(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 155 983 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
16.03.2016 Bulletin 2016/11

(21) Application number: **08775458.6**

(22) Date of filing: **04.06.2008**

(51) Int Cl.:
E04C 2/04 *(2006.01)*

(86) International application number:
PCT/FI2008/050333

(87) International publication number:
WO 2008/148940 (11.12.2008 Gazette 2008/50)

(54) **FIRE-SAFE VENTILATED STRUCTURE FOR A BUILDING**

FEUERFESTE BELÜFTETE STRUKTUR FÜR EIN GEBÄUDE

STRUCTURE VENTILÉE ANTI-FEU POUR UN IMMEUBLE

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR

(30) Priority: **07.06.2007 FI 20070243 U**

(43) Date of publication of application:
24.02.2010 Bulletin 2010/08

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Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The invention relates to a ventilated and fire-safe structure, equipped with a fire-safe windscreen and intended for buildings, such as e.g. apartment and commercial buildings, where non-inflammability is required of the windscreen.

Prior art

[0002] In prior art, it is known to provide protection against the wind by using so-called "non-woven" fabrics, i.e. fiber fabrics, as a windscreen for mineral wool products to be installed on external building walls.

[0003] In prior art solutions, the wind protection is comprised of a combination of fiberglass felt and paint or of a special fabric alone. These prior art solutions are basically functional, but do involve shortcomings. First of all, they have poor fire characteristics, i.e. burn too easily. Secondly, the application thereof on the surface of an insulating material requires a separate gluing process, i.e. a separate glue matter. Accordingly, there is a demand for novel, sufficiently moisture-permeable windscreens, which are non-inflammable, structurally simpler, and capable of being installed on the surface of an insulating material in a simpler manner.

[0004] DE1683498 A discloses a fire-safe ventilated structure for a building, which as an inner wall cladding comprises a concrete element and a mineral wool layer, which is bonded to an external side of the concrete element, as well as a façade element which is secured by means of fasteners and spacers through the insulation to the inner concrete cladding so as to leave between the facade element and insulation an air gap necessary for ventilation. However, the solution in DE1683498 A does not involve any windscreen, particularly not a moisture-permeable windscreen, which is non-inflammable and installed on the surface on the mineral wool layer.

Description of the invention

[0005] A solution to the foregoing prior art problems has been provided by inventing a fire-safe ventilated structure for a building, which as an inner wall cladding comprises a concrete element and a mineral wool layer, which is bonded to an external side of the concrete element and which on its external side has a hardened windscreen applied in a mortary state to the mineral wool layer and being permeable to moisture and non-inflammable, as well as a façade element which is secured by means of fasteners and spacers through the windscreen and the insulation to the inner concrete cladding so as to leave between the façade element and the windscreen coating an air gap necessary for ventilation.

[0006] The fire-safe ventilated structure for buildings, provided by the invention, fulfils the requirements regarding both adequate ventilation and fire safety. For apartment and commercial buildings, in particular, the solution presented by the invention provides an important service because of its non-inflammability. The risks of fire spreading and damage caused thereby are particularly high in apartment and commercial buildings and, thus, the structure of the invention serves a useful purpose especially in that type of buildings.

[0007] According to one preferred embodiment, the windscreen consists of a mineral-based material. In its preferred service as a coating, the windscreen is firmly attached to the fibers of the insulating material, conforming to the insulation material's surface, i.e. being laminated therewith. The air blocker coating used in a ventilated structure of the invention does not allow the entry of air flows in adverse amounts while, on the other hand, it does allow the passage of water vapor the way a proper windscreen is supposed to work.

[0008] According to another preferred embodiment, the windscreen material consists of backing coat plaster. Other material options include artificial-resin based, acrylic or organic adhesives.

[0009] All of the windscreen substances, mentioned above and useful in this invention, are non-inflammable and can be applied manually or with a spray gun and, regarding the material characteristics thereof, all these are elastic and contain fibers. According to one preferred option, the windscreen substance can be applied to the insulating material as early as in the concrete element casting process, by laying an amount of such material on the bottom of a mould, upon which is then placed a layer of insulating material, with a cast concrete layer being added on top of the latter. On the other hand, according to another embodiment, being applied manually or with a spray gun, the windscreen substance can be bonded to the surface of a concrete cladding element insulating material for example at the factory or worksite.

[0010] As stated above, the question is about a ventilated structure, the inner wall cladding of which comprises a concrete element and a rock wool product (a panel or a lamella, meaning that wool fibers are either parallel with the insulating panel's surface or orthogonal with respect to the insulation surface), preferably bonded thereto at the factory during the course of the casting process. Alternatively, of course, the insulation layer can be bonded to the concrete cladding element with a variety of fastening elements. A problem with such assemblies is that the surface of an unprotected thermal insulating material is exposed to flowing air and allows such air flows inside, thus affecting the product's heat insulation performance. In order to deal with this problem, the insulation layer is covered with a windscreen coating. In the event that a mineral wool insulating material, preferably rock wool, is coated with a windscreen coating at the factory, the coating of sealed joints will be performed consequently at the worksite by using the same substance. The actual

façade is mounted either at the factory or at the worksite with separate fasteners and spacers through the insulating material and the windscreen to the inner concrete cladding, thus leaving between the façade element and the windscreen-coated insulation surface an air gap needed for ventilation.

