



Eco-efficient thermal insulation panel based on bio-materials.

IS IT:

Product

Technology

Equipment

APPLICABLE FOR:

Restoration

Rehabilitation

New Construction

APPLICABLE ON:

1. Foundations and underground structures

2. Vertical structures

3. Horizontal structures and vertical connections

4. Roof and terraces

5. Façade and building envelope

6. Finishes and completion elements

7. Integrated services

8. General strategies for building recovery

Related companies: No companies. Experimental product and Scientific research (patent n.1402131).

DESCRIPTION

A new eco-friendly panel has been produced by using as raw material the cladodes of Opuntia Ficus-Indica. It is present the thermal insulation properties of a new eco-friendly panel by showing that the performances achieved are competitive with those of commercially available products.

This panel was produced starting, as raw material, from the fresh stems, named commonly cladodes, of Opuntia Ficus-indica, which appropriately cleaned, dried, grinded, and sifted were mixed with a polyester resin as binder.

It is used in restoration interventions to improve thermal performance.

The prototypes realized have shown thermal performances satisfying and competitive with those of other commercially available panels.

Particularly the thermal conductivity of the rigid panel and bulk materials were equal to 0.071 W/mK and 0.057 W/mK, respectively.

WHY TO USE

Improvement of thermal insulation.

HOW TO USE AND APPLY

The product can be applied by two different methods: As panel between other layer or bulk to mix whit other building material.

The panels in Opunthia Ficus Indica, are particularly suited to the treatment of environmental and architectural thermal insulation thanks to their transmittance properties.

The composition of natural materials (lignin) and the absence of harmful substances make these panels particularly suitable for human health.

Panels are flexible and robust, they are easily handled and transported, and can be processed with the tools and utensils used for woodworking.

They do not require any special maintenance.

They are also resistant to compression, vapor permeable, flame resistant and accidental impact.

Panels especially suitable for the construction of ceilings and walls of particular thermic characteristics.

IMPROVEMENT OF THERMAL INSULATION

The tested material can be used both in the form of granules and rigid panel.

As granules it can be directly applied as a filling of cavities, while as a rigid panel it can be interposed between different layers of other materials (vapor barrier, internal and external finishing layers, stiffening layers, etc.) both for the formation of vertical perimeter walls and for insulated roofs but also for internal partitions when it is necessary to thermally insulate one environment from others.

The panel is recyclable and reusable when used without other associated layers and when using biodegradable adhesives and binders.

TECHNICAL CHARACTERISTICS

APPEARANCE: Solid panel or granulated

COLOR: Brown

ODOR: none

SOLUBILITY: None

STORAGE: The panels can be stored individually while the granules can be collected in bags.

RESISTANCE: It is widely resistant to conditions harsher climatic conditions. Good resistance to main mechanical strength.

RECOMMENDATIONS AND OTHER INFORMATION

The panel and the granulate have no contraindications for human health.

Patent n. 0001402131 of the 28th of August 2013

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EXAMPLES

A technology has been developed that can be applied for construction of roofs, floors, internal and external walls and in all those systems where an improvement in the insulation of the technical element is required.

It has been conceived an element that can be produced using cycles similar to the currently existing panels.

It can therefore be made industrially with competitive costs.

The inclusion of the panel in an industrial production cycle would also give, as secondary products, a powder part and a liquid part produced by grinding, usable in the pharmaceutical, food, cosmetic and manufacturing sectors.

REFERENCES / SOURCES AND LITERATURE

Patent n. 0001402131 of the 28th of August 2013

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De Vecchi A.; Valenza A.; Colajanni S.; Sanfilippo E (2015) "Eco-Friendly Materials for the energy retrofit of existing buildings", in ZEMCH 2015 : International Conference - ISBN:978-8894152609 vol. 1 (pp.583-592).

WEBSITE OF THE COMPANY

www.unipa.it



IMAGES AND CAPTIONS



Fig.1: Cladodes of *Opuntia ficus-indica*. © *Simona Colajanni*



Fig.2: Samples in a microwave oven. © *Simona Colajanni*



Fig.3: Granules sorted by size. ©Simona Colajanni



Fig.4: Opuntia Ficus-indica panel. ©Simona Colajanni



Fig.5: Thermal insulation test. ©Simona Colajanni