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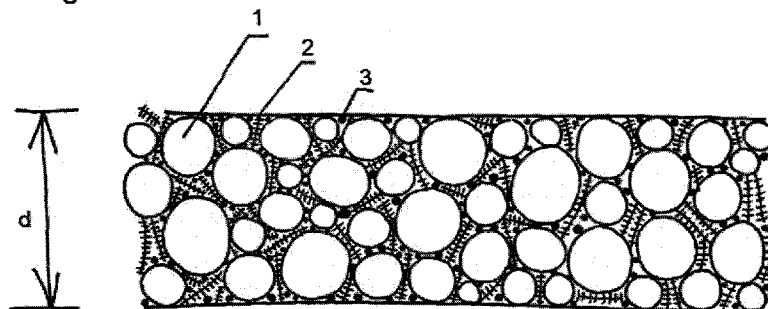
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(54) Title: COMPOSITE BOARD WITH HYDRO - ACCUMULATION PROPERTIES

Fig. 1



(57) Abstract: The composite board with hydro - accumulation properties consists of 40- 70 % of crushed textiles (2), 20 - 40 % of recycled polyester elements (1) and 10- 20 % of binding fibres (3).



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Composite Board with Hydro - Accumulation Properties

Technical Field

The invention relates to a composite board with hydro-accumulation properties.

Hitherto State-of-the-Art

One known embodiment of a board used in a roof structure comprises a mixture composed of recycled textile materials and primary textile material. The composite board composition results in a higher liquid retention capacity. By using recycled materials, low cost and low carbon (CO_x) production is possible. The production technology does not put increased demands on water consumption.

This board was made by the technology of thermo bonding using bi-component fibres without use of chemical additives, on a production line allowing continuous production.

A disadvantage of the current stat-of-the-art boards is that the boards are not flexible and shape-adjustable to the details of the construction requirements, they are unable to retain sufficient amount of fluid corresponding at least to the fluid weight of the same weight as the board for the period of 1 hour and they do not allow fluid transport in the cross section of the board depending on needed use.

Subject of the Invention

It aim of the present invention to is provide boards that have a hydro-accumulation effect similar to mineral or glass fibre boards, they are without chemical additives, but they also provide other advantages. The above-mentioned drawbacks are eliminated by the composite board with the hydro-accumulation properties as per the present invention, which is based in particular on the fact that it consists of 40-70% of crushed textiles, 20-40% of recycled polyester elements and 10-20% of binding fibres.

From a manufacturing standpoint, it appears advantageous if the recycled polyester elements have a particle size from 1 to 40 mm, more preferably 15 mm.

From the ecological point of view, it seems advantageous if the crushed textile is selected from the group consisting of crushed carpet textile, crushed filter textile or shredded filtration textile, and recycled polyester elements are selected from the group consisting of recycled polyester fibres or shredded structured fibres.

Explanation of Drawings

The invention will be explained using the drawing in which Fig. 1 shows the structure of the composite board in section.

Examples of the Invention Realization

The composite board according to Fig. 1 consists of 40-70% of crushed textiles 2, 20-40% of recycled polyester elements 1 with the size of 1-40 mm and 10-20% of binding fibres 3.

The composite board is manufactured using the technology of thermo-binding without use of chemical additives on a production line allowing continuous production; at first the crushed textiles and recycled polyester elements are ground, then the individual components are melted in an oven and bound in a press with pre-set final thickness of the composite board. Then the resulting material is cut into individual composite boards.

Example 1

There was manufactured the composite board with the thickness of $d=20$ mm, consisting of 70 % of crushed textiles in the form of crushed carpet textile, 20 % of recycled polyester elements in the form of recycled polyester fibres and 10 % of binding fibres.

Example 2

There was manufactured the composite board with the thickness of $d=40$ mm, consisting of 70 % of crushed textiles in the form of crushed carpet textile, 20 % of recycled polyester elements in the form of recycled polyester fibres and 10 % of binding fibres.

Example 3

There was manufactured the composite board with the thickness of $d=20$ mm, consisting of 40 % of crushed filtration textiles, 40 % of recycled polyester elements in the form of shredded structured polyester fibres and 20 % of binding fibres.

Example 4

There was manufactured the composite board with the thickness of $d=20$ mm, consisting of 40 % of shredded filtration textiles, 40 % of recycled polyester elements in the form of shredded structured polyester fibres and 20 % of binding fibres.

In the course of testing, the best results of hydro accumulation were shown by the weight of 2000 g/m² with thickness of 2 cm and the weight of 4000 g/m² with thickness of 4 cm.

Maximal hydro-accumulation ability of composite boards is specified in table 1, while

Δh	average thickness of the board d of a dry unloaded samples of tested set, 8 pieces of tested samples from different manufacturing batches in [mm]
Δm_{dry}	average weight of a dry sample of the tested set of samples in [kg]
$\Delta q_{\text{extensiv (80 kg}\cdot\text{m}^{-2})}$	average hydro-accumulation absorptive capacity of the tested set of samples - 8 pieces of tested samples from different manufacturing batches with load of 80 kg·m ⁻² , corresponding to an extensive roof loading, in [l·m ⁻²]
$\Delta q_{\text{semi-intensive (170 kg}\cdot\text{m}^{-2})}$	average hydro-accumulation absorptive capacity of the tested set of samples - 8 pieces of tested samples from different manufacturing batches with load of 170 kg·m ⁻² , corresponding to a semi-intensive roof loading, in [l·m ⁻²]