[0011] Regardless of whether the windscreen is applied in a mould on the insulating material of concrete cladding elements to be cast during the casting of a concrete cladding element or on the surface of the insulating material at the factory or worksite after an embedding process of the concrete in the insulating material has been performed in a mould, this windscreen is nevertheless constructed without a separate core or without a separate gluing process and glue matter. This is possible because the windscreen coating, capable of being applied, sprayed or bonded in a mortary state (contains e.g. water), possesses gluiness/mortariness, whereby the bonding to the insulating material occurs during the course of its drying, thus establishing a uniform windproof surface/coating on the heat insulating material of mineral wool (e.g. rock wool). Notwithstanding its alkalinity, the windscreen material is apt for use with rock wool as rock wool has resistance to alkali. During its application process, the windscreen coating is a wet mortary substance as opposed to the currently available materials which consist of fabric or panel products.

Working example

[0012] The invention will now be described more specifically by way of example with reference to the figure 1 of principle, which shows a fire-safe ventilated building structure of the invention in a cross-sectional view as seen from the top of such a structure in an assembled condition. The presently described example is not to be construed as limiting our invention which is defined in the claims.

[0013] In a ventilated building structure 7 as shown in fig. 1, the inner wall cladding comprises a concrete element 1, to which is bonded, during the course of its casting, an insulation layer of rock wool 8, which consists of several lamellae of rock wool. The insulation layer 8 has its outer surface provided with a windscreen coating 3 made up of hardened backing coat plaster. This material, i.e. backing coat plaster, applicable as the windscreen coating 3, is bonded to the insulation layer 8 during the course of casting the concrete element 1 by first laying backing coat plaster for the layer 3 on the bottom of a mould, then on top of that the insulation layer 8 of rock wool lamellae, followed by casting the concrete layer 1 for a final and topmost layer.

[0014] Alternatively, the windscreen coating 3 is not bonded until after embedding of the concrete 1 with the insulation 8 has taken place in a mould, in which case the windscreen material is applied to the insulation layer by spraying or grinding it onto the insulation surface either at the fabrication plant of concrete elements or at the worksite.

[0015] In this example, the ventilated structure according to the invention is ultimately completed at the worksite, wherein an actual façade 4 is secured to the concrete element 1 included in an entity consisting, as described above, of the mutually bonded concrete cladding 1, the insulation 8, and the windscreen coating 3, through the insulation 8 and the windscreen coating 3 by means of suitable fasteners 5. Interposed between the windscreen coating 3 of the insulation 8 and the façade are suitable spacers 6 to provide a space between the façade 4 and the coating 3 for an air gap 9 needed for ventilation.

Air Permeability test for mortar-coated rock wool products

1 Specimens and measuring method

[0016] Specimen size was 300 mm x 300 mm x specimen thickness. Top edges of the specimens were taped with duct tape to make the edges of specimens intact and to improve the compactness of specimens in a measuring apparatus. With such a procedure, the resulting surface area of a measured region was 0.0784 m^2 as opposed to normally employed 0.09 m^2.

[0017] The measurement was conducted by applying the EN 29053 method. Air flow rates used in the measurement of each specimen were 0.3 l/min, 0.7 l/min, and 1 l/min.

[0018] The employed products consisted of rock wool.

2 Results

Specimen	Wool weight/g	Coating weight/g	L-value 10^{-6} m^3/m^2sPa	To be noted
1	509.3	392.2	16	
2	542.0	662.1	17	Coating has a 10 cm crack
3	563.1	539.8	21	
4	525.7	337.8	16	

(continued)

Specimen	Wool weight/g	Coating weight/g	L-value 10^{-6} m^3/m^2sPa	To be noted
5	538.9	176.4	16	
6	525.8	171.7	21	

[0019] Thus, the results indicate that the mortar coating has an air permeability factor acceptable in buildings (L-value < 25 x 10^{-6} m^3/m^2sPa) and that, consequently, it functions quite well as a windscreen in external wall structures, which are provided with a ventilation opening or gap between an insulating material coated with this windscreen and an actual façade.

Claims

1. A fire-safe ventilated structure (7) for a building, which as an inner wall cladding comprises a concrete element (1) and a mineral wool layer (8), which is bonded to an external side of the concrete element and which on its external side has a hardened windscreen coating (3) applied in a mortary state to the mineral wool layer and being permeable to moisture and non-inflammable, as well as a façade element (4) which is secured by means of fasteners (5) and spacers (6) through the windscreen coating (3) and the insulation (8) to the inner concrete cladding (1) so as to leave between the façade element (4) and the windscreen coating (3) an air gap (9) necessary for ventilation.

2. A structure (7) as set forth in claim 1, wherein the windscreen coating (3) consists of a mineral-based material.

3. A structure (7) as set forth in claim 2, wherein the mineral-based substance consists of backing coat plaster.

4. A structure (7) as set forth in any of claims 1-3, wherein the insulation (8) is applied to the inner cladding element (1) of concrete during the course of casting the concrete element.

