A juncture system for structural insulated panels includes magnesium oxide moldings and/or components made of cementitious materials that are shaped to join structural insulated panels (SIPs) with inorganic faces. The various components employ “standard” shapes to make for a minimum of parts and made of materials for adequate strength. For example, connecting shapes are made of magnesium oxide reinforced with the fiberglass. Thickness of the shapes approximate the same thickness as the outside face used on the magnesium oxide SIP, thus simplifying construction.
1. I's I

2. CHANNELS □

3. ANGLES ▼

4. ZEES ▼

5. WEDGES △

FIG. 11
STRUCTURAL INSULATED PANEL SYSTEM INCLUDING JUNCTURES

[0001] This application claims benefit under 35 U.S.C. §119(e) of a provisional application Ser. No. 61/057,236, filed May 30, 2008, entitled MAGNESIUM OXIDE SIP PANEL JUNCTURES, the entire contents of which are incorporated herein in their entirety.

BACKGROUND

[0002] The present invention relates to building structures incorporating magnesium oxide structural insulated panels and junctures for same.

[0003] Magnesium oxide and (non-wood) cementitious faced structural insulated panels (SIPs) are in demand in areas where termites and rot are common. However, the current approach to making these panels with plastic foam core is to use dimensional lumber (sometimes treated) for junctures, plates and blocking. A problem is that the use of wood in a product that is rot and termite resistant like magnesium oxide and fiber reinforced cement does not make sense and defeats the purpose, since wood is basically not a rot and termite resistant material that is going to last as long as magnesium oxide and cement. Yet this practice continues.

SUMMARY OF THE PRESENT INVENTION

[0004] In one aspect of the present invention, a juncture system for joining structural insulated panels includes a plurality of connecting junctures including molded reinforced cementitious material shapes configured to connect adjacent-vertically positioned ones of the structural insulated panels.

[0005] In another aspect of the present invention, a building construction includes a plurality of structural insulated panels arranged adjacently to form joints, and a plurality of connecting junctures including molded shapes made of cementitious material and connecting adjacently-positioned ones of the structural insulated panels at the joints.

[0006] The present invention includes the use of magnesium oxide for components of the juncture system, the material being well adapted to join structural insulated panels (i.e., “SIP panels”) with inorganic faces. Also, a minimum of “standard” shapes are used to make for a minimum of parts in the system.

[0007] In one form, connecting shapes are made of magnesium oxide reinforced with the fiberglass, with the material strength allowing a thickness of the shapes to approximately the same thickness as the outside face used on the magnesium oxide SIP. It is contemplated that other cementitious materials may be substituted for the magnesium oxide shapes, though it is noted that some of these shapes may have flanges that are much thinner than the outer sheet on the SIP panels, thus potentially complicating construction and assembly.

[0008] These and other aspects, objects, and features of the present invention will be understood and appreciated by those skilled in the art upon studying the following specification, claims, and appended drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0009] FIGS. 1 and 2 show an SIP panel with facing components made of magnesium oxide and fiberglass reinforcement.

[0010] FIGS. 3-9 show versions of various junctures including connecting shape joining adjacent SIP panels like FIG. 1.

[0011] FIGS. 10A-10J, and FIG. 11 show various connectors for junctures.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0012] The present concept includes the use of magnesium oxide (or other cementitious material) and fiberglass reinforcement for the juncture system that joins the SIP panels with inorganic faces. “Standard” shapes are used to make for a minimum of parts. Connecting shapes (also called “connecting junctures”) are made of magnesium oxide that is reinforced with the fiberglass for optimal strength, with a thickness of the shape being approximately the same thickness as the outside face used on the magnesium oxide SIP. It is contemplated that other cementitious materials may be substituted for the magnesium oxide shapes except the shapes may have thinner flanges, which can complicate construction. It is also contemplated that the reinforcement can be materials other than fiberglass, including metal, virgin plastic, plastic composite, recycled plastic, and/or recycled carpet.

[0013] Typical thickness for the magnesium oxide panel and connecting shape might be 8 mm (0.314 inches) and if the shape were to be of material much stronger, it would probably be less thick such as about 18 gauge (0.048 inches) thick.

[0014] The shapes provided will be a series of different shapes and sizes, such as:

[0015] T’S

[0016] CHANNELS

[0017] ANGLES

[0018] Z’S

[0019] WEDGES

[0020] Shapes for typical SIP construction are rectangular, while organic faces are a variety of different materials.

