



# RECYCLED TAPIALBLOCK: ECO-INNOVATIVE MATERIALS FOR A CIRCULAR ECONOMY

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Recycled tapialblock: prefabricated block with earth and recycled aggregates without baking.



## **GOALS**

Recycled Tapialblock is a prefabricated block with earth and recycled aggregates without baking, where the principles of Circular Economy are applied in the construction sector.

It is an Eco-innovative project. We use 100% recycled material. In the manufacturing process, existing precast concrete technology is reused. The product obtained is unique and capable of meeting the actual needs on the market.

The development of the project is based on solving environmental problems that affect the

construction and rehabilitation of buildings, with the aim of Reducing, Recycling and Reusing.



### ***- Reduced consumption of natural materials and waste***

The construction sector is one of the economic activities that generates the most waste. Incorporate recycled soil and aggregate from construction and demolition waste, which is integrated into the base material of the prefabricated block, minimizes the extraction of raw materials, and reduces waste from the activity itself, avoiding the dumping of waste, revaluing it to introduce it back into the market, with which public spending on management of waste also decreases.

### ***- Selection of materials with low environmental impact***

Replace the earth with recycled material, no hazardous substances, no added chemical additives, the resulting product is recyclable and reusable.



### ***- Reduction of the environmental impact of production***

It is manufactured by reusing existing technology, the production process is adaptable to any prefabricated plant, cooking of the product is eliminated, energy consumption and CO2 emissions are reduced, it does not generate waste.

### ***- Optimization in handling, storage and transport***

9 blocks per pallet, divided into three floors in height. Thanks to the size and strength of the block, uniformity and ease of handling are achieved, while saving space and cost-effectiveness of loading, unloading and transporting the product.

### ***- Reduction of environmental impact during use***

Thanks to the properties of the earth, among these, the thermal inertia capacity allows us to improve the energy efficiency inside the inhabited spaces, where it also regulates naturally the humidity and the temperature of the air.

### ***- Lifetime increase***

It is a durable material, we have the example of milenial rammed earth buildings that are in perfect condition.

In the event of demolition, it can be reused as a raw material, with a minimum of treatment, closing the life cycle of the product.





## **BACKGROUND**

At Fetdeterra, we are ACCIO accredited advisors in the areas of green economy, eco-innovation, product design and technology development.

Fetdeterra is created with the aim of promoting a more sustainable, ecological and respectful construction with the environment. Using 100% recyclable materials, low economic and energy cost, which allows the construction of healthy and efficient habitats. We study what are the properties of the materials, what should be the optimal composition to obtain the maximum benefits. At the same time we open a path for its normalization and adaptation to current legislation.

We analyze the old construction systems to identify the advantages and correct the shortcomings,



providing innovative constructive solutions for their use in the current context.

After the positive experience obtained with the initial project of development and creation of TAPIALBLOCK, a prefabricated block with natural extraction of earth, our proposal is to continue protecting and improving the environment, until developing a constructive system with prefabricated blocks, where the whole of the base material is replaced by earth and aggregates 100% recycled RECYCLED TAPIALBLOCK.



## **PHASES OF DEVELOPMENT**

### ***- Material***

The product consists of gravel, sand, silt and clay from the recycling of excavated soil and inert construction and demolition waste.

The basis of the research is the knowledge of the material, the characterization of the land through standardized laboratory tests, from which the formulations of the land are developed.

Due to the proportion of the chosen format, the strength tests are performed not only on compression, but also on bending and cutting, to ensure that the material is able to withstand the stresses that occur during handling of the product.

### ***- Manufacturing***

For the manufacture of the blocks, the existing precast concrete industry is reused. In reference to these factories, we do not find similar precedents, in the case of materials for the Bioconstruction, they are technologically underdeveloped products.

With the adaptation of the machinery and the material to the productive system, the control of moisture, agglutination and mixing of the rammed earth, hardening and quality of the final product is guaranteed.

The material was formulated so that in the manufacture, the components of the rammed earth would be ordered in a random way, producing controlled segregations on the surface, as occurs in a traditional tapial, and thus avoiding the image of an industrialized product.



## **BENEFITS**

### ***- Health and benefits for the user***

Thanks to the specific properties of the minerals contained in the rammed earth, a healthy, balanced and relaxing environment is created, capable of transmitting a sensation of well-being. The strength lies in its mass, texture and colour.

Rammed Earth is a material that breathes and purifies the air, with thermal inertia to reduce the energy cost of building, regulates humidity and indoor temperature, absorbs electromagnetic waves and provides sound insulation.

### ***- Sustainability for the environment***

It does not generate any waste, nor toxic, it reduces CO2 emissions, it is a long-lasting material, recyclable and totally reusable.



## **PREFABRICATION**

Advantages offered by the prefabricated block of Rammed Earth versus the traditional construction system of mud walls are:

- -Absolute control of the material, curing and product quality.
- -Knowledge of the data and coefficients of the rammed earth product, for technical code *justification*.
- -Constant geometry and regular dimensions.
- -Reduction of execution time.
- -Elimination of specialized labour.
- -Minimization of the necessary materials and equipment.
- -On-site costs Reduction.



## **CONSTRUCTION SYSTEM**

### ***- Handling***

Prefabricated Rammed Earth blocks can be cut without problems, they must be manipulated with the help of block lifting clamps, mounted on crane or machine. These will have to guarantee the contact along the lateral surface of the block avoiding differential tensions on it.

### **- Placement**

Placed with a minimum joint between blocks, which allows to introduce the mortar. The same mortar can be used for the base and the grouting of the pieces. It can be polished for a better integration of the joint with the block.

### ***- Finishes and surface treatments***

Both indoors and outdoors Tapialblock can be seen as finishing, if preferred, it can be coated or painted, always with materials compatible with the earth to avoid later pathologies.

In the case of coating with mortar, it is recommended to use a mortar of earth and / or lime, and paints based on silicates, minerals, fat lime paste or vegetables, to ensure maximum breathability of the support.