Table 1 Maximal hydro-accumulation properties of composite boards

Maximal hydro-accumulation properties of developed boards						
t _{air} = 20°C, t _{H2O} = 15°C, absorption 10 min, settlement 2 min, loading 5 min, sample 30 x 30 cm						
Tested set of samples			Δh	Δm _{dry}	Δq _{extensiv} (80 kg·m ⁻²)	Δq _{semi-intensive} (170 kg·m ⁻²)
Material from the example	Slope	Thickness/area weight	mm	kg	l·m ⁻²	l·m ⁻²
Example 2	0°	40 mm / 4000 g·m ⁻²	40,8	0,320	30,873	28,708
Example 2	10°	40 mm / 4000 g·m ⁻²	40,8	0,320	20,051	-
Example 1	0°	20 mm / 2000 g·m ⁻²	20,5	0,310	13,893	11,483
Example 3	0°	20 mm / 2000 g·m ⁻²	20,6	0,168	16,416	-
Example 3	5°	20 mm / 2000 g·m ⁻²	20,6	0,168	15,381	-
Example 3	10	20 mm / 2000 g·m ⁻²	20,6	0,168	14,619	-
Example 4	0°	40 mm / 4000 g·m ⁻²	40,1	0,331	31,532	-
Example 4	10°	40 mm / 4000 g·m ⁻²	40,1	0,331	18,329	-

The heterogeneous structure of the multi-component input material allows for increased hydro-accumulation of the board under load. This characteristic is mainly ensured by the character of the input mixture composed of a matrix with a variable size of elements. The combination of different materials in the composite board contributes to its ability to accumulate rainwater and thus achieve the desired hydro-accumulation effect in the building industry, for example, in the realization of vegetation roofs, where the mean value of the absorption ranges for 20 - 30 mm of technical layers with 60 mm substrate from 22 to 28 l / m².

In production practice it is possible to use input materials with different geometrical characteristics and size of elements, as well as different production technologies in order to achieve similar spatial structure. The spatial structure of the board allows the production of a board at least 1 cm high.

Handling the composite board is easy thanks to its physical properties.

The production technology enables the production of the product in various area weights in the range from 500 to 6000 g / m², and in the form of not only boards but also rolls.

The value of dynamic rupture by a cone for the thickness of 3 cm according to ČSN EN ISO 13433 may be 0 mm.

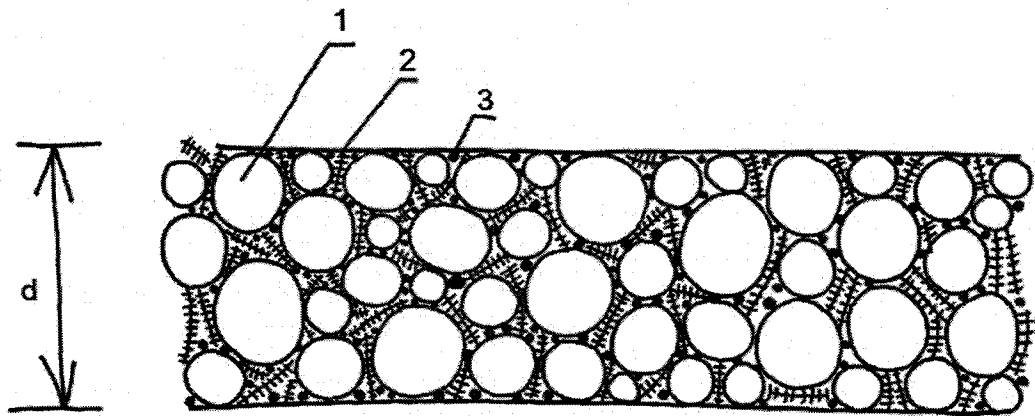
Industrial Applicability

The invention of the hydro-accumulation fibre board, in particular of the retention board, is intended for roof structures, facade constructions or modifications of the details of structures in contact with the soil, where the aim is the rain water retention.

Patent Claims

1. A composite board with hydro - accumulation properties characterised by the fact that it consists of 40–70 % of crushed textiles (2), 20 – 40 % of recycled polyester elements (1) and 10 – 20 % of binding fibres (3).
2. A composite board according to claim 1, characterised by the fact that the recycled polyester elements contain the particles with the size from 1 to 40 mm.
3. A composite board according to claim 1, characterised by the fact that the crushed textile is selected from the group consisting of crushed carpet textiles, crushed filtration textiles or shredded filtration textile.
4. A composite board according to claim 1, characterised by the fact that the recycled polyester elements are selected from the group consisting of recycled polyester fibres or shredded structured fibres.

Fig. 1



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A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
D04H E04D E04B D21J A01G
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 169 131 A1 (DYWANOW AGNELLA S A FAB [PL]) 31 March 2010 (2010-03-31)	1,3,4
Y	paragraphs [0001], [0004], [0006], [0007]	2
Y	----- WO 03/000976 A1 (UNIV LEEDS [GB]; RUSSELL STEVE J [GB]; POURMOHAMMADI ALI [GB]) 3 January 2003 (2003-01-03) page 10	2
A	----- WO 01/48330 A1 (JOHANSEN FRIDTJOV [NO]) 5 July 2001 (2001-07-05) page 6, line 5 - line 23	1
A	----- CH 709 108 A2 (MUZYRYA OLEG [CH]) 15 July 2015 (2015-07-15) paragraphs [0011], [0020], [0024] - paragraphs [0028] - [0032]	1-4

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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