Patentansprüche

1. Feuerfeste belüftete Struktur (7) für ein Gebäude, die als Innenwandverkleidung ein Betonelement (1) und eine Mineralwolleschicht (8) umfasst, welche mit einer Außenseite des Betonelements verbunden ist und auf ihrer Außenseite eine gehärtete Windschutzbeschichtung (3) aufweist, die in einem Mörtelzustand auf die Mineralwolleschicht aufgebracht und feuchtigkeitsdurchlässig und nicht entflammbar ist, sowie ein Fassadenelement (4), das derart mittels Befestigungselementen (5) und Distanzstücken (6) durch die Windschutzbeschichtung (3) und die Isolierung (8) an der inneren Betonverkleidung (1) befestigt ist, dass zwischen dem Fassadenelement (4) und der Windschutzbeschichtung (3) ein Luftspalt (9) belassen ist, welcher zur Belüftung notwendig ist.

2. Struktur (7) nach Anspruch 1, wobei die Windschutzbeschichtung (3) aus einem mineralbasierten Material besteht.

3. Struktur (7) nach Anspruch 2, wobei die mineralbasierte Substanz aus Rückseitenbeschichtungsmörtel besteht.

4. Struktur (7) nach einem der Ansprüche 1 bis 3, wobei die Isolierung (8) auf das innere Verkleidungselement (1) aus Beton im Verlauf des Gießens des Betonelements aufgebracht wird.

Revendications

1. Structure ventilée et anti-feu (7) destinée à un bâtiment, qui en tant qu'habillage de paroi intérieure comprend un élément en béton (1) et une couche de laine minérale (8) qui est collée à un côté extérieur de l'élément en béton et qui présente sur son côté extérieur un revêtement de brise-vent durci (3) appliqué dans un état au mortier sur la couche de laine minérale et étant perméable à l'humidité et ininflammable, ainsi qu'un élément de façade (4) qui est fixé au moyen de fixations (5) et d'écarteurs (6) à travers le revêtement de brise-vent (3) et l'isolation (8) vers l'habillage de paroi intérieure (1) de façon à laisser un espace d'air (9) nécessaire à la ventilation entre l'élément de façade (4) et le revêtement de brise-vent (3).

2. Structure (7) selon la revendication 1, dans laquelle le revêtement de brise-vent (3) consiste en un matériau à base minérale.

3. Structure (7) selon la revendication 2, dans laquelle la substance à base minérale consiste en du plâtre à enduit au verso.

4. Structure (7) selon l'une quelconque des revendications 1 à 3, dans laquelle l'isolation (8) est appliquée sur l'élément d'habillage intérieur (1) de béton pendant la coulée de l'élément en béton.

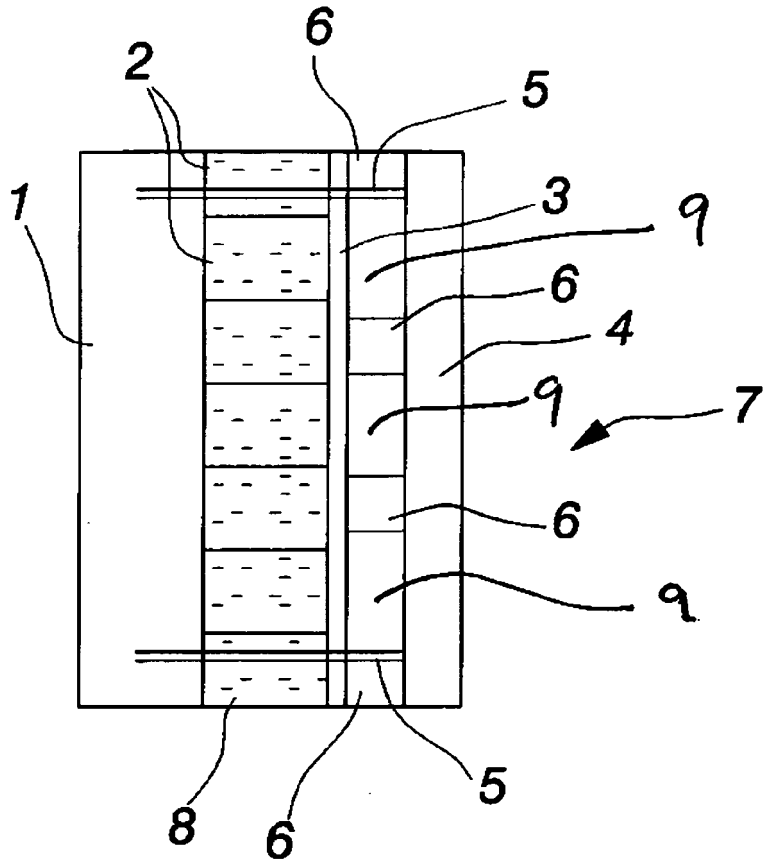

Fig. 1

REFERENCES CITED IN THE DESCRIPTION

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