The essential structural element of the developed insulation mounting profile is the angle iron (1), with the shape of the letter "L", made of any material, preferably steel or composite with a high density, that can carry loads even up to 450 kg/m². The angle iron (1), which is supplemented with the adhering foam (2), forms a compact, basic part of the profile with the cross section of a right triangle. The foam (2) can be made of any plastic, preferably foamed polypropylene having a cellular structure. The foam (2) can be even the floral sponge, i.e. made of polyurethane with short chains, as well as of polystyrene (soft tort hard), a styrodur, a polyurethane, preferably having a density from 15 kg/m² to 450 kg/m², a foamed PVC or another plastic, such as ABS, PE, PP, or compressed wood chips or other material combined with polyurethane. The basic part of the developed insulation mounting profile, consisting of the angle iron (1) along with the adhering foam (2), is covered with the layer of resin (4), for example, with epoxy resin, urine resin or polyurethane resin, and then coated with the layer of glass fiber (5), carbon fiber or fiber impregnated with resin. To such prepared basic part of the insulation profile is installed the supplementing foam (3), made, for example, of one of the materials, from which the adhering foam (2) is made. The supplementing foam (3) along with the previously prepared basic part of the profile is also covered with the layer of resin (4), and then with the layer of fiber (5).
Insulation mounting profile and method for manufacturing of insulation mounting profiles

The subject matter of the invention is an insulation mounting profile, which is designed to create fastening systems and thermal insulation of windows and doors. It is usually placed in the insulation area of all kinds of buildings, including multi-family buildings, single-family buildings, as well as public buildings, livestock buildings and farm buildings.

The subject matter of the invention is also a method for manufacturing of unified insulation mounting profiles, which can easily be used for manufacturing of individualized insulation mounting profiles, tailored to individual needs of investors.

There are many solutions for mounting profiles and fastening systems, as well as thermal insulation of windows, doors and facades.

Known from Polish description of the invention with the application number P 294954 (publ. BUP No. 26/1993 of 27 December 1993) is the solution entitled "The method for making contacts between the window and the wall, and the thermal insulation element for the application of this method". The invention presented herein solves the problem of elimination of thermal bridges at contacts between the window and the wall. The method involves placing the thermal insulation element in the location of the horizontal contact between the window and the wall, which is also the external sill. The thermal insulation element is made of a thermal insulation material in the form of a narrow board, having a trapezoidal shape in the cross section. On the surface of the thermal insulation material of the element is placed a thin layer of plastic with a mesh.

Known from another Polish description of the utility model with the application number W-101801 (publ. BUP No. 14/1996 of 8 July 1996) is the solution entitled "The element for the installation of aluminum windows with the thermal separation". The subject matter of the utility model presented herein is the element for the installation of aluminum windows with the thermal separation, as well as tilt and turn windows in freestanding construction containers. The element for the installation of aluminum windows with the thermal separation is a monolithic moulding made of the wall and the wall of edges juxtaposed at a right angle, while the relationships between the wall to the wall at particular sizes are expressed by the following ratios: 1.6 to 1.19 to 1 and 2.3 to 1, most preferably 1.9 do 1. The wall has through fixing hollows, and the window with the element is fixed to the window opening by a screw element.
Known from another Polish description of the utility model with the application number W-115579 (publ. BUP No. 02/2007 of 22 January 2007) is the solution entitled „The angular element of the thermal insulation housing“. The angular element of the thermal insulation housing presented herein comprises a base and a side wall, made of a thermal insulation board, where between two stiffening linings is placed a layer of the thermal insulation material. The base and the side wall are connected to each other to form the angular bent edge at the connection point. The angular element has on the opposite face edges the longitudinal seal protrusions on the one side, and the longitudinal seal socket on the other.

Known from another Polish description of the utility model with the application number W-119897 (publ. BUP No. 21/2012 of 8 October 2012) is the solution entitled „The steal profile reinforcing windows and doors with the thermal insert“. The reinforcing steel profile with the thermal insert for manufacturing of windows and doors of PVC profiles, constituting a steal upper and side element, separated by a rolled thermal insert, is characterized by the fact that the upper element has a bend forming the protrusion and the socket made between the double and single bend of the protrusion, where is placed the thermal insert by one end, located in the socket of the side element by the other end, formed between the double and single bend of the protrusion, wherein the vertical arm of the side element has a protrusion.

The purpose of the invention is to develop such a mounting profile, which will enable the creation of the entire fastening system and the thermal insulation of windows, doors and glass facades, as well as enable and at least facilitate their assembly, regardless of the shape and regardless of the type of the wall, in which are made the holes built using the developed profile. The purpose of the invention is also to develop an efficient method for manufacturing of the insulation mounting profile.

The essence of the insulation mounting profile lies in the fact that it is an angle iron made of any material, preferably steel or composite with high density, which can carry loads of up to 450 kg/m2 and which is supplemented by an adhering foam. They constitute an essential part of the insulation mounting profile and are covered with a layer of resin, and then with a layer of fiber.

Preferably, in the insulation mounting profile the angle iron has the shape of the letter „L“. Preferably, the angle iron and the foam create a compact, basic part of the profile with the cross-section of a right triangle.

Preferably, the foam is made of a foamed polypropylene with a cellular structure; is preferably made up of a linear polymer or a branched polymer or a side-chain polymer or a multi-branched polymer or a star polymer or a ladder polymer or a cross-linked polymer or a cyclic polymer or a catenane polymer or a ratexan polymer or a dendrimeric polymer, and in particular a floral sponge, a polystyrene, a styrodur, or a polyurethane with a density from 15 kg/m2 to 450
kg/m², foamed PVC or other plastics, such as: ABS, PE, PP, or compressed wood chips or other material combined with polyurethane,

Preferably, resin is epoxy resin, urea resin or polyurethane.
Preferably, the layer of fiber is glass fiber, carbon fiber or fiber impregnated with resin.

Preferably, the basic part of the insulation profile is fixed to the supplementing foam, preferably made of one of the materials, from which the adhering foam is made.

Preferably, the profile is equipped with anchors.

Preferably, the profile has sockets, which are equipped with plugs.

Preferably, the profile is an appropriately shaped profile, forming the window sill, i.e. the sill profile.

Preferably, the plugs have two layers - the outer layer of the plug is a membrane, preferably EPDM or Winflex, while the inner layer is an adhesive, and in addition, optionally the plug is protected from sticking with a siliconized paper.

The method for manufacturing of the insulation mounting profile is characterized in that it is performed as a result of successively taken steps:

- selected components are collected from containers to the composite, and
- in the component mixing unit is produced a component from which are casted blocks in molds, intended for cutting sill profiles, preferably are casted ready profiles, for example, with reinforcing elements placed in them at once, taking the form of angle irons, or concentrated elements,
- then, there are cut, or cut off the elements, which are purified of dusts (at the working position, as shown in Fig. 15).
- cut elements are passed through the drawing die (at the working position, as shown in Fig. 16), in which they are coated with resin or its equivalent, and then
- these elements are passed through the drawing die (at the working position, as shown in Fig. 17), in which they are coated with fiber, after application of which the hardness of their surface is fixed, wherein placing of both the layer of resin and fiber may take place by any means, i.e., for example, resin is applied to the profile by means of a brush or a roller, by immersing it in resin or spraying, for example, with a gun
- optionally, resin is further tainted in any color.

The developed insulation mounting profile is made of materials that have been used so far in completely different fields, of polymers (including the floral sponge, i.e. of polyurethane with short polymer chains), which in combination with resins exhibit surprising, hitherto unknown properties, perfectly suitable for the use in construction.

The solution according to the invention allows a simple and quick installation of windows, doors and glass facades eliminating thermal bridges, previously formed at the place of their installation. The developed insulation mounting profile can reduce structural components used so far in the installation of windows and
doors, because it can be a separate structural component, which alone carries significant loads. This is possible thanks to the materials used, whose properties have not been yet applied in construction at all - or were only used for other purposes. Both, due to the properties of the materials used, as well as due to the characteristics of the profile structure - there was obtained an unexpectedly favorable distribution of stresses in the profile and in the entire beam, which allows to achieve the maximum strength with extremely low expenditure of materials and use of materials, which excellent technical parameters have not been used so far. The developed profile is extremely light after coating with glass fiber, or carbon fiber, or after soaking with resin - is extremely tough, and yet exhibits excellent thermal insulation properties.

It is worth noting the properties of carbon fibers, the use of which is provided in the developed invention. These fibers, which are formed as a result of the controlled pyrolysis of polyacrylonitrile and other organic polymers, consist almost entirely of stretched carbon structures, chemically similar to graphite. Their highly organized structure confers a high mechanical strength, and the fact that they consist almost entirely of graphite makes them infusible and chemically resistant. These fibers have been used so far as a construction material in many laminates, but have never been used to strengthen the structures of mounting profiles for window and door openings (also glass fibers or resins have not been used so far for this purpose). Carbon fibers are currently used mainly to reinforce yacht sails and to improve the properties of the material of which tents are made.

The developed structure eliminates the need for placing windows or doors in the wall opening; these elements can be installed outside the wall, so that the thermal insulation is directly fed to the window or the door. As a result, the solution according to the invention eliminates any thermal bridges, which are created so far when connecting the windows and the doors with the wall face.

The invention has led to the development of an extremely strong profile, which makes it possible to limit the additional structural elements in the building, because the profile plays their role alone and replaces them.

The method according to the invention, i.e., the method for manufacturing of insulation mounting profiles, provides for the organization of a deliberate and extremely easily organized technological cycle that enables both the manufacture of highly customized and even most complex profiles, as well as simple and standardized profiles.

The subject matter of the invention is shown in the example of the performance in the drawings, where Fig. 1 - shows an axonometric view of the cross section through two juxtaposed profiles, where in one of them the steel angle iron is used, Fig. 2 - shows an axonometric view of the cross section through the profile using the angle iron made of concentrated mass, Fig. 3 - shows an axonometric view of the cross section of the profile using a different angle iron made of concentrated mass, Fig. 4 - shows a horizontal module of the profile, while Fig. 5 - shows a vertical module of the profile with properly positioned plugs, Fig. 6 - shows a horizontal module of the profile with another installation method, using anchors, Fig. 7 - shows an arched module of the profile, Fig. 8 - shows an example
of the insulation of the round window frame, using circular arc modules of the profile, Fig. 9 - shows an axonometric view of the cross section through the profile, where in addition the sill profile is used in a shape forming the window sill, while the drawings Fig. 10, Fig. 11 Fig. 12, Fig. 13 and Fig. 14 - show an axonometric view of profiles, with which sill profiles of another type are also juxtaposed, then Fig. 15 - shows the cleaning stage of the cut sill profile from particles of contaminants, which precedes the coating stage of the sill profile made using the method presented in the developed method, Fig. 16 - shows the method for coating of the sill profile with resins, Fig. 17 - shows a device for applying glass fiber or its equivalent to the sill profile, and finally Fig. 18 - presents an axonometric view of the cross section through the profile, which is covered at the bottom and on the side with a thick layer of the insulation material.

As shown in the drawings, an essential structural element of the developed insulation mounting profile is the angle iron 1, with the shape of the letter „L”, made of any material, preferably steel or composite with a high density, that can carry loads even up to 450 kg/m2. The angle iron 1 supplemented with the adhering foam 2 form a compact, basic part of the profile with the cross section of a right triangle. The foam 2 can be made of any plastic, preferably of foamed polypropylene having a cellular structure. The foam 2 can be:

- a linear polymer (a polymer, in which main chains are straight and do not have any branches, e.g. high density polyethylene or teflon), a branched polymer (a polymer, in which main chains are branched), a side-chain polymer (a polymer, in which short, side chains are regularly or irregularly distributed along the main chain), a multi-branched polymer (a polymer, in which there are many multi branches and it is not possible to distinguish the chain), a star polymer (a polymer, in which from a single central point there go few or several "arms", which are conventional linear chains), a ladder polymer (a polymer, which consists of two parallel main chains, periodically connected with short side chains to the entire or partial form, if the side forming the framework is broken in some places), a cross linked polymer (a polymer, which forms a dimensional, continuous network, such that it is no longer possible to distinguish single particles, which are divided into high and low density cross linking), a cyclic polymer (a polymer, in which instead of linear particles are arranged large cyclic particles), a catetane polymer (a polymer resembling connected links of the chain, in which cyclic portions merge to form a long polymer chain), a ratexan polymer (with the so-called shashlik structure, in which short cyclic particles were „strung” on the polymer chain), a dendrimeric polymer (a polymer, in which the particles from one chain spread to another, and from them to another and there is formed a dendrimeric structure resembling a tree)

especially

- made of the floral sponge, i.e. polyurethane with short chains,
- made of styrofoam (soft or hard),
- made of styrodor,
- made of polyurethane having a density from 15 kg/m² to 450 kg/m²,
- made of foamed PVC, or
- made of other plastics, such as ABS, PE, PP, or
- made of compressed wood chips or other material, combined with polyurethane.

The basic part of the developed insulation mounting profile, consisting of the angle iron 1 with the adhering foam 2, is covered with the layer of resin 4, for example, with epoxy resin, urea resin or polyurethane resin, and then coated with the layer of glass fiber 5, carbon fiber or fiber impregnated with resin. To such prepared, basic part of the insulation mounting profile is installed the supplementing foam 3, made, for example, of one of the materials, of which the adhering foam 2 is made. The supplementing foam 3, along with the previously prepared basic part of the profile, is covered with the layer of resin 4, and then with the layer of fiber 5. Resin 4 can be, for example, applied to the profile using a roller or a brush, by immersion in resin 4 or spraying, using, for example a gun. Resin 4 may be further tainted in any color.

The installation of the profile to the wall opening or to the wall face is facilitated by slots 6, which are made in the course of manufacturing of the profile. Slots 6 are the holes that allow easy insertion of screws, and thus installation of the insulation mounting profile to the wall face.

In order to protect slots 6, and thus installation points, there are used plugs 7. Plugs 7 have two layers - the outer layer of the plug 7 is a membrane, preferably EPDM or Winflex, while the outer layer is an adhesive, thanks to which plugs 7 are installed to the insulation mounting profile. In the course of manufacturing of the profile, plugs 7 are partially adhered to the profile, while on the other part the plug 7 is protected from adhering with a siliconized paper. Plugs 7 are adhered to the profile in such a way as to leave free access to the slot 6, and hence ensure easy installation of the profile to the wall. After installation of the profile, it is sufficient to remove the adhesive protection, which usually comprises a silicone paper, and stick the remainder of the plug 7, and thus protect slots 6 and installation elements, for example, from the penetration of moisture from the outside.

The developed insulation mounting profile can be also installed to the wall using anchors 8.

With an unexpected achievement of extremely favorable strength and insulation parameters, arising from the use in the construction of the profile of the materials, which so far have never been used for the installation of windows and are known and used in horticulture - the developed insulation mounting profile can be formed in any manner (as shown in Figure 4, 5, 6 and 7). This allows the use of the developed profile for easy installation of windows and doors of any shape, according to the user's individual needs. In the course of the installation of windows, any mounting profile can have an appropriately formed shape to further create the window sill.
The profile is also a structural element and an element of thermal insulation, and given an appropriate shape of the profile it can also be a window sill, i.e. the sill profile 9.

The method according to the invention is performed as a result of successively taken steps:

- selected components are collected from containers to the composite, and
- in the component mixing unit is produced a component from which are casted blocks in molds, intended for cutting sill profiles 9, preferably are casted ready profiles, for example, with reinforcing elements placed in them at once, taking the form of angle irons 1, or concentrated elements,
- then, there are cut, or cut off the elements, which are purified of dusts (at the working position, as shown in Fig. 15).
- cut elements are passed through the drawing die (at the working position, as shown in Fig. 16), in which they are coated with resin 4 or its equivalent, and then
- these elements are passed through the drawing die (at the working position, as shown in Fig. 17), in which they are coated with fiber 5, after application of which the hardness of their surface is fixed, wherein placing of both the layer of resin 4 and fiber 5 may take place by any means, i.e., for example, resin (4) is applied to the profile by means of a brush or a roller, by immersing it in resin 4 or spraying, for example, with a gun
- optionally, resin 4 is further tainted in any color.
List of elements:

1. angle iron,
2. adhering foam,
3. supplementing foam,
4. resin,
5. fiber,
6. slot,
7. plug,
8. anchor,
9. sill profile.
Patent claims

1. The insulation mounting profile is characterized in that it is the anchor iron (1), made of any material, preferably steel or composite with a high density, that can carry loads even up to 450 kg/m², and which is complemented by the adhering foam (2), forming the basic part of the insulation mounting profile - are covered with the layer of resin (4), and then coated with the layer of fiber (5).

2. According to the claim 1, the insulation mounting profile is characterized in that the anchor iron (1) has the shape of the letter "I".

3. According to the claim 1 or the claim 2, the insulation mounting profile is characterized in that the anchor iron (1) and the foam (2) form a compact, basic part of the profile with the cross section of a right triangle.

4. According to the claim 1, the claim 2 or the claim 3, the insulation mounting profile is characterized in that the foam (2) is made of a foamed polypropylene having a cellular structure, it is preferably a linear polymer or a branched polymer or a side-chain polymer or a multi-branched polymer or a star polymer or a ladder polymer or a cross linked polymer or a cyclic polymer or a catetane polymer or a ratexan polymer or a dendrimeric polymer, and a floral sponge, a polystyrene, a styrodur, or a polyurethane having a density from 15 kg/m² to 450 kg/m², a foamed PVC or other plastics, such as ABS, PE, PP, or compressed wood chips or other material connected with polyurethane.

5. According to the claim 1, the claim 2, the claim 3 or the claim 4, the insulation mounting profile is characterized in that, for example, resin (4) is epoxy resin, urine resin or polyurethane resin.

6. According to the claim 1, the claim 2, the claim 3, the claim 4 or the claim 5, the insulation mounting profile is characterized in that the layer of fiber (5) is glass fiber, carbon fiber or fiber impregnated with resin.

7. According to the claim 1, the claim 2, the claim 3, the claim 4, the claim 5 or the claim 6, the insulation mounting profile is characterized in that the base part of the insulation mounting profile is fixed to the supplementing foam (3), preferably made of one of the materials, from which the adhering foam (2) is made.

8. According to the claim 1, the claim 2, the claim 3, the claim 4, the claim 5, the claim 6 or the claim 7, the insulation mounting profile is characterized in that the profile is equipped with anchors (8).
9. According to the claim 1, the claim 2, the claim 3, the claim 4, the claim 5, the claim 6, the claim 7 or the claim 8, the insulation mounting profile is characterized in that it has slots (6), which are preferably equipped with plugs (7).

10. According to the claim 1, the claim 2, the claim 3, the claim 4, the claim 5, the claim 6, the claim 7, the claim 8 or the claim 9, the insulation mounting profile is characterized in that it is a properly shaped profile forming the sill, i.e. the window sill.

11. According to the claim 9 or the claim 10, the insulation mounting profile is characterized in that plugs (7) have two layers - the outer layer of the plug (7) is a membrane, preferably EPDM or Winflex, while the inner layer is an adhesive, and in addition, optionally the plug (7) protected from adhering with a siliconized paper.

12. The method for manufacturing of the insulation mounting profile is characterized in that it is performed as a result of successively taken steps:
- selected components are collected from containers to the composite, and
- in the component mixing unit is produced a component from which are casted blocks in molds, intended for cutting sill profiles (9), preferably are casted ready profiles, for example, with reinforcing elements placed in them at once, taking the form of angle irons (1), or concentrated elements,
- then, there are cut, or cut off the elements, which are purified of dusts (at the working position, as shown in Fig. 15).
- cut elements are passed through the drawing die (at the working position, as shown in Fig. 16), in which they are coated with resin (4) or its equivalent, and then
- these elements are passed through the drawing die (at the working position, as shown in Fig. 17), in which they are coated with fiber (5), after application of which the hardness of their surface is fixed, wherein placing of both the layer of resin (4) and fiber (5) may take place by any means, i.e., for example, resin (4) is applied to the profile by means of a brush or a roller, by immersing it in resin (4) or spraying, for example, with a gun
- optionally, resin (4) is further tainted in any color.
International application No
PCT/PL2016/000142

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. E06B1/60
ADD. E06B1/70 E06B1/00 E06B3/20 E06B1/02

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)
E06B

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

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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
"E" earlier application or patent but published on or after the international filing date
"L" 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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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"A" document member of the same patent family

Date of the actual completion of the international search
16 February 2017

Date of mailing of the international search report
27/02/2017

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Authorized officer
Blancquaert, Katleen

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