[0021] A first issue in determining how to make an acceptable SIP panel is to determine the appropriate thickness. The thickness is determined by strength requirements of the structure and fire code. For structure, a 12 mm thick magnesium oxide panel is stronger than a 7/16″ OSB (oriented strand board), and 7/6″ OSB is stronger than stick construction (i.e. building constructs using 2×4 and 2×6 wood studs and boards). It is appropriate to use thinner gauge to avoid “overkill” and the associated “wasted extra cost.” Generally, 6, 8, or 10 mm magnesium oxide panel will work if they both have the same amount of fiberglass as in the 12 mm magnesium oxide panels.

[0022] Junctures and materials are particularly important for meeting fire codes. Specifically, part of the fire test, especially in the use of SIP panels, is what type of junctures and materials are appropriate and produce optimal results. Customers who want magnesium oxide board SIPs probably do not want dimensional lumber for junctures for the reasons noted above in the background discussion. The present components “re-invent” the junctures of “stick-like” constructions with rot and insect resistant materials. Exemplary components include molded magnesium oxide shapes having a same thickness and reinforcement as at the panel faces. Alter-
natively, they can be made of cementitious material and/or with other reinforced material, preferably at a thickness of at least about 18 gauge.

FIGS. 1 and 2 show an SIP panel 20 with foam interior core 21 and facing components 22 made of magnesium oxide and fiberglass reinforcement. The core 21 includes grooves 23 along edges, the grooves 23 being under edges of the reinforced magnesium oxide facing components 22.

FIGS. 3-9 show various junctures including connecting shape joining adjacent SIP panels like FIG. 1, where the connecting shapes include a flange(s) fitting into the grooves 23 to add strength and fire resistance to the juncture. Specifically, FIG. 3 illustrates spline connector shapes 25 that fit into coplanar grooves 23 of in-line adjacent SIP panels 20. Screws or fasteners 26 are used to secure the juncture. Field-applied expanded foam 27 is used to fill any void between cores 21, and field-applied mastic 28 is used to fill any void between the spline connecting shape 25 and facing components 22. FIG. 4 shows a U-shaped connecting shape 30 fitted into grooves 23 in an end of a SIP panel 20. The assembly is abutting against sealant 31 on a flat upper surface 32 of a foundation 33. An anchoring bolt 34 extends from the foundation 33 up through the connecting shape 30. Notably, the U-shaped connecting shape 30 is first bolted to the foundation 33, and sealant 31 and mastic 28 applied, and then the SIP panel 20 is placed.

FIG. 5 shows a corner formed by SIP panels 20, with a U-shaped connecting shape 30 in each SIP panel 20, and with a corner angle connecting shape 40 used to secure the juncture. Various screws 26 and 41 are used, along with a long screw 42 that extends through one of the SIP panels 20 and into the U-shaped connecting shape 30 on the other SIP panel 20.

FIG. 6 shows a roof SIP panel 20 jointed to a vertical wall SIP panel 20. The wall SIP panel 20 includes a U-shaped connecting shape 30 and top-mounted wedge shaped connecting shape 45. Side-facing beads of mastic 28 join the U-shaped connecting shape 30 to the wall SIP panel 20, and top-facing beads of mastic 28 join the wedge-shaped connecting shape 45 to the U-shaped connecting shape 30 along with an angled short screw 46. A long screw 47 extends at an angle through the roof SIP panel 20 into the wedge-shaped connecting shape 45 and to the U-shaped connecting shape 30.

FIG. 7 shows coplanar wall SIP panels 20 spaced apart for receiving a floor joist 50, and FIG. 8 shows the wall SIP panels 20 with the floor joist 50 in place. Specifically, the wall SIP panels 20 each include a U-shaped connecting shape 30, with mastic 28 and screws 26 and 41 for retention. The bottom wall SIP panel 20 includes a top plate 51 on which an end of the joint 50 sets. Angled screws or nails 52 extend through a portion of the joint 50, the top plate 51, and into the U-shaped connecting shape 30. An outer cap board 53 covers an outer end of the floor joist 50, and an outer face component 54 is attached to an outer surface of the cap board 53. A Z-shaped connecting shape 55 includes a center flange resting on a top of the floor joist 50, and outer down flange 56 forming a drip surface for the joint, and an inner up flange 57 for setting an inside position of the upper wall SIP panel 20. Sub-floor panels 58 are secured to a top of the floor joists 50. A screw 41 attaches the top U-shaped connecting shape 30 to a top of the top U-shaped connecting shape 30 prior to attachment of the top wall SIP panel 20. FIG. 9 shows a similar arrangement of top and bottom wall SIP panels 20, each having a U-shaped connecting shape 30 but also each including a Z-shaped connecting shape 55. An intermediate wall SIP panel (not shown in FIG. 9) would be positioned in the gap between the two illustrated SIP panels 20.

