bases, airtightness between the infill masonry
and the sub-base is ensured without the aid of any vapor barrier, provided the tightness of the junction itself is guaranteed.

ELECTRICAL OUTLETS:

To achieve good airtightness where the electrical or telephone system is installed, simple rules must be followed: use airtight boxes or seal unused holes, secure the conduit sleeves, and finish with plaster.

CEILING JUNCTION:

Airtightness of the ceiling is achieved by laying a vapor barrier along the entire length of the beams of the load-bearing structure. The vapor membrane is then embedded into the plaster of the Biomattone® infill masonry for at least 1.5 cm, both above and below the ceiling.

WINDOWS AND DOORS:

Airtightness along the junction between the Biomattone® infill masonry and the window/door frame is achieved with a vapor barrier that runs from the reveal and is sealed into the wall's internal plaster for at least 1.5 cm. The airtightness of a building envelope can be verified using the “blower-door test”, which measures the air change rate due to infiltration. By carrying out this test during construction work, any necessary corrective measures against heat loss can be adopted, thus preventing damage to building elements and the related repair costs.

SELECTED **PROJECTS**

LIVIGNO (SO)

MALUA BAY - AUSTRALIA

SAN CATALDO (LE)

OSAKA - JAPAN

PORTO RECANATI (MC)

UNIVERSITY OF PISA

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