FIG. 10 shows various connectors for junctures. In particular, there are shown a spline connector shape 25, wedge connector shape 45, and two different width U-shaped connecting shapes 30 and 30'. The illustrated connecting shapes also include an offset in-line connector shape 60 for connecting wall SIP panels 20 positioned in parallel but offset longitudinally, two different corner connecting shapes 40 and 40', and two different Z-shaped connecting shapes 55 and 55'. The edge detail of a SIP panel 20 includes grooves 23 forming a groove width of about 1” by 2½ inch deep. It is contemplated that most circumstances can be handled by a juncture system that includes five shapes, as are illustrated in FIG. 11. These shapes include “I” shapes, C channel shapes, “L” shapes, “Z” shapes, and wedge shapes.

It is to be understood that variations and modifications can be made on the aforementioned structure without departing from the concepts of the present invention, and further it is to be understood that such concepts are intended to be covered by the following claims unless these claims by their language expressly state otherwise.

The embodiment of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A juncture system for joining structural insulated panels comprising:
   a plurality of connecting junctures including molded reinforced cementitious material shapes configured to connect adjacent-positioned ones of the structural insulated panels.
2. The juncture system defined in claim 1, wherein the cementitious material includes magnesium oxide.
3. The juncture system defined in claim 1, wherein the cementitious material includes fiberglass reinforcement.
4. The juncture system defined in claim 1, wherein the cementitious material includes fiberglass reinforcement.
5. The juncture system defined in claim 1, wherein the shapes include at least one of an “I” shape, “U” shape, “L” shape, and “Z” shape.
6. The juncture system defined in claim 5, wherein the shapes include at least two of an “I” shape, “U” shape, “L” shape, and “Z” shape.
7. The juncture system defined in claim 6, wherein the shapes include each of an “I” shape, “U” shape, “L” shape, and “Z” shape.
8. The juncture system defined in claim 1, wherein the structural insulated panels have face components, and wherein the shapes have flanges with about the same thickness as the face components.
9. The juncture system defined in claim 1, wherein at least one of the connecting junctures includes an “I” shape that interconnects two panels at edges thereof in a lineal direction.
10. The juncture system defined in claim 1, wherein at least one of the connecting junctures includes an angled recess adapted to receive and interconnect two adjacent structural insulated panels at an angle to form a corner.
11. The juncture system defined in claim 1, wherein at least one of the connecting junctures includes a “Z” shape that can be used to horizontally to connect two adjacent panels and also act as a flashing for water.
12. The juncture system defined in claim 1, wherein the connecting junctures include different specific junctures,
with at least a first juncture being used to form a corner on adjacent walls, and a second juncture to in-line connect panels, and a third juncture used to define an edge trim, and fourth juncture used to form one of a top and bottom plate for walls.

13. The juncture system defined in claim 12, wherein at least some of the junctures include one of stainless steel or galvanized steel to accomplish durability.

14. The juncture system defined in claim 1, wherein at least some of the junctures include at least one of virgin plastic, plastic composite, recycled material, and recycled carpet.

15. A building construction comprising:

a plurality of structural insulated panels arranged adjacently to form joints; and

a plurality of connecting junctures including molded shapes made of cementitious material and connecting adjacently-positioned ones of the structural insulated panels at the joints.

16. The building construction defined in claim 15, wherein the cementitious material includes fiberglass reinforcement.

17. The building construction defined in claim 15, wherein the cementitious material includes magnesium oxide.

18. The building construction defined in claim 15, wherein the shapes include at least two of: “I” shape, “U” shape, “L” shape, and “Z” shape.

19. The building construction defined in claim 18, wherein the shapes include at least three of: “I” shape, “U” shape, “L” shape, and “Z” shape.

20. The building construction defined in claim 18, wherein the structural insulated panels have face components, and wherein the shapes have flanges with about a same thickness as the face components.

21. The building construction defined in claim 15, wherein at least one of the connecting junctures includes an “I” shape defining opposing recesses adapted to receive and interconnect two of the structural insulated panels at edges thereof in a lineal direction.

22. The building construction defined in claim 15, wherein at least one of the connecting junctures includes an angled recess adapted to receive and interconnect two adjacent structural insulated panels at an angle to form a corner.

23. The building construction defined in claim 15, wherein at least one of the connecting junctures includes a “Z” shape that can used to horizontally to connect two adjacent panels and also act as a flashing for water.

24. The building construction defined in claim 15, wherein the connecting junctures include different specific junctures, with at least a first juncture being used to form a corner on adjacent walls, and a second juncture used to connect in-line panels, and a third juncture used to define an edge trim, and a fourth juncture used to form one of a top and bottom plate for walls.

25. The building construction defined in claim 15, wherein at least some of the junctures include at least one of virgin plastic, plastic composite, recycled material, and recycled carpet